HP Mobile Subscriber Activation Solution Pack v7.0.0

User's Guide

Legal Notices

Warranty

Hewlett-Packard makes no warranty of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be held liable for errors contained herein or direct, indirect, special, incidental or consequential damages in connection with the furnishing, performance, or use of this material.
A copy of the specific warranty terms applicable to your Hewlett-Packard product can be obtained from your local Sales and Service Office.

Restricted Rights Legend

Use, duplication or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause in DFARS 252.227-7013.
Hewlett-Packard Company United States of America.
Rights for non-DOD U.S. Government Departments and Agencies are as set forth in FAR 52.227-19(c)(1,2).

Copyright Notices

Trademark Notices

Java™ is a U.S. trademark of Oracle®.
Linux is a U.S. registered trademark of Linus Torvalds
Microsoft® is a U.S. registered trademark of Microsoft Corporation.
Oracle® is a registered U.S. trademark of Oracle Corporation, Redwood City, California.
UNIX® is a registered trademark of the Open Group.
Windows® and MS Windows® are U.S. registered trademarks of Microsoft Corporation.
All other product names are the property of their respective trademark or service mark holders and are hereby acknowledged.

Table of Contents

In This Guide

This manual describes the HP Mobile Subscriber Activation (MSA) Solution Pack v7.0.0 and explains its features. MSA performs its normal operational tasks without human interaction. Hence this guide aims more to give an understanding of how MSA works than to give instructions for the user. It describes the role of MSA in an overall business solution and also describes what the individual elements of MSA do and how they work together. There are 5 chapters:

- General Description – provides an introduction and overview
- Service Catalog and Service Orders – overall the task of MSA is to execute service orders
- Architecture for Service Order Execution – here the elements of MSA and their interactions are explained
- User Interface – summarizes what is available on the user interface of MSA and how it works
- Reports – how to generate reports documenting what MSA has done within a certain period of time

Audience

Since there is so little user interaction with MSA the primary audience for this guide is system integrators and other audiences with a general interest, such as the CSP's IT experts. For the specific topic of reports, this guide is the source of information on how to extract them.

References

Other manuals for HP Mobile Subscriber Activation Solution Pack v7.0.0:

- HP Mobile Subscriber Activation SP v7.0.0 – Services Specifications.
- HP Mobile Subscriber Activation SP v7.0.0 – Delivery Guide – provides the details needed for a delivery project team to add new services to MSA and configure it to run on a multi-server platform.

Acronyms

- CSP: Communications Service Provider
- HPSA: HP Service Activator

1. MSA General Description

As part of HP's fulfillment business solution for mobile services the HP Mobile Subscriber Activation (MSA) is the element which performs activation of subscriber services. MSA supports any combination of services provided over 2G, 3G and 4G networks and is distributed as commercial off-the-shelf (COTS) software as the foundation for an activation solution for a mobile service provider. The solution will generally need to be adapted to the CSP's environment through a delivery project.

Most of the interfaces of MSA are southbound, to those systems and network elements in the CSP's infrastructure where subscriber services are activated: HLR, HSS, etc., all the systems which need to be aware of subscribers. These systems are the activation targets for MSA. Commonly occurring activation targets are supported by pre-packaged adapters. New targets may be supported without the need to release a new version of MSA, as the adapters needed for new activation targets are produced by HP's adapter factory when required by a delivery project. For common types of interface this is quite simple, once the details of the necessary commands to invoke on the targets are known and understood; programming is typically not required. The components used for different common classes of interfaces are described in chapter 3.

In fact, to add support for a new service to MSA, as it will happen in a delivery project, is generally simple and fast. The service must be added to MSA's catalog to make its activation invokable by service orders, and the southbound interface adapter required to activate the implied target must be added.

MSA builds on HP Service Activator (HPSA) including components of the Extension Pack for HPSA. For a description of the components from HPSA and the Extension Pack that are used in MSA and the role they play, please refer to chapter 3. The description in chapter 3 will help to understand how MSA can be customized and configured in several ways to fit exactly to the requirements of a particular CSP with a given CRM system and a given service infrastructure.

A very important requirement is scalability. The key factor is the volume of service orders that can be processed. MSA can be deployed on multiple services to scales to be able to process several hundred service orders per second. Chapter 3 also explains how this performance is achieved.

2. Service Catalog and Service Orders

MSA processes service orders. It uses information in the service catalog to recognize and validate received service orders, decompose them to service actions, and map service action requests to workflows defining how to execute the actions.

The action repertoire of an MSA system is defined by the contents of its service catalog. Each service action is defined by name, parameters and the action workflow. There can also be a workflow to roll back the service action.

The catalog can also contain definitions of composite service orders, consisting of multiple service actions. When a service is executed, it is decomposed into the service actions. The service order definition also specifies how to execute the service actions within the service order, in effect it is a process specification.

Service actions within a service order may be executed in sequence or in parallel. The action to take in case a service action terminates unsuccessfully is also specified. Errors can be ignored, or may cause the entire service order to fail. It can also be specified that already completed service actions shall be rolled back by executing inverse ("rollback") service actions. This feature can be used to undo completed actions, so that composite orders are executed cleanly as transactions, leaving no state changes when they do not succeed.

Service orders may be composed in multiple levels; a complex service order may include simpler service orders, as shown in

Figure 2-1, where SO stands for service order, SA for service action.

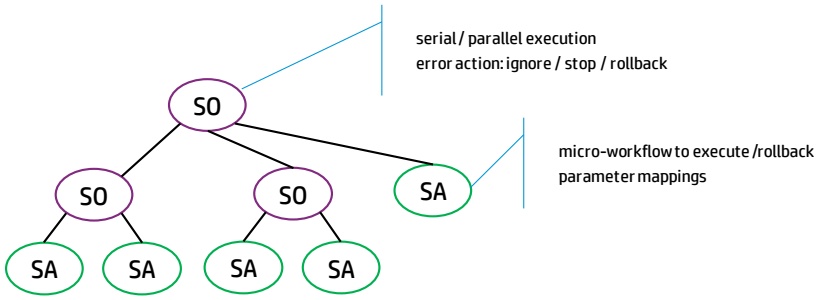

Figure 2-1 Service Order Structure

By supporting decomposition of orders for customer facing services, even in multiple levels, and the mapping to actions that can be performed against the actual infrastructure, the resources, this catalog structure supports SID-style service specifications, which can also be composed in multiple levels and map customer facing services to resource facing services.

Service order messages received by MSA from a client over the northbound interface will refer to definitions in the catalog. The service order message may refer to the definition of a composite service order, or it may refer to definitions of individual service actions in which case it is the client who defines, through the structure of the message, the way they are combined. The message may then include multi-level service compositions similar to those of service orders in the catalog as described in the preceding paragraph. It is also possible to refer to (simpler) service orders already defined in the catalog as elements of a (more complex) composite service order message.

The first form of service order message, i.e. a reference to a service order definition in the catalog, is the simplest and shortest. The second form, i.e. composition of the service order by the client, is the most

flexible; it allows the client to freely combine services to activate by a service order request. OMM uses the second form of service order messages, it composes service orders as simple sequences of service actions. The catalog out-of-the-box does not include any composite service order definitions. If needed for a solution, they can be added by the delivery project or even as modifications, when the system is already in operation, by the system administrator.

To summarize, the composite structure of a service order is depicted in

Figure 2-1. The atoms of the structure, the service actions, are defined in the catalog. The structure of the order, how the atoms are combined, may be defined in the catalog or in the service order message. Regardless of how it is done, a service order is executed by decomposing its structure, from top to bottom, and executing the service actions.

3. Architecture for Service Order Execution

MSA uses several components of HP Service Activator (including the Extension Pack): the Order Manager, the Workflow Engine, the configurable Adapter Modules, AM-CL for command line interfaces or AM-WS for web services. For other interface types (as an example, a CORBA interface) protocol adapters are custom built. The components and their interconnectivity are shown in For readers familiar with the HPSA core product and the HPSA Extension Pack the components of MSA are also known as follows: the Order Manager as SOSA, the Workflow Engine as the workflow manager / MWFM, AM-CL as ECP and AM-WS as WSC.

.

For readers familiar with the HPSA core product and the HPSA Extension Pack the components of MSA are also known as follows: the Order Manager as SOSA, the Workflow Engine as the workflow manager / MWFM, AM-CL as ECP and AM-WS as WSC.

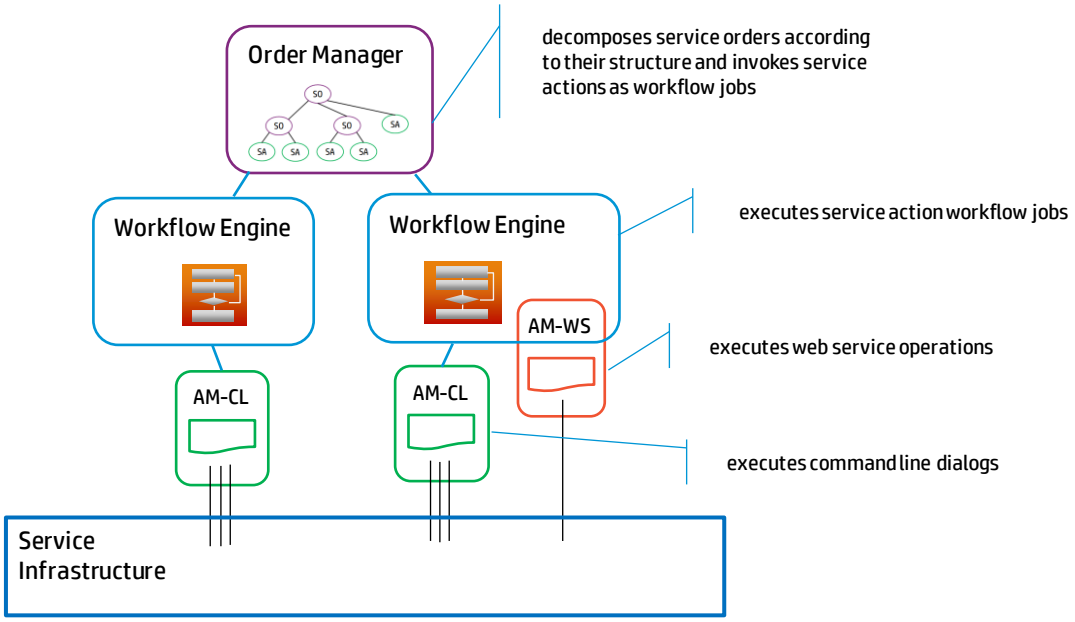

Figure 3-1 MSA Processing Components

The different components may all be deployed on the same server or on several servers to achieve higher capacity. Extreme scaling, to a capacity of processing thousands of service orders per second, can be achieved by using multiple servers.

3.1. Order Manager: Receiving and Decomposing and Service Orders

In the component architecture of MSA, the Order Manager exposes the northbound interface, validates incoming orders with their parameters, decomposes the orders and orchestrates the execution of the resulting service actions.

In the internal architecture of the Order Manager the northbound interface is implemented as a replaceable component, known as a protocol adapter. Multiple protocol adapters can be created and configured, enabling an MSA system to receive service orders from multiple clients, which may even use

different protocols. Any protocol adapter deployed into MSA must use the catalog with the structure that is described in chapter 2. MSA's native protocol adapter supports a SOAP-based web service protocol. It supports synchronous and asynchronous modes of invocation. A WSDL document for the native interface is available to use to integrate a client system as part of a delivery project. If a different protocol is required to integrate with a specific client system, it can be custom developed in a delivery project.

Service actions are executed as workflow jobs by the Workflow Engine. The Order Manager interacts with the Workflow Engine to invoke each service action. Multiple instances of HPSA with the Workflow Engine can be deployed, each one on a separate server. The Order Manager is configured with internal queues for different types of service actions, where each queue is mapped to one or more HPSA instances, to control the distribution of work over the server cluster, and to throttle the flow of service action jobs, to avoid overloading the HPSA instances and keep the number of simultaneous sessions with target systems controlled. This architecture is the key to the extreme scalability of MSA with respect to processing high volumes of service orders.

During the processing of service orders the Order Manager records events in a history database, from which reports can later be drawn to understand what happened in the MSA system.

Note that while an MSA deployment can include multiple services each running HPSA with adapters there can only be a single Order Manager server. It is the single point of entry for service orders.

The setup of a cluster will be done by the delivery project. The contents of the catalog and also the configuration of queues for multi-server configurations can be modified by a system administrator.

3.2. Service Action Workflow Logic

For each service action in the catalog a single HPSA micro-workflow will be defined to perform it, and possibly a second micro-workflow for rollback.

The workflow is dedicated to the activation target for the service. It knows which kind of adapter to use to interact with the target. For a command-line oriented target, the adapter will be based on ECP and will include a command template to apply. For a web service target, the adapter will be based on WSC and will include a web service descriptor. Other cases, for example CORBA, will also be possible.

If there are multiple instances of the target system in the CSP's infrastructure, one of the parameters from the service order such as MSISDN is used to select the proper one. The resulting target is looked up in the internal data model, and if the target exists in multiple versions, the proper one is determined before the template to use if retrieved. This allows different versions of the same target system to coexist in the infrastructure.

The workflow will normally include one interaction with the target to activate the service through the adapter followed by logic to interpret the response from the target and take proper action in the case of errors or exception cases. If an error cannot be repaired the workflow will report a service action error back to the Order Manager, which will then take the proper action as specified for the service order within which the service action was executed (ignore / stop with error / rollback the service order).

Note that the HPSA concept of compound task, as supported by the HPSA Resource Manager, is not used for service orders which require multiple target activations. Hence MSA adapters need not be HPSA plug-ins in the standard sense of HPSA (i.e. with atomic tasks executed by the HPSA Resource Manager). Rollback in MSA is implemented for service orders in the Order Manager, not for compound tasks in micro-workflows.

3.3. Southbound Interface – Command Line

Command line dialogs with target systems are executed by AM-CL, which is a generic component, customized with command templates for the specific target. AM-CL manages connections to target systems which support the use of command lines over the telnet, ssh or raw TCP protocol.

AM-CL manages pools of equivalent connections to the same target to support high volume efficient communication. Pools are typically set up by the delivery project, but are manageable by from the user interface.

Each service action workflows will then invoke AM-CL to perform a dialog with the target. To this end it will use a command template. The command template will contain the commands to send to the target and the prompts and error messages that must be recognized in responses.

The complete adapter for a command-line target will include command templates for all different dialogs with the target, i.e. for each activation function that is used by a distinct service action.

For new command line adapters the templates will be created, based on documentation for the target, by the delivery project.

3.4. Southbound Interface – Web Service

For targets which are controlled through web service (SOAP) interfaces there is also a generic adapter module, AM-WS. This module is driven by a web service descriptor which is initially derived from the definition of the web service in WSDL form. The descriptor defines the methods that can be called on the target. The calls are made from the service action workflows. The workflow specifies the method to call and its parameters. The result information from the target is passed back to the workflow for postprocessing.

The initial web service descriptor derived from WSDL can be modified to be more convenient to use from the workflow. For new web service adapters this modification will happen as part of the delivery project.

Web service interactions with target systems are handled by WSC. The web service definition is represented as a web service descriptor document. This structure allows a workflow to invoke any operation supported by the web service.

4. User Interface

MSA runs essentially as an automatic flow-through solution, as a "black box". It is not necessary to attend to MSA through the user interface during normal operation. It does have a user interface which allows some system administrative and configuration functions, and also provides access to the Report module which allows extracting information about MSA's operation from the history database.

As explained in chapter 3, MSA uses several components of the HPSA Extension Pack and the user interface is also the one from the Extension Pack. It is a web user interface. The URL to access it and access credentials (usermame and password) will be available from the system administrator after handover from a delivery project. After login a window as shown in

Figure 4-1 will appear. The window has three areas: the menu at the top, the info area below it, and the main work area. In

Figure 4-1 the info area shows the user's login information. When an object has been selected as working context, the object's attributes are shown here. The work area is for general input and windows depending on the function selected.

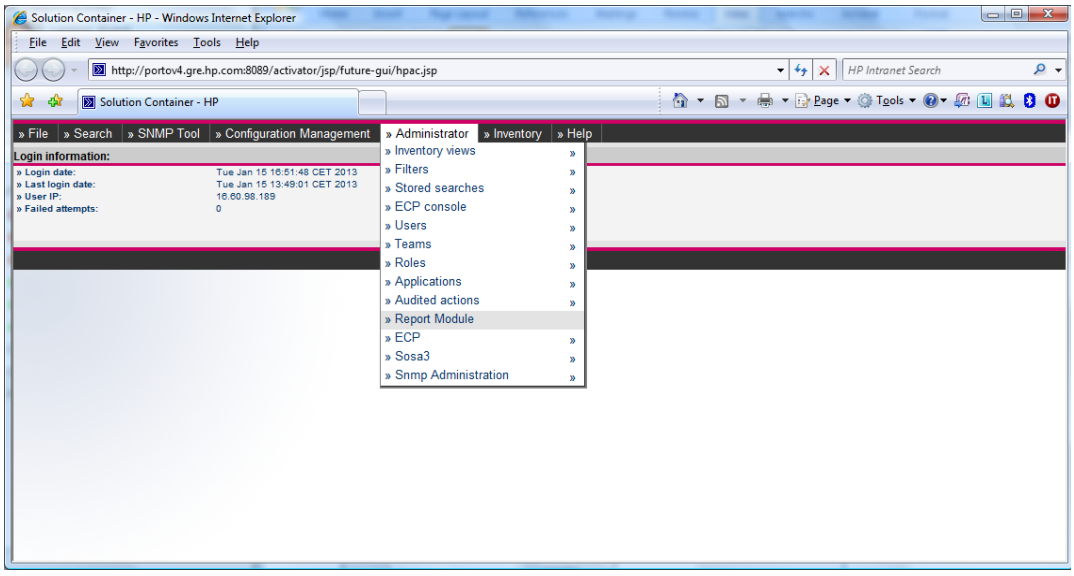

Figure 4-1, MSA User Interface

As

Figure 4-1 shows, the menu structure in the user interface is hierarchical. Every choice in the menu structure can be defined as a path, starting in the menu bar at the top. In

Figure 4-1the path
Administrator -> Report Module is selected. The lack of arrows to the right of the selection 'Report Module' indicates that this is a leaf in the hierarchy and so the path terminates there. All descriptions of how to select functions from the menu hierarchy can be given as paths.

Once a function is selected, further interactions and will take place in the info area and the work area. As

Figure 5-1 shows, for the Report Module the desired report and parameters for it are selected in the info area, and then the actual report will be shown in the info area. For more details of the Reports function, see the next chapter.

A number of tasks that have been mentioned in chapter 3 can be accomplished through the user interface. Most of these will normally be done by HP staff through the delivery project or as solution support. All the tasks are described in the Delivery Guide. Here is a summary list:

- Define service orders and service actions in the catalog.
- Configure service actions queues to manage multi-server cluster configurations.
- Manage various components of the system: lock/unlock, suspend/resume.
- Manage pools of connections to targets.
- Manage target inventory and mapping from service order parameters to select proper target when there is more than one of a kind.
- Edit command templates for command-line targets.
- Edit web service descriptors.

5. Reports

The Report Module in the user interface allows the user to retrieve information about what has happened in MSA. Typically extracted reports will be about the recent past. The predefined set of reports described in this chapter can be extended by a delivery project. Each report is implemented with a database query. As seen in

Figure 5-1 the query, i.e. the report, is select from the 'Select Query' dropdown field in the info area. Also specified are the period (from data and to date) for which data should be extracted, and the output format. The predefined possibilities are briefly shown in the following sections.

Note that for all the reports the data that is shown can be extracted to different formats.

5.1. Order Processing Report

This report shows the number of service orders that have been processed OK or KO group for each 10 minute period over the specified time interval. The available output formats for this report are Table, Plot and Pie Graph.

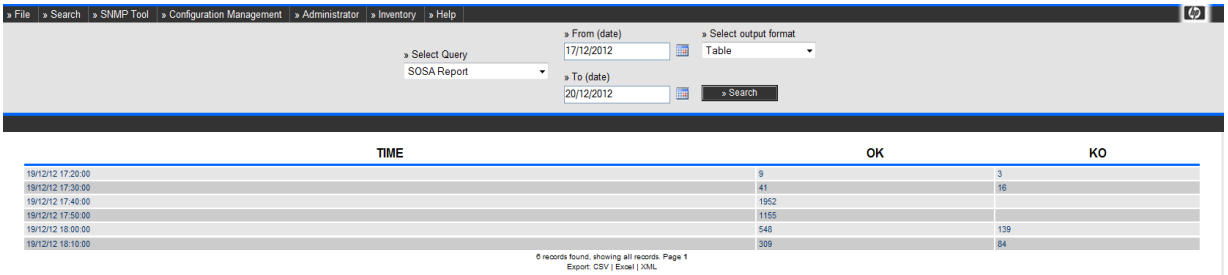

Figure 5-1, Order Processing Report in Table Format

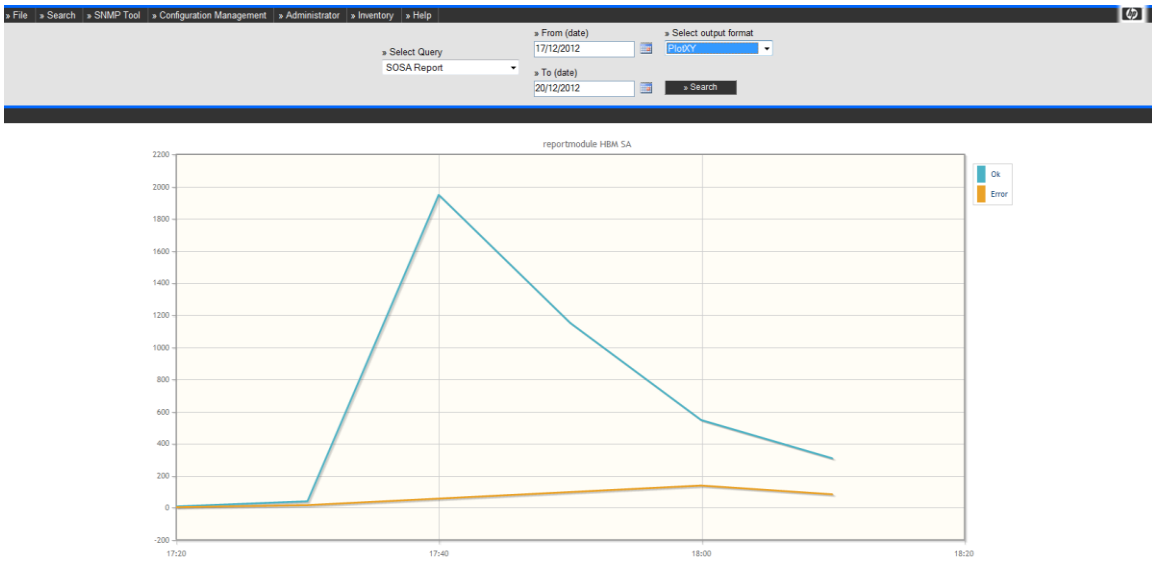

Figure 5-2, Order Processing Report in Plot Format

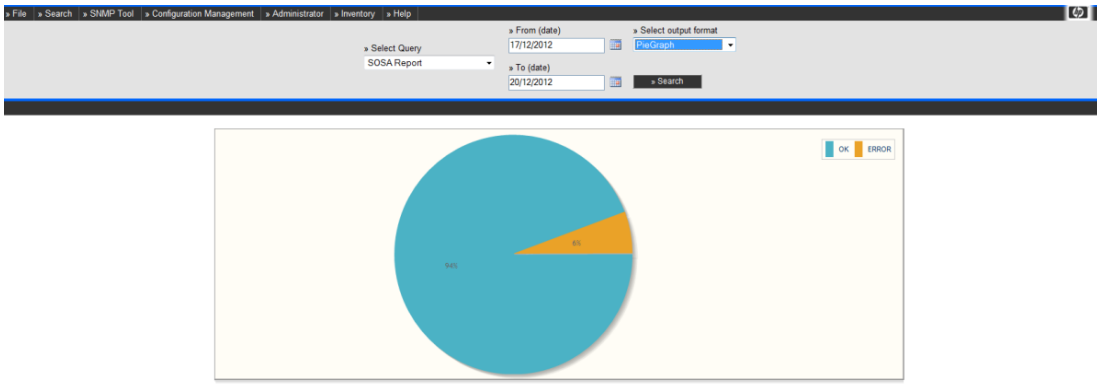

Figure 5-3, Order Processing Report in Pie Chart Format

5.2. Workflow Execution Report

This report shows the number of each service action workflow in the MSA system has been executed over the specified time interval. The available output formats for this report are Table and Pie Graph.

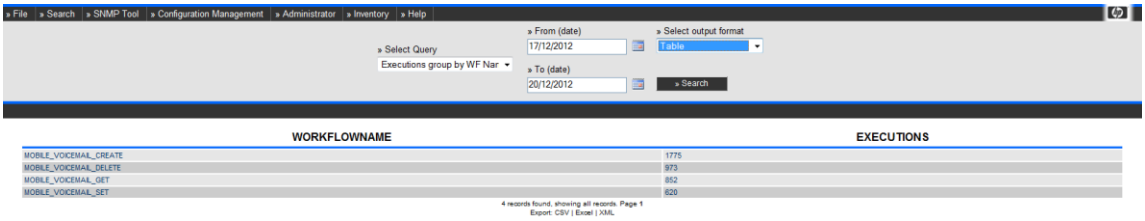

Figure 5-4, Workflow Execution Report Table Form

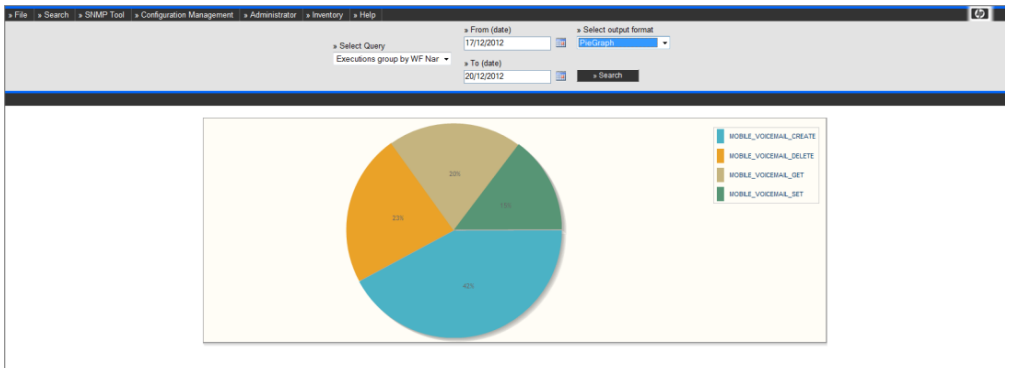

Figure 5-5, Workflow Execution Report, Pie Chart Form

5.3. Response Report

This report shows the number of executions of service actions by the response/errorcode over the time period. This report is only available in a table format:

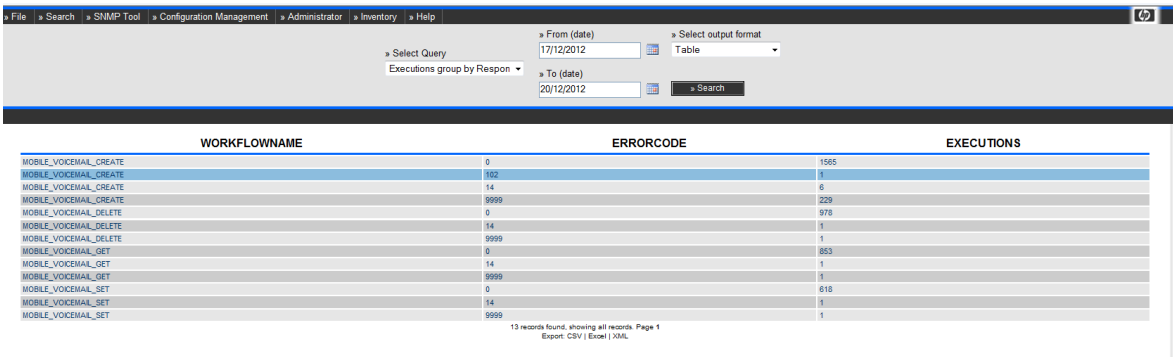

Figure 5-6, Response Report

5.4. MSISDN Report

This report shows all order for a specified phone number over the time period. It is available in table format as shown in

Figure 5-7.

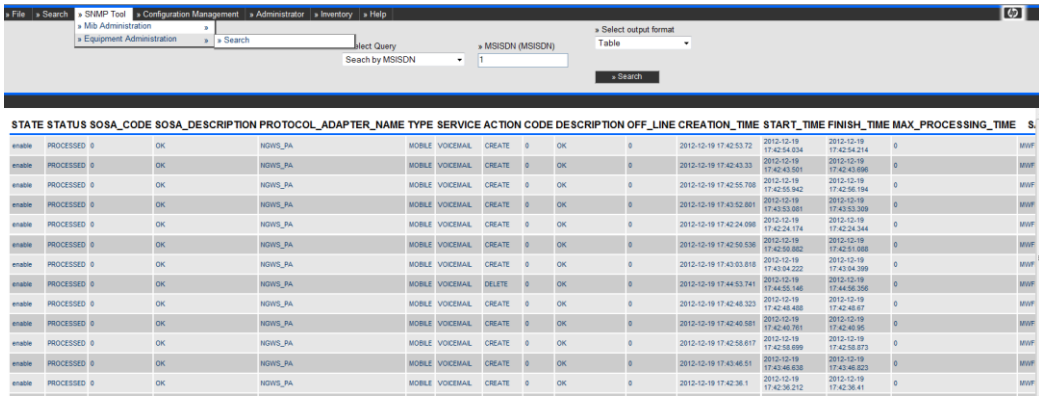

Figure 5-7, MSISDN Report