



**Hewlett Packard**  
Enterprise

# HPE Network Automation Software

Software Version: 10.21  
Windows® and Linux® operating systems

## User Guide

Document Release Date: November 2016  
Software Release Date: November 2016

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# Chapter 1: Getting Started

**Note:** This document is updated as new information becomes available. To check for recent updates, or to verify that you are using the most recent edition of a document, go to:

**<https://softwaresupport.hpe.com>**

For more information, see "[Documentation Updates](#)" on page 2.

As networks continue to expand, network topologies continue to increase in complexity. In addition, many networks must now comply with regulations and security best practices. This results in a complex infrastructure with multiple protocols, technologies, and vendors to support.

Centrally managing the network infrastructure in a secure, automated, and centralized fashion becomes vital for the effects of performance — from additional security vulnerabilities to a complete outage — all of which can cause increased liability, lost revenues, and lost productivity.

HPE Network Automation (NA) provides an enterprise class solution that tracks and regulates configuration and software changes across routers, switches, firewalls, load balancers, and wireless access points. NA provides visibility into network changes, enabling an IT staff to identify and correct trends that could lead to problems, while mitigating compliance issues, security hazards, and disaster recovery risks. NA also captures full audit trail information about each device change.

Network engineers can use NA to pinpoint the following:

- Which device configuration changed
- What exactly was changed in the configuration
- Who made the change
- Why the change was made

In addition, NA can enforce security and regulatory policies at the network level by making sure that configurations comply with predefined standards. The end result is a resilient and maintainable network that is compliant with standards and regulations.

NA supports an array of devices from leading vendors, including HPE, Cisco, Nortel, F5 Networks, and Extreme, to provide insights into your network change process. NA's scalable architecture enables you to incorporate the best devices from the best vendors, and support all your devices using one tool.

For information about installing or upgrading NA, see the *NA Installation and Upgrade Guide*.

For information about new features in this version of NA, see the *NA Release Notes*.

## NA Home Page

The NA Home page is generally the first page that appears after you log on to NA. You can also return to the NA Home page by clicking the **Network Automation** link in the upper left-hand corner of each page.

Immediately after you log on to the NA console, a banner at the top of the page displays the time that you last logged on and the number of failed log-on attempts for your user name. This information includes connections to the NA Telnet or SSH proxy sessions initiated from the NA console.

The Search options on the menu bar enable you to find devices by Hostname or IP address and connect to them via Telnet or SSH. For more information, see ["Search/Connect Function" on page 243](#).

Use this information to track whether someone else might be using your NA user name.

The NA Home Page includes two frames. The left-hand frame includes:

- Current Device Group (Inventory is the default)
- My Favorites
- My Settings — The My Settings area includes the following sections:
  - My Profile
  - My Workspace
  - My Preferences
  - My Permissions
  - Change Password
  - Quick Launch

For more information about configuring the options in the My Workspace area, see ["Editing User Settings" on page 234](#).

The right-hand frame can be customized to include a snapshot of recent configuration changes in the past 24 hours, various system events, and tasks requiring your approval. For more information, see ["Customizing the NA Home Page" on page 240](#).

## Help Menu Options

The following options are available from the Help drop-down menu:

- Documentation — Opens the HPE Network Automation Documentation page. Note that context-sensitive online Help information is available from the Help link on each NA page.
- Support — Opens the HPE Customer Support page. This site provides HPE customers with the most recent patch releases and documentation. In addition, you can upload files for issue resolution and troubleshooting.
- HPE Live Network — Opens the HPE Live Network page, where you can download Security Alert Service data and other NA Content Service material. HPE Live Network is a complementary content delivery service that is integrated into HPE Network Automation and can deliver periodic network security and compliance content updates.

In addition, the HPE Live Network portal hosts:

- Driver packs
- The specialized NDS driver development forum
- The general NA community forum

The HPE Live Network security and compliance service enables immediate assessment of network security and policy violations, as well as automated remediation options. HPE Live Network includes

valuable free content as well as subscription services. For more information, see ["Software Vulnerability Report" on page 602](#).

**Note:** For information about installing the HPE Live Network Service, see the *NA Installation and Upgrade Guide*.

- About Network Automation — Opens the About Network Automation page, where you can view information about HPE Network Automation. For more information about the About Network Automation page, see ["Viewing the Latest Software Version" on page 21](#).

## Search the Help Topics

### To search for specific information across all help topics

1. In the navigation pane of the Help window, click the **Search** tab.
2. Type in a search string (see [table](#)).
3. Click the **Search** button. The order of the resulting list of topics is based on a ranking order, with highest ranking topics at the top of the list.

### Search Variables

Description	Variable	Example
Search for one or more words. When you enter a group of words into the search field, "or" is inferred.		device interface
Search for a phrase.	" " (wrap a text string in quotes)	"navigation pane"
Search for "either of" or "any of" specific strings.	OR (case insensitive)   (pipe symbol)	device OR interface OR address "IP address" "MAC address"
Search for two or more specific strings.	AND (case insensitive) + (plus symbol) & (ampersand)	device AND interface AND address "device name"+address "device name"&"interface"
Search for all topics that do not contain something.	NOT (case insensitive) ! (exclamation mark)	NOT device ! device
Search for all topics that contain one string and do not contain another.	^ (carat symbol)	device ^ interface


## Search Variables , continued

Description	Variable	Example
Combinations of the above.	( ) parenthesis	interface and (address or status) device or VLAN (address)

**Note:** Results returned are case insensitive. However, results ranking takes case into account and assigns higher scores to case matches. Therefore, a search for "templates" followed by a search for "Templates" would return the same number of help topics, but the order in which the topics are listed would be different.

## Opening a Command Window

To open a command window, do the following:

1. On the top right of the NA Home page (or any page), move the pointer over the **Connect** button ().
2. Enter a device IP address or hostname.
3. Click the **Connect** button

You can also open a command window from the Device Details page using the Connect menu. Within the command window, you can select the text that you want to copy and press the Return key. The highlighted text is placed into a copy buffer. You can then paste it into another application. Enter `exit` and close the window when you are finished.

**Note:** If you use the Telnet/SSH Proxy to connect directly to devices, you remain in the Telnet/SSH Proxy when you exit the device. Unless you enter `exit` again, you can enter CLI commands and connect to other devices.

To view Help for CLI commands, enter: `help` to see a list of all commands. Enter `help <command name>` to see detailed help on a specific command.

## Accessing Documentation

The core NA Documentation Set includes:

- *NA User Guide*— To view the PDF version, after logging in, from the Help drop-down menu, click Documentation. The HPE Network Automation Documentation page opens. Select *HPE Network Automation User Guide* from the list.
- NA Help Files — To view the online Help files, after logging in, click the Help link at the top of any NA page.

- *NA Installation and Upgrade Guide* — To view the PDF version, after logging in, from the Help drop-down menu, click Documentation. The HPE Network Automation Documentation page opens. Select *HPE Network Automation Installation and Upgrade Guide* from the list.
- *NA Release Notes* — To view the PDF version, after logging in, from the Help drop-down menu, click Documentation. The HPE Network Automation Documentation page opens. Select *HPE Network Automation Release Notes* from the list.

If you are interested in additional NA publications, including the documentation listed below, please navigate to the NA Support site:

- *NA Multimaster Distributed System on Oracle Guide*
- *NA Multimaster Distributed System on SQL Server Guide*
- *NA Horizontal Scalability Guide*
- *NA Satellite Guide*

## Viewing the Latest Software Version

To view the About Network Automation page, from the Help drop-down menu, click About Network Automation. The About Network Automation page opens.

You can view detailed information about the current NA software version. In addition, this page includes the following links:

- Download Driver Update Packages — Displays the HPE Live Network web site.
- View Latest Release Notes — Displays the HPE Passport sign-in page.
- View License Information — For more information, see "[Viewing License Information](#)" below.
- Contact Customer Support — Displays the Software Support Online web site.
- View System Configuration — For more information, see "[Viewing System Configuration Pages](#)" on the [next page](#).

There is also a list of device drivers installed on your system. Refer to the Driver Release Service (DRS) documentation for detailed information on supported devices. The DRS is an automated driver release and delivery system.

## Viewing License Information

The License Information page enables you to determine:

- To whom your product is licensed.
- How many nodes the license includes.
- How many nodes are in use.
- When your license expires.

You can also update your license from this page.

To view the License Information page:

1. From the Help drop-down menu, click About Network Automation. The About Network Automation page opens.
2. Click the View License Information link. The License Information page opens.

Fields	Description/Action
Product	Displays the software version you are licensed to use.
Feature	The licensed functionality, which is one of the following:  Premium—All NA functionality is permitted <i>except</i> for policy compliance related features (items on the <b>Policies</b> menu).  Ultimate—All NA functionality is permitted.
Licensed to	Displays the name of your company or division.
Number of nodes licensed	Displays the number of nodes the software is allowed to recognize. Keep in mind that some devices, such as the Cisco 6500, contain cards that operate as separate nodes.
Number of nodes in use	Displays the number of nodes activated in NA.
License expiration	Displays when your software license expires.
Update License button	When it is time to update your software license, HPE sends you new license text. Paste the text into the box, then click Update License to install the new license.

## Viewing System Configuration Pages

If the Distributed System is enabled and you have configured NA Cores, the View System Configuration page enables you to determine:

- How many NA Cores are configured
- How many Partitions are configured

For information about Overlapping IP Networks and Restricted Device and User Views, see "[Segmenting Devices and Users](#)" on page 142. For information about installing and configuring a **Multimaster**<sup>1</sup> Distributed System, see the *NA Multimaster Distributed System on Oracle Guide* or the *NA Multimaster Distributed System on SQL Server Guide*.

<sup>1</sup>A system with more than one database, where each database contains a complete set of all data.

# Chapter 2: Configuring Administrative Settings

As the System Administrator, you can define values for configurable settings that affect HPE Network Automation (NA) operation. These settings receive initial values during installation, but you can change the values to customize features. For example, you can change the default values for intervals associated with various operations, or configure support for scripting languages. You can also customize the appearance and content of certain pages.

To review the configuration options and make changes, on the menu bar under Admin, select Administrative Settings. You can select the following options:

- Configuration Management
- Device Access
- Server
- Workflow
- User Interface
- Telnet/SSH
- Reporting
- User Authentication
- Server Monitoring
- NA/NNMi Integration

## Configuration Management

The Configuration Mgmt page enables you to configure:

- Configuration change detection
- User identification
- Startup and running configurations
- ACL parsing and editing
- Configuration policy verification - The HPE Network Automation Software Premium edition license does not include this configuration. It is available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page (**Help > About Network Automation > View License Information** link).
- Pre-task and post-task snapshots
- Diagnostics
- Flash storage space
- Boot Detection
- Custom Service Types

To view the Configuration Mgmt page, on the menu bar under Admin select Administrative Settings and click Configuration Mgmt. The Configuration Mgmt page opens. Be sure to click Save to save your changes.

## Configuration Mgmt Page Fields

Field	Description/Action
<b>Change Detection</b>	
Change Detection	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Enabled — NA takes device configuration snapshots whenever changes are detected (the default).</li> <li>• Polling Only — NA takes device configuration snapshots during device group snapshots, but not when changes are detected.</li> <li>• Disabled — Configuration snapshots are not taken in response to detected changes or during device group snapshots.</li> </ul> <p>For more information about change detection, see <a href="#">"Change Detection" on page 30</a>.</p>
Change Detection Interval	<p>Enter the delay interval between detection of a change and the snapshot. The default is 10 minutes. When NA detects a change, the device snapshot is delayed for the interval specified here. The subsequent snapshot reflects all change notifications sent during the interval.</p>
Syslog Detection Patterns	<p>If you want to add a pattern to the default patterns supplied by NA, enter a pattern in the right-hand box and click Add Pattern &lt;&lt;. You can select a pattern from the left-hand box and click Delete Pattern to delete a pattern. NA looks in the Syslog server for matches to these patterns. When NA finds a match, it indicates a configuration change and takes a snapshot of the device configuration, if enabled above.</p> <div style="background-color: #e0e0e0; padding: 10px; margin: 10px 0;"> <p><b>Note:</b> HPE provides a Syslog server. If you kept your current Syslog server when you installed NA, you still must install the NA Syslog server and relay Syslog messages to the NA Syslog server.</p> </div> <p>For more information about Syslog message patterns, see <a href="#">"Syslog Messages" on page 31</a>.</p>
Syslog Patterns to Ignore	<p>If you want to ignore a pattern, enter a pattern in the right-hand box and click Add Pattern &lt;&lt;. You can select a pattern from the left-hand box and click Delete Pattern to delete a pattern.</p>
Secondary IP Types	<p>Select a Secondary IP type. Primary and Alternate are selected by default. Secondary IP types are used for change detection Syslog event handling for secondary IP addresses. Note that not all secondary IP addresses are included in Syslog event handling. You can select from the following options:</p> <ul style="list-style-type: none"> <li>• Primary</li> <li>• Alternate</li> <li>• Console</li> </ul>



Field	Description/Action
	<ul style="list-style-type: none"> <li>• Hop Box</li> <li>• NAT</li> <li>• Connect Through</li> <li>• Internal Through</li> <li>• Internal Direct</li> </ul> <p>For more information about managing IP addresses, see "<a href="#">Device Managed IP Addresses Page Fields</a>" on page 209.</p>
Use IP Address of sender of Syslog Messages	If checked, the IP address of the Syslog messages sender is used.
Users to Ignore for Change Detection	Indicate the users to ignore when processing Syslog or AAA change events. To add a user, enter the user name in the right-hand box and click Add Username <<. To delete a user select the username in the left-hand box and click Delete Username.
Change Detection Task Priority	<p>The priority of the snapshot tasks that NA creates in response to a syslog message.</p> <p>The highest possible priority is 3, which is the default setting. The lowest possible priority is 5.</p>
<b>Change User Identification</b>	
Auto-Create Users	If checked, NA creates a new user if it does not recognize the author of a configuration change.
Auto-Create User Suffix	Enter the suffix that NA appends to new users per the Auto-Create feature. The default is "_auto".
Syslog User Identification	If checked, NA tries to identify users from Syslog messages.
Syslog User Patterns	<p>The Syslog User Patterns are Java regular expressions. You add a capturing group to indicate where the username is in the regular expression, for example:</p> <ul style="list-style-type: none"> <li>• User (\S+) authenticated</li> <li>• session opened for user (\S+)</li> <li>• Login successful for user (\S+) on</li> </ul> <p>NA uses these patterns to determine which user is responsible for a configuration change.</p> <p>Enter a pattern in the right-hand box and click Add Pattern &lt;&lt;. You can select a pattern in the left-hand box and then click Delete Pattern to delete the pattern. NA looks in the Syslog for matches to these regular expressions. When NA finds a match, it captures the text as a user. Normally, the device drivers populate these patterns.</p>
Resolve Workstation IP Address from	If checked, NA resolves the IP address from the Syslog message and treats the domain name as the username responsible for the related configuration change. This method is used only if the username cannot be determined in other ways from the Syslog

Field	Description/Action
Syslog	message.
Store Unresolved IP Addresses	If checked, when a host name using DNS cannot be resolved, NA treats the IP address as a username. Periods are replaced by dashes. For example, 10.10.1.1 becomes user 10-10-1-1.
Auto-Create Users from Syslog	If this option and Auto-Create Users are checked, NA attempts to match users identified from Syslog messages to existing users. When there is no existing user, a new user is created.
<b>Startup/Running Configurations</b>	
Capture Startup Config	Select one of the following options: <ul style="list-style-type: none"> <li>• Off — NA does not capture each startup configuration.</li> <li>• Detect Only — NA captures each startup configuration and compares it to the running configuration, but does not store the startup configuration.</li> <li>• On (the default) — NA captures each startup configuration, compares it to the running configuration, and stores the startup configuration. Keep in mind that not all vendors and devices support the concept of a startup configuration.</li> </ul>
<b>ACL Parsing</b>	
Parse ACL Data with each Snapshot	Select one of the following options: <ul style="list-style-type: none"> <li>• Enabled — NA parses and stores ACL data with each snapshot.</li> <li>• Disabled — NA does not parse ACL data with each snapshot.</li> </ul> <p>Keep in mind that this option only sets the default state of this feature when adding new devices. You can use batch editing to turn on and off ACL parsing for groups of devices.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> This option can be overridden on a device-by-device basis.</p> </div>
<b>ACL Editing</b>	
Show pre-edit application script	If checked, the script for pre-processing ACL applications is displayed when editing or creating ACLs. The pre-application script negates the existing applications of an ACL on the device. The new or updated ACL script adds the edited ACL to the device.
Show edit preparation script	If checked, the edit preparation script is displayed when editing or creating ACLs. The edit preparation script performs any necessary scripting to prepare the device to accept the edited ACL.
Show application script	If checked, the ACL application script is displayed when editing or creating ACLs. The application script is the piece of scripting used to apply an ACL, for example to a VTY connection. The application script re-applies the ACL.
<b>Configuration Policy Verification</b>	
Verify Before Deploy by	If checked, NA checks edited configurations against defined configuration policies before deployment.

Field	Description/Action
Default	
Pattern Timeout	Enter the maximum number of seconds a pattern can take to match a configuration. The default is 30 seconds.
Run Auto-remediation Script	If checked, controls whether auto-remediation scripts should be allowed to run automatically after a rule is found non-compliant. For information about auto-remediation scripts, see <a href="#">"Creating Auto-remediation Scripts" on page 564</a> .
Show Policy compliance success result summary	If checked, displays the details of the data that complies with the selected configuration policy and rule.
Automatically apply imported policies to the Inventory group	If checked, all imported policies are applied to the Inventory group.
<b>Pre-Task and Post-Task Snapshots</b>	
User Override Pre/Post Task Snapshot	If checked, enables users to override the default pre-task and post-task snapshot settings when running individual tasks. If override is allowed, the pre and post task snapshot options are displayed on New Task pages, where applicable. If override is not allowed, the default setting is used. (For more information, see <a href="#">"Configuring Pre-Task and Post-Task Snapshots" on page 32</a> .)
Allow Per-Script Pre/Post Task Snapshot Setting Hints	<p>If checked, enables individual scripts to override pre-task and post-task snapshot settings.</p> <div style="background-color: #f0f0f0; padding: 10px; border: 1px solid #ccc;"> <p><b>Note:</b> To override the pre-task snapshot setting, include a comment in the script with the text "tc_pre_snapshot=true" to request a pre-task snapshot or "tc_pre_snapshot=false" to request no pre-task snapshot. To override the post-task snapshot setting, include a comment in the script with the text "tc_post_snapshot=true" to request a post-task snapshot as part of the task, "tc_post_snapshot=task" to request a post-task snapshot as a separate task, or "tc_post_snapshot=false" to request no post-task snapshot.</p> </div> <p>For more information, see <a href="#">"Configuring Pre-Task and Post-Task Snapshots" on page 32</a>.</p>
Snapshot Before Run Command Script	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• None (default)</li> <li>• As part of task</li> </ul>
Snapshot After Run Command Script	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (default)</li> <li>• Scheduled as separate task</li> </ul>

Field	Description/Action
Snapshot Before Configuration Deployment	Select one of the following options: <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (default)</li> </ul>
Snapshot After Configuration Deployment	Select one of the following options: <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (default)</li> <li>• Scheduled as separate task</li> </ul>
Snapshot After Provisioning Device	Select one of the following options: <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (default)</li> <li>• Scheduled as separate task</li> </ul>
Snapshot Before Run Diagnostic	Select one of the following options: <ul style="list-style-type: none"> <li>• None (default)</li> <li>• As part of task</li> </ul>
Snapshot After Run Diagnostic	Select one of the following options: <ul style="list-style-type: none"> <li>• None (default)</li> <li>• As part of task</li> <li>• Scheduled as separate task</li> </ul>
Snapshot Before Deploy Change Plan	Select one of the following options: <ul style="list-style-type: none"> <li>• None (default)</li> <li>• As part of task</li> </ul>
Snapshot After Deploy Change Plan	Select one of the following options: <ul style="list-style-type: none"> <li>• None (default)</li> <li>• As part of task</li> <li>• Scheduled as separate task</li> </ul>
Snapshot Before Delete ACL	Select one of the following options: <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (default)</li> </ul>
Snapshot After Delete ACL	Select one of the following options: <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (default)</li> <li>• Scheduled as separate task</li> </ul>
Snapshot After	Select one of the following options:

Field	Description/Action
Synchronize Startup/Running	<ul style="list-style-type: none"> <li>• None (default)</li> <li>• As part of task</li> <li>• Scheduled as separate task</li> </ul>
Post-Task Snapshot Delay	Enter the delay for any post-task snapshots that run as separate snapshot tasks (if any). The default is 30 seconds.
<b>Diagnostics</b>	
Topology Data Gathering Frequency	Topology data is included in a new class of diagnostics that requires throttling to preserve network performance. Topology data is used to render network diagrams. Gathering topology data represents a significant load on the NA server and should be done as infrequently as possible. Enter the minimum amount of time (in hours) allowed between attempts to gather topology data. The default is 168 hours.
Stored Topology Data	Enter the allowable age (in hours) of topology data currently stored in the database. If the stored data is older than this value, data will be retrieved directly from the device. Otherwise the stored data will be used. The default is 72 hours.
Duplex Data Gathering Frequency	Duplex mismatch data is included in a new class of diagnostics that requires throttling to preserve network performance. Duplex mismatch data is used to identify a common end-to-end performance problems. Often times a duplex mismatch occurs when one machine is set at full-duplex and another at half-duplex. Gathering duplex mismatch data represents a significant load on the NA server and should be done as infrequently as possible. Enter the minimum amount of time (in hours) allowed between attempts to gather duplex data. The default is 168 hours.
Stored Duplex Data	Enter the allowable age (in hours) of duplex data currently stored in the database. If the stored data is older than this value, data will be retrieved directly from the device. Otherwise the stored data will be used. The default is 72 hours.
Schedule VLAN Diagnostic	<p>The connection between snapshot tasks and VLAN Data Gathering diagnostics.</p> <ul style="list-style-type: none"> <li>• If any snapshot task that identifies a device configuration change should trigger a VLAN Data Gathering diagnostic, select this check box.</li> <li>• If snapshot tasks should never trigger the VLAN Data Gathering diagnostic, clear this check box.</li> </ul>
Store VLAN Diagnostic Session Log	<p>The VLAN Data Gathering diagnostic session log setting.</p> <ul style="list-style-type: none"> <li>• To store the session logs of VLAN Data Gathering diagnostics scheduled by snapshot tasks, select this check box.</li> </ul> <p><b>Note:</b> This setting requires that the Schedule VLAN Diagnostic option is also selected.</p> <p><b>Note:</b> Storing the session logs can consume significant system resources and disk space.</p>

Field	Description/Action
	<ul style="list-style-type: none"> <li>To discard the session logs of VLAN Data Gathering diagnostics scheduled by snapshot tasks, clear this check box.</li> </ul>
Store Diagnostic Data on Warning	<p>The diagnostic data storage on success sensitivity setting.</p> <ul style="list-style-type: none"> <li>To save all diagnostic data regardless of whether all diagnostic commands succeed, select this check box.</li> <li>To save diagnostic data only when all diagnostic commands in the task are successful, clear this check box.</li> </ul>
Force a save of the latest diagnostics	<p>The diagnostic data storage on run sensitivity setting.</p> <ul style="list-style-type: none"> <li>To save the diagnostic data from all diagnostics, even when the data is the same as from the previous run, select this check box.</li> <li>To save diagnostic data only when the results are different from the stored diagnostic data, clear this check box.</li> </ul>
<b>Flash Storage Space</b>	
Flash Low Event	If checked, an event is generated if the detected available flash storage space is low.
Flash Low Threshold	Enter the percentage of flash storage space that must be filled before a low space event is generated. The default is 90%.
<b>Boot Detection</b>	
Error Margin Factor	Enter how much clock drift (in seconds per six hours) to allow for when detecting device boots. It is recommended that the minimum frequency with which you check your devices be once every six hours.
<b>Custom Service Types</b>	
Custom Service Types	<p>Add or delete user-defined service types here.</p> <p>For more information, see <a href="#">"About Service Types" on page 102</a>.</p>

## Change Detection

NA uses several methods for detecting changes to a device configuration, including:

- Syslog messages
- AAA log reading
- Internal proxy

From these methods, NA uses a number of different inputs to determine who actually made a change on the device. This information provides the most likely user responsible for the change. In order of priority, the following information is used:

- User who scheduled a password change that was run on the device.
- User who scheduled a software update that was run on the device.
- User who deployed a configuration to the device.

- User who ran a script on the device.
- User who connected to the device via NA's proxy.
- User information gathered from AAA logs.
- User information parsed out of a syslog message.

NA assigns a change attribution to a device interaction that is higher in the priority list. For example, if a user schedules a password change while another user had proxied to the device during the same time period, if a change had been detected, that change would be assigned to the user who had scheduled the password change.

To view configuration changes on a device:

1. On the menu bar under Devices, click Inventory. A list of all currently managed devices opens.
2. Click the device for which you want to view configuration changes. The Device Details page opens.
3. From the View drop-down menu, click Configuration Changes.
4. In the Changed By column, click the Details link. The User Attribution Details page opens.

## Syslog Messages

The NA Core Syslog server forwards Syslog messages to the NA Core that match a list of Syslog patterns for the drivers that are in-use on the system. When the Discover Driver task runs, it updates the list of Syslog message patterns to look for, and then instructs the NA Syslog server to update its list of Syslog message patterns.

The NA **Satellite**<sup>1</sup> Syslog server does the same thing. It includes a list of Syslog message patterns for in-use devices and only forwards messages to the NA Core that match one of those patterns. As a result, when you run the Deploy Remote Agent task, the following message is displayed: `Initialized Satellite with N syslog change detection patterns from Core.`

The initial NA Satellite receives the current Syslog message pattern list. Subsequent Discover Driver tasks notify both the NA Core Syslog server and the NA Satellite Syslog servers when new devices are discovered that require new Syslog patterns.

## User Attribution Details Page Fields

Not all configuration changes can be attributed to a "user" and could be marked as N/A.

Field	Description/Action
<b>Change Event Detail</b>	
User	Displays the name of the user who made the change.
Date	Displays the date the change was made.
Device Interaction	Displays the method used to detect the change, for example Syslog.

<sup>1</sup>An NA functionality to manage devices remotely. A satellite consists of a remote gateway and a remote NA agent.

Field	Description/Action
Additional Details	Displays additional details about the change, for example if the change was made from the console.

## Configuring Pre-Task and Post-Task Snapshots

Configuring pre-task and post-task snapshots enables you to:

- Define the pre and post snapshot behavior for various task types
- Run post snapshots as separate tasks
- Override the default pre-task and post-task snapshot behavior when running a specific task

Pre-task and post-task snapshot options can be displayed for the following tasks:

- Deploy Config (see ["Deploying Device Configurations" on page 167](#))
- Run Diagnostics (see ["Run Diagnostics Task Page Fields" on page 291](#))
- Delete ACL (see ["Deleting ACLs" on page 659](#))
- Synchronized Startup and Running (see ["Synchronize Startup and Running Task Page Fields" on page 305](#))
- Run Command Script (see ["Run Command Script Task Page Fields" on page 284](#))
- Deploy Change Plan (see ["Deploy Change Plan Task Page Fields" on page 296](#))
- Batch Insert ACL Line (see ["Batch Inserting ACL Lines" on page 656](#))
- Batch Remove ACL Line (see ["Batch Deleting ACL Lines" on page 657](#))

When providing snapshot hints in command scripts, you can add a special tag to a command script to specify the pre or post task snapshot behavior when running that script. For example, suppose you have an advanced script that does not actually connect to or modify a device. The advanced script simply uses the NA API to extract information about a device and generate a report. In that case, there is no need to take a snapshot after the task is run, so the advanced script could include a tag to indicate that no post snapshot is needed.

Keep in mind that if more than one script is selected to run against a group of devices, and more than one of the scripts contains a hint, the most conservative behavior among those specified is used.

## Device Access

The Device Access page enables you to:

- Designate device connections methods
- Configure Detect Network Devices task settings
- Configure Bastion host settings
- Configure SecurID device access
- Configure SSH device access
- Specify what credentials should be used to access devices on a per-task basis
- Designate Nortel BayRS MIB/OS versions
- Enter Gateway Mesh information



Network environments are often protected by network firewalls. NA provides four methods for accessing devices through firewalls:

- Open up direct access through the firewall.
- Create a Network Address Translation (NAT) on the firewall and configure NA to use the NAT to access the device. Keep in mind that NAT addresses do not appear on the device configuration for the device using the NAT.
- Configure NA to use an existing bastion host on the far side of the firewall to proxy management requests. Since bastion hosts are already allowed access through the firewall, the bastion host configuration enables management of a device through a proxy connectivity of the bastion host.
- Using a Gateway Mesh. (For more information, see the *NA Satellite Guide*.)

Keep in mind that a console server maintains a physical connection to the device using the serial link. These links are provided through Telnet to specific IP port numbers hosted on the console server. Console server connections are available even if the network device is disconnected from the network.

To view the Device Access page, on the menu bar under Admin select Administrative Settings and click Device Access. The Device Access page opens.

## Device Access Page Fields

Field	Description/Action
<b>Device Connection Methods</b>	
Password Selection	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Always try last successful passwords first. — If checked, NA first tries the last successful password from the previous access to the device. If the last successful password changes in the middle of the task, the new last successful password is not guaranteed to be used for the remainder of that task. In addition, the “Last used rule changed” event will continue to be generated. Consequently, you can determine when devices are not using their expected password rule.</li> <li>• Always try passwords in defined order. — If checked, NA always tries passwords in a defined order. Keep in mind that NA keeps track of the most recently used authentication credentials for the next round of communications with a device. This enables you to take advantage of the Device Password Rules, while minimizing the number of connection attempts to each device. For more information, see "<a href="#">Creating Device Password Rules</a>" on page 127.</li> </ul>
Default Connection Methods	<p>The following methods are used to connect to devices. These methods appear checked by default on the New Device page and in the Add Device wizard. Check one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Telnet</li> <li>• SSH</li> <li>• RLogin</li> <li>• SNMP</li> <li>• SCP</li> <li>• FTP</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>TFTP</li> </ul> <p><b>Note:</b> NA has an integrated TFTP server and will generally access a device via SNMP or CLI to set up the transfer to and from this device. For devices that have their own TFTP server, NA acts as a TFTP client. Typically, SCP must be used with the CLI. SCP requires a device be enabled to use SSH. SCP cannot run if the device does not have a SSH server running. NA also provides an integrated FTP server and will generally access a device via the CLI to set up the transfer to and from the device.</p>
Bad Login Attempt Delay	Enter the number of seconds to delay after a bad login attempt to allow the device time to recover. The default is five seconds.
SNMP Timeout	Enter the number of seconds to delay while waiting for a device to operate on a set of SNMP commands (such as loading a configuration). The default is 40 seconds.
Maximum number of Password Attempts	Enter the maximum number of password attempts allowed. Zero (0) represents no limit. Keep in mind that if you have 10 password rules and you enter 3, NA stops after the first three password rules are tried. This setting is useful if your TACACS server locks out usernames after three failed login attempts. You can enter 1 if you want to try only one password rule. This setting is useful if only one password rule works.
Maximum Archived Rules	Enter the maximum number of archived password rules to try. The default is 3. To disable this option, enter 0.
<b>Detect Network Devices Task Settings and Port Scan Task Settings</b>	
Path to Nmap utility	Enter the path to the Nmap utility for scanning network devices. <p><b>Note:</b> Nmap enables you to scan networks to determine which ports are up and the services they offer. To know more, go to <a href="http://www.Insecure.Org">www.Insecure.Org</a>. For information about installing Nmap, see the <i>NA Installation and Upgrade Guide</i>.</p>
Allow Nmap Port Scan	If checked, users with the appropriate permissions can use Nmap to scan network devices. For information about using Nmap, see <a href="#">"Port Scan Page Fields" on page 353</a> .
Nmap Port Scan Option	Displays the default option when using Nmap to scan network devices. Nmap controls how a device scan is performed. By default, NA passes -PO to Nmap that instructs Nmap to work over IP instead of UDP. See the Nmap documentation for a complete list of options. For information about using Nmap, see <a href="#">"Port Scan Page Fields" on page 353</a> .
Max Addresses to Discover Per Task	Enter the maximum number of IP addresses to discover. Be sure to limit Detect Network Devices tasks to the maximum number of addresses (1024 is the default) to scan to reduce network traffic.
Max SNMP Scanner	Enter the maximum number of SNMP scanner threads the Detect Network Devices tasks will spawn during device discovery using the SNMP scanning method. The default is 79.

Field	Description/Action
Threads	<p>Theoretically, the higher the maximum SNMP scanner thread count, the faster the task runs. However, having too many SNMP scanner threads can impact system performance due to CPU overhead and network traffic that each SNMP scanner thread requires.</p> <p><b>Note:</b> When configuring the Detect Network Devices task, you have the option to have the Detect Network Devices task use SNMP to detect devices. As a result, the task will spawn many SNMP scanner threads that communicate to devices via SNMP. For information about other scanning methods, see "<a href="#">Detect Network Devices Task Page Fields</a>" on page 345.</p>
Network Discovery IP or CIDR Range Exclusions	Enter IP addresses or Classless Inter-Domain Routing (CIDR) range exclusions (for example: 192.168.1.0-192.168.2.0 or 192.168.31.0/24) in the right-hand box and click the Add Pattern << button. Ranges are inclusive. To delete patterns, select the patterns from the left-hand box and click the Delete Pattern button.
SNMP Timeout	Enter an SNMP timeout value in milliseconds for each SNMP SysOID probe. The default is 500ms.
<b>Bastion Host Settings</b>	
Use Bastion Host by Default	<p>If checked, new devices use bastion host for Telnet and SSH access.</p> <p><b>Note:</b> Bastion Host settings can be overridden on a device-by-device basis.</p>
Default Bastion Host	Enter the hostname or IP address of the bastion host to use for Telnet and/or SSH access.
Default Bastion Host Username	Enter the username of the bastion host to use for Telnet and/or SSH access.
Default Bastion Host Password	Enter the password of the bastion host to use for Telnet and/or SSH access.
<b>SecurID Device Access</b>	
SecurID License Usage	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Use Unique Tokens Per User — If checked (the default), each device access will use only the seed(s) corresponding to the user that initiated the task or Telnet/SSH proxy connection.</li> <li>• Software Token Pool Username — If checked, a pool of general use software token seeds are provided and used as efficiently as possible for maximum performance. Enter the username for which the pool of SecurID Software Tokens are associated.</li> </ul> <p>Using unique Software Tokens per user requires more tokens, and increases token maintenance. Using Software Tokens from a pool with a common user reduces the</p>

Field	Description/Action
	number of tokens required, and potentially increases task throughput.
Max Software Tokens	Enter the maximum number of Software Token licenses imported to the machine running NA. The default is 1024.
Passcode Lifetime	Enter the lifetime for SecurID token codes. The default is 60 seconds.
<b>FTP and SSH Device Access</b>	
FTP/SSH User	<p>Enter a FTP or SSH user. The FTP or SSH username is used when accessing the FTP or SSH server via a device connection. If this username does not exist in the system FTP or SSH server, it will be created automatically.</p> <div style="background-color: #e0e0e0; padding: 10px; margin-top: 10px;"> <p><b>Note:</b> When using SCP on a Linux platform, you will need to modify your system's SSH daemon (SSHD) to run on an alternate port and restart the SSHD service. Port 8022 is recommended. Keep in mind that the device specific settings must be configured to enable SCP and SSH to function properly. In addition, the device and the device driver must support SCP to use the NA SSH server for SCP.</p> </div>
FTP/SSH Password	Enter a FTP or SSH password. The FTP or SSH password is used when accessing the FTP or SSH server via a device connection.
Enable Public Key Authentication	<p>The specification for using public key-based authentication when connecting from NA to devices over SSH-2.</p> <ul style="list-style-type: none"> <li>• To use public key-based authentication for establishing SSH-2 sessions with devices, select this check box.</li> <li>• To use device password rules for establishing SSH-2 sessions with devices, clear this check box.</li> </ul> <p>For more information, see <a href="#">"Configure Public Key-Based Authentication to Devices" on page 40</a>.</p>
Private Key File Location	<p><i>Optional.</i> The absolute path to the private key file on the NA server.</p> <p>If no file is specified, NA uses its default private key file.</p>
Private Key Passphrase	<i>Optional.</i> The password for accessing the private key file.
<b>Task Credentials</b>	
Allow Standard Device Credentials	<p>Select one or more of the following tasks. By default, all of the tasks are selected.</p> <ul style="list-style-type: none"> <li>• Configure Syslog</li> <li>• Delete ACLs</li> <li>• Deploy Configuration File</li> <li>• Deploy Passwords</li> <li>• Discover Driver</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Reboot Device</li> <li>• Run Command Script</li> <li>• Run Diagnostics</li> <li>• Deploy Change Plan</li> <li>• Run ICMP Test</li> <li>• Synchronize Startup and Running</li> <li>• Take Snapshot</li> <li>• Update Device Software</li> </ul> <p>The above tasks enable users to select standard processing with device-specific passwords and/or network-wide password rules. For information about per-task credentials, see "<a href="#">Per-Task Credentials</a>" on page 41. For information about password rules, see "<a href="#">Device Password Rules Page Fields</a>" on page 128.</p>
Allow Per-Task Device Credentials	<p>Select one or more of the following tasks.</p> <ul style="list-style-type: none"> <li>• Configure Syslog</li> <li>• Delete ACLs</li> <li>• Deploy Configuration File</li> <li>• Discover Driver</li> <li>• Deploy Passwords</li> <li>• Reboot Device</li> <li>• Run Command Script</li> <li>• Run Diagnostics</li> <li>• Deploy Change Plan</li> <li>• Run ICMP Test</li> <li>• Synchronize Startup and Running</li> <li>• Take Snapshot</li> <li>• Update Device Software</li> </ul> <p>If checked, the above tasks will prompt users to enter one-time use device credentials specific to that task. For information about per-task credentials, see "<a href="#">Per-Task Credentials</a>" on page 41.</p>
Allow User AAA Credentials	<p>Select one or more of the following tasks.</p> <ul style="list-style-type: none"> <li>• Configure Syslog</li> <li>• Delete ACLs</li> <li>• Deploy Configuration File</li> <li>• Discover Driver</li> <li>• Deploy Passwords</li> <li>• Reboot Device</li> <li>• Run Command Script</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Run Diagnostics</li> <li>• Deploy Change Plan</li> <li>• Run ICMP Test</li> <li>• Synchronize Startup and Running</li> <li>• Take Snapshot</li> <li>• Update Device Software</li> </ul> <p>If checked, the above tasks enable users to select the task owner's AAA credentials to use when running the task.</p> <p><b>Note:</b> The user must have valid AAA credentials defined.</p> <p>For information about per-task credentials, refer to <a href="#">"Per-Task Credentials" on page 41</a>.</p>
Fallback Admin User	Enter an Admin user whose AAA credentials are used for tasks with unknown users.
Enable Password Option	<p>For AAA authentication, which passwords should be tried to enter enable mode on a device. Available options are:</p> <ul style="list-style-type: none"> <li>• Try user's password for enable, then fall back to rule's defined enable password</li> <li>• Try rule's defined enable password, then fall back to trying user's password for enable</li> <li>• Try only user's password for enable</li> <li>• Use only rule's defined enable password</li> </ul>
<b>Nortel Discovery</b>	
Nortel BayRS MIB/OS Versions	Displays a list of additional BayRS MIB versions/revisions that will discover the BayRS driver. Use <MIB Version>/<Revision> sequences separated by vertical bars, for example: 14.00/1D12 14.20/).
<b>Gateway Mesh</b>	
Local Gateway Host	Enter the hostname or IP address and port of the Gateway system that is in the same Realm as the NA Core (for example: gw-v1an10:3001). For information about the Gateway Mesh, refer to <a href="#">"Overlapping IP Networks" on page 144</a> .
Local Gateway Proxy Port	Enter the port name of the Gateway system that is in the same Realm as the NA Core (for example: gw-v1an10:3001). The default is 3002. For information about the Gateway Mesh, see <a href="#">"Overlapping IP Networks" on page 144</a> .
Local Gateway Admin Port	Enter the Admin port number for the Gateway in the local Realm. This is used to fetch the Realm names from the Gateway Mesh. The default is 9090.
Local Core IP	Enter the IP address of the local NA Core. This is used to fetch the Gateway logs.
Gateway Admin Private	Enter the file name of the private key for the Gateway needed to connect to the Admin port. This can be an absolute path or a relative path. A relative path is relative to the root of

Field	Description/Action
Key Filename	<p>the NA install tree, typically <code>C:\NA</code>. Keep in mind that the private key for the Gateway is created when the Gateway is installed.</p> <p>When using a NA Standalone Gateway, the private key filename is <code>opswgw-mngt-server.pkcs8</code>. This file must be copied from the <code>saOPSWgw*/certificates</code> directory where the NA Gateway was installed. This file should be copied to the root of the NA installation, typically <code>C:\&lt;NA_HOME&gt;</code>. If you are integrating NA with HPE SA, NA uses the HPE SA Gateway Mesh. In this case, copy the <code>spog.pkcs</code> file from the HPE SA host to the root of the NA installation, typically <code>C:\&lt;NA_HOME&gt;</code>. Be sure to change the filename in the Admin Settings to <code>spog.pkcs8</code>.</p> <div style="background-color: #e0e0e0; padding: 10px; border: 1px solid #ccc;"> <p><b>Note:</b> The <code>.pkcs8</code> file is a PKCK#8 format file containing a private key used in a public key encryption scheme. To secure the Gateway Mesh, the private key must be used to administer the Gateway Mesh. NA uses the Gateway Mesh administration function to list the Realm names supported by the Gateway Mesh.</p> </div> <p>To test the Gateway Admin settings, open the New Device page and scroll down to the Connection Information section to see that there is a Realm name list.</p>
Gateway Mesh Delay	Enter the number of seconds of latency to reach remote Realms through the Gateway Mesh. The default is five seconds. This number is added to the time-outs used when communicating with remote devices.
<b>Reboot Default Settings</b>	
Determine Device Reachability	The default setting of the <b>Check device reachability after reboot</b> check box on the Reboot Device task page. This setting also determines whether NA performs the device reboot verification process for each rebooted device from the Update Device Software task. For more information, see " <a href="#">Device Reboot Verification Process</a> " on page 278.
Default Estimated Reboot Time	The default value of the Estimated Reboot Time field on the Reboot Device and Update Device Software task pages. This value should be the maximum expected reboot time of all devices managed by NA. Specify a time in seconds.
Disable Reboot Device Option	<p>The reboot control for the Update Device Software task page.</p> <ul style="list-style-type: none"> <li>• If NA users should never select the <b>Reboot device after deploying</b> check box on the Update Device Software task page, select the <b>Users cannot enable device reboot with software deployment</b> check box.</li> <li>• If company policy permits NA users to select the <b>Reboot device after deploying</b> check box on the Update Device Software task page, clear the <b>Users cannot enable device reboot with software deployment</b> check box.</li> </ul>

Be sure to click Save to save your changes.

# Configure Public Key-Based Authentication to Devices

NA supports using a public key-private key pair for authenticating NA to a device when connecting over SSH-2. With public key-based authentication, a device uses a stored copy of the NA public key to verify the authenticity of the private key that NA sends in the connection request.

NA ships with a default public key-private key pair.

## To implement public key-based authentication to devices

1. Install a copy of the NA public key on each device to which NA will connect over SSH.
  - When using the NA-provided keys, install the following public key as a single line:  
AAAAB3NzaC1yc2EAAAADAQABAAQgQDD62k3h03zp6Yv5zCfM+LRjE+nTLXaeZgb9NojNLXo18QoACRoALPRLXGGapIqKf0LdbWkKQEDs21xsdSy4EHap02JWM9f/+mM26z1Bo46e1A50xpvAPNWtnHaLmPbPdp7ar7rJ7g2eX+0+W6SxUGTAETvo2Iwz1N/hS8KPLgr3w==
  - When using custom keys, install the custom NA public key.
2. *Optional.* Place the custom NA private key file (\*.pem) in a limited access directory on the NA server.

**Note:** When using the NA-provided keys, this step is not needed.

3. Configure NA to use the private key file for SSH-2 connections to devices.
  - a. On the Administrative Settings - Device Access page (**Admin > Administrative Settings > Device Access**), under FTP and SSH Device Access, enable the use of the NA public key by selecting the check box for the **Enable Public Key Authentication** field.
  - b. To use a custom key, enter the complete path to the custom NA private key file (\*.pem) in the **Private Key File Location** box.
  - c. If the custom key requires a password, enter that password in the **Private Key Password** box.
  - d. Click **Save**.
4. Configure NA to use SSH-2 for connecting to devices. For each device that stores the NA public key, do the following:
  - a. Navigate to the device page.
  - b. From the device page, open the Edit Device page (**Edit > Edit Device**).
  - c. Under Connection Information, select the **SSH** check box, and then select the **SSH2 Only** option.
  - d. Click **Save**.

## Example command script for installing the NA public key on a Cisco IOS 15 device with user name Manager

```
conf t
ip ssh pubkey-chain
username Manager
key-string
AAAAB3NzaC1yc2EAAAADAQABAAQgQDD62k3h03zp6Yv5zCfM+LRjE+nTLXaeZgb9NojNLXo18QoACRoALPRLXGG
apIqKf0LdbWkKQEDs21xsdSy4EHap02JWM9f/+mM26z1Bo46e1A50xpvAPNWtnHaLmPbPdp7ar7rJ7g2eX+0+W6S
xUGTAETvo2Iwz1N/hS8KPLgr3w==
exit
exit
```



```
exit  
exit
```

**Note:** Enter the key as a single line with no line breaks.

## Per-Task Credentials

Configuring per-task credentials enables you to specify what credentials are used to access devices by specifying unique credential handling for tasks that access devices. You can:

- Run tasks using the AAA credentials of the task owner
- Run tasks using one-time credentials specified when the task is created
- Configure which types of tasks require which types of credentials

Typically in a secure environment, you might have implemented a AAA server, such as CiscoSecure ACS TACACS+ server, that limits which commands each user is allowed to run on each device.

For example, suppose both User A and User B can run command scripts using specific commands for which they have permissions. Once NA is implemented, both User A and User B need to be able to run commands scripts. However, you want to ensure that both User A and User B maintain credentials to run only the commands for which they have permissions.

Consequently, when using per-task credentials, you do not have to set up a new, static NA account for User A and User B with permissions to run commands scripts. Each user can run command scripts with their current permissions. If either User A or User B uses a command for which they do not have permissions, NA will return an error.

When using AAA credentials, NA:

- Tries all standard credentials processing, including Last Successful Credentials, Device-Specific Credentials, Password Rules, and Device Archived Passwords.
- For each attempt, NA replaces the username and password with the task owner's AAA username and password. If an attempt fails, NA will retry again with the user's AAA password as both the exec and enable password. If all AAA login attempts fail, the task will fail.

**Note:** There is a hidden configuration setting `proxy/auth_fallback_for_aaa_task` that can be set in a `.RCX` file. If set to true, NA will fall back and attempt standard password handling.

When configuring one-time credentials, NA uses the specified type of credential handling, based on its task type. For example, if only AAA credentials are allowed for Snapshot tasks, all snapshot task will use AAA credentials. If more than one credentials type is allowed for a given task type, the user has a choice as to which to use.

If a given task is selected to use one-time credentials, NA uses the exact credentials specified by the user when the task was created. If the one-time credentials fail, the task fails.

**Note:** If the one-time credentials succeed, NA does not update the last successful credentials information for the device.

# Server

The Server page enables you to:

- Designate TFTP, FTP, and SMTP servers
- Set NA task limits
- Configure Syslog
- Configure device importing intervals
- Configure Primary IP address reassignment and deduplication settings
- Configure Domain Name resolution
- Enable the Audit Log
- Configure database pruning
- Configure advanced scripting capabilities
- Configure HTTP Proxy Servers
- Configure dynamic device group re-calculation
- Specify the absolute path to the directory of the extension drivers
- Configure server performance tuning
- Configure event differencing size thresholds
- Ignore Syslog change detection on non-managing NA Cores

To view the Server page, on the menu bar under Admin, select Administrative Settings and click Server. The Server page opens.

## Server Page Fields

Field	Description/Action
<b>Servers</b>	
TFTP Server IPv4 Address	Enter the IPv4 address of the FTP/TFTP server used by NA (by default, the NA server itself).
TFTP Server IPv6 Address	Enter the IPv6 address of the FTP/TFTP server used by NA (by default, the NA server itself). For detailed information about IPv6 support, see the <i>NA Administration Guide</i> .
TFTP File Path	Enter the path and folder to which the FTP/TFTP server writes the configuration files. NA requires read/write permissions to this folder. The default location is <NA_HOME>/server/ext/tftp/tftpdroot.
TFTP Server Port	The port on which the NA-provided TFTP server receives data. If you change this port, update the TFTP destination for all sending processes and devices.
Syslog Server IPv4 Address	Enter the IPv4 address of the Syslog server used by NA.  <b>Note:</b> When not specified, the first non-loopback IPv4 address of the NA server is used.

Field	Description/Action
Syslog Server IPv6 Address	<p>Enter the IPv6 address of the Syslog server used by NA.</p> <p><b>Note:</b> When not specified, the first non-loopback IPv6 address of the NA server is used.</p>
Syslog Server Port	The port on which the NA-provided syslog server receives data. If you change this port, update the syslog destination for all sending processes and devices.
FTP Server Port	The port on which the NA-provided FTP server receives data. If you change this port, update the FTP destination for all sending processes and devices.
SMTP Server	Enter the host name or IP address of the SMTP server NA uses to send email notifications.
SMTP From Address	Enter the From address NA uses for email.
<b>Tasks</b>	
Max Concurrent Tasks	<p>Enter the maximum number of tasks that can run simultaneously. This setting limits the number of non-group tasks that can run simultaneously. NA limits the number of concurrent non-group tasks to avoid hindering the system and network performance. The default is 20 concurrent non-group tasks. Keep in mind that there is a limit to the number of database connections in the database connection pool.</p> <p>For the recommended values of Max Concurrent Tasks, see the <i>NA Support Matrix</i>.</p> <p><b>Note:</b> This field is specific to the NA Core.</p> <p><b>Note:</b> NA runs only as many tasks as can be supported by the current NA server configuration. If there is insufficient memory to run the number of tasks configured by Max Concurrent Tasks, NA runs only as many tasks as the available memory can support. For information about the current health of the NA task subsystem, see "<a href="#">Viewing Task Load</a>" on page 407.</p>
Max Concurrent Group Tasks	<p>Enter the maximum number of group tasks that can run simultaneously. A group task, such as a snapshot run against the device inventory, also schedules child tasks (one task for each device in the group).</p> <p><b>Note:</b> This field is specific to the NA Core.</p> <p><b>Note:</b> By setting the Max Concurrent Group Tasks value less than the Max Concurrent Tasks value, you ensure that during large group operations, NA is able to run independent tasks that are time-sensitive. For example, during a large group-wide change password task, NA still runs snapshot tasks triggered</p>

Field	Description/Action
	by real-time change detection in a timely manner.
Max Task Length	Enter the maximum time a task can run before it is stopped and given a Failed status. The default is 3,600 seconds (one hour). When the “Max Task Length” time period is reached for a given task, NA attempts to stop the task. The task will not actually stop processing, however, until it reaches a point where it can safely stop. Note that for some tasks, this could take a significant amount of time.
<b>Syslog Configuration</b>	
Configure Syslog by Default	If checked, NA automatically configures Syslog change detection on new devices.
Default Syslog Relay	Enter the default host name or IP address of the relay host for new devices.
<b>Device Import</b>	
Overwrite Existing Devices	Select one of the following options: <ul style="list-style-type: none"> <li>• Yes — NA overwrites existing device data stored in the NA database with the data you import. Devices not included in the import are unaffected.</li> <li>• No — NA does not overwrite existing device data stored in the NA database with the data you import.</li> </ul>
Missing Device Interval	Devices that are missing from an import source longer than this interval are deleted, marked inactive, or left unchanged (per the Missing/Inaccessible Device Action). The default is 45 days.
Inaccessible Device Interval	Any device that NA cannot access in this interval is deleted, inactive, or left unchanged (per the Missing/Inaccessible Device Action). The default is 45 days.
Missing/Inaccessible Device Action	Select one of the following options: <ul style="list-style-type: none"> <li>• Delete device — Deletes devices that are missing or inaccessible from the database.</li> <li>• Mark device inactive — Marks missing or inaccessible devices as inactive (the default). In general, it is a good idea to change devices to inactive rather than deleting them from the database to preserve the configuration history</li> <li>• No action — No action is taken for missing or inaccessible devices.</li> </ul>
<b>User Import</b>	
Overwrite Existing User or User Group	Select one of the following options: <ul style="list-style-type: none"> <li>• Yes — NA overwrites existing user account and user group data stored in the NA database with the data you import. User accounts and user groups not included in the import are unaffected.</li> <li>• No — NA does not overwrite existing user account or user group data stored in the NA database with the data you import.</li> </ul>

Field	Description/Action
<b>Primary IP Reassignment and Deduplication Settings</b>	
Primary IP Address Reassignment	If checked, NA looks through all IP addresses associated with the device, including the primary IP address (plus all other interfaces associated with the device), and sets the primary IP address that matches a RegEx or other rule, if provided.
Interface Name Reassignment RegEx Patterns	Enter a Regular Expression (RegEx) patterns in the right-hand box and click the Add Pattern << button. A regular expression is a special text string to specify the interface name (for example: Loopback.*) to which an IP address must conform. To delete patterns, select the patterns from the left-hand box and click the Delete Pattern button.
IP Address Reassignment RegEx Patterns	Enter a Regular Expression (RegEx) patterns in the right-hand box and click the Add Pattern << button. A regular expression is a special text string to match IP addresses on available interfaces (for example: 10\.\.1\.\.*). To delete patterns, select the patterns from the left-hand box and click the Delete Pattern button.
IP Reassignment Order	If more than one IP address matches the interface names or IP address patterns, select either: <ul style="list-style-type: none"> <li>• Lowest IP address to assign as the primary IP address (the default)</li> <li>• Highest IP address to assign as the primary IP address</li> </ul>
Duplication Detection	Select one of the following options for devices when duplicates are detected. <p><b>Note:</b> Devices are considered duplicates if they have the same interface and IP address information.</p> <ul style="list-style-type: none"> <li>• Leave Duplicates</li> <li>• Deactivate Duplicates (the default)</li> <li>• Delete Duplicates</li> </ul>
<b>Domain Name Resolution</b>	
Overwrite Existing Domain Names	If checked, NA overwrites manual FQDN entries with DNS-resolved FQDN entries when you run a Resolve FQDN task. Keep in mind that when the task is run, both the Device Domain Name and the Device Hostname are replaced.
<b>Audit Log</b>	
Audit Logging	Select one of the following options: <ul style="list-style-type: none"> <li>• Enabled — NA stores an audit log of user actions. Click View Audit Log to see the log.</li> <li>• Disabled — NA does not store an audit log of user actions (the default).</li> </ul>
<b>Database Pruning</b>	
Configurations	Enter the number of days to save configurations in the database. The default is 365 days.

Field	Description/Action
Diagnostics	Enter the number of days to save diagnostics in the database. The default is 45 days.
Events	Enter the number of days to save events in the database. The default is 45 days.
Tasks	Enter the number of days to save tasks in the database. The default is 365 days.
Sessions	Enter the number of days to save proxy Telnet/SSH sessions in the database. The default is 45 days.
Log Files	Enter the number of days to save server log files. The default is 30 days. Log files can get very large, so pruning them can be vital to freeing up disk space on your server.
Temporary Driver Files	Enter the number of days to save temporary driver files. The default is 30 days.
Task Log Files	Enter the number of days that task log files will be retained. The default is 7 days.
Topology Data	Enter the number of days to save topology data. The default is 45 days.
Diagram Files	Enter the number of days to save diagram files. The default is 1 day.
ACL Data	Enter the number of days to save ACL data. The default is 365 days.
Device Authentication Data	Enter the number of days to save Device Authentication data. The default is 45 days.
<b>Advanced Scripting</b>	
Scripting Language 1	<p>Advanced Scripting enables you to run custom scripts written in the scripting languages used in your network. You must have the language interpreter for each language installed and then associate the path with the language option via the Advanced Scripting settings.</p> <p>The scripting language specified here appears in a selection list on the New Command Script page when the Advanced Scripting option is enabled. By default, this setting is pre-configured for Expect. You must specify the path to the interpreter for this language in the corresponding Path to Interpreter [#] setting on this page.</p> <p>You can configure Advanced Scripting capability for up to five languages, and you can overwrite the pre-configured defaults if you do not use those languages. Only languages that run from the command line are supported (for example, JScript and Python).</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Slots 1 and 2 are pre-configured for Expect and Perl. However, NA installs only the interpreter for Expect. You must install the interpreter for each language you specify here, and configure the path before you can run scripts written in these languages.</p> </div>
Path to Interpreter 1	The full path and command for starting the interpreter that runs the language

Field	Description/Action
	specified in Scripting Language 1.
Working Directory 1	The full path of the working directory for the interpreter that runs the language specified in Scripting Language 1.
Architecture of Interpreter 1	The architecture of the interpreter that runs the language specified in Scripting Language 1. Available options are: <ul style="list-style-type: none"> <li>• 32-bit Application</li> <li>• 64-bit Application</li> <li>• Not Applicable</li> </ul>
Scripting Language [2-5]	The language specified here is displayed in the Language selection list on the New Command Script page when the Advanced Scripting option is enabled. You must specify the path to the interpreter for this language in the corresponding Path to Interpreter [#] setting. <div style="background-color: #e0e0e0; padding: 10px; margin-top: 10px;"> <p><b>Note:</b> By default, Scripting Language 2 is pre-configured for Perl, but you must install the Perl interpreter for this setting to function.</p> <p>After installing Perl, you must configure the architecture of the interpreter that runs the language specified in Scripting Language 2. Available options are:</p> <ul style="list-style-type: none"> <li>• 32-bit Application</li> <li>• 64-bit Application</li> <li>• Not Applicable</li> </ul> </div>
Path to Interpreter [2-5]	The full path and command for starting the interpreter that runs the language specified in the associated Scripting Language [#] box. <div style="background-color: #e0e0e0; padding: 10px; margin-top: 10px;"> <p><b>Note:</b> For Windows environments, by default Path to Interpreter 2 is pre-configured for Perl, but NA does not install the Perl interpreter. Perl must be installed and the path configured for this setting to function.</p> </div>
<p><b>Dynamic Groups</b></p> <p>For more information, see <i>Configuring Dynamic Group Calculation</i> in the <i>NA Administration Guide</i>.</p>	
Dynamic Group Auto-Recalculation	Enter how frequently the system re-calculates the member devices of all dynamic groups. The default is 60 minutes. Enter 0 to disable Auto-recalculation. <div style="background-color: #e0e0e0; padding: 10px; margin-top: 10px;"> <p><b>Note:</b> Re-calculating dynamic group members means NA will do number of queries to determine which devices belong to the dynamic group, based on the group's rules and/or filters.</p> </div>
Event Driven Recalculation	If checked, the system will re-calculate all dynamic group members each time a device change event occurs.

Field	Description/Action
Device Change Events	<p>Select the device change events that will trigger dynamic group member re-calculation. This setting is in effect only when the Event Driven Recalculation option is enabled. Examples of device change events include:</p> <ul style="list-style-type: none"> <li>• Device Added</li> <li>• Device Configuration Change</li> <li>• Device Deleted</li> <li>• Device Edited</li> <li>• Device Software Change</li> <li>• Device Unmanaged</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> The Configuration Policy Non-Compliance device change event is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page (<b>Help &gt; About Network Automation &gt; View License Information</b> link).</p> </div>
<b>Drivers</b>	
Driver extension directory	Enter the directory where NA should look for any additional drivers. Refer to your Driver Development Kit (DDK) documentation for information on developing drivers.
<b>Performance Tuning</b>	
Device Deletion Transaction Timeout	The timeout value in seconds before NA reverts delete transactions. If a device has many records or the database is slow to complete the device deletion operation, increase this value.
Filter events For a list of events, see <a href="#">"Getting Started" on page 442.</a>	Click the check box for each event you want to filter. This enables you to tune the performance of your system. You can also limit event differencing for large configs, limit line-by-line masking for large configurations, limit storage and display of large task session logs, and so on.
Limit event differencing for large configs	For very large configurations, the process of creating the configuration difference report in an event e-mail can consume a large amount of system resources. Enabling this option and setting a size limit (see below) will cause the configuration difference report to be skipped for events where the configuration size is greater than the specified threshold.
Event differencing size threshold	Setting a size limit will cause the configuration difference report to be skipped for events where the configuration size is greater than the specified threshold.
Limit line-by-line masking for large configs	For very large configurations, the process of showing the line-by-line differences between two configurations can consume a large amount of system resources. Enabling this option and setting a size limit (see below) will cause the configuration differences page to show the two configurations side-by-side without any additional highlighting or line numbering for those configurations with a size greater than the specified threshold.



Field	Description/Action
Line-by-line masking size threshold	Setting a size limit will cause the configuration differences page to show the two configurations side-by-side without any additional highlighting or line numbering for those configurations with a size greater than the specified threshold.
Limit storage and display of large task session logs	Task session logs are stored as part of the task results. Some devices dump large amounts of data into the session log, resulting in a significant increase in the size of the task table in the database. Enabling this option and setting size limit (see below) causes the session logs to be truncated once the specified threshold is met, ensuring that session logs never grow too large.
Task session log size threshold	Setting a size limit causes the session logs to be truncated once the specified threshold is met, ensuring that session logs never grow too large.
Ignore Syslog Change Detection on non-Managing Cores	In a Distributed System, if devices are setup to send Syslog messages to multiple NA Cores, database replication conflicts can occur when both NA Cores try to schedule Snapshot tasks for the same device at the same time. Enabling this option instructs the NA Core to ignore the Syslog message and not schedule the Snapshot task. For information about Distributed Systems, see the <i>NA Multimaster Distributed System on Oracle Guide</i> or the <i>NA Multimaster Distributed System on SQL Server Guide</i> .
Allow a core or cores in the mesh to run all tasks created on that core locally	This option instructs the local NA Core that tasks for a given device can run on any NA Core, so to ensure that only one task at a time runs on any device. This NA Core must communicate with the other NA Cores to determine what tasks are running. For information about Distributed Systems, see the <i>NA Multimaster Distributed System on Oracle Guide</i> or the <i>NA Multimaster Distributed System on SQL Server Guide</i> .
Allow this core to run all tasks created on it locally	This option causes any tasks created by a user logged into this NA Core to assign tasks to the current NA Core. This ignores the managing NA Core for the site to which the device belongs. For information about Distributed Systems, see the <i>NA Multimaster Distributed System on Oracle Guide</i> or the <i>NA Multimaster Distributed System on SQL Server Guide</i> .
Reserve this core for user interaction	In a <b>Horizontal Scalability</b> <sup>1</sup> environment that uses distributed round robin task assignment, do not run regularly-scheduled or user-initiated device tasks on this core. For more information, see the <i>NA Horizontal Scalability Guide</i> .
Allow partial words with wild cards in full-text search	This option is applicable only to Oracle database. If selected, you can use wild cards at any position of a word in the multi-word full-text search phrase.  <b>Note:</b> Too many wildcards in a search string can slow down full-text search on a large database.
Skip recalculation of	If selected, NA skips full-scale, dynamic group recalculation for any dynamic group

<sup>1</sup>A configuration where multiple NA cores connect to a single NA database. For more information, see the NA Horizontal Scalability Guide.

Field	Description/Action
dynamic groups with non-full-text configuration search	that performs a non-full-text configuration search.
Disallow non-full-text configuration search in UI	If you select this option when full-text search is enabled, you are not allowed to perform non-full-text configuration search in the NA console.
Validate full-text search phrase	If selected, the validation of multi-word full-text search phrase is enforced to avoid an invalid search.  <b>Note:</b> This option does not work if the the <b>Allow partial words with wild cards in full-text search</b> option is selected in an Oracle database.

## Workflow

The HPE Network Automation (NA) Workflow Integration & Routing Engine (WIRE) manages the process of network configuration, ensuring that network changes are made according to predefined policies, completed in the correct sequence, and approved by the appropriate people.

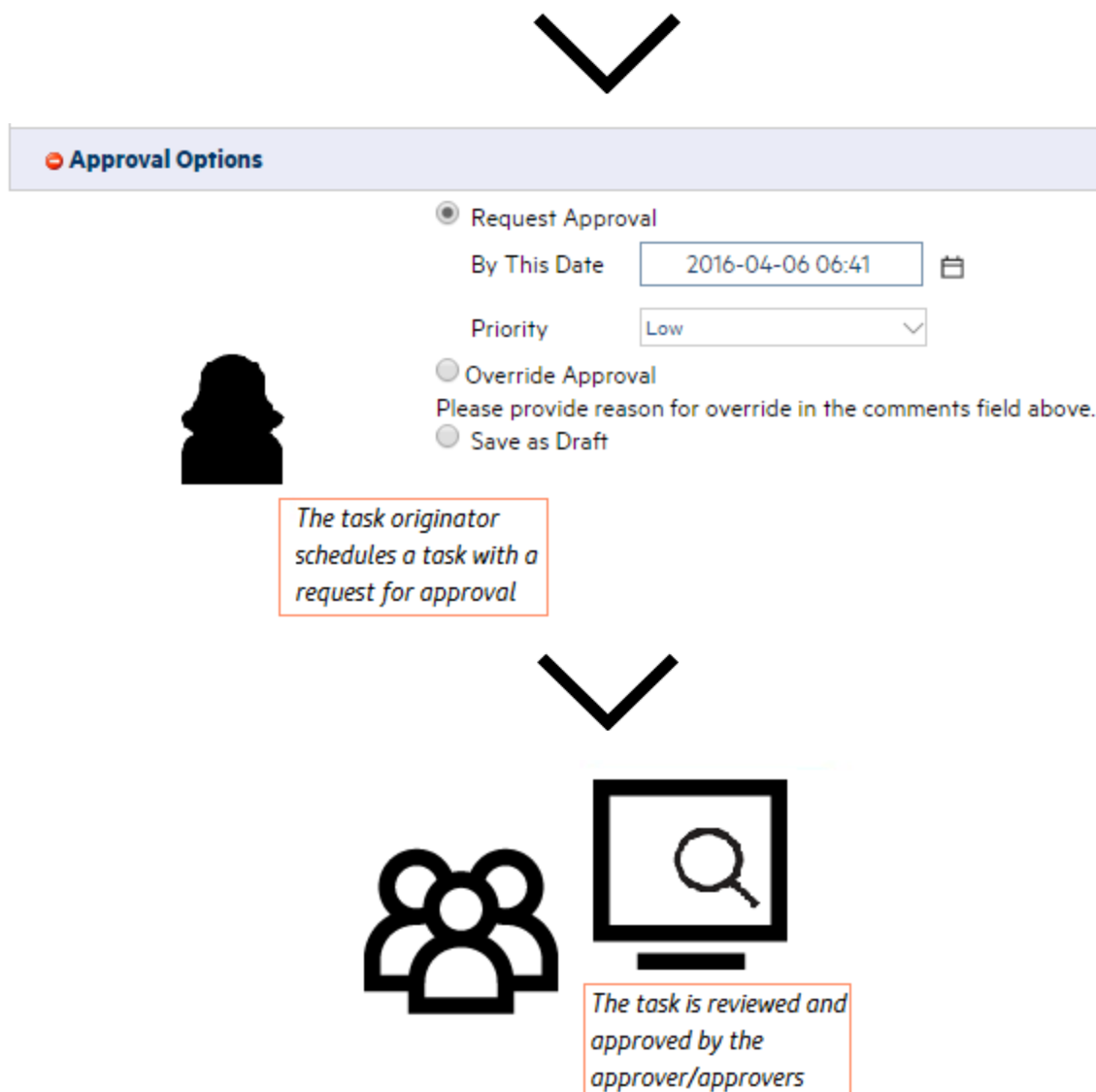
Workflow indicates an ordered sequence of tasks that begins with the originator of a task submitting the task for approval, and ends with the approver approving or rejecting it. (For more information about the different approval statuses, see the ["Creating Workflows" on page 642.](#)) While the originator of a task is a limited access user, the approver (an individual or a group of individuals) is a power user or a full access user. (For more information about the different groups of users, see ["New User Page Fields" on page 223.](#))

**Note:** Workflow cannot be applied to the sub-tasks in NA.

Workflow manages the sequencing of tasks, the gaining of approvals, and the auditing of results, thus helping you to control who does what to the network and why. Device configurations can be accomplished accurately and in accordance with the objectives of your organization. Also, the possibility of out-of-policy changes and inadvertent configuration errors reduces to a large extent.

The following graphic describes the Workflow process:





A few scenarios where the NA Workflow approval feature can be used are as follows:

- Deploying a configuration in bulk - While deploying a configuration on a group of devices that belong to a specific device family, the Workflow feature is handy to review and approve the task before running it.
- Modifying device access credentials - As this task involves change in SNMP community strings, device passwords and so on of a device or a group of devices, it requires approval before it is executed.
- Running auto-remediation scripts on non-compliant policies - When it is required to run an auto-remediation script to bring a non-compliant device in compliance, it is important to implement the task using Workflow. This ensures that the script is duly approved to make changes to the device configuration.

**Note:** The HPE Network Automation Software Premium edition license does not include this functionality. It is available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page (**Help > About Network Automation > View License Information** link).

The Workflow page enables you to:

- Enable workflow
- Configure event notification and response rules
- Configure the Device Reservation System
- Configure Device Reservations for the Telnet/SSH Proxy

To view the Workflow page, on the menu bar under Admin, select Administrative Settings and click Workflow. The Workflow page opens.

### Workflow Page Fields

Field	Description/Action
<b>Workflow</b>	
Enable Workflow	If checked, approval is required for tasks for which an Approval rule is defined.
Priority Values	<p>Defines the priority values that can be set on tasks requiring approval. The default values include:</p> <ul style="list-style-type: none"> <li>• Low</li> <li>• Medium</li> <li>• High</li> </ul> <p>You can add different values, such as Urgent, Normal, and so on by entering the value and clicking the Add Value &lt;&lt; button. You can delete a value by selecting the value and clicking Delete Value button.</p> <p><b>Note:</b> The NA Scheduler does not look at the values. It is basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
<b>Event Notification &amp; Response Rules</b>	
Run Task	If checked (the default), all tasks that are scheduled due to event rules must be approved. For example, if a configuration policy non-compliance event occurs, thereby triggering a task for corrective action, the task must be approved before deployment.
<b>Device Reservation System</b>	
Device Reservation System	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Enabled — Enables the Device Reservation System (the default). For information about the Device Reservation System, see "<a href="#">Reserving Devices</a>" on page 175.</li> <li>• Disabled — Disables the Device Reservation System.</li> </ul>
Default Duration	Enter the number of minutes devices and/or device groups can remain reserved. The default is 60 minutes.
Max Number of Columns in Activity Calendar	Sets the maximum number of columns in the Activity Calendar. The default value is 1024. For information about the Activity Calendar, see " <a href="#">Activity Calendar</a> " on page 175.

Field	Description/Action
Minimum Overlap for Half-Hour	Set the minimum number of minutes into a half-hour a reservation must extend for it to be displayed on the Activity Calendar as reserved for that half-hour. The default value is 5 minutes.
<b>Telnet/SSH Proxy Reservation</b>	
Device Reservations for Telnet/SSH Proxy	<p>The NA Telnet/SSH Proxy can be used to access and configure devices. It provides access control, keystroke session logging, and in-line commenting capabilities. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Ignore — Ignore device reservations when accessing devices via the Telnet/SSH proxy (the default). For information about the Device Reservation System, see <a href="#">"Reserving Devices" on page 175</a>.</li> <li>• Warn — Warn users if an approved device reservation does not exist when connecting to a device via the Telnet/SSH proxy.</li> <li>• Prevent — Prevent users from connecting to a device via the Telnet/SSH proxy if an approved device reservation does not exist. If the user has Override permission, he/she is prompted as to whether or not to override non-access to the device.</li> </ul> <p>If Warn or Prevent is selected, NA looks for a matching device reservation, including user, device or device group, if approved, and the time reserved for the multi-task project.</p>
No Device Reservation Warning Message	Enter the warning message to display when an approved device reservation does not exist. The default warning message is: <i>WARNING: You do not have an approved reservation for this device at this time.</i> You have the option of deleting the default warning message.

## User Interface

The User Interface page enables you to:

- Configure login security
- Set the date format shown on all pages
- Customize NA menus
- Add slots for the View/Edit Modules pages
- Add and delete roles from the New/Edit Templates pages
- Customize the size of the text box on the Edit Command Script Diagnostic pages
- Customize the Device Selector display
- Enable enhanced custom fields
- Configure Quick Launch tasks

To view the User Interface page, on the menu bar under Admin, select Administrative Settings and click User Interface. The User Interface page opens. Be sure to click Save when you are done.

## User Interface Page Fields

Field	Description/Action
<b>Security</b>	
Session Timeout	<p>Enter the number of seconds NA waits before terminating an inactive Web session. The default is 1800 seconds. Keep in mind that the change will not take effect until your next login.</p> <p><b>Note:</b> When SAML is enabled, the NA session timeout is used to redirect to the identity provider (IdP) so that the session can be validated again. For example, if the NA session timeout is 1800 seconds, and the IdP session timeout is 3600 seconds, NA redirects to the IdP after 1800 seconds of inactivity. However, as the IdP session is active, the user continues to be logged on.</p>
Check Device Permissions for View Device Configuration	If checked, users can view the device configuration only if they have appropriate device permission. You must restart NA for your change to take effect.
Auto-complete user name and password	If checked, the browser's auto-complete function is enabled on the NA login page.
Show Stack Traces	If checked, exception stack traces can be viewed in the Web UI error page.
Cross site scripting check	If checked, NA checks user input to filter out the potential cross site scripting elements such as <script>, <object>, <img>, <input>, and so on. This option enables you to remove potentially malicious JavaScript code from your scripts. An error is returned when malicious JavaScript code is found.
Filter HTML Output	<p>Limit the tags that NA interprets when displaying HTML-formatted text. Display the following tags and their contents as literal text:</p> <ul style="list-style-type: none"> <li>• applet</li> <li>• body</li> <li>• embed</li> <li>• frame</li> <li>• script</li> <li>• frameset</li> <li>• html</li> <li>• iframe</li> <li>• img</li> <li>• style</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• layer</li> <li>• link</li> <li>• ilayer</li> <li>• meta</li> <li>• object</li> </ul> Enable to prevent potential cross-site scripting injections into NA
<b>Date/Time Display</b>	
Date Format	This setting controls how dates appear throughout the Web interface. The default format is MMM-dd-yy HH:mm:ss. You can vary the order of the date and time elements, swap the date and time, enter a 4-digit year (yyyy), and change the month to a 2-digit numeric value (MM). Keep in mind that the elements are case-sensitive. For example HH refers to a 24-hour clock, while hh refers to a 12-hour clock.
<b>Menu Customization</b>	
Show Custom Menu Link	If checked, a user-defined name appears in the <b>My Settings</b> area of the My Workspace pane. You provide the menu title and link to an HTML page, such as the home page of your ticketing application.
Custom Menu Title	Enter the name you want to appear.
Custom Menu Page	If Show Custom Menu Link is selected, enter the URL to the HTML page you want to display when a user clicks the menu title. This can be a page within another HTML application.
<b>Configuration Comparison</b>	
Lines of Context for Visual Comparison	Enter the number of lines to display above and below each change when comparing two configurations. The default is 3.
Lines of Context for Email Comparison	Enter the number of lines to display above and below each change when comparing two configurations as text in email. The default is 3.
<b>Software Center</b>	
Slots	Add and delete the slots (chassis slots for cards/blades/modules) that users see on the View/Edit Modules pages. To add a slot, enter it in the right-hand box and click Add Slot <<. To delete a slot, select the slot in the left-hand box and click Delete Slot.
Show file compliance	Select the checkbox to display the compliance level for each Image file in the Image Sets.

Field	Description/Action
level	
Device Models	Enter a device model and then click the Add Model button. Use the Delete Model button to delete device models.
Processor Types	Enter a processor type and then click the Add Processor button. Use the Delete Processor button to delete processor types.
Device BootROM	Enter a Device BootROM and then click the Add BootROM button. Use the Delete BootROM button to delete device bootROMs.
<b>Templates</b>	
Template Roles	Add and delete the roles that template authors choose from on the New/Edit Template pages. Roles can describe the role devices play in your network, such as Border or Core. To add a role, enter it in the right-hand box and click Add Role <<. To delete a role, select the role in the left-hand box and click Delete Role.
<b>Scripts</b>	
Script Text Height	Enter the size (height) of the text box on the Edit Command Script and Edit Diagnostics pages. The default is 12 rows.
Script Text Width	Enter the size (width) of the text box on the Edit Command Script and Edit Diagnostics pages. The default is 60 characters.
<b>Enhanced Custom Fields</b>	
Enable Enhanced Custom Fields	If checked, you can configure enhanced custom fields for some data sets. Custom data fields enable you to assign useful data to specific devices, configurations, users, and so on. For more information, see " <a href="#">Enhanced Custom Fields Setup</a> " on page 549.
<b>Proxy Window</b>	
Dimension of proxy window	Select the size to use for the proxy window.
<b>Miscellaneous</b>	
Task Page Refresh Interval	Enter the number of seconds for the Task List pages to refresh. The default is 60 seconds.
Config Size Threshold for Displaying as Plain Text	Enter a config size threshold for displaying a config in plain text. The default is 200,000 bytes. Keep in mind that certain configs are too large to provide special handling, such as line numbering, without consuming enormous server and browser resources. When a config exceeds the default value, it is displayed as plain text using <pre> and </pre> tags.
Mask Community Strings	If checked, community strings in the Web UI will not be shown in plain text. This option is for NA-displayed community strings only. Community strings embedded in configurations are masked based on driver-specific sensitive



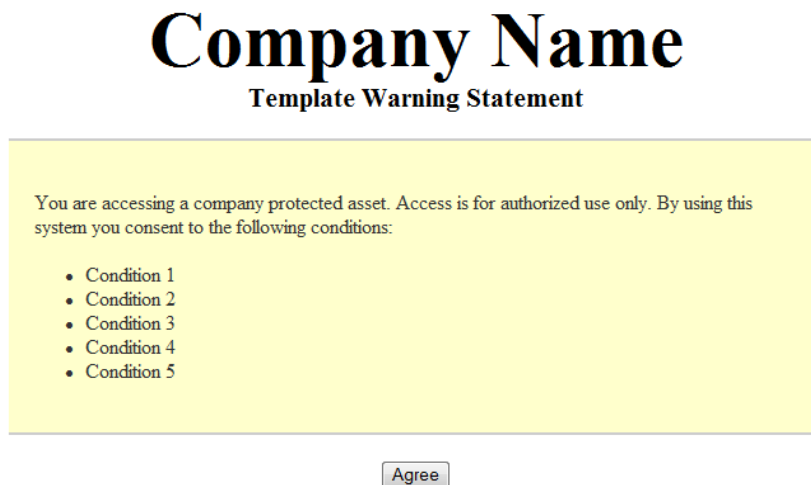
Field	Description/Action
	data masking implementation.
Disable hidden stack trace output	<p>If checked, hidden stack trace is disabled. If not checked, when a server error occurs, NA outputs the stack trace as hidden text in the HTML page in addition to the server log.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> A full Java stack trace is provided as hidden HTML by default to aid in Support calls. If you think this might be a potential security vulnerability, check this option.</p> </div>
Disable detailed exception message output	If checked, output of the detailed exception message is disabled. If not checked, when a server error occurs, NA outputs a detailed exception message in the HTML page, in addition to the server log.
Display user full name in report	<p>The user name display format setting. This setting affects the name displayed for fields such as Added By and Changed By in the NA console. It does not impact the user names included in the output of commands run on the NA proxy.</p> <ul style="list-style-type: none"> <li>• To display user names as first_name last_name in the NA console, select this check box.</li> <li>• To display user names as the log-on names in the NA console, clear this check box.</li> </ul>
Mask User Names in Log Files	<p>In log files, replace with asterisk (*) characters the following items:</p> <ul style="list-style-type: none"> <li>• NA user names</li> <li>• Device user names</li> <li>• SNMPv3 user names</li> </ul>
Mask Passwords in Log Files	<p>In log files, replace with asterisk (*) characters the following items:</p> <ul style="list-style-type: none"> <li>• NA user passwords</li> <li>• Device user passwords</li> <li>• SNMP community strings</li> <li>• SNMPv3 passwords</li> </ul>
Remove User Names from the Troubleshooting Package	<p>In the troubleshooting package created from the Download Troubleshooting Info page, remove the following items:</p> <ul style="list-style-type: none"> <li>• NA user names</li> <li>• Device user names</li> <li>• SNMPv3 user names</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> This setting does not apply to the package created from the Send Troubleshooting Info page.</p> </div>

Field	Description/Action
Remove Passwords from the Troubleshooting Package	<p>In the troubleshooting package created from the Download Troubleshooting Info page, remove the following items:</p> <ul style="list-style-type: none"><li>• NA user passwords</li><li>• Device user passwords</li><li>• SNMP community strings</li><li>• SNMPv3 passwords</li></ul> <p><b>Note:</b> This setting does not apply to the package created from the Send Troubleshooting Info page.</p>

## Enabling the Logon Banner

You can enable a banner page that is displayed when the user attempts a log on to the NA console. The banner typically contains the terms and conditions related to your company. To be able to get into the Login page, the user must accept the terms and conditions.

An example of the banner is as follows:



**To enable the logon banner, follow these steps:**

**Note:** Do not enable the logon banner when Security Assertion Markup Language (SAML) is enabled as the external user authentication for NA. For more information, see *Configuring NA to Support SAML User Authentication* in the *NA Administration Guide*.

1. Create the banner page by using the following template, located on an installed NA system:  
`$INSTALLDIR/resource/exampleConsentPage.html`

2. Place the created page in the following location:

```
$INSTALLDIR/resource/consentPage.html
```

3. Make sure that the **Agree** button is specified in the consentPage.html as follows:

```
<input type="button" name="CompanyAgree" value="Agree"  
onClick="window.location="/acceptConsent.html"' >
```

To enable the banner in CLI, create a consentMessage.txt in the following location:

```
$INSTALLDIR/resource/consentMessage.txt
```

An example of the consentMessage.txt is as follows:

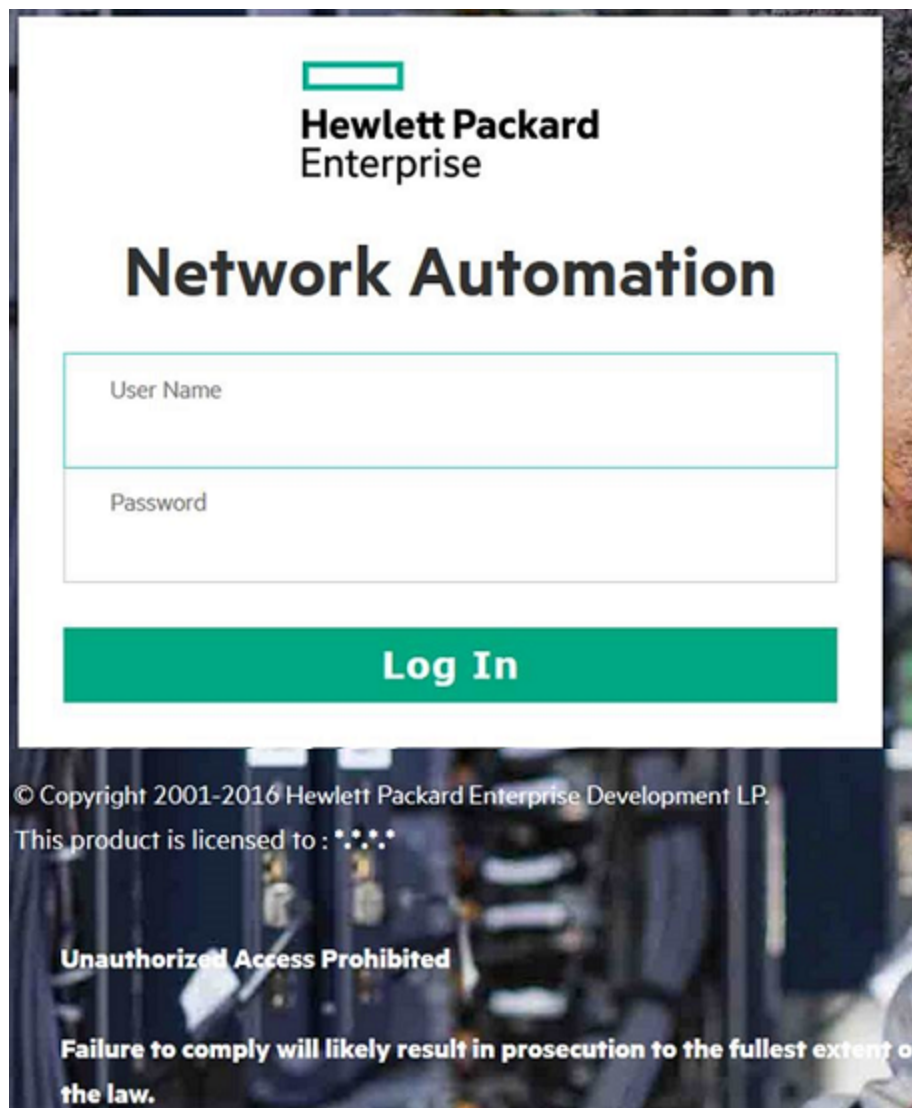
```
Disconnect IMMEDIATELY if you are not an authorized user!  
Failure to comply will likely result in prosecution to the fullest extent of the law.
```

After the banner is enabled, restart the NA truecontrol services (/etc/init.d/truecontrol restart) so that the the content of the consentMessage.txt is displayed when the Telnet and SSH clients attempt to log in to the CLI.

**Note:** Based on the SSH client used, the logon banner might be displayed differently.

## Customizing the NA Login Page

You can customize the HPE Network Automation Software (NA) Login page to display information, such as a warning message or company-specific information. For example:



To customize the NA Login page, follow these steps:

1. In the <NA\_HOME>/resource directory, open the customer\_banner.html file in a text editor that supports HTML.
2. Uncomment the existing lines, and then enter the text to be displayed on the NA login page.
3. Save the file, and then open the NA console login page. The text from the customer\_banner.html file appears under the **Log In** button. There is no limitation on the number of words you can display.
4. Verify that the text displays properly on the page.

## Telnet/SSH

The Telnet/SSH page enables you to configure:

- Telnet/SSH logging
- The Telnet/SSH proxy
- Device single sign-on

- The Telnet client
- The Telnet server
- The SSH server

To view the Telnet/SSH page, on the menu bar under Admin, select Administrative Settings and click Telnet/SSH. The Telnet/SSH page opens.

Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issues. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.

### Telnet/SSH Page Fields

Field	Description/Action
<b>Telnet/SSH Session Logging</b>	
Log Commands	If checked, this option saves your commands when running a Telnet or SSH session. To view the commands, from the Device Information page, click View Telnet/SSH Sessions and then View Commands Only. The Convert to Script links on this page enable you to quickly capture the commands from a session into a script for future use. For more information, see <a href="#">"Adding Command Scripts" on page 560</a> .
Log Responses	If checked, this option saves the complete session logs when running a Telnet or SSH session. To view the logs, from the Device Information page, click View Telnet/SSH Sessions and the View Full Session. The Convert to Script links on this page enable you to quickly capture the commands from a session into a script for future use. For more information, see <a href="#">"Adding Command Scripts" on page 560</a> .
Force Logging	If checked, this option forces logging of device command and the responses for each Telnet/SSH session during API usage.
<b>Telnet/SSH Proxy</b>	
Enable Telnet/SSH Server	The Telnet/SSH Proxy can be used to access and configure devices. It provides access control, keystroke session logging, and in-line commenting capabilities. If checked (the default), NA can operate as a Telnet/SSH server.
Server Inactivity Timeout	Enter the maximum time an idle Telnet or SSH session is connected to the NA Telnet/SSH server before being disconnected. If a Telnet/SSH client connected to NA is not active for this period of time, the session times out. The default is 30 minutes.
Default Connection Method	Select either Telnet or SSH to connect to a device without Single Sign-on. This is the connection method used by the Telnet/SSH Proxy connect command when the <i>-method</i> option is not included. The method is ignored unless Use Single Sign-on is selected and the Edit Device page Supports list includes the same connection method.  <div style="background-color: #e0e0e0; padding: 5px;"> <p><b>Note:</b> When NA is configured to use SecurID for external authentication, Single Sign-on functionality will not be enabled when connecting to the NA proxy. You will need to authenticate again using your SecurID credentials because SecurID tokencodes</p> </div>

Field	Description/Action
	cannot be reused.
Device Inactivity Timeout	Enter the number of minutes NA keeps an idle device session open before closing the connection. The default is 30 minutes.
SSH Login Timeout	Enter the number of seconds for timeout of SSH logins using the “-login” switch in the NA proxy. The default is 15 seconds.
Alert for Concurrent Session	Select one of the following options: <ul style="list-style-type: none"> <li>Warn of Concurrent Sessions — If checked (the default), NA issues a warning when a second user tries to connect to a device. This helps prevent one user from inadvertently overwriting the changes of another. Only users with Admin permissions can override a warning.</li> <li>Prevent Concurrent Sessions — If checked, NA prevents concurrent sessions for all users.</li> <li>No Action — If checked, NA ignores concurrent sessions.</li> </ul>
Concurrent Session Handling for Distributed System	Select one of the following options: <ul style="list-style-type: none"> <li>Allow sessions to non-local devices (Note that if both “Warn of Concurrent Sessions” (see above) and “Allow sessions to non-local devices” is checked, no warning is issued.)</li> <li>Prevent sessions to non-local devices</li> </ul> For information on Distributed Systems, see the <i>NA Multimaster Distributed System on Oracle Guide</i> .
Connect to Unknown Devices	If checked (the default), NA enables users to connect to unmanaged devices.
Max Device Connection List	Enter the maximum number of devices displayed when connecting to a device based on a wildcard search and multiple matching devices are found. The default is 20. If more devices can be returned, you are prompted to restrict the wildcard expression.
<b>Device Single Sign-On</b>	
Use Single Sign-on	If checked (the default), NA automatically authenticates a user once, then logs them into devices for which they have modify device permissions. <p><b>Note:</b> When NA is configured to use SecurID for external authentication, Single Sign-on functionality will not be enabled when connecting to the NA proxy. You will need to authenticate again using your SecurID credentials because SecurID tokencodes cannot be reused.</p>
Sign-On Mode When No Modify	Select one of the following options: <ul style="list-style-type: none"> <li>Provide Login Prompt</li> </ul>

Field	Description/Action
Device Permission	<ul style="list-style-type: none"> <li>• Sign On To Limited Access Mode</li> <li>• Deny Login</li> </ul>
Display Sign-on Banner	If checked (the default), NA displays the sign-on banner when it logs into a device.
Use AAA Login for Single Sign-on	If checked, NA uses the AAA login information. This option refers to the Use AAA Login for Proxy Interface section on the New/Edit User page.
Use HPE Network Automation Login when AAA Login Fails	If checked (the default) and your AAA user name and password information fails, your NA login information is used.
<b>Telnet Client</b>	
Telnet Client	Select one of the following options: <ul style="list-style-type: none"> <li>• Use NA's integrated telnet client (the default)</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin: 5px 0;"> <p><b>Note:</b> This is the only option that supports single-sign on.</p> </div> <ul style="list-style-type: none"> <li>• Use standard browser telnet:// URL to NA's telnet proxy</li> <li>• Use standard browser telnet:// URL directly to the indicated device</li> </ul>
<b>Telnet Server (changing these setting restarts the Telnet/SSH server)</b>	
Enable Telnet	If checked (the default), NA acts as a Telnet server.
Telnet Server Port	Enter the port on which NA accepts client connections. The default for Windows is 23. The default for Linux is 8023.
Max Telnet Connections	Enter the maximum Telnet client connections NA accepts simultaneously. The default is 50.
<b>SSH Server (changing these setting restarts the Telnet/SSH server)</b>	
Enable SSH	If checked (the default), NA acts as an SSH server.
SSH Server Port	Enter the port on which NA accepts client connections. The default is 22.
Max SSH Connections	Enter the maximum SSH client connections NA accepts simultaneously. The default is 50.

# Reporting

The Reporting page enables you to customize the Network Status Report for your organization, including:

- Policy Rule Violations
- Software Compliance Violations
- Startup vs. Running Config Mismatch
- Device Access Failure
- Configuration Change
- Email Report
- Diagramming
- Image Synchronization Report

For each reporting category, you can set status indicators for individual devices (and for the device group) using a combination of risk level color codes and parameters that specify a threshold for the percentage of devices that are out of compliance at each tier. For example, a higher score might be assigned to the border routers group, which control external network access and remote offices, while LAN devices might remain at the default values.

Providing settings that best reflect the significance of each event in your network can help you identify problems and keep the network in compliance with all established policies practices.

The Reporting page also provides options for the format and content of email reports sent via a user-defined email notification task and for specifying the location where you want to save the reports. You can also enable diagramming and set diagramming parameters. For information about Diagramming, see "[Diagramming Page Fields](#)" on page 596.

The status (risk level) of a non-complying device determines the status of the group. For example, if you set the risk level for a single non-compliant device to yellow, and one device in a group is in violation, the device group will reflect status yellow when the threshold number of devices in violation is reached.

To view the Reporting page, on the menu bar under Admin, select Administrative Settings and click Reporting. The Reporting page opens.

## Reporting Page Fields

Field	Description/Action
<b>Policy Rule Violations</b>	
Device Status Color	Select the color to display when a single device in a device group is in violation of a configuration policy rule. The options include: <ul style="list-style-type: none"><li>• Red (the default)</li><li>• Yellow</li><li>• Green</li></ul>
Category Status Color	Enter the threshold percentage of devices that have configuration policy violations for the following device status colors: <ul style="list-style-type: none"><li>• Yellow — The default 1%.</li></ul>



Field	Description/Action
	<ul style="list-style-type: none"> <li>Red — The default is 2%.</li> </ul>
<b>Software Level Violations</b>	
Device Status Color	Select the color to display when the software for a single device in a device group is out of compliance. The options include: <ul style="list-style-type: none"> <li>Red (the default)</li> <li>Yellow</li> <li>Green</li> </ul> The following compliance levels are considered to be violations: <ul style="list-style-type: none"> <li>Security Risk</li> <li>Pre-production</li> <li>Obsolete</li> <li>Bronze</li> <li>Silver</li> <li>Gold</li> <li>Platinum</li> </ul>
Category Status Color	Enter the threshold percentage of devices that have software level violations. The options include: <ul style="list-style-type: none"> <li>Yellow — The default 1%.</li> <li>Red — The default is 2%.</li> </ul>
<b>Startup vs. Running Config Mismatch</b>	
Device Status Color	Select the color to display when the startup configuration of a single device in a device group does not match its running configuration. The options include: <ul style="list-style-type: none"> <li>Red</li> <li>Yellow (the default)</li> <li>Green</li> </ul>
Category Status Color	Enter the threshold percentage of devices that have startup versus run mismatches. The options include: <ul style="list-style-type: none"> <li>Yellow — The default 1%.</li> <li>Red — The default is 2%.</li> </ul>
<b>Device Access Failure</b>	
Device Status Color	Select the color to display when a single device in a device group reports a device access failure. The options include: <ul style="list-style-type: none"> <li>Red</li> <li>Yellow (the default)</li> <li>Green</li> </ul>

Field	Description/Action
Category Status Color	Enter the threshold percentage of devices that have access failures. The options include: <ul style="list-style-type: none"> <li>• Yellow — The default 1%.</li> <li>• Red — The default is 2%.</li> </ul>
<b>Configuration Change</b>	
Device Status Color	Select the color to display when the configuration of a single device in a device group has changed. The options include: <ul style="list-style-type: none"> <li>• Red</li> <li>• Yellow (the default)</li> <li>• Green</li> </ul>
Category Status Color	Enter the threshold percentage of devices that have configuration changes. The options include: <ul style="list-style-type: none"> <li>• Yellow — The default 1%.</li> <li>• Red — The default is 2%.</li> </ul>
<b>Email Report</b>	
Email Report Format	Select the email format you want to use when sending search results as an email report. Keep in mind that this does not apply to Network Status reports. Options include: <ul style="list-style-type: none"> <li>• HTML mail (the default)</li> <li>• CSV file attachment</li> <li>• Plain text</li> <li>• HTML mail (without links)</li> </ul>
Include Text Details in Email Reports	If checked, complete task details are included in email reports that contain the results of a task search in comma separated value (CSV) file format. Keep in mind that this does not apply to Network Status reports.
Email Links	Select the format of addresses for HTML links in an email report. Options include: <ul style="list-style-type: none"> <li>• Hostname (if resolvable)</li> <li>• IP Address</li> <li>• Canonical Name (FQDN, if resolvable) (the default)</li> <li>• User Defined — Enter the user-defined server address to use in email links.</li> </ul>
<b>SingleView</b>	
Device Change Events to Track	Select the device change events to track. This setting determines the default set of events to display on the Single View page. For more information, see <a href="#">"SingleView Page Fields" on page 539</a> . Events include: <ul style="list-style-type: none"> <li>• Device Configuration Change</li> <li>• Device Booted</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Device Diagnostic Changed</li> <li>• Device Password Change</li> <li>• Module Added</li> <li>• Module Changed</li> <li>• Module Removed</li> <li>• Software Change</li> <li>• User Message</li> </ul>
Diagnostics to Track	<p>Select the diagnostics to track. This setting determines which Device Diagnostic Changed events are displayed if that event type is selected on the Single View page. For more information, see <a href="#">"SingleView Page Fields" on page 539</a>. Default diagnostics types include:</p> <ul style="list-style-type: none"> <li>• Hardware Information</li> <li>• Memory Troubleshooting</li> <li>• NA Detect Device Boot</li> <li>• NA Device File System</li> <li>• NA Flash Storage Space</li> <li>• NA Interfaces</li> <li>• NA Module Status</li> <li>• NA OSPF Neighbors</li> <li>• NA Routing Table</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> For more information about diagnostics, see <a href="#">"View Menu Options" on page 185</a>.</p> </div>
<b>Diagramming</b>	
Enable Diagramming	If checked, enables the diagramming functionality.
Maximum Nodes	Enter the maximum number of nodes to display in the diagram. The default is 250 nodes. This value can be lowered if generating the diagram is causing “Out of Memory” errors. Diagrams that include a large number of nodes result in large images. Images are generated in memory in uncompressed form before being output in JPEG format. You can increase the value if you want to include more nodes in your diagram, but keep in mind that you could run out of memory.
Label Font Size	Enter the font point size for labels in the diagram. The default is 8. Increasing this value increases the size of the labels in relation to the size of the nodes, potentially making the labels more readable.
Maximum Layout Duration	Enter the maximum time for which the layout algorithm is to run. The default is 30 seconds. The layout algorithm will stop after this maximum amount of time. Keep in mind that an accurate diagram is still generated if this limit is reached. However, the

Field	Description/Action
	diagram might not be as optimally laid-out as possible.
Diagram Compactness	Enter the amount of space shown between nodes, from 0 to 100. The default is 95. This value controls how spread out the diagram appears. Nodes on a less compact diagram are easier to read. While a more compact diagram uses less space, compact diagrams can be hard to read. Also keep in mind that compact diagrams can take slightly longer to run, since the layout tends to take longer.
Quality-Time Ratio	Enter the preferred layout ratio from 0 to 100. The default is 100. Higher values generate a cleaner looking diagram, but take longer to layout and use more CPU cycles.
Preferred Edge Length	Enter a preferred edge length value, from 0 to 100. The default is 100. In general, longer edges provide more space between nodes in the diagram, however the layout algorithm will override this setting as needed. Larger values will cause the diagram to be more spread out, making memory consumption higher. Higher values do make edges less likely to overlap nodes and labels, thereby making the diagram more readable.
Preferred Minimal Node Distance	Enter a preferred minimal node distance value, from 0 to 100. The default is 20. This value controls how close nodes without connections are spaced. Smaller values contribute to a more compact diagram.
<b>Image Synchronization Report</b>	
Image Synchronization Files	Enter an Image Synchronization report file and click the Add Files button. The Delete Files button enables you to delete Image Synchronization report files. The Image Synchronization report enables you to view the currently running or backup software images on a device, or group of devices, that do not reside in the NA software image repository. For more information, see <a href="#">"Image Synchronization Report" on page 603</a> .
<b>Other</b>	
Use Excel CSV Format	If checked (the default), when exporting search results to a comma separated value (CSV) file, Microsoft Excel CSV format is used.
Email Report File Export Location	Enter the path to the location on the NA server where you want all report files to be saved. All reports are automatically saved to this location when the user selects the "Save this report to file" option when defining the Email Report task. The default location is <NA_HOME>/addins.

## User Authentication

User authentication enables you to centralize the authentication of users in one place and eliminate the need to maintain multiple databases. The following user authentication options are available:

- Lightweight Directory Access Protocol (LDAP)
- Security Assertion Markup Language (SAML) 2.0
- SecurID
- TACACS+
- RADIUS

- Public Key Infrastructure (PKI)
- HPE Server Automation (HPE SA)
- HPE Operations Orchestration (HPE OO)

Keep in mind that if external authentication fails, NA attempts to fall back to the local user credentials in the following cases:

- When the external authentication service is down or inaccessible.
- For static user accounts that have never successfully logged in through an external authentication method.
- For the administrator user account created during the NA installation.

**Note:** By design, when NA is configured to use SAML or PKI user authentication, NA never attempts to fall back to local user credentials. Additionally, if the user name of the administrator user account created during NA installation does not correspond to the SAML Subject NameID (for SAML user authentication) or a certificate (for PKI user authentication), that account is not available for connecting to the NA web user interface.

**Note:** If you want NA to fail over to local authentication, you must enable this capability on the user's account. By default, NA will not fail over to local authentication. For more information, see ["Authentication Failover" below](#) and ["New User Page Fields" on page 223](#).

User authentication also enables you to configure the following security policies for user credentials managed in NA:

- Define a minimum password length
- Define password complexity rules
- Lock out users after a configured number of consecutive failed logon attempts NA console

**Note:** With SAML or PKI user authentication, the process of connecting to the NA console validates that the password for the NA user in the NA database meets the security policies and has not expired. Additionally NA user passwords might be used for device authentication.

To view the User Authentication page, on the menu bar under Admin, select Administrative Settings and click User Authentication. The User Authentication page opens. For more information, see ["User Authentication Page Fields" on page 75](#).

## Authentication Failover

When NA is configured to use an external application for user authentication, NA can fail over to local (NA core server) authentication in certain cases.

NA attempts authentication failover for the following users:

- The administrator user account (UID = 1) created at NA installation.
- Any user account that is configured for failover. (The External Auth Failover checkbox is selected on the New User or Edit User page.)

If external authentication does not succeed, NA uses the following algorithm:

- If NA cannot connect to the external authentication application, NA attempts local authentication if the user attempting to log on to the NA console is UID = 1 or is configured for authentication failover. If the user is not configured for authentication failover, NA does not attempt local authentication and returns a normal authentication error.
- If NA connects to the external authentication application but that application returns an error, NA attempts local authentication if the user attempting to log on to the NA console is UID = 1. For any other users, NA does not attempt local authentication and returns a normal authentication error.
- For LDAP authentication only, if the user attempting to log on to the NA console does not exist in the directory service, NA attempts local authentication.

## LDAP Authentication

If your organization uses Microsoft Active Directory or Lightweight Directory Access Protocol (LDAP), you can import both your groups and users into NA. NA maintains active contact with your LDAP database, remaining current on who can and cannot log into applications.

Even when external user authorization is enabled, it is possible to login to NA if network problems make the LDAP server unreachable. If NA cannot connect to the designated LDAP server, users who have previously logged in to NA can login to NA using their NA user password. You can setup a NA password on the My Profile page. For more information, see ["My Profile Page Fields" on page 235](#).

Make sure that no LDAP user has the same username as the NA System Administrator. The default System Administrator's username is "admin," but it can be changed. If there is a name conflict between the default administrator and another LDAP user, it may prevent the default administrator from logging in to NA.

If a user is created in NA and deleted in LDAP, that user can login to NA again using his/her NA password (not LDAP password).

For information about setting up external authentication for LDAP, see ["LDAP External Authentication Setup" on page 82](#).

## SecurID Authentication

The RSA SecurID solution provides for two-part authentication. It requires something known by the user (a password or PIN) and something accessible to the user (a tokencode generated by RSA software or hardware). The tokencode generally changes every 60 seconds. For more information, see ["Using SecurID" on page 612](#).

## TACACS+ Authentication

Cisco IOS software currently supports several versions of the Terminal Access Controller Access Control System (TACACS) security protocol, including TACACS+. TACACS+ provides detailed accounting information and flexible administrative control over authentication and authorization processes.

Using your TACACS+ server (typically CiscoSecure ACS) to authenticate users provides the following benefits:

- NA users need only remember a single username and password
- NA user administration can be centralized on the ACS server

- TACACS+ password restrictions can be easily enforced

Using your TACACS+ server to authenticate users into NA enables you to:

- Configure NA to use a TACACS+ server to authenticate user logins (to verify that the user has entered a valid username/password pair).
- Support TACACS+ authentication for the Telnet/SSH Proxy.
- Assign individual users a fallback password in NA.
- Identify TACACS+ users so their fallback password is only used when the TACACS+ server is inaccessible (but not if any user other than Admin has entered an invalid TACACS+ password).
- Configure multiple TACACS+ servers for fail-over purposes.

Keep in mind that NA needs to be defined in TACACS+ as an authenticating device, similar to any other router, along with a specific username. This enables users to login to NA and NA to login to their network devices.

**Note:** TACACS+ is not used for authorization/permissions. This means that the user must be added manually to NA and assigned proper permissions before they can be authenticated via TACACS+. Once a user is identified as a TACACS+ user in NA, you cannot remove this designation.

### Configuring TACACS+ Server in a Multimaster Distributed System/Horizontal Scalability Environment

To configure the TACACS+ external authentication server in an NA Multimaster Distributed System/Horizontal Scalability environment, you must first configure it on NAcore1 and then repeat the steps on each of the additional cores. To configure TACACS+ on NAcore1, follow these steps:

1. Add the NA server to the TACACS+ server.
2. On the NA server, go to **Admin > Administrative Settings > User Authentication**.
3. On the **Administrative Settings - User Authentication** page, enter the required information in the **TACACS+ / RADIUS Authentication** section. For more information about the fields in the **TACACS+ / RADIUS Authentication** section, see "[TACACS+ / RADIUS Authentication](#)" on page 76
4. On the NA server, create a new user with the same username as the TACACS+ user.
5. Log in to NA with the credentials of the TACACS+ user.

## RADIUS Authentication

RADIUS (Remote Authentication Dial-In User Service) enables:

- A network access server to operate as a RADIUS client. The RADIUS client is responsible for passing information to designated RADIUS servers and then acting on the returned responses.
- RADIUS servers to receive connection requests, authenticate users, and then return all necessary client configuration information for proper connection.
- RADIUS servers to act as a proxy client to other RADIUS servers or other authenticating servers.

**Note:** RADIUS is not used for authorization/permissions. This means that the user must be added manually to NA and assigned proper permissions before they can be authenticated via RADIUS. Once a user is identified as a RADIUS user in NA, you cannot remove this designation.

To enable TACAC+ or RADIUS authentication, On the menu bar under Admin, select Administrative Settings and click the User Authentication tab. The User Authentication page opens. Be sure to click Save when you are done.

## SAML Authentication

SAML is an open-standard data format for exchanging authentication and authorization data between an identity provider (IdP) and a service provider (SP). The most important requirement that is addressed by SAML is the web browser Single Sign-on (SSO).

The SAML specification defines three roles—a user, the IdP, and the SP. When a user requests a service from the service provider, the service provider requests and obtains an identity assertion from the identity provider. Based on the assertion, the service provider takes the access control decision—whether or not to perform service for the connected user.

NA can authenticate a user based on SAML when using the web user interface. When SAML is enabled as the external authentication for the web user interface, for CLI and API, you can use either the local credentials that are available in the NA database, or the credentials from an LDAP source. For more information, see ["SAML Authentication" on page 77](#) section of User Authentication Page Fields.

**Note:** For information about configuring and disabling SAML user authentication, see *Configuring NA to Support SAML User Authentication* in the *NA Administration Guide*.

NA uses the information in the SAML Authentication Statement to determine the NA user account name. The user account name is determined based on one of the following fields:

- The value of NameID as part of the subject in a SAML Assertion
- The value of an attribute that is a part of the SAML Assertion

NA consults the NA database to determine the user's validity and access privileges. The user account must be defined in the NA database. The password for the user account must meet the security policies for NA user credentials. The permissions granted to the user account control the user's access to the content in the NA database.

**Note:** When SAML is enabled, the NA session timeout is used to redirect to the IdP so that the session can be validated again. For example, if the NA session timeout is 1800 seconds, and the IdP session timeout is 3600 seconds, NA redirects to the IdP after 1800 seconds of inactivity. However, as the IdP session is active, the user continues to be logged on.

**Note:** When SAML is enabled and a new user is created, the user *must* change the password at least once, after the first log in. To change the password, on the NA Home page, under **My Settings**, click **Change Password**, and then enter the required details. For more information, see ["Change Password Page Fields" on page 238](#).

## Public Key Infrastructure (PKI)

NA can authenticate a user based on the information in an X.509-format certificate. The certificate can be installed into the browser that runs the NA console. Alternatively, the certificate can be on a separate device,



such as a smart card, that the user connects to the computer before opening the NA console. PKI user authentication enables both Common Access Card (CAC) and Personal Identity Verification (PIV) for user authentication into NA.

**Note:** For information about configuring and disabling PKI user authentication, see *Configuring NA to Support PKI User Authentication* in the *NA Administration Guide*.

With PKI user authentication, the following factors contribute to whether NA grants a user access to the NA console:

- NA user validity and access privileges
- Certificate conditions
- Certificate revocation

## NA User Validity and Access Privileges

NA determines the NA user account name from information in the certificate and consults a user directory to determine the user's validity and access privileges.

The NA user account name comes from either of the following certificate fields:

- An attribute of the Subject field  
The attribute value can contain an exact match or a superset of the NA user name.
- A value in the Subject Alternative Name field

The user directory can be either the NA database or a directory service accessed through LDAP.

- When connecting directly with NA, an NA user account must be defined for the subject (user name) of each certificate. The password for the user account must meet the security policies for NA user credentials. The permissions granted to the user account control the user's access to content in the NA database.

**Note:** When the certificate subject includes the at sign (@), replace this character with the underscore character (\_) in the NA user name. However, you can set the `replaceAtSign` parameter to `false` in the `appserver.rcx` file, and retain the at sign (@) in the NA user name in the certificate subject. For more information, see the *Configure NA for PKI User Authentication* topic in the *NA Administration Guide*.

- When connecting with a directory service, the directory service configuration defines each user's access to content in the NA database.

## Certificate Revocation Status

A certificate revocation list (CRL) identifies certificates that have been revoked before their expiration date. NA can use either or both of the following approaches to determine whether a non-expired certificate has been revoked:

- CRL checking  
NA periodically downloads the CRLs for the certificates used for logging on to NA. When a user attempts to log on to NA, NA checks the CRL for the user's certificate. If that certificate is not in the CRL, the certificate has not been revoked.

- Online Certificate Status Protocol (OCSP) checking

An OCSP responder periodically downloads the CRLs needed throughout the organization. When a user attempts to log on to NA, NA queries the OCSP responder for the user's certificate. If that certificate is not in a CRL, the OCSP responder returns a success message.

**Note:** The NA server must be able to access the CRL servers and the OCSP responder directly. Proxied connections are not supported.

## HPE Server Automation (HPE SA)

The HPE Server Automation option enables the NA system to use the HPE SA system for user authentication. As a result, HPE SA users can use their HPE SA credentials to login to NA. This option also enables you to display HPE SA servers in network diagrams and link to HPE SA servers from MAC Addresses. For more information, see ["NA/SA Integration" on page 180](#).

## HPE Operations Orchestration (HPE OO)

IT organizations often perform troubleshooting tasks manually using out-of-date troubleshooting guides that provide no audit trail of the actions being performed. Even when IT organizations deploy scripts as their automation solution, the scripts are hard to maintain and do not provide an audit trail.

The HPE OO option enables you to launch HPE OO flows in guided mode directly from the NA Web UI. To run unattended HPE OO flows, you must create a command script for the language "Flow". For information about launching unattended flows, see ["HPE Operations Orchestration \(HPE OO\) Flows" on page 556](#).

In general, the HPE OO enables you to centralize all of your routine triage, troubleshooting, and maintenance tasks within NA. You can define which HPE OO flows are available and then launch:

- An unattended HPE OO flow to collect and present data from a 3rd party system given either one or multiple device IP addresses. For more information, see ["HPE Operations Orchestration \(HPE OO\) Flows" on page 556](#).
- A predefined Manage Software Upgrade flow. This HPE OO flow removes the router from monitoring systems, removes the router from the OSPF mesh, upgrades the IOS image, and then re-inserts the device into the OSPF mesh and re-adds it to the monitoring system. For more information about the Process Automation option, see ["Edit Menu Options" on page 207](#).

For detailed information about HPE OO, see the *HPE Operation Orchestration User's Guide* and the *HPE Operation Orchestration Software Development Kit Guide*.

## Certificate Conditions

For tighter security, NA can accept only those certificates that match the specified type and source.

- The Enhanced Key Usage certificate field identifies the purposes of the certificate. If you specify one or more usage object identifiers (OIDs), NA does not accept certificates that do not include at least one of the specified OIDs.
- The Issuer certificate field identifies the certificate authority that generated the certificate. If you specify one or more trusted issuers, NA does not accept certificates from any other certificate authorities.

## User Authentication Page Fields

Field	Description/Action
<b>User Password Security</b>	
Minimum User Password Length	Enter the minimum number of characters a password must contain. Passwords with fewer characters than this number are considered invalid.
User Password Must Contain Upper and Lower Case	If checked, users must choose passwords that contain both lower-case and upper-case alphabetic characters.
Additional User Password Restriction	Select one the following options: <ul style="list-style-type: none"> <li>• No additional restrictions (the default)</li> <li>• Must contain at least one non-alphabetic digit or special character</li> <li>• Must contain at least one digit and at least one special character</li> </ul>
Maximum Consecutive Login Failures	Enter the maximum number of allowed consecutive user authentication failures. After the set number of allowed logon failures, the user is disabled. A value of 0 (zero) indicates that this check must be skipped. <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> This setting applies only to the local user authentication and not to any of the external authentication methods.</p> </div>
<b>External Authentication Type</b>	
External Authentication Type	Select the type of external authentication you would like to use. Options include: <ul style="list-style-type: none"> <li>• None (Local Auth)</li> <li>• HPE Server Automation</li> <li>• HPE Server Automation &amp; TACACS+</li> <li>• TACACS+</li> <li>• RADIUS</li> <li>• SecurID</li> <li>• SAML 2.0</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Caution:</b> Complete the steps in <i>Configuring NA to Support SAML User Authentication</i> in the <i>NA Administration Guide</i> before selecting this option on this page.</p> <p>For information about setting up the SAML Service Provider, see <a href="#">"Setting up the SAML Service Provider" on page 85</a></p> </div>

Field	Description/Action
	<p>For using LDAP as the authentication source for CLI/API when SAML is enabled, you must do an additional configuration. For more information, see <a href="#">"SAML Authentication" on the next page</a>.</p> <ul style="list-style-type: none"> <li>PKI           <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p><b>Caution:</b> Complete the steps in <i>Adding a Root Certificate to NA</i> in the <i>NA Administration Guide</i> before selecting this option on this page. Also see <i>Configuring NA to Support PKI User Authentication</i> in the <i>NA Administration Guide</i>.</p> </div> </li> <li>LDAP           <p>If you select HPE Server Automation, TACACS+, RADIUS, or PKI, configure that selection in the corresponding section on this page. If you select LDAP, click the LDAP Setup link. For more information, see <a href="#">"LDAP External Authentication Setup" on page 82</a>. SecurID has no additional external authentication options.</p> </li> </ul>
<b>TACACS+ / RADIUS Authentication</b>	
Primary TACACS+ or RADIUS Server	Enter the host name or IP address of the primary TACACS+ or RADIUS server.
Secondary TACACS+ or RADIUS Server	Enter the host name or IP address of the secondary TACACS+ or RADIUS server. This field is optional.
TACACS+ or RADIUS Secret	Enter the shared secret for the NA host configured on the TACACS+ or RADIUS server. A TACACS+ or RADIUS secret is the key (password) that the TACACS+ or RADIUS client (NA) uses to encrypt communications with the TACACS+ or RADIUS server. The client and server must agree on the secret so the server can decrypt the communications.
TACACS+ or RADIUS Authentication Method	<p>Select one of the following authentication methods used to encrypt communications between NA and the TACACS+ or RADIUS server:</p> <ul style="list-style-type: none"> <li>PAP (Password Authentication Protocol)</li> <li>CHAP (Challenge Handshake Authentication Protocol)</li> <li>MSCHAP (Microsoft Challenge Handshake Authentication Protocol)</li> <li>ARAP (TACACS+ only)</li> <li>ASCII (TACACS+ only)</li> </ul>
Use RADIUS NAS-IP instead of default NAS-	Selecting this option sends the RADIUS NAS-IP field using the NA Core information, instead of the default NAS-Identifier field. It will send the first non loopback IP address it finds for the NA Core.

Field	Description/Action
ID	<p><b>Note:</b> 'NAS' in this settings is not from the NA product. It is specific to RADIUS authentication.</p>
Fixed RADIUS NAS-IP string	<p>Enter a constant string to use as the RADIUS NAS-IP field instead of the default IP Address found. This option can be used to tell NA what IP address to use for the NAS-IP field, rather than letting NA use its default. This should only be necessary for multiple network interface card system or to set the field to an IP address not bound to the server.</p> <p><b>Note:</b> 'NAS' in this settings is not from the NA product. It is specific to RADIUS authentication.</p>
<b>SAML Authentication</b>	
Authentication source for CLI/API when using SAML	<p>The authentication source for CLI/API when SAML is enabled as the external authentication method for web user interface. For more information about configuring NA to support SAML, see <i>Configuring NA to Support SAML User Authentication</i> in the <i>NA Administration Guide</i>.</p> <p>Available options include:</p> <ul style="list-style-type: none"> <li>• HPE Network Automation—The NA database is the authentication source.</li> <li>• LDAP—A directory service database is the authentication source. After saving the configuration on this page, click the LDAP Setup link to configure the NA connection to the directory service. For more information, see "<a href="#">LDAP External Authentication Setup</a>" on page 82.</li> </ul>
<b>PKI Authentication</b>	
User Directory	<p>The location of the NA user definitions. These definitions limit who can log on to NA and what each user can access. Available options include:</p> <ul style="list-style-type: none"> <li>• HPE Network Automation—NA users are defined in the NA database.</li> <li>• LDAP—NA users are defined in a directory service database. After saving the configuration on this page, click the LDAP Setup link to configure the NA connection to the directory service. For more information, see "<a href="#">LDAP External Authentication Setup</a>" on page 82.</li> </ul>
Ordered Subject Attributes	<p><i>Optional.</i> Specify at least one value for either Ordered Subject Attributes or Ordered Subject Alternative Name Types.</p> <p>The portion of the certificate that contains the NA user name as specified in the user directory. This attribute must be in either the Subject field or in the Subject Alternative Name field of the certificate.</p> <ul style="list-style-type: none"> <li>• If the value of the attribute equates to the NA user name, enter the single attribute.</li> <li>• If the value of the attribute includes content beyond the NA user name, enter a regular expression that extracts the needed portion of the attribute.</li> </ul>

Field	Description/Action
	<p>For example, for an email address in the format first.last@example.com, the following regular expression extracts the first.last portion to be the NA user name: EMAILADDRESS=(^[^@]+).*</p> <p>Enter one or more subject attributes. Order is important. NA tries to match each subject attribute to the presented certificate and stops when a certificate contains that attribute. When this field contains multiple values, ensure that the first matching value for each certificate is the value that is configured as the NA user name. (To change the order, delete entries from the top of the list and re-add them to the bottom of the list.)</p> <p>For a list of supported attributes, see the X.509 certificate specification.</p>
<p>Ordered Subject Alternative Name Types</p>	<p><i>Optional.</i> Specify at least one value for either Ordered Subject Attributes or Ordered Subject Alternative Name Types.</p> <p>The type of data in the Subject Alternative Name field of the certificate. This data must match the NA user name as specified in the user directory.</p> <p>Supported types are:</p> <ul style="list-style-type: none"> <li>• rfc822Name, which must contain an email address</li> <li>• otherName, which might contain many values; NA can use only the principal name</li> </ul> <p>Enter one or more subject alternative name types. Order is important. NA tries to match each subject alternative name to the presented certificate and stops when a certificate contains that name. When this field contains multiple values, ensure that the first matching value for each certificate is the value that is configured as the NA user name. (To change the order, delete entries from the top of the list and re-add them to the bottom of the list.)</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> NA tries all Subject attributes before trying Subject Alternative Name values.</p> </div>
<p>Subject Alternative Name OID</p>	<p><i>Optional.</i> If the Subject Alternative Name type is otherName, enter <b>1.3.6.1.4.1.311.20.2.3</b>, which is the object identifier (OID) of the principal name in the other name of the Subject Alternative Name field.</p>
<p>Extended Key Usage</p>	<p><i>Optional.</i> To restrict the type of certificate that can be used for logging on to NA, enter the OID of each permitted certificate type from the Extended Key Usage field of the certificate.</p> <p>For example, to limit NA to accepting certificates on smart cards only, enter one OID: <b>1.3.6.1.4.1.311.20.2.2</b></p>
<p>Trusted Issuer</p>	<p><i>Optional.</i> To restrict the certificates that can be used for logging on the NA to only those generated by specific certificate authorities, enter the full distinguished name of each permitted certificate issuer from the Issuer field of the certificate. For example: CN=Hewlett Packard Enterprise Private Class 2 Certification Authority, O=Hewlett Packard Enterprise Company, C=US, OU=IT Infrastructure, O=HPE.com</p>
<p>Certificate Revocation Checking</p>	<p>The order in which NA uses the supported approaches to determine whether a certificate has been revoked. Available options include:</p> <ul style="list-style-type: none"> <li>• CRL followed by OCSP (the default)</li> </ul>

Field	Description/Action
Order	<ul style="list-style-type: none"> <li>OCSP followed by CRL</li> </ul> <p>For more information, see <a href="#">"Certificate Revocation Status" on page 73</a>.</p> <p><b>Note:</b> If certificate revocation list (CRL) checking and Online Certificate Status Protocol (OCSP) checking are not both enabled, this setting has no impact.</p>
Certificate Revocation Checking Requirements	<p>The extent of the checks to determine whether a certificate has been revoked.</p> <p>Available options include:</p> <ul style="list-style-type: none"> <li>Check all—If the first check returns either success or not applicable, also run the other check.</li> <li>First response—If the first check returns a response, use that response. Run the other check only when the first check does not return a response.</li> </ul> <p><b>Note:</b> If certificate revocation list (CRL) checking and Online Certificate Status Protocol (OCSP) checking are not both enabled, this setting has no impact.</p>
Enable Certificate Revocation List (CRL) Checking	<p>The CRL check specification.</p> <ul style="list-style-type: none"> <li>If NA should use CRL checking to test certificate revocation, select this check box, and then configure the CRL checking behavior.</li> <li>If NA should not use CRL checking to test certificate revocation, clear this check box.</li> </ul>
CRL Checking Mode	<p>The strictness of the CRL check to determine whether a certificate has been revoked.</p> <p>Available options include:</p> <ul style="list-style-type: none"> <li>Require and use CRL specified—The certificate must specify a CRL, this page must identify a CRL location, or both. NA must be able to access the CRL. The certificate must not be on the CRL.</li> <li>Enforce CRL if specified—If the certificate specifies a CRL or if this page identifies a CRL location, NA must be able to access the CRL and the certificate must not be on the CRL.</li> <li>Attempt to use CRL if specified—If the certificate specifies a CRL or if this page identifies a CRL location and NA can access the CRL, the certificate must not be on the CRL. However, if NA cannot access the specified CRL, NA assumes that the certificate has not been revoked.</li> </ul> <p>If the certificate specifies a CRL and the CRL Locations field contains any values, NA checks the CRLs listed in this field and ignores any CRLs specified in certificates.</p>
CRL Refresh Period	<p>The frequency with which NA downloads active CRLs. An active CRL is one that has been used to check a certificate within the CRL Refresh Timeout value.</p> <p>Specify either hours (h) or days (d). The minimum value is 1h. The default value is 1d.</p>
CRL Refresh Timeout	<p>The length of time that NA keeps inactive CRLs. If a CRL has not been used to check a certificate within this timeframe, NA discards the CRL and does not retrieve an updated file until it is needed.</p>

Field	Description/Action
	Specify either hours (h) or days (d). The minimum value is 1h. The default value is 3d.
CRL Locations	<p><i>Optional.</i> To override the CRL specification in certificates, enter the full path to each CRL in HTML format. Supported protocols are:</p> <ul style="list-style-type: none"> <li>• HTTP</li> <li>• HTTPS</li> <li>• File on the NA server</li> </ul> <p>When overriding the CRL specification, NA checks the CRLs listed in this field and ignores any CRLs specified in certificates.</p>
Enable Online Certificate Status Protocol (OCSP) Checking	<p>The OCSP check specification.</p> <ul style="list-style-type: none"> <li>• If NA should use OCSP checking to test certificate revocation, select this check box, and then configure the OCSP checking behavior.</li> <li>• If NA should not use OCSP checking to test certificate revocation, clear this check box.</li> </ul>
OCSP Checking Mode	<p>The strictness of the OCSP check to determine whether a certificate has been revoked. Available options include:</p> <ul style="list-style-type: none"> <li>• Require and access OCSP responder specified—The certificate must specify an OCSP responder, this page must identify a URL, or both. NA must be able to access the OCSP responder, which must return success.</li> <li>• Enforce OCSP responder if specified—If the certificate specifies an OCSP responder or if this page identifies a URL, NA must be able to access the OSCP responder, which must return success.</li> <li>• Attempt to access OCSP responder if specified—If the certificate specifies an OCSP responder or if this page identifies a URL and NA can access the OCSP responder, the OCSP responder must return success. However, if NA cannot access the specified OCSP responder, NA assumes that the certificate has not been revoked.</li> </ul> <p>If the certificate specifies an OCSP responder and the URL of OCSP Responder field contains a value, NA contacts the OCSP responder identified in this field and ignores any OCSP responders specified in certificates.</p>
Enable Sending Nonce in OCSP Request	<p>The nonce specification. When using nonces, NA attaches a random number to each OCSP request. The nonce alters the encryption of the message, which prevents an interceptor from impersonating either end of the communication.</p> <ul style="list-style-type: none"> <li>• To attach a nonce to each request to the OCSP responder, select this check box.</li> <li>• To not use nonces, clear this check box.</li> </ul>
URI of OCSP Responder	<p><i>Optional.</i> To override the OCSP responder specification in certificates, enter the full URI to an OCSP responder. Supported protocols are:</p> <ul style="list-style-type: none"> <li>• HTTP</li> <li>• HTTPS</li> </ul> <p>When overriding the OCSP responder specification, NA contacts the OCSP responder</p>



Field	Description/Action
	identified in this field and ignores any OCSP responders specified in certificates.
<b>HPE Server Automation Authentication</b>	
Twist Server	Enter the host name or IP address of the HPE Twist server. Refer to the <i>HPE Server Automation User's Guide</i> for information.
Twist Port Number	Enter the Twist port number (typically 1032) to connect to the HPE Twist server. Refer to the <i>HPE Server Automation User's Guide</i> for information.
Twist Username	Enter the Twist Web-services API (wsapi) username, typically <i>wsapiReadUser</i> .
Twist Password	Enter the Twist Web-services API (wsapi) password.
OCC Server	Enter the HPE Command Center (OCC) host name for linking to connected servers. The OCC server is the HPE Server Automation (HPE SA) Web UI client. NA can create hyperlinks to HPE SA. As a result, you can jump from the NA Server page to the HPE SA Server page. For more information, see <a href="#">"Servers Page Fields" on page 203</a> .
Default User Group	Select the name of the user group to which you can add HPE SA authenticated users from the drop-down menu. This group enables you to set default permissions for HPE SA users. For more information, see <a href="#">"NA/SA Integration" on page 180</a> .
<b>HPE Operations Orchestration Authentication</b>	
OO Hostname	Enter the hostname or IP address of the HPE OO server.
OO Port	Enter the HPE OO port number to connect to the HPE OO server.
OO Service	Select one of the following connection options to the HPE OO service: <ul style="list-style-type: none"> <li>• https://</li> <li>• http://</li> </ul> The HPE OO service uses SSL or plain text.
OO Username	Enter the HPE OO Username.
OO Password	Enter the HPE OO password.
Guided Flow Names	Enter a guided flow name in the right-hand box and click Add Pattern <<. The flows applies to all device families. For example, if you prefix the guided flow name with <i>Cisco IOS:flow 1</i> , the guided flow applies to all devices that belong to the Cisco IOS device family. You can select a guided flow name in the left-hand box and then click Delete Pattern to delete the guided flow name.  For information on configuring flows, see the <i>HPE Operations Orchestration User's Guide</i> . For information about logging on to HPE OO, see the <b>Process Automation</b> field description in <a href="#">"Edit Menu Options" on page 207</a> .

# LDAP External Authentication Setup

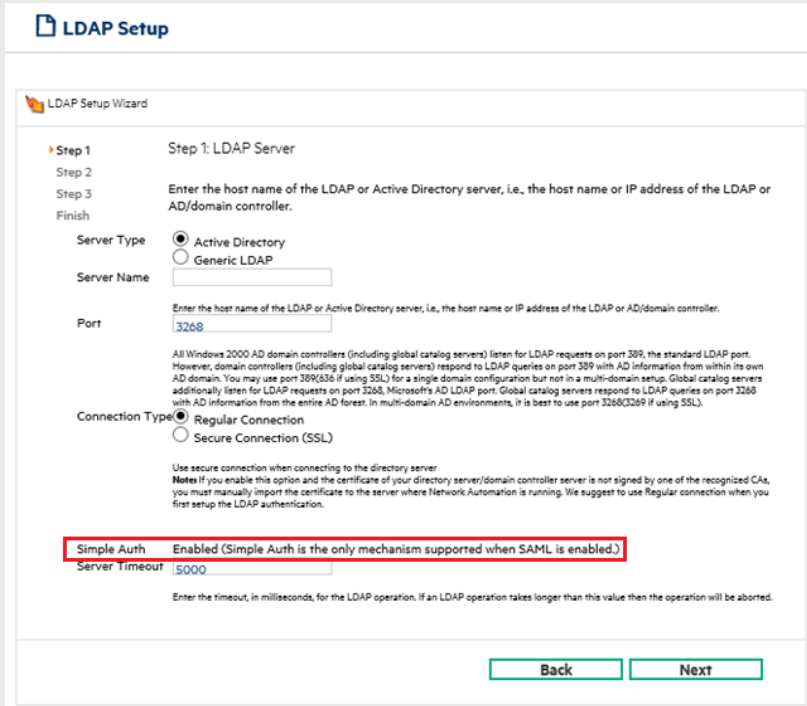
To enable LDAP external authentication:

1. On the menu bar under Admin, select Administrative Settings and click User Authentication. The Administrative Settings - User Authentication page opens.
2. Scroll down to the External Authentication Type field.
3. In the External Authentication Type field, select LDAP, and click Save.
4. Click the LDAP Setup link (You can also access the link through **Admin > Additional Setups for External Authentication > LDAP Setup**). The LDAP Setup Wizard opens. If you have previously setup LDAP authentication, the following information is displayed:
  - LDAP Authentication Status
  - LDAP Authentication Server Host
  - Port number
  - Connection User Name
  - Connection user password
  - Search Base
  - If you using a secure connection
  - Server timeout

**Note:** NA checks that the fields are the same each time a user logs in. If necessary, NA updates the User field information with the corresponding information from LDAP. For example, if the NA administrator manually updates User A in NA and changes User A's Email address, the next time User A logs in, NA automatically changes User A's Email address to the value found in LDAP.

The following table guides you through the setup process.

Step	Action
1	<p>At the Welcome to the LDAP Setup Wizard page, click Next. Enter the following information and click Next:</p> <ul style="list-style-type: none"><li>• Server Type —Select the server type, either Active Directory (the default) or Generic LDAP.</li><li>• Server Name — Enter the hostname of the LDAP or Active Directory server (the hostname or IP address of the AD/domain controller).</li><li>• Port — Enter the LDAP request port number. Use port 389 or port 636 (for SSL) for a single domain configuration.</li><li>• Connection Type — Select either Regular Connection (the default) or Secure Connection (SSL). Be sure to select Secure Connection when connecting to the directory server.</li></ul>

Step	Action
	<p><b>Note:</b> If you enable this option and the certificate of your directory server/domain controller server is not signed by one of the recognized CAs, you must manually import the certificate to the server where NA is running.</p> <p>For detailed information about LDAP SSL Configuration, see the procedure that follows this table.</p> <ul style="list-style-type: none"> <li>• Simple Auth - Select one of the following options: <ul style="list-style-type: none"> <li>• No - If you enable this option, NA automatically adds LDAP users or groups and synchronizes user information from LDAP.</li> <li>• Yes - If you enable this option, LDAP is used only for authentication. NA does not automatically add LDAP users or groups and does not synchronize user information. Users must be created manually in NA. The passwords entered while creating new users is used only during authentication failover. For more information about authentication failover, see <a href="#">"Authentication Failover" on page 69.</a></li> </ul> </li> </ul> <p><b>Note:</b> When SAML is enabled, <b>Simple Auth</b> is the only available option, and is enabled by default as shown in the following image:</p>  <ul style="list-style-type: none"> <li>• Server Timeout — Enter the timeout, in milliseconds, for the LDAP operation. If an LDAP operation takes longer than this value, the operation will be aborted.</li> </ul>
2	<p>Enter the following information and click Next:</p> <ul style="list-style-type: none"> <li>• Connection User Name — Enter the connection user name. Keep in mind that to query user</li> </ul>

Step	Action
	<p>information from the AD server, NA should bind to the AD server with a domain user account (DN). The DN can be in the Windows 2000 LDAP format or in Windows 2000 User Principal Name (UPN) format. The Windows 2000 UPN format is a short-hand notation that uniquely identifies the DN in the LDAP tree. Both the user account and respective domain are included in the UPN. An example of a Windows 2000 UPN DN is <i>jsmith@hpe.com</i>.</p> <ul style="list-style-type: none"><li>• Connection User Password — Enter the connection user password</li><li>• Search Base — Enter the search base. The search base is the starting point in the LDAP directory for LDAP searches. Ideally, the search base should be set to the root domain of the entire AD forest. This enables NA to query the entire Windows 2000 AD forest. If the search base is set at a particular OU level, only child objects of that particular OU can be queried. Similarly, if the search base is set at a particular domain level, only child objects of that particular domain can be queried. For this reason, the search base should be as general as possible.</li></ul>
<b>3</b>	Indicate which security groups can access NA. You can use the Find option to locate user groups in LDAP and click Next.
<b>4</b>	<p>You can verify the External Authentication setup by entering the user name and passwords then click the Test Login button. Be sure to click the Save button to save the setup information. If there are no errors, the following message is displayed and the External Authentication Setup Summary page is updated:</p> <p>Successfully updated External Authentication settings.</p>

## LDAP SSL Configuration

1. Enable secure socket layer (SSL) communication over LDAP for the Windows domain controllers as described in Microsoft documentation.
2. Set up and export a Base-64 encoded certificate from the Active Directory server.  
For information, see the applicable Microsoft documentation.
3. Copy the following files to the NA core server:
  - Base-64 encoded certificate from the Active Directory server
  - Root certificate of the Certificate Authority
4. At a Windows command prompt, change to the following directory:  
<NA\_HOME>\jre\bin
5. Enter the following commands:
  - a. `keytool -import -file <PATH_TO_THE_CERT_FILE> -alias ADSCert -keystore ../../server/ext/jboss/server/default/conf/truecontrol.keystore`  
The keystore password is sentinel.  
  
Replace the `PATH_TO_THE_CERT_FILE` with the absolute path to the certificate file on the NA core server.
  - b. `keytool -import -file <PATH_TO_THE_ROOT_CERT_FILE> -alias ADSRootCert -keystore ../../server/ext/jboss/server/default/conf/truecontrol.truststore`  
The keystore password is sentinel.  
  
Replace the `PATH_TO_THE_ROOT_CERT_FILE` with the absolute path to the root certificate file on the NA core server.
6. Restart the NA services. For more information, see ["Start, Stop, or Restart All NA Services" on page 702](#).

**Tip:** If you restart the NA services from the NA console, the keystore changes are not loaded.

**Note:** In a Horizontal Scalability environment, you must configure the LDAP external authentication manually on each of the NA core.

## Setting up the SAML Service Provider

To set up NA as the SAML Service Provider (SP), follow these steps:

1. On the menu bar under Admin, select External Authentication Setup, and then click SAML Setup. The Build SAML Configuration File page opens.
2. On the Build SAML Configuration File page, enter the required details.

The following table describes the fields that appear on the page:

Field	Description
SP Entity ID	The unique identifier for the SAML SP entity.
Alias for signing certificate	The certificate alias used for signing the SAML authentication request.
Use same certificate	Select the check box if you want to use the same certificate for both signing and encryption.
Alias for encryption certificate	The certificate alias used for encrypting the SAML authentication response.
NameId Format	Select the name identifier format. The default value is transient.
IdP metadata file	Browse for the IdP metadata file that you want to import.

3. Do one of the following:
  - Click **Save & Export** if you want to configure NA as the SAML SP, and generate the SP metadata file. You must click this button when you set up NA as the SAML SP for the first time.
  - Click **Export** if you want to only generate the SP metadata file.

On successful generation of the SP metadata file (which is `na_spmetadata.xml` by default), the **Download NA SAML SP Metadata** page appears.

4. On the page, click Download. The downloaded SP metadata file is used for identity assertion from the IdP.
5. Restart the NA services.

## Server Monitoring

Server monitoring enables you to check on the overall health of the NA server. Alert notification and event logging are triggered when a error is discovered. All of the server monitors are pre-packaged and shipped with NA.

In the event that a monitor receives an error, a NA Monitor Error event is triggered and notification of the error is sent to the System Administrator. Keep in mind that the system will not continue to send Monitor Error events for that monitor when it is checked later and is still in an error state. Once a monitor is in an error state, and an event to that effect is triggered, the system will only send a Monitor Okay event if the state changes to okay.

**Note:** If the system is restarted and the error condition persists, a new Monitor Error event is triggered. If the database is inaccessible, the system will attempt to email that fact to the administrator.

The Server Monitoring page enables you to configure server monitors. You also have the option of enabling all or only specific server monitors. The results of the most recent monitor runs are stored in the Monitor log file and can be viewed in the System Status page.

**Note:** Only Administrators have permission to change monitoring tasks settings. All users can view monitoring results.

To view the Server Monitoring page, on the menu bar under Admin, select Administrative Settings and click Server Monitoring. The Server Monitoring page opens.

**Server Monitoring Page Fields**

Field	Description/Action
<b>Server Monitoring</b>	
Enable Server Monitoring	If checked (the default), server monitoring is enabled. Email notification in the event of an NA error is generated. The most recent results are stored in the Monitor log file and can be viewed from the System Status page. If not checked, the scheduled monitor check will no longer be executed. However, server monitors can still be run manually.
Delay on Startup Before Starting Monitoring	Enter the number of minutes to delay starting server monitoring after startup. The default is two minutes.
Delay Between Monitoring Runs	Enter the number of minutes to delay between monitoring runs. The default is 360 minutes.
Enable the ConfigMonitor	If checked, the Config monitor is enabled. This monitor checks that the installed .rcx files and other configuration files are okay. This monitor makes a backup of the initial installed .rcx files and keeps a backup of the latest error-free installed .rcx files.
Enable the DatabaseDataMonitor	If checked, the Database Data monitor is enabled. This monitor checks that all critical system components are in the database, for example that an admin user exists, that there is only one crypto key, that one paused or pending Inventory snapshot task exists, and so on. This monitor makes a backup of the crypto key and the admin email address (for use if the database server is down).
Enable the DatabaseMonitor	If checked, the Database monitor is enabled. This monitor checks for database connectivity, for example if there are invalid credentials or too many connections.
Enable the DiskMonitor	If checked, the Disk monitor is enabled. This monitor checks for low disk space conditions.
Enable the DynamicDeviceGroup Monitor	If checked, the DynamicDeviceGroup monitor is enabled. This monitor counts the number of dynamic device groups.
Enable the FTPMonitor	If checked, the FTP monitor is enabled. This monitor sends a FTP file with a timestamp to the local machine, and then checks the file system to verify it was written correctly.
Enable the HTTPMonitor	If checked, the HTTP monitor is enabled. This monitor ensures that the NA Web server is running correctly.

Field	Description/Action
Enable the LDAPMonitor	If checked, the LDAP monitor is enabled. This monitor checks that the LDAP server is available.
Enable the LicenseMonitor	If checked, the LicenseMonitor is enabled. This monitor checks if the available licenses drop below the percentage of managed devices and/or if the next license to expire is within the number of days specified. Refer to the "Monitor Configuration" section below for more information.
Enable the LogMonitor	If checked, the LogMonitor is enabled. The LogMonitor is responsible for managing log settings. When log levels are left at Trace or Debug for too long, system performance can suffer. The LogMonitor routinely checks for logs left at these lower levels and resets them to Error.
Enable the MemoryMonitor	If checked, the Memory monitor is enabled. This monitor checks for low memory conditions.
Enable the RMIMonitor	If checked, the RMI monitor is enabled. This monitor checks that RMI access to the NA EJBs is working. It ensures that some other EJB container (Java application server) has not grabbed the RMI port.
Enable the RunExternalTaskMonitor	If checked, the Run External Task monitor is enabled. This monitor ensures the NA server can run an external .bat or .sh file.
Enable the SatelliteMonitor	<p>If checked, the Satellite monitor is enabled. This monitor checks that Syslog and TFTP are running and that the Satellite is the same version as the NA Core. For information on NA Satellite configuration, see the <i>NA Satellite Guide</i>.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> To disable the TFTP checking in the satellite monitor, clear the <b>Enable the TFTPMonitor</b> check box. To disable the syslog checking in the satellite monitor, clear the <b>Enable the SyslogMonitor</b> check box.</p> </div>
Enable the SMTPMonitor	If checked, the SMTP monitor is enabled. This monitor makes a Telnet connection to Port 23 on the configured mail server, sends an SMTP QUIT command, and waits for the proper 221 response code.
Enable the SSHMonitor	If checked, the SSH monitor is enabled. This monitor tests the connection to the SSH server embedded in NA.
Enable the SyslogMonitor	If checked, the Syslog monitor is enabled. This monitor sends a Syslog message to NA and ensures that it is received by the NA Management Engine.
Enable the TelnetMonitor	If checked, the Telnet monitor is enabled. This monitor checks that the Telnet server embedded in NA is running correctly.
Enable the TFTPMonitor	If checked, the TFTP monitor is enabled. This monitor sends a TFTP file with a timestamp to the local machine, and then checks the file system to verify it was written correctly.
<b>Monitor Configuration</b>	
Check the Inventory	If checked, the Inventory snapshot in the Database Data monitor is checked.



Field	Description/Action
Snapshot in the DatabaseDataMonitor	
Warning Threshold for Free Disk Space	Enter the threshold to trigger the free disk space warning message. The default is 20 MB.
Error Threshold for Free Disk Space	Enter the threshold to trigger the free disk space error message. The default is 10 MB.
Drives To Monitor for Disk Space	Enter a drive in the right-hand box and then click Add Drive <<. To delete a drive, select the drive in the left-hand box and click Delete Drive.
Warning Threshold for Managed Devices Count	Enter a percentage of your total licenses. If the available licenses drop below this percentage, a warning is issued. Device count threshold defaults to 10%.
Warning Threshold for License Expiration	Enter a number of days. If the next license expires within the number of days specified, a warning is issued. The expiration date threshold defaults to 30 days.
Automatically reset logs to ERROR and close task logs when log monitor detects an issue.	This option is checked by default. When this option is checked, if the log monitor detects that a log has been set to too low a level for too long, it will automatically reset that log's level to ERROR.
Time that logs set to set TRACE level will not be reported as open too long.	The default is 48 hours. The time a log can be at TRACE level without the log monitor detecting it has been set too low for too long.
Time that logs set to set DEBUG level will not be reported as open too long.	The default is 48 hours. The time a log can be at DEBUG level without the log monitor detecting it has been set too low for too long.
Time that active task logs will not be reported as open too long.	The default is six hours. The time that active task logs will not be reported as open too long.
Warning Threshold for Free RAM	Enter the size threshold to trigger the free RAM warning message. The default is 64 MB.  <b>Tip:</b> If only one condition (size or percentage) is met, NA generates a warning message. If both conditions are met, NA generates an error message.
Warning Threshold for Free RAM	Enter the percentage threshold to trigger the free RAM warning message. The default is 15%.  <b>Tip:</b> If only one condition (size or percentage) is met, NA generates a

Field	Description/Action
	warning message. If both conditions are met, NA generates an error message.
Delay for SSH Thread Check	Enter the delay for the SSH Thread check. The default is 15000 milliseconds.
Delay for TFTP File Check	Enter the delay for the TFTP file check. The default is 5000 milliseconds.
Delay for FTP File Check	Enter the delay for the FTP file check. The default is 5000 milliseconds.
Delay for Syslog message to show up	Enter the delay for the Syslog message to be displayed. The default is 45000 milliseconds.

## NA/NNMi Integration

Integrating with HPE Network Node Manager i Software (NNMi) provides the following features and benefits in a system already running both NNMi and NA:

- NNMi incident integration
- Access from NNMi to NA device information:
  - Current configuration
  - Configuration history
  - Policy compliance status

**Note:** The HPE Network Automation Software Premium edition license does not include this functionality. It is available only with the NA Ultimate edition license. To determine your license level, on the NA console, see the **Feature** field on the License Information page (**Help > About Network Automation > View License Information** link).

- Operations efficiency

To enable the HPE NNMi–HPE NA integration, follow the procedure in the *HPE Network Node Manager i Software–HPE Network Automation Integration Guide*. This procedure includes configuring communication between NA and NNMi on the HPE NNMi–HPE NA Integration Configuration form in the NNMi console. The integration sets the corresponding fields on the NA/NNMi Integration page in the NA console.

To change the behavior of the HPE NNMi–HPE NA integration for out-of-service triggers and NNMi device rediscovery (configuration poll) triggers, update the configuration on the NA/NNMi Integration page in the NA console.

For detailed information about the HPE NNMi–HPE NA integration, see the *HPE Network Node Manager i Software–HPE Network Automation Integration Guide*, which is available from <https://softwaresupport.hpe.com>.

To view the NA/NNMi Integration page, on the menu bar under Admin, select Administrative Settings and click NA/NNMi Integration. The NA/NNMi Integration page opens.

### NA/NNMi Integration Page Fields

Field	Description/Action
<b>NNMi Integration Servers (Set by NNMi)</b>	
Integration Server List	<p>Each row in the table describes one connection between NA and one NNMi management server. The integration populates a row with the information on the HPE NNMi–HPE NA Integration Configuration form in the NNMi console. The table includes the following columns:</p> <ul style="list-style-type: none"> <li>• Integration Enabled—The status of the integration with the NNMi management server identified in the NNMi Server column.</li> <li>• NNMi Server—The name of the NNMi management server specified on the HPE NNMi–HPE NA Integration Configuration form in the NNMi console. Each value in this column is a link to the initial NNMi console view for this NNMi management server.</li> <li>• NNMi System ID—The unique identifier of the NNMi management server.</li> <li>• NNMi Protocol—The protocol for connecting to the NNMi web services as specified on the HPE NNMi–HPE NA Integration Configuration form in the NNMi console.</li> <li>• NNMi Port—The NNMi web services port specified on the HPE NNMi–HPE NA Integration Configuration form in the NNMi console.</li> <li>• NNMi User—The NNMi user name specified on the HPE NNMi–HPE NA Integration Configuration form in the NNMi console. NA connects to NNMi as this user.</li> <li>• NA User—The NA user account name specified on the HPE NNMi–HPE NA Integration Configuration form in the NNMi console. NNMi connects to NA as this user.</li> </ul>
<b>NNMi Integration Out-of-Service Settings (Set by NA)</b>	
The settings in this area apply to all NNMi management servers integrated with NA.	
Tasks That Place Device Out-of-Service	<p>The NA tasks that request NNMi to place the device out-of-service. NNMi does not generate incidents for out-of-service devices. After the task completes, the integration waits for the time shown in the Out-of-Service Completion Delay field and then requests NNMi to resume managing the device.</p> <p>The default selections are:</p> <ul style="list-style-type: none"> <li>• Update Device Software</li> <li>• Deploy Passwords</li> <li>• Reboot Device</li> </ul> <p>To disable this feature, clear all selections from the task list.</p> <p>For more information, see <i>Disabling Network Management During Device Configuration</i> in the <i>HPE Network Node Manager i Software–HPE Network Automation Integration Guide</i>.</p>
If the device task fails	<p>The integration behavior on failure of a task that placed a device out-of-service.</p> <p>Available options include:</p> <ul style="list-style-type: none"> <li>• Restore NNMi device management mode to the value saved prior to being placed out-of-</li> </ul>

Field	Description/Action
	<p>service. (This is the default setting.)</p> <ul style="list-style-type: none"> <li>• NNMi device remains out-of-service.</li> </ul>
If the device compliance check fails	<p>The integration behavior on failure of the compliance check triggered by a task that placed a device out-of-service.</p> <p>Available options include:</p> <ul style="list-style-type: none"> <li>• Restore NNMi device management mode to the value saved prior to being placed out-of-service. (This is the default setting.)</li> <li>• NNMi device remains out-of-service.</li> </ul>
Out of Service Completion Delay	<p>The time (in minutes) that the integration waits between completion of a task that placed a device out-of-service and restoring the NNMi device management mode. This delay provides time for devices to recover after NA completes the task.</p> <p>The default value is 10 minutes. The maximum value is 1440 minutes (24 hours).</p> <p>To change the maximum value, add the <code>nmm/integration/max_out_of_service_delay</code> option to the <code>adjustable_options.rcx</code> file.</p>
<p><b>NNMi Integration Device Config Poll Settings (Set by NA)</b></p> <p>The settings in this area apply to all NNMi management servers integrated with NA.</p>	
Tasks That Request NNMi Config Poll	<p>The NA tasks for which the integration triggers an NNMi device configuration poll on task completion. If the selected task is also selected in the Tasks That Place Device Out-of-Service field, the configuration poll request occurs after completion of the time shown in the Out-of-Service Configuration Delay field.</p> <p>The default selections are:</p> <ul style="list-style-type: none"> <li>• Update Device Software</li> <li>• Deploy Passwords</li> <li>• Reboot Device</li> <li>• Discover Driver</li> </ul> <p>For more information, see <i>Triggering NNMi Node Config Polls from NA</i> in the <i>HPE Network Node Manager i Software—HPE Network Automation Integration Guide</i>.</p>

## Viewing Monitor Results

The System Status page displays the results of the most recent monitor runs. To view the System Status page, on the menu bar under Admin, click **System Status**. The System Status page opens.

### System Status Page Fields

Field	Description/Action
Run All link	Run all of the listed monitors.

Field	Description/Action
Configure Server Monitoring link	Opens the Server Monitoring Page. For more information, see <a href="#">"Server Monitoring" on page 86</a> .
Monitor Name	Displays the monitor name. Each monitor can return a variety of messages about the subsystem it is monitoring. For more information, see <a href="#">"Monitor Messages" below</a> .
Status	Displays the monitor status, including: <ul style="list-style-type: none"> <li>• Okay</li> <li>• Warning</li> <li>• Error</li> <li>• Disabled</li> </ul>
Last Checked	Displays the date and time the monitor was last run.
Result	Displays information about the results.
Actions	You can select the following options: <ul style="list-style-type: none"> <li>• Run Now — Runs the monitor immediately.</li> <li>• View Details — Opens the Monitor Details page, where you can view details about the monitor, including a description of the monitor, the status, results, and additional diagnostic information.</li> <li>• Start/Stop Service — Opens the Start/Stop Services page. For more information, see <a href="#">"Starting and Stopping Services" on page 97</a>.</li> </ul>

## Monitor Messages

Each monitor can return a variety of messages about the subsystem it is monitoring. This section details some of these messages and possible corrective actions.

Monitor	Description/Resolution
BaseServerMonitor	<threadname> is not running. — A thread necessary for proper functioning of NA has failed for an unknown reason. You may have to restart the NA management engine.
ConfigMonitor	<ul style="list-style-type: none"> <li>• Missing file &lt;filename&gt;.rcx — One of NA's required configuration files is missing. Contact Support for assistance.</li> <li>• Error getting required config from &lt;filename&gt;.rcx — One of NA's configuration files has become corrupted. Contact Support for assistance.</li> <li>• Exception parsing rcx file: &lt;filename&gt; — One of NA's configuration files has become corrupted. Contact Support for assistance.</li> </ul>
DatabaseMonitor on Postgres	<ul style="list-style-type: none"> <li>• Cannot connect to the Postgres server on &lt;servername&gt;:5432. — There is noPostgres server running at the location where NA is trying to connect. You can</li> </ul>

Monitor	Description/Resolution
	<p>either restart the Postgres service or verify that the NA connection information is correct.</p> <ul style="list-style-type: none"> <li>• Communication link failure: java.io.IOException — The connection to the Postgres server has been lost. You may have to restart the NA management engine or restart the Postgres service.</li> <li>• Access denied for user: &lt;username&gt; to database &lt;database_name&gt; — NA is trying to connect to the wrong database or there is some permission problem with the existing database. Verify that the NA connection information is correct.</li> <li>• Invalid authorization specification: Access denied for user: &lt;username&gt; (Using password: YES) — NA is trying to connect using the wrong username or password. Reset the NA database username and password to the correct values.</li> <li>• General error: Table NA.RN_CRYPTO_KEY doesn't exist — NA can connect to the database using the credentials given, but the database is either not a NA database or is corrupt (as it is missing the RN_CRYPTO_KEY table). Verify that the NA connection information is correct.</li> </ul>
DatabaseMonitor on Oracle	<ul style="list-style-type: none"> <li>• Error establishing socket. Connection refused: connect — There is no Oracle server running at the location where NA is trying to connect. You may have to restart the Oracle service or verify that the NA connection information is correct.</li> <li>• Connection reset by peer: socket write error. — The connection to the Oracle server has been lost. You may have to restart the NA management engine or restart Oracle.</li> <li>• ORA-12505 Connection refused, the specified SID (&lt;database_name&gt;) was not recognized by the Oracle server. — NA is trying to connect to the wrong database name. Verify that the NA connection information is correct.</li> <li>• ORA-01017: invalid username/password; logon denied — NA is trying to connect using the wrong username or password. Reset the NA database username and password to the correct values.</li> <li>• ORA-00942: table or view does not exist — NA can connect to the database using the credentials given, but the database is either not a NA database or is corrupt (as it is missing the RN_CRYPTO_KEY table). Verify that the NA connection information is correct.</li> </ul>
DatabaseMonitor on SQLServer	<ul style="list-style-type: none"> <li>• Error establishing socket. — There is no SQLServer running at the location where NA is trying to connect. Either restart the SQLServer service or verify that the NA connection information is correct.</li> <li>• Connection reset by peer: socket write error — The connection to SQLServer has been lost. Either restart the NA management engine or restart SQLServer.</li> <li>• Cannot open database requested in login &lt;database_name&gt;. Login fails. — NA is trying to connect to the wrong database name or there is some permission problem with the existing database. Verify that the NA connection information is correct.</li> <li>• Login failed for user &lt;username&gt;. — NA is trying to connect using the wrong username or password. Reset the NA database username and password to the correct values.</li> <li>• Invalid object name RN_CRYPTO_KEY. — NA can connect to the database</li> </ul>

Monitor	Description/Resolution
	<p>using the credentials given, but the database is either not a NA database or is corrupt (as it is missing the RN_CRYPTO_KEY table). Verify that the NA connection information is correct.</p>
DatabaseData Monitor	<ul style="list-style-type: none"> <li>• Could not find an administrative user. — NA does not have an administrative user configured. Contact Support for assistance.</li> <li>• Multiple crypto keys exist. — NA contains multiple crypto keys in its database. Contact Support for assistance.</li> <li>• Current key does not match saved key. — NA is now using a different crypto key. Contact Support for assistance.</li> <li>• More than one crypto key. — NA is now using a different crypto key. Contact Support for assistance.</li> <li>• Could not find an Inventory group snapshot. — NA does not contain a task to collect configs from all of the devices in the system. Create a Snapshot task for the Inventory group.</li> <li>• Could not find a reporting task. — NA does not contain a task to generate summary reports. Create a Generate Summary Reports task.</li> <li>• Could not find a pruner task. — NA does not contain a task to prune old data from the database. Create a Prune Database task.</li> </ul>
DiskMonitor	<p>Disk/Filesystem &lt;filesystem&gt; has only &lt;space&gt; bytes free. Error threshold is &lt;limit&gt; bytes. — The NA server is close to filling up a disk drive. Delete unnecessary files from the disk drive.</p>
HTTPMonitor	<p>Did not get NA login page. — An application is running on the configured HTTP/HTTPS port, but it does not appear to be the NA web server. Stop any other web servers (e.g. IIS) running on the NA server and then restart the NA management engine.</p>
LDAPMonitor	<ul style="list-style-type: none"> <li>• ActiveDirectory is not in use. — This is an informational message that reveals the NA server is not configured to use LDAP.</li> <li>• Exception in LDAPMonitor: javax.naming. CommunicationException: &lt;hostname&gt;:389 — The host &lt;hostname&gt; does not exist. Correct the Server Name setting for external authentication.</li> <li>• Exception in LDAPMonitor: javax.naming. CommunicationException: &lt;hostname&gt;:389 — The host &lt;hostname&gt; exists but is not accepting connections on the LDAP port (389). Check that the Server Name setting is correct. If so, check that the LDAP server is running on that host.</li> <li>• Exception in LDAPMonitor: javax.naming.AuthenticationException — The Connection User Name or Connection User Password setting for external authentication is incorrect. Check that these settings are correct.</li> </ul>
LicenseMonitor	<p>Warnings such as “License about to expire” or “Device count exceeds the current threshold of available licenses” are displayed in the Results column. If no warnings are displayed, the number of available device licenses is displayed, for example, “3454 of 3600 device licenses remaining.” Click the View Details link to view details about the license, such as used and free licenses, and the license expiration date.</p>

Monitor	Description/Resolution
	<p><b>Note:</b> If multiple licenses are used, the expiration date is the date of the next license to expire.</p>
MemoryMonitor	<p>&lt;bytes&gt; bytes free. — This is how much memory is available to the system. It is approaching an insufficient amount for proper system functioning when an Error condition occurs. Contact Support for assistance.</p>
RMIMonitor	<p>Could not connect to RMI port 1099. — Another application is using the port 1099 that NA needs for its client and API to function properly. Stop the application that is using port 1099 and restart the NA management engine. If this is not possible, contact Support for assistance.</p>
RunExternalTask Monitor	<ul style="list-style-type: none"> <li>• CreateProcess: &lt;path&gt;\tc_test.bat error=5 — NA does not have permissions to access the test script (and possible other scripts). Check the file system permissions for NA's directories.</li> <li>• CreateProcess: &lt;path&gt;\tc_test.bat error=2 — NA cannot find the test script. Contact Support for assistance.</li> <li>• Running &lt;path&gt;\tc_test.bat from directory &lt;path&gt; Got result code: 0 Got output: &lt;text&gt; — The test script is corrupted. Contact Support for assistance.</li> </ul>
SMTPMonitor	<ul style="list-style-type: none"> <li>• SMTP Server name is blank. — The SMTP Server name administrative setting in NA is blank. Verify that a mailserver is set in the Administrative Settings page.</li> <li>• Can't open Telnet connection to &lt;hostname&gt; 25 — Either NA cannot connect to &lt;hostname&gt; or the host is not receiving connections on the SMTP port (25). Verify that the correct mailserver is set in the Administrative Settings page. Verify that the NA server can access port 25 on that server.</li> <li>• Timeout waiting Expected: 220 Received. — An application is running on port 23 on the configured mail server, but it does not appear to be an SMTP application since it is not responding with the proper SMTP codes. Verify that the correct mailserver is set in the Administrative Settings page.</li> </ul>
SSHMonitor	<p>Unknown problem connecting to SSH server. — The NA SSH server is not working correctly. Make sure no other application is listening to the SSH port that NA is using. Restart the NA management engine.</p>
SyslogMonitor	<p>Test syslog message did not get processed. — NA's built-in Syslog server is either not running or has some problem. Contact Support for assistance.</p>
TelnetMonitor	<ul style="list-style-type: none"> <li>• Can't open Telnet connection to &lt;hostname&gt; 23. — The NA Telnet server is not working correctly. Restart the NA management engine. If this does not correct the problem, contact Support for assistance.</li> <li>• Timeout waiting Expected: HPE Login: Received. — An application is running on the configured Telnet port, but it does not appear to be the NA Telnet server. Modify the NA Telnet server listening port.</li> </ul>
FTPMonitor	<ul style="list-style-type: none"> <li>• Connection timed out to the FTP server. — The FTP server is either not running or not accepting connections. Restart the FTP server.</li> </ul>



Monitor	Description/Resolution
	<ul style="list-style-type: none"> <li>• Test FTP file was written but could not be read successfully. Check FTP path setting. — The FTP file was successfully written to the FTP server, but could not subsequently be read from the filesystem. Check that the FTP path setting is correct in the NA management engine.</li> <li>• Found checkpoint file but timestamp is out of date. — The most recent file write attempt failed, and the system found a previous checkpoint attempt. This means that the FTP server worked at some point in the past but is not working now. Restart the FTP server.</li> </ul>
TFTPMonitor	<ul style="list-style-type: none"> <li>• Connection timed out to the TFTP server. — The TFTP server is either not running or not accepting connections. Restart the TFTP server.</li> <li>• Test TFTP file was written but could not be read successfully. Check TFTP path setting. — The TFTP file was successfully written to the TFTP server, but could not subsequently be read from the filesystem. Check that the TFTP path setting is correct in the NA management engine.</li> <li>• Found checkpoint file but timestamp is out of date. — The most recent file write attempt failed, and the system found a previous checkpoint attempt. This means that the TFTP server worked at some point in the past but is not working now. Restart the TFTP server.</li> </ul>

## Starting and Stopping Services

The primary functional units within NA include the following:

- NA Management Engine
- HPE Live Network
- TFTP, FTP, and Syslog servers

Typically, you would only stop, start, or restart a service when working with Customer Support.

To start/stop services or reload drivers, on the menu bar under Admin, click Start/Stop Services. The Start/Stop Services page opens.

**Note:** When using the Web user interface to start and stop NA services, you could lose the ability to navigate to the previous page. If you click the Back button, you could see a page with the text: null. Click your browser's Back button instead.

### Start/Stop Services Page Fields

Field	Description/Action
Management Engine	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Stop — Stops the Management Engine (also referred to as the NA server). This is the main service within NA.</li> <li>• Restart — Restarts the Management Engine.</li> </ul>

Field	Description/Action
HPE Live Network	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Reload Drivers — Enables you to reload NA drivers so that they are available when adding new devices. The Reload button does not discover drivers.</li> <li>Reload Content — Content is a suite of NA enhancements and extensions available from HPE which do not require a product upgrade. However, a subscription to some content service(s) may be required. For example, NA supports content import of software level policies via the HPE Security Service. As part of the HPE Security Service, you can download software level policies from HPE to assist you in managing network integrity. For more information, see <a href="#">"Software Levels Page Fields" on page 429</a>.</li> </ul>
TFTP Server	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Start — Starts the TFTP server. NA uses this primarily to retrieve and deploy configurations.</li> </ul> <p><b>Note:</b> TFTP provides the best performance. If TFTP is not available, NA uses Telnet or SSH to process configurations.</p> <ul style="list-style-type: none"> <li>Stop — Stops the TFTP server.</li> <li>Restart — Restarts the TFTP server.</li> </ul>
FTP Server	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Start — Starts the FTP server. NA uses this primarily to retrieve and deploy configurations.</li> </ul> <p><b>Note:</b> If FTP is not available, NA uses TFTP, Telnet, or SSH to process configurations.</p> <ul style="list-style-type: none"> <li>Stop — Stops the FTP server.</li> <li>Restart — Restarts the FTP server.</li> </ul>
Syslog Server	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Start — Starts the Syslog server. NA could be your only Syslog server, or other Syslog servers may forward messages to NA. NA uses Syslog messages to detect real-time change events and attribute them to users.</li> <li>Stop — Stops the Syslog server.</li> <li>Restart — Restarts the Syslog server.</li> </ul>

## Reviewing Drivers

The Drivers page displays a list of the installed drivers on your system and the number of drivers currently in use. The Drivers page enables you to determine which NA drivers were built in-house or endorsed by HPE, and as a result are supported by HPE.

To view the Drivers page, on the menu bar under Admin click Drivers. The Drivers page opens.

### Drivers Page Fields

Field	Description/Action
Reload Drivers link	Enables you to reload drivers when you have added, removed, or updated drivers for NA.
Description	Displays the driver name.
Internal Name	Displays the unique driver name used to identify the driver. This is used by Support.
Package Name	Displays the driver package name.
Version	Displays the driver version.
Build Number	Displays the current NA build number.
Author	Displays the name of the person who wrote the driver. If not specified, it implies that the driver was built in-house by HPE.
Certified	Displays if the driver is certified. A certified driver is a NA driver either created by HPE, or created by third party and endorsed by HPE.
In Use	Displays if the driver is currently in use.

# Chapter 3: Adding Devices and Device Groups

Use the following table to quickly locate information.

Topic	Refer to:
Getting Started	"Getting Started" below
Adding Devices	"Adding Devices" on page 102
Editing Devices	"Edit Device Page Fields" on page 108
Bare Metal Provisioning	"Bare Metal Provisioning" on page 113
Adding New Device Templates	"Adding New Device Templates" on page 117
Using the Add Device Wizard	"Using the New Device Wizard" on page 121
Importing Devices	"Importing Devices" on page 122
Creating Device Password Rules	"Creating Device Password Rules" on page 127
Adding Device Groups	"Adding Device Groups" on page 132
Dynamic Groups	"Dynamic Device Groups" on page 135
Device Selector	"Device Selector" on page 137
Viewing Device Groups	"Viewing Device Groups" on page 139
Segmenting Devices and Users	"Segmenting Devices and Users" on page 142
Setting Up The HPE Gateway	"Setting Up The HPE Gateways" on page 145
Editing Device Groups	"Editing Device Groups" on page 151
Editing a Batch of Devices	"Editing a Batch of Devices" on page 152
Discovering Device Drivers	"Discovering Device Drivers" on page 154
Listing Telnet/SSH Session	"Listing Telnet/SSH Sessions" on page 156
Using a Bastion Host	"Using a Bastion Host" on page 159

## Getting Started

When you add a device, HPE Network Automation Software (NA):

1. Auto-detects and assigns the correct device driver to enable communication with the device. This process is called Driver Discovery.
2. Takes a snapshot of the device to collect the system information and initial configuration.
3. Runs the set of core diagnostics, such as “NA Interfaces” and “NA Routing Table”. (For a complete list of diagnostics, see ["View Menu Options" on page 185.](#))

To successfully discover and snapshot a device, NA requires full access to the device, and may also require SNMP read access to the device.

Keep in mind that console servers are used to provide access to devices that are not currently reachable on the IP network, and may only be reachable via a serial connection over the device’s console port, for example devices with either a hardware failure, located in protected networks, or that do not run the IP protocol (IPX, ATM, and so on).

If you want to use a standard console server, for example a Cisco AS5xxx, that uses SSH authentication, you can connect from the console server to the target device by Telnetting to the console server loopback address with the appropriate port number. To do this, you must:

- Configure the desired device(s) to use the SSH connection method.
- Configure the desired devices to use bastion host access. Be sure to provide the address and credentials for the console server as the bastion host.
- Set the device to use device-specific credentials (since in this case each device will have a different target port).
- Configure the appropriate access variables on each affected device. These variables might include:
  - `hop_prompt = >` (The Cisco console server prompt.)
  - `hop_target_connect_protocol = telnet` (Use Telnet to connect from console server to target device.)
  - `hop_telnet_cmd_host = <loopback IP>` (IP address of the loopback on the console server.)
  - `hop_telnet_cmd_port = <device port>` (Port number of the target device on the console server.)

**Note:** Telnet Console servers with simple authentication, where the target device is still specified by port, can be supported using a set of Access Variable `console_xxx`. More complex Telnet console server configurations could require the use of customized bastion host access.

A bastion host is a host that has elevated privileges to access sections of a protected network that most other hosts cannot. This enables a management system to use a bastion host as a “hop” in managing elements on the protected network for which the bastion host has privileges. Typically, a bastion host is used for Internet and DMZ routers/switches, Extranet partners, and secured and/or private networks.

In both cases, NA uses console servers and bastion hosts as a means of accessing a device (usually via the CLI) to perform its normal management functions when other access methods, for example Telnet, SSH, FTP/TFTP, and SNMP, are not available.

**Note:** If all access methods are enabled, NA uses the following order to access devices: SSH, Telnet, SNMP, and Console. NA also performs file transfers before screen scrapes. For example, SSH+SCP, SSH+TFTP, SSH+Screen Scrape, Telnet+SCP, Telnet+TFTP, Telnet+Screen Scrape, SNMP+TFTP, and Console+Screen Scrape.

## Device Groups Naming Convention

When referencing system generated device groups associated with policies, the device groups naming convention has been updated. For example, in previous releases, a device group named `DynamicCfgPolicyxxxx` (where `xxxx` is the name of the device group used for creating a group of devices for which to apply a policy), is now named `Config Policy Group - CONFIGPOLICYNAME - TIMESTAMP` (where `CONFIGPOLICYNAME` is the name of the configuration policy the device group was created from and `TIMESTAMP` is the time the device group was created).

## About Service Types

Some device drivers define one or more service types for the associated devices. Service types can identify the device's purpose, are searchable, and can be used to create groups.

The NA-defined service types identify protocols (for example: OSPF, BGP, IS-IS, or MPLS) or specialized services (for example: Power over Ethernet ports or VoIP) that the device supports.

Define additional service types in the Custom Service Types field on the **Administrative Settings - Configuration Mgmt** page.

Assign custom service types to a device on the **Edit Device** page.

## Adding Devices

To add a new device, on the menu bar under Devices, select New, and then click Device. The New Device page opens. After you add a new device, you can either click the Save button or the Save And Add Another button.

**Note:** The Detect Network Devices task enables you to locate devices on your network that you want to place under NA management. Once you provide a range of IP addresses, NA scans your network looking for devices. For more information, see "[Detect Network Devices Task Page Fields](#)" on page 345.

## New Device Page Fields

Field	Description/Action
Use Wizard link	Opens the New Device Wizard. For more information, see " <a href="#">Using the New Device Wizard</a> " on page 121.  <b>Tip:</b> The New Device Wizard opens automatically when no devices are present.
IP Address (or DNS name)	Enter the device's IP address or DNS host name.
Hostname	Enter the device's host name, if applicable.

Field	Description/Action
Site <name>	<p>Select a Partition from the drop-down menu. This field is only displayed if you have configured one or more Security Partitions. In addition, the field name can be modified on the Partitions page. (For more information, see <a href="#">"Partitions Page Fields" on page 149.</a>)</p> <p>In general, a Security Partition is a grouping of devices with unique IP addresses. Multiple Security Partitions can be managed by a single NA Core. A NA Core in an installation of a NA server, comprised of a single Management Engine, associated services, and a single database.</p> <div style="background-color: #e0e0e0; padding: 5px; border: 1px solid #ccc;"> <p><b>Note:</b> If a Security Partition applies to a Device/Device Group, there could be additional drop-down menus for each Security Partition. (For more information about Security Partitions, see <a href="#">"Segmenting Devices and Users" on page 142.</a>)</p> </div>
Belongs to Groups	<p>Displays the group(s) to which the device will be a member. Use the Device Selector to select groups. For information about how to use the Device Selector, see <a href="#">"Device Selector" on page 137.</a></p>
Change Detection and Polling	<p>The change detection and polling setting. Possible values are:</p> <ul style="list-style-type: none"> <li>• Enabled—NA periodically polls the device to verify the stored configuration against the device's actual configuration.</li> <li>• Polling Only—NA polls the device for changes as part of the regular polling task only.</li> <li>• Disabled—NA does not periodically poll or otherwise manage the device.</li> </ul>
Management Status	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Active — When checked (the default), NA records changes to the device.</li> <li>• Pre-production — When checked, the device is designated as a pre-production device. A pre-production device is a device that is not yet active in the production network.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; border: 1px solid #ccc;"> <p><b>Note:</b> Bare metal devices must use the pre-production status.</p> </div> <ul style="list-style-type: none"> <li>• Inactive — When checked, NA does not record changes to the device. It is a good idea to select this options if the device is not supported or is not in active use. Making devices inactive reduces network traffic and frees resources.</li> </ul>
Device Driver	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Auto Discover Driver — When checked (the default), NA queries the device using SNMP or Telnet and assigns the most appropriate device driver.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; border: 1px solid #ccc;"> <p><b>Note:</b> If you are editing an existing device, the option changes to Re-discover Driver.</p> </div> <ul style="list-style-type: none"> <li>• Specify Driver — When checked, either the driver that is currently assigned to</li> </ul>

Field	Description/Action
	the device is displayed, or you can select from the list of available drivers from the drop-down menu.
Comments	Comments about the device.
<b>Password Information</b>	
Use network-wide password rules	<p>If checked (the default), NA uses a network-wide device password rule that applies to a device. Using network-wide password rules is a highly scalable method for setting device credentials.</p> <div style="background-color: #e0e0e0; padding: 10px;"> <p><b>Note:</b> For large networks where groups of devices share the same credentials, use Device Password Rules. This enables you to consolidate device credentials in one place for easy manageability. For more information about creating device password rules, see "<a href="#">Creating Device Password Rules</a>" on page 127.</p> </div>
Use this password rule first/Last used password rule	<p>If selected, NA first tries the selected device password rule.</p> <p>If NA is not able to access the device using the selected device password rule, NA tries the last successfully used device password rule. If that rule also does not provide devices access, NA tries the remaining device password rules.</p> <p>NA changes the rule selection to be the successfully used device password rule.</p>
Use device-specific password information	<p>If checked, NA uses authentication credentials that are specific to the device. Enter the following information to implement device-specific password rules.</p> <ul style="list-style-type: none"> <li>• Username — Enter the username that is used to access the device, if needed. If your devices are configured to use a AAA solution, such as TACACS+ or RADIUS, create a AAA user account and use those AAA credentials as the device credentials.</li> <li>• Password — Enter the password that NA uses to access the device.</li> <li>• Confirm Password — Enter the password again for confirmation.</li> <li>• Enable Password — Enter the enable password that NA needs to access privileged mode. Most configuration changes require the enable password.</li> </ul> <div style="background-color: #e0e0e0; padding: 10px;"> <p><b>Note:</b> Some devices may not require a password to access the privileged mode, for example Nortel ASN/ARN. Some devices can be configured to disable the password for the privileged mode. Check with your network administrator for site specific configurations.</p> </div> <ul style="list-style-type: none"> <li>• Confirm Enable Password — Enter the enable password again.</li> <li>• SNMP Read-Only Community String — Enter the SNMP password that NA uses to Read SNMP values.</li> <li>• SNMP Read/Write Community String — Enter the SNMP password that NA uses to modify Read/Write SNMP values.</li> <li>• SNMPv3 Username — Enter the SNMPv3 username that is used to access the</li> </ul>



Field	Description/Action
	<p>device.</p> <ul style="list-style-type: none"> <li>• SNMPv3 Authentication Password — Enter the SNMPv3 authentication password that NA uses to access the device.</li> <li>• Confirm SNMPv3 Authentication Password — Enter the SNMPv3 authentication password again for confirmation.</li> <li>• SNMPv3 Encryption Password — Enter the SNMPv3 encryption password.</li> <li>• Confirm SNMPv3 Encryption Password — Enter the SNMPv3 encryption password again for confirmation.</li> </ul>
<b>Device Access Settings</b>	
Device Access Settings	<p>NA is designed to work with most networks and network devices. However, unique device configurations can affect NA's ability to manage certain devices. Device access settings enable you to tailor NA to adapt to your network configuration. Device access settings are tied to device password information. The device-specific settings you enter are applied only if you choose to use device-specific passwords. Network-wide device settings can be added to your password rules. For more information about TACACS+ authentication, see <a href="#">"TACACS+ Authentication" on page 70</a>. For more information about using SecurID, see <a href="#">"Logging On to the NA Console Using SecurID" on page 616</a>.</p> <div style="background-color: #f0f0f0; padding: 5px;"> <p><b>Note:</b> For detailed information on how to use device access settings, click the "How To Use Device Access Settings" link. The access.variables help file opens in a new browser window.</p> </div>
<b>NAT Information</b>	
NAT IP Address	<p>Enter the internally-configured IP address of the device if it is different from the primary IP address NA uses to access the device.</p> <div style="background-color: #f0f0f0; padding: 5px;"> <p><b>Note:</b> If you are using NAT, be sure to enter the IP address that NA should use to access the device in the Device IP box at the top of the page.</p> </div>
TFTP Server IP Address	Enter the NATed IP address of the NA server local to the device.
FTP Server IP Address	Enter the NATed IP address of the NA server local to the device.
<b>Connection Information</b>	
Connection Method	<p>NA can communicate with your network devices using any combination of the following protocols. Select one or more protocols that you want to use. NA chooses the most efficient protocol available at any given time from those you select.</p> <ul style="list-style-type: none"> <li>• SNMP</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• SNMPv1 or SNMPv2c (community string authentication)</li> <li>• SNMPv3 (user authentication) — With SNMPv3, you have the following options: noAuthNoPriv (username only), authNoPriv (username, authentication password), and authPriv (username, authentication, and encryption password). Authentication methods include SHA (Secure Hash Algorithm) and MD5 (Message Digest Algorithm). Encryption methods include DES (Data Encryption Standard), 3DES (Triple DES), AES (Advanced Encryption Standard), AES128, AES192, and AES256.</li> <li>• RLogin</li> <li>• Telnet</li> <li>• SSH (You can select either SSH1 or SSH2 (the default), SSH1 Only, or SSH2 Only.)</li> <li>• Console Server (via Telnet) check box — In addition to the standard network connections, NA can connect to a device through a console server. Also, if the standard connections fail, the Telnet/SSH Proxy automatically fails-over to the console settings when connecting users to devices. If checked, enter the IP address or hostname of the console server, along with the port number.</li> <li>• Only use console server check box — By default, you must select at least one connection method. Telnet is used as the default. If checked, this option enables you to not check any of the above connection methods.</li> </ul>
Transfer Protocol	Select one or more of the following transfer protocols: <ul style="list-style-type: none"> <li>• SCP</li> <li>• SFTP</li> <li>• FTP</li> <li>• TFTP</li> <li>• HTTP</li> <li>• HTTPS</li> </ul>
Bastion Host	If the “Use a Unix or Linux Bastion Host for Telnet and SSH access” check box is checked, enter the: <ul style="list-style-type: none"> <li>• IP address or hostname of the Bastion Host.</li> <li>• Username (typically root) used to access the Bastion Host.</li> <li>• Password used to access the Bastion Host.</li> <li>• Password again for confirmation.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> To modify Bastion Host information, go to "<a href="#">Device Managed IP Addresses Page Fields</a>" on page 209.</p> </div>
<b>Syslog Configuration</b>	
Configure Syslog on Device for	If checked (the default), and if either by driver discovery or you assigned a driver to each device, NA takes the following steps for each device:

Field	Description/Action
Configuration Change Detection	<ol style="list-style-type: none"> <li>1. Takes a snapshot of the configuration.</li> <li>2. Updates the configuration to send Syslog messages to NA.</li> <li>3. Writes a comment in the configuration indicating that the device was auto-configured to enable change detection.</li> <li>4. Takes a final snapshot.</li> </ol> <p>You can select one of the following options:</p> <ul style="list-style-type: none"> <li>• Set device to log to NA Syslog Server — Checked by default if the Configure Syslog on Device for Configuration Change Detection check box is checked.</li> <li>• Device logs to a syslog relay, set the correct logging Level — Enter the IP address or hostname of the relay host. If a relay host has been entered before, it appears here by default.</li> </ul>
<b>ACL Parsing</b>	
	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Enabled — If enabled (the default), ACL data is stored for the device upon each snapshot. Keep in mind that ACLs are not loaded in until a snapshot is taken.</li> <li>• Disabled — If disabled, ACL data is not stored for the device upon each snapshot.</li> </ul>
<b>Additional Information</b>	
<p>Keep in mind that NA populates some of the following fields automatically from the device snapshot process. If you manually populate these fields, your data is overwritten each time the device is polled.</p>	
Device Description	The user-defined description of the device.
Model	Enter the manufacturer's model number for the device.
FQDN	Enter the domain to which the device belongs. This is detected if the Resolve FQDN Administration option is selected.
Serial Number	Enter the manufacturer's serial number for the device.
Vendor	Enter the vendor of the device, for example Cisco or Nortel.
Asset Tag	Enter your company's asset tag number for the device.
Location	Enter the physical or logical location of the device in your network.
Hierarchy Layer	<p>A hierarchy layer is a device attribute. You can set a device's hierarchy layer when adding or editing a device. As a result, when configuring a network diagram, you can select which hierarchy layers to filter. For example, you could select to diagram your entire network (Inventory) and then filter on "Core" to get only your Core devices—devices with a hierarchy layer set to Core. For information about diagramming your network, see <a href="#">"Diagramming" on page 591</a>.</p> <p><b>Note:</b> The options provided below are default hierarchy layers. For more</p>

Field	Description/Action
	<p>information, see <a href="#">"Editing the appserver.rcx File" on page 599</a></p> <p>Select a hierarchy layer from the drop-down menu. Options include:</p> <ul style="list-style-type: none"> <li>• Layer not set</li> <li>• Core</li> <li>• Distribution</li> <li>• Access</li> <li>• Edge</li> </ul>
Custom Service Type	<p>The available user-defined service types.</p> <p><i>Optional.</i> Select one or more service types to associate with the device.</p> <p>For more information, see <a href="#">"About Service Types" on page 102</a>.</p>

## Edit Device Page Fields

Field	Description/Action
IP Address (or DNS name)	Displays the device's IP address or DNS host name.
Hostname	Displays the device's host name, if applicable.
Site <name>	<p>Displays the Site name. Note that the field's name can be modified on the Partitions page. (For more information, see <a href="#">"Partitions Page Fields" on page 149</a>.) In general, a Security Partition is a grouping of devices with unique IP addresses. Multiple Security Partitions can be managed by a single NA Core. A NA Core in an installation of a NA server, comprised of a single Management Engine, associated services, and a single database.</p> <p><b>Note:</b> If a Security Partition applies to a Device/Device Group, there could be additional drop-down menus for each Security Partition. (For information about Security Partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a>.)</p>
Belongs to Groups	Displays the group(s) to which the device will be a member. Use the Device Selector to select groups. For information about using the Device Selector, see <a href="#">"Device Selector" on page 137</a> .
Change Detection and Polling	<p>The change detection and polling setting. Possible values are:</p> <ul style="list-style-type: none"> <li>• Enabled—NA periodically polls the device to verify the stored configuration against the device's actual configuration.</li> <li>• Polling Only—NA polls the device for changes as part of the regular polling task only.</li> <li>• Disabled—NA does not periodically poll or otherwise manage the device.</li> </ul>

Field	Description/Action
Management Status	<p>Options include:</p> <ul style="list-style-type: none"> <li>Active — When checked (the default), NA records changes to the device.</li> <li>Pre-production — When checked, the device is designated as a pre-production device. A pre-production device is a device that is not yet active in the production network.</li> </ul> <p><b>Note:</b> Bare metal devices must use the pre-production status.</p> <ul style="list-style-type: none"> <li>Inactive — When checked, NA does not record changes to the device. It is a good idea to select this options if the device is not supported or is not in active use. Making devices inactive reduces network traffic and frees resources.</li> </ul>
Device Driver	<p>Options include:</p> <ul style="list-style-type: none"> <li>Re-Discover Driver — When checked (the default), NA queries the device using SNMP or Telnet and assigns the most appropriate device driver.</li> <li>Specify Driver — When checked, either the driver that is currently assigned to the device is displayed, or you can select from the list of available drivers from the drop-down menu.</li> </ul>
Comments	Comments about the device.
<b>Password Information</b>	
Use network-wide password rules	<p>If checked (the default), NA uses a network-wide device password rule that applies to a device. Using network-wide password rules is a highly scalable method for setting device credentials.</p> <p><b>Note:</b> For large networks where groups of devices share the same credentials, use Device Password Rules. This enables you to consolidate device credentials in one place for easy manageability. For information about creating device password rules, see <a href="#">"Creating Device Password Rules" on page 127</a>.</p>
Use this password rule first/Last used password rule	<p>If selected, NA first tries the selected device password rule.</p> <p>If NA is not able to access the device using the selected device password rule, NA tries the last successfully used device password rule. If that rule also does not provide devices access, NA tries the remaining device password rules.</p> <p>NA changes the rule selection to be the successfully used device password rule.</p>
Use device-specific password information	<p>If checked, NA uses authentication credentials that are specific to the device. Enter the following information to implement device-specific password rules.</p> <ul style="list-style-type: none"> <li>Username — Enter the username that is used to access the device, if needed. If your devices are configured to use a AAA solution, such as TACACS+ or RADIUS, create a AAA user account and use those AAA credentials as the device credentials.</li> <li>Password — Enter the password that NA uses to access the device.</li> <li>Confirm Password — Enter the password again for confirmation.</li> <li>Enable Password — Enter the enable password that NA needs to access privileged</li> </ul>

Field	Description/Action
	<p>mode. Most configuration changes require the enable password.</p> <p><b>Note:</b> Some devices may not require a password to access the privileged mode, for example Nortel ASN/ARN. Some devices can be configured to disable the password for the privileged mode. Please check with your network administrator for site specific configurations.</p> <ul style="list-style-type: none"> <li>• Confirm Enable Password — Enter the enable password again.</li> <li>• SNMP Read-Only Community String — Enter the SNMP password that NA uses to Read SNMP values.</li> <li>• SNMP Read/Write Community String — Enter the SNMP password that NA uses to modify Read/Write SNMP values.</li> <li>• SNMPv3 Username — Enter the SNMPv3 username that is used to access the device.</li> <li>• SNMPv3 Authentication Password — Enter the SNMPv3 authentication password that NA uses to access the device.</li> <li>• Confirm SNMPv3 Authentication Password — Enter the SNMPv3 authentication password again for confirmation.</li> <li>• SNMPv3 Encryption Password — Enter the SNMPv3 encryption password.</li> <li>• Confirm SNMPv3 Encryption Password — Enter the SNMPv3 encryption password again for confirmation.</li> </ul>
Reset last used password rule	If checked, NA resets the last used password rule.
<b>Device Access Settings</b>	
Device Access Settings	<p>NA is designed to work with most networks and network devices. However, unique device configurations can affect NA's ability to manage certain devices. Device access settings enable you to tailor NA to adapt to your network configuration. Device access settings are tied to device password information. The device-specific settings you enter are applied only if you choose to use device-specific passwords. Network-wide device settings can be added to your password rules. For information about TACACS+ authentication, see <a href="#">"TACACS+ Authentication" on page 70</a>. For information about using SecurID, see <a href="#">"Logging On to the NA Console Using SecurID" on page 616</a>.</p> <p><b>Note:</b> For detailed information on how to use device access settings, click the "How To Use Device Access Settings" link. The access.variables help file opens in a new browser window.</p>
<b>NAT Information</b>	
NAT IP Address	Displays the internally configured IP address of the device if it is different from the primary IP address NA uses to access the device.

Field	Description/Action
	<p><b>Note:</b> If you are using NAT, be sure to enter the IP address that NA should use to access the device in the Device IP box at the top of the page.</p>
TFTP Server IP Address	Displays the NATed IP address of the NA server local to the device.
<b>Connection Information</b>	
Connection Method	<p>NA can communicate with your network devices using any combination of the following protocols. Displays one or more protocols that you are using. NA chooses the most efficient protocol available at any given time from those you select.</p> <ul style="list-style-type: none"> <li>• SNMP</li> <li>• SNMPv1 or SNMPv2c (community string authentication)</li> <li>• SNMPv3 (user authentication) — With SNMPv3, you have the following options: noAuthNoPriv (username only), authNoPriv (username, authentication password), and authPriv (username, authentication, and encryption password). Authentication methods include SHA (Secure Hash Algorithm) and MD5 (Message Digest Algorithm). Encryption methods include DES (Data Encryption Standard), 3DES (Triple DES), AES (Advanced Encryption Standard), AES128, AES192, and AES256.</li> <li>• RLogin</li> <li>• Telnet</li> <li>• SSH (You can select either SSH1 or SSH2 (the default), SSH1 Only, or SSH2 Only.)</li> <li>• Console Server (via Telnet) check box — In addition to the standard network connections, NA can connect to a device through a console server. Also, if the standard connections fail, the Telnet/SSH Proxy automatically fails-over to the console settings when connecting users to devices. If checked, enter the IP Address or Host Name of the console server, along with the port number. (To modify Console Server information when editing existing devices, go to <a href="#">"Device Managed IP Addresses Page Fields"</a> on page 209.)</li> </ul> <p><b>Note:</b> Connections to Cisco ASA child devices can go through the parent device. However, if the Telnet and SSH connection methods on the Cisco ASA child device do not match the parent device's connection methods, some communications could fail because the child device's connection method settings do not override the parent device's connection method settings.</p>
Transfer Protocol	<p>Transfer protocols include:</p> <ul style="list-style-type: none"> <li>• SCP</li> <li>• SFTP</li> <li>• FTP</li> <li>• TFTP</li> <li>• HTTP</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• HTTPS</li> </ul>
Bastion Host	To modify Bastion Host information, go to <a href="#">"Device Managed IP Addresses Page Fields" on page 209.</a> )
<b>ACL Parsing</b>	
	<p>Options include:</p> <ul style="list-style-type: none"> <li>• Enabled — If enabled (the default), ACL data is stored for the device upon each snapshot. Keep in mind that ACLs are not loaded in until a snapshot is taken.</li> <li>• Disabled — If disabled, ACL data is not stored for the device upon each snapshot.</li> </ul>
<b>Additional Information</b>	
Keep in mind that NA populates some of the following fields automatically from the device snapshot process. If you manually populate these fields, your data is overwritten each time the device is polled.	
Device Description	The user-defined description of the device.
Model	Displays the manufacturer's model number for the device.
FQDN	Enter the Fully Qualified Domain Name (FQDN) to which the device belongs. This is detected if the Resolve FQDN Administration option is selected.
Serial Number	Displays the manufacturer's serial number for the device.
Vendor	Displays the vendor of the device, for example Cisco or Nortel.
Asset Tag	Displays your company's asset tag number for the device.
Location	Displays the physical or logical location of the device in your network.
Hierarchy Layer	<p>A hierarchy layer is a device attribute. You can set a device's hierarchy layer when adding or editing a device. As a result, when configuring a network diagram, you can select which hierarchy layers on which to filter. For example, you could select to diagram your entire network (Inventory) and then filter on "Core" to get only your Core devices—devices with a hierarchy layer set to Core. For information about diagramming your network, see <a href="#">"Diagramming" on page 591.</a></p> <p><b>Note:</b> The options provided here are default hierarchy layers. For information about adding custom hierarchy layers, see <a href="#">"Editing the appserver.rcx File" on page 599.</a></p> <p>Select a hierarchy layer from the drop-down menu. Options include:</p> <ul style="list-style-type: none"> <li>• Layer not set</li> <li>• Core</li> <li>• Distribution</li> <li>• Access</li> </ul>



Field	Description/Action
	<ul style="list-style-type: none"><li>• Edge</li></ul>
Custom Service Type	The available user-defined service types. <i>Optional.</i> Select one or more service types to associate with the device. For more information, see <a href="#">"About Service Types" on page 102.</a>

## Bare Metal Provisioning

Bare Metal Provisioning is the process of taking a device out of the box and bringing it to a state where it can function in a production network. Bare metal devices have not yet been set up to a point where they could properly interact with NA. The most common scenario for a bare metal device is one that has not yet gone through an initialization procedure, for example an interactive CLI session, that configures the device to the point where it will respond appropriately to standard NA interaction.

**Note:** Bare metal devices are devices that are booting up for the first time, often running some form of “bootstrap” OS. NA can only interact with the device in a very limited way when using a bare metal driver.

In general, the bare metal provisioning process includes:

- **Preparation** — During preparation, devices are brought into the system and setup to the point where they are capable of accepting configurations, firmware, OS, and so on. These devices can have a temporary location on the network, but they are not setup with the IP information that matches their intended location within the network. The goal of the preparation stage is to get the device to a known good state that can accept the type of data NA intends to provision. As a result, the device will be able to handle configuration deployment, OS deployment, and custom scripting.
- **Prototyping** — Prototyping is the process of defining and maintaining device templates. Device templates are manipulated using similar mechanisms to other devices in NA, however, there is no actual device associated with the device templates. The goal of the prototyping stage is to be able to define device configuration and other provisioning information without having to have a device to work against. The secondary goal is to provide a means to define, maintain, and reuse the information.

**Note:** Device templates provide the ability to define configurations, OS/file specifications, and other device-specific information that can then be applied to existing devices. Device templates also have the ability to support certain device operations, such as policy checking without needing an actual device to test against. For more information, see ["Adding New Device Templates" on page 117.](#)

- **Provisioning** — During provisioning, an abstract device template is applied to a real device (usually a pre-production device). This application consists of taking the provisioning information of the device template and appropriately applying it to the device. For device template configurations, this would be a process of deploying the configuration. Provisioning also includes the ability to provide certain information that will customize the device template's provisioning information to that device. This information is similar to providing variable values for a custom script. The goal of the provisioning stage is to be able to apply the device configuration and other provisioning information of a device template to a real device.

The following outlines the bare metal provisioning steps.

1. Add the pre-production device to NA. For more information, see ["Adding Devices" on page 102](#). A pre-production device is a device that is not yet active in the production network.

**Note:** You do not have to add a pre-production device to NA before configuring device templates. However, to be able to deploy a device template to a pre-production device, the device must be managed by NA.

2. Configure a device template. A device template is an abstract device configuration, including OS/file system and configuration information which can be provisioned to other devices. For more information, see ["Adding New Device Templates" on page 117](#).
3. Connect to the bare metal device. Bare metal devices are a form of pre-production devices. Functionality is very limited to making a Telnet or SSH proxy connection, running a script against the device, attempting to discover a driver, and editing device settings. For more information, see ["Bare Metal Provisioning Scripts" on page 557](#).
4. Provisioning a device from a device template. For more information, see ["Provision Device Task Page Fields" on page 356](#). Note that you can search for device templates. For more information, see ["Searching for Device Templates" on page 530](#).

## Device Templates

Device templates enable you to define configurations and other device-specific information that can then be applied to existing devices. Device templates also have the ability to support certain device operations, such as policy checking, without needing an actual device to test against. For more information about the bare metal provisioning process, see ["Bare Metal Provisioning" on the previous page](#).

**Note:** Device templates are full configuration files that can be deployed to a device, completely overwriting any pre-existing data.

To access the Device Templates page, on the menu bar under Devices, select Device Tools and click Device Templates. The Device Templates page opens.

## Device Template Page Fields

Field	Description/Action
New Device Template link	Opens the New Device Template page. For more information, see <a href="#">"Adding New Device Templates" on page 117</a> .
Check Boxes	You can use the left-side check boxes to delete device templates. After selecting the device template, click the Actions drop-down menu and click Delete. The adjacent Select drop-down menu enables you to select or deselect all of the device templates.
Host Name	Displays device template's host name. Clicking the host name opens the Device Template Details page, where you can view additional information for a template. For more information,

Field	Description/Action
	see <a href="#">"Device Template Details Page Fields"</a> below.
Device Vendor	Displays the vendor of the device, for example Cisco or Nortel.
Device Model	Displays the manufacturer's model number for the device.
Partition	If you have created Partitions for security or business reasons, you can partition Device Password Rules for each device in a specific Partition. For more information about creating partitions, see <a href="#">"Segmenting Devices and Users"</a> on page 142.
Actions	<p>You can select the following actions:</p> <ul style="list-style-type: none"> <li>• Edit — Opens the Edit Device Template page. For more information, see <a href="#">"Device Template Page Fields"</a> on the previous page.</li> <li>• View Config — Opens the View Config page. For more information, see <a href="#">"Device Configuration Detail Page Fields"</a> on page 162.</li> <li>• Test Policy Compliance — Opens the Test Policy Compliance page. For more information, see <a href="#">"Test Policy Compliance Page Fields"</a> on page 432.</li> </ul>

## Device Template Details Page Fields

Selecting a device on the Device Template page opens the Device Template Details page for that device.

Menu Option	Description/Action
View Menu	<p>You can select the following options:</p> <ul style="list-style-type: none"> <li>• Device Template Home — Opens the Device Template page. For more information, see <a href="#">"Device Template Page Fields"</a> on the previous page.</li> <li>• Device Template Detail — Enables you to select specific Device Templates for which you want to view details.</li> <li>• Current Configuration — Opens the Configuration Detail page, where you can view the configuration currently set for this template and add comments. When you click the "Deploy to Device" option, you can schedule a configuration deployment or initiate an immediate configuration deployment.</li> <li>• Configuration History — Opens the Device Configurations page, where you can view configuration changes. For more information, see <a href="#">"Device Configurations Page Fields"</a> on page 161.</li> <li>• ACLs — Opens the Device ACLs page where you can view information on Access Control Lists (ACLs). For more information, see <a href="#">"Viewing ACLs"</a> on page 652.</li> <li>• Interfaces — Opens the Device Interfaces page, where you can view information on the device's interfaces. For more information, see <a href="#">"Device Interfaces Page Fields"</a> on page 188.</li> </ul>

Menu Option	Description/Action
Edit Menu	<p>You can select the following options:</p> <ul style="list-style-type: none"> <li>• Edit Configuration — Opens the Edit Configuration page with the current configuration, where you can edit the configuration and then deploy it. For more information, see <a href="#">"Edit Template Configuration Page" on the next page</a>.</li> <li>• Edit Device Template — Opens the Edit Device Template page. For more information, see <a href="#">"New Device Template Page Fields" on page 118</a>.</li> <li>• Delete Device Template — Enables you to delete the Device Template.</li> <li>• Save As A New Template — Enables you to save the current Device Template as a new Device Template. For more information, see <a href="#">"Device Template Page Fields" on page 114</a>.</li> <li>• Process Automation — Opens the HPE Operations Orchestration login page, where you can log in to HPE Operations Orchestration and launch HPE Operations Orchestration flows in guided mode. For information about using HPE Operations Orchestration, refer to the <i>HPE Operations Orchestration User's Guide</i>.</li> </ul>
Provision Menu	<p>You can select the following option:</p> <ul style="list-style-type: none"> <li>• Provision Device From Template — Opens the Device Template page for the device, where you can provision a different device using the current Device Template. For more information, see <a href="#">"Device Specific Template Page" on page 120</a>.</li> </ul>
Comments	Comments about the device.
Vendor	Displays the device manufacturer's name.
Model	Displays the device's model designation.
Driver Name	Displays the driver assigned to the device.
Device Type	Displays the type of device, such as router, switch, or firewall.
Device Origin	<p>The source of the initial device information in one of the following formats:</p> <ul style="list-style-type: none"> <li>• Added by &lt;import source&gt; through user &lt;user name&gt; (Create date: &lt;timestamp&gt;) The device import source is known.</li> <li>• Added on &lt;timestamp&gt; The device import source is unknown.</li> <li>• Manually added by &lt;user name&gt; (Create date: &lt;timestamp&gt;) The name user added the device manually.</li> </ul>
Last Configuration Change	The timestamp of the most recent device configuration change.
Management Status	Since device templates are not actual devices, and therefore cannot be designated as Active or Inactive, Device Template is displayed.

## Edit Template Configuration Page

A Device Template's configuration is essentially a script that can be used to replace a device's entire configuration file. The configuration should therefore be a complete working configuration file that a device can use at boot time.

Instead of creating a configuration from scratch, you can copy the configuration from a device already on your network using the "Save As New Template" command. For more information, see ["Edit Menu Options" on page 207](#).

Variables can be used to customize the configuration. Note that the '\$' character is reserved for the variable name. Use escape sequence `\x24` if you need to enter a literal '\$' in a Device Template.

**Note:** Variables beginning with the `tc_` are reserved for special use. You cannot define any variables that begin with that character sequence.

Custom variables, such as `$MyVar$` can have prompts defined for them using the Pull Variables button. The Pull Variables button refreshes the page, adding input fields at the bottom of the page for each variable used in the Device Template. Use these fields to define custom prompts for the variables and to limit the values that each prompt will accept:

- Allow multiple lines in value
- Limit Values To: (first, last, next-to-last)
- Password (If checked, NA does not echo the password when prompting for a value on the Run Command Script Task page.

Reserved variables, such as `$tc_device_hostname$` are automatically filled in with the value from the device or devices being provisioned. The values from the Device Template itself are not used for these variables.

**Note:** If you would rather have custom variables supplied in a CSV file, you can replace the existing `scriptField1`, `scriptFiled2`, and so on headers with the names of the custom variables from your Device Template. Using a CSV file enables a Device Template to provision several devices at once. Be sure to provide variable values for each device to be provisioned with the Device Template.

### Changing a Device's Primary IP Address

If you want to change a device's Primary IP Address as part of the Device Template Provisioning process, there is a special reserved variable for this purpose and used only for Device Templates: `$tc_device_primary_ip$`. Unlike other reserved variables, its value is supplied by you when the Provision Device task runs or in a CSV file. The CSV data file includes this variable as a column.

If you include `$tc_device_primary_ip$` in your Device Template's configuration, after the Provision Device task completes, NA updates the Primary IP Address used to access the device to this new value. NA will display the new Primary IP Address to identify the device in all reports and searches.

## Adding New Device Templates

The New Device Template page enables you to add a new device template.

To add a new device template, on the menu bar under Devices, select New and click Device Template. You can also access this page from the New Device Template link on the Device Templates page. The New Device Template page opens.

## New Device Template Page Fields

The New Device Template page enables you to configure a device template.

**Note:** The Edit Device Template page is identical to the New Device Template page, except that the fields are populated.

Field	Description/Action
Name	Enter the device template's name.
Partition	Select a Partition from the drop-down menu, if applicable. Keep in mind that the new device template will only apply to the devices in the Partition. For more information about creating partitions, see <a href="#">"Segmenting Devices and Users" on page 142.</a>
Device Driver	Select a driver from the list of available drivers from the drop-down menu
Comments	Comments about the device.
<b>Connection Information</b> (Although a device template is not an actual device, and cannot be connected to itself, devices that are provisioned from the device template can inherit these connection settings. For more information, see <a href="#">"Device Templates" on page 114.</a> )	
Connection Method	<p>NA can communicate with your network devices using any combination of the following protocols. Select one or more protocols that you want to use. NA chooses the most efficient protocol available at any given time from those you select</p> <ul style="list-style-type: none"> <li>• SNMP</li> <li>• SNMPv1 or SNMPv2c (community string authentication)</li> <li>• SNMPv3 (user authentication) — With SNMPv3, you have the following options: noAuthNoPriv (username only), authNoPriv (username, authentication password), and authPriv (username, authentication. and encryption password). Authentication methods include SHA (Secure Hash Algorithm) and MD5 (Message Digest Algorithm). Encryption methods include DES (Data Encryption Standard), AES (Advanced Encryption Standard), AES192, and AES256.</li> <li>• RLogin</li> <li>• Telnet</li> <li>• SSH (You can select either SSH1 or SSH2 (the default), SSH1 Only, or SSH2 only.)</li> </ul>
Transfer Protocol	<p>Select one or more of the following transfer protocols:</p> <ul style="list-style-type: none"> <li>• SCP</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• SFTP</li> <li>• FTP</li> <li>• TFTP</li> <li>• HTTP</li> <li>• HTTPS</li> </ul>
<b>ACL Parsing</b>	
	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Enabled — If enabled (the default), ACL data is stored for the device upon each snapshot. Keep in mind that ACLs are not loaded in until a snapshot is taken.</li> <li>• Disabled — If disabled, ACL data is not stored for the device upon each snapshot.</li> </ul>
<p><b>Additional Information</b></p> <p>Keep in mind that NA populates some of the following fields automatically from the device snapshot process. If you manually populate these fields, your data is overwritten each time the device is polled.</p>	
Device Description	The user-defined description of the device.
Model	Enter the manufacturer's model number for the device. The Resolve FQDN task enables you to set the FQDN (Fully Qualified Domain Name) for each device in the system by running a reverse DNS lookup on the device's primary IP address.
Vendor	Enter the vendor of the device, for example Cisco or Nortel.
Hierarchy Layer	<p>A hierarchy layer is a device attribute. You can set a device's hierarchy layer when adding or editing a device. As a result, when configuring a network diagram, you can select which hierarchy layers on which to filter. For example, you could select to diagram your entire network (Inventory) and then filter on "Core" to get only your Core devices—devices with a hierarchy layer set to Core. For information about diagramming your network, see <a href="#">"Diagramming" on page 591</a>.</p> <div style="background-color: #f0f0f0; padding: 10px; margin: 10px 0;"> <p><b>Note:</b> The options provided below are default hierarchy layers. For more information about adding custom hierarchy layers, see <a href="#">"Editing the appserver.rcx File" on page 599</a>.</p> </div> <p>Select a hierarchy layer from the drop-down menu. Options include:</p> <ul style="list-style-type: none"> <li>• Layer not yet set</li> <li>• Core</li> <li>• Distribution</li> <li>• Access</li> <li>• Edge</li> </ul>
Custom Service Type	The available user-defined service types.

Field	Description/Action
	<p><i>Optional.</i> Select one or more service types to associate with the device.</p> <p>For more information, see <a href="#">"About Service Types" on page 102.</a></p>

Be sure to click the Save button when you are finished or the Save And Add Another button if you want to add another device template.

## Device Specific Template Page

When you select the Provision Device From Template option from the Provision menu on the Device Template Details page, the Device Template page opens for that device. This page shows a list of devices that match the driver assigned to the device template, which can be provisioned from the device template.

Field	Description/Action
Display Devices	<p>Select one of the following options from the pull-down menu:</p> <ul style="list-style-type: none"> <li>• All</li> <li>• Active</li> <li>• Pre-production</li> </ul>
Host Name	<p>Displays the host name of the device. Clicking a host name opens the Device Detail page, where you can view information about the device and its configuration history.</p>
Device IP	<p>Displays the IP address of the device. Devices in red failed the last snapshot attempt. Inactive devices are marked with an icon beside the IP address. Clicking an IP address opens the Device Detail page, where you can view information about the device and its configuration history.</p>
Device Vendor	<p>Displays the name of the device manufacturer.</p>
Device Model	<p>Displays the model designation of the device.</p>
Partition	<p>Select a Partition from the drop-down menu, if applicable. Keep in mind that the new device template will only apply to the devices in the Partition. For more information about creating partitions, see <a href="#">"Segmenting Devices and Users" on page 142.</a></p>
Actions	<p>You can select the following options:</p> <ul style="list-style-type: none"> <li>• Provision Device — Opens the New Task - Provision Device page, where you can provision the device. For more information, see <a href="#">"Provision Device Task Page Fields" on page 356.</a></li> <li>• Compare Configuration — Opens the Compare Device Configurations page. For more information, see <a href="#">"Comparing Device Configurations" on page 166.</a></li> </ul>



# Using the New Device Wizard

To add devices using the New Device Wizard, on the menu bar under Devices, click New Device Wizard. The New Device Wizard opens.

## New Device Wizard Page Fields

Step	Description/Action
<b>Step 1: Create Device</b>	<p>Enter the following information:</p> <ul style="list-style-type: none"><li>• Hostname or IP — Enter the host name or IP address of the device.</li><li>• Comments — Enter any comments about the device.</li><li>• Management Status — Select either Active or Inactive.</li></ul> <div style="background-color: #f0f0f0; padding: 5px;"><p><b>Note:</b> Pre-production devices cannot be added via the New Device Wizard.</p></div> <p>When you are finished, click either:</p> <ul style="list-style-type: none"><li>• Next — Opens the Authenticate page. (See below)</li><li>• Finish — If the device was successfully added, the Add Device Wizard Congratulations page opens. This page provides information on any discovery issues.</li></ul>
<b>Step 2: Authenticate Device</b>	<p>Select one of the following options:</p> <ul style="list-style-type: none"><li>• Use network-wide password rules — If checked (the default), NA uses a network-wide device password rule that applies to the device. You can click the Create One link to create a network-wide password rule. For more information, see <a href="#">"Creating Device Password Rules" on page 127</a>.</li><li>• Use device-specific password — If checked, enter the following information for the device: Username, Password, Enable Password (if applicable), SNMP Read Community String, and SNMP Write Community String. For SNMPv3, enter authentication and encryption information.</li></ul> <p>When you are finished, click either:</p> <ul style="list-style-type: none"><li>• Back — You are returned to the Create Device step.</li><li>• Next — Opens the Configure page. (See below)</li><li>• Finish — If the device was successfully added, the Add Device Wizard Congratulations page opens. This page provides information on discovery issues.</li></ul>
<b>Step 3: Configure Device</b>	<p>NA attempts to discover the vendor and model of the device. If successful, NA retrieves and stores the device configuration. The device is then configured for change detection. If you do not want to configure the device for change detection, uncheck the Update Syslog Configuration on Device box. If the box is checked, select one of the following options:</p> <ul style="list-style-type: none"><li>• Log to HPE Network Automation's Syslog Server — Checked by default if the Update Syslog Configuration on Device box is checked.</li><li>• Log to existing Syslog Relay Host — Enter the host name or IP address of the relay host.</li></ul>

Step	Description/Action
	<p><b>Note:</b> NA will set the correct logging level for change detection.</p> <p>Click Finish. If the device was successfully added, the Add Device Wizard Congratulations page opens. This page provides information on any discovery issues.</p>

## Importing Devices

There are several ways to import devices from a comma-separated values (CSV) file:

- Using device password rules (usually assigned to group) and a CSV file.
- Importing device data in one CSV file and device password information in another CSV file.

To import devices using CSV files, use the New Task/Template – Import Devices task page (**Devices > Device Tasks > Import**). For more information, see ["Import Devices Task Page Fields" on page 327](#).

NA can be configured to regularly import devices from a CSV file. The first time you import devices, you will have to:

- Set up the Device Password Rules and have them applied to the Inventory group (all devices). For more information, see ["Creating Device Password Rules" on page 127](#).
- Configure the default connection method. For more information, see ["Device Access Page Fields" on page 33](#).
- Prepare the device import file (Device.csv). Keep in mind you can edit the Device.csv file or load it into a program such as Excel. For more information, see ["Creating CSV Files for Importing Device Data" below](#).

**Note:** The Detect Network Devices task enables you to locate devices on your network that you want to place under NA management. After you provide a range of IP addresses, NA scans your network looking for devices. For more information, see ["Detect Network Devices Task Page Fields" on page 345](#).

To import devices using groups and device password rules, make sure you have:

1. Defined groups for the devices you are importing. For more information, see ["Adding Device Groups" on page 132](#).
2. Defined network-wide password rules for each group. For more information, see ["Creating Device Password Rules" on page 127](#).
3. Created a *device.csv* file that includes the group to which each device belongs. For more information, see ["Creating CSV Files for Importing Device Data" below](#).
4. Discovered drivers for the imported devices. For more information, see ["Discovering Device Drivers" on page 154](#). For a detailed information about the supported devices, see the Driver Release Service (DRS) documentation . The DRS is an automated driver release and delivery system.

## Creating CSV Files for Importing Device Data

Use the import device data task to import information about devices, device groups, or device passwords into NA from CSV files. The first row of the CSV file contains the NA database column names for the data you are

importing. Each additional row represents one device, device group, or device-specific password.

NA provides templates for the CSV files. Note the following:

- Do not include columns unless you are populating them. An empty value overwrites existing data if the device already exists.
- The column names must match the database column names. Do not change the database column names set by NA.
- Because the data fields are comma-delimited, fields can include whites pace but not commas (.). Use a colon (:) to separate values within a field.
- Data fields that are string types cannot include any of the following characters: single quotation mark ('), quotation mark ("), angle brackets (< >).
- Column order is not significant.

### To create a CSV file for import

1. Navigate to the New Task/Template - Import Devices page.
2. Under Task Options, Data Type, click the appropriate CSV template link.
3. In an editing tool, do the following:
  - Add information to the data table.
  - To prevent overwriting existing data, delete any unused columns.
  - For information about the columns in the CSV file, see the appropriate section:
    - ["Device Data Import File" below](#)
    - ["Device Group Data Import File" on page 126](#)
    - ["Device-Specific Password Data Import File" on page 127](#)

**Note:** For a CSV file containing non-English characters, edit the file in a text editor, not Microsoft Office Excel. Save the CSV file with UTF-8 encoding.

4. Save the file as type CSV on the local system.

## Device Data Import File

The *device.csv* template file contains the NA database column names for device data. During import, NA uses the values in the primaryIPAddress and hostName columns, combined with the values in the optional siteName column, to uniquely identify devices in the database. Populate at least one of the primaryIPAddress or hostName columns.

### Device Import File Fields

Column Name	Description/Action
primaryIPAddress	The primary IP address for the device.  Either the primaryIPAddress or the hostName column must be included in each device data import file.

Column Name	Description/Action
	<p><b>Note:</b> In a NAT environment, specify the IP address that NA should use to access the device.</p> <p><b>Note:</b> This value can be set at device creation only.</p>
hostName	<p>The host name of the device.</p> <p>Either the primaryIPAddress or the hostName column must be included in each device data import file.</p> <p><b>Note:</b> This value can be set at device creation only.</p>
siteName	<p>The name of the site (partition) to which the device belongs.</p> <p><b>Note:</b> This value can be set at device creation only. It takes precedence over the Site selected on the Import Devices task page.</p>
deviceGroupName	<p>A colon-separated list of the device groups that contain the device.</p> <p>If a device group name does not exist, NA creates that device group with default properties.</p>
deviceDriver	<p>The name of the device driver.</p> <p><b>Tip:</b> It is recommended to not specify a device driver and let NA determine which driver to use.</p>
excludeFromPoll	<p>The polling setting for the device. Specify one of the following numeric values:</p> <ul style="list-style-type: none"> <li>• 1 — Disabled (do not poll the device automatically)</li> <li>• 2 — Polling Only (poll the device for changes as part of the regular polling task only)</li> </ul>
managementStatus	<p>The management status of the device. Specify one of the following numeric values:</p> <ul style="list-style-type: none"> <li>• 0 — Active (managed)</li> <li>• 1 — Inactive (not managed)</li> <li>• 3 — Pre-production (not yet fully configured)</li> </ul>
nATIPAddress	<p>The internally-configured IP address of the device, if different from the primary IP address NA uses to access the device.</p>
tFTPServerIPAddress	<p>The IP address of the TFTP server local to the device.</p>
accessMethods	<p>The connection methods for the device. This value is constructed as follows:</p>

Column Name	Description/Action
	<p>access_methods[+connect_methods[+console]], for example:</p> <ul style="list-style-type: none"> <li>• CLI:TFTP+ssh+console</li> <li>• CLI:FTP+ssh:telnet</li> <li>• SNMP:TFTP</li> </ul> <p>The value of accessMethods can be CLI, SNMP, TFTP, or FTP, and colon-delimited if more than one access method is supported.</p> <p><b>Note:</b> connect_methods only applies if CLI is supported, and can be SSH or Telnet, and colon-delimited if more than one method is supported.</p> <p>For more information, see <a href="#">"New Device Template Page Fields" on page 118</a>.</p>
consoleIPAddress	The IP address of the console associated with the device.
consolePort	<p>The port number for the console.</p> <p><b>Note:</b> Only Telnet is used to access console server.</p>
deviceName	<p>The description that identifies the device.</p> <p><b>Note:</b> NA updates this value with each device poll.</p>
model	<p>The manufacturer's model number for the device.</p> <p><b>Note:</b> NA updates this value with each device poll.</p>
primaryFQDN	The domain to which the device belongs.
serialNumber	The manufacturer's serial number for the device.
vendor	<p>The vendor of the device, for example Cisco or Nortel.</p> <p><b>Note:</b> NA updates this value with each device poll.</p>
assetTag	Your company's asset tag number for the device.
geographicalLocation	The physical or logical location of the device in your network.
performACLParsing	<p>The ACL parsing setting for the device. Specify one of the following numeric values:</p> <ul style="list-style-type: none"> <li>• 0 — Enabled (parse and store ACL data with each snapshot)</li> <li>• 1 — Disabled (do not parse ACL data with each snapshot)</li> </ul>
hierarchyLayer	The hierarchy layer for the device. Specify one of the following numeric values:

Column Name	Description/Action
	<ul style="list-style-type: none"> <li>• 1 — Core</li> <li>• 2 — Distribution</li> <li>• 3 — Access</li> <li>• 4 — Edge</li> </ul> <p><b>Note:</b> If additional hierarchy layers are configured, other values are possible. For more information, see <a href="#">"Editing the appserver.rcx File" on page 599</a>.</p> <p><b>Note:</b> NA updates this value with each device poll.</p>
comments	Additional information about the device. Do not include commas (,).
deviceCustom[1-6]	If additional device fields are defined on the Custom Data Setup page, you can import data for any of those fields. Use the column headings as defined in the template file.
<enhanced custom field name>	If enhanced custom fields are enabled and defined for devices, you can import data for any of those fields. Add one column for each field for which to import data. Set the column headings to the actual name of the enhanced custom fields in the NA database.

## Device Group Data Import File

The *device\_group.csv* template file contains the NA database column names for device group data. During import, NA uses the values in the deviceGroupName column to uniquely identify device groups in the database.

### Device Group Import File Fields

Column Name	Description/Action
deviceGroupName	<p>The name (255 character maximum) of the device group.</p> <p>This column must be included in each device group data import file.</p> <p><b>Note:</b> This value can be set at device group creation only.</p>
siteName	The name of the site (partition) to which the device group belongs.
comments	Description text (255 character maximum) about the device group. Do not include commas (,).
isParent	<p>The parent specification of the device group. Specify one of the following numeric values:</p> <ul style="list-style-type: none"> <li>• 0 — Not a parent (does not contain other device groups)</li> </ul>

### Device Group Import File Fields, continued

Column Name	Description/Action
	<ul style="list-style-type: none"><li>• 1 — Parent (contains other device groups)</li></ul>
shared	The visibility setting of the device group. Specify one of the following numeric values: <ul style="list-style-type: none"><li>• 0 — Private (visible only to the group owner and the System Administrator)</li><li>• 1 — Public (visible to all users)</li></ul>
parentDeviceGroupName	The name of the parent device group to which the device group belongs.  <b>Note:</b> This value must be a public device group.
deviceGroupCustom[1-6]	If additional device group fields are defined on the Custom Data Setup page, you can import data for any of those fields. Use the column headings as defined in the template file.

## Device-Specific Password Data Import File

The *device\_auth.csv* template file contains the NA database column names for device-specific password data. During import, NA uses the values in the *deviceIPAddress* column to uniquely identify devices in the database.

### Device-Specific Password Data Import File Fields

Column Name	Description/Action
deviceIPAddress	The primary IP address for the device.  This column must be included in each device password data import file.
readCommunityString	The SNMP read-only community string.
writeCommunityString	The SNMP read/write community string.
localUserName	The username that NA uses to access the device. If your devices are configured to use a AAA solution, such as TACACS+, create a AAA user account for NA and use those AAA credentials as the device credentials.
localPassword	The password that NA uses to access the device.
enablePassword	The enable password that NA needs to access privileged mode.

## Creating Device Password Rules

Device password rules enable you to apply the same username, password, and SNMP community strings to groups of devices, IP address ranges, or host names.

**Note:** Device password rules can only be applied to “public” device groups. You cannot apply a password rule to “private” device groups

When attempting to log in to a device, NA applies the applicable Device Password Rules list sequentially until the login succeeds, and then sets that rule as the device login. If the rule fails during a future login attempt, NA tries the applicable rules again in sequence until it finds a new valid login. This is configurable on the Device Access page. For more information, see ["Device Access Page Fields" on page 33](#).

**Note:** The “Always try last successful password first” and “Always try passwords in defined order” options can be set when creating device passwords. For more information, see ["Device Access Page Fields" on page 33](#).

To create Device Password Rules, on the menu bar under Devices select Device Tools and click Device Password Rules. The Device Password Rules page opens.

**Note:** The order of rules is significant. NA applies rules in the order shown on the Device Password Rules page. If you notice a persistent performance problem when taking snapshots, consider reordering the rules to place the most commonly-used rules at the top. You should also restrict rules to fewer groups or smaller IP ranges.

## Device Password Rules Page Fields

Field	Description/Action
New Password Rule link	Opens the Device Password Rule page. You can use this page to create and edit device password rules. For more information, see <a href="#">"Device Password Rule Page Fields" on the next page</a> .
Check Boxes	You can use the left-side check boxes to delete device password rules. After selecting the rules, click the Actions drop-down menu and click Delete. The adjacent Select drop-down menu enables you to select or deselect all of the rules.
Change Date	Displays the date and time the rule was last changed.
Rule Name	Displays the name of the rule.
Type	Displays the type of rule, either: <ul style="list-style-type: none"><li>• IP Range</li><li>• Host Name</li><li>• Device Group</li></ul>
Partition	If you have created Partitions for security or business reasons, you can partition Device Password Rules for each device in a specific Partition. Keep in mind that you can configure Device Password Rules to be shared by all devices in all Partitions, as well as for specific



Field	Description/Action
	<p>devices in specific Partitions. If the Device Password Rule is available to all Partitions, it is labeled [Shared]. For more information about creating partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p> <p><b>Note:</b> When creating Device Password Rules, you can select a Partition from the drop-down menu. For more information, see <a href="#">"Device Password Rule Page Fields" below</a>.</p>
Devices	Displays the rule's host name, IP address, or group name.
Created By	Displays the login name of the person who modified the rule. NA means the name is not available.
Actions	<p>You can select the following actions for each rule:</p> <ul style="list-style-type: none"> <li>• Edit—Opens the Device Password Rule page, where you can edit the rule. For more information, see <a href="#">"Device Password Rule Page Fields" below</a>.</li> <li>• Rule order—Device password rules are listed in priority order. Use the arrows to reorder the rules.</li> </ul>

## Device Password Rule Page Fields

**Note:** Passwords and SNMP community strings are stored in the NA database encrypted.

Field	Description/Action
<b>Rule Definition</b>	
Network-Wide Password Rule	If checked (the default), NA uses a network-wide device password rule that applies to all devices in the rule. Using a network-wide password rule is a highly scalable method for setting device credentials.
Rule Name	Enter the rule name.
Partition	Select a Partition from the drop-down menu, if applicable. Keep in mind that the Device Password Rule will only apply to the devices in the Partition. For more information about creating partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a> .
Insert Before	Select an existing rule name from the drop-down menu that this rule is to be inserted above.
IP Range	<p>If checked, enter the first and last IP addresses of the range to which the rule applies.</p> <ul style="list-style-type: none"> <li>• IPv4 addresses can include wild cards. For more information, see <a href="#">"Wildcards in IPv4 Address Ranges" on page 131</a>.</li> <li>• IPv6 addresses can be fully notated or use short form notation. IPv6 addresses cannot include wild cards.</li> </ul>

Field	Description/Action
Hostname	If checked, enter the host name for which this rule applies. Using wild cards (* or ?), you can apply this rule to a set of related devices.
Device Group	If checked, select the name of one group using the Device Selector to which this rule applies. To apply the rule to all devices, select Inventory. Remember that device password rules can only be assigned to a single device group.
Device-Specific Password Information	If checked, enter a device IP address. NA takes the current authentication information on this page and copies it to the specified device when you click the Save button.
<b>Password Information</b>	
Username	Enter the username that NA uses to access the device. If your devices are configured to use a AAA solution, such as TACACS+, create a AAA user account for NA and use those AAA credentials as the device credentials.
Password	Enter the password that NA uses to access the device.
Confirm Password	Enter the password again for confirmation.
Enable Password	Enter the enable password that NA needs to access privileged mode. Most configuration changes require the enable password.  <div style="background-color: #f0f0f0; padding: 5px; border: 1px solid #ccc;"> <p><b>Note:</b> Some devices may not require a password to access the privileged mode, for example Nortel ASN/ARN. Some devices can be configured to disable the password for the privileged mode. Please check with your network administrator for site specific configurations.</p> </div>
Confirm Enable Password	Enter the enable password again for confirmation.
SNMP Read-Only Community String	Enter the SNMP read-only community string.
SNMP Read/Write Community String	Enter the SNMP read/write community string.
SNMPv3 Username	Enter the SNMPv3 username that is used to access the device.
SNMPv3 Authentication	Enter the SNMPv3 authentication password that NA uses to access the device.

Field	Description/Action
Password	
Confirm SNMPv3 Authentication Password	Enter the SNMPv3 authentication password again for confirmation.
SNMPv3 Encryption Password	Enter the SNMPv3 encryption password.
Confirm SNMPv3 Encryption Password	Enter the SNMPv3 encryption password again for confirmation.
Show Device Access Settings	<p>NA is designed to work with most networks and network devices. However, unique device configurations can affect NA's ability to manage certain devices. Device access settings enable you to tailor NA to adapt to your network configuration. Device access settings are tied to device password information. The device-specific settings you enter are only applied if you choose to use device-specific password information. Network-wide device settings can be added to your password rules. Examples include:</p> <ul style="list-style-type: none"> <li>• Exec mode prompt</li> <li>• Config mode prompt</li> <li>• Admin prompt</li> </ul> <p><b>Note:</b> When defining device password rules, although you are able to define multiple values for each device access setting, you should only specify one value per device access setting. If you specify a device access setting more than once, only one of the values is used, and there is no specific determination of which value will be used. For detailed information on how to use device access settings, click the "How To Use Device Access Settings" link.</p>

Be sure to click the Save button when you are finished. The new rule is displayed in the Device Password Rules list.

## Wildcards in IPv4 Address Ranges

The IP Range field on the **Device Password Rule** page supports the use of the question mark (?) and asterisk (\*) wildcards for IPv4 addresses. NA interprets these wildcards differently for each end of the IP address range.

- For the beginning IP address, NA interprets the wildcards to define the lowest possible IP address.
- For the ending IP address, NA interprets the wildcards to define the highest possible IP address.

For example, NA interprets the IP address range 10.178.5?.1\* to 10.178.5?.1\* to be 10.178.50.10-10.178-59.199 inclusive.

# Adding Device Groups

Creating a device group helps you categorize your devices in ways that make sense for your organization. Your devices are probably organized already, perhaps using one of the following schemes:

- Geography/physical location, such as Seattle and New York
- Business unit/department, such as Sales, Purchasing, and Manufacturing
- Role in the network architecture, such as core, edge, distribution, and access

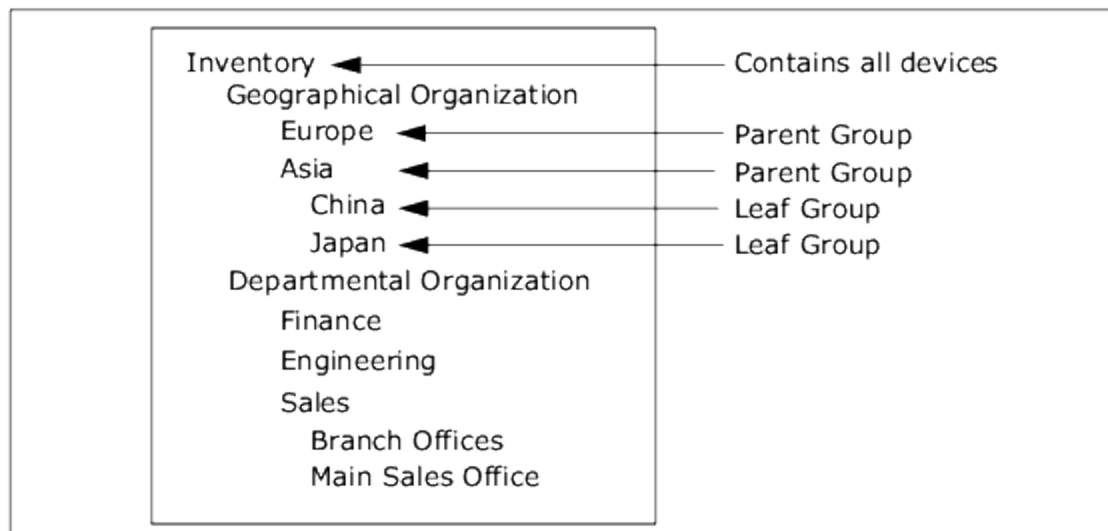
Initially, the Device Groups page includes one system group, the Inventory group. The Inventory group contains all devices added to NA. However, any user-defined groups you create also appear on this page.

A device group hierarchy in NA is made up of parent groups and leaf groups.

- A parent group can only have one parent. Any previous association is overwritten if you add a parent group as a child group of a new parent group. In addition, a parent group can contain only device groups, not devices.
- A leaf group can contain only devices, not other device groups.

Keep in mind that the default Inventory group is treated specially and is both a parent and a leaf group. It contains all devices in the system. Any leaf groups that do not belong to a parent group are included in the Inventory group.

Creating a device group hierarchy enables you to easily run tasks and reports against a set of device groups. An example device group hierarchy is shown below.



With this device group hierarchy, for example, you can run tasks and reports against the Japan devices or against the Asia devices (which would include all of the China and Japan devices).

## New Group Page Fields

To add new device groups, on the menu bar under Devices select New and click Device Group. The New Group page opens.

**Note:** Unless you are the NA administrator, you cannot grant “Manage View” or “Manage Partition” permissions to a user group.

Field	Description/Action
Group Name	Enter a group name
Description	Enter a description of the group.
Site <name>	Select a Partition from the drop-down menu, if applicable. Note that the field name can be modified on the Partitions page. (For more information, see <a href="#">"Partitions Page Fields" on page 149.</a> )
Owner	Select a name from the drop-down menu. Admin is the default.
Sharing	Select either Public or Private. All users can see Public groups, while only the group owner and the System Administrator can see Private groups.  <b>Note:</b> With private device groups, multiple users can set up their own device groups. When they log into NA, they only see their device groups, as well all public device groups. As a result, users can customize NA for ease-of-use and scalability.
Parent Device Group	The Inventory group appears in the drop-down menu, but you can select another group. Keep in mind that your selection is ignored if you make the group private. Private groups cannot be part of the group hierarchy.
Devices	Select one of the following options:  Use Device Selector to select a fixed device set (static group) — For information on how to use the Device Selector, see <a href="#">"Device Selector" on page 137.</a>  Use filters to define a dynamic device set (dynamic group) — For more information, see <a href="#">"Dynamic Device Groups" on page 135.</a>

## Adding Parent Groups

To add a new parent group:

1. On the menu bar under Devices click Groups. The Device Group page opens. For more information, see ["Device Groups Page Fields" on page 139.](#)
2. Click the New Parent Group link at the top of the page. The New Parent Group page opens.

**Note:** You must have the correct permissions to create parent groups. Also, the device group hierarchy is shared and all parent groups must be made public.

## New Parent Group Page Fields

Field	Description/Action
Group Name	Enter the name of the parent group.
Description	Enter a description of the parent group, which usually differentiates this from other groups.
Site <name>	Select a Partition from the drop-down menu. Note that the field name can be modified on the Partitions page. (For more information, see <a href="#">"Partitions Page Fields" on page 149.</a> )
Sharing	Parent groups are always public.
Parent Device Group	Inventory is displayed by default in the drop-down menu.
Child Device Groups	<ul style="list-style-type: none"> <li>All device groups — Displays a list of all current device groups. Select the device groups you want to include as children of the parent group and click Copy &gt;&gt;. Keep in mind that a group can only be a child of one parent group. If the group you are adding already belongs to a parent group, the group will be removed from the former parent group.</li> <li>Children of this group — Displays a list of device groups that are assigned to the parent group as children. Select the child groups you want to remove from this parent group and click &lt;&lt; Remove.</li> </ul>

When you are finished, click the Save button. The Parent Group opens.

## Parent Group Page Fields

Field	Description/Action
New Group link	Opens the New Group page, where you can create a new device group. For more information, see <a href="#">"Adding Device Groups" on page 132.</a>
New Parent Group link	Opens the New Parent Group page, where you can add a new parent group. For more information, see <a href="#">"New Parent Group Page Fields" above.</a>
Group Name	Displays the user-defined name of the device group. Clicking a group name opens the Device Group Details page. For more information, see <a href="#">"Device Group Details Page Fields" on page 140.</a>
Description	Displays a description of the group, which usually differentiates this from other groups.
Number of devices	Displays the number of devices in the group.
Owner	Displays the user name that created the device group.
Sharing	Displays whether the group is Public or Private. All users can see Public groups, while only the group owner and the System Administrator can see Private groups.

Field	Description/Action
Actions	<p>You can select the following options:</p> <ul style="list-style-type: none"> <li>• View — Displays the devices contained in the selected device group. The devices can either be direct children of this device group if this is a leaf device group, or they could be children of child groups if the device group is a parent device group. For more information about the View option, see <a href="#">"Viewing Device Groups" on page 139</a>.</li> <li>• Edit Group — Opens the Edit Group page, where you can change the name and comments for a user-defined group. You can also add and delete devices from the group. For more information, see <a href="#">"Editing Device Groups" on page 151</a>.</li> <li>• Delete — Permanently deletes a group.</li> <li>• Diagram — Opens the Diagramming page. For more information, see <a href="#">"Diagramming" on page 591</a>.</li> <li>• Make Public/Private — Toggles a device group between Public and Private modes.</li> </ul>

## Dynamic Device Groups

A dynamic device group is very similar to a static device group, except the devices included in a dynamic device group are not fixed. Rather, the system determines which devices are included in a dynamic device group by doing a query using predefined criteria associated with the group.

As with static device groups, dynamic device groups are displayed in all group lists, including Run Device tasks pages, Search pages, Diagrams, Device Software reports, and so on. The following table outlines the differences between static and dynamic device groups.

Static Device Groups	Dynamic Device Groups
Created by selecting devices. For more information, see <a href="#">"Adding Device Groups" on page 132</a> .	Created by defining a set of search criteria and/or rules. The maximum search criteria is 10. The steps for creating a dynamic device group are listed below.
Devices remain fixed unless manually added or removed.	Devices can change when network and/or device configuration events occur.
Can manually remove devices from the group.	Cannot manually remove devices from the group.

**Note:** A dynamic group can only be a child group in the group hierarchy. In addition, dynamic groups do not appear on the Edit Device page or the Import Device Task page, where you specify to which group devices belong.

## Creating Dynamic Device Groups

There are two ways to create a dynamic device group:

- Using the Device Search Results page
- Using the New Group page

**Caution:** While creating a dynamic device group, if regular expression searches are part of the criteria, note that it could be performance intensive. Therefore, use them judiciously.

**Note:** A dynamic device group that is created using any policy compliant conditions before enforcing the HPE Network Automation Software Premium edition license, becomes static after the HPE Network Automation Software Premium edition license is enforced. To determine your license level, see the **Feature** field on the License Information page (**Help > About Network Automation > View License Information** link).

To create a dynamic group using the Device Search page:

1. On the menu bar under Reports, select Search For and click Devices. The Search For Device page opens.
2. Enter search criteria. For example, check the Device Vendor field and enter Cisco.
3. Click the Search button. The Device Search Results page opens displaying all of your Cisco devices.
4. Scroll down to the bottom of the page until you see the yellow “Search Criteria” section.
5. Enter the name of the dynamic group, check the “Create as a dynamic group” option, and click the Create Group button.
6. The “Successfully created new device group: <name>” message is displayed at the top of the Device Search Results page.

To create a dynamic group using the New Group Page:

1. On the menu bar under Devices, select New and click Device Group. The New Group page opens.
2. Enter the name of the dynamic group in the Group Name field.
3. Complete the Description, Partition name (if applicable), Owner, Sharing, Parent Device Group, and Devices fields as needed. For more information, see ["Adding Device Groups" on page 132](#).
4. Scroll down to the Devices field.
5. Click the “Use filters to define a dynamic device set (dynamic group)” option. The display changes enabling you to:
  - Configure searches using one or more search criteria, for example Device IP, Domain Name, Policy Compliance, and so on.

**Note:** You must specify at least one search filter and/or rule to create a dynamic device group.

- Create a Boolean expression using the AND and OR operators to filter searches, if necessary.

**Note:** This tool does not support the use of regular expressions.

- Limit a search by device group. Using this option, you can create a dynamic group based on other groups.



6. Once you have defined your dynamic device group, click the Save button. The new dynamic device group is displayed.

To change a dynamic device group to a static device group, open the Edit Group page and scroll down to the Device field. Click the “Use Device Selector to select a fixed device set (static group)” option. When you change a dynamic device group to a static device group, the current devices become the members of the new static device group.

## Calculating Dynamic Device Groups

A dynamic device group’s members are calculated when:

- You first configure the dynamic device group.
- You click the “Update device list” link on the Dynamic Device Group page.
- A background process periodically re-calculates all of the dynamic device groups.
- Predefined device change events occur.

For more information, see *Configuring Dynamic Group Calculation* in the *NA Administration Guide*.

## Device Selector

The Device Selector includes two options:

- Device selection — Enables you to easily navigate group trees to select devices for a variety of applications, for example when scheduling tasks on devices.
- Device group selection — Enables you to easily navigate group trees to select device groups for a variety of applications, for example when editing device groups.

Each of these selectors opens a window, enabling you to navigate devices and device groups.

## Selecting Devices

By default, the Device Selector is closed. To quickly browse a fixed device or device group, you can enter the first few characters of an IP address, hostname, or device group name. Search results are displayed immediately after the first character is entered.

To select from the auto-complete list:

- For a single item — Click the item, or press the down arrow to highlight an item, and then press the Enter key.
- For multiple items — Press the Ctrl key, select the desired items, and press the Enter key.

To de-select from the auto-complete list:

- For a single item — Click the red X icon displayed to the right of the item.
- For multiple items — Press the Ctrl key, select the desired items, and Click the red X icon displayed to the right of the items.

If you are searching by prefixing a Partition name, for example, `Default Site:10.255.1.10`, the auto-complete list displays just the Partition name until the full name has been entered. For example, if you enter `Def`, you will not see the complete Partition name, `Default Site:10.255.1.10`, until the full Partition name is entered.

## Selecting Device Groups

To browse for device groups, click the magnifying glass icon. The Device Group Selector window opens and displays the device groups hierarchy with the Inventory device group listed first.

The device group hierarchy is collapsed by default. You can expand it by clicking the plus (+) sign. A single click on a device group displays all of the devices in that group. If there are more entries than can be displayed, a vertical scroll bar is displayed.

To view a list of all devices in a device group, click the name of the device group. The following information is displayed.

Field	Description/Action
Filter	Enables you to quickly browse a device group.
Host Name	Displays the host name of the device.
Device IP	Displays the IP address of the device.
Device Vendor	Displays the name of the device manufacturer.
Device Model	Displays the model designation of the device.
Partition	Displays the Partition to which the device group belongs. Partitions are a set of NA objects. Partitions can be used in conjunction with a permissions model, group hierarchy, distribution of devices across NA Cores, and network diagramming. For more information, see <a href="#">"Partitions" on page 148</a> .

## Device Selector Buttons

Use the following Device Selector buttons:

- Apply button — To select one or more devices or device groups, click the desired entries in the display (they become highlighted), and click the Apply button. The selected items are added and the Device Selector or Device Group Selector window remains open. If any of the selected devices or device groups are not allowed, the Apply button is grayed out.
- OK button — Adds the currently selected items and closes the Device Selector or Device Group Selector window. If any of the selected devices or device groups are not allowed, the OK button is grayed out.
- Cancel button — Closes the Device Selector or Device Group Selector window without saving any changes.

**Note:** There are re-size icons at the top-right corner of Device Selector and Device Group Selector windows. You have the option of maximizing and restoring to original size, respectively.

# Viewing Device Groups

Initially, the Device Groups page includes one system group: the Inventory group. The Inventory group contains all devices. However, any user-defined groups you create also appear on this page.

The View action link displays the devices contained in the selected device group. The devices can either be direct children of a device group if the device group is a leaf device group, or they could be children of child groups if the device group is a parent device group.

In previous NA releases, you could only view a leaf group's devices by clicking the device group's name. Now, you can click the View action link to see a listing of devices from the perspective of any of the parent groups in its ancestry. This enables batch editing of devices from the desired parent group's perspective.

For example, if you had device groups organized by state, then by county, and then by city, you can now do batch edits on all the devices at the state level, whereas previously you could only do batch edits on devices at the city level. For more information about adding device groups, see ["Adding Device Groups" on page 132](#).

To view device groups, on the menu bar under Devices, click Groups. The Device Groups page opens. Keep in mind that Public device groups are visible to all users. Private device groups are visible only to the group owner and NA administrators.

## Device Groups Page Fields

Field	Description/Action
New Group link	Opens the New Group page, where you can create a new device group. For more information, see <a href="#">"Adding Device Groups" on page 132</a> .
New Parent Group link	Opens the New Parent Group page, where you can add a new parent group. For more information, see <a href="#">"New Parent Group Page Fields" on page 134</a> .
Group Name	Displays the user-defined name of the device group. Parent groups are not indented, unless they are also children of other parent groups. Groups that belong to a parent group are indented beneath their parent. Clicking a group name opens the Device Group page, where you can view detailed information about the device group. For more information, see <a href="#">"Device Group Details Page Fields" on the next page</a> .
Description	Displays a description of the group.
Number of devices	Displays the number of devices in the group.
Owner	Displays the user name that created the device group.
Sharing	Displays whether the group is Public or Private. All users can see Public device groups, while only the group owner and the NA Administrator can see Private device groups.
Actions	The Actions field for the Inventory group is empty until you select a group name. User-defined groups display the following actions: <ul style="list-style-type: none"><li>View — Displays the devices contained in the selected device group. The devices can either be direct children of this device group if this is a leaf device group, or they could be</li></ul>

Field	Description/Action
	<p>children of child groups if the device group is a parent device group.</p> <ul style="list-style-type: none"> <li>• Edit — Opens the Edit Group page, where you can change the name and comments for a user-defined group. You can also add and delete devices from the group. For more information, see <a href="#">"Editing Device Groups" on page 151</a>.</li> <li>• Delete — Permanently deletes the group.</li> <li>• Diagram — Opens the Diagramming page. For more information, see <a href="#">"Diagramming" on page 591</a>.</li> <li>• Make Public/Private — Toggles a device group between Public and Private modes.</li> </ul>

Note that the device group's tree includes a tooltip that shows the device groups partition membership. This information can be used to help differentiate between duplicate device group names and for setting up device group partitions.

For example, if you are creating multiple partitions and multiple user groups that have View permissions set to those partitions, two device groups could have the same name when you view the Device Groups page. Using the tooltip, you can view the partition name to which the device group belongs, for example, "Partition1: Edge Routers" and "Partition2: Edge Routers". For more information about configuring partitions, see ["Partitions" on page 148](#).

To view detailed information about a device group:

1. On the menu bar under Devices, click Groups. The Device Groups page opens.
2. Click the group name on which to view detailed information. The Device Group Details page opens.

## Device Group Details Page Fields

Field	Description/Action
Groups link	Opens the Device Groups page, where you can view all of the device groups. For more information, see <a href="#">"Device Groups Page Fields" on the previous page</a> .
New Device link	Opens the New Device page where you can add a new device. For more information, see <a href="#">"Adding Devices" on page 102</a> .
New Device Group link	Opens the New Group page, where you can add a new group. For more information, see <a href="#">"Adding Device Groups" on page 132</a> .
New Parent Group link	Opens the New Parent Group page, where you can add a new parent group. For more information, see <a href="#">"Adding Parent Groups" on page 133</a> .
Edit Group link	Opens the Edit Group page, where you can edit the device group. For more information, see <a href="#">"Editing Device Groups" on page 151</a> .
Update Device	Refreshes the page and recalculates the device group membership.

Field	Description/Action
List link	
Current Working Group	Shows the current working group in the drop-down menu. You can select a different group from the drop-down menu.
List Active Devices Only check box	If checked, the list of devices is restricted to actively managed devices.
Run Task on this Group	You can select a task from the drop-down menu to run on this group. For more information about running tasks, see <a href="#">"About Tasks" on page 245</a> .
Check Boxes	<p>You can use the left-side check boxes to manage devices. After selecting the devices, click the Actions drop-down menu. Options include:</p> <ul style="list-style-type: none"> <li>• Activate — Instructs NA to manage the selected devices.</li> <li>• Deactivate — Instructs NA not to manage the selected devices.</li> <li>• Batch Edit — Opens the Batch Edit Device page, where you can assign a driver and set the connection methods for all the checked devices at once. For more information, see <a href="#">"Editing a Batch of Devices" on page 152</a>.</li> <li>• Diagram — Opens the Diagramming page. For more information, see <a href="#">"Diagramming" on page 591</a>.</li> <li>• Delete — Deletes the selected devices.</li> <li>• Select a task to run against the device group.</li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the devices.</p>
Host Name	Displays the host name of the device. Clicking a host name opens the Device Detail page, where you can view information about the device and its configuration history.
Device IP	Displays the IP address of the device. Devices in red failed their most recent snapshot attempt. Inactive devices are marked with an icon beside the IP address. Clicking an IP address opens the Device Detail page, where you can view information about the device and its configuration history.
Device Vendor	Displays the name of the device manufacturer.
Device Model	Displays the model designation of the device.
Partition	<p>Displays the Partition to which the device belongs.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions.</p>

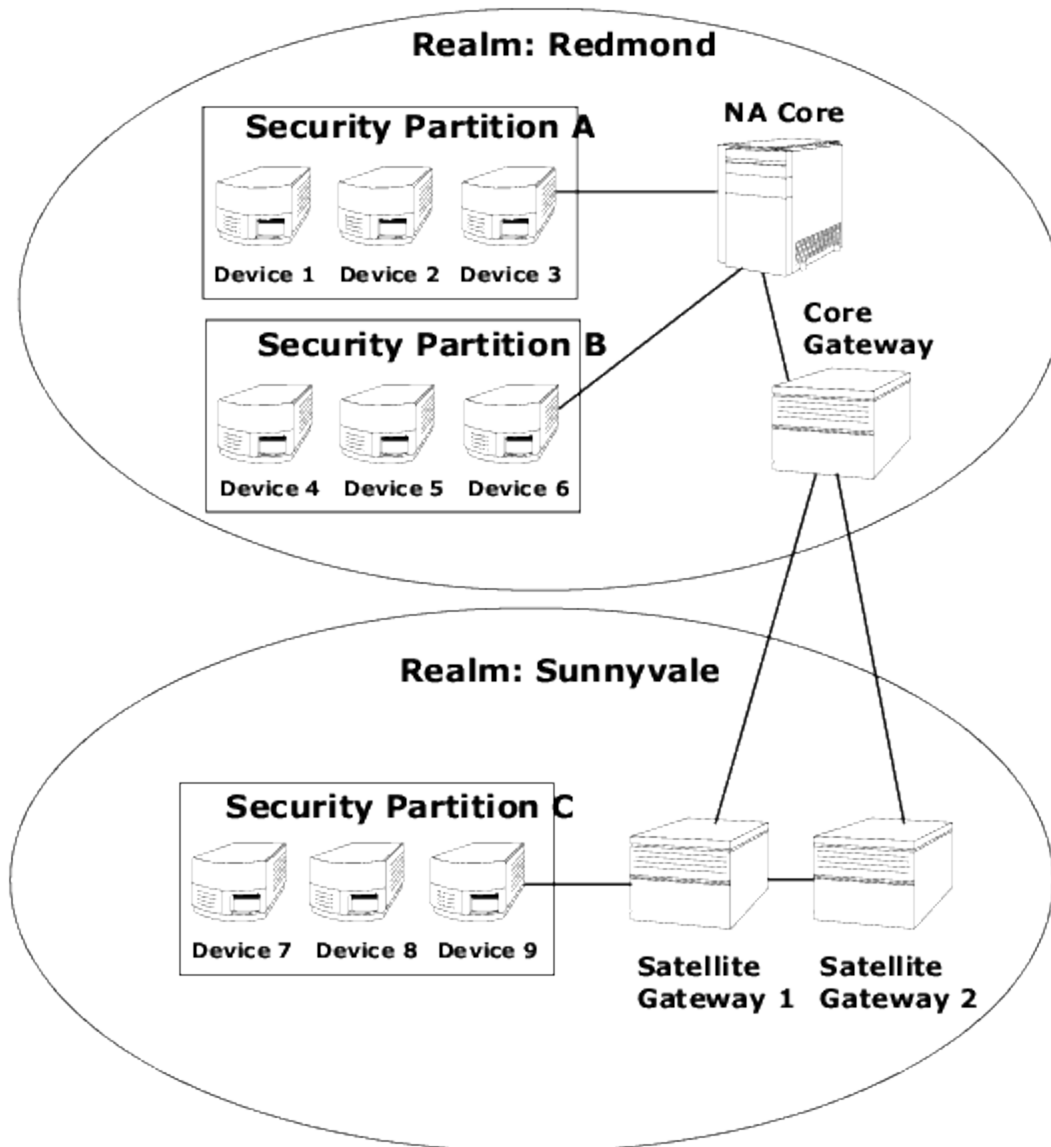
Field	Description/Action
Last Changed Time	Displays the date and time the device's configuration was last changed.
Actions	You can select the following actions: <ul style="list-style-type: none"><li>• Edit — Opens the Edit Device page, where you can edit the information for this device. For more information, see <a href="#">"Edit Device Page Fields" on page 108</a></li><li>• Telnet — Opens a Telnet window.</li><li>• SSH — Opens an SSH Window.</li><li>• View Config — Opens the Current Configuration page, where you can view the latest configuration and add comments.</li></ul>

## Segmenting Devices and Users

NA provides the ability to manage overlapping IP networks and partition both devices (and device groups) and users (and user groups). The following terms are used in this section.

- **NA Core** — A single NA Management Engine, associated services (Syslog and TFTP), and a single database. A NA Core can manage multiple Partitions (set of devices). Multiple NA Cores can be connected in a Distributed System configuration. (For detailed information on installing and configuring a Distributed System, see the *NA Multimaster Distributed System on Oracle Guide* or the *NA Multimaster Distributed System on SQL Server Guide*.)
- **Security Partition** — A set of NA objects that are part of a Partition. NA objects can include devices, users, command scripts, device password rules, policies, software images, and so on. Partitions can be used in conjunction with a permissions model, group hierarchy, distribution of devices across NA Cores, and network diagramming.
- **Default Site Partition** — The default Partition (named Default Site). If you are new to NA, the default Partition is the only Partition available. The default Site Partition is needed by the system to connect to devices via the Gateway Mesh. It includes all of the devices currently managed by NA. You can rename the default Site Partition, however you cannot modify the properties. (**Note:** If you have configured multiple Partitions in earlier versions of NA, you will be able to edit those Partitions. However, you will not be able to add or delete Partitions.)
- **Realm** — A network segment. In general, a Realm is identified by a set of unique IP addresses. For example, a Realm cannot contain two devices numbered as 10.255.111.128. Instead, the devices must be broken out into separate Realms. A Partition is not required to be in the same Realm as its managing NA Core. Keep in mind that a Realm is a large area that can include many Partitions. While a Realm does not have to include any NA Cores, typically a NA Core manages devices in its local Realm. A NA Core can manage devices in remote Realms via the Gateway Mesh. The Gateway Mesh is used to proxy IP traffic between Realms.

The following figure illustrates the various components of a multi-Security Partition configuration. Keep in mind that Realms and Partitions cannot overlap and a device cannot be in more than one Realm, as shown in the figure. However, there can be multiple Partitions and NA Cores in a Realm. There can also be multiple Gateways in a Realm.



## Local Realms

If a device is in a Local Realm, NA will connect directly to it without going through the NA Gateway Mesh.

When NA connects to a device, if the device is in the same Realm as the local Core, NA connects directly to the device. Otherwise, NA connects to the device through the Gateway Mesh by connecting to the local Core Gateway and requesting the Core Gateway to connect to the device in the specified Realm.

**Note:** Local Realms are aliases for the Core Realm. If a device is in the core Realm or in a local Realm, NA connects directly to the device.

## Local Realms and NAT Access

If a NAT IP Address is assigned to a device in NA, NA connects to the device using the NAT IP Address. The NAT IP Address has a Realm associated with it, so the same rule applies. If the NAT IP Address Realm is local (either the core's Realm or a defined local Realm), access is direct. Otherwise, access is through the Gateway Mesh.

While NA could assume that all NAT access is local, allowing a Realm to be associated with a NAT IP address ensures that NA L3 network diagrams can correctly reflect that one interface on a device is in a different L3 cloud.

## Local Realms and Console access

If a Console Server is defined for a device in NA, NA connects using the Console Server. The Console Server's IP Address also has a Realm name associated with it. It is handled the same as NAT access above.

## Local Realms and Bastion Host Access

If a Bastion Host is defined for a device, NA uses the Bastion Host. You cannot assign a Realm to the Bastion Host IP address. NA always accesses the Bastion Host locally. This enables you to use local Realms to manage devices in different remote Realms without using the Gateway Mesh if there is Bastion Host access to the remote devices. Bastion Host access only allows CLI access to devices. As a result, SNMP and TFTP cannot be used. Since TFTP cannot be used, software updates will not work for devices using Bastion Host access.

## Adding a Local Realm

**To add a local realm, follow these steps:**

1. Edit the `<NA_HOME>/jre/adjustable_options.rcx` file where `NA_HOME` is the root of the NA installation (typically `C:\<NA_HOME>` on Windows).
2. Remove the comments around `gateway/mesh/local_realms` and add the local realm names:

```
<!--Gateway Mesh: define realms that do not use the Gateway Mesh-->
<array name="gateway/mesh/local_realms">
  <value>Local Realm 1</value>
  <value>Local Realm 2</value>
</array>
```
3. Restart NA.

## Overlapping IP Networks

Every Partition must have a managing NA Core. However as shown in the previous figure, the managing NA Core does not have to be in the same Realm as the Partition it is managing.

When accessing devices, if the NA Core is in the same Realm, for example Device 3, NA directly connects to the device to manage it. If the NA Core is in a different Realm than a device it is managing, for example



Device 9, NA connects to Satellite Gateway 1 in its Realm, which then communicates through the other Gateways to Device 9.

The collection of Gateways is called a *Gateway Mesh*. A Gateway in the same Realm as a NA Core is called a *Core Gateway*. A Gateway in a Realm without a NA Core is called a *Satellite Gateway*. The Gateway Mesh enables a NA Core to manage devices in different Realms. (For more information about configuring the gateway mesh, see "[Device Access Page Fields](#)" on page 33.)

Keep in mind that installing and configuring a HPE Gateway is only required if you want to manage devices and networks that use duplicate and/or overlapping IP addresses. The HPE Gateway is a standalone product and not bundled with NA.

You can configure multiple:

- **Realms** — Enables you to use overlapping IP addresses. That is, more than one device with the same IP address.
- **Security Partitions (in the same Realm)** — Enables you to restrict view access for users to devices that are in the same Realm. If a Partition is deleted, all objects are automatically placed in the Default Partition (named Default Site).
- **Gateways (in the same Realm)**— Enables you to improve up-time in the event that one Gateway fails.
- **NA Cores (in the same Realm)** — Enables you to share access to device information in the NA system. The NA Distributed System on Oracle is a multimaster system where data from each NA Core in a Gateway Mesh is accessible to all other NA Cores. This allows for redundant data and failover in the event of a NA Core crash. (For more information, see the *NA Multimaster Distributed System on Oracle Guide*.)

## Setting Up The HPE Gateways

The following terms are used in this section:

- **Gateway** — An application that routes IP traffic to other Gateways.
- **Gateway Mesh** — A collection of Gateways that route traffic between themselves.
- **Core Gateway** — A Gateway running in the same Realm with a NA Core.
- **Satellite Gateway** — A Gateway running in a Realm that does not have a NA Core.
- **IP Space** — One or more Realms that have no overlapping IP addresses.

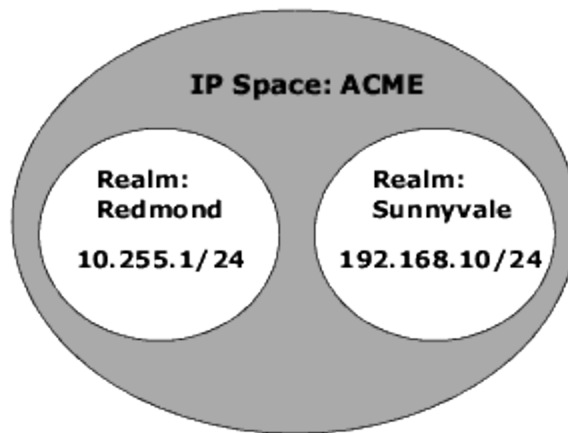
Using the HPE Gateway with NA provides support for overlapping IP addresses (multiple devices that have the same IP address). In addition, by installing a NA remote agent on the same LAN with the devices being managed, Syslog and TFTP can be used to manage the devices locally. For more information, see "[Deploy Remote Agent Page Fields](#)" on page 380.

**Note:** If there are many NA users in the same LAN, a NA Core (NA Multimaster Distributed System) might be preferable to a NA remote agent on that LAN. For more information, see the *NA Multimaster Distributed System on Oracle Guide*.

In general, the HPE Gateway enables a NA Core to manage servers that are behind one or more NATed devices or firewalls. It does this by creating persistent TCP tunnels between Gateway instances, much like SSH tunnels. In addition, the HPE Gateway provides bandwidth management. This is important when a tunnel is transmitting over a low-bandwidth link and you need to limit usage of the bandwidth to a fixed amount that is less than the maximum link speed.

**Note:** For information about installing a Satellite configuration, see the *NA Satellite Guide*.

HPE Server Automation (HPE SA) uses the Gateway Mesh in each install. However, NA only uses the Gateway Mesh when needed to handle overlapping IP spaces. With NA/SA integration, a Realm can be a collection of networks with no overlapping IP addresses, as shown below. As a result, an IP Space can be defined as one or more Realms with no overlapping IP addresses.



NA Cores can be in different IP spaces in a NATed environment. If there is a NA Core in the same IP space, it is more efficient for the NA Core to communicate directly to devices instead of going through the Gateway Mesh, unless the NA Core is not topologically close to the devices being managed. To reduce WAN utilization, it might be beneficial to place a NA Satellite topologically close to the devices being managed.

To setup the HPE Gateway, you need to install:

1. A Core Gateway for each NA Core
2. A Satellite Gateway for each remote Realm

**Note:** When sharing a Gateway between HPE SA and NA, you must use the HPE SA installer. The NA Gateway installer cannot install a Gateway that is used by HPE SA. The NA Gateway installer is for NA-only Gateway Meshes.

For step-by-step instructions for installing a Core Gateway, installing a Satellite Gateway, and configuring NA to use the Gateway Mesh, see the *NA Satellite Guide*. For more information about configuring the gateway mesh, see "[Device Access Page Fields](#)" on page 33.

## Gateway List Page Fields

The Gateway List page displays the currently configured Gateways and enables you to edit Gateway information. For more information, see "[Edit Gateway Page Fields](#)" on page 148.

To open the Gateway List page, on the menu bar under Admin, click Gateways. The Gateway List page opens.

**Note:** Once you have installed the Gateway Mesh, you need to install an NA remote agent on each

Satellite Gateway host. Do not install an NA remote agent to the host with the Core Gateway.

Field	Description/Action
Deploy Remote Agent link	Opens the Deploy Remote Agent page, where you can deploy a NA remote agent. For more information, see <a href="#">"Deploy Remote Agent Page Fields" on page 380</a> .
Monitor Satellite link	Opens the Monitor Details page, where you view monitor status. The following details are displayed: <ul style="list-style-type: none"> <li>• Name</li> <li>• Description</li> <li>• Status</li> <li>• Last Checked</li> <li>• Result</li> <li>• Additional Diagnostic Information</li> </ul>
IP Space	Displays the IP space name. An IP space is one or more Realms that have no overlapping IP addresses.
Realm	Displays the Realm name. The Realm name is returned from the Gateway. The Realm name is set when the Gateway is installed and cannot be modified in NA. To change the Realm name, you need to re-install the Gateway. (For instructions, see the <i>NA Satellite Guide</i> .)
Gateway	Displays the Gateway name. The Gateway name is set when the Gateway is installed and cannot be modified in NA. (For instructions, see the <i>NA Satellite Guide</i> .)
Host	Displays the hostname or IP address of the system on which the Gateway is installed. If the Gateway host has multiple IP addresses, this is the IP address that would be used from the Gateway host. The Host IP address is only important if you have more than one Gateway installed in the same Realm. <b>Note:</b> You can install multiple Satellite Gateways in the same Realm for redundancy.
Partition	Displays the Partition name associated with the Realm name, if applicable. For more information, see <a href="#">"Partitions" on the next page</a>
Core	In a Multimaster Distributed System environment, the Core name is set on the Edit Core page. If the Realm name on the Edit Core page matches the Realm name for a Gateway, the Gateway List page displays the Core name of the Core. For information on the Edit Core page, see the <i>NA Multimaster Distributed System on Oracle Guide</i> .
Agent	Displays the name of the NA remote agent for Satellite Gateways. The NA remote agent name can be changed on the Edit Gateway page. Once you have installed the Gateway Mesh, you must install a NA remote agent on each Satellite Gateway host. If there is no NA remote agents installed, the Agent column is empty. For more information, see <a href="#">"Deploy Remote Agent Page Fields" on page 380</a> .
Actions	There is one option:

Field	Description/Action
	<ul style="list-style-type: none"><li>Edit — Opens the Edit Gateway page. For more information, see <a href="#">"Edit Gateway Page Fields" below</a>.</li></ul>

## Edit Gateway Page Fields

NA automatically sets the IP Space name based on the Realm Name. However, if two Realms are in the same IP Space, and you want them diagrammed correctly in L3 diagrams, you can edit the Gateway to set the IP Space name.

To open the Edit Gateway page, on the Gateway List page, click the Edit option in the Actions column.

Field	Description/Action
Gateway	Displays the Gateway name. The Gateway name is set when the Gateway is installed and cannot be modified in NA.
Realm	Displays the Realm name. The Realm name is returned from the Gateway. The Realm name is set when the Gateway is installed and cannot be modified in NA.
IP Space	Displays the IP space name. An IP space is one or more Realms that have no overlapping IP addresses. Enter a new IP space name.
Host	Displays the hostname or IP address of the system on which the Gateway is installed. Enter a new host name or IP address.
Satellite	Displays the Satellite Gateway running in a Realm that does not have a NA Core. Enter a Satellite Gateway name, if applicable.

## Partitions

Partitions are a set of NA objects. NA objects can include devices, users, command scripts, device password rules, policies, software images, and so on. Partitions can also be used in conjunction with a permissions model, group hierarchy, distribution of devices across NA Cores, and network diagramming.

Partitions are always public groups. They can be placed within the device group hierarchy. If an object (such as Device, Device Group, User, or User Group) is added to Partition, it is automatically removed from the Partition to which it previously belonged.

If a Partition is deleted, all objects are automatically placed in the Default Partition (named Default Site). This is done to ensure that any device appears in only one Partition. Any reference to an IP address without an explicit Partition uses the default Partition. (For more information about partitions, see ["Segmenting Devices and Users" on page 142](#).)

NA provides the ability to restrict which users can view other users. As a result, you can partition users and user groups in the NA system. For example, if a Managed Service Provider is managing a large banking institution, the users working for the Manager Service Provider can be rendered invisible to the bank's users.

Keep in mind that when partitioning user objects, such as password rules, only users that have access rights to all Partitions can create and/or edit global (or shared) objects.

## Partitions Page Fields

To open the Partitions page, on the menu bar under Admin click Security Partitions. The Partitions Page opens.

Field	Description/Action
Partition By	Select a Partition from the drop-down menu, if applicable. The default partition is named Site. The default Site Partition is needed by the system to connect to devices via the Gateway Mesh. Any reference to an IP address without an explicit Partition uses the default Site Partition.
Rename link	Enables you to rename the Partition. This name is displayed on the New Device, New Device Group, and New Parent Device Group pages. For more information, see <a href="#">"New Device Page Fields" on page 102</a> .
New Partition link	Opens the New Partition page where you can create a new Partition. For more information, see <a href="#">"New Partitions Page" on the next page</a> .
Partition Name	Displays the default Site Partition and any other Partitions that you have created.
Core	In a distributed NA installation, this specifies which NA Core will be used to manage devices in this Partition.  <b>Note:</b> This option is not displayed if there is only one NA Core. (For more information, see the <i>NA Horizontal Scalability Guide</i> , the <i>NA Multimaster Distributed System on Oracle Guide</i> , or the <i>NA Multimaster Distributed System on SQL Server Guide</i> .)
Realm Name	Select a Realm from the drop-down menu. This specifies what Realm the devices and/or users in this Partition are in.  <b>Note:</b> This option is not displayed if there is only one Realm (which means, there is no HPE Gateway Mesh). If the NA Core is not in the same Realm, NA uses the HPE Gateway Mesh to connect to the devices in this Partition.
Description	Provides a description of the Partition.
Number of Devices	Displays the number of devices in the Partition.
Actions	You can select the following actions: <ul style="list-style-type: none"><li>• Edit — Opens the Edit Partition page. For more information, see <a href="#">"Edit Partition Page Fields" on the next page</a>.</li><li>• Delete — Enables you to delete a Partition. Keep in mind that you cannot delete the default Site Partition.</li></ul>

## New Partitions Page

To add a new Partition:

1. On the menu bar under Admin, click Security Partitions. The Partitions page opens.
2. Click the New Partition link at the top of the page. The New Partition page opens.
3. Enter the Partition name and a description.
4. In the Devices field, use the Device Selector to select the devices you want in the Partition. For information on how to use the Device Selector, see ["Device Selector" on page 137](#).

**Note:** A Partition can apply to both devices and users. If the Partition applies to users, on the Edit User page you have the option of editing the Partition.

5. Click the Save button. The Partitions page opens displaying the current Partitions. Keep in mind there is one default Partition named *Default Site*. This Partition contains all of the discovered devices in your network.

## Edit Partition Page Fields

To edit a Partition:

1. On the menu bar under Admin, click Security Partitions. The Partitions page opens.
2. For the Partition you want to edit, click the Edit option in the Actions column. The Edit Partition <name> page opens. The following table includes the fields when editing the default Site Partition.

Field	Description/Action
Partition Name	Displays the Partition name.
Description	Provides a description of the partition.
Core	This field is only displayed for partitions in the default Partition. In a distributed NA installation, this specifies which NA Core will be used to manage devices in this Partition. (For more information about NA Cores, see <a href="#">"Overlapping IP Networks" on page 144</a> .)
Realm Name	This field is only displayed for Partitions in the default Site Partition. Select a Realm from the drop-down menu. This specifies what Realm the devices in this Partition are in. If the NA Core is not in the same Realm, NA uses the Gateway Mesh to connect to the devices in this Partition.
Devices	A list of devices is displayed in the Device Selector's Devices box. For information about using the Device Selector, see <a href="#">"Device Selector" on page 137</a> . Keep in mind that when you add a device to a partition, it is automatically removed from its previous partition. In addition, to delete a partition, you must move all the devices from it into a different partition before the system can delete it.

Be sure to click the Save button when you are done.

## Adding Devices to a Partition

To add devices to a Partition, follow these steps:

1. On the menu bar under Admin click Security Partitions. The Partitions page opens.
2. In the Partition Name column, click the Partition you want to edit. The Partition page opens. This page is similar to the Inventory page, where you can view a list of the managed devices in the Partition. However, there are two added links at the top of the page—Edit Group and Partitions. Clicking the Partitions link returns you to the Partitions page. (For more information, see ["Viewing Devices" on page 172.](#))
3. Click the Edit Group link to open the Edit Partition page, where you can edit the devices in the Partition.
4. Click Save. (For more information about partitions, see ["Segmenting Devices and Users" on page 142.](#))

Field	Description/Action
Partition Name	Displays the name of the Partition.
Description	Displays the description of the Partition.
Devices	A list of devices is displayed, if applicable. For information about using the device selector, see <a href="#">"Device Selector" on page 137.</a>

Be sure to click the Save button when you are done.

## Viewing Partition Details

A Partition can be a set of devices and/or users. A device and/or user can only be in one partition. If there is more than one Partition, each device and/or user is in one (and only one) Partition.

To view and/or edit Partition information:

1. On the menu bar under Admin click Security Partitions.
2. Click the Partition of which you want information. For more information, see ["Viewing Devices" on page 172.](#)

## Editing Device Groups

To edit an existing device group:

1. On the menu bar under Devices, click Groups. The Device Groups page opens.
2. Click Edit in the Actions column for the device group you want to edit. The Edit Group page opens. Be sure to click Save when you are done.

### Edit Group Page Fields

Field	Description/Action
Group	Displays the name of the device group.

Field	Description/Action
Name	
Description	Displays a description of the device group.
Partition	Select a Partition from the drop-down menu.  <b>Note:</b> This field is only displayed if you have configured one or more Partitions.  In general, a Partition is a grouping of devices with unique IP addresses. Multiple Partitions can be managed by a single NA Core. A NA Core is an installation of a NA server, comprised of a single Management Engine, associated services, and a single database.
Sharing	Either informs you that the device group you are editing is public or private, or that the device group is a parent group. If you are editing a leaf group, you are informed that the device group has a parent.
Parent Device Group	Displays the name of the parent device group in the drop-down menu.
Devices	Select one of the following options: <ul style="list-style-type: none"><li>• Use Device Selector to select a fixed device group (static group) — For information on how to use the Device Selector, see <a href="#">"Device Selector" on page 137</a>.</li><li>• Use filters to define a dynamic device set (dynamic group) — The display changes, enabling you to configure searches using one or more search criteria, create a Boolean expression using the AND and OR operators to filter searches, or limit a search by device group.</li></ul> <b>Note:</b> This tool does not support the use of regular expressions.
Child Device Groups	<ul style="list-style-type: none"><li>• All device groups — Displays a list of all current device groups. Select the device groups you want to include as children of the parent group and click Copy &gt;&gt;.</li><li>• Children of this group — Displays a list of device groups that are assigned to the parent group as children. Select the child groups you want to remove from this parent group and click &lt;&lt; Remove.</li></ul>

## Editing a Batch of Devices

The batch edit functionality enables you to make changes to device settings. You can:

- Assign a driver
- Set connection methods (SNMP, SNMPv3, Telnet, SSH)
- Set transfer protocols
- Set bastion host information



- Reset the last used password
- Set ACL parsing
  1. On the menu bar under Devices, click Inventory. A list of all currently managed devices opens.
  2. Check the check boxes for the devices you want to edit in one batch operation.
  3. On the Actions drop-down menu, click Batch Edit. The Batch Edit Device page opens. Be sure to click the Save button when you are finished.

**Batch Edit Device Page Fields**

Field	Description/Action
Devices	Lists the selected devices.
Assign Driver	If checked, select the driver to assign to the batch of devices.
Set Connection Methods	<p>If checked, select the access methods for the batch edit from the following connection methods and transfer protocols:</p> <p>Connection Methods:</p> <ul style="list-style-type: none"> <li>• SNMP</li> <li>• SNMPv3 (user authentication) — With SNMPv3, you have the following options: noAuthNoPriv (username only), authNoPriv (username, authentication password), and authPriv (username, authentication. and encryption password). Authentication methods include SHA (Secure Hash Algorithm) and MD5 (Message Digest Algorithm). Encryption methods include DES (Data Encryption Standard), AES (Advanced Encryption Standard), AES192, and AES256.</li> <li>• SNMPv1 or SNMPv2c (checked by default)</li> <li>• Telnet</li> <li>• SSH — Select either SSH1 or SSH2 (the default), SSH1 Only, or SSH2 Only.</li> </ul> <p>Transfer Protocols (checked by default):</p> <ul style="list-style-type: none"> <li>• SCP</li> <li>• SFTP</li> <li>• FTP</li> <li>• TFTP</li> <li>• HTTP</li> <li>• HTTPS</li> </ul>
Set Bastion Host Information	<p>If checked, enter the following information:</p> <ul style="list-style-type: none"> <li>• Use a Unix or Linux bastion host for Telnet and SSH access, if applicable</li> <li>• IP address or Host Name of the bastion host</li> <li>• Bastion Host Username</li> <li>• Bastion Host Password</li> <li>• Confirm the password</li> </ul>
Reset Last	If checked, reset last used passwords.

Field	Description/Action
Used Passwords	
Set ACL Parsing	If checked, select one of the following options: <ul style="list-style-type: none"><li>• Enable ACL parsing and storage with each snapshot.</li><li>• Disable ACL parsing and storage with each snapshot.</li></ul>
Set Hierarchy Layer	Select a Hierarchy Layer from the drop-down menu.
Set Custom Service Type	If checked, select from the available user-defined service types. For more information, see <a href="#">"About Service Types" on page 102</a> .
Set Custom Data Field	If checked, you can edit the custom data you assigned to a device. For more information, see <a href="#">"Enhanced Custom Fields Setup" on page 549</a> .

## Discovering Device Drivers

Discovery matches an appropriate device driver to any device. The device driver translates proprietary commands for each device to the universal format that NA uses to manage heterogeneous networks.

Discovery queries each new device using SNMP or Telnet/SSH and assigns the appropriate device driver. If this process fails, the result appears on the Recent Tasks page. NA cannot actively manage a device configuration until the correct driver is assigned. If driver discovery fails, you can assign a driver manually. Refer to the Driver Release Service (DRS) documentation for detailed information on supported devices. The DRS is an automated driver release and delivery system.

To initiate the device driver discovery process, on the menu bar under Devices, select New Device Task and click Discover Driver. The New Task - Discover Driver page opens. For more information, see ["Discover Driver Task Page Fields" on page 269](#). Keep in mind that device driver discovery is also initiated by the Deploy Software task. After software is successfully uploaded (and the device is rebooted, if this option is selected), a device driver discovery task is initiated.

## Accessing Devices Using Telnet

Launching Telnet and SSH sessions from NA offers several benefits:

- Simplify logins — Users log in using their NA account. NA verifies the user's permissions. The user can enter NA CLI commands or connect directly to a device. The user can exit from one device, then connect to another, and so on, in one session. The user must remember only one login, regardless of device vendors, types, and so on. If the requested login method does not work, NA automatically tries backup login methods.

- Organize by groups and permissions — Organizing devices into groups and assigning permissions per group ensures that users access just the devices they care about and have permissions for.
- Store configurations, even without AAA — The Telnet/SSH Proxy enables you to store modified configurations, in-line comments, and who made changes. The Telnet/SSH Proxy automatically associates audit logs of sessions to the configurations.
- Reduce ACLs — You need an Access Control List (ACL) only for the NA server, rather than one ACL per device.
- Increase security — Identifying who is changing devices on your network makes it easier to detect an unauthorized user and track unauthorized changes. NA also makes it easy to deploy a stable configuration stored prior to the unauthorized changes, correcting potential damage and restoring network service quickly.

In addition, you can connect your Telnet/SSH client to devices through NA, and track the sessions. NA has been tested with connections from the following clients (though others may also work):

- SecureCRT
- Windows Telnet
- Putty

There are a number of Admin Settings related to the Telnet/SSH Proxy interface. For information, see ["Telnet/SSH" on page 60](#).

To initiate a Telnet session using NA, on the menu bar under Devices, click Inventory. A list of all currently managed devices opens. Select the Telnet option in the Actions column for the device. You are logged into the device and you see the device prompt in the Telnet window.

**Note:** If your system does not already have the Java Runtime Environment (JRE) installed, your browser initiates a download from the Sun Website the first time you use Telnet or SSH. This is expected and you should approve the download and installation of the JRE.

The first time you run a Telnet or SSH session from NA, you may see a security window asking you to download a certificate from HPE. Click Grant always to continue. This verifies that you trust content from HPE.

You can enter whatever device commands you like. Enter *quit* when finished. This logs you out of the Telnet session, but you remain in a NA Telnet Proxy session. The Proxy session uses the NA> prompt.

In a Telnet/SSH Proxy session, you can connect to another device or enter NA CLI commands. You can initiate a Proxy session directly by clicking Connect at the top of any page.

**Note:** Although NA will attempt to separate all command/response sequences from the session, this is not foolproof. When a device automatically completes a command, or when the device prompts for further command parameters, the result is not necessarily a clear command/response separation. In addition, a session that includes the use of these kinds of interactive shortcuts might not be a good candidate for the generation of an advanced script.

## Accessing Devices Using SSH

To initiate an SSH session, on the menu bar under Devices, click Inventory. A list of all currently managed devices opens. Select the SSH option in the Actions column for the device. You can enter whatever device

commands you like. Enter *quit* when you are finished.

**Note:** You can initiate a Proxy session directly by clicking Connect at the top of any page. In a SSH Proxy session, you can connect to another device or enter NA CLI commands.

## Configuring the SSH Terminal Size for Certain Devices

The default terminal length used for the virtual pseudo SSH terminal that NA uses for an SSH connection to a device is 80 columns wide and 24 rows high. For devices with prompts longer than 80 characters, you might want to adjust the terminal width to a larger size.

### To configure the terminal size for a connection to a specific device

1. From the Device Details page, open the Edit Device page (**Edit > Edit Device**).
2. In the Password Information section, select **Use device-specific password information**, and then enter the credentials for accessing the device.
3. Configure the terminal size.
  - a. Expand the Device Access Settings section.
  - b. In a **Custom Setting** field, enter `terminal_columns`, and then in the associated **Value** field, enter the terminal width.
  - c. In a **Custom Setting** field, enter `terminal_rows`, and then in the associated **Value** field, enter the terminal height.
4. Click **Save**.

### To configure the terminal size for connections to a group of devices

1. On the Device Password Rules page (**Admin > Device Password Rules**), start a new rule or open a rule to edit.
2. Configure the terminal size.
  - a. Click the **Show Device Access Settings** link.
  - b. In the third **Name** field, enter `terminal_columns`, and then in the associated **Value** field, enter the terminal width.
  - c. In the fourth **Name** field, enter `terminal_rows`, and then in the associated **Value** field, enter the terminal height.
3. Click **Save**.

For more information, see ["Device Password Rules Page Fields" on page 128](#).

## Listing Telnet/SSH Sessions

To list Telnet and SSH sessions, on the menu bar under Devices, click Inventory. A list of all currently managed devices opens. Click the device. The Device Details page for that device opens. From the View drop-down menu, click Telnet/SSH Sessions. The Telnet/SSH Session page opens with the device host name or IP address at the top.

### Telnet/SSH Session List Page Fields

Field	Description/Action
Check Boxes	You can use the left-side check boxes to delete sessions. Once you have selected the session, click the Actions drop-down menu and click Delete. The adjacent Select drop-down menu enables you to select or deselect all sessions.
Start Date	Displays the date and time the session began.
Status	Displays the status of the session, either Open or Closed.
Type	Displays the type of session, either Telnet or SSH.
End Date	Displays the date and time the session ended.
Created By	Displays the name of the person who created the session.
<Custom Fields>	All custom fields defined for Telnet/SSH sessions appear on this page.
Actions	You can select from the following options: <ul style="list-style-type: none"> <li>View Full Telnet/SSH Session — Opens the Telnet/SSH Session page, where you can view the commands entered and the device responses during this session.</li> <li>View Commands Only — Opens the Telnet/SSH Session page, where you can view only the commands entered during this session. This is useful for recording scripts to replay on this or other devices. Click any command to view the device response to that command.</li> </ul>

**Note:** Selecting text with the left mouse button highlights the text. You can then press the Enter key to paste the text onto the clipboard. Pressing the right mouse button inside the Telnet/SSH applet pastes the text from the clipboard to the applet.

A shortcut when using connect is adding wildcards to the host name or IP address, such as `connect dev*`. This returns a list of devices (or a message to narrow your search). Enter the number of the device you want to connect to. The Shell interface supports the following control characters.

Control Character	Description
^A	Moves the cursor to beginning of the input line.
^B, Left Arrow	Moves the cursor back one character.
^C	Cancel the input line and returns a new prompt.
^D	Erases the character under the cursor.
^F, Right Arrow	Moves the cursor right one character.
^H, Backspace, Delete	Erases the character to the left of the cursor.

Control Character	Description
^J, ^M	Sends a CRLF.
^K	Kills from the cursor to end of line and places text in the kill buffer.
^L, ^R	Echoes a command on new command line (simulates screen redraw).
^N, Down Arrow	Moves to the next command in the command history.
^P, Up Arrow	Moves to the previous command in the command history.
^T	Transposes the character under the cursor with the previous character.
^U, ^X	Deletes from the cursor to the beginning of line, and places the deleted characters in the kill buffer.
^W	Deletes from the cursor to the beginning of word, and places the deleted characters in kill buffer.
^Y	Yanks from the kill buffer to the current location.
^\ ESC-b	Closes the current device connection (useful for access through a console server). Moves the cursor backwards one word.
ESC-f	Moves the cursor forwards one word.

## Making Configuration Changes Using the Telnet/SSH Proxy

Do the following to make configuration changes via the Telnet/SSH Proxy.

1. Telnet or SSH to the NA server and log in using your NA credentials.
2. Use the *connect* command to connect to devices. You can enter *connect\** to view the devices available for connection through NA. If there are too many devices to display, narrow the field by entering the first few letters of the hostname (or digits of the IP address), followed by an asterisk, for example: *connect bor\**.
3. Enter the number from the list of numbers displayed in the Telnet/SSH Proxy of the device to which you want to connect. NA automatically logs you into the device after checking your access credentials.
4. Assuming that this is a Cisco IOS device, enter *Config T* mode on the device, make the change, and add any relevant comments.
5. Exit out of Configure Terminal mode and enter *Exit*.
6. To exit the NA Telnet/SSH Proxy, enter *Exit* at the prompt.

Keep in mind when using the Telnet/SSH Proxy, in-line commenting occurs as you are logged into the device.

# Using a Bastion Host

A bastion host is a gateway between a private network and a public network. Used as a security measure, a bastion host can act as a barrier between private and public networks to prevent attacks by hackers.

Using a bastion host with NA enables you to have lockdown capability over Telnet or SSH access. You can:

- Specify a bastion host on a per device basis.
- Specify username (optional) and password as login credentials for the bastion host.
- Telnet or SSH to the bastion host and then Telnet or SSH through to the target device.

**Note:** When using a bastion host, all CLI access will be routed through the bastion host rather than directly to the device. When connecting via the Telnet/SSH Proxy to a device configured to use a bastion host, NA connects via the bastion host, and applies the user's AAA credentials, if indicated, to both the bastion host and the target device.

Keep in mind that access to a bastion host will not go through the normal NA password rules processing. If the bastion host credentials are invalid, there is no fallback. After logging into the bastion host, access from there to the device will follow the normal password processing in NA.

**Note:** Multiple bastion hosts cannot be specified for an specific device. However, you can simulate this by load-balancing across multiple bastion hosts that share a DNS name.

To designate a Unix or Linux bastion host for Telnet & SSH access:

1. On the menu bar under Devices, click Inventory. A list of all currently managed devices opens.
2. Click the New Device link at the top of the page. The New Device page opens.
3. Scroll down to the middle of the page to locate the Connection Information section. For more information, see "[New Device Page Fields](#)" on page 102.

To designate if new devices should use a bastion host by default for Telnet and SSH access, on the menu bar under Admin, select Administrative Settings and click Device Access. For more information, see "[Device Access Page Fields](#)" on page 33.

# Chapter 4: Managing Device Configurations

Use the following table to quickly locate information.

Topic	Refer to:
Getting Started	<a href="#">"Getting Started" below</a>
Viewing Device Configuration Changes	<a href="#">"Viewing Device Configuration Changes" below</a>
Comparing Device Configurations	<a href="#">"Comparing Device Configurations" on page 166</a>
Deploying Device Configurations	<a href="#">"Deploying Device Configurations" on page 167</a>

## Getting Started

HPE Network Automation (NA) detects and records device configuration changes. When a device configuration change occurs, NA downloads the configuration into its centralized repository. NA supports multiple real-time change detection and alerting systems that enable you to immediately identify what changes were made and by whom.

For devices that support user attribution via Syslog, such as Cisco IOS devices, NA extracts the username and associates it with a configuration change. If NA cannot associate the username with an NA user, a new user account is created with a randomly generated password. By default, NA appends the term “\_auto” to the new user to distinguish it as auto-generated. This enables NA to report ownership for all changes, including ones made by unregistered users. NA uses several methods, including AAA accounting logs, Syslog messages, and Proxy logs to discover the author of a given configuration change.

Access Control Lists (ACLs) are part of the configuration on many devices. They filter network traffic by controlling whether forwarded packets are accepted or blocked at the router's interfaces.

In general, the definition of an ACL is a collection of configuration statements. These statements define addresses, protocols, and patterns to accept or deny. ACLs can be used to restrict the contents of routing updates and to provide network security.

NA retrieves configuration information from devices and extracts the ACL statements and applications from the configuration. NA then stores the ACLs independent of the configuration. For more information about creating ACLs, see ["Creating ACLs" on page 655](#).

## Viewing Device Configuration Changes

The Configuration Changes page enables you to view configurations that have changed. Devices that appear in red text failed a recent task. Inactive devices are indicated with an icon next to the IP address.



With configuration changes shown in different colors, you can easily scan two configurations and quickly identify the areas that have changed. Without NA to automatically identify a misconfigured device, you must manually connect to the device, call up the configuration, and identify if there is anything anomalous about it.

To view a complete list of all recent configuration changes, on the menu bar under Devices, click Configuration Changes. The Configuration Changes page opens. You can click a device to view specific device configuration information.

To view configuration changes for a specific device:

1. On the menu bar under Device, click Inventory. A list of all currently managed devices opens.
2. Click the device for which you want to view configuration changes. The Device Details page for that device opens.
3. From the View drop-down menu, click Configuration Changes. The Device Configurations page opens. For information about the Device Configuration Detail page, see "[Device Configuration Detail Page Fields](#)" on the next page.

## Device Configurations Page Fields

Field	Description/Action
Hostname	Displays the device's host name. Clicking the device's host name opens the Device Details page, where you can view information about this device.
Device IP	Displays the device's IP address. Clicking the device's IP address opens the Device Details page, where you can view information about this device.
Last Snapshot Attempt	The timestamp of the most recent device configuration snapshot attempt (regardless of result).
Last Snapshot Result	The result of the most recent snapshot attempt.
View menu	Opens the View menu. For more information, see " <a href="#">View Menu Options</a> " on page 185.
Edit menu	Opens the Edit menu. For more information, see " <a href="#">Edit Menu Options</a> " on page 207
Provision menu	Opens the Provision menu. For more information, see " <a href="#">Provision Menu Options</a> " on page 218.
Connect menu	Opens the Connect menu. For more information, see " <a href="#">Connect Menu Options</a> " on page 219.
Scheduled Deployments for Device link	Opens the Task Search Results page, where you can view if there are any deployments scheduled for the device.
Edited Configurations link	Opens the Edited Configuration Search Results page. For more information, see " <a href="#">Search For Configuration Page Fields</a> " on page 485.
Check Boxes	You can use the left-side check boxes to compare two device configurations and/or delete device configurations. After selecting the devices, click the Actions drop-down menu and

Field	Description/Action
	<p>click one of the following:</p> <ul style="list-style-type: none"> <li>• Compare — Opens the Compare Device Configurations page, where you can compare the two selected configurations side-by-side. The differences are highlighted in different colors to make them easy to view.</li> <li>• Delete — Deletes the checked device configurations.</li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the device configurations.</p>
Date	Displays the date and time the configuration was added or changed.
Changed By	Displays the login name of the person who changed the configuration, device, or task. N/A means not applicable.
Comments	Displays any comments about the configuration.
Actions	<p>You can select the following actions:</p> <ul style="list-style-type: none"> <li>• Compare to Previous — Opens the Compare Device Configuration page, where you can view the selected configuration and its previous configuration side-by-side. The differences are highlighted in different colors to make them easy to view.</li> <li>• View Config — Opens the Device Configuration Detail page, where you can view the entire configuration, deploy this version of the configuration to the device running configuration or startup configuration, and reboot, if applicable. You can also edit the configuration, download the text version of the configuration, email the configuration, and compare the configuration to the previous or next configuration. For more information, see "<a href="#">Device Configuration Detail Page Fields</a>" below.</li> <li>• Diagnostics — Opens the Diagnostics page, where you can view diagnostic information for this configuration. Diagnostics include Basic IP, Device Information, NA Detect Device Boot, NA Interfaces, NA Module Status, NA OSPF Neighbors, and NA Routing Table. For detailed information about diagnostics, see "<a href="#">View Menu Options</a>" on page 185.</li> </ul>

If the Startup and Running Configurations differ, the following links are displayed at the top of the Device Configurations page:

- View Startup — Opens the Device Configuration page, where you can view the current startup configuration. For more information, see "[Device Configuration Detail Page Fields](#)" below.
- Compare Startup with Running — Opens the Compare Device Configurations page, where you can compare the Startup and Running Configurations. For more information, see "[Comparing Device Configurations](#)" on page 166.
- Synchronize — Opens the New Task - Synchronize Startup and Running page, where you can synchronize the Startup and Running Configurations. For more information, see "[Synchronize Startup and Running Task Page Fields](#)" on page 305.

## Device Configuration Detail Page Fields

The Device Configuration Detail page enables you to:

- Examine the details of a particular configuration.
- Enter comments about the configuration.
- Deploy this version of the configuration to the device. For example, you could deploy a stable configuration to roll back an incorrect change to the device.

**Note:** For easy navigation, there are links directly above the configuration text that enable you to quickly parse sections of the configuration file. For example, if the configuration file includes an Access List section, you can click the Access List link at the top of the configuration file and navigate directly to that section. Note that currently, only the Cisco IOS generic driver supports section parsing.

To view the Device Configuration Details page for a specific device:

1. On the Device Details page, click the View drop-down menu and then click Configuration Changes. The Device Configurations page opens.
2. In the Actions column, click the View Config link option. The Device Configuration Detail page opens.

Field	Description/Action
Hostname	Displays the device's host name. Clicking the device's host name opens the Device Details page, where you can view information about this device.
Device IP	Displays the device's IP address. Clicking the device's IP address opens the Device Details page, where you can view information about this device.
Last Snapshot Attempt	The timestamp of the most recent device configuration snapshot attempt (regardless of result).
Last Snapshot Result	The result of the most recent snapshot attempt.
Watch Device Link	<p>Adds the device to a watch group. If necessary, NA creates a device group for the watch group and a Watch Devices event rule for that device group. For more information, see <a href="#">"About Watch Groups" on page 165</a>.</p> <p>To remove a device from the watch group, click Stop Watching Device.</p>
View menu	Opens the View menu. For more information, see <a href="#">"View Menu Options" on page 185</a> .
Edit Menu	Opens the Edit menu. For more information, see <a href="#">"Edit Menu Options" on page 207</a>
Provision menu	Opens the Provision menu. For more information, see <a href="#">"Provision Menu Options" on page 218</a> .
Connect menu	Opens the Connect menu. For more information, see <a href="#">"Connect Menu Options" on page 219</a> .
Deploy to running configuration link	<p>Opens the New Task - Deploy Config page, where you can deploy the configuration to the running config.</p> <p><b>Note:</b> This action may not be available for all devices.</p> <p>For more information, see <a href="#">"Deploying Device Configurations" on page 167</a>.</p>

Field	Description/Action
Deploy to startup configuration and reboot link	<p>Opens the New Task - Deploy Config page, where you can deploy the configuration to the startup config and reboot the device (so the startup and running configurations remain synchronized).</p> <p><b>Note:</b> This action may not be available for all devices.</p> <p>For more information, see <a href="#">"Deploying Device Configurations" on page 167</a>.</p>
Deploy Binary Configuration and Reboot link	Deploys the binary configuration to the device and reboots the device.
View Text Config link	Displays the configuration in plain text in a new browser window so you can copy it to the clipboard and paste it into other applications.
Download Text Config link	Downloads the configuration in Text format so you can copy it to another system.
Download Binary Config link	Downloads the configuration in Binary format so that you can copy it to another system.
Email Text Config link	Enables you to email the configuration.
Compare to previous link	<p>Opens the Compare Device Configurations page, where you can view the older and newer configurations side-by-side. The differences are highlighted in different colors to make them easy to view.</p> <p><b>Note:</b> If this is the first configuration, the text will read, "This is the first configuration." If this is the last configuration, the text will read, "This is the current configuration."</p>
Changed By	Displays the login name of the person whose change triggered the snapshot and a "Details" link so as to provide user details.
Create Date	Displays the date and time of the snapshot that captured the configuration change.
<custom fields>	Displays any custom fields defined for device snapshots and diagnostics.
Configuration Comments	Enter comments to differentiate this configuration from others, especially the previous configuration. Click Edit Comments. The Edit Comments option enables you to edit the custom fields and comments for this configuration. For more information about editing device configuration data, see <a href="#">"Editing Device Configuration Data" on the next page</a> .
Line/Configuration Text	Displays the configuration file.

## Editing Device Configuration Data

You can add or edit configuration comments by clicking the Edit Inline Configuration Comments option from the Edit menu. For information about adding custom data, see ["Custom Data Setup" on page 545](#).

When editing in-line comments:

- Whenever a line in a configuration changes, the comment for that line is removed. For example, if you change the host name, NA also removes any comment immediately above the host name command because NA cannot be sure the comment remains valid after the command is changed.
- Be careful when adding or removing blank lines. Because blank lines can be significant for some devices, NA treats added or removed blank lines as configuration changes. You can add blank comment lines (lines that begin with a double comment character, usually! or ##).
- In-line comments are not versioned in the same way as configuration files. A comment block applies to the next command in the configuration. If a deployment does not affect the next command line, the comment does not change. If you deploy an old configuration (to overwrite a new one), the comments from the newer configuration may be applied to the deployed configuration, even though the comments might end up in the wrong places.
- If you are concerned about losing comments in a file that requires significant editing, it is recommended that you copy the configuration file with the comments before saving, so you can restore comments if necessary.

## About Watch Groups

A watch group is a device group of devices that are of particular interest to an NA user. The watch group is associated with a Watch Devices event rule that defines when NA should send an email notification to the NA user identified in the watch group name. By default, the Watch Devices event rule sends an email notification for the following events:

- Device Access Failure
- Device Booted
- Device Configuration Change
- Device Configuration Change - No User
- Device Configuration Deployment
- Device Configuration Deployment Failure
- Device Deleted
- Device Diagnostic Changed
- Device Edited
- Device Flash Storage Running Low
- Device Password Change Failure
- Device Port Duplex Mismatch Detected
- Device Software Change
- Device Startup/Running Config Difference
- Software Vulnerability Detected

**To create your watch group**

- On the **Device Configuration Detail** page or the **Device Details** page, click the Watch Details link.  
If necessary, NA creates a watch group for the current user, and then adds the current device to the current user's watch group.  
If necessary, NA creates a Watch Devices event rule for the new watch group.

#### To add a device to your watch group

- On the **Device Configuration Detail** page or the **Device Details** page, click the Watch Details link.

#### To remove a device from your watch group

- On the **Device Configuration Detail** page or the **Device Details** page, click the Stop Watching Device link.

#### To delete your watch group

- On the **Device Groups** page, select the Delete action for your watch group.

#### To change which events trigger email notifications for the watch group

- On the Event Notification & Response Rules page, select the Edit action for the Watch Device rule.  
For more information, see "[New Event Notification & Response Rules Page Fields](#)" on page 449.

## Comparing Device Configurations

The Compare Device Configuration page displays two configurations for the same device side-by-side. Additions, deletions, and changes are highlighted in two columns with line numbers on the left. Each configuration is identified by its unique IP address and the date/time on which the configuration snapshot was taken.

To compare two configurations from different devices:

1. On the menu bar under Devices, click Configuration Changes. The Configuration Changes page opens.
2. Using the left-side check boxes, click any two devices.
3. On the Actions drop-down menu, click Compare. The Compare Device Configurations page opens.

#### Compare Device Configurations Page Fields

Field	Description/Action
Lines Changed	Displays the number of lines changed, highlighted in light purple.
Lines Inserted	Displays the number of inserted lines, highlighted in light green.
Lines Deleted	Displays the number of lines deleted, highlighted in light yellow.
Show differences with context	If selected (the default), only changes with three lines before and after each change are displayed.
Show full text	If checked, the complete configuration file is displayed.
Show UNIX-style diff	If checked, the configuration file is displayed in UNIX diff format.
Deploy to	Opens the Deploy Configuration page, where you can deploy this configuration to the

Field	Description/Action
Running configuration link	<p>running config on the device.</p> <p><b>Note:</b> This action may not be available for all devices.</p>
Deploy to startup configuration and reboot	<p>Opens the Deploy Configuration page, where you can deploy the configuration to the startup config and reboot the device (so the startup and running configurations remain synchronized).</p> <p><b>Note:</b> This action may not be available for all devices.</p>
Configuration #1/Configuration #2	<p>Clicking the Configuration #1 or Configuration #2 link opens the Device Configuration Detail page. For more information, see "<a href="#">Device Configuration Detail Page Fields</a>" on <a href="#">page 162</a>.</p> <p><b>Note:</b> If this is the first configuration, the text will read, "This is the first configuration." If this is the last configuration, the text will read, "This is the current configuration."</p>
Device	<p>Displays the host name and IP address for the device. Clicking the device's host name and IP address opens the Device Details page, where you can view information about this device and its configuration history.</p>
Date	<p>Displays the date and time of the snapshot that captured the configuration change.</p>

## Deploying Device Configurations

There are two ways to deploy a configuration:

- To the running configuration — When deployed, the configuration file remains in use until the device is rebooted. Rebooting the device might cause the startup configuration to overwrite the running configuration.
- To the startup configuration — When deployed, the device is rebooted and the new configuration becomes both the running and startup configuration.

To deploy a configuration:

1. On the menu bar under Devices, click Configuration Changes. The Configuration Changes page opens.
2. In the Actions column for a device, click View Config. The Device Configuration Detail page opens. Select one of the following options (if applicable):
  - Deploy to running configuration — Opens the New Task - Deploy Config page, where you can deploy this configuration to the running config on the device.
  - Deploy to startup configuration and reboot — Opens the New Task - Deploy Config page, where you can deploy the configuration to the startup config and reboot the device (so the startup and running configurations remain synchronized).

- Deploy to startup configuration — Opens the New Task - Deploy Config page, where you can deploy the configuration to the startup config. This option applies to devices that do not need to be rebooted to synchronize the startup and running configurations.

### Deploy Config Task Page Fields

Field	Description/Action
Task Name	Displays Deploy Config. You can enter a different task name if applicable.
Applies to	Displays the device's Host Name or IP address.
Schedule Date	Select one of the following options: <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that most tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issues. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task. <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Large amounts of data could be stored. For more information, see <a href="#">"Logging" on page 692</a>.</p> </div>
Force Save	The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i> ). <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul>



Field	Description/Action
	<p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Check boxes	<p>The “Verify that changes are compliant with all policies that apply to the device” check box is selected by default. Depending on the task type, you can also opt to “Deploy to running configuration” or “Deploy to startup configuration and reboot.”</p> <p><b>Note:</b> The “Verify that changes are compliant with all policies that apply to the device” check box is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page (<b>Help &gt; About Network Automation &gt; View License Information</b> link).</p>
Configuration	Displays the configuration.
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see "<a href="#">Device Access Page Fields</a>" on page 33.)</p>	
Device Credentials	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use task-specific credentials. You are prompted to enter Username, Password, Confirm Password, Enable Password, Confirm Enable Password, SNMP Read-Only Community String, and SNMP Read/Write Community String.</li> <li>• Use task owner’s AAA credentials. The task owner must have valid AAA credentials defined.</li> </ul> <p><b>Note:</b> Standard password rules and device-specific</p>

Field	Description/Action
	passwords are used. However, the task owner's AAA username and password are applied.
<b>Pre-Task / Post-Task Snapshot Options</b>	
Snapshot options only appear if the system is configured to enable user overrides on the Configuration Mgmt Page under Administrative Settings. (For more information, see <a href="#">"Configuration Mgmt Page Fields" on page 24.</a> )	
Pre-Task Snapshot	Select one of the following options: <ul style="list-style-type: none"> <li>• None (the default)</li> <li>• As part of task</li> </ul>
Post-Task Snapshot	Select one of the following options: <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (the default)</li> <li>• Scheduled as a separate task</li> </ul>
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflow. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options: <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The

Field	Description/Action
	default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see <a href="#">"Logging" on page 692</a>.</p>

# Chapter 5: Viewing Devices

To view a list of the managed devices, on the menu bar under Devices click Inventory. Inventory is the default working group. It lists all of the currently managed devices. For more information about adding new devices, see ["Adding Devices" on page 102](#).

## Inventory Page Fields

Field	Description/Action
Groups link	Opens the Device Groups page, where you can view a list of current device groups. For more information, see <a href="#">"Viewing Device Groups" on the next page</a> .
New Device link	Opens the New Device page, where you can add a new device. For more information, see <a href="#">"Adding Devices" on page 102</a> .
New Device Group link	Opens the New Device Group page, where you can add a new device group. For more information, see <a href="#">"Adding Device Groups" on page 132</a> .
New Parent Group link	Opens the New Parent Group page, where you can add a new parent group. For more information, see <a href="#">"Adding Parent Groups" on page 133</a> .
Current Working Group	Displays Inventory, the default group. You can select a different group from the drop-down menu, if applicable.
List active devices only check box	Check this box if you want the inventory list to include only active devices. Inactive devices are not actively managed.
Run Task on this Group	You can select a task from the drop-down menu to run on this group. For more information about running tasks, see <a href="#">"About Tasks" on page 245</a> .
Group Description	List of all devices known to the system.
Check Boxes	You can use the left-side check boxes to manage devices. Once you have selected devices, click the Actions drop-down menu. Options include: <ul style="list-style-type: none"><li>• Activate — Instructs NA to manage the selected devices.</li><li>• Deactivate — Instructs NA not to manage the selected devices.</li><li>• Batch Edit — Opens the Batch Edit Device page, where you can assign a driver and set the connection methods for all the selected devices at once. For more information, see <a href="#">"Editing a Batch of Devices" on page 152</a>.</li></ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Diagram — Opens the Diagramming page. For more information, see <a href="#">"Diagramming" on page 591</a>.</li> <li>• Delete — Deletes the selected devices.</li> <li>• Select a task to run against the checked devices. For more information, see <a href="#">"Running Tasks Against a Temporary Device Group" on page 255</a>.</li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the devices.</p>
Host Name	Displays the host name of the device. Devices in red failed the last snapshot attempt. Inactive devices are marked with an icon beside the IP address. Clicking the Host Name link opens the Device Details page, where you can view basic information about the device and its configuration history. For more information about the Device Details page, see <a href="#">"View Menu Options" on page 185</a> .
Device IP	Displays the IP address of the device. Clicking the Device IP link opens the Device Details page, where you can view basic information about the device and its configuration history. For more information about the Device Details page, see <a href="#">"View Menu Options" on page 185</a> .
Device Vendor	Displays the device manufacturer's name.
Device Model	Displays the device's model designation.
Partition	Displays the Partition to which the device belongs.  <b>Note:</b> This field is only displayed if you have configured one or more Partitions.
Actions	You can select the following actions for each device: <ul style="list-style-type: none"> <li>• Edit — Opens the Edit Device page, where you can edit the information for this device. For more information, see <a href="#">"Edit Device Page Fields" on page 108</a>.</li> <li>• Telnet — Opens a Telnet window.</li> <li>• SSH — Opens an SSH window.</li> <li>• View Config — Opens the Current Configuration page, where you can view the latest configuration, deploy to running configuration, and/or add comments.</li> </ul>
Display results in groups of	You can set the number of items to display per page from the drop-down menu. The default is 25.

## Viewing Device Groups

A device group is a method for categorizing your devices in ways that make sense for your organization, for example:

- Geography/physical location
- Business unit/department

- Role in the network architecture
- Activation state

Once created, device groups can be used to direct various features, such as searching, authenticating rules, and updating passwords. For more information about adding device groups, see ["Adding Device Groups" on page 132](#).

Initially, the Device Groups page includes one system group: the Inventory group. The Inventory group contains all devices. However, any user-defined groups you create also appear on this page.

To view a list of the device groups, on the menu bar under Devices, click Groups. The Device Groups page opens. Keep in mind that Public device groups are visible to all users. Private device groups are visible only to the owner and NA administrators.

### Device Groups Page Fields

Field	Description/Action
New Group link	Opens the New Group page, where you can create a new device group. For more information about creating new device groups, see <a href="#">"Adding Device Groups" on page 132</a> .
New Parent Group link	Opens the New Parent Group page, where you can add a new parent group. For more information, see <a href="#">"Adding Parent Groups" on page 133</a> .
Group Name	<p>Displays the user-defined name of the device group. Parent groups are not indented unless they are also children of other parent groups. Groups that belong to a parent group are indented beneath their parent. Clicking a group name opens the Device Group page, where you can view detailed information about the device group. For more information, see <a href="#">"Viewing Device Groups" on the previous page</a>.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Group names that are preceded by the cloud icon are included in Partitions. For more information about Partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p> </div>
Description	Displays a brief description of the group.
Number of devices	Displays the number of devices in the group.
Owner	Displays the user name that created the device group.
Sharing	Displays whether the device group is Public or Private. All users can see Public device groups, while only the owner and the System Administrator can see Private device groups.
Actions	<p>The Actions field for the Inventory group is empty until you select a Group Name. User-defined device groups display the following actions:</p> <ul style="list-style-type: none"> <li>• View — Displays the devices contained in the selected device group. The devices can either be direct children of this device group if this is a leaf device group, or they could be children of child groups if the device group is a parent device group. For more information about the View option, see <a href="#">"Device Groups Page Fields" on page 139</a>.</li> <li>• Edit — Opens the Edit Group page, where you can edit the information for the device group.</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"><li>• Delete — Enables you to delete the device group.</li></ul> <div style="background-color: #f0f0f0; padding: 10px; margin: 10px 0;"><p><b>Note:</b> If you try to delete a device group that has one or more policies linked to it, the confirmation prompt displays a warning indicating that policies are linked to the selected device group. For information about enabling the warning message, see <i>Configuring NA to Warn Before Deleting a Device Group Linked With Policies</i> in <i>NA Administration Guide</i>.</p></div> <ul style="list-style-type: none"><li>• Diagram — Diagramming enables you to gather topology data from your network devices. For more information, see <a href="#">"Diagramming" on page 591</a>.</li><li>• Make Private/Make Public — Enables you to designate the device group as Public or Private. All users can see Public device groups, while only the owner and the System Administrators can see Private device groups.</li></ul>

## Reserving Devices

For organizations with large networks, managing who is working on which devices and at what times is important. The Device Reservation System enables you to reserve a device or a group of devices for a specific period of time. Device Reservation conflict notification prevents you from accidentally working on devices that are already under maintenance and allows a large IT group to schedule and work on the network in a controlled, organized fashion. (For more information about configuring the Device Reservation System and the Activity Calendar, see ["Workflow" on page 50](#).)

Keep in mind that devices and/or device groups affected by sub-tasks of a multi-task project are automatically reserved for the duration of the tasks. In addition, when a multi-task project is approved, and one or more scheduled tasks include the following read-write tasks (listed below), a check is done to determine if the read-write task affects a currently reserved device. If it does, a device reservation conflict event is created. However, a device reservation conflict does not prevent you from running the task against the device or device group. The read-write tasks include:

- Deploy Configuration
- Run Command Script
- Deploy Passwords
- Reboot Device
- Synchronize Startup and Running
- Update Device Software

If a multi-task project reserves a device or group of devices, you are informed when a device configuration change is detected on any of the devices.

For information about setting up multi-task projects, refer to ["Scheduling Multi-Task Projects" on page 394](#).

## Activity Calendar

The Activity Calendar enables you to view the activity that is taking place on your network. It provides a list of the device tasks and reservations that have been scheduled for any given day, including:

- All tasks scheduled to run on the day being viewed.
- The start time and date of the task.
- The duration of the task.
- The reserved devices and/or device groups on which the tasks are being run against.
- If the task has an uncleared Device Reservation Conflict event.

**Note:** The Activity Calendar displays only the read-write tasks of a device. For more information about the read-write tasks, see ["Reserving Devices" on the previous page](#)

All task blocks start and end on hour or half hour demarcations. Consequently, if a task starts at 22 minutes after the hour, it will be displayed within the row that represents the hour.

The left-hand calendar displays the current month. The right-hand calendar displays the next month. The selected day is highlighted on the appropriate calendar. You can select a specific day by clicking the day listed on the calendar. The page is re-drawn with the appropriate day's events.

Task Details are displayed below the calendars in the right-hand pane. The following task information is provided:

- Start time
- Duration
- The name of the user who scheduled the event
- The status of the event, for example Pending, Running, and Success.

To view the Activity Calendar, on the menu bar under Tasks, click Activity Calendar. The Activity Calendar opens. The following figure shows a sample Activity Calendar display.



The screenshot shows the 'Activity Calendar' interface. At the top, there is a title 'Activity Calendar' and navigation links for 'Add to Favorites' and 'Help'. Below the title, it indicates '21 Total Tasks/Reservations' and a date selector for 'Mar-16-16'. The main area is divided into two calendar views for March and April 2016. The March calendar shows the 16th as the selected date. Below the calendar, a task detail panel for 'AutomationBrKt9VEp' is displayed, showing a start time of 'Mar-16-16 01:08:59', a duration of '60 minutes', scheduled by 'admin', and a status of 'Succeeded'. A task list on the left shows a task 'Automationvhwum8Tt' with a link to 'Configure Syslog'. The interface also includes a vertical axis on the left with time slots from 0.00 to 5.00.

If you click the link displayed in a cell, the information in the Tasks panel is updated. If a multi-task project has an uncleared device reservation conflict, the cell is highlighted in yellow. For information about configuring a multi-task project, see "[Scheduling Multi-Task Projects](#)" on page 394.

## Viewing Device Details

The Device Details page enables you to perform device-specific tasks. To view the Device Details page:

1. On the menu bar under Devices, click Inventory.
2. On the Inventory page, click a device. The Device Details page opens for that device. (Keep in mind that you can view the Device Details page from most other pages using the Search feature.)

### Device Details Page Fields

Field	Description/Action
Hostname	The host name of the device. To reload this page, click the link.
Device IP	The IP address of the device. To reload this page, click the link.
Last Snapshot Attempt	The timestamp of the most recent device configuration snapshot attempt (regardless of result).
Last Snapshot Result	The result of the most recent snapshot attempt. If the snapshot failed, the link opens that <b>Task Result</b> page.
Information links	<p>When applicable, links provide more information about the device. For example, if a device is not in compliance with one or more policies, the Policy Events link opens the <b>Policy Activity</b> page. If NA identifies a difference between the startup and running configurations, the following links appear:</p> <ul style="list-style-type: none"> <li>• View Startup—Opens the <b>Device Configuration</b> page.</li> <li>• Compare Startup with Running—Opens the <b>Compare Device Configurations</b> page.</li> <li>• Synchronize—Opens the <b>New Task - Synchronize Startup and Running</b> page.</li> </ul>
Watch Device link	<p>Adds the device to a watch group. If necessary, NA creates a device group for the watch group and a Watch Devices event rule for that device group. For more information, see <a href="#">"About Watch Groups" on page 165</a>.</p> <p>To remove a device from the watch group, click Stop Watching Device.</p>
View menu	Opens the View menu. For more information, see <a href="#">"View Menu Options" on page 185</a> .
Edit menu	Opens the Edit menu. For more information, see <a href="#">"Edit Menu Options" on page 207</a>
Provision menu	Opens the Provision menu. For more information, see <a href="#">"Provision Menu Options" on page 218</a> .
Connect menu	Opens the Connect menu. For more information, see <a href="#">"Connect Menu Options" on page 219</a> .
<b>Device Details</b>	
Device Description	The user-defined description of the device.
FQDN	The fully qualified domain name of the device.
Service Type	<p>The NA-defined and user-defined service types associated with the device.</p> <p>For more information, see <a href="#">"About Service Types" on page 102</a>.</p>
Comments	Comments about the device.
Vendor	The device vendor.

Field	Description/Action
Model	The manufacturer's model number of the device.
Device Family	The device family specification. A device family is a collection of devices that share a similar configuration CLI command syntax.
Software Version	The version of operating system software running on the device.
Driver Name	The NA driver for accessing the device.
Device Type	The type of device, for example: router, switch, or firewall.
Serial Number	The manufacturer's serial number of the device.
Asset Tag	Your company's asset tag number for the device.
System Memory	The amount of system memory on the device.
Location	The location of the device. Typically, location comes from the configuration file.
Device Origin	The source of the initial device information in one of the following formats: <ul style="list-style-type: none"> <li>• Added by &lt;import source&gt; through user &lt;user name&gt; (Create date: &lt;timestamp&gt;) The device import source is known.</li> <li>• Added on &lt;timestamp&gt; The device import source is unknown.</li> <li>• Manually added by &lt;user name&gt; (Create date: &lt;timestamp&gt;) The name user added the device manually.</li> </ul>
Last Successful Snapshot	The timestamp of the most recent successful snapshot.
Last Configuration Change	The timestamp of the most recent device configuration change.
Last Access Attempt	The timestamp of the most recent attempt to access the device (regardless of result).
Last Access Success	The timestamp of the most recent successful device access.
Change Detection and Polling	The change detection and polling setting. Possible values are: <ul style="list-style-type: none"> <li>• Enabled—NA periodically polls the device to verify the stored configuration against the device's actual configuration.</li> <li>• Polling Only—NA polls the device for changes as part of the regular polling task only.</li> <li>• Disabled—NA does not periodically poll or otherwise manage the device.</li> </ul>

Field	Description/Action
Management Status	The management status of the device. Possible values are: <ul style="list-style-type: none"> <li>Active—NA records changes to the device configuration.</li> <li>Inactive—NA does not record changes to the device configuration. You cannot change the device configuration through NA.</li> </ul>
Password Rule	The password rule that NA uses when accessing the device.
VTP Domain	If applicable, the VLAN Trunking Protocol (VTP) domain name.
VTP Operating Mode	If applicable, the VLAN Trunking Protocol (VTP) operating mode.
Ticket Number	If applicable, the ticket number. You can click the Update Ticket button to update the ticket if you have installed one of the NA Connectors.
NNMi Associations (if configured)	A list of the NNMi management servers integrated with NA. This field is displayed only if the device is synchronized with one or more NNMi management servers through the HPE NNMi-HPE NA Integration. The list includes the following columns: <ul style="list-style-type: none"> <li>Integration Enabled—The status of the integration with the NNMi management server identified in the NNMi Server column.</li> <li>NNMi Server—The name of the NNMi management server. If the integration is currently enabled, the link opens the NNMi console to the initial view for this NNMi management server.</li> <li>Node UUID—The UUID of this device in NNMi. If the integration is currently enabled, the link opens the NNMi console to the <b>Node</b> form for this device.</li> </ul>

## NA/SA Integration

Implementing changes in an IT environment requires a coordinated effort between network administrators and system administrators. There can be servers running different operating systems and network devices that include firewalls, load balancers, switches, routers, and so on. For example, in some environments, you are required to make changes to network devices that are actually part of an application, such as load balancers and firewalls.

Integrating Network Automation (NA) with Server Automation (SA) enables you to:

- View Layer 1 connectivity between SA servers and NA network devices. Keep in mind that NA only infers the location of the wiring. NA uses heuristics (as best it can) to determine the physical connections between devices and/or servers. For more information about SA, see the *Server Automation User's Guide*.
- View Layer 2 connectivity between SA servers and NA network devices. NA reduces the number of data link connections between devices and/or servers to make network diagrams more readable. Only connections that can be inferred through transitive connections are reduced. configuring the Device Reservation System and the Activity Calendar "[Diagramming](#)" on page 591.

- View information on SA servers that are seen by a given NA network device and conversely view which network device can see a given SA server.

To set up NA/SA integration, you must run the NA Topology Data Gathering diagnostic. This diagnostic instructs NA to collect MAC addresses for all switches. MAC addresses are required to discover and add Layer 2 and Layer 1 connections.

In some cases, Layer 1 connectivity (wiring) can be inferred from the Layer 2 connectivity (ARP tables). This enables you to detect configuration mismatches, such as duplex and speed settings.

- For information about configuring NA/SA integration, see ["User Authentication" on page 68](#).
- For information about creating network diagrams, see ["Diagramming" on page 591](#).
- For information about viewing interface details, including duplex and speed settings, see ["Interface Detail Page Fields" on page 189](#).
- For information about viewing SA servers, see ["Servers Page Fields" on page 203](#).

**Note:** In a Horizontal Scalability environment, you must configure the SA external authentication details manually on each of the NA core server.

## NA/SA Permissions

When integrating NA and SA, the same username and password is used to login to both systems. Keep in mind, however, a user's SA permissions control what SA servers can be viewed by that user in both SA and NA. Similarly, a NA user's permissions control what network devices can be viewed by that user in both NA and SA.

When configuring NA, you can specify a SA username and password. For more information, see ["User Authentication Page Fields" on page 75](#). The SA user's permissions control what SA servers are discovered by NA when it reads the MAC addresses via the Topology Gathering Diagnostic. Because users can see only the SA servers for which they have permissions, it is recommended that you specify a SA user that can view all SA servers. This ensures that all known SA servers are mapped to appropriate MAC addresses in NA.

For example:

- Server1's MAC address is 0060839488A1.
- SA User A can view Server1.
- SA User B cannot view Server1.
- Switch S7 is connected to Server1.

If NA is configured to use SA User A as the Twist Server username, NA maps 0060839488A1 to Server1 when the Topology Gathering Diagnostic runs. If SA User A logs into NA, he/she can view Server1 on the Servers page (from the Device Details page) for Switch S7. If SA User B logs into NA, he/she cannot view Server1 on the Servers page because he/she does not have permission to view Server1.

## Device Hardware Information

In addition to basic hardware details about managed SA servers and NA network devices, NA/SA integration also reports on the following information about network interfaces:

- On the server side, network interfaces identify the ethernet interface, MAC address, devices connected, VLAN name, duplex and speed settings, and so on.

- On the network device side, network interfaces identify the Ethernet port, speed and duplex settings, and connected devices. Auto-negotiate modes are set on a network interface in NA and are then negotiated on a network card in SA. You can create policies that define this configuration, such as a policy that specifies duplex as Full (Auto) and speed as 100 (Auto).

For more information, see "[Device Interfaces Page Fields](#)" on page 188.

## Connecting to NA Through a Firewall

The NA Application Program Interface (API) uses Java Remote Method Invocation (Java RMI) to connect to the NA server. Java RMI can run over various protocols. NA supports Java RMI only over Java Remoting. When integrating SA and NA, SA uses the NA API. As a result, Java RMI and jboss Remoting use the following ports:

- Java Naming and Directory Interface (JNDI) (typically port 1099)
- RMI (typically a dynamic 1098)
- RMI Object (typically port 4446)

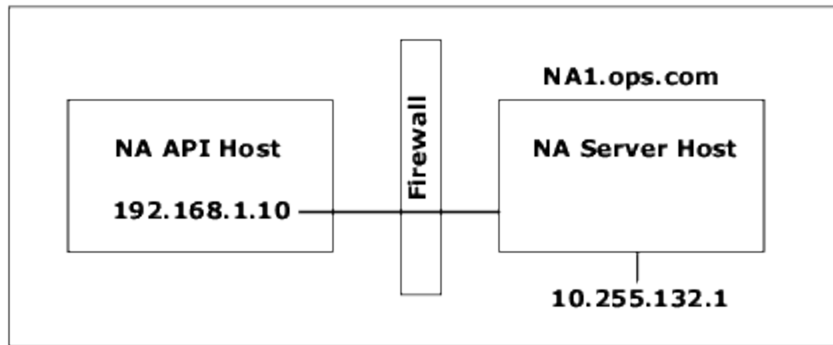
To use the NA Java API through a firewall, do the following:

1. Open the following ports through the firewall:
  - Java Naming and Directory Interface (JNDI) (typically port 1099)
  - RMI (typically a dynamic 1098)
  - RMI Object (typically port 4446)
2. Determine next steps.
  - If the NA core server host has the same IP address on both sides of the firewall, configuration is complete.
  - If the NA core server host has a different IP address outside the firewall, continue with [step 3](#).
3. Configure NA to use the RMI server hostname (instead of the IP address) by creating the following file:
  - *Windows*:  
<NA\_HOME>\server\ext\jboss\server\default\conf\jnp.properties
  - *Linux*:  
<NA\_HOME>/server/ext/jboss/server/default/conf/jnp.properties

This file should include the following line:

```
java.rmi.server.useLocalHostname=true
```
4. Save the file and restart the NA server.
5. Ensure that the hostname resolution is correct on the NA server host and on the NA API host (which is the SA server host, when integrating SA and NA).

In the following example, NA is running on a host named NA1.ops.com with an IP address of 10.255.132.1. Outside the firewall, to access NA1.ops.com, use 192.168.1.10. The NA Server Host (10.255.132.1) must correctly resolve to NA1.ops.com. On the NA API Host, NA1.ops.com must correctly resolve to 10.255.132.1.



At a high level, the Java RMI/jboss Remoting performs as follows:

1. The client connects to the JNDI port (1099) on host 10.255.132.1.
2. The client queries: Where is bean Connect?
3. The server replies: On port 1098 on host na1.ops.com.
4. The client looks up the IP address for na1.ops.com.
5. The client connects to port 1098 on host 10.255.132.1.
6. If the client requires new Java.class files, the client connects to port 4446 on host 10.255.132.1.

## Changing Ports

To change the JNDI port, do the following:

1. Edit the following file to change 1099 to 1199, for example:
  - *Windows:* <NA\_HOME>\server\ext\jboss\server\default\conf\bindingservice.beans\META-INF\bindings-jboss-beans.xml
  - *Linux:* <NA\_HOME>/server/ext/jboss/server/default/conf/bindingservice.beans/META-INF/bindings-jboss-beans.xml
2. Save the file and restart the NA server.

**Note:** If you change the JNDI port, the code calling the NA API will also need to be changed. Instead of connecting to NA1.ops.com:1099, for example, the NA API will have to connect to NA1.ops.com:1199 (or whatever port is configured).

To change the RMI port, do the following:

1. Edit the following file to change 1098 to 1198, for example:
  - *Windows:* <NA\_HOME>\server\ext\jboss\server\default\conf\bindingservice.beans\META-INF\bindings-jboss-beans.xml
  - *Linux:* <NA\_HOME>/server/ext/jboss/server/default/conf/bindingservice.beans/META-INF/bindings-jboss-beans.xml

2. Save the file and restart the NA server.

**Note:** Changes to the RMI Port are transparent to the client. No client changes are required.

To change the RMI Object port, do the following:

1. Edit the following file to change 4446 to 4447, for example:
  - *Windows:* <NA\_HOME>\server\ext\jboss\server\default\conf\bindingservice.beans\META-INF\bindings-jboss-beans.xml
  - *Linux:* <NA\_HOME>/server/ext/jboss/server/default/conf/bindingservice.beans/META-INF/bindings-jboss-beans.xml
2. Save the file and restart the NA server.

**Note:** Changes to the RMI Object Port are transparent to the client. No client changes are required.

## Incorrect Port Counts

If port counts are incorrect, do the following to configure which port types are counted:

1. Stop NA.
2. Update the *\$NA/adjustable\_options.rcx* file and add the following entries anywhere between the <options> and </options> tags:

```
<array name="PortCount/PortTypes">
<value>Ethernet</value>
<value>FastEthernet</value>
<value>GigEthernet</value>
<value>FDDI</value>
<value>Lex</value>
<value>TokenRing</value>
<value>VGAnyLan</value>
<value>Pos</value>
<value>Serial</value>
<value>HSSI</value>
<value>ATM</value>
<value>Dialer</value>
<value>BRI</value>
<value>DSL</value>
<value>TenGigabitEthernet</value>
<value>GigEthernetTrunk</value>
</array>
```

**Note:** Edit the above list as appropriate for the interface/port types that you want counted.

3. Replace \$NA with the location where NA has been installed, typically */opt/na*.
4. Update the *\$NA/adjustable\_options.rcx* file and add the following entry anywhere between the <options> and </options> tags:



```
<option name="snapshot/force_update_model_data">true</option>
```

**Note:** This option causes NA to recompute the port counts (and other device data) on every checkpoint snapshot even if there is no configuration change.

5. Restart NA.
6. Run a Snapshot task against Inventory to update the port counts.
7. Check the “Make snapshot a checkpoint” option on the New Task page. This will recompute the port counts for existing devices.

**Note:** After running the Snapshot task, you might want to remove `<option name="snapshot/force_update_model_data">true</option>` from the `$NA/adjustable_options.rcx` file to improve performance.

## View Menu Options

Menu Option	Description/Action
Device Detail	<p>You can select the following options:</p> <ul style="list-style-type: none"><li>• Device Home — Opens the Device Details page for that device.</li><li>• ACLs — Opens the Device ACLs page, where you can view a list of all ACLs associated with this device. For more information, see <a href="#">"Viewing ACLs" on page 652</a>.</li><li>• Interfaces — Opens the Device Interfaces page, where you can view the device's interfaces and a list of upstream and downstream devices connected via each interface. When a connected device is actively managed, there is a link to that device. This enables you to traverse the Layer 3 topology when troubleshooting without having to look up your network diagrams.</li></ul> <p><b>Note:</b> The Device Interfaces page is updated when you run the Interfaces diagnostic. By default, this diagnostic runs when NA detects a configuration change.</p> <p>For more information, see <a href="#">"Device Interfaces Page Fields" on page 188</a>.</p> <ul style="list-style-type: none"><li>• IP Addresses — Opens the Device IP Addresses page, where you can view all IP addresses that are associated with the device. This includes the IP addresses of interfaces on the device, as well as IP addresses on the network that are visible to the device. For more information, see <a href="#">"Device IP Addresses Page Fields" on page 193</a>.</li><li>• MAC Addresses — Opens the Device MAC Addresses page, where you can view a list of all MAC addresses known to NA that are associated with the device. For more information, see <a href="#">"Device MAC Addresses Page Fields" on page 194</a>.</li><li>• VLANs — Opens the Device VLANs page, where you can view VLAN information as it is configured on the device. For more information, see <a href="#">"Device VLANs Page Fields" on page 196</a>.</li></ul>

Menu Option	Description/Action
	<ul style="list-style-type: none"> <li>• VTP Information — Opens the VTP Detail page, where you can view VTP information for a VLAN. For more information, see "<a href="#">VTP Detail Page Fields</a>" on page 199.</li> <li>• Modules — Opens the Device Blade/Modules page, where you can view a list of the modules (blades, cards) installed on the device. By default, the module data is updated weekly by the Module Status diagnostic. For more information, see "<a href="#">Device Blades/Modules Page Fields</a>" on page 201.</li> <li>• Policies — Open the Device Policies page, where you can Verify that the correct policy was applied to the device, view if the policy passed or failed, view policies that are applied to the device when the device is added to NA, and view the exceptions that are in place for a policy applied to the device. For more information, see "<a href="#">Device Policies Page Fields</a>" on page 202.</li> <li>• Servers — Opens the Servers page, where you can view a list of HPE Server Automation (SA) servers that are connected to the device. For more information, see "<a href="#">Servers Page Fields</a>" on page 203.</li> </ul>
SingleView	<p>Opens the SingleView page, where you can track events that indicate changes to either a single device or all of your devices on one page. For more information, see "<a href="#">Consolidated View of Events (SingleView)</a>" on page 539.</p>
Current Configuration	<p>Opens the Current Configuration page, where you can deploy the configuration to the running configuration on the device. For more information, see "<a href="#">Device Configurations Page Fields</a>" on page 161.</p>
Configuration Changes	<p>Opens the Device Configurations page, where you can view two device configurations side-by-side. For more information, see "<a href="#">Comparing Device Configurations</a>" on page 166.</p>
Diagnostics	<p>Select an option from the Diagnostics list. Each option shows a historical list of diagnostics specific to the device. The most frequently employed diagnostics include:</p> <ul style="list-style-type: none"> <li>• All — Displays all of the diagnostics on one page.</li> <li>• Basic IP — Displays the basic IP information, such as the default gateway, DNS servers, Domain list, and the IP addresses assigned to installed interfaces.</li> <li>• Memory Troubleshooting — This diagnostic is a sample custom diagnostic that is implemented for some devices. It is included as a standard diagnostic after a device configuration change.</li> <li>• Device Information — Displays basic device information, such as software and hardware versions, the model and host name of the device, and interface descriptions. Although this information appears with the default diagnostics, it is updated only when NA runs a snapshot task on the device.</li> <li>• NA Detect Device Boot — Displays information on when the device was last booted.</li> <li>• NA Device File System — Records what files (generally software image files) are currently on the device's flash cards or hard drive. This data is used by the Deploy Software task.</li> <li>• NA Duplex Data Gathering — Gathers Layer 2 connectivity data, such as duplex settings and the current port state, for Interface reports. Note that not all devices support this diagnostic. In addition, it does not have any viewable diagnostic output.</li> </ul>

Menu Option	Description/Action
	<ul style="list-style-type: none"> <li>• NA Flash Storage Space — This diagnostic is special-purpose diagnostic used only against Nortel BayRS devices to trigger a low-flash space event, which then causes a compression script to run.</li> <li>• NA Interfaces — Displays the interfaces information for the device, such as state, IP address, errors, I/O rate, and VLAN information.</li> <li>• NA Module Status — Displays the module diagnostics for this device.</li> <li>• NA OSPF Neighbors — Displays a list of the OSPF neighbor tables stored in the NA database.</li> <li>• NA Routing Table — Displays all the routing tables for this device stored in the NA database. If BGP is running, it shows the Routing Table summary information, when available.</li> <li>• NA Topology Data Gathering — This diagnostic is used to populate the tables used for diagramming and topology reports. It does not have any viewable diagnostic output.</li> <li>• NA VLAN Data Gathering — This diagnostic is used to gather the latest VLAN information. The information on the New Device VLAN and Edit Device VLAN pages is based on the last time VLAN data was gathered from the device. To ensure that you have the latest VLAN data, run the VLAN Data Gathering diagnostic to update NA with the latest VLAN data.</li> </ul> <div style="background-color: #e0e0e0; padding: 10px; margin: 10px 0;"> <p><b>Note:</b> This diagnostic does not result in storing any diagnostic text in the database. The diagnostic only updates certain tables in the database. As a result, the diagnostic is not viewable.</p> </div> <ul style="list-style-type: none"> <li>• NA Port Scan — This diagnostic uses Nmap to scan a device's ports and return details on which ports are open and what services they provide.</li> </ul>
Device Tasks	<p>Opens the Device Tasks page, where you can view a list of all tasks associated with this device. You can also view details about the task or rerun the task from this page. For more information about Device Tasks page, see <a href="#">"Device Tasks Page Fields" on page 204</a>.</p>
Device Events	<p>Opens the Device Events page, where you can view recent system events for the device, including their success/failure status, and access detailed information about the event by clicking the link in the Summary field. For more information about the Device Events page fields, see <a href="#">"Device Events Page Fields" on the next page</a>.</p>
Device Relationships	<p>Opens the Device Relationships page. Device relationships enable you to create a relationship between devices and then view the relationships. For more information about device relationships, see <a href="#">"Device Relationships Page Fields" on page 204</a>.</p>
Software Audit Trail	<p>Opens the Device Software History page, where you can view what software is loaded on the device. For more information about the Device Loaded Software page fields, see <a href="#">"Device Software History Page Fields" on page 205</a>.</p> <div style="background-color: #e0e0e0; padding: 10px; margin: 10px 0;"> <p><b>Note:</b> This option is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page—<b>Help</b></p> </div>

Menu Option	Description/Action
	<a href="#">&gt; About Network Automation &gt; View License Information link.</a>
Telnet/SSH Sessions	Opens the Device Session page, where you can view a list of the Telnet and SSH sessions associated with the device. Sessions can include only the commands or the keystroke logging for the entire session. For more information about the Device Session page fields, see " <a href="#">Device Sessions Page Fields</a> " on page 206.

Keep in mind that most of the NA diagnostics are standard diagnostics that are shipped with the product and cannot be edited, with the exception of the following sample diagnostics:

- Memory Troubleshooting
- Hardware Information

## Device Events Page Fields

The Device Events page enables you to view recent system events for the device, including their success/failure status, and access detailed information about the event.

Field	Description/Action
Check Boxes	You can use the left-side check boxes to delete selected events. After selecting events, click the Actions drop-down menu and click Delete. The adjacent Select drop-down menu enables you to select or deselect all of the events.
Event Date	Displays the date and time the event occurred.
Summary	Displays a brief summary of the event. If you click the Summary link, the Event Detail page opens, where you can view detailed information about the event.
Added By	Displays the person or process that initiated the event.

## Device Interfaces Page Fields

The Device Interfaces page enables you to view the device's interfaces and a list of upstream and downstream devices connected via each interface. Keep in mind that although a Port is a Layer 2 term and Interface is a Layer 3 term, NA does not make that distinction.

To view the Device Interfaces page, on the View menu for a device, select Device Details and click Interfaces. The Device Interfaces page opens.

Field	Description/Action
Port Name	Displays the name of the port, such as Ethernet0 or Serial1.

Field	Description/Action
Port Type	Displays the name of the port type, such FastEthernet.
Port Status	Displays if the interface is Configured Up or Administratively Down.  <b>Note:</b> This does not reflect the protocol state of the interface, only the configured state.
Running Port State	Specifies the Layer 2 connectivity of the port (up or down). This information is gleaned from the NA Duplex Data Gathering diagnostic. For more information, see <a href="#">"Run Diagnostics Task Page Fields" on page 291</a> .
Port IP	Displays the primary IP address for the interface. NA parses the IP address from the device configuration. For more information, see <a href="#">"Device Configurations Page Fields" on page 161</a> .
Description	Displays a brief description of the interface. NA parses the description from the device configuration.
Negotiated Duplex	Displays the negotiated duplex, either full or half. This information is gathered by the Gather Topology Data Diagnostic. For more information, see <a href="#">"Run Diagnostics Task Page Fields" on page 291</a> .
Actions	You can select the following actions for each interface: <ul style="list-style-type: none"> <li>• Edit Interface — Opens the Edit Interface Detail page, where you can edit the details about this interface and any custom data fields. For more information, see <a href="#">"Edit Interface Detail Page Fields" on page 191</a>.</li> <li>• View Interface — Opens the Interface Detail page, where you can view details about this interface and custom data, view alternate IP addresses, the connected servers, and view or edit comments. For more information, see <a href="#">"Interface Detail Page Fields" below</a>. For detailed information about SA server management, see the <i>HPE Server Automation User's Guide</i>.</li> <li>• Interfaces in Subnet — Opens the Interfaces in Subnet page, where you can view all the interfaces in the same subnet as this interface. This enables you to traverse the devices linked within the subnet, as long as the devices are actively managed. For more information, see <a href="#">"Interfaces in Subnet Page Fields" on page 192</a>.</li> </ul>

## Interface Detail Page Fields

The Interface Detail page enables you to view details for a specific interface. Keep in mind that although a Port is a Layer 2 term and Interface is a Layer 3 term, NA does not make that distinction.

Field	Description/Action
Device	Displays the name and IP address of the device.
Name	Displays the interface name, for example: Ethernet0/1
Type	Displays the type of interface, for example: Ethernet

Field	Description/Action
Status	Displays the status of the interface, for example: Configured Up
Connected to	Displays the servers to which the interface is connected.
Primary IP	Displays the interface's Primary IP address. If you click the Interfaces in Subnet link, the Device Interfaces page opens, where you can view all the interfaces in the same subnet as this interface. This enables you to traverse the devices linked within the subnet, as long as the devices are actively managed. For more information, see <a href="#">"Device Interfaces Page Fields" on page 188</a>
Description	Displays a description of the interface.
MAC Address	Displays the MAC address of the interface, for example: 00-50-10-F6-41
Member VLANs	<p>Displays the VLANs to which this device belongs. If you click the VLAN name link, the VLAN Detail page opens for the VLAN. For more information, see <a href="#">"VLAN Detail Page Fields" on page 198</a>.</p> <p>For detailed information about VLANs, see <a href="#">"Virtual Local Area Networks (VLANs)" on page 195</a>.</p> <p><b>Note:</b> If a trunk port does not have a native VLAN (untagged VLAN), "No Native VLAN" is displayed at the bottom of the Member VLANs list.</p>
Duplex	Network interfaces identify the Ethernet port, speed, duplex settings, devices connected, and VLAN name. Auto-negotiate modes are set on a network interface in NA and are then negotiated on a network card in SA. A duplex mismatch is a configuration mismatch between the speed and duplex of a managed server and a connected network device.
Speed	Network interfaces identify the Ethernet port, speed, and duplex settings, devices connected, and VLAN name. Auto-negotiate modes are set on a network interface in NA and are then negotiated on a network card in SA. A speed mismatch is a configuration mismatch between the speed and duplex of a managed server and a connected network device.
Configuration	Displays the current configuration of the interface. If you click the View Configuration link, the Current Configuration page opens. Configlet parsing enables the parser to extract the lines in the configuration relevant to the interface.
VRF	<p>Displays the section of the device configuration defining the Virtual Routing and Forwarding (VRF) that is associated with the interface. VRF enables multiple instances of a routing table to co-exist within the same router. Because the routing instances are independent, the same or overlapping IP addresses can be used without conflicting with each other.</p> <p><b>Note:</b> This field is displayed only if the interface has an associated VRF and the device driver supports VRF parsing.</p>
QoS	Displays Quality of Service (QoS) information. NA parses the interface configuration for

Field	Description/Action
	QoS configuration statements and displays the corresponding global configuration information. In other words, parts of the configuration that are related to, but not included in the interface configuration, are shown. This includes route-maps, policy-maps, class-maps, and ACLs. This information provides a broader view of the device configuration and why the network is performing as it is (packet loss, long delays for certain packet types, and so on).
ACLs	Displays the ACLs that are known to exist on the interface.
Last Modified	Displays when the interface was last modified.
Comments	Displays any comments about the interface.
Edit Detail link	Opens the Edit Interface Detail page. For more information, see <a href="#">"Edit Interface Detail Page Fields"</a> below.

## Edit Interface Detail Page Fields

The Edit Interface Detail page enables you edit the details for an interface and any custom data fields.

To navigate to the Edit Interface Detail page:

1. From the Device Details page, select the View menu.
2. From the View menu, select Device Detail and click Interfaces. The Device Interfaces page opens.
3. In the Actions field, click the Edit Interface link for the port you want to edit. The Edit Interface Detail page opens.

**Note:** The Edit Interface Detail page includes a section to configure trunk ports. The VLAN Trunk checkbox enables you to set up a trunk port. The section is a collapsible set of fields that are displayed when checked, including "Native VLAN ID" and "Member VLANs", as described in the table.

Field	Description/Action
Device	Displays the name and IP address of the device.
Name	Displays the interface name, for example: Ethernet0/1
Type	Displays the type of interface, for example: Ethernet
Status	Displays the status of the interface, for example: Configured Up
Connected to	Displays the servers to which the interface is connected.
Primary IP	Displays the interface's Primary IP address. If you click the Interfaces in Subnet link, the Device Interfaces page opens, where you can view all the interfaces in the same subnet as this interface. This enables you to traverse the devices linked within the subnet, as long as the devices are actively managed.

Field	Description/Action
Description	Displays a description of the interface.
MAC Address	Displays the MAC address of the interface, for example: 00-50-10-F6-41
Member VLANs	Displays the VLANs to which this device belongs. For detailed information about VLANs, see <a href="#">"Virtual Local Area Networks (VLANs)" on page 195</a> .
Duplex	Network interfaces identify the Ethernet port, speed, duplex settings, devices connected, and VLAN name. Auto-negotiate modes are set on a network interface in NA and are then negotiated on a network card in SA. A duplex mismatch is a configuration mismatch between the speed and duplex of a managed server and a connected network device.
Speed	Network interfaces identify the Ethernet port, speed, and duplex settings, devices connected, and VLAN name. Auto-negotiate modes are set on a network interface in NA and are then negotiated on a network card in SA. A speed mismatch is a configuration mismatch between the speed and duplex of a managed server and a connected network device.
VLAN Trunk	<p>Certain ports can be configured as trunk port, physical ports, and port channels (aggregated links). Loop-back ports and ports for VLAN interfaces cannot be configured as trunk. Unchecking a VLAN Trunk sets a port as non-trunk. As a result, the port is assigned to the VLAN indicated in Native VLAN ID field. Any modification of the VLAN trunk port settings results in creating a new VLAN task to apply the changes on the device. For more information, see <a href="#">"VLAN Task Page Fields" on page 365</a>.</p> <p><b>Note:</b> The VLAN Trunk field is not displayed on the Edit Interface Detail page if the device driver does not support the enhanced VLAN functionality.</p>
Native VLAN ID	The Native VLAN ID is a VLAN whose packets are not tagged on the trunk port. In addition, any untagged packets received on the port are considered those of the Native VLAN. Note that Native VLAN is a Cisco term. For example, the ProCurve does not use the Native VLAN terminology. The ProCurve uses the untagged VLAN membership terminology. A trunk port can have only one untagged VLAN membership.
Member VLANs	The VLAN trunk port transports the traffic of the selected VLANs. Any VLANs that are not selected will be pruned.
Specify VLAN ID	For Cisco devices, any VLAN ID or VLAN ID range can be specified for a trunk port. Trunk ports on Cisco devices can be members of VLANs that are not defined on the device. (Note that this field is not displayed for non-Cisco devices.)
Comments	Displays any comments about the interface.

## Interfaces in Subnet Page Fields

The Interfaces in Subnet page enables you to view the interfaces in a subnet, along with the negotiated duplex and negotiated speed settings. The Layer 3 interfaces are compared to other interfaces in the subnet. If there is a mismatch, the mismatched ports display their value in bold, red text.



Field	Description/Action
Host Name	Displays the name host or IP address on which the interface resides.
Port Name	Displays the name of the port, such as Ethernet0 or Serial1.
Port Status	Displays if the interface is Configured Up or Administratively Down.  <b>Note:</b> This does not reflect the protocol state of the interface, only the configured state.
Port IP	Displays the primary IP address for the interface. NA parses the IP address from the device configuration.
Description	Displays a brief description of the interface. NA parses the description from the device configuration.
Negotiated Duplex	Displays the negotiated duplex, either full or half. This information can be used to determine if traffic through a switch is impacted by another switch operating at either full duplex, 100M, or half duplex, 10M. For example, you might have switch on the network that is forced to queue packets due to a delay on part of the path.
Negotiated Speed	Displays the negotiated speed, such as 100M.
Actions	You can select the following actions for each interface: <ul style="list-style-type: none"> <li>• Edit Interface — Opens the Edit Interface page, where you can edit the details about this interface and any custom data fields.</li> <li>• View Interface — Opens the Interface Detail page, where you can view details about this interface and custom data, view alternate IP addresses, the connected servers, and view or edit comments. For more information, see <a href="#">"Interface Detail Page Fields" on page 189</a>. For detailed information about SA server management, see the <i>HPE Server Automation User's Guide</i>.</li> </ul>

## Device IP Addresses Page Fields

The Device IP Addresses page enables you to view all IP addresses that are associated with the device. This includes the IP addresses of interfaces on the device, as well as IP addresses on the network that are visible to the device.

Field	Description/Action
Port Name	Displays the port name associated with the device's IP address.
Address	Displays the IP address.
Address Type	Displays the type of IP address, for example: "Address of Port" or "Seen from Port".
VLAN	Provides a link to the VLAN, if any, containing this IP address if the type is "Address of Port".

Field	Description/Action
Description	Provides a description of the IP address.
Remote Location	Provides links to the remote location if the type is “Seen from Port”. The remote location is a device and port known to NA (or if NA/SA integration is enabled, a server and interface known to SA).
First Seen	Displays the date and time the IP address was first identified.
Last Seen	“Current” is displayed if the IP address was seen the last time NA gathered topology data. If not current, this is the date and time when NA last saw the IP address on the network. Keep in mind that the IP address is possibly no longer on the network, for example an IP address of a laptop or other transient device. In addition, the routing traffic could change such that the IP address is no longer in the main flow.
Associated MAC	Opens the Device MAC Addresses page, where you can view a list of all MAC addresses known to NA that are associated with the device.
Actions	You can select the following actions for each device: <ul style="list-style-type: none"> <li>View Details — Opens the IP Address Details page, where you can view details on the following information: Device, Device Port, IP address, MAC Address, Type, First Seen, and Last Updated.</li> <li>View MAC - Opens the MAC Address Details page that is cross-referenced with this IP address. Cross-referencing means that when NA gathers data, the IP address and MAC address were indicated as coming from the same source. This is only available on “seen from port” records.</li> </ul>

## Device MAC Addresses Page Fields

The Device MAC Addresses page enables you to view a list of all MAC addresses that are associated with the device.

Field	Description/Action
Port Name	Displays the port name associated with the device’s IP address.
Address	Displays the device’s MAC address.
Address type	Displays the type of the MAC address, for example: “Address of Port” or “Seen from Port”.
VLAN	Provides links to the VLAN, if any, containing this MAC address if the type is “Address of Port”.
Description	Displays the description of the MAC address.
Remote Location	Provides links to the remote location if the type is “Seen from Port”. The remote location is a device and port known to NA. This could alternately be a server and interface known to HPE Server Automation (SA). For more information about NA/SA integration, see <a href="#">"NA/SA Integration" on page 180</a> .

Field	Description/Action
First Seen	Displays the date and time the MAC address was first identified.
Last Seen	“Current” is displayed if the MAC address was seen the last time NA gathered topology data. If not current, this is the date and time when NA last saw the MAC address on the network. Keep in mind that the MAC address is possibly no longer on the network, for example a MAC address on a laptop or other transient device. In addition, the routing traffic could change such that the MAC address is no longer in the main flow.
Associated IP	Opens the Device IP Addresses page, where you can view a list of all IP addresses known to NA that are associated with the device.
Actions	You can select the following actions for each device: <ul style="list-style-type: none"><li>• View Details — Opens the MAC Address Details page, where you can view details on the following information: Device, Device Port, MAC address, Type, Configuration snippet, First Seen, and Last Updated.</li><li>• View IP - Opens the IP Address Details page, where you can view details on the Device, Device Port, IP Address, MAC Address, Type, First Seen and Last Updated.</li><li>• that is cross-referenced with this IP address. Cross-referencing means that when NA gathers data, the IP address and MAC address were indicated as coming from the same source. This is only available on “Seen from Port” records.</li></ul>

## Virtual Local Area Networks (VLANs)

VLANs (Virtual Local Area Networks) are conglomerations of ports that act as a single broadcast domain. VLANs operate at Layer 2 (the Data Link layer) which modifies the Ethernet frame with the VLAN tag to provide broadcast domain segmentation and group device across network switches. NA gathers information about what VLANs are defined on a managed device and the VLAN to which each port is assigned.

In general, a VLAN segments broadcast domains so as to group end-stations together even if they are not located in the same network switch. VLANs enable network switches to be virtualized, meaning that a network switch can serve more than one Layer 2 network and a LAN spanning multiple network switches.

Because VLANs provide segmentation services, they address security, scalability, and network management issues in Layer 2 without using network routers. Different broadcast domains provide security within organizations because they isolate the traffic of one domain from the others.

For example in an enterprise environment, the Finance Department, Human Resources Department, and Sales Department can have their own broadcast domain so that their traffic cannot be seen by the other departments. In addition, the Finance Department could have employees in different facilities. As a result, a VLAN can group them together as if they were in one physical location connected to the same network switch, increasing the scalability of the network.

VLANs also provide virtualization for network switches by enabling a network switch to be segmented into multiple broadcast domains and enabling multiple network switches to be part of a broadcast domain. Therefore, instead of having a separate network switch for each department within an organization, a network switch can be divided into virtual network switches with VLANs to serve multiple departments.

NA enables you to view and provision VLANs on network switches. With NA, you can:

- View a complete list of a device's VLANs
- View specific VLAN details
- View a list of ports assigned to a VLAN
- View trunk ports
- View a list of VLANs on a trunk port
- View the native VLAN of a trunk port (the VLAN whose traffic on the trunk port is not tagged)
- View VTP settings of a network switch
- Create a new VLAN on a network switch
- Change a port assigned to a VLAN (add/prune ports)
- Change a VLAN's name
- Delete a VLAN
- Configure a port as a trunk port (multiple VLAN with tagging)
- Change trunk port VLANs (VLAN membership)
- Change trunk port native VLAN
- Configure a trunk port as a non-trunk

## Device VLANs Page Fields

The Device VLANs page displays a list of all VLANs on the device. For detailed information about VLANs, see ["Virtual Local Area Networks \(VLANs\)" on the previous page](#).

To navigate to the Device VLANs page:

1. From the Inventory page, select the device for which you want VLAN details. Note that you can also use the Search options on any page to locate devices. The Device Details page opens.
2. On the Device Details page, select the View menu.
3. From the View menu, select the Device Details option and click the VLANs option. The Device VLANs page opens.

**Note:** If a device driver does not support the enhanced VLAN features, provisioning actions are not displayed.

Field	Description/Action
New VLAN link	Opens the New Device VLAN page, where you can create a new VLAN. For more information, see <a href="#">"Creating and Editing VLANs" on the next page</a> .
VLAN	Displays the VLAN name.
VLAN Type	Displays the VLAN type. This field is vendor specific.
VLAN ID	Displays the VLAN's ID.
VLAN Status	Displays the VLAN's status, such as active or suspended.

Field	Description/Action
Last Modified	Displays the date and time NA last read the VLAN from the device. (Note that NA might have read the VLAN from the device since this date and time, but there is no change.)
Description	Displays information about the VLAN pulled from the device.
Actions	<p>You can select the following actions for each VLAN:</p> <ul style="list-style-type: none"> <li>View — Opens the VLAN Detail page, where you can view VLAN details. The VLAN Ports information is linked to the Device Interface page. For more information, see <a href="#">"VLAN Detail Page Fields" on the next page</a>. Keep in mind that trunk ports are displayed if they are members of the VLAN.</li> <li>Edit — Opens the Edit VLAN Detail page, where you can view VLAN details and edit the VLAN name, description, and port membership. For more information, see <a href="#">"Creating and Editing VLANs" below</a>.</li> <li>Delete — Opens a dialog box, where you can confirm that you want to delete the VLAN.</li> </ul>

## Creating and Editing VLANs

The New Device VLAN page enables you to enter a VLAN name and check the ports to be assigned to the new VLAN. The Edit Device VLAN pages enable you to modify the VLAN name and port membership information. For detailed information about VLANs, see ["Virtual Local Area Networks \(VLANs\)" on page 195](#).

**Note:** The information on the New Device VLAN and Edit Device VLAN pages is based on the last time VLAN data was gathered from the device. Any modifications on the device after the last time VLAN data was gathered is not reflected on these pages. To ensure that you have the latest VLAN data, run the VLAN Data Gathering diagnostic to update NA with the latest VLAN data. For more information, see ["Run Diagnostics Task Page Fields" on page 291](#).

Field	Description/Action
Device	Displays the device's host name and/or IP address. If you click the device link, the Device Details page opens. For more information, see <a href="#">"Viewing Device Details" on page 177</a> .
VLAN Name	Enter a new VLAN name or edit the existing VLAN name.
VLAN ID	Enter the VLAN ID. Note that the VLAN ID field is text only for the Edit VLAN operation, unlike the New VLAN operation in which the VLAN ID is an input field.
VLAN Type	Displays the VLAN type. This field is vendor specific. This information is automatically populated from data gathered from the device.
VLAN Status	Displays the VLAN's status, such as active or suspended. This information is automatically populated from data gathered from the device.
VLAN MTU	Displays the VLAN Maximum Transmission Unit (packet size) that the VLAN can use. This field is vendor specific. This information is automatically populated from data gathered from the device.

Field	Description/Action
VLAN Ports	<p>Displays a list of VLAN ports. Port names are links to the Interface Detail page for that port. For more information, see <a href="#">"Interface Detail Page Fields" on page 189</a></p> <p>Ports that are currently assigned to the VLAN are checked. Available ports that are currently not assigned but can be assigned, are not checked. Their Native VLAN name is specified between right parentheses. If the port is a Trunk port, it is stated as such. In addition, if the port is a PortChannel, its Aggregated Ports are displayed in a comma separated list.</p> <p>Ports that are currently assigned to the VLAN can be pruned (removed) from the VLAN by unchecking their checkboxes. Similarly, ports that are not currently assigned to the VLAN can be assigned by checking their checkboxes.</p>
VLAN Description	Displays a description of the VLAN.

Be sure to click the Save button when you are finished. If you have made any modification, the VLAN Task page opens. For more information, see ["VLAN Task Page Fields" on page 365](#).

## VLAN Detail Page Fields

When you click the View option in the Actions field on the Device VLANs page, the VLAN Detail page opens.

Field	Description/Action
Device	Displays the device's host name and/or IP address. If you click the device link, the Device Details page opens. For more information, see <a href="#">"Viewing Device Details" on page 177</a> .
VLAN Name	Displays the VLAN name.
VLAN ID	Displays the VLAN's ID.
VLAN Type	Displays the VLAN type. This field is vendor specific.
VLAN Status	Displays the VLAN's status, such as active or suspended.
VLAN MTU	Displays the VLAN Maximum Transmission Unit (packet size) that the VLAN can use. This field is vendor specific.
VLAN Ports	<p>Displays a list of VLAN ports. If you click a port link, the Interface Details page opens for that port. If a trunk port does not have a native VLAN (untagged VLAN), "No Native VLAN" is displayed at the bottom of the Member VLANs list. For more information, see <a href="#">"Interface Detail Page Fields" on page 189</a>.</p> <p>Trunk ports have all VLANs listed on the Device Interface pages. For more information, see <a href="#">"Device Interfaces Page Fields" on page 188</a>.</p>
VLAN Description	Displays information about the VLAN pulled from the device.

Field	Description/Action
Last Modified Date	Displays the date and time NA last read the VLAN from the device. (Note that NA might have read the VLAN from the device since this date and time, but there is no change.)
Edit Detail link	Opens the Edit VLAN Details page. For more information, see <a href="#">"Creating and Editing VLANs" on page 197</a> .

## VTP Detail Page Fields

The VLAN Trunking Protocol (VTP) is a Cisco proprietary protocol to manage VLANs among Cisco switches. VTP defines a management domain called VTP domain. One or more switches in a VTP domain are configured as a server to distribute VLAN configuration so that others do not need to be manually configured. There are three levels of participation (operating modes):

- Server
- Client
- Transparent

Switches configured as a server in a VTP domain advertise any VLAN configuration changes to other switches in the domain. VTP packets are sent to the switches connected to the server. The switches that are in Client mode respond to VTP packets and modify their own VLAN configuration accordingly, and then relay the VTP packets to other switches in the domain. Switches in Transparent mode do not change their VLAN configurations, but rather relay the VTP packets to other switches.

NA displays device VTP information if the device is a Cisco switch and the device participates in a VTP domain. For detailed information on VLANs, refer to ["Virtual Local Area Networks \(VLANs\)" on page 195](#).

**Note:** NA does not provision VTP settings. NA's VTP support is read-only, meaning that NA only gathers VTP information from devices for display.

To navigate to the VTP Details page:

1. From the Inventory page, select the device for which you want VTP details. Note that you can also use the Search options on any page to locate devices. The Device Details page opens.
2. On the Device Details page, Select the View menu and click the VTP Information option. The VTP Details page opens.

Field	Description/Action
Device	Displays the device's host name and/or IP address. If you click the device link, the Device Details page opens. For more information, see <a href="#">"Viewing Device Details" on page 177</a> .
VTP Version	Displays the VTP version.
Configuration Version	Displays the configuration version number.
Domain Name	Displays the VTP Domain Name. The name is a link to the VTP Domain's page, where you can view a list of devices that belong to that domain. For more information, see <a href="#">"VTP</a>

Field	Description/Action
	<p><a href="#">Domain Page" on page 201.</a></p> <p><b>Note:</b> VTP Domain Names containing single quotation marks (') cause NA to return a SQL error.</p>
Maximum VLANs Supported Locally	Displays the maximum number of locally supported VLANs.
Number of Existing VLANs	Displays the number of existing VLANs.
VTP Operating Mode	Displays the VTP's operating mode, including Server, Client, Transparent, or Off.
VTP Pruning Mode	If enabled, VTP pruning enables you to remove unnecessary traffic caused by unknown unicasts and broadcasts.
VTP V2 Mode	If enabled, VTP 2 mode can be used for Token Ring VLANs.
VTP Traps Generation	If enabled, VTP traps can be generated for troubleshooting.
MD5 Digest	If enabled, MD5 Digest can be used for troubleshooting. MD5 Digest displays a 16-byte word (MD5 value) constructed from a combination of the VTP Password (if configured) and the VTP Domain Name.
VTPs in This Domain	Displays the devices in the domain. The devices' Hostname and/or IP Address is a link to the Device Details page. The device's details page includes VTP domain name and operating mode information if a device has VTP configuration. For more information, see <a href="#">"Viewing Device Details" on page 177.</a>
Last Modified By	Displays who last modified the VTP.
Last Modified Date	Displays the date the VTP was last modified.

## VTP Domains Page Fields

The VLAN Trunking Protocol (VTP) Domains page lists the VTP domains in the network of one or more devices that NA manages. For detailed information about VLANs, see ["Virtual Local Area Networks \(VLANs\)" on page 195.](#)

To navigate to the VTP Domains page, from the Devices menu, select Device Tools and click the VTP Domains option. The VTP Domains page opens.



Field	Description/Action
Domain Name	Displays the domain name.
VTP Version	Displays the VTP version.
Number of Devices	Displays the number of devices NA is aware of in the domain.
Actions	If you click the View link, the VTP Domain page opens. For more information, see " <a href="#">VTP Domain Page</a> " below.

## VTP Domain Page

The VTP Domain page displays the devices in a specific domain. For detailed information about VLANs, see "[Virtual Local Area Networks \(VLANs\)](#)" on page 195.

To navigate to the VTP Domain (domain\_name) page, on the VTP Domains page, click the View option in the Actions field for the domain for which you want to view device details. The VTP Domain page opens.

Field	Description/Action
Host Name	Displays the host name of the device. If you click the Host Name link, the Device Details page opens. For more information, see " <a href="#">Viewing Device Details</a> " on page 177.
Device IP	Displays the Device's IP address. If you click the Device IP link, the Device Details page opens. For more information, see " <a href="#">Viewing Device Details</a> " on page 177.
MD5 Digest	If enabled, MD5 Digest can be used for troubleshooting.
Operating Mode	Displays the VTP operating mode, for example Server, Client, Transparent, or Off.
Partition	Displays the Partition to which the device belongs.  <b>Note:</b> This field is only displayed if you have configured one or more Partitions.
Actions	You can select the following actions: <ul style="list-style-type: none"> <li>View VTP — Opens the VTP Detail page. For more information, see "<a href="#">VTP Detail Page Fields</a>" on page 199.</li> <li>View VLANs — Opens the Device VLANs page. For more information, see "<a href="#">Device VLANs Page Fields</a>" on page 196.</li> </ul>

## Device Blades/Modules Page Fields

The Device Blade/Modules page lists the modules (blades, cards) installed on the device. By default, the module data is updated weekly by the Module Status Diagnostic task.

Field	Description/Action
Module Slot	Displays the slot on the device in which the module is installed.
Module Description	Displays a brief description of the module. NA parses the description from the device configuration.
Module Model	Displays the model identifier.
Module Serial	Displays the module's serial number.
Actions	<p>You can select the following actions for each module:</p> <ul style="list-style-type: none"> <li>• Edit Module — Opens the Edit Blade/Module Detail page, where you can view the module inventory details and edit the custom data fields.</li> <li>• View Module — Opens the Blade/Module Detail page, where you can view the module inventory details and edit the comments.</li> </ul>

## Device Policies Page Fields

The Device Policies page enables you to:

- Verify that the correct policy was applied to the device.
- View if the policy passed or failed.
- View policies that are applied to the device when the device is added to NA.
- View the exceptions that are in place for a policy applied to the device.

For information about creating policies, see ["How the NA Policy Manager Works" on page 411](#).

For information about viewing applied policies, see ["Viewing Applied Policies" on page 424](#).

Field	Description/Action
Policy Name	Displays the policy name.
Rule Name	Displays the policy's rule name, if applicable. For more information, see <a href="#">"New Rule Page Fields" on page 416</a> .
Description	Displays a description of the policy, for example: Ensure password
Policy Rule Exception	Displays the policy rule exception, if applicable. For more information, see <a href="#">"Adding a Rule Exception" on page 423</a> .
Status	<p>Displays the policy's status, including:</p> <ul style="list-style-type: none"> <li>• Active</li> <li>• Inactive</li> <li>• Passed</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>Failed</li> </ul>
Importance	Indicates the importance of the rule that was violated, including: <ul style="list-style-type: none"> <li>Informational — Events that typically do not require a response.</li> <li>Low — Events that may require a response as time permits.</li> <li>Medium — Events that require a timely response, typically within 72 hours.</li> <li>High — Events that require an urgent response, typically within 24 hours.</li> <li>Critical — Events that require an immediate response.</li> </ul>
Actions	You can select the following actions for each policy: <ul style="list-style-type: none"> <li>Edit Policy — Opens the Edit Policy page, where you can edit the policy. For more information, see <a href="#">"Editing a Policy" on page 421</a>.</li> <li>Edit Policy Rule — Opens the Edit Policy Rule page, where you can edit the policy's rule. For more information, see <a href="#">"New Rule Page Fields" on page 416</a>.</li> </ul>

## Servers Page Fields

The Servers page displays the name of each server that is connected to the device on which you are displaying details. If you click a server's hostname, the Server Detail page opens. For detailed information about using SA, see the *HPE Server Automation User's Guide*.

Keep in mind that NA only infers the location of Layer 1 wiring. NA's reduction algorithm reduces (as best it can) all connections between devices and/or servers.

**Note:** If you are not logged in to HPE Server Automation (SA) Command Center, you are prompted to login when you click a server's hostname.

Field	Description/Action
Network Device Interface	The network device interface used by the server, for example FastEthernet1/0.
Server Host Name	Displays the server's host name. Clicking the server's hostname opens the Server Detail page. Refer to the <i>HPE Server Automation User's Guide</i> for information.
Server Interface	The server interface name as reported by the operating system.
Customer	Displays the customer name.
Facility	Displays the customer's facility.
Server Use	Displays server use. Refer to the <i>HPE Server Automation User's Guide</i> for information.
Deployment Stage	Displays the Deployment Stage. Refer to the <i>HPE Server Automation User's Guide</i> for information.

## Device Tasks Page Fields

The Device Tasks page lists of all tasks associated with the device. You can also view details about the task or rerun the task from this page.

Field	Description/Action
Refresh this page every 60 seconds	Uncheck this box if you do not want the display to refresh every 60 seconds. For more information about setting this value, see <a href="#">"User Interface Page Fields" on page 54</a> .
Check Boxes	You can use the left-side check boxes to delete selected tasks. Once you have selected the tasks, click the Actions drop-down menu and click Delete. The adjacent Select drop-down menu enables you to select or deselect all of the tasks.
Scheduled Date	Displays the date and time the task ran or is scheduled to run.
Task Name	Clicking the task name opens the Task Information page, where you can view task details, such the originator of the task, when the task was created, and the devices affected by the task. You can also view detailed task history information.
Task Status	The task state. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Scheduled By	Displays the login name of the person who scheduled the task (or the last user to modify the task).
Comments	Displays comments about the task.
Actions	You can select the following actions for each task: <ul style="list-style-type: none"><li>• Detail — Opens the Task Detail page, where you can view details about the task.</li><li>• Run Again — Opens the Edit Task page, where you can edit and rerun a task. This link appears only when you can rerun the task.</li></ul>

## Device Relationships Page Fields

The Device Relationships page enables you to view parent, peer, and child device relationships. In general, device relationships maintain data for both parent, peer and child devices.

Device dependencies are defined by the Device Relationships API. For example, if two devices are defined in an context relationship, the relationship is maintained by the Context Management functionality. For more information about Context Management, see ["Add Context to Device Task Page Fields" on page 360](#). For information about the Device Relationship API, see the *NA CLI/API Command Reference*.

Any two devices that are related will participate in what is called a device relationship. For example, if a device can only be reached through another device, the first device becomes the child and the second device becomes the parent. As a result, if the parent device is not accessible, the child device cannot be accessed.

Currently, NA only supports the VMware® ESX® server in terms of device relationships. Keep in mind that the CLI is used to access the VMware ESX server. However, once in the server shell, the VMware ESX server looks very similar to other Linux servers.

Once a VMware ESX server is identified, information about the server is provided from the Modules option from the Device Details menu to new devices. For more information, see ["Viewing Device Details" on page 177](#).

These new devices will in turn be able to access their information by using information they have via their parent. In this case, a vSwitch knows it is run by a VMware ESX server. As a result, when a snapshot task is run, the vSwitch is accessed using information known about the VMware ESX server. This could mean a direct connection to the VMware ESX server or it could mean a direct connection to the device. Wherever possible, the device(s) contained in the parent are displayed as real devices.

To open the Device Relationships page, on the Device Details page, from the View menu click Device Relationships.

Field	Description/Action
Parent Devices	Displays the parent devices.
Peer Devices	Displays the peer devices
Child Devices	Displays the child devices.

To add or remove a parent, peer, or child device, click the Add or Delete link in the appropriate column. For information about adding devices, see ["Adding Devices" on page 102](#).

For devices that support contexts, the following information is displayed on the Device Context page:

- Hostname of the context
- Context name
- Link to remove the context
- Link to add a new Context. For more information, see ["Add Context to Device Task Page Fields" on page 360](#).

**Note:** Specific information (such as the variables) needed to add/remove a context is embedded in the driver. These variables are presented in the Add/Remove task pages.

## Device Software History Page Fields

The Device Software History page enables you to view what software is currently loaded on a device.

Field	Description/Action
Hostname	Displays the device's hostname. Clicking the device's hostname opens the Device Details page, where you can view information about the device.
Device IP	Displays the device's IP address. Clicking the device's IP address opens the Device Details page, where you can view information about the device.

Field	Description/Action
Last Access Time	Displays the date and time the device was last accessed (such as taking a snapshot).
Last Snapshot Result	The result of the most recent snapshot attempt. If the snapshot failed, the link opens that <b>Task Result</b> page.
View menu	Opens the View menu. For more information, see <a href="#">"View Menu Options" on page 185</a> .
Edit menu	Opens the Edit menu. For more information, see <a href="#">"Edit Menu Options" on the next page</a>
Provision menu	Opens the Provision menu. For more information, see <a href="#">"Provision Menu Options" on page 218</a> .
Connect menu	Opens the Connect menu. For more information, see <a href="#">"Connect Menu Options" on page 219</a> .
Change Date	Displays the date and time the software was last deployed.
Changed By	Displays the name of the person who last deployed the software to the device.
Change To	Displays the current software version running on the device.
Device Software Version	Displays the current software version running on the device.
Changed From	Displays the software version that was running on the device prior to the software deployment.
Software Level	Displays the software level rating. For more information, see <a href="#">"Adding New Software Levels" on page 427</a> .
Image Set	Displays the name of the last Image Set deployed to the device. An image set is a grouping of images that can be deployed to a device simultaneously. An image set can contains one or more images.

## Device Sessions Page Fields

The Device Session page lists the Telnet and SSH sessions associated with the device. Sessions can include only the commands or the keystroke logging for the entire session.

Field	Description/Action
Start	Displays the date the session began.

Field	Description/Action
Date	
Status	Displays if the session is Open or Closed.
Type	Displays if the session is via Telnet or SSH.
End Date	Displays the date the session ended.
Created By	Displays the login name of the person who opened the session.
Actions	<p>You can select the following actions for each session:</p> <ul style="list-style-type: none"> <li>View Full Telnet/SSH Session — Opens the Telnet/SSH Session page, where you can view the commands and system responses for that session. There is also a text display for the configuration (if any) created by this session.</li> <li>View Commands Only — Opens the Telnet/SSH Session page, but limits the display to only the commands entered during the session. This can be useful when you want to create a script from the commands.</li> </ul>

## Edit Menu Options

Menu Option	Description/Action
Take Snapshot	<p>Opens the New Task - Snapshot page. The Snapshot task enables you to schedule a snapshot. A snapshot refreshes the copy of the device configuration and related data stored in the NA database. Specifically, a snapshot checks whether the stored configuration matches the running configuration on the device. If not, the snapshot task replaces the copy of the device configuration and related data stored in the NA database. For more information, see <a href="#">"Take Snapshot Task Page Fields" on page 300</a>.</p>
Discover Driver	<p>Opens the New Task - Discover Task page. Driver discovery creates a task to check whether a driver is assigned to the device. If not, discovery overwrites the current driver with the most appropriate driver in the NA database.</p> <p><b>Note:</b> NA requires a driver to communicate with each device.</p> <p>For more information, see <a href="#">"Discover Driver Task Page Fields" on page 269</a>.</p>
Edit & Deploy Configuration	<p>Opens the Edit Configuration page with the current configuration, where you can edit the configuration and then deploy it. When you click the "Deploy to Device" option, you can schedule a configuration deployment or initiate an immediate configuration deployment. NA will deploy the configuration change to the device and capture the resulting configuration. The Task Result page for this task will automatically refresh while the task runs. For more information, see <a href="#">"Deploying Device Configurations" on</a></p>

Menu Option	Description/Action
	<a href="#">page 167</a> .
Edit Inline Configuration Comments	Opens the Edit Configuration page, where you can enter comments, often times prefixed with two exclamation points (!!). Keep in mind that the persistent comment character is only two characters. However, some devices use multiple comment characters as delimiters. This can cause the comment engine to have difficulties parsing persistent comments.
Edit Device	Opens the Edit Device page, where you can edit the information for the device. For more information, see <a href="#">"Edit Device Page Fields" on page 108</a> .
Edit Managed IP Addresses	<p>Opens the Device Managed IP Addresses page, where you can view and modify the information for all IP addresses that might be used to access the device. Keep in mind that there must be one primary IP address that uniquely identifies each device. However, you can add alternate IP addresses to increase the odds that NA can connect to the device. Alternate IP addresses reduce administration overhead and increase the quality of device data.</p> <div style="background-color: #e0e0e0; padding: 10px; margin: 10px 0;"> <p><b>Note:</b> If NA fails to access a device by the primary IP address, it tries the alternate addresses in the order listed. To ensure network efficiency, move the IP addresses that are most likely to be accessed to the top of the list.</p> </div> <p>For more information, see <a href="#">"Device Managed IP Addresses Page Fields" on the next page</a>.</p>
Activate/Deactivate Device	Manages or unmanages the device.
Delete Device	Opens a dialog box, where you can confirm that you want to remove the device entirely from the NA database. If you permanently delete a device from the NA database, you will lose the configuration history for that device. Instead, consider editing the device to make it inactive, which preserves the configuration history.
Save As New Device	<p>Enables you to use existing devices to pre-fill the Add Device and Add Device Template pages with the following information:</p> <ul style="list-style-type: none"> <li>• Groups</li> <li>• Drivers</li> <li>• Password information</li> <li>• Connection information</li> <li>• Model</li> <li>• Vendor</li> </ul> <p>For more information, see <a href="#">"New Device Page Fields" on page 102</a>.</p>
Save As New Template	<p>Enables you to use existing devices to pre-fill the Add Device Template page with the following information:</p> <ul style="list-style-type: none"> <li>• Configuration file</li> </ul>



Menu Option	Description/Action
	<ul style="list-style-type: none"> <li>• Drivers</li> <li>• Connection information</li> <li>• Model</li> <li>• Vendor</li> <li>• Hierarchy Layer</li> </ul> <p>For more information, see <a href="#">"Device Template Page Fields"</a> on page 114.</p>
New Message	<p>Opens the New Message page, where you can post a message to all NA users referring to this device. You can also track the event using SingleView. For more information, see <a href="#">"Consolidated View of Events (SingleView)"</a> on page 539.</p>
Process Automation	<p>Opens the HPE Operations Orchestration login page, where you can login to HPE Operations Orchestration and launch HPE Operations Orchestration flows in guided mode. For information about configuring HPE Operations Orchestration user authentication, see <a href="#">"User Authentication"</a> on page 68. For information about using HPE Operations Orchestration, see the <i>HPE Operations Orchestration User's Guide</i>.</p>

## Device Managed IP Addresses Page Fields

The Device Managed IP Addresses page enables you to view and manage all IP addresses that might be used to access the device. Keep in mind that there must be one primary IP address that uniquely identifies each device.

You can connect to a device using:

- A primary IP address
- Any number of secondary IP addresses (provided by the device or manually entered)
- A console server IP address and port
- A bastion host
- A hop box
- IP address of another device

Field	Description/Action
Define Bastion Host link	<p>If no bastion host is defined for the device, the New IP Address page opens. For more information, see <a href="#">"New IP Address Page (Bastion Host)"</a> on page 211. If the device does have a bastion host defined, two additional links appear:</p> <ul style="list-style-type: none"> <li>• Edit Bastion Host</li> <li>• Delete Bastion Host</li> </ul>
New IP Address link	<p>Opens the New IP Address page. For more information, see <a href="#">"New IP Address Page (Custom IP Address)"</a> on page 215. It is recommended that when using NAT or other addressing schemes, you add IP addresses that are not automatically detected by NA. The IP addresses you add here are labeled "custom".</p>

Field	Description/Action
New Console Server link	Opens the New IP Address page. For more information, see <a href="#">"New IP Address Page (Console Server)" on page 215</a> .
New Hop Box link	Opens the New IP Address page. For more information, see <a href="#">"New IP Address Page (Hop Box)" on page 216</a> .
New Connection Through link	Opens the New IP Address page. For more information, see <a href="#">"New IP Address Page (New Connection Through)" on page 217</a> .
Reset last used IP link	Enables you to reset the last used IP address.
Port IP	Displays the device's port IP address, either Primary, Alternate, or Custom. (All IP Addresses populated by parsing the device configuration are listed as "Alternate".)
Use To Access Device	Displays No or Yes. NA tries to access the device first by its primary IP address, then by its console server address (if any), and finally by any alternate IP addresses that states Yes in this field (No is the default).
Type	Displays the type of IP address: Primary, Alternate, or Custom. The IP Address from the New/Edit Device page is always the primary IP address. Additional IP addresses detected are alternate addresses. If IP addresses are added using the New IP Address link, they are considered custom IP addresses.
Realm Name	Displays the Realm name. The Realm name is returned from the Gateway. The Realm name is set when the Gateway is install and cannot be modified in NA.
Actions	<p>You can select the following actions for each device:</p> <ul style="list-style-type: none"> <li>• Edit — Opens the Edit Device page for the primary IP Address, where you can modify the IP address and subnet mask, insert the new IP address before the primary IP address for a new access order, and comment the change. This page is displayed for the Alternate, NAT, TFTP Server, and Custom IP Addresses. For more information, see <a href="#">"Edit Device Page Fields" on page 108</a>. Note that only those IP addresses that were manually added to the device can be selected for deletion. For all other IP Addresses, the New IP Address page opens. For more information, see <a href="#">"New IP Address Page (Custom IP Address)" on page 215</a>.</li> <li>• Move Up — When multiple alternate IP addresses appear in the list, this option moves the IP address up in the list. NA tries the alternate addresses in the order listed.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin: 10px 0;"> <p><b>Note:</b> This option is only available for Secondary, Custom, and Hop Box IP Addresses. Primary and Console IP Addresses are not sortable.</p> </div> <ul style="list-style-type: none"> <li>• Move Down — When multiple alternate IP addresses appear in the list, this option moves the IP address down in the list. NA tries the alternate addresses in the order listed.</li> </ul>

Field	Description/Action
	<p><b>Note:</b> This option is only available for Secondary, Custom, and Hop Box IP Addresses. Primary and Console IP Addresses are not sortable.</p>

## New IP Address Page (Bastion Host)

The NA bastion host feature provides access to network devices through an intermediate bastion host with a standard shell configuration. Use of a bastion host provides an extra layer of security for device access.

With the NA bastion host feature, NA first connects to the bastion host. NA then uses the native CLI client tools on the bastion host to connect to the target device's IP address. The device connection usually uses the same connection method as the bastion host connection. The bastion host feature supports CLI-based connection methods only. It does not support proxy file-based protocols.

The NA bastion host feature is highly customizable and can be applied to many scenarios through the use of the appropriate access variables. This topic describes how to configure the NA bastion host feature.

Note the following:

- Bastion host customization is a good solution for many, but not all, device access scenarios.
- Bastion host configuration is unique to every situation. Expect some trial and error during the customization process. For example, you might need to alter the values of connection script variables based on observation of the session logs that indicate the sent and expected values.

A bastion host can be sub-optimal in handling multiple connection methods, password rules, and target IP addresses. For each connection attempt the system does a fresh log in to and log out from the bastion host. In the case of a connection failure, NA is generally not optimal in short-circuiting additional attempts on that address/connection method using different password rules. Therefore, the password rules and other device settings should be optimized so the minimal set of connection methods, credentials, and IP addresses are attempted.

On the Device Managed IP Addresses page, when you click the Define Bastion Host link, the New IP Address page opens.

**Note:** After configuring a bastion host, all attempts to access the device (including console server access) first log in to an intermediary host (the bastion host), and then attempt to connect to the device.

Field	Description/Action
Bastion Host IP Address Value	The hostname or IP address of the bastion host.
Username	The user name for connecting to the bastion host.
Password / Confirm Password	The password for the specified user name.

Field	Description/Action
Device Connection Method	The method for connecting to the bastion host. When connecting to the device from the bastion host, NA uses the connection method configured for the device. This connection method can be different from the method for connecting to the bastion host. Possible values are: <ul style="list-style-type: none"> <li>ssh</li> <li>telnet</li> </ul>
Connection Script Variables	The information that NA uses to form the command for connecting to the device from the bastion host. Also, the expected responses from the device during the connection procedure. For more information, see " <a href="#">Connection Script Variables</a> " below. <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Leaving any fields blank uses the default values, which should work for most bastion hosts running on a UNIX operating system.</p> </div>
Comments	Optional comments.

## Connection Script Variables

The following table describes the connection script variables for configuring a connection to a device from a bastion host or hop box. The default values are the standard values for a UNIX client.

Variable	Accepts Regular Expression	Description / Action	Default Value
Prompt (for SSH or telnet connections)	Yes	The expected prompt string on the bastion host or hop box.	(\x23 \x24 %), which translates to a number sign (#), a dollar sign (\$), or a percent sign (%).
<b>SSH Connection Variables</b>			
SSH Command	No	The base command to run on the bastion host or hop box to initiate the SSH connection.	ssh -v -e none -o 'numberofpasswordprompts 1'  The default value includes the following options: <ul style="list-style-type: none"> <li>-v Verbose mode, which provides more output for determining error conditions.</li> <li>-e none No escape character; an unexpected character could kill the session without warning.</li> <li>-o 'numberofpasswordprompts 1' Do not repeat the password prompt.</li> </ul>

Variable	Accepts Regular Expression	Description / Action	Default Value
SSH Command User	No	The SSH command argument that specifies the user name for connecting to the device.	-l \$target_username
SSH Command Host	No	The SSH command argument that specifies the target device IP address or hostname.	\$host
SSH Command Port	No	The command argument that specifies the target device port.	-p \$hop_console_port
SSH Authenticity Prompt	Yes	The pattern of the SSH client prompt to verify the authenticity of the certificate on the remote device.  When the SSH client prompts for authenticity, NA answers yes, which permits the SSH connection to proceed.	authenticity
SSH Error String	Yes	The pattern of the SSH client response that indicates a connection failure while attempting to connect to the target device.	(timed out reset refused closed unreachable)
SSH Ignorepass String	Yes	The pattern of the SSH client responses that NA should ignore while looking for a password prompt.  Because the connection uses verbose output, the SSH client might generate output that does not require a response.	numberofpassword
SSH Password Prompt	Yes	The pattern of the SSH client prompt to enter the password for connecting to the device.	assword
SSH Invalid Password String	Yes	The pattern of the SSH client response that indicates the provided credentials are	Permission denied

Variable	Accepts Regular Expression	Description / Action	Default Value
		invalid.	
SSH Connected String	Yes	The pattern of the SSH client response that indicates a successful connection to the target device.	ntering interactive session
<b>Telnet Connection Variables</b>			
Telnet Username Prompt	Yes	The pattern of the telnet client prompt to enter the user name for connecting to the device.	sername login:
Telnet Password Prompt	Yes	The pattern of the telnet client prompt to enter the password for connecting to the device.	assword
Telnet Command	No	The base command to run on the bastion host or hop box to initiate the telnet connection.	telnet
Telnet Command Host	No	The telnet command argument that specifies the target device IP address or hostname.	\$host
Telnet Command Port	No	The telnet command argument that specifies the target device port.	\$hop_console_port
Telnet Error String	Yes	The pattern of the telnet client response that indicates a connection failure while attempting to connect to the target device.	(timed out reset refused closed unreachable)
Telnet Connected String	Yes	The pattern of the telnet client response that indicates a successful connection to the target device.	Connected to Open

## SSH Console Server

The NA console server configured on the New IP Address Page (Console Server) page is a telnet pass-through to the target device. To use SSH authentication to a console server, configure that connection as a bastion host on the New IP Address Page (Bastion Host) page. Follow these steps:

1. Configure the devices to use the SSH connection method.
2. Because each device has a different target port, set the device to use device-specific credentials.
3. On the New IP Address Page (Bastion Host) page, configure device access through a bastion host.
  - Provide the IP address and credentials for the console server as the bastion host.
  - For Device Connection Method, select telnet.
  - NA uses telnet to connect to the target device from the console server.
  - Customize the **Connection Script Variables** as follows:
    - Set **Prompt** to the Cisco console server prompt.
    - Set **Telnet Command Host** to the IP address of the loopback interface on the console server.
    - Set **Telnet Command Port** to the port number of the target device on the console server.

## New IP Address Page (Custom IP Address)

On the Device Managed IP Addresses page, when you click the New IP Address link, the New IP Address page opens.

Field	Description/Action
Custom IP Address Value	The hostname or IP address.
Device Access	The device access specification. Possible values are: <ul style="list-style-type: none"><li>• yes—NA uses this IP address to access the device.</li><li>• no (the default)—NA does not use this IP address to access the device.</li><li>• only—NA uses only this IP address (path) to access the device. NA does not use any other IP addresses to access the device.</li></ul>
Comments	Optional comments.

## New IP Address Page (Console Server)

The NA console server feature is similar to the NA bastion host feature. The console server feature supports only basic telnet console server configurations, where the destination device is specified by port. More complicated console server scenarios might be possible through bastion host customization. For more information, see "[SSH Console Server](#)" on the previous page.

If both console server access and bastion host access are configured for a device, NA connects to the bastion host and then initiates a connection from the bastion host to the console server, which then connects to the target device.

On the Device Managed IP Addresses page, when you click the New Console Server link, the New IP Address page opens.

**Note:** Console server is used when a telnet-enabled console server provides an automatic pass-through to a device based on a port. This option only works for the telnet protocol. Enabling a console server

automatically enables telnet for the device.

Field	Description/Action
Console IP Address Value	The hostname or IP address of the console server.
Console Port	The console server port to connect to.
Device Access	The device access specification. Possible values are: <ul style="list-style-type: none"><li>• yes—NA uses this IP address to access the device.</li><li>• no (the default)—NA does not use this IP address to access the device.</li><li>• only—NA uses only this IP address (path) to access the device. NA does not use any other IP addresses to access the device.</li></ul>
Comments	Optional comments.

## New IP Address Page (Hop Box)

On the Device Managed IP Addresses page, when you click the New Hop Box link, the New IP Address page opens.

Hop box is a general use of the bastion host scripting to connect to a device. Unlike the bastion host, the hop box option requires you to specify the IP address to use after logging in to the intermediary host. Hop box paths do not first go through the specified bastion host (if any).

Field	Description/Action
Hop Box IP Address Value	The hostname or IP address of the hop box.
Target IP (from Hop Box)	The IP address of the device as viewed from the hop box.
Username	The user name for connecting to the hop box.
Password / Confirm Password	The password for the specified user name.
Device Access	The device access specification. Possible values are: <ul style="list-style-type: none"><li>• yes—NA uses this IP address to access the device.</li><li>• no (the default)—NA does not use this IP address to access the device.</li><li>• only—NA uses only this IP address (path) to access the device. NA does not use any other IP addresses to access the device.</li></ul>



Field	Description/Action
Device Connection Method	The method for connecting to the hop box. NA uses the same method for connecting to the device from the hop box. Possible values are: <ul style="list-style-type: none"> <li>ssh</li> <li>telnet</li> </ul>
Connection Script Variables	The information that NA uses to form the command for connecting to the device from the hop box. Also, the expected responses from the device during the connection procedure. For more information, see <a href="#">"Connection Script Variables" on page 212</a> . <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Leaving any fields blank uses the default values, which should work for most bastion hosts running on a UNIX operating system.</p> </div>
Comments	Optional comments.

## New IP Address Page (New Connection Through)

On the Device Managed IP Addresses page, when you click the New Connection Through link, the New IP Address page opens.

The New Connection Through option enables you to connect to a device through another device. Keep in mind that this option is only supported via the CLI. SNMP is not supported.

**Note:** New Connection Through can only be used for devices already in NA.

Using Telnet and SSH, there are four possible combinations:

- Access Device A (SSH) through Device B (SSH)
- Access Device A (SSH) through Device B (Telnet)
- Access Device A (Telnet) through Device B (SSH)
- Access Device A (Telnet) through Device B (Telnet)

As a result, when connecting Device A through Device B, New Connection Through automatically adds Device B. As part of the NA Module Status diagnostic, any contexts found are automatically added as devices and will have connection paths automatically configured. For information about device contexts, see ["Add Context to Device Task Page Fields" on page 360](#).

Field	Description/Action
Connection Through IP Address Value	The hostname or IP address to connect through.
Device Access	The device access specification. Possible values are: <ul style="list-style-type: none"> <li>• yes—NA uses this IP address to access the device.</li> <li>• no (the default)—NA does not use this IP address to access the device.</li> <li>• only—NA uses only this IP address (path) to access the device. NA does not</li> </ul>

Field	Description/Action
	use any other IP addresses to access the device.
Comments	Optional comments.

## Provision Menu Options

Menu Option	Description/Action
Provision Device from Template	Opens the Device Template page where you can view Device Templates for this device. For information, see <a href="#">"Device Template Page Fields" on page 114</a> .
Check Policy Compliance	<p>Opens the New Task - Check Policy Compliance page, where you can view devices whose configurations and software are or are not in compliance with current policies. For information, see <a href="#">"Check Policy Compliance Task Page Fields" on page 372</a>.</p> <div style="background-color: #f0f0f0; padding: 10px; border: 1px solid #ccc;"> <p><b>Note:</b> The HPE Network Automation Software Premium edition license does not include this option. It is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page (<a href="#">Help &gt; About Network Automation &gt; View License Information</a> link).</p> </div>
Configure Syslog	Opens the New Task - Configure Syslog page, where you configure Syslog on this device for real-time change detection. For information, see <a href="#">"Configure Syslog Task Page Fields" on page 259</a> .
Delete ACLs	Opens the New Task - Delete ACLs page, where you can delete ACLs. For information, see <a href="#">"Deleting ACLs" on page 659</a> .
Deploy Passwords	Opens the New Task - Deploy Passwords page, where you can setup a task to deploy password changes to the device. For information, see <a href="#">"Deploy Passwords Task Page Fields" on page 264</a> .
Reboot Device	Opens the New Task - Reboot Device page, where you can Reboot Devices that are in the NA database. For information, see <a href="#">"Reboot Device Task Page Fields" on page 274</a> .
Run ICMP Test	Opens the New Task - Run ICMP Test page, where you can schedule either a ping or traceroute test from a device to one or more devices. For information, see <a href="#">"Run ICMP Test Task Page Fields" on page 279</a> .
Run Command Script	Opens the New Task - Run Command Scripts page, where you can edit and schedule a command script for the device. For information, see <a href="#">"Run Command Script Task Page Fields" on page 284</a> .
Run Diagnostics	Opens the New Task - Run Diagnostics page, where you can schedule diagnostics for the device. For information, see <a href="#">"Run Diagnostics Task Page Fields" on page 291</a> .

Menu Option	Description/Action
Synchronize Startup and Running	Opens the New Task - Synchronize Startup and Running page, where you can synchronize the startup and running of configurations for a device. For information, see <a href="#">"Synchronize Startup and Running Task Page Fields"</a> on page 305.
Update Device Software	Opens the New Task - Update Device Software page, where you can schedule the deployment of software to one or more devices. For information, see <a href="#">"Update Device Software Task Page Fields"</a> on page 310.
New VLAN	Opens the New Task - VLAN page, where you can configure VLANs on a network switch. For information, see <a href="#">"VLAN Task Page Fields"</a> on page 365.
Device Contexts	Opens the New Task - Device Context page where you can create a device context. A context is a device inside a device. A context can be hardware (with modules and slots) or virtual. NA uses device contexts to automatically add a relationship between a parent device and a child device. NA does not require a context to have an IP address. Rather, you can configure a through path connection to the context, thereby enabling NA to manage the context. For information, see <a href="#">"Add Context to Device Task Page Fields"</a> on page 360.
Port Scan	Opens the New Task - Port Scan Task page that enables Nmap to discover network devices. Nmap can also be used to scan a device's ports and return details on which ports are open and what services they provide. For information, see <a href="#">"Port Scan Page Fields"</a> on page 353.

## Connect Menu Options

NA supports single sign-on to network devices using the Telnet or SSH protocol. The NA server acts as a Telnet/SSH proxy. The data transferred is in clear text format.

Keep in mind that if you do not use the NA server as a Telnet/SSH proxy, you can login directly to the device through a secured URL or by using standard Telnet commands.

Menu Option	Description/Action
Via Proxy Using Telnet	Opens a Telnet window, where you can enter Telnet commands to this device.
Via Proxy Using SSH	Opens an SSH window, where you can enter SSH commands to this device.

# Chapter 6: Managing Users

Use the following table to quickly locate information.

Topic	Refer to:
Adding Users	<a href="#">"Adding Users" below</a>
Email Notification	<a href="#">"Email Notification" on page 222</a>
Configuring User Passwords	<a href="#">"Configuring User Passwords" on page 226</a>
Adding User Groups	<a href="#">"Adding User Groups" on page 229</a>
Adding New User Roles	<a href="#">"Adding User Roles" on page 232</a>
Editing User Settings	<a href="#">"Editing User Settings" on page 234</a>
Quick Launches	<a href="#">"About Quick Launch" on page 238</a>
Customizing the NA Home Page	<a href="#">"Customizing the NA Home Page" on page 240</a>
Search/Connect Function	<a href="#">"Search/Connect Function" on page 243</a>

## Adding Users

Designing user authentication and authorization is a challenging task. The choices you make affect how HPE Network Automation (NA) is used. Adopting a proper authentication and authorization design helps alleviate many security risks.

Best practices in both information security and IT departments generally include the concept of “least privilege”, which means that each user should be assigned the least amount of rights necessary to perform their job duties. In addition, the nature of some organizations creates an environment where it is appropriate for the tasks that each user can perform to be separated by each user’s role.

The following terms are used in this section:



- **Role** — Roles are used to partition users into groups that share the same security privileges. A user assigned to a role is granted permissions defined by the role. For example, if a user is authorized to perform certain operations, such as adding devices, managing configuration policies, or deploying software, NA uses fixed role identities with which to access resources. Creating a new user role from scratch, rather than using an existing role as a starting point, creates a template with default deny permissions on every action type. This allows roles to be easily created in line with the “least privilege” security best practice.
- **User Group** — A user group is a logical container for the purpose of user management. The System Administrator can assign users to user groups, which in turn map to specific roles. Keep in mind that a user group can be assigned one or more roles.

To add a new user, on the menu bar under Admin click Users. The All Users page opens. Click the New User link at the top of the page. The New User page opens. For more information, see ["New User Page Fields" on page 223](#).

**Note:** You can also navigate to the New User page by clicking the New User option under Admin.

**Note:** You can import new users and modifications to existing users from a CSV file. For more information, see ["Import Users Task Page Fields" on page 332](#).

## All Users Page Fields

Field	Description
New User link	Opens the New User page, where you can add users. For more information, see <a href="#">"New User Page Fields" on page 223</a> . Keep in mind that only the System Administrator can add users.
Search for Users link	Opens the Search For Users page, where you can search for users by first name, last name, email address, and/or AAA user name. For more information, see <a href="#">"Searching for Users" on page 516</a> .
Logged on Users link	Opens the Logged On Users page, where you can view who is currently logged in, including their user name, user host, and the last access time. Keep in mind that this only shows users who are logged in using the Web UI, not the Command Line Interface (CLI). <b>Note:</b> You can also select the Logged On Users option from the Admin drop-down menu to view this page. For more information, see <a href="#">"Logged on Users Page Fields" on the next page</a> .
User Groups link	Opens the User Groups page, where you can add and edit user groups. For more information, see <a href="#">"User Groups Page Fields " on page 229</a> .
User Roles & Permissions link	Opens the User Roles & Permissions page, where you can edit user permissions. For more information, see <a href="#">"User Roles and Permissions Page Fields " on page 233</a> .
Users in this group	Displays the following icons: <ul style="list-style-type: none"><li>•  Regular User Account</li><li>•  Disabled User Account</li></ul>
User Name	Displays the user's full name.
First Name	Displays the user's first name.
Last Name	Displays the user's last name.
Email	Displays the user's email address.
Actions	You can select the following options: <ul style="list-style-type: none"><li>• Edit — Opens the Edit User page. If the account is your own account, the My Profile page opens. Note that only users in the Administrator Group can view password options on the</li></ul>

Field	Description
	<p>My Profile page. For more information, see <a href="#">"My Profile Page Fields" on page 235</a>. Any changes to your profile are shown on the User List page.</p> <ul style="list-style-type: none"> <li>• Delete —You can delete a user (with Admin privileges).</li> <li>• Permissions — Opens the User Permissions page. If you click the Edit User Profile option at the top of the page, the Edit User page opens. You can make changes to the user profile and click Save. The changes are shown on the User List page. For more information, see <a href="#">"New User Page Fields" on the next page</a>.</li> <li>• Config Changes — Opens the Config Search Results page. This page displays what configuration changes, if any, the user made. For more information, see <a href="#">"Viewing Device Configuration Changes" on page 160</a>.</li> </ul>

## Logged on Users Page Fields

The Logged on Users page enables you to view who is currently logged in to NA, including their user name, email address, user's host system, and the last date and time the user accessed the host system. Keep in mind that this page only shows users who are logged in using the NA UI, not the Command Line Interface (CLI).

Field	Description/Action
User Name	Displays the user's name
Email Address	Displays the user's email address. For more information about sending and receiving email messages to logged-in users, see <a href="#">"Email Notification" below</a> .
User Host	Displays the host IP address of the system to which the user is logged in.
Last Access Time	Displays the date and time the user last accessed the system.

## Email Notification

While logged in to NA, you can send messages to one or more logged-in NA users. Keep in mind that while you can delete your messages, once you logout of NA, all messages are automatically deleted.

**Note:** You cannot use the API to implement this feature because the NA UI framework communicates the message. There is no database access.

To send a message:

1. From the Admin menu, click Logged On Users. The Logged On Users page opens.
2. Check the checkboxes of the user(s) to whom you want to send a message. Note that you can select all users from the Select drop-down menu.
3. From the Actions drop-down menu, select Send Message. The Send Message page opens.
4. Enter your message text in the Message field.

- When you are finished entering your message text, click the Submit button. If successful, “Your message has been sent.” is displayed at the top of the Logged On Users page.

To read a message:

- If you have a new message, click the “A new message has arrived” link at the top of the left-hand frame of the NA UI. The message is displayed, including who sent the message and when it was sent. You have the option of replying to the message or deleting it.

**Note:** The “A new message has arrived” link changes to “View Messages” after you have read all of your messages. All messages are displayed in the order that they were sent.

- If you click the Reply button, the Send Message page opens, enabling you to reply to the message. If you click the Delete button, the message is deleted.

When sending a reply, NA uses the UserID from the original message’s Sender UserID. You are automatically the SenderID of the new message.

- Select the Reply button under the message. The Send Message page opens.
- Enter your message text and click the Submit button. The “A new message has arrived” link is displayed at the top of the left-hand frame of the NA UI for the user to whom you sent the message.

## New User Page Fields

When you are first adding users, this page is empty except for your Admin account information. After you have completed this page and saved it, if you need to edit the information, you can do so on the Edit User page. The fields on the Edit User page are identical to the fields on the New User page.

Field	Description/Action
<b>User Information</b>	
User Name	<p>Enter the NA user name of the user. This name is used to login to NA, such as Operator or Administrator.</p> <p>You cannot add a new user with the same user name as that of an active or disabled user. However, you can add a user with the same user name as that of an archived user, in which case the archived user name is renamed to a unique user name.</p> <p><b>Note:</b> User names can contain the following:</p> <ul style="list-style-type: none"> <li>• At sign (@)</li> <li>• Alphanumeric characters</li> <li>• Periods (.)</li> <li>• Underscores (_)</li> <li>• Hyphens (-)</li> <li>• Backslashes(\)</li> <li>• Space</li> </ul>

Field	Description/Action
Password	Enter the NA password for the user. This is the password used when logging into NA. For more information about setting passwords, see <a href="#">"Configuring User Passwords" on page 226</a> .
Confirm Password	Enter the user's NA password for confirmation.
Password Option	<p>Select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• User cannot change password</li> <li>• Password never expires</li> <li>• Account is locked out</li> </ul> <p>For more information about setting password options, see <a href="#">"Configuring User Passwords" on page 226</a>.</p>
First Name	Enter the first name of the user.
Last Name	Enter the last name of the user.
Email Address	Enter the email address of the user.
User belongs to selected groups	<p>Select one or more of the following default user groups to which the user belongs. These groups provide user roles and all associated permissions for the user. Keep in mind that NA does not assign a group by default. A user that does not belong to a group can only perform limited tasks, such as viewing devices and configuration changes.</p> <div style="background-color: #e0e0e0; padding: 5px; margin: 10px 0;"> <p><b>Note:</b> If you created a new group, it is displayed in the list.</p> </div> <ul style="list-style-type: none"> <li>• Limited Access User — Limited Access users are typically operators that do not have passwords to configure network devices. While they have permission to view devices, they cannot modify most information in the NA database, or run batch operations or operations which would reconfigure network devices.</li> <li>• Full Access User — Full Access users are typically network engineers trusted with passwords to configure some, if not all, devices in the network. They have permission to modify most information in the NA database, and can reconfigure devices one-at-a-time, but not in batch mode. Often times they are restricted as to which devices they have permission to reconfigure.</li> <li>• Power User — Power users are typically expert engineers allowed to perform most actions. They can reconfigure and otherwise act on groups of devices.</li> <li>• Administrator — Administrators are responsible for administering NA, including managing users, setting policy, and running network-wide operations. They have permission to take any action on any device.</li> <li>• View All Partitions — Enables users to view all Partitions. A Partition is a set of NA devices. Each Partition belongs to only one NA Core. As a</li> </ul>



Field	Description/Action
	<p>result, a Partition is managed by one (and only one) NA Core. In addition, each device belongs to one and only one Partition. For more information about configuring Partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p>
Site	<p>Select the partition to which this user belongs. The user will only be visible to other users who have view permission to that partition.</p> <div style="background-color: #e0e0e0; padding: 5px; border: 1px solid #ccc;"> <p><b>Note:</b> The Site drop-down menu is not available if the user has access to only one partition.</p> </div>
Status	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Enabled — The account is enabled (the default).</li> <li>• Disabled — The account is disabled. You can use this option to disable an account while still keeping the account on the system.</li> </ul>
External Auth Failover	<p>If external authentication server cannot be reached, you can enable authentication failover to local authentication.</p>
Comments	<p>Enter comments about the account.</p>
<b>AAA</b>	
AAA User Name	<p>Enter the AAA (TACACS+ or RADIUS) username for this user. This enables NA to associate AAA user names with NA user names. Keep in mind if you want NA to failover to local authentication, you must enable this capability on the user's account. By default, NA will not failover to local authentication.</p> <p>You cannot add a new user with the same AAA user name as that of an active or disabled user. However, you can add a user with the same AAA user name as that of an archived user, in which case the archived AAA user name is renamed to a unique AAA user name.</p>
AAA Password	<p>Enter the AAA password for this user.</p>
Confirm AAA Password	<p>Enter the AAA password again for verification.</p>
Use AAA Login for Proxy Interface check box	<p>If checked, NA checks the user's AAA credentials when logging the user into the Telnet/SSH Proxy.</p>
<b>SecurID</b>	
<p>After a new user has been added, a link to the Manage Software Tokens page is displayed when you edit the user's information. The Manage Software Tokens page enables you to add Software Token licenses associated with the user's login. For more information, see <a href="#">"Adding SecurID Software Tokens" on page 616</a>.</p>	

# Configuring User Passwords

The following options are displayed on the New User page for NA users with user password setting permissions for creating new user profiles or editing existing user profiles:

- User cannot change password
- Password never expires
- Account is locked out

All the new users created in the NA database must change their passwords at least once. For a local authentication log in, the Reset Password page is displayed when the user logs on for the first time. However, for external authentication such as SAML and PKI, the user must change the password by following this step:

- On the NA Home page, under **My Settings**, click **Change Password**, and then enter the required details. For more information, see ["Change Password Page Fields" on page 238](#).

While editing the details of a user, an additional option is displayed in the Edit User page:

- User must change password at next logon - The administrator selects this option after editing the details of a new user.

**Note:** The option is auto-selected when the administrator modifies the password details of an existing user.

**Note:** If the users are created using the CLI, they must first log on using the NA UI, change their password, and then log in using the CLI.

**Note:** When using the CLI, users will not be able to log on if their passwords have expired. They must reset their password using the NA UI.

## User Scenario One

User A is leaving the company to pursue other opportunities and there is a need to disable his account yet preserve historical data related to the account. The NA system administrator:

1. Logs in to NA.
2. From the main menu under Admin, the NA system administrator clicks the Users option. The All Users page opens.
3. The NA system administrator clicks the Edit option in the Actions column for User A. The Edit User page opens for User A.
4. On the Edit User page, the NA system administrator selects the "Disabled" option in the Status field and clicks the Save button.

As a result of the above action, if User A were to attempt to login to NA, he receives the following message:  
Account is disabled.

## User Scenario Two

The NA system administrator is about to do maintenance on the NA system. He needs to ensure that there are no NA users logged into the system. After everyone has logged out of NA, the NA system administrator:

1. Logs in to NA.
2. From the main menu under Admin, the NA system administrator clicks the Users option. The All Users page opens.
3. The NA system administrator clicks the Edit option in the Actions column for each user. The Edit User page opens.
4. On the Edit User page, the NA system administrator selects the “Account locked out” checkbox in the Password Options field and clicks the Save button.

As a result of the above action, if any user attempts to login to NA during the system maintenance period, he/she receives the following message: Account is locked out.

After completing system maintenance, the NA system administrator returns to the Edit User page for each user and unchecks the “Account is locked out” checkbox and clicks the Save button. As a result, users can now login to NA.

**Note:** Currently, there is no way to batch edit user accounts.

## User Scenario Three

User B has been on vacation for several weeks. While she was away, the NA system administrator was told to comply with the new corporate password policy. Employees must now change their NA passwords every 30 days. To comply with this new policy, the NA system administrator:

1. Logs in to NA.
2. From the main menu under Admin, the NA system administrator clicks the Users option. The All Users page opens.
3. The NA system administrator clicks the Edit option in the Actions column for User B. The Edit User page opens.
4. On the Edit User page, the NA system administrator selects the “User must change password at next logon” checkbox in the Password Options field and clicks the Save button.

As a result of the above action, when User B arrives at work and tries to login to NA, she receives the following message: Your password has expired. Please reset your password. Your new password must be different from your previous <eight> passwords.

User B must enter her user name, old password, new password, and then enter her new password again for confirmation.

**Note:** You can change your password on the Change Password page, unless the NA system administrator has checked the “User cannot change password” option on the New or Edit User page. For more information, see ["Change Password Page Fields" on page 238](#).

## Password Expiration

NA system administrators can enable or disable NA user password expiration by selecting the “Password never expires” option on the New and Edit User pages. For security, the following settings are included in the *appserver.rcx* file:

- *security/user\_password\_expiration\_enabled* — By default, this setting is false.
- *security/user\_password\_expire\_in\_days* — By default, the value is 180 days. The value must be greater than 0 and less than 1,000. This setting is ignored if the *security/user\_password\_expiration\_enabled* setting is false.

If you need to modify the default values, do the following:

1. Stop NA.
2. Open the *\$NA/adjustable\_options.rcx* file and add the following entries anywhere between the `<options>` and `</options>` tags:

```
<option name="security/user_password_expiration_enabled">false</option>
<option name="security/user_password_expire_in_days">180</option>
<option name="security/user_password_reuse_allowed">false</option>
<option name="security/user_password_history_size">8</option>
```
3. Modify the values as needed and save the file.
4. Repeat Steps 1, 2, and 3 on all NA Cores.
5. Restart NA.

## Password Reuse

To prevent users from using previous passwords, previous passwords are stored in the database. A new `RN_PASSWORD_HISTORY` table has been created for this purpose.

Two new settings are included in the *appserver.rcx* file:

- *security/user\_password\_reuse\_allowed* — The default value is false.
- *security/user\_password\_history\_size* — The default value is 8. The valid range is [1, 999].

## Deleting User Names

As of NA 10.21, deleted user names remain in the NA database. In this way, reports can show changes made by users who no longer have access to NA. Note the following:

- The All Users page does not display deleted user names.
- User group pages do not display deleted user names.
- The User Search Results page includes deleted user names that match the search criteria.

To delete a user name, follow these steps:

1. Navigate to the All Users page (**Admin > Users**).
2. Locate the row for the user name to delete.
3. In the Actions column, click **Delete**.

# Adding User Groups

To add a new user group, on the menu bar under Admin click User Groups. The User Groups page opens. Click the New User Group link at the top of the page. The New User Group page opens. For more information, see ["New User Group Page Fields" on the next page](#).

**Note:** You can also navigate to this page from the All Users page by clicking the User Groups link.

**Note:** You can import new user groups and modifications to existing user groups from a CSV file. For more information, see ["Import Users Task Page Fields" on page 332](#).

## User Groups Page Fields

Field	Description/Action
New User Group link	Opens the New User Group page, where you can add user groups. For more information, see <a href="#">"New User Group Page Fields" on the next page</a> .
Users link	Opens the All Users page, where you can edit user groups. For more information, see <a href="#">"All Users Page Fields" on page 221</a> .
User Roles & Permissions link	Opens the User Roles & Permissions page, where you can edit user permissions. For more information, see <a href="#">"User Roles and Permissions Page Fields " on page 233</a> .
Group Name	Displays the name of the user group. Clicking any of the Group Name links opens User Details page, where you can view all of the current users in the group. For more information about adding users and editing user profiles, see <a href="#">"All Users Page Fields" on page 221</a> .
Description	Displays a brief description of the group.
User Roles	Displays the user roles that have been assigned to the group. Clicking a user role opens the User Role Information page, where you can view details about the user role. For more information, see <a href="#">"Adding User Roles" on page 232</a> .
Actions	You can select the following options: <ul style="list-style-type: none"><li>• Edit — Opens the Edit User Group page. For more information, see <a href="#">"User Groups Page Fields " above</a>.</li><li>• Delete — You can delete the group (with Admin privileges).</li><li>• Permissions — Opens the View Permissions page. For more information, see <a href="#">"New User Group Page Fields" on the next page</a>.</li></ul>

## New User Group Page Fields

By default, a user group will use the most permissive Command Permission as defined by the union of roles applied to the user group. To ensure the appropriate lock-down of permissions, assign the most restrictive roles possible to the user group.

Field	Description/Action
<b>General Information</b>	
Group Name	Enter the name of the user group.
Description	Enter a description of the user group.
Site	Select the partition to which this user group belongs.  <b>Note:</b> The Site drop-down menu is not available if the user has access to only one partition.
<b>Command Permissions</b>	
Existing Command Permission Role	<p>Users in the user group must be explicitly granted the corresponding command permission for every action they attempt to perform. If checked (the default), select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Administrator — Administrators are responsible for administering NA, including managing users, setting policy, and running network-wide operations. They have permission to take any action on any device.</li> <li>• Power — Power users are typically expert engineers allowed to perform most actions. They can reconfigure and otherwise act on groups of devices.</li> <li>• Full Access — Full Access users are typically network engineers trusted with passwords to configure some, if not all, devices in the network. They have permission to modify most information in the NA database, and can reconfigure devices individually, but not in batch mode. Often times they are restricted as to which devices they have permission to reconfigure.</li> <li>• Limited Access — Limited Access users are typically operators that do not have passwords to configure network devices. While they have permission to view devices, they cannot modify most information in the NA database, or run batch operations or operations which would reconfigure network devices.</li> </ul> <p><b>Note:</b> If you have defined a command permission role other than the default command permission roles, it is displayed in the list.</p>
Customized Command Permission Role	If checked, you can customize command permission roles specific to this user group. For each command, click a button to grant or deny permission to this role. For a complete list of Command permissions, see <a href="#">"Command Permissions" on page 707</a> . You can click Grant All to grant permission to all commands. This is useful for Admin users and when you want to deny permission to only a few commands. Click Deny All to deny permission to all

Field	Description/Action
	<p>commands. By default, all commands are denied. The following icons to the right of certain commands indicate that you may need to modify device permissions or script permissions.</p> <ul style="list-style-type: none"> <li>• Modify Device Permission required icon — NA can control permissions on a per-device basis. Modify Device Per Permission specifies whether you can modify a device. You must have Modify Device Permission for the specific device(s) you want to run this command against. See “Modify Device Permissions” below.</li> <li>• Script Permission required icon — NA can control permissions on a per Command Script basis. Script Permission specifies whether you can run a Command Script. You must have Script Permission for the specific Command Script you want to run. See “Script Permissions” below.</li> </ul> <p><b>Note:</b> Custom scripts are presumed to modify device configurations. Therefore, they are checked against the user’s Modify Device Config permissions.</p>
<b>Modify Device Permissions</b>	
All Devices	<p>Enables users in the group to modify all devices.</p> <p><b>Note:</b> If a user without Modify Device permissions views a device configuration, the sensitive information in the device configuration, such as passwords and SNMP community strings, are masked. This ensures that users without Modify Device permissions cannot view sensitive data.</p>
None	No device can be modified. This is the default setting.
Existing Modify Device Permission Role	Enables you to select existing Modify Device permission roles for the users in the group. If there are no existing roles configured, the following message is displayed: No existing roles found.
Customized Modify Device Permission Role	Enables you to select Device Permission roles from the list specific to this user group.
<b>Script Permissions</b>	
All Scripts	Enables the users in the group to run all scripts against the devices for which they have the Modify Device permission.
None	No scripts can be run. This is the default setting.
Existing Script Permission Role	Enables you to select existing script permission roles for users in the group. If there are no existing roles configured, the following message is displayed: No existing roles found.

Field	Description/Action
Customized Script Permission Role	Select one or more command scripts that users in this user group can run against the devices for which they have the Modify Device permission.
<b>View Partition Permissions</b>	
All objects	Enables the users in the user group to view all Partitions. (For more information, see <a href="#">"Segmenting Devices and Users" on page 142.</a> )  <b>Note:</b> If you are not using View Permissions, new users are placed in the View All Partitions group, giving them View Permission to all devices. If you create View Permissions, new users are not implicitly granted any View Permissions.
None	No Partitions are viewable. This is the default setting.
Existing View Permission Role	Enables you to select an existing View permission role for users in the user group. If there are no existing roles configured, "No existing roles found" is displayed.
Customize View Permission Role	Enables you to select View permission roles from the list. If the All radio button is selected, all Partitions are included.
<b>Users</b>	
Users in Group/All Users	To add a user, select the user from the right-hand box and click << Add. To remove a user, select the user in the left-hand box and click Remove.

Be sure to click the Save button after entering the required information.

## Adding User Roles

Users must be explicitly granted the corresponding command permission for each action they want to perform, such as viewing a page in the NA console or running a command. A set of command permissions creates a command permission role. You can then apply the role to a user group to set the command permissions for that given user group. For example, the network operations staff could have permission to access device records and view changes, but not to script changes on devices or remove devices.

**Note:** If you are not using View Permissions, new users are placed in the View All Partitions group, giving them View Permission to all devices. If you create View Permissions, new users are not implicitly granted any View Permissions.

To add a new user role:



1. On the menu bar under Admin, click the User Roles & Permissions option. The User Roles & Permissions page opens. For more information, see ["User Roles and Permissions Page Fields "](#) below.
2. Click the New User Role link at the top of the page. The New User Role page opens. For more information, see ["New User Role Page Fields "](#) on the next page.

## User Roles and Permissions Page Fields

Field	Description/Action
New User Role link	Opens the New User Role page, where you can select a user role. For more information, see <a href="#">"New User Role Page Fields "</a> on the next page.
Users link	Opens the All Users page, where you can view current users and add new additional ones. For more information, see <a href="#">"All Users Page Fields"</a> on page 221.
User Groups link	Opens the User Groups page, where you can view current user ground and add new additional ones. For more information, see <a href="#">"User Groups Page Fields "</a> on page 229.
<b>System Default Roles</b>	
Role Name	Displays the role name. You can select any role to view information for the role, including a list of command permissions for the role.
Role Type	Displays the role type, including Command Permission, Modify Device Permission, Script Permission, and View Partition Permission.
Description	Displays a description of the role.
Actions	You can select the following options: <ul style="list-style-type: none"> <li>• Edit — The Edit User Role page opens. For more information, see <a href="#">"Adding User Roles" on the previous page</a>. Keep in mind that default roles cannot be edited.</li> <li>• Create Copy — Opens the Edit User Role page, where you can add a new user role. For more information, see <a href="#">"New User Role Page Fields "</a> on the next page.</li> <li>• Delete — You can delete the role (Admin privileges only). Keep in mind that default roles cannot be deleted.</li> </ul>
<b>User Defined Roles</b>	
Role Name	Displays the role name. You can select any role to view information for the role, including a list of command permissions for the role.
Role Type	Displays the role type, for example Command Permission, Modify Device Permission, View Partitions Permissions, and Script Permission.
Description	Displays a description of the role.
Actions	You can select the following options: <ul style="list-style-type: none"> <li>• Edit — The Edit User Role page opens. For more information, see <a href="#">"New User Role Page Fields "</a> on the next page.</li> <li>• Create Copy — Opens the Edit User Role page, where you can add a new user role. For</li> </ul>

Field	Description/Action
	<p>more information, see <a href="#">"New User Role Page Fields "</a> below. Keep in mind that user-defined roles cannot be copied.</p> <ul style="list-style-type: none"><li>• Delete — You can delete the role (with Admin privileges only).</li></ul>

## New User Role Page Fields

Field	Description/Action
Type	<p>Select a user role from the drop-down menu. The display is modified depending on your selection. The options include:</p> <ul style="list-style-type: none"><li>• Command Permission — Enter the name and description of the user role. For each command, click a button to grant or deny permission to this role. For a complete list of Command permissions, see <a href="#">"Command Permissions" on page 707</a>. You can click Grant All to grant permission to all commands. This is useful for Admin users and when you want to deny permission to only a few commands. Click Deny All to deny permission to all commands.</li><li>• Modify Device Permission — Enter the name and description of the user role. Use the Device Selector to select the device group(s). For more information about using the Device Selector, see <a href="#">"Device Selector" on page 137</a>. This role will have Modify Device permission for all devices that are members of the selected device groups.</li><li>• Script Permission — Enter the name and description of the user role. Select the scripts from the list. This role will have Script permission to all selected scripts.</li><li>• View Partition Permission — Enter the name and description of the user role. Select the Partitions from the list. This role will have View Partition permission for all devices and/or users that are members of the selected partition's device and/or user groups. Keep in mind that View Partition Permissions are assigned to user groups, not individual users. Users belonging to multiple user groups can obtain multiple View Partition Permissions. For information about segmenting devices, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</li></ul>

Be sure to click the Save button after selecting the user role.

Keep in mind that user groups are not automatically assigned to user roles. To assign a user group to a user role:

1. On the menu bar under Admin, click User Groups. The User Groups page opens.
2. Click the Edit option in the Actions column for the group you want to add to the new role. The Edit User Group page opens. For more information, see ["New User Group Page Fields" on page 230](#).

## Editing User Settings

On the NA Home page, the "My Workspace" area includes the following sections:

- Current Device — Displays the current device, if applicable.
- Current Device Group — Displays the current device group. Inventory is the default.

- My Favorites — Displays a list of your favorite devices, URLs, and/or NA pages. You can add items to this list by clicking the Add To Favorites link at the top of most NA pages.
- Quick Launches — For more information, see ["About Quick Launch" on page 238](#).
- My Settings — For more information, see ["My Settings" below](#).

## My Settings

You can select the following options under My Settings:

- My Profile — For more information, see ["My Profile Page Fields" below](#).
- My Workspace — For more information, see ["My Workspace Page Fields" on the next page](#).
- My Preferences — For more information, see ["My Preference Page Fields" on page 237](#).
- My Permissions — For more information, see ["My Permissions Page Fields" on page 237](#).
- Change Password — For more information, see ["Change Password Page Fields" on page 238](#).
- Quick Launch — For more information, see ["About Quick Launch" on page 238](#).

## My Profile Page Fields

The **My Profile** page enables you to change your user settings, such as your user name, password, and email address. Note that only the users in the **Administrator Group** can view the password options. For more information, see ["Configuring User Passwords" on page 226](#).

On the NA Home page under **My Settings** click **My Profile**. The **My Profile** page opens. Be sure to click the **Save** button when you are finished.

Field	Description/Action
<b>User Information</b>	
User Name	Enter a new NA username.
First Name	Enter a new first name.
Last Name	Enter a new last name.
Email Address	Enter a new email address.
User belongs to groups	Displays the groups to which you belong. Clicking a group opens the current list of users that belong to the group.
Site	Select the partition to which this user belongs. The user will only be visible to other users who have view permission to that partition.  <b>Note:</b> The Site drop-down menu is not available if the user has access to only one partition.
External Auth Failover	Check if in the event external authentication fails, authentication automatically fail-overs to local authentication.

Field	Description/Action
check box	<p><b>Note:</b> When SAML is enabled, this check box applies only to the CLI/API interface, and not to the NA web user interface.</p>
Comments	Enter any comments about the user account.
<b>AAA</b>	
AAA User Name	Enter a new AAA (TACACS+ or RADIUS) username.
AAA Password	Enter a new AAA password.
Confirm AAA Password	Enter your new AAA password again for confirmation.
Use AAA Login for Proxy Interface check box	If checked, your AAA login information is used with each NA Telnet and SSH session.
<b>SecurID</b>	
Manage Software Token licenses link	<p>NA can be configured to login to devices using SecurID credentials. Clicking this link opens the View SecurID Tokens page. For more information, see <a href="#">"Adding SecurID Software Tokens" on page 616</a>.</p> <p><b>Note:</b> This link is not displayed if software tokens are not supported on your platform or SecurID is not properly configured.</p>

## My Workspace Page Fields

To edit your workspace, on the NA Home page under My Settings click My Workspace. The My Workspace page opens.

Field	Description/Action
Favorite Links	Displays your favorite links. Links can be devices, NA pages, or other URLs. To remove a link, click the red Delete icon next to the link you want to remove. You can also rename a link by entering a new name and then clicking the Rename button. You can use the up and down arrows to move a favorite link up or down in the list.
Add Customized Favorite Link	Enter a link name in the Link Name field. The maximum number of characters is 25. You can also enter a link URL address. Be sure to click the Add Favorite Link button when you are done.
Workspace Settings	You can use a favorite with a relative URL as your default Home page by selecting the link from the drop-down menu. To change the number of links allowed on your My Favorites list, select a number from the drop-down menu. The default is 10.

Field	Description/Action
	<p><b>Note:</b> You cannot use a favorite with an absolute URL for the home page.</p>
	<p><b>Note:</b> This option is not available until you add a shortcut.</p>

## My Preference Page Fields

To edit current your NA Home page preferences, on the NA Home page under My Settings click My Preferences. The My Preference page opens. This page enables you to customize the Home page.

Field	Description/Action
Show My Tasks and Approval Requests (when Workflow is enabled) on the home page	Select Yes (the default) or No.
Show Recent Changes on the home page	Select Yes (the default) or No.
Show Recent Events on the home page	Select Yes (the default) or No.
Show System Reports on the home page	Select Yes or No (the default).
Show My Favorite Reports on the home page	Select Yes (the default) or No.
Show My Device Groups on the home page	Select Yes (the default) or No.

Be sure to click the Save button to save your preferences.

## My Permissions Page Fields

The View Permissions page displays the permissions you have due to the groups to which you belong. Keep in mind that there are also assigned roles. For more information, see ["New User Role Page Fields " on page 234.](#)

**Note:** If you are not using View Permissions, new users are placed in the View All Partitions group, giving them View Permission to all devices. If you create View Permissions, new users are not implicitly granted any View Permissions.

To view your current permissions, on the NA Home page under My Settings click My Permissions. The My Permissions page opens.

Field	Description/Action
User Groups and Roles	Displays all of the groups you belong to and the roles assigned to each group. For more information, see <a href="#">"Adding User Roles" on page 232</a> .
Command Permissions Granted	Displays the permissions you have relative to commands. For more information, see <a href="#">"Command Permissions" on page 707</a> .
Modify Device Permissions Granted	Displays the permissions you have to modify devices.
Script Permissions Granted	Displays the permissions you have to run and modify scripts.
View Partitions Permissions Granted	Displays the permissions you have to view users and/or devices. For more information, see <a href="#">"Segmenting Devices and Users" on page 142</a> .

## Change Password Page Fields

To change your local authentication password, on the NA Home page, under My Settings, click **Change Password**. The Change Password page opens.

Field	Description/Action
<b>Local Authentication Password</b>	
Old Password	Enter the old password.
New Password	Enter a new password.
Confirm New Password	Enter the new password again for confirmation and click the <b>Submit</b> button.

## About Quick Launch

The **Quick Launches** area of the My Workspace pane provides for one-click initiation of common tasks. Each quick launch action is a shortcut to a task template. If relevant, the selected task runs in the context of the selected device or device group. The default context is the Inventory device group.

**Tip:** To determine the current device context of a quick launch action, hover over the link name.

For example, if you have configured a quick launch action for taking a snapshot, on the Device Details page for a device, clicking the **Take Snapshot** quick launch action runs the Take Snapshot task automatically.

**Note:** Quick launch actions always run against the current device or device group regardless of the **Applies to** setting of the task template. For example, a Reboot Device task quick launch action runs against the current device or device group and automatically reboots the selected devices. You are not prompted before the reboot.

The content of the **Quick Launches** area is specific to the current NA user.

**Note:** Only users with Admin permissions can create, run, and delete quick launches.

## Configure a Quick Launch Action

Each quick launch action is a shortcut to a task template. For information about task templates, see "[Task Templates](#)" on page 255.

### To add a task to the Quick Launches area

1. Open the Task Templates page (**Tasks >Task Templates**).
2. In the **Actions** column, click **Add to Quick Launches**.

NA adds the task template with a predetermined name. You can rename the quick launch action on the **Quick Launch** page.

## Manage Quick Launch Actions

Manage quick launch actions on the **Quick Launch** page, which is accessible from the **Quick Launch** link under My Settings in the My Workspace pane.

### To change the display order of the quick launch actions

- On the **Quick Launch** page, use the up and down arrows.

### To delete a quick launch action

- On the **Quick Launch** page, click the red X button.

### To rename a quick launch action

- On the **Quick Launch** page, enter a new name in the text box, and then click **Rename**. The name cannot exceed 25 characters.

The following table describes the fields on the **Quick Launch** page. For information about configuring quick launch actions, see "[Configure a Quick Launch Action](#)" above.

Field	Description/Action
task templates listing page link	Clicking the link opens the Task Templates page. For information, see " <a href="#">Task Templates</a> " on page 255.
<b>Quick Launch Actions – Device</b>	
The existing quick launch actions that run device task templates. If no such actions are available, this section is not visible.	
<b>Quick Launch Actions – Policy</b>	
The existing quick launch actions that run policy task templates. If no such actions are available, this section is not visible.	
<b>Quick Launch Actions – Report</b>	
The existing quick launch actions that run report task templates. If no such actions are available, this section is not visible.	

Field	Description/Action
<b>Quick Launch Settings</b>	
Maximum links to display on Quick Launch	The capacity of the <b>Quick Launches</b> area. The default value is 10.
Number of devices for quick launch warning	The threshold at which NA warns before running the task associated with the quick launch action. If this number or more devices are currently selected, NA requires user interaction before continuing with the action.

## Customizing the NA Home Page

The NA Home page opens whenever you login to NA. You can also return to the NA Home page by clicking the **Network Automation** link in the upper left-hand corner of each page.

The NA Home Page includes two frames. The left-hand frame includes:

- Current Device Group (Inventory is the default)
- My Favorites
- My Settings — The My Settings area includes the following sections:
  - My Profile
  - My Workspace
  - My Preferences
  - My Permissions
  - Change Password
  - Quick Launch

For more information about configuring the options in the My Workspace area, see ["Editing User Settings" on page 234](#).

The right-hand frame can be customized to include:

- Workflow approvals
- List of tasks
- Recent configuration changes (what device changed and when)
- Recent system events (such as device access failures)
- Selected device groups
- Selected favorite reports
- Selected system reports

For more information, see ["My Homepage Tab Fields " on the next page](#) and ["Statistics Dashboard Tab Fields" on page 242](#).



## My Homepage Tab Fields

Field	Description/Action
<b>Workflow Approvals</b> (if applicable)	
Tasks Awaiting My Approval link	<p>Displays the tasks awaiting your approval, including:</p> <ul style="list-style-type: none"> <li>• Task Name — Displays the task name. If you click the task name, the Task Information page opens, where you can approve the task. For more information about the Task Information page, see <a href="#">"Task Information Page Fields" on page 648</a>.</li> <li>• Approve By — Displays the date and time by which the task must be approved. For more information about task approval, see <a href="#">"Approval Requests" on page 646</a>.</li> <li>• Approval — Displays the Approval status.</li> <li>• Schedule Date — Displays when the task was scheduled.</li> <li>• Status — Displays the current status.</li> </ul> <p>Click the View All link to open the Approval Requests page, where you can view a list of your approval requests. For more information about the Approval Requests page, see <a href="#">"Approval Requests" on page 646</a>.</p>
<b>My Tasks</b>	
Task Name	Displays a list of your tasks. For more information, see <a href="#">"About Tasks" on page 245</a> . When you first configure NA, a list of default tasks are displayed, including Take Snapshot, Generate Summary Reports, Run Diagnostics, and Data Pruning.
Scheduled Date	Displays the date and time the task was scheduled.
Status	The task state. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
View All link	Opens the My Tasks page, where you can view all of your tasks. For more information, see <a href="#">"About Tasks" on page 245</a> .
<b>Recent Changes</b>	
Time frame	<p>The default time frame is the past 24 hours. You can select the following time frames:</p> <ul style="list-style-type: none"> <li>• Past 1, 2, 4, 8, 12, 24, and 48 hours</li> <li>• Past 1 and 2 weeks</li> <li>• Past 1 month</li> <li>• All Configs</li> </ul>
Date	Displays the date and time of the configuration change.
Device	Displays the host name or IP address of the device that was changed. Clicking the device link opens the Device Details page.
Changed By	Displays the login name of the person who changed the configuration, device, or task. N/A means not applicable.

Field	Description/Action
Comments	Displays any comments about the configuration.
Action	<p>You can select the following actions:</p> <ul style="list-style-type: none"> <li>• Compare to Previous — Opens the Compare Device Configuration page, where you can view the selected configuration and the next previous configuration side-by-side. The differences are highlighted in different colors to make them easy to view.</li> <li>• View Config — Opens the Device Configuration Detail page, where you can view the entire configuration, deploy this version of the configuration to the device running configuration, edit the configuration, retrieve diagnostics, and compare the configuration to the previous configuration.</li> </ul>
View All link	Opens the Configuration Changes page, where you can view all the configuration changes and adjust the time frame in which you view changes. For more information, see " <a href="#">Viewing Device Configuration Changes</a> " on page 160.
<b>Recent Events</b>	
Time frame	<p>The default time frame is the past 24 hours. You can select the following time frames:</p> <ul style="list-style-type: none"> <li>• Past 1, 2, 4, 8, 12, 24, and 48 hours</li> <li>• Past 1 and 2 weeks</li> <li>• Past 1 month</li> <li>• All Configs</li> </ul>
Event Summary	Displays the type of event. Click the link to view a complete list of events of this type. For more information, see " <a href="#">Consolidated View of Events (SingleView)</a> " on page 539.
Count	Displays the number of events of this type.
Event List Page link	Opens the <b>System &amp; Network Events</b> page, where you can see a longer list of events and adjust the time frame in which you view events. For more information, see " <a href="#">Consolidated View of Events (SingleView)</a> " on page 539.
<b>My Device Groups (if applicable)</b>	
Device Group links	Opens the Device Groups page, where you can view the current device groups.
<b>My Favorite Reports (if applicable)</b>	
All Favorite Reports link	Opens the <b>User &amp; System Reports</b> page, where you can view the reports you created from custom searches as well as the System reports.

## Statistics Dashboard Tab Fields

The Statistics Dashboard tab provides information on the following:

- Top 5 Vendors
- Top 5 OS Versions
- Top 5 Active Users
- Average Number of Changers Per Day
- Change Frequency
- Top 10 Most Accessed Devices
- Software Level
- OS Inventory
- Configuration Policy Compliance

For more information, see ["Summary Reports" on page 606](#)

## Search/Connect Function

The NA Home page (and every page) includes a Search Tab on the top right of each page that enables you to find devices by Hostname or IP address and connect to them via Telnet or SSH. The search function accepts wildcards, so you can quickly find a group of related devices, or at least narrow your search until you find the target device. For information about the Search for Devices page fields, see ["Searching for Devices" on page 461](#).

You can also use the Search For menu to open the search page for a specific type of NA data.

# Chapter 7: Scheduling Tasks

Use the following table to quickly locate information.

Topic	Refer to:
What Are Tasks?	"About Tasks" on the next page
Task Templates	"Task Templates" on page 255
Configure Syslog Task	"Configure Syslog Task Page Fields" on page 259
Deploy Passwords Task	"Deploy Passwords Task Page Fields" on page 264
Discover Driver Task	"Discover Driver Task Page Fields" on page 269
Reboot Device Task	"Reboot Device Task Page Fields" on page 274
Run ICMP Test Task	"Run ICMP Test Task Page Fields" on page 279
Run Command Script Task	"Run Command Script Task Page Fields" on page 284
Run Diagnostics Task	"Run Diagnostics Task Page Fields" on page 291
Take Snapshot Task	"Take Snapshot Task Page Fields" on page 300
Synchronize Startup and Running Task	"Synchronize Startup and Running Task Page Fields" on page 305
Update Device Software Task	"Update Device Software Task Page Fields" on page 310
Import Devices Task	"Import Devices Task Page Fields" on page 327
Import Users Task	"Import Users Task Page Fields" on page 332
Import Resource Identities Task	"Add Resource Identities to a Pool from a CSV File" on page 339
Detect Network Devices Task	"Detect Network Devices Task Page Fields" on page 345
Deduplication Task	"Deduplication Task Page Fields" on page 350
Port Scan	"Port Scan Page Fields" on page 353
Provision Device from Template	"Provision Device Task Page Fields" on page 356
Add Context to Device	"Add Context to Device Task Page Fields" on page 360
Remove Context from Device	"Remove Context from Device Task Page Fields" on page 363
VLAN	"VLAN Task Page Fields" on page 365
Backup Device Software Task	"Backup Device Software Task Page Fields " on page 369

Topic	Refer to:
Check Policy Compliance Task	<a href="#">"Check Policy Compliance Task Page Fields" on page 372</a>
Generate Summary Reports Task	<a href="#">"Generate Summary Reports Task Page Fields" on page 375</a>
Email Report Task	<a href="#">"Email Report Task Page Fields" on page 377</a>
Deploy Remote Agent Task	<a href="#">"Deploy Remote Agent Page Fields" on page 380</a>
Resolve FQDN Task	<a href="#">"Resolve FQDN Task Page Fields" on page 382</a>
Data Pruning Task	<a href="#">"Data Pruning Task Page Fields" on page 385</a>
Run External Application Task	<a href="#">"Run External Application Task Page Fields" on page 388</a>
Scheduling Multi-Task Projects	<a href="#">"Scheduling Multi-Task Projects" on page 394</a>
Viewing My Tasks	<a href="#">"Viewing My Tasks" on page 398</a>
Viewing Scheduled Tasks	<a href="#">"Viewing Scheduled Tasks" on page 400</a>
Viewing Running Tasks	<a href="#">"Viewing Running Tasks" on page 401</a>
Viewing Recent Tasks	<a href="#">"Viewing Recent Tasks" on page 403</a>
Viewing Task Load	<a href="#">"Viewing Task Load" on page 407</a>

## About Tasks

Tasks are the primary mechanism by which HPE Network Automation (NA) interacts with your network. Tasks are specific actions you can either schedule or run immediately. The Task Information page provides the results of performed tasks, such as snapshots to identify device and configuration changes and software policy compliance to identify devices that are or are not in compliance.

Tasks are the primary mechanism by which HPE Network Automation Software (NA) interacts with your network. Each task is a specific action that can be scheduled to run as soon as possible or at a specific date and time. A task can be run one time or on a recurring basis. Additionally, any pending or running task can be canceled, and any completed task can be rerun.

Most tasks work against one or more network devices. Some tasks apply to managing the NA system. The following table lists the tasks available in NA.

Tasks can be integrated into a workflow. In this way, an approver can verify the task configuration before it is run. For more information, see ["Creating Workflows" on page 642](#).

### NA Tasks

NA Task Name	Description	Information
<b>Tasks That Change Devices</b>		

### NA Tasks, continued

NA Task Name	Description	Information
Configure Syslog	Configure a device to send syslog messages to the NA core.	"Configure Syslog Task Page Fields" on page 259
Deploy Passwords	Change the password settings and SNMP community strings on a device.	"Deploy Passwords Task Page Fields" on page 264
Reboot Device	Reboot a device.	"Reboot Device Task Page Fields" on page 274
Run ICMP Test	Issue a ping or traceroute command to a device.	"Run ICMP Test Task Page Fields" on page 279
Run Command Script	Run a command script on a device.	"Run Command Script Task Page Fields" on page 284
Deploy Change Plan	Deploy a change plan on a device.	"Deploy Change Plan Task Page Fields" on page 296
Synchronize Startup and Running	Overwrite the startup configuration with the current running configuration of a device.	"Synchronize Startup and Running Task Page Fields" on page 305
Update Device Software	Deploy software to a device.	"Update Device Software Task Page Fields" on page 310
Provision Device from Template	Provision a device from an NA device template.	"Provision Device Task Page Fields"

## NA Tasks, continued

NA Task Name	Description	Information
		on page 356
Add Context to Device	Add a device context to a device in the device configuration and the NA database.	"Add Context to Device Task Page Fields" on page 360
Remove Context from Device	Delete a device context from a device in the device configuration and the NA database.	"Remove Context from Device Task Page Fields" on page 363
VLAN	Provision VLAN entities and trunk ports.	"VLAN Task Page Fields" on page 365
Create ACLs	Create access control lists in a device configuration.	"Creating ACLs" on page 655
Delete ACLs	Remove access control lists from a device configuration.	"Deleting ACLs" on page 659
Deploy Config	Deploy a configuration to a device.	"Deploying Device Configurations" on page 167
<b>Tasks That Update NA Without Changing Devices</b>		
Discover Driver Task	Determine which NA driver NA should use when communicating with a device.	"Discover Driver Task Page Fields" on page 269
Run Diagnostics	Run one or more diagnostics to gather information about a device.	"Run Diagnostics Task Page Fields" on page 291
Take Snapshot	Compare the stored device configuration to the running configuration. If the configurations are different, save a copy of the running configuration to NA.	"Take Snapshot Task Page Fields" on page 300
Import	Import device information into the NA database from a CSV file.	"Import

## NA Tasks, continued

NA Task Name	Description	Information
Devices		<a href="#">Devices Task Page Fields</a> on page 327
Import Users	Import user information into the NA database from a CSV file.	<a href="#">"Import Users Task Page Fields"</a> on page 332
Import Resource Identities	Import resource identity information into the NA database from a CSV file.	<a href="#">"Add Resource Identities to a Pool from a CSV File"</a> on page 339
Detect Network Devices	Discover devices in the network management environment and add those devices to the NA inventory.	<a href="#">"Detect Network Devices Task Page Fields"</a> on page 345
Deduplication	Resolve instances of device duplication within the NA database.	<a href="#">"Deduplication Task Page Fields"</a> on page 350
Port Scan	Scan the ports of a device to identify open ports, closed ports, and certain vulnerabilities.	<a href="#">"Port Scan Page Fields"</a> on page 353
Backup Device Software	Copy software images from a device to the NA software image repository.	<a href="#">"Backup Device Software Task Page Fields"</a> on page 369
Check Policy Compliance	Determine whether a device is in compliance with configuration or software level policies.  <div style="background-color: #e0e0e0; padding: 5px;"> <p><b>Note:</b> The HPE Network Automation Premium edition license does not include this task. It is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page (<a href="#">Help &gt; About Network Automation &gt; View License Information</a> link).</p> </div>	<a href="#">"Check Policy Compliance Task Page Fields"</a> on page 372
Generate Summary	Update the NA summary reports.	<a href="#">"Generate Summary"</a>



## NA Tasks, continued

NA Task Name	Description	Information
Reports		<a href="#">Reports Task Page Fields</a> on page 375
Email Report	Email the selected report to the named recipients.	<a href="#">"Email Report Task Page Fields"</a> on page 377
Deploy Remote Agent	Deploy the NA satellite agent to a remote NA gateway server.	<a href="#">"Deploy Remote Agent Page Fields"</a> on page 380
Resolve FQDN	Update the NA database with the fully qualified domain name of a device as obtained by reverse DNS lookup on the device's primary IP address.	<a href="#">"Resolve FQDN Task Page Fields"</a> on page 382
Data Pruning	Remove obsolete files from the NA database.	<a href="#">"Data Pruning Task Page Fields"</a> on page 385
Run External Application	Run a non-NA command on the NA core server, passing information from the NA database to the command.	<a href="#">"Run External Application Task Page Fields"</a> on page 388
Deploy Hotfix	Install an NA hotfix to one or more NA cores.	<a href="#">"Deploy Hotfix"</a> on page 390

## Task Priority, Schedule, and State

Tasks include priority, schedule, and state.

### Priority

Task priority is the relative importance of one task compared to another task. The five priority levels are 1 through 5 with 1 being the highest priority. The default task priority is priority 3. Only NA administrators and NA users with the Set Highest Task Priority command permission can create tasks with priority 1.

If you change the priority of a group task that is not yet running, NA creates all of the child tasks with the new priority.

**Note:** Task-related APIs and CLIs provide the `-taskpriority` option. For information, see the

*NA CLI/API Command Reference.*

**Schedule**

The task schedule date determines the first possible time that NA can run the task. Actual task start time might be later than the task schedule date. Other time values related to tasks Set Highest Task Priority include:

- Start date—The time the task actually starts.
- Complete data—The time the task completes.
- Duration—The time the task ran. This value is the difference between the complete date and the start date.

**State**

The following table describes the possible task states. The numerical identifier appears in the output of the `list task` command for the NA API and CLI. (For more information, see the *NA CLI/API Command Reference*.)

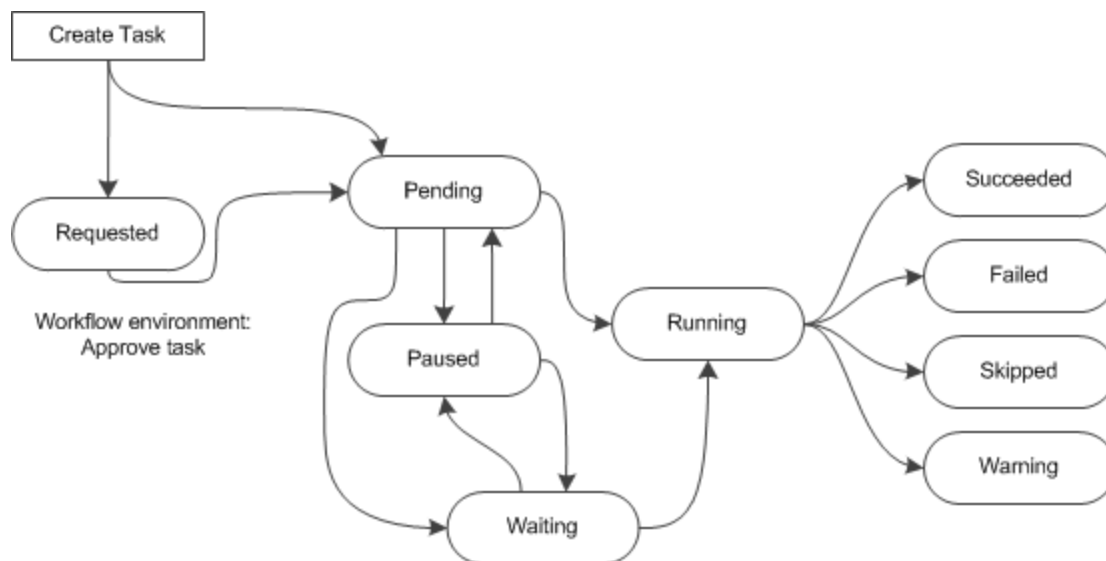
**Task States**

Task State	Identifier	Description
Pending	1	The task schedule date has not yet occurred. At the schedule date, if the value of Max Concurrent Tasks has not been reached, a Pending task moves to the Running task state. Otherwise, the task moves to the Waiting task state until NA resources are available.
Succeeded	2	A final state. The task completed successfully.
Failed	3	A final state. The task completed with an error.
Running	4	The task is running. The task runs until completion or until the end of the estimated duration. Running tasks cannot be paused.
Paused	5	The task is paused.
Starting	6	In a workflow environment, the task is saved as a draft. NA does not run tasks in this state.
Waiting	7	The task schedule date has passed, but NA configuration (Max Concurrent Tasks or Max Concurrent Group Tasks) or system resource limitations prevent NA from running the task. When NA resources become available, a Waiting task moves to the Running task state.
Synchronous	8	The task run mode is set to synchronous. For more information, see <a href="#">"Task Run Mode" on page 252</a> .
Duplicate	9	The task has the same task type and same target device as a task that is currently in the Running task state. NA will not run this task.
Prototype	10	An NA internal state.
Skipped	11	A final state. The task could not be started and was not run. Reasons that NA skips a task include:

### Task States, continued

Task State	Identifier	Description
		<ul style="list-style-type: none"> <li>The target device is inactive.</li> <li>No driver is assigned to the target device.</li> <li>No device password rule matches the device.</li> </ul> For information about why the task was skipped, see the Task Information page.
Warning	12	A final state. The task completed with a warning. This state applies to a group task whose child tasks are in a variety of final states. For information about the warning, see the Task Information page.
Requested	13	In a workflow environment, the task is ready for approval. For more information, see <a href="#">"Approving Tasks" on page 647</a> .  As of NA 10.21, tasks in the Requested state cannot be edited. For information about changing this behavior, see "Configuring NA to Permit Editing of Tasks Waiting for Approval" in the <i>NA Administration Guide</i> .
Template	14	The task is a task template and cannot be run directly.

The following figure illustrates the transitions among the most common task states.



## NA Core Association for a Task

In a [Horizontal Scalability](#)<sup>1</sup> or [Multimaster](#)<sup>2</sup> Distributed System environment, a child task might run on a different NA core from the group task or the parent task. The Task Information, Running Tasks, and Recent

<sup>1</sup>A configuration where multiple NA cores connect to a single NA database. For more information, see the NA Horizontal Scalability Guide.

<sup>2</sup>A system with more than one database, where each database contains a complete set of all data.

Tasks pages identify the NA core association for a task. This association is created when the child task moves to the Running state. The Scheduled Tasks page does not identify core associations for tasks because the associations have not yet been made.

## Group and Parent Tasks

A group task is one that works on multiple devices. The devices on which a group task runs can be selected individually, through device groups, or by a combination of both approaches. Create a group task to apply the same configuration to a task that should be run on multiple devices.

At run time, the group task creates one child task for each target device. The child task has the same configuration as the group task. The group task monitors the progress of the child tasks and does not complete until all child tasks have reached a final state. On the Task Information page for each child task, the group task is accessible from the Parent Task field.

A parent task is one that spawns a child task that has a different configuration from the parent task. For example, if a Snapshot task detects a device configuration change, NA initiates a Run Diagnostics task against that device. (This behavior is configurable.)

If a Deploy Hotfix task applies to multiple NA cores, the initial task is a parent task that spawns the same configuration to the other NA cores. For more information, see ["Deploy Hotfix" on page 390](#).

A multi-task project is another type of parent task. Within a multi-task project, each sub-task is a child task of the multi-task project.

## Task Run Mode

The NA task configuration includes the task run mode, which is one of the following:

- **Parallel**—Multiple child tasks of a group task can run at the same time. Alternatively, the task runs on a single device. This is the default run mode.  
Most tasks use parallel run mode.
- **Serial**—Only one child task of a group task runs at any given time. Serial run mode applies to group tasks only.

Serial run mode is useful for tasks such as Reboot Device and Update Device Software that temporarily make the target device unavailable. Running a group task in serial run mode ensures that only one device is unavailable at a time. Additionally, the **Stop on Failure** setting causes NA to skip the remaining tasks if one child task fails. In this way, you can fix the problem that prevented successful completion of the child task before running the child task on other devices.

When the target devices for the task are selected individually, the order of device selection determines the order in which the child tasks run.

- **Synchronous**—The task command returns task results only after the task completes. Synchronous run mode is available from the API or CLI only.  
Synchronous run mode blocks on the task request until the task return. This behavior is important for a script that requires the task result before continuing. Synchronous tasks run immediately regardless of NA

configuration and system resources. For more information, see the `-runmode` option of the task commands in the *NA CLI/API Command Reference*.

## Task Run Order

NA runs all higher priority tasks before running lower priority tasks. For example, NA runs all priority 2 tasks before running any priority 3 tasks.

Within each priority, NA runs tasks in order of the task schedule date.

For tasks with the same priority and concurrent schedule date, NA runs tasks in a round robin fashion. That is, NA runs one or more child tasks from each concurrent group task at one time. In this way, a group task on a large number of devices does not delay the running of other tasks.

**Tip:** By default, NA does not run multiple tasks on one device at the same time. You can override this behavior for some task types.

## Task Results

View task results on the Task Information page for the task.

## Task CSV Template File

Many NA tasks support the use of a comma-separated values (CSV) format file as a method for specifying the target devices for the task. In this case, the Task CSV Template link provides a starting CSV file containing the following columns:

Column Name	Description
primaryIPAddress	For all tasks, identify the target devices, one per row. Populate the primaryIPAddress column or the hostName column but not both.
hostName	
scriptField[1-3]	For the Run Command Script task, replace the column name with the name of a custom variable in the command script. If necessary add more columns for additional custom variables. The custom variable name is case-sensitive.  In each row, enter the custom variable values for that device.  Any custom variables defined in the script and not referenced in the CSV file appear on the New Command Script task page for user input.
tc_device_ primary_ip	For the Provision Device task, specify the desired IP address for each target device.

## Rerun a Subset of a Group Task

A group task with status other than Succeeded includes at least one child task with Failed, Skipped, or Warning status. Rerunning the group task repeats the task functionality on all devices for that group task. You can rerun the group task functionality on only the devices that did not have a successful outcome by creating a temporary device group of those devices and then creating a new task for the temporary device group.

### To rerun some child tasks of a group task

1. On the Task Information page of the group task, do the following:
  - a. Note the task configuration.
  - b. If necessary, expand the Additional Information section.
  - c. In the Result Details field, click the link for a status (for example, Skipped).  
The <task name> – <status> Child Tasks page displays the subset of devices with this status.
2. On the Child Tasks page, in the Search Criteria area, do the following:
  - a. Verify that the **All Result Devices** option is selected.
  - b. In the **Save as a new device group named** box, enter a device group name. For example: TempDeviceGroup
  - c. Click **Create Group**.
3. *Optional.* Add devices of a different status to the temporary device group.
  - a. On the Task Information page, click the link for a different status (for example, Failed).
  - b. On the Child Tasks page, in the Search Criteria area, do the following:
    - i. Verify that the **All Result Devices** option is selected.
    - ii. From the **Add to an existing static device group** list, select the temporary device group name.
    - iii. Click **Add**.
4. Create a new task to run against the temporary device group. Specify the same configuration as for the group task.
5. *Optional.* After the task completes, delete the temporary device group.

## Tuning NA Task Behavior

The Tasks area of the Administrative Settings - Server page (**Admin > Administrative Settings > Server**) provides the following options for tuning how NA processes tasks:

- **Max Concurrent Tasks**—The maximum number of individual and child tasks that can run at a time on one NA core. This value does not include synchronous tasks.

**Note:** The Max Concurrent Tasks are specific to the NA Core.

- **Max Concurrent Group**—The maximum number of group tasks that can run at a time on one NA core.

**Note:** The Max Concurrent Group Tasks are specific to the NA Core.

- **Max Task Length**—The default setting of the estimated duration for all new tasks.

## Running Tasks Against a Temporary Device Group

You can run a task or set of tasks (as a multi-task project) against a temporary device group by using either of the following approaches:

- On any device group page, select the check boxes for some or all device rows, and then select the task to run against the selected devices from the **Actions** menu.
- Import a CSV file that contains a list of devices. For example, in a network of 200 devices with one DNS server for each 50 devices, you could create four device groups (each with 50 servers). Alternatively, you could generate a CSV file that maps the devices to DNS servers. You could load the CSV file into a command script and run one task to update all of the DNS servers. For information about running command scripts, see ["Run Command Script Task Page Fields" on page 284](#).

For information about multi-task projects, see ["Multi-Task Project Page Fields" on page 395](#).

## Task Templates

Task Templates enable you to save task definitions so that you can easily configure and run new and existing tasks without having to start from scratch. You can also create links to your most often run tasks in the My Favorites section under the "My Workspace" area on the NA Home page.

A task template can include an identifying tag. Any task run using that template includes the tag. These task templates and tasks can be filtered by tag on the following pages in the NA console:

- Task Templates
- Scheduled Tasks
- Running Tasks
- Recent Tasks

Subtasks and re-run tasks include the related tag, if any.

If needed, create a new tag as part of creating a task template. Deleting all task templates and tasks for a given tag removes that tag from the NA database.

Tags are meant for task templates only. NA ignores a tag applied to a specific task.

There are three ways to create a Task Template:

- On any new or edit task page, click the "Save as Task Template" option in the Save Options field. As a result, the task is saved as a template and displayed on the Task Template page. For more information about configuring tasks, see ["NA Tasks" on page 258](#).
- Click the Create Template link in the Actions column on the Scheduled Tasks page. For more information, see ["Viewing Scheduled Tasks" on page 400](#).
- Click the Create Template link in the Actions column on the Recent Tasks page. For more information, see ["Viewing Recent Tasks" on page 403](#).

NA ignores the value of the **Schedule Date** field for a task template.

When scheduling a Multi-Task Project and saving the project as a Task Template, you must select all of the devices and/or device groups to which the project applies, due to the project's sub-tasks. You also must have the proper permissions to run Multi-Task Projects. For more information, see ["Scheduling Multi-Task Projects" on page 394](#).

You can search for Task Templates on the Search for Tasks page. For more information, see ["Searching for Tasks" on page 495](#).

To view your current Task Templates, on the main menu bar under Tasks, click Task Templates. The Task Templates page opens.

**Note:** You can also navigate to the Task Templates page from the Scheduled Tasks, Running Tasks, and Recent Tasks pages.

Field	Description/Action
My Tasks link	Opens the My Task page for viewing the status of each task. For more information, see <a href="#">"Viewing My Tasks" on page 398</a> .
My Drafts link	Opens the My Drafts page. For more information, see <a href="#">"Viewing My Tasks" on page 398</a> .
Approval Requests link	Opens the Approval Requests page, where you can view tasks needing approval by the currently logged in user. For more information, see <a href="#">"Approval Requests" on page 646</a> for information.
Scheduled Tasks link	Opens the Scheduled Task page for viewing the tasks that are in the queue but have not yet run. For more information, see <a href="#">"Viewing Scheduled Tasks" on page 400</a> .
Running Tasks link	Opens the Running Task page for viewing all running tasks. For more information, see <a href="#">"Viewing Running Tasks" on page 401</a> .
Recent Tasks link	Opens the Recent Tasks page for viewing the recent tasks. For more information, see <a href="#">"Viewing Recent Tasks" on page 403</a> .
Template Tag	The template tag filter. Select an item from the list.
Current Working Group	The device filter. Select a device group from the list.
Check Boxes	You can use the left-side check boxes to delete/cancel templates. After selecting the template, click the Actions drop-down menu and click one of the following options: <ul style="list-style-type: none"> <li>• Delete</li> <li>• Cancel</li> </ul> The adjacent Select drop-down menu enables you to select or deselect all templates.
Create	Displays the date and time NA began running the task.



Field	Description/Action
Date	
Template Name	Displays the template name.
Host/Group	Displays the host or group name of the network device(s) associated with the task. You can click the link to open the Device Information page, where you can view detailed information about the devices in the group.
Priority	Displays the task's priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Partition	If you have created Partitions for security or business reasons, the Partitions are displayed in the column. For more information, see <a href="#">"Segmenting Devices and Users" on page 142</a> for detailed information on creating Partitions.
Created By	Displays the login name of the person who scheduled the task (or the last user to modify the task).
Comments	Displays comments about the task.
Actions	<p>You can select the following actions:</p> <ul style="list-style-type: none"> <li>• Delete — Opens a dialogue box to confirm that you want to delete the template. Note that when you delete a template, its corresponding favorite link is removed as well.</li> <li>• Edit — Open the Edit Task page for the selected task, for example the Edit Task - Snapshot page. You can then edit the task and save it as a template.</li> </ul> <p><b>Note:</b> Unless you change the name of the template, the new template overrides the old template.</p> <ul style="list-style-type: none"> <li>• Run — Opens the Rerun Task page, where you can re- run the task, or edit the task and the run it again.</li> </ul> <p><b>Note:</b> This option only appears if the task can be rerun as configured in the task's "Scheduling Options" field.</p> <ul style="list-style-type: none"> <li>• Add to Favorites — Adds the task to the "My Favorites" section in the My Workspace area of the NA Home page so that you can run the task without having to navigate to the task page.</li> <li>• Add to Quick Launches — Adds the Quick Launch link to the Quick Launches section under the "My Workspace" tab on the NA Home page. The Quick Launch link assumes the name of the current Task Template. If you want to rename the link, use the displayed pop-up box. For more information about Quick Launches, see <a href="#">"About Quick Launch" on page 238</a>.</li> </ul>
Display results in groups of	You can set the number of items to display per page from the drop-down menu. The default is 25.

# NA Tasks

To open the New Task/Template page, on the menu bar under Tasks, select Task and click the task you want to schedule. The New Task/Template page opens for that task. The following table lists the tasks from which you can choose.

Task	Refer to...
Configure Syslog	"Configure Syslog Task Page Fields" on the next page
Deploy Passwords	"Deploy Passwords Task Page Fields" on page 264
Discover Driver	"Discover Driver Task Page Fields" on page 269
Reboot Device	"Reboot Device Task Page Fields" on page 274
Run ICMP Test	"Run ICMP Test Task Page Fields" on page 279
Run Command Script	"Run Command Script Task Page Fields" on page 284
Run Diagnostics	"Run Diagnostics Task Page Fields" on page 291
Deploy Change Plan	"Deploy Change Plan Task Page Fields" on page 296
Take Snapshot	"Take Snapshot Task Page Fields" on page 300
Synchronize Startup and Running	"Synchronize Startup and Running Task Page Fields" on page 305
Update Device Software	"Update Device Software Task Page Fields" on page 310
Import Device	"Import Devices Task Page Fields" on page 327
Import User	"Import Users Task Page Fields" on page 332
Import Resource Identities	"Add Resource Identities to a Pool from a CSV File" on page 339
Detect Network Devices	"Detect Network Devices Task Page Fields" on page 345
Deduplication	"Deduplication Task Page Fields" on page 350
Port Scan	"Port Scan Page Fields" on page 353
Provision Device From Template	"Provision Device Task Page Fields" on page 356
Device Context	"Add Context to Device Task Page Fields" on page 360
VLAN	"VLAN Task Page Fields" on page 365
Backup Device Software	"Backup Device Software Task Page Fields " on page 369
Check Policy Compliance	"Check Policy Compliance Task Page Fields" on page 372
Generate Summary Reports	"Generate Summary Reports Task Page Fields" on page 375
Email Report	"Email Report Task Page Fields" on page 377

Task	Refer to...
Deploy Remote Agent	<a href="#">"Deploy Remote Agent Page Fields" on page 380</a>
Resolve FQDN	<a href="#">"Resolve FQDN Task Page Fields" on page 382</a>
Prune Data	<a href="#">"Data Pruning Task Page Fields" on page 385</a>
Run External Application	<a href="#">"Run External Application Task Page Fields" on page 388</a>
Deploy Hotfix	<a href="#">"Deploy Hotfix" on page 390</a>

## Configure Syslog Task Page Fields

The Configure Syslog task enables you to schedule the automatic configuration of one or more devices to send Syslog messages. NA uses Syslog messages to help detect real-time configuration changes.

After discovery (or when you assign a driver to each device), NA:

1. Takes a snapshot of the configuration.
2. Updates the configuration to send Syslog messages to NA.
3. Writes a comment in the configuration indicating that the device was auto-configured to enable change detection.
4. Takes a final snapshot.

Field	Description/Action
Task Name	Displays Configure Syslog. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	If you are creating a task template, the template tag for filtering tasks run from the template. Options include: <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	Select one of the following options: <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device</li> </ul>

Field	Description/Action
	<p>group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137</a>.</p> <ul style="list-style-type: none"> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253</a>.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	<p>The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a>.</p>
Comments	<p>Enter comments about the task.</p>
<b>Task Options</b>	
Session Log	<p>To store the complete device session log, click the "Store complete device session log" check box. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p> <p><b>Note:</b> Large amounts of data could be stored. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p> </div>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Syslog Configuration	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Set Device to Log to the NA Syslog Server (the default).</li> <li>Device Logs to a Syslog Relay, Set the Correct Logging Level. — Enter a Relay Host.</li> </ul>
Estimated Duration	<p>Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.</p>
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see <a href="#">"Device Access Page Fields" on page 33</a>.)</p>	
Device Credentials	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one or more of the following options:</p>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined.</li> </ul> <div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Standard password rules and device-specific passwords are used. However, the task owner's AAA username and password are applied.</p> </div>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
Override Approval	<p>If the task allows override, select this option to override the approval process.</p>
Save as Draft	<p>If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.</p>
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	<p>Enter the number of minutes to wait before trying again. The default is five minutes.</p>
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="border: 1px solid #ccc; padding: 5px; background-color: #f0f0f0;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	<p>Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.</p>
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Deploy Passwords Task Page Fields

The Deploy Passwords task enables you change the password settings and SNMP community strings for multiple devices from a central location.

**Note:** When you deploy a password to a single device that uses network-wide password rules, NA sets the device to use device-specific password information. You can change this setting on the Edit Device page. To deploy a password to a single device, select the Deploy Password option from the Provision menu. For more information, see "[Provision Menu Options](#)" on page 218.

Keep in mind that if your network uses AAA with NA, you should change passwords through your AAA server, not through NA. Otherwise, NA might lose contact with the devices. In addition, NA does not actually manage AAA passwords, nor does NA manage device-maintained user accounts. NA only manages what is prompted for when you schedule a password deploy for a single device, or the output of the "what this means" links if you schedule a group password deploy.

NA supports password and community string changes for most devices, including menu-driven devices such as the Nortel Baystack 450. Refer to the Driver Release Service (DRS) documentation for detailed information on supported devices. The DRS is an automated driver release and delivery system.

Upon a successful change, NA performs a device snapshot and downloads the changed configuration. To quickly view all recent password or SNMP community string changes, navigate to the Configuration Changes page. For more information, see "[Viewing Device Configuration Changes](#)" on page 160.

If you use AAA and attempt to change the device password with the password deployment functionality, NA might attempt to connect to the device using the new password, not AAA. However, the device could still expect an AAA login. If necessary, you would have to manually reconfigure the device to use AAA (in case that changed), and reconfigure NA to login to the device using the correct AAA credentials.

**Note:** In some cases, the Deploy Passwords task might not assign the username portion of the new credentials as part of the required credentials for NA to access a device. This can be seen when you run a Deploy Passwords task making password changes to a device where a username is required to login to the device. When the task completes and a snapshot executes, the error message reports Missing Username. If this occurs, after running the Deploy Passwords task, edit the device and add the username to the "Use device-specific password information" section. For more information, see "[Device Password Rule Page Fields](#)" on page 129.

Field	Description/Action
Task Name	Displays Deploy Passwords. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"><li>• Save as task — The option is selected by default.</li><li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see "<a href="#">Task Templates</a>" on page 255.</li></ul>



Field	Description/Action
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see "<a href="#">Device Selector</a>" on page 137.</li> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see "<a href="#">Task CSV Template File</a>" on page 253.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	<p>The task priority. For more information, see "<a href="#">Task Priority, Schedule, and State</a>" on page 249.</p>
Comments	<p>Enter comments about the task.</p>
<b>Task Options</b>	
Session Log	<p>To store the complete device session log, click the "Store complete device session log" check box. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p>

Field	Description/Action
	<p><b>Note:</b> Large amounts of data could be stored. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>• Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Limited Access Username	<p>Enter the limited access user name for NA to set on the device. Keep in mind that user names vary depending on the device's vendor and operating system. Click the "What this means" link for device-specific information.</p> <p><b>Note:</b> A blank user name means that the associated field will not be changed on the device.</p>

Field	Description/Action
Limited Access Password	<p>Enter the limited access password for NA to set on the device. Keep in mind that passwords vary depending on the device's vendor and operating system. Click the "What this means" link for device-specific information.</p> <p><b>Note:</b> A blank password means that the associated field will not be changed on the device.</p>
Confirm Password	<p>Enter the password again to confirm it.</p>
Full Access Username	<p>Enter the full access user name for NA to set on the device. Keep in mind that user names vary depending on the device's vendor and operating system. Click the "What this means" link for device-specific information.</p> <p><b>Note:</b> A blank user name means that the associated field will not be changed on the device.</p>
Full Access Password	<p>Enter the full access password for NA to set on the device. Keep in mind that passwords vary depending on the device's vendor and operating system. Click the "What this means" link for device-specific information.</p> <p><b>Note:</b> A blank password means that the associated field will not be changed on the device.</p>
Confirm Password	<p>Enter the password again to confirm it.</p>
SNMP Read Community Strings	<p>To add an SNMP Read Community String, enter the string in the right-hand box, then click &lt;&lt; Add Read Community String. To remove an SNMP Read Community String, select the name in the left-hand box, then click Delete Read Community String. Select "Append to existing community strings on device" (the default) or "Replace existing community strings on device."</p>
SNMP Write Community Strings	<p>To add an SNMP Write Community String, enter the string in the right-hand box, then click &lt;&lt; Add Write Community String. To remove an SNMP Write Community String, select the name in the left-hand box, then click Delete Write Community String. Select "Append to existing community strings on device" (the default) or "Replace existing community strings on device."</p>
Estimated Duration	<p>Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.</p>

Field	Description/Action
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see "<a href="#">Device Access Page Fields</a>" on page 33.)</p>	
<p>Device Credentials</p>	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined.</li> </ul> <div style="border: 1px solid gray; background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Standard password rules and device-specific passwords are used. However, the task owner's AAA username and password are applied.</p> </div>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
<p>Request Approval</p>	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
<p>Override Approval</p>	<p>If the task allows override, select this option to override the approval process.</p>
<p>Save as Draft</p>	<p>If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.</p>
<p><b>Scheduling Options</b></p>	
<p>Retry Count</p>	<p>If the task fails, NA tries the task again this many times,</p>

Field	Description/Action
	<p>allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	Not available
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Discover Driver Task Page Fields

The Discover Driver task enables you to schedule driver discovery.

Field	Description/Action
Task Name	Displays Discover Driver. You can enter a different task name if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137</a>.</li> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253</a>.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options: Start As Soon As Possible (the default) Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</p>
Task Priority	<p>The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a>.</p>
Comments	<p>Enter comments about the task.</p>
<b>Task Options</b>	

Field	Description/Action
Session Log	<p>To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p> <div style="background-color: #e0e0e0; padding: 5px; border: 1px solid #ccc;"> <p><b>Note:</b> Large amounts of data could be stored. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p> </div>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>• Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Options	<p>If there is no driver set, check the “Only if No Driver is set” check box (the default).</p>
Estimated Duration	<p>Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.</p>
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see <a href="#">"Device Access Page Fields" on page 33</a>.)</p>	
Device Credentials	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one</p>

Field	Description/Action
	<p>or more of the following options:</p> <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Standard password rules and device-specific passwords are used. However, the task owner's AAA username and password are applied.</p> </div>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
Override Approval	<p>If the task allows override, select this option to override the approval process.</p>
Save as Draft	<p>If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.</p>
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	<p>Enter the number of minutes to wait before trying again. The default is five minutes.</p>



Field	Description/Action
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="background-color: #e0e0e0; padding: 5px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	<p>Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.</p>
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Reboot Device Task Page Fields

The Reboot Device task enables you to reboot devices.

Field	Description/Action
Task Name	Displays Reboot Device. You can enter a different task name if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137</a>.</li> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253</a>.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the</li> </ul>

Field	Description/Action
	calendar icon next to the date box to open the calendar and select a date and time.
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that large amounts of data could be stored. This option is recommended for device troubleshooting only. For more information about logging, see <a href="#">"Logging" on page 692</a> .
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p> </div>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>• Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child</p>

Field	Description/Action
	tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a> .
Verify Reboot Completion	<p>The reboot verification specification.</p> <ul style="list-style-type: none"> <li>• If NA should verify that the device has booted up before marking the task successful, select the <b>Check device reachability after reboot</b> check box.</li> <li>• If device reboot verification is not needed, clear the <b>Check device reachability after reboot</b> check box.</li> </ul> <p>For more information, see <a href="#">"Device Reboot Verification Process " on page 278</a>.</p>
Estimated Reboot Time	<p>The timeout for the device reboot verification process. This value applies only when the <b>Check device reachability after reboot</b> check box is selected.</p> <p>You can change the default value of this setting with the <b>Default Estimated Reboot Time</b> field on the Administrative Settings - Device Access page.</p>
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see <a href="#">"Device Access Page Fields" on page 33</a>.)</p>	
Device Credentials	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined.</li> </ul> <p><b>Note:</b> Standard password rules and device-specific</p>

Field	Description/Action
	<p>passwords are used. However, the task owner's AAA username and password are applied.</p>
<p><b>Approval Options</b></p>	
<p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
<p>Request Approval</p>	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
<p>Override Approval</p>	<p>If the task allows override, select this option to override the approval process.</p>
<p>Save as Draft</p>	<p>If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.</p>
<p><b>Scheduling Options</b></p>	
<p>Retry Count</p>	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
<p>Retry Interval</p>	<p>Enter the number of minutes to wait before trying again. The default is five minutes.</p>
<p>Recurring Options</p>	<p>Not available</p>
<p><b>Task Completed Notification</b></p>	
<p>Task Completed Notification</p>	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>

Field	Description/Action
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a> .

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Device Reboot Verification Process

The information in this section applies to the Reboot Device and Update Device Software tasks.

By default, after sending the reboot command to a device, NA waits a predetermined time before marking the reboot task as completed successfully. This wait gives the device time to fully boot up before NA accesses the device for other tasks. The length of the wait is set by the device driver and is not configurable.

As of version 10.21, NA can optionally ping a device to verify reachability before marking the reboot task as completed. At a high level, this optional process is as follows:

1. Ping the device to verify that it responds to the ping command.
2. Initiate the device reboot.
3. Verify device shutdown.
  - If the device *did* respond to the initial ping command in step 1, ping the device. A failed ping command indicates that the device has shut down.
  - If the device did *not* respond to the initial ping command in step 1, ignore this step. A failed ping command adds no additional information.
4. Verify device startup.
  - If the device *did* respond to the initial ping command in step 1, ping the device. As necessary, continue pinging the device until reaching the value of the Estimated Reboot Time.
    - If the device responds to the ping command, mark the reboot task as completed successfully.
    - If the device does not respond before reaching the value of the Estimated Reboot Time, mark the reboot task as completed with failure.

- If the device did *not* respond to the initial ping command in step 1, wait for the value of the Estimated Reboot Time, and then mark the task as completed with warning.

**Note:** For this process to work, the ping command must be accessible from the value of the PATH variable on the NA core server .

**To enable device reboot verification for a single Reboot task, follow these steps:**

1. On the **Reboot Device** task page, select the **Check device reachability after reboot** check box.
2. Verify the value of the **Estimated Reboot Time** field. If necessary, change this time.

**To enable device reboot verification for all Update Device Software tasks, follow this step:**

- On the **Administrative Settings - Device Access** page, select the **Determine Device Reachability** check box.

**Note:** If the **Determine Device Reachability** check box is selected, NA performs device reboot verification for each device that is rebooted during an Update Device Software task. The device reboot could be automatic or because the **Reboot device after deploying software** check box is selected for that task. You cannot control the device reboot verification setting for each Update Device Software task.

**To set the default configuration for device reboot verification, follow these steps:**

1. Open the **Administrative Settings - Device Access** page ( **Admin > Administrative Settings > Device Access** ).
2. Under Default Reboot Settings, select the **Determine Device Reachability** check box.
3. *Optional.* Change the value of the **Default Estimated Reboot Time** field.
4. Click **Save**.

## Run ICMP Test Task Page Fields

The Run ICMP (Internet Control Message Protocol) Test task enables you to schedule either a ping or traceroute test from a device to one or more devices.

Traceroute attempts to trace the path a packet takes through the network. Traceroute transmits packets with small Time-To-Live (TTL) values. TTL is an IP header field that is designed to prevent packets from running in loops, also known as hop-limit . Traceroute depends on devices sending an ICMP Time Exceeded message back to the sender. Traceroute causes devices along a packet's normal delivery path to generate these ICMP messages that identify the path.

Packet INternet Groper (Ping) sends a single packet and listens for a single packet in reply. Ping is implemented using the required ICMP Echo function.

In general, the traceroute option performs its action by going from one device to the next along routes that the device knows about. Alternatively, ping goes to each device along the route individually.

Keep in mind that the traceroute and ping commands are not functions that NA completes. The devices do these. NA must be able to login to the source device and then issue the appropriate command for that device to trace to the destination devices. Each device could implement the functionality differently (or not at all). What you see in the ICMP Test Results page is a dump of what the device displays on the screen.

Both ping and traceroute are excellent networking troubleshooting tools. For example, with ping you can test 100 devices to see if they can access a specific device. Or if you see that 20 devices are having a problem accessing a specific device, you can run an automated remote traceroute and check the path each device is taking to that destination.

**Note:** Use ICMP tests only to verify connectivity occasionally or after a change. They are not a replacement for monitoring software. You should schedule ICMP tests no more than once per 10 minutes.

Field	Description/Action
Task Name	Displays Run ICMP Test. You can enter a different task name if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see "<a href="#">Task Templates</a>" on page 255.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see "<a href="#">Device Selector</a>" on page 137.</li> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see "<a href="#">Task CSV Template File</a>" on page 253.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> </ul>



Field	Description/Action
	<ul style="list-style-type: none"> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	<p>To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p> <div style="border: 1px solid #ccc; padding: 5px; background-color: #f0f0f0;"> <p><b>Note:</b> Large amounts of data could be stored. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p> </div>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Test Type	Select either ping or traceroute.
Target Host List	To add a host, enter the name in the right-hand box, then click << Add Host. To remove a host, select the host name in the left-hand box, then click Remove Host.
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.

Field	Description/Action
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see <a href="#">"Device Access Page Fields" on page 33.</a>)</p>	
<p>Device Credentials</p>	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined. Note : Standard password rules and device-specific passwords are used. However, the task owner's AAA username and password are applied.)</li> </ul>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
<p>Request Approval</p>	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
<p>Override Approval</p>	<p>If the task allows override, select this option to override the approval process.</p>
<p>Save as Draft</p>	<p>If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.</p>
<p><b>Scheduling Options</b></p>	
<p>Retry Count</p>	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the

Field	Description/Action
	Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see <a href="#">"Logging" on page 692</a> .

Be sure to click Save when you are finished. The ICMP Test Result page opens if the task is scheduled to run immediately.

**Note:** What you see in the ICMP Test Results page is a dump of what the device displays on the screen.

If the task is successful and you selected the ping option, the following information is displayed, depending on the device and the information you entered on the Run ICMP Test Task page:

- Create Date
- Command Run
- Result
- Command Output (for example: Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms )

If you selected the traceroute option, the following information is displayed, depending on the device and the information you entered on the Run ICMP Test Task page:

- Create Date
- Command Run
- Result
- Command Output (for example:  
1 1ms 1ms 1ms 10.255.111.2  
2 4ms 4ms 4ms 10.255.111.3  
3 \*\*\*\*)

The first column displays the hop. The next three columns show the time it took for the device to respond. If the time the device takes to respond is longer than the designated time-out value, asterisks are displayed.). The last column is the host that responded.

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Run Command Script Task Page Fields

The Run Command Script task enables you to run command scripts.

Field	Description/Action
New Command Script link	Opens the New Command Script page. For information about writing scripts, see <a href="#">"Adding Command Scripts" on page 560</a> .
Command Scripts link	Opens the Command Scripts page. For more information, see

Field	Description/Action
	<a href="#">"Viewing Command Scripts" on page 558.</a>
Task Name	Displays the Run Command Script name. You can enter a different task name, if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255.</a></li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137.</a></li> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253.</a></li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249.</a>

Field	Description/Action
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that large amounts of data could be stored. For more information, see <a href="#">"Logging" on page 692</a> .
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Run Mode	For a group task, the method for processing child tasks. Available options are: Parallel—Multiple child tasks of this group task can run at the same time. Serial—Only one child task of this group task runs at any given time. If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box. If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box. If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a> .
Command Script to Run	<p>Select the command script to run. The options will change depending on the type of script you select. Standard command scripts include:</p> <ul style="list-style-type: none"> <li>• Cisco IOS Initial Setup</li> <li>• Cisco IOS Insert Line into ACL by ACL id</li> <li>• Cisco IOS Insert Line into ACL by Handle</li> <li>• Cisco IOS Remove Line from ACL by ACL id</li> <li>• Cisco IOS Remove Line from ACL by Handle</li> <li>• Compress Flash</li> <li>• Contivity 1100 Deploy SNMP Community Strings</li> <li>• Extended Ping</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Full Duplex</li> <li>• ios_7k_reboot</li> <li>• ios_generic_reboot</li> <li>• ios_l3switch_reboot</li> <li>• Passport 8xxx - Deploy Community Strings</li> <li>• Passport 8xxx - Deploy SNMP-v3 Community Strings</li> <li>• Passport 8xxx - Deploy User Passwords</li> <li>• Passport 8xxx - Enable Radius</li> <li>• Passport 8xxx - Enable Web Server</li> <li>• Sample - Provision FastEther Interface</li> <li>• Set Banner</li> <li>• Set Banner Only If Needed</li> <li>• Set Location</li> <li>• Set NTP Server</li> <li>• Turn off directed broadcast</li> <li>• Update Interface</li> </ul>
Preview option	Enables you to build the complete script, but not run it. As a result, you can view which commands will run without actually executing the commands.
Limit to script types	Select all (the default) or select one of the following: <ul style="list-style-type: none"> <li>• ACL Advanced Script</li> <li>• ACL Application Script</li> <li>• ACL Creation Script</li> <li>• ACL Edit Script</li> </ul>
<b>Depending on the command script you select, the following options could be displayed.</b>	
Mode	Displays the device access mode, such as Cisco Exec or Nortel Manager. This is similar to the device platform.
Variables	If the script has variable fields to fill in, enter the values. When finished, you can click Update Scripts to view the script that will run with these variable values. For information about defining custom variables, see <a href="#">"Adding Command Scripts" on page 560</a> .
Device Family	(Advanced Scripting) Displays the name of the device family on which this script runs. A device family is a collection of devices that share a similar configuration CLI command syntax.
Parameters	Enter the parameters for the script.
Script	Displays the device-specific commands to run. You can edit this

Field	Description/Action
	<p>instance of the script, however your changes are not saved after this instance runs. If there are multiple modes, one instance of the script appears for each mode.</p> <div style="background-color: #e0e0e0; padding: 10px; border: 1px solid #ccc;"> <p><b>Note:</b> The height and width of the Script box is controlled by settings in the Administrative Settings page, User Interface tab. If you use the scripting feature extensively, you may want to adjust these settings so that you can see the script without scrolling.</p> </div>
Deploy option	<p>To run scripts line-by-line rather than deploying in bulk, check the “Run scripts line-by-line...” check box. Keep in mind that devices that are able to run scripts through a bulk deployment method (such as Cisco IOS configuration scripts) do so whenever possible. The default is that the entire contents of the script is deployed and run in a single batch. If an error occurs, the script keeps going. Running a script line-by-line in such cases will result in the script capturing the error and stopping execution.</p>
Wait Option	<p>Checked by default. If you uncheck this option, the task is allowed to run even if there is already another task running against the same device.</p>
Language	<p>(Advanced Scripting) Displays the language in which the script was written.</p>
Estimated Duration	<p>Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.</p>
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see <a href="#">"Device Access Page Fields" on page 33.</a>)</p>	
Device Credentials	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP</li> </ul>



Field	Description/Action
	Read/Write Community String. <ul style="list-style-type: none"> <li>Use task owner's AAA credentials. The task owner must have valid AAA credentials defined. ( Note : Standard password rules and device-specific passwords are used. However, the task owner's AAA username and password are applied.)</li> </ul>
<b>Pre-Task / Post-Task Snapshot Options</b>	
Snapshot options only appear if the system is configured to enable user overrides on the Configuration Mgmt Page under Administrative Settings. (For more information, see <a href="#">"Configuration Mgmt Page Fields" on page 24.</a> )	
Pre-Task Snapshot	Select one of the following options: <ul style="list-style-type: none"> <li>None (the default)</li> <li>As part of task</li> </ul>
Post-Task Snapshot	Select one of the following options: <ul style="list-style-type: none"> <li>None</li> <li>As part of task (the default)</li> <li>Scheduled as a separate task</li> </ul>
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options: <ul style="list-style-type: none"> <li>No Retry (the default)</li> <li>Once</li> <li>Twice</li> <li>Three Times</li> </ul>

Field	Description/Action
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>Once Only — The task occurs only once on the specified date/time (the default).</li> <li>Periodically — Specify a Repeat Interval in minutes.</li> <li>Daily — The task occurs each day at the specified time.</li> <li>Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>No End Date (the default)</li> <li>End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see <a href="#">"Logging" on page 692</a>.</p>

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Run Diagnostics Task Page Fields

The Run Diagnostics task enables you to schedule the running of diagnostics. On the menu bar under Tasks, select New Tasks and click Run Diagnostics. The Run Diagnostics page opens.

Field	Description/Action
New Diagnostic link	Opens the New Diagnostics page. For more information, see <a href="#">"New Diagnostic Page Fields" on page 542</a> .
Diagnostic link	Opens the Diagnostics page. For more information about managing diagnostics, see <a href="#">"New Diagnostic Page Fields" on page 542</a> .
Task Name	Displays Run Diagnostics. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	If you are creating a task template, the template tag for filtering tasks run from the template. Options include: <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	Select one of the following options: <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137</a>.</li> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253</a>.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc</p>

Field	Description/Action
	<div style="background-color: #f0f0f0; padding: 5px;">                     device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.                 </div>
Schedule Date	Select one of the following options: <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	To store the complete device session log, click the "Store complete device session log" check box. Keep in mind that large amounts of data could be stored. For more information about logging, see <a href="#">"Logging" on page 692</a> .
Force Save	The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i> ). <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.                     </div>
Run Mode	For a group task, the method for processing child tasks. Available options are: <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>• Serial—Only one child task of this group task runs at any given time.</li> </ul>

Field	Description/Action
	<p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Diagnostics to Run	<p>Select the diagnostic to run. Use Ctrl+click to select/deselect additional diagnostics. Diagnostics include:</p> <ul style="list-style-type: none"> <li>• Hardware Information</li> <li>• Memory Troubleshooting</li> <li>• NA Detect Device Boot</li> <li>• NA Device File System</li> <li>• NA Duplex Data Gathering</li> <li>• NA Flash Storage Space</li> <li>• NA Interfaces</li> <li>• NA Module Status</li> <li>• NA OSPF Neighbors</li> <li>• NA Routing Table</li> <li>• NA Topology Gathering</li> <li>• NA VLAN Data Gathering</li> <li>• NA Port Scan</li> </ul> <p>For detailed information on diagnostics, see <a href="#">"View Menu Options" on page 185</a>.</p>
Run compliance check when change detected	<p>The diagnostic policy compliance check setting. If any of the selected diagnostics returns output that differs from the output of the previous run of that diagnostic on a device, NA can initiate the diagnostic policy rules for the policy checks associated with that device.</p> <ul style="list-style-type: none"> <li>• If NA should run the diagnostic policy rules for a device when this task identifies a difference in diagnostic data, select this check box.</li> <li>• If this task should not trigger diagnostic policy compliance checks, clear this check box.</li> </ul> <p>The default value of this setting is configurable (as described in the <i>NA Administration Guide</i>).</p>
Wait option	<p>Checked by default. If you uncheck this option, the task is allowed to run even if there is already another task running</p>

Field	Description/Action
	against the same device.
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.
<p><b>Device Credentials Options</b></p>	
<p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see "<a href="#">Device Access Page Fields</a>" on page 33.)</p>	
Device Credentials	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined. ( Standard password rules and device-specific passwords are used. However, the task owner's AAA username and password are applied.)</li> </ul>
<p><b>Pre-Task / Post-Task Snapshot Options</b></p>	
<p>Snapshot options only appear if the system is configured to enable user overrides on the Configuration Mgmt Page under Administrative Settings. (For more information, see "<a href="#">Configuration Mgmt Page Fields</a>" on page 24.)</p>	
Pre-Task Snapshot	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• None (the default)</li> <li>• As part of task</li> </ul>
Post-Task Snapshot	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (the default)</li> <li>• Scheduled as a separate task</li> </ul>
<p><b>Approval Options</b></p>	
<p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	

Field	Description/Action
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and</li> </ul>

Field	Description/Action
	time.
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="border: 1px solid #ccc; padding: 5px; background-color: #f0f0f0;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a> .

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Deploy Change Plan Task Page Fields

The Deploy Change Plan task enables you to run a change plan.

**Note:** Modifications made to a referenced change script are not effective on a scheduled task. However, when a referenced diagnostic condition is modified, the scheduled task executes the modified condition.

Field	Description/Action
New Change Plan link	Opens the New Change Plan page. For more information, see <a href="#">"Adding or Modifying a Change Plan" on page 574</a> .
Change Plans Link	Opens the Change Plans page. For more information, see <a href="#">"Change Plans Page Fields" on page 573</a> .



Field	Description/Action
Task Name	Displays the name of the Deploy Change Plan task. You can enter a different task name, if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"> <li>Save as task — The option is selected by default.</li> <li>Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	If you are creating a task template, the template tag for filtering tasks run from the template. Options include: <ul style="list-style-type: none"> <li>General purpose—Do not apply a tag to this task template</li> <li>Existing—Select from the list of existing template tags.</li> <li>New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	Select one of the following options: <ul style="list-style-type: none"> <li>Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137</a>.</li> <li>CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253</a>.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	Select one of the following options: <ul style="list-style-type: none"> <li>Start As Soon As Possible (the default)</li> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that large amounts of data could be stored. For more information, see <a href="#">"Logging" on page 692</a> .
Force Save	The device configuration update setting. This setting applies to only those devices that

Field	Description/Action
	<p>support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>• Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Change Plan to Deploy	<p>Select the name of the change plan to deploy. The options will change depending on the type of change plan you select.</p>
<p><b>Depending on the change plan you select, the following options could be displayed.</b></p>	
Variables	<p>If the script has variable fields to fill in, enter the values. After entering the values, you can click Update Scripts to view the script that will run with these variable values. For information about defining custom variables, see <a href="#">"Adding or Modifying a Change Plan" on page 574</a>.</p>
Pre-Change Boolean Expression	<p>Displays the Boolean expression of the condition labels for the selected change plan.</p>
Conditions	<p>Displays the list of conditions defined for the selected change plan.</p>
Change Script	<p>Displays the name of the change script.</p>
Mode	<p>Displays the device access mode, such as Linux enable.</p>
Script	<p>Displays the device-specific commands to run. You can edit this instance of the script, however your changes are not saved after this instance runs. If there are multiple modes, one instance of the script appears for each mode.</p>

Field	Description/Action
	<p><b>Note:</b> The height and width of the Script box is controlled by settings in the Administrative Settings page, User Interface tab. If you use the scripting feature extensively, you may want to adjust these settings so that you can see the script without scrolling.</p>
Deploy option	<p>To deploy the change plan line-by-line rather than deploying in bulk, check the “Deploy Change Plans line-by-line...” check box. For devices that are able to deploy change plans through a bulk deployment method, it is recommended to do so whenever possible. The default is that the entire contents of the plan is deployed and run in a single batch. If an error occurs, the plan keeps going. Deploying a change plans line-by-line in such cases will result in the plan capturing the error and stopping execution.</p>
Wait Option	<p>Checked by default. If you uncheck this option, the task is allowed to run even if there is already another task running against the same device.</p>
Estimated Duration	<p>Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.</p>
<p><b>Pre-Task / Post-Task Snapshot Options</b></p> <p>Snapshot options only appear if the system is configured to enable user overrides on the Configuration Mgmt Page under Administrative Settings. (For more information, see <a href="#">"Configuration Mgmt Page Fields" on page 24.</a>)</p>	
Pre-Task Snapshot	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• None (the default)</li> <li>• As part of task</li> </ul> <p><b>Note:</b> If the condition defined for a change plan fails, the pre-task snapshot is not captured.</p>
Post-Task Snapshot	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (the default)</li> <li>• Scheduled as a separate task</li> </ul>
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>

Field	Description/Action
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see <a href="#">"Logging" on page 692</a>.</p>

## Take Snapshot Task Page Fields

The Take Snapshot task enables you to schedule a snapshot. A snapshot checks whether the stored configuration matches the running configuration on the device. If not, the task stores a new copy of the device configuration and related data in the NA database.

If you select the “Make Snapshot a Checkpoint” option, the NA database is updated even if NA does not detect a difference. As a result, the snapshot still appears as a configuration change on the Home page, Summary reports, Configuration Change search results, and so on.

Field	Description/Action
Task Name	Displays Take Snapshot. You can enter a different task name if applicable.

Field	Description/Action
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137</a>.</li> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253</a>.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	<p>The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a>.</p>
Comments	<p>Enter comments about the task.</p>
<b>Task Options</b>	
Session Log	<p>Check the "Store complete device session log" box to store a</p>

Field	Description/Action
	<p>debugging log. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p> <p><b>Note:</b> Large amounts of data could be stored. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>• Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Options	<p>Select one or both of the following options:</p>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Make Snapshot a Checkpoint — Copies the running configuration to the NA database rather than checking first whether the stored configuration differs from the running configuration. Note that this option stores the configuration file regardless of whether it changed. However, even if there is no change, the snapshot still appears as a configuration change on the Home page, Summary reports, Configuration Change search results, and so on. As a result, the number of configuration changes includes the check-pointed configurations, and therefore these counts might not be accurate.</li> <li>• Retrieve Binary Configuration — Copies the binary configuration, if any, as well as any text information to the NA database.</li> </ul>
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see "<a href="#">Device Access Page Fields</a>" on page 33.)</p>	
Device Credentials	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined. (Standard password rules and device-specific passwords are used. However, the task owner's AAA username and password are applied.)</li> </ul>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the

Field	Description/Action
	calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.



Field	Description/Action
	<p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see <a href="#">"Logging" on page 692</a> .

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Synchronize Startup and Running Task Page Fields

The Synchronize Startup and Running task enables you to synchronize the startup and running of configurations for a device. NA will overwrite the startup configuration with the current running configuration. This task ensures that when the device reboots, the current configuration will continue to run.

Field	Description/Action
Task Name	Displays Synchronize Startup and Running. You can enter a different task name if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>Existing—Select from the list of existing template tags.</li> <li>New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Device / Group — Enter an IP Address, Hostname, or Device Group name on which to run the task against or click the magnifying glass icon. For information about how to use the Device Selector, see "<a href="#">Device Selector</a>" on page 137.</li> <li>CSV — Enter the name or browse for the CSV file containing a list of devices. The CSV file must provide a method to identify the device associated with each of the rows (IP address and Hostname) in the CSV file. If you click the Task CSV Template link, you can download a sample CSV file.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Start As Soon As Possible (the default)</li> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see " <a href="#">Task Priority, Schedule, and State</a> " on page 249.
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	Check the “Store complete device session log” box to store a debugging log. This is useful when debugging a failed snapshot, however large amounts of data can be stored. For more information about logging, see " <a href="#">Logging</a> " on page 692.
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>If NA should overwrite the startup configuration with the</li> </ul>

Field	Description/Action
	<p>current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</p> <ul style="list-style-type: none"> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>• Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Options	<p>Select the "Bypass if in sync" box if you want NA to skip the task if the configurations are already synchronized.</p>
Estimated Duration	<p>Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.</p>
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see <a href="#">"Device Access Page Fields" on page 33</a>.)</p>	
Device Credentials	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one</p>

Field	Description/Action
	<p>or more of the following options:</p> <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined. ( Standard password rules and device-specific passwords are used. However, the task owner's AAA username and password are applied.)</li> </ul>
<p><b>Pre-Task / Post-Task Snapshot Options</b></p> <p>Snapshot options only appear if the system is configured to enable user overrides on the Configuration Mgmt Page under Administrative Settings. (For more information, see <a href="#">"Configuration Mgmt Page Fields" on page 24.</a>)</p>	
<p>Post-Task Snapshot</p>	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (the default)</li> <li>• Scheduled as a separate task</li> </ul>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
<p>Request Approval</p>	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
<p>Override Approval</p>	<p>If the task allows override, select this option to override the approval process.</p>
<p>Save as Draft</p>	<p>If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.</p>
<p><b>Scheduling Options</b></p>	
<p>Retry Count</p>	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is

Field	Description/Action
	not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a> .

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task's start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Update Device Software Task Page Fields

Use the update device software task to schedule the deployment of software to one or more devices. For information about preparing software for deployment, see ["Software Images" on page 436](#)

The procedure for completing the update device software task varies with the number of target devices.

- ["Deploy Software to One Device" below](#)
- ["Deploy Software to Multiple Devices" on page 318](#)

**Note:** The available fields on the New Task/Template – Update Device Software page change in response to certain selections on this page.

## Deploy Software to One Device

To update the software on one device:

1. If the correct software files are not loaded into NA, add a software image set. For more information, see ["Adding Image Sets" on page 437](#).

**Tip:** To view the details of the existing software image sets, see the Software Images page (**Devices > Device Tools > Software Images**).

2. Navigate the New Task/Template – Update Device Software page. Paths include:
  - Devices > Device Tasks > Update Device Software
  - Tasks > New Tasks > Update Device Software
  - From a device page, Provision > Update Device Software
  - The current device is pre-selected on the task page.
  - From the Software Images page, click the Update Device link for an image set.
  - From the Software Images in Set page, click the Update Device link.
3. If necessary, in the Applies to field, select a device.

4. If the Image Set list is available, select an item from the list.
  - NA displays the image sets that match the selected device.
  - If the Image Set list is not available, NA has already determined the image set to use.
  - If the Image Set list is empty, no image sets match the selected device.
5. In the Deployment Table field, do the following:  
Note the time of the last file system diagnostic. The total, free, and net memory numbers shown in the Deployment Table field are from this diagnostic.
  - a. *Optional.* Click the **Run a File System Diagnostic** link to update the memory values.
  - b. *Optional.* Select preprocessing and postprocessing tasks for each of the slots on the device.
  - c. NA lists the tasks supported by the device.
  - d. Move files and folders from the Software Image Repository area to the On Device area.
  - e. *Optional.* Mark files in the On Device area for deletion, as the boot image, or as the OS image.
6. Complete the task configuration. For information about the task fields, see the "[Update Device Software Task Page Fields for a Single Device](#)" below.
7. Click **Save**.

#### Update Device Software Task Page Fields for a Single Device

Field	Description/Action
Task Name	Displays Update Device Software. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see "<a href="#">Task Templates</a>" on page 255.</li> </ul>
Template Tag	If you are creating a task template, the template tag for filtering tasks run from the template. Options include: <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p> </div>
Applies to	Select one of the following options: <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more</li> </ul>

## Update Device Software Task Page Fields for a Single Device, continued

Field	Description/Action
	<p>information, see <a href="#">"Device Selector" on page 137</a>.</p> <ul style="list-style-type: none"> <li>Restrict to devices in partition — Select a partition. Software images will be updated on devices in the specified partition only. For information about setting device restrictions, click <b>More</b>.</li> <li>CSV — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253</a>.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Start As Soon As Possible (the default)</li> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	<p>The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a>.</p>
Comments	<p>Enter comments about the task.</p>
<b>Task Options</b>	
Session Log	<p>Check the “Store complete device session log” box to store a debugging log. This is useful when debugging a failed snapshot, however large amounts of data can be stored. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul>



### Update Device Software Task Page Fields for a Single Device, continued

Field	Description/Action
	<p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>• Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Image Set	<p>The name of the software image set containing the files to be deployed. Select an item from the list.</p> <p>This field is available only until you have selected an image set.</p>
Deployment Table	<p>The device software update specification:</p> <ul style="list-style-type: none"> <li>• The On Device area displays the contents of the file systems on the device. For each file system, NA displays the total size, the free space, and the net free space after the device software update. If the net free space is a negative number, the device file system is not large enough for the planned update.</li> <li>• The Software Image Repository area displays the files for the selected image set.</li> </ul> <p>For each file, NA displays the file size and, if applicable, a compliance warning.</p> <p><b>Note:</b> Compliance warnings are not displayed by default. For more information, see <a href="#">"User Interface Page Fields" on page 54</a>.</p>

### Update Device Software Task Page Fields for a Single Device, continued

Field	Description/Action
	<p>This field provides the following actions:</p> <ul style="list-style-type: none"> <li>• Run a new file system diagnostic to update the total, free, and net memory numbers. (For information, see <a href="#">"Run Diagnostics Task Page Fields" on page 291.</a>)</li> <li>• Select from the preprocessing and postprocessing tasks (for example, the Cisco IOS squeeze command) supported by the device to compact the device memory. These tasks do not remove files from the device. Ensure that sufficient memory will be available for the update.</li> <li>• Select files and folders to add to the device by dragging them from the Software Image Repository to a file system under On Device. (To undo a move, drag the item back to the Software Image Repository.)</li> <li>• In the On Device area, mark files for special treatment by right-clicking a file name, and then selecting <b>Mark for deletion</b>, <b>Mark as boot image</b>, or <b>Mark as OS image</b>. (To undo a selection, select <b>Remove marker</b>.)</li> </ul> <div style="background-color: #f0f0f0; padding: 10px; margin-top: 10px;"> <p><b>Note:</b> The boot image and OS image selections are available for devices running Cisco IOS only. Only one file can be the boot image or OS image. Marking a second file clears the selection of the first file.</p> </div>
Summary	Displays the changes to be made.
Verify	<p>If selected, the Verify option verifies images using commands available on the device. The MD5 checksum on the device is compared to the MD5 checksum stored in the database. Keep in mind that if the device does not support this option, the driver will run a Verify command against the image.</p>
Reboot	<p>The device reboot specification.</p> <ul style="list-style-type: none"> <li>• If NA should reboot each device after applying a software update, select the <b>Reboot device after deploying software</b> check box, and then enter the estimated reboot time.</li> <li>• If NA should not reboot each device after applying a software update, clear the <b>Reboot device after deploying software</b> check box.</li> </ul> <div style="background-color: #f0f0f0; padding: 10px; margin-top: 10px;"> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• Some devices automatically reboot after a software</li> </ul> </div>

### Update Device Software Task Page Fields for a Single Device, continued

Field	Description/Action
	<p>update. This setting does not impact the behavior of those devices.</p> <ul style="list-style-type: none"> <li>• If device reboot verification is enabled, NA pings each device to verify reachability before marking the reboot task as completed. For more information, see "<a href="#">Device Reboot Verification Process</a>" on page 278 .</li> <li>• The <b>Reboot device after deploying software</b> check box might not available for either of the following reasons:           <ul style="list-style-type: none"> <li>• The selected devices do not support reboot.</li> <li>• The NA administrator has disabled this option with the <b>Disable Reboot Device Option</b> check box on the Administrative Settings - Device Access page.</li> </ul> </li> </ul>
Estimated Reboot Time	<p>The maximum time that NA should wait between initiating a device reboot and initiating a snapshot of the updated device configuration. This value applies in the following cases:</p> <ul style="list-style-type: none"> <li>• When the <b>Reboot device after deploying software</b> check box is selected.</li> <li>• When devices automatically reboot after a software update.</li> </ul> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• If the <b>Determine Device Reachability</b> check box is selected on the Administrative Settings - Device Access page, this value serves as the timeout after which NA declares that the device did not reboot successfully.</li> <li>• You can change the default value of this setting with the <b>Default Estimated Reboot Time</b> field on the Administrative Settings - Device Access page.</li> </ul>
Estimated Duration	<p>Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.</p>
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is</p>	

## Update Device Software Task Page Fields for a Single Device, continued

Field	Description/Action
	<p>enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see "<a href="#">Device Access Page Fields</a>" on page 33.)</p>
Device Credentials	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined. ( Standard password rules and device-specific passwords are used. However, the task owner's AAA username and password are applied.)</li> </ul>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
Override Approval	<p>If the task allows override, select this option to override the approval process.</p>
Save as Draft	<p>If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.</p>
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>

### Update Device Software Task Page Fields for a Single Device, continued

Field	Description/Action
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task's start date, duration, and status. For more information, see "[Task Information Page Fields](#)" on page 405.

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see "[Viewing My Tasks](#)" on page 398.

If the images you have selected to deploy do not fit in the device's available free disk space, an error message is displayed. You can either return to the task and make changes or deploy the software. It is possible that the disk space calculation is in error.

## Deploy Software to Multiple Devices

To update the software on multiple devices at one time:

1. If the correct software files are not loaded into NA, add a software image set. For more information, see "[Adding Image Sets](#)" on page 437 .

**Tip:** To view the details of the existing software image sets, see the Software Images page (**Devices > Device Tools > Software Images**).

2. Navigate the New Task/Template – Update Device Software page. Paths include:
  - Devices > Device Tasks > Update Device Software
  - Tasks > New Tasks > Update Device Software
  - From the Software Images page, click the Update Device link for an image set.
  - From the Software Images in Set page, click the Update Device link.
3. In the Applies to field, select devices.  
NA determines which image sets apply to the selected devices.
4. If the Image Set list is available, select an item from the list.
  - NA displays the image sets that match the selected devices.
  - If the Image Set list is not available, NA has already determined the image set to use.
  - If the Image Set list is empty, no image sets match any of the selected devices.
5. In the Slots list, select the file system to receive files.  
The number next to each file system name indicates the number of qualified devices that use this file system name.
6. In the Selected Devices field, note the number of qualified and unqualified devices. To see a list of the unqualified devices, click the **Show Detail** link.  
By default, only the qualified devices will receive the files. To attempt file placement on an unqualified device, select the check box for that device.

**Note:** File placement onto unqualified devices is expected to fail.

7. In the Memory Preparation field, select an option.

For the Delete files matching the specified pattern and then compact memory option, click the **Show Detail** link to list the files that will be kept on and deleted from each qualified device (and each selected unqualified device). To customize this list, enter regular expressions in the Delete files matching this regex pattern and But keep files matching this regex pattern boxes.

**Note:** NA never removes the vlan.dat , running-config , or startup-config files from the devices.

8. In the Deployment Table field, do the following:
  - a. Move files and folders from the Software Image Repository area to the On Device area.

**Note:** When deploying software to multiple devices, the On Device area shows only the files that will be added to the devices. The total memory number is the smallest file system free space of all qualified devices.

- b. *Optional.* Mark files in the On Device area for deletion, as the boot image, or as the OS image.
9. Complete the task configuration. For information about the task fields, see the ["Update Device Software Task Page Fields for Multiple Devices"](#) below.
10. Click **Save**.

**Update Device Software Task Page Fields for Multiple Devices**

Field	Description/Action
Task Name	Displays Update Device Software. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"> <li>Save as task — The option is selected by default.</li> <li>Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates"</a> on page 255.</li> </ul>
Template Tag	If you are creating a task template, the template tag for filtering tasks run from the template. Options include: <ul style="list-style-type: none"> <li>General purpose—Do not apply a tag to this task template</li> <li>Existing—Select from the list of existing template tags.</li> <li>New—Enter a new template tag.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p> </div>
Applies to	Select one of the following options: <ul style="list-style-type: none"> <li>Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector"</a> on page 137.</li> </ul>

## Update Device Software Task Page Fields for Multiple Devices, continued

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Restrict to devices in partition — Select a partition. Software images will be updated on devices in the specified partition only. For information about setting device restrictions, click <b>More</b>.</li> <li>• CSV — Enter the name of the CSV file containing the target devices. For more information, see "<a href="#">Task CSV Template File</a>" on page 253.</li> <li>• Restrict to devices in partition — Select a partition. Software images will be updated on devices in the specified partition only. Click the More... link for additional information about setting device restrictions.</li> <li>• CSV — Enter the name or browse for the CSV file containing a list of devices. The CSV file must provide a method to identify the device associated with each of the rows (IP address and Hostname) in the CSV file. If you click the Task CSV Template link, you can download a sample CSV file.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p> </div>
Schedule Date	Select one of the following options: <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see " <a href="#">Task Priority, Schedule, and State</a> " on page 249.
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	Check the "Store complete device session log" box to store a debugging log. This is useful when debugging a failed snapshot, however large amounts of data can be stored. For more information about logging, see " <a href="#">Logging</a> " on page 692.
Force Save	The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i> ).



### Update Device Software Task Page Fields for Multiple Devices, continued

Field	Description/Action
	<ul style="list-style-type: none"> <li>If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Image Set	<p>The name of the software image set containing the files to be deployed. Select an item from the list.</p> <p>This field is available only until you have selected an image set.</p>
Slots	<p>The file system to receive the files. Select an item from the list.</p> <p>The number next to each file system name indicates the number of qualified devices that use this file system name.</p>
Selected Devices	<p>The number of qualified and unqualified devices for the image set and slot selection.</p>
Unqualified Devices	<p>Information about the unqualified devices. To view this field, click the <b>Show Detail</b> link in the Selected Devices field.</p>

### Update Device Software Task Page Fields for Multiple Devices, continued

Field	Description/Action
	<p>By default, only the qualified devices will receive the files. To force NA to attempt file placement on an unqualified device, select the check box for that device.</p>
Memory Preparation	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• None — Do not prepare the device memory before updating the software. You should manually ensure that the device has enough memory to receive the new software, otherwise the task will fail.</li> <li>• Compact device memory on selected slot — Before deploying software, NA executes a command to compact memory, such as the Cisco IOS squeeze command, if one is supported by the device. No files are removed from the device. You should still ensure that sufficient memory will be available for the update.</li> <li>• Delete files matching the specified pattern and then compact memory — Before deploying software, NA deletes the files listed under the <b>Show Detail</b> link from each qualified device (and each selected unqualified device). To customize this list, enter regular expressions in the Delete files matching this regex pattern and But keep files matching this regex pattern boxes.</li> </ul> <div style="background-color: #e0e0e0; padding: 10px;"> <p><b>Note:</b> NA never removes the vlan.dat , running-config , or startup-config files from the devices.</p> <p>If the deploy software task fails, followed by a device power failure or reboot, the device might not be bootable.</p> </div>
Deployment Table	<p>The device software update specification:</p> <ul style="list-style-type: none"> <li>• The On Device area shows the files that will be added to the devices. The total memory number is the smallest file system free space of all qualified devices (and selected unqualified devices).</li> <li>• The Software Image Repository area displays the files for the selected image set.</li> </ul> <p>For each file, NA displays the file size and, if applicable, a compliance warning.</p> <div style="background-color: #e0e0e0; padding: 10px;"> <p><b>Note:</b> Compliance warnings are not displayed by default. For more information, see "<a href="#">User Interface Page Fields</a>" on</p> </div>

### Update Device Software Task Page Fields for Multiple Devices, continued

Field	Description/Action
	<p style="background-color: #e0e0e0; padding: 5px;">page 54</p> <p>This field provides the following actions:</p> <ul style="list-style-type: none"> <li>• Select files and folders to add to the device by dragging them from the Software Image Repository to a file system under On Device. (To undo a move, drag the item back to the Software Image Repository.)</li> <li>• In the On Device area, mark files for special treatment by right-clicking a file name, and then selecting <b>Mark as boot image</b> or <b>Mark as OS image</b>. (To undo a selection, select <b>Remove marker</b>.)</li> </ul> <div style="background-color: #e0e0e0; padding: 5px;"> <p><b>Note:</b> The boot image and OS image selections are available for devices running Cisco IOS only. Only one file can be the boot image or OS image. Marking a second file clears the selection of the first file.</p> </div>
Summary	Displays the changes to be made.
Verify	If selected, the Verify option verifies images using commands available on the device. The MD5 checksum on the device is compared to the MD5 checksum stored in the database. Keep in mind that if the device does not support this option, the driver will run a Verify command against the image.
Reboot	<p>The device reboot specification.</p> <ul style="list-style-type: none"> <li>• If NA should reboot each device after applying a software update, select the <b>Reboot device after deploying software</b> check box, and then enter the estimated reboot time.</li> <li>• If NA should not reboot each device after applying a software update, clear the <b>Reboot device after deploying software</b> check box.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px;"> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• Some devices automatically reboot after a software update. This setting does not impact the behavior of those devices.</li> <li>• If device reboot verification is enabled, NA pings each device to verify reachability before marking the reboot task as completed. For more information, see "<a href="#">Device</a></li> </ul> </div>

### Update Device Software Task Page Fields for Multiple Devices, continued

Field	Description/Action
	<p><a href="#">Reboot Verification Process</a> " on page 278 .</p> <ul style="list-style-type: none"> <li>The <b>Reboot device after deploying software</b> check box might not available for either of the following reasons: <ul style="list-style-type: none"> <li>The selected devices do not support reboot.</li> <li>The NA administrator has disabled this option with the <b>Disable Reboot Device Option</b> check box on the Administrative Settings - Device Access page.</li> </ul> </li> </ul>
Estimated Reboot Time	<p>The maximum time that NA should wait between initiating a device reboot and initiating a snapshot of the updated device configuration. This value applies in the following cases:</p> <ul style="list-style-type: none"> <li>When the <b>Reboot device after deploying software</b> check box is selected.</li> <li>When devices automatically reboot after a software update.</li> </ul> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>If the <b>Determine Device Reachability</b> check box is selected on the Administrative Settings - Device Access page, this value serves as the timeout after which NA declares that the device did not reboot successfully.</li> <li>You can change the default value of this setting with the <b>Default Estimated Reboot Time</b> field on the Administrative Settings - Device Access page.</li> </ul>
Estimated Duration	<p>Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.</p>
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see "<a href="#">Device Access Page Fields</a>" on page 33.)</p>	
Device Credentials	<p>Depending on the Device Credentials options enabled on the Server page under Administrative Settings, you can select one or more of the following options:</p>

### Update Device Software Task Page Fields for Multiple Devices, continued

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Standard password rules and device-specific passwords are used. However, the task owner's AAA username and password are applied.</p> </div>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
Override Approval	<p>If the task allows override, select this option to override the approval process.</p>
Save as Draft	<p>If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.</p>
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	<p>Enter the number of minutes to wait before trying again. The default is five minutes.</p>

### Update Device Software Task Page Fields for Multiple Devices, continued

Field	Description/Action
Recurring Options	The task will begin on the date/time specified above, then recur per the following. Select one of the following options: <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including: <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box. <div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a> .

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task's start date, duration, and status. For more information, see "[Task Information Page Fields](#)" on page 405.

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see "[Viewing My Tasks](#)" on page 398.

**Note:** If the images you have selected to deploy do not fit in the device's available free disk space, an error message is displayed. You can either return to the task and make changes or deploy the software. It is possible that the disk space calculation is in error.

## Import Devices Task Page Fields

The Import Devices task reads data from a comma-separated values (CSV) format file. Each row in the CSV file describes one database object. For device data, the values in the primaryIPAddress and hostName columns, combined with the values in the optional siteName column, uniquely identify the objects. For device group data, the values in the deviceGroupName column uniquely identify the objects. For device-specific passwords, the values in the deviceIPAddress column uniquely identify the objects.

It is recommended that you create network-wide device password rules before importing devices. You can also import a set of device-specific data from one file, and then import the device password data from a second file.

For each row in the CSV file, NA updates the database as follows:

- If the unique identifier does not exist, NA creates a new object using the values specified in the file.
  - Empty cells equate to NULL.
  - NA uses default values for database columns that are not included in the CSV file.
- If the unique identifier exists, NA does the following:
  - If the Overwrite Existing Devices flag is set, NA updates the database object with the values specified in the CSV file. (Empty cells equate to NULL.)

**Note:** NA does not modify existing device groups.

- If the Overwrite Existing Devices flag is not set, NA ignores that row and makes no changes to that database object.

You can import new database objects and modifications to existing database objects from one CSV file. Be sure to completely populate any column included in the CSV file.

**Tip:** In the CSV file, include only those columns for which you want to set values. If some objects in your data set require columns that do not apply to other objects, create multiple CSV files and multiple import tasks.

### To import device data

1. Create a CSV import file as described in ["Creating CSV Files for Importing Device Data"](#) on page 122.

**Note:** If the Overwrite Existing Devices option is set to Yes on the Admin > Administrative Settings > Server page, the data in the CSV file overwrite the data in NA. If you do not want certain fields overwritten, remove those fields from the CSV table.

2. Navigate to the New Task/Template - Import Devices page.
3. Make your configuration choices. (For more information, see ["Import Devices Task Page Fields"](#) on the [previous page](#).)
4. Click Save to apply your changes.

### Import Device Data Task Page Fields

Field	Description/Action
Device Import Admin Settings link	Opens the Administrative Settings page (Server tab), where you can set NA task limits, enable Workflow, Configure Syslog, and so on.
Task Name	Set the name of this task.
Save Options	Select one of the following options: <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates"</a> on page 255.</li> </ul>
Template Tag	If you are creating a task template, the template tag for filtering tasks run from the template. Options include: <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Site	Provides a drop-down menu where you can select a Partition. This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see <a href="#">"Segmenting Devices and Users"</a> on page 142. <p><b>Note:</b> This value can be set at device or device group creation only. The value in the siteName column of the CSV file takes precedence over the Site selected here.</p>
Schedule Date	Select one of the following options: <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> </ul>



### Import Device Data Task Page Fields, continued

Field	Description/Action
	<ul style="list-style-type: none"> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Import File	<p>Enter the name of the CSV file containing the import data.</p> <ul style="list-style-type: none"> <li>If the file is on the local system, you can use the Browse button to locate the file.</li> <li>If the file is on the NA core server, specify the file name found in the base directory. (The default base directory is set as &lt;NA_HOME&gt;/imports in appserver.rcx.) For information about specifying the base directory, see <i>Specifying the Base Directory for Import Tasks</i> in <i>NA Administration Guide</i>.</li> </ul> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Do not use any absolute or relative path (<i>/../</i>) reference in the file name.</p> </div>
Data Type	<p>Select one of the following options and enter the data you are importing:</p> <ul style="list-style-type: none"> <li>Devices — The device CSV template contains all available fields for importing network device data into NA.</li> <li>Device Group — The device group CSV template contains all available fields for importing device group data into NA.</li> <li>Passwords — The device passwords CSV template is only required if you are not using device password rules.</li> </ul> <p>If you are using a template to create a new CSV file, click the link to open the template file. Save the file to a location on the local system, and then modify the contents to fit your device data, deleting unused columns. For more information, see <a href="#">"Creating CSV Files for Importing Device Data" on page 122</a>.</p>
Syslog Configuration	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Set Device to Log to the NA Syslog Server</li> <li>Device Logs to a Syslog Relay, set the correct logging level</li> <li>Do not configure syslog</li> </ul> <p>Check the "Run Discover Drivers on newly imported Devices" box if you want NA to discover device drivers for the devices associated with the CSV file you are importing. This option requires valid device passwords and community strings. Therefore, you should only use the option when you already have passwords and device password rules set up and debugged for your network or when you import the second file containing device password information.</p>

### Import Device Data Task Page Fields, continued

Field	Description/Action
	Check the Deactivate inactive or missing devices check box if you want NA to deactivate devices that have not been accessed or imported successfully in the last 45 days.
Preprocess Command	To automate and schedule the entire process within NA, enter the name (and path) of the script file to run before importing the data. This field needs the full executable command which runs in the command/shell console on the server. For example, "perl" needs to be specified if the filter is a PERL script for Windows: <code>perl c:/filter.pl</code>
Log filename	<p>Enter the name of the file to which NA will write information about the import task.</p> <p><b>Note:</b> Do not use any absolute or relative path (<code>/..</code>) reference in the file name.</p> <p>The log file is helpful when debugging import problems. Check the "Append to log file" if you want NA to append this data to the existing log file. You can append the information to an existing log file, only if you set the <code>import/overwrite/logfile</code> parameter in the <code>appserver.rcx</code> file to <code>true</code>. By default it is set to <code>false</code>, and NA overwrites any existing data in the log file. For more information, see <i>Specifying the Base Directory for Import Tasks in NA Administration Guide</i>.</p>
Device Origin	Enter the name you want to give this import file. This is useful when you import data on a recurring basis and need to differentiate different data sources and dates.
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.

### Import Device Data Task Page Fields, continued

Field	Description/Action
<b>Scheduling Options</b>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single

## Import Device Data Task Page Fields, continued

Field	Description/Action
	time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a> .

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Import Users Task Page Fields

The Import Users task reads data from a comma-separated values (CSV) format file. Each row in the CSV file describes one database object. For user account data, the values in the userName column uniquely identify the objects. For user group data, the values in the userGroupName column uniquely identify the objects.

For each row in the CSV file, NA updates the database as follows:

- If the unique identifier does not exist, NA creates a new object using the values specified in the file.
  - Empty cells equate to NULL.
  - NA uses default values for database columns that are not included in the CSV file.
- If the unique identifier exists, NA does the following:
  - If the Overwrite Existing User or User Group flag is set, NA updates the database object with the values specified in the CSV file. (Empty cells equate to NULL.)
  - If the Overwrite Existing User or User Group flag is not set, NA ignores that row and makes no changes to that database object.

You can import new database objects and modifications to existing database objects from one CSV file. Be sure to completely populate any column included in the CSV file.

**Tip:** In the CSV file, include only those columns for which you want to set values. If some objects in your data set require columns that do not apply to other objects, create multiple CSV files and multiple import tasks.

### To import user data:

1. Create a CSV import file as described in ["Creating CSV Files for Importing User Data" on page 336](#) .  
If the Overwrite Existing User or User Group option is set to Yes on the Admin > Administrative Settings > Server page, the data in the CSV file overwrite the data in the NA database. If you do not want certain fields overwritten, remove those columns from the CSV file.
2. Navigate to the New Task/Template - Import Users page.

3. Make your configuration choices. (For more information, see ["Import User Data Task Page Fields" below](#).)
4. Click Save to apply your changes.

### Import User Data Task Page Fields

Field	Description/Action
User Import Admin Settings link	Opens the Administrative Settings page (Server tab), where you can set NA task limits, enable Workflow, Configure Syslog, and so on.
Task Name	Set the name of this task.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Import File	<p>Enter the name of the CSV file containing the import data.</p> <ul style="list-style-type: none"> <li>• If the file is on the local system, you can use the Browse button to locate the file.</li> <li>• If the file is on the NA core server, specify the file name found in the base directory. (The default base directory is set as &lt;NA_HOME&gt;/imports in appserver.rcx.) For information about specifying the base directory, see <i>Specifying the Base Directory for Import Tasks in NA Administration Guide</i>.</li> </ul>

### Import User Data Task Page Fields, continued

Field	Description/Action
	<p><b>Note:</b> Do not use any absolute or relative path (<i>../</i>) reference in the file name.</p>
Data Type	<p>Select one of the following options and enter the data you are importing:</p> <ul style="list-style-type: none"> <li>User — The user CSV template contains all available fields for importing user account data into NA.</li> <li>User Group — The user group CSV template contains all available fields for user group data into NA.</li> </ul> <p>If you are using a template to create a new CSV file, click the link to open the template file. Save the file to a location on the local system, and then modify the contents to fit your user data, deleting unused columns. For more information, see <a href="#">"Creating CSV Files for Importing User Data" on page 336</a>.</p>
Preprocess Command	<p>To automate and schedule the entire process within NA, enter the name (and path) of the script file to run before importing the data. This field needs the full executable command which runs in the command/shell console on the server. For example, "perl" needs to be specified if the filter is a PERL script for Windows: perl c:/filter.pl</p>
Log filename	<p>Enter the name of the file to which NA will write information about the import task.</p> <p><b>Note:</b> Do not use any absolute or relative path (<i>../</i>) reference in the file name.</p> <p>The log file is helpful when debugging import problems. Check the "Append to log file" if you want NA to append this data to the existing log file. You can append the information to an existing log file, only if you set the <code>import/overwrite/logfile</code> parameter in the <code>appserver.rcx</code> file to <code>true</code>. By default it is set to <code>false</code>, and NA overwrites any existing data in the log file. For more information, see <i>Specifying the Base Directory for Import Tasks</i> in <i>NA Administration Guide</i>.</p>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
Override Approval	<p>If the task allows override, select this option to override the approval process.</p>
Save as	<p>If checked, you can save the task as a draft and return to it later. The task will not</p>

### Import User Data Task Page Fields, continued

Field	Description/Action
Draft	run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	

### Import User Data Task Page Fields, continued

Field	Description/Action
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see <a href="#">"Logging" on page 692</a> .

## Creating CSV Files for Importing User Data

Use the import users task to import information about user accounts or user groups into NA from CSV files. The first row of the CSV file contains the NA database column names for the data you are importing. Each additional row represents one user account or user group.

NA provides templates for the CSV files. Note the following:

- Do not include columns unless you are populating them. An empty value overwrites existing data if the user account or user group already exists.
- The column names must match the database column names. Do not change the database column names set by NA.
- Because the data fields are comma-delimited, fields can include whitespace but not commas (.). Use a colon (: ) to separate values within a field.
- Data fields that are string types cannot include any of the following characters: single quotation mark ('), quotation mark ("), angle brackets (< >).
- Column order is not significant.

### To create a CSV file for import

1. Navigate to the New Task/Template - Import Users page.
2. Under Task Options, Data Type, click the appropriate CSV template link.
3. In an editing tool, do the following:
  - Add information to the data table.
  - To prevent overwriting existing data, delete any unused columns.
  - For information about the columns in the CSV file, see the appropriate section:
    - ["User Account Data Import File" on the next page](#)
    - ["User Group Import File" on page 338](#)

**Note:** For a CSV file containing non-English characters, edit the file in a text editor, not Microsoft Office Excel. Save the CSV file with UTF-8 encoding.

4. Save the file as type CSV on the local system.



## User Account Data Import File

The *user.csv* template file contains the NA database column names for user account data. During import, NA uses the values in the *userName* column to uniquely identify user accounts in the database.

### User Account Data Import Fields

Column Name	Description/Action
userName	<p>The user name for logging on to NA, for example Operator or Administrator.</p> <p>This column must be included in each user account data import file.</p> <p><b>Note:</b> User names can contain alphanumeric characters, periods (.), underscores (_), hyphens (-), and backslashes(\) only.</p> <p><b>Note:</b> This value can be set at user creation only.</p>
siteName	<p>The name of the site (partition) to which the user account belongs. The user account will only be visible to other users who have view permission to that partition.</p> <p><b>Note:</b> This value can be set at user creation only.</p>
userGroupName	A colon-separated list of the user groups that contain the user account.
firstName	The first name of the user.
lastName	The last name of the user.
userPassword	<p>The password for the user account.</p> <p>When creating new user accounts, this column must be included.</p>
emailAddress	The email address of the user.
passwordOption	<p>A colon-separated list of the password options for the user account. Specify one or more of the following numeric values:</p> <ul style="list-style-type: none"> <li>• 1 — User must change password at next logon</li> <li>• 2 — User cannot change password</li> <li>• 4 — Password never expires</li> <li>• 6 — User cannot change password and password never expires</li> <li>• 8 — Account is locked out</li> <li>• 9 — User must change password at next logon and account is locked out</li> <li>• 10 — User cannot change password and account is locked out</li> <li>• 12 — Password never expires and account is locked out</li> <li>• 14 — User cannot change password, password never expires, and account is locked out</li> </ul>

## User Account Data Import Fields, continued

Column Name	Description/Action
	For more information about setting password options, see <a href="#">"Configuring User Passwords" on page 226</a> .
aaaUserName	The AAA (TACACS+ or RADIUS) user name for this user.
aaaPassword	The AAA password for the AAA user name.
useAaaLoginForProxy	The proxy setting. Specify one of the following numeric values: <ul style="list-style-type: none"> <li>• 0 — Disabled (use the NA credentials for this user account when authenticating into the telnet/SSH proxy)</li> <li>• 1 — Enabled (use the AAA credentials for this user account when authenticating into the telnet/SSH proxy)</li> </ul>
status	The status of the user account. Specify one of the following numeric values: <ul style="list-style-type: none"> <li>• 0 — Enabled</li> <li>• 1 — Disabled</li> </ul>
allowFailover	The authentication failover setting. Specify one of the following numeric values: <ul style="list-style-type: none"> <li>• 0 — Disabled (prevent user authentication if the external authentication server cannot be reached)</li> <li>• 1 — Enabled (use local authentication if the external authentication server cannot be reached)</li> </ul>
userCustom[1-6]	If additional user fields are defined on the Custom Data Setup page, you can import data for any of those fields. Use the column headings as defined in the template file.
comments	Additional information (255 character maximum) about the user account. Do not include commas (,).

## User Group Import File

The *user\_group.csv* template file contains the NA database column names for user group data. During import, NA uses the values in the `userGroupName` column to uniquely identify user groups in the database.

**Tip:** To apply a customized permission role to a user group, do one of the following:

- Create a new user role on the Admin > User Roles & Permissions page, and then specify that role in the CSV file.
- Remove the permissions columns from the CSV file. After importing the new user groups, configure customized permission roles to each new user group in the NA console.

### User Group Data Import File Fields

Column Name	Description/Action
userGroupName	The name (255 character maximum) of the user group. This column must be included in each user group data import file.
siteName	The name of the site (partition) to which the user group belongs.  <b>Note:</b> This value can be set at user group creation only.
description	Description text (255 character maximum) about the user group. Do not include commas (,).
commandPermission	The command permission type. Specify one of the following values: <ul style="list-style-type: none"><li>• NONE</li><li>• A colon-separated list of existing command permission roles to assign to the user group.</li></ul>
scriptPermission	The script permission type. Specify one of the following values: <ul style="list-style-type: none"><li>• ALL</li><li>• NONE</li><li>• A colon-separated list of existing script permission roles to assign to the user group.</li></ul>
viewPermission	The view partition permission type. Specify one of the following values: <ul style="list-style-type: none"><li>• ALL</li><li>• NONE</li><li>• A colon-separated list of existing view partition permission roles to assign to the user group.</li></ul>
deviceModificationPermission	The modify device permission type. Specify one of the following values: <ul style="list-style-type: none"><li>• ALL</li><li>• NONE</li><li>• A colon-separated list of existing modify device permission roles to assign to the user group.</li></ul>

## Add Resource Identities to a Pool from a CSV File

Create a resource identity pool, and then populate that pool with resource identities. Add resource identities in either of the following ways:

- Enter data into the NA console. (For more information, see ["Add Resource Identities to a Pool from the NA Console" on page 672.](#))
- Create a comma-separated values (CSV) file of the data and import the data into the NA database as described here.

Resource identity names must be unique within a given resource identity pool. When the same resource identity name is included in multiple resource identity pools, each of those resource identities is unique in the NA database. A resource identity cannot be shared among multiple resource identity pools.

To add resource identities to a pool from a CSV file

1. Create a CSV import file as described in ["Creating CSV Files for Importing Resource Identity Data" on page 676](#).
2. Navigate to the New Task/Template - Import Resource Identities into Resource Identity Pool page.
3. Customize the task. (For more information, see ["Import Resource Identity Data Task Page Fields" below](#).)
4. Click **Save**.

#### Import Resource Identity Data Task Page Fields

Field	Description/Action
Task Name	Set the name of this task.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about task templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags</li> <li>• New—Enter a new template tag</li> </ul> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p> </div>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Partition (if configured)	The partition filter. This field is only displayed if you have configured one or more Partitions. For more information about partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a> .
Resource	The resource identity pool to receive the imported resource IDs.

### Import Resource Identity Data Task Page Fields, continued

Field	Description/Action
Identity Pool	The available resource identity pools are those associated with the selected partition.
Import File	<p>Enter the name of the CSV file containing the import data.</p> <ul style="list-style-type: none"> <li>If the file is on the local system, you can use the Browse button to locate the file.</li> <li>If the file is on the NA core server, specify the file name found in the base directory. (The default base directory is set as &lt;NA_HOME&gt;/imports in appserver.rcx.) For information about specifying the base directory, see <i>Specifying the Base Directory for Import Tasks</i> in <i>NA Administration Guide</i>.</li> </ul> <p><b>Note:</b> Do not use any absolute or relative path (./..) reference in the file name.</p>
Data Type	<p>The Resource Identity data type is for importing resource identity data into NA.</p> <p>To create a template CSV file, select a resource identity pool, and then click the <b>Resource Identity CSV Template</b> link to open the template file. Save the file to a location on the local system, and then modify the contents to fit your resource identity data, deleting unused columns. For more information, see <a href="#">"Creating CSV Files for Importing Resource Identity Data" on page 676</a>.</p>
Preprocess Command	To automate and schedule the entire process within NA, enter the name (and path) of the script file to run before importing the data. This field needs the full executable command which runs in the command/shell console on the server. For example, "perl" needs to be specified if the filter is a PERL script for Windows: perl c:/filter.pl
Log filename	<p>Enter the name of the file to which NA will write information about the import task.</p> <p><b>Note:</b> Do not use any absolute or relative path (./..) reference in the file name.</p> <p>The log file is helpful when debugging import problems. Check the "Append to log file" if you want NA to append this data to the existing log file. You can append the information to an existing log file, only if you set the import/overwrite/logfile parameter in the appserver.rcx file to true. By default it is set to false, and NA overwrites any existing data in the log file. For more information, see <i>Specifying the Base Directory for Import Tasks</i> in <i>NA Administration Guide</i>.</p>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.

### Import Resource Identity Data Task Page Fields, continued

Field	Description/Action
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	If the task fails, NA will try the task again this many times, allowing for the Retry Interval between retries. Select one of the following options: <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	The task will begin on the date/time specified above, then recur per the following. Select one of the following options: <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including: <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box. <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.

## Import Resource Identity Data Task Page Fields, continued

Field	Description/Action
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a> .

## Creating CSV Files for Importing Resource Identity Data

Use the import resource identities into resource identity pool task to automate creation in the NA database of resource identities in a resource identity pool. Define the new resource identities in a CSV file. The first row of the CSV file contains the column names for the data you are importing. Each additional row represents one resource identity.

NA can create a template CSV file. This template is pool-specific and includes the column names for the custom fields associated with the pool. Note the following:

- Do not include columns unless you are populating them.
- Do not change the column names set by NA.
- Because the data fields are comma-delimited, fields can include whitespace but not commas (,).
- Data fields that are string types cannot include any of the following characters: single quotation mark ('), quotation mark ("), angle brackets (< >).
- Column order is not significant.

For each row in the CSV file, NA updates the database as follows:

- If the unique identifier does not exist in the target resource identity pool, NA creates a new object using the values specified in the file.
  - Empty cells equate to NULL.
  - If the status column is not included in the CSV file, NA imports all new resource identities with status Available.
- If the unique identifier exists in the target resource identity pool, NA ignores that row and makes no changes to that database object.

**Tip:** In the CSV file, include only those columns for which you want to set values. If some objects in your data set require columns that do not apply to other objects, create multiple CSV files and multiple import tasks.

### To create a CSV file for import

1. Navigate to the New Task/Template - Import Resource Identities into Resource Identity Pool page.
2. Under Task Options, do the following:
  - a. If the Resource Identity Pool field is empty, select a pool name.
  - b. Click the **Resource Identity CSV Template** link.

3. In an editing tool, do the following:
  - Add information to the data table.
  - Delete any unused columns.
  - For information about the columns in the CSV file, see the "[Resource Identity Data Import File](#)" on [page 678](#).

**Note:** For a CSV file containing non-English characters, edit the file in a text editor, not Microsoft Office Excel. Save the CSV file with UTF-8 encoding.

4. Save the file as type CSV on the local system.

## Resource Identity Data Import File

The *resourceid-template.csv* template file contains the NA database column names for resource identity data. During import, NA uses the values in the name column to uniquely identify resource identities in the database. Resource identity names must be unique within a resource identity pool.

### Resource Identity Data Import Fields

Column Name	Description/Action
name	The resource identity name. This column must be included in each resource identity data import file.
status	The status of the resource identity. Specify one of the following values: <ul style="list-style-type: none"><li>• available or 0</li><li>• inuse or 1</li></ul>
description	The description of the resource identity.  <b>Note:</b> The resource identity description is available only from the CLI.
rimcf:<custom field name>	If custom resource identity fields are associated with the target resource identity pool, the CSV file can include data for any of those fields. <ul style="list-style-type: none"><li>• When using the template CSV file, NA adds the custom field names to the template.</li><li>• When creating a CSV file by hand, add one column for each custom field for which to import data. Set each column heading to the prefix rimcf: followed by the actual name of an custom field from the resource identities table on the Enhanced Custom Fields Setup page. The name is case-sensitive. For example, for a custom field named Location, set the column heading to rimcf:Location.</li></ul> For information about creating custom resource identity fields, see " <a href="#">Define Custom Resource Identity Fields</a> " on <a href="#">page 686</a> .



## Detect Network Devices Task Page Fields

Detecting network devices enables you to locate devices on your network that you want to place under NA management. Once you provide a range of IP addresses, NA scans your network looking for devices. Newly discovered devices are automatically added, along with the appropriate device drivers. In addition, if the Primary IP Address Reassignment option is checked on the Administrative Settings — Server page, NA automatically assigns the correct IP address to a device if the device has multiple IP addresses and interfaces. Consequently, a device is only entered into the system once. For information about task settings, see ["Device Access Page Fields" on page 33](#) and ["Server" on page 42](#).

If you select Driver Discovery on the task page, after NA adds the device to the system, it polls the device to see what type of device it is and subsequently assigns the appropriate device driver to manage the device. NA then takes a snapshot of the device and downloads the configuration and asset information from the device into the database.

For unsupported hosts, a group is also created and added to the system (Inventory). To make sure that unsupported devices are not added as active (and therefore count towards the device's license) and to prevent any operation performed against Inventory that would include these devices, all devices from unsupported hosts are set to inactive by default.

If you want to perform tasks against these devices, you must first activate them. You can activate devices from either the:

- Device Details page, using the Provision menu (Activate Device option).
- Group Device page, where you can select devices using the check boxes and then select the Activate option from the Actions drop-down menu.

When running the Detect Network Devices task, the Task Information page shows:

- Active nodes — Active nodes are IP addresses that responded to either an SNMP scan or an Nmap scan. A node is considered active if it can be managed by NA. Refer to the *HPE Network Automation Device Driver Reference* for a list of supported devices.
- Non-active nodes — Non-active nodes are IP addresses that did not respond to either an SNMP scan or an Nmap scan, or both. A device might not respond to an SNMP scan if an incorrect community string is used by NA to query the device.
- Unsupported hosts — Unsupported hosts are IP addresses that responded to either an SNMP scan or an Nmap scan. However in the case of SNMP, it returned a SysOID that NA does not support. In the case of Nmap, the operating system fingerprint returned no matches that NA supports.
- Existing devices — Existing devices indicate that the device's IP address is already known to NA and exists in the system as either the primary IP address of the device or the IP address appears in the database as a result of the BasicIP diagnostic.

Field	Description/Action
Task Name	Displays Detect Network Devices. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"><li>• Save as task — The option is selected by default.</li><li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task"</a></li></ul>

Field	Description/Action
	<p><a href="#">Templates"</a> on page 255.</p>
<p>Template Tag</p>	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
<p>Schedule Date</p>	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
<p>Task Priority</p>	<p>The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State"</a> on page 249.</p>
<p>Comments</p>	<p>Enter comments about the task.</p>
<p><b>Task Options</b></p>	
<p>Max Nodes</p>	<p>Enter the number of IP addresses to discover. The maximum is 1024. Keep in mind that tasks with more nodes than the maximum allowed will cause the task to fail.</p>
<p>Inclusions</p>	<p>Enter IP addresses or Classless Inter-Domain Routing (CIDR) range inclusions (for example: 192.168.1.0-192.168.2.0 or 192.168.31.0/24) in right-hand box and click the &lt;&lt; Add Discovery Range button. Ranges are inclusive. You can use the Delete Discovery Range button to delete ranges.</p>
<p>Exclusions</p>	<p>Enter IP addresses or Classless Inter-Domain Routing (CIDR) range exclusions (for example: 192.168.1.0-192.168.2.0 or 192.168.31.0/24) in the right-hand box and click the &lt;&lt; Add Exclusion Range button. Ranges are inclusive. You can use the Delete Exclusion Range button to delete ranges.</p>
<p>Scanning Methods</p>	<p>Select one or both of the following scanning methods:</p> <ul style="list-style-type: none"> <li>• SNMP (the default)</li> <li>• Nmap (Note: Careful consideration should be taken when identifying the network range you are going to scan. Some network topologies can result in very long scans. In addition, it is recommended that you do not scan Internet addresses.)</li> </ul>

Field	Description/Action
	For detailed information on scanning methods, see <a href="#">"Scanning Methods" on page 349</a> .
Password rule fallback	If selected (the default), SNMP scans the require community strings. Password rule fallback is used for those community strings.
Partitions	Select a Partition from the drop-down menu. For more information about Partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a> .
Device Group Name	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Use the default group name (DetectedNetworkDevices&lt;nnn &gt;, where nnn is the task ID) or select a device group from the drop-down menu.</li> <li>• Enter a device group name for added devices (the default).</li> </ul> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> When using the Detect Network Devices task, a new group could be created from devices that responded to the network scan, but did not return a known OS.</p> </div>
Driver Discovery	If checked (the default), device drivers are discovered after the device has been detected.
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see <a href="#">"Device Access Page Fields" on page 33</a>.)</p>	
Device Credentials	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Use network-wide password rules</li> <li>• Use task specific credentials — Enter the username, password, and SNMP community string information.</li> </ul>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA

Field	Description/Action
	Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.

Field	Description/Action
	<div style="border: 1px solid #ccc; padding: 5px; background-color: #f9f9f9;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task schedule to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a> .

## Scanning Methods

There are two types of Internet Protocol (IP) traffic:

- User Datagram Protocol (UDP) — UDP is a simple message-based connectionless protocol. With UDP, packets are sent across the network in chunks. In general, UDP is rather unreliable and the order of arriving packets is not guaranteed.
- Transmission Control Protocol (TCP) — TCP is a connection-oriented protocol. TCP is very reliable and the order in which packets are received along a connection is guaranteed.

SNMP scanning uses UDP. SNMP attempts connections to systems using known SYSOIDs to identify network devices. The SNMP scanning method has less impact on your network because it does not require multiple connections to each system. In addition, SNMP is fast, however it can be bogged down if there are a lot of password rules, since all password rules are tried for every IP address scanned. Also, SNMP requires login credentials (community strings) to be successful.

Nmap Scanning uses TCP, although it can be configured to use UDP for some tasks. Because Nmap is a port scanner, if you do not want your network scanned, you should opt for the SNMP scanning method. In addition, Nmap makes many connections to devices so as to test the various ports.

Keep in mind that Nmap does not login to devices, and therefore does not need login credentials. Nmap can range from fast to slow, depending on the network configuration and the IP addresses being scanned. Scanning IP addresses, for example 192.168.0.0, can be very slow. It is highly recommended that you only scan IP address ranges that are within your own organization.

**Note:** Many organizations have monitoring systems that will send alarms if they detect a network scan in progress. If you are using Nmap to detect network devices, make sure your IT team is fully aware of the scheduled activity.

## Defining IP Address Ranges

You must specify at least one IP address inclusion range. You can define ranges two ways:

- CIDR (Classless InterDomain Routing) notation — CIDR denotes a block or range of IP addresses, for example 10.255.1.0/24. This represents an IP address range from 10.255.1.0 to, and including, 10.255.1.255. In total, 256 IP addresses. The /24 in the 10.255.1.0/24 CIDR notation represents how many bits make up the CIDR block's prefix. In this case, it is 24 bits. The balance of the block (the final eight bits) are considered wildcards. Other examples include:
  - 192.168.100.1/32 is a single host 192.168.100.1. (Note all 32 bits make up the prefix without any wildcard bits.)
  - 172.16.0.0/16 is an extremely large range from 172.16.0.0 to 172.16.255.255. It is recommended not to discover ranges this large.
  - 10.255.0.0/23 is a moderately large range. This range goes from 10.255.0.0 to 10.255.1.255, and includes 512 IP addresses.
- Ranged input — IP address blocks are represented with a lowest-highest notation, for example 10.255.1.0 - 10.255.1.255. You can enter a single IP address, for example 192.168.100.1. Exclusion ranges can also be specified. This enables you to mask out certain addresses, or ranges of addresses, from network device detection. For example, you can scan the range 10.255.1.0/24. However, if there are printers from 10.255.1.10 to 10.255.1.20 that you do not want to scan, the inclusion range is 10.255.1.0/24. The exclusion range is 10.255.1.10 -10.255.1.20.

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task's start date, duration, and status. For more information, see "[Task Information Page Fields](#)" on page 405.

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see "[Viewing My Tasks](#)" on page 398.

## Deduplication Task Page Fields

If you import devices into NA using either the CSV (Comma Separated Value) file or Connectors, it is possible to have duplicate devices created in the NA database. For example, if you are importing devices from different management systems, such as HPE Network Node Manager or CiscoWorks, they could use different management IP addresses to refer to the same device.

The Deduplication task enables you to resolve device duplication issues. Keep in mind that the Detect Network Devices task does this automatically. For more information, see "[Detect Network Devices Task Page Fields](#)" on page 345.

Field	Description/Action
Task Name	Displays Deduplication. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"><li>• Save as task — The option is selected by default.</li><li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see "<a href="#">Task</a></li></ul>

Field	Description/Action
	<a href="#">Templates" on page 255.</a>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137.</a></li> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253.</a></li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249.</a>
Comments	Enter comments about the task.
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.

Field	Description/Action
<b>Scheduling Options</b>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see <a href="#">"Logging" on page 692</a>.</p>



If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task's start date, duration, and status. For more information, see "[Task Information Page Fields](#)" on page 405.

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see "[Viewing My Tasks](#)" on page 398.

## Port Scan Page Fields

Nmap is used for discovering network devices. Nmap can also be used to scan a device's ports and return details on which ports are open and what services they provide. By running the Port Scan task, you can:

- Easily confirm which ports on a device are open or closed
- Determine a device's vulnerability based on TCP stack, OS detection, and other Nmap provided services

The results of the port scan are displayed on from the Device Details page's View menu (View →> Diagnostics →> NA Port Scan). For more information, see "[Viewing Device Details](#)" on page 177.

To set Port Scan task settings, see "[Device Access](#)" on page 32 .

**Note:** If the Port Scan task fails, it is possible that Nmap is not configured properly. For more information about entering the path to the Nmap utility, see "[Device Access Page Fields](#)" on page 33. For information about installing Nmap, see the *NA Installation and Upgrade Guide*.

Keep in mind that the ports are actually software based sockets open for listening. The details of the diagnostic are searchable using the Search for Diagnostics page. For more information, see "[Search For Diagnostic Page Fields](#)" on page 489.

Field	Description/Action
Task Name	Displays Port Scan. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"><li>• Save as task — The option is selected by default.</li><li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see "<a href="#">Task Templates</a>" on page 255.</li></ul>
Template Tag	If you are creating a task template, the template tag for filtering tasks run from the template. Options include: <ul style="list-style-type: none"><li>• General purpose—Do not apply a tag to this task template</li><li>• Existing—Select from the list of existing template tags.</li><li>• New—Enter a new template tag.</li></ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	Select one of the following options: <ul style="list-style-type: none"><li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the</li></ul>

Field	Description/Action
	<p>target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137</a>.</p> <ul style="list-style-type: none"> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253</a>.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	<p>To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p> <p><b>Note:</b> Large amounts of data could be stored. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>• Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	

Field	Description/Action
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options: <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	The task will begin on the date/time specified above, then recur per the following. Select one of the following options: <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including: <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.

Field	Description/Action
	<p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the "Store log output generated by this task" checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see " <a href="#">Logging</a> " on page 692.

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task's start date, duration, and status. For more information, see "[Task Information Page Fields](#)" on page 405.

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see "[Viewing My Tasks](#)" on page 398.

## Provision Device Task Page Fields

The Provision Device task applies a Device Template to a device. For information about creating Device Templates, see "[Device Templates](#)" on page 114 .

The task will fail if the Device Template and the device on which to apply it do not match.

Field	Description/Action
Task Name	Displays Provision Device. You can enter a different task name if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see "<a href="#">Task Templates</a>" on page 255.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>

Field	Description/Action
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137</a>.</li> <li>CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253</a>.</li> </ul>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Start As Soon As Possible (the default)</li> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	<p>To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p> <p><b>Note:</b> Large amounts of data could be stored. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>Serial—Only one child task of this group task runs at any given time.</li> </ul>

Field	Description/Action
	<p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Device Template	Select a device template from the drop-down menu.
Compliance option	If checked, NA will test policy compliance before provisioning the device.
Status option	If checked, the device status is set to Active upon provisioning.
Data copy option	If checked, additional information from the Device Template is copied to the device.
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.
<b>Pre-Task / Post Task Snapshot Options</b>	
Pre-Task Snapshot	Select one of the following options: <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task</li> </ul>
Post-Task Snapshot	Select one of the following options: <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task</li> <li>• Scheduled as a separate task</li> </ul>
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.

Field	Description/Action
<b>Scheduling Options</b>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see <a href="#">"Logging" on page 692</a>.</p>

## Add Context to Device Task Page Fields

A context is a device inside a device. A context can be hardware (with modules and slots) or virtual. If a context does not have an IP address, NA connects to the context through the parent device.

In general, the context appears as a standalone device to NA.

In the case of a Cisco Catalyst device containing Cisco Firewall Service Module (FWSM), the Cisco FWSM can include contexts. As a result, the Cisco FWSM and its contexts appear to NA as a device, because the Cisco FWSM and its contexts have their own configurations.

The NA Module Status diagnostic discovers contexts on the parent device. NA automatically adds the discovered contexts to the NA database as devices and configures the connection paths. For more information about connection through devices, see ["New IP Address Page \(New Connection Through\)" on page 217](#).

The NA Module Status diagnostic also automatically adds internal device relationships. For information about adding and removing user-defined device relationships, see ["Device Relationships Page Fields" on page 204](#).

When the NA Module Status diagnostic determines that a context has been removed, NA marks the corresponding device as inactive. If the NA Module Status diagnostic later sees the device, NA re-enables the device, thus preserving the device history.

The Add Context to Device task configures a new context on the device. Only some device types support contexts.

To access the Add Context to Device task page, follow these steps:

1. On the Device Details page, click **Provision > Device Contexts**.
2. On the Device Contexts page, click the **Add Context** link.

Field	Description/Action
Task Name	Set the name of this task.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For information about task templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	Device — Enter the IP address or hostname of the target device. Device context tasks (add and remove) can only be run against a single device.



Field	Description/Action
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Start As Soon As Possible (the default)</li> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	<p>To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p> <p><b>Note:</b> Large amounts of data could be stored. For detailed information about logging, see <a href="#">"Logging" on page 692</a> .</p>
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Variables	<p>Variables are defined in the device driver and displayed in NA at run-time. As a result, variables are different for each device. For example, the CiscoPIX FWSM device uses the following variables to create a device context:</p> <ul style="list-style-type: none"> <li>Context Name —Enter the name of the device context you want to create.</li> <li>Config Location — Enter the location of the configuration for the device context. In this case, it is a set of protocols that specify how you plan to provide the configuration. For example, if the configuration is on the local disk, you would select “disk” from the drop-down menu.</li> <li>Config Filename — Enter the filename of the configuration, for example: default.cfg</li> </ul>
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.

Field	Description/Action
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options: <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	Not available
<b>Task Completed Notification</b>	
Task Completed Notification	If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box. <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For detailed information about logging, see <a href="#">"Logging" on page 692</a> .

## Remove Context from Device Task Page Fields

**Note:** For information about device contexts, see ["Add Context to Device Task Page Fields" on page 360](#).

The Remove Context from Device task updates the device configuration to delete the context from the device. Only some device types support contexts.

To access the Remove Context from Device task, follow these steps:

1. On the Device Details page, click **Provision > Device Contexts**.
2. On the Device Contexts page, in the Actions column, click **Remove from Device** for the context.

Field	Description/Action
Task Name	Set the name of this task.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For information about task templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	Device — Enter the IP address or hostname of the target device. Device context tasks (add and remove) can only be run against a single device.
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Session	To store the complete device session log, click the "Store complete device session log"

Field	Description/Action
Log	<p>check box. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p> <p><b>Note:</b> Large amounts of data could be stored. For detailed information about logging, see <a href="#">"Logging" on page 692</a> .</p>
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Variables	The variables list is pre-populated for the selected device context.
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	Not available
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For detailed information about logging, see <a href="#">"Logging" on page 692</a> .</p>

## VLAN Task Page Fields

NA enables you to provision VLAN entities and trunk ports. You can:

- Create new VLAN
- Edit a VLAN name
- Edit VLAN port assignments
- Edit VLAN comments (only in the database, not on the device)
- Configuring trunk ports (For more information, see ["Configuring Trunk Ports" on page 368](#).)

Creating a new VLAN or editing VLAN names and port assignments on the New Device VLAN page results in scheduling a new VLAN task that performs the change on a device. For more information, see ["Creating and Editing VLANs" on page 197](#).

**Note:** NA does not update the database with requested VLAN changes. Rather, NA schedules a post Snapshot task and a VLAN Data Gathering diagnostic task to capture the changes as the result of New VLAN task.

Field	Description/Action
Task Name	Displays Add VLAN. You can enter a different task name if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see "<a href="#">Task Templates</a>" on page 255.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see " <a href="#">Device Selector</a> " on page 137.
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see " <a href="#">Task Priority, Schedule, and State</a> " on page 249.
Comments	Enter comments about the task.
<b>Task Options</b>	
Session Log	<p>To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p> <p><b>Note:</b> Large amounts of data could be stored. For more information about logging, see "<a href="#">Logging</a>" on page 692.</p>
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at</li> </ul>

Field	Description/Action
	<p>the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</p> <ul style="list-style-type: none"> <li>If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Edit VLAN	Displays the name of the edited VLAN.
Rename to	Displays the new name of the VLAN.
Add ports	Displays the ports to add.
Remove ports	Displays the ports to delete.
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>No Retry (the default)</li> <li>Once</li> <li>Twice</li> <li>Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	Not available

Field	Description/Action
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see <a href="#">"Logging" on page 692</a>.</p>

## Configuring Trunk Ports

The VLAN Trunk option on the Edit Interface Detail page enables you to configure a trunk port. Keep in mind that only certain ports can be configured as trunk port, including physical ports and port channels (aggregated links). Loopback ports and ports that are used as VLAN interfaces cannot be configured as trunk ports.

The VLAN Trunk option is a collapsible set of rows that are displayed when you check the VAN Trunk option on the Edit Interface Detail page. The displayed fields include:

- Native VLAN ID
- Member VLANs

**Note:** Native VLAN traffic is untagged on the trunk port. In addition, any untagged packets received on the trunk port are considered those of the Native VLAN.

Native VLAN is a Cisco term. ProCurve does not use the Native VLAN term. Instead, ProCurve uses the Member VLANs term. As a result, the trunk port can have only one untagged VLAN membership. In essence, the Native VLAN ID and Member VLANs term have the same meaning.

Trunk ports carry the traffic of selected VLANs in the Member VLANs field. Any VLANs that are unselected will be pruned (removed the VLAN membership if the trunk ports were previously a member of the VLAN).



Unchecking the VLAN Trunk option configures a port as a non-trunk port and assigns it to the VLAN indicated in the Native VLAN ID field.

**Note:** If the Trunk Port option is unchecked, you are prompted for the default VLAN ID if the port is currently a trunk port. The default VLAN ID is the one to which the port will be assigned when the trunk port becomes a non-trunk port. You are prompted to enter a VLAN ID. If you do not enter a VLAN ID, the Native VLAN ID will be used. If there is no Native VLAN ID, NA does not send the default VLAN ID to the device. As a result, the device will assign the port to its default VLAN, which is VLAN 1.

For more information, see ["Edit Interface Detail Page Fields" on page 191](#). Any modification of VLAN trunk port settings results in creating a VLAN task to apply the changes on the device. For more information, see ["VLAN Task Page Fields" on page 365](#).

## Backup Device Software Task Page Fields

The Backup Device Software task enables you to copy software images from a device(s) to the NA software image repository. All copied software images are added to an existing software image set unless you specify that each software image goes in its own unique software image set. The name of the software image set then becomes a combination of the specified software image set name and the name of the software image set copied from the device. Keep in mind:

- A new software image set name is created if you specify a unique name.
- Software image sets are added to an existing software image set if the software image set name is not unique.
- Duplicate software images are not added to an existing software image set. As a result, you will receive a warning message when the Backup Device Software task runs.

When a new software image set is created, the attributes of the software image set match information known about the device from which it was downloaded. This ensures that the downloaded software images are not applied to devices that are not capable of running the software image. For more information, see ["Image Synchronization Report" on page 603](#).

A link is provided on the Backup Device Software Task Results page to a list of the software image set(s) so you can verify all software image set names and requirements

To open the Backup Device Software Task page, on the menu bar under Reports, select Image Synchronization Report. On the Image Synchronization Report, check one or more checkboxes and then select the Sync Image option from the Actions drop-down menu.

Field	Description/Action
Task Name	Displays Backup Device Software. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"><li>• Save as task — The option is selected by default.</li><li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li></ul>

Field	Description/Action
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see " <a href="#">Task Priority, Schedule, and State</a> " on page 249.
Comments	Enter comments about the task.
Custom 1	Enter custom data.
<b>Task Options</b>	
Session Log	<p>To store the complete device session log, click the “Store complete device session log” check box. Keep in mind that all tasks that interact with a device can be run with session logging enabled. This provides a detailed log of the interaction with the device during the task. Session logs should be viewed as the first step to debugging device-specific issue. Session logs provide details on CLI, SNMP, and all transfer protocol actions taken during the task.</p> <p><b>Note:</b> Large amounts of data could be stored. For more information about logging, see "<a href="#">Logging</a>" on page 692.</p>
Force Save	<p>The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i>).</p> <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p>
Base Image Set	You can select from the following options:

Field	Description/Action
Name	<ul style="list-style-type: none"> <li>• Use Name — Enter the base image set name.</li> <li>• Use Existing — Select an existing software image set from the drop-down menu.</li> </ul>
Image Storage	<p>The device and software image you are copying to the NA software repository are displayed. You can select from the following options:</p> <ul style="list-style-type: none"> <li>• Group Image Sets — All copied software images are added to either a new or existing software image set.</li> <li>• Separate images into unique Image Sets — The image set name specified above (either manually or selected) is used as the base name for the new image set. The full name will include the original name and the name of the software image copied from the device.</li> </ul>
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.
<b>Scheduling Options</b>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	Not available
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information, see <a href="#">"Logging" on page 692</a>.</p>

Click the Save Task button after entering the required information. The Task Information page opens. The page includes detailed task information, including task status, devices affected, duration, result details, and so on.

## Check Policy Compliance Task Page Fields

The HPE Network Automation Premium edition license does not include this task. It is available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page (**Help > About Network Automation > View License Information** link).

The Check Policy Compliance task enables you to determine if devices are in compliance with either configuration policies or software level policies. You should only need to run the Check Policy Compliance task when you create or update policies. By doing so, you can quickly determine if a device is out of compliance with the newly created policy.

By default, NA runs a compliance check on a device's configuration whenever a configuration change is detected. If configured, you are notified if a configuration change violates applied policies. In addition, you can configure a number of automated reactions, such as emailed alerts, SNMP traps, and even run a command script to force the device to return to a compliant state.

Field	Description/Action
Task Name	Displays Check Policy Compliance. You can enter a different task name if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Save as task — The option is selected by default.</li> <li>Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see "<a href="#">Task Templates</a>" on page 255.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>General purpose—Do not apply a tag to this task template</li> <li>Existing—Select from the list of existing template tags.</li> <li>New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see "<a href="#">Device Selector</a>" on page 137.</li> <li>CSV File — Enter the name of the CSV file containing the target devices. For more information, see "<a href="#">Task CSV Template File</a>" on page 253.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the</p>

Field	Description/Action
	devices included in the ad-hoc device group.
Schedule Date	Select one of the following options: <ul style="list-style-type: none"> <li>Start As Soon As Possible (the default)</li> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Run Mode	For a group task, the method for processing child tasks. Available options are: <ul style="list-style-type: none"> <li>Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
Action	Select one or all of the following options: <ul style="list-style-type: none"> <li>Check configuration policy compliance (the default) — Checks to see if the selected device(s) are in compliance with configuration policies.</li> <li>Check diagnostics compliance — Checks to see if the selected device(s) are in compliance with diagnostic policies.</li> <li>Check software compliance — Checks to see if the selected device(s) are in compliance with software policies.</li> <li>Check software level — If checked, the software level is checked, resulting in text output showing the software level and any identified security vulnerabilities.</li> </ul>
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override	If the task allows override, select this option to override the approval process.

Field	Description/Action
Approval	
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options: <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	The task will begin on the date/time specified above, then recur per the following. Select one of the following options: <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including: <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box. <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	

Field	Description/Action
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a> .

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Generate Summary Reports Task Page Fields

The Generate Summary Reports task enables you to update the Summary reports (which by default are updated by a recurring task each Sunday). If you want to permanently change the schedule for updating Summary reports, you can edit the existing recurring task.

Field	Description/Action
Task Name	Displays Generate Summary Reports. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	If you are creating a task template, the template tag for filtering tasks run from the template. Options include: <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Schedule Date	Select one of the following options: <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .

Field	Description/Action
Comments	Enter comments about the task.
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options: <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	The task will begin on the date/time specified above, then recur per the following. Select one of the following options: <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including: <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>



Field	Description/Action
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task's start date, duration, and status. For more information, see "[Task Information Page Fields](#)" on page 405.

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see "[Viewing My Tasks](#)" on page 398.

## Email Report Task Page Fields

The Email Report task enables you to email NA reports.

Field	Description/Action
Task Name	Displays Email Report. You can enter a different task name if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task templates, see "<a href="#">Task Templates</a>" on page 255.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>

Field	Description/Action
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Report to run	Select a report to email. (Keep in mind that each time this task runs, the last saved report is overwritten with the new information. Summary reports cannot be emailed using this task.)  <b>Note:</b> Reports related to policy and compliance are available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page ( <b>Help &gt; About Network Automation &gt; View License Information</b> link).
Applies to	This field is displayed for the Network Status report only. Select the device group against which you want to run the report.
Email Recipients	Enter one or more email addresses. Be sure to separate addresses with commas.
Email Subject	Enter the subject line of the email message.
Email Format	Select one of the following options from the drop-down menu: <ul style="list-style-type: none"> <li>• Default format</li> <li>• HTML mail</li> <li>• CSV file attachment</li> <li>• Plain text</li> <li>• HTML mail (without links)</li> </ul>
File Export	Click the check box to save a copy of the report to file.
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.

Field	Description/Action
<b>Scheduling Options</b>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task's start date, duration, and status. For more information, see "[Task Information Page Fields](#)" on page 405.

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see "[Viewing My Tasks](#)" on page 398.

## Deploy Remote Agent Page Fields

The Deploy Remote Agent task enables you to deploy a NA remote agent on each Satellite Gateway host. By installing a NA remote agent on the same LAN with the devices being managed, WAN traffic can be minimized and Syslog and TFTP can be used to manage the devices locally.

To open the Deploy Remote Agent task, on the menu bar under Tasks, select New Task and click Deploy Remote Agent. You can also navigate to this page by clicking the Deploy Remote Agent link on the Gateway List page. For more information, see "[Gateway List Page Fields](#)" on page 146.

Field	Description/Action
Task Name	Displays Deploy Remote Agent. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"> <li>Save as task — The option is selected by default.</li> <li>Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see "<a href="#">Task Templates</a>" on page 255.</li> </ul>
Template Tag	If you are creating a task template, the template tag for filtering tasks run from the template. Options include: <ul style="list-style-type: none"> <li>General purpose—Do not apply a tag to this task template</li> <li>Existing—Select from the list of existing template tags.</li> <li>New—Enter a new template tag.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p> </div>
Schedule Date	Select one of the following options: <ul style="list-style-type: none"> <li>Start As Soon As Possible (the default)</li> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see " <a href="#">Task Priority, Schedule, and State</a> " on page 249.
Comments	Enter comments about the task.
<b>Task Options</b>	
Action	Select one of the following options:

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Install (or Reinstall) — Installs the NA remote agent. If there is already a NA remote agent installed, the existing NA remote agent is removed and a new NA remote agent is installed.</li> <li>• Uninstall — Uninstalls the NA remote agent.</li> </ul>
Deploy Agent to Gateway	Select the Gateway name from the drop-down menu where the NA remote agent is to be deployed.
Login	<p>Deploying a remote agent requires root privileges on the Satellite Gateway host. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• As Root — SSH as username root and enter the root password.</li> <li>• As Non-root — SSH as a non-root user. If you select this option, select either su Password (the root password) or sudo Password (the sudo password, which is typically the same as your username password, but can be different depending on how sudo is configured).</li> </ul>
Managing Core	<p>If the Core Gateway is installed on the same host as the NA Core, the Managing Core should be “localhost” (the default). If the Core Gateway is on a different host from the NA Core, the Managing Core should be the hostname or IP Address of the NA Core.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> If the NA Core host has a different IP address, use the IP address that is appropriate when connecting to the NA Core from the Core Gateway host.</p> </div>
In Realm	Select the Realm name of the Core Gateway from the drop-down menu.
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	Not available
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>

## Resolve FQDN Task Page Fields

The Resolve FQDN task enables you to set the FQDN (Fully Qualified Domain Name) field for each device in the NA database by running a reverse DNS lookup on the device’s primary IP address. If the FQDN field is unset in the NA database, the Resolve FQDN task populates this field with the value returned by the DNS lookup. If the FQDN field is set in the NA database, the behavior of this task depends on NA configuration.

- If the FQDN field contains an IP address, NA replaces the IP address with the value returned by DNS lookup.
- If the Overwrite Existing Domain Names check box is selected on the Administrative Settings - Server page, NA overwrites the FQDN field with the value returned by DNS lookup. (NA also updates the value of the hostname field.)
- If the dnslookup/always\_override\_existing\_fqdn RCX file option is set to true, NA overwrites the FQDN field with the value returned by DNS lookup but does not change the value of the hostname field.

Field	Description/Action
Task Name	Displays Resolve FQDN. You can enter a different task name if applicable.

Field	Description/Action
Save Options	<p>Select one or more of the following options:</p> <ul style="list-style-type: none"> <li>Save as task — The option is selected by default.</li> <li>Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>General purpose—Do not apply a tag to this task template</li> <li>Existing—Select from the list of existing template tags.</li> <li>New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see <a href="#">"Device Selector" on page 137</a>.</li> <li>CSV File — Enter the name of the CSV file containing the target devices. For more information, see <a href="#">"Task CSV Template File" on page 253</a>.</li> </ul> <p><b>Note:</b> When scheduling tasks to run against an ad-hoc device group (by using the check boxes on the Device List page to select devices for the group), this section displays the devices included in the ad-hoc device group.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Start As Soon As Possible (the default)</li> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	<p>The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a>.</p>
Comments	<p>Enter comments about the task.</p>
<b>Task Options</b>	
Run Mode	<p>For a group task, the method for processing child tasks. Available options are:</p> <ul style="list-style-type: none"> <li>Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status</p>

Field	Description/Action
	<p>of the other child tasks, clear the <b>Stop on Failure</b> check box.</p> <p>If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a>.</p>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
Override Approval	<p>If the task allows override, select this option to override the approval process.</p>
Save as Draft	<p>If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.</p>
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	<p>Enter the number of minutes to wait before trying again. The default is five minutes.</p>
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> </ul>



Field	Description/Action
	<ul style="list-style-type: none"> <li>End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Data Pruning Task Page Fields

Data pruning is a system task that requires a system administrator or someone with similar permissions to configure the system. Data pruning removes obsolete files, diagnostics, events, and tasks. The following files are not removed by data pruning:

- Current configuration
- Configurations scheduled for deployment

When the NA server is configured for pruning, you can specify how long the files should be kept. The default settings for these files include:

- Configurations — 365 days
- Tasks — 365 days
- Diagnostics — 45 days
- Events — 45 days
- Sessions — 45 days
- Log files — 30 days

Field	Description/Action
Task Name	Displays Data Pruning. You can enter a different task name if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p> </div>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Run External Application Task Page Fields

The Run External Application task enables you to schedule an external application to run from NA, such as the “ping” command or an external language interpreter. This task can be used to enable integration with external Help Desk and NMS solutions.

**Note:** On a Windows platform, the path should use the Windows file separator character, which is a backslash (\). The short names (those with ~<n> ) are only needed when a file name includes spaces. For example, `C:\<NA_HOME>` is fine, but `C:\Program Files` is not. Keep in mind that short names are only needed when you are passing parameters, for example: `C:\Program Files\Internet Explorer\iexplore.exe` is fine. However, `C:\Program Files\Internet Explorer\iexplore.exe someFilename.html` will not work. You would need to use `C:\Progra~1\Intern~1\iexplore.exe someFilename.html`.

Field	Description/Action
Task Name	Displays Run External Application. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"> <li>Save as task — The option is selected by default.</li> <li>Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	If you are creating a task template, the template tag for filtering tasks run from the template. Options include: <ul style="list-style-type: none"> <li>General purpose—Do not apply a tag to this task template</li> <li>Existing—Select from the list of existing template tags.</li> <li>New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Schedule Date	Select one of the following options: <ul style="list-style-type: none"> <li>Start As Soon As Possible (the default)</li> <li>Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	

Field	Description/Action
Run	Enter the command line utility or script you want to execute. Be sure to provide the fully-qualified path and filename for the executable file. You can supply parameters to an external application by supplying both the name of the application to run, followed by its parameter(s). For example, to run an external command “foo” with parameters “bar” and “bat”, you would enter “foo bar bat” without the quotes.
Start in	Enter the path of the external application and the startup directory for that application.
Task Result	Check the “Treat non-zero result code as fail task” box if you want to treat non-zero result code as a failed task.
Text Output	Select one of the following options: <ul style="list-style-type: none"> <li>Results from stdout (the default) — After the application runs, its standard text output to the console is stored in the Task Details. This is used for most applications, such as command line utilities.</li> <li>Results from file — For no output, select this option, but leave the filename blank. After the application runs, NA reads this file and includes the contents in the Task Details. This is useful for commands that write output to a file instead of stdout. Be sure to enter the fully-qualified path to the result file, if applicable.</li> </ul>
<b>Approval Options</b>	
Approval options are only displayed if the task is part of a Workflow Approval Rule.	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options: <ul style="list-style-type: none"> <li>No Retry (the default)</li> <li>Once</li> <li>Twice</li> <li>Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring	The task will begin on the date/time specified above, then recur per the following. Select one

Field	Description/Action
Options	<p>of the following options:</p> <ul style="list-style-type: none"> <li>Once Only — The task occurs only once on the specified date/time (the default).</li> <li>Periodically — Specify a Repeat Interval in minutes.</li> <li>Daily — The task occurs each day at the specified time.</li> <li>Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>No End Date (the default)</li> <li>End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	<p>Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.</p>
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Deploy Hotfix

Use the Deploy Hotfix task to schedule and automate the installation of one hotfix in the NA environment. To install multiple hotfixes, run the Deploy Hotfix task once for each hotfix.

The Deploy Hotfix task carries out the following processes:

1. Configures NA to not start any new tasks for the duration of the Deploy Hotfix task. Tasks remain in the Pending and Waiting states until the Deploy Hotfix task completes or times out.
2. If necessary, downloads the hotfix package from an FTP server.
3. Extracts the hotfix package to the designated directory.
4. Runs the hotfix installation script to place the hotfix files into the correct locations on the NA core server.
5. Restarts the NA services.
6. Configures NA to start new tasks according to task schedules.

**Note:** A running Deploy Hotfix task cannot be canceled after NA starts the hotfix installation script.

In a **Horizontal Scalability**<sup>1</sup> environment, for a Deploy Hotfix task that includes multiple NA cores, the following additional information applies:

- If the Deploy Hotfix task is configured to download the hotfix package from an FTP server, only the NA core on which the task was created must be able to reach the FTP server. The other NA cores receive the hotfix package from the first NA core (after successful deployment of the hotfix to that NA core).
- The Deploy Hotfix task runs first on the NA core on which the task was created. Then, the task runs on the other NA cores in numerical order.

If the NA core on which the task was created is not selected in the **Target NA Cores** field, the Deploy Hotfix task runs on that NA core for the purpose of initiating the task on the selected NA cores. In this case, NA does not deploy the hotfix on that NA core.

- The first Deploy Hotfix task becomes the parent task that spawns a child task on each of the other selected NA cores. NA updates the parent task with the status of the child tasks.
- NA waits for the Deploy Hotfix task to complete or time out on one NA core before starting the Deploy Hotfix task on another NA core.
- In the case of NA core failover, the Deploy Hotfix task for the stopped NA core is not moved to a different NA core. Instead that task is moved to the Failed state.
- For finer control of hotfix deployment, create a Deploy Hotfix task for one NA core at a time. In this way you can validate that the hotfix was deployed successfully before initiating the next Deploy Hotfix task.

**Note:** Use the Deploy Hotfix task only for an individual hotfix provided by Support. The Deploy Hotfix task does not support NA patch installation.

### Deploy Hotfix Task Page Fields

Field	Description/Action
Task Name	The name of this task instance. The default value is Deploy Hotfix. <b>Best practice:</b> Include the hotfix number in the task name to simplify searching for this task.
Save Options	Select one of the following options:

<sup>1</sup>A configuration where multiple NA cores connect to a single NA database. For more information, see the NA Horizontal Scalability Guide.

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about task templates, see "<a href="#">Task Templates</a>" on page 255.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see " <a href="#">Task Priority, Schedule, and State</a> " on page 249.
Comments	Enter comments about the task.
<b>Task Options</b>	
Hotfix Package	<p>The location of the hotfix package. Available options include:</p> <ul style="list-style-type: none"> <li>• Local File — The location of the file on the local system. Click <b>Browse</b> to locate the file.</li> <li>• Network File — The location of the file on an FTP server accessible from this NA core server. Specify the FTP server, user name, password, and path to the file in URL format. For example: ftp://\$UserName\$: \$Password\$@server.example.com/pub/hf1234.zip</li> </ul> <p><b>Note:</b> The hotfix package must be in .zip format.</p>
MD5 Checksum	The MD5 checksum of the hotfix file. NA compares the MD5 checksum of the downloaded file to this value.
Extraction Directory	<p>The directory in which NA will extract the hotfix package. This directory must exist on each target NA core at the time this task runs. Specify the full path to the file.</p> <p><b>Note:</b> The directory path and name must not contain any white space.</p> <p><b>Note:</b> For a non-root user, you must grant all permissions to this directory; else, the Deploy Hotfix task fails.</p>



Field	Description/Action
Immediacy	<p>The task urgency setting.</p> <ul style="list-style-type: none"> <li>If NA should wait for the currently running tasks to complete before initiating this task, select the <b>Wait for Running Tasks to Complete</b> check box.</li> <li>If NA should start this task immediately, clear the <b>Wait for Running Tasks to Complete</b> check box.</li> </ul> <p>When the NA services are restarted, all running tasks on the NA core are moved to the Failed state.</p>
Target NA Cores	Select the NA cores to receive the hotfix with this task instance.
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>No Retry (the default)</li> <li>Once</li> <li>Twice</li> <li>Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	Not available
<p><b>Task Completed Notification</b></p>	
Task Completed Notification	If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.

Field	Description/Action
	<p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a> .

If the task is scheduled to run immediately, the Task Information page opens. The Task Information page provides task details, such as the task’s start date, duration, and status. For more information, see ["Task Information Page Fields" on page 405](#).

If the task is scheduled to start in the future, the My Tasks page opens with the new task highlighted. For more information, see ["Viewing My Tasks" on page 398](#).

## Scheduling Multi-Task Projects

You can configure a multi-task project to run several different tasks sequentially joined together under a single project. For example, you might want to perform a software upgrade and then push an updated configuration to the device. Consolidating the tasks together under one project simplifies the management approvals by authorizing work at the project level rather than the task level. It also enables you to coordinate sets of disparate tasks and manage them as one unit.

**Note:** You must have the proper permissions to run Multi-Task Projects. For more information, see ["User Roles and Permissions Page Fields " on page 233](#).

Each task included in the multi-task project is run in the order you specify. For example, you can schedule driver discovery, a snapshot, run a custom script, and so on, for a group of devices. Keep in mind that as far as the NA Scheduler is concerned, the multi-task project is considered one task. When the multi-task project is scheduled to run, the NA Scheduler runs all the tasks in the order specified. If for some reason one of the tasks in the multi-task project does not run, the multi-task project fails. If the multi-task project requires approval, when the multi-task project is approved, all of the tasks included in the multi-task project are automatically approved.

**Note:** You can reserve devices and/or device groups using the Multi-Task Project page.

## Sub-task Warning Status

For multi-task projects, if a sub-task completes with a Warning status, you can continue to run subsequent sub-tasks or cancel all of the remaining sub-tasks. This feature enables you to cancel tasks that are running against a device that could be experiencing issues.

To enable this feature:

1. From the Admin menu, navigate to the Custom Data Setup page.
2. Scroll down to the 6th API Name field under the Tasks section.
3. In the 6th API Name field, enter: `subtask_control`
4. In the Display Name field, enter: Cancel remaining tasks that have warning message
5. In the Values field, check the Limit to: checkbox and enter: Yes , No
6. Click the Save button.

If this feature is enabled, when you create sub-tasks for multi-task projects, the following field is displayed under the Comments field on all multi-task sub-task pages: Cancel remaining tasks that have warning messages

This field includes the following options:

- Blank — The remaining sub-tasks continue to run.
- Yes — The remaining sub-tasks are canceled.
- No — The remaining sub-tasks continue to run.

**Note:** To disable this feature, uncheck the 6th API Name checkbox on the Custom Data Setup page and click the Save button.

To create a multi-task project, on the menu bar under Tasks, click New Multi-Task Project. The New/Template Task - Multi-Task Project page opens.

## Multi-Task Project Page Fields

Field	Description/Action
Task Name	Displays Multi-Task Project. You can enter a different task name if applicable.
Save Options	Select one of the following options: <ul style="list-style-type: none"><li>• Save as task — The option is selected by default.</li><li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about Task Templates, see <a href="#">"Task Templates" on page 255</a>.</li></ul>
Schedule Date	Select one of the following options: <ul style="list-style-type: none"><li>• Start As Soon As Possible (the default)</li><li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li></ul>

Field	Description/Action
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Add any comments about the multiple task job.
<b>Task Options</b>	
Sub Tasks	Select a subtask from the drop-down menu. Depending on the subtask you select, the new task page for that task opens, where you can configure the task. For example, if you select the Configure Syslog task, the New Task/Template – Configure Syslog page opens. As you add tasks, they are displayed on the Edit Task - Multiple Task Project page. You can edit or delete the task if necessary. When you click Save Task, the Pending Tasks page opens. For more information, see <a href="#">"Viewing Scheduled Tasks" on page 400</a> .
Reserved Devices	Use the Device Selector to reserve devices. For information about using the Device Selector, see <a href="#">"Device Selector" on page 137</a> or click the question mark (?) in the upper right-hand corner of the Device Selector.
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that the tasks are to run against. The default is 60 minutes.
<b>Approval Options</b>	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<b>Scheduling Options</b>	
Retry Count	If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options: <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	Not available

Field	Description/Action
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon completion of the multi-task project, select the <b>Send Email</b> check box. Click the information icon to view the format of the email content (subject and body).</p> <p><b>Note:</b> NA does not send an email message upon completion of each subtask.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.

After entering the required information, click Save.

## How to Configure a Multi-Task Project

This section steps you through the process of setting up a multi-task project, including reserving devices and/or device groups for your project and using the Activity Calendar to view your project's reserved devices and/or device groups.

1. On the menu bar under Tasks, click New Multi-Task Project. The New Task/Template - Multi-Task Project page opens.
2. In the Task Name field, enter a name for your project, for example Pine Valley Office. It is assumed that you have already added specific devices and/or device groups to a parent group named Pine Valley Office . If not, see ["Adding Device Groups" on page 132](#) for information.
3. In the Schedule Date field, either check Start As Soon As Possible (the default) or click the calendar, from which you can select a date and time you want your project to start.
4. Click the down arrow to select a task priority from 1 to 5, with 1 being the highest priority. The default value is 3. Higher priority tasks run before lower priority tasks.
5. In the Comments field, enter comments about your project.
6. In the Sub Tasks field under Task Options, select a sub-task you want to include in your project from the drop-down menu. For example, if you select the Deploy Passwords task, the New Task/Template - Deploy Passwords page opens.
7. Using the Deploy Passwords page, in the Applies To field, select Pine Valley Office from the drop-down menu. You could also enter the name or browse for a CSV file containing a list of the devices and/or device groups in Pine Valley Office.
8. Complete the Task Options section. The options displayed in this section differ from task to task. For information about the Deploy Password task, see ["Deploy Passwords Task Page Fields" on page 264](#) .
9. Click Save Task. You are returned to the Multi-Task Project page, where you can add additional sub-tasks to your project.

10. To reserve all of the devices in the Pine Valley Office, in the Reserved Devices field, click Modify. The Device Selector opens.
11. Double click Pine Valley Office. All devices in the Pine Valley Office are displayed.
12. If you want to reserve all of the devices in the Pine Valley Office, click Select All and then click the right arrows (>>>). The devices are listed in the Selected Devices box. To add only specific devices, you can narrow your search by entering a portion of the host name or IP address of the device or select only devices you want to add, and then click the right arrow.
13. Enter the Estimated Duration time for which you want to reserve the devices. The default is one hour.
14. Click Save Task. The list of reserved devices is included in the Reserved Devices field.
15. Click Save Task. The My Tasks page opens, where you can edit, delete, pause, or run your project immediately.
16. On the menu bar under Tasks, click Activity Calendar. The Activity Calendar opens.
17. Using the calendar, select the day on which your project has reserved the Pine Valley Office devices. Your project, Pine Valley Office, is displayed in the time slot you selected.
18. Click Pine Valley Office. The Task Information page opens, where you can view detailed information about your project.

## Viewing My Tasks

The My Tasks page shows tasks originated by the currently logged in user, including the task approval status, if applicable, and if the task has not yet run.

To view the My Task page, on the menu bar under Tasks, click My Tasks. The My Task page opens.

### My Tasks Page Fields

Field	Description/Action
My Drafts link	If applicable, opens the My Drafts page.
Approval Requests link	If the task requires approval, opens the Approval Requests page, where you can view tasks needing approval by the currently logged in user. By default, the page shows tasks that have not completed, including tasks that are: <ul style="list-style-type: none"> <li>• Not approved</li> <li>• Waiting Approval</li> <li>• Waiting to run</li> </ul> For more information, see " <a href="#">Approval Requests</a> " on page 646.
Scheduled Tasks link	Opens the Scheduled Task page for viewing the tasks that are in the queue but have not yet run. For more information, see " <a href="#">Viewing Scheduled Tasks</a> " on page 400.
Running Task link	Opens the Running Task page for viewing all running tasks. For more information, see " <a href="#">Viewing Running Tasks</a> " on page 401.
Recent Tasks link	Opens the Recent Tasks page for viewing the recent tasks. For more information, see " <a href="#">Viewing Recent Tasks</a> " on page 403.

Field	Description/Action
Show Tasks Check Boxes	<p>If the task requires approval, you can select the following display options:</p> <ul style="list-style-type: none"> <li>• Approved</li> <li>• Not Approved</li> <li>• Waiting Approval</li> <li>• Overridden</li> <li>• Draft</li> <li>• No Approval Required</li> </ul>
Check Boxes	<p>You can use the left-side check boxes to delete tasks. After you select the tasks, click the Actions drop-down menu and click Delete/Cancel. The adjacent Select drop-down menu enables you to select or deselect all tasks.</p>
Schedule Date	<p>Displays the date and time the task was created.</p>
Approved By Date	<p>If applicable, displays the date and time the task must be approved. If a task is not approved by its approval date, its status is set to "Not Approved." ( Approval options are only displayed if the task is part of a Workflow Approval Rule.)</p>
Task Name	<p>Displays the task name. Clicking a task opens the Task Details page. For more information, see <a href="#">"About Tasks" on page 245</a>.</p>
Approval Status	<p>If applicable, displays the task's approval status. Approval status is only displayed if the task is part of a Workflow Approval Rule. Approval statuses include:</p> <ul style="list-style-type: none"> <li>• Awaiting Approval</li> <li>• Approved</li> <li>• Not Approved</li> <li>• Overridden</li> <li>• No Approval Required</li> </ul>
Task Status	<p>The task state. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a>.</p>
Priority	<p>The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a>.</p>
Task Type	<p>Displays the task type, for example:</p> <ul style="list-style-type: none"> <li>• Deploy Password</li> <li>• Deploy Config</li> <li>• Discover Driver</li> <li>• Reboot Device</li> <li>• Take Snapshot</li> <li>• Synchronize Startup and Running Configurations</li> </ul> <p>For a complete list of tasks, see <a href="#">"About Tasks" on page 245</a>. ( Multi-Task Project tasks may or may not be displayed on the My Tasks results page. It depends on whether the Multi-Task</p>

Field	Description/Action
	Project task includes at least one of the task types listed above as a sub-task.)
Actions	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Delete — Enables you to delete the task.</li> <li>• Pause — Pauses the task so it does not run at its scheduled time. ( You can select Resume if you want to resume the task.)</li> <li>• Run Now — Runs the task as soon as possible. If the maximum number of concurrent tasks has not been reached, the task runs immediately.</li> <li>• Edit — Opens the Edit Task page.</li> </ul>
Display results in groups of	You can set the number of items to display per page from the drop-down menu. The default is 25.

## Viewing Scheduled Tasks

To view scheduled tasks that are in the queue, but have not yet run, on the menu bar under Tasks click Scheduled Tasks. The Scheduled Tasks page opens.

### Scheduled Tasks Page Fields

Field	Description/Action
My Tasks link	Opens the My Task page for viewing the status of each task. For more information, see <a href="#">"Viewing My Tasks" on page 398</a> .
Task Templates link	Opens the Task Template page. Refer to <a href="#">"Task Templates" on page 255</a> for information.
Running Task link	Opens the Running Task page for viewing all running tasks. For more information, see <a href="#">"Viewing Running Tasks" on the next page</a> .
Recent Tasks link	Opens the Recent Tasks page for viewing the recent tasks. For more information, see <a href="#">"Viewing Recent Tasks" on page 403</a> .
Template Tag	The template tag filter. Select an item from the list.
Current Working Group	The device filter. Select a device group from the list.
Show Child Tasks	To include child and parent tasks in the list of running tasks, select this check box. To include only parent tasks in list of running tasks, clear this check box.
Check Boxes	You can use the left-side check boxes to delete/cancel scheduled tasks. After selecting the tasks, click the Actions drop-down menu and click one of the following options:



Field	Description/Action
	<ul style="list-style-type: none"> <li>Delete</li> <li>Cancel</li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all tasks.</p>
Schedule Date	Displays the date and time when NA is scheduled to run the task.
Task Name	Displays the task name.
Host/Group	Displays the host or group name of the network device(s) associated with the task. You can click the link to open the Device Information page, where you can view basic information about the devices in the group.
Task Status	The task state. For more information, see <a href="#">"Task Priority, Schedule, and State"</a> on page 249.
Priority	Displays the task's priority. For more information, see <a href="#">"Task Priority, Schedule, and State"</a> on page 249.
Scheduled By	Displays the login name of the person who scheduled the task (or the last user to modify the task).
Comments	Displays comments about the pending task.
Actions	<p>You can select the following actions for each entry in the Pending Tasks table:</p> <ul style="list-style-type: none"> <li>Delete — Deletes the task.</li> <li>Pause — Pauses the task so it does not run at its scheduled time. ( You can select Resume if you want to resume the task.)</li> <li>Run Now — Runs the task as soon as possible. If the maximum number of concurrent tasks has not been reached, the task runs immediately.</li> <li>Edit — Opens the Edit Task page, where you can edit and rerun the task that is recurring or has not yet occurred.</li> <li>Create Template — Opens the Task Templates page, where you can save task definitions so that you can easily configure and run new and existing tasks without having to start from scratch. For more information, see <a href="#">"Task Templates"</a> on page 255.</li> </ul>
Display results in groups of	You can set the number of items to display per page from the drop-down menu. The default is 25.

## Viewing Running Tasks

To view running tasks, on the menu bar under Tasks click Running Tasks. The Running Tasks page opens.

**Note:** To change the task page refresh interval, on the menu bar under Admin, select Administrative Settings and click User Interface. On the User Interface page, scroll down to the Miscellaneous section

and enter a task page refresh interval.

### Running Tasks Page Fields

Field	Description/Action
My Tasks link	Opens the My Task page for viewing the status of each task. For more information, see <a href="#">"Viewing My Tasks" on page 398</a> .
Scheduled Task link	Opens the Scheduled Task page for viewing the tasks that are in the queue but have not yet run. For more information, see <a href="#">"Viewing Scheduled Tasks" on page 400</a> .
Recent Tasks link	Opens the Recent Tasks page for viewing the recent tasks. For more information, see <a href="#">"Viewing Recent Tasks" on the next page</a> .
Template Tag	The template tag filter. Select an item from the list.
Current Working Group	The device filter. Select a device group from the list.
Show Child Tasks	To include child and parent tasks in the list of running tasks, select this check box. To include only parent tasks in list of running tasks, clear this check box.
Refresh this page every 60 seconds	Uncheck this box if you do not want the display to refresh every 60 seconds. For more information about setting this value, see <a href="#">"User Interface Page Fields" on page 54</a> .
Check Boxes	You can use the left-side check boxes to delete/cancel tasks. After you select the tasks, click the Actions drop-down menu and click one of the following options: <ul style="list-style-type: none"> <li>• Delete</li> <li>• Cancel</li> </ul> The adjacent Select drop-down menu enables you to select or deselect all tasks.
Start Date	Displays the date and time NA began running the task.
Task Name	Displays the task type.
Host/Group	Displays the host or group name of the network device(s) associated with the task. You can click the link to open the Device Information page, where you can view basic information about the devices in the group.
Task Status	Displays the status of the task (running). If the maximum number of concurrent tasks has been reached, the task is waiting for another task to finish. Consequently, the Running Tasks page returns "No Tasks Found." ( The number of tasks could exceed the Max Concurrent Tasks value because group parent tasks are not included in the setting.)
Priority	Displays the task's priority level. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .

Field	Description/Action
Core	In a <a href="#">Horizontal Scalability</a> <sup>1</sup> or <a href="#">Multimaster</a> <sup>2</sup> Distributed System environment, displays the name of the NA core on which the task is running.
Partition	If NA uses partitions, displays the name of the partition in which the task is running. For more information about creating Partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a> .
Scheduled By	Displays the login name of the person who scheduled the task (or the last user to modify the task).
Comments	Displays comments about the pending task.
Actions	Available actions include: <ul style="list-style-type: none"> <li>• Detail — Opens the Task Information page, where you can view details about the task.</li> <li>• Cancel — Cancels the task.</li> <li>• Increase Priority — If your NA user is authorized to do so, increases the task's priority level. Available for parent tasks only.</li> <li>• Decrease Priority — Decreases the task's priority level. Available for parent tasks only.</li> </ul>
Display results in groups of	You can set the number of items to display per page from the drop-down menu.

## Viewing Recent Tasks

To view recent tasks, on the menu bar under Tasks click Recent Tasks. The Recent Tasks page opens. The Recent Tasks page shows all recent tasks, regardless of their status.

### Recent Tasks Page Fields

Field	Description/Action
My Tasks link	Opens the My Task page for viewing the status of each task. For more information, see <a href="#">"Viewing My Tasks" on page 398</a> .
Task Templates link	Opens the Task Template page. Refer to <a href="#">"Task Templates" on page 255</a> for information.
Scheduled Tasks link	Opens the Scheduled Task page for viewing the tasks that are in the queue but have not yet run. For more information, see <a href="#">"Viewing Scheduled Tasks" on page 400</a> .
Running Tasks link	Opens the Running Task page for viewing all running tasks. For more information, see <a href="#">"Viewing Running Tasks" on page 401</a> .

<sup>1</sup>A configuration where multiple NA cores connect to a single NA database. For more information, see the NA Horizontal Scalability Guide.

<sup>2</sup>A system with more than one database, where each database contains a complete set of all data.

Field	Description/Action
Template Tag	The template tag filter. Select an item from the list.
Current Working Group	The device filter. Select a device group from the list.
Show Tasks Within	Select the time frame for which to view recent tasks, and then click Refresh.
Show Detail	To view task details for the recent tasks, select this check box, and then click Refresh.
Show Child Tasks	To include child and parent tasks in the list of recent tasks, select this check box, and then click Refresh.  To include only parent tasks in list of recent tasks, clear this check box, and then click Refresh.
Task Status	Select the task statuses to display, and then click Refresh.
Check Boxes	You can use the left-side check boxes to delete/cancel tasks. After you select the tasks, click the Actions drop-down menu and click one of the following options: <ul style="list-style-type: none"> <li>• Delete</li> <li>• Cancel</li> </ul> The adjacent Select drop-down menu enables you to select or deselect all tasks.
Complete Date	Displays the date and time NA began running the task.
Task Name	Displays the task type.
Host/Group	Displays the host or group name of the network device(s) associated with the task. You can click the link to open the Device Information page, where you can view detailed information about the devices in the group.
Task Status	The task state. For more information, see " <a href="#">Task Priority, Schedule, and State</a> " on page 249.
Priority	The task priority. For more information, see " <a href="#">Task Priority, Schedule, and State</a> " on page 249.
Core	In a Horizontal Scalability or Multimaster Distributed System environment, displays the name of the NA core on which the task ran.
Partition	If NA uses partitions, displays the name of the partition in which the task ran. For more information about creating Partitions, see " <a href="#">Segmenting Devices and Users</a> " on page 142.
Scheduled By	Displays the login name of the person who scheduled the task (or the last user to modify the task).

Field	Description/Action
Comments	Displays comments about the task.
Actions	<p>You can select the following action for each task in the Recent Tasks table:</p> <ul style="list-style-type: none"> <li>• Detail — Opens the Task Information page, where you can view details about the task.</li> <li>• Run Again — Opens the Rerun Task page, where you can edit the task and run it again. <b>(Note:</b> This option only appears if the task can be rerun.)</li> <li>• Create Template — Opens the Task Templates page, where you can save task definitions so that you can easily configure and run new and existing tasks without having to start from scratch. For more information, see "<a href="#">Task Templates</a>" on page 255.</li> </ul>
Display results in groups of	You can set the number of items to display per page from the drop-down menu.

## Task Information Page Fields

The Task Information page includes detailed information on tasks, including:

- Task status
- Task priority
- Originator
- Devices affected
- Duration
- Approval information
- Result details
- Task history

The Task information page also provides links to more detailed information in the event of a warning or failure. Keep in mind that a task can be successfully completed but still contain errors. For example, you could successfully deploy to a running configuration but have invalid commands within the configuration.

To open the Task Information page:

1. Select a device from the Inventory page. The Device Details page opens.
2. From the View drop-down menu, click Device Tasks. The Device Tasks page opens.
3. Click the Detail option in the Actions column for the task on which you want detailed information. The Task Information page opens.

Field	Description/Action
Edit Task link	Opens the task page so that you can edit the task. This link is only displayed for pending tasks. For more information, see " <a href="#">About Tasks</a> " on page 245.
Run Again link	Opens the task page so that you can re-run the task. This link is only displayed for completed tasks. For more information, see " <a href="#">About Tasks</a> " on page 245.

Field	Description/Action
Return to List link	Opens the My Tasks page. For more information, see <a href="#">"Viewing My Tasks" on page 398</a> .
<b>General Information</b>	
Task Name	Displays the task name.
Task Status	The task state. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .  <b>Note:</b> Multi-task projects continue processing when a warning is encountered. The warning status is shown in the parent task.
Comments	Displays any comments about the task.
Originator	Displays the username or process that scheduled the task.
Priority	Displays the task's priority. There are five task priority levels, 1 through 5. 1 is the highest task priority level. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Create Date	Displays the date and time the task was created.
Devices Affected	Displays the host name and/or IP address of the affected device.
Schedule Date	Displays the date and time the task was scheduled to run.
Start Date	Displays the task's start date.
Complete Date	Displays the task's complete date.
Duration	Displays the task's duration.
Repeat Type	Displays the repeat type, for example: non-recurring.
Run Mode	The processing method for this task. For more information, see <a href="#">"Task Run Mode" on page 252</a> .
Core	In a Horizontal Scalability or Multimaster Distributed System environment, the NA core association for the task. For more information, see <a href="#">"NA Core Association for a Task" on page 251</a> .
Parent Task	Displays the parent task.
<b>Approval Information</b>	

Field	Description/Action
Approver (s)	Displays a list of task approvers.
Approval Status	Displays the task approval status.
Priority	Displays the task priority.
Approved By	Displays the date and time the task must be approved.
New Comments	Enter additional comments about the task.
Approve Button	Click the Approve button to approve the task.
View Task Details link	Clicking the View Tasks link opens the Diagnostics History page.
<b>Additional Information</b>	
Result Details	<p>Displays the diagnostics that were automatically run (depending on the device type), for example:</p> <ul style="list-style-type: none"> <li>• Diagnostic “NA Module Status” completed</li> <li>• Diagnostic “NA Routing Table” completed</li> <li>• Diagnostic “NA Interfaces” completed</li> <li>• Diagnostic “NA OSPF Neighbors” completed</li> </ul>
<b>Task History</b>	
Task History Information	Displays task history information, such as when the task was run, the repeat type, and status.

## Viewing Task Load

The Task Load page provides a glimpse into the health of the NA task subsystem. This page includes all running and waiting tasks, including tasks the current user might not have permission to view.

In a single NA core environment, the Task Load page displays information about the tasks on the NA core.

In a **Horizontal Scalability**<sup>1</sup> environment, the Task Load page displays information about the tasks on each NA core in the environment.

The Task Load page refreshes automatically.

<sup>1</sup>A configuration where multiple NA cores connect to a single NA database. For more information, see the NA Horizontal Scalability Guide.

To view the Task Load page, on the menu bar under Tasks, click Task Load. The Task Load page opens. (You can also access this page under Admin.)

### Task Load Page

Field	Description
<b>Local Core Information</b> In a single NA core environment, this table displays information about the tasks on the NA core. In a Horizontal Scalability or <b>Multimaster</b> <sup>1</sup> Distributed System environment, the Local Core table displays information about the tasks on the NA core to which the NA console is connected. However, the Max Concurrent Tasks and the Max Concurrent Group Tasks are specific to the NA Cores and cannot be replicated across the Cores in a Multimaster Distributed System environment.	
Max Concurrent Tasks	The current configuration for the Max Concurrent Tasks setting. To adjust this value, click the Max Concurrent Tasks link.
Tasks Running	The number of currently running tasks. If this value is less than the value of the Max Concurrent Tasks setting, see the Message field for an explanation of the difference.
Tasks Waiting	The number of tasks waiting to be run. As each running task completes, NA starts one of the waiting tasks.
Message	A statement that answers the following question: How does the number of running tasks compare to the Max Concurrent Tasks setting?
Efficiency	A brief description of how well NA is processing the current task load. Possible values are: <ul style="list-style-type: none"> <li>• Optimal</li> <li>• Moderate</li> <li>• Poor</li> </ul> For information about tuning NA to process tasks more efficiently, see the <i>NA Administration Guide</i> .
<b>Remote Core Information</b> In a Horizontal Scalability environment, the Remote Cores table displays information about the tasks on the other NA scores.	
Name	The name of the NA core.
Core Hostname	The hostname of the NA server.

<sup>1</sup>A system with more than one database, where each database contains a complete set of all data.



Field	Description
Tasks Running	The number of tasks currently running on the core.
Tasks Waiting	The number of tasks waiting to be run on the core.

# Chapter 8: Managing Policy Assurance

The HPE Network Automation Premium edition license does not include this feature. It is available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page ([Help > About Network Automation > View License Information](#) link).

**Note:** For an NA Premium license, by default, the policies are marked as **inactive** in the database. When you upgrade to the NA Ultimate license, ensure that you make the required policies **active** manually.

Use the following table to quickly locate information.

Topic	Refer to:
Getting Started	<a href="#">"Getting Started" below</a>
Creating a Policy	<a href="#">"Creating a Policy" on page 412</a>
Creating a Policy Rule	<a href="#">"New Rule Page Fields" on page 416</a>
Importing/Exporting Policies	<a href="#">"Importing/Exporting Policies" on page 420</a>
Editing a Policy	<a href="#">"Editing a Policy" on page 421</a>
Viewing Applied Policies	<a href="#">"Viewing Applied Policies" on page 424</a>
Viewing Policy Activity	<a href="#">"Viewing Policy Activity" on page 425</a>
Viewing Policy Compliance	<a href="#">"Viewing Policy Compliance" on page 425</a>
Adding a New Compliance	<a href="#">"Adding New Software Levels" on page 427</a>
Testing Policy Compliance	<a href="#">"Testing Policy Compliance" on page 432</a>

## Getting Started

The HPE Network Automation (NA) Policy Manager enables you to establish standards, or best practices, to ensure your network meets your security, reliability, and quality goals. By providing policy enforcement capability and integrated remediation, NA automates the laborious task of validating that devices and configurations match defined best practices, as well as the remediation steps required to bring the device back into compliance with those best practices.

The NA Policy Manager also plays a critical role in meeting regulatory compliance requirements, such as PCI or Sarbanes-Oxley (SOX) in a cost-effective and efficient manner.

The following terms are used in this section:

- Policy — A Policy is a collection of rules that test the configuration and run-time state of your devices.
- Rule — A Rule is an automated test that validates at least one of the following:

- Specific configuration settings
  - Specific data model element
  - The run-time state of a device (also known as a Diagnostic)
  - The software version running on a device
- Diagnostic — A Diagnostic is a command that is run on a device to collect information about the device that is not captured in its configuration file. For example, on a Cisco router, a Diagnostic would be the output of the command Show NTP Status. For a list of Diagnostics, see the Diagnostics field in "[View Menu Options](#)" on page 185.
  - Rule Exception — A rule exception is part of a rule. However, its purpose is to exclude text it matches in the device configuration from consideration by the rule it is part of.
  - Auto-remediation — A predefined script that will run automatically when a device is out of compliance with a policy rule.

## How the NA Policy Manager Works

To get started with the NA Policy Manager, you first create policies within NA to define the best practice standards to which devices must adhere. Next, you test your policies to validate that they are correctly catching violations. Finally, you assign each policy to a specific device group (or a set of device groups). As a result, NA automatically validates that devices match the defined policies.

Each time a device changes, e.g., the device is reloaded or experiences a configuration change, NA validates that device against the policy assigned to its device group. If the device fails the Policy check, the device is marked as out of compliance. If a change to a device (or group of devices) is non-compliant, the NA Policy Manager generates an event and triggers a notification rule. As a result, you can correct the non-compliant change, preserving both compliance and network availability.

You can summarize the policy compliance status for all of your managed devices. This enables you to provide a risk-rated snapshot of your policy compliance statuses and quickly identify and resolve high-risk configuration and software level violations.

When NA runs a policy check against a device, it processes each rule and checks whether the rule applies to the device or not. If the rule applies, the device is tested against the rule. If the rule does not apply, the rule is skipped for that device.

Rules can be applied in two ways:

- The rule is device family specific. The rule is only checked against a device if the device is using a specific driver, such as Cisco IOS or Juniper JunOS. For example, if you create a rule to apply to devices with Cisco IOS drivers, the rule is never validated against an Extreme switch.
- The rule is device family indifferent. The rule is validating criteria in the normalized data model and therefore is not device family specific. By default, NA parses configuration and device information into normalized elements for its data model. This includes device attributes, such as model number, hostname, location, and so on. Because this data is normalized across all device families, it is not device family specific. As a result, you can apply the rule to all device families, thereby eliminating the need to create a specific rule for each device family in your network.

**Note:** If you set a rule to all device families, you should not use the config or config block criteria in that

rule. Config and Config Block formats are device family specific. If you use the config or config block criteria and set the rule to support all device families, you will get numerous false positives, as NA attempts to find the configuration text in each device configuration.

When executing a policy that checks configuration text, NA removes any leading white spaces by default. As a result, when defining a configuration text that could have leading white spaces, be sure to formulate the regular expression such that it will look for the white space character(s).

For example, if the configuration text on which to search is (note that there are two leading white spaces at beginning of the line):

```
description this yields unexpected results
```

you would typically use the following regular expression to define the configuration text block that the policy should look for:

```
\s+description.*
```

**Note:** \s is the regular expression that matches any white space character. When you run the policy against the configuration, however, the configuration fails the policy. When the \s is removed from the configuration text definition in the policy rule, the configuration passes the policy because NA strips off the leading white spaces by default from the configuration text.

## Creating a Policy

The HPE Network Automation Premium edition license does not include this feature. It is available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page ([Help > About Network Automation > View License Information](#) link).

Before you can create policies rules, you need to create a policy. To create a policy, on the menu bar under Policies click Policy List. The Policies page opens.

NA ships with several default policies, including the NSA Router Best Practices policy. Some examples of policies you might want to configure include:

- All configurations in a device group must have Access List 110 defined.
- All Fast Ethernet interfaces must have duplex set to Auto Negotiate.
- All border routers must have certain DNS servers.

**Note:** You can navigate directly to the New Policy page by clicking the New Policy option, or you can view the existing polices on the Policies page and then click the New Policy link at the top of the page.

## Policies Page Fields

Field	Description
New Policy	Opens the New Policy page, where you can create a new configuration policy. For more

Field	Description
link	information, see <a href="#">"New Policy Page Fields" on the next page.</a>
Check Policy Compliance link	<p>Opens the Check Policy Compliance task page, where you can check for policy compliance. For more information, see <a href="#">"Check Policy Compliance Task Page Fields" on page 372.</a></p> <p><b>Note:</b> You can also navigate to the Check Policy Compliance task page by clicking the Check Policy Compliance option under Policies → Policy Tasks on the menu bar.</p>
Import/Export link	<p>Opens the Import/Export Policies page, where you can import a pre-configured configuration policy or export a configuration policy to a file. For more information, see <a href="#">"Importing/Exporting Policies" on page 420.</a></p> <p><b>Note:</b> You can also navigate to the Import/Export Policies page by clicking the Import/Export Policies option.</p>
Policy Tag drop down menu	Enables you to select a policy tag. As a result, you can easily group policies.
Check Boxes	<p>You can use the left-side check boxes to manage configuration policies. Once you have selected the policies, click the Actions drop-down menu and click either:</p> <ul style="list-style-type: none"> <li>• Activate — Instructs NA to check the compliance configurations against the selected policies.</li> <li>• Deactivate — Instructs NA not to check the compliance configurations against the selected policies.</li> <li>• Batch Edit — Enables you to batch edit policies. As a result, you can easily change the policy status (Active or Inactive) and the device groups (Scope) to which the policies are applied.</li> <li>• Delete — Deletes the selected polices.</li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the polices.</p>
Policy Name	Displays the policy name.
Status	Displays the policy's status, either Active or Inactive.
Partition	<p>If you have created Partitions for security or business reasons, you can partition polices for a specific Partition. Keep in mind that you can configure polices to be shared by all users in a Partition, as well as for specific users in specific Partitions. If the policy is available to all Partitions, it is labeled [Shared]. For more information on creating Partitions, see <a href="#">"Segmenting Devices and Users" on page 142.</a></p>
CVE	Displays the CVE (Common Vulnerabilities and Exposures) name. CVE is a list of standardized names for vulnerabilities and other information on security exposures.
Create Date	Displays the date the policy was created.

Field	Description
Actions	<p>You can select the following action:</p> <ul style="list-style-type: none"> <li>View &amp; Edit — Opens the Edit Policy page, where you can edit the configuration policy. For more information, see <a href="#">"Editing a Policy" on page 421</a>.</li> <li>Test — Opens the Test Policy Page, where you can test policies against a device or group of devices.</li> </ul> <p><b>Note:</b> Because determining if a policy includes a rule causes performance issues, the Test option is displayed next to each policy, regardless of if it is testable or not. For more information, see <a href="#">"Test Policy Page Fields" on page 433</a>.</p>

## New Policy Page Fields

To open the New Policy page, on the menu bar under Policies, click New Policy. The New Policy page opens.

Field	Description/Action
<b>New Policy</b>	
Policy Name	Enter the policy name. A policy is a set of rules applied to a device or a group of devices.
Policy Description	Enter a description of the policy.
Partition	Select a Partition from the drop-down menu. ( <b>Note:</b> This field is only displayed if you have configured one or more Partitions.) In general, a Partition is a grouping of devices with unique IP addresses. Multiple Partitions can be managed by a single NA Core. A NA Core is an installation of a NA server, comprised of a single Management Engine, associated services, and a single database. For more information about creating Partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a> .
Policy Tag	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>General purpose — If you do not want to tag a policy, it is used as a general purpose policy.</li> <li>Existing — Select a tag from the drop-down menu.</li> <li>New — Create a new policy tag by entering a tag name.</li> </ul>
Scope	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>Select the device groups to which this policy applies — Use the Device Selector to select groups. For information about using the Device Selector, see <a href="#">"Device Selector" on page 137</a>.</li> <li>Use filters to define a dynamic policy scope — A policy scope includes the devices a policy can potentially affect. Keep in mind that the policy scope can only affect a given device if the policy has a policy rule that affects the device family containing the device. When defining a policy, you can define the policy</li> </ul>

Field	Description/Action
	<p>scope the same way you define a Dynamic Group. As a result, you can create a private Dynamic Group in conjunction with a policy. (For more information about creating dynamic groups, see "<a href="#">Dynamic Device Groups</a>" on page 135.)</p>
<p><b>Search Criteria</b> (when using filters to define a dynamic policy scope)</p>	
<p>Each time you select a search criterion from the Add Criteria drop-down menu, it is displayed in the Search Criteria section, where you can then select an operator, such as Contains, Matches, or Equals, and enter the information on which to search. If you want to delete a defined criterion, click the X next to the search criterion index letter.</p>	
<p>Add Criteria</p>	<p>Select one or more search criteria from the drop-down menu, for example:</p> <ul style="list-style-type: none"> <li>• Configuration Text</li> <li>• Device IP</li> <li>• Device Status</li> <li>• Host Name</li> <li>• Password Rule</li> </ul>
<p><b>Boolean Expression</b></p>	
<p>Expression</p>	<p>By default, the defined criteria index letters are displayed with the Boolean 'and' expression. For example, if you defined three search criteria, the expression would look like <i>A and B and C</i>. You can edit the Boolean expression as needed. Click the Reset Expression button to reset the expression to the default.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> The Boolean operator must be entered in lowercase. In addition, the maximum number of criteria is 10.</p> </div>
<p><b>Limit search by device group</b></p>	
<p>Device belongs to</p>	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Use Shift+click to select/deselect multiple device groups. If you do not select a device group, NA will discard the device group filter when searching.</p> </div>
<p><b>Limit search by view and partitions</b> (This information is displayed if you have configured Views and Partitions. For more information, see "<a href="#">Segmenting Devices and Users</a>" on page 142.)</p>	
<p>..but not these devices</p>	<p>Enter the IP address or hostname of the device in the right-hand box and then click Add Exception &lt;&lt;. To remove a device, select the IP address or hostname of the device in the left-hand box and click Remove Exception.</p>

Field	Description/Action
Policy Rules	The Policy Rules table displays all rules that will be applied by the policy. The policy applies all rules to each saved device selected for this policy. Keep in mind that rules are applied in no particular order.
New Rule button	To create a new rule for this policy, click the New Rule button. The New Rule page opens. For more information, see <a href="#">"New Rule Page Fields" below</a> .
Detailed Description	Enter a detailed description of the policy. Keep in mind that a short description of the policy appears in any list in which the policy appears. This field enables you to add a detailed description of the policy.
Policy Status	Click one of the following options: <ul style="list-style-type: none"> <li>• Active — Marks the policy active (the default).</li> <li>• Inactive — Deactivates the policy.</li> </ul>
<b>Additional Policy Fields</b> (These fields are automatically populated when the policy is from The HPE Security and Compliance Service.)	
CVE	Enter the CVE (Common Vulnerabilities and Exposures) name. CVE is a list of standardized names for vulnerabilities and other information on security exposures. (For more information, refer to <a href="http://www.cve.mitre.org">www.cve.mitre.org</a> .)
Vendor Advisory URL	Enter the URL to an external reference for advisory information on a vulnerability. Keep in mind that when creating a policy and including a vendor advisory URL and/or a vendor solution URL, the URL must start with the "http://" prefix, otherwise the link might not be correctly interpreted by the browser. Note that if the URL field is left blank, when selected, the link could open the NA home page.
Vendor Solution URL	Enter a URL to an external reference for more information on possible solutions to the vulnerability.
Disclosure Date	Enter the date when the software vulnerability was flagged in the following format: <i>yyyy-MM-dd</i> .
Solution	Enter detailed solution information.

Be sure to click the Save button when you are finished.

## New Rule Page Fields

When you click the New Rule button on the New Policy page, the New Rule page opens. Keep in mind that rules can be applied in two ways:

- The rule is device family specific. The rule is only checked against a device if the device is using a specific driver, such as Cisco IOS or Juniper JunOS. For example, if you create a rule to apply to devices with Cisco IOS drivers, the rule is never validated against an Extreme switch.
- The rule is device family indifferent. The rule is validating criteria in the normalized data model and therefore is not device family specific. By default, NA parses configuration and device information into normalized elements for its data model. This includes device attributes, such as model number, hostname, location, and so on. Because this data is normalized across all device families, it is not device family



specific. As a result, you can apply the rule to all device families, thereby eliminating the need to create a specific rule for each device family in your network.

Field	Description/Action
<b>New Rule</b>	
Rule Name	Enter the rule name.
Rule Type	<p>Select a rule type. For example, you can define a rule based on the configuration text or data model elements pulled from configuration text of the selected device(s). Options include:</p> <ul style="list-style-type: none"> <li>• Configuration — If selected, the configuration rule checks to see if the selected device(s) configuration text is in compliance with the current configuration rule.</li> <li>• Diagnostics — If selected, the rule checks to see if the selected device(s) Diagnostic text is in compliance with current Diagnostic rule. Diagnostic text is generated by running diagnostics. For more information, see <a href="#">"Run Diagnostics Task Page Fields" on page 291</a>.</li> </ul> <div style="background-color: #f0f0f0; padding: 5px; margin: 10px 0;"> <p><b>Note:</b> Use caution when renaming diagnostics on which policy rules are based. If you rename the diagnostic on which a policy rule is based, you will lose the policy rules condition.</p> </div> <ul style="list-style-type: none"> <li>• Software — If selected, the rule checks to see if the selected device(s) are in compliance with the current software rule. See <a href="#">"Software Level Report" on page 601</a>.</li> </ul>
Rule Description	Enter a description of the rule.
<b>Applies to devices with these drivers</b>	
All Device Families	<p>Click the radio button if you want to apply the rule to all device families. By default, NA parses configuration and device information into normalized elements for its data model. This includes device attributes, such as model number, hostname, location, and so on. Because this data is normalized across all device families, it is not device family specific.</p> <div style="background-color: #f0f0f0; padding: 5px; margin: 10px 0;"> <p><b>Note:</b> If you set a rule to all device families, you should not use the config or config block criteria in that rule. Config and Config Block formats are device family specific. If you use the config or config block criteria and set the rule to support all device families, you will get numerous false positives, as NA attempts to find the configuration text in each device configuration.</p> </div>
Device Family	<p>Select the device family to which the rule applies from the drop-down menu, for example BayStack, Cisco IOS or Nortel ASF. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• All applicable drivers — If checked (the default), NA chooses all applicable drivers. Keep in mind that a rule applies only to devices that are assigned a specific driver.</li> <li>• Select specific drivers — If checked, select one or more drivers from the list. Keep in mind that a configuration rule applies only to the configuration for devices that are assigned a specific driver.</li> </ul>
Define Text Block	Enables you to set text blocks to be used by configuration block conditions. If you select the

Field	Description/Action
	<p>Set Text Blocks option, the Block Start Pattern and the Block End Pattern fields are displayed. These are only used if a condition of the type “Config Block” is added. The condition is applied to specific blocks of text within the configuration file, such as a single interface in a Cisco IOS device. If you are applying the rule to each instance of a specific block within the configuration file, enter the block start pattern, for example <i>interface .*</i> and the block end pattern, for example <i>!</i>.</p> <p>The configuration text extracted by the block start and end patterns includes the lines that match the start and end patterns. As a result, any Config Block condition will be matched against not only the lines between the start and end patterns, but also the lines that match the start and end patterns. For example, if you have the following block start and end patterns:</p> <pre>block start: interface .* block end : !</pre> <p>And the configuration text includes the following lines:</p> <pre>... no service pad service timestamps log uptime service timestamps log uptime interface FastEthernet0/7 description testfor bug 145762 speed 100 duplex full ! ip default-gateway 10.255.1.1 ip http server ...</pre> <p>The extracted portion of the configuration to be used for any Config Block condition matches will be:</p> <pre>interface FastEthernet0/7 description testfor bug 145762 speed 100 duplex full !</pre> <p>Note that it includes lines that match with the start and end patterns, <i>interface FastEthernet0/7</i> and <i>!</i> respectively.</p>
Rule Conditions	<p>Select one or more conditions from the drop-down menu, for example Config Text, Flash Memory, and Host Name.</p> <p>Notes regarding specific conditions:</p> <ul style="list-style-type: none"> <li>Because a device can have multiple modules, the Module Model field is presented to the criteria as a semi-colon (;) separated list of all module models for that device. If any of the module models matches the search string, the search results include the device. The Module Description field is handled in a similar manner. For example, a device containing five modules might present the following results for module model and module</li> </ul>

Field	Description/Action
	<p>description:            N5K-C5010-FAN; N5K-C5010P-BF-SUP; N5K-C5010P-BF; N5K-M1600; N5K-PAC-550W            Chassis fan module;20x10GE/Supervisor;20x10GE/Supervisor; 6x10GE Ethernet Module;AC power supply</p> <ul style="list-style-type: none"> <li>• The uptime is reported as a decimal value. For example, uptime of 2 days 23 hours is displayed as 2.95.</li> </ul> <p>The following fields can apply to each condition:</p> <ul style="list-style-type: none"> <li>• Regular Expression — When checked, the pattern is a regular expression. When not checked, the pattern is a string to be matched against the configuration (diagnostics) text or the data model element value.</li> <li>• Must contain — Configuration (diagnostics) text or the value of the data model element must contain the pattern.</li> <li>• Must not contain — Configuration (diagnostics) text or the value of the data model element must not contain the pattern.</li> <li>• Must contain only — Configuration (diagnostics) text or the value of the data model element must contain the pattern, but must not contain any other matches for the pattern given in “But must not have any additional lines containing:” field.</li> <li>• Lines in Exact Order — When checked, pattern lines must match in the given sequence. Each line in a condition pattern is interpreted as an independent pattern and checked separately. When this option is checked, those independent matches must be in the given sequence without any unmatched characters (other than white space).</li> </ul> <p>In addition to using “and” and “or” to build a Boolean expression, you can configure conditional rules using “if-then-else” logic, in which “else” is optional. For example, if you define five conditions from ‘A’ to ‘E’, the Boolean expression could be built as: “<i>if (A and B) then (C or D) else E</i>”. (<b>Note:</b> The Boolean operator must be entered in lowercase. In addition, the maximum number of criteria is 10.)</p> <p>The <a href="#">get help</a> link provides information on using regular expressions. The <a href="#">Device Variables</a> link opens the Device Variables page. The page includes a list of built-in variables you can use in your Policy Rule definition. As a result, their values are replaced when the Policy Rule is being checked.</p> <p>Click the Reset Expression button to reset the expression to the default.</p>
Importance	<p>Select the importance level. This indicates the non-compliance risk rating for the policy rule. NA can sort violations based on their severity. For example, Critical violations can automatically open a trouble ticket in the Change Management system, while Informational violations can be identified in a daily report. Options include:</p> <ul style="list-style-type: none"> <li>• Informational — Events that typically do not require a response.</li> <li>• Low — Events that may require a response as time permits.</li> <li>• Medium — Events that require a timely response, typically within 72 hours (the default).</li> <li>• High — Events that require an urgent response, typically within 24 hours.</li> <li>• Critical — Events that require an immediate response.</li> </ul>

Field	Description/Action
Detailed Description	Enter a description of the rule.
Rule Exceptions	<p>Displays a list of rule exceptions, if applicable. A rule exception is part of a rule. For example, a rule exception can exclude text it matches in the device configuration from consideration by the configuration rule it is part of.</p> <p>To add an Exception Rule, click the New Exception link. The New Rule Exception page opens. (For more information, see <a href="#">"Adding a Rule Exception" on page 423.</a>)</p>
Auto-Remediation Scripts	<p>The Auto-remediation pop-up window accesses the data on the Policy Rule page to show variable mappings, generate sample code, and validate the script before it is saved.</p> <p>An Auto-remediation script enables you to define variables in the script that reference data from regular expression pattern groups in a violated policy rule. (For more information, see <a href="#">"Creating Auto-remediation Scripts" on page 564.</a>)</p> <p>To add a new Auto-remediation script, click the New Auto-Remediation Script link. The Auto-remediation script pop-up window includes a command script page. To assist in entering Auto-remediation scripts, you can select the following links:</p> <ul style="list-style-type: none"><li>• Show Variables — Displays the variable mappings in regular expression patterns. This enables you to view what portions of the patterns apply to which regular expression groups. The highlighted portions on the regular expression pattern are referenced with the variable on the left. Note that the section before the (.*) in the variable must be replaced with the @foreach loop variable. The variable names show regular expression groups. In addition, the regular expression group 0 (zero) represents the entire pattern.</li><li>• Generate Sample Code — Generates sample template code with variables that you can use. Device commands must be added into @foreach loops. Device commands can reference the variables listed in each generated loop above.</li></ul>

Click the Save button to save the rule, or the Save And Add Another button to save the current rule and add a new one. You can also click the New Exception link to add a new rule exception.

## Importing/Exporting Policies

You can import predefined policies or export policies to a file. This enables you to easily share policies.

**Note:** When importing policies that were exported from a different NA core server, determine the names of all diagnostics referenced by the imported policies. Diagnostics of the same name and function system must exist on the target system.

To import or export a policy, on the menu bar under Policies, click Import/Export Policies. The Import/Export Policies page opens.

To print a policy, on the Import/Export Policies page, select that policy in the Export Policy area, and then click **Print**. On the results page, use the web browser functionality to print the output.

**Note:** NA is able to import policies of previous versions, starting with NA 6.2.

### Import/Export Policies Page Fields

Field	Description/Action
Import Policy	Enter the policy file to import or click the Browse button to locate the policy file. When the policy file is displayed, click the Import button. If a policy already exists, you are prompted to rename it.
Export Policy	Displays a list of the current configuration policies. Click the configuration policies you want to export and then click the Export button. Keep in mind that the device groups associated with the configuration policy are not exported. Also, any configuration policy exception rules are not exported.

## Editing a Policy

To edit a policy:

1. On the menu bar under Policies, click Policy List. The Policies page opens.
2. Click the View & Edit action for the policy you want to edit. The Edit Policy page opens. Be sure to click Save when finished.

### Edit Policy Page Fields

Field	Description/Action
Policy Name	Displays the policy name.
Policy Description	Displays a description of the policy.
Partition	<p>Select a Partition from the drop-down menu.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions.</p> <p>In general, a Partition is a grouping of devices with unique IP addresses. Multiple Partitions can be managed by a single NA Core. A NA Core is an installation of a NA server, comprised of a single Management Engine, associated services, and a single database. For more information about creating Partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p>
Policy Tag	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• General purpose — If you do not want to tag a policy, it is used as a general purpose policy.</li> <li>• Existing — Select a new policy from the drop-down menu.</li> <li>• New — Enter the location of the policy.</li> </ul>
Scope	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Select the device groups to which this policy applies — Select one or more</li> </ul>

Field	Description/Action
	<p>device groups from the list. You can use Shift+click or Ctrl+click to select multiple device groups.</p> <ul style="list-style-type: none"> <li>• Use filters to define a dynamic policy scope — A policy scope includes the devices a policy can potentially affect. Keep in mind that the policy scope can only affect a given device if the policy has a policy rule that affects the device family containing the device. When defining a policy, you can define the policy scope the same way you define a Dynamic Group. As a result, you can create a private Dynamic Group in conjunction with a policy. (For more information about creating dynamic groups, see <a href="#">"Dynamic Device Groups" on page 135.</a>)</li> </ul>
<p><b>Search Criteria</b> (when using filters to define a dynamic policy scope)</p> <p>Each time you select a search criterion from the Add Criteria drop-down menu, it is displayed in the Search Criteria section, where you can then select an operator, such as Contains, Matches, or Equals, and enter the information on which to search. If you want to delete a defined criterion, click the X next to the search criterion index letter.</p>	
Add Criteria	<p>Select one or more search criteria from the drop-down menu, for example:</p> <ul style="list-style-type: none"> <li>• Configuration Text</li> <li>• Device IP</li> <li>• Device Status</li> <li>• Password Rule</li> <li>• Host Name</li> </ul>
<p><b>Boolean Expression</b></p>	
Expression	<p>By default, the defined criteria index letters are displayed with the Boolean ‘and’ expression. For example, if you defined three search criteria, the expression would look like <i>A and B and C</i>. You can edit the Boolean expression as needed. Click the Reset Expression button to reset the expression to the default.</p> <p><b>Note:</b> The Boolean operator must be entered in lowercase. In addition, the maximum number of criteria is 10.</p>
<p><b>Limit search by device group</b></p>	
Device belongs to	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use Shift+click to select/deselect multiple device groups. If you do not select a device group, NA will discard the device group filter when searching.</p>

Field	Description/Action
<b>Limit search by view and partitions</b> (This information is displayed if you have configured Views and Partitions. For more information, see " <a href="#">Segmenting Devices and Users</a> " on page 142.)	
..but not these devices	To add an IP address or hostname of the device, enter the Host name or IP address in the right-hand box and then click Add Exception <<. To remove a device, select the IP address or hostname of the device in the left-hand box and click Remove Exception.
Policy Rules	Displays all rules that will be applied by the policy. The policy applies all configuration rules to each saved device selected for this policy. Keep in mind that rules are applied in no particular order. The importance column displays either Informational, Low, Medium, High, or Critical. This indicates the non-compliance risk rating for the policy rule. Click the View & Edit link in the Actions column to edit the rule.
New Rule button	To create a new rule for this policy, click the New Rule button. The New Rule page opens. For more information, see " <a href="#">New Rule Page Fields</a> " on page 416.
Detailed Description	Displays a detailed description of the policy.
Policy Status	Click one of the following options: <ul style="list-style-type: none"> <li>Active — Marks the policy active (the default).</li> <li>Inactive — Deactivates the policy.</li> </ul>
<b>Software Policy Fields (These fields are automatically populated when the policy is from the HPE Security and Compliance Service.)</b>	
CVE	Displays the CVE (Common Vulnerabilities and Exposures) name. CVE is a list of standardized names for vulnerabilities and other information on security exposures. (For more information, refer to <a href="http://www.cve.mitre.org">www.cve.mitre.org</a> .)
Vendor Advisory URL	Displays the URL to an external reference for advisory information on a vulnerability.
Vendor Solution URL	Displays a URL to an external reference for more information on possible solutions to the vulnerability.
Disclosure Date	Displays the date when the software vulnerability was flagged in the following format: <i>yyyy-MM-dd</i> .
Solution	Displays detailed solution information.

## Adding a Rule Exception

A rule exception is part of a rule. Like a rule, it is a regular expression. However, its purpose is to exclude text it matches in the device configuration from consideration by the configuration rule it is part of.

An exception rule typically excludes either a text pattern or a specific device configuration from the configuration rule. Exceptions are usually created when one or more device configurations do not comply with a rule, but you cannot alter the rule to fit all similar configurations.

To add a rule exception to an existing configuration rule:

1. On the Policies page (**Policies > Policy List**), in the **Actions** column, click **View & Edit** for the policy.
2. On the Edit Policy page, in the **Actions** column, click **View & Edit** for the policy rule.
3. On the Edit Policy Rule page, click the New Exception link for the Rule Exceptions field. The New Rule Exception page opens.

### New Rule Exception Page Fields

Field	Description/Action
Device	Enter the IP address or hostname of the device to which this exception rule applies.
Expires on	If checked, choose the month, day, year, hour, and minute after which this exception is disregarded by the rule. An exception rule's expiration date is the date after which the exception ceases to have any effect on the rule it is part of. Although the exception rule continues to exist after its expiration date, the configuration policy applies the rule as if the exception rule does not exist.
Ignore text matching this pattern when checking the configuration rule	If checked, enter text. All text in a device's configuration that matches the text you entered is not subject to this configuration rule.  <b>Note:</b> The <a href="#">get help</a> link provides examples.
Ignore this device entirely when checking the configuration rule	If checked, NA skips this device when checking the configuration rule.

## Viewing Applied Policies

You can view policies that apply to a device. As a result, you can:

- Verify that the correct policy was applied to the device
- View if the policy passed or failed
- View policies that are applied to the device when the device is added to NA
- View the exceptions that are in place for a policy applied to the device

### To view applied policies

1. Create a new policy for a device. For more information, see ["Creating a Policy" on page 412](#).
2. Run the policy against the device. For more information, see ["Viewing Policy Compliance" on the next page](#).
3. Open the Device Details page for the device.
4. Click the View menu.
5. Select Device Details and click Polices. The Device Polices Page opens. For more information, see ["Device Policies Page Fields" on page 202](#).



# Viewing Policy Activity

You can view events that show a device's configuration was not in compliance with the rules contained in one or more policies. The events indicate when NA detected and recorded that a device was non-compliant.

To view the Policy Activity page, on the menu bar under Policies, click Policy Activity. The Policy Activity page opens.

## Policy Activity Page Fields

Field	Description/Action
For the (time frame)	Select the time frame in which you want to view non-compliance events. The default is the past hour.
Current Working Group	Select the group for which you want to view non-compliance events. The default is Inventory, which includes all other groups.
Event Date	Displays the date the policy was found to be in non-compliance.
Policy Name	Displays the name of the policy. Click this link to open the Edit Policy page. You can edit the policy and any included rules. For more information, see <a href="#">"Editing a Policy" on page 421</a> .
Host Name	Displays the host name of the device. Click this link to view basic information about the device.
Device IP	Displays the IP address of the device. Click this link to view basic information about the device and its configuration history.
Summary	Displays the event type (Configuration Policy Non-Compliance). Click this link to open the System Event Detail page, where you can view details of the non-compliance event.
Importance	Indicates the importance of the rule that was violated, including: <ul style="list-style-type: none"><li>• Informational — Events that typically do not require a response.</li><li>• Low — Events that may require a response as time permits.</li><li>• Medium — Events that require a timely response, typically within 72 hours.</li><li>• High — Events that require an urgent response, typically within 24 hours.</li><li>• Critical — Events that require an immediate response.</li></ul>

# Viewing Policy Compliance

The Policy Compliance page enables you to view the devices whose configurations are or are not in compliance with configuration policies.

To view the Policy Compliance page, on the menu bar under Policies, click Policy Compliance. The Policy Compliance page opens.

### Policy Compliance Page Fields

Field	Description/Action
Check Policy Compliance link	Opens the Check Policy Compliance task page, where you can check for configuration compliance. For more information, see <a href="#">"Check Policy Compliance Task Page Fields" on page 372</a> .
Current Working Group	Select the group for which you want to view device compliance status.
Display only devices that are not in compliance	If checked, devices that are in compliance are not displayed.
Host Name	Displays the host name of the device. Click this link to view basic information about the device.
Device IP	Displays the IP address of the device. Click this link to view basic information about the device and its configuration history.
Policy Compliance	<ul style="list-style-type: none"> <li>• Yes — Indicates that the device's configuration is in compliance with all polices.</li> <li>• No — Indicates that the device's configuration is not in compliance with all configuration policies. Clicking No opens the Configuration Policy Activity page. For more information, see <a href="#">"Viewing Policy Activity" on the previous page</a>.</li> <li>• Unknown — Indicates devices that have not had their policy compliance checked.</li> </ul>
Device Status	The management status of the device.
Partition	Displays the Partition to which the device belongs, if applicable.
Compliance Change At	The timestamp of the most recent change to the policy compliance status.
Last Changed Time	Displays the date and time the device's configuration was last changed.
Actions	<p>You can select the following options:</p> <ul style="list-style-type: none"> <li>• Policy Events — Opens the Configuration Policy Activity page, where you can view the details of the non-compliance event. For more information, see <a href="#">"Viewing Policy Activity" on the previous page</a>.</li> <li>• Policies Applied — Opens the Configuration Policies that Apply to Device page, where you can view the configuration polices and rules for a specific device. For more information, see <a href="#">"Configuration Policies That Apply to Device Page Fields" below</a>.</li> </ul>

## Configuration Policies That Apply to Device Page Fields

To view the Configuration Policies That Apply to Device page:

1. On the menu bar under Policies, click Policy Compliance.
2. In the Actions column for the device on which you need information, click the Policies Applied link. The Configuration Policies That Apply to Device page opens.

Field	Description/Action
Policy Name	Displays the name of the configuration policy applied to the device.
Rule Name	Displays the name of the configuration rule applied to the device.
Out of compliance key	Displays if the device is currently out of compliance, including: <ul style="list-style-type: none"> <li>• High Importance (red)</li> <li>• Medium Importance (amber)</li> <li>• Low Importance (green)</li> </ul>
Actions	You can select the following options: <ul style="list-style-type: none"> <li>• Host name or IP address — Opens the Device Information page, where you can view basic information about the device and its configuration history.</li> <li>• Policy Name — Opens the Edit Configuration Policy page, where you can edit the policy and add/edit configuration rules. For more information, see <a href="#">"Editing a Policy" on page 421</a>.</li> <li>• Rule Name — Opens the Edit Configuration Rule page, where you can edit the configuration rule. For more information, see <a href="#">"Adding a Rule Exception" on page 423</a>.</li> </ul>

## Adding New Software Levels

As the number of network device security alerts and notifications about security vulnerabilities continue to increase, many organizations are faced with tracking which OS version is present on each device and whether that OS version is vulnerable to security issues. NA enables you to specify OS versions that are susceptible to security problems and then generate alerts or automated responses when those versions are detected. Keep in mind that you can group images into categories, such as “pre-production” or “Obsolete.” Images can also be classified, for example “Security Risk,” based on recently discovered vulnerabilities.

To add a new software level or review existing compliance definitions:

1. On the menu bar under Polices, click Software Levels. The Software Levels page opens. (For more information, see ["Software Levels Page Fields" on page 429](#).)
2. Click the Add Level link. The Add Level page opens. Be sure to click Save when you are finished.

## Add Software Level Page Fields

Field	Description/Action
<b>Add Software Level</b>	
Level Name	Enter the level name.

Field	Description/Action
Status	<p>Displays one of the following options:</p> <ul style="list-style-type: none"> <li>• Active — Marks the configuration policy active (the default).</li> <li>• Inactive — Deactivates the configuration policy. Inactive policies do not generate non-compliance events.</li> </ul>
Level	<p>Select a compliance rating name. You can use any of the compliance definitions given depending on your requirements and validation procedures. Options include:</p> <ul style="list-style-type: none"> <li>• Security Risk</li> <li>• Pre-production</li> <li>• Obsolete</li> <li>• Bronze</li> <li>• Silver</li> <li>• Gold</li> <li>• Platinum</li> </ul>
Description	<p>Enter a description of the compliance. To improve awareness of security issues, any security risk description should include a short title of the vulnerability, any applicable CVE/CAN or CERT designations, and a link to the vendor notice, if available.</p>
Partition	<p>Select a Partition from the drop-down menu. If you have created Partitions for security or business reasons, you can partition software levels for a specific Partition. Keep in mind that you can configure policies to be shared by all users in a Partition, as well as for specific users in specific Partitions. If the software level is available to all Partitions, it is labeled [Shared].</p>
<b>Matching Criteria</b> (Matching criteria can use wildcard operators: * and ?.)	
Software Version	<p>Enter the software version for which this compliance policy applies.</p>
Device Driver	<p>Select a device driver used to access the device from the drop-down menu. (Any is the default.)</p>
Device Model	<p>Enter the device model.</p>
Filename	<p>Enter the filename, if applicable.</p>
Configuration Contains	<p>Enter a pattern to match against the current device configuration to determine if the compliance applies to a given device.</p>
<b>Software Vulnerability Information (for Security Risk level)</b>	
Disclosure Date	<p>Enter the date when the software vulnerability was flagged in the following format: yyyy-MM-dd.</p>
Importance	<p>Select the severity of the security vulnerability from the drop-down menu, including:</p> <ul style="list-style-type: none"> <li>• Informational</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Low</li> <li>• Medium</li> <li>• High</li> <li>• Critical</li> </ul>
CVE Name	Enter the CVE (Common Vulnerabilities and Exposures) name. CVE is a list of standardized names for vulnerabilities and other information on security exposures. (For more information, refer to <a href="http://www.cve.mitre.org">www.cve.mitre.org</a> .)
Solution	Enter solution information.
Advisory URL	Enter the URL to an external reference for advisory information on a vulnerability.
Solution URL	Enter a URL to an external reference for more information on possible solutions to the vulnerability.

## Software Levels Page Fields

NA has the ability to define software levels, essentially a regular expression to match against software versions. You can assign a software level to that regular expression. Any device with a software version that matches the regular expression is considered at that level.

**Note:** Software levels can be partitioned so that only those with the appropriate permissions can view and edit them. For more information, see ["Partitions" on page 148](#).

The Software Levels page enables you to review existing software level definitions.

Field	Description/Action
Add Level link	Opens the Add Software Level page, where you can add a software levels. For more information, see <a href="#">"Add Software Level Page Fields" on page 427</a> .
Device Software Report link	Opens the Device Software report, where you can view the software version and compliance rating currently assigned to each device. For more information, see <a href="#">"Device Software Report" on page 599</a> .
Software Level Report link	Opens the Software Level report, where you can view the software level currently assigned to each device. For more information, see <a href="#">"Software Level Report" on page 601</a> .
View	<p>The software level filter. Options include:</p> <ul style="list-style-type: none"> <li>• User Defined Levels—Software levels created within NA.</li> <li>• Service Defined Levels—Policies obtained through the HPE Live Network security and compliance service.</li> <li>• Security Alert Service alerts—Events originating from the Security Alert</li> </ul>

Field	Description/Action
	Service, which is a subscription-based service.
Check boxes	<p>You can use the left-side check boxes to manage software level definitions. Once you have selected the compliance definitions, click the Actions drop-down menu and click either:</p> <ul style="list-style-type: none"> <li>• Activate — Instructs NA to activate the software level definition.</li> <li>• Deactivate — Instructs NA to deactivate the software level definition.</li> <li>• Delete — Deletes the software level definition.</li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the policies.</p>
Name	Displays compliance's name.
Version	Displays the software version.
Driver	Displays the driver name.
Model	Displays the model designation of the device.
Filename	You can provide a filename (wildcards are allowed), that the system can use to determine compliance. For example, you can tag all images that begin with router5*.bin as Obsolete.
Software Level	<p>Displays the compliance rating name. Ratings include:</p> <ul style="list-style-type: none"> <li>• Security Risk</li> <li>• Pre-production</li> <li>• Obsolete</li> <li>• Bronze</li> <li>• Silver</li> <li>• Gold</li> <li>• Platinum</li> </ul>
Importance	<p>Displays either Informational, Low, Medium, High, or Critical. This indicates the importance of the compliance rule that was violated.</p> <ul style="list-style-type: none"> <li>• Informational — Events that typically do not require a response.</li> <li>• Low — Events that may require a response as time permits.</li> <li>• Medium — Events that require a timely response, typically within 72 hours.</li> <li>• High — Events that require an urgent response, typically within 24 hours.</li> <li>• Critical — Events that require an immediate response.</li> </ul>
Last Modified	Displays when the software level was last modified.
Partition	If you have created Partitions for security or business reasons, you can partition software levels for a specific Partition. Keep in mind that you can configure software levels to be shared by all users in a Partition, as well as for specific users in specific Partitions. For more information about creating Partitions,

Field	Description/Action
	see " <a href="#">Segmenting Devices and Users</a> " on page 142.
CVE	Displays CVE (Common Vulnerabilities and Exposures) name. CVE is a list of standardized names for vulnerabilities and other information on security exposures.
Comments	Displays a description of the compliance.
Actions	<p>You can select the following options:</p> <ul style="list-style-type: none"> <li>• Edit — Opens the Edit Compliance page where you can edit the compliance.</li> <li>• Delete — Enables you to delete the compliance.</li> </ul>

## Editing a Software Level

To edit a software level, on the Software Levels page (**Policies > Software Levels**), in the **Actions** column, click **Edit** for the software level. The Edit Software Level page opens. Be sure to click Save when finished.

### Edit Software Level Page Fields

Field	Description/Action
<b>Edit Software Level</b>	
Level Name	Displays the policy name.
Status	<p>Displays one of the following options:</p> <ul style="list-style-type: none"> <li>• Active — Marks the configuration policy active (the default).</li> <li>• Inactive — Deactivates the configuration policy. Inactive policies do not generate non-compliance events.</li> </ul>
Level	<p>Displays the software level rating name. You can use any of the definitions given depending on your requirements and validation procedures. Options include:</p> <ul style="list-style-type: none"> <li>• Security Risk</li> <li>• Pre-production</li> <li>• Obsolete</li> <li>• Bronze</li> <li>• Silver</li> <li>• Gold</li> <li>• Platinum</li> </ul>
Description	Displays a description of the compliance.
<b>Matching Criteria</b>	
Software Version	Displays the software version for which this compliance policy applies.

Field	Description/Action
Device Driver	Displays the device driver used to access the device.
Device Model	Displays the device model.
Configuration Contains	Displays the pattern used to match against the current device configuration to determine if the compliance policy applies to a given device.
<b>Software Vulnerability Information (for Security Risk compliance level)</b>	
Discloser Date	Displays the date when the software vulnerability was flagged.
Importance	Displays the severity of the security vulnerability, including: <ul style="list-style-type: none"> <li>• Informational</li> <li>• Low</li> <li>• Medium</li> <li>• High</li> <li>• Critical</li> </ul>
CVE Name	Displays the CVE (Common Vulnerabilities and Exposures) name. CVE is a list of standardized names for vulnerabilities and other information on security exposures. (For more information, refer to <a href="http://www.cve.mitre.org">www.cve.mitre.org</a> .)
Solution	Displays solution information.
Vendor Advisory Link	Displays a URL to an external reference for advisory information on a vulnerability.
Vendor Solution Link	Displays a URL to an external reference for more information on possible solutions to the vulnerability.

## Testing Policy Compliance

You can test device configurations for compliance against one or more configuration policies or test your configuration policies against one or more configurations. This enables you to test a device's configuration compliance or test a configuration policy before deployment.

On the menu bar under Policies click Test Policy Compliance. The Test Policy Compliance page opens.

## Test Policy Compliance Page Fields

Field	Description/Action
Policy List link	Opens the Policies page, where you can view a list of your policies. For more information, see " <a href="#">Policies Page Fields</a> " on page 412.



Field	Description/Action
Select the policies to be applied	<p>You can select one of the following options:</p> <ul style="list-style-type: none"> <li>• All Policies — If checked (the default) all the configuration policies that you can access and that have non-empty conditions are tested.</li> <li>• Policies that are applicable to selected device groups — Select a device group for which to run the test against. To select multiple device groups, press the Shift key while selecting device groups.</li> <li>• Selected policies — Select a specific policy. To select multiple policies, press the Shift key while selecting policies.</li> </ul>
Test policy against existing devices	Select the devices on which to test the policy against. For information about using the Device Selector, see " <a href="#">Device Selector</a> " on page 137.
Test policy against text	<p>If you select this option, enter or paste the configuration text in the box and select the device family for the configuration text you entered from the drop-down menu.</p> <p>NA tests the configuration rules and diagnostics rules of the selected policies against this text. If a rule includes multiple diagnostics, results are not predictable.</p>

After selecting the options, click Perform Test.

If the configuration policy check passes, the details of the data that complies with the configuration policy and the rule are displayed in a new window—the details are displayed only if you have selected the **Show Policy compliance success result summary** check box on the **Configuration Mgmt** page. Else, the “Device [device name] is in compliance with selected and applicable policies” message is displayed. For more information about the **Show Policy compliance success result summary** check box, see "[Configuration Mgmt Page Fields](#)" on page 24.

If the configuration policy check fails, a list of each violation is displayed in the new window with links to detailed information.

## Test Policy Page Fields

When you first create a policy, you will want to test the policy to validate that it is correctly catching issues with a device. You may not, however, want NA to generate non-compliance events because that could trigger alerts in your fault management system or upset your network compliance metrics. In this case, using the Test Policy capability is ideal. When you use the Test Policy condition, no events are generated. As a result, you can test the policy without generating any non-compliance events.

When you have selected the devices, click the Perform Test button.

Field	Description/Action
Select the policies to be tested	Select a policy from the drop-down menu.
Select the devices to test against	Select the devices for which to test the policy against. For information about using the Device Selector, see " <a href="#">Device Selector</a> " on page 137.

# Chapter 9: Deploying Software

Use the following table to quickly locate information.

Topic	Refer to:
Getting Started	<a href="#">"Getting Started" below</a>
Software Images	<a href="#">"Software Images" on page 436</a>
Adding Image Sets	<a href="#">"Adding Image Sets" on page 437</a>
Deploying Software	<a href="#">"Deploying Software" on page 439</a>
Adding a New Compliance	<a href="#">"Adding a New Software Level" on page 439</a>
Viewing Device Software Versions	<a href="#">"Viewing Device Software Versions " on page 441</a>

## Getting Started

HPE Network Automation (NA) provides a central repository of device software, including operating system (OS) images, that you can deploy to one or more devices that share the same software. Having a central storage location guarantees that the last known good software is available in-house.

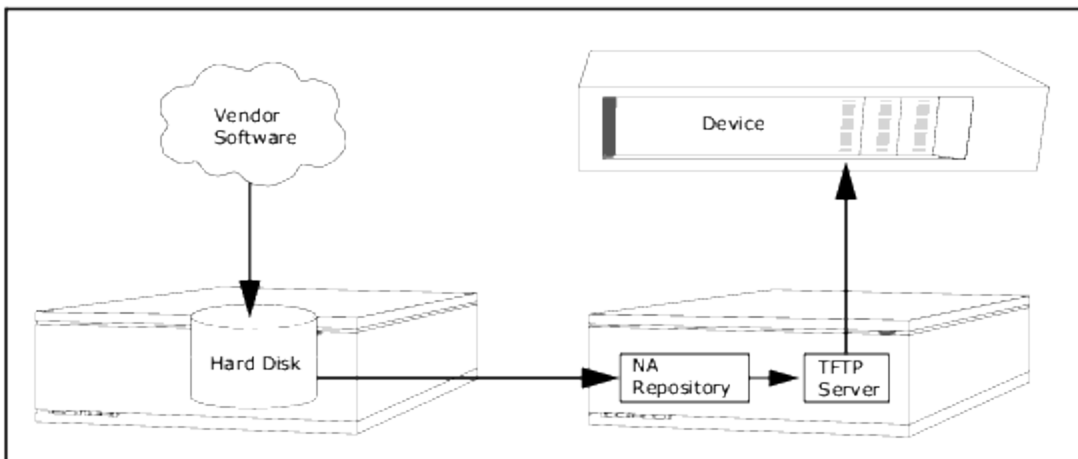
You can:

- Upload software image sets into the system. An image set is a grouping of images that can be deployed to a device simultaneously. An image set can contain one or more images. When you initiate a software upload, you select an image set to be uploaded. Each image in the image set is uploaded in turn. If the device has a problem (e.g. out of memory), the rest of the upload is aborted.
- Add or upload files to a device.
- Define the minimum requirements for an image set, such as the device family, device model, minimum RAM, processor, or boot ROM version required to run the image successfully.
- Prepare a device prior to deploying an image by deleting files to free up flash memory space, and/or compacting the flash memory.
- Reboot a device after deploying an image.
- Schedule updates through NA. For example, you might deploy a new image to one device successfully during the day shift, then schedule updates to many more devices during off-peak hours.
- Define multiple compliance ratings to identify software versions and upgrade devices as resources permit.
- Designate which image should be the Boot image for devices that have multiple Boot images. You can select a Boot image, and if necessary an OS image, currently on the device, or transfer a new Boot and/or OS image. If you select a single Boot and/or OS image, commands are issued on the device to set those images as the images to use for Boot and/or OS. Depending on the device, these will not take affect until the next time the device reboots, which can be selected as part of the Update Device Software task. For more information, see ["Update Device Software Task Page Fields" on page 310](#).

Another feature is the Image Synchronization Report, which enables you to view the currently running or backup software images on a device, or group of devices, that do not reside in the NA software image repository. For more information, see ["Image Synchronization Report" on page 603](#).

**Note:** A Boot image contains the complete contents and structure of system's storage media. The Boot image enables the associated hardware to boot. An OS image contains instructions for running a device after the device is on and has gathered information regarding its interfaces. The OS image contains items such as routing protocols.

The following figure illustrates the download process.



There are several best practices that you should follow when using the software update feature. HPE recommends the following practices when deploying software images:

- Follow your standard change control and approval processes. Any time you modify the state of a device some risk is entailed. To minimize the impact this could have on your network, adhere to all defined change processes in the organization, such as approvals, notifications, change windows, and so on.
- Research and understand the proper steps for updating a given device and OS version. On some devices, multiple images may be required to upgrade. In addition, there may be firmware or hardware dependencies.
- Test the functionality of a given OS version before deploying it on a production network. When upgrading (or particularly when downgrading) OS versions, the device configuration may be altered or may need to be updated prior to or after the change. Before deploying a given version in production test it thoroughly in a test-lab environment to ensure the configuration upgrades successfully and the device functions as expected.
- Backup your current device images. Use the NA repository to store the existing images on your devices before upgrading them. This way you can quickly recover should a new image exhibit any unexpected results. Keep in mind that the Image Synchronization report enables you to view the currently running or backup software images on a device, or group of devices, that do not reside in the NA software image repository. For more information, see ["Image Synchronization Report" on page 603](#).
- When upgrading a device, it is a good idea to have out-of-band management access to the device via a console server.
- Provide image requirements and verify them carefully. NA enables you to specify the requirements for each software image.

- When deploying images to business critical devices, do not use the auto-reboot function. Rather, use the software update feature to prepare the devices and load the images, then manually inspect each device to be sure it is in a clean state before rebooting it.
- Update a single device first before updating a group of devices.

## Software Images

Before you upgrade a device's software, you should be aware of the currently installed software on each device, including:

- Image set
- Filenames
- Required driver

On the menu bar under Devices, select Device Tools and click Software Images. The Software Images Page opens.

### Software Images Page Fields

Field	Description/Action
Add Image Set link	Opens the Add Software Image Set page, where you can add an Image Set. For more information, see <a href="#">"Adding Image Sets" on the next page</a> .
Software Levels link	Opens the Software Levels page, where you can add a new software level or view the Device Software report. For more information about adding a new level, see <a href="#">"Adding New Software Levels" on page 427</a> . For information about the Device Support report, see <a href="#">"Device Status Report" on page 589</a> .
Image Set	Displays the name of the Image Set.
Driver Required	Displays the name of the NA driver required for this platform.
Model Required	Displays the name of the required model. Note that this field has been expanded from 255 characters to 4,000 characters so as to accommodate all possible models.
Hardware Required	Displays hardware requirements, if applicable.
Partition	If you have created Partitions for security or business reasons, you can partition software images according to Partitions. If the software image is available to all Partitions, the software image is labeled "Shared" (or "Global") depending on configuration. Keep in mind that you cannot edit or delete software images without the proper permissions. For more information about creating Partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a> .
Actions	You can select the following options:

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Edit — Opens the Edit Software Image page, where you can edit existing software information. For more information, see <a href="#">"Edit Software Image Page Fields" on the next page</a>.</li> <li>• Software Images — Opens the Manage Images in Set page, where you can edit the image set, add images, and deploy software. For more information, see <a href="#">"Adding Image Sets" below</a>, <a href="#">"Edit Software Image Page Fields" on the next page</a>, or <a href="#">"Deploying Software" on page 439</a>.</li> <li>• Delete — Enables you to delete the image.</li> <li>• Update Device — Opens the Update Device Software Task page. For more information, see <a href="#">"Deploying Software" on page 439</a>.</li> </ul>

## Adding Image Sets

To add Image Sets:

1. On the menu bar under Devices, select Device Tools and click Software Images. The Software Images page opens.
2. Click the Add Image Set link. The Add Software Image Set page opens. Be sure to click the Save Software button when finished.

**Note:** The file size cannot be larger than 256MB.

### Add Software Image Set Page Fields

Field	Description/Action
Image Set Name	Enter the Image Set Name. All images in a particular Image Set are applied to the same file system location on the device.
Partition	<p>Select a Partition from the drop-down menu.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions.</p> <p>In general, a Partition is a grouping of devices with unique IP addresses. Multiple Partitions can be managed by a single NA Core. An NA Core in an installation of an NA server, comprises a single Management Engine, associated services, and a single database.</p>
Image 1... 5	You can enter up to five new images or configuration files for the Image Set.
Vendor MD5 Checksum	Enter the vendor's MD5 checksum. Checksum is a 128-bit checksum computed using the MD5 algorithm. MD5 is a cryptographically secure algorithm. It is very difficult for someone to intentionally change a file and still obtain the same checksum for the file. Frequently, a vendor supplies these checksums along with the software images for their devices. If you compute the checksum on the image (or NA computes it for you), it should match what the vendor supplied. If it does not match, you probably have a corrupted image file which should not be deployed or the vendor may have calculated a checksum using a

Field	Description/Action
	different algorithm.
Archive file with multiple images	Specify a ZIP or TAR archive file. NA expands the archive file and adds all contained files to the image set.
Image Set Requirements	<p>Image Set requirements include:</p> <ul style="list-style-type: none"> <li>• Driver — The driver information to save with the software. The list includes all known drivers. For example, if you want to upload software on a Cisco Aironet 1100 Access Point, select the “Cisco Aironet access points, 350, 1100, and 1200 series, IOS version 12.2” drivers.</li> <li>• Model — The model information to save with the software. The list includes all known models. For example, if you have a Cisco Aironet 1200 series Access Point, select “AIR-AP1220-IOS-UPGRD (C1200 Series).”</li> <li>• System Memory (in bytes) &gt;= — The minimum RAM the image set requires to operate successfully. On most devices, the image resides in processor memory, also known as System Memory or DRAM. The amount of processor memory physically present is calculated for each device using the File System diagnostic. For example, 16,384 bytes equals 16k. Note that not all devices support the File System diagnostic. On those devices, the RAM requirement is ignored.</li> <li>• Processor — The CPU on the device. For example, if you have a Cisco Aironet 1200 series Access Point, select “AIR-AP1220-IOS-UPGRD (PowerPC405GP).”</li> <li>• Boot ROM — The ROM on the device.</li> </ul>
Description	Enter a brief description to differentiate this software download from others.

## Edit Software Image Page Fields

To edit software images:

1. On the menu bar under Devices, select Device Tools and click Software Images. The Software Images page opens.
2. For the image set you want to edit, click the Edit option in the Actions column. The Edit Software Image Set page opens.

Field	Description/Action
Image Set Name	Displays the name for this image set. You can also specify an existing image set, in which case NA adds the new image to the existing image set. All images in a particular image set are applied to the same file system location on the device.
Partition	<p>Select a Partition from the drop-down menu.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions.</p>

Field	Description/Action
Image Set Requirements	<ul style="list-style-type: none"><li>• Driver — The driver information to save with the software. The list includes all known drivers. For example, if you want to upload software on a Cisco Aironet 1100 Access Point, select the “Cisco Aironet access points, 350, 1100, and 1200 series, IOS version 12.2” drivers.</li><li>• Model — The model information to save with the software. The list includes all known models. For example, if you have a Cisco Aironet 1200 series Access Point, select “AIR-AP1220-IOS-UPGRD (C1200 Series).”</li><li>• Device RAM Required &gt;= — The minimum RAM of the device.</li><li>• Processor — The CPU on the device. For example, if you have a Cisco Aironet 1200 series Access Point, select “AIR-AP1220-IOS-UPGRD (PowerPC405GP).”</li><li>• Boot ROM — The ROM on the device.</li><li>• Description — A brief description, to differentiate this software download from others.</li></ul>

Be sure to click Save Software when finished.

## Deploying Software

The Update Software option enables you to automatically upgrade the current software images installed on your devices. This significantly reduces the time it takes to manually roll out network-wide software upgrades and provides an audit trail for software upgrades to ensure that all policies and procedures are being followed.

To automatically upgrade the current software image on your devices:

1. On the menu bar under Devices, select Device tools and click Software Images. The Software Images page opens.
2. For the image set you want to deploy, click the Update Software option in the Actions column. The Update Device Software task opens. For more information, see ["Update Device Software Task Page Fields" on page 310](#).

Keep in mind that:

- Total memory is the total physical memory on the device.
- Free memory is the free memory available for uploads at the time of the last memory diagnostic.
- Net memory is the estimate of free memory after the Update Device Software task is run, taking into account any files you marked to be added or removed from the device (but not taking into account the squeeze pre or post processing task).

## Adding a New Software Level

It is very important that your devices are running the latest approved software. Network administrators can group images into categories, such as Pre-production or Obsolete. Images can also be classified, for example Security Risk, based on recently discovered vulnerabilities.

To add a new software level or review existing definitions:

1. On the menu bar under Devices, select Device Tools and click Software Images. The Software Images page opens.
2. Click the Software Levels option at the top of the page. The Software Levels page opens.
3. Click the Add Level option. The Add Software Level page opens. Be sure to click Save when finished.

**Add Software Level Page Fields**

Field	Description/Action
<b>Add Software Level</b>	
Level Name	Enter the level name.
Status	Displays one of the following options: <ul style="list-style-type: none"> <li>• Active — Marks the configuration policy active (the default).</li> <li>• Inactive — Deactivates the configuration policy. Inactive policies do not generate non-compliance events.</li> </ul>
Level	Select a compliance rating name. You can use any of the compliance definitions given depending on your requirements and validation procedures. Options include: <ul style="list-style-type: none"> <li>• Security Risk</li> <li>• Pre-production</li> <li>• Obsolete</li> <li>• Bronze</li> <li>• Silver</li> <li>• Gold</li> <li>• Platinum</li> </ul>
Description	Enter a description of the compliance.
Partition	Select a Partition from the drop-down menu. <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions.</p> </div>
<b>Matching Criteria</b> (Matching criteria can use wildcard operators: * and ?.)	
Software Version	Enter the software version currently running on the device.
Device Driver	Select a device driver used to access the device from the drop-down menu. (Any is the default.)
Device Model	Enter the device model.
Filename	Enter a string to match the OS filename.
Configuration Contains	Enter a pattern to match against the current device configuration to determine if the compliance applies to a given device.
<b>Software Vulnerability Information</b> (for Security Risk compliance level)	



Field	Description/Action
Disclosure Date	Enter the date when the software vulnerability was flagged in the following format: <i>yyyy-MM-dd</i> .
Importance	Select the severity of the security vulnerability from the drop-down menu, including: <ul style="list-style-type: none"><li>• Critical</li><li>• High</li><li>• Medium</li><li>• Low</li><li>• Informational</li></ul>
CVE Name	Enter the CVE (Common Vulnerabilities and Exposures) name. CVE is a list of standardized names for vulnerabilities and other information on security exposures. (For more information, refer to <a href="http://www.cve.mitre.org">www.cve.mitre.org</a> .)
Solution	Enter detailed solution information.
Advisory Link	Enter the URL to an external reference for advisory information on a vulnerability.
Solution Link	Enter the URL to an external reference for more information on possible solutions to the vulnerability.

## Viewing Device Software Versions

The Device Software report enables you to view the software version and compliance rating currently assigned to each device.

1. On the menu bar under Devices, select Device Tools and click Software Images. The Software Images page opens.
2. Click the Software Levels option at the top of the page. The Software Levels page opens.
3. Click the Device Software Report option at the top of the page. The Device Software Report opens. For more information, see "[Device Status Report](#)" on page 589.

**Note:** You can also navigate to the Device Software report from the Reports drop-down menu.

# Chapter 10: Event Notification Rules

Use the following table to quickly locate information.

Topic	Refer to:
Getting Started	<a href="#">"Getting Started" below</a>
Adding Event Rules	<a href="#">"Adding Event Rules" on page 448</a>
Event Rule Search Results	<a href="#">"Event Notification &amp; Response Rules Page Fields" on page 449</a>
New Event Notification Rules	<a href="#">"New Event Notification &amp; Response Rules Page Fields" on page 449</a>
Event Rule Variables	<a href="#">"Event Rule Variables" on page 454</a>

## Getting Started

HPE Network Automation (NA) enables you to trigger many different actions when events occur in the system, including:

- Running tasks, such as snapshots or diagnostics
- Sending Email notification
- Sending Email digests
- Sending SNMP traps
- Sending Syslog messages

Event rules can be limited to specific device groups and/or times of day. The following table describes the available events from which you can select.

Event	Description
Approval Denied	A user has denied an approval request.
Approval Granted	A user has approved a task.
Approval No Longer Required	A task approval is no longer required.
Approval Override	A user has overridden the approval of a task allowing the task to run without approval.
Approval Request	A user has created a task that requires approval before it can run.
Approval Task Changed	A user has made a change to a task that requires approval before it can run.
Approval Task Deleted	A user has deleted a task that was earmarked for approval.

Event	Description
Approval Task Timeout	A task was not approved in the time allotted.
Change Plan Added	A change plan is added.
Change Plan Deleted	A change plan is deleted.
Change Plan Modified	A change plan is modified.
Command Authorization Error	A user tried to run a command that he/she is not authorized to use.
Concurrent Telnet/SSH Session Override	A user ignored the restriction on simultaneous logins. The user logged in to a device via the Proxy despite another user's prior login.
Policy Added	A user has added a new configuration policy.
Policy Changed	A user has changed a configuration policy.
Policy Non-Compliance	A configuration change violated a policy rule.
Policy Pattern Timeout	A policy pattern took more than 30 seconds to match.
Policy Rule Added	A user has added a new configuration rule.
Policy Rule Changed	A user has changed a configuration rule.
Device Access Failure	NA cannot access a device. This could be due to a bad password or there was no route to the host.
Device Added	A user added a device.
Device Booted	A device was rebooted.
Device Change Plan Completed Successfully	A device change plan succeeded.
Device Change Plan Failed	A device change plan failed.
Device Command Script Completed Successfully	A device command script succeeded.
Device Command	A device command script failed.

Event	Description
Script Failed	
Device Configuration Change	NA detected a configuration change while running a Snapshot task.
Device Configuration Change - No User	NA detected a configuration change by an unknown user.
Device Configuration Deployment	NA successfully deployed a configuration to a device.
Device Configuration Deployment Failure	NA failed to deploy a configuration to a device.
Device Data Failure	NA failed to save a configuration or diagnostic output to the database.
Device Deleted	A user permanently removed a device.
Device Diagnostic Changed	The results of a diagnostic differ from the previous results.
Device Diagnostic Completed Successfully	A device diagnostic succeeded.
Device Diagnostic Failed	A device diagnostic failed.
Device Edited	A user modified a device's information.
Device Flash Storage Running Low	A device's flash storage is running low.
Device Group Added	A user has added a device group.
Device Group Deleted	A user has deleted a device group.
Device Group Modified	A user modified a device group.
Device Inaccessible	A device is inaccessible.

Event	Description
Device Managed	A user marked a device as Active.
Device Missing From Import	When the Import task is run periodically and given a file of devices to import, this event occurs when a device was included in the file the last time the import occurred, but is no longer included in the file during the current import.
Device Password Change	A user deployed a password change.
Device Password Change Failure	NA failed to deploy a device password change.
Device Permissions - Modified	A device was added to or removed from a group, which changed permissions such that users can modify the device.
Device Permissions - New Device	Someone added a new device to a device group, changing the permissions for users associated with that device group.
Device Reload failed	A device reload failed.
Device Reservation Conflict	There was a device reservation conflict.
Device Snapshot	NA checked a device for a configuration change.
Device Snapshot Failed	The device snapshot to check for a configuration change failed. Only separate tasks of type snapshot trigger this event. Pre-snapshot tasks and post-snapshot tasks that run as part of a diagnostic or a command script do not trigger this event.
Device Software Change	NA detected a new OS version on a device (for example: from IOS 11 to IOS 12).
Device Startup/Running Config Difference	NA detected a difference between the Startup and Running configurations.
Device Unmanaged	A user marked a device as Inactive. Imported devices can also be Inactive if unreachable for a certain time of period.
Distributed System - Broken Replication Job	NA detected a broken replication job.
Distributed System - Data Synchronization Delay warning	NA detected a data synchronization delay warning.

Event	Description
Distributed System - Deferred LOBs Exceed Threshold	NA detected an excess of deferred LOBs.
Distributed System- Device Software Transfer Error	NA detected a device software transfer error.
Distributed System - Fixed Replication Job	NA detected a fixed replication job.
Distributed System - RMI Error	NA detected a RMI error.
Distributed System - Replication Errors	NA detected replication errors.
Distributed System - Stopped Merge Agent Job	NA detected a stopped merge agent job.
Distributed System - Time synchronization Error	NA detected a time synchronization warning.
Distributed System - undeletable anomalous generations	NA detected undeletable anomalous generations.
Distributed System - uniqueness conflict	NA detected a uniqueness conflict.
Email Report Saved	A user has saved an email report.
External Directory Server Authentication Error	NA could not connect to an external LDAP authentication server.
Last Used Device	The password last used for access to a device was changed.

Event	Description
Password Changed	
License Almost Exceeded	The devices exceed 90% of the total number of licensed nodes.
License Almost Expired	Your NA license expires soon (date-based licenses only).
License Exceeded	The devices exceed the total number of licensed nodes. NA allows a 20% excess.
License Expired	Your license has expired. NA will no longer allow logins, but will continue to take scheduled snapshots and record changes.
Module Added	Someone added a module/blade/card to a device.
Module Changed	Someone changed the attributes of a module/blade/card installed in a device.
Module Removed	Someone removed a module/blade/card from a device.
Monitor Error	A server monitor failed to run.
Monitor Okay	A server monitor ran successfully.
Pending Task Deleted	A user deleted a scheduled task before it ran.
Reserved Device Configuration Changed	A user has changed the device configuration on a reserved device.
Scheduled for Deploy Configuration Edited	A user modified a configuration that was scheduled to be deployed.
Scheduled for Deploy Password Modified	A new password was deployed, and there is another Password Deploy task scheduled. This indicates that the new password that was just deployed will be changed again (when the pending Password Deploy task executes).
Security alert	NA has detected a security alert.
Server Startup	The NA Management Engine was started.
Session Data Captured	The Proxy saved a connect session to the database.
Software Update Failed	NA failed to update the OS software on a device.
Software Update Succeeded	NA successfully updated the OS software on a device.

Event	Description
Software Vulnerability Detected	If you setup a software level set to "Security Risk," when NA snapshots devices and detects an OS version that is tagged as a "Security Risk," this event is generated.
Summary Reports Generated	A user has generated Summary reports.
Task Completed	A task has completed.
Task Started	A task has started.
Ticket Created	When using the HPE Remedy AR System Connector (or any of the HPE Connectors that interact with a 3rd party Ticketing systems), this event indicates that NA created a ticket in that 3rd party Ticketing system.
User Added	A user has been added.
User Authentication Error	A user entered an incorrect password when logging into NA.
User Authentication Error Lockout	A user is locked out due to too many consecutive failed login attempts.
User Deleted	A user has been deleted
User Disabled	A user record was edited and the user's status changes from Enabled to Disabled.
User Enabled	A user record was edited and the user's status changes from Disabled to Enabled.
User Login	A user logged in to NA.
User Logout	A user has logged out of NA.
User Message	A user created a message by clicking the New Message link.
User Permission Changed	A user's permission has been changed.

## Adding Event Rules

To add event notification rules, on the menu bar under Admin, click Event Notification & Response Rules. The Event Notification & Response Rules page opens. This page lists currently defined rules that are triggered by NA events. Event rules marked with a pound sign (#) are inactive.

**Note:** Admin users see all event rules; other users see only their own event rules.



## Event Notification & Response Rules Page Fields

Field	Description/Action
New Event Notification & Response Rule link	Opens the New Event Notification & Response Rule page. For more information, see <a href="#">"New Event Notification &amp; Response Rules Page Fields"</a> below.
Rule Name	Displays the name of the event rule.
Partition	If you have created Partitions for security or business reasons, you can partition event rules according to Partitions. If the event rule is available to all Partitions, the event rule is labeled "Shared" (or "Global") depending on configuration. Keep in mind that you cannot edit or delete event rules without the proper permissions. For more information about creating Partitions, see <a href="#">"Segmenting Devices and Users"</a> on page 142.
Action	Displays the action performed by the event rule. Actions include: <ul style="list-style-type: none"><li>• Run Task</li><li>• Send Email</li><li>• Send SNMP Trap</li><li>• Add to Email Digest</li><li>• Send Syslog Message</li></ul>
Created By	Displays the event rule's owner.
Actions	You can select from the following options: <ul style="list-style-type: none"><li>• Edit — Opens the Edit Event Notification &amp; Response Rule page, where you can edit an event rule. For more information, see <a href="#">"New Event Notification &amp; Response Rules Page Fields"</a> below.</li><li>• Delete — Opens a confirmation window, where you are prompted to confirm the deletion. This option appears only when you have permission to delete the event rule.</li></ul>

## New Event Notification & Response Rules Page Fields

The New Event Notification & Response Rule page enables you to add/edit a new Event Notification & Response rule.

1. On the menu bar under Admin, click Event Notification & Response Rules. The Event Notification & Response Rules page opens.
2. Click the New Event Notification & Response Rule link at the top of the page. The New Event Notification & Response Rule page opens.

Field	Description/Action
Add Email and Event Rule named	Enter the event rule name.
To take this action	<p>Select one of the following options.</p> <div style="background-color: #f0f0f0; padding: 5px;"> <p><b>Note:</b> Depending on the option you select, the page will refresh and provide specific fields for the action.</p> </div> <ul style="list-style-type: none"> <li>• Run Task — For more information, see <a href="#">"Run Task Action" on the next page.</a></li> <li>• Send Email Digest — For more information, see <a href="#">"Send Email Digest Action" on the next page.</a></li> <li>• Send Email Message — For more information, see <a href="#">"Send Email Message Action" on page 452.</a></li> <li>• Send SNMP Trap — For more information, see <a href="#">"Send SNMP Trap Action" on page 453.</a></li> <li>• Send Syslog Message — For more information, see <a href="#">"Send Syslog Message Action" on page 454.</a></li> <li>• Create/Add to Ticket — For more information, see <a href="#">"Create/Add to Ticket" on page 454.</a></li> </ul>
When the following events occur	<p>Select one or more of the events from the events list. You can select multiple events using Ctrl+click or Shift+click. For a description of the event rules, see <a href="#">"Getting Started" on page 442.</a></p> <p>If you select the Configuration Policy Non-Compliance event, which is available only with the NA Ultimate edition license, select one of the following options:</p> <ul style="list-style-type: none"> <li>• of any importance — If selected (the default) the event rule will trigger regardless of the importance of any violated configuration policy rules. For more information about setting the configuration policy rule importance, see <a href="#">"New Rule Page Fields" on page 416.</a></li> <li>• of at least &lt; &gt; importance — You can select either Critical, High, Medium (the default), Low, or Informational. The event rule will trigger only if the event was generated due to the failure of a configuration policy rule with an importance equal to or greater than the importance selected. For more information, see <a href="#">"New Rule Page Fields" on page 416.</a></li> <li>• For all policies — If selected (the default) all the configuration polices that you can access and that have non-empty conditions are checked.</li> <li>• For selected policies — Select one or more configuration policies from the list. You can use Shift+click or Ctrl+click to select multiple configuration polices.</li> </ul>

Field	Description/Action
	<p>If you select the Device Command Script Completed Successfully or Device Command Script Failed event, you can select a command script from the drop-down menu. If you select the Device Diagnostic Changed or the Device Diagnostic Completed Successfully event, you can select a diagnostic from the drop-down menu.</p>
Rule Status	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Active — If checked (the default), the event rule is run when the event occurs.</li> <li>• Inactive — If checked, the event rule is not run. This option can be used to temporarily turn off an event rule.</li> </ul>
Between	<p>If checked, specify a time range and select the hours to start and end the event rule.</p>
On devices in this Partition	<p>If partitioning is enabled, select a Partition from the drop-down menu. For more information about creating Partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p>
And in these groups	<p>If checked, select one or more groups from the list.</p>
<p>Depending on the action you select, the bottom portion of the New Event Notification &amp; Response Rules page will be different.</p>	
<p><b>Run Task Action</b></p>	
<p>When an event occurs, you can have it trigger any NA task. You can have NA take a snapshot, store diagnostics, run a command script, or even launch an external application. You can even feed event variables into the command line for external applications. This enables you to customize NA and tailor its operations to your needs.</p>	
Wait	<p>Enter the number of seconds, minutes, hours, or days to wait before running the task.</p>
And then run this task	<p>Select a task to run from the drop-down menu.</p>
<p><b>Send Email Digest Action</b></p>	
<p>Email digests combine multiple NA events into a single email report that is sent periodically. Email digests can be used to inform users of common system events, such as configuration changes or device add, delete, and change activity.</p> <p>You can quickly scan digests for events of interest, while minimizing email volume. Each user can have one email digest. A user can set up multiple event rules. Each rule feeds a different set of events into their digest.</p>	
<p><b>Note:</b> If you want multiple email digests with different schedules or recipient lists, you can create users whose only purpose is to define appropriate digest rules.</p>	

Field	Description/Action
Send all my digests starting at (hour)	Enter the hour of the day when you want NA to send your email digests.
And repeating every (hours)	Enter the interval at which you want NA to send your email digests. For example, if you enter 6, the digests are sent every six hours.
To	Enter the email address of the recipient. Be sure to separate multiple addresses with commas. Note: If the variable is set to \$EventUserEmail\$, the email address is derived from the user who created the Email Digest. As a result, if the user's email address changes, the new email address is used.
Subject	Enter a brief subject line of the message.
Message Header	Enter a message header. This is the text that begins the header or summary section of the message. For HTML messages, this is often an ordered list tag <ol>.
End Summary	Enter the text that ends the header or summary section of a message. For HTML messages, this is often an ordered list end tag </ol>.
Message Footer	Enter the message footer. You can tailor this to your needs. For example, you could provide contact information or indicate this message is sent by the NA server.
Text Message or HTML Message	Check either Text Message or HTML Message (the default). If you select HTML Message, NA sends the appropriate mail headers so that the mail reader can interpret the HTML in the message. If you select Text Message, NA sends a plain text message, and any HTML tags are displayed as is.
Event Summary	This field provides the summary text, briefly describing the event. The specific message content is unique to the rule. For HTML messages, this line often begins with a list item tag <li> and may contain additional HTML tags and NA variables. If you click the Display Variable Names link, the Event Rule Variables window opens, listing all the variables you can use.
Event Details	This field includes the text, variables, and optional HTML tags that describe the event in detail.
<b>Send Email Message Action</b>	
<p>You can send email messages to users or distribution lists when NA events occur. One email message is sent for each event. For example, you can use this action to alert all users when a core device's configuration changes, to notify a system administrator when a device is inaccessible, or to keep an archive of system events in a public folder. You could also define a text-only event rule with a brief</p>	

Field	Description/Action
	message to email your pager.
To	Enter a comma-separated list of email addresses to receive the message. To send email to the user associated with the event, use the variable \$EventUserEmail\$.
Subject	Enter the subject line of the email message. You can use variables to include system information on the subject line.
Text Message	If checked, NA sends a plain text message. Any HTML tags are displayed as is.
HTML Message	If checked, NA sends the appropriate mail headers so that the mail reader can interpret the HTML in the message.
Both Text and HTML	If checked (the default), both a text message and an HTML message is sent. Keep in mind that NA sends a multi-part email message. The email client displays whichever format is appropriate. For example, Outlook displays HTML by default. If messages are received on a pager, PDA, or similar device, HPE recommends using short text-only messages.
<b>Send SNMP Trap Action</b>	
<p>An SNMP Trap is a network status message (defined by RFCs 1155 and 1215). This action is used to send SNMP traps when NA events occur. For example, you can send an SNMP trap to your Network Management System (NMS) every time a snapshot is taken. To display the trap correctly, you may first need to load the NA Management Information Base (MIB), which defines the message format. <b>(Note:</b> The network must be configured to permit SNMP traffic to travel through routers, firewalls, and other network devices.)</p>	
SNMP Trap Receiver Hostname	Enter the DNS name or IP address of the host.
SNMP Trap Receiver Port	Enter the host port that receives the SNMP trap. If you click the User Default Port link, the default port number is entered. 162 is the standard SNMP port.
SNMP Community String	Enter the community string to use when sending the SNMP trap. The recipient must be configured to accept this string. If you click the Use Default Community String link, the default community string, Public, is entered.
SNMP Version	Select the version of SNMP to use, either v1 (the default) or v2.
Event Description	Enter a description of the event. You can include NA variables. If you click the Display Variable Names link, the Event Rule Variables window opens, which lists all the variables you can use. For more information, see <a href="#">"Event Rule Variables" on the next page</a>

Field	Description/Action
Subsystem	Enter text that is meaningful in your environment.
Severity	Select one of the following options to identify the severity of the event. Note that there is no intrinsic security level associated with each event, so you can assign any value that makes sense. <ul style="list-style-type: none"> <li>• Alert</li> <li>• Critical</li> <li>• Debug</li> <li>• Emergency</li> <li>• Error</li> <li>• Info</li> <li>• Notice</li> <li>• Warning</li> </ul>
<b>Send Syslog Message Action</b>	
You can use syslog messages to forward any NA event to an external management system. For example, you might notify your CA UniCenter system when NA detects a device configuration change so that an alert appears on your operations console.	
Syslog Hostname	Enter the host name of the Syslog server.
Syslog Port	Enter the port used by Syslog. If you click the Use Default Port link, the default Syslog port, 514, is entered.
Syslog Message	Enter the Syslog message, including variables. If you click the Display Variable Names link, the Event Rule Variables window opens, which lists all the variables you can use. For more information, see <a href="#">"Event Rule Variables" below</a> .
<b>Create/Add to Ticket</b>	
Ticketing System Hostname	Enter the ticketing system hostname.
Event Description	Enter the event description.

## Event Rule Variables

Several event rule variables are available for:

- Device events
- Device configuration events
- Device diagnostics events
- Task events
- All events

## Device Events Variables

**Note:** Variables are case-sensitive. You must enter them exactly as shown.

You can use these variables only for device event rules:

Variable	Description
\$DeviceID\$	NA's identification number for the device.
\$HostName\$	The device's host name.
\$IPAddress\$	The devices primary IP address.
\$FQDN\$	The devices fully-qualified domain name.
\$Vendor\$	The device's manufacturer.
\$Model\$	The device's model number.

## Variables for Device Configuration Events

**Note:** Variables are case-sensitive. You must enter them exactly as shown.

You can use these variables only for device configuration event rules:

Variable	Description
\$DataID\$	NA's identification number for the latest configuration
\$Comments\$	Configuration comments.
\$Diff\$	Textual differences of the configuration changes.

## Variables for Device Diagnostic Events

**Note:** Variables are case-sensitive. You must enter them exactly as shown.

You can use these variables only for device diagnostics event rules:

Variable	Description
\$CurrentDiag\$	The text of the current diagnostic.
\$PreviousDiag\$	The text of the previous diagnostic.
\$Diff\$	The textual difference of the changes between current and previous diagnostic.
\$DataID\$	Indicates that it is also for diagnostic events.

## Task Event Variables

**Note:** Variables are case-sensitive. You must enter them exactly as shown.

You can use these variables only for device diagnostics event rules:

Variable	Description
\$ApprovalDate\$	Task approval date.
\$ApproverEmails\$	Comma separated list of email addresses of the task approvers.
\$ApprovalPriority\$	Task approval priority.
\$OriginatorFirstName\$	The first name of the task originator.
\$OriginatorLastName\$	The last name of the task originator.
\$OriginatorName\$	The name of the task originator.
\$TaskName\$	The task name.
\$TaskComments\$	The task comments.
\$TaskDevices\$	A list of devices affected by the task.
\$TaskFrequency\$	The frequency of the task.
\$TaskID\$	The task identifier.

## Variables for All Events

You can use the following variables in all event rules. Keep in mind Variables are case-sensitive. You must enter them exactly as shown.

**Note:** For a complete list of variables, click the [Display Variable Names](#) link on the [New Event Notification & Response Rule](#) page.

Variable	Description
\$AppURL\$	NA's application URL (such as <i>https://host/</i> ) used to put links to NA directly into email messages.
\$EventID\$	The NA identification number of this event.
\$EventType\$	The type of event.
\$EventDate\$	The date the event occurred.
\$EventText\$	The event details.
\$EventUserFirstName\$	The first name of the NA user associated with this event. (Note: If no user is



Variable	Description
	associated with this event or if no First Name is set for the user, this will be an empty string.)
\$EventUserLastName\$	The last name of the NA user associated with this event. (Note: If no user is associated with this event or if no Last Name is set for the user, this will be an empty string.)
\$EventUserName\$	The NA user name associated with this event (indicates “no user” when appropriate).
\$EventUserEmail\$	Email address of the user associated with this event.
\$FyiEmails\$	Comma separated list of email addresses of the task FYI recipients.
\$LocalHostName\$	The hostname of the NA server.
\$LocalHostAddress\$	The IP address of the NA server.

# Chapter 11: Performing Searches

Use the following table to quickly locate information.

Search	Refer to:
Searching configuration text	"Using the Full-Text Search Functionality" on the next page
Searching for Devices	"Searching for Devices" on page 461
Searching for Interfaces	"Searching for Interfaces" on page 470
Searching for Modules	"Searching for Modules" on page 474
Searching for Policies	"Searching for Policies" on page 477
Searching for Compliance	"Searching for Policy, Rule, and Compliance" on page 480
Searching for Configurations	"Search For Configuration Page Fields" on page 485
Searching for Diagnostics	"Searching for Diagnostics" on page 488
Searching for Resource Identities	"Search for Resource Identities" on page 492
Searching for Tasks	"Searching for Tasks" on page 495
Searching for Sessions	"Searching for Sessions" on page 502
Searching for Events	"Searching for Events" on page 506
Event Descriptions	"Event Descriptions" on page 509
Searching for Users	"Searching for Users" on page 516
Searching for ACLs	"Searching for ACLs" on page 518
Searching for MAC Addresses	"Searching for MAC Addresses" on page 522
Searching for IP Addresses	"Searching for IP Addresses" on page 525
Searching for VLANs	"Searching for VLANs" on page 528
Searching for Device Templates	"Searching for Device Templates" on page 530
Single Search	"Single Search" on page 533
Advanced Search	"Advanced Search" on page 536

# Using the Full-Text Search Functionality

After full-text search is enabled, faster configuration text search is available for the following report options:

- Reports > Search For > Devices > Configuration Text > contains (full text)
- Reports > Search For > Configurations > Configuration Text > contains (full text)
- Reports > Search For > Device Templates > Configuration Text > contains (full text)
- Reports > Advanced Search > Search Criteria > Configuration Text > contains (full text)

Additionally, you can create a dynamic group based on the results of a Search Criteria > Configuration Text > contains (full text) search.

Similarly, these searches also support searching for configuration text that does not contain (full text). The search is always case-insensitive for the contains (full text) and does not contain (full text) operators. For information about the search types that these operators support, see the [contains \(full text\) and does not contain \(full text\) Usage table](#).

## contains (full text) and does not contain (full text) Usage

Search Type	Notes	Examples
Search for a single word	A word is a sequence of characters containing no spaces.	<ul style="list-style-type: none"> <li>• interface</li> <li>• telnet</li> <li>• snmp</li> </ul>
Search for a single word using the wildcard	The asterisk character (*) is the only supported wildcard; this wildcard must be at the end of the search phrase.	<ul style="list-style-type: none"> <li>• interf*</li> <li>• tel*</li> </ul>
Search for an IP address	<p>IP address searches are treated the same as a single word searches. The asterisk character (*) is the only supported wildcard; this wildcard must be at the end of the search phrase.</p> <div style="background-color: #e0e0e0; padding: 5px;"> <p><b>Note:</b> With a PostgreSQL database, you cannot perform a search of an IPv4 address by using the wildcard character. You must give the exact IP address to get the match. However, if you are searching for an IPv6 address, only a part of the address must be provided for the desired results. For example, if you are searching for 'fe80:0000:0000:0000:0202:b3ff:fe1e:8329', you must provide only 'fe80:' as the search phrase.</p> </div>	<ul style="list-style-type: none"> <li>• 10.11.12.13 results in an exact match</li> <li>• 10.11.12.* results in all addresses that start with 10.11.12</li> <li>• 10.11.* results in all addresses that start with 10.11</li> <li>• fe80:0000:0000:0000:0202:b3ff:fe1e:8329 results in an exact match</li> <li>• fe80:0000:0000:0000:0202:b3ff:fe1e:* results in all address that that start with fe80:0000:0000:0000:0202:b3ff:fe1e</li> <li>• fe80:0000:0000:0000:0202:b3ff:* results in all addresses that start with fe80:0000:0000:0000:0202:b3ff</li> </ul>

### contains (full text) and does not contain (full text) Usage, continued

Search Type	Notes	Examples
Search for a phrase	A phrase is a sequence of characters containing one or more white spaces.	<ul style="list-style-type: none"> <li>• set vlan</li> <li>• set vpn name</li> </ul>
Search for a phrase using the wildcard	<ul style="list-style-type: none"> <li>• The asterisk character (*) is the only supported wildcard; this wildcard must represent one or more complete words within of the search phrase.</li> <li>• The * must <i>not</i> be at the end of the search phrase.</li> <li>• Use white space on either side of the *. If white space is absent, NA treats the search as a word using the wildcard.</li> </ul>	<ul style="list-style-type: none"> <li>• set * name</li> <li>• telnet * table * settings</li> </ul> <p><b>Note:</b> Logical operators (AND, OR, NOT, ACCUM, EQUIV) are not supported nor considered as part of search strings.</p>

## Using the Regular Expression Search Functionality

A regular expression (regex or regexp) is a sequence of characters that define a search pattern. Regex-based search criteria—contains (regexp) and does not contain (regexp)—can be used for pattern matching with strings, or for string matching. For example, a search criteria as Host Name contains (regexp) '^10.\*.\*.13\$' matches all devices with addresses that start with 10 and end with 13.

**Note:** The contains (regexp) and does not contain (regexp) operators are based on the database-specific regular expression SQL queries. For detailed information, see the specific database SQL references—such as for Oracle database, see the *Oracle® Database SQL Reference*.

The search is always case-insensitive for the contains (regexp) and does not contain (regexp) operators. However, for NA running with a Microsoft SQL (MS SQL) database, the case sensitivity depends on how the function is implemented in the database. For more information, see the *Enabling Regular Expression Search Functionality in Microsoft SQL* chapter in the *NA Administration Guide*.

Regex is enabled for all the report options available on the NA console. For information about fields that have the regex-based search options, see the page field details of each type of reports later in this chapter.

For NA running with an MS SQL database, the regular expression search is disabled by default. For information about enabling the regex search in MS SQL, see the *Enabling Regular Expression Search Functionality in Microsoft SQL* chapter in the *NA Administration Guide*.

Additionally, you can create a dynamic group based on the results of a Search Criteria > Configuration Text > contains (regexp) search.

# Searching for Devices

Device searches enable you to search for devices using a combination of criteria and operators.

If you have installed NA Ultimate, you can also search for devices that are out of compliance with specified policies or rules. (For more information about creating policies, see ["Creating a Policy" on page 412.](#))

To search for devices, on the menu bar under Reports select Search For and click Devices. The Search For Device page opens. When you are finished entering search criteria, click the Search button. NA returns a list of devices containing all the specified search criteria on the Device Search Results page. For more information, see ["Device Search Results Page Fields" on page 468.](#)

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

## Search For Device Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to select the information you want to include in the Device Search Results page.
Host Name	Select an operator and enter the Host Name. Operators include: <ul style="list-style-type: none"><li>• Contains</li><li>• Does not contain</li><li>• Matches</li><li>• Equals</li><li>• Does not equal</li><li>• Contains (regexp)</li><li>• Does not contain (regexp)</li></ul> You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones. <b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.
Device IP	Select an operator and enter the device’s IP address.
IP Address Range	A range of device IP addresses in the format x.x.x.x-y.y.y.y. The available operator is: <ul style="list-style-type: none"><li>• Equals — The specified range is inclusive.</li></ul> <b>Tip:</b> NA returns devices with a primary or secondary IP address in this range. To see the secondary IP address results, select the <b>Secondary IP Address</b> check box.

Field	Description/Action
Secondary IP Address	Select an operator and enter the device's secondary IP address.
Device Vendor	Select an operator and enter the name of the vendor who manufactured the device.
Device Model	Select an operator and enter the model designation of the device.
Device Family	The device family specification. Operators include: <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Device Type	Select the type of network device, such as router, switch, firewall, VPN, Virtual Switch, DialUp, DSL_ISDN, WAN, Wireless AP, or load balancer from the scroll-down menu.
Device ID	The device ID specification. Operators include: <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Device Status	Select from the following options for the device: <ul style="list-style-type: none"> <li>• Active</li> <li>• Inactive</li> <li>• Pre-Production (A pre-production device is a device that is not yet active in the production network. For more information, see <a href="#">"Bare Metal Provisioning" on page 113.</a>)</li> </ul>
Driver Name	Select one or more drivers associated with the device from the scroll-down menu. To select multiple drivers, click the first driver, then Ctrl+click to select additional drivers.
FQDN	Select an operator and enter a Fully Qualified Domain Name (FQDN).
Policy Compliance	The HPE Network Automation Premium edition license does not include this check box. It is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page ( <b>Help &gt; About Network Automation &gt; View License Information</b> link).  Select from the following options for the device: <ul style="list-style-type: none"> <li>• Any (the default)</li> <li>• Device in compliance</li> <li>• Device not in compliance</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Device has no applicable policy</li> <li>• Non-Compliant based on Rule Priority — Select a rule priority from the drop-down menu. You can select Critical, High, Medium, Low, or Informational. This enables you to filter the search to include only devices that are in violation of configuration rules above a given importance. ( For more information about the importance ratings for configuration policy rules, see <a href="#">"New Rule Page Fields" on page 416 .</a> )</li> <li>• Non-Compliant with Selected Policies — Select one or more policies from the list.</li> <li>• Non-Compliant with Selected Rules — Select one or more rules from the list. (For more information about policy rules, see <a href="#">"New Rule Page Fields" on page 416.</a>)</li> </ul>
Access Methods	Select an access method from the scroll-down menu: <ul style="list-style-type: none"> <li>• FTP</li> <li>• RLogin</li> <li>• SCP</li> <li>• SNMP</li> <li>• SSH</li> <li>• TFTP</li> <li>• Telnet</li> </ul>
Device Location	Select an operator and enter the location of the device.
Serial Number	Select an operator and enter the serial number of the device.
Asset Tag	Select an operator and enter information from the device asset tag.
Device Software Version	Select an operator and enter the version number of the operating system running on the device.
Device Firmware Version	Select an operator and enter the version number of the firmware running on the device.
Device Description	The user-defined description of the device.
Comments	Select an operator and enter a unique portion of the comment for the device.  This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.
Free Ports	Select an operator (equals, is less than, or is greater than) and enter the number of free ports.
Percentage of Free Ports	Select an operator (equals, is less than, or is greater than) and enter a percentage of free ports.
Total Ports	Select an operator (equals, is less than, or is greater than) and enter the total number of ports on the device.

Field	Description/Action
Ports In Use	Select an operator (equals, is less than, or is greater than) and enter the number of ports in use.
Percentage of Ports In Use	Select an operator (equals, is less than, or is greater than) and enter a percentage of ports in use.
System Memory	Select an operator (equals, is less than, or is greater than) and enter the total amount of RAM (MB) on the device.
Uptime	<p>Select an operator (is less than or is greater than) and enter the total amount of days. The total number of days, hours, minutes, and seconds since the device was last rebooted is shown on the Device Search Results page.</p> <div style="background-color: #e0e0e0; padding: 10px; border: 1px solid #ccc;"> <p><b>Note:</b> Uptime data is collected during the NA Detect Device Boot diagnostic. For the uptime data to be reliable, a recurring diagnostic task must be in place that routinely collects this data. Not all devices support the NA Detect Device Boot Diagnostic. Devices that do not support the diagnostic, as well as devices that have never had the diagnostic run, will have empty fields for Uptime and Uptime Store Date. For information about the Run Diagnostics task, see <a href="#">"Run Diagnostics Task Page Fields" on page 291</a>.</p> </div>
Uptime Stored Date	<p>Select an operator (since or until) and then select a timeframe from the pull-down menu. Anytime is the default. You can use the calendar option to select a specific day. The last time NA Detect Device Boot diagnostic was run is shown in the Device Search Results page. For information about the NA Detect Device Boot diagnostic, see <a href="#">"View Menu Options" on page 185</a>.</p> <div style="background-color: #e0e0e0; padding: 10px; border: 1px solid #ccc;"> <p><b>Note:</b> Uptime data is collected during the NA Detect Device Boot diagnostic. For the uptime data to be reliable, a recurring diagnostic task must be in place that routinely collects this data. Not all devices support the NA Detect Device Boot Diagnostic. Devices that do not support the diagnostic, as well as devices that have never had the diagnostic run, will have empty fields for Uptime and Uptime Stored Date.</p> </div>
Configuration Text	<p>Select an operator, and then enter a unique portion of the device configuration on which to search.</p> <ul style="list-style-type: none"> <li>• The "contains" and "does not contain" operators support regular expressions, including the ? and * wildcards. These searches are case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</li> <li>• The "contains (full text)" and "does not contain (full text)" operators support the * wildcard only. For more information, see <a href="#">"Using the Full-Text Search Functionality" on page 459</a>. These searches are always case-insensitive.</li> </ul> <div style="background-color: #e0e0e0; padding: 10px; border: 1px solid #ccc;"> <p><b>Note:</b> These operators require that full-text search is enabled for the database.</p> </div>



Field	Description/Action
	<ul style="list-style-type: none"> <li>IPv6 address shorthand notation (double colon) cannot be used in combination with wildcards.</li> <li>The "contains (regexp)" and "does not contain (regexp)" operators are based on the database-specific regular expression SQL queries. For detailed information, see the specific database SQL references; such as for Oracle database, see the <i>Oracle® Database SQL Reference</i>.</li> </ul> <p>If the search operator is "contains" or "contains (full text)," set the number of context lines around the matching line in the Show context lines around the matching line when displaying text fields field.</p>
Different Startup/Running	If checked, search devices with different startup and running configuration.
Last Changed Time	<p>Select the following operators:</p> <ul style="list-style-type: none"> <li>Since or Until</li> <li>Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p> </div>
Last Successful Snapshot	The timestamp of the most recent successful snapshot. Specify a time range.
Last Snapshot Attempt	The timestamp of the most recent device configuration snapshot attempt (regardless of result). Specify a time range.
Last Snapshot Result	<p>The result of the most recent snapshot attempt. Operators include:</p> <ul style="list-style-type: none"> <li>Contains</li> <li>Does not contain</li> <li>Matches</li> <li>Equals</li> <li>Does not equal</li> <li>Contains (regexp)</li> <li>Does not contain (regexp)</li> </ul>
Last Access Attempt	The timestamp of the most recent attempt to access the device (regardless of result). Specify a time range.
Last Successful Attempt	The timestamp of the most recent successful device access. Specify a time range.
Last Access Result	<p>The result of the most recent attempt to access the device. Operators include:</p> <ul style="list-style-type: none"> <li>Contains</li> <li>Does not contain</li> <li>Matches</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Change Detection and Polling	<p>The device management mode filter. Available options include:</p> <ul style="list-style-type: none"> <li>• Any—Do not limit the report based on the status of change detection and polling.</li> <li>• Enabled—Limit the report to devices for which change detection and polling is enabled.</li> <li>• Disabled—Limit the report to devices for which change detection and polling is disabled.</li> <li>• Polling Only—Limit the report to devices for which change detection is disabled but polling is enabled.</li> </ul>
Create Date	<p>Select the following operators:</p> <ul style="list-style-type: none"> <li>• Since or Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
Password Rule	Select an operator and enter a Password Rule Name.
ACL ID	Select an operator and enter an ACL ID.
ACL Handle	Select an operator and enter an ACL handle.
ACL Type	Select an operator and enter an ACL type.
ACL Configuration	<p>Select an operator and enter an ACL type.</p> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</p>
ACL Application	<p>Select an operator and enter an ACL application.</p> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</p>
Module Slot	Select an operator and enter a module slot.
Module Description	Select an operator and enter a module description.
Module Model	Select an operator and enter a module model.
Module Serial	Select an operator and enter a module serial.

Field	Description/Action
Module Memory	Select an operator and enter module memory.
Module Software Version	The module software version specification. Operators include: <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Module Firmware Version	Select an operator and enter the module's firmware version.
Module Hardware Revision	Select an operator and enter the module's hardware revision.
ROM Version	Select an operator and enter the module's ROM version. The ROM version is the version of the bootstrap code used in ROM to instruct the device on how to boot and load the operating system.
Service Type	Select an operator and enter an NA-defined service type.
Custom Service Type	Select an operator and enter a user-defined custom service type.
VTP Domain Name	Select an operator and enter a VLAN Trunking Protocol (VTP) domain name.
VTP Operating Mode	Select an operator and enter a VLAN Trunking Protocol (VTP) operating mode.
Device Access Mode	Select an operator and enter the name of the protocol used to access the device. For example, <code>snmp</code> , <code>cli</code> , <code>telnet</code> .
Access Mode Last Accessed Date	Select the following operators: <ul style="list-style-type: none"> <li>• Since or Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin: 10px 0;"> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p> </div> <p>The search result displays the details of the last time when the protocol was used.</p>
Device Custom Data	Select an operator and enter the unique text that might appear in any of the custom fields that are listed.

Field	Description/Action
	<p><b>Note:</b> This section is not displayed if there are no custom fields.</p>
Show context lines around the matching line when displaying text fields	<p>If the search operator for the Configuration Text field is "contains" or "contains (full text)," set the number of context lines around the matching line in this field. The default is 3. The maximum is 5.</p> <p><b>Note:</b> This feature can significantly slow performance if there is a large number of results to load.</p>
Device belongs to	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information about using the Device Selector, see "<a href="#">Device Selector</a>" on page 137.</p>
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see "<a href="#">Partitions</a>" on page 148.</p>

When you click the Search button, NA returns a list of devices containing all the specified search criteria on the Device Search Results page. For more information, see "[Device Search Results Page Fields](#)" below.

## Device Search Results Page Fields

The Device Search Results page display depends on the search criteria that you selected on the Search For Devices page. For more information about the search criteria, see "[Search For Device Page Fields](#)" on page 461. The following table describes the available options on the Device Search Results page.

Option	Description/Action
Modify this search link	Returns you to the Search For Device page, where you can edit your search criteria and run the search again.
View Search	Scrolls down to the Search Criteria information.

Option	Description/Action
Criteria link	
Check Boxes	<p>You can use the left-side check boxes to manage devices. Once you have selected the devices, click the Actions drop-down menu and click either:</p> <ul style="list-style-type: none"> <li>• Activate — Instructs NA to manage the selected devices.</li> <li>• Deactivate — Instructs NA not to manage the selected devices.</li> <li>• Batch Edit — Opens the Batch Edit page. For more information, see <a href="#">"Editing a Batch of Devices" on page 152.</a></li> <li>• Diagram — For more information, see <a href="#">"Diagramming" on page 591.</a></li> <li>• Delete — Deletes the selected devices.</li> <li>• Check Policy Compliance — For more information, see <a href="#">"Check Policy Compliance Task Page Fields" on page 372.</a></li> </ul> <div style="background-color: #f0f0f0; padding: 10px; margin: 10px 0;"> <p><b>Note:</b> The Check Policy Compliance check box is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page (<a href="#">Help &gt; About Network Automation &gt; View License Information link</a>).</p> </div> <ul style="list-style-type: none"> <li>• Configure Syslog — For more information, see <a href="#">"Configure Syslog Task Page Fields" on page 259.</a></li> <li>• Deploy Passwords — For more information, see <a href="#">"Deploy Passwords Task Page Fields" on page 264.</a></li> <li>• Discover Driver — For more information, see <a href="#">"Discover Driver Task Page Fields" on page 269.</a></li> <li>• Reboot Device — For more information, see <a href="#">"Reboot Device Task Page Fields" on page 274.</a></li> <li>• Run Command Script — For more information, see <a href="#">"Run Command Script Task Page Fields" on page 284.</a></li> <li>• Run Diagnostics — For more information, see <a href="#">"Run Diagnostics Task Page Fields" on page 291.</a></li> <li>• Run ICMP Test — For more information, see <a href="#">"Run ICMP Test Task Page Fields" on page 279.</a></li> <li>• Take Snapshot — For more information, see <a href="#">"Take Snapshot Task Page Fields" on page 300.</a></li> <li>• Synchronize Startup and Running — For more information, see <a href="#">"Synchronize Startup and Running Task Page Fields" on page 305.</a></li> <li>• Update Device Software — For more information, see <a href="#">"Update Device Software Task Page Fields" on page 310.</a></li> <li>• Delete ALCs — For more information, see <a href="#">"Deleting ACLs" on page 659.</a></li> <li>• Provision Device — For more information, see Refer to <a href="#">"Edit Device Page Fields" on page 108.</a></li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the devices.</p>
Actions	<p>You can select the following actions for each entry in the Device Search Results table:</p>

Option	Description/Action
	<ul style="list-style-type: none"><li>• Edit — Opens the Edit Device page, where you can edit information about this device.</li><li>• Telnet — Opens a Telnet window to the NA CLI. NA will attempt to log you into the device.</li><li>• SSH — Opens an SSH window to NA CLI. NA will attempt to log you into the device.</li><li>• View Config — Opens the Current Configuration page, where you can edit and add comments to the selected configuration.</li></ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"><li>• Save as a new device group — Select either “All Result Devices” or “Selected Devices Only,” enter the name of the new device group, and click Create Group.</li><li>• Add to an existing static device group — Select either “All Result Devices” or “Selected Devices Only,” select a device group from the drop-down menu, and click Add.</li><li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li><li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li><li>• View Search Result as CSV File — Downloads the search results in CSV format.</li></ul> <p><b>Note:</b> Check the “Include result details” option if you checked the “Configuration Text” option and entered the configuration text you want to find when defining the search criteria on the Search for Configuration page. The configuration text is not included in the CSV file if you do not check the “Include result details” option.</p>

## Searching for Interfaces

You use interface searches to search the NA database for information on interfaces installed in your devices. Keep in mind that although a Port is a Layer 2 term and Interface is a Layer 3 term, NA does not make that distinction.

To search for interfaces, on the menu bar under Reports select Search For and click Interfaces. The Search For Interface page opens. After entering the search criteria, click the Search button. NA returns a list of interfaces containing all the specified search criteria on the Interface Search Results page. For more information, see ["Interface Search Results Page Fields" on page 473](#).

**Note:** When entering search criteria, if you change to a different page before running the search, your settings are lost.

## Search For Interface Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to select the information you want to include in the Interface Search Results page.
Port Name	Select an operator and enter the port's name, such as Ethernet0 or Serial1. A port is defined as a single endpoint defined as a combination of a binding and a network address. Operators include: <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Port IP	Select an operator and enter the port IP.
CIDR Range	Select an operator and enter the port's Classless Inter-Domain Routing (CIDR) range, for example: 192.168.1.0-192.168.2.0 or 192.168.31.0/24). Keep in mind that CIDR ranges are inclusive.
Port Type	Select an operator and enter the port type, such as Ethernet, FastEthernet, or PortChannel.
Port Status	Select an operator and enter the port's status, such as Configured Up or Administratively Down.
Running Port State	Displays if the port is Configured Up or Administratively Down. <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> This does not reflect the protocol state of the port, only the configured state.</p> </div>
Description	Select an operator and enter the port's description.
Configured Duplex	Select and operator and enter the port's configured duplex setting.
Configured Speed	Select and operator and enter the port's configured speed setting.
Negotiated Duplex	Select an operator and enter the port's detected duplex setting.
Negotiated Speed	Select an operator and enter the port's detected speed setting.
VLAN Name	Select an operator and enter the port's VLAN name. The VLAN name is the name of the VLAN, for example VLAN2 or VLAN3,

Field	Description/Action
	on which to limit the search.
Host Name	<p>Select an operator and enter the device's Host Name. Keep in mind that you can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <p><b>Note:</b> Wildcards do not work with the "equals" and "does not equal" operators.</p>
Device IP	Select an operator and enter the device's IP address.
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Module Slot	Select an operator and enter a module slot number.
Module Description	Select an operator and enter the module's description.
Module Model	Select an operator and enter the module's model number.
Module Serial	Select an operator and enter the module's serial number.
Module Firmware Version	Select an operator and enter the module's firmware version.
Interface Custom Data	<p>Select an operator and enter the unique text that might appear in any of the custom fields that are listed.</p> <p><b>Note:</b> This section is not displayed if there are no custom fields.</p>
Device belongs to	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information about using the Device Selector, see "<a href="#">Device Selector</a>" on page 137.</p>
Partition	Select a Partition to limit search results to devices in that Partition. The Default Partition



Field	Description/Action
	<p>(named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured multiple Partitions. For more information about Partitions, see <a href="#">"Partitions" on page 148</a>.</p>

## Interface Search Results Page Fields

The Interface Search Results page display depends on the search criteria that you selected on the Search For Interface page. For more information about search criteria, see ["Search For Interface Page Fields" on page 471](#). The following table describes the available options on the Interface Search Results page.

Option	Description/Action
Modify this search link	Returns you to the Search For Interface page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Check Boxes	<p>You can use the left-side check boxes to select interfaces. Once you have selected an interface, click the Actions drop-down menu and click Run Interface Script. The New Task - Run Command Script page opens. For more information, see <a href="#">"Running Command Scripts" on page 571</a>.</p> <p>The adjacent Select drop-down menu enables you to select or deselect all of the interfaces.</p>
Actions	<p>You can select the following actions for each entry in the Interface Search Results table:</p> <ul style="list-style-type: none"> <li>• Edit Interface — Opens the Edit Interface Detail page, where you can edit information about this interface. For more information, see <a href="#">"Edit Interface Detail Page Fields" on page 191</a>.</li> <li>• View Interface — Opens the Interface Detail page, where you can view interface details. For more information, see <a href="#">"Interface Detail Page Fields" on page 189</a>.</li> </ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"> <li>• Save as a new device group — Select either "All Result Devices" or "Selected Devices Only," enter the name of the new device group, and click Create Group.</li> <li>• Add to an existing static device group — Select either "All Result Devices" or "Selected Devices Only," select a device group from the drop-down menu, and click Add.</li> <li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li> <li>• Email Search Result - Enter the email address to send the search results to and click Send.</li> </ul>

Option	Description/Action
	<p>You must separate multiple addresses with a comma.</p> <ul style="list-style-type: none"> <li>View Search Result as CSV File - Downloads the search results in CSV format.</li> </ul>

## Searching for Modules

You use module searches to search the NA database for information on the cards, blades, or modules installed in your devices.

To search for modules, on the menu bar under Reports, select Search For and click Modules. The Search For Module page opens. When you are finished entering search criteria and click the Search button, NA returns a list of modules containing all the specified search criteria on the Module Search Results page. For more information, see ["Searching for Policies" on page 477](#).

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

## Search For Module Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the Module Search Results page to show only the selected information.
Host Name	<p>Select an operator and enter the Host Name. Operators include:</p> <ul style="list-style-type: none"> <li>Contains</li> <li>Does not contain</li> <li>Matches</li> <li>Equals</li> <li>Does not equal</li> <li>Contains (regex)</li> <li>Does not contain (regex)</li> </ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p>
Device IP	Select an operator and enter the device’s IP address.
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>Equals</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Module Slot	Select an operator and enter the slot on the device in which the module is installed.
Module Description	Select an operator and enter a unique portion of the module's description.
Module Model	<p>Select an operator and then enter the model of the module. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p> </div>
Module Serial	Select an operator and enter the module's serial number.
Module Memory	Select an operator and enter the total amount of RAM (MB) on the module.
Module Firmware Version	Select an operator and enter the version number of the firmware loaded on the module.
Module Hardware Revision	Select an operator and enter a portion of the module's hardware revision designation.
Comments	<p>Select an operator and enter a portion of the module's comment.</p> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</p>
Module Custom Data	<p>Select an operator and enter the unique text that might appear in any of the custom fields that are listed.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> This section is not displayed if there are no custom fields.</p> </div>

Field	Description/Action
Device belongs to	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information about using the Device Selector, see <a href="#">"Device Selector" on page 137</a>.</p>
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see <a href="#">"Partitions" on page 148</a>.</p>

## Module Search Results Page Fields

The Module Search Results page display depends on the search criteria that you selected on the Search For Module page. For more information, see ["Search For Module Page Fields" on page 474](#). The following table describes the available options on the Module Search Results page.

Option	Description/Action
Modify this search link	Returns you to the Search for Module page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Actions	<p>You can select the following actions for each entry in the Module Search Results table:</p> <ul style="list-style-type: none"> <li>• Edit Module — Opens the Edit Blade/Module Detail page, where you can edit information about this module.</li> <li>• View Module — Opens the Blade/Module Detail page, where you can view module details.</li> </ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"> <li>• Save as a new device group — Select either “All Result Devices” or “Selected Devices Only,” enter the name of the new device group, and click Create Group.</li> <li>• Add to an existing static device group — Select either “All Result Devices” or “Selected Devices Only,” select a device group from the drop-down menu, and click Add.</li> </ul>

Option	Description/Action
	<ul style="list-style-type: none"> <li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li> <li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li> <li>• View Search Result as CSV File - Downloads the search results in CSV format.</li> </ul>

## Searching for Policies

The HPE Network Automation Software Premium edition license does not include this functionality. It is available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page ([Help > About Network Automation > View License Information](#) link).

The NA Policy Manager applies a set of rules, or filters, to each device configuration change that NA detects. If a change to a device (or group of devices) is non-compliant, the NA Policy Manager generates an event which can trigger a notification rule. As a result, you can correct the non-compliant change, preserving both compliance and network availability. For more information about policy management, see ["Creating a Policy" on page 412](#). For information about the auto-remediation feature, see ["How the NA Policy Manager Works" on page 411](#).

The Search for Policies page enables you to narrow down that list of policies you want to view. This enables you to:

- Easily generate a list of policies in NA by using policy attributes as search criteria.
- Easily manage the policies in NA.

If you want to view all of your current policies, on the main menu bar under Policies, click Policy List. For more information, see ["Policies Page Fields" on page 412](#).

To search for policies, on the menu bar under Reports, select Search For and click Polices. The Search For Polices page opens. When you are finished entering search criteria, click the Search button. NA returns a list of policies containing all the specified search criteria on the Policies Search Results page.

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

## Search For Polices Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the Policies Search Results page to show only the selected information.
Policy Name	Select an operator and enter the policy name. Operators include: <ul style="list-style-type: none"> <li>• Contains</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Device Group	Select a device group the match the policy scope to be searched Use the Device Selector to select groups. For information about using the Device Selector, see " <a href="#">Device Selector</a> " on <a href="#">page 137</a> .
Create Date	Select the following operators: <ul style="list-style-type: none"> <li>• Since or Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p> </div>
Status	Select one of the following operators: <ul style="list-style-type: none"> <li>• Any (default)</li> <li>• Active</li> <li>• Inactive</li> </ul>
CVE	Enter the CVE (Common Vulnerabilities and Exposures) name, along with an operator. CVE is a list of standardized names for vulnerabilities and other information on security exposures.
Disclosure Date	Select the following operators: <ul style="list-style-type: none"> <li>• Since or Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p> </div>
Solution	Enter the solution text, along with an operator.  This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.
Vendor URL	Enter a URL to an external reference for more information on the vulnerability, along with an operator.
Solution URL	Enter a URL to an external reference for more information on possible solutions to the vulnerability, along with an operator.
Policy Tag	Select the policy tag on which to search. Policy tags enable you to search for compliance

Field	Description/Action
	entries related to policies with selected tags.
Partition	Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.  <b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see " <a href="#">Partitions</a> " on page 148.

## Policies Search Results Page Fields

The Policies Search Results page displays the search criteria you selected on the Search For Policies page. Refer to "[Search For Polices Page Fields](#)" on page 477 for information.

Option	Description/Action
Check Boxes/Drop-down Menus	You can use the left-side check boxes to manage devices. Once you have selected the devices, click the Actions drop-down menu and click either: <ul style="list-style-type: none"> <li>• Activate — Instructs NA to manage the selected devices.</li> <li>• Deactivate — Instructs NA not to manage the selected devices.</li> <li>• Batch Edit — Opens the Batch Edit Policies page, where you can modify the selected policies' scope, add device exceptions, and set their (policies') status.</li> <li>• Delete — Deletes the selected devices.</li> </ul>
Modify this search link	Returns you to the Search For Policies page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Actions	You can select the following action for each policy: <ul style="list-style-type: none"> <li>• View &amp; Edit — Opens the Edit Policy page, where you can modify policies.</li> <li>• Test — Opens the Test Policy page. For more information, see "<a href="#">Test Policy Compliance Page Fields</a>" on page 432.</li> </ul>
Search Criteria	Displays the search criteria used in the search. You can: <ul style="list-style-type: none"> <li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see "<a href="#">User &amp; System Reports</a>" on page 582.</li> <li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li> <li>• View Search Result as CSV File - Downloads the search results in CSV format.</li> </ul>

# Searching for Policy, Rule, and Compliance

The HPE Network Automation Software Premium edition license does not include this functionality. It is available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page (**Help > About Network Automation > View License Information** link).

The Search for Policy, Rule, and Compliance page enables you to search for devices and their associated compliance and applicable policies and rules. This enables you to:

- Easily generate a list of devices that are in or out of compliance.
- Easily generate a list of devices that have not been checked yet by a specific policy rule.
- Identify devices for which a policy rule applies.
- Identify which policy rules apply to specific devices.
- Identify which devices do not have any applicable policies.

**Note:** On this page, you cannot search for policies or rules independent of devices.

To search for policies, policy rules, and compliance violations, on the menu bar under Reports, select Search For and click Compliance. The Search For Policy, Rule, and Compliance page opens. After entering the search criteria, click the Search button. NA returns a list of devices containing all the specified search criteria on the Policy, Rule, and Compliance Search Results page.

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

## Search For Policy, Rule, and Compliance Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the Policies Search Results page to show only the selected information.
Host Name	Select an operator and enter the Host Name. Operators include: <ul style="list-style-type: none"><li>• Contains</li><li>• Does not contain</li><li>• Matches</li><li>• Equals</li><li>• Does not equal</li><li>• Contains (regex)</li><li>• Does not contain (regex)</li></ul> You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2,



Field	Description/Action
	and ?jones.  <div style="background-color: #e0e0e0; padding: 5px; border: 1px solid #ccc;"> <p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p> </div>
Device IP	Select an operator and enter the device’s IP address. Operators include: <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regex)</li> <li>• Does not contain (regex)</li> </ul>
Device ID	The device ID specification. Operators include: <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Device Group	Use the Device Selector to select groups. For information about using the Device Selector, see <a href="#">"Device Selector" on page 137</a> .
Compliance	Select one of the following options: <ul style="list-style-type: none"> <li>• Any compliance state</li> <li>• Device in compliance</li> <li>• Device not in compliance</li> <li>• Device not checked yet</li> <li>• Device has no applicable policy</li> </ul>
Policy	Enter the name of the policy or select a policy from the drop-down menu.
Rule	Enter a policy configuration rule or select one from the drop-down menu.
Rule Type	Select one or more of the following options: <ul style="list-style-type: none"> <li>• Configuration</li> <li>• Diagnostics</li> <li>• Software</li> </ul>
Rule Importance	Select one or more Importance levels. Options include: <ul style="list-style-type: none"> <li>• Informational — Events that typically do not require a response.</li> <li>• Low — Events that may require a response as time permits.</li> <li>• Medium — Events that require a timely response, typically within 72 hours.</li> <li>• High — Events that require an urgent response, typically within 24 hours.</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Critical — Events that require an immediate response.</li> </ul>
Rule Description	Include rule description in search results.
CVE	<p>Enter the CVE (Common Vulnerabilities and Exposures) name, along with an operator. CVE is a list of standardized names for vulnerabilities and other information on security exposures. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regex)</li> <li>• Does not contain (regex)</li> </ul>
Last Checked Date	<p>Select the following operators:</p> <ul style="list-style-type: none"> <li>• Since or Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
Rule Out Of Compliance Date	<p>The rule out of compliance date is the time that NA detects that a device is out of compliance with a particular rule.</p> <p>Select the following operators:</p> <ul style="list-style-type: none"> <li>• Since or Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
Policy Tag	Select a Policy Tag. Policy tags enable you to search for compliance entries related to policies with selected tags.
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see <a href="#">"Partitions" on page 148</a> for detailed information on Partitions.</p>

# Policy, Rule, and Compliance Search Results Page Fields

The Policy, Rule, and Compliance Search Results page displays the search criteria you selected on the Search For Policy, Rule, and Compliance page. For more information, see ["Search For Policy, Rule, and Compliance Page Fields" on page 480](#).

Option	Description/Action
Check Boxes/Drop-down Menus	<p>You can use the left-side check boxes to manage devices. Once you have selected a device, click the Actions drop-down menu and select an action. The available options are:</p> <ul style="list-style-type: none"> <li>• Activate — Instructs NA to manage the selected devices.</li> <li>• Deactivate — Instructs NA not to manage the selected devices.</li> <li>• Batch Edit — Opens the Batch Edit Device page, where you can assign a driver and set the connection methods for all of the selected devices.</li> <li>• Diagram — For more information, see <a href="#">"Diagramming" on page 591</a>.</li> <li>• Delete — Deletes the selected devices.</li> <li>• Check Policy Compliance — For more information, see <a href="#">"Check Policy Compliance Task Page Fields" on page 372</a>.</li> <li>• Configure Syslog — For more information, see <a href="#">"Configure Syslog Task Page Fields" on page 259</a>.</li> <li>• Deploy Passwords — For more information, see <a href="#">"Deploy Passwords Task Page Fields" on page 264</a>.</li> <li>• Discover Driver — For more information, see <a href="#">"Discover Driver Task Page Fields" on page 269</a>.</li> <li>• Reboot Device — For more information, see <a href="#">"Reboot Device Task Page Fields" on page 274</a>.</li> <li>• Run Command Script — For more information, see <a href="#">"Run Command Script Task Page Fields" on page 284</a>.</li> <li>• Run Diagnostics — For more information, see <a href="#">"Run Diagnostics Task Page Fields" on page 291</a>.</li> <li>• Run ICMP Test — For more information, see <a href="#">"Run ICMP Test Task Page Fields" on page 279</a>.</li> <li>• Take Snapshot — For more information, see <a href="#">"Take Snapshot Task Page Fields" on page 300</a>.</li> </ul>
Check Boxes/Drop-down Menus ( <i>continued</i> )	<ul style="list-style-type: none"> <li>• Synchronize Startup and Running —For more information, see <a href="#">"Synchronize Startup and Running Task Page Fields" on page 305</a>.</li> <li>• Update Device Software —For more information, see <a href="#">"Update Device Software Task Page Fields" on page 310</a>.</li> <li>• Delete ALCs —For more information, see <a href="#">"Deleting ACLs" on page 659</a>.</li> <li>• Provision Device — For more information, see <a href="#">"Edit Device Page Fields" on page 108</a>.</li> </ul>

Option	Description/Action
View Detailed CVS Report	Enables you to create a CSV file with all of the records, including the event detail that explains why the compliance failed.
Modify this search link	Returns you to the Search For Policy, Rule, and Compliance page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Search Criteria	Displays the search criteria used in the search. You can: <ul style="list-style-type: none"><li>• Save as a new device group — Select either “All Result Devices” or “Selected Devices Only,” enter the name of the new device group, and click Create Group.</li><li>• Add to an existing static device group — Select either “All Result Devices” or “Selected Devices Only,” select a device group from the drop-down menu, and click Add.</li><li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li><li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li><li>• View Search Result as CSV File - Downloads the search results in CSV format.</li></ul>

## Searching for Configurations

Configuration searches enable you to search configuration files using a combination of criteria and operators. All search criteria are joined by the Boolean operators AND/OR and the results match all criteria.

To search for configuration files, on the menu bar under Reports, select Search For and click Configurations. Keep in mind that when entering search criteria, your settings are lost if you change to a different page before running the search.

**Note:** When searching with a criterion that includes configurations, if you have a lot of stored configurations, the query could be slow. It is recommended that you select the “include” option when searching configurations. As a result, the full text search features of either the Oracle or SQL Server database are used.

When you are finished entering your search criteria and click the Search button, NA returns a list of configurations containing all the specified search criteria on the Configuration Search Results page. For more information, see ["Configuration Search Results Page Fields" on page 487](#).

## Search For Configuration Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the Configuration Search Results page to show only the selected information.
Host Name	<p>Select an operator and then enter the host name of the device. Operators include:</p> <ul style="list-style-type: none"><li>• Contains</li><li>• Does not contain</li><li>• Matches</li><li>• Equals</li><li>• Does not equal</li><li>• Contains (regexp)</li><li>• Does not contain (regexp)</li></ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p>
Device IP	Select an operator and then enter the IP address of the device.
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"><li>• Equals</li><li>• Is less than</li><li>• Is greater than</li></ul>
Date	<p>Select the following operators:</p> <ul style="list-style-type: none"><li>• Since or Until</li><li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li></ul> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
Changed By	Select an operator and then enter the login name of a user who might have changed a device’s configuration.
Device Status	<p>Select from the following options for the device:</p> <ul style="list-style-type: none"><li>• Active</li><li>• Inactive</li><li>• Pre-Production (A pre-production device is a device that is not yet active in the production network. For more information, see <a href="#">"Bare Metal Provisioning" on page 113.</a>)</li></ul>

Field	Description/Action
Device Type	Select the type of network device, such as router, switch, firewall, VPN, DialUp, DSL_ ISDN, or load balancer from the scroll-down menu.
Comments	<p>Select an operator (contains or does not contain) and then enter the comment text you want to find. This searches only text that appears in the Configuration Comment box in the Device Configuration Detail page.</p> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</p>
Configuration Text	<p>Select an operator, and then enter a unique portion of the device configuration on which to search.</p> <ul style="list-style-type: none"> <li>The "contains" and "does not contain" operators support regular expressions, including the ? and * wildcards. These searches are case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</li> <li>The "contains (full text)" and "does not contain (full text)" operators support the * wildcard only. For more information, see <a href="#">"Using the Full-Text Search Functionality" on page 459</a>. These searches are always case-insensitive.</li> </ul> <p><b>Note:</b> These operators require that full-text search is enabled for the database.</p> <ul style="list-style-type: none"> <li>IPv6 address shorthand notation (double colon) cannot be used in combination with wildcards.</li> <li>The "contains (regex)" and "does not contain (regex)" operators are based on the database-specific regular expression SQL queries. For detailed information, see the specific database SQL references; such as for Oracle database, see the <i>Oracle® Database SQL Reference</i>.</li> </ul> <p>If the search operator is "contains" or "contains (full text)," you can provide a value in the "Show &lt;#&gt; context lines around the matched line when displaying Current Configuration" check box at the bottom of the page. You can include up to five lines above and below the search text in the results page. The default value is three.</p> <p><b>Note:</b> When the number of results to load is large, showing context lines can significantly slow performance.</p>
Search Scope	<p>Check one of the following options:</p> <ul style="list-style-type: none"> <li>Search current configurations Only — If checked, only the current configuration is searched.</li> <li>Search all configurations — If checked, all of the current and historical configurations are searched.</li> </ul>
Different Startup/Running	If checked, search devices with different startup and running configuration.
Configuration Custom Data	Select an operator and enter the unique text that might appear in any of the custom fields that are listed.

Field	Description/Action
	<p><b>Note:</b> This section is not displayed if there are no custom fields.</p>
Device belongs to	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information about using the Device Selector, see "<a href="#">Device Selector</a>" on page 137.</p>
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see "<a href="#">Partitions</a>" on page 148.</p>

## Configuration Search Results Page Fields

The Configuration Search Results page display depends on the search criteria you selected on the Search For Configuration page. For more information, see "[Search For Configuration Page Fields](#)" on page 485. The following table describes the available options on the Configuration Search Results page.

Field	Description/Action
Modify this search link	Returns you to the Search For Configuration page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Check Boxes	<p>You can use the left-side check boxes to compare and delete configuration from the NA database. Once you have selected the configurations, click the Actions drop-down menu and click either:</p> <ul style="list-style-type: none"> <li>• Compare — Opens the Compare Device Configurations page, where you can compare any two configurations. The differences are highlighted for easy reference. You can also deploy configurations from this page.</li> <li>• Delete — Deletes the selected configuration from the NA database.</li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the devices.</p>
Actions	You can select the following actions for each entry in the Configuration Search Results table:

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Compare to Previous — The Compare Device Configurations page opens, where you can view this and the previous configurations side by side. The differences are highlighted in different colors to make them easy to read.</li> <li>• View Config — Opens the Device Configuration Detail page, where you can edit and add comments to the selected configuration. You can also deploy the selected configuration from this page.</li> <li>• Diagnostics — Opens the Diagnostics page, where you can view diagnostic information for this configuration.</li> </ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"> <li>• Save result devices as a new device group — Enter the name of the new group and click Create Group.</li> <li>• Add result devices to existing device group — Select a group from the drop-down menu and click Add.</li> </ul> <div style="background-color: #f0f0f0; padding: 5px;"> <p><b>Note:</b> For information on creating a Dynamic Group, see "<a href="#">Dynamic Device Groups</a>" on page 135.</p> </div> <ul style="list-style-type: none"> <li>• Save the search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page.</li> <li>• Email Search Result — Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li> <li>• View Search Result as a CSV file — Downloads the search results in CSV format.</li> </ul> <div style="background-color: #f0f0f0; padding: 5px;"> <p><b>Note:</b> Select the “Include result details” option if you selected the “Configuration Text” option and entered the configuration text you want to find when defining the search criteria on the <b>Search for Configuration</b> page. The configuration text is not included in the CSV file if you do not select the “Include result details” option.</p> </div>

## Searching for Diagnostics

Diagnostic searches provide access to your device diagnostic information based on search criteria you define. Results match all search criteria. The type of information provided by each diagnostic is device-specific.

To search for diagnostics, on the menu bar under Reports select Search For and click Diagnostics. The Search For Diagnostic page opens.



**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

When you are done entering your search criteria and click the Search button, NA returns a list of diagnostics containing all the specified search criteria on the Diagnostics Search Results page. For more information, see ["Search For Diagnostic Page Fields" below](#).

**Note:** The NA VLAN Data Gathering and the NA Topology Gathering diagnostics are not searchable. For more information, see ["View Menu Options" on page 185](#).

## Search For Diagnostic Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the Diagnostics Search Results page to show only the selected information.
Host Name	<p>Select an operator and enter the host name of the device. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p>
Device IP	Select an operator and then enter the IP address of the device.
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Date	<p>Select the following operators:</p> <ul style="list-style-type: none"> <li>• Since or Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul>

Field	Description/Action
	<p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
Diagnostic Type	<p>Select the type of diagnostic data on which you want to search from the scroll-down menu. To select or deselect multiple types, use Ctrl+click. Diagnostic types include:</p> <ul style="list-style-type: none"> <li>• NA Device File System</li> <li>• Hardware Information</li> <li>• ICMP Test</li> <li>• Memory Troubleshooting</li> <li>• NA Detect Device Boot</li> <li>• NA Flash Storage Space</li> <li>• NA Interfaces</li> <li>• NA Module Status</li> <li>• NA OSPF Neighbors</li> <li>• NA Port Scan</li> <li>• NA Routing Table</li> <li>• NA Topology Data Gathering</li> </ul> <p><b>Note:</b> For detailed information on diagnostics, refer to Diagnostics field on the "<a href="#">View Menu Options</a>" on page 185.</p>
Device Status	<p>Select from the following options for the device:</p> <ul style="list-style-type: none"> <li>• Active</li> <li>• Inactive</li> <li>• Pre-Production (A pre-production device is a device that is not yet active in the production network. For more information, see "<a href="#">Bare Metal Provisioning</a>" on page 113.)</li> </ul>
Search Scope	<p>The extent of the query for the selected devices and diagnostics.</p> <ul style="list-style-type: none"> <li>• To view only the most recent result for each diagnostic, select the <b>Search current diagnostics only</b> check box.</li> <li>• To view all diagnostic results, select the <b>Search all diagnostics</b> check box.</li> </ul>
Diagnostic Text	<p>Select an operator and enter a unique portion of the diagnostics you want to search for or exclude from the search results. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field</p>

Field	Description/Action
	searches are case-insensitive.
Diagnostic Custom Data	Select an operator and enter the unique text that might appear in any of the custom fields that are listed.  <b>Note:</b> This section is not displayed if there are no custom fields.
Device belongs to	Select one of the following operators from the drop-down menu and then select one or more device groups: <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <b>Note:</b> Use the Device Selector to select groups. For information on how to use the Device Selector, refer to " <a href="#">Device Selector</a> " on page 137.
Partition	Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.  <b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see " <a href="#">Partitions</a> " on page 148.

## Diagnostic Search Results Page Fields

The Diagnostics Search Results page display depends on the search criteria you selected on the Search for Diagnostics page. For more information, see "[Search For Diagnostic Page Fields](#)" on page 489. The following table describes the available options on the Diagnostic Search Results page.

Option	Description/Action
Modify this search link	Returns you to the Search For Diagnostic page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Check Boxes	You can use the left-side check boxes to select Diagnostics from the NA database. Once you have selected the diagnostics, click the Actions drop-down menu and click: <ul style="list-style-type: none"> <li>• Compare — Opens the Compare Diagnostics Type page, where you can compare any two diagnostics of the same type.</li> </ul>

Option	Description/Action
	<ul style="list-style-type: none"> <li>Delete — Deletes the selected configuration from the NA database.</li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the diagnostics.</p>
Actions	<p>You can select the following actions for each entry in the Diagnostics Search Results table:</p> <ul style="list-style-type: none"> <li>View Detail — Enables you to view the details of the diagnostic.</li> <li>Compare to Previous — Compares this diagnostic to the previous one.</li> </ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"> <li>Save as a new device group — Select either “All Result Devices” or “Selected Devices Only,” enter the name of the new device group, and click Create Group.</li> <li>Add to an existing static device group — Select either “All Result Devices” or “Selected Devices Only,” select a device group from the drop-down menu, and click Add.</li> <li>Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li> <li>Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li> <li>View Search Result as CSV File - Downloads the search results in CSV format.</li> </ul>

## Search for Resource Identities

The Search for Resource Identity page provides for searching across all resource identities in NA.

### To search for resource identities

1. Open the Search for Resource Identity page (**Reports > Search For > Resource Identities**).
2. Select the check box for each property to include as a column on the search results page.
3. Enter search criteria. (For more information, see ["Search For Resource Identity Page Fields" below](#).)
4. Click **Search**.

NA returns a list of resource identities that satisfy all of the specified search criteria. For information about the search results, see the ["Search For Resource Identity Page Fields" below](#).

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

### Search For Resource Identity Page Fields

Field	Description/Action
Check boxes	Select the left-side check box for each property to include as a column on the Resource Identities Search Results page.
Resource Identity	The name of the resource identity. Operators include:

### Search For Resource Identity Page Fields, continued

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul> <p><b>Note:</b> This property is always included in the search results.</p>
Status	<p>The current status of the resource identity. Possible values are:</p> <ul style="list-style-type: none"> <li>• <b>Available</b> — The resource identity is not currently associated with a real-world resource.</li> <li>• <b>In Use</b> — The resource identity is associated with a real-world resource.</li> </ul> <p><b>Note:</b> This property is always included in the search results.</p>
Pool	The name of the resource identity pool. Use Ctrl+click to select multiple pools.
Partition (if configured)	The name of the partition. Use Ctrl+click to select multiple partitions.
Description	<p>The description of the resource identity. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Create Date	The timestamp of the initialization of the resource identity. Specify a time range.
Created By	<p>The NA user who created the resource identity. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Last Modified Date	The timestamp of the last change to the resource identity. Specify a time range.

### Search For Resource Identity Page Fields, continued

Field	Description/Action
Last Modified By	<p>The NA user who last changed the resource identity. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Custom Fields (if configured)	<p>The enabled custom resource identity fields.</p> <p>For fields with a limited set of values, use Ctrl+click to select multiple pools.</p> <p>For other fields, operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul> <p>For information about creating custom resource identity fields, see <a href="#">"Define Custom Resource Identity Fields" on page 686</a>.</p>

## View Resource Identity Search Results

The Resource Identity Search Results page displays the results of a specific search. The columns on this page correspond to the selected criteria on the Search For Resource Identity page.

### Resource Identity Search Results Page Fields

Option	Description/Action
Modify this search link	Opens the Search For Resource Identity page as customized for this search. Edit the search criteria, and then re-run the search.
View Search Criteria link	Moves to the Search Criteria area at the end of this page.
Select menu	Provides a shortcut for selecting or clearing the selection of all rows in the search results.
Actions menu	Provides for acting on the selected rows in the search results. The available action

## Resource Identity Search Results Page Fields, continued

Option	Description/Action
	<p>is:</p> <ul style="list-style-type: none"> <li>Delete — Delete the selected resource identities from the NA database.</li> </ul>
<b>Results table</b>	
Check boxes	Select the check box for one or more rows. Then select an item from the Actions menu above the results table.
Resource identity properties	One column for each property selected on the Search For Resource Identity page. To view the information for a specific resource, click the resource identity name.
Actions	<p>Available actions include:</p> <ul style="list-style-type: none"> <li>Acquire ID — Change the status of the resource identity to <b>In Use</b>.</li> <li>Release ID — Change the status of the resource identity to <b>Available</b>.</li> <li>Edit ID — Modify the resource identity information.</li> </ul>
<b>Search Criteria area</b>	
Search Criteria	The search criteria used in the search. To change the search criteria, click the Modify this search link at the top of the page.
Save search as a user report named	<p>Enter the name of the user report, and then click <b>Save</b>.</p> <p>View the saved report on the User &amp; System Reports page. For more information, see <a href="#">User &amp; System Reports</a>.</p>
Email Search Result	Enter a comma-separated list of email addresses to receive the search results and then click <b>Send</b> .
View Search Result as CSV File	Click the link to download the search results in CSV format.

## Searching for Tasks

Task searches enable you to search the NA database for tasks scheduled on your network.

To search for tasks, on the menu bar under Reports select Search For and click Tasks. The Search For Task page opens. Make a selection for any field to be included in the search. Select the check box for each field to be included on the Tasks Search Results page.

When you click the Search button, NA returns a list of tasks containing all the specified search criteria on the Task Search Results page. For more information, see "[Task Search Results Page Fields](#)" on page 501.

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

## Search For Task Page Fields

All fields are optional.

Field	Description/Action
Task Name	<p>The task name.</p> <p>Select an operator, and then enter a value. Operators include:</p> <ul style="list-style-type: none"><li>• Contains</li><li>• Does not contain</li><li>• Matches</li><li>• Equals</li><li>• Does not equal</li><li>• Contains (regexp)</li><li>• Does not contain (regexp)</li></ul>
Host Name	<p>The host name of the device on which the tasks run.</p> <p>Select an operator, and then enter a value. Operators include:</p> <ul style="list-style-type: none"><li>• Contains</li><li>• Does not contain</li><li>• Matches</li><li>• Equals</li><li>• Does not equal</li><li>• Contains (regexp)</li><li>• Does not contain (regexp)</li></ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones. (<b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.)</p>
Device IP	<p>The IP address of the device on which the tasks run.</p> <p>Select an operator, and then enter a value. Operators include:</p> <ul style="list-style-type: none"><li>• Contains</li><li>• Does not contain</li><li>• Matches</li><li>• Equals</li><li>• Does not equal</li><li>• Contains (regexp)</li><li>• Does not contain (regexp)</li></ul>
Scheduled By	<p>The NA user name of the person who scheduled the tasks.</p> <p>Select an operator, and then enter a value. Operators include:</p>



Field	Description/Action
	<ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regex)</li> <li>• Does not contain (regex)</li> </ul>
Create Date	<p>The time the tasks are created.</p> <p>For one or both rows select Since or Until, and then select a value:</p> <ul style="list-style-type: none"> <li>• Anytime</li> <li>• Customize (opens the calendar)</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin: 10px 0;"> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p> </div> <ul style="list-style-type: none"> <li>• Now</li> <li>• 1 hour ago to 1 year ago</li> </ul>
Schedule Date	<p>The time the tasks are scheduled to run.</p> <p>For one or both rows select Since or Until, and then select a value:</p> <ul style="list-style-type: none"> <li>• Anytime</li> <li>• Customize (opens the calendar)</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin: 10px 0;"> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p> </div> <ul style="list-style-type: none"> <li>• Now</li> <li>• 1 hour ago to 1 year ago</li> </ul>
Start Date	<p>The time the tasks actually started.</p> <p>For one or both rows select Since or Until, and then select a value:</p> <ul style="list-style-type: none"> <li>• Anytime</li> <li>• Customize (opens the calendar)</li> <li>• Now</li> <li>• 1 hour ago to 1 year ago</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin: 10px 0;"> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p> </div>
Complete Date	<p>The time the tasks completed.</p>

Field	Description/Action
	<p>For one or both rows select Since or Until, and then select a value:</p> <ul style="list-style-type: none"> <li>• Anytime</li> <li>• Customize (opens the calendar)</li> <li>• Now</li> <li>• 1 hour ago to 1 year ago</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p> </div>
Duration	<p>The duration (in seconds) of the tasks. This value is the difference between the complete date and the start date.</p> <p>Select an operator, and then enter a value. Operators include:</p> <ul style="list-style-type: none"> <li>• equals</li> <li>• is less than</li> <li>• is greater than</li> </ul>
Task Status	<p>The task state. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a>.</p> <p>To select or deselect multiple values, use <code>Ctrl+click</code>.</p>
Task Priority	<p>The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a>.</p>
Task Type	<p>The task type filter.</p> <p>To select multiple values, use <code>Ctrl+click</code>.</p>
Task ID	<p>The task ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Failure or Skipped Type	<p>The task failure type filter.</p> <p>To select or deselect multiple values, use <code>Ctrl+click</code>. Options include:</p> <ul style="list-style-type: none"> <li>• Cancelled by user (pending)</li> <li>• Cancelled by user (waiting)</li> <li>• Core stopped</li> <li>• Device unreachable</li> <li>• Incorrect password</li> <li>• Insufficient privileges</li> <li>• No password found</li> <li>• Timed out</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Unrecognized device</li> <li>• Unsupported device</li> </ul>
Comments	<p>The task comment text.</p> <p>Select an operator, and then enter a value. Operators include:</p> <ul style="list-style-type: none"> <li>• contains</li> <li>• does not contain</li> </ul>
Result	<p>The task result text.</p> <p>Select an operator, and then enter a value. Operators include:</p> <ul style="list-style-type: none"> <li>• contains</li> <li>• does not contain</li> </ul> <p>If the search operator is contains, set the number of context lines around the matching line in the Show context lines around the matching line when displaying text fields field.</p>
Core	<p>The name of the NA core with which the tasks are associated.</p> <p>Select an operator, and then enter a value. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Approve By Date	<p>The time the tasks were approved.</p> <p>For one or both rows select Since or Until, and then select a value:</p> <ul style="list-style-type: none"> <li>• Anytime</li> <li>• Customize (opens the calendar)</li> <li>• Now</li> <li>• 1 hour ago to 1 year ago</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p> </div>
Approval Status	<p>The task approval status filter.</p> <p>To select or deselect multiple values, use Ctrl+click. Options include:</p> <ul style="list-style-type: none"> <li>• Approved</li> <li>• Draft</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Not Applicable</li> <li>• Not Approved</li> <li>• Overridden</li> <li>• Waiting Approval</li> </ul>
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Device Type	<p>The type of device (for example: router, switch, firewall, VPN, DialUp, DSL_ISDN, or load balancer) on which the tasks run.</p> <p>To select or deselect multiple values, use Ctrl+click. The list of options depends on the devices in the NA inventory.</p>
Exclude Child Tasks	<p>If selected, child tasks are excluded from the search.</p>
Run Mode	<p>The method for processing tasks. Available options are:</p> <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of a group task can run at the same time. Alternatively, the task runs on a single device.</li> <li>• Serial—Only one child task of a group task runs at any given time. Serial run mode applies to group tasks only.</li> <li>• Synchronous—The task command returns task results only after the task completes. Synchronous run mode is available from the API or CLI only.</li> </ul> <p>For more information, see "<a href="#">Task Run Mode</a>" on page 252.</p>
Stop on Failure Configured	<p>To search for group tasks with serial run mode that have the <b>Stop on Failure</b> check box selected, select this check box.</p>
Custom Data	<p>Select an operator, and then enter the unique text that might appear in any of the custom fields that are listed.</p> <p><b>Note:</b> This section is not displayed if there are no custom fields.</p>
Show context lines around the matching line when displaying text fields	<p>If the search operator for the Result field is contains, set the number of context lines around the matching line in this field. The default is 3. The maximum is 5.</p> <p><b>Note:</b> This feature can significantly slow performance if there is a large number of results to load.</p>
Device belongs to group	<p>The device group filter.</p> <p>Select an operator, and then select one or more device groups. Operators include:</p>

Field	Description/Action
	<ul style="list-style-type: none"> <li>Any of selected groups (the default)</li> <li>All of selected groups</li> <li>None of selected groups</li> </ul> <p>For information about selecting device groups, see <a href="#">"Device Selector" on page 137</a>.</p>
Partition	<p>The name of the partition in which the tasks run.</p> <p>Select a partition from the list.</p> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> This field is only displayed if NA uses partitions.</p> </div>

## Task Search Results Page Fields

The Tasks Search Results page display depends on the search criteria you selected on the Search for Task page. For more information, see ["Search For Task Page Fields" on page 496](#). The following table describes the available options on the Task Search Results page.

Option	Description/Action
Modify this search link	Returns you to the Search For Tasks page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Check Boxes	<p>You can use the left-side check boxes delete tasks from the Task Search Results table. Once you have selected the tasks, click the Actions drop-down menu and click:</p> <ul style="list-style-type: none"> <li>Delete — Deletes the selected tasks.</li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the tasks.</p>
Actions	<p>You can select the following actions for each entry in the Tasks Search Results table:</p> <ul style="list-style-type: none"> <li>Edit — The Edit Task page opens, where you can edit and rerun a task that is recurring or has not yet occurred. This link appears only when you can edit the task.</li> <li>Delete — Deletes the task. This link appears only when the task has not yet run.</li> <li>Pause — Pauses the task. This link appears only when the task has not yet run.</li> <li>Run Now — Runs the task. This link appears only when the task has not yet run.</li> <li>Run Again — The Rerun Task page opens, where you can rerun the task.</li> <li>Detail — The Task Information page opens, where you can view task details.</li> <li>Cancel — Cancels the task.</li> </ul>

Option	Description/Action
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"><li>• Save as a new device group — Select either “All Result Devices” or “Selected Devices Only,” enter the name of the new device group, and click Create Group.</li><li>• Add to an existing static device group — Select either “All Result Devices” or “Selected Devices Only,” select a device group from the drop-down menu, and click Add.</li><li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li><li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li><li>• View Search Result as a CSV file — Downloads the search results in CSV format.</li></ul> <p><b>Note:</b> Check the “Include result details” option if you checked the “Result” option and entered the task results you want to find when defining the search criteria on the Search for Tasks page. The task results are not included in the CSV file if you do not check the “Include result details” option.</p>

## Searching for Sessions

NA’s script execution and management capabilities provide tremendous benefits when it comes to pushing out changes to multiple devices simultaneously. However, for those with little scripting experience, creating command scripts can be difficult. As a result, NA’s ScriptMaster enables NA to automatically generate scripts based on Telnet or SSH sessions recorded through the Telnet/SSH Proxy.

You can use session searches to find Telnet/SSH Proxy sessions. In addition, you can configure the Session Search Results page to include session data that appears before and after the matching session data to provide a context for interpreting the results.

Note that there is an Admin Setting that determines whether NA saves just the commands or the full Telnet/SSH command session. For more information, see ["Telnet/SSH" on page 60](#).

To search for sessions, on the menu bar under Reports, select Search For and click Telnet/SSH Sessions. The Search For Session page opens. When you are finished entering search criteria and click the Search button, NA returns a list of Telnet/SSH sessions containing all the specified search criteria on the Session Search Results page. For more information, see ["Session Search Results Page Fields" on page 505](#).

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

## Search For Session Page Fields

Field	Description/Action
Host Name	<p>Select an operator and enter the host name of the device associated with the session. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p>
Device IP	Select an operator and enter the IP address of the device associated with the session.
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Device Status	<p>Select from the following options for the device:</p> <ul style="list-style-type: none"> <li>• Active</li> <li>• Inactive</li> <li>• Pre-Production (A pre-production device is a device that is not yet active in the production network. For more information, see <a href="#">"Bare Metal Provisioning" on page 113.</a>)</li> </ul>
Created By	Select an operator and enter the login name of the person who might have created a session.
Start Date	<p>Select the following operators:</p> <ul style="list-style-type: none"> <li>• Since/Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
End Date	Select the following operators:

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Since/Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
Status	<p>Select one or more of the following status options:</p> <ul style="list-style-type: none"> <li>• Failed</li> <li>• Open</li> <li>• Closed</li> </ul>
Session Type	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Any</li> <li>• Telnet</li> <li>• SSH</li> </ul>
Session Data	<p>Select an operator (contains or does not contain) and enter a unique portion of the session you want to find.</p> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</p> <p>If the search operator is “contains,” you can provide a value in the &lt;#&gt; context lines box at the bottom of the page. You can include up to five lines above and below the search text in the results.</p> <p><b>Note:</b> When the number of results to load is large, showing context lines can significantly slow performance.</p>
Session Custom Data	<p>Select an operator and enter the unique text that might appear in any of the custom fields that are listed.</p> <p><b>Note:</b> This section is not displayed if there are no custom fields.</p>
Device belongs to	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information about using the Device Selector, see "<a href="#">Device Selector</a>" on page 137.</p>



Field	Description/Action
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.</p> <div style="background-color: #e0e0e0; padding: 10px; margin-top: 10px;"> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see <a href="#">"Partitions" on page 148</a> for detailed information on Partitions.</p> </div>

## Session Search Results Page Fields

The Session Search Results page display depends on the search criteria you selected on the Search for Sessions page. For more information, see ["Search For Session Page Fields" on page 503](#). The following table describes the available options on the Session Search Results page.

Option	Description/Action
Modify this search link	Returns you to the Search For Sessions page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Actions	<p>You can select the following actions for each entry in the Session Search Results table:</p> <ul style="list-style-type: none"> <li>• Host Name — Opens the Device Information page, where you can view basic information about the device and its configuration history.</li> <li>• Device IP — Opens the Device Information page, where you can view basic information about the device and its configuration history.</li> <li>• View Full Telnet/SSH Session — Opens the Telnet/SSH Session page, where you can see the commands and system responses for that session. This page includes the Convert to Script links that simplifies creation of a script from commands run during the current session. For more information, see <a href="#">"Adding Command Scripts" on page 560</a>. There is also a link to the configuration (if any) created by this session.</li> <li>• View Commands Only — Opens the Telnet/SSH Session page, where you can see just the commands for that session. This page includes the Convert to Script links that simplifies creation of a script from commands run during the current session. There is also a link to the configuration (if any) created by this session.</li> </ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"> <li>• Save as a new device group — Select either "All Result Devices" or "Selected Devices Only," enter the name of the new device group, and click Create Group.</li> <li>• Add to an existing static device group — Select either "All Result Devices" or "Selected</li> </ul>

Option	Description/Action
	<p>Devices Only,” select a device group from the drop-down menu, and click Add.</p> <ul style="list-style-type: none"> <li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see "<a href="#">User &amp; System Reports</a>" on page 582.</li> <li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li> <li>• View Search Result as a CSV file — Downloads the search results in CSV format.</li> </ul> <p><b>Note:</b> Check the “Include result details” option if you checked the “Session Data” option and entered the session data you want to find when defining the search criteria on the Search for Session page. The session data is not included in the CSV file if you do not check the “Include result details” option.</p>

## Searching for Events

You can search for system and user events, such as a device access failure. For more information about NA events, see "[Event Descriptions](#)" on page 509.

To search for events, on the menu bar under Reports, select Search For and click Events. The Search For Events page opens. When you are finished entering search criteria and click the Search button, NA returns a list of events containing all the specified search criteria on the Event Search Results page. For more information, see "[Search For Events Page Fields](#)" below.

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

## Search For Events Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the Event Search Results page to show only the selected information.
Date	<p>Select the following operators:</p> <ul style="list-style-type: none"> <li>• Since/Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
Summary	Select the name of one or more events. Use Ctrl+click to select/deselect additional events.

Field	Description/Action
	For more information about each event, see <a href="#">"Event Descriptions" on page 509</a> .
Added By	Select an operator and provide the login name of the person who created the event.
Importance	<p>Select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Informational — Events that typically do not require a response.</li> <li>• Low — Events that may require a response as time permits.</li> <li>• Medium — Events that require a timely response, typically within 72 hours.</li> <li>• High — Events that require an urgent response, typically within 24 hours.</li> <li>• Critical — Events that require an immediate response.</li> </ul>
Host Name	<p>Select an operator and enter the host name of the device associated with these events. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p> </div>
Device IP	Select an operator and enter the IP address of the device associated with these events.
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Description	<p>Select an operator and enter the unique text from the event you are searching for. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Contains (regex)</li> <li>• Does not contain (regexp)</li> </ul> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</p>

Field	Description/Action
	<p>To show the text in the results page, you can include up to five lines above and below the search text in the results.</p> <p><b>Note:</b> When the number of results to load is large, showing context lines can significantly slow performance.</p>
Device belongs to group	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information about using the Device Selector, see "<a href="#">Device Selector</a>" on page 137.</p>
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see "<a href="#">Partitions</a>" on page 148.</p>

## Event Search Results Page Fields

The Event Search Results page display depends on the search criteria you selected on the Search for Events page. For more information, see "[Search For Events Page Fields](#)" on page 506. The following table describes the available options on the Event Search Results page.

Field	Description/Action
Modify this search link	Returns you to the Search For Events page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Check Boxes	<p>The check boxes for each event enable you to delete events. Once you have selected the events, click the Actions drop-down menu and click:</p> <ul style="list-style-type: none"> <li>• Delete — Deletes the selected events.</li> </ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the tasks.</p>

Field	Description/Action
Actions	<p>You can select the following actions for each entry in the Events Search Results table:</p> <ul style="list-style-type: none"> <li>• Summary — Opens the Event Detail page, where you can view the detailed result of this event.</li> <li>• Host Name — Opens the Device Details page, where you can view basic information about the device and its configuration history.</li> </ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"> <li>• Save as a new device group — Select either “All Result Devices” or “Selected Devices Only,” enter the name of the new device group, and click Create Group.</li> <li>• Add to an existing static device group — Select either “All Result Devices” or “Selected Devices Only,” select a device group from the drop-down menu, and click Add.</li> <li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li> <li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li> <li>• View Search Result as a CSV file — Downloads the search results in CSV format.</li> </ul> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Check the “Include result details” option if you checked the “Description” option and entered the event description text you want to find when defining the search criteria on the Search for Events page. The event description text is not included in the CSV file if you do not check the “Include result details” option.</p> </div>

## Event Descriptions

The following table describes the NA events. The events are listed in alphabetical order.

Event	Description
Approval Denied	A user has denied an approval request.
Approval Granted	A user has approved a task.
Approval No Longer Required	A task approval is no longer required.
Approval Override	A user has overridden the approval of a task allowing the task to run without approval.
Approval Request	A user has created a task that requires approval before it can run.
Approval Task Changed	A user has made a change to a task that requires approval before it can run.
Approval Task Deleted	A user has deleted a task that was earmarked for approval.

Event	Description
Approval Task Timeout	A task was not approved in the time allotted.
Change Plan Added	A change plan is added.
Change Plan Deleted	A change plan is deleted.
Change Plan Modified	A change plan is modified.
Command Authorization Error	A user tried to run a command that he/she is not authorized to use.
Command Script Modified	A command script has been modified.
Concurrent Telnet/SSH Session Override	A user ignored the restriction on simultaneous logins. The user logged in to a device via the Proxy despite another user's prior login.
Device Access Failure	NA cannot access a device. This could be due to a bad password or there was no route to the host.
Device Added	A user added a device.
Device Booted	A device was rebooted.
Device Change Plan Completed Successfully	A device change plan succeeded.
Device Change Plan Failed	A device change plan failed.
Device Command Script Completed Successfully	A device command script succeeded.
Device Command Script Failed	A device command script failed.
Device Configuration Change	NA detected a configuration change while running a Snapshot task.
Device Configuration Change - No User	NA detected a configuration change by an unknown user.
Device Configuration Deployment	NA successfully deployed a configuration to a device.
Device Configuration Deployment Failure	NA failed to deploy a configuration to a device.
Device Context Add	A device context addition failed.

Event	Description
Failed	
Device Context Added	A device context was successfully added.
Device Context Remove Failed	A device context remove failed.
Device Context Removed	A device context was successfully removed.
Device Data Failure	NA failed to save a configuration or diagnostic output to the database.
Device Deleted	A user permanently removed a device.
Device Diagnostic Changed	The results of a diagnostic differ from the previous results.
Device Diagnostic Completed Successfully	A device diagnostic succeeded.
Device Diagnostic Failed	A device diagnostic failed.
Device Edited	A user modified a device's information.
Device Flash Storage Running Low	A device's flash storage is running low.
Device Group Added	A user has added a group.
Device Group Deleted	A user has deleted a group.
Device Group Modified	A user modified a device group.
Device Inaccessible	A device is inaccessible.
Device Managed	A user marked a device as Active.
Device Missing From Import	When the Import task is run periodically and given a file of devices to import, this event occurs when a device was included in the file the last time the import occurred, but is no longer included in the file during the current import.
Device Password Change	A user deployed a password change.
Device Password Change Failure	NA failed to deploy a device password change.
Device Permissions - Modified	A device was added to or removed from a group, which changed permissions such that users can modify the device.

Event	Description
Device Permissions - New Device	Someone added a new device to a device group, changing the permissions for users associated with that device group.
Device Port Duplex Mismatch Detected	A device port duplex mismatch was detected.
Device Provision Failed	A device was not successfully provisioned.
Device Provision Succeeded	A device successfully provisioned.
Device Relationship Added	A device relationship was successfully added.
Device Relationship Deleted	A device relationship was successfully deleted.
Device Relationship Modified	A device relationship was successfully modified.
Device Reload Failed	A device reload failed.
Device Reloaded	A device was successfully reloaded.
Device Reservation Conflict	There was a device reservation conflict.
Device Snapshot	NA checked a device for a configuration change.
Device Software Change	NA detected a new OS version on a device (for example: from IOS 11 to IOS 12).
Device Startup/Running Config Difference	NA detected a difference between the Startup and Running configurations.
Device Template Added	A device template was successfully added.
Device Template Deleted	A device template was successfully deleted.
Device Template Edited	A device template was successfully edited.
Device Unmanaged	A user marked a device as Inactive. Imported devices can also be Inactive if unreachable for a certain time of period.
Diagnostic Modified	A user has modified a diagnostic.
Distributed System — Abnormal Shutdown	A running NA core detected and responded to the unexpected shutdown of another NA core in the Horizontal Scalability environment.



Event	Description
of Core	
Distributed System — Broken Replication Job	NA detected a broken replication job.
Distributed System — Data Synchronization Delay Warning	NA detected a data synchronization delay warning.
Distributed System — Deferred LOBs Exceed Threshold	NA detects deferred LOBs that exceeded the threshold.
Distributed System — Deferred Transactions Exceed Threshold	NA detects deferred transactions that exceeded the threshold.
Distributed System — Device Software Transfer Error	NA detected a device software transfer error.
Distributed System — Fixed Replication Job	NA detected a fixed replication job.
Distributed System — Normal Shutdown of Core	An NA core communicated its transition before shutting down.
Distributed System — Processed Normal Shutdown of Core	A running NA core responded to the normal shutdown of another NA core in the <a href="#">Horizontal Scalability</a> <sup>1</sup> environment.
Distributed System — Replication Errors	NA detected replication errors.
Distributed System — RMI Error	NA detected a RMI error.
Distributed System — Stopped Merge Agent Job	NA detected a stopped merge agent job.
Distributed System — Time Synchronization Warning	NA detected a time synchronization warning.
Distributed System —	NA detected undeletable anomalous generations.

<sup>1</sup>A configuration where multiple NA cores connect to a single NA database. For more information, see the NA Horizontal Scalability Guide.

Event	Description
Undeletable Anomalous Generations	
Distributed System — Uniqueness Conflict	NA detected a uniqueness conflict.
Driver Discovery Failure	NA detected a failed driver discovery.
Driver Discovery Success	NA detected a successful driver discovery.
Driver Load Error	NA detected a driver load error.
Duplicate Device Detected	NA detected a duplicate device.
Dynamic Group Full Update Failed	A full update of a dynamic group has failed.
Dynamic Group Full Update Started	A full update of a dynamic group has started.
Dynamic Group Full Update Succeeded	A full update of a dynamic group was successfully completed.
Dynamic Group Update Error	NA detected a device group update error.
Email Report Saved	A user has saved an email report.
External Directory Server Authentication Error	NA could not connect to an external LDAP authentication server.
Last Used Device Password Changed	The password last used for access to a device was changed.
License Almost Exceeded	The devices exceed 90% of the total number of licensed nodes.
License Almost Expired	Your NA license expires soon (date-based licenses only).
License Exceeded	The devices exceed the total number of licensed nodes. NA allows a 20% excess.
License Expired	Your license has expired. NA will no longer allow logins, but will continue to take scheduled snapshots and record changes.
Module Added	Someone added a module/blade/card to a device.
Module Changed	Someone changed the attributes of a module/blade/card installed in a device.

Event	Description
Module Removed	Someone removed a module/blade/card from a device.
Monitor Error	A server monitor failed to run.
Monitor Okay	A server monitor ran successfully.
Pending Task Deleted	A user deleted a scheduled task before it ran.
Policy Added	A user has added a new configuration policy.
Policy Changed	A user has changed a configuration policy.
Policy Non-Compliance	A configuration change violated a policy rule.
Policy Pattern Timeout	A policy pattern took more than 30 seconds to match.
Policy Rule Added	A user has added a new configuration rule.
Policy Rule Changed	A user has changed a configuration rule.
Reserved Device Configuration Changed	A user has changed the device configuration on a reserved device.
Scheduled for Deploy Configuration Edited	A user modified a configuration that was scheduled to be deployed.
Scheduled for Deploy Password Modified	A new password was deployed, and there is another Password Deploy task scheduled. This indicates that the new password that was just deployed will be changed again (when the pending Password Deploy task executes).
Security Alert	NA has detected a security alert.
Server Startup	The NA Management Engine was started.
Session Data Captured	The Proxy saved a connect session to the database.
Software Update Failed	NA failed to update the OS software on a device.
Software Update Succeeded	NA successfully updated the OS software on a device.
Software Vulnerability Detected	If you setup a software level set to "Security Risk," when NA snapshots devices and detects an OS version that is tagged as a "Security Risk," this event is generated.
Summary Reports Generated	A user has generated Summary reports.

Event	Description
Task Completed	A task has completed.
Task Started	A task has started.
Ticket Created	When using the HPE Remedy AR System Connector (or any of the HPE Connectors that interact with a 3rd party Ticketing systems), this event indicates that NA created a ticket in that 3rd party Ticketing system.
User Added	A user has been added.
User Authentication Error	A user entered an incorrect password when logging into NA.
User Authentication Error Lockout	A user is locked out due to too many consecutive failed login attempts.
User Deleted	A user has been deleted
User Disabled	A user record was edited and the user's status changes from Enabled to Disabled.
User Enabled	A user record was edited and the user's status changes from Disabled to Enabled.
User Login	A user logged in to NA.
User Logout	A user has logged out of NA.
User Message	A user created a message by clicking the New Message link.
User Permission Changed	A user's permission has been changed.

## Searching for Users

You can use the Search for Users page to search for users by first name, last name, email address, and/or AAA user name. To search for users, on the menu bar under Reports select Search For and click Users. The Search For Users page opens.

When you click the Search button, NA returns a list of events containing all the specified search criteria on the User Search Results page. For more information, see ["User Search Results Page" on the next page](#).

## Search For Users Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the User Search Results page to show only the selected information.
First Name	Select an operator and enter the user's first name. Operators include: <ul style="list-style-type: none"> <li>• Contains</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Last Name	Select an operator and enter the user's last name.
User Name	<p>Select an operator and enter the user's username. You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <p><b>Note:</b> Wildcards do not work with the "equals" and "does not equal" operators.</p>
Email Address	Select an operator and enter the user's email address.
AAA User Name	Select an operator and enter the user's AAA username.
Comments	Select an operator (contains or does not contain) and then enter the comment text you want to find.
Member of User Group	Select the user group of which the user(s) are a member.
User Custom Data	Select an operator and enter user custom service data.
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see <a href="#">"Partitions" on page 148</a>.</p>

## User Search Results Page

The User Search Results page displays the search criteria you selected on the Search for Users page. For more information, see ["Search For Users Page Fields" on the previous page](#).

Field	Description/Action
Modify this search link	Returns you to the Search For Events page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Actions	You can select the following actions for each entry in the Tasks Search Results table: <ul style="list-style-type: none"><li>• Edit — Open the My Profile page, where you can edit the user's profile. For more information, see <a href="#">"My Profile Page Fields" on page 235</a>.</li><li>• Delete — Enables you to delete the user if you have the proper permissions. Otherwise, the option is greyed out.</li><li>• Permissions — Opens the My Permissions page, where you can edit the user's permissions. For more information, see <a href="#">"My Permissions Page Fields" on page 237</a>.</li><li>• Config Changes — Opens the Config Search Results, where you can view configuration changes made by the user.</li></ul>
Search Criteria	Displays the search criteria used in the search. You can: <ul style="list-style-type: none"><li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li><li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li><li>• View Search Result as CSV File - Downloads the search results in CSV format.</li></ul>

## Searching for ACLs

Access Control Lists (ACLs) are part of the configuration on most devices. They filter network traffic by controlling whether routed packets are accepted or blocked at the router's interfaces. In general, an ACL is a collection of statements. Each statement defines a pattern that would be found in an IP packet. ACLs are often used to restrict the contents of routing updates and to provide network security.

NA retrieves configuration information from devices and extracts the ACL statements from the configuration. NA then stores the ACLs independent of the configuration. As a result, you can:

- View the current ACLs on a device and compare them against the previous ACLs.
- Add comments to an ACL.
- Modify/create an ACL and deploy it back to the device.

For information on modifying and/or creating an ACL, see ["Creating ACLs" on page 655](#).

To search for ACLs, on the menu bar under Reports, select Search For and click ACLs. The Search For ACLs page opens.

## Search For ACLs Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the ACL Search Results page to show only the selected information.
Host Name	<p>Select an operator and enter the host name of the device associated with the session. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regex)</li> <li>• Does not contain (regex)</li> </ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones. (Note: Wildcards do not work with the “equals” and “does not equal” operators.)</p>
Device IP	Select an operator and enter the device’s IP address.
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
ACL ID	Select an operator and enter the ACL’s ID. The ACL ID is a number or name based on the device ACL list, while the ACL Handle is a descriptive name or value assigned by the user. By default, the ACL ID and ACL Handle are the same until the user defines the ACL Handle.
ACL Handle	Select an operator and enter the ACL’s Handle. The ACL Handle is a descriptive name or value assigned by the user. By default, the ACL ID and ACL Handle are the same until the user defines the ACL Handle.
ACL Type	Select an operator and enter the type of ACL, such as “extended.” Keep in mind that ACL types are driver dependent.
ACL Configuration	<p>Select an operator, either contains or does not contain, and enter any configuration commands that define the ACL.</p> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</p> <p>If the search operator is “contains,” you can provide a value in the &lt;#&gt; context lines box at the bottom of the page. You can include up to five lines above and below the search text in the results.</p>

Field	Description/Action
	<p><b>Note:</b> When the number of results to load is large, showing context lines can significantly slow performance.</p>
ACL Application	<p>Select an operator, either contains or does not contain, and enter the entity that is using the ACL. For example, if an ACL is applied to an interface, the interface is an application of the ACL.</p> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</p>
Search Scope	<p>If checked, search results will be limited to those ACLs that are currently configured on all devices. If unchecked, the search results will contain both current and historical ACLs.</p>
Comments	<p>Select an operator, either contains or does not contain, and enter any ACL comments.</p> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</p>
Changed By	<p>Select an operator and enter the name of the user that last changed the ACL.</p>
Last Modified	<p>Select the following operators:</p> <ul style="list-style-type: none"> <li>• Since or Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
Device belongs to group	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information about using the Device Selector, see "<a href="#">Device Selector</a>" on page 137.</p>
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see "<a href="#">Partitions</a>" on page 148.</p>

When you click the Search button, NA returns a list of ACLs containing all the specified search criteria on the ACL Search Results page. For more information, see "[ACL Search Results Page Fields](#)" on the next page.



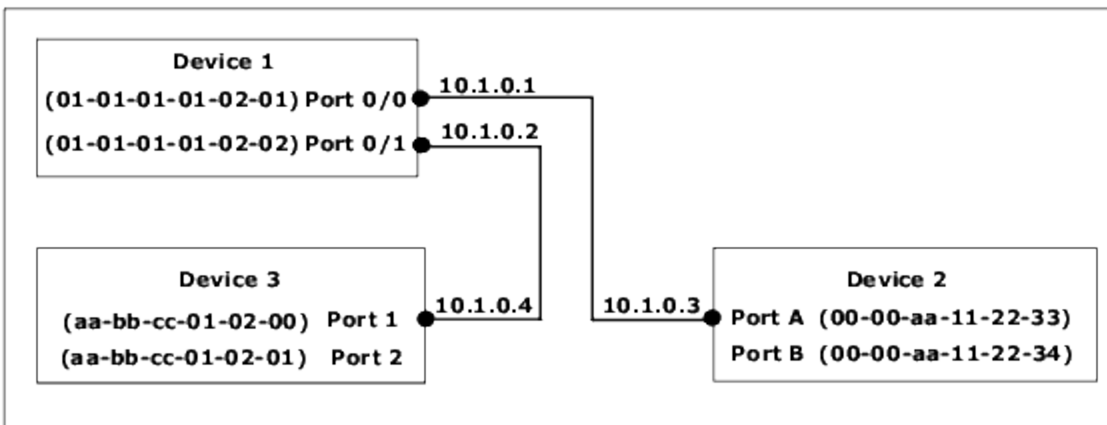
## ACL Search Results Page Fields

The ALC Search Results page display on the search criteria you selected on the Search for ACLs page. For more information, see ["Search For ACLs Page Fields" on page 519](#). The following table describes the available options on the ACLs Search Results page.

Option	Description/Action
Modify this search link	Returns you to the Search For ACLs page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Check Boxes	<p>The check boxes for each ACL enable you to compare two ACLs. Once you have selected the ACLs, select the Actions drop-down menu and click:</p> <ul style="list-style-type: none"><li>• Compare — Opens the Compare ACL page, where you can compare any two ACLs. The differences are highlighted for easy reference. You have the option of displaying differences with context, showing full text, or show UNIX-style differences.</li></ul> <p>The adjacent Select drop-down menu enables you to select or deselect all of the ACLs.</p>
Actions	<p>You can select the following actions for each entry in the ACL Search Results table:</p> <ul style="list-style-type: none"><li>• Edit ACL — Opens the Edit ACL page, where you can edit the ACL. For more information, see <a href="#">"Deleting ACLs" on page 659</a>.</li><li>• View ACL — Opens the View ACL page, where you can view the ACL. For more information, see <a href="#">"Viewing ACLs" on page 652</a>.</li><li>• ACL History — Opens ACL History page, where you can edit and view the ACL.</li></ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"><li>• Save as a new device group — Select either "All Result Devices" or "Selected Devices Only," enter the name of the new device group, and click Create Group.</li><li>• Add to an existing static device group — Select either "All Result Devices" or "Selected Devices Only," select a device group from the drop-down menu, and click Add.</li><li>• Set handle for selected ACLs — Enter an ACL handle. The ACL Handle is a descriptive name or value assigned by the user.</li><li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li><li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li><li>• View Search Result as CSV File - Downloads the search results in CSV format.</li></ul>

## Searching for MAC Addresses

MAC addresses are unique addresses that identify ports on a device. MAC addresses are also known as BIAs (Burned-in Addresses), hardware addresses, and physical addresses. NA gathers information about which MAC addresses are assigned to ports on devices and which MAC addresses are visible from those ports. The following figure illustrates the relationship between MAC addresses, IP addresses, and ports.



To search for MAC Addresses, on the menu bar under Reports, select Search For and click MAC addresses. The Search For MAC Address page opens. After you enter your search criteria and click the Search button, NA returns a list of MAC addresses containing all the specified search criteria on the MAC Address Search Results page. For more information, see "[MAC Address Search Results Page Fields](#)" on page 524.

## Search For MAC Address Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the MAC Address Search Results page to show only the selected information.
Host Name	<p>Select an operator and enter the host name of the device. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p>

Field	Description/Action
	<p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p>
Device IP	Select an operator and enter the IP address of the device.
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Port Name	Select an operator and enter the device port name. The port name is the name of the actual port on the device. For example, Ethernet0/1.
Port Description	Select an operator and enter a description of the port.
Address	Select an operator and enter a MAC address pattern on which to search.
Address Type	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• All addresses (the default)</li> <li>• Seen from port — Display only those MAC addresses that are connected to the device/port (those MAC address types external to the device/port, but visible to it).</li> <li>• Address of port — Display only those MAC addresses that are internal to the device (the MAC addresses that are assigned to ports on the device).</li> </ul>
Search Scope	<p>The scope of the search. Available options include:</p> <ul style="list-style-type: none"> <li>• All addresses (the default)</li> <li>• Limit search to addresses no longer seen—Limit the search results to only those MAC addresses that are no longer seen in the latest data capture.</li> <li>• Limit search to addresses currently present—Limit the search results to only those MAC addresses that are currently present in the latest data capture.</li> </ul>
VLAN	Select an operator and enter the port’s VLAN name. The VLAN name is the name of the VLAN, for example VLAN2 or VLAN3, on which to limit the search.
Associated IP	Select an operator and enter an IP address associated with the MAC you are searching for.
Device belongs to group	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information about using the Device</p>

Field	Description/Action
	Selector, see <a href="#">"Device Selector" on page 137</a> .
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see <a href="#">"Partitions" on page 148</a>.</p>

## MAC Address Search Results Page Fields

The MAC Address Search Results page displays the search criteria you selected on the Search For MAC Address page. For more information, see ["Search For MAC Address Page Fields" on page 522](#).

Option	Description/Action
Modify this search link	Returns you to the Search For MAC Address page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Actions	<p>You can select the following action for each MAC address:</p> <ul style="list-style-type: none"> <li>View Details — Opens the MAC Address Detail page, where you can view details on the following information: Device, Device Port, MAC address, Type, First Seen, and Last Updated.</li> <li>View IP - Opens the IP Address Detail page that is cross-referenced with this MAC address. This option is only available on “Seen from Port” records. Cross-referencing means that when NA gathers data, the IP address and MAC address were indicated as coming from the same source.</li> </ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"> <li>Save as a new device group — Select either “All Result Devices” or “Selected Devices Only,” enter the name of the new device group, and click Create Group.</li> <li>Add to an existing static device group — Select either “All Result Devices” or “Selected Devices Only,” select a device group from the drop-down menu, and click Add.</li> <li>Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li> <li>Email Search Result - Enter the email address to send the search results to and click Send.</li> </ul>

Option	Description/Action
	<p>Be sure to separate multiple addresses with a comma.</p> <ul style="list-style-type: none"><li>• View Search Result as CSV File - Downloads the search results in CSV format.</li></ul>

## Searching for IP Addresses

An IP address—Internet Protocol address—is a unique numerical address for network devices. Any participating network device, such as a router, switch, firewall, and so on has their own unique IP address. Currently, NA supports:

- IPv4 — IPv4 supports 32-bit and 64-bit addresses in octet notation
- IPv6 — IPv6 supports 128-bit addresses in octet notation (For detailed information on IPv6 support, see the *NA Installation and Upgrade Guide*.)

To search for IP addresses, on the menu bar under Reports, select Search For and click IP Addresses. The Search For IP Addresses page opens. When you are finished entering search criteria, click the Search button. NA returns a list of IP addresses containing all the specified search criteria on the IP Address Search Results page.

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

## Search For IP Address Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the IP Addresses Search Results page to show only the selected information.
Host Name	<p>Select an operator and enter the host name of the device associated with the session. Operators include:</p> <ul style="list-style-type: none"><li>• Contains</li><li>• Does not contain</li><li>• Matches</li><li>• Equals</li><li>• Does not equal</li><li>• Contains (regex)</li><li>• Does not contain (regex)</li></ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p>

Field	Description/Action
	<p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p>
Device IP	<p>Select an operator and enter the IP address of the device, for example:</p> <ul style="list-style-type: none"> <li>IPv4: 10.255.?.255, 192.*, 172.16.30.1</li> <li>IPv6: aff:38?:10, fc00:c0a8:* , ::1</li> </ul>
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>Equals</li> <li>Is less than</li> <li>Is greater than</li> </ul>
Port Name	<p>Select an operator and enter the device port name. The port name is the name of the actual port on the device. For example: Ethernet0/1.</p>
Port Description	<p>Select an operator and enter a description of the port.</p>
Address	<p>Select an operator and enter a IP address pattern on which to search, for example: IPv4: 10.255.?.255, 192.*, 172.16.30.1 IPv6: aff:38?:10, fc00:c0a8:* , ::1</p>
Address Type	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>All addresses (the default)</li> <li>Seen from port — Display only those IP addresses that are connected to the device/port (those IP address types external to the device/port, but visible to it).</li> <li>Address of port — Display only those IP addresses that are internal to the device (the IP addresses that are assigned to ports on the device).</li> </ul>
Search Scope	<p>The scope of the search. Available options include:</p> <ul style="list-style-type: none"> <li>All addresses (the default)</li> <li>Limit search to addresses no longer seen—Limit the search results to only those IP addresses that are no longer seen in the latest data capture.</li> <li>Limit search to addresses currently present—Limit the search results to only those IP addresses that are currently present in the latest data capture.</li> </ul>
VLAN	<p>Select an operator and enter the port’s VLAN name. The VLAN name is the name of the VLAN, for example VLAN2 or VLAN3, on which to limit the search.</p>
Associated MAC	<p>Select an operator and enter an associated MAC address.</p>
Device belongs to group	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>Any of selected groups (the default)</li> <li>All of selected groups</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information on how to use the Device Selector, see <a href="#">"Device Selector" on page 137</a>.</p>
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Partition) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about partitions, see <a href="#">"Partitions" on page 148</a></p>

## IP Address Search Results Page Fields

The IP Address Search Results page displays the search criteria you selected on the Search For IPs page. For more information, see ["Search For IP Address Page Fields" on page 525](#).

Option	Description/Action
Modify this search link	Returns you to the Search For IP Address page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Actions	<p>You can select the following action for each MAC address:</p> <ul style="list-style-type: none"> <li>View Details — Opens the IP Address Details page, where you can view details on the following information: Device, Device Port, IP address, Type, First Seen, and Last Updated.</li> <li>View IP - Opens the IP Address detail page that is cross-referenced with this IP address. This option is only available on "Seen from Port" records. Cross-referencing means that when NA gathers data, the IP address and MAC address were indicated as coming from the same source.</li> </ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"> <li>Save as a new device group — Select either "All Result Devices" or "Selected Devices Only," enter the name of the new device group, and click Create Group.</li> <li>Add to an existing static device group — Select either "All Result Devices" or "Selected Devices Only," select a device group from the drop-down menu, and click Add.</li> <li>Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li> </ul>

Option	Description/Action
	<ul style="list-style-type: none"> <li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li> <li>• View Search Result as CSV File - Downloads the search results in CSV format.</li> </ul>

## Searching for VLANs

VLANs (Virtual Local Area Networks) are conglomerations of ports that act as a single broadcast domain. VLANs operate at Layer 2 (the Data Link layer). NA gathers information about what VLANs are defined on a device and what VLAN each port is assigned to. For more information about VLANs, see "[Virtual Local Area Networks \(VLANs\)](#)" on page 195.

To search for VLANs, on the menu bar under Reports, select Search For and click VLAN. The Search For VLAN page opens. When you are finished entering search criteria, click the Search button. NA returns a list of VLANs containing all the specified search criteria on the VLAN Search Results page.

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

## Search For VLAN Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the VLANs Search Results page to show only the selected information.
Host Name	<p>Select an operator and enter the host name of the device associated with the session. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regex)</li> <li>• Does not contain (regex)</li> </ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <p><b>Note:</b> Wildcards do not work with the "equals" and "does not equal" operators.</p>



Field	Description/Action
Device IP	Select an operator and enter the IP address of the device.
Device ID	The device ID specification. Operators include: <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
VLAN ID	Select an operator and enter the VLAN's ID. The VLAN ID identifies the VLAN using a 12-bit field in the VLAN's tag. For more information about VLANs, see <a href="#">"Virtual Local Area Networks (VLANs)" on page 195</a> .
VLAN Name	Select an operator and enter the VLAN name.
VLAN Type	Select an operator and enter the VLAN type.
VLAN Description	Select an operator and enter the VLAN's description.
Private VLAN	Select an operator and enter the private VLAN description.
Device belongs to group	Select one of the following operators from the drop-down menu and then select one or more device groups: <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information on how to use the Device Selector, see <a href="#">"Device Selector" on page 137</a>.</p>
Partition	Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory. <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about partitions, see <a href="#">"Partitions" on page 148</a>.</p>

## VLAN Search Results Page Fields

The VLAN Search Results page displays the search criteria you selected on the Search For VLAN page. For more information, see ["Search For VLAN Page Fields" on the previous page](#).

Option	Description/Action
Modify this search link	Returns you to the Search For VLANs page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Actions	You can select the following action for each VLAN: <ul style="list-style-type: none"><li>• View Details — Opens the VLAN Detail page, where you can view details about the search with links to the Device and Interface Detail pages. For more information, see "<a href="#">VLAN Detail Page Fields</a>" on page 198.</li><li>• Edit — Opens the Edit VLAN Detail page. For more information, see "<a href="#">Creating and Editing VLANs</a>" on page 197.</li><li>• Delete — Opens a dialog box, where you can confirm that you want to delete the VLAN.</li></ul>
Search Criteria	Displays the search criteria used in the search. You can: <ul style="list-style-type: none"><li>• Save as a new device group — Select either "All Result Devices" or "Selected Devices Only," enter the name of the new device group, and click Create Group.</li><li>• Add to an existing static device group — Select either "All Result Devices" or "Selected Devices Only," select a device group from the drop-down menu, and click Add.</li><li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see "<a href="#">User &amp; System Reports</a>" on page 582.</li><li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li><li>• View Search Result as CSV File - Downloads the search results in CSV format.</li></ul>

## Searching for Device Templates

Device templates enable you to define configurations, OS/file specifications, and other device-specific information that can then be applied to existing devices. Device templates also have the ability to support certain device operations, such as policy checking, without needing an actual device to test against. For more information, see "[Device Templates](#)" on page 114.

To search for device templates, on the menu bar under Reports, select Search For and click Device Templates. The Search For Device Template page opens. When you are finished entering search criteria, click the Search button. NA returns a list of device templates containing all the specified search criteria on the Device Templates Search Results page.

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

## Search For Device Template Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the Device Template Search Results page to show only the selected information.
Template Name	<p>Select an operator and enter the name of the device template. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regex)</li> <li>• Does not contain (regex)</li> </ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p> </div>
Device Vendor	Select an operator and enter the device vendor.
Device Model	Select an operator and enter the device model.
Driver Name	Select a driver from the list.
Device Description	The user-defined description of the device.
Comments	<p>Select an operator and enter comments.</p> <p>This field is case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</p>
Configuration Text	<p>Select an operator, and then enter a unique portion of the device configuration on which to search.</p> <ul style="list-style-type: none"> <li>• The "contains" and "does not contain" operators support regular expressions, including the ? and * wildcards. These searches are case-sensitive unless the tips at the top of the page indicate that <i>all</i> text field searches are case-insensitive.</li> <li>• The "contains (full text)" and "does not contain (full text)" operators support the * wildcard only. For more information, see <a href="#">"Using the Full-Text Search Functionality" on page 459</a>. These searches are always case-insensitive.</li> </ul>

Field	Description/Action
	<p><b>Note:</b> These operators require that full-text search is enabled for the database.</p> <ul style="list-style-type: none"> <li>IPv6 address shorthand notation (double colon) cannot be used in combination with wildcards.</li> <li>The "contains (regexp)" and "does not contain (regexp)" operators are based on the database-specific regular expression SQL queries. For detailed information, see the specific database SQL references; such as for Oracle database, see the <i>Oracle® Database SQL Reference</i>.</li> </ul> <p>If the search operator is "contains" or "contains (full text)," you can provide a value in the "Show &lt;#&gt; context lines around the matched line when displaying Current Configuration" check box at the bottom of the page. You can include up to five lines above and below the search text in the results page. The default value is three. (<b>Note:</b> When the number of results to load is large, showing context lines can significantly slow performance.)</p>
Create Date	<p>Select the following operators:</p> <ul style="list-style-type: none"> <li>Since or Until</li> <li>Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
Device Custom data	Select an operator and enter device custom data.
Partition	<p>Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about partitions, see <a href="#">"Partitions" on page 148</a>.</p>

## Device Templates Search Results Page Fields

The Device Search Results page displays the search criteria you selected on the Search For Device Template page. For more information, see ["Searching for Device Templates" on page 530](#).

Option	Description/Action
Modify this search link	Returns you to the Search For Device Template page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Actions	You can select the following action for each device template:

Option	Description/Action
	<ul style="list-style-type: none"> <li>• Edit — Opens the Edit Device Template page, where you can edit information about this Device Template. For more information, see <a href="#">"Device Template Page Fields" on page 114</a>.</li> <li>• View Config — Opens the Current Configuration page, where you can edit and add comments to the selected configuration.</li> </ul>
Search Criteria	<p>Displays the search criteria used in the search. You can:</p> <ul style="list-style-type: none"> <li>• Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li> <li>• Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li> <li>• View Search Result as CSV File - Downloads the search results in CSV format.</li> </ul>

## Single Search

To search for device change events, on the menu bar under Reports, click SingleSearch. The Single Search page opens. When you click the Search button, NA returns a list of events containing all the specified search criteria you specify on this page on the Single Search Results page. For more information, see ["Single Search Page Fields" below](#).

## Single Search Page Fields

Field	Description/Action
Check boxes	Use the left-side check boxes to customize the Events Search Results page to show only the selected information.
Date	<p>Select the following operators:</p> <ul style="list-style-type: none"> <li>• Since or Until</li> <li>• Anytime, Customize (opens the calendar), Now, or 1 hour ago to 1 year ago</li> </ul> <p><b>Note:</b> Clicking the calendar icon opens the calendar, where you can select a date and time.</p>
Summary	Select the name of one or more events. Use Ctrl+click to select/deselect additional events. For more information about each event, see <a href="#">"Event Descriptions" on page 509</a> .
Added By	<p>Select an operator and provide the login name of the person who created the event. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regex)</li> <li>• Does not contain (regex)</li> </ul>
Importance	<p>Select one or more Importance level. Options include:</p> <ul style="list-style-type: none"> <li>• Informational — Events that typically do not require a response.</li> <li>• Low — Events that may require a response as time permits.</li> <li>• Medium — Events that require a timely response, typically within 72 hours.</li> <li>• High — Events that require an urgent response, typically within 24 hours.</li> <li>• Critical — Events that require an immediate response.</li> </ul>
Host Name	<p>Select an operator and enter the host name of the device associated with these events. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regex)</li> <li>• Does not contain (regex)</li> </ul> <p>You can use wildcard characters. The ? stands for any one character in that position, while the * stands for any number of characters in that position, for example: usa-ny-ny-*, 10.0.*.2, and ?jones.</p> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Wildcards do not work with the “equals” and “does not equal” operators.</p> </div>
Device IP	<p>Select an operator (see above) and enter the IP address of the device associated with these events.</p>
Device ID	<p>The device ID specification. Operators include:</p> <ul style="list-style-type: none"> <li>• Equals</li> <li>• Is less than</li> <li>• Is greater than</li> </ul>
Description	<p>Select an operator (contains or does not contain) and enter the unique text from the event for which you are searching. To show the context lines around the matched line when displaying the event description, check Show and enter the number of lines. Three is the default value.</p>
Device	<p>Select an operator (Any of the selected groups, All of the selected groups, or None of the</p>

Field	Description/Action
Belongs to group	selected groups) and select one or more groups from the scroll-down list.
Partition	Select a Partition to limit search results to devices in that Partition. The Default Partition (named Default Site) initially includes all of Inventory.  <b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about partitions, see <a href="#">"Partitions" on page 148</a> .

## Single Search Results Page Fields

The Single Search Results page display depends on the search criteria you selected on the Single Search page. For more information, see ["Single Search Page Fields" on page 533](#). The following table describes the available options on the Single Search Results page.

Field	Description/Action
Modify this search link	Returns you to the Search for Single Search page, where you can edit your search criteria and run the search again.
View Search Criteria link	Scrolls down to the Search Criteria information.
Check Boxes	The check boxes for each event enables you to delete events. Once you have selected the events, click the Actions drop-down menu and click: <ul style="list-style-type: none"> <li>Delete — Deletes the selected events.</li> </ul> The adjacent Select drop-down menu enables you to select or deselect all of the tasks.
Search Criteria	Displays the search criteria used in the search. You can: <ul style="list-style-type: none"> <li>Save as a new device group — Select either "All Result Devices" or "Selected Devices Only," enter the name of the new device group, and click Create Group.</li> <li>Add to an existing static device group — Select either "All Result Devices" or "Selected Devices Only," select a device group from the drop-down menu, and click Add.</li> <li>Save search as a user report — Enter the name of the user report and click Save. You can view User reports from the User &amp; System Reports page. For more information, see <a href="#">"User &amp; System Reports" on page 582</a>.</li> <li>Email Search Result - Enter the email address to send the search results to and click Send. Be sure to separate multiple addresses with a comma.</li> <li>View Search Result as CSV File - Downloads the search results in CSV format.</li> </ul>

# Advanced Search

The Advanced Search page enables you to:

- Create a Boolean expression using the AND and OR operators to filter searches. You can use parenthesis in the Boolean expressions to refine the search.

**Note:** This tool does not support the use of regular expressions.

- Configure searches using one or more search criteria, for example IP address, Domain Name, and Policy Compliance.
- Limit a search by device group.
- Customize the output of the Advanced Search Results page.

To open the Advanced Search page, on the menu bar under Reports, click Advanced Search. When you click the Search button, NA returns the search criteria you specified.

## Advanced Search Page Fields

Field	Description/Action
Search For	<p>Object types include:</p> <ul style="list-style-type: none"> <li>• ACL</li> <li>• Compliance - The HPE Network Automation Premium edition license does not include this object type. It is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page (<b>Help &gt; About Network Automation &gt; View License Information</b> link).</li> <li>• Configuration</li> <li>• Device</li> <li>• Diagnostic</li> <li>• Event</li> <li>• Interface</li> <li>• Module</li> <li>• Resource Identity</li> <li>• Session</li> <li>• Task</li> </ul>
<p><b>Search Criteria</b></p> <p>Each time you select a search criterion, it is displayed in the Search Criteria section, where you can then select an operator, such as Contains, Matches, or Equals, and then enter the information on which to search. To delete a defined criterion, click the X next to the search criterion index letter.</p>	
Add Criteria	The available search criteria depend on the object type highlighted in the Search For list. If custom fields, enhanced custom fields, or both are



Field	Description/Action
	<p>defined for the object type, those field names are sorted into the criteria list, with lowercase letters having lower priority than uppercase letters.</p> <p>For each criterion to be included in the search, select that property and then specify the search parameters. The available operators depend on the data type of the selected property.</p>
<b>Boolean Expression</b>	
Expression	<p>By default, the defined criteria index letters are displayed with the Boolean 'and' expression. For example, if you defined three search criteria, the expression would look like <i>A and B and C</i>. You can edit the Boolean expression as needed. Click the Reset Expression button to reset the expression to the default. (<b>Note:</b> The maximum number of criteria is 10.)</p>
<b>Limit search by device group</b> (if applicable to the Search For selection)	
Device belongs to group	<p>Select one of the following operators from the drop-down menu and then select one or more device groups:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> Use the Device Selector to select groups. For information about using the Device Selector, see "<a href="#">Device Selector</a>" on page 137.</p>
Partition (if configured)	<p>Select a Partition. The default Partition (named Default Site) initially includes all of Inventory.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. For more information about Partitions, see "<a href="#">Partitions</a>" on page 148</p>
<b>Customize Output</b>	
Select fields to be included in search results	<p>Select the fields to be included in the Advanced Search Results page. To select multiple fields, click the first field, then Ctrl+click to select/deselect additional fields.</p>
Sort results by	<p>Select the search criterion from the drop-down menu for which you want to sort the results of the search. You can specify Ascending (the default) or Descending.</p>
Display results in groups of	<p>Enter the number of items you want displayed on the Advanced Search Results page. The default 25.</p>
Show <#> context lines	<p>When displaying text fields on the Advanced Search Results page, enter</p>

Field	Description/Action
around the matching line when displaying text fields	the number of lines around the matching line to be displayed. The default is 3. In the Advanced Search page, this field is applicable only for the <b>Configuration</b> and <b>Configuration Text</b> search criteria.

## Sample Advanced Search

The following advanced search assumes that you have two data centers under management. One data center is located on the New York and the other in California. The search informs you of all the Cisco devices that do not have the proper timezone set for either of the data centers.

1. Log into NA.
2. From the main menu bar under Reports, click Advanced Search. The Advanced Search page open.
3. In the Search for field select Devices from the drop-down menu.
4. In the Search Criterias field, select Driver Name from the drop-down menu.
5. Select all Cisco drivers in use by NA.
6. Select Host Name from the Add Criteria drop-down menu.
7. Select does contain from the drop-down menu and enter: redmond
8. Select Configuration Text from the Add Criteria drop-down menu.
9. Select does not contain from the drop-down menu and enter: set timezone PST.
10. In the Boolean Expression field, modify the default string to read: A or (B and C).
11. Click the Search button.

# Chapter 12: Managing Events and Diagnostics

Use the following table to quickly locate information.

Topic	Refer to:
Consolidated View of Events (SingleView)	"Consolidated View of Events (SingleView)" below
Diagnostics	"Diagnostics" on page 541
Adding & Customizing Diagnostics	"Adding & Editing Custom Diagnostics" on page 544

## Consolidated View of Events (SingleView)

SingleView enables you to track events that indicate changes to either a single device or all of your devices on one page. You can select from a list of event types, including:

- Device Booted
- Device Configuration Change
- Device Diagnostic Changed
- Device Password Change
- Device Reloaded
- Device Software Change
- Module Added
- Module Changed
- Module Removed
- Reserved Device Configuration Changed
- User Message

For a complete list of NA Events, see ["Event Descriptions" on page 509](#).

To view the SingleView page, on the menu bar under Reports, click SingleView. The SingleView page opens.

## SingleView Page Fields

Field	Description/Action
View Search Results as CSV	You are prompted for the location to save the displayed results as a CSV file.

Field	Description/Action
File link	
Displayed Change Event Types link	Scrolls down to the Displayed Change Event Types menu, where you can select events to display.
For the:	Displays the time frame for viewing events. Options include: <ul style="list-style-type: none"> <li>• Past 1, 2, 4, 8, 12, 24, and 48 hours</li> <li>• Past 1 and 2 weeks</li> <li>• Past 1 month</li> <li>• All Events</li> </ul>
Current Working Group	Select a device group from the drop-down menu.
Check Boxes	You can use the left-side check boxes to delete events from the NA database. Once you have selected the events, click the Actions drop-down menu and click Delete. This deletes the selected events from the NA database. The adjacent Select drop-down menu enables you to select or deselect all of the events.
Event Date	Displays the date/time of the event in the format MMM-dd-yy HH:mm:ss. (The format is configurable by the System Administrator.)
Host Name	Displays the host name or IP address of the device. Clicking the Host Name or IP Address opens the Device Details page, where you can view information about the device and its configuration history.
Summary	Displays the type of event. For a list of NA Events, see <a href="#">"Event Descriptions" on page 509</a> . Clicking the event type link opens the Event Detail page. This page includes: <ul style="list-style-type: none"> <li>• The date and time the event occurred.</li> <li>• The login name of the person or process that added the event.</li> <li>• The event type.</li> <li>• A brief description of the event.</li> <li>• A link to detailed information about the device.</li> </ul>
Added By	Displays the login name of the person whose action caused the event to be created.
Actions	The Compare to Previous link appears for the following events: <ul style="list-style-type: none"> <li>• Device Configuration Change — Opens the Compare Device Configurations page. For more information, see <a href="#">"Comparing Device Configurations" on page 166</a>.</li> <li>• Device Diagnostic Changed — Opens the corresponding comparison page, depending on the type of diagnostic that was changed, for example Compare NA Device File System page or the Compare NA Module Status page.</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Device Password Change — Opens the Compare Device Configurations page. For more information, see <a href="#">"Comparing Device Configurations" on page 166</a>.</li> </ul>
Displayed Change Event Types	Displays a list of event types from which you can select, including: <ul style="list-style-type: none"> <li>• Device Booted</li> <li>• Device Configuration Change</li> <li>• Device Diagnostic Changed</li> <li>• Device Password Change</li> <li>• Device Reloaded</li> <li>• Device Software Change</li> <li>• Module Added</li> <li>• Module Changed</li> <li>• Module Removed</li> <li>• Reserved Device Configuration Changed</li> <li>• User Message</li> </ul>

## Diagnostics

In addition to configuration files, NA gathers other device information, such as routing tables, port statistics, and IP settings. Collectively, these are called *Diagnostics*. Diagnostics can help you determine the effects of configuration changes and troubleshoot complex issues such as routing problems and performance degradations.

By default, NA captures a basic set of diagnostics from a device each time NA detects a configuration change on that device. You can define additional diagnostic tasks or event rules to capture diagnostics at different times, and can define additional custom diagnostics to capture specific device information that is useful in your environment.

NA enables you to automatically launch diagnostics as a result of specific events. In addition, environmental diagnostics, such as CPU utilization, can be created and monitored so that automated reactions and responses can take place when certain thresholds are reached. For more information about automatically running a diagnostic as a result of a configuration change or other event, see ["Adding Event Rules" on page 448](#).

On the menu bar under Devices, select Device Tools and click Diagnostics. The Diagnostics page opens. The available diagnostics are listed.

## Diagnostics Page Fields

Field	Description/Action
New Diagnostic	Opens the New Diagnostics page, where you can create a new diagnostic. For more information, see <a href="#">"New Diagnostic Page Fields" on the next page</a> .

Field	Description/Action
link	
Run Diagnostics link	Opens the Run Diagnostics Task page, where you can run any diagnostic. For more information, see <a href="#">"Run Diagnostics Task Page Fields" on page 291</a> .
Import/Export Diagnostics link	Opens the Import/Export Command Scripts/Diagnostics page, where you can import a pre-configured command script or diagnostic script, or export a command script or diagnostic script to a file. For more information, see <a href="#">"Import/Export Scripts/Diagnostics Page Fields" on page 560</a> .
Check Boxes	You can use the left-side check boxes to delete diagnostics. Once you have selected the diagnostics click the Actions drop-down menu and click Delete. This deletes the selected diagnostics. The adjacent Select drop-down menu enables you to select or deselect all of the diagnostics.
Script Name	Displays the name of the diagnostic.
Mode/Device Family	Displays the device access mode in which the diagnostic runs, such as Cisco IOS enable.
Last Modified	Displays the date and time the diagnostic was last modified.
Partition	<p>Diagnostics can be applicable to a specific Partition. All users can view diagnostics that are labeled [Shared] because they are applicable to all Partitions.</p> <div style="background-color: #e0e0e0; padding: 10px; margin-top: 10px;"> <p><b>Note:</b> If the NA Administrator has partitioned devices, you can only view, edit, and run diagnostics that belong to a specific Partition (and the devices belonging to that Partition) for which you have permission to view. For more information about segmenting devices an users, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p> </div>
Last Modified by	Displays the name of the last user to modify the diagnostic (when available).
Actions	<p>You can select from the following options:</p> <ul style="list-style-type: none"> <li>• Edit — Opens the Edit Diagnostic page, where you can edit the diagnostic. For more information, see <a href="#">"New Diagnostic Page Fields" below</a>.</li> <li>• Run — Opens the New Task - Run Diagnostics page, where you can run the diagnostic. For more information, see <a href="#">"Run Diagnostics Task Page Fields" on page 291</a>.</li> </ul>

## New Diagnostic Page Fields

To create a new diagnostic:

1. On the menu bar under Devices, select Device Tools and click Diagnostics. The Diagnostics page opens.
2. Click the New Diagnostic link at the top of the page. The New Diagnostic Page opens. Be sure to click the Save Script button when you are finished.

Field	Description/Action
Diagnostics link	Opens the Diagnostics page, where you can create or run predefined diagnostics. For more information, see <a href="#">"Diagnostics Page Fields" on page 541</a> .
Name	Enter the name of the diagnostic.
Description	Enter descriptive comments for the diagnostic.
Partition	<p>Diagnostics can be applicable to a specific Partition. All users can view diagnostics that are labeled [Shared] because they are applicable to all Partitions.</p> <div style="background-color: #e0e0e0; padding: 10px; border: 1px solid #ccc;"> <p><b>Note:</b> If the NA Administrator has partitioned devices, you can only view, edit, and run diagnostics that belong to a specific Partition (and the devices belonging to that Partition) for which you have permission to view. For more information about segmenting devices and users, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p> </div>
Advanced Scripting check box	<p>If checked, Diagnostics can be defined as an advanced script without user-defined variables. The following fields replace the Mode and Driver fields:</p> <ul style="list-style-type: none"> <li>• Device Family — Select the name of the device family on which this script runs. A device family is a collection of devices that share a similar configuration CLI command syntax.</li> <li>• Language — Select the language in which the script was written.</li> <li>• Parameters — Enter the parameters for the script.</li> </ul> <p>For more information, see <a href="#">"Adding Command Scripts" on page 560</a> for detailed information on creating advanced scripts.</p>
Mode	Select the device access mode, such as Cisco IOS enable or TippingPoint NGFW configuration.
Driver	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• All applicable drivers (the default)</li> <li>• Select specific drivers</li> </ul> <p>If selecting one or more drivers from the list, you can click one driver or use Shift+click or Ctrl+click to select multiple drivers.</p> <p><b>(Note:</b> Devices that are menu-driven, such as the Baystack 470, cannot be accessed by custom diagnostics.)</p>
Script	<p>Enter the device-specific commands to run. Keep in mind the height and width of the Script box is controlled by settings from the Administrative Settings option. If you use the scripting feature extensively, you may want to adjust these settings so that you can see the script without scrolling.</p> <div style="background-color: #e0e0e0; padding: 10px; border: 1px solid #ccc;"> <p><b>Note:</b> Scripts can exist with the same name, but different modes. This is how NA manages multi-vendor scripts. To run a script, simply select the script name. Each version of the script will load. When you run a script against a device group, NA knows the device type and applies the appropriate script.</p> </div>

To view diagnostics for a specific device:

1. On the menu tab under Devices, click Inventory.
2. Click the Host Name or IP Address of the device for which you want diagnostic information.
3. From the View drop-down menu, select Diagnostics and click the diagnostic you want to view. Each option shows a historical list of diagnostics specific to the device.

## Adding & Editing Custom Diagnostics

NA enables you to define custom diagnostics to capture specific information that is useful in your environment. Because each user can run custom diagnostics, any user can analyze network problems, even though they may not have permission to modify the device configuration.

To define a custom diagnostic, you provide one or more commands to run on the device. NA stores the results of these commands as the diagnostic results. All users have permissions to run diagnostics, therefore it is important that these commands not change the device configuration. Custom diagnostics should perform read-only tasks.

You can use event rules to trigger diagnostics. For example, you could set a rule to run diagnostics whenever a configuration fails to deploy.

For multi-vendor networks, you can create multiple diagnostics with the same name, but running on different types of devices. Diagnostics with the same name are linked. When you run a group task, NA automatically runs the correct version of the diagnostic for each device. For example, you could run a group diagnostic to collect data on all your routers in San Francisco, even if the routers are from multiple vendors.

**Note:** You must periodically purge old data from the NA database. While it is important to purge all your old data periodically to maintain performance and restore disk space, it is especially important to purge diagnostic and script data. Unlike configurations, which are stored only when they differ from their previous instance, all diagnostic and script data is stored. By default, NA purges diagnostic data after 45 days. For more information, see ["Data Pruning Task Page Fields" on page 385](#).



# Chapter 13: Custom Data Setup

The purpose of custom data fields is to enable you to assign useful data to specific devices, configurations, users, and so on. This gives you added flexibility and enables you to integrate NA with other applications.

By default, HPE Network Automation (NA) supports up to six custom data fields. Enhanced custom data fields provide up to 25 additional custom data fields for the Device Details and Device Interfaces pages. For information about enabling enhanced custom data fields, see ["User Interface Page Fields" on page 54](#). For information about configuring enhanced custom data fields, see ["Enhanced Custom Fields Setup" on page 549](#). For information about enabling more than 25 enhanced custom fields, see the *NA Administration Guide*.

Previously, several CLI commands had the ability to modify a custom field through the use of the `customname` and `customvalue` options on the command. However, you could only manipulate one field at a time. This was cumbersome if you needed to modify multiple fields. As a result, the new `customnames` and `customvalues` values enable you to specify multiple fields to modify simultaneously.

Note that the names and values are in comma separated lists. If you have a value that includes a comma, be sure to put it in single quotes. For example:

```
mod device -customnames "Location, Floor, Rack" -customvalues "'Seattle, WA',3rd,'126-18,10'"
```

**Note:** The old options are still available to preserve backward compatibility of existing scripts.

To add custom data, on the menu bar under Admin click Custom Data Setup. The Custom Data Setup page opens.

## Custom Data Setup Page Fields

Field	Description/Action
Custom Data Setup	Select a custom data setup from the drop-down menu. Options include: <ul style="list-style-type: none"><li>• Device Configurations &amp; Diagnostics</li><li>• Devices</li><li>• Device Blades/Modules</li><li>• Device Interfaces</li><li>• Device Groups</li><li>• Users</li><li>• Tasks</li><li>• Telnet/SSH Sessions</li></ul>
Check Boxes	You can use the left-side check boxes to enable the field. Consequently, the field appears in the user interface and is available to the integration API.
<b>Device Configuration &amp; Diagnostics</b>	

Field	Description/Action
<p>These fields appear on the Device Configuration Detail page. You can enter or edit the values by clicking the Edit Comments link, which opens the Edit Device Configuration Detail page.</p>	
API Name	<p>Identifies the field to the integration API and notification rules. You can use A-Z, a-z, 0-9, _ , - , &amp; (not including the comma) in an API name.</p>
Display Name	<p>Displays the name that users see in the user interface.</p>
Values	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Can contain HTML — If checked (the default) users (or the integration API) are expected to enter HTML code in this field. NA displays the field as HTML, not text, in the user interface. This enables you to include a link to an external trouble ticket application.</li> <li>• Limit to — If checked, enter values, separated by commas, that will appear in a drop-down list box.</li> </ul>
<p><b>Devices</b></p>	
<p>These fields appear on the Device Information page. You can enter or edit the values by clicking the Edit link, which opens the Edit Device page, or by clicking Add from the Devices drop-down menu, which opens the New Device page.</p>	
API Name	<p>Identifies the field to the integration API and notification rules. You can use A-Z, a-z, 0-9, _ , - , &amp; (not including the comma) in an API name.</p>
Display Name	<p>Displays the name that users see in the user interface.</p>
Values	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Can contain HTML — If checked (the default) users (or the integration API) are expected to enter HTML code in this field. NA displays the field as HTML, not text, in the user interface. This enables you to include a link to an external trouble ticket application.</li> <li>• Limit to — If checked, enter values, separated by commas, that will appear in a drop-down list box.</li> </ul>
<p><b>Device Blades/Modules</b></p>	
<p>These fields appear on the View Module and Edit Module pages available from the Device Blades/Modules page (<b>View &gt; Device Details &gt; Modules</b>).</p>	
API Name	<p>Identifies the field to the integration API and notification rules. You can use A-Z, a-z, 0-9, _ , - , &amp; (not including the comma) in an API name.</p>
Display Name	<p>Displays the name that users see in the user interface.</p>
Values	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Can contain HTML — If checked (the default) users (or the integration API) are expected to enter HTML code in this field. NA displays the field as HTML, not text, in the user interface. This enables you to include a link to an external trouble ticket application.</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>Limit to — If checked, enter values, separated by commas, that will appear in a drop-down list box.</li> </ul>
<b>Device Interfaces</b>	
These fields appear on the View Interface and Edit Interface pages available from the Device Interfaces page ( <b>View &gt; Device Details &gt; Interfaces</b> ).	
API Name	Identifies the field to the integration API and notification rules. You can use A-Z, a-z, 0-9, _, -, & (not including the comma) in an API name.
Display Name	Displays the name that users see in the user interface.
Values	Select one of the following options: <ul style="list-style-type: none"> <li>Can contain HTML — If checked (the default) users (or the integration API) are expected to enter HTML code in this field. NA displays the field as HTML, not text, in the user interface. This enables you to include a link to an external trouble ticket application.</li> <li>Limit to — If checked, enter values, separated by commas, that will appear in a drop-down list box.</li> </ul>
<b>Device Groups</b>	
These fields appear on the Device List page for the group. You can enter or edit the values by clicking the Edit Group link, which opens the Edit Group page, or by clicking Groups from the Devices drop-down menu, which opens the New Group page.	
API Name	Identifies the field to the integration API and notification rules. You can use A-Z, a-z, 0-9, _, -, & (not including the comma) in an API name.
Display Name	Displays the name that users see in the user interface.
Values	Select one of the following options: <ul style="list-style-type: none"> <li>Can contain HTML — If checked (the default) users (or the integration API) are expected to enter HTML code in this field. NA displays the field as HTML, not text, in the user interface. This enables you to include a link to an external trouble ticket application.</li> <li>Limit to — If checked, enter values, separated by commas, that will appear in a drop-down list box.</li> </ul>
<b>Users</b>	
These fields appear on the My Profile page. You can enter or edit the values by clicking the Edit link on the User List page, which opens the Edit User page, or by clicking New User on the User List page, which opens the New User page.	
API Name	Identifies the field to the integration API and notification rules. You can use A-Z, a-z, 0-9, _, -, & (not including the comma) in an API name.
Display Name	Displays the name that users see in the user interface.

Field	Description/Action
Values	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Can contain HTML — If checked (the default) users (or the integration API) are expected to enter HTML code in this field. NA displays the field as HTML, not text, in the user interface. This enables you to include a link to an external trouble ticket application.</li> <li>• Limit to — If checked, enter values, separated by commas, that will appear in a drop-down list box.</li> </ul>
<b>Tasks</b>	
<p>These fields appear on Task pages. You cannot enter or edit the values through the user interface, but only through the integration API.</p>	
API Name	<p>Identifies the field to the integration API and notification rules. You can use A-Z, a-z, 0-9, _, -, &amp; (not including the comma) in an API name.</p>
Display Name	<p>Displays the name that users see in the user interface.</p>
Values	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Can contain HTML — If checked (the default) users (or the integration API) are expected to enter HTML code in this field. NA displays the field as HTML, not text, in the user interface. This enables you to include a link to an external trouble ticket application.</li> <li>• Limit to — If checked, enter values, separated by commas, that will appear in a drop-down list box.</li> </ul>
<b>Telnet/SSH Sessions</b>	
<p>These fields appear on the Telnet/SSH Session List page. You cannot enter or edit the values through the user interface, but only through the integration API.</p>	
API Name	<p>Identifies the field to the integration API and notification rules. You can use A-Z, a-z, 0-9, _, -, &amp; (not including the comma) in an API name.</p>
Display Name	<p>Displays the name that users see in the user interface.</p>
Values	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Can contain HTML — If checked (the default) users (or the integration API) are expected to enter HTML code in this field. NA displays the field as HTML, not text, in the user interface. This enables you to include a link to an external trouble ticket application.</li> <li>• Limit to — If checked, enter values, separated by commas, that will appear in a drop-down list box.</li> </ul>

# Enhanced Custom Fields Setup

Use custom fields to assign useful data to specific devices or resource identity pools. This additional information provides flexibility for customizing reports and integrating NA with other applications.

**Note:** Before you can add enhanced custom fields, you must enable the Enhanced Custom Fields application. For more information, see ["User Interface Page Fields" on page 54](#).

To view the current custom fields and add data to the Device Details, Device Interfaces, and resource identity management pages, on the menu bar under Admin click Extended Custom Fields Data Setup. The Enhanced Custom Fields Data Setup page opens.

Field	Description/Action
Enhanced Custom Field menu	The enhanced custom field type to display. Available options include: <ul style="list-style-type: none"> <li>• Devices (the default)</li> <li>• Device Interfaces</li> <li>• Resource Identities</li> </ul>
New Custom Field link	Clicking the New Custom Field link opens the New Custom Data Field page, where you can add custom data fields. These data fields are displayed on the Device Details, Device Interfaces, and resource identity pages. For more information, see <a href="#">"New Custom Data Field Page" on the next page</a> .  For information about the Device Details and Device Interfaces pages, see <a href="#">"View Menu Options" on page 185</a> and <a href="#">"Device Interfaces Page Fields" on page 188</a> .  For information about custom fields for resource identities, see <a href="#">"Define Custom Resource Identity Fields" on page 686</a> .
<b>Devices / Device Interfaces / Resource Identities</b>	
Enabled	Indicates if the custom data field is enabled.
Field Name	Displays the name of the custom data field.
Limit Values To	Displays a list of comma separated values. The list is shown as a drop-down menu when editing the actual data.
Allow HTML	Indicates if users can enter HTML code in this data field. NA displays the data field as HTML, not text.
Actions	Select one of the following options: <ul style="list-style-type: none"> <li>• Edit — Opens the Edit Custom Data Field page, where you can edit the current information. For more information, see <a href="#">"New Custom Data Field Page" on the next page</a>.</li> <li>• Delete — Enables you to delete Custom Data Fields. Deleting a data field will cause any data associated with that field to be deleted as well.</li> </ul>

# New Custom Data Field Page

To add custom data to the Device Details, Device Interfaces, and resource identity pages, on the menu bar under Admin click Enhanced Custom Fields Setup. The enhanced Custom Fields Setup page opens. Click the New Custom Devices Field link at the top of the page.

Field	Description/Action
Enabled	If checked, the custom data field is enabled.
Field Name	Enter a data field name.  <b>Note:</b> Custom resource identity field names must not include any of the following characters: period (.), single quotation mark ('), quotation mark ("), angle brackets (< >), brackets ([ ]), braces ({ }), or the closing parenthesis ()).
Limit Values To	Enter a list of comma separated values. The list is shown as a drop-down menu when editing the actual data.
Allow HTML	If checked, users can enter HTML code in this field. NA displays the field as HTML, not text.

Click the Save button when you are done. The new field is displayed on the Enhanced Custom Fields Setup page.

# Chapter 14: Creating Configuration Templates

Configuration templates enable rapid, straightforward deployment of new device configurations. Using configuration templates:

- Engineers can provision devices or services quickly while conforming to departmental configuration standards.
- Network architects can create friendly GUI prompts with validation parameters so that template users can fill in the blanks to rapidly populate and deploy new configurations.

In general, configuration templates are fragments of configuration data that can be assembled in various ways to form a script. In turn, this script can add to data already on a device or replace parts of a configuration.

For information about creating device templates, see "[Device Templates](#)" on page 114.

After you create a configuration template and populate it with commands, you can create a script from the template. When you run the script, it deploys the configuration commands, either as a fragment or an entire configuration, to one or more devices.

## Viewing Configuration Templates

To view the current configuration templates, on the menu bar under Devices, select Device Tools and click Configuration Templates. The Configuration Templates page opens. Use this page to view a list of configuration templates sorted by vendor.

### Configuration Templates Page Fields

Field	Description/Action
New Configuration Template link	Opens the New Configuration Template page, where you create a new configuration template. For more information, see " <a href="#">Creating New Configuration Templates</a> " on the next page.
Vendor	Displays the vendor for the devices to which this configuration template applies. Clicking the Vendor link opens the Configuration Templates page, where you can view the templates for this vendor. From this page, you can: <ul style="list-style-type: none"><li>• Include the configuration template in a script and build a full script from them.</li><li>• Create a new configuration template.</li></ul>
Check Boxes	You can use the left-side check boxes to delete configuration templates. Once you have selected the templates, click the Actions drop-down menu and click Delete. This deletes the selected configuration templates. The adjacent Select drop-down menu enables you to select or deselect all of the configuration templates.

Field	Description/Action
Name	Displays the name of the configuration template.
Partition	<p>If you have created Partitions for security or business reasons, you can partition configuration templates for each device in a specific Partition. Keep in mind that you can configure templates to be shared by all devices in all Partitions, as well as for specific devices in specific Partitions. For more information about creating partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions. In general, a Partition is a grouping of devices with unique IP addresses. Multiple Partitions can be managed by a single NA Core. A NA Core in an installation of a NA server, comprised of a single Management Engine, associated services, and a single database.</p>
Role	<p>Displays the role of the configuration template. The default roles include:</p> <ul style="list-style-type: none"><li>• Any</li><li>• Core</li><li>• Border</li><li>• Test</li></ul>
Model	Displays the model of the devices to which this configuration template applies.
Processor/Component	Displays the processor of the devices to which this configuration template applies.
Drivers	Displays the drivers assigned to the devices to which this configuration template applies.
Actions	<p>You can select one of the following options:</p> <ul style="list-style-type: none"><li>• View Details — Opens the View Configuration Template page, where you can view the configuration template as HTML in a separate browser window. For more information, see <a href="#">"Viewing Configuration Templates" on the previous page</a>.</li><li>• View Text — Opens a text window, where you can view the configuration template as text in a separate browser window. For more information, see <a href="#">"Viewing Configuration Templates" on the previous page</a>.</li><li>• Edit — Opens the Edit Configuration Template page, where you can add or edit a configuration template. For more information, see <a href="#">"Creating New Configuration Templates" below</a>.</li></ul>

## Creating New Configuration Templates

To create a new configuration template:



1. On the menu bar under Devices, select Device Tools and click Configuration Templates. The Configuration Templates page opens.
2. Click the New Template link at the top of the page. The New Configuration Template page opens. Be sure to click the Save Template button when finished.

### New Configuration Template Page Fields

Field	Description/Action
Templates link	Opens the Configuration Templates page, where you can view all of the current configuration templates. For more information, see <a href="#">"Viewing Configuration Templates" on page 551</a> .
Name	Enter the name of the configuration template.
Partition	<p>Select a Partition from the drop-down menu.</p> <div style="background-color: #e0e0e0; padding: 5px; margin: 10px 0;"> <p><b>Note:</b> This field is only displayed if you have configured one or more Partitions.</p> </div> <p>If you have created Partitions for security or business reasons, you can partition configuration templates for each device in a specific Partition. Keep in mind that you can configure templates to be shared by all devices in all Partitions, as well as for specific devices in specific Partitions. For more information about creating partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p>
Comments	Enter a description of the configuration template. Comments are included in all tables, so include only crucial information.
Role	<p>Select a role for the configuration template. Default roles include:</p> <ul style="list-style-type: none"> <li>• Any</li> <li>• Core</li> <li>• Border</li> <li>• Test</li> </ul>
Model	Enter the model of the devices to which this applies.
Processor/Component	Enter the processor of the devices to which this configuration template applies.
Mode	<p>Select the device command line interface (CLI) mode in which the configuration template runs.</p> <div style="background-color: #e0e0e0; padding: 5px; margin: 10px 0;"> <p><b>Note:</b> Commands should not change the CLI prompt or mode. Otherwise, the script will stop running at that command and return an error.</p> </div>
Driver	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• All applicable drivers (the default)</li> <li>• Select specific drivers — Select the driver assigned to the devices to which this configuration template applies. The list includes only drivers that are</li> </ul>

Field	Description/Action
	compatible with the selected mode.
Template	<p>Enter the configuration commands and comments that populate the configuration template. Each line you enter should represent one complete command for the device. After the command, you should see the device's prompt again. When the configuration template is applied to devices, this configuration will be deployed.</p> <p>Keep in mind that variable names cannot begin with tc, but can include any combination of uppercase alpha, lowercase alpha, 0 through 9, and underscore characters.</p>

## View a Configuration Template Page Fields

To view a specific configuration template:

1. On the menu bar under Devices, select Device Tools and click Configuration Templates. The Configuration Templates page opens.
2. Click the View Details option in the Actions column for the configuration template you want to view. The View Configuration Template page for that template opens.

Field	Description/Action
Edit Template link	Opens the Edit Configuration Template page, where you can create a new configuration template. For more information, see <a href="#">"Creating New Configuration Templates" on page 552</a> .
Text Version link	Opens a text window, where you can view the configuration template as text in a separate browser window. The text would look something like the following:  <pre>sflow destination \$dest_ip_1\$ \$dest_udp_port1\$ sflow destination \$dest_ip_2\$ \$dest_udp_port2\$</pre>
Template link	Opens the Configuration Templates page, where you can view a list of configuration templates sorted by vendor. For more information, see <a href="#">"Viewing Configuration Templates" on page 551</a> .
Comments	Displays comments entered by the configuration template author or edited later. ( <b>Note:</b> The Comments box is hidden unless populated.)
Line	Displays the number of each line in the configuration template.
Template Text	Displays the configuration commands and comments that populate the configuration template.
Name	Displays the name of the configuration template.
Partition	If you have created Partitions for security or business reasons, you can partition configurations for each device in a specific Partition. Keep in mind that you can configure templates to be shared by all devices in all Partitions, as well as for specific devices in specific Partitions. For more information about creating

Field	Description/Action
	partitions, see <a href="#">"Segmenting Devices and Users" on page 142.</a>
Model	Displays the model of the devices to which this configuration template applies.
Last Modified By	Displays the user or process that last modified the configuration template.
Role	Displays the role of the configuration template. The default roles include: <ul style="list-style-type: none"><li>• Any</li><li>• Core</li><li>• Border</li><li>• Test</li></ul>
Last Modified Date	Displays the date the configuration template was last modified.
Processor/Component	Displays the processor of the devices to which this configuration template applies.
Mode	Displays device command line interface (CLI) mode in which the configuration template runs.
Drivers	Displays the drivers assigned to the devices to which this configuration template applies.

# Chapter 15: Managing Command Scripts

Use the following table to quickly locate information.

Topic	See:
Getting Started	<a href="#">"Getting Started" below</a>
Importing and Exporting Command Scripts and Diagnostics	<a href="#">"Import/Export Scripts/Diagnostics Page Fields" on page 560</a>
Adding & Editing Command Scripts	<a href="#">"Adding Command Scripts" on page 560</a>
Running Command Scripts	<a href="#">"Running Command Scripts" on page 571</a>
Creating Auto-remediation Scripts	<a href="#">"Creating Auto-remediation Scripts" on page 564</a>

## Getting Started

You can define command scripts to run a set of commands on one or multiple active devices. Command scripts are particularly useful for batch actions on a group of devices. For example, you could run a script on the Inventory group to update all devices to match standard policies, such as setting the SNMP trap logging host, NTP server, or a corporate login banner.

The Advanced Scripting feature enables you to run custom scripts written in various command line languages, such as Expect and PERL. Advanced scripting enables the extended capability of conditional logic. Because advanced scripts must support a fully functional Expect engine, external Telnet/SSH clients are called and run in a separate process. For information about the Advanced Scripting feature, see ["Adding Command Scripts" on page 560](#).

**Note:** Language support must be installed to use the Advanced Scripting feature. In addition, you must configure the Administrative Settings to enable it. Support for the Expect language is installed with NA. Windows environments with PERL scripting capability must install PERL (CPAN).

## HPE Operations Orchestration (HPE OO) Flows

To run HPE Operations Orchestration (HPE OO) flows via an advanced command script:

1. Make sure HPE Operations Orchestration Authentication setup is configured correctly. For more information, see ["User Authentication" on page 68](#).
2. Check the Advanced Scripting box and select "Flow" as the language. Advanced scripting instructs NA to use the "Flow" language type. Else, NA tries to interpret the syntax as device syntax, such as IOS.
3. In the Script field, enter `/PAS/services/http/execute/Library/<path to flow>?flowvariable=value,flowvariable2=value2`.

**Note:** You can still use command script variables as needed, and any number of HPE OO flow input variables. For information about using HPE OO, see the *HPE Operations Orchestration Software Development Kit Guide*.

## Bare Metal Provisioning Scripts

Bare metal provisioning scripts enable you to bring a bare metal device to a state that can be accessed by a NA device driver. Creating a bare metal script is the same as creating a standard command script. All custom script variables are available in the bare metal script. However, when creating bare metal scripts, you must:

- Select Bare Metal Script as script type
- Select one of the Bare Metal modes
- Name the command script appropriately, including the device family on which the script is designed to run

**Note:** Although you can use advanced scripting when you select the Bare Metal Script type, it is recommended that you do not select the “advanced script” checkbox.

For detailed information about bare metal provisioning, see ["Edit Device Page Fields" on page 108..](#)

A typical bare metal script scenario would be as follows:

1. Rack mount the device.
2. Setup the console access to the device (or possibly a management IP address).
3. Login to NA.
4. On the menu bar under Devices, select New and click Device. The New Device page opens. For more information about adding devices to NA, see ["Adding Devices" on page 102.](#)
5. Add the device to NA with following information:
  - IP Address
  - Host name
  - Passwords
  - Console address/port (if the device has not been configured with an accessible management IP address)
  - Other appropriate device fields
6. Select a Management Status of Pre-Production.
7. Specify a bare metal driver for this device.
8. Save the device. The Device Details page opens.
9. From the Provision menu, click Run Command Script. The Run Command Script page opens. The page is automatically populated with bare metal script lists. For more information, see ["Running Command Scripts" on page 571.](#)
10. Select a bare metal script that is appropriate to the device and provide the values for the script variables if required.

11. Run the script. If the script succeeds, a Discovery task is automatically scheduled if you have enabled the “Run driver discovery task” option on the Run Command Script page. Note that you can disable this option if needed.
12. If the Discovery task succeeds, the device moves from the bare metal stage to a pre-production device.

Below is a sample bare metal script for a Cisco 2800 device.

```
#scriptvar.carriage_return="\r"
#scriptvar.command_delay="3"
#scriptvar.baremetal_timeout="5"
#scriptvar.success_pattern=/Building configuration/
yes
yes
$tc_device_hostname$
$tc_device_password$
$legacy_enable_password$
$tc_device_enable_password$
no
FastEthernet0/0
yes
no
yes
$tc_device_ip$
$network_mask$
2
```

Keep the following in mind when creating bare metal scripts:

- On top of the bare metal script, you can choose to define some script settings (all optional). These lines always start with #scriptvar.
- Carriage\_returns define the format of the line break that is sent to the device for each command. This can be \r, \n, \r\n, or none (no linebreaks are sent after each command).
- Command\_delays define the wait time (in seconds) before NA sends the next command to device in the script.
- Baremetal\_timeout defines the Expect timeout for the command.
- Success\_patterns define a regular expression pattern. When a valid success pattern is specified, the task will be considered successful only when such a pattern is matched with the device output.

## Viewing Command Scripts

To view a list of predefined and custom command scripts, on the menu bar under Devices, select Device Tools and click Command Scripts. The Command Scripts page opens. The page displays a list of command scripts for which you have permissions. Users with full access to command scripts see a selection of predefined scripts delivered with NA.

## Command Scripts Page Fields

Field	Description/Action
New Command Script link	Opens the New Command Script page, where you can write a new script and pull variables from the script to define prompts. For more information, see <a href="#">"Adding Command Scripts" on the next page</a> .
Run Command Scripts link	Opens the Run Command Script Task page, where you can set up a task to run command scripts. Before saving the task, you can edit variables in the script to create a unique instance of the script. For more information, see <a href="#">"Run Command Script Task Page Fields" on page 284</a> .
Import/Export Commands Scripts link	Opens the Import/Export Command Scripts/Diagnostics page, where you can import a pre-configured command script or export a command script to a file. For more information, see <a href="#">"Import/Export Scripts/Diagnostics Page Fields" on the next page</a> .
Script Type	The Script Type drop-down menu enables you to filter the list of scripts to view only scripts of a specific type.
Check Boxes	You can use the left-side check boxes to delete scripts. Once you have selected the scripts, click the Actions drop-down menu and click Delete. This deletes the selected scripts. The adjacent Select drop-down menu enables you to select or deselect all of the scripts.
Script Name	Displays the name of the script.
Mode / Device Family	Displays the device access mode, such as Cisco Exec or Nortel Manager, in which the script runs. Device Family is used for Advanced Scripting and displays a collection of devices that share a similar configuration CLI command syntax.
Last Modified	Displays the date and time the script was last modified.
Partition	<p>Command script and/or diagnostics can be applicable to a specific Partition. All users can view command scripts and/or diagnostics that are labeled "global" because they are applicable to all Partitions.</p> <div style="background-color: #e0e0e0; padding: 10px; margin-top: 10px;"> <p><b>Note:</b> If the NA Administrator has partitioned devices, you can only view, edit, and run command scripts and/or diagnostics that belong to a specific partition for which you have permission to view. For more information, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p> </div>
Last Modified By	Displays the name of the last user to modify the script. For example, if the script is a script template, this field shows who modified the script for a specific instance.
Actions	<p>You can select one of the following options:</p> <ul style="list-style-type: none"> <li>• Edit — Opens the Edit Command Script page, where you can modify an existing script. For more information, see <a href="#">"Adding Command Scripts" on the next page</a>.</li> <li>• Run — Opens the Run Command Script Task page, where you can run the command script. For more information, see <a href="#">"Running Command Scripts" on page 571</a>.</li> </ul>

## Import/Export Scripts/Diagnostics Page Fields

When you click the Import/Export Commands Scripts link on the Command Scripts page, the Import/Export Scripts/Diagnostics page opens.

Field	Description/Action
Import	<p>The import options.</p> <ul style="list-style-type: none"><li>To import a command script or diagnostic from a non-driver source, select <b>Import from file</b>, and then enter the file name or click <b>Browse</b>.</li><li>To import a command script or diagnostic from an NA-provided device driver, select <b>Import from driver</b>, and then select from the list of drivers that contain custom content.</li></ul> <p>Click <b>Import</b>, select the scripts to import, and then click <b>Continue</b>. If the command script or diagnostic script already exists, you are prompted to rename it.</p>
Export Scripts/Diagnostics	<p>A list of the current command scripts and diagnostic scripts.</p> <ul style="list-style-type: none"><li>Select the check box for each command script to export. To export all command scripts, select the <b>All command scripts</b> check box.</li><li>Select the check box for each diagnostic script to export. To export all diagnostics, select the <b>All diagnostic scripts</b> check box.</li></ul> <p>Select the scripts to export, click <b>Export</b>, and then specify the name and location of the export file.</p>

## Adding Command Scripts

Command scripts enable you to:

- Run a custom set of commands on one or more devices.
- Run scripts as a scheduled task, and use event rules to trigger scripts to run. For example, you could set a rule to configure standard settings on a particular device type whenever a device of that type is added.

NA provides several options for adding scripts. You can:

- Write or copy a script into the New Command Script page, adding variables or defining prompts as needed.
- Create template scripts that enable users to edit variable values before running a script. For more information, see ["Creating a Script from a Configuration Template" on page 571](#).
- Convert a session log to an Expect or Perl script. Because NA installs Expect, the Convert to Expect script link is automatically available. The Convert to Perl script link is only displayed if Perl is configured as a scripting language in the Administrative Settings. For more information, see ["Server" on page 42](#). Keep in mind that the Convert to Perl script link requires the *Opware::NA::Connect Perl* module that is installed when NA is installed.

NA supports both simple and advanced scripting.

Simple scripting is mode-based (CLI command language). Keep in mind that simple command scripts do not recognize device CLI errors. Consequently, NA assumes the device CLI commands executed were successful. A simple command script only fails if it cannot reach the device or it loses connection to the device during the execution of the script.



Advanced scripting is based on any command line scripting language, such as Expect or PERL, including scripts that contain conditional logic (*if*, *while*, and *for* conditions). You can customize instances of a script by including variables. When you run the script, you are prompted for a value for each variable. Refer to the following table for additional details.

**Note:** Character '\$' is reserved for the variable name. Use escape sequence `\x24` if you need to enter a literal '\$' in a script.

Simple Scripts	Advanced Scripts
<ul style="list-style-type: none"><li>• No if or loops</li><li>• Uses device command (Cisco commands like <i>show conf</i>)</li><li>• No error handling</li><li>• No login required</li><li>• No NA device variables</li></ul>	<ul style="list-style-type: none"><li>• If and loops permitted</li><li>• Uses language commands (PERL or Expect commands such as <code>send "show conf\n"</code> or <code>print SOCKET "show conf\n"</code>)</li><li>• Can handle errors</li><li>• Requires code to login</li><li>• Can access NA device variables</li></ul>

You can use scripts to perform the same task on different types of devices by creating multiple scripts with the same name so that all scripts by that name run as a single task. (The devices must be configured as a device group.) When you run the script, you see every instance of the script that applies to any device in the group. For example, you could run a script to change the NTP server on all your routers, even if the routers are from different vendors. When running multiple scripts of the same name, you can edit each instance of the script.

To add a new command script:

1. On the menu bar under Devices, select Device Tools and click Command Scripts. The Command Scripts page opens.
2. Click the New Command Script link at the top of the page. The New Command Script page opens. Be sure to click Save Script when you are finished. When the script is saved successfully, the Command Scripts page opens. The script you added appears in the list and is highlighted. Keep in mind that a script does not run until you schedule it as a task.

**Note:** Variables beginning with "tc\_" are reserved for special use. You cannot define any variables in custom or advanced scripts that begin with this character sequence.

### New Command Script Page Fields

Command scripts enable you to:

- Run a custom set of commands on one or more devices.
- Run scripts as a scheduled task, and to use event rules to trigger scripts to run. For example, you could set a rule to configure standard settings on a particular device type whenever a device of that type is added.

When you create a command script, you can define your own custom variables, such as `$MyVar$`. Custom variables are displayed as user-supplied variables on the Run Command Script Task page.

If you would rather have custom variables supplied in a CSV file, you can replace the existing scriptField1, scriptField2, and so on headers with the custom variables from your script. As a result, when you go to run the command script, any custom variables in the script (also referenced in the CSV file) are noted in the Run Command Script Task page's Task Options/Variables field as Provided in the CSV data file.

Any custom variables defined in the script, but not referenced in the CSV file, are displayed for user input. For more information, see ["Run Command Script Task Page Fields" on page 284](#).

Field	Description/Action
Command Scripts link	Opens the Command Scripts page, where you can view the list of command scripts. For more information, see <a href="#">"Command Scripts Page Fields" on page 559</a> .
Name	Enter the name of the new script.
Description	Enter a description of the script, for example whether it was created from a template and who created it.
Partition	<p>Scripts and/or diagnostics can be applicable to a specific Partition or globally. All users can view scripts and/or diagnostics that are labeled "global" because they are applicable to all Partitions. You can select a specific Partition from the drop-down menu.</p> <p><b>Note:</b> If the NA Administrator has partitioned devices, you can only view, edit, and run scripts and/or diagnostics that belong to a specific partition for which you have permission to view. For more information about segmenting devices and users, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p>
Script Type	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• General Purpose (the default)</li> <li>• Existing — Select a script from the drop-down menu.</li> <li>• New — Enter a new script type.</li> </ul>
Advanced Scripting	<p>If checked, the page is refreshed to provide settings specific to custom scripts written in command line languages such as Expect and PERL. Advanced Scripting specific fields include:</p> <ul style="list-style-type: none"> <li>• Device Family — A device family is a collection of devices that share a similar configuration CLI command syntax. Select a device family. This restricts the script to run against those devices whose driver is in the selected device family. This feature enables you to assign one name to multiple implementations of a script created for different devices so that they can run as a single task.</li> <li>• Language — Select the scripting language in which the script you are adding is written. You must install language support and configure the language in Administrative Settings/Server/Advanced Scripting to use this feature. Options include Expect, Perl, and Flow.</li> </ul> <p><b>Note:</b> Expect support is installed with NA, but you must still configure the path.</p> <p>For information about Flow, see <a href="#">"HPE Operations Orchestration (HPE OO)" on page 74</a>.</p> <ul style="list-style-type: none"> <li>• Parameters — Enter the authentication parameters for the script. You can include NA or your own custom variables.</li> </ul>

Field	Description/Action
	<p><b>Note:</b> Using parameters for authentication is recommended as this strategy reduces the security risk of having passwords written to a file.</p> <ul style="list-style-type: none"> <li>• Script — Advanced Scripting commands can contain conditional logic and include predefined variables. Variable names can only contain letters, numerals and underscores (_). The required format is the variable name between two dollar signs (\$), as illustrated in these examples: \$report\$, \$my_address\$, \$port_3_ip\$. Advanced scripts must include any code required to connect and log in to the device. For example, you can connect to \$tc_device_ip\$ and log in using \$tc_device_password\$.</li> <li>• Device variables link — Displays a list of device variables available for use in your advanced custom scripts. These variables always begin with \$tc_ and the names are case sensitive. (You can also create your own variables.)</li> <li>• Pull Variables button — Refreshes the page, adding input fields at the bottom of the page for each variable used in the script. Use these fields to define custom prompts for the variables and to limit the values that each prompt will accept. You can select the following options for each variable:           <ul style="list-style-type: none"> <li>- allow multiple lines in value</li> <li>- Limit Values To: (first,last,next-to-last)</li> <li>- Password (If checked, NA does not echo the password when prompting for a value on the Run Command Script Task page.</li> </ul> </li> </ul>
Mode	Select the device access mode, such as Cisco Exec or Nortel Manager.
Driver	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• All applicable drivers (the default)</li> <li>• Select specific drivers — If selecting one or more drivers from the list, you can click one driver or use Shift+click or Ctrl+click to select multiple drivers.</li> </ul> <p><b>Note:</b> Devices that are menu driven, such as the Baystack 470, cannot be accessed by custom scripts.</p>
Script	<p>Enter the device-specific commands to send to the device, or paste in and edit an existing script. Refer to the help information on the Command Script page regarding how commands must be entered.</p> <p><b>Note:</b> Variable names cannot begin with tc_ (reserved for NA), but can include any combination of uppercase alpha, lowercase alpha, 0 through 9, and underscore characters.</p>
Pull Variables button	<p>Refreshes the page, adding input fields at the bottom of the page for each variable used in the script. Use these fields to define custom prompts for the variables and to limit the values that each prompt will accept. Sample fields include:</p> <ul style="list-style-type: none"> <li>• HOSTNAME</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>ETH_SLOT1</li> </ul> <p>Enter the custom prompt you want the user to respond to when this script runs, and the response values you want this prompt to accept. Values must be separated by commas, so you cannot use values that include commas. If you specify multiple values, when the user sees the prompt, a list of accepted values is provided in the prompt dialog.</p>

You can restrict the access to command scripts by associating them with Partition. For more information about securing access to command scripts, contact Support.

## Creating Auto-remediation Scripts

An Auto-remediation script enables you to define variables in the script that reference data from regular expression pattern groups in a violated policy rule. Auto-remediation variables can also be used with non-regular expression patterns.

Auto-remediation scripts are different from standard command scripts. Given the possibility of complex policy definitions, Auto-remediation scripts must have basic language constructs, such as `for`-loop and `if`-statements, requiring a pre-processing step to generate the actual command script to run on a device.

Auto-remediation scripts include syntax to enable you to iterate over matches. The Auto-remediation script is converted to a command script with regular expression variable substitutions. The template processor (command script generator) parses and generates an executable command script, which is then run by the Auto-remediation task.

To add a new Auto-remediation script, see ["New Rule Page Fields" on page 416](#).

## Auto-remediation Script Syntax

NA includes new Auto-remediation script syntax to be able to access violation data. The following table describes the scripting language elements used in Auto-remediation scripts.

Language Element	Description
<code>@foreach</code>	Loop syntax to iterate over matched lines.
<code>@ifexists</code>	Control syntax to test whether a variable has a match.
<code>@end</code>	Indicates the end of <code>@foreach</code> or <code>@ifexists</code> .
<code>\$loop_variable\$</code>	Any variable name that you want to use to iterate over matches of a regular expression pattern line in a condition.
<code>\$line_match_variable\$</code>	Represents an array of configuration lines that are matched for a regular expression pattern line of a condition. For example, configuration lines matched for first line of Condition A: <code>\$condition_A_line_1\$</code> .

Language Element	Description
<code>\$regex_group_match_variable\$</code>	Represents the text that is matched for a regex group.
@	The prefix for Auto-remediation language elements so as to distinguish them from device commands.
//	The prefix to comment out a line in an Auto-remediation script.

## Auto-remediation Script Variable Naming Conventions

The following table describes the Auto-remediation script naming conventions.

Variable	Naming Convention	Example
Loop	<code>\$any_string\$</code>	<code>\$interface\$</code> — Each config line that matches a regex pattern.
Pattern line match (that represents matches for a line of a regex pattern)	<code>\$condition_&lt;label&gt;_line_&lt;number&gt;\$</code>	<code>\$condition_A_line_2\$</code> — Config lines that match for the second line of Condition A.
Regex group match	<code>\$(loop_variable).regex_group_&lt;number&gt;\$</code>	<code>\$interface.regex_group_1\$</code> — Match for the first regex group in a config line that matched the regex pattern. <ul style="list-style-type: none"> <li>number = 0: whole match</li> <li>number &gt; 0: regex capturing groups</li> </ul>
Block start pattern	<code>\$block_start\$</code>	Built-in variable name for the block start pattern.
Block end pattern	<code>\$block_end\$</code>	Built-in variable name for the block end pattern.

Notes:

- `@foreach $loop_variable$ in $line_match_variable$`, where `$loop_variable$` is used to represent each matched line of `$line_match_variable$`: the array of matches for a line of a regex pattern in a condition. For example, `$condition_A_line_1$` is a match variable that represents all configuration lines that are matched for the first line of Condition A.
- `@ifexists $regex_group_match_variable$`, where the `$regex_group_match_variable$` is used to represent matches for a regular expression group.
- Nested `@foreach` loops are allowed.
- Block start and end patterns are accessed by `$block_start$` and `$block_end$` array variables. (Refer to Example 3 on page 639.)

- Regular expression groups are part of the regular expression patterns that are enclosed in parentheses. For example, pattern `interface (.*)`, `(.*)` is a regular expression group (also called capturing group).
- Violation data is available for “must not contain” and “must contain only” operators. There is no violation data for the “must contain” operator because violations occur when there is no match for a pattern using the “must contain” operator. Keep in mind you can write an Auto-remediation script without any variable references. As a result, no Auto-remediation script syntax elements are used.
- Auto-remediation variables can be used with non-regular expression patterns. As a result, there will be no regular expression group variables; the entire match can be accessed with a group zero variable (for example: `$matching_line.regex_group_0$` where `$matching_line$` is a `@foreach` loop variable).
- The Auto-remediation task runs as a Run Command Script task. However, what is actually run on the device is a command script that is generated by the Auto-remediation script pre-processing engine before the Run Command Script task is scheduled. For more information about running command scripts, see ["Run Command Script Task Page Fields" on page 284](#).
- Auto-remediation scripts must be enabled from the “Configuration Policy Verification” section on the Configuration Management page. For more information, see ["Configuration Management" on page 23](#).

## Auto-remediation Script Examples

### **Example 1: No Violation Data (simplest case)**

The simplest Auto-remediation scripts are used with the “must contain” operator because the results do not produce violation data. As a result, the script does not require any Auto-remediation script syntax.

Assume the following condition (note that the patterns are not regular expressions):

```
Condition A: Config Text
must contain
ntp server 169.243.103.34
ntp server 170.242.62.16
ntp server 170.242.62.17
ntp server 169.243.226.94
```

When the configuration text does not include the lines in the pattern, Condition A is violated. To fix the violation, the following Auto-remediation script inserts the lines into the configuration:

```
Script:
ntp server 169.243.103.34
ntp server 170.242.62.16
ntp server 170.242.62.17
ntp server 169.243.226.94
```

As noted above, there is no need to use Auto-remediation script syntax in the script.

### **Example 2: Violation Data**

The following example illustrates how to use Auto-remediation with violation data references. Note that this is only an example and is not to be used in a real case.

Assume we want to check the following lines in a configuration against the condition given below (which includes two regular expression pattern lines):

```
Configuration text:
...
access-list 139 deny ip host 192.168.139.1 any
access-list 139 deny ip host 192.168.139.2 any
```

```
access-list 139 permit ip any any
```

```
...
```

Condition A: Config Text

must not contain

```
access-list (.* ) deny ip host (.* ) any
access-list (.* ) permit (192\.0\.0\..*)
```

The following lines in the above configuration text will violate the condition:

```
access-list 139 deny ip host 192.168.139.1 any
access-list 139 deny ip host 192.168.139.2 any
```

The two lines will be placed in the `$condition_A_line_1$` array variable because they are matched against the first pattern line of Condition A. The bold-faced text of the matched lines are matched for regular expression groups, and can be referenced with regular expression group match variables.

Auto-remediation variables can only be accessed within a `@foreach` loop. Because each pattern line can possibly match multiple configuration lines, matched lines are iterated within a loop. To access the above two lines that are matched to the first pattern line of Condition A, use the `@foreach` loop syntax:

```
@foreach $matching_line$ in $condition_A_line_1$
...
@end
```

The above line means: Access each matched configuration line that is placed into the array variable (pattern line match variable) of `$condition_A_line_1$` using the `$matching_line$` loop variable.

With the `$matching_line$` loop variable, Auto-remediation scripts can access one matched line in each iteration of the loop. A matched line and its parts for regular expression groups are accessed through the loop variable as follows (in the above `@foreach` loop):

```
$matching_line.regex_group_0$
$matching_line.regex_group_1$
$matching_line.regex_group_2$
```

The variable for group zero (`$matching_line.regex_group_0$`) holds the entire matched configuration line, while others (groups one and two) hold the regular expression groups defined within parentheses. As a result, the values for the variables in the first iteration of the loop are as follows:

```
$matching_line.regex_group_0$: access-list 139 deny ip host 192.168.139.1 any
$matching_line.regex_group_1$: 139
$matching_line.regex_group_2$: 192.168.139.1
```

As an example, assume the following Auto-remediation script corrects the violations:

```
@foreach $matching_line$ in $condition_A_line_1$
no $matching_line.regex_group_0$
access-list 100 permit $matching_line.regex_group_2$ any
@end
```

Each line within the `@foreach` loop is a command to be run on the device. In this example, the first line (`no <line>`) removes a line from the configuration text of the device, while the second line inserts a line into the configuration text of the device.

Note that two variable references are used in the sample Auto-remediation script: `$matching_line.regex_group_0$` and `$matching_line.regex_group_2$`. When this Auto-remediation script is executed by the Policy Manager after a compliance check, the following command script will be generated and scheduled to run on the device:

```
no access-list 139 deny ip host 192.168.139.1 any
access-list 100 permit 192.168.139.1
no access-list 139 deny ip host 192.168.139.2 any
access-list 100 permit 192.168.139.2
```

### **Example 3: Blocks**

Block-based conditions must have nested loops to iterate over the blocks and matches of condition patterns. Assume the following Policy Rule definition includes block start/end patterns and one block text condition:

Configuration text:

```
...
interface Ethernet0/0
description New York LAN Back Bone
ip address 10.16.241.1 255.255.255.224
no ip mroute-cache
half-duplex
!
interface Ethernet0/1
description Chicago LAN Back Bone
ip address 10.1.1.1 255.255.255.252
half-duplex
!
...
```

Block Start: interface (.\*)

Block End: !

Condition A: Config Block

must not contain

```
ip address (10\..*)\s(.*)
```

The @foreach loop used to access the violation data of the above condition looks like:

```
@foreach $matching_line$ in $condition_A_line_1$
no $matching_line.regex_group_0$
@end
```

However, matches for Condition A are organized by blocks. The above @foreach loop does not know which block the \$condition\_A\_line\_1\$ array has matches. As a result, the condition pattern needs to be surrounded by a @foreach loop for the blocks as follows:

```
@foreach $matching_block$ in $block_start$
@foreach $matching_line$ in $condition_A_line_1$
interface $matching_block.regex_group_1$
no $matching_line.regex_group_0$
@end
@end
```

The generated command script is as follows:

```
interface Ethernet0/0
no ip address 10.16.241.1 255.255.255.224
interface Ethernet0/1
no ip address 10.1.1.1 255.255.255.252
```

### **Example 4: Must Contain Only Operator**



The “Must Contain Only” operator has two patterns:

- The first pattern defines what configuration text must be included.
- The second pattern defines what configuration text must not have other than the matches of the first one.

The violation data is generated for the second pattern. For example:

```
Condition A: Config Text
must contain only:
Must contain these lines:
ntp server 169\.243\.103\.34
ntp server 170\.242\.62\.16
ntp server 170\.242\.62\.17
ntp server 169\.243\.226\.94
But must not have any additional lines containing:
ntp server(.*)
```

There are two possible violations:

1. Any lines in the “Must contain these lines” patterns do not match against the configuration text. In this case, there is no violation data produced since the violation is due to the absence of the desired lines.
2. Any configuration text line that matches the `ntp server(.*)` pattern does not match any lines in the “Must contain these lines” patterns. In this case, there is violation data. It can be accessed via `$condition_A_line_1$` array variable.

An Auto-remediation script to correct possible violations might look like the following:

```
ntp server 169.243.103.34
ntp server 170.242.62.16
ntp server 170.242.62.17
ntp server 169.243.226.94

@foreach $matching_line$ in $condition_A_line_1$
  no ntp server $matching_line.regex_group_1$
@end
```

The first four lines ensure that the configuration text has the lines defined in the “Must contain these lines” patterns. The `@foreach` loop is to remove any lines that match the `ntp server(.*)` that caused a violation.

### **Example 5: @ifexists statement**

A regular expression can include groups that might not have any matching text. As a result, variables that reference these groups might have no stored values, for example:

```
logging ((10\.1\..*)|(172\.1\..*))
```

Regular expression groups:

```
Group 0: logging ((10\.1\..*)|(172\.1\..*))
Group 1: ((10\.1\..*)|(172\.1\..*))
Group 2: (10\.1\..*)
Group 3: (172\.1\..*)
```

One of the regular expressions capturing groups for the IP Addresses for Group 2 or 3 will not have any value.

Assume we have the following condition with the above regular expression pattern:

```
Condition A: Config Text
must not contain
logging ((10\.1\..*)|(172\.1\..*))
```

An Auto-remediation script to access the violation data above must use the `@ifexists` statement to test whether there is any violation data available for the capturing group variables for Groups 2 and 3. Otherwise, no command script is generated when the Auto-remediation script tries to access a capturing group variable that does not have any value.

The Auto-remediation script will look like the following:

```
@foreach $matching_line$ in $condition_A_line_1$
  @ifexists $matching_line.regex_group_2$
  no logging $matching_line.regex_group_2$
  @end
  @ifexists $matching_line.regex_group_3$
  no logging $matching_line.regex_group_3$
  @end
@end
```

### **Example 6: Multiple Conditions**

The following example illustrates multiple conditions.

```
Block Start: interface (.*
Block End: !
```

```
Condition A: Config Block
must not contain
ip address (10\..*)\s(.*
```

```
Condition B: Config Text
must contain only:
Must contain these lines:
ntp server 169\.243\.103\.34
ntp server 170\.242\.62\.16
ntp server 170\.242\.62\.17
ntp server 169\.243\.226\.94
```

```
But must not have any additional lines containing:
ntp server(.*
```

```
Logic: A AND B
```

The Auto-remediation script will look like the following:

```
@foreach $matching_block$ in $block_start$
  @foreach $matching_line$ in $condition_A_line_1$
  interface $matching_block.regex_group_1$
  no $matching_line.regex_group_0$
  @end
@end

ntp server 169.243.103.34
ntp server 170.242.62.16
ntp server 170.242.62.17
ntp server 169.243.226.94

@foreach $matching_line$ in $condition_B_line_1$
```

```
no ntp server $matching_line.regex_group_1$  
@end
```

## Running Command Scripts

Your ability to run and to edit instances of command scripts is restricted by your permissions. Only the Administrator, Full Access, and Power users (who have the Modify Device permission) can run the scripts.

You can set up a script to run once, periodically based on a user-defined interval, or as a recurring task. In addition, you can schedule the task to start at a specific time or as soon as possible. Keep in mind that you can edit the script and supply values for variables before running it.

To run a script from the Command Scripts page:

1. On the menu bar under Devices, select Device Tools and click Command Scripts. The Command Scripts page opens.
2. Select the name of the script you want to run.
3. In the Action column, click Run. The Run Command Script Task page opens. For more information, see ["Run Command Script Task Page Fields" on page 284](#).

**Note:** You can also run a command script from the Tasks menu.

## Creating a Script from a Configuration Template

To create a script from a configuration template:

1. On the menu bar under Devices, select Device Tools and click Configuration Templates. The Configuration Templates page opens. For more information, see ["Viewing Configuration Templates" on page 551](#).
2. Click the vendor link. The Configuration Templates page for that vendor opens.
3. Select the configuration template to include in your script and click Update Script.
4. Edit the script, if necessary, and click the Create Script button to create a script that can be deployed to the device. The Save Script from Template page opens.
5. Edit the Name, Description, and any other fields. Keep in mind that variable names cannot begin with "tc\_". However, they can include any combination of uppercase alpha, lowercase alpha, 0 through 9, and underscore characters.
6. Click Save Script. The Command Scripts page opens. The new script is highlighted.

# Chapter 16: Managing Change Plans

Use the following table to locate information:

Topic	See:
Getting Started	<a href="#">"Getting Started" below</a>
Viewing Change Plans	<a href="#">"Viewing Change Plans" on the next page</a>
Adding or Editing Change Plans	<a href="#">"Adding or Modifying a Change Plan" on page 574</a>

## Getting Started

You can define a change plan that executes a script on one or more devices after successful validation of predefined conditions. Based on the current state of a device, you can decide whether or not to make any changes to the device. To get the current state of a device, you can define three types of conditions. They are as follows:

- Diagnostic
- Device Attribute
- Device Groups

For more information about defining conditions, see ["New Condition Page Fields" on page 576](#).

After you define a condition, you can define a pre-change boolean expression that evaluates the condition and decides if the change should be executed on the device. Though this is optional, note that if you do not define a pre-change boolean expression, a condition is neither evaluated nor executed.

Among the conditions used in the pre-change boolean expression, the device group condition is evaluated first. It is followed by the evaluation of the device attribute condition, and then the diagnostic condition.

You can also define the change that needs to be executed on a device. A change script is a command script that runs a custom set of commands on one or more devices. For more information about adding a new change script, see ["Adding or Modifying a New Change Script" on page 579](#).

After a change plan is created successfully, you can deploy it on one or more devices.

**Note:** While creating a change plan using CLI, you cannot create a new diagnostic condition or a new change script. You must refer to an existing diagnostic condition or a change script that is created using the NA web user interface. For more information, see the *Defining Change Conditions Using XML* chapter of the *NA Administration Guide*.

# Viewing Change Plans

To view the list of defined change plans, on the menu bar under Devices, select Device Tools and click Change Plans. The Change Plans page opens. The page displays a list of change plans for which you have permissions. For information about the fields that appear on the Change Plans page, see "[Change Plans Page Fields](#)" below.

## Change Plans Page Fields

Field	Description/Action
New Change Plan Link	Opens the New Change Plan page, where you can create a new change plan to execute scripts on one or more devices after successful validation of predefined conditions. For more information, see " <a href="#">Adding or Modifying a Change Plan</a> " on the next page.
Deploy Change Plans Link	Opens the New Task/Template - Deploy Change Plan page. For more information, see " <a href="#">Deploy Change Plan Task Page Fields</a> " on page 296.
Check Boxes	You can use the left-side check boxes to delete a change plan. After selecting the change plans, click the Actions drop-down menu and click Delete. This deletes the selected change plans. The adjacent Select drop-down menu enables you to select or deselect all of the change plans.
Name	Displays the name of the change plan.
Device Family	Displays the device family of the change plan.
Partition	A change plan can be applicable to a specific Partition. All users can view change plans that are labeled [Shared] because they are applicable to all Partitions.  <b>Note:</b> If the NA Administrator has partitioned devices, you can only view and edit change plans that belong to a specific partition for which you have permission. For more information, see " <a href="#">Segmenting Devices and Users</a> " on page 142.
Last Modified Date	Displays the date and time the change plan was last modified.
Actions	You can select one of the following options: <ul style="list-style-type: none"><li>• Edit — Opens the Edit Change Plan page, where you can modify an existing change plan. For more information, see "<a href="#">Adding or Modifying a Change Plan</a>" on the next page.</li><li>• Deploy — Opens the New task/Temppla - Deploy Change Plan page, where you can run the Deploy Change Plan task.</li></ul>

# Adding or Modifying a Change Plan

To add a new change plan, follow these steps:

1. On the Change Plan page, click the New Change Plan link . The New Change Plan page opens.
2. Enter the required details in the fields that appear on the page. The following table describes the fields that appear on the New Change Plan page:

Field	Description/Action
Change Plans	Opens the Change Plans page. For more information, see " <a href="#">Change Plans Page Fields</a> " on the previous page.
Name	<p>Enter the name of the new change plan.</p> <p><b>Note:</b> You can create multiple change plans with the same name provided that the device family is different. That is, you cannot create two change plans with the same name for the same device family.</p> <p><b>Note:</b> A change plan and a command script cannot have the same name.</p>
Description	Enter a description of the change plan, such as who created it.
Partition	<p>Change plans can be applicable to a specific Partition. All users can view change plans that are labeled [Shared] because they are applicable to all Partitions.</p> <p><b>Note:</b> If the NA Administrator has partitioned devices, you can only view, edit, and run scripts and/or diagnostics that belong to a specific partition for which you have permission to view. For more information about segmenting devices and users, see "<a href="#">Segmenting Devices and Users</a>" on page 142.</p> <p><b>Note:</b> This field is disabled when you are modifying a change plan. If you want to modify the partition, you must delete the condition and the change script.</p>
Device Family	<p>Select the name of the device family on which the change plan runs. A device family is a collection of devices that share a similar configuration command syntax.</p> <p><b>Note:</b> This field is disabled when you are modifying a change plan. If you want to modify the device family, you must delete the condition and the change script.</p>

Field	Description/Action
<b>Define Conditions</b>	
Add Condition	<p>Select the type of condition from the following options:</p> <ul style="list-style-type: none"> <li>• Diagnostic - If selected, opens the New Condition page with the options to add the type of diagnostic data.</li> <li>• Device Attribute - If selected, opens the New Condition page with the options to add the device attribute criteria based on the device access mode selected.</li> <li>• Device Groups - If selected, opens the New Condition page with the options to add the group to which the selected device belongs.</li> </ul> <p>For more information about the fields that appear on the New Condition page, see "<a href="#">New Condition Page Fields</a>" on the next page.</p>
<b>After you define and save conditions, the New Change Plan page gets refreshed to list the following details of the newly-added conditions:</b>	
Label	Displays the label of the condition.
Name	Displays the name of the condition.
Operator	Displays the operator that is selected to define the output of the condition.
Value	Displays the value that is selected to define the output of the condition.
Mode / Device Family	This field appears only if you have defined a diagnostic condition. Displays the device access mode in which the condition runs. Device Family is used for Advanced Scripting and displays a collection of devices that share a similar configuration command syntax.
Type	Displays the condition type.
Actions	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Edit - To modify the selected condition.</li> <li>• Delete - To delete the selected condition.</li> </ul>
<b>Validation</b> - This field appears only after you define a condition.	
Pre-Change Boolean Expression	<p>Specify a boolean expression for the change plan. Each condition that is defined, is assigned with a label that can be used to specify the expression. If a label is not used in the boolean expression, the condition is neither evaluated nor executed.</p> <p>AND, OR, and NOT are the boolean operators that are allowed to define an expression. Note that you can use NOT only with AND/OR, or at the beginning of an expression followed by a label. You can also use parenthesis to specify an expression for validation.</p>

Field	Description/Action
	<p>Examples:</p> <ol style="list-style-type: none"> <li>For an available set of labels of A, B, and C, you can specify the following expression: A AND B AND C</li> <li>If you want to use NOT, with an available set of labels of A, B, and C, you can specify expressions as follows:               <ul style="list-style-type: none"> <li>○ (A and NOT C)                   <div style="background-color: #e0e0e0; padding: 5px; margin-top: 5px;"><b>Note:</b> Here, you cannot specify it as (A NOT C).</div> </li> <li>○ NOT C                   <div style="background-color: #e0e0e0; padding: 5px; margin-top: 5px;"><b>Note:</b> This is an example of an expression that can start with the NOT operator.</div> </li> </ul> </li> </ol>
<b>Change</b>	
Add Change Script Button	Click this button to add a new change script. The New Change Script page opens. For more information, see <a href="#">"Adding or Modifying a New Change Script" on page 579</a> .

- Click **Save Plan**. After the change plan is saved, the Change Plans page opens. The change plan that you added appears in the list and is highlighted.

## New Condition Page Fields

Based on the condition that you select on the New Change Plan page, the New Condition page displays fields for the following:

- ["Diagnostic Data" below](#)
- ["Select Device Attribute" on page 578](#)
- ["Add a Device Group" on page 579](#)

### Diagnostic Data

If you select the Any Device Family option on the New Change Plan page, you can create only an advanced diagnostic condition.

The following table describes the fields that appear to enter the details of the diagnostic data:

Field	Description/Action
Diagnostic Selection	<p>Select the type of diagnostic data that the change plan can check before running the commands on one or multiple active devices.</p> <p>Select a new or an existing diagnostic data. The existing diagnostic data is displayed based on the partition and the device family that you selected on the New Change Plan page.</p>



Field	Description/Action
	<p>If you select an existing data, the following options appear:</p> <ul style="list-style-type: none"> <li>• Copy Diagnostic - Select this option to create a new diagnostic data by modifying the data of the selected diagnostic.</li> <li>• Reference Diagnostic - Select this option to use the selected diagnostic to create the new condition, which means that you cannot modify the existing data.</li> </ul> <p><b>Note:</b> After you create a condition using the reference diagnostic option, if the device family or partition of the diagnostic is modified on the "<a href="#">Diagnostics Page Fields</a>" on <a href="#">page 541</a>, NA skips the deploy change plan task for the change plan created with this condition. In such cases, you must delete and recreate the change condition.</p>
Name	Enter the name of the condition.
Description	Enter a description of the condition, such as who created it.
Advance Scripting	<p>If checked, the page is refreshed to provide settings specific to custom scripts written in command line languages such as Expect and PERL. Advanced Scripting specific fields include:</p> <ul style="list-style-type: none"> <li>• Language — Select the language in which the script was written..</li> <li>• Parameters — Enter the parameters for the scripts.</li> </ul> <p><b>Note:</b> Using parameters for authentication is recommended as this strategy reduces the security risk of having passwords written to a file.</p>
Mode	Select the device access mode, such as Cisco Exec or Nortel Manager.
Driver	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• All applicable drivers (the default)</li> <li>• Select specific drivers — If selecting one or more drivers from the list, you can click one driver or use Shift+click or Ctrl+click to select multiple drivers.</li> </ul> <p><b>Note:</b> Devices that are menu driven, such as the Baystack 470, cannot be accessed by custom scripts.</p>
Script	Enter the specific commands to send to the device, or paste in and edit an existing script. Refer to the help information on the Command Script page regarding how commands must be entered.
Diagnostic Output	<p>You can use one of the following operators to compare the result of the diagnostic:</p> <ul style="list-style-type: none"> <li>• contains</li> <li>• does not contain</li> <li>• equals</li> <li>• does not equal</li> </ul>

Field	Description/Action
	<ul style="list-style-type: none"> <li>• is less than - Make sure that you enter a positive number for this operator.</li> <li>• is greater than - Make sure that you enter a positive number for this operator.</li> <li>• between - Enter it as a range (in the number-number format). For example, 10-200. Make sure that you enter only positive numbers in the range.</li> <li>• contains (regexp)</li> <li>• does not contain (regexp)</li> </ul> <p><b>Note:</b> The value of a diagnostic output cannot exceed 255 characters.</p> <p><b>Note:</b> For a regexp operator, the output is based on Java expressions. Make sure that it is a complete pattern match. Match groups are not supported.</p>

After you enter the required details, click **Save Condition**. However, if you want to add another diagnostic type data, click **Save And Add Another**.

**Note:** The newly-created diagnostic condition is listed on the Diagnostics page (Device > Device Tools > Diagnostics). However, the condition is not editable. Also, the condition is not listed on the Import/Export Scripts/Diagnostics (Device > Device Tools > Diagnostics > Import/Export Diagnostics) page.

### Select Device Attribute

You can define a device attribute that the change plan can check before running the commands on one or multiple active devices.

The following table describes the fields that appear to define a device attribute:

Field	Description/Action
Select Device Attribute	<p>Lists the attributes that belong to devices. After you select an attribute, the corresponding operators are displayed. For example, if you select 'Comments' as the attribute, the following operators appear:</p> <ul style="list-style-type: none"> <li>• contains</li> <li>• does not contain</li> <li>• contains (regexp)</li> <li>• does not contain (regexp)</li> </ul> <p>Select an operator to define the value.</p> <p><b>Note:</b> The value cannot exceed 255 characters.</p> <p><b>Note:</b> For a regexp operator, the result is based on the database regular expression query, as done for a device or a dynamic device group search.</p>

Field	Description/Action
	<p><b>Note:</b> After you create a condition with a policy or a policy rule as an attribute, if the policy or the policy rule is deleted on the Policy List page, you must recreate the condition.</p>

After you select the criteria, click **Save Condition**. However, if you want to add another criteria, click **Save And Add Another**.

### Add a Device Group

The following field appears to enable you to add a device group:

Field	Description/Action
Device belongs to group	<p>Displays the operators and the device groups.</p> <p><b>Note:</b> Private groups are not displayed as options while creating a device group condition.</p> <p>Select an operator, and then select one or more device groups. Operators include:</p> <ul style="list-style-type: none"> <li>• Any of selected groups (the default)</li> <li>• All of selected groups</li> <li>• None of selected groups</li> </ul> <p><b>Note:</b> The value cannot exceed 255 characters.</p> <p><b>Note:</b> If a device group that belongs to a condition is deleted from the Device Group page, you must recreate the condition.</p>

After you enter the required details, click **Save Condition**. However, if you want to add another device group filter, click **Save And Add Another**.

## Adding or Modifying a New Change Script

Use the New Change Script page to add a new change script that can be executed based on the boolean expression evaluation results. After you enter the required details, save the script. However, note that a change script is not listed on the Command Scripts (Device > Device Tools > Command Scripts) page.

If you select the Any Device Family option on the New Change Plan page, you can create only an advanced change script.

The following table lists the fields that appear on this page:

Field	Description/Action
Change	Select a new or an existing change script. The existing data is displayed based on the

Field	Description/Action
Script Selection	<p>partition and the device family that you selected on the New Change Plan page.</p> <p>If you select an existing script, the following options appear:</p> <ul style="list-style-type: none"> <li>• Copy - Select this to create a new Change Script by modifying the selected script.</li> <li>• Reference - Select this to create a new Change Script from the the selected script, which means that you cannot modify the existing data.</li> </ul> <p><b>Note:</b> After you create a change script using the reference option, if the command script is modified on the "<a href="#">Command Scripts Page Fields</a>" on page 559, NA skips the deploy change plan task for the change plan created with this change script. In such cases, you must delete and recreate the change script.</p>
Name	Enter the name of the new change script.
Description	Enter a description of the change script, such as who created it.
Script Type	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• General Purpose (the default)</li> <li>• Existing — Select a script from the drop-down menu.</li> <li>• New — Enter a new script type.</li> </ul>
Advanced Scripting	<p>If checked, the page is refreshed to provide settings specific to custom scripts written in command line languages such as Expect and PERL. Advanced Scripting specific fields include:</p> <ul style="list-style-type: none"> <li>• Language — Select the language in which the script was written.</li> <li>• Parameters — Enter the parameters for the script.</li> </ul> <p><b>Note:</b> Using parameters for authentication is recommended as this strategy reduces the security risk of having passwords written to a file.</p>
Mode	Select the device access mode, such as Cisco Exec or Nortel Manager.
Driver	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• All applicable drivers (the default)</li> <li>• Select specific drivers — If selecting one or more drivers from the list, you can click one driver or use Shift+click or Ctrl+click to select multiple drivers.</li> </ul> <p><b>Note:</b> Devices that are menu driven, such as the Baystack 470, cannot be accessed by custom scripts.</p>
Script Text	Enter the device-specific commands to send to the device, or paste in and edit an existing script. Refer to the help information on the page regarding how commands must be entered.

Field	Description/Action
	<p><b>Note:</b> Variable names cannot begin with tc_ (reserved for NA), but can include any combination of uppercase alpha, lowercase alpha, 0 through 9, and underscore characters.</p>
Variables	<p>Displays the following:</p> <ul style="list-style-type: none"><li>• Pull Variables button — Refreshes the page, adding input fields at the bottom of the page for each variable used in the script. Use these fields to define custom prompts for the variables and to limit the values that each prompt will accept. You can select the following options for each variable:<ul style="list-style-type: none"><li>- allow multiple lines in value</li><li>- Limit Values To: (first,last,next-to-last)</li><li>- Password (If checked, NA does not echo the password when prompting for a value on the Deploy Change Plan Task page.)</li></ul></li><li>• Device variables link — Displays a list of device variables available for use in your advanced custom scripts. These variables always begin with \$tc_ and the names are case sensitive. (You can also create your own variables.)</li></ul>

# Chapter 17: Reports

HPE Network Automation (NA) offers both default reports that require no input and ad-hoc reports. Default reports include:

- User and System Reports
- Dashboard reports
- Summary reports
- Best Practices reports
- Network Status reports
- Configuration reports
- Device Status reports
- Software Vulnerability reports
- Task/Job reports
- Telnet/SSH User Session Log reports
- Compliance Center reports

Ad-hoc reports provide flexibility and control to report on data within NA. Ad-hoc reports can be manually or automatically generated based on regular expression criteria for one or more fields. Common ad-hoc reports could include:

- All Cisco devices running 12.\* versions of IOS
- All devices using insecure protocols for configuration management
- All devices with a faulty module
- All configuration changes made over a period of time for a set of devices
- All Telnet/SSH session logs initiated by a specific user
- All device changes that results because of an approval override
- All ACLs that deny traffic on specific ports

## User & System Reports

The User & System reports are the results of searches you defined and saved using the Search capabilities. Only searches that you defined appear in the list of User reports.

For information about performing searches, see ["Performing Searches" on page 458](#).

Each report includes a summary of the criteria used in the search. Your saved searches are accessible only by your user account.

**Note:** If you have not run and saved any searches, no user reports are available.

**Note:** User reports created using the following criteria are available only with the NA Ultimate edition license:

- Search for Policies
- Search for Compliance
- Search for Task > Check Policy Compliance task type

System reports on predefined queries. They are generated when you select the report. Each report includes a summary of the criteria used in the search. The System reports include:

Configuration	<ul style="list-style-type: none"> <li>• All changes made in the last 12 hours</li> <li>• All changes made in the last 24 hours</li> <li>• All changes made in the last 48 hours</li> <li>• All changes made in the last week</li> <li>• All changes made in the last month</li> <li>• All changes made by myself in the last 48 hours</li> </ul>
Policy Events	<p>Policy rule violations in the past 24 hours.</p> <div style="background-color: #e0e0e0; padding: 5px;"> <p><b>Note:</b> The HPE Network Automation Premium edition license does not include this criteria. It is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page (<b>Help &gt; About Network Automation &gt; View License Information</b> link).</p> </div>
Devices	<ul style="list-style-type: none"> <li>• All devices changed in the last 24 hours</li> <li>• All devices changed in the last week</li> <li>• All devices with access failures</li> <li>• All inactive devices (Note: Rather than deleting inactive devices, you can specify them as inactive so as to retain the configuration history.)</li> <li>• All duplicate IP addresses</li> <li>• All devices without driver assigned</li> <li>• All devices with driver assigned but no configuration stored</li> <li>• All devices with different startup and running configurations</li> </ul>
Duplicate IP	<p>All duplicate IP addresses — This report displays which devices have interfaces that are configured with the same IP address. However, it does not remove the IP address that is causing the duplicate detection.</p> <p>The IP type is either how the IP address was added or how it is used. The values for this column are:</p> <ul style="list-style-type: none"> <li>• 1 — Manual (A manually added IP address.)</li> <li>• 2 — NAT (Network Address Translation, user-defined NATed IP address.)</li> <li>• 3 — Primary on Port (Primary IP address for a port.)</li> <li>• 4 — Secondary on Port (Secondary IP address for a port.)</li> </ul>

	<ul style="list-style-type: none"> <li>• 5 — TFTP to Device (IP address to access a device via TFTP.)</li> <li>• 6 — Primary on Device (Primary IP address used to access the device.)</li> <li>• 7 — Console (IP address for console access to the device.)</li> </ul>
Session	<ul style="list-style-type: none"> <li>• All sessions created in the last 24 hours</li> <li>• All sessions created in the last 48 hours</li> <li>• All sessions created in the last week</li> <li>• All sessions created by myself in the last 48 hours</li> </ul>
Software Levels	<ul style="list-style-type: none"> <li>• Device Software Levels</li> </ul>
Task	<ul style="list-style-type: none"> <li>• All failed, skipped, and duplicate tasks in the last 24 hours</li> <li>• All failed, skipped, and duplicate tasks in the last week</li> </ul>
Other	<ul style="list-style-type: none"> <li>• Best Practices Report</li> <li>• Network Status Report</li> <li>• Device Status Report</li> <li>• COSO Compliance Status - Available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page (<b>Help &gt; About Network Automation &gt; View License Information</b> link).</li> <li>• COBIT Compliance Status - Available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page (<b>Help &gt; About Network Automation &gt; View License Information</b> link).</li> <li>• GLBA Compliance Status - Available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page (<b>Help &gt; About Network Automation &gt; View License Information</b> link).</li> </ul>

To view the User & System reports, on the menu bar under Reports click User & System Reports. The User & System Reports page opens.

### User & System Reports Fields

Field	Description/Action
Type	Displays the type of event or report.
Report	Displays the name of the report, for example Device Status, HIPAA Compliance Status, All inactive devices, and so on. Clicking the report opens the report.
Actions	<p>You can select the following actions:</p> <ul style="list-style-type: none"> <li>• Email Report — Displays the Email Report form where you can create a task to send the output of a report via email. You can specify the recipient. User login is the default. You must save the task to generate the email message.</li> </ul> <p><b>Note:</b> Reports related to policy and compliance are available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License</p>



Field	Description/Action
	<p>Information page (<a href="#">Help &gt; About Network Automation &gt; View License Information</a> link).</p> <ul style="list-style-type: none"><li>• <b>Modify</b> — For User reports, you can click the Modify option for an event. The Search For Events page opens.</li><li>• <b>Mark as System Report</b> — For User reports, you can click the Mark as System Report. The report is moved to the System Reports section.</li><li>• <b>Delete (red X icon)</b> — Permanently deletes the report.</li><li>• <b>Click the Up or Down arrows</b> to move the report up or down in the list.</li></ul>

## Network Status Report

The Network Status Report provides an overview of network configuration, health, and compliance, combined with two independent views of the network:

- Best Practices
- Device Status

The Network Status report delivers proactive reporting capability. By scheduling the report to run as a recurring Email Report task, network administrators and engineers automatically receive up-to-date information that can help eliminate problems before they impact the network. Network Status reports can also provide management with an overview of network operations' effectiveness in resolving policy and software level issues and handling configuration changes.

**Note:** The default configuration for this report is to run against the Inventory device group.

Events are reported based on a three-tiered representation of the risk introduced to the network. The System Administrator sets the threshold for each category and assigns the risk level indicator color to reflect the impact on the network.

- **Red** — High risk, including policy violations, software level violations, and device access failures combined with any other Yellow level event.
- **Yellow** — Moderate risk, including startup and running configuration mismatches and device access failures.
- **Green** — Within threshold or low risk. This is the best practice.

The status of any device group is based on the highest risk condition of any device in the group. The status of the network is based on the highest risk condition of any group in the network.

To view the Network Status report, on the menu bar under Reports, click Network Status. You can run this report on demand using the Run Again button on the report page or schedule the report to run as a task and email it to key network and management staff using the Email Report option. For information about emailing reports, see "[Emailing Reports](#)" on page 610.

### Network Status Report Fields

Field	Description/Action
Best Practices Report link	Opens the Best Practices Report. For more information, see <a href="#">"Best Practices Report" on the next page</a>
Device Status Report link	Opens the Device Status Report. For more information, see <a href="#">"Device Status Report" on page 589</a> .
Report Date	Displays the date and time the report was last run.
Device Groups Reported	Displays the number of reported device groups.
Change Device Groups	Displays a list of currently defined device groups. You can run the Network Status report for a single device group or for multiple devices groups. All other parameters are predefined. Summary and detail information is provided per category for each device group you specify. Click the Run Again button when finished.
Status	Displays the name of the device group and the number of devices in the group.
<b>Device Status</b>	
Device Status	<p>Displays the status level indicator with percentages of issues found. Status levels include:</p> <ul style="list-style-type: none"> <li>• Red — High risk</li> <li>• Yellow — Moderate risk</li> <li>• Green — Low risk</li> </ul> <p>If you click Device Status, the Device Status report opens. For more information, see <a href="#">"Device Status Report" on page 589</a>.</p>
<b>Best Practices Status</b>	
Issue	<p>Displays the five key network issues that NA tracks, including:</p> <ul style="list-style-type: none"> <li>• Policy Rule Violations — Devices that do not comply with one or more defined configuration policies. Move the cursor over the information icon for more information.</li> </ul> <div style="background-color: #e0e0e0; padding: 10px; margin: 10px 0;"> <p><b>Note:</b> This option is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page—<a href="#">Help &gt; About Network Automation &gt; View License Information</a> link.</p> </div> <ul style="list-style-type: none"> <li>• Software Level Violations within 24 hours — Devices that are running non-approved software versions. Move the cursor over the information icon for more information.</li> <li>• Startup vs. Running Configuration Mismatch — Devices with mismatched startup and running configurations. Move the cursor over the information icon for more information.</li> <li>• Device Access Failure — Devices that NA could not reach. Move the cursor over the</li> </ul>

Field	Description/Action
	<p>information icon for more information.</p> <ul style="list-style-type: none"> <li>• Configuration Changes within 24 hours — Device configuration changes detected in the past 24 hours. Move the cursor over the information icon for more information.</li> </ul> <p>Available action links vary for each issue. For example, for all reported Device Access Failures, you can click the link to view the device details View Task option, where you can identify the tasks that failed. For Startup vs. Running Configuration Mismatches, you can click the link to view the Compare Startup with Running option, which shows both configurations with the differences highlighted.</p> <p>If you click Best Practices Status, the Best Practices report opens. For more information, see "<a href="#">Best Practices Report</a>" below.</p>
<b>Network Status Report Details</b>	
High Risk (Red) Issues	<p>Displays summary information for any of the five issues that returned a red status. Available action links vary for each issue. For example:</p> <ul style="list-style-type: none"> <li>• All reported Device Access Failures — Click the link to view the device details View Task option, where you can identify the tasks that failed.</li> <li>• Policy Rule Violations — Click the link to view the Configuration Policy Activity page, where you can view events that show if a device's configuration was not in compliance with the configuration rules contained in one or more configuration policies. The value shown in the Policy Importance column is the highest importance of all configuration rules currently violated by the device.</li> </ul> <div style="background-color: #f0f0f0; padding: 10px; margin: 10px 0;"> <p><b>Note:</b> This option is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page—<b>Help &gt; About Network Automation &gt; View License Information</b> link.</p> </div> <ul style="list-style-type: none"> <li>• Startup vs. Running Configuration Mismatches — Click the link to view the Compare Startup with Running option that shows both configurations. All differences are highlighted.</li> </ul>

## Best Practices Report

Best practices for network management dictate that non-compliance with any of the following issues be carefully monitored:

- Policy Rule Violations within 24 hours (Available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page—**Help > About Network Automation > View License Information** link.)
- Software Level Violations
- Startup vs. Running Configuration Mismatch
- Device Access Failure
- Configuration Changes within 24 hours

NA enables you to define the acceptable level of non-conformance with each of these issues. If the threshold is exceeded, a yellow or red warning is shown depending on the level of non-compliance. NA also displays which devices failed to comply so you can take corrective action.

If all five indicators are green, NA has evaluated your network and determined your network health is good. If some indicators show yellow, you should target those areas for corrective action. If some indicators are red, the issues flagged could represent a critical risk to network stability and should receive immediate attention.

To view the Best Practices report, on the menu bar under Reports click Best Practices. The Best Practices report opens.

**Note:** You can also navigate to the Best Practices report from the Network Status report.

### Best Practices Report Fields

Field	Description/Action
Network Status Report link	Opens the Network Status report. For more information, see <a href="#">"Network Status Report" on page 585</a> .
Device Status Report link	Opens the Best Practices Report. For more information, see <a href="#">"Device Status Report" on the next page</a> .
Report Date	Displays the date and time the report was last run.
Device Groups Reported	Displays the number of reported device groups.
Change Device Groups	Displays a list of currently defined groups. You can run the Best Practices report for a single group or for multiple groups. All other parameters are predefined. Summary and detail information is provided per category for each group you specify. Click the Run Again button when finished.
Status	Displays the name of the group and the number of devices in the group. Status levels include: <ul style="list-style-type: none"> <li>• Red — High risk</li> <li>• Yellow — Moderate risk</li> <li>• Green — Within threshold</li> </ul>
Issue	Displays the five key network issues that NA tracks, including: <ul style="list-style-type: none"> <li>• Policy Rule Violations within 24 hours — Devices that do not comply with one or more defined configuration polices. Move the cursor over the information icon for more information.</li> </ul> <p><b>Note:</b> This option is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page—<b>Help</b></p>

Field	Description/Action
	<p>&gt; <b>About Network Automation &gt; View License Information</b> link.</p> <ul style="list-style-type: none"> <li>• Software Level Violations — Devices that are running non-approved software versions. Move the cursor over the information icon for more information.</li> <li>• Startup vs. Running Configuration Mismatch — Devices with mismatch startup and running configurations. Move the cursor over the information icon for more information.</li> <li>• Device Access Failure — Devices that NA could not reach. Move the cursor over the information icon for more information.</li> <li>• Configuration Changes within 24 hours — Device configuration changes detected in the past 24 hours. Move the cursor over the information icon for more information.</li> </ul>
<b>Best Practices Report Details</b>	
High Risk (Red) Issues	Displays summary information for any of the five issues that returned a red status. Available action links vary for each issue. For example, for all reported Device Access Failures, you can click the link to view the device details View Task option, where you can identify the tasks that failed. For Startup vs. Running Configuration Mismatches, you can click the link to view the Compare Startup with Running option that shows both configurations. All differences are highlighted.

## Device Status Report

The Device Status report lists all of the devices in your network and analyzes them individually for each of the Best Practices issues. For information about each of the Best Practices issues, see ["Network Status Report" on page 585](#).

Each device that does not comply with one or more of the issues is flagged with a yellow or red warning. The report also summarizes the entire network to see how many devices generated yellow or red warnings.

To view the Device Status report, on the menu bar under Reports click Device Status. The Device Status report opens.

**Note:** You can also navigate to the Device Status report from either the Network Status report or the Best Practices report.

### Device Status Report Fields

Field	Description/Action
Network Status Report link	Opens the Network Status report. For more information, see <a href="#">"Network Status Report" on page 585</a> .
Best	Opens the Best Practices Report. For more information, see <a href="#">"Best Practices Report" on page</a>

Field	Description/Action
Practices Report link	<a href="#">587</a> .
Report Date	Displays the date and time the report was last run.
Device Groups Reported	Displays the number of reported device groups.
Change Device Groups	Displays a list of currently defined groups. You can run the Best Practices report for a single group or for multiple groups. All other parameters are predefined. Summary and detail information is provided per category for each group you specify. Click the Run Again button when finished.
Status	Displays the name of the group and the number of devices in the group. Status levels include: <ul style="list-style-type: none"> <li>• Red — High risk</li> <li>• Yellow — Moderate risk</li> <li>• Green — Within threshold</li> </ul>
<b>Device Status Report Details</b>	
Moderate Risk (Yellow) and High Risk (Red) Issues	Displays summary information for any of the five issues that returned a yellow or red status. Available action links vary for each issue. For example, for all reported Config Changes within 24 hours, you can click the View Config link to view the configuration information for that device. For Device Access Failures, you can click the View Device Tasks link, where you can identify the tasks that failed.

## Statistics Dashboard

To view the Statistics Dashboard, on the menu bar under reports, click Statistics Dashboard. The Statistics Dashboard opens. The Statistics Dashboard provides information on the following reports:

- Top 5 Vendors — For more information, see ["Summary Reports" on page 606](#).
- Top 5 OS Versions — For more information, see ["Summary Reports" on page 606](#).
- Number of Configuration Change - Last 7 Days — For more information, see ["User & System Reports" on page 582](#).
- Change History by Time of Day — For more information, see ["Summary Reports" on page 606](#).
- Top 10 Most Accessed Devices — For more information, see ["Summary Reports" on page 606](#).
- System Status — For more information, see ["Network Status Report" on page 585](#).
- Software Level — For more information, see ["Summary Reports" on page 606](#).
- Configuration Policy Compliance — For more information, see ["Summary Reports" on page 606](#).

**Note:** Reports related to policy and compliance are available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page (**Help > About Network Automation > View License Information** link).

## Diagramming

Diagramming enables you to gather topology data from your network devices. Network diagrams can be viewed in either Visio, static JPEG, or interactive JPEG format and printed. The topology data, including Layer 3 IP addresses and subnets, and Layer 2 details spanning MAC addresses and VLANs, provides a snapshot of the current state of your network.

Diagramming must be enabled on the **Admin > Administrative Settings > Reporting** page. For more information, see ["Reporting" on page 64](#).

In terms of VLANs, the ports associated with a given VLAN are drawn in the VLAN box. Cisco's VLAN Trunking Protocol (VTP) Domain information is also displayed, if applicable. All aggregated ports are hidden, with an annotation to the associated port channel that lists the aggregated port names. For more information about VLANs, see ["Virtual Local Area Networks \(VLANs\)" on page 195](#).

Keep in mind that Layer 3 data includes IP addresses obtained from the device's configuration file. Layer 2 data is tied to the MAC addresses of the interfaces on each device and data from the MAC tables showing what MAC address the device sees. NA maps which devices can communicate with each other as a result of being on the same network.

You can detect Layer 1 (physical cable) connections. Layer 1 connections are inferred from Layer 2 data (MAC addresses that are seen by switches), captured, and then added to the NA database. The Layer 1 diagram type in NA displays the same connections as in HPE SA. Refer to the *HPE Server Automation User's Guide* for information.

The inferred Layer 1 data is based on heuristics. NA reduces the number of data link connections between devices and/or servers to make network diagrams more readable. Only connections that can be inferred through transitive connections are reduced.

In the OSI model, each layer is an abstraction designed to hide the layer below. Therefore, the Layer 2 data gathered from devices cannot generate 100% accurate Layer 1 data. In particular, Layer 1 data could be incorrect if any of the following conditions exist:

- The device does not return the interface number where MAC addresses are seen.
- There was no traffic between the devices within a few minutes of when NA gathers the topology data (where MAC addresses are seen).
- There is an unaddressable device, such as a hub, between two managed devices.

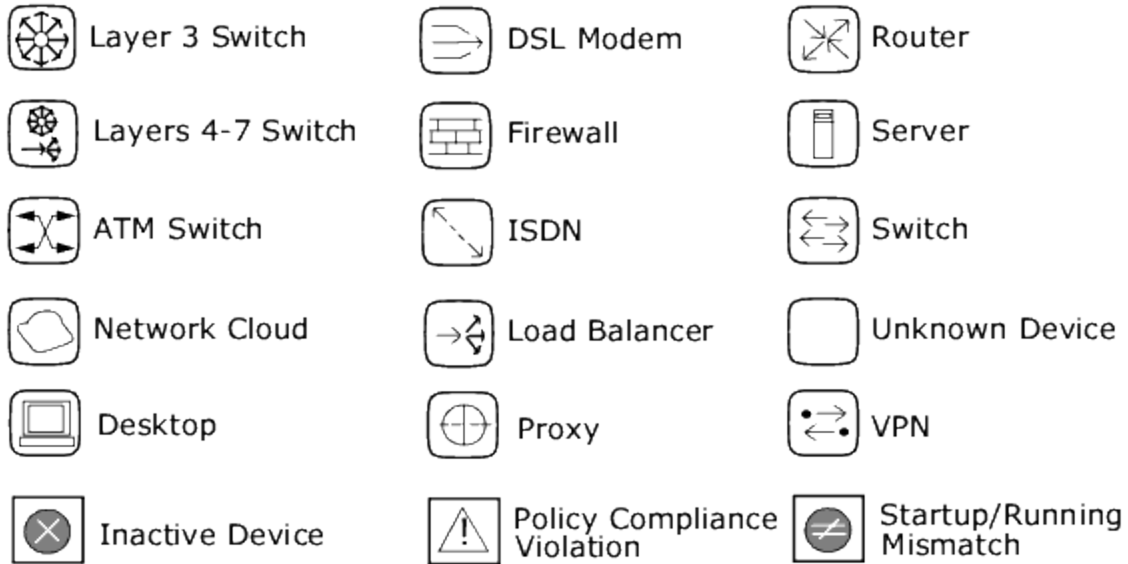
The following colors, borders, lines, and icons are used in diagrams.

- Red — The device failed its last access, either as a result of a Snapshot task or another task.

**Note:** For VLANs and ports, red indicates that the VLAN is administratively down and gray indicates that the VLAN is up and running.

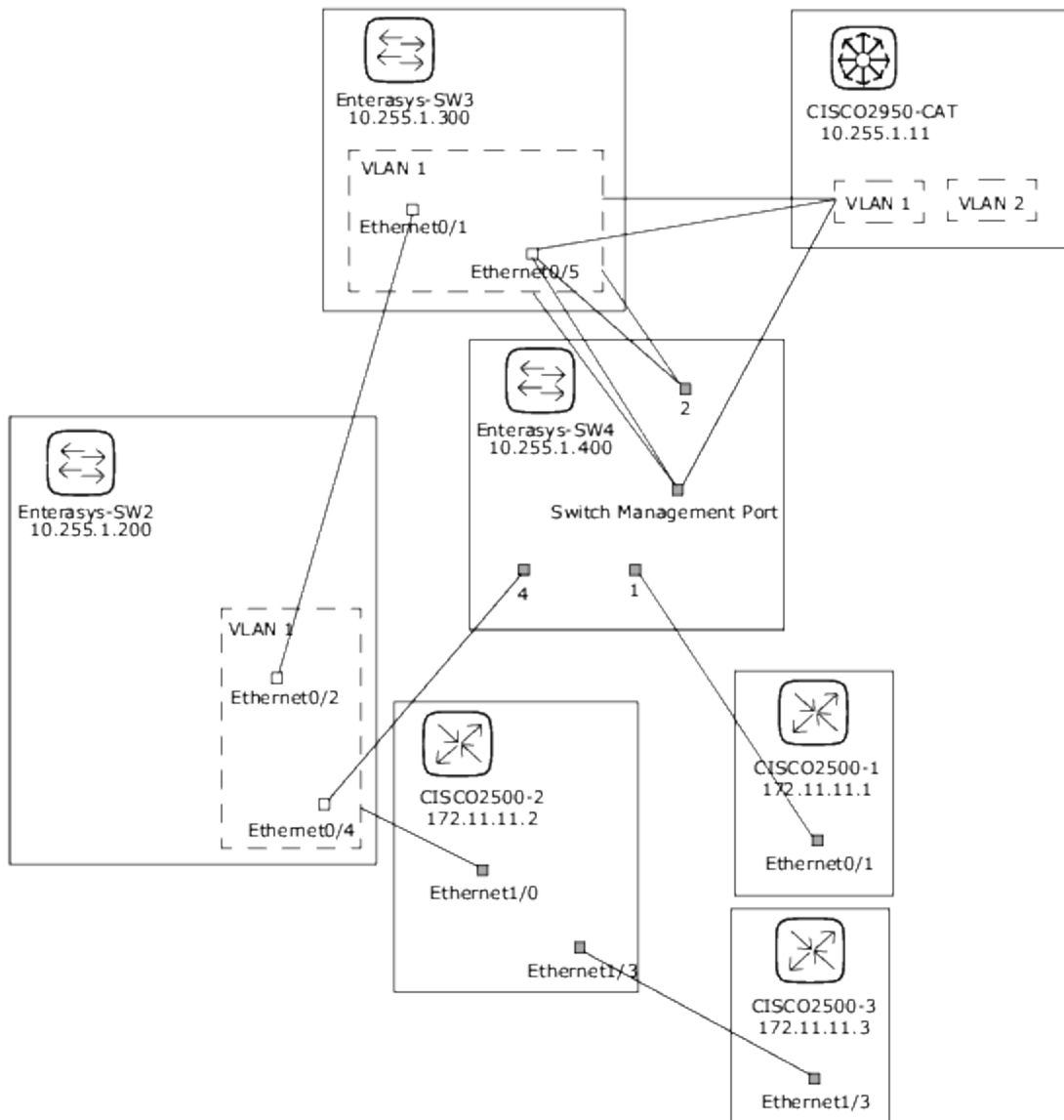
- Gray — The device contains no snapshot data.
- White — The device is up and running.

- Device borders — A solid border indicates a device. A dashed border indicates a virtual grouping, where each VLAN in a device is shown as its own device.
- Dashed lines — Depict Layer 3 connections.
- Solid lines — Depict Layer 2 connections

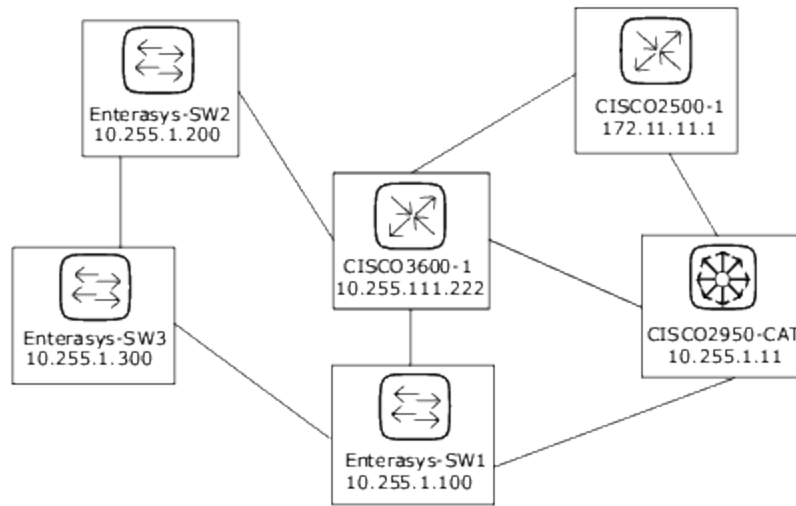


The following figure shows a simple network diagram, including connections between VLANs and ports.

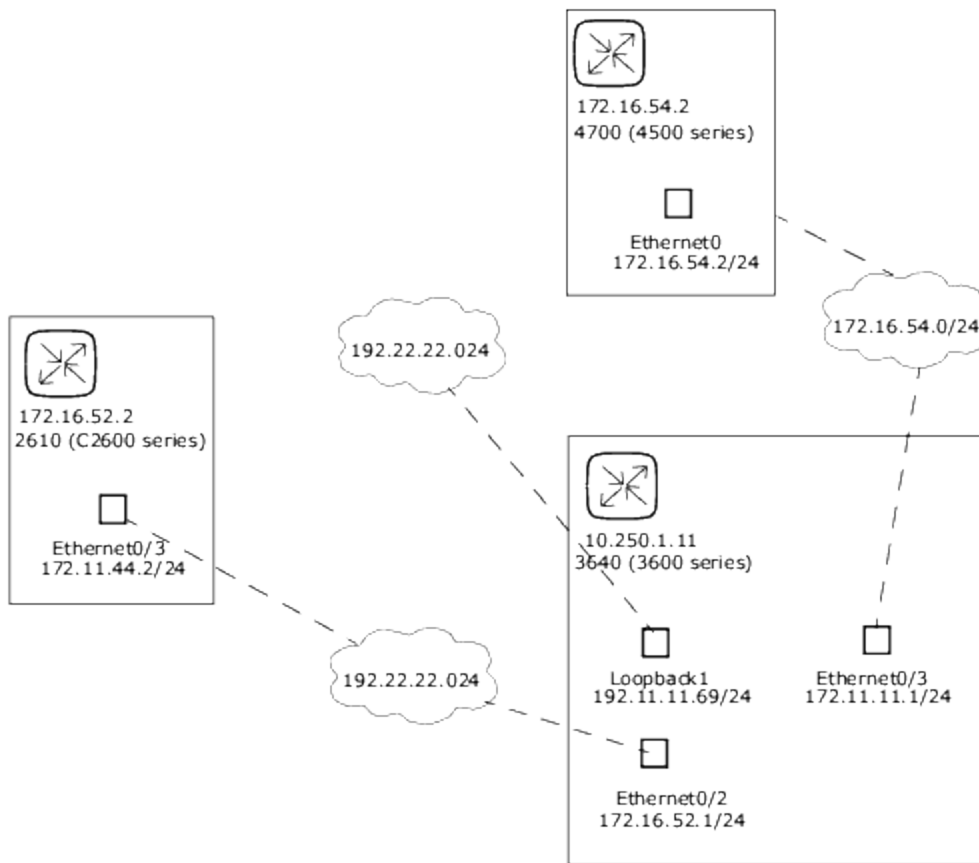




The following sample figure shows a simple network diagram with collapsed devices.



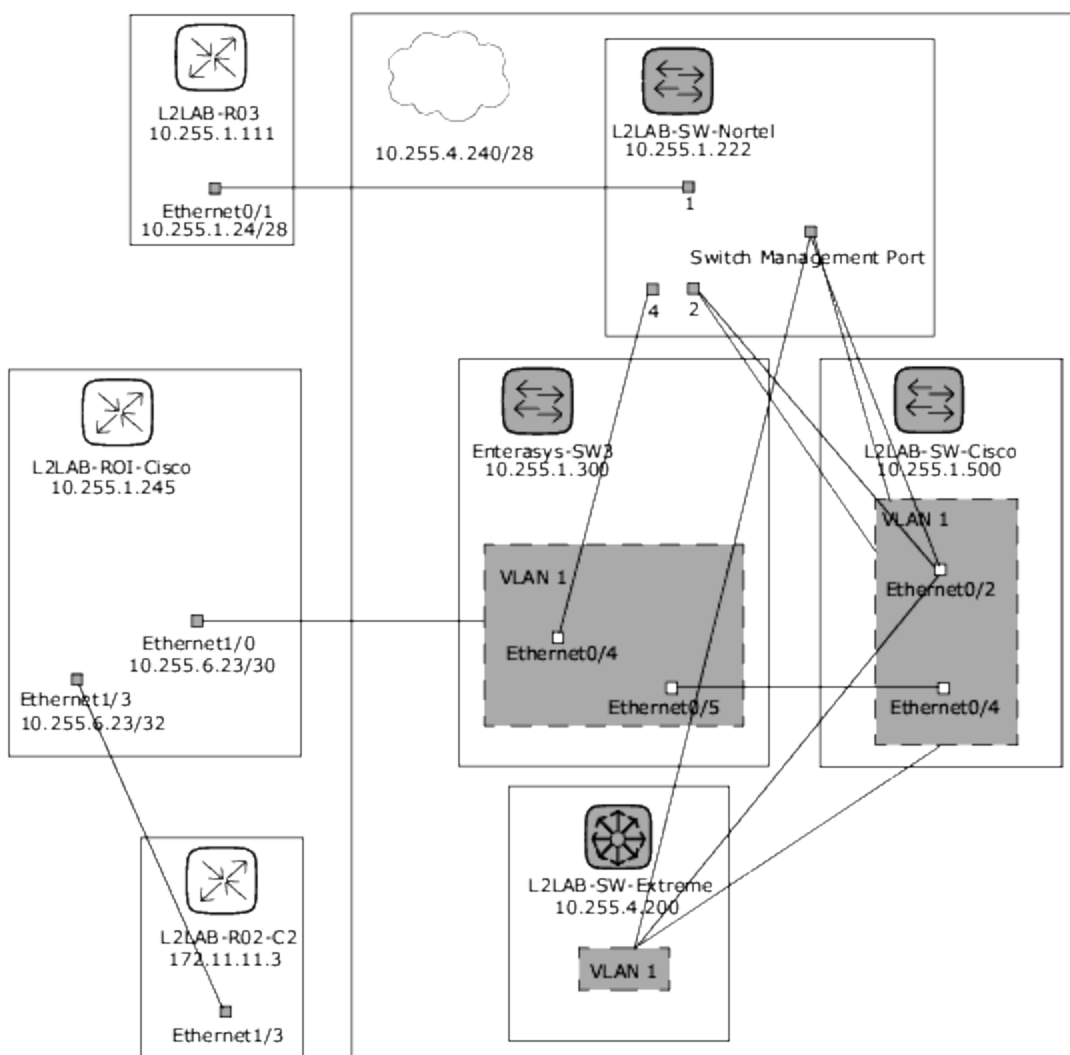
The following sample figure shows a simple network diagram utilizing clouds as a shortcut method to connect devices that share the same subnet. Keep in mind clouds can logically represent gateway objects, such as routers and switches.



A Layer 3 diagram collects all selected devices and connects the devices in the same subnet using the IP address and subnet mask. Multiple devices in a subnet are connected with a cloud. As a result, the cloud represents the subnet.

An expanded Layer 3 diagram starts with a basic Layer 3 diagram. If more than one device is connected to a subnet, the subnet is expanded to locate all the devices that might lie within the subnet. Expanded Layer 3 diagrams include all the interfaces connected to the cloud and traverse to other devices via known Layer 2 connections (discovered from the Topology Gathering diagnostic). The expanded cloud then becomes a container for all devices that participate in the subnet. Keep in mind that as Layer 2 connections are traversed, devices could be added to the diagram that were not originally selected.

The following sample figure shows an expanded Layer 3 network diagram. After the basic Layer 3 diagram is generated, each cloud that has more than one device connected to it is expanded. Keep in mind that NA walks all of the Layer 2 connections. As a result, the devices in the cloud are grouped within a cloud node.



To view the Diagramming page, on the menu bar under Reports click Diagramming. The Diagramming page opens. When you are done configuring your diagram, click the Generate button.

## Diagramming Page Fields

Field	Description/Action
Diagram Type	<p>Select one of the following diagram types from the drop-down menu. A sample diagram indicating the type of diagram is displayed to the right of the drop-down menu.</p> <ul style="list-style-type: none"> <li>• Layer 1: Ports (Inferred)</li> <li>• Layer 2: Ports</li> <li>• Layer 3: Ports</li> <li>• Layer 3: Ports (Expanded)</li> <li>• Layer 1: Devices (Inferred)</li> <li>• Layer 2: Devices</li> <li>• Layer 3: Devices</li> <li>• Layer 3: Devices (Expanded)</li> </ul> <div style="background-color: #f0f0f0; padding: 10px; margin-top: 10px;"> <p><b>Note:</b> The inferred Layer 1 data is based on heuristics. NA reduces the number of data link connections between devices and/or servers to make network diagrams more readable. Only connections that can be inferred through transitive connections are reduced. For more information, see <a href="#">"NA/SA Integration" on page 180</a>.</p> </div>
Output format	<p>Select one of the following formats for your network diagram:</p> <ul style="list-style-type: none"> <li>• JPEG (Interactive) — Enables you to display your network diagram in Joint Photographic Experts Group (JPEG) output and select devices in the network diagram. When you select a device, the Device Details page opens for the device. (For more information, see <a href="#">"View Menu Options" on page 185</a>.)</li> <li>• JPEG (Static) — Displays your network diagram in Joint Photographic Experts Group (JPEG) format.</li> <li>• Visio — You must have Visio 2003 or higher, including Service Pack 2 or higher, or the Visio Viewer installed on your system for viewing network diagrams in Visio. These are .rdx files.</li> </ul>
Device Selection	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Devices &amp; Groups — Enter an IP Address, Hostname, or Device Group name on which to run the task against or click the magnifying glass icon. For information about using the Device Selector, see <a href="#">"Device Selector" on page 137</a>.</li> <li>• Route — Enter a starting route device and an end route device. NA runs an ICMP Test task between the two devices. (For more information about ICMP test task, see <a href="#">"Run ICMP Test Task Page Fields" on page 279</a>.) This is done as a traceroute, which shows all of the IP addresses that were encountered between the source device and the destination device.</li> <li>• Single Device — Enter the IP address or hostname of the device. You can designate the number of connections to display up to three hops.</li> </ul>
Hierarchy Layer Filter	<p>A hierarchy layer is a device attribute. You can set a device's hierarchy layer when</p>

Field	Description/Action
	<p>adding or editing a device. (For more information, see <a href="#">"Adding Devices" on page 102.</a>) As a result, when configuring a diagram, you can select a hierarchy layer on which to filter. For example, you could diagram your entire network (Inventory) and then filter on "Core" to diagram only your Core devices—devices with a hierarchy layer set to Core.</p> <div style="background-color: #e0e0e0; padding: 10px; margin: 10px 0;"> <p><b>Note:</b> The options provided below are default filters. You must assign filtering values to your devices to be able to designate a filter here. For more information about creating custom filters, see <a href="#">"Editing the appserver.rcx File" on page 599.</a></p> </div> <p>Select one or more of the following options from the drop-down menu:</p> <ul style="list-style-type: none"> <li>• Core</li> <li>• Distribution</li> <li>• Access</li> <li>• Edge</li> </ul>
<b>Advanced Options</b>	
Advanced Filter	<p>Select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Hide inactive devices — Removes all inactive devices from the network diagram.</li> <li>• Hide devices not connected to any other selected devices — Removes all devices that have no connections to other devices from the network diagram.</li> <li>• Hide VLANs that have no connections — Removes VLANs that are not connected to any ports or other VLANs from the network diagram.</li> <li>• Hide unconnected interfaces/ports — Removes all interfaces and ports that have no connections to other devices from the network diagram.</li> <li>• Hide ports not associated with a device — Removes all Layer 2 ports not associated with a device from the network diagram. (<b>Note:</b> NA collects routing information from each managed device. Often times, devices have routes to devices and ports that are connected to non-managed devices. A device could see a port that is on a NA managed device, but that device may not support the NA Topology Data Gathering diagnostic. In this case, NA cannot make the grouping connection between the port and the device.)</li> <li>• Enter the minimum number of subnet connections to create a subnet cloud. The default is 2.</li> </ul>
Grouping	<p>Select one or both of the following options:</p> <ul style="list-style-type: none"> <li>• Connect contained subnets to their supernet — Enables you to group subnets together. For example, presume IP address range 10.255.0.0/23 and the range 10.255.1.0/24. The /24 network is contained within the /23 network. It is possible that traffic can flow between the two network. As a result, the /23 network and the /24 network would be shown as connected in the diagram.</li> <li>• Show VLANs as separate devices — Separates a device into multiple representations of the same device (one for each VLAN). VLAN devices are shown with a dashed outline, the same as the VLAN grouping within devices for the other graph types.</li> </ul>

Field	Description/Action
	<p>(<b>Note:</b> This option is automatically selected for Expanded L3 diagrams and cannot be disabled.)</p>
<p><b>Annotations</b></p>	
<p>Device Annotations</p>	<p>Select the fields you want to appear with each graphed device. Keep in mind that it does not take too many fields for the graph to become overwhelmed with text. Some of the available options include:</p> <ul style="list-style-type: none"> <li>• Hostname</li> <li>• Primary IP</li> <li>• Fully Qualified Domain Name</li> <li>• Device Description</li> <li>• Partition</li> <li>• Model</li> <li>• Vendor</li> <li>• Serial Number</li> <li>• Asset tag</li> <li>• Last Changed Date</li> <li>• Custom Fields</li> <li>• Last Access Status</li> <li>• Show Device Inactive</li> <li>• Show Policy Compliance Status</li> <li>• Show Startup/Running Mismatch</li> <li>• VTP Information</li> </ul>
<p>Endpoint Annotations</p>	<p>Select one or more of the following options:</p> <ul style="list-style-type: none"> <li>• Interface Description</li> <li>• Port Name</li> <li>• IP Address</li> <li>• Port Type</li> <li>• Port Status</li> <li>• Running Port State</li> <li>• MAC Address</li> <li>• Realm</li> </ul>
<p>Interconnection Annotations</p>	<p>Select one or more of the following option:</p> <ul style="list-style-type: none"> <li>• Subnet — Labels the interconnecting lines with subnet information.</li> <li>• VLAN — Labels the interconnecting lines with VLAN information.</li> </ul>
<p>Cloud Annotations</p>	<p>Select the following option:</p> <ul style="list-style-type: none"> <li>• Subnet — Text is included with a Layer 3 cloud (a shortcut method to connect devices</li> </ul>

Field	Description/Action
	that share the same subnet). <ul style="list-style-type: none"><li>• Realm — Text is included with a Layer 3 cloud. (A Realm is a network segment with no overlapping IP addresses.)</li></ul>
Graph Annotations	Select the following option: <ul style="list-style-type: none"><li>• Annotation Titles — Provides a title for each selected annotation. For example: Hostname: L2LAB-SW01-C0000xl</li></ul>
Save diagram as a user report named:	Enter as name for the diagram and click the Save button.
Email diagram to:	Enter an email address and click the Email button.

Once your diagram has been generated, if you selected the JPEG - Interactive option, clicking a device opens the Device Details page for the device. For more information, see ["Viewing Device Details" on page 177](#).

## Editing the appserver.rcx File

Hierarchy filtering layers are given values in the order of their appearance. For example, Core is 1, Distribution is 2, and so on. This information is stored in the appserver.rcx file located in the *Product/config* directory. The file looks like the following:

```
<array name="diagramming/hierarchy_layers">  
<value>core</value>  
<value>distribution</value>  
<value>access</value>  
<value>edge</value>  
</array>
```

Keep in mind that the numeric values are stored in the database. If you edit the appserver.rcx file, the changes are not reflected in the database. Consequently, you will also need to change the data associated with the device. (For more information, see ["New Device Page Fields" on page 102](#).)

## Device Software Report

The Device Software report enables you to view the software version and compliance rating currently assigned to each device.

To view the Device Software report, on the menu bar under Reports, click Device Software. The Device Software Report opens.

### Device Software Report Fields

Field	Description
Software Level Report link	Opens the Software Level report, where you can view the software versions and levels currently assigned to each device. For more information, see <a href="#">"Software Level Report" on the next page</a> .
Software Levels link	Opens the Software Levels page, where you can edit or delete a software level. For more information, see <a href="#">"Adding a New Software Level" on page 439</a> .
Current Working Group	Select a device group from the drop-down menu. Inventory is the default.
Level At or Below	Select a software level, for example: <ul style="list-style-type: none"> <li>• Any Level</li> <li>• Security Risk</li> <li>• Pre-production</li> <li>• Bronze</li> <li>• Silver</li> </ul>
Host Name	Displays the hostname of the device. Clicking the hostname opens the Device Details page, where you can view detailed information about the device.
Device IP	Displays the IP address of the device. Devices in red failed the last snapshot attempt. Inactive devices are marked with an icon beside the IP address.
Change Date	Displays when the software was last deployed to the device.
Device Software Version	Displays the detected software version running on the device.
Software Level	Displays the software level, if applicable.
Importance	Displays the severity of the security vulnerability, including: <ul style="list-style-type: none"> <li>• Informational — Events that typically do not require a response.</li> <li>• Low — Events that may require a response as time permits.</li> <li>• Medium — Events that require a timely response, typically within 72 hours.</li> <li>• High — Events that require an urgent response, typically within 24 hours.</li> <li>• Critical — Events that require an immediate response.</li> </ul>
Comments	Provides a description of the vulnerability.
Actions	You can select the following action: <ul style="list-style-type: none"> <li>• View Software Audit Trail — Opens the Device Software Audit Trail page, where you can view what software is loaded on the device. For more information, see <a href="#">"Device Software History Page Fields" on page 205</a>.</li> </ul>



# Software Level Report

The Software Level report enables you to view the software versions and levels currently assigned to each device.

To view the Software Level report:

1. On the menu bar under Policies, click Software Levels. The Software Levels page opens.
2. Click the Software Level Report link at the top of the page. The Software Level Report opens.

## Software Level Report Fields

Field	Description
Device Software Report link	Opens the Device Software report, where you can view the software version and compliance rating currently assigned to each device. For more information, see <a href="#">"Device Software Report" on page 599</a> .
Software Levels link	Opens the Software Levels page, where you can edit or delete a software level. For more information, see <a href="#">"Adding a New Software Level" on page 439</a> .
Current Working Group	Select a device group from the drop-down menu. Inventory is the default.
Importance At or Above	Select an importance level for the severity of the security vulnerability, including: <ul style="list-style-type: none"><li>• Informational — Events that typically do not require a response.</li><li>• Low — Events that may require a response as time permits.</li><li>• Medium — Events that require a timely response, typically within 72 hours.</li><li>• High — Events that require an urgent response, typically within 24 hours.</li><li>• Critical — Events that require an immediate response.</li></ul>
Host Name	Displays the hostname of the device. Clicking the hostname opens the Device Details page, where you can view detailed information about the device.
Device IP	Displays the IP address of the device. Clicking the IP address opens the Device Details page, where you can view detailed information about the device.
Change Date	Displays the date and time the software was last deployed to the device.
Device Software Version	Displays the detected software version running on the device.
Software Level	Displays the software level rating of the software.
Importance	Displays the severity of the security vulnerability, including: <ul style="list-style-type: none"><li>• Informational — Events that typically do not require a response.</li><li>• Low — Events that may require a response as time permits.</li></ul>

Field	Description
	<ul style="list-style-type: none"> <li>• Medium — Events that require a timely response, typically within 72 hours.</li> <li>• High — Events that require an urgent response, typically within 24 hours.</li> <li>• Critical — Events that require an immediate response.</li> </ul>
Comments	Provides a detailed description of the vulnerability.
Actions	<p>You can select the following action:</p> <ul style="list-style-type: none"> <li>• View Software Audit Trail — Opens the Device Software Audit Trail page, where you can view what software is loaded on the device. For more information, see "<a href="#">Device Software History Page Fields</a>" on page 205.</li> </ul>

## Software Vulnerability Report

**Note:** This report is available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page—**Help > About Network Automation > View License Information** link.

Unless you have The HPE Live Network policies loaded, the Software Vulnerability Report displays an empty search results page.

**Note:** TON enables you to download Security Alert Service data and other NA Content Service material. For information about HPE Live Network, see "[Help Menu Options](#)" on page 18.

Once you have imported the TON policies and run the compliance check, the results specific to any policy that has a Common Vulnerabilities and Exposures (CVE) value are displayed.

Keep in mind that the Software Vulnerability report gathers data from the tables that contain the results of the compliance and policy checks. As a result, there are no specific software vulnerability events generated. The events generated are policy non-compliance events.

To view the Software Vulnerability report, on the menu bar under Reports, click Software Vulnerabilities. The Software Vulnerability report opens.

### Software Vulnerability Report Fields

Field	Description/Action
Check Boxes/Drop-down Menus	<p>You can use the left-side check boxes to selected specific devices. Once you have selected the devices, you can select the Actions drop-down menu select an action, for example:</p> <ul style="list-style-type: none"> <li>• Batch Edit</li> <li>• Check Policy Compliance</li> <li>• Deploy Passwords</li> <li>• Reboot Device</li> </ul>

Field	Description/Action
Host Name	Displays the device's host name.
Device IP	Displays the device's IP address.
Device Compliance State	Displays the device's compliance state.
Policy	Displays the name of the policy.
Rule	Displays the policy configuration rule.
Rule Importance	Displays the importance level, either: <ul style="list-style-type: none"><li>• Informational — Events that typically do not require a response.</li><li>• Low — Events that may require a response as time permits.</li><li>• Medium — Events that require a timely response, typically within 72 hours.</li><li>• High — Events that require an urgent response, typically within 24 hours.</li><li>• Critical — Events that require an immediate response.</li></ul>
Rule Description	Displays the rule description.
CVE	Displays the CVE (Common Vulnerabilities and Exposures) name, along with an operator. CVE is a list of standardized names for vulnerabilities and other information on security exposures.
Last Checked Date	Displays the last checked date.

## Image Synchronization Report

The Image Synchronization report enables you to view the currently running or backup software images on a device, or group of devices, that do not reside in the NA software image repository. You can then schedule a task to copy the software images from the device(s) to the NA software image repository. As a result, all software images will be available for download from the NA software repository in the event of an emergency.

**Note:** Not all device drivers support this functionality. Refer to the Driver Release Service (DRS) documentation for detailed information on supported devices. The DRS is an automated driver release and delivery system.

To view the Image Synchronization report, on the menu bar under Reports, select Image Synchronization Report. The Image Synchronization report opens.

### Image Synchronization Report Fields

Field	Description/Action
Current working group	Displays the default group. You can select a different group from the drop-down menu, if applicable.
Check Boxes/Drop-down Menus	<p>You can use the left-side check boxes to selected specific devices. Once you have selected the devices, you can select the Select drop-down menu to click All or None or select the adjacent Actions drop-down menu and click the Sync Image or Exclude Filename option. The Exclude Filename option enables you to add a filename to a list that NA ignores. As a result, the filename is not displayed in the Image Synchronization Report.</p> <p><b>Note:</b> You must have Modify Device Permission to use the Sync Image option.</p>
Synch Image option	Opens the Backup Device Software Task page, where you can copy software images to the NA software image repository. (For more information, see " <a href="#">Backup Device Software Task Page Fields</a> " on page 369.)
Host Name	Displays the host name of the device. Clicking the Host Name opens the Device Details page, where you can view information about the device and its configuration history.
Device IP	Displays the IP address of the device. Clicking the IP Address opens the Device Details page, where you can view information about the device and its configuration history.
Slot	Displays the slot in which the software image resides on the device.
File Name	Displays the name of the software image.
File Size	Displays the size of the software image.
Email Search Result	Enter the email address to send the search results to and click Send. Be sure to separate multiple email addresses with a comma.
View Search Result as a CSV File link	Opens the search results in CSV format using Excel (Windows platform) or Star Office or Gnumeric (Unix platform).

## System & Network Events Report

The System & Network Events report enables you to track events that indicate changes to either a single device or all of your devices. For a complete list of events, see "[Event Descriptions](#)" on page 509.

To view the System & Network Events report, on the menu bar under Reports click System & Network Events. The System & Network Events report opens.

### System & Network Events Report Fields

Field	Description/Action
New Message link	Opens the New Message page, where you can post a message to all users referring to this device. You also have the option of tracking the event with SingleView.
For the:	Displays the time frame for viewing events. Options include: <ul style="list-style-type: none"> <li>• Past 1, 2, 4, 8, 12, 24, and 48 hours</li> <li>• Past 1 and 2 weeks</li> <li>• Past 1 month</li> <li>• All Events</li> </ul>
Current Working Group	Select a device group from the drop-down menu.
Check Boxes	You can use the left-side check boxes to delete events from the NA database. Once you have selected the events, click the Actions drop-down menu and click Delete. This deletes the selected events from the NA database. The adjacent Select drop-down menu enables you to select or deselect all of the events.
Event Date	Displays the date/time of the event in the format MMM-dd-yy HH:mm:ss. (The format is configurable by the System Administrator.)
Host Name	Displays the host name or IP address of the device. Clicking the Host Name or IP Address opens the Device Details page, where you can view information about the device and its configuration history.
Summary	Displays the type of event. For a list of Events, see <a href="#">"Event Descriptions" on page 509</a> . Clicking the event type link opens the Event Detail page. This page includes: <ul style="list-style-type: none"> <li>• The date and time the event occurred.</li> <li>• The login name of the person or process that added the event. Clicking the Detail link for diagnostic changes opens the Task Result page where you can view task details. For more information, see <a href="#">"Task Information Page Fields" on page 405</a>.</li> <li>• The event type.</li> <li>• A brief description of the event.</li> <li>• A link to detailed information about the device.</li> </ul>
Added By	Displays the login name of the person whose action caused the event to be created.

## Software Vulnerabilities Event Details Report

The software vulnerabilities event details report enables you to view details about software vulnerability, including advisory information and possible solutions.

To view the Software Vulnerabilities Event details:

1. On the menu bar, select Search For and click Events. The Search For Events page opens.
2. Select the Software Vulnerability Detected event summary and click the Search button. The Event Search Results page opens.

Field	Description/Action
Check Boxes	You can use the left-side check boxes to delete events from the NA database. Once you have selected the events, click the Actions drop-down menu and click Delete. This deletes the selected events from the NA database. The adjacent Select drop-down menu enables you to select or deselect all of the events.
Date	Displays the date/time of the event in the format MMM-dd-yy HH:mm:ss. (The format is configurable by the System Administrator.)
Summary	Displays Software Vulnerability Detected. If you click the link, the Event Detail page opens, where you can view information on the security vulnerability, including: <ul style="list-style-type: none"> <li>• Date</li> <li>• Added by</li> <li>• Summary</li> <li>• Description, including the name, Importance, and CVE (Common Vulnerabilities and Exposures)</li> <li>• Actions — Provides links to NA reports and external links to advisory and solution information.</li> <li>• Device</li> </ul>
Host Name	Displays the host name or IP address of the device. Clicking the Host Name or IP Address opens the Device Details page, where you can view information about the device and its configuration history.
Added by	Displays the username of the person who added the event.

## Summary Reports

Summary reports provide an overview of configuration activity on your network. They can help you analyze trends and identify problem areas that require particular attention. You can easily provide these reports to upper management to help communicate what your team does and the value it contributes to the organization. Because the data is presented in a standard Microsoft Office (2007) Open XML (OOXML) File format (with the .xlsm file extension), it is easy to sort and filter information and cut & paste it into other applications.

By default, NA is configured to update Summary reports on a weekly basis. Each time they are updated, the prior Summary reports file is backed up, so you can maintain an archive of these reports for historical analysis or to provide an audit trail. Reports are stored by default in `.\<install directory>\addins`.

To update the Summary reports manually:

1. On the menu bar under Tasks, click New Tasks and select Generate Summary Reports. The New Task - Generate Summary Reports page opens.
2. Make sure Start As Soon As Possible is selected.
3. Click Save Task.

The task updates the Summary reports, showing you the status of the task on the Task Information page. When the status is Succeeded, you can open the latest Summary reports.

**Note:** The Summary reports are available in Microsoft Office 2007 - Office Open XML (OOXML) File format. You require Microsoft Excel 2010 or above to open these files. Excel macros are used to calculate the report data. Depending on your browser and Excel security settings, you may be prompted to enable macros when you open the Summary reports.

To open the Summary reports, on the menu bar under Reports click Summary Reports. If Summary Reports does not appear on the drop-down menu, the System Administrator should check your Administrative setting.

To navigate to specific Summary reports, you can either click the contents links on the top-level Summary report and use the Home link to return to the top-level Summary report, or use the tabs at the bottom of each report. If you do not see all the tabs at the bottom, try maximizing the window or click and drag the column adjustor to the right.

**Note:** After upgrading to NA 10.21, note the following about Summary reports:

- Administrators can access the old reports from the <NA\_HOME>/addins directory. The old reports cannot be accessed from the NA web user interface.
- To access reports from the NA web user interface, run the Generate Summary Reports task atleast once. For more information about the Generate Summary Reports task, see "[Generate Summary Reports Task Page Fields](#)" on page 375.
- Any customization done to the .x1s templates must be recreated in the in the .x1sm files. You can access the existing templates from the <NA\_HOME>/clients directory.

### Summary Reports Descriptions

Report	Reported Information
Summary	Displays an overview of the rate of recent change activity, the most active users, and the network profile. Reports include: <ul style="list-style-type: none"><li>• Top 5 Vendors — Displays the number of devices per the top five vendors.</li><li>• Top 5 OS Versions — Displays the top five OS versions that are in use.</li><li>• Number of Configuration Change - Last 7 Days — Displays the average number of configuration changes per day for the past 7 days.</li><li>• Change History by Time of Day — Displays when configuration changes were made.</li><li>• Top 10 Most Accessed Devices — Displays the top 10 most accessed devices during the reporting period.</li></ul>
Change Frequency	Displays an overview of changes made in your network. The report provides the average number of changes per week over the past 30 days, broken down by users and device groups. This helps you identify top performers, as well as network areas showing a disproportionate rate of change.
Changes Per Day	Displays the number of configuration changes per day for the past two weeks. The report includes both a bar chart and table with the same data. The vertical axis shows the number of changes. The horizontal axis shows each day in the two

Report	Reported Information
	week period.
Statistical Charts	<p>Displays configuration changes over the past week. The Change Detection Methods pie chart shows you how changes were detected, including:</p> <ul style="list-style-type: none"> <li>• Syslog</li> <li>• Telnet/SSH</li> <li>• Proxy</li> <li>• Regular or manual polling</li> <li>• AAA</li> <li>• Configuration or script deployment</li> </ul> <p>The Change History by Time of Day bar chart shows you at what time NA detected changes. You can use these charts to monitor your changes. You can also set a policy to have network engineers make changes using the Telnet/SSH Proxy, Command Scripts, or Configuration Edit &amp; Deploy.</p>
Configuration Changes	<p>Displays the following for the past week:</p> <ul style="list-style-type: none"> <li>• Change detection, including the trigger and number of changes.</li> <li>• Change history by time of day.</li> <li>• Device configuration changes, including the Host Name, IP Address, the date and time of the last change, and the User Name from Proxy, AAA, Syslog, and so on.</li> </ul>
Device Status	<p>Displays the inactive devices tracked by NA.</p> <ul style="list-style-type: none"> <li>• The Top 10 Most Accessed Devices — Displays which devices took the most configuration snapshots of in the past week. Typically, these are the devices engineers are logging into or changing most often.</li> <li>• Device Password Changes — Displays a record of all devices whose passwords were changed in the past week.</li> <li>• Devices With Access Failures — Displays which devices NA could not access, either because the device was unavailable or its password information was incorrect. This list serves as a checklist to ensure NA is managing devices successfully.</li> </ul>
Device Inventory	<p>Displays all devices tracked by NA, including:</p> <ul style="list-style-type: none"> <li>• Host Name (from the Device Information page)</li> <li>• IP Address (from the Device Information page)</li> <li>• Asset Tag (from the Device Information page)</li> <li>• Location (from the configuration file)</li> <li>• Vendor (from the configuration file)</li> <li>• Model (from the configuration file)</li> <li>• Operating System Version (from the configuration file)</li> <li>• Serial Number (from the configuration file)</li> </ul>



Report	Reported Information
	<ul style="list-style-type: none"> <li>• Device Description (from the Device Information page)</li> <li>• Last Snapshot Result (from tasks)</li> <li>• Last Modified Configuration (from tasks)</li> </ul>
Operating System (OS) Inventory	<p>Displays all the device OS versions running in your network, and lists how many devices are running each version. This report helps you to:</p> <ul style="list-style-type: none"> <li>• Ensure compliance with corporate standards for accepted OS versions.</li> <li>• Test or evaluate proposed changes to your architecture or services.</li> <li>• Save time when applying a vendor’s security alert or patch to specific OS versions.</li> </ul>
System Status	<p>Displays the activity and health of the NA system. The report lists devices that do not have a device driver assigned and cannot be managed. It also provides summary information about recent system activity and the number of records in the NA database.</p> <ul style="list-style-type: none"> <li>• System Status — For devices and groups, the report displays the total number of configurations, devices, device groups, unmanaged devices, and authentication rules. For users, the report displays the total number of users and AAA users without NA accounts. The report also displays the number of custom reports.</li> <li>• System Activity — For tasks and messages, the report displays the total number of successful tasks, failed tasks, and system events. For the integrated Telnet/SSH client, the report displays the total number of Telnet and SSH sessions recorded.</li> <li>• Devices with No Driver — Displays the Host Name and IP Address of devices without drivers.</li> </ul>
Policy Compliance	<div style="background-color: #e0e0e0; padding: 5px;"> <p><b>Note:</b> This information is available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page—<b>Help &gt; About Network Automation &gt; View License Information</b> link.</p> </div> <p>Displays the number of policies that are and are not in compliance. The Host Name, IP Address, and the last configuration change information is displayed. The report includes both a simple pie chart with numeric totals and three tables with detailed data, including:</p> <ul style="list-style-type: none"> <li>• Configuration Policies in Compliance</li> <li>• Configuration Policies not in Compliance</li> <li>• Configuration Polices (including that name of the configuration policy and the number of associated rules).</li> </ul>

# Emailing Reports

Email reports from the Email Report Task page (**Reports > Reporting Tasks > Email Report**). For more information, see "[Email Report Task Page Fields](#)" on page 377.



# Chapter 18: Using SecurID

The RSA SecurID solution provides for two-part authentication. It requires something known by the user (a password or PIN) and something accessible to the user (a tokencode generated by RSA software or hardware). The tokencode generally changes every 60 seconds. Some device makers incorporate this authentication system into their network devices. For detailed information about how SecurID works, see the SecurID documentation.

**Note:** When NA is configured to use SecurID for external authentication, Single Sign-on functionality will not be enabled when connecting to the NA proxy. You will need to authenticate again using your SecurID credentials because SecurID tokencodes cannot be reused.

HPE Network Automation (NA) supports SecurID for highly secure, two-factor authentication for:

- Authenticating users logging into NA
- Accessing network devices through NA

The following table describes NA SecurID support:

Accessing NA	Connection Method	SecurID Support
NA Console (in a web browser)	HTTP	Yes
	HTTPS	Yes
SSH/Telnet Proxy	SSH	Yes
	Telnet	Yes
API	RMI	No

**Note:** By default, for SSH with SecurID authentication with a device, NA expects that the device supports SecurID over SSH using keyboard interactive, and specifically supports Next-token-code mode. For devices that do not support the keyboard interactive access method, you can enable the `allow_securid_with_password` option as described in ["Accessing Network Devices" on page 614](#)

## RSA Authentication Manager

During installation, the NA installer installs the `rsa_api.properties` file into the following directory:

- *Windows:* `<NA_HOME>\jre`
- *Linux:* `<NA_HOME>/jre`

Edit this file to set the following parameters:

- `RSA_AGENT_HOST` — The IP address of the NA core server.
- `SDCONF_LOC` — The location of the RSA configuration file generated by RSA Authentication Manager. Ensure that the line for the operating system of the NA core server is uncommented.

For example, for an NA core on the Windows operating system:

```
RSA_AGENT_HOST=10.255.140.124
#SDCONF_LOC=/var/ace/api/sdconf.rec
SDCONF_LOC=C:\\NA\\jre\\sdconf.rec
```

For example, for an NA core on the Linux operating system:

```
RSA_AGENT_HOST=10.255.140.124
SDCONF_LOC=/var/ace/api/sdconf.rec
#SDCONF_LOC=C:\\NA\\jre\\sdconf.rec
```

## User Authentication

For user authentication into NA, make sure:

- You have purchased hardware or software tokens from RSA.
- The RSA Authentication Manager is running and accessible from the NA core server.
- On the RSA Authentication Manager, the NA core server is added as an Agent Host.
- In the Agent Host settings, the Agent type is “UNIX Agent.”
- You created users on the RSA Authentication Manager.
- You assigned software tokens to the RSA Authentication Manager users.
- You enabled users to connect from Agent Hosts.

For NA to access devices, make sure:

- NA is running.
- The RSA software token software is installed on the NA core server. For information about the software version that HPE tested with, see the *NA Support Matrix*.
- The RSA Authentication Manager is running and accessible from the devices.
- You have obtained software tokens from RSA.
- You have imported the SecurID tokens to the NA core server using the RSA Software Token application.
- You have added licenses to the RSA Authentication Manager.
- You have created a user on the RSA Authentication Manager.
- You have assigned a software token to the user.
- You have set the PIN for the token.
- You have enabled the user to connect to the devices.
- In NA, you added a user corresponding to the SecurID user.
- You selected if you are using unique per user tokens or a pool of tokens.
- You assigned a token pool user name if using a token pool.
- You assigned the token to the user.

**Tip:** The RSA Authentication Manager was formerly called the ACE Server.

#### To enable SecurID for user authentication to NA

1. Designate RSA SecurID as the external authentication mechanism. For more information, see "[User Authentication Page Fields](#)" on page 75.
2. Edit the `rsa_api.properties` file as described in "[RSA Authentication Manager](#)" on page 612.
3. Copy the `sdconf.rec` file from the RSA Authentication Manager server onto the NA core server. Place the `sdconf.rec` file in the location specified by the uncommented `SDCONF_LOC` parameter in the `rsa_api.properties` file.
4. Restart the NA services. For more information, see "[Starting and Stopping Services](#)" on page 97

## Accessing Network Devices

For access from NA to devices, you will need to download software token software and licenses from RSA. Hardware token licenses, such as FOBS and pinpads, cannot be used.

You can download the software token software from RSA's Website. Be sure to install the software on the same system on which NA is installed. You will also need to import the software token licenses to this system through the normal SecurID mechanisms.

**Note:** The RSA Authentication Manager and the server running NA need to be time synchronized. Software tokens are sensitive to time differences. If the two servers are more than a minute out of sync, the generated tokencodes could fail. You can use NTP on both servers to keep the clocks accurate.

NA monitors access to devices when using SecurID to ensure that a given tokencode is not used twice. This means that activities in NA might be slower when using SecurID device access. To address this, NA provides the ability to load multiple software token seeds into the system. You can use one of the following token management modes:

- Per user — Each NA user has one or more corresponding software token seeds. In this mode, each device access uses only the seed(s) corresponding to the user that initiated the task or NA proxy connection. It is recommended that all users in the system have valid software tokens assigned.
  - On the Home page under My Settings, click My Profile. The My Profile page opens. For more information about My Profile page fields, see "[My Profile Page Fields](#)" on page 235.

**Note:** For more information about adding and/or updating SecurID tokens, see "[Adding SecurID Software Tokens](#)" on page 616.

- Pool — A pool of general use software token seeds are provided to NA and used as efficiently as possible for maximum performance. On the menu bar under Admin, select Administrative Settings and click the Device Access option. The Device Access page opens, where you can configure SecurID device access. For more information, see "[Device Access Page Fields](#)" on page 33.

Once software seeds have been loaded into NA, you can designate specific devices or sets of devices for management via RSA SecurID authentication. When a device (or group of devices) is configured for SecurID access and software seeds have been entered, NA automatically generates the correct time-limited tokencode each time it needs to access the device.

### To enable SecurID access to a specific device

1. From the Device Details page, open the Edit Device page (**Edit > Edit Device**).
2. In the Password Information section, select **Use device-specific password information**.
3. Configure the use of SecurID.
  - a. Expand the Device Access Settings section.
  - b. In a **Setting** list, select Use SecurID, and then in the associated **Value** field, enter either **exec** or **enable**.
    - Enter **exec** to use SecurID only for logging on to a device.
    - Enter **enable** to use SecurID for logging on to a device and entering enable mode.
  - c. *Optional.* To use a specific user pool of SecurID token seeds for this device, in a **Custom Setting** field, enter **securid\_pool\_override**, and then in the associated **Value** field, enter the user name.
  - d. *Optional.* If the device does not support the keyboard interactive access method, configure SecurID password access to the device. In a **Custom Setting** field, enter **allow\_securid\_with\_password**, and then in the associated **Value** field, enter **true**.
4. Click **Save**.

### To enable SecurID access for a group of devices

1. On the Device Password Rules page (**Admin > Device Password Rules**), start a new rule or open a rule to edit.
2. Configure the use of SecurID.
  - a. Click the **Show Device Access Settings** link.
  - b. In a **Name** list, select Use SecurID, and then in the associated **Value** field, enter either **exec** or **enable**.
    - Enter **exec** to use SecurID only for logging on to a device.
    - Enter **enable** to use SecurID for logging on to a device and entering enable mode.
  - c. *Optional.* To use a specific user pool of SecurID token seeds for this device, in a **Name** field that does not have a list, enter **securid\_pool\_override**, and then in the associated **Value** field, enter the user name.
  - d. *Optional.* If the devices do not support the keyboard interactive access method, configure SecurID password access to the device. In a **Name** field that does not have a list, enter **allow\_securid\_with\_password**, and then in the associated **Value** field, enter **true**.
3. Click **Save**.

For more information, see ["Device Password Rule Page Fields" on page 129](#).

### To configure NA to use SecurID password access for all devices

- Add the following line to the `adjustable_options.rcx` file:  

```
<option name="ssh2/allow_securid_with_password">true</option>
```

For more information, see ["Working with .rcx Files" on page 703](#).

# Adding SecurID Software Tokens

To add SecurID software tokens:

1. Using the RSA Software Token application, import the tokens to the server where NA is running.
2. On the Home page under My Settings, click My Profile. The My Profile page opens. For more information about My Profile page fields, see ["My Profile Page Fields" on page 235](#).
3. Under the SecurID section at the bottom of the page, click the Manage Software Token licenses link. The View SecurID Tokens page opens, where you can view, add, and/or update software token licenses associated with your user login. These licenses are used to login into devices if the devices are configured to require SecurID credentials.
4. Click the Add Token link. The New SecurID Tokens page opens. You can add a single software token or a pool of general use software tokens per user.

**Note:** You can also navigate to the Manage Software Token licenses link by clicking the Users option under Administration and then clicking the Edit option for that user.

## New SecurID Tokens Page

Field	Description/Action
SecurID User	Enter the username assigned to the token on the RSA Authentication Manager.
Software Token Serial Number	Enter the serial number of the token (zero padded).
PIN	If a PIN is configured for the token when issued from the RSA Authentication Manager, enter it here. ( <b>Note:</b> If the PIN is updated, it must also be updated here. )
Confirm PIN	Re-enter the PIN for confirmation.
Password	If a password is configured for the token when issued from the RSA Authentication Manager, enter it here.

# Logging On to the NA Console Using SecurID

The procedure for logging in to NA with SecurID authentication includes using a PIN to generate a tokencode for accessing the NA console. SecurID supports the following methods for generating the PIN:

- System-generated PIN
- User-generated PIN

The RSA Authentication Manager configuration determines the method used in your environment.

## To log in to the NA console using SecurID authentication

1. On the NA console log-in page, do the following:
  - a. Enter your NA user name.
  - b. Enter your tokencode in the **Password** field.
  - c. Click **Log In**.



2. Respond to the PIN prompt.
  - For a system-generated PIN, note the new PIN from SecurID, select **Yes**, and then click **Log In**.
  - For a user-generated PIN, enter a PIN of the length specified by your Security Administrator, and then click **Log In**.
3. Enter the PIN into your tokencode generator, and then note the results.
4. On the NA console log-in page, do the following:
  - a. Re-enter your NA user name.
  - b. Enter the newly-generated tokencode in the **Password** field.
  - c. Click **Log In**.

## RSA Log Messages

By default, RSA event and debug messages are stored in the `<NA_HOME>/server/ext/jboss/server/default/log/server.log` file. This behavior overrides the values of the `RSA_LOG_FILE` and `RSA_DEBUG_FILE` variables in the `rsa_api.properties` file.

In the `server.log` file, search for `com.rsa.authagent.authapi` to locate the RSA messages.

*Optional.* If you prefer to isolate the RSA messages in a separate log file, define a handler in the `<NA_HOME>/server/ext/jboss/server/default/deploy/jboss-logging.xml` file that redirects RSA log messages to a particular file. For example:

```
<size-rotating-file-handler file-name="/tmp/rsa_api.log" name="RSA API"
autoflush="true" append="true" rotate-size="500k" max-backup-index="3">
  <formatter>
    <pattern-formatter pattern="%d{HH:mm:ss} %m%n"/>
  </formatter>
</size-rotating-file-handler>
<logger category="com.rsa.authagent.authapi" use-parent-handlers="false">
  <level name="INFO"/>
  <handlers>
    <handler-ref name="RSA API"/>
  </handlers>
</logger>
```

## SecurID Troubleshooting

- I. If you cannot login to NA using SecurID, contact your RSA Administrator.
- II. If you are using SecurID for device access, it is recommended that you turn off the Syslog User Identification option for change detection, or you could receive Snapshot Task Failed messages.
  1. On the menu bar under Admin, select click Administrative Settings and click Configuration Mgmt. The Configuration Mgmt page opens.
  2. At the Change User Identification section — Syslog User Identification, uncheck the “Identify who made a configuration change from the syslog message text, if possible.” check box.

3. At the Change User Identification section — Auto-Create Users from Syslog, uncheck the “Create new users in NA when the change author identified from syslog does not already exist (Auto-Create Users must be enabled).” check box.
4. Click the Save button.

III. If external authentication fails, NA attempts to fall-back to the local user credentials in the following cases:

- When the external authentication service is down or inaccessible.
- For static user accounts that have never successfully logged in via an external authentication method.
- For the built-in Admin user account.

IV. The Node Secret file is used to authenticate communication between the RSA SecurID authentication agent and RSA Authentication Manager. If you see the following type of message in the RSA Authentication Manager log file, you must update the Node Secret file for the NA core server.

```
07/12/2006 22:00:19U ----/core15.hpe.com ---->/  
07/12/2006 18:00:19L Node verification failed NARsa.rduNA.HPE.com
```

To create a Node Secret:

1. Click Agent Host → Add (or Edit) Agent Host.
2. Click Create Node Secret.
3. In the Password box, enter a password and then enter it again in the Confirm Password box.
4. If you want to save the Node Secret file under the default name and directory, click OK. The Node Secret file is created in the default directory using the default name `nodesecret.rec`. The default directory is `ACEPROG` until you specify a different directory, in which case the directory you specify becomes the default directory until you restart the Database Administration application. If you want to save the file under a different name, click Browse. In the Node Secret Filename Specification dialog box, change the name and directory, and then click Save.

**Note:** If a Node Secret file with the same name exists in the specified directory, click Yes to overwrite it or click No to return to the Node Secret Filename Specification dialog box. When you click Yes, the Node Secret file is created using the name and directory you specify.

In the Add (or Edit) Agent Host dialog box, the Create Node Secret File button is unavailable. Node Secret Created is selected.

5. Click OK.
6. Copy the new Node Secret file to the Agent host.
7. Copy the Load Node Secret utility (`agent_nsload`) from the RSA Authentication Manager media to the Agent host. Be sure to copy the correct `agent_nsload` process for the operating system of the Agent host.
8. On the Agent host, run the Load Node Secret utility to load the new Node Secret file. On the command line prompt, enter: `agent_nsload -f path -p password` (where `path` is the directory location and name of the Node Secret file and `password` is the password used to protect the Node Secret file.)

**Note:** If the RSA Authentication Manager is on a different platform from the NA core server, the `agent_nsload` executable might not be compatible. In this case, contact RSA to get the correct binary. In addition, you might have to reboot the NA core server so that RSA DLLs can locate the new Node Secret file.

# Chapter 19: Compliance Center

The Compliance Center is NA's portal for accessing reports and information that help determine the current compliance status of your network infrastructure with respect to Sarbanes-Oxley (Section 404) and supporting internal control frameworks.

The Public Company Accounting Reform and Investor Protection Act of 2002, commonly known as Sarbanes-Oxley, is designed to improve the accuracy and reliability of corporate disclosures to investors. Sarbanes-Oxley generally applies to all U.S. companies registered with or required to file reports with the SEC (Securities and Exchange Commission). The regulation requires the CEO and CFO of reporting companies to certify their companies' SEC reports.

A key provision of Sarbanes-Oxley is Section 404, which specifically addresses internal control over financial reporting. Section 404 requires that reporting companies include an internal control report and assessment as part of their financial reporting. Sarbanes-Oxley (Section 404) provides no specific control requirements for IT-related compliance efforts, so organizations must select an internal control framework, such as COSO, COBIT, ITIL, or PCI Data Security Standard and enforce and report against that framework. For detailed information regarding Sarbanes-Oxley (Section 404) compliance using NA, refer to the online information presented on the Compliance Center Home page.

To access the Compliance Center Home page, on the menu bar under Reports, click Compliance Center. The Compliance Center Home page opens.

**Note:** HPE Compliance Center is based on HPE's understanding of the regulations and standards presented. HPE is not an auditor or legal authority, and you should consult your corporate auditor or legal representative for guidance.

## Compliance Center Home Page

Options	Description/Action
Sarbanes-Oxley (Section 404)	Opens the Sarbanes-Oxley (Section 404) Compliance Status overview information.
COBIT Compliance Status link	Opens the COBIT Compliance Status report. For more information, see <a href="#">"COBIT Compliance Status Reports" on the next page.</a>
COSO Compliance Status link	Opens the COSO Compliance Status report. For more information, see <a href="#">"COSO Compliance Status Reports" on page 626.</a>
ITIL Compliance Status link	Opens the ITIL Compliance Status report. For more information, see <a href="#">"ITIL Compliance Status Reports" on page 629.</a>
GLBA Compliance Status link	Opens the GLBA Compliance Status report. For more information, see <a href="#">"GLBA Compliance Status Reports" on page 631.</a>
HIPAA Compliance Status	Opens the HIPAA Compliance Status report. For more information, see

Options	Description/Action
link	<a href="#">"HIPAA Compliance Status Reports" on page 634.</a>
PCI Data Security Standard Compliance Status link	Opens the PCI Data Security Standard report. For more information, see <a href="#">"PCI Data Security Standard Compliance Status Reports" on page 641.</a>

## COBIT Compliance Status Reports

COBIT (Control Objectives for Information and related Technology) is an internal control framework that helps meet the needs of management by bridging the gaps among business risks, control needs, and technical issues, while balancing risk versus return over IT and its processes.

NA enhances the implementation of four domains for effective internal control system as defined by COBIT:

- **Monitoring** — NA monitors processes, assesses internal control adequacy, secures independent assurance, and provides for independent audit.
- **Delivery & Support** — NA helps to manage service levels, third-party services, and performance and capacity, ensure continuous service system security, identify and allocate costs, educate and train users, assist and advise customers, and manage configurations, data, facilities, and operations.
- **Planning & Organization** — NA helps to define a strategic IT plan, determine technological direction, manage the IT investment and human resources, communicate management aims and directions, and ensure compliance with external requirements.
- **Acquisition & Implementation** — NA helps to identify automated solutions, acquire and maintain technology infrastructure, develop and maintain procedures, install and accredit systems, and manage changes.

For detailed information on COBIT and how NA enhances the implementation of COBIT, click the “More information about COBIT and achieving compliance using HPE Network Automation” link on the COBIT Status Compliance page.

To view the COBIT Compliance Status reports:

1. On the menu bar under Reports, click Compliance Center. The Compliance Center Home page opens.
2. Click the COBIT Compliance Status link. The COBIT Compliance Status page opens.

### COBIT Compliance Status Page Fields

Fields	Description/Action
<b>MONITORING</b>	
M1 Monitor the processes	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Devices with different startup and running configurations. Clicking the Device List link opens Device Search Results report.</li> <li>• Inactive devices. Clicking the Inactive Devices link opens the Device Search Results page.</li> <li>• ACLs. Clicking the All ACLs link opens the ACLs Search Results page.</li> <li>• ACLs in use. Clicking the ACLs In Use link opens the ACLs Search Results</li> </ul>

Fields	Description/Action
	<p>page.</p> <ul style="list-style-type: none"> <li>• ACL changes in the last 7 days. Clicking the ACL Changes link opens the ACLs Search Results page.</li> <li>• Approved changes in the last 7 days. Clicking the Approved Changes link opens the Approved Changes Search Results page.</li> </ul>
M2 Assess internal control adequacy	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Workflow rules in place. Clicking the Workflow Setup link opens the Workflow Wizard.</li> <li>• Configuration polices in place. Clicking the Configuration Polices link opens the Polices page.</li> <li>• Unapproved changes in the last 7 days. Clicking the Unapproved Changes link opens the Unapproved Changes page.</li> </ul>
M3 Obtain independent assurance	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Monitors showing an “okay” status. Clicking the System Status link opens the System Status report.</li> <li>• Devices in software level. Clicking the Device Software Report link opens the Software Level Search Results page.</li> <li>• Configuration policy non-compliance events in the last 24 hours. Clicking the Configuration Policy Events (24 hours) link opens the Configure Policy Activity page.</li> <li>• Configuration policy non-compliance events in the last 7 days. Clicking the Configuration Policy Events (7 days) link opens the Configure Policy Activity page.</li> <li>• Configuration management “Best Practices” green (within threshold) statuses. Clicking the Network Status Report link opens the Network Status report.</li> </ul>
M4 Provide for independent audit	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Accessible User reports. Clicking the User &amp; System Reports link opens the User &amp; System Reports page.</li> <li>• Accessible System reports. Clicking the User &amp; System Reports link opens the User &amp; System reports.</li> </ul>
<b>DELIVERY &amp; SUPPORT</b>	
DS1 Define and manage service levels	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Configuration management “Best Practices” green (within threshold) statuses. Clicking the Network Status Report link opens the Network Status report.</li> <li>• Average changes per day (last 7 Days). Clicking the Summary Reports link opens the Summary reports.</li> <li>• Average changes per day (last 30 Days). Clicking the Summary Reports link opens the Summary reports.</li> </ul>
DS2 Manage third-	<p>Displays the number of:</p>

Fields	Description/Action
party services	<ul style="list-style-type: none"> <li>• Devices with access failures. Clicking the Inaccessible Devices link opens the Device Search Results page.</li> <li>• Devices that have different startup and running configurations. Clicking the Devices List link opens the Device Search Results page.</li> <li>• Inactive devices. Clicking the Inactive Devices link opens the Device Search Results page.</li> </ul>
DS3 Manage performance and capacity	Displays the number of devices with port availability less than 10%. Clicking the Port Availability link opens the Device Search Results page.
DS4 Ensure continuous service	Displays the number of: <ul style="list-style-type: none"> <li>• Diagnostics run in the last 24 hours. Clicking the Diagnostics (24 hours) link opens the Diagnostic Search Results page.</li> <li>• Diagnostics run in the last 7 days. Clicking the Diagnostics (7 days) link opens the Diagnostic Search Results page.</li> </ul>
DS5 Ensure systems security	Displays the number of: <ul style="list-style-type: none"> <li>• Users restricted to specific sets of devices. Clicking the User List link opens the User Search Results page.</li> <li>• Users assigned Administrator access permissions. Clicking the User List link opens the All User page.</li> <li>• Device Password Rules in place. Clicking the Device Password Rules link opens the Device Password Rules page.</li> <li>• ACLs. Clicking the All ACLs link opens the ACLs Search Results page.</li> <li>• ACLs in use. Clicking the ACLs In Use link opens the ACLs Search Results page.</li> <li>• ACL changes in the last 7 days. Clicking the ACL Changes link opens the ACLs Search Results page.</li> </ul>
DS6 Identify and allocate costs	Displays the number of: <ul style="list-style-type: none"> <li>• Devices in inventory. Clicking the Device List link opens the Inventory page.</li> <li>• Modules in inventory. Clicking the Module link opens the Module Search Results page.</li> </ul>
DS7 Educate and train users	Provides links to the following documentation: <ul style="list-style-type: none"> <li>• <i>NA User Guide</i></li> <li>• NA Release Notes</li> </ul>
DS8 Assist and advice customers	Provides links to the following: <ul style="list-style-type: none"> <li>• Download driver update packages</li> <li>• View latest Release Notes</li> <li>• View license Information</li> <li>• Create a Technical Support ticket</li> </ul>

Fields	Description/Action
	<ul style="list-style-type: none"> <li>Email Customer Support</li> </ul>
DS9 Manage the configuration	Displays the number of: <ul style="list-style-type: none"> <li>Configuration changes detected in the last 7 days. Clicking the Configuration Changes link opens the Config Search Results page.</li> <li>Stored device configurations. Clicking the Active Configurations link opens the Config Search Results page.</li> <li>Changes pending approval. Clicking the Changes Pending Approval link opens the Changes Pending Search Results page.</li> <li>Approved changes in the last 7 days. Clicking the Approved Changes link opens the Approved Changes Search Results page.</li> <li>Unapproved changes in the last 7 days. Clicking the Unapproved Changes link opens the Unapproved Changes page.</li> </ul>
DS10 Manage problems and incidents	Displays the number of: <ul style="list-style-type: none"> <li>Configuration Changes detected in the last 24 hours. Clicking the Dashboard link opens the Home page.</li> <li>NA events that occurred in the last 24 hours. Clicking the Dashboard link opens the Home page.</li> </ul>
DS11 Manage data	Displays the number of stored device configurations.
DS12 Manage facilities	Displays the number of: <ul style="list-style-type: none"> <li>Devices in inventory. Clicking the Device List link opens the Inventory page.</li> <li>Modules in inventory. Clicking the Modules link opens the Module Search Results page.</li> </ul>
DS13 Manage operations	Displays the number of: <ul style="list-style-type: none"> <li>Device change tasks scheduled for the next 24 hours. Clicking the Pending Tasks (24 hours) link opens the Task Search Results page.</li> <li>Device change tasks scheduled for the next 7 days. Clicking the Pending Tasks (7 days) link opens the Task Search Results page.</li> <li>Software deployments scheduled for the next 24 hours. Clicking the Pending Deployments (24 hours) link opens the Task Search Results page.</li> <li>Software deployments scheduled for the next 7 days. Clicking the Pending Deployments (7 days) link opens the Task Search Results page.</li> <li>Changes pending approval. Clicking the Changes Pending Approval link opens the Changes Pending Search Results page.</li> </ul>
<b>PLANNING &amp; ORGANIZATION</b>	
PO1 Define a strategic IP plan	Displays the number of: <ul style="list-style-type: none"> <li>Devices in inventory. Clicking the Device List link opens the Device Details page.</li> <li>Modules in inventory. Clicking the Modules link opens the Module Search Results</li> </ul>

Fields	Description/Action
	<p>page.</p> <ul style="list-style-type: none"> <li>• Displays the number of devices with port availability less than 10%. Clicking the Port Availability link opens the Device Search Results page.</li> </ul>
PO2 Define the information architecture	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Devices in inventory. Clicking the Device List link opens the Inventory page.</li> <li>• Modules in inventory. Clicking the Modules link opens the Module Search Results page.</li> <li>• Stored device configurations. Clicking the Active Configurations link opens the Config Search Results page.</li> </ul>
PO3 Determine the technological direction	<p>Displays the number of devices in inventory from the total number of vendors. Clicking the Device List by Vendors link opens the Inventory page.</p>
PO4 Define the IT organization and relationships	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Users restricted to specific sets of devices. Clicking the User List link opens All Users page.</li> <li>• Users assigned Administrator access permissions Clicking the User List link opens the All Users page.</li> <li>• Device Password Rules in place Clicking the Device Password Rules link opens the Device Password Rules List page</li> </ul>
PO5 Manage the IT investment	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Devices in inventory. Clicking the Device List link opens the Inventory page.</li> <li>• Modules in inventory. Clicking the Modules link opens the Module Search Results page.</li> <li>• Devices not active. Clicking the Device List link opens the Inventory page.</li> </ul>
PO6 Communicate management aims and directions	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Configuration management “Best Practices” green (within threshold) statuses. Clicking the Network Status Report link opens the Network Status report.</li> <li>• Active configurations policies. Clicking the Configurations Policies link opens the Config Search Results page.</li> </ul>
PO7 Manage human resources	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Users restricted to specific sets of devices. Clicking the User List link opens the User Search Results page.</li> <li>• Users assigned Administrator access permissions. Clicking the User List link opens the User Search Results page.</li> <li>• Device Password Rules in place. Device Password Rules in place Clicking the Device Password Rules link opens the Device Password Rules page.</li> </ul>
PO8 Manage compliance with	<p>Displays the number of active configurations policies. Clicking the Configurations Policies link opens the Config Search Results page. Clicking the Compliance Center</p>



Fields	Description/Action
external requirements	link opens the Compliance Center Home page.
PO9 Assess risks	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Configuration management “Best Practices” green (within threshold) statuses. Clicking the Network Status Report link opens the Network Status report.</li> <li>• Devices with access failures. Clicking the Inaccessible Devices link opens the Device Search Results page.</li> <li>• Displays the number of devices with port availability less than 10%. Clicking the Port Availability link opens the Device Search Results page.</li> </ul>
PO10 Manage projects	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Device change tasks scheduled for the next 24 hours. Clicking the Pending Tasks (24 hours) link opens the Task Search Results page.</li> <li>• Device change tasks scheduled for the next 7 days. Clicking the Pending Tasks (7 days) link opens the Task Search Results page.</li> <li>• Software deployments scheduled for the next 24 hours. Clicking the Pending Deployments (24 hours) link opens the Task Search Results page.</li> <li>• Software deployments scheduled for the next 7 days. Clicking the Pending Deployments (7 days) link opens the Task Search Results page.</li> </ul>
PO11 Manage quality	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Monitors showing an “okay” status. Clicking the System Status link opens the System Status report.</li> <li>• Devices in software compliance. Clicking the Device Software Report link opens the Software Compliances Search Results page.</li> <li>• Configuration policy non-compliance events in the last 24 hours. Clicking the Policy Events (24 hours) link opens the Configure Policy Activity page.</li> <li>• Configuration policy non-compliance events in the last 7 days. Clicking the Policy Events (7 days) link opens the Configure Policy Activity page.</li> <li>• Configuration management “Best Practices” green (within threshold) statuses. Clicking the Network Status Report link opens the Network Status report.</li> </ul>
<b>ACQUISITION &amp; IMPLEMENTATION</b>	
AI1 Identify automated solutions	<p>Provides the following default links:</p> <ul style="list-style-type: none"> <li>• System task to prune database runs weekly. Clicking the Pending Tasks link opens the Pending Tasks page.</li> <li>• System task to gather module inventory data runs weekly. Clicking the Pending Tasks link opens the Scheduled Tasks page.</li> <li>• System task to update Summary Reports runs daily. Clicking the Pending Tasks link opens the Scheduled Tasks page.</li> <li>• System task to poll for device configuration changes runs daily. Clicking the Pending Tasks link opens the Scheduled Tasks page.</li> </ul>

Fields	Description/Action
AI2 Acquire and maintain application software	This is not applicable.
AI3 Acquire and maintain technology infrastructure	Displays the number of: <ul style="list-style-type: none"> <li>• Devices in inventory. Clicking the Device List link opens the Inventory page.</li> <li>• Modules in inventory. Clicking the Modules link opens the Module Search Results page.</li> <li>• Stored device configurations. Clicking the Active Configurations link opens the Config Search Results page.</li> </ul>
AI4 Develop and maintain procedures	Displays the number of: <ul style="list-style-type: none"> <li>• Configuration management “Best Practices” green (within threshold) statuses. Clicking the Network Status Report link opens the Network Status report.</li> <li>• Active configurations policies. Clicking the Configurations Policies link opens the Config Search Results page.</li> </ul>
AI5 Install and accredit systems	Displays the number of: <ul style="list-style-type: none"> <li>• Monitors showing an “okay” status. Clicking the System Status link opens the System Status report.</li> <li>• Device software compliance. Clicking the Device Software Report link opens the Software Levels Search Results page.</li> <li>• Configuration management “Best Practices” green (within threshold) statuses. Clicking the Network Status Report link opens the Network Status report.</li> </ul>
AI6 Manage changes	Displays the number of: <ul style="list-style-type: none"> <li>• Telnet/SSH Proxy sessions in the last 7 days. Clicking the Sessions link opens the Session Search Results page.</li> <li>• Device change tasks scheduled in the last 7 days. Clicking the Past Tasks (7 days) link opens the Task Search Results page.</li> <li>• Device change tasks scheduled for the next 7 days. Clicking the Pending Tasks (7 days) link opens the Task Search Results page..</li> <li>• Changes pending approval. Clicking the Changes Pending Approval link opens Changes Pending Search Results page.</li> <li>• Approved changes in the last 7 days. Clicking the Approved Changes link opens the Approved Changes Search Results page.</li> <li>• Unapproved changes in the last 7 days. Clicking the Unapproved Changes link opens the Unapproved Changes page.</li> </ul>

## COSO Compliance Status Reports

In 1992, the Committee of Sponsoring Organizations of the Treadway Commission (COSO) issued a landmark report on internal control. *Internal Control—Integrated Framework*, which is often referred to as

“COSO”, provides a basis for establishing internal control systems and determining their effectiveness.

NA provides five essential components for an effective internal control system:

- Control Environment — Establishes the foundation for the internal control system by providing fundamental discipline and structure.
- Risk Assessment — Includes identification and analysis by management of relevant risks to achieving objectives.
- Control Activities — Ensures management objectives are achieved and risk mitigation strategies are carried out.
- Information and Communication — Supports all control components by communicating control responsibilities to employees, and by providing information in a form and timeframe that enables employees to carry out their duties.
- Monitoring — Includes the external oversight of internal controls by management or other parties outside the process.

For detailed information on COSO, click the “More information about COSO and achieving compliance using HPE Network Automation” link.

To view the COSO Compliance Status reports:

1. On the menu bar under Reports, click Compliance Center. The Compliance Center Home page opens.
2. Click the COSO Compliance Status link. The COSO Compliance Status page opens.

#### COSO Compliance Status Page Fields

Fields	Description/Action
Control Environment	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Users restricted to specific sets of devices. Clicking the User List link opens the User Search Results page.</li> <li>• Users assigned Administrator access permissions Clicking the User List link opens the User Search Results page.</li> <li>• Device Password Rules in place. Device Password Rules in place Clicking the Device Password Rules link opens the Device Password Rules page.</li> <li>• Configuration polices in place. Clicking the Configuration Polices link opens the Polices page.</li> <li>• Workflow rules in place. Clicking the Workflow Setup link opens the Workflow Wizard.</li> <li>• ACLs. Clicking the All ACLs link opens the ACLs Search Results page.</li> <li>• ACLs in use. Clicking the ACLs In Use link opens the ACLs Search Results page.</li> </ul>
Risk Assessment	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Configuration management “Best Practices” green (within threshold) statuses. Clicking the Network Status Report link opens the Network Status report.</li> <li>• Devices with access failures. Clicking the Inaccessible Devices link opens the Device Search Results page.</li> <li>• Displays the number of devices with port availability less than 10%. Clicking the Port Availability link opens the Device Search Results page.</li> </ul>

Fields	Description/Action
Control Activities	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Telnet/SSH Proxy sessions in the last 7 days. Clicking the Sessions link opens the Session Search Results page.</li> <li>• Device change tasks scheduled for the next 24 hours. Clicking the Pending Tasks (24 hours) link opens the Task Search Results page.</li> <li>• Device change tasks scheduled for the next 7 days. Clicking the Pending Tasks (7 days) link opens the Task Search Results page.</li> <li>• Software deployments scheduled for the next 24 hours. Clicking the Pending Deployments (24 hours) link opens the Task Search Results page.</li> <li>• Software deployments scheduled for the next 7 days. Clicking the Pending Deployments (7 days) link opens the Task Search Results page.</li> <li>• Changes pending approval. Clicking the Changes Pending Approval link opens Changes Pending Search Results page.</li> </ul>
Information and Communication	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Configuration changes detected in the last 24 hours. Clicking the Dashboard link opens the Home page.</li> <li>• NA events that occurred in the last 24 hours. Clicking the Dashboard link opens the Home page.</li> <li>• Average number of changes per day (last 7 days). Clicking the Summary Reports link opens the Summary reports.</li> <li>• Average number of changes per day (last 30 days). Clicking the Summary Reports link opens the Summary reports.</li> </ul>
Monitoring	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Monitors showing an “okay” status. Clicking the System Status link opens the System Status report.</li> <li>• Device software compliance. Clicking the Device Software Report link opens the Software Compliance Search Results page.</li> <li>• Configuration policy non-compliance events in the last 24 hours. Clicking the Configuration Policy Events (24 hours) link opens the Configure Policy Activity page.</li> <li>• Configuration policy non-compliance events in the last 7 days. Clicking the Configuration Policy Events (7 days) link opens the Configure Policy Activity page.</li> <li>• Devices that have different startup and running configurations. Clicking the Devices List link opens the Device Search Results page.</li> <li>• Inactive devices. Clicking the Inactive Devices link opens the Device Search Results page.</li> <li>• Approved changes in the last 7 days. Clicking the Approved Changes link opens the Approved Changes Search Results page.</li> <li>• Unapproved changes in the last 7 days. Clicking the Unapproved Changes link opens the Unapproved Changes page.</li> <li>• ACL changes in the last 7 days. Clicking the ACL Changes link opens the ACLs Search Results page.</li> </ul>

# ITIL Compliance Status Reports

ITIL (IT Infrastructure Library) was developed for the British government by the CCTA (now the OGC: Office of Government Commerce), and has been rapidly adopted across the world as the standard for best practice in the provision of IT services. Three major areas of ITIL include:

- Service Support — Enables IT services to be effectively provided.
- Service Delivery — Enables the management of IT services.
- Security Management — Enables the protection of data and infrastructures.

For detailed information on ITIL, click the “More information about ITIL and achieving compliance using HPE Network Automation” link.

To view the ITIL Compliance Status reports:

1. On the menu bar under Reports, click Compliance Center. The Compliance Center Home page opens.
2. Click the ITIL Compliance Status link. The ITIL Compliance Status page opens.

## ITIL Compliance Status Page Fields

Fields	Description/Action
<b>Configuration Management</b>	
Service support process	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Configuration changes detected in the last 7 days. Clicking the Configuration Changes link opens the Config Search Results page.</li> <li>• Stored device configurations. Clicking the Active Configurations link opens the Config Search Results page.</li> </ul>
<b>Incident Management</b>	
Service support process	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Configuration changes detected in the last 24 hours. Clicking the Dashboard link opens the Home page.</li> <li>• NA events that occurred in the last 24 hours. Clicking the Dashboard link opens the Home page.</li> </ul>
<b>Problem Management</b>	
Service support process	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Configuration management “Best Practices” green (within threshold) statuses. Clicking the Network Status Report link opens the Network Status report.</li> <li>• Devices with access failures. Clicking the Inaccessible Devices link opens the Device Search Results page.</li> </ul>
<b>Change Management</b>	
Service support process	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Telnet/SSH Proxy sessions in the last 7 days. Clicking the Sessions link opens the Session Search Results page.</li> </ul>

Fields	Description/Action
	<ul style="list-style-type: none"> <li>• Device change tasks scheduled for the next 24 hours. Clicking the Pending Tasks (24 hours) link opens the Task Search Results page.</li> <li>• Device change tasks scheduled for the next 7 days. Clicking the Pending Tasks (7 days) link opens the Task Search Results page.</li> <li>• Changes pending approval. Clicking the Changes Pending Approval link opens Changes Pending Search Results page.</li> <li>• Approved changes in the last 7 days. Clicking the Approved Changes link opens the Approved Changes Search Results page.</li> <li>• Unapproved changes in the last 7 days. Clicking the Unapproved Changes link opens the Unapproved Changes page.</li> <li>• Configuration polices in place. Clicking the Configuration Polices link opens the Policies page.</li> <li>• Workflow rules in place. Clicking the Workflow Setup page opens the Workflow Wizard.</li> </ul>
<b>Service Desk</b>	
Service support function	Displays the number of: <ul style="list-style-type: none"> <li>• Device change tasks scheduled for the next 24 hours. Clicking the Pending Tasks (24 hours) link opens the Task Search Results page.</li> <li>• Device change tasks scheduled for the next 7 days. Clicking the Pending Tasks (7 days) link opens the Task Search Results page.</li> </ul>
<b>Release Management</b>	
Service delivery process	Displays the number of: <ul style="list-style-type: none"> <li>• Software deployments scheduled for the next 24 hours. Clicking the Pending Deployments (24 hours) link opens the Task Search Results page.</li> <li>• Software deployments scheduled for the next 7 days. Clicking the Pending Deployments (7 days) link opens the Task Search Results page.</li> <li>• Devices in software compliance. Clicking the Device Software Report link opens the Software Compliance Search Results page.</li> </ul>
<b>Service Level Management</b>	
Service delivery process	Displays the number of: <ul style="list-style-type: none"> <li>• Configuration management “Best Practices” green (within threshold) statuses. Clicking the Network Status Report link opens the Network Status report.</li> <li>• Average changes per day (last 7 Days). Clicking the Summary Reports link opens the Summary reports.</li> <li>• Average changes per day (last 30 Days). Clicking the Summary Reports link opens the Summary reports.</li> </ul>
<b>Capacity Management</b>	
Service delivery	Displays the number of devices with port availability less than 10%. Clicking the Port Availability link opens the Device Search Results page.

Fields	Description/Action
process	
<b>Continuity Management</b>	
Service delivery process	Displays the number of: <ul style="list-style-type: none"> <li>• Diagnostics run in the last 24 hours. Clicking the Diagnostics (24 hours) link opens the Diagnostic Search Results page.</li> <li>• Diagnostics run in the last 7 days. Clicking the Diagnostics (7 days) link opens the Diagnostic Search Results page.</li> </ul>
<b>Availability Management</b>	
Service delivery process	Displays the number of: <ul style="list-style-type: none"> <li>• Configuration policy non-compliance events in the last 24 hours. Clicking the Configuration Policy Events (24 hours) link opens the Configure Policy Activity page.</li> <li>• Configuration policy non-compliance events in the last 7 days. Clicking the Configuration Policy Events (7 days) link opens the Configure Policy Activity page.</li> </ul>
<b>IT Financial Management</b>	
Service delivery process	Displays the number of: <ul style="list-style-type: none"> <li>• Monitors showing an “okay” status. Clicking the System Status link opens the System Status report.</li> <li>• Devices in inventory. Clicking the Device List link opens the Inventory page.</li> <li>• Modules in inventory. Clicking the Module link opens the Module Search Results page</li> </ul>
<b>Security Management</b>	
Service delivery process	Displays the number of: <ul style="list-style-type: none"> <li>• Users restricted to specific sets of devices. Clicking the User List link opens the All Users page.</li> <li>• Users assigned Administrator access permissions. Clicking the User List link opens the User Search Results page.</li> <li>• Device password rules in place. Device Password Rules in place Clicking the Device Password Rules link opens the Device Password Rules page.</li> <li>• ACLs. Clicking the All ACLs link opens the ACLs Search Results page.</li> <li>• ACLs in use. Clicking the ACLs In Use link opens the ACLs Search Results page.</li> <li>• ACL changes in the last 7 days. Clicking the ACL Changes link opens the ACLs Search Results page.</li> </ul>

## GLBA Compliance Status Reports

The Financial Modernization Act of 1999, also known as the Gramm-Leach-Bliley Act (GLBA), includes provisions to protect consumers’ personal financial information held by financial institutions. There are three principal privacy requirements:

- Pretexting provisions
- Financial Privacy Rule
- Safeguards Rule

The Safeguards Rule requires all financial institutions to design, implement, and maintain safeguards to protect customer information. The Safeguards Rule applies not only to financial institutions that collect information from their own customers, but also to financial institutions, such as credit reporting agencies that receive customer information from other financial institutions.

For detailed information on GLBA, click the “More information about GLBA and achieving compliance using HPE Network Automation” link.

To view the GLBA Compliance Status reports:

1. On the menu bar under Reports, click Compliance Center. The Compliance Center Home page opens.
2. Click the GLBA Compliance Status link. The GLBA Compliance Status page opens.

**GLBA Compliance Status Page Fields**

Fields	Description/Action
<b>Interagency Guideline Section</b>	
II.A. Information Security Program	Displays the number of: <ul style="list-style-type: none"> <li>• Devices in inventory.</li> <li>• Modules in inventory.</li> <li>• Stored device configurations.</li> </ul>
II.B. Objectives	Displays the number of: <ul style="list-style-type: none"> <li>• Users restricted to specific groups of devices.</li> <li>• Users assigned Administrator permissions.</li> <li>• Failed user login attempts in the past 7 days.</li> <li>• Changes pending approval.</li> <li>• Approved changes in the last 7 days.</li> <li>• Unapproved changes in the past 7 days.</li> <li>• ACLs identified.</li> <li>• ACLs in use.</li> <li>• ACL changes in the past 7 days.</li> </ul>
III.A. Involve the Board of Directors	Displays the number of: <ul style="list-style-type: none"> <li>• Available user reports.</li> <li>• Available System reports.</li> </ul>
III.B. Assess Risk	Displays the number of: <ul style="list-style-type: none"> <li>• Configuration management “Best Practices” green status.</li> <li>• Devices software level.</li> <li>• Monitors with an “Okay” status.</li> </ul>



Fields	Description/Action
	<ul style="list-style-type: none"> <li>• Devices with access failures.</li> <li>• Devices with port availability of less than 10%.</li> <li>• Devices with different startup and running configurations.</li> </ul>
III.C.1. Manage and Control Risk (Policies & Procedures)	Displays the number of: <ul style="list-style-type: none"> <li>• Workflow rules in place.</li> <li>• Configuration policies in place.</li> <li>• Device password rules in place.</li> </ul>
III.C.2. Manage and Control Risk (Training)	You can access the following documentation: <ul style="list-style-type: none"> <li>• <i>NA User Guide</i></li> <li>• <i>NA Release Notes</i></li> </ul>
III.C.3. Manage and Control Risk (Testing)	Displays the number of: <ul style="list-style-type: none"> <li>• Configuration policy non-compliance events in the past 24 hours.</li> <li>• Configuration policy non-compliance events in the past 7 days.</li> <li>• Devices not in software level.</li> <li>• Diagnostics run in the past 24 hours.</li> <li>• Diagnostics run in the past 7 days.</li> </ul>
III.D. Oversee Service Provider Arrangements	Displays the number of: <ul style="list-style-type: none"> <li>• Stored configurations.</li> <li>• Devices with different startup and running configurations.</li> <li>• Non-active devices.</li> <li>• Devices with access failures.</li> </ul>
III.E. Adjust the Program	Displays the number of: <ul style="list-style-type: none"> <li>• Users added in the last month.</li> <li>• Devices added in the last month.</li> <li>• Device groups added in the last month.</li> <li>• Configuration stored in the last month.</li> </ul>
III.F. Report to the Board	Displays: <ul style="list-style-type: none"> <li>• The number of Configuration management “Best Practices” green status.</li> <li>• System Status report.</li> <li>• Summary reports.</li> <li>• HPE Network Automation Compliance Center.</li> </ul>

Fields	Description/Action
III.G. Implement the Standards	This requirement is outside the scope of NA.

## HIPAA Compliance Status Reports

HIPAA is the Health Insurance Portability & Accountability Act of 1996. The final HIPAA Security Rule was published on February 20, 2003. Under the final rule, covered entities include the Department of Health and Human Services (HHS) Medicare Program, other federal agencies operating health plans or providing health care, state Medicaid agencies, private health plans, health care providers, and health care clearinghouses that process, transmit, and/or store protected health information (PHI) in electronic form.

For detailed information on HIPAA, click the “More information about HIPAA and achieving compliance using HPE Network Automation” link.

To view the HIPAA Compliance Status reports:

1. On the menu bar under Reports, click Compliance Center. The Compliance Center Home page opens.
2. Click the HIPAA Compliance Status link. The HIPAA Compliance Status page opens.

### HIPAA Compliance Status Page Fields

Fields	Description/Action
<b>Security Standards: General Rules</b>	
(1) Ensure the confidentiality, integrity, and availability of all electronic protected health information the covered entity creates, receives, maintains, or transmits.	Displays the number of: <ul style="list-style-type: none"> <li>• Stored device configurations</li> <li>• Devices with access failures.</li> <li>• Devices with port availability of less than 10%.</li> </ul>
(2) Protect against any reasonably-anticipated threats or hazards to the security or integrity of such information.	Displays the number of: <ul style="list-style-type: none"> <li>• Failed user login attempts in the past 7 days.</li> <li>• ACLs identified.</li> <li>• ACLs in use.</li> <li>• ACL changes in the past 7 days.</li> </ul>
(3) Protect against any anticipated uses or disclosures that are not permitted or required under subpart E of this part.	Displays the number of: <ul style="list-style-type: none"> <li>• Users restricted to specific sets of devices.</li> <li>• Users assigned Administrator access permissions.</li> </ul>
(4) Ensure compliance with this subpart by its workforce.	You can open the HPE Network Automation Compliance Center HIPAA Compliance Status report.

Fields	Description/Action
<b>Administrative Safeguards</b>	
<p>(A) Risk analysis (Required). Conduct an accurate and thorough assessment of the potential risks and vulnerabilities to the confidentiality, integrity, and availability of electronic protected health information held by the covered entity.</p>	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Configuration management “Best Practices” green status.</li> <li>• Devices in software level.</li> <li>• Monitors with an “Okay” status.</li> <li>• Devices with access failures.</li> <li>• Devices with port availability of less than 10%.</li> <li>• Software vulnerabilities detected.</li> <li>• Devices with different startup and running configurations.</li> </ul>
<p>(B) Risk management (Required). Implement security measures sufficient to reduce risks and vulnerabilities to a reasonable and appropriate level to comply with §164.306(a).</p>	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Workflow rules in place.</li> <li>• Active configuration policies.</li> <li>• Device Password Rules in place.</li> </ul>
<p>(C) Sanction policy (Required). Apply appropriate sanctions against workforce members who fail to comply with the security policies and procedures of the covered entity.</p>	<p>This requirement is outside the scope of NA.</p>
<p>(D) Information system activity review (Required). Implement procedures to regularly review records of information system activity, such as audit logs, access reports, and security incident tracking reports.</p>	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• User login attempts in the past 7 days.</li> <li>• Users added in the past 7 days.</li> <li>• Users deleted in the past 7 days.</li> <li>• User permissions changed in the past 7 days.</li> <li>• Configuration policies changed in the past 7 days.</li> <li>• Configuration policies added in the past 7 days.</li> </ul>
<p>Identify the security official who is responsible for the development and implementation of the policies and procedures required by this subpart for the entity.</p>	<p>This requirement is outside the scope of NA.</p>
<b>Workforce Security</b>	
<p>(A) Authorization and/or supervision (Addressable). Implement procedures for the authorization and/or supervision of workforce members who work with electronic protected health information or in locations where it might be accessed.</p>	<p>Displays the number of:</p> <ul style="list-style-type: none"> <li>• Users restricted to specific group of devices.</li> </ul>

Fields	Description/Action
	<ul style="list-style-type: none"> <li>• Approved changes in the last 7 days.</li> <li>• Unapproved changes in the last 7 days.</li> </ul>
(B) Workforce clearance procedure (Addressable). Implement procedures to determine that the access of a workforce member to electronic protected health information is appropriate.	Displays the number of users assigned Administrator Access permissions.
(C) Termination procedures (Addressable). Implement procedures for terminating access to electronic protected health information when the employment of a workforce member ends or as required by determinations made as specified in paragraph (a)(3)(ii)(B) of this section.	Displays the number of users deleted in the past 7 days.
<b>Information Access Management</b>	
(A) Isolating health care clearinghouse functions (Required). If a health care clearinghouse is part of a larger organization, the clearinghouse must implement policies and procedures that protect the electronic protected health information of the clearinghouse from unauthorized access by the larger organization.	Displays the number of: <ul style="list-style-type: none"> <li>• Users restricted to specific groups of devices.</li> <li>• Users assigned restricted (non-Admin) access permissions.</li> </ul>
(B) Access authorization (Addressable). Implement policies and procedures for granting access to electronic protected health information, for example, through access to a workstation, transaction, program, process, or other mechanism.	Displays the number of: <ul style="list-style-type: none"> <li>• Users restricted to specific groups of devices.</li> <li>• Users assigned restricted (non-Admin) access permissions.</li> </ul>
(C) Access establishment and modification (Addressable). Implement policies and procedures that, based upon the entity's access authorization policies, establish, document, review, and modify a user's right of access to a workstation, transaction, program, or process.	Displays the number of: <ul style="list-style-type: none"> <li>• User accounts enabled in HPE Network Automation.</li> <li>• User accounts disabled in HPE Network Automation.</li> </ul>
<b>Security Awareness and Training</b>	
(A) Security reminders (Addressable). Periodic security updates.	Displays the number of: <ul style="list-style-type: none"> <li>• User accounts enabled in HPE Network Automation</li> <li>• User accounts disabled in HPE Network Automation.</li> </ul>
(B) Protection from malicious software (Addressable). Procedures for guarding against, detecting, and reporting malicious software.	This requirement is outside the scope of NA.
(C) Log-in monitoring (Addressable). Procedures for monitoring log-in attempts and reporting discrepancies.	Displays the number of:

Fields	Description/Action
	<ul style="list-style-type: none"> <li>• User login attempts in the past 7 days.</li> <li>• Failed user login attempts in the past 7 days.</li> </ul>
(D) Password management (Addressable). Procedures for creating, changing, and safeguarding passwords.	Displays the number of NA password changes in the past 7 days.
<b>Security Incident Procedures</b>	
Response and Reporting (Required). Identify and respond to suspected or known security incidents; mitigate, to the extent practicable, harmful effects of security incidents that are known to the covered entity; and document security incidents and their outcomes.	Displays the number of: <ul style="list-style-type: none"> <li>• User login attempts in the past 7 days.</li> <li>• Failed user login attempts in the past 7 days.</li> <li>• Configuration changes detected in the past 7 days.</li> </ul>
<b>Contingency Plan</b>	
(A) Data backup plan (Required). Establish and implement procedures to create and maintain retrievable exact copies of electronic protected health information.	NA does not create or maintain electronic protected health information.
(B) Disaster recovery plan (Required). Establish (and implement as needed) procedures to restore any loss of data.	NA is a high-availability (HA) system that can be implemented to support automatic failure detection and automatic (or manual) failover with no data loss.
(C) Emergency mode operation plan (Required). Establish (and implement as needed) procedures to enable continuation of critical business processes for protection of the security of electronic protected health information while operating in emergency mode.	NA is a high-availability (HA) system that can be implemented to support automatic failure detection and automatic (or manual) failover with no data loss.
(D) Testing and revision procedures (Addressable). Implement procedures for periodic testing and revision of contingency plans.	NA supports periodic testing of automatic failure detection and automatic (or manual) failover.
(E) Applications and data criticality analysis (Addressable). Assess the relative criticality of specific applications and data in support of other contingency plan components.	NA's robust reporting capabilities provide the foundation to assess NA' relative criticality with respect to other contingency plan components.
<b>Evaluation</b>	
Perform a periodic technical and nontechnical evaluation.	Displays the number of: <ul style="list-style-type: none"> <li>• Users restricted to specific group</li> </ul>

Fields	Description/Action
	of devices. <ul style="list-style-type: none"> <li>• Users assigned Administrator Access permissions.</li> <li>• Workflow rules in place. Clicking the Workflow Setup page opens the Workflow Wizard.</li> <li>• Configuration policies in place.</li> <li>• Device password rules in place.</li> </ul>
Written contract or other arrangement (Required). Document the satisfactory assurances required by paragraph (b)(1) of this section through a written contract or other arrangement with the business associate that meets the applicable requirements of § 164.314(a).	This requirement is outside the scope of NA.
<b>Physical Safeguards</b>	
(i) Contingency operations (Addressable). Establish (and implement as needed) procedures that allow facility access in support of restoration of lost data under the disaster recovery plan and emergency mode operations plan in the event of an emergency.	This requirement is outside the scope of NA.
(ii) Facility security plan (Addressable). Implement policies and procedures to safeguard the facility and the equipment therein from unauthorized physical access, tampering, and theft.	This requirement is outside the scope of NA.
(iii) Access control and validation procedures (Addressable). Implement procedures to control and validate a person's access to facilities based on their role or function, including visitor control, and control of access to software programs for testing and revision.	Displays the number of: <ul style="list-style-type: none"> <li>• User login attempts in the past 7 days.</li> <li>• Failed user login attempts in the past 7 days.</li> <li>• Users restricted to specific groups of devices.</li> <li>• Users assigned restricted (non-Admin) access permissions.</li> </ul>
(iv) Maintenance records (Addressable). Implement policies and procedures to document repairs and modifications to the physical components of a facility which are related to security (for example, hardware, walls, doors, and locks).	This requirement is outside the scope of NA.
<b>Workstation Use</b>	
Implement policies and procedures that specify the proper functions to be performed.	This requirement is outside the scope of NA.
Implement physical safeguards for all workstations that access electronic protected health information, to restrict access to	This requirement is outside the scope of NA.

Fields	Description/Action
authorized users.	
<b>Device and Media Controls</b>	
(i) Disposal (Required). Implement policies and procedures to address the final disposition of electronic protected health information, and/or the hardware or electronic media on which it is stored.	This requirement is outside the scope of NA.
(ii) Media re-use (Required). Implement procedures for removal of electronic protected health information from electronic media before the media are made available for re-use.	This requirement is outside the scope of NA.
(iii) Accountability (Addressable). Maintain a record of the movements of hardware and electronic media and any person responsible therefore.	This requirement is outside the scope of NA.
(iv) Data backup and storage (Addressable). Create a retrievable, exact copy of electronic protected health information, when needed, before movement of equipment.	This requirement is outside the scope of NA.
<b>Technical Safeguards</b>	
(i) Unique user identification (Required). Assign a unique name and/or number for identifying and tracking user identity.	Displays the number of: <ul style="list-style-type: none"> <li>• User accounts enabled in HPE Network Automation.</li> <li>• User accounts disabled in HPE Network Automation.</li> </ul>
(ii) Emergency access procedure (Required). Establish (and implement as needed) procedures for obtaining necessary electronic protected health information during an emergency.	HPE Network Automation is a high-availability (HA) system that can be implemented to support automatic failure detection and automatic (or manual) failover with no data loss.
(iii) Automatic logoff (Addressable). Implement electronic procedures that terminate an electronic session after a predetermined time of inactivity.	Web user sessions terminated after 1800 seconds of inactivity. 1800 is the default value. This value can be configured.
(iv) Encryption and decrypting (Addressable). Implement a mechanism to encrypt and decrypt electronic protected health information.	This requirement is outside the scope of NA.
<b>Audit Controls</b>	
Implement hardware, software, and/or procedural mechanisms that record and examine activity in information systems that contain or use electronic protected health information.	This requirement is outside the scope of NA.

Fields	Description/Action
<b>Standard Integrity</b>	
Mechanism to authenticate electronic protected health information (Addressable). Implement electronic mechanisms to corroborate that electronic protected health information has not been altered or destroyed in an unauthorized manner.	This requirement is outside the scope of NA.
<b>Person or Entity Authentication</b>	
Implement procedures to verify that a person or entity seeking access to electronic protected health information is the one claimed.	This requirement is outside the scope of NA.
<b>Transmission Security</b>	
(i) Integrity controls (Addressable). Implement security measures to ensure that electronically transmitted electronic protected health information is not improperly modified without detection until disposed of.	This requirement is outside the scope of NA.
(ii) Encryption (Addressable). Implement a mechanism to encrypt electronic protected health information whenever deemed appropriate.	This requirement is outside the scope of NA.
<b>Policies and Procedures</b>	
Implement reasonable and appropriate policies and procedures to comply with the standards, implementation specifications, or other requirements.	This requirement is outside the scope of NA.
<b>Documentation</b>	
(i) Time limit (Required). Retain the documentation required by paragraph (b)(1) of this section for 6 years from the date of its creation or the date when it last was in effect, whichever is later.	This requirement is outside the scope of NA.
(ii) Availability (Required). Make documentation available to those persons responsible for implementing the procedures to which the documentation pertains.	This requirement is outside the scope of NA.
(iii) Updates (Required). Review documentation periodically, and update as needed, in response to environmental or operational changes affecting the security of the electronic protected health information.	This requirement is outside the scope of NA.



# PCI Data Security Standard Compliance Status Reports

In an effort to combat data theft and maintain consumer confidence, all of the major credit card issuers have formulated detailed security programs, including:

- Visa USA Cardholder Information Security Program (CISP)
- MasterCard Site Data Protection (SDP) program
- Discover Information Security and Compliance (DISC) program
- American Express Data Security Operating Policy (DSOP)

In late 2004, Visa and MasterCard aligned their programs under a single standard: the Payment Card Industry (PCI) Data Security Standard. Fundamental security best practices focused on protecting cardholder data comprise the 12 PCI requirements. Penalties for failure to comply with the requirements or to rectify a security issue are severe: possible restrictions on the merchant or permanent prohibition of the merchant's participation in Visa programs, and a fine of up to \$500,000 per incident.

For information about the ways that NA functionality pertains to the PCI Data Security Standard, click the "More information about the PCI Data Security Standard and achieving compliance using HPE Network Automation" link.

To view the PCI Data Security Standard Compliance Status reports:

1. On the menu bar under Reports, click Compliance Center.  
The Compliance Center Home page opens.
2. Click the PCI Data Security Standard Compliance Status link.  
The PCI Data Security Standard Compliance Status page opens.

## PCI Data Security Standard Compliance Status Page

The PCI Data Security Standard Compliance Status page consolidates information available in NA under the requirements of the PCI Data Security Standard. For each standard requirement, the page presents a table with the following columns:

- **Specification**—Each row in the table describes one portion of the requirement.
- **Status**—Displays a summary of the managed network as it applies to this portion of the requirement.
- **More Information**—Links to the NA console pages that support the information in the Status column.

# Chapter 20: Creating Workflows

The following terms are used in this chapter:

- **Task** — Tasks are the primary mechanism by which NA interacts with your network. Tasks are specific actions you can either schedule or run immediately. Completed tasks provide the result of NA activities. Workflow tasks include all tasks, for example:
  - Deploy Passwords
  - Reboot Device
  - Task Snapshot
  - Run Command Script
  - Synchronize Startup and Running Configurations
  - Update Device Software
  - Run DiagnosticsFor a complete list of tasks, see ["About Tasks" on page 245](#).

**Note:** The Check Policy Compliance task is available only with the NA Ultimate edition license. To determine your license level, see the **Feature** field on the License Information page (**Help > About Network Automation > View License Information** link).

- **Project** — A project is an ordered sequence of tasks. From NA's point of view, a project is just another type of task with sub-tasks that are sequentially run (instead of in parallel).
- **Originator** — An individual who submits a task for approval.
- **Approver** — An individual or a group of individuals who can approve a task and confirm that the task complies with all internal policies.
- **FYI Recipients** — An individuals or a group of individuals who receive notification based on actions taken by the originator or the approver.
- **Approved** — The approval status of a task that has been approved for execution.
- **Not Approved** — The approval status of a task that has been rejected. A rejected task either does not have enough data or has incorrect data that could lead to negative consequences on the network. A rejected task cannot be recycled.
- **Suspended** — The approval status of a task that is temporarily (or permanently) on hold.
- **Override** — An action performed by the Originator of a task for use in emergencies when the approval process needs to be overridden. This function is only available if enabled in the Administrative Settings.

**Note:** You may want to enable all Power users to create tasks that do not require approval. For more information about creating rules, see ["Workflow Wizard" on the next page](#). For example, you can create a rule such as, "All Power Users do not need approval," before the "All Users need approval by Admin" rule

to enable Power users to bypass approval.

## Workflow Wizard

The Workflow Wizard enables you to easily setup a Workflow for tasks. To open the Workflow Wizard, on the menu bar under Admin click Workflow Setup. The Workflow Wizard opens.

Step	Description/Action
<b>Welcome Page</b>	The Welcome page provides a brief introduction to the Workflow Wizard. Click Next to continue.
<b>Step 1: Enable Workflow</b>	You are asked if you want to enable Workflow and require approval for some or all tasks. Click Yes and then click Next to continue. If you click No and then click Next, the Setup Complete page opens, where you can return to Workflow Wizard home page.
<b>Step 2: Enable Workflow - Cont'd.</b>	The Enable Workflow - Cont'd page provides an overview of the information you must provide when creating a Workflow. Click Next to continue.
<b>Step 3: Manage Approval Rules</b>	<p>Enter the name of the new Workflow Approval Rule and click Next to continue. You also have the option of modifying or deleting existing Workflow Approval Rules. All existing Workflow Approval Rules are displayed at the bottom of the page.</p> <p><b>Note:</b> NA is shipped with one default Workflow Approval Rule: <i>All users approved by Administrator.</i></p> <p><b>Note:</b> Workflow Approval Rules can be partitioned according to Partitions. Keep in mind that there are some Workflow Approval Rules that are available to all Partitions. These Workflow Approval Rules are labeled “Shared” (or “Global”), depending on configuration. However, you cannot edit or delete them without proper permissions. For information about creating Partitions, see <a href="#">"Segmenting Devices and Users" on page 142.</a></p>
<b>Step 4: Originator Setup</b>	The Originator Setup page enables you to designate the users that will trigger this rule when they create a task. When you are done adding users, click Next to continue.
<b>Step 5: Task Setup</b>	The Task Setup page enables you to designate which tasks need approval. When you are done adding tasks, click Next to continue. If you do not designate a task to require approval, the approval setting for that task appears as “Not Applicable.”
<b>Step 6: Device Group Setup</b>	The Device Group Setup page enables you to define Workflow Approval Rules based on device groups. This enables you to configure Workflow Approval Rules on device usage, device type, and so on. If device partitioning is enabled, there is a Partition selection drop-down menu. Keep in mind that the priority level can only be adjusted inside a Partition. Global rules always have higher priority than Partition rules. When you are done adding device

Step	Description/Action
	<p>groups, click Next. Keep in mind that at task creation time, the Workflow Approval Rule only applies if:</p> <ul style="list-style-type: none"> <li>• The task is against a single device and the Workflow Approval Rule's device group contains the device.</li> <li>• The task is against a device group and the Workflow Approval Rule's device group has a non-empty intersection with the task's device group.</li> </ul>
<b>Step 7: Approver Setup</b>	The Approver Setup page enables you to designate who can approve a task and confirm that the task complies with all internal policies, or if no approval is required. Keep in mind that a task originator cannot review his/her own tasks. When you are done adding users, click Next to continue.
<b>Step 8: FYI Recipient Setup</b>	The FYI Recipient Setup page enables you to designate who receives notification based on actions taken by the Workflow Approval Rule originator or approver. When you are done adding users, click Save. Keep in mind that originators and approvers need not be added as recipients. For more information about email notification, see <a href="#">"Email Notification" on page 650</a> .
<b>Setup Complete</b>	After you have successfully added a Workflow Approval Rule, the "Successfully created new rule <rule name>" message is displayed at the top of the page. You can now create a new Workflow Approval Rule for other users (originators) or modify/delete existing approval rules by clicking the Manage Approval Rules link. You can click the My Tasks option from the Tasks drop-down menu to view a summary of originator and approver actions. For more information, see <a href="#">"My Tasks" below</a> .

## My Tasks

The My Tasks page shows tasks originated by the current logged in user, including the task approval status, if applicable, and if the task has not yet run.

To view the My Tasks page, on the menu bar under Tasks click My Tasks. The My Tasks page opens.

### My Tasks Page Fields

Field	Description/Action
My Drafts link	If applicable, opens the My Drafts page.
Approval Requests link	<p>If the task requires approval, opens the Approval Requests page, where you can view tasks needing approval by the currently logged in user. By default, the page shows tasks that have not completed, including tasks that are:</p> <ul style="list-style-type: none"> <li>• Not approved</li> <li>• Waiting Approval</li> <li>• Waiting to run</li> </ul> <p>For more information, see <a href="#">"Approval Requests" on page 646</a>.</p>

Field	Description/Action
Scheduled Tasks link	Opens the Scheduled Task page for viewing the tasks that are in the queue but have not yet run. For more information, see <a href="#">"Viewing Scheduled Tasks" on page 400</a> .
Running Tasks link	Opens the Running Task page for viewing all running tasks. For more information, see <a href="#">"Viewing Running Tasks" on page 401</a> .
Recent Tasks link	Opens the Recent Tasks page for viewing the recent tasks. For more information, see <a href="#">"Viewing Recent Tasks" on page 403</a> .
Show Tasks Check Boxes	If the task requires approval, you can select the following display options: <ul style="list-style-type: none"> <li>• Approved</li> <li>• Not Approved</li> <li>• Waiting Approval</li> <li>• Overridden</li> <li>• Draft</li> <li>• No Approval Required</li> </ul>
Check Boxes	You can use the left-side check boxes to delete tasks. After you select the tasks, click the Actions drop-down menu and click Delete/Cancel. The adjacent Select drop-down menu enables you to select or deselect all tasks.
Schedule Date	Displays the date and time the task was created.
Task Name	Displays the task name. Clicking a task opens the Task Information page. For more information, see <a href="#">"About Tasks" on page 245</a> .
Approved By Date	If applicable, displays the date and time the task must be approved. If a task is not approved by its approval date, its status is set to "Not Approved."  <div style="background-color: #e0e0e0; padding: 5px;"><b>Note:</b> Approval options are only displayed if the task is part of a Workflow Approval Rule.</div>
Approval Status	If applicable, displays the task's approval status. Approval status is only displayed if the task is part of a Workflow Approval Rule. Approval statuses include: <ul style="list-style-type: none"> <li>• Awaiting Approval</li> <li>• Approved</li> <li>• Not Approved</li> <li>• Overridden</li> <li>• No Approval Required</li> </ul>
Task Status	The task state. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Priority	Displays the task's priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .

Field	Description/Action
Task Type	<p>Displays the task type, for example:</p> <ul style="list-style-type: none"> <li>• Deploy Password</li> <li>• Deploy Config</li> <li>• Discover Driver</li> <li>• Reboot Device</li> <li>• Take Snapshot</li> <li>• Synchronize Startup and Running Configurations</li> </ul> <p>For a complete list of tasks, see <a href="#">"About Tasks" on page 245</a>.</p> <p><b>Note:</b> Multi-Task Project tasks may or may not be displayed on the My Tasks results page. It depends on whether the Multi-Task Project task includes at least one of the task types listed above as a sub-task.</p>
Actions	<p>You can select one of the following options:</p> <ul style="list-style-type: none"> <li>• Delete — Enables you to delete the task.</li> <li>• Pause — Pauses the task so it does not run at its scheduled time.</li> </ul> <p><b>Note:</b> You can select Resume if you want to resume the task.</p> <ul style="list-style-type: none"> <li>• Run Now — Runs the task as soon as possible. If the maximum number of concurrent tasks has not been reached, the task runs immediately.</li> <li>• Edit — Opens the Edit Task page for that task.</li> </ul>
Display results in groups of	<p>You can set the number of items to display per page from the drop-down menu. The default is 25.</p>

## Approval Requests

The Approval Requests page enables you to view tasks needing approval by the currently logged in user. By default, the page shows tasks that have not yet completed where the approval status is either Approved, Waiting Approval or Not Approved.

**Note:** To view completed tasks, on the menu bar under Reports, select Search For and click Tasks. For more information, see ["Search For Task Page Fields" on page 496](#).

To view the Approval Requests page, on the menu bar under Tasks, click Approval Requests. The Approval Requests page opens.

### Approval Requests Page Fields

Field	Description/Action
My Tasks	Opens the My Task page for viewing the status of each task. For more information, see <a href="#">"Viewing My Tasks" on page 398</a> .
Scheduled Tasks link	Opens the Scheduled Task page for viewing the tasks that are in the queue but have not yet run. For more information, see <a href="#">"Viewing Scheduled Tasks" on page 400</a> .
Running Tasks link	Opens the Running Task page for viewing all running tasks. For more information, see <a href="#">"Viewing Running Tasks" on page 401</a> .
Recent Tasks link	Opens the Recent Tasks page for viewing the recent tasks. For more information, see <a href="#">"Viewing Recent Tasks" on page 403</a> .
Show Tasks	If checked, tasks with the following approval status are displayed: <ul style="list-style-type: none"> <li>• Approved</li> <li>• Not Approved</li> <li>• Waiting Approval</li> </ul>
Task Name	Displays the task name. To approve a task, click the Task name. The Task Information page opens. For more information, see <a href="#">"Task Information Page Fields" on the next page</a> .
Approve By	Displays the date and time the task must be approved. If a task is not approved by its approval date, its status is set to "Not Approved." <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Tasks that have run are removed from the Approval Request page. Tasks past their approval date are marked Not Approved and will remain on the Approval Request page until the Data Pruner deletes them. For more information about data pruning, see <a href="#">"Data Pruning Task Page Fields" on page 385</a>.</p> </div>
Approval Status	Displays the task's approval status. Approval statuses include: <ul style="list-style-type: none"> <li>• Waiting Approval</li> <li>• Not Approved</li> </ul>
Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Date	Displays the date and time the task was created.
Status	The task state. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Scheduled By	Displays the name of the person who scheduled the task.

## Approving Tasks

If you have been designated to approve a task:

1. On the menu bar under Tasks, click Approval Requests. The Approval Requests page opens. For more information, see ["Approval Requests" on page 646](#).
2. Click the task name to view approval options. The Task Information page opens.
3. Click the Approve button.

## Task Information Page Fields

The Task Information page includes detailed information on tasks, including:

- Task status
- Originator
- Devices affected
- Duration
- Approval information
- Result details

The Task information page also provides links to more detailed information in the event of a warning or failure. Keep in mind that a task can be successfully completed but still contain errors. For example, you could successfully deploy to a running configuration but have invalid commands within the configuration.

To open the Task Information page:

1. Select a device from the Inventory page. The Device Details page opens.
2. From the View drop-down menu, click Device Tasks. The Device Tasks page opens.
3. Click the Detail option in the Actions column for the task on which you want detailed information. The Task Information page opens.

Field	Description/Action
Edit Task link	Opens the task page so that you can edit the task. This link is only displayed for pending tasks.
Run Again link	Opens the task page so that you can re-run the task. This link is only displayed for completed tasks.
Return to List link	Opens the My Task page for viewing the status of each task. For more information, see <a href="#">"Viewing My Tasks" on page 398</a> .
<b>General Information</b>	
Task Name	Displays the task name.
Task Status	The task state. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .  <b>Note:</b> Multi-task projects continue processing when a warning is encountered. The warning status is shown in the parent task.
Comments	Displays any comments about the task.



Field	Description/Action
Originator	Displays the username or process that scheduled the task.
Create Date	Displays the date and time the task was created.
Devices Affected	Displays the host name and/or IP address of the affected device.
Schedule Date	Displays the date and time the task was scheduled to run.
Start Date	Displays the task's start date.
Complete Date	Displays the task's complete date.
Duration	Displays the task's duration.
Repeat Type	Displays the repeat type, for example: non-recurring.
<b>Approval Information</b>	
Approver(s)	Displays a list of task approvers.
Approval Status	Displays the task approval status.
Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Approved By	Displays the date and time the task must be approved.
New Comments	Enter additional comments about the task.
Approve Button	Click the Approve button to approve the task.
View Task Details link	Clicking the View Tasks link opens the Diagnostics History page.
<b>Additional Information</b>	
Result Details	<p>Displays the diagnostics that were automatically run (depending on the device type), for example:</p> <ul style="list-style-type: none"> <li>• Diagnostic "NA Module Status" completed</li> <li>• Diagnostic "NA Routing Table" completed</li> <li>• Diagnostic "NA OSPF Neighbors" completed</li> </ul>
<b>Task History</b>	
Task History Information	Displays task history information, such as when the task was run, the repeat type, and status.

# Email Notification

Task approvers receive email notification based on actions taken by the Workflow Rule originator. The Workflow Wizard's FYI Recipient Setup page can be used to notify users other than approvers of the task. For more information, see "[Workflow Wizard](#)" on page 643.

A sample email notification follows:

From: HPE on nas\_server1  
Sent: Thursday, April 10, 2014 1:24 PM  
To: Chris Admin  
Subject: Request for Approval

---

Terry has requested the Snapshot task for your approval on or before 2014-04-17 00:00:00:0

Task Name: Snapshot  
Description: Taking a snapshot of Lab2  
Priority: High  
Approval required on or before: 2014-04-17 00:00:00:0  
Originator: Terry  
Devices Affected: 172.22.123.26  
Task Frequency: Repeat once  
Task Schedule Date: 2014-04-17 15:00:00:0

You may approve, reject, or request clarification by accessing HPE Network Automation at <http://terry/task.view.htm/taskID=10023>

Clicking the link at the bottom of the email opens the Approval Requests page where you can approve or not approve a task. For more information, see "[Approval Requests](#)" on page 646.

# Chapter 21: Working With ACLs

Use the following table to quickly locate information.

Topic	Refer to:
Getting Started	"Getting Started" below
Viewing ACLs	"Viewing ACLs" on the next page
Running Command Scripts	"Running Command Scripts" on page 655
Creating ACLs	"Creating ACLs" on page 655
Changing ACL Applications	"Changing ACL Applications" on page 655
Batch Inserting ACL Lines	"Batch Inserting ACL Lines" on page 656
Batch Deleting ACL Lines	"Batch Deleting ACL Lines" on page 657
Commenting ACLs and Creating ACL Handles	"Commenting ACLs and Creating ACL Handles" on page 657
Creating ACL Templates	"Creating ACL Templates" on page 658
Editing ACLs	"Editing ACLs" on page 659
Deleting ACLs	"Deleting ACLs" on page 659

## Getting Started

Access Control Lists (ACLs) are used by many organizations to control the flow of IP traffic. This is done mostly for increased security, but can also be used to increase performance by preventing the operation of bandwidth intensive systems, such as streaming audio or video, from public Web sites.

In general, the definition of an ACL is a collection of configuration statements. These statements define addresses and/or patterns to accept or deny. NA retrieves configuration information from devices and extracts the ACL statements from the configuration. NA then stores the ACLs independent of the configuration.

The NA ACL Manager provides a quick way to:

- View ACLs on devices
- Maintain a history of ACLs
- Comment on ACLs and maintain those comments in the configuration

The ACL Manager also provides a quick way to use existing ACL configurations to create ACL templates.

This chapter includes instructions on how to enable (and disable) ACLs parsing for a device or group of devices.

- For information about turning on ACL parsing for a single device, see ["Configuration Mgmt Page Fields" on page 24](#).
- For information about turning on ACL parsing for a group of devices, see ["Editing a Batch of Devices" on page 152](#).
- For information about searching for ACLs, see ["Search For ACLs Page Fields" on page 519](#).

**Note:** ACL information is not available until after the first stored or checkpoint snapshot is taken of the device after ACL parsing is enabled.

## Viewing ACLs

To view ACLs on a device:

1. On the menu bar under Devices, click Inventory.
2. On the Inventory page, select the device that has ACL parsing enabled. The Device Details page opens. (Note: When adding devices that support ACLs, make sure the Enabled option is selected.) Once the devices are discovered, and a checkpoint snapshot is taken, you are able to view a device's ACLs. (For more information about adding devices, see ["Adding Devices" on page 102](#).)
3. From the View drop-down menu, select Device Detail and then click ACLs. The Device ACLs page opens. For more information, see ["Device ACLs Page Fields" below](#).
4. On the Device ACLs page, click the View ACL option for any ACL listed. The View ACL page opens. For more information, see ["View ACL Page Fields" on the next page](#).

## Device ACLs Page Fields

Field	Description/Action
Hostname	Displays the device's host name. Clicking the device's host name opens the last visited Device Details page, where you can view information about this device's ACLs.
Device IP	Displays the device's IP address. Clicking the device's IP address opens the last visited Device Details page, where you can view information about this device's ACLs.
Last Snapshot Attempt	The timestamp of the most recent device configuration snapshot attempt (regardless of result).
Last Snapshot Result	The result of the most recent snapshot attempt.
Check Boxes	You can use the left-side check boxes to compare two ACLs. Once you have selected the ACLs, click the Actions drop-down menu and click: <ul style="list-style-type: none"><li>• Compare — Opens the Compare Script page, where you can compare the two selected ACLs side by side. The differences are highlighted in different colors to make them easy to view.</li></ul>

Field	Description/Action
	The adjacent Select drop-down menu enables you to select or deselect all of the device configurations.
ACL ID	Displays the ACL ID. The ACL ID refers to how the device identifies the ACL in its configuration. Keep in mind that while many devices use an integer index as the ACL ID, not all do. As a result, ACL IDs are stored as strings.
ACL Handle	Displays the ACL handle. The ACL Handle is the ACL name you defined. By default, the ACL Handle is the same as the ACL ID. If you do not supply a specific ACL Handle, the driver uses the ACL ID. (Note: This field is used to sort ACLs by default.)
ACL Type	Displays the ACL type, as defined by the device.
Last Modified Date	Displays the date and time the ACL was last modified.
Actions	<p>You can select the following actions:</p> <ul style="list-style-type: none"> <li>• Edit ACL — Opens the Edit ACL page, where you can edit the ACL. For more information, see <a href="#">"Running Command Scripts" on page 655</a>.</li> <li>• View ACL — Opens the View ACL page, where you can view the ACL. For more information, see <a href="#">"View ACL Page Fields" below</a></li> <li>• ACL History — Opens the ACL History page, where you can view the full audit trail of all changes. Keep in mind that you can use the ACL history to facilitate restoring an ACL to a prior configuration. To do this, you would view the historical ACL and then click the Edit ACL action link.</li> </ul>

## View ACL Page Fields

To open the View ACL page:

1. On the menu bar under Devices, click Inventory.
2. On the Inventory page, select the device that has ACL parsing enabled. The Device Details page opens.

**Note:** When adding devices that support ACLs, make sure the Enabled option is selected.

After the devices are discovered, and an initial snapshot is taken, you are able to view a device' ACLs.

3. From the View drop-down menu, select Device Detail and then click ACLs. The Device ACLs page opens.
4. On the Device ACLs page, click the View ACLs option for any ACL listed. The View ACL page opens.

Field	Description/Action
Device	Display the host name and IP address of the device. Clicking the device's IP address opens the last visited Device Details page, where you can view information about this device's ACLs.

Field	Description/Action
ID	Displays the ACL ID. The ACL ID refers to how the device identifies the ACL in its configuration.
ACL Handle	Displays the ACL handle. The ACL Handle is the ACL name you defined.
ACL Type	Displays the ACL type.
Last Modified Date	Displays the date and time the ACL was last modified.
Last Modified User	Displays the user who last modified the ACL. Keep in mind that the last modified user can be "N/A" to indicate that NA does not know which user is responsible for this particular version of the ACL. If a user is shown, a link to the User Attribution Details page is provided, showing all activity NA knows about that occurred prior to retrieving this version of the ACL. Because the user is only NA's best guess, it is possible that other activity represents the actual cause for the ACL change.
ACL Script	Displays the configuration scripting that defines the ACL. The ACL script represents the configuration lines necessary to define the ACL. You can select the following options: <ul style="list-style-type: none"> <li>• New ACL — Opens the Run Command Script Task page, enabling you to use the existing ACL as a template. (For more information, see <a href="#">"Creating ACLs" on the next page.</a>)</li> <li>• Edit ACL — Opens the Run Command Script Task page, enabling you to edit the ACL. (For more information, see <a href="#">"Running Command Scripts" on the next page.</a>)</li> <li>• New ACL Template — Opens the New Command Script page, enabling you to save the existing ACL as a template. (For more information, see <a href="#">"Creating ACL Templates" on page 658.</a>)</li> <li>• Edit ACL Template — Opens the New Command Script page, enabling you to create a template that edits the current ACL. (For more information, see <a href="#">"Creating ACL Templates" on page 658.</a>)</li> </ul>
ACL Application	If the ACL is applied, the ACL application is displayed. ACL applications include a list of configuration commands that define where the ACL is used. Keep in mind that some ACL types do not have any separate application scripting. These ACLs will not show any application script. You can select the following options: <ul style="list-style-type: none"> <li>• Apply ACL — Opens the New Task - Run Command Script page, enabling you to (re) apply the ACL. (For more information, see <a href="#">"Creating ACLs" on the next page.</a>)</li> <li>• Apply ACL Template — Opens the New Command Script page, creating an ACL application template. (For more information, see <a href="#">"Creating ACL Templates" on page 658.</a>)</li> </ul>
Comments	Displays any comments about the ACL. You can select the following options: <ul style="list-style-type: none"> <li>• Edit Comments — Opens the Edit ACL Page.</li> <li>• History — Opens the ACL History page.</li> <li>• View Related Config — Opens the Device Configuration page. (For more information, see <a href="#">"Device Configurations Page Fields" on page 161.</a>)</li> </ul>

# Running Command Scripts

The Run Command Script task enables you to run command scripts. For more information, see ["Run Command Script Task Page Fields" on page 284](#). Keep in mind that on the Run Command Script Task page, the following Task Options are shown:

- Command Script to Run — Indicates that you are running an ACL Edit Script from a specific ACL on the device. The ACL is identified both by its ID and Handle (in parentheses).
- Limit to script types — The script type is automatically set to “ACL Edit Script.”
- Mode — Displays the device access mode, such as Cisco IOS configuration.
- Script — Displays the device-specific commands to run. The script to run is automatically populated, providing a copy of the existing ACL configuration. Keep in mind that if you are editing an ACL with applications, you will be provided with copies of the ACL application scripting, both before the ACL configuration scripting (to undo applications, if necessary) and after the ACL configuration scripting (to reapply the ACL). In many cases (such as IOS), to make an ACL configuration exactly match what you specify in a script, you will need to remove that ACL first, then put it back.

# Creating ACLs

To create a new ACL using an existing ACL as a template:

1. On the menu bar under Devices, click Inventory.
2. Select the device whose ACL parsing you want to enable. The Device Details page opens.
3. From the View drop-down menu, select Device Detail and click ACLs. The Device ACLs page opens.
4. In the Actions column, click the Edit ACL option. The Run Command Script page opens. For more information, see ["Run Command Script Task Page Fields" on page 284](#).

The following fields in the Run Command Script Task page are automatically populated:

- Command Script to Run — Displays the type of script (Apply ACL) and the source ACL.
- Limit to script types — Displays the type of script (ACL Edit Script).
- Mode — Displays the correct script mode for applying an ACL on the device.
- Script — Displays a copy of the existing ACL application scripting. Be sure to check this thoroughly and make any necessary changes.

**Note:** You should not run ACL scripts line-by-line. ACL scripts can result in lost connectivity when run line-by-line.

If you add an ACL to a device using the same ACL ID that already exists, you are actually editing the existing ACL on that device.

# Changing ACL Applications

To change ACL applications:

1. On the menu bar under Devices, click Inventory.
2. Select the device whose ACL parsing you want to enable. The Device Details page opens.
3. From the View drop-down menu, select Device Detail and click ACLs. The Device ACLs page opens.
4. Click the View ACL option. The View ACL page opens. (For more information, see ["View ACL Page Fields" on page 653.](#))
5. Click the Apply ACL option. The Run Command Script page opens. (For more information, see ["Creating ACLs" on the previous page.](#))

The following fields in the Run Command Script Task page are automatically populated:

- Command Script to Run — Displays the type of script (Apply ACL) and the source ACL.
- Limit to script types — Displays the type of script (ACL Application Script).
- Mode — Displays the correct script mode for applying an ACL on the device.
- Script — Displays the copy of the existing ACL application scripting.

**Note:** You should not run ACL scripts line-by-line. ACL scripts can result in lost connectivity when run line-by-line.

## Batch Inserting ACL Lines

You can batch deploy ACL lines. NA automatically adds the necessary lines to the appropriate ACL on single or multiple devices, based on ACL ID or ACL Handle. The following steps are specific to Cisco IOS devices only.

To batch insert a line into an ACL(s)

1. On the menu bar under Devices, select Device Tasks and click Batch Insert ACL Line. The New Task - Run Command Script page opens. (For more information, see ["Creating ACLs" on the previous page.](#))
2. You can select a device or group of devices on which to run the task. Upon selecting device or group, the page will update.
3. Command Script to Run — Choose either:
  - a. Cisco IOS Insert Line into ACL by ACL ID
    - Id of ACL to insert line into — Enter the ACL ID that you want to add a line to. If you selected a group of devices, this adds a line to each device that contains an ACL that matches this ACL ID.
    - ACL line to insert — Enter the ACL line exactly as you would on the device.
    - Location to add line — Choose where to add the line. Options include first, last, and next-to-last.
    - Update Scripts — Click when you have completed the above variables.
    - Parameters — Optional parameters.
    - Script — This is the actual script that updates the ACL. The option to edit this script before execution makes this feature very flexible.
  - b. Cisco IOS Insert Line into ACL by Handle
    - ACL line to insert (without 'access-list {id}') — Enter the ACL line that you want to insert without any "access-list ACLID." The script will place this if necessary.
    - Location to add line — Choose where to add this line. Options include first, last, and next-to-last.
    - Update Scripts — Click when you have completed the above variables.



- Parameters — Optional parameters.
- Script — This is the actual script that will update the ACL. The option to edit this script before execution makes this feature very flexible.

## Batch Deleting ACL Lines

You can batch remove ACL lines. NA automatically removes the necessary lines to the appropriate ACL on single or multiple devices, based on the ACL ID or ACL Handle. The following steps are specific to Cisco IOS devices only.

To batch delete a line into an ACL(s)

1. On the menu bar under Devices, select Device Tasks and click Batch Remove ACL Line. The New Task - Run Command Script page opens. (For more information, see ["Creating ACLs" on page 655](#).)
2. You can select a device or group of devices on which to run the task. Upon selecting a device or group, the page will update.
3. Command Script to Run — Choose either:
  - a. Cisco IOS Remove Line from ACL by ACL ID
    - Id of ACL to delete line from — Enter the ACL ID that you want to remove a line from. If you have selected a group of devices, this will remove a line from each device ACL that matches this ACL ID.
    - ACL line to delete — Enter the ACL line exactly as it appears on the device. Keep in mind that some ACL lines have multiple space characters, for example: `access-list 139 and deny ip host192.168.139.2 any` contains three spaces between “deny” and “ip.”
    - Update Scripts — Click when you have completed the above variables.
    - Parameters — Optional parameters.
    - Script — This is the actual script that will update the ACL. The option to edit this script before execution makes this feature very flexible.
  - b. Cisco IOS Remove Line from ACL by Handle
    - ACL Handle — Enter the ACL Handle that you want to delete a line from. If you selected a group of devices, this will delete a line from each device that contains an ACL that matches this ACL Handle.
    - ACL line to delete (without 'access-list {id}') — Enter the ACL line that you want to delete without any "access-list ACLID." The script will place this if necessary.
    - Update Scripts — Click this when you have completed the above variables.
    - Parameters — Optional parameters.
    - Script — This is the actual script that will update the ACL. The option to edit this script before execution makes this feature very flexible.

## Commenting ACLs and Creating ACL Handles

NA integrates an in-line commenting feature with ACL comments. This allows the comments for an ACL to be included in the configuration and for changes in the configuration comments to get included and reapplied to the ACL.

On devices that support in-line commenting, the ACLNAME: text following the double-comment character sequence that identifies a NA in-line comment indicates the ACL Handle. On devices that do not support in-line commenting, the ability to move ACL comments to and from the configuration is not available. However, ACL comments and handles will continue to be maintained within the ACL.

To enter comments:

1. On the menu bar under Devices, click Inventory.
2. On the Inventory page, select the device that has ACL parsing enabled. The Device Details page opens.
3. From the View drop-down menu, select Device Detail and click ACLs. The Device ACLs page opens.
4. Click the View ACL option. The View ACL page opens. For more information, see "[View ACL Page Fields](#)" on page 653.
5. Click the Edit Comments option. The Edit ACL page opens.
6. Enter comments in the Comments field.
7. Edit the ACL Handle.
8. Click Save.

For devices that support NA in-line commenting, changing the comments in the configuration will be reflected in the ACL comments.

## Creating ACL Templates

In addition to directly creating scripts based on existing ACLs, you can use ACLs to form the basis for ACL command script templates. ACL templates can also be created for editing and applying ACLs.

1. On the menu bar under Devices, click Inventory.
2. On the Inventory page, select the device that has ACL parsing enabled. The Device Details page opens.
3. From the View drop-down menu, select Device Detail and click ACLs. The Device ACLs page opens.
4. Click the View ACL option in the Actions column. The View ACL page opens.
5. Click the New ACL Template link under the ACL Script. The New Command Script page opens. For more information, see "[Adding Command Scripts](#)" on page 560

The following fields in the New Command Script page are automatically populated:

- Script Type — Displays the ACL script template type being created, including: ACL Creation Script, Edit ACL Script, or Apply ACL Script.
- Mode — displays the correct script mode to run the ACL script on the device.
- Script — Displays a copy of the existing ACL application scripting.

**Note:** You can use the reserved variable "\$tc\_aclid\_for\_handle\$" in your script when you need an ACL ID. When you run the script, you are prompted for the ACL handle. When the script is actually run on the device, each instance of this variable in the script will be replaced by the ACL ID on the device whose handle matches what you provided.

6. Enter a name for your new ACL creation script.
7. Edit the script. For more information, see "[Running Command Scripts](#)" on page 655.

8. Be sure to click Save Script when you are finished. When the script is saved successfully, the Script Search Results (Command Scripts) page opens. The script you added appears in the list and is highlighted. Keep in mind that a script does not run until you schedule it as a task.
9. Select the Run action.
10. Specify the Hostname or IP address of one device that is capable of running the script.
11. Enter the ACL ID.
12. Save the task. When the task is complete, the new ACL is displayed on the View ACL Page. For more information, see ["Device ACLs Page Fields" on page 652](#).

## Editing ACLs

To edit an ACL:

1. On the menu bar under Devices, click Inventory.
2. On the Inventory page, select the device that has ACL parsing enabled. The Device Details page opens.
3. From the View drop-down menu, select Device Detail and click ACLs. The Device ACLs page opens.
4. Click the Edit ACL option for the ACL you want to edit. The Run Command Script page opens. For more information, see ["Creating ACLs" on page 655](#).

When you click the Edit ACL link, the following fields in the Run Command Script task are automatically populated:

- Command Script to Run — Displays the type of script (Edit ACL) and the source ACL.
- Limit to script types — Displays the type of script (Edit ACL Script).
- Mode — Displays the correct script mode for editing an ACL on the device.
- Script — Displays the device-specific commands to run. Be sure to check this thoroughly and make any necessary changes.

If you want to deploy the edited ACL to several devices, select the device group to which you want to deploy ACL. For more information, see ["Run Command Script Task Page Fields" on page 284](#).

**Note:** You should not run ACL scripts line-by-line. ACL scripts can result in lost connectivity when run line-by-line.

## Deleting ACLs

One of the more time-consuming tasks in ACL management is removing older, unused ACLs from devices so that they do not interfere with newer applications and ACLs. When deleting ACLs for a single device, the ACLs on that device are listed. When deleting ACLs for a group of devices, all ACL handles on all devices in the group are listed, and the deletion of ACLs is by handle, not by ACL ID.

To delete ACLs, from the Devices menu, select Device Tasks and click Delete ACLs. The New Task - Delete ACLs page opens.

When you delete an ACL from a device configuration, the ACL no longer appears in the list of managed ACLs. Although the history of the ACL is still searchable using the Search For ACL option, the ACL history is not

displayed when viewing device specific ACLs. There is no tracking of deleted ACLs from a device specific interface. To rollback the configuration of a deleted ACL, search for that ACL and then re-deploy it.

Keep in mind that ACLs that have no applications are deleted. However, ACLs with applications are not deleted. By default, NA will not delete ACLs if they have an application script. An option is provided that forces the deletion of ACLs even if they have applications. If this is checked, all ACLs selected will be deleted.

**Note:** NA does not guarantee that it will locate all applications of an ACL in the device's configuration. It is possible that an ACL has no application script, but is actually in use somewhere on the device. In such cases, the Delete ACLs task will attempt to delete the ACL (since it knows of no applications), resulting in unexpected device behavior.

### Delete ACLs Task Page

The Delete ACLs task enables you to delete ACLs. To delete ACLs, from the Devices menu, select Device Tasks and click Delete ACLs. The Delete ACLs page opens. When you are finished click the Save Task button.

Field	Description/Action
Task Name	Displays Delete ACLs. You can enter a different task name if applicable.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about task templates, see "<a href="#">Task Templates</a>" on page 255.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags.</li> <li>• New—Enter a new template tag.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p> </div>
Applies to	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Device / Group — Enter an IP address, hostname, or device group name that identifies the target devices or click the magnifying glass icon to use the device selector. For more information, see "<a href="#">Device Selector</a>" on page 137.</li> <li>• CSV File — Enter the name of the CSV file containing the target devices. For more information, see "<a href="#">Task CSV Template File</a>" on page 253.</li> </ul>

Field	Description/Action
Schedule Date	Select one of the following options: <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Add any comments about the multiple task job.
<b>Task Options</b>	
Session Log	Check the “Store complete device session log” box to store a debugging log. This is useful when debugging a failed snapshot, however large amounts of data can be stored.
Force Save	The device configuration update setting. This setting applies to only those devices that support a startup configuration. The default value of this setting is configurable per task type (as described in the <i>NA Administration Guide</i> ). <ul style="list-style-type: none"> <li>• If NA should overwrite the startup configuration with the current running configuration at the completion of this task, select the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> <li>• If NA should not change the startup configuration, clear the <b>If applicable, save the running configuration to the startup configuration upon task completion</b> check box.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> This setting overrides all other approaches to determining whether to update the device startup configuration.</p> </div>
Run Mode	For a group task, the method for processing child tasks. Available options are: <ul style="list-style-type: none"> <li>• Parallel—Multiple child tasks of this group task can run at the same time.</li> <li>• Serial—Only one child task of this group task runs at any given time.</li> </ul> <p>If the failure of any one child task should cause NA to skip all child tasks that have not yet run, select the <b>Stop on Failure</b> check box.</p> <p>If all child tasks of this group task should attempt to run without regard to the failure status of the other child tasks, clear the <b>Stop on Failure</b> check box.</p>

Field	Description/Action
	If this task runs on a single device, it does not have any child tasks and the run mode must be Parallel. For more information, see <a href="#">"Task Run Mode" on page 252</a> .
ACLs to delete	You can select the following options: <ul style="list-style-type: none"> <li>• Show ACLs without applications — Displays only ACLs without known applications (the default).</li> <li>• Show all ACLs — If selected, all ACLs, including the ACL IDs, with handles in parentheses, are displayed. You can select any number of ACLs from the list. (Note: If you are running this task against a group of devices, the list contains all ACL handles found on all devices in the group. There is no option to filter the list by ACLs without applications.)</li> </ul>
Delete ACLs even with applications check box	If checked, selected ACLs are deleted even if they have known applications.
Estimated Duration	Enter the amount of time for which you want to reserve the device or device groups that this task is to run against. The default is 60 minutes.
<p><b>Device Credentials Options</b></p> <p>Device credentials options are displayed depending on the Allows Standard Device Credentials, Allow Per-Task Device Credentials, and/or the Allow User AAA Credentials options configured on the Device Access page under Administrative Settings. If Allow Per-Task Device Credentials is enabled, you are prompted to enter the appropriate credentials. In addition, if more than one Device Credentials option is enabled, you are prompted to select which option to use when running the task. If only one Device Credentials option is enabled, it is used automatically and you are not prompted. (For information about enabling device credentials, see <a href="#">"Device Access Page Fields" on page 33</a>.)</p>	
Device Credentials	Depending on the Device Credentials options enabled on the Device Access page under Administrative Settings, you can select one or more of the following options: <ul style="list-style-type: none"> <li>• Use standard device-specific credentials and network-wide password rules (the default).</li> <li>• Use specific task credentials. You are prompted to enter a Username, Password, Confirm Password, Enable Password, Confirm Enable Password, SNMP Read-Only Community String, and a SNMP Read/Write Community String.</li> <li>• Use task owner's AAA credentials. The task owner must have valid AAA credentials defined.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Standard password rules and device-specific passwords are used. However, the task owner's AAA</p> </div>

Field	Description/Action
	<div style="background-color: #e0e0e0; padding: 5px; border: 1px solid #ccc;">username and password are applied.</div>
<p><b>Pre-Task / Post-Task Snapshot Options</b></p> <p>Snapshot options only appear if the system is configured to enable user overrides on the Configuration Mgmt Page under Administrative Settings. (For more information, see "<a href="#">Configuration Mgmt Page Fields</a>" on page 24.)</p>	
Pre-Task Snapshot	Select one of the following options: <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (the default)</li> </ul>
Post-Task Snapshot	Select one of the following options: <ul style="list-style-type: none"> <li>• None</li> <li>• As part of task (the default)</li> <li>• Scheduled as a separate task</li> </ul>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.
Override Approval	If the task allows override, select this option to override the approval process.
Save as Draft	If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.
<p><b>Scheduling Options</b></p>	
Retry Count	If the task fails, NA tries the task again this many times, allowing for the Retry Interval between retries. Select one of the following options: <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> <li>• Three Times</li> </ul>

Field	Description/Action
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"><li>• Once Only — The task occurs only once on the specified date/time (the default).</li><li>• Periodically — Specify a Repeat Interval in minutes.</li><li>• Daily — The task occurs each day at the specified time.</li><li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li><li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li></ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"><li>• No End Date (the default)</li><li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li><li>• End by — Click the calendar icon and select a date and time.</li></ul>



# Chapter 22: Tracking Resources

Every network uses a variety of resources such as IP addresses, DNS host names, VLAN identifiers, and virtual machine names that must be unique within a given context. Network administrators must know which names are valid in the environment. Additionally, network administrators must track which resource identifiers have been used and which are available for the current provisioning task.

One approach to tracking resource lifecycle state is to maintain spreadsheets of the various resources. To be useful, these spreadsheets must be updated for every status change of each resource. This manual process can be neglected and is error prone.

As of HPE Network Automation (NA) 10.21, the Resource Identity Management feature provides a framework for maintaining an inventory of network resources in the NA database. Within NA, a resource identity represents each real-world resource. A resource identity pool groups similar resource identities. NA stores resource identities in machine-consumable format for integration into an automated provisioning system.

By default, a resource identity has the following attributes:

- Name

In each resource identity pool, the resource identity names must be unique. The same resource identity name can be used in multiple resource identity pools. However, each of those resource identities is a different entity.

- Description

- Status

The possible status values are:

- Available: The resource identity is not currently associated with a real-world resource.
- In Use: The resource identity is associated with a real-world resource.

Additionally, each resource identity can have one or more custom fields for storing additional information. For example, an IP address resource identity might have two custom fields, one for subnet mask and one for customer. In this example, the value of the subnet mask custom field might remain unchanged for the life of the IP address resource identity while the value of the customer custom field can change when the IP address resource identity status changes.

Associate custom resource identity fields to a resource identity pool. Set the custom resource identity field values for each resource identity.

You can acquire a resource identity for use in a provisioning task or release it from use so that it is available for a future provisioning task.

- Acquiring a resource identity sets its status to **In Use**. Optionally, you can set custom field values while acquiring a resource identity. For example, you can set the customer custom field to indicate the user of the IP address resource identity.
- Releasing a resource identity sets its status to **Available**. Optionally, you can clear custom field values while releasing a resource identity. For example, you can remove the user name from the customer custom field of the IP address resource identity.

The following topics apply to resource identity management:

- ["Manage Pools of Resource Identities" below](#)
- ["Manage the Resource Identities in a Pool" on page 670](#)
- ["Manage the Status of Resource Identities" on page 681](#)
- ["Locate Specific Resource Identities" on page 683](#)
- ["Define Custom Resource Identity Fields" on page 686](#)
- ["Command-Line Interface for Tracking Resources" on page 689](#)

## Manage Pools of Resource Identities

A resource identity pool contains resource identities. Each resource identity pool can be associated with one partition or can be shared across all partitions.

Optionally, custom resource identity fields can be associated with a resource identity pool. Actual values of the custom fields are set for each resource identity within the pool.

Create a resource identity pool before populating it with resource identities.

The following topics apply to resource identity pools:

- ["View Resource Identity Pools" below](#)
- ["Create Resource Identity Pools" on the next page](#)
- ["Modify Resource Identity Pool Information" on page 668](#)
- ["Delete Resource Identity Pools" on page 669](#)

## View Resource Identity Pools

To view a list of the resource identity pools, from anywhere in the NA console, click **Devices > Device Tools > Resource Identity Pools**.

The Resource Identity Pools page lists the resource identity pools for a partition. For information about the fields on this page, see the ["Resource Identity Pools Page Fields" below](#).

On the Resource Identity Pools page, you can initiate any of the following actions:

- ["Create Resource Identity Pools" on the next page](#)
- ["Modify Resource Identity Pool Information" on page 668](#)
- ["Delete Resource Identity Pools" on page 669](#)
- ["Add Resource Identities to a Pool from the NA Console" on page 672](#)
- ["Add Resource Identities to a Pool from a CSV File" on page 673](#)
- ["Acquire a Resource Identity" on page 681](#)

### Resource Identity Pools Page Fields

Field	Description/Action
Navigation link	New Pool — Create a new resource identity pool.

### Resource Identity Pools Page Fields, continued

Field	Description/Action
Name	The name of the resource identity pool.
Description	The description of the resource identity pool.
Partition	The partition association.
IDs: Available	The number of resource identities with status Available in the resource identity pool.
In Use	The number of resource identities with status In Use in the resource identity pool.
Total	The total number of resource identities in the resource identity pool.  This value is the sum of the resource identities with status Available and the resource identities with status In Use.
Actions	Available actions include: <ul style="list-style-type: none"> <li>• Add IDs — Add one or more resource identities to this resource identity pool from the NA console.</li> <li>• Import IDs — Import one or more resource identities from a CSV file into this resource identity pool.</li> <li>• Acquire Next ID — Identify and change the status of one resource identity in this resource identity pool to <b>In Use</b>. This action provides no control over which resource identity is acquired.</li> <li>• Edit Pool — Modify the resource identity pool information.</li> </ul>

## Create Resource Identity Pools

Create a resource identity pool before populating it with resource identities.

### To create a resource identity pool:

1. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
2. Click the **New Pool** link.
3. On the New Resource Identity Pool page, enter the configuration. (For more information, see the "[New Resource Identity Pool Page Fields](#)" below.)
4. Click **Save**.

For information about adding resource identities to the new pool, see "[Add Resource Identities to a Pool from the NA Console](#)" on page 672 or "[Add Resource Identities to a Pool from a CSV File](#)" on page 673.

### New Resource Identity Pool Page Fields

Field	Description/Action
<b>General Information</b>	

## New Resource Identity Pool Page Fields, continued

Field	Description/Action
Name	The name of the resource identity pool.
Description	The description (up to 255 characters) of the resource identity pool.
Partition (if configured)	<p>The partition association.</p> <ul style="list-style-type: none"><li>To associate the resource identity pool with one partition, select that partition name.</li><li>To make the resource identity pool available to all partitions, select [Shared].</li></ul> <p>If partitions are not configured, the new pool belongs to the Default Site partition.</p> <p>For information about creating partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p>
<b>Custom Fields (if configured)</b>	
Custom Fields (if configured)	<p>The custom resource identity fields assignment area.</p> <ul style="list-style-type: none"><li>The Custom Fields for This Pool column lists the custom resource identity fields associated with this pool.</li><li>The All Custom Fields column lists the custom resource identity fields that are defined and enabled in the NA database. This column includes the fields listed in the Custom Fields for This Pool column.</li></ul> <p>Select the custom resource identity fields for this resource identity pool as follows:</p> <ul style="list-style-type: none"><li>To assign custom resource identity fields to this pool, select field names in the All Custom Fields column, and then click <b>&lt;&lt; Add</b>.</li><li>To remove custom resource identity fields from this pool, select field names in the Custom Fields for This Pool column, and then click <b>Remove &gt;&gt;</b>.</li></ul> <p>For information about creating custom resource identity fields, see <a href="#">"Define Custom Resource Identity Fields" on page 686</a>.</p>

## Modify Resource Identity Pool Information

Modify a resource identity pool to change the name, description, or partition of the pool and to change which custom fields are associated with the pool. For information about changing pool membership, see ["Manage the Resource Identities in a Pool" on page 670](#).

To modify a resource identity pool:

1. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
2. In the Actions column, click **Edit Pool** for the pool.
3. On the Edit Resource Identity Pool page, update the pool configuration.  
For information about the fields on this page, see the ["Edit Resource Identity Pool Page Fields" on the next page](#).
4. Click **Save**.

### Edit Resource Identity Pool Page Fields

Field	Description/Action
<b>General Information</b>	
Name	The name of the resource identity pool.
Description	The description (up to 255 characters) of the resource identity pool.
Partition (if configured)	<p>The partition association.</p> <ul style="list-style-type: none"> <li>To associate the resource identity pool with one partition, select that partition name.</li> <li>To make the resource identity pool available to all partitions, select [Shared].</li> </ul> <p>If partitions are not configured, the new pool belongs to the Default Site partition.</p> <p>For information about creating partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a>.</p>
<b>Custom Fields (if configured)</b>	
Custom Fields (if configured)	<p>The custom resource identity fields assignment area.</p> <ul style="list-style-type: none"> <li>The Custom Fields for This Pool column lists the custom resource identity fields associated with this pool.</li> <li>The All Custom Fields column lists the custom resource identity fields that are defined and enabled in the NA database. This column includes the fields listed in the Custom Fields for This Pool column.</li> </ul> <p>Select the custom resource identity fields for this resource identity pool as follows:</p> <ul style="list-style-type: none"> <li>To assign custom resource identity fields to this pool, select field names in the All Custom Fields column, and then click <b>&lt;&lt; Add</b>.</li> <li>To remove custom resource identity fields from this pool, select field names in the Custom Fields for This Pool column, and then click <b>Remove &gt;&gt;</b>.</li> </ul> <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Removing a custom resource identity field from a pool deletes any values for the field from the resource identities in this pool when you click <b>Save</b>.</p> </div> <p>For information about creating custom resource identity fields, see <a href="#">"Define Custom Resource Identity Fields" on page 686</a>.</p>

## Delete Resource Identity Pools

Deleting a resource identity pool removes the pool and the resource identities in that pool from the NA database.

To delete a resource identity pool:

1. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
2. In the check box column, select the check box for the pool that you want to delete.

3. From the **Actions** menu, select **Delete**.

## Manage the Resource Identities in a Pool

The resource identities in a resource identity pool represent real-world resources. From a pool, set the values and status in the NA database for the resource identities in that pool.

The following topics apply to resource identity pools:

- ["View the Resource Identities in a Pool" below](#)
- ["Add Resource Identities to a Pool from the NA Console" on page 672](#)
- ["Add Resource Identities to a Pool from a CSV File" on page 673](#)
- ["View Resource Information" on page 678](#)
- ["Modify Resource Identity Information" on page 679](#)
- ["Manage the Status of Resource Identities" on page 681](#)
- ["Delete Resource Identities from a Pool" on page 680](#)

## View the Resource Identities in a Pool

### To view the resources in a specific pool

1. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
2. In the **Name** column, click the pool name.

The Resource Identities in Pool page lists the resource identities in the selected pool. For information about the fields on this page, see the ["Resource Identities in Pool Page Fields" below](#).

On the Resource Identities in Pool page, you can initiate any of the following actions:

- ["View Resource Identity Pools" on page 666](#)
- ["Modify Resource Identity Pool Information" on page 668](#)
- ["View Resource Information" on page 678](#)
- ["Modify Resource Identity Information" on page 679](#)
- ["Add Resource Identities to a Pool from the NA Console" on page 672](#)
- ["Add Resource Identities to a Pool from a CSV File" on page 673](#)
- ["Delete Resource Identities from a Pool" on page 680](#)
- ["Acquire a Resource Identity" on page 681](#)
- ["Release a Resource Identity from Being Used" on page 682](#)

### Resource Identities in Pool Page Fields

Field	Description/Action
Navigation links	Available navigation links include: <ul style="list-style-type: none"><li>• Add IDs — Add one or more resource identities to this resource identity pool from the NA console.</li><li>• Import IDs — Import one or more resource identities from a CSV file into this resource</li></ul>

## Resource Identities in Pool Page Fields, continued

Field	Description/Action
	<p>identity pool.</p> <ul style="list-style-type: none"> <li>• <b>Acquire Next ID</b> — Change the status of one resource identity in this resource identity pool to <b>In Use</b>. This action provides no control over which resource identity is acquired.</li> <li>• <b>Edit Pool</b> — Modify the resource identity pool information.</li> <li>• <b>List Pools</b> — List the available resource identity pools.</li> </ul>
Pool	The name of the resource identity pool.
Description	The description of the resource identity pool.
Partition	The partition association of the resource identity pool.
Created By	The user who created the resource identity pool.
At	The timestamp of the resource identity pool creation.
Last Modified By	The user who last changed the resource identity pool.
At	The timestamp of the last change to the resource identity pool.
IDs: Available	The number of resource identities with status Available in the resource identity pool.
In Use	The number of resource identities with status In Use in the resource identity pool.
Total	<p>The total number of resource identities in the resource identity pool.</p> <p>This value is the sum of the resource identities with status Available and the resource identities with status In Use.</p>
Show list	<p>The view filter. Possible values are:</p> <ul style="list-style-type: none"> <li>• <b>All</b> — Display all resource identities in the pool.</li> <li>• <b>Available</b> — Display only the resource identities in the pool that are not currently associated with real-world resources.</li> <li>• <b>In Use</b> — Display only the resource identities in the pool that are associated with real-world resources.</li> </ul>
ID	The name of the resource identity.
Status	<p>The current status of the resource identity. Possible values are:</p> <ul style="list-style-type: none"> <li>• <b>Available</b> — The resource identity is not currently associated with a real-world resource.</li> <li>• <b>In Use</b> — The resource identity is associated with a real-world resource.</li> </ul>
Created By	The user who created the resource identity.
Last Modified	The user who last changed the resource identity.

### Resource Identities in Pool Page Fields, continued

Field	Description/Action
By	
Last Modified	The timestamp of the last change to the resource identity.
Actions	Available actions include: <ul style="list-style-type: none"><li>• Acquire ID — Change the status of the resource identity to <b>In Use</b>.</li><li>• Release ID — Change the status of the resource identity to <b>Available</b>.</li><li>• Edit ID — Modify the resource identity information.</li></ul>

## Add Resource Identities to a Pool from the NA Console

Create a resource identity pool, and then populate that pool with resource identities. Add resource identities in either of the following ways:

- Enter data into the NA console as described here.
- Create a comma-separated values (CSV) file of the data and import the data into the NA database. (For more information, see ["Add Resource Identities to a Pool from a CSV File" on the next page.](#))

Resource identity names must be unique within a given resource identity pool. When the same resource identity name is included in multiple resource identity pools, each of those resource identities is unique in the NA database. A resource identity cannot be shared among multiple resource identity pools.

### To add resource identities to a pool from the NA console

1. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
2. In the Actions column, click **Add IDs** for the pool.
3. On the Add Resource Identities to Pool page, enter data for the new resource identities.
  - If no custom resource identity fields are associated with this pool, enter up to five resource identity names, set the description and current status for each, and then click **Save**.
  - If custom resource identity fields are associated with this pool, enter a resource identity name and description, set its status, set the custom field values, and then click either **Save & Add Another** or **Save**.

For information about the fields on this page, see the ["Add Resource Identities to Pool Page Fields" below](#).

### Add Resource Identities to Pool Page Fields

Field	Description/Action
Pool	The name of the resource identity pool.
Description	The description of the resource identity pool.



### Add Resource Identities to Pool Page Fields, continued

Field	Description/Action
Partition	The partition association of the resource identity pool.
Available	The number of resource identities with status Available in the resource identity pool.
In Use	The number of resource identities with status In Use in the resource identity pool.
Total	The total number of resource identities in the resource identity pool. This value is the sum of the resource identities with status Available and the resource identities with status In Use.
General Information	
ID	The name (up to 255 characters) of the resource identity.
Description	The description (up to 255 characters) of the resource identity.
Status	The current status of the resource identity. Possible values are: <ul style="list-style-type: none"> <li>• <b>Available</b> — The resource identity is not currently associated with a real-world resource.</li> <li>• <b>In Use</b> — The resource identity is associated with a real-world resource.</li> </ul>
<b>Custom Fields (if configured)</b>	
Custom Fields	The current value of each custom resource identity field for this resource identity. For information about creating custom resource identity fields, see <a href="#">"Define Custom Resource Identity Fields" on page 686</a> .

## Add Resource Identities to a Pool from a CSV File

Create a resource identity pool, and then populate that pool with resource identities. Add resource identities in either of the following ways:

- Enter data into the NA console. (For more information, see ["Add Resource Identities to a Pool from the NA Console" on the previous page](#).)
- Create a comma-separated values (CSV) file of the data and import the data into the NA database as described here.

Resource identity names must be unique within a given resource identity pool. When the same resource identity name is included in multiple resource identity pools, each of those resource identities is unique in the NA database. A resource identity cannot be shared among multiple resource identity pools.

To add resource identities to a pool from a CSV file

1. Create a CSV import file as described in ["Creating CSV Files for Importing Resource Identity Data" on page 676](#).
2. Navigate to the New Task/Template - Import Resource Identities into Resource Identity Pool page.
3. Customize the task. (For more information, see ["Import Resource Identity Data Task Page Fields" on the next page](#).)
4. Click **Save** .

### Import Resource Identity Data Task Page Fields

Field	Description/Action
Task Name	Set the name of this task.
Save Options	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Save as task — The option is selected by default.</li> <li>• Save as task template — If selected, the task is saved as a task template and displayed on the Tasks Templates page. For more information about task templates, see <a href="#">"Task Templates" on page 255</a>.</li> </ul>
Template Tag	<p>If you are creating a task template, the template tag for filtering tasks run from the template. Options include:</p> <ul style="list-style-type: none"> <li>• General purpose—Do not apply a tag to this task template</li> <li>• Existing—Select from the list of existing template tags</li> <li>• New—Enter a new template tag</li> </ul> <p><b>Note:</b> If the save option is <b>Save as task</b>, NA ignores the template tag setting.</p>
Schedule Date	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Start As Soon As Possible (the default)</li> <li>• Start At — Enter a date and time to start the task. Click the calendar icon next to the date box to open the calendar and select a date and time.</li> </ul>
Task Priority	The task priority. For more information, see <a href="#">"Task Priority, Schedule, and State" on page 249</a> .
Comments	Enter comments about the task.
<b>Task Options</b>	
Partition (if configured)	The partition filter. This field is only displayed if you have configured one or more Partitions. For more information about partitions, see <a href="#">"Segmenting Devices and Users" on page 142</a> .
Resource Identity Pool	<p>The resource identity pool to receive the imported resource IDs.</p> <p>The available resource identity pools are those associated with the selected partition.</p>
Import File	<p>Enter the name of the CSV file containing the import data.</p> <ul style="list-style-type: none"> <li>• If the file is on the local system, you can use the Browse button to locate the file.</li> <li>• If the file is on the NA core server, specify the file name found in the base directory. (The default base directory is set as &lt;NA_HOME&gt;/imports in appserver.rcx.) For information about specifying the base directory, see <i>Specifying the Base Directory for Import Tasks</i> in <i>NA Administration Guide</i>.</li> </ul> <p><b>Note:</b> Do not use any absolute or relative path (<i>../</i>) reference in the file name.</p>

## Import Resource Identity Data Task Page Fields, continued

Field	Description/Action
Data Type	<p>The Resource Identity data type is for importing resource identity data into NA.</p> <p>To create a template CSV file, select a resource identity pool, and then click the <b>Resource Identity CSV Template</b> link to open the template file. Save the file to a location on the local system, and then modify the contents to fit your resource identity data, deleting unused columns. For more information, see <a href="#">"Creating CSV Files for Importing Resource Identity Data" on the next page.</a></p>
Preprocess Command	<p>To automate and schedule the entire process within NA, enter the name (and path) of the script file to run before importing the data. This field needs the full executable command which runs in the command/shell console on the server. For example, "perl" needs to be specified if the filter is a PERL script for Windows: <code>perl c:/filter.pl</code></p>
Log filename	<p>Enter the name of the file to which NA will write information about the import task.</p> <div style="background-color: #f0f0f0; padding: 5px; margin: 5px 0;"> <p><b>Note:</b> Do not use any absolute or relative path (<code>../</code>) reference in the file name.</p> </div> <p>The log file is helpful when debugging import problems. Check the "Append to log file" if you want NA to append this data to the existing log file. You can append the information to an existing log file, only if you set the <code>import/overwrite/logfile</code> parameter in the <code>appserver.rcx</code> file to <code>true</code>. By default it is set to <code>false</code>, and NA overwrites any existing data in the log file. For more information, see <i>Specifying the Base Directory for Import Tasks in NA Administration Guide</i>.</p>
<p><b>Approval Options</b></p> <p>Approval options are only displayed if the task is part of a Workflow Approval Rule.</p>	
Request Approval	<p>Checked by default if the task needs approval before it can run. To change the date by which the task must be approved, click the calendar icon next to the date to open the calendar and select a date and time. You can also select a task priority. Keep in mind that you can add different priority values, such as Urgent and Normal, when configuring Workflows. The NA Scheduler does not look at the values. They are basically a visual queue for you to determine which tasks need approval in a timely manner.</p>
Override Approval	<p>If the task allows override, select this option to override the approval process.</p>
Save as Draft	<p>If checked, you can save the task as a draft and return to it later. The task will not run in Draft mode.</p>
<p><b>Scheduling Options</b></p>	
Retry Count	<p>If the task fails, NA will try the task again this many times, allowing for the Retry Interval between retries. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• No Retry (the default)</li> <li>• Once</li> <li>• Twice</li> </ul>

### Import Resource Identity Data Task Page Fields, continued

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Three Times</li> </ul>
Retry Interval	Enter the number of minutes to wait before trying again. The default is five minutes.
Recurring Options	<p>The task will begin on the date/time specified above, then recur per the following. Select one of the following options:</p> <ul style="list-style-type: none"> <li>• Once Only — The task occurs only once on the specified date/time (the default).</li> <li>• Periodically — Specify a Repeat Interval in minutes.</li> <li>• Daily — The task occurs each day at the specified time.</li> <li>• Weekly — Select one or more days of the week. The task occurs on these days at the specified time.</li> <li>• Monthly — Select the day of the month the task occurs once each month on this day at the specified time.</li> </ul>
Range of Recurrence	<p>If you select any of the recurring options, with the exception Once Only, you can specify a range of recurrence, including:</p> <ul style="list-style-type: none"> <li>• No End Date (the default)</li> <li>• End after &lt; &gt; occurrences — Enter the number of occurrences.</li> <li>• End by — Click the calendar icon and select a date and time.</li> </ul>
<b>Task Completed Notification</b>	
Task Completed Notification	<p>If you want NA to send an email message upon task completion, select the <b>Send Email</b> check box.</p> <p><b>Tip:</b> The format of the email content is the same for all tasks. For information about changing the email content, see the <i>NA Administration Guide</i>.</p>
Email Recipients	Enter a comma-separated list of email addresses to receive the message. The default value is the email address of the task originator.
<b>Task Logging</b>	
Task Logging	<p>If available, you can enable logs for a specific task scheduled to be run a single time. Select the “Store log output generated by this task” checkbox and select one or more logs using the Shift key. The logs you select are highlighted. Keep in mind when a task has been setup to run with logging, and the log is not able to be initiated, the task will fail immediately without any further processing. For more information about logging, see <a href="#">"Logging" on page 692</a>.</p>

## Creating CSV Files for Importing Resource Identity Data

Use the import resource identities into resource identity pool task to automate creation in the NA database of resource identities in a resource identity pool. Define the new resource identities in a CSV file. The first row of

the CSV file contains the column names for the data you are importing. Each additional row represents one resource identity.

NA can create a template CSV file. This template is pool-specific and includes the column names for the custom fields associated with the pool. Note the following:

- Do not include columns unless you are populating them.
- Do not change the column names set by NA.
- Because the data fields are comma-delimited, fields can include whitespace but not commas (,).
- Data fields that are string types cannot include any of the following characters: single quotation mark ('), quotation mark ("), angle brackets (< >).
- Column order is not significant.

For each row in the CSV file, NA updates the database as follows:

- If the unique identifier does not exist in the target resource identity pool, NA creates a new object using the values specified in the file.
  - Empty cells equate to NULL.
  - If the status column is not included in the CSV file, NA imports all new resource identities with status Available.
- If the unique identifier exists in the target resource identity pool, NA ignores that row and makes no changes to that database object.

**Tip:** In the CSV file, include only those columns for which you want to set values. If some objects in your data set require columns that do not apply to other objects, create multiple CSV files and multiple import tasks.

### To create a CSV file for import

1. Navigate to the New Task/Template - Import Resource Identities into Resource Identity Pool page.
2. Under Task Options, do the following:
  - a. If the Resource Identity Pool field is empty, select a pool name.
  - b. Click the **Resource Identity CSV Template** link.
3. In an editing tool, do the following:
  - Add information to the data table.
  - Delete any unused columns.
  - For information about the columns in the CSV file, see the "[Resource Identity Data Import File](#)" on the next page.

**Note:** For a CSV file containing non-English characters, edit the file in a text editor, not Microsoft Office Excel. Save the CSV file with UTF-8 encoding.

4. Save the file as type CSV on the local system.

## Resource Identity Data Import File

The *resourceid-template.csv* template file contains the NA database column names for resource identity data. During import, NA uses the values in the name column to uniquely identify resource identities in the database. Resource identity names must be unique within a resource identity pool.

### Resource Identity Data Import Fields

Column Name	Description/Action
name	The resource identity name. This column must be included in each resource identity data import file.
status	The status of the resource identity. Specify one of the following values: <ul style="list-style-type: none"><li>• available or 0</li><li>• inuse or 1</li></ul>
description	The description of the resource identity.  <b>Note:</b> The resource identity description is available only from the CLI.
rimcf:<custom field name>	If custom resource identity fields are associated with the target resource identity pool, the CSV file can include data for any of those fields. <ul style="list-style-type: none"><li>• When using the template CSV file, NA adds the custom field names to the template.</li><li>• When creating a CSV file by hand, add one column for each custom field for which to import data. Set each column heading to the prefix rimcf: followed by the actual name of a custom field from the resource identities table on the Enhanced Custom Fields Setup page. The name is case-sensitive. For example, for a custom field named Location, set the column heading to rimcf:Location.</li></ul> For information about creating custom resource identity fields, see <a href="#">"Define Custom Resource Identity Fields" on page 686</a> .

## View Resource Information

### To view information about a resource identity

1. Navigate to the Resource Identities in Pool page for the pool to query.
  - a. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
  - b. In the Name column, click the pool name.
2. In the Name column, click the resource identity name.

The Resource Identity page describes the resource identity. For information about the fields on this page, see the ["Resource Identity Page Fields" on the next page](#).

### Resource Identity Page Fields

Field	Description/Action
Navigation link	Edit — Modify the resource identity information.
Pool	The name of the resource identity pool.
Description	The description of the resource identity pool.
Partition	The partition association of the resource identity pool.
Available	The number of resource identities with status Available in the resource identity pool.
In Use	The number of resource identities with status In Use in the resource identity pool.
Total	The total number of resource identities in the resource identity pool.  This value is the sum of the resource identities with status Available and the resource identities with status In Use.
<b>General Information</b>	
ID	The name of the resource identity.
Description	The description of the resource identity.
Status	The current status of the resource identity. Possible values are: <ul style="list-style-type: none"> <li>• <b>Available</b> — The resource identity is not currently associated with a real-world resource.</li> <li>• <b>In Use</b> — The resource identity is associated with a real-world resource.</li> </ul>
<b>Custom Fields (if configured)</b>	
Custom Fields	The current value of each custom resource identity field for this resource identity.  For information about creating custom resource identity fields, see <a href="#">"Define Custom Resource Identity Fields" on page 686</a> .

## Modify Resource Identity Information

### To modify information about a resource identity

1. Navigate to the Resource Identities in Pool page for the pool to query.
  - a. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
  - b. In the **Name** column, click the pool name.
2. In the **Actions** column, click **Edit ID** for the resource identity.
3. On the Edit Resource Identity page, update the information.  
For information about the fields on this page, see the ["Edit Resource Identity Page Fields" on the next page](#).
4. Click **Save**.

### Edit Resource Identity Page Fields

Field	Description/Action
Pool	The name of the resource identity pool.
Description	The description of the resource identity pool.
Partition	The partition association of the resource identity pool.
Available	The number of resource identities with status Available in the resource identity pool.
In Use	The number of resource identities with status In Use in the resource identity pool.
Total	The total number of resource identities in the resource identity pool.  This value is the sum of the resource identities with status Available and the resource identities with status In Use.
<b>General Information</b>	
ID	The name (up to 255 characters) of the resource identity.
Description	The description (up to 255 characters) of the resource identity.
Status	The current status of the resource identity. Possible values are: <ul style="list-style-type: none"> <li>• <b>Available</b> — The resource identity is not currently associated with a real-world resource.</li> <li>• <b>In Use</b> — The resource identity is associated with a real-world resource.</li> </ul>
<b>Custom Fields (if configured)</b>	
Custom Fields	The current value of each custom resource identity field for this resource identity.  For information about creating custom resource identity fields, see <a href="#">"Define Custom Resource Identity Fields" on page 686</a> .

## Delete Resource Identities from a Pool

Deleting a resource identity removes the resource identity from the resource identity pool and the NA database.

### To delete a resource identity

1. Navigate to the Resource Identities in Pool page for the pool to query.
  - a. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
  - b. In the **Name** column, click the pool name.
2. In the check box column, select the check box for the resource identity that you want to delete.
3. From the **Actions** menu, select **Delete**.



# Manage the Status of Resource Identities

Maintaining synchronization of the status of the resource identities stored in NA with the status of the real-world resources provides easy identification of available real-world resources. This synchronization is a manual effort. Possible resource identity status values are:

- Available — The resource identity is not currently associated with a real-world resource.
- In Use — The resource identity is associated with a real-world resource.

The following topics apply to resource identity pools:

- ["Identify Available Resource Identities" below](#)
- ["Acquire a Resource Identity" below](#)
- ["Release a Resource Identity from Being Used" on the next page](#)

## Identify Available Resource Identities

Depending on your resource identity management implementation, an available resource identity can indicate either of the following situations:

- A real-world resource that is available to be deployed in the network
- A resource identity that can be assigned to a newly requisitioned real-world resource

### To identify which resource identities in a pool are available

1. Navigate to the Resource Identities in Pool page for the pool to query.
  - a. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
  - b. In the **Name** column, click the pool name.
2. In the **Show** list, select **Available**.

## Acquire a Resource Identity

Acquire a resource identity to let others know that the associated real-world resource is in use. You can select the resource identity to reserve, or NA can select the resource identity to reserve.

### To acquire a specific resource identity in a resource identity pool

1. Navigate to the Resource Identities in Pool page for the pool to query.
  - a. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
  - b. In the **Name** column, click the pool name.
2. In the **Actions** column, click **Acquire ID** for the resource identity.
3. If custom resource identity fields are associated with this pool, on the Acquire Resource Identity page, verify the current custom field values and update them as needed.
4. *Optional.* On the Resource Identities in Pool page, copy the name of the reserved resource identity from the success message near the top of the page. Use this name in your network provisioning procedure.

### To acquire any resource identity in a resource identity pool

1. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
2. In the **Actions** column, click **Acquire Next ID** for the pool.

3. If custom resource identity fields are associated with this pool, on the Acquire Resource Identity page, verify the current custom field values and update them as needed.

**Note:** The title of the Acquire Resource Identity page includes the name of the resource identity that NA selected.

For information about the fields on this page, see the "[Acquire Resource Identity Page Fields](#)" below.

*Optional.* On the Resource Identities in Pool page, copy the name of the reserved resource identity from the success message near the top of the page.

#### Acquire Resource Identity Page Fields

Field	Description/Action
Pool	The name of the resource identity pool.
Description	The description of the resource identity pool.
Partition	The partition association of the resource identity pool.
Available	The number of resource identities with status Available in the resource identity pool.
In Use	The number of resource identities with status In Use in the resource identity pool.
Total	The total number of resource identities in the resource identity pool. This value is the sum of the resource identities with status Available and the resource identities with status In Use.
<b>Do any custom field values need adjusting?</b>	
Custom Fields	The current value of each custom resource identity field for this resource identity. Specify the values of custom fields that depend on how the resource is used. For information about creating custom resource identity fields, see " <a href="#">Define Custom Resource Identity Fields</a> " on page 686.

## Release a Resource Identity from Being Used

Release a resource identity to let others know that the associated real-world resource is no longer being used.

#### To release a resource

1. Navigate to the Resource Identities in Pool page for the pool to query.
  - a. Open the Resource Identity Pools page (**Devices > Device Tools > Resource Identity Pools**).
  - b. In the **Name** column, click the pool name.
2. In the **Actions** column, click **Release ID** for the resource identity.
3. If custom resource identity fields are associated with this pool, on the Release Resource Identity page, verify the current custom field values and update them as needed.
4. On the Resource Identities in Pool page, note the name of the freed resource identity in the success message near the top of the page.

For information about the fields on this page, see the ["Release Resource Identity Page Fields" below](#).

#### Release Resource Identity Page Fields

Field	Description/Action
Pool	The name of the resource identity pool.
Description	The description of the resource identity pool.
Partition	The partition association of the resource identity pool.
Available	The number of resource identities with status Available in the resource identity pool.
In Use	The number of resource identities with status In Use in the resource identity pool.
Total	The total number of resource identities in the resource identity pool. This value is the sum of the resource identities with status Available and the resource identities with status In Use.
<b>Do any custom field values need adjusting?</b>	
Custom Fields	The current value of each custom resource identity field for this resource identity. Clear the values of custom fields that depend on how the resource is used. For information about creating custom resource identity fields, see <a href="#">"Define Custom Resource Identity Fields" on page 686</a> .

## Locate Specific Resource Identities

Use the NA search capabilities to identify the resource identities that match specific criteria.

The following topics apply to locating specific resource identities:

- ["Search for Resource Identities" below](#)
- ["View Resource Identity Search Results" on page 685](#)

## Search for Resource Identities

The Search for Resource Identity page provides for searching across all resource identities in NA.

### To search for resource identities

1. Open the Search for Resource Identity page (**Reports > Search For > Resource Identities**).
2. Select the check box for each property to include as a column on the search results page.
3. Enter search criteria. (For more information, see ["Search For Resource Identity Page Fields" on the next page](#).)
4. Click **Search**.

NA returns a list of resource identities that satisfy all of the specified search criteria. For information about the search results, see the ["Search For Resource Identity Page Fields" on the next page](#).

**Note:** When entering search criteria, your settings are lost if you change to a different page before running the search.

### Search For Resource Identity Page Fields

Field	Description/Action
Check boxes	Select the left-side check box for each property to include as a column on the Resource Identities Search Results page.
Resource Identity	<p>The name of the resource identity. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul> <p><b>Note:</b> This property is always included in the search results.</p>
Status	<p>The current status of the resource identity. Possible values are:</p> <ul style="list-style-type: none"> <li>• <b>Available</b> — The resource identity is not currently associated with a real-world resource.</li> <li>• <b>In Use</b> — The resource identity is associated with a real-world resource.</li> </ul> <p><b>Note:</b> This property is always included in the search results.</p>
Pool	The name of the resource identity pool. Use Ctrl+click to select multiple pools.
Partition (if configured)	The name of the partition. Use Ctrl+click to select multiple partitions.
Description	<p>The description of the resource identity. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Create Date	The timestamp of the initialization of the resource identity. Specify a time range.
Created By	<p>The NA user who created the resource identity. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> </ul>

### Search For Resource Identity Page Fields, continued

Field	Description/Action
	<ul style="list-style-type: none"> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Last Modified Date	The timestamp of the last change to the resource identity. Specify a time range.
Last Modified By	<p>The NA user who last changed the resource identity. Operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul>
Custom Fields (if configured)	<p>The enabled custom resource identity fields.</p> <p>For fields with a limited set of values, use Ctrl+click to select multiple pools.</p> <p>For other fields, operators include:</p> <ul style="list-style-type: none"> <li>• Contains</li> <li>• Does not contain</li> <li>• Matches</li> <li>• Equals</li> <li>• Does not equal</li> <li>• Contains (regexp)</li> <li>• Does not contain (regexp)</li> </ul> <p>For information about creating custom resource identity fields, see <a href="#">"Define Custom Resource Identity Fields" on the next page.</a></p>

## View Resource Identity Search Results

The Resource Identity Search Results page displays the results of a specific search. The columns on this page correspond to the selected criteria on the Search For Resource Identity page.

### Resource Identity Search Results Page Fields

Option	Description/Action
Modify this search link	Opens the Search For Resource Identity page as customized for this search. Edit

### Resource Identity Search Results Page Fields, continued

Option	Description/Action
	the search criteria, and then re-run the search.
View Search Criteria link	Moves to the Search Criteria area at the end of this page.
Select menu	Provides a shortcut for selecting or clearing the selection of all rows in the search results.
Actions menu	Provides for acting on the selected rows in the search results. The available action is: <ul style="list-style-type: none"> <li>• Delete — Delete the selected resource identities from the NA database.</li> </ul>
<b>Results table</b>	
Check boxes	Select the check box for one or more rows. Then select an item from the Actions menu above the results table.
Resource identity properties	One column for each property selected on the Search For Resource Identity page. To view the information for a specific resource, click the resource identity name.
Actions	Available actions include: <ul style="list-style-type: none"> <li>• Acquire ID — Change the status of the resource identity to <b>In Use</b>.</li> <li>• Release ID — Change the status of the resource identity to <b>Available</b>.</li> <li>• Edit ID — Modify the resource identity information.</li> </ul>
<b>Search Criteria area</b>	
Search Criteria	The search criteria used in the search. To change the search criteria, click the Modify this search link at the top of the page.
Save search as a user report named	Enter the name of the user report, and then click <b>Save</b> . View the saved report on the User & System Reports page. For more information, see <a href="#">User &amp; System Reports</a> .
Email Search Result	Enter a comma-separated list of email addresses to receive the search results and then click <b>Send</b> .
View Search Result as CSV File	Click the link to download the search results in CSV format.

## Define Custom Resource Identity Fields

Custom resource identity fields provide for storing additional information with each resource identity. For example, an IP address resource identity might have a custom field for subnet mask.

Custom resource identity fields are associated with a resource identity pool. In this way, all resource identities within that pool have the same custom fields available.

The general flow for working with custom resource identity fields is as follows:

1. Enable enhanced custom fields in the NA console. For more information, see ["Enable Custom Fields in NA" below](#).
2. Define custom resource identity fields on the Enhanced Custom Fields Setup page. For more information, see ["Create Custom Resource Identity Fields in the NA Database" below](#).
3. Associate custom resource identity fields with a resource identity pool while creating or editing the pool.
4. Set the values of custom resource identity fields at any of the following times:
  - While creating a resource identity
  - While editing a resource identity
  - While acquiring a resource identity for use
  - While releasing a resource identity from being used

**Note:** In the NA console, custom resource identity fields are managed as enhanced custom fields. However, custom resource identity fields require additional business logic beyond that for the other types of enhanced custom fields. When using the CLI with custom resource identity fields, use the `resource id custom field` commands, not the `metadata` commands.

## Enable Custom Fields in NA

**To enable display of the Enhanced Custom Fields Setup page in the NA console**

1. Open the Administrative Settings – User Interface page (**Admin > Administrative Settings > User Interface**).
2. In the **Enhanced Custom Fields** area, select the **Enable Enhanced Custom Fields** check box.
3. Click **Save**.

**Note:** Disabling enhanced custom fields removes the Enhanced Custom Fields Setup page from the NA console but does not delete the existing custom fields from the NA database.

## Create Custom Resource Identity Fields in the NA Database

**Tip:** For custom fields that should be updated while acquiring or releasing a resource identity, include an indicator to that effect as part of the custom field name. For example, for a custom field that stores the name of the customer using the real-world resource, the custom field name might be `Acquire:Customer`.

**To create custom resource identity fields**

1. Open the Enhanced Custom Fields Setup page (**Admin > Enhanced Custom Fields Setup**).
2. In the **Enhanced Custom Field** menu, select **Resource Identities**.

3. Click the **New Custom resource identities Field** link.
4. On the New Custom Data Field page, enter data for the new field.

**Note:** Custom resource identity field names must not include any of the following characters: period (.), single quotation mark ('), quotation mark ("), angle brackets (< >), brackets ([ ]), braces ({ }), or the closing parenthesis ().

For more information, see ["New Custom Data Field Page" on page 550](#).

5. Click **Save**.

## Modify Custom Resource Identity Fields in the NA Database

### To modify a custom resource identity field

1. Open the Enhanced Custom Fields Setup page (**Admin > Enhanced Custom Fields Setup**).
2. In the **Enhanced Custom Field** menu, select **Resource Identities**.
3. In the **Actions** column, click **Edit** for the custom field.
4. On the Edit Custom Data Field page, update the information.

For more information, see ["New Custom Data Field Page" on page 550](#).

**Note:** Clearing the **Enabled** check box disables the custom field. Disabled custom fields retain their associated values in the NA database. Disabled custom resource identity fields are not accessible from the Resource Identity Management feature.

5. Click **Save**.

## Delete Custom Resource Identity Fields from the NA Database

Deleting a custom resource identity field deletes all data for that custom field for all resource identity pools in NA. To remove a custom field from one pool, remove that field from the Custom Fields for This Pool list on the Edit Resource Identity Pool page. For information, see ["Modify Resource Identity Pool Information" on page 668](#).

### To delete a custom resource identity field

1. Open the Enhanced Custom Fields Setup page (**Admin > Enhanced Custom Fields Setup**).
2. In the **Enhanced Custom Field** menu, select **Resource Identities**.
3. In the **Actions** column, click **Delete** for the custom field.



# Command-Line Interface for Tracking Resources

The NA command-line interface includes `resource id pool`, `resource id`, and `resource id custom field` commands for Resource Identity Management.

From the NA proxy, use the following commands:

- `add resource id pool`
- `mod resource id pool`
- `del resource id pool`
- `show resource id pool`
- `list resource id pool`
- `list resource id pool all`
- `add resource id`
- `del resource id`
- `list resource id`
- `show resource id`
- `acquire resource id`
- `release resource id`
- `list resource id custom field data`
- `mod resource id custom field data`
- `show resource id custom field data`

(Use the associated API commands to script integration with Resource Identity Management.)

For information about these commands, from the NA proxy type help or see the *NA CLI/API Command Reference*.

# Chapter 23: Troubleshooting

This section includes the following topics:

- ["Driver Discovery Failed" below](#)
- ["Device Snapshot Failed" below](#)
- ["No Real-Time Change Detection Via Syslog" on the next page](#)
- ["Session Logs" on page 692](#)
- ["Logging" on page 692](#)
- ["Removing Access Information from the Troubleshooting Package" on page 696](#)
- ["Download Troubleshooting Info Page Fields" on page 697](#)
- ["Send Troubleshooting Info Page Fields" on page 700](#)

## Driver Discovery Failed

If you cannot discover a driver for a device:

1. Make sure that the device you are trying to discover is a supported device model and OS version. Refer to the Driver Release Service (DRS) documentation for detailed information on supported devices. The DRS is an automated driver release and delivery system. If the device is not supported, contact Customer Support. If the device is supported, go to Step 2.
2. From the NA core server, telnet or SSH to the device using the operating system's telnet command or a third-party utility such as Putty. If you cannot connect to the device, work with your network administrator to resolve the connection issue. If you can Telnet or SSH to the device but the Discover Driver task still fails, go to Step 3.
3. Check to see if you have read-only SNMP enabled on the device. If read-only SNMP is enabled, using this community string, try to contact to the device using read-only SNMP from the NA core server. Make sure you use the community string you configured for the device within NA. If you do not want to enable read-only SNMP, you can manually select the driver from the driver drop-down list when you add or edit devices. For more information, see ["Editing Device Configuration Data" on page 165](#). Once you have enabled read-only SNMP, login to NA, select the device you are trying to add, and click Edit Device. Update the device with the correct read-only SNMP community string and click Discover Driver. If the Discover driver task still fails, go to Step 4.
4. Login to NA. On the menu bar, select Admin and click the Troubleshooting option. The Troubleshooting page opens. In the list box, select device/session/log and device/driver/discovery. Set the level to Trace (most message). Click Submit. Click the device you are attempting to discover and then click Discover Driver. Once the Discover Driver task fails, on the menu bar select Admin and click Troubleshooting. Click Send Troubleshooting Information. In the comments section, specify what is failing and the device model and OS version. For more information, see ["Logging" on page 692](#).

## Device Snapshot Failed

If a device snapshot failed:

1. Make sure the device you are trying to snapshot is a supported device model and OS version for NA. Refer to the Driver Release Service (DRS) documentation for detailed information on supported devices. The DRS is an automated driver release and delivery system. If the device is not supported, contact Customer Support. If the device is supported, go to Step 2.
2. Make sure that there is a device driver assigned to the device. On the Device List page, click the problem device. For more information, see ["View Menu Options" on page 185](#). Scroll down to the Driver Name field and check if it has a value. If there is no driver, click the Discover Driver link. If there is a driver, go to Step 3.
3. Telnet and/or SSH to the device from the NA server. An easy way to verify that NA can Telnet or SSH to a device is to click the Telnet or SSH link for the device on the Device List page. For more information, see ["Viewing Devices" on page 172](#). If you cannot login to the device, this could be caused by incorrect access lists on the device, incorrect password information, or network connectivity issues. Contact Customer Support. If you can Telnet and/or SSH to the device, but the Discover driver task fails, go to Step 4.
4. Check to see if you have read-only SNMP enabled on the device. If read-only SNMP is enabled on the device, using this OID, try to contact the device via read-only SNMP from the NA server. Make sure you use the community string you configured for the device within NA. If you do not want to enable read-only SNMP, you can manually select the driver from the driver drop-down list when you add or edit devices. For more information, see ["Editing Device Configuration Data" on page 165](#). Once you have enabled read-only SNMP, login to NA, select the device you are trying to add, and click Edit Device. Update the device with the correct read-only SNMP community string and click Snapshot. If the Snapshot task still fails, call Customer Support.

## No Real-Time Change Detection Via Syslog

If there is no real-time change detection via Syslog:

1. Make sure that the device you are trying to snapshot is a supported device model and OS Version for NA. Refer to the Driver Release Service (DRS) documentation for detailed information on supported devices. The DRS is an automated driver release and delivery system. If the device is not supported, contact Customer Support. If the device is supported, go to Step 2.
2. Make sure the Syslog settings are configured correctly so that Syslog messages are reaching the NA server. Initiate an event that will trigger a Syslog change message to be sent to NA.
3. Make sure that the device/OS combination supports real-time change detection via Syslog. Refer to the Driver Release Service (DRS) documentation for detailed information on supported devices. The DRS is an automated driver release and delivery system. If possible, verify on the vendor's website that Syslog notification of change is available in this device and OS. If the device does not support real-time change detection via Syslog, go to Step 4.
4. There is another method by which NA provides real-time change detection: AAA logging. Check to see if you have AAA change detection enabled. For more information, see ["Configuration Mgmt Page Fields" on page 24](#). If you are using AAA, make sure that the device supports real-time change detection via AAA.

# Session Logs

The difficult part of any automation task is not the automation itself, but trying to determine the cause of failure if an automation task fails. NA provides detailed troubleshooting capabilities to help you quickly identify reasons for failure and resolve them.

NA provides a detailed device session log from any device task. As a result, you can see what NA is sending to the device and how the device is responding.

1. Log into NA.
2. On the main menu bar under Devices and select New Device Task and click Run Command Script. The New Task/Template – Run Command Script page opens.
3. In the Applies to field, enter a device hostname or IP address on which you are allowed to make configuration changes.
4. Under Task Options — Session Log, check the “Store complete device session log” box.
5. Under Task Options — Command Script to Run, select the command script you want to run from the drop down menu.
6. Specify the mode to run in. For example, if this is an IOS device, select Cisco IOS Configuration.
7. Enter the commands you want to send to the device.
8. Click the Save Task button.

As the task runs, you will see the output of the NA <-> device interaction. You should be able to determine:

- What NA sent to the device.
- What NA expected to receive from the device.
- What NA actually received from the device.

# Logging

Logging is the means of obtaining information about what NA is doing when performing its functions. In the case of system failures, logging is the primary means of identifying what is going wrong and the means of troubleshooting the issue.

# Log Levels

Logs are provided in the form of a series of messages that record events occurring in the system. By default, these messages only record significant events, such as errors, unexpected situations, or cases of potentially bad data. This is termed the ERROR logging level. Logging levels are a means of indicating how much information is recorded about an aspect of the system. The lower the level, the more messages recorded.

NA Log levels include:

- FATAL — Messages are only recorded in cases where fatal errors are encountered. This is the highest logging level.
- ERROR — Messages are recorded primarily to show error cases. This is the default logging level.
- DEBUG — Messages are recorded to help identify why a particular error has occurred. This is the middle logging level.

- TRACE — Messages are recorded about the general functioning of the system. This is the lowest logging level.

**Note:** Setting to many logs can significantly degrade system performance. In most cases you should only adjust logging levels when instructed to do so by Customer Support.

## Log Names

Logs are given names that provide some idea of what part of the system they relate to. Log names are hierarchical, meaning that one log can include a number of sub-logs. NA provides the following top-level logs:

- API — Logging related to interaction with NA through means other than the standard Web interface.
- Cache Provider — Logging related to tracking database caching performance improvements.
- DDK — Logging related to the DDK.
- Device — Logging related primarily to interaction with devices.
- External — Logging related to external utilities, such as TFTP, FTP, Syslog server, and connectors to third-party applications.
- Feature — Logging related to specific NA features.
- FlexUI — Logging related to tracking issues specific to the Flex user interface components (for example, the Device Selector).
- System — Logging related to internal functioning of the NA system and server.
- Web UI — Logging related to interaction with NA through its Web interface.

There are many sub-logs under each of these broad categories. For example, under the Device log there are the Access, Session, and Data sub-logs. These sub-logs include more specialized logging focused on access to devices, interaction with them, and the data retrieved, respectively. Each of these sub-logs has sub-logs of its own for further specialized focus when needed.

Sub-logs are referenced by preceding them with the containing log name followed by a slash, for example:

- Device
- Device/Access
- Device/Access/AuthenticationRules
- Device/Session
- Device/Session/SSH
- Device/Session/SNMP

The level of any log is equal to the lowest level set for that log or any of its containing logs. As a result, if the Device/Session/SNMP log was set to the ERROR level, but the Device/Session log was set to the DEBUG level, the Device/Session/SNMP log would be treated as if it, too, was set to the DEBUG level.

Since enabling a large number of logs at a low level can degrade system performance, you should be careful in setting a broad container log to a low level since this automatically sets all of its contained logs to that level as well.

**Note:** Although log names provide some clue as to the part of the system they relate to, you should always contact Customer Support for instructions before manipulating log settings.

## Session Logs

Session Logs are a special type of log used to show how NA interacts with a device during a task. This is only available for those tasks that actually interact with devices. The output of this log is automatically inserted into the task results.

Session logs are enabled via a check box provided in each device-specific task creation page. In most cases, re-running a task will automatically result in the session log being enabled even if it was not enabled when the task was first run. For more information about task creation, see ["Scheduling Tasks" on page 244](#).

Session logs are intended to help identify issues that arise due to common device interaction problems, such as connectivity failures, authentication failures, or scripting errors. They can also be used to show what NA is doing to achieve a certain result on the device, and confirm that it is, in fact, doing the right thing.

The session log shows information about:

- Task process steps (This information is specific to NA. It is used to help organize the log.)
- Connection attempts via various protocols
- Disconnections and connection failures
- The commands sent to the device
- The results received from the device
- The results that were expected from the device (if any)

**Note:** Many failure cases will result from a command being sent with a certain result expected. When the device responds with a different result, the task fails.

When reviewing Session Logs, keep in mind that NA attempts to complete a task by any means possible. Therefore, you could see failures in the Session Log even if a task completes successfully. For example, a configuration snapshot could succeed despite the session log showing failed TFTP upload attempts. These failed attempts could indicate a problem with TFTP connectivity to the device, but the failure only causes NA to try another means to obtain the configuration. If these other means succeed, the task will succeed in spite of the TFTP failures.

## Task Logs

Task Logs are general-purpose logs created to track system activity related to one specific task. Task logging is limited to tasks that are run once (not on a recurring schedule). In addition, if the task is device-related, the Task Log is only available when run against a single device. Not all types of tasks in NA support Task Logs. For example, Task Logs are not available when you create a new event notification and response rule for a task.

**Note:** Although all NA users can create a task-specific log, only users with Administrative privileges can view and download them. If you do not have the proper privileges to view and download logs, contact your NA system administrator, and if necessary have him or her provide the log information to Support.

If task logging is available for a task, a Task Logging section is provided in the task creation page. If the task being created is not appropriate to task logging (because it is being run against a group of devices or on a recurring schedule, for example), the task logging interface will be unresponsive.

Enabling task logging for a task consists of enabling the checkbox and choosing one or more log names. A list of all available log names are provided. This list could include an entry for a default set of logs appropriate to the task you are creating. You can select as many logs as you like, including or excluding the default set. Log names that are selected from the list are automatically set to TRACE level for the Task Log.

When you run the task, a log specific to that task is generated as a file and stored along with the NA server logs. If, for any reason, the task log file is unable to be created, the task will immediately fail with an error message. No information about the task log is provided in the task results page.

## Server Logs

Server Logs are the logs for the entire NA system. They contain messages recording the activity of all tasks and all other processes in one location. Server Logs are enabled in the Troubleshooting page. For more information, see "[Configure NA Logging](#)" below.

**Note:** Server logs should only be used as instructed by Customer Support.

## Log Management

In addition to enabling and disabling the different types of logs, NA can manage how long log files are retained and provide performance management techniques to reset log levels after a period of time.

For information about managing how long log files are retained, see "[Server](#)" on page 42.

For performance management techniques regarding how NA automatically resets log levels and how you can modify the setting, see "[Server Monitoring](#)" on page 86.

## Configure NA Logging

NA can gather a wide variety of log information. Under normal circumstances, you do not need to change the log levels. At times, Support will ask you to change the logging level for one or more NA logs to collect more information about a specific area of NA behavior. To avoid extra load on the NA core, be sure to reset the changed log levels after you collect the necessary information.

Change log levels on the Troubleshooting (**Admin > Troubleshooting**) page.

**Note:** You must have Administrative privileges to be able access logs files.

Field	Description/Action
Send Troubleshooting Information link	Opens the Send Troubleshooting Info page, where you can compose an email and send system information and logs to Customer Support. For more information, see " <a href="#">Send Troubleshooting Info Page Fields</a> " on page 700
Download Troubleshooting Information link	Enables you to download troubleshooting information. For more information, see " <a href="#">Download Troubleshooting Info Page Fields</a> " on page 697 For information about removing user names and passwords from the troubleshooting

Field	Description/Action
	package, For more information, see <a href="#">"Removing Access Information from the Troubleshooting Package"</a> below.
Send Test Email to Admin User link	Sends an email to the System Administrator. It is used to ensure that NA's email system is configured correctly and to troubleshoot cases where email (in particular troubleshooting email) is not getting through.
Enable logging for	Select one or more components for which you want to enable logging. For more information about logging in NA, see <a href="#">"Logging"</a> on page 692.
and for	Enter any additional software components that are not on the list.
at level < > and above	Select a logging level. Options include: <ul style="list-style-type: none"> <li>• Fatal (fewest messages)</li> <li>• Error (default)</li> <li>• Debug</li> <li>• Trace (most messages)</li> </ul> For more information, see <a href="#">"Log Levels"</a> on page 692.
Keep < > days worth of logs	Enter how long you would like to keep log data. The default is two days. <div style="background-color: #e0e0e0; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Log data can require large amounts of disk space.</p> </div>
Reset	If checked, all logs are reset to the default logging level (Error) when you click the Submit button.

## Removing Access Information from the Troubleshooting Package

To ensure that the troubleshooting package does not include user names and passwords, follow these steps:

1. If necessary, on the Administrative Settings - User Interface page, under Miscellaneous, enable the following settings:
  - Remove User Names from the Troubleshooting Package
  - Remove Passwords from the Troubleshooting Package

**Note:** These settings do not apply to the package created from the Send Troubleshooting Info page.

2. If the settings listed in step 1 have been recently enabled, delete the existing log files from the NA server.
  - a. Stop the NA services.
  - b. Delete all \*log\* files in the following directories:



- o <NA\_HOME>/server/log
  - o <NA\_HOME>/server/ext/jboss/server/default/log
  - c. Start the NA services.
3. Start collecting new log files. On the Troubleshooting page, do the following:
    - a. In the **Enable logging for** list, select the log files to collect.
    - b. Set **Keep** to a non-zero value.
    - c. Click **Submit**.
  4. After replicating the problem that requires Support assistance, create the troubleshooting package on the Download Troubleshooting Info page.
  5. Send the troubleshooting packing to your Support contact. Include a description of the problem and the Support ticket number in the body of the email message.

## Download Troubleshooting Info Page Fields

Use the Download Troubleshooting Info page to create a package of information about the NA core that you can send to Support.

To open the Download Troubleshooting Info page, on the Troubleshooting (**Admin > Troubleshooting**) page, follow these steps:

1. Click the Download Troubleshooting Information link.
2. On the Download Troubleshooting Info page, select the required options. The following table describes the information that you can include in the troubleshooting package:

**Note:** You must have Administrative privileges to be able access logs files.

Include Option	Files	Description
Server logs for the last < > hours	<NA_HOME>/server/ext/jboss/server/default/log/boot.log	Logs of NA startup
	<NA_HOME>/server/ext/jboss/server/default/log/metrics.log [.*]	Logs of JVM memory for forensic analysis
	<NA_HOME>/server/ext/jboss/server/default/log/server.log	Logs of the NA server processes
	<NA_HOME>/server/ext/jboss/server/default/log/keycloak.log	Logs of SAML authentication
	<NA_HOME>/server/log/ftp_wrapper.log[.*]	Logs of the NA-provided FTP server
	<NA_HOME>/server/log/tftp_wrapper.log[.*]	Logs of the NA-provided TFTP server

Include Option	Files	Description
SystemInfo.txt	Compilation of information that describes the NA environment	
Administrative Settings	<NA_HOME>/jre/*.rcx	NA properties files
	<NA_HOME>/server/ext/wrapper/conf/aaa_agent_wrapper.conf	Configuration file for the NA-provided AAA log reader
	<NA_HOME>/server/ext/wrapper/conf/jboss_wrapper.conf	Configuration file for the NA JVM
	<NA_HOME>/server/ext/wrapper/conf/syslog_wrapper.conf	Configuration file for the NA-provided syslog server
	<NA_HOME>/server/ext/wrapper/conf/tftp_wrapper.conf	Configuration file for the NA-provided TFTP server
	<NA_HOME>/UninstallerData/installvariables.properties	Values of the NA initial installation variables
	<NA_HOME>/server/ext/jboss/server/default/deploy/dbds.xml	Configuration file for database connections
	<NA_HOME>/server/ext/jboss/server/default/log/boot.log	Logs of NA startup
	<NA_HOME>/server/ext/jboss/server/default/log/metrics.log [.*]	Logs of JVM memory for forensic analysis
	SystemInfo.txt	Compilation of information that describes the NA environment
System Status File	<NA_HOME>/server/ext/jboss/server/default/log/boot.log	Logs of NA startup
	<NA_HOME>/server/ext/jboss/server/default/log/metrics.log [.*]	Logs of JVM memory for forensic analysis
	<NA_HOME>/server/ext/jboss/server/default/log/tc-monitor.csv	Current status of the NA monitors
	SystemInfo.txt	Compilation of

Include Option	Files	Description
		information that describes the NAenvironment
Wrapper logs including the last < > historical files	<NA_HOME>/server/log/jboss_wrapper.log[.*]	Current and historical logs for the NA jboss process
	<NA_HOME>/server/ext/jboss/server/default/log/boot.log	Logs of NAstartup
	<NA_HOME>/server/ext/jboss/server/default/log/metrics.log [.*]	Logs of JVM memory for forensic analysis
	SystemInfo.txt	Compilation of information that describes the NAenvironment
Gateway logs including the last < > historical files	<NA_HOME>/server/log/opswgw-<gateway>.log [historical.*]	Logs of the NA gateways
	<NA_HOME>/server/log/opswgw-<gateway>.properties	Properties file of the NA gateways
	<NA_HOME>/server/log/opswgw-<gateway>.nassat.log	Properties file of the NA remote agents
	<NA_HOME>/server/log/opswgw-<gateway>.catalina.out	Log file of the NA remote agents
	<NA_HOME>/server/ext/jboss/server/default/log/boot.log	Logs of NA startup
	<NA_HOME>/server/ext/jboss/server/default/log/metrics.log [.*]	Logs of JVM memory for forensic analysis
	SystemInfo.txt	Compilation of information that describes the NAenvironment
	<gateway> is the name of the gateway to which the respective log/property file belongs	
Task Logs	List of specific tasks that ran with task logging enabled	Logs of the specified tasks
	SystemInfo.txt	Compilation of

Include Option	Files	Description
		information that describes the NAEenvironment

3. Click **Download**.

## Send Troubleshooting Info Page Fields

Use the Send Troubleshooting Info page to package troubleshooting information and send an email message containing this information in one step.

**Note:** The Send Troubleshooting Info page does not remove user names and passwords from the collected information. To ensure that the troubleshooting package does not include user names and passwords, use the Download Troubleshooting Info page to create the troubleshooting package and then send the package from your email client. For more information, see ["Removing Access Information from the Troubleshooting Package" on page 696](#).

To open the Send Troubleshooting Info page, on the Troubleshooting (**Admin > Troubleshooting**) page, follow these steps:

1. Click the Send Troubleshooting Information link.
2. On the Send Troubleshooting Info page, enter the required details. The following table describes the fields that appear on the page:

**Note:** You must have Administrative privileges to be able access logs files.

Fields	Description/Action
To	Enter your email address if it is not already displayed.
Subject	The subject line, "HPE Network Automation Info," is displayed.
Problem Number	Enter the problem number related to an open ticket, if applicable.
Comments	Enter comments regarding the issue. Be sure to include your return email address and direct phone (or cell number). The contact information on file is not always accurate or specific to the person with the issue.
Include	Select one or more of the following options: <ul style="list-style-type: none"> <li>• Server logs for the last &lt; &gt; hours — Enter the number of hours worth of stored logs you want to send. The default is 4.</li> <li>• Administrative settings — Include the collection of Administrative settings and options in effect for your NA server.</li> </ul>

Fields	Description/Action
	<ul style="list-style-type: none"><li>• System Status File — A file created to provide system status information.</li><li>• Wrapper Logs — If requested, this sends the Jboss_Wrapper log file.</li><li>• Gateway Logs — If requested, this downloads the log and properties files from the NA gateways and remote agents. This field appears only if NA is configured with a gateway.</li><li>• Task Logs — A list of available task log files. Each file lists the task type, task ID, device (if applicable), and time the task completed.</li></ul> <p>For information about the files that are included for each of these options, see "<a href="#">Download Troubleshooting Info Page Fields</a>" on page 697.</p>

3. Click **Send**.

# Appendix A: Common Procedures

This section describes procedures that are common to many HPE Network Automation (NA) configuration and maintenance tasks. It includes the following topics:

- ["Start, Stop, or Restart All NA Services" below](#)
- ["Disable All NA Services" on the next page](#)
- ["Working with .rcx Files" on the next page](#)

## Start, Stop, or Restart All NA Services

Stopping the NA services before changing the NA configuration prevents conflicting data from being stored in the NA database. Some procedures call for restarting the NA services to read the updated configuration.

### To start all NA services

- *Windows*: Open the **Services** control panel. In the list of services, right-click each of the following services, and then click **Start**:
  - **TrueControl ManagementEngine**
  - **TrueControl FTP Server**
  - **TrueControl Syslog Server**
  - **TrueControl TFTP Server**
  - **TrueControl SA Client**
- *Linux*: Run the following command:  
`/etc/init.d/truecontrol start`

### To stop all NA services

- *Windows*: Open the **Services** control panel. In the list of services, right-click each of the following services, and then click **Stop**:
  - **TrueControl ManagementEngine**
  - **TrueControl FTP Server**
  - **TrueControl Syslog Server**
  - **TrueControl TFTP Server**
  - **TrueControl SA Client**
- *Linux*: Run the following command:  
`/etc/init.d/truecontrol stop`

### To restart all NA services

- *Windows*: Open the **Services** control panel. In the list of services, right-click each of the following services, and then click **Restart**:
  - **TrueControl ManagementEngine**
  - **TrueControl FTP Server**
  - **TrueControl Syslog Server**
  - **TrueControl TFTP Server**
  - **TrueControl SA Client**
- *Linux*: Run the following command:  

```
/etc/init.d/truecontrol restart
```

## Disable All NA Services

Some procedures call for disabling automatic startup of the NA services on system boot.

### To disable all NA services

- *Windows*: Open the **Services** control panel. In the list of services, right-click each of the following services, click **Properties**, and then set Startup Type to **Disabled**:
  - **TrueControl ManagementEngine**
  - **TrueControl FTP Server**
  - **TrueControl Syslog Server**
  - **TrueControl TFTP Server**
  - **TrueControl SA Client**
- *Linux*:  

```
mv /etc/rc.d/rc5.d/S99truecontrol /etc/S99truecontrol
```

## Working with .rcx Files

The HPE Network Automation (NA) property files use the `.rcx` extension. NA reads `.rcx` files in reverse alphabetical order. If a given setting is in multiple `.rcx` files, NA uses the last-read value. Thus, the settings in the `adjustable_options.rcx` file take precedence over the settings in the other `.rcx` files installed with NA.

**Note:** At startup, NA reads *all* files in the `jre` directory and interprets their contents for NA configuration options. For this reason, save all backup copies of `.rcx` files outside the root NA directory.

In Horizontal Scalability environments, NA shares the actual values of most settings, not the `.rcx` files, across the NA cores. When a setting is modified on one NA core, that setting is replicated to the other NA

cores. If an NA core is not operational during the change replication, that NA core does not receive the change. In that case, at a later time, use the Admin > Distributed > Renew Configuration Options page to push changes to other NA cores.

**Tip:** The distributed system options section of the appserver .rcx file lists the settings that are specific to one NA core and are not shared across the NA cores.

Some configuration changes require .rcx file modifications. The .rcx files are located in the following directory:

- *Windows:* <NA\_HOME>\jre
- *Linux:* <NA\_HOME>/jre

**Caution:** Always edit .rcx files with care. These files use XML format. If a .rcx file change results in invalid XML, the NA console might not start correctly.

**Tip:** It is recommended to make all configuration changes in the adjustable\_options.rcx file. NA patch installations and product upgrades might overwrite any of the other NA-installed .rcx files.

The general procedure for changing .rcx files is as follows:

1. Back up the .rcx file to a location outside the <NA\_HOME> directory.  
(NA reads all .rcx files within the NA directory structure.)
2. Add new content or update existing content as described in the instructions.
3. Save the .rcx file.
4. Reload the .rcx settings by doing *one* of the following:
  - In the NA console, on the Admin > Administrative Settings > User Interface page, click **Save**.
  - Run the `reload server options` command from the NA proxy.
  - Restart the NA services.

**Tip:** Some changes do not take effect until the NA services have been restarted.



# Appendix B: Command Line Reference

To open a command window, in the Search tab on the left-hand side of the display, enter a device IP address or hostname and click the Connect button.

You can also open a command window from the Device Details page using the Connect menu. Within the command window, you can select the text that you want to copy and press the Return key. The highlighted text is placed into a copy buffer. You can then paste it into another application. Enter `exit` and close the window when you are finished.

**Note:** If you use the Telnet/SSH Proxy to connect directly to devices, you remain in the Telnet/SSH Proxy when you exit the device. Unless you enter `exit` again, you can enter CLI commands and connect to other devices.

To view Help for CLI commands, enter: `help` to see a list of all commands. Enter `help <command name>` to see detailed help on a specific command.

**Note:** The CLI is not case-sensitive. You can enter all commands and options in lowercase or uppercase.

CLI Help is available online using the following commands:

- At the CLI prompt, enter: `help`. You should see a list of nearly all the CLI commands in alphabetical order. For example, to see Help for the `import` command, enter: `import`. (**Note:** There is no Help text for the `help` or the `exit/quit` commands.)
- To view help information for the `import` command, for example, enter: `help import`. The command `help <command name>` returns detailed information on that command, including the name, a synopsis, a description, and examples.
- When you are finished with the command line, enter: `exit`. Depending on the type of session you started, you may need to enter `exit` again and manually close the window.

**Note:** You can also enter the help command and just the first word of a command to return a list of all the commands that begin with the same first word.

The type conventions used in the CLI Help text have specific meanings. The following table lists the conventions and their meanings.

Convention	Meaning
>	A single right angle bracket indicates the command prompt where you enter your commands.
-	A dash precedes a command option.
< >	Angle brackets surround variable text that you must fill in, such as an IP address. Do not include the angle brackets.

Convention	Meaning
[ ]	Square brackets delineate one or more optional elements.
	A vertical pipe separates arguments within brackets. Include only one argument.

For a complete list of CLI commands, including syntax and examples, see the *NA CLI/API Command Reference*.

# Appendix C: Command Permissions

Users must be explicitly granted the corresponding command permission for each action they want to perform, such as viewing a page in the NA console or running a command. A set of command permissions creates a command permission role. You can then apply the role to a user group to set the command permissions for that given user group. For more information, see ["New User Role Page Fields " on page 234.](#)

**Note:** NA includes four types of permissions, including Command permissions, Modify Device permissions, Script permissions, and View Device permissions. Some Command permissions require one or more of the other permissions as noted in the following table.

## To grant command permissions

1. On the User Roles & Permissions page (**Admin > User Roles & Permissions**), click the New User Role link at the top of the page.
2. On the New User Role page, grant permissions. For more information, see ["Adding User Roles" on page 232.](#)

## Command Permission Definitions

Command Permission	Enabled Functionality
3rd Party Integrations	Access the <b>Admin &gt; Administrative Settings&gt; NA/NNMi Integration</b> menu item.
Add Device	Add devices to the NA database.
Add Device Group	Create device groups in the NA database.  <b>Note:</b> To enable creating private device groups, grant both of the following permissions: <ul style="list-style-type: none"><li>• Add Device Group</li><li>• Edit Device Group</li></ul> <b>Note:</b> To enable creating public device groups, grant both of the following permissions: <ul style="list-style-type: none"><li>• Add Device Group</li><li>• Administer Device Groups</li></ul>
Add Event	Create a user message event for a device.
Add SNMP Trap Config	Configure SNMP traps.

Command Permission	Enabled Functionality
Admin Settings	<p>Change administrative settings.</p> <p><b>Note:</b> Some administrative settings, such as Workflow Setup and External Authentication Setup, require additional permissions.</p>
Administer Device Groups	<p>Create, edit, and delete device groups in the NA database, including parent and public groups.</p>
Annotate Device Configuration	<p>Annotate device configurations in the NA database.</p>
Authorize Concurrent Telnet/SSH Sessions	<p>Override the prevention of multiple proxy connections to a device.</p>
Auto Remediation Scripts	<p>Create and edit auto remediation scripts in the NA database.</p>
Backup Device Software	<p>Schedule the Backup Device Software task.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the devices to be backed up.</p>
Batch Edit Device	<p>Edit multiple devices simultaneously.</p>
Change Device Password	<p>Schedule the Deploy Passwords task for one device.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the device to be changed.</p>
Change Device Password (Group)	<p>Schedule the Deploy Passwords task for multiple devices.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.</p>
Check Configuration Policy Compliance	<p>Schedule the Check Configuration Policy Compliance task.</p>
Configure Syslog	<p>Schedule the Configure Syslog task for one device.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the device to be changed.</p>
Configure Syslog (Group)	<p>Schedule the Configure Syslog task for multiple devices.</p>

Command Permission	Enabled Functionality
	<p><b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.</p>
Connector Redirect	Obsolete. Supported integration with HPE Network Node Manager 7.xx and 8.xx.
Data Pruning Task	Schedule the Data Pruning task to run one time.
Data Pruning Task (Group)	Schedule the Data Pruning task to run periodically.
Deduplication	Schedule the Deduplication task for one device.
Deduplication (Group)	Schedule the Deduplication task for multiple devices.
Delete Access	<p>Run the <code>del access</code> CLI command.</p> <p><b>Tip:</b> It is recommended that this permission be given to administrators only.</p>
Delete Device	<p>Delete devices from the NA database.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the devices to be deleted.</p>
Delete Device Configuration	Delete device configurations from the NA database.
Delete Device Group	Delete device groups from the NA database.
Delete Diagnostics	Delete diagnostic records from the NA database.
Delete Driver	<p>Clear driver assignments from devices in the NA database.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.</p>
Delete Session	Delete telnet and SSH session records from the NA database.
Delete Software Compliance	Delete software compliance records from the NA database.
Delete Software Image	Delete software images from the NA software repository.
Delete System Event	Delete system events from the NA database.
Delete Task	Delete task records from the NA database.

Command Permission	Enabled Functionality
	The task owner can delete a task record without this permission.
Deploy Change Plan	<p>Schedule the Deploy Change Plan task for a device.</p> <p><b>Note:</b> This permission is not available for a Power user and a Full Access user.</p>
Deploy Remote Agent	Schedule the Deploy Remote Agent task.
Deploy Software	<p>Schedule the Update Device Software task for one device.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the device to be changed.</p>
Deploy Software (Group)	<p>Schedule the Update Device Software task for multiple devices.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.</p>
Detect Network Devices	Schedule the Detect Network Devices task for one device.
Detect Network Devices (Group)	Schedule the Detect Network Devices task for multiple devices.
Device Context	Schedule the Add Context to Device task for one device.
Device Single Sign-On	<p>Instantiate a telnet or SSH session to a device without providing credentials using the NAproxy.</p> <p><b>Note:</b> The user must also have the Telnet/SSH Client permission and Modify Device Permission for the target devices.</p>
Discover Device Driver	<p>Schedule the Discover Driver task for one device.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the device to be changed.</p>
Discover Device Driver (Group)	<p>Schedule the Discover Driver task for multiple devices.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.</p>

Command Permission	Enabled Functionality
Drivers	View the Drivers page ( <b>Admin &gt; Drivers</b> ).
Edit ACL	Access the Edit ACL action on the Device Details > ACLs page.
Edit ACL Comments	Access the Edit Comments action on the Device Details > ACLs > View ACL page.
Edit Config [Changed By] User	Reset the tracking of which user changed a device configuration.  <b>Tip:</b> It is recommended that this permission be given to administrators only.
Edit Device	Edit devices in the NA database.  <b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.
Edit Device Group	Edit device groups and device group membership in the NA database.
Edit Inactive Device	Edit the <b>Comments</b> field of inactive devices.  <b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.
Edit Task	Edit scheduled tasks.  The task owner can edit a scheduled task without this permission.
Edit User	Edit other user's profiles.  An NA user can edit their own profile without this permission.
Email Report	Schedule the Email Report task.  <b>Note:</b> Reports related to policy and compliance are available only with the NA Ultimate edition license. To determine your license level, see the <b>Feature</b> field on the License Information page ( <b>Help &gt; About Network Automation &gt; View License Information</b> link).
External Authentication Setup	Configure external authentication to NA. For supported external authentication methods, see " <a href="#">User Authentication</a> " on page 68.
Generate Summary Reports	Schedule the Generate Summary Reports task for one device.
Generate Summary Reports (Group)	Schedule the Generate Summary Reports task for multiple devices.

Command Permission	Enabled Functionality
Import Devices & Passwords	Schedule the Import Devices task.
List SysOIDs	Run the <code>list sys oids all</code> CLI command.
List View	Obsolete. Run the <code>list view</code> CLI command.
Manage ACL	<p>Schedule the Delete ACLs task for one or multiple devices.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.</p>
Manage Change Plan	<p>Create, edit, and delete change plans.</p> <p><b>Note:</b> This permission is not available for a Power user and a Full Access user.</p>
Manage Command Script	Create, edit, and delete command scripts.
Manage Configuration Policy	Create, edit, and delete device policies.
Manage Device Password Rule	Create, edit, and delete device password rules.
Manage Diagnostic Script	Create, edit, and delete diagnostic scripts.
Manage Distributed System	<p>Access the <b>Admin &gt; Distributed</b> menu.</p> <p><b>Note:</b> This menu is available only for distributed systems. For information, see the <i>NA Horizontal Scalability Guide</i>, the <i>NA Multimaster Distributed System on Oracle Guide</i>, or the <i>NA Multimaster Distributed System on SQL Server Guide</i>.</p>
Manage Enhanced Custom Data	Create, edit, and delete custom data field values with the <code>add metadata</code> , <code>del metadata</code> , <code>mod metadata</code> , and <code>mod custom data</code> CLI commands.
Manage Enhanced Custom Data Fields	Create, edit, and delete custom data field definitions on the Enhanced Custom Fields Setup page ( <b>Admin &gt; Enhanced Custom Fields Setup</b> ) and with the <code>add metadata field</code> , <code>del metadata field</code> , <code>mod metadata field</code> , <code>list metadata field</code> , and <code>show metadata field</code> CLI commands.
Manage Event Rule	<p>Create, edit, and delete Event Notification &amp; Response rules.</p> <p>The rule owner can edit and delete a rule without this permission.</p>



Command Permission	Enabled Functionality
Manage Gateways	View the Gateway List ( <b>Admin &gt; Gateways</b> ) and Edit Gateway pages. Edit and delete gateways. Schedule the Deploy Remote Agent task. For information, see the <i>NA Satellite Guide</i> .
Manage IP Address	Add, edit, and delete the primary and secondary IP addresses of devices in the NA database.  <b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.
Manage License	View and update NA license information.
Manage Partition	Create, edit, and delete partitions.
Manage Software Compliance	Create and edit software levels.
Manage Software Image	Add, edit, and delete software images.
Manage System Report	Reorder system and user reports, promote user reports to system reports, and delete system reports.
Manage Template	Create, edit, and delete script templates.
Manage User Group	Create, edit, and delete user groups.  <b>Tip:</b> It is recommended that this permission be given to administrators only.
Manage User Role	Create, edit, and delete user roles.
Manage User	Create, edit, and delete NA user accounts.
Manage View	Rename partitions on the Partitions page.  <b>Note:</b> To enable this functionality, grant both of the following permissions: <ul style="list-style-type: none"> <li>• Manage Partition</li> <li>• Manage View</li> </ul>
Modify Device Configuration	Schedule the Deploy Config task for one device.  <b>Note:</b> The user must also have the Modify Device Permission for the device to be changed.
Modify SecurID	Add, edit, and delete SecurID token information.

Command Permission	Enabled Functionality
Multi-Task Project	Schedule a multi-task project for one device.
Multi-Task Project (Group)	Schedule a multi-task project for multiple devices.
Override Workflow Approvals	Run a task without going through the Workflow approval process.
Port Scan	Schedule the Port Scan task for one device.
Port Scan (Group)	Schedule the Port Scan task for multiple devices.
Provision Device	Schedule the Provision Device task for one or multiple devices.  <b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.
Reload Device Task	Schedule the Reboot Device task for one device.  <b>Note:</b> The user must also have the Modify Device Permission for the device to be changed.
Reload Device Task (Group)	Schedule the Reboot Device task for multiple devices.  <b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.
Resolve FQDNs	Schedule the Resolve FQDN task for one device.  <b>Note:</b> The user must also have the Modify Device Permission for the device to be changed.
Resolve FQDNs (Group)	Schedule the Resolve FQDN task for multiple devices.  <b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.
Resource Identity: Acquire/Release/Edit	Acquire, release, and edit existing resource identities.
Resource Identity: Add/Import	Add new resource identities to a resource identity pool.  <b>Note:</b> To enable this functionality, grant both of the following permissions:

Command Permission	Enabled Functionality
	<ul style="list-style-type: none"> <li>• Resource Identity: Add/Import</li> <li>• Resource Identity: View</li> </ul>
Resource Identity: Delete	Delete resource identities from the NA database.
Resource Identity: View	View resource identity properties.
Resource Identity Pool: Manage	Create, edit, and delete resource identity pools in the NA database.
Resource Identity Pool: View	View resource identity pools and their members.
Run Command Script	<p>Schedule the Run Command Script task for one device.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the device to be changed <i>and</i> the Script Permission for the script to be run.</p>
Run Command Script (Group)	<p>Schedule the Run Command Script task for multiple devices.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the device to be changed <i>and</i> the Script Permission for the script to be run.</p>
Run Diagnostic Script	<p>Schedule the Run Diagnostic task for one device.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the device to be changed.</p>
Run Diagnostic Script (Group)	<p>Schedule the Run Diagnostic task for multiple devices.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.</p>
Run External Application	<p>Schedule the Run External Application task for one device.</p> <p><b>Tip:</b> It is recommended that this permission be given to administrators only.</p>
Run External Application (Group)	Schedule the Run External Application task for multiple devices.

Command Permission	Enabled Functionality
	<p><b>Tip:</b> It is recommended that this permission be given to administrators only.</p>
Run ICMP Test	Schedule the Run ICMP Test task for one device.
Run ICMP Test (Group)	Schedule the Run ICMP Test task for multiple devices.
Set Highest Task Priority	Set tasks to priority 1.
Synchronize Startup & Running	<p>Schedule the Synchronize Startup and Running task for one device.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the device to be changed.</p>
Synchronize Startup & Running (Group)	<p>Schedule the Synchronize Startup and Running task for multiple devices.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the devices to be changed.</p>
Take Snapshot	Schedule the Take Snapshot task for one device.
Take Snapshot (Group)	Schedule the Take Snapshot task for multiple devices.
Task Quick Launches	Create and run quick launches for task templates for the current user.
Telnet/SSH Client	Access the Java applet client for instantiating a telnet or SSH session to a device using the NAproxy.
Troubleshooting	Configure NA logging. Package and send NA troubleshooting information.
Update Device Comments	<p>Edit the <b>Comments</b> field of active devices.</p> <p><b>Note:</b> The user must also have the Modify Device Permission for the device to be changed.</p>
Update Device Ticket	If NA is integrated with a ticket tracking system, such as Remedy, edit a ticket for this device.
User Password Settings	View the <b>Password Options</b> field on the New User and Edit User pages.
View ACL	View ACL scripts.

Command Permission	Enabled Functionality
View Change Plan	View change plans.  <b>Note:</b> This permission is not available for a Power user and a Full Access user.
View Command Script	View command scripts, advanced scripts, and diagnostic scripts.
View Configuration Policy & Compliance	View compliance policies and device compliance status.
View Configuration Policy Event	View the policy activity for a device.  <b>Note:</b> The user must also have the Modify Device Permission for the device.
View Deployed Software	View the software level of devices.
View Device Configuration	View device configurations with sensitive information masked (for example, passwords and community strings).
View Device Diagnostic	View device diagnostic results.
View Device Information	View all device information except for device configurations.
View Diagnostic Script	View diagnostic scripts.
View Driver	View the assigned driver and the family classification of devices.
View Enhanced Custom Data	View custom data field values with the <code>list metadata</code> and <code>show metadata</code> CLI commands.
View Full Device Configuration	View device configurations including sensitive information (for example, passwords and community strings).  <b>Note:</b> The user must also have the Modify Device Permission for the device.
View Script & Diagnostic Result	View the results of Run Command Script and Run Diagnostics tasks.
View Session	View the command and response history of telnet and SSH sessions to devices. The device owner can view session history without this permission.
View Software Image	View the device software images in the NA software image repository.

<b>Command Permission</b>	<b>Enabled Functionality</b>
Archive	
View System Status	View the System Status page ( <b>Admin &gt; System Status</b> ). View monitor details and run monitors.
View Task	View details of all tasks in all states (for example, Requested, Pending, and Succeeded).
View Template	View script templates.
View User Information	View all user information. An NA user can view their own information without this permission.
Workflow Setup	Configure Workflow approval rules.

# Appendix D: Sample Scripts

This sections provides the following sample scripts:

- ["Sample PERL Script #1" below](#)
- ["Sample PERL Script #2" on the next page](#)
- ["Sample Expect Script" on page 721](#)

## Sample PERL Script #1

This PERL script sets all FastEthernet interfaces to full duplex on Cisco 2600s and 7200s.

```
#
# Sample Script to set all FastEthernet interfaces
# to full duplex on Cisco 2600s and 7200s
#
use Socket;

$iaaddr = gethostbyname("$tc_device_ip$");
$stelnet_port = 23;
$sin = sockaddr_in($stelnet_port, $iaaddr);
socket(DEV, PF_INET, SOCK_STREAM, getprotobyname('tcp'));
connect(DEV, $sin) || die "Can't connect to $tc_device_hostname$: $!\n";

sendln("");
sendln("$tc_device_password$");
sendln("en");
sendln("$tc_device_enable_password$");
sendln("conf t");

for $name (split(" ", "$tc_device_port_name_list$")) {
    if ($name =~ /FastEthernet/)
        sendln("interface $name");
        sendln("duplex full");
        sendln("exit");
    }
}
sendln("exit");
sendln("exit");
sendln("");
close(DEV);
exit;
```

(continued on next page)

```
sub sendln {
    my ($line) = @_ ;
    $line .= "\n";
    syswrite(DEV, $line, length($line));
    while (<DEV> {
```

```
print;
die "Failed to execute command\n"
if (/^\% (Unknown|Unrecognized|Invalid|. *uthorization failed)/);
last if (/name:/ ||
/word:/ ||
/>/ ||
^#);
}
}
```

## Sample PERL Script #2

This PERL script sets all interfaces to no IP-directed broadcast.

```
#
# Sample Script to set all interfaces
# to no ip directed broadcast
#
use Socket;

$ipaddr = gethostbyname("$tc_device_ip$");
$telnet_port = 23;
$sin = sockaddr_in($telnet_port, $ipaddr);
socket(DEV, PF_INET, SOCK_STREAM, getprotobyname('tcp'));
connect(DEV, $sin) || die "Can't connect to $tc_device_hostname$: $!\n";

sendln("");
sendln("$tc_device_password$");
sendln("en");
sendln("$tc_device_enable_password$");
sendln("conf t");

for $name (split(" ", "$tc_device_port_name_list$")) {
    sendln("interface $name");
    sendln("no ip directed-broadcast");
    sendln("exit");
}
sendln("exit");
sendln("exit");
sendln("");
close(DEV);
exit;

sub sendln {
    my ($line) = @_;
    $line .= "\n";
    syswrite(DEV, $line, length($line));
    while (<DEV>) {
        print;
        die "Failed to execute command\n"
        if (/^\% (Unknown|Unrecognized|Invalid|. *uthorization failed)/);
        last if (/name:/ ||
/word:/ ||
```



```
/> ||  
^#);
```

## Sample Expect Script

This Expect script modifies the banner to contain a given string only if the banner does not already contain the string.

```
#  
# Sample Script to set the banner only if  
# it is not already set correctly  
#  
spawn telnet $tc_device_ip$  
set banner "****Unauthorized Access Prohibited****"  
expect {  
  $banner {  
    puts "\nBanner is already set correctly\n"  
    exit 0  
  } "word:"  
}  
send "$tc_device_password$\r"  
expect ">"  
send "en\r"  
expect "word:"  
send "$tc_device_enable_password$\r"  
expect "\#"  
send "config t\r"  
expect "\#"  
send "banner motd /$banner/\r"  
expect "\#"  
send "exit"
```

# Glossary

## C

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### **Command Script**

A file with commands, processed from beginning to end. In NA, a command script enables you to run a custom set of commands on one or more devices. You can also run a script as a scheduled task, and use event rules to trigger the scripts to run.

### **Core**

A single Management Engine and the associated services (for example, syslog and TFTP).

## D

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### **Default Site Partition**

The default Partition is named Default Site). If you are new to NA, the default Partition is the only Partition available. It includes all of the devices currently managed by NA.

### **Device Group**

A way to categorize your devices that makes sense to your organization. You can create device groups based on schemes such as geography, business unit, or their role in the network architecture. Device groups can be static or dynamic. While the static group includes a fixed set of devices, for a dynamic group, the system determines the devices to be included in the group. To determine this, the system uses predefined criteria associated with the group.

### **Device Password Rule**

Enables you to apply the same username, password, and SNMP community strings to

groups of devices, IP address ranges, or host names.

### **Diagnostic**

A command that is run on a device to collect information about the device that is not captured in its configuration file. For example, on a Cisco router, a Diagnostic would be the output of the command Show NTP Status.

### **Distributed System**

A system with more than one Core, with each Core running on a separate server.

## G

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### **Gateway**

An application that routes IP traffic to other Gateways. The Gateway software enables you to manage servers behind NATed devices and firewalls. In addition, the Gateway supports bandwidth throttling on tunnels between Realms and can be used anywhere SSL proxying or TCP port forwarding is used. Tunnels can be authenticated and optionally encrypted using SSL.

## H

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### **Horizontal Scalability**

A configuration where multiple NA cores connect to a single NA database. For more information, see the NA Horizontal Scalability Guide.

## M

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### **Multimaster**

A system with more than one database, where each database contains a complete set of all data.

### Multi-Task Project

A multi-task project can run several different tasks sequentially joined together under a single project. Each task included in the multi-task project is run in the order you specify.

## P

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### Parent Group

A device group hierarchy in NA is made up of parent groups and Leaf groups. A parent group can only have one parent. A parent group can contain only device groups, not devices.

### Partition

A set of objects. objects can include devices, users, command scripts, device password rules, policies, software images, and so on. Partitions can also be used in conjunction with a permissions model, group hierarchy, distribution of devices across cores, and network diagramming.

### Policy

A collection of rules that test the configuration and run-time state of your devices.

## R

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### Realm

A network segment. In general, a Realm is identified by a set of unique IP addresses. For example, a Realm cannot contain two devices numbered as 10.255.111.128. Instead, the devices must be broken out into separate Realms. A Site is not required to be in the same Realm as its managing NA Core.

### Resource Identity

The representation of a real-world resource for Resource Identity Management.

### Resource Identity Management

The feature for tracking network resources such as IP addresses, DNS host names, VLAN identifiers, and virtual machine names that must be unique within a given context. Access Resource Identity Management from the Resource Identity Pools page (Devices > Device Tools > Resource Identity Pools). See also Resource Identity and Resource Identity Pool.

### Resource Identity Pool

A group of similar resource identities for Resource Identity Management.

### Role

Roles are used to partition users into groups that share the same security privileges. A user assigned to a role is granted permissions defined by the role. For example, if a user is authorized to perform certain operations, such as adding devices, managing configuration policies, or deploying software, NA uses fixed role identities with which to access resources.

### Rule

An automated test that validates at least one of the following: Specific configuration settings Specific data model element The run-time state of a device (also known as a Diagnostic) The software version running on a device

### Rule Exception

A rule exception is part of a rule. However, its purpose is to exclude text it matches in the device configuration from consideration by the rule it is part of.

## S

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### Satellite

An NA functionality to manage devices remotely. A satellite consists of a remote gateway and a remote NA agent.

### **Single Search**

The Single Search option enables you to search all events containing the specified search criteria you specify on the Single Search Results page.

### **SingleView**

SingleView enables you to track events that indicate changes to either a single device or all of your devices on one page.

## **T**

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### **Task Pool Initialization**

When the NA management engine starts, it queries the database to construct the Task Pool. When a task is created, updated, or deleted, NA only updates the database which is attached to the local NA Core. The database replication mechanism handles the necessary changes in the databases attached to remote NA Cores. However, it is the application's responsibility to call remote NA Cores to update their the Task Pool in memory.

### **Tasks**

The primary mechanism by which NA interacts with your network. Tasks are specific actions you can either schedule or run immediately, for example Deploy Passwords, Reload Device, and Task Snapshot.

## **U**

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### **User Group**

A logical container for the purpose of user management. The System Administrator can assign users to user groups, which in turn map to specific roles.

### **User View**

View that applies to users and user groups

## **W**

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### **Workflow**

The NA Workflow Integration and Routing Engine (WIRE) manages the process of network configuration, ensuring that network changes are made according to predefined policies, completed in the correct sequence, and approved by the appropriate people.

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