



HPE NFV Director

Release Notes

V4.2

First Edition



Hewlett Packard
Enterprise

Notices

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Preface

About this guide

The Release Notes describe information related to the HPE NFV Director V4.2 on RHEL 6.6 **x86_64** platform.

NFV Director V4.2 is a minor release that supersedes NFV Director V4.1 minor release and 4.1.1 maintenance release.

Audience

This Release Notes document is aimed at Product Users, Solution Architects, System Integrators, Solution Developers, and Software Development Engineers.

Reference Documentation

Table 1: NFV Director User Documentation

User Documentation	Remarks
NFV Director V4.2 Edition 2 Installation and Configuration Guide	
NFV Director V4.2 Edition 1 High Availability Solution Guide	
NFV Director V4.2 Edition 2 Administration Guide	Updated compared to 4.1.1
NFV Director V4.2 Edition 2 On-Boarding Guide	Updated compared to 4.1.1
NFV Director V4.2 Edition 2 User Guide	Updated compared to 4.1.1
NFV Director V4.2 Edition 1 Troubleshooting Guide	
NFV Director V4.2 Edition 1 VIM Integration Guide	Updated compared to 4.1.1
NFV Director V4.2 Edition 1 Integrator Guide for NFVO Managed Mode	New Guide
NFV Director V4.2 Edition 1 Integrator Guide for VIM Managed Mode	New Guide
NFV Director V4.2 OpenSource and Third-Party Licenses	
NFV Director V4.2 Edition 1 Tracking API Guide	Updated compared to 4.1.1
NFV Director V4.2 Edition 1 Operations API Guide	Updated compared to 4.1.1
NFV Director V4.2 Edition 1 NFVD Extension API Guide	Updated compared to 4.1.1
NFV Director V4.2 Edition 1 NFVD API Guide	Updated compared to 4.1.1
NFV Director V4.2 Edition 1 Resource Modeler User Guide	
NFV Director V4.2 Edition 1 OMI and uCMDB for NFVD User Guide	
NFV Director V4.2 Edition 1 Performance and Sizing Guide	
NFV Director V4.2 Edition 1 vCenter Integration Guide	

Document history

Table 2: Document history

Edition	Date	Description
1.0	14 March 2017	First Edition

Chapter 1

Overview of NFV Director features

HPE NFV Director provides a common point to ensure consistent management and behavior of VNFs, regardless of the vendor, enabling each VNF to efficiently run on heterogeneous hardware platforms and virtualization environments.

HPE NFV Director automatically manages the end-to-end services across VNFs.

HPE NFV Director is designed to meet the evolving ETSI specifications for the NFV orchestrator. This orchestrator manages and orchestrates virtual network functions and network services, thus providing a global resource management, and consistently applies global, cross-VNF, and VNF-specific policies.

HPE NFV Director provides orchestration of multi-vendor/multi-version VNFs across multiple Vendor-Version VIMs, multiple sites and multiple organizations providing a single pane of glass to control resource consumption and quota usage.

HPE NFV Director provides true multi tenancy allowing to:

- Manage several VIMs (even different VIM vendors and VIM versions) under the same domain and split the access to them into a hierarchy of Organization - Virtual Datacenters and VNF Groups
- Manage VIM hierarchy of regions and availability zones (when the VIM is OpenStack)
- Manage several VNF descriptors (even different VNF vendors and VNF versions) under the same domain and split the access to them into a hierarchy of Organization - Virtual Datacenters and VNF Groups
- Manage several Networks manage by different VIMs (even different networking modules of each VIM) through the use of ETSI Virtual Links
- Manage several Images manage by different VIMs (even different image modules of each VIM)
- Manage several Flavors manage by different VIMs (even different compute modules of each VIM),
- Multiple levels of users, roles and permissions to allow an efficient control over multitenancy and visibility.

1.1 VNF management

- Supports deploying VNF with custom extensions.
- Supports VNF Descriptor by using internal OpenXML-based format.
- Supports import / export of VNF TOSCA (Taker based) Descriptor
- Supports affinity rules (must, must not) on VNF placement—Extensible to support other policies and policies on other objects.
- Supports multiple versions of the same VNF—Extensible to automatically update existing instances.

1.2 VNF monitoring

This module provides the following features:

- Automatic monitoring VNFs, and NFV compute infrastructure with correlation across end-to-end NFV topology.
- Automation rules for actions such as scale-in, scale-out, scale-up, and scale-down.
- Configurable and extensible set of pre-defined monitoring templates.
- Extensible to monitor virtual and physical network infrastructure.
- Easy to add or customize monitoring of any SNMP source.
- Extensible complex monitoring rules and thresholds.

1.3 Resource discovery

Discovery supports the following features:

- Automatic discovery of available resources in a DC.
- Periodic reconciliation in order to track updates to resources.
- Refresh operation of selected resources.

1.4 VIM related features

VIM supports the following features:

- Affinity and anti-affinity rules through the use of resource pools.
- Multi-vendor, multi-type VIM through plug-in adaptors. The adaptors can augment VIM capabilities.
- Support both NFVO managed and VIM managed modes.

1.5 Event correlation and autonomous action

The event correlation and autonomous action supports the following features:

- Extensible to correlate events from different sources (VNFM, EMS, Physical resources) and take Automatic actions.
- Configurable simple automated actions (like scale-out if CPU > 80).
- Extensible more complex physical-to-virtual topology-based automated actions.

1.6 Virtual Infrastructure Manager and Hypervisors

The NFV Director supports through a plug-in extension, any type of VIM and even direct connectivity to hypervisor, although the preferred way (provided out-of-the-box) are any OpenStack VIM.

The NFV Director provides an OpenStack southbound interface (Kilo version) that can interface any VIM for supporting that interface.

The NFV director is out-of-the-box multi VIM and selects the VIM depending on the server the VM has been assigned to.

Following Virtual Infrastructure Manager and hypervisors are supported:

- HPE Helion OpenStack Carrier Grade 2.0, including DCN (Nuage 3.2.x)
- OpenStack Kilo, Liberty and Mitaka
- RedHat OpenStack 8.0
- VMWare vCenter 5.5

1.7 High Availability solution

NFV Director provides reference implementation for deploying NFV Director in High Availability mode. For more details, refer to the NFV Director V4.2 High Availability Solution Guide.

1.8 General

- Northbound APIs allow Integration with existing OSS.
- Lifecycle Management Notifications available for external subscription

Chapter 2 Overview of NFV Director Software components

This chapter provides overview of various software components of the NFV Director. For further details on various software components, refer to NFV Director Troubleshooting Guide “Verifying various product versions”.

2.1 Fulfillment

The following table lists the various software components that comprise NFV Director Fulfillment.

Table 3: NFV Director Fulfillment

Product	Version
HPE Service Activator	V62-1A
HPE SA Patch	V62-1A-9
HPE SA Extension Pack	6.1
HPE SA EP Patch	EP6.1-4
Oracle Database	11gR2 / 12c



NOTE:

Oracle Database is not included in NFV Director software release. It is mandatory to have Oracle Database.

2.2 Assurance

Table 4: NFV Director Assurance Gateway

Product	Version
Assurance Gateway	V4.2

Table 5: NFV Director UCA Automation

Product	Version
HPE UCA for EBC	V3.1
HPE UCA for EBC Patch	UCAEBC31SRVLIN_00007
HPE UCA for EBC Topology Extension	V3.1
HPE UCA for EBC Topology Extension Patch	UCAEBC31TOPOLIN_00001
UCA Automation Solution	V1.2
UCA Automation Patch	EBCATM-12LIN-00003
Open Mediation and Channel Adapters	See Table 6

Table 6: NFV Director Open Mediation and Channel Adapter

Product	Version
OSS Open Mediation	V700
UCA EBC Channel Adapter	V3.1
UCA HPSA Channel Adapter	V2.0
UCA Autoconsole Channel Adapter	V2.0
Generic SNMP Channel Adapter	V200L01 RevB
SiteScope Customization for Generic SNMP Channel Adapter	V2.0.0 L01 RevC
VMware ESXi Customization for Generic SNMP Channel Adapter	V2.0

Table 7: NFV Director SiteScope

Product	Version
HPE SiteScope	11.30
HPE SiteScope SIS_00373	11.31
HPE SiteScope SIS_00383	11.31 IP2
HPE SiteScope 11.31 Patch 1	QCCR1D152415IP2v4-11.31.000-Linux2.6_64.rpm
HPE SiteScope 11.31 Patch 2	QCIM11123656IP2v1-11.31.000-Linux2.6_64.rpm

2.3 NFV Director GUI

Table 8: NFV Director GUI

Product	Version
Apache Couch DB	V1.6.0-1
NodeJS	V4.6.2
HPE Unified OSS Console	2.3
Graphviz	2.38.0-1
OpenSSL	1.0.1e-42

**NOTE:**

Apache Couch DB as well as Graphviz are not included in NFV Director software release. It is mandatory to have both Apache Couch DB and Graphviz.

2.4 Components required for NFV Director OpenStack Discovery

Table 9: NFV Director OpenStack Discovery

Product	Version
OSS Open Mediation	V700
OpenStack Channel Adapter	1.0.0
Fulfillment Channel Adapter	1.0.0
NFVD Fulfillment	See 2.1
Oracle Database	See 2.1
UCA HPSA Channel Adapter	See 2.2
LDAP (OpenLDAP/ActiveDirectory)	OpenLDAP V3

2.5 Components required for NFV Director integration with OMi and BSMC (optional)

Table 10: NFV Director integration with OMi and BSM Connector

Product	Version
OSS Open Mediation	V700
CMDB Channel Adapter	1.0.0
UCA HPSA Channel Adapter	See 2.2

OMi Channel Adapter	1.0.0
NFVD Fulfillment	See 2.1
Oracle Database	See 2.1
OMi	10.00/01
BSM-Connector	10.00
BSM-C for OneView Management Pack (MP)	
OMi Management Pack for HPHelion Carrier Grade (MP)	
OMi Management Pack for Nuage DCN (MP)	

2.6 Components required for NFV Director integration with DCN (optional)



NOTE: NFV Director was validated with Alcatel-Lucent Nuage DCN, V3.2.1.1.



NOTE: Table “NFV Director Networking” is provided to indicate the NFVD software component requirements for integration with DCN.

Table 11: NFV Director Networking

Product	Version
OSS Open Mediation	V700
NFVD Fulfillment	See 2.1
SiteScope	See 2.2
OMi	See 2.5
OMi Management Pack for Nuage DCN (MP)	See 2.5
CMDB Channel Adapter	See 2.5
UCA HPSA Channel Adapter	See 2.2
Generic SNMP Channel Adapter	See 2.2
SiteScope Customization for Generic SNMP Channel Adapter	See 2.2

2.7 Supported browsers



NOTE:

Browser	URL
Microsoft Internet Explorer	http://windows.microsoft.com/en-us/internet-explorer/download-ie
Mozilla Firefox	https://www.mozilla.org/en-US/firefox
Google Chrome	https://www.google.com/chrome

NFV Director Component	Browser	Remarks
NFV D GUI	Microsoft IE	10 or later
	Mozilla Firefox	V32 or later

	Google Chrome	V37 or later
HP Service Activator	Microsoft IE	9 or later
	Mozilla Firefox	All latest versions
	Google Chrome	All latest versions
SiteScope	Firefox / IE	
UCA-EBC	Firefox / Chrome	All latest versions
Neo4J	Firefox / Chrome	All latest versions

Chapter 3 New Features/Enhancements

3.1 NFVD Architecture and installation

- Automatic installer for NFV Director High Availability setup.
- An audit tool to count the number of objects managed by NFVD
- Oracle 12c is supported
- NFVD can be installed on the baremetal hardware.
- NFVD architecture supports Geo Redundancy setup.

3.2 New Operation mode VIM-Manages for OpenStack VIMs

In several customer there exist the need to orchestrate VIMs without the need of being admin and even use only the public URLs of OpenStack (as maybe admin ones are even out of reach of the orchestrator). As an answer for that need VIM-Manages mode is introduced in this version to delegate some actions (like create tenants / Flavors / images / even networks) to the OpenStack admin users and just make use of those items once discovered

- NFV Director is able to mark each Datacenter, Organization, VDC and VNF Group as NFVO-Manages or VIM-Manages.
- In VIM-Manages mode NFVD can be configured to use a member user and to attack the public URLs of OpenStack and delegate several operations to the VIM admin (like creating flavors or select the concrete server to deploy the VMs)
- In VIM-Manages mode it is possible to add OpenStack tenants to an already deployed VDC (of course the organization / VDC / VNF group and DC need to be VIM manages)
- In VIM-Manages the placement of the Virtual machines is delegated to the VIM intelligence improving the deployment speed.
- In VIM-Manages it is also possible to keep adding projects to an already deployed VDC or VNF Group

3.3 Improved networking

- Import existing private OpenStack networks into a single NFVD Virtual Link (VDC scope)
- Import existing shared OpenStack networks into a single NFVD Virtual Link (Organization or Domain scope)
- Add existing OpenStack networks to an already deployed VLINK
- Restrict the access of a shared VLINK to only the VDCs of the same organization preventing other VDCs to access a network even if it is shared at OpenStack level
- Deploy a VNF with OpenStack security groups and rules

3.4 Enhanced discovery and usage of discovered entities

- Use and operate from NFV Director GUI the OpenStack project, Networks, images, flavors and security groups
 - If those entities are created manually over the VIM NFV Director is now not only able to discover them but also to manage and visualize them
- Able to re-use already created security groups, images or flavors if they are already present on the VIM
- Able to trigger discovery process from the GUI
- Discovery progress can be tracked from the GUI
- Refresh the discovery of each individual item to speed the discovery time of the manually created items
- Restrict the refresh to a region / tenant to speed even more the refresh operation
- Cancellation of on-going discovery.

3.5 Improved deployment

- Deploy a VNF with security groups and make use of the already existing ones
- Deploy a VNF specifying a concrete flavor or create it on the fly
- Deploy on any cinder type and track the usage on the default external storage quota
- Ephemeral disk is supported at VNF design time

3.6 Enhanced On boarding process

- Design a VNF with security groups and security rules on the VNF designer
- Design a VNF with an OpenStack discovered image
- Design a VNF with an OpenStack discovered flavor
- Design a VNF with any cinder type
- Design from the GUI a VNF with one monitor and several conditions and action attached to the same monitor
- TOSCA descriptor import and export capabilities has been added to the VNF design process

3.7 VIM Support

- Thanks to the VIM-Managed mode NFVD can be configured to manage VIMs using only a member user (of course delegating to the VIM some admin responsibilities)
- Deploy cinder volumes using any cinder type although by default only the 5 predefined types will be controlled by the quota allowance
- Red Hat OpenStack V8 has been validated to work with NFVD
- Mitaka OpenStack has been validated to work with NFVD
- Liberty OpenStack has been validated to work with NFVD
- Vmware Vcenter V5.5 has been validated to work with NFVD
- Deploy on Vcenter based infrastructure using shared disk is now possible from deployment and discovery perspective
- Image uploaded from NFVD Image and conversion to OVF is supported over Vcenter based Infrastructure.
- Heal, scale in / out operations over Vcenter based infrastructure is now supported

3.8 Security

- VIM Passwords are encrypted
- User/password creation/modifications communication is encrypted
- NFVD has adopt banking policy about user passwords and every time user password is created or updated a 'one-time use URL' email is sent to the user to avoid man in the middle attacks
- Product documentation has been improved to document to different levels of security can be established on northbound / south bound or intra modules communication
- NFVD can be configured to access only public URLs of the VIM if it is running on VIM-Manages mode
- Keystone V3.0 is supported and you can work as well with the default domain using the unscoped calls.
- Https can be configured in the northbound interfaces or in the southbound interfaces.

3.9 Performance

- VDC manager display and refresh time has been improved
- Browser screen display time has been improved

- VNF deployment and scale-in/out performance has been improved in all modes
- VNF quota and resource assignment task are delegated to the VIM on the VIM-manages mode
- Discovery has been improved and it is possible to refresh individual items (one datacenter, only the project, only the networks, etc ...)

3.10 Usability

- A dedicated screen for discovery management has been added for the domain users so they can trigger, enable, disable, schedule and see the progress of discovery processes
- A dedicated screen to list OpenStack discovered items within a single datacenter has been added for the domain users to be able to track and manage all the discovered items
- Design of VNF has been improved to allow better design of monitors allowing now to add as many conditions and actions you want to a single monitor
- Design of VNF has been improved to allow usage of discovered images and flavors so the user does not need to write the names but it can select from the available list
- Design of VNF has been improved to allow usage of any type of cinder type

3.11 Integration

- NFVD V4.2 intermediate sprints have been extensively validated by HPE NFVD Global Practice in the first ETSI Plugtest event (<http://www.etsi.org/news-events/events/1104-1st-nfv-plugtests>) integrating several Networks services from different VNF vendors against different VIMs versions and vendors at the SAME time.
 - At ETSI Plug test HPE NFV Director has been the only one able to interface OpenStack VIMs and Vcenter Based VIMs.
- Important features have been IP captured, productized and enhanced from NFVD Global Practice work at Verizon and those are now part of the product, like security groups, security groups design, network and flavor discovery

3.12 User Documentation

Following are the new User Documents introduced in in NFV Director V4.2

- NFV Director V4.2 High Availability Solution Guide – replaces NFV Director V4.1.1 Edition 1 High Availability Installation and Configuration Guide.
- NFV Director V4.2 Integrator Guide for NFVO Managed Mode
- NFV Director V4.2 Integrator Guide for VIM Managed Mode



NOTE: vCenter Resource Modeler Guide is deprecated; replaced by vCenter Integration Guide.

Chapter 4 Fixed Problems

NFV-D V4.2 fixes the following problems:

CR ID	Comments
2680	Non explanatory error message is thrown when you try to execute a work over an element which already has a job running over it (on running or error status)
2690	VNF Firewall deployment failed with errors raised on attach_service_net task
2879	NFVD does not allow to model and deploy VNFs using / booting from Cinder volumes.
2909	Using NFVD Resource Modeler, some errors may happen when exporting a TLD to xml format
2910	attribute INSTANTIATE.Enable_dhcp of SUBNETWORK:GENERIC attribute must be visible in Virtual Link component.
2911	NO_GATEWAY option in Virtual Link do not end with no gateway configured in OpenStack.
2912	SRIOV virtual ports cannot be connected to non-physical networks.
2918	Unable to deploy a VM based on standard template : resource assignment error
2924	Monitor with close-loop mode and Type E-mail does not work
2930	Deployment fails with error "Updating extra specs not permitted when flavor is associated to one or more valid instances" but the flavor is not used.
2934	Scale up failed because of max reached on core, memory is not at max and the value of amount for memory have change.
2942	Closed-loop operation with scaleout type is not working.
2973	adding a monitor to an instance in VDC Manager before deploying the instance does not deploy the monitor when deploying the VNF.
2984	Typo in informative logs displayed on standard output when installing FF patch.
1808	SiteScope parallel deploy calls do not work.
2112	Install Guide: When invoking ECP/bin/showStatus.sh during normal operations, error "Service RmiEcpService not found" returned.
3089	Scale up on VNF which already reached the max memory/core failed but act like scale down on core/memory value and no change on flavor in HCG
3090	Scale down on VNF which already reached the min memory/core failed but act like scale up on core/memory in VDC Manager and no change on flavor in HCG
3093	Wrong information in OrchestraConfiguration.xml on AA in 4.1.1
2939 2940 2943 2944	Configuration not updated after UCA Automation patch upgrade.

Chapter 5 Known limitations

CR ID	Comments
2001	<p>Description: Only virtual machines deployed by NFV Director on controlled VIM can be managed.</p> <p>Customer Impact: Control of the VIM (thru quota management, catalog management) is limited. NFV Director cannot get the virtual machine resources utilized in the VIM, if the virtual machine is not deployed/managed by NFVD.</p> <p>Workaround: Make sure that all virtual machines deployed on VIM are deployed by NFV Director, or create their corresponding datamodel representations manually</p>
2385	<p>Description: Management of external storage is limited to use of a pre-defined list of Cinder volume types, which have to be explicitly created on OpenStack VIM:</p> <ul style="list-style-type: none"> • Vmware-Quality-A • Kvm-Baremetal-Quality-A • Vmware-Quality-B • Kvm-Baremetal-Quality-B • All-vs-Quality-C <p>Other Cinder volume types defined in VIM are discovered by NFV Director but will be grouped under the default</p> <p>Customer impact: VIM IT Admin needs to comply with volume types pre-defined by NFV Director. Or use other but then quota of those will not be controlled at NFV Level.</p> <p>Out of the box in NFVO manages mode NFV Director controls the usage of 5 out of the box cinder types, deployment using other cinder types is possible but quota allowance will not be enforced unless a quota extension is added</p>
2738	Changing info on VM template through browser leads to losing this template in VNFC designer; template is no more available.
3871	Not able to get the KPI values in the NFVD UI when we deploy the VNF with monitor, Workaround: Go to the SiteScope UI to view the KPI
3862	Two versions of installer RPMs are in NFVD V4.2 - nfv-installer-04.02.000-4.6.el6.noarch.rpm in NFVD420_Software.tar, and nfv-installer-04.02.000-4.7.el6.noarch.rpm NFVD V4.2 uses nfv-installer-04.02.000-4.7.el6.noarch.rpm RPM.
	<ul style="list-style-type: none"> • OpenStack Domains <ul style="list-style-type: none"> ○ Current version of NFVD is able to manage the default domain on OpenStack but no other so trying to discover and deploy over other domain may lead into unexpected exceptions ○ If you have an OpenStack vim with other domain other than default that may not be discovered and will neither be used
	<ul style="list-style-type: none"> • Monitors <ul style="list-style-type: none"> ○ If you are using NFVD monitors going to OpenStack then the proper ceilometers KPIs must be available if not you will not be able to see the values on the NFVD KPIs ○ Monitors can not be modified once the VNF has been deployed
	<ul style="list-style-type: none"> • Nova micro version <ul style="list-style-type: none"> ○ The minimum NOVA micro version supported is V2.2 or greater
	<ul style="list-style-type: none"> • Add OpenStack project <ul style="list-style-type: none"> ○ It is only possible to add a project on VIM manages mode
	<ul style="list-style-type: none"> • Add OpenStack network <ul style="list-style-type: none"> ○ It is only possible to add an OS network on VIM manages mode
	<ul style="list-style-type: none"> • VIM Support <ul style="list-style-type: none"> ○ SR-IOV and PCI ports are only supported on HELION 2.0

	<ul style="list-style-type: none"> Reconnect a VNF <ul style="list-style-type: none"> A VNF can only be connected before deployment and trying to connect VNF endpoints after deployment will have no effect
	<ul style="list-style-type: none"> Physical external elements <ul style="list-style-type: none"> There is no out of the box support for physical external element (like physical FWs or EMS), of course NFVD is prepared for that and extensions of NFVD can be plugged to support them
	Security groups should be modeled as one per Vport and a single security group cannot be related to several Vports
	<ul style="list-style-type: none"> NFV Director relies on standard technologies such as Databases and configuration files so no automatic backup tool is provided out of the box. It is assumed that the IT administrator is performing standard backups of configuration files and databases so in case of disaster those can be restored.
	<ul style="list-style-type: none"> Virtual Link modifications are not allowed when is Active (deployed or with OpenStack networks imported): <ul style="list-style-type: none"> Changes over IP address changes over segmentation (vlan/vxlan) scopes (public domain/organization or private/vdc) any other VLINK related parameters.
	<ul style="list-style-type: none"> Virtual Link monitoring: <ul style="list-style-type: none"> Monitors and KPIs for VLINK will only be shown on a DCN based scenario as openstack neither vcenter provide still those KPIs

5.1 NFVD default install behavior

- NFV Director is installed by default using IPV4 if IPV6 is needed then a translator proxy is needed
- NFV Director is installed by default as HTTP so if HTTPS is needed either a proxy or manual changes on NFVD configuration is needed

5.2 Scale up/down over a VIM

- In order to use this feature you must be sure that your VIM support the resize on the same host (that not always is configured to true by default)
 - `grep allow_resize_to_same_host /etc/nova/nova.conf`
`allow_resize_to_same_host=True`
- Also take into consideration that most of the vims perform that operation with a reboot of the VM (One exception is HPE HCG that can perform a live scale / up / down over certain scenarios)

5.3 NFV Director VIM access

- NFV Director assumes connectivity to public and admin URLs of the VIM (regardless if you are using VIM-Manages or NFVO-Manages, regardless the OpenStack user you configure in NFVD to access the VIM)
- Default installation used admin URLs for every operation
- If VIM-Managed is going to be used then it can be reconfigured so non admin operations uses only public URLs
 - you can do this by configuring global NFVD to access public URLs by default and force only the operations that need admin to use admin URL
 - you can do this by as well configuring global NFVD to admin public URLs by default and force only the operations that does not need admin to use public URL
- NFV Director has a global flag to use for all the platform admin or public URLs,
- There is a flag per VIM to force the VIM to use public or admin

- There exist as well a last flag per operation that can enforce by operation but it will still be common along all the platform. The operation flag configuration cannot be different for two VIMs managed by the same NFV director installation
- In VIM Manages the user defined at OpenStack (even if member user) MUST be admin of the projects it has access to if not operations like create Vports will fail making a VM deployment to fail

5.4 Keystone V2/V3 support

- NFV Director supports keystone V2
- NFV Director supports keystone V3.0 with scoped method on the default domain or unscoped method. Depends which method return the endpoint you could configure properly the OpenStack.properties file with:

- Scoped method

```
authenticationJson={ \ "auth\": { \ "identity\": { \ "methods\": [ \ "password\ " ],
\ "password\": { \ "user\": { \ "domain\": { \ "name\": \ "${DOMAIN}\ " }, \ "name\": \ "${USER}\ ",
\ "password\": \ "${PASSWORD}\ " } } }, \ "scope\": { \ "project\": { \ "domain\": { \ "id\":
\ "default\ " }, \ "name\": \ "${TENANT}\ " } } } }
```

- Unscoped method

```
authenticationJson={ \ "auth\": { \ "identity\": { \ "methods\": [ \ "password\ " ],
\ "password\": { \ "user\": { \ "domain\": { \ "name\": \ "${DOMAIN}\ " }, \ "name\": \ "${USER}\ ",
\ "password\": \ "${PASSWORD}\ " } } } }
```

- Reference on: <http://developer.OpenStack.org/api-ref/identity/v3/?expanded=password-authentication-with-scoped-authorization-detail>
- Trying to use higher versions of keystone 3.2 / 3.4 may lead into authentication issues if they do not support the unscoped call (basically not specifying the domain on the call)

5.5 Flavor related

- It is recommended to select an existing flavor on VIM manages and AUTO-EXACT Match on NFVO manages
- NFV Director only create Public flavors available to all users (unless it runs on VIM manages mode so flavor will be tied to the default tenant NFVD is associated)
- It is assumed that all the flavor used in NFV Director are public within the same region (even if they are discovered)
- NFV Director ONLY support a single Virtual CPU per VM
- NFVD using AUTO-EXACT Match to create the flavors only supports Helion CG and Windriver extra specs. Of course it is possible to use any extra specs using an discovered flavor over any VIM
- Is not possible to set extra specs like nova flavor-key numa.pinned.asym set hw:numa_mem.0=512 \ hw:numa_mem.1=512 unless you use an specific flavor on VIM-MANAGES mode
- NFV Director supports two modes of operation
- VIM-MANAGES (select a flavor is preferred as auto will force some defaults)
 - In this mode NFVD is unaware of the HW details and so it cannot enforce any quota
 - AUTO is selected for flavor
 - In this mode NFVD is unaware of the HW details and so if AUTO is selected and NUMA id is set to 0 extra specs will be always set to

- hw:numa_node.0=0 (virtual CPU 0 goes to physical NUMA 0) as NFVD is unaware if there more than numa 0 on the server side
 - A Concrete Flavor name is selected
 - In this mode NFVD is unaware of the HW details and so if an specific flavor is selected then it can use other numas
 - hw:numa_node.0=1
- NFVO-MANAGES (auto is preferred when selecting a flavor as forcing one may lead into issues)
 - In this mode NFVD is fully aware of the HW details and so it can enforce quota
 - In this version In order to enforce the right validation NFVD is forcing the compute and NUMA used at OpenStack level
 - AUTO is selected for flavor
 - In this mode NFVD aware of the HW details and so if AUTO is selected and NUMA id is set to 0 extra specs will be always set to the corresponding physical NUMA
 - hw:numa_node.0=0 (virtual CPU 0 goes to physical NUMA 0) or hw:numa_node.0=1 (virtual CPU 0 goes to physical NUMA 1)
 - A Concrete Flavor name is selected
 - In this mode NFVD is forcing the compute and NUMA used at OpenStack level and so if the server forced by NFVD does not match the flavor numa then it will raise an error
 - hw:numa_node.0=1 but NFVD has forced NUMA 0 ERROR will be raised stating that flavor is not possible to be used
 - If NUMA affinity is needed then use auto
 - If a specific NUMA must to be used then customization is required.

5.6 Live Migration

- Live migrate is operation is supported in NFV Director as long as the managed VIM as well supports that
- There is a limitation that Live migrate will succeed only over those VNFs that are using boot from volume in an OpenStack VIM as Block Migration option is not yet supported
- There is no support for live migrate over a Vcenter based VIM

5.7 Operation Related

- In the VDC screen before performing any action over an element (like delete / deploy / scale / apply changes) is recommended to refresh the VDC to get the proper status as the status may have change
- In the particular case of deployment is especially important to refresh. If you don't refresh after a deployment it is possible to delete the VNF without removing the VMs/volumes from OpenStack

5.8 Discovery

- Discovery of a full datacenter will reconcile all the data all will be shown on the datacenter management screen
- When refreshing individual items ONLY the items manually created over the VIM will be visible on the GUI the items created by NFVD will be shown on the Datacenter Management ONLY after a full DC discovery

As part of the discovery process there are several items that are discovered and some other that are not discovered

VIM	Entity	Item Is discovered	Attributes are updated	Relationships are updated	Item Is deleted
Openstack	Domains	Limited	Limited	Limited	Limited
Openstack	Regions	YES	YES	Yes	Yes
Openstack	Enpoints	YES	YES	Yes	Yes
Openstack	Availability zones	YES	YES	Yes	Yes
Openstack	Servers	YES	YES	Yes	Yes
Openstack	Cinder types	YES	YES	Yes	Yes
Openstack	Projects	YES	YES	Yes	Yes
Openstack	Networks	YES	YES	Yes	Yes
Openstack	Flavours	YES	YES	Yes	Yes
Openstack	Images	YES	YES	Yes	Yes
Openstack	Security groups	YES	YES	Yes	Yes
Openstack	virtual Machines	YES	YES	YES	YES
Openstack	virtual ports	YES	YES	YES	YES
Openstack	Volumes	YES	YES	YES	YES
Openstack	snapshots	NO	NO	NO	NO
Openstack	Config drive	NO	NO	NO	NO
Openstack	Metadata	NO	NO	NO	NO
Openstack	Key pair	NO	NO	NO	NO
Openstack	Heat stack	NO	NO	NO	NO
Openstack	Routers	NO	NO	NO	NO
Openstack	Floating ips	NO	NO	NO	NO
Openstack	Virtual ips	NO	NO	NO	NO
Openstack	LBAAS	NO	NO	NO	NO
VIM	Entity	Is discovered	Is updated	Is updated	Is deleted
Vcenter	ESX server	YES	YES	YES	YES
Vcenter	Shared disk	YES	YES	YES	YES
Vcenter	Vierual router	YES	YES	YES	YES
Vcenter	virtual Machines	YES	YES	YES	YES
Vcenter	virtual ports	YES	YES	YES	YES
SDN	Entity	Is discovered	Is updated	Is updated	Is deleted
Nuage	Floating ips	NO	NO	NO	NO
Nuage	Networks	NO	NO	NO	NO
Nuage	Vports	NO	NO	NO	NO
SDN	Entity	Is discovered	Is updated	Is updated	Is deleted
CTX	Floating ips	NO	NO	NO	NO
CTX	Networks	NO	NO	NO	NO
CTX	Vports	NO	NO	NO	NO

In NFVO manages there are some limitations as it is expected to create all the elements

Manually created items cannot be used in NFVO mode (as per de below table) if you do not have the latest NFVD V4.2 patch

Chapter 6 Known problems

CR ID	Comments
1962	At domain scope, In the Job management window, when a job is in error, you have a 'Fix Job' / 'Abort Job' actions. Clicking on these result in NoResultException
2205	<p>Description: When using "Delete Image" action to delete image, image is deleted from NFV Director portal but remains on file system.</p> <p>Customer impact: Housekeeping of file system is not automatic and requires to be done by explicitly removing file on file system. Impact is minor as long as there is still enough space on file system.</p> <p>Workaround: On NFV-Director Virtual Machine Fulfillment/GUI, login as root:</p> <p>Delete unused images from the image repository you configured at installation time (default value is /var/opt/uoc2/server/public/addons/plugins/nfvd_portal/image_repository)</p>
2757	After un-deploy of VNF and deleting VNF component the status of image associated remains as "Used".
3361	Loading templates in VDC screen takes too long time
3405	Scale up operation does not work in RHOS 8 Liberty
3572	Error in GUI when opening the VNF with VNF Designer. Error message pops up, and user cannot view or add components.
3607	HA configuration: only self-monitors of primary (VM1) appears
3714	HA Topology: Service Activator process is not fault-tolerant: it may take up to 5 minutes to detect failure and 1-2 more minutes to restart process
3728	HA Topology: Self Monitors: Duplicate Remote servers are getting created in SiteScope, for the same host.
3792	TENANT and FLAVOR OPENSTACK Artifacts are not added into Datacenter tree when creating them in NFVO mode
3798	When scale-Up operation fails, Monitor goes to "STOPPED" state. Note: Fix to be available in the next patch.
3804	NFVD Auto installer does not work with non-root user
3824	Summary for consumed vs Total resources for NFVD.domain is not displayed properly in RHOS 8 Liberty
3831	<p>Description: Unable to update the Authentication details from the UI</p> <p>Customer impact: Prevent the user to change authentication parameters once created.</p> <p>Workaround: Change the artifact attributes using the browser:</p> <ul style="list-style-type: none"> • Navigate to browser's view and open the "edit" mode • Open browser's graph • Double click the "Datacenter" node to load the given datacenter instance • Select the new created datacenter instance, the graph will load the datacenter instance's root artifact and root artifact's direct children artifacts' shapes in the graph area. (For the datacenter, it will load datacenter artifact and VIM artifact shape) • Double click the VIM artifact and it will load VIM artifact's children artifact. Select it. • In the inspector area, edit and change the artifact's attributes you want to update. Then click "Action->update" menu item. • Click "Update"
3832	Rollback in scale-down operation is failing in RHOS 8 Liberty
3834	Error while Scaling Out using a VNF with a Security Group
3838	<p>Cancelling a datacenter discovery process leads to locking of start-discovery process</p> <p>Note: Fix to be available in the next patch.</p>
3856/3867	Live Migrate not working from GUI or API.

3860	Cannot edit monitor added on deployed VM
3863	NFV-D is not able to discern which keystone endpoint is v3 if it's not tagged as "identity"

Chapter 7 Known deprecations

- Load Balancer feature is deprecated in 4.2 and will not be available from next versions.

Chapter 8 Security Guidance

The following recommendations have been identified for NFV Director V4.2:

CR ID	Comments
1267	<p>Description: Confidential data (passwords in clear text) and non-confidential data is mixed in a configuration file. While access to the file is protected by operating system file access permissions care should however be taken if the configuration file is copied to avoid unintentional exposure of confidential data.</p> <p>Where:</p> <ul style="list-style-type: none"> • /opt/HPE/nfvd/tpp/jboss/standalone/configuration/standalone.xml, datasource block "assurance-DS". <p>Recommendation: Secure all backups and copies made of the above file. Also appropriate permissions at Operating system for those file must be set up manually</p>
3805	<p>Description: Default super token used for authentication for internal communications.</p> <p>Recommendation: These super token used for internal communication are configurable. The default credentials can be overridden. Please provide you own tokens by following:</p> <p>On the <ORACLE_HOST>,</p> <ul style="list-style-type: none"> • Supertoken must be updated at DB level in nfvd_idm_token table <p>On the <FF_HOST>,</p> <ul style="list-style-type: none"> • Supertoken new value must be updated on the nfvd.properties of the HPSA virtual machines <p>On the <AA_HOST>,</p> <ul style="list-style-type: none"> - Configure super token assurance should accept (i.e. others should pass to assurance APIs) using the "AUTH_TOKEN_VALUE" variable in following files: <ul style="list-style-type: none"> • /var/opt/HPE/nfvd/conf/nfvd.properties • /var/opt/UCA-EBC/instances/default/deploy/UCA_NFVD_StatePropagation-4.2.0/conf/statepropagation.property • /var/opt/UCA-EBC/instances/default/deploy/UCA_NFVD_Persistence_Valuepack-4.2.0/conf/persistence.properties - Configure super token that assurance should use for communications with fulfillment (i.e. fulfillment accepted super token) using "token" variable in following files: <ul style="list-style-type: none"> • /opt/OV/ServiceActivator/solutions/NFVD/etc/config/nfvd_config.properties - Configure super token that assurance should use for communications with fulfillment (i.e. fulfillment accepted super token) using FULFILLMENT_AUTH_TOKEN_VALUE variable in following files: /var/opt/HPE/nfvd/conf/nfvd.properties and /var/opt/UCA-EBC/instances/default/deploy/UCA_NFVD_StatePropagation-4.2.0/conf/statepropagation.property <p>On the <GUI_HOST>,</p> <ul style="list-style-type: none"> - Configure the GUI to use the AA super token: <ul style="list-style-type: none"> • /opt/uoc2/server/public/addons/plugins/nfvd/config.json <pre>"server_assurance": { "protocol": "http", "authToken": "xxxxxxxxx"</pre>

	},
3806	<p>Description: Configure the signature verification on SAML tokens.</p> <p>Recommendation: Follow chapter 17, “security guide” of HPE Unified OSS Console Installation and Configuration Guide, document on How to configure SAML / SSO option. Specifically, see 'Example of SAML configuration with SAML assertion digital signature checking'</p>
3808	<p>Description: Incomplete audit trail due to use of shared user accounts</p> <p>Recommendation: Create unix user accounts and provide sudo access in order to create audit trail.</p>
3810	<p>Description: Automation Installation procedure uses file with sensitive data</p> <p>Recommendation: Edit the following files on all platform nodes after installation: /var/opt/HPE/nfvd/install/NFVD_var* /var/opt/HPE/nfvd/install/repo_ansible/group_vars/all</p> <p>And empty the values represented by the following variables. DB_ROOT_PWD UOC_ROOT_PWD GUI_ROOT_PWD FF_ROOT_PWD AA_ROOT_PWD SITESCOPE_ROOT_PWD</p>
3815	<p>Description: Support for TLSv1.2</p> <p>Recommendation: NFVD does not support this. Terminate all user traffic on to a proxy to secure communications if needed as described on the admin guide.</p>

Chapter 9 Verifying HPE Signatures



NOTE:

- If you do not already have GnuPG installed, you will have to download and install it. For information about obtaining and installing GnuPG, see <http://www.gnupg.org>
- The wget utility may not be available in the system by default. Install it using yum install

NFV Director components are digitally signed and accompanied by a set of GnuPG keys.

On: <INSTALLER_HOST>

Login: root

9.1 Importing HPE public key

Perform the following steps to import the HPE public key needed for verifying the integrity of the delivered product:

- Create a directory where the HPE public keys will be stored:

```
# mkdir -p signcheck
```

- Download the compressed HPE GPG Public Key, and extract the keys:

```
# cd signcheck
# wget -P signcheck/ https://ftp.hp.com/pub/keys/HPE-GPG-Public-Keys.tar.gz
```

- Uncompress and extract the file content in signcheck directory

```
# gunzip HPE-GPG-Public-Keys.tar.gz
# tar xvf HPE-GPG-Public-Keys.tar
```

We get a list of HPE Public Certificates.

- Run the gpg import command to import the public certificate 2BAF2262.pub:

```
# gpg --import signcheck/2BAF2262.pub
```

- Configure level of trust for the imported key:

```
# gpg --edit-key 2BAF2262

gpg (GnuPG) 2.0.14; Copyright (C) 2009 Free Software Foundation, Inc.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
pub 2048R/2BAF2262 created: 2015-12-10 expires: 2025-12-07 usage: SCEA
trust: unknown validity: unknown
[ unknown] (1). Hewlett Packard Enterprise Company RSA-2048-14 <signhp@hpe.com>
Command> trust
pub 2048R/2BAF2262 created: 2015-12-10 expires: 2025-12-07 usage: SCEA
trust: unknown validity: unknown
[ unknown] (1). Hewlett Packard Enterprise Company RSA-2048-14 <signhp@hpe.com>
Please decide how far you trust this user to correctly verify other users' keys
(by looking at passports, checking fingerprints from different sources, etc.)

 1 = I don't know or won't say
 2 = I do NOT trust
 3 = I trust marginally
 4 = I trust fully
 5 = I trust ultimately
 m = back to the main menu
Your decision? 5
Do you really want to set this key to ultimate trust? (y/N) y
pub 2048R/2BAF2262 created: 2015-12-10 expires: 2025-12-07 usage: SCEA
trust: ultimate validity: unknown
[ unknown] (1). Hewlett Packard Enterprise Company RSA-2048-14 <signhp@hpe.com>
```

Please note that the shown key validity is not necessarily correct unless you restart the program.
Command> **quit**

9.2 Verifying signature



NOTE: Repeat the below steps for the following packages:

NFVD Resource Modeler-win32.win32.x86_64.zip
NFVD420_BaseProduct.tar
NFVD420_Software.tar
nfvd-installer-04.02.000-4.7.el6.noarch.rpm
HP_SiteScope_1131.tar



NOTE: `<package_name>.sig` files are usually located under Signature directory at the same level as NFV Director deliverables.

- Run the `gpg verify` command to verify the signature file

```
# gpg --verify <package_name>.sig <package_name>
```

- If signature verification completed successfully, the command output will contain the following lines:

```
gpg: Signature made <DATE> using RSA key ID 2BAF2262  
gpg: Good signature from "Hewlett Packard Enterprise Company RSA-2048-14 <signhp@hpe.com>"
```