**Oracle Communications® ASAP™ Cartridge 1.0
GA Release for Nokia NSM**

Nokia NSM (Nokia Subscription Manager) Cartridge 1.0 Guide

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Cartridge Overview

ASAP cartridges are discrete software components that are developed for the ASAP product. An ASAP cartridge offers specific domain behavior on top of the core ASAP software, and provides the configuration that supports a set of services on a network element (NE).

An ASAP cartridge is not a stand-alone component, but operates in conjunction with the ASAP core product. ASAP cartridges offer the following benefits:

◆ **Reduced Time to Market** - time to market of new services is reduced through simplified development, implementation, and extension of cartridges on customer sites.

◆ **Extendable** - cartridges can be extended to include additional services and components that deliver business value, without requiring changes to the original cartridge.

◆ **Simplified Effort** - the effort and technical knowledge that is required to perform customizations is reduced.

◆ **Ease of Installation** - cartridges can be installed into an ASAP environment without interfering with the existing install base.

An ASAP cartridge can be used to configure ASAP to provision the following:

◆ NEs from a specific vendor, such as Nortel or Lucent.

◆ Technologies, such as Asynchronous Transfer Mode (ATM) and Frame Relay switches, or Internet Protocol (IP) routers.

◆ Services that are supported on the NE, such as ATM, IP Virtual Private Networks (VPN), Wireless, or Optical.

Cartridges are designed for a specific technology, software load, and service.

An ASAP cartridge supports a particular set of services on an NE. These services are independent of customer-specific service definitions. Professional Services or systems integrators can perform extensions to the cartridge to support customer-specific requirements.

For more information on extending a cartridge, refer to the *ASAP Cartridge Development Guide for Service Activation*.

Cartridge content

An ASAP cartridge contains the following:

- An interface to the NE
- A set of scripts, such as State Tables or Java methods
- A set of atomic actions in the form of Atomic Service Description Layer (ASDL) commands
- A set of Common Service Description Layer (CSDL) commands that form meaningful services
- Sample work orders
- Installation scripts

Prerequisites

System integrators such as managers, designers, programmers, and testers who are responsible for the adaptation and integration of ASAP-based solutions should use this manual as a reference. It assumes that readers possess the following skills:

- A knowledge of ASAP programming concepts
- A good working knowledge of the UNIX operating system
- A thorough understanding of service and network provisioning
- Familiarity with telecommunications

About this guide

This guide provides a detailed description of the Nokia NSM cartridge. It contains overview and technical information to assist with extending and integrating the cartridge into a customer environment.

The scope of this guide includes ASAP as it pertains to the use of this cartridge. It is not intended to be a complete ASAP reference guide.

For additional information when using this cartridge, refer to the following supporting documentation:

- **Activation documentation set**—for detailed information on the ASAP component.
- **ASAP Cartridge Development Guide for Service Activation**—for information on how to extend a cartridge.

The Nokia NSM cartridge provides the ASAP service configuration and network element (NE) interface to activate subscription services on NOK-NSM_1-0-HOST NEs.

Services, features, and options

This cartridge supports the following services:

Table 1: Supported services

Service	Description
Query LDAP directory for a given DN	This service queries the LDAP directory for a given DN (Distinguished Name). This function is equivalent to reading the entries with a given DN.
Query LDAP directory using search filters	This service queries the LDAP directory for all matching entries of a search filter.
Query LDAP schema	This service queries the LDAP schema for all object classes, attribute types and matching rules.
Add entry to the directory	This service adds an entry to the directory for the given DN, object class and attributes.
Delete entry from the directory	This service deletes an entry from the directory for a given DN.
Modify entry in the directory	This service modifies an entry (add or delete an attribute, add or delete an attribute value, replace an attribute value etc.) in the directory.
Modify DN of the entry in the directory	This service modifies the DN of an entry.
Add Subscriber on the NSM	This service adds a subscriber on the Nokia Subscription Manager.
Delete Subscriber from the NSM	This service deletes an existing subscriber from the Nokia Subscription Manager.
Modify Subscriber on the NSM	This service modifies the subscriber's attributes and/or renames the distinguished name on the Nokia Subscription Manager.
Query Subscriber on the NSM	This service queries the subscriber information on the Nokia Subscription Manager.

Hardware and software requirements

The following sections contain the high-level software and hardware environment requirements for provisioning subscription services using this cartridge, including:

◆ Network element (NE) interface

◆ ASAP version

Network element (NE) interface

The following database tables in SARM are configured to support the NE configuration:

◆ tbl_host_clli

◆ tbl_clli_route

◆ tbl_comm_param

◆ tbl_resource_pool

◆ tbl_ne_config

ASAP version

This cartridge was developed and tested using ASAP version 4.7.1.

For more information on the operating environment of this ASAP version, refer to the ASAP version 4.7.1 Release Record.

Connecting to the NE

This cartridge uses LDAP communication interface for communication with the remote NE.

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Installing and Testing the Cartridge

This chapter describes the following procedures related to installing and testing the cartridge:

◆ Downloading the cartridge
◆ Installing the cartridge
◆ Uninstalling the cartridge
◆ Testing the cartridge installation

Downloading the cartridge

Before you can install the cartridge, you must use the internet to download the cartridge's TAR file from Oracle's Customer Portal.

Use the following instructions to download, then unTAR the TAR file.

To download the TAR file

1. Login to Oracle MetaLink internet home page (http://www.metalink.oracle.com).

2. Download the cartridge patch to your workstations.

To unTAR the TAR file

1. On your workstation, create a repository directory—the naming of which is your choice.

    ```
    mkdir <repository dir>
    ```

2. Untar NokiaNSM_1_0_X_R1_0_0.<buildID>.tar

    ```
    tar xvf NokiaNSM_1_0_X_R1_0_0.<buildID>
    ```

3. Copy the resulting /Nokia directory and its contents to the repository directory.

    ```
    cp -rf /Nokia <repository_dir>
    ```

The directory structure in the repository directory should look like the following illustration. (this illustration describes the minimum required structure; you can enhance this directory structure with additional directories based on your requirements and deliverables).

```
<repository_directory>
   /Nokia
      /README
      /installCartridge
      /uninstallCartridge
```

```
/NOKIA_NSM_1_0_SUB_1_0.sar
```

Starting ASAP

Before installing the cartridge, ensure that ASAP is running.

To start ASAP

1. To start ASAP, execute the following script:

    ```
    start_asap_sys
    ```

2. Ensure the ASAP Daemon (DAM_$ENV_ID) is running by checking the ASAP status using the ASAP script "status".

3. Check whether the WebLogic instance for this ASAP environment is running. If not, start the WebLogic instance.

The *ASAP Administration Guide* contains more information on starting ASAP, the ASAP Daemon, and WebLogic.

Installing the cartridge

Run the installation script *installCartridge* to install the cartridge. You will find this script under /Nokia. The script executes the following tasks:

◆ Configures the Nokia NSM-specific NE using the SACT.

◆ Deploys the Nokia NSM cartridge service model (only if the Nokia NSM service model is not yet deployed) using the Service Activation Deployment Tool (SADT).

◆ Copies the Nokia NSM-specific jar files and the cpp library file to the ASAP environment.

◆ Loads the sample work orders to the SRP database.

For information on the SACT and the SADT, refer to the *ASAP Administration Guide*.

To install the cartridge

1. Run the installCartridge script from /Nokia. At the prompt, type:

   ```
   installCartridge NOKIA_NSM_1_0_SUB_1_0.sar
   ```

2. The script prompts you for the values of the following WebLogic login parameters:

   ◆ WebLogic Hostname

   ◆ WebLogic HTTP Port

   ◆ WebLogic Login User ID

   ◆ WebLogic Login Password

   The script loads the NEP-NE configuration and the CSDL-ASDL configuration to the SARM database, and loads sample work orders to the SRP database. The script also copies the cartridge-specific jar files and cpp library file to the ASAP environment.

3. Restart ASAP to upload the cartridge configuration into ASAP.

Uninstalling the cartridge

Run the uninstallation script *uninstallCartridge* to uninstall the Nokia NSM cartridge. This script is located under /Nokia. The script executes the following tasks:

◆ Unconfigures Nokia NSM-specific NEs using the SACT.

◆ Undeploys the Nokia NSM cartridge service model (only if the Nokia NSM service model is already deployed) using the Service Activation Deployment Tool (SADT).

◆ Removes the Nokia NSM-specific jar files and cpp library file from the ASAP environment.

For more information on the SACT and the SADT, refer to the *ASAP Administration Guide*.

To uninstall the cartridge

1. Run the uninstallCartridge script from /Nokia. At the prompt, type:

   ```
   uninstallCartridge NOKIA_NSM_1_0_SUB_1_0.<timestamp>.sar
   ```

2. The script prompts you for the values of the following parameters:

   ◆ WebLogic Hostname
   ◆ WebLogic HTTP Port
   ◆ WebLogic Login User ID
   ◆ WebLogic Login Password

The script unloads the NEP-NE configuration and CSDL-ASDL configuration from SARM database. It also removes the cartridge specific jar files and cpp library file from the ASAP environment.

Testing the cartridge installation

To test this cartridge installation, you need to know about the network element (NE), services, and basic Activation configuration. You may need to perform adjustments to provision a service for a specific NE, network, or connectivity configuration.

You can test the cartridge installation using one of the following methods:

◆ **Loopback mode**—does not actually connect to or send commands to the NE.
◆ **Live mode**—connects to and sends commands to a live NE.

Configuring loopback and live mode parameters

Set the following variables to test the cartridge in loopback or live testing modes.

Loopback mode

Set the following parameter to test the cartridge in loopback mode.

Table 2: Loopback Mode Parameter Settings

Configuration Variable	Parameter Settings	Location
LOOPBACK_ON	1 (default setting)	ASAP.cfg

Live mode

Set the following parameter to test the cartridge in live mode.

Table 3: Live Mode Parameter Settings

Configuration Variable	Parameter Settings	Location
LOOPBACK_ON	0	ASAP.cfg

Communication parameters

The following are the list of parameters for the sample NE configuration XML used by SACT.

Table 4: Communication parameters

dev_type	host	device	param_label	param_value	param_desc
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	HOST_IPADDR	172.16.12.200	The network IP address for the Sun LDAP directory.
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	PORT	389	The port of the directory server.
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	HOST_USERID	cn=comnet	The bind DN used for an authentication.
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	HOST_PASSWORD	chennai123	The bind password used for an authentication.
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	OPEN_TIMEOUT	5	5 seconds open time-out.
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	READ_TIMEOUT	2	2 seconds read time-out.
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	LDAP_VERSION	3	The LDAP protocol version to use.

Table 4: Communication parameters

dev_type	host	device	param_label	param_value	param_desc
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	SIZELIMIT	500	Size limit used while searching.
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	RESPONSELOG	TRUE	The flag that enables/disables the response log.
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	DELIMITER	|	Used to separate values from a single ASDL parameter entry. If no delimiter specified in this table, it defaults to a comma.
W	NOK-NSM_1-0-HOST	COMMON_DEVICE_CFG	BASEDN	o=nosc,dc=itelcel,dc=com	The base DN containing the root suffix and the community part used on the NSM.

Modifying nokia_nsm_1_0_ne_config.xml

Use the following procedure to modify nokia_nsm_1_0_ne_config.xml.

To modify nokia_nsm_1_0_ne_config.xml

1. Create a new source directory under /Nokia. You can give this directory any appropriate, meaningful name you want to.

   ```
   mkdir <new_source_directory>
   ```

2. Copy NOKIA_NSM_1_0_SUB_1_0.sar.sar to this new source directory.

   ```
   cp NOKIA_NSM_1_0_SUB_1_0.sar.sar ./<new_source_directory>
   ```

3. Change directory to <new_source_directory>.

   ```
   cd <new_source_directory>
   ```

4. Un-jar NOKIA_NSM_1_0_SUB_1_0.sar.sar. This extracts the contents of the sar file (see Figure 1 on page 12 for an example of the resulting file structure).).

   ```
   jar xvf NOKIA_NSM_1_0_SUB_1_0.sar.sar
   ```

5. Edit <new_source_directory>/Nokia/common/application_config/ nokia_nsm_1_0_ne_config.xml in with the appropriate changes.

6. Create a new sar file at the <new_source_directory> level.

   ```
   CreateSar $PWD
   ```

7. Uninstall the cartridge using NOKIA_NSM_1_0_SUB_1_0.sar.sar in /Nokia (That is, use the original sar file that you copied in Step 2 above—see "Uninstalling the cartridge" on page 7 for uninstallation instructions).

8. After you uninstall the cartridge, rename the sar file in /Nokia so you have a backup copy of it.

9. Copy the new sar file from <new_source_directory> to /Nokia.

10. Reinstall the cartridge (see "Installing the cartridge" on page 7 for installation instructions).

Figure 1: File Structure of the Un-Jared .sar File

```
META-INF/activation-model.xml
Nokia/
    nsm_1_0/
        subscription/
            sample_wo/
            sarm/
                ne_progs/
                PLSQL/
            control/
                PLSQL/
            nep/
                PLSQL/
            java/
                lib/
            cpp/
                lib/
            service_model/{at least one .xml file}
        common/
            sarm/
                ne_progs/
                PLSQL/
            control/
                PLSQL/
            nep/
                PLSQL/
            java/
                lib/
            cpp/
                lib/
            service_model/
            application_config/
            scripts/
```

Testing the installation

The following procedure describes the steps required to test the cartridge installation in loopback mode. We recommend that you perform the initial cartridge installation test in loopback mode.

To test in loopback mode

1. Stop ASAP by typing the following command at the UNIX prompt:

   ```
   stop_asap_sys
   ```

2. Ensure loop back mode is on. See "Loopback mode" on page 8 for a description of how to set the loop back parameter to "On".

3. Start ASAP by typing:

   ```
   start_asap_sys
   ```

4. Send the sample work orders through the SRP Emulator by typing:

   ```
   run_suite $SRP <ctrl_password> <suite name>
   ```

   You can locate the suite names in /Nokia/sample_wo by typing:

   ```
   grep SUITE * | grep -v END
   ```

   A list of all available suites appears.

   For more information on the SRP Emulator, refer to the *ASAP Administration Guide*.

5. Verify the status of the sample work orders by typing:

   ```
   asap_utils l
   ```

   All successful work orders returns to the 104 state.

   To view the sample work orders provided with this cartridge, refer to the Nokia NSM cartridge source.

Viewing the sample work orders

You find the sample work orders under the sample_wo directory in the sar file. The following procedure describes how to view the sample work orders.

To view the sample work orders

1. If necessary, create a repository directory under /Nokia, copy the sar file to the new directory and un-jar the sar file, as described by Step 1 through Step 4 in "Modifying nokia_nsm_1_0_ne_config.xml" on page 10.

2. Locate and view the sample work order files under /Nokia/nsm_1_0/subscription/ sample_wo.

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Atomic Service Description Layer (ASDL) Commands

ASDL commands represent a set of atomic actions that ASAP can perform on a network element (NE). ASAP can combine ASDLs to create meaningful services (CSDLs) within a cartridge.

This chapter presents detailed information on the ASDL parameters that we provide with this cartridge. The following table lists and describes the type of parameter information that is included.

Table 5: ASDL parameter information

Item	Description
Parameter Name	Identifies the parameter that is configured for the stated service.
Description	Describes the parameter.
Range	Describes or lists the range of values that can be used to satisfy this parameter.
Default Value	Configures a default value for the parameter so that it is not mandatory for the upstream system to provide a value.

Table 5: ASDL parameter information

Item	Description
Type	Indicates one of the following parameter types: ◆ S—Scalar, specifies the parameter label transmitted on the ASDL command. Scalar parameters are conventional name-value pair parameters. ◆ C—Compound, specifies the base name of the compound parameter transmitted on the ASDL command. A compound parameter contains structures or arrays of information that are represented by a particular structure name or compound parameter name. Each compound parameter can contain a large number of elements. If you use compound parameters, you only require a single entry in the ASAP translation tables to call the compound parameter and all its associated parameter elements. ◆ I—Indexed, identifies a parameter that contains a sequential numerical index value to tell the SARM that it should execute the same operation (for example, an ASDL command) for all occurrences of that index. Consequently, if there are several options on a particular CSDL command (OPT1, OPT2, OPT3, etc.), you can specify the OPT parameter as an indexed parameter. When you specify the OPT parameter as an indexed parameter, the SARM generates several occurrences of that same ASDL command and each command has a different value for the option being transmitted to the NEP. For more information on parameter types, refer to the *ASAP Developer Reference*.
Class	Indicates one of the following parameter classifications: ◆ R—Required scalar parameter ◆ O—Optional scalar parameter ◆ C—Required compound parameter ◆ N—Optional compound parameter ◆ M—Mandatory indexed parameter ◆ I—Optional indexed parameter ◆ S—Parameter count

For a detailed description of the Required and Optional parameter classifications, refer to the *ASAP Administration Guide.*

ASDL commands

This cartridge provides the following ASDL commands:

◆ A_NOK-NSM_1-0_ADD_ENTRY
◆ A_NOK-NSM_1-0_ADD_ENTRY-RB
◆ A_NOK-NSM_1-0_ADD_SUBSCRIBER
◆ A_NOK-NSM_1-0_DELETE_ENTRY
◆ A_NOK-NSM_1-0_DELETE_SUBSCRIBER
◆ A_NOK-NSM_1-0_MODIFY_ENTRY
◆ A_NOK-NSM_1-0_MODIFY_ENTRY-RB
◆ A_NOK-NSM_1-0_MODIFY_SUBSCRIBER
◆ A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN
◆ A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN-RB
◆ A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-RB
◆ A_NOK-NSM_1-0_QUERY_DN
◆ A_NOK-NSM_1-0_QUERY_SCHEMA
◆ A_NOK-NSM_1-0_QUERY_SUBSCRIBER
◆ A_NOK-NSM_1-0_QUERY_SUBSCRIBER-RB
◆ A_NOK-NSM_1-0_QUERY_WITH-SEARCH-FILTER

A_NOK-NSM_1-0_ADD_ENTRY

Adds an entry to the directory for the given DN, object class and attributes.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.addEntry

Table 6: A_NOK-NSM_1-0_ADD_ENTRY

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
DN	Distinguished name of the entry to be queried.			S	R
ATTRIBUTE	This compound parameter contains the attribute types and values of the entries to be added.			C	R

MML Commands

```
add(netscape.ldap.LDAPEntry entry)
```

Output Parameters

None.

A_NOK-NSM_1-0_ADD_ENTRY-RB

Roll back action for the "add entry" feature.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.addEntryRB

Table 7: A_NOK-NSM_1-0_ADD_ENTRY-RB

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
OLD_DN	Distinguished name of the entry to be queried.			S	R
OLD_ATTRIBUTE	This compound parameter contains the attribute types and values of the entries to be added.			C	R

MML Commands

```
add(netscape.ldap.LDAPEntry entry)
```

Output Parameters

None.

A_NOK-NSM_1-0_ADD_SUBSCRIBER

Adds a subscriber on the Nokia Subscription Manager.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.addSubscriber

Table 8: A_NOK-NSM_1-0_ADD_SUBSCRIBER

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
IMSI	International mobile subscriber identity.	Digit string: 15 digits		S	R
MSISDN	Mobile station ISDN.	5 to 15 digits		S	R
RATE_PLAN	Indicates the rate plan for the subscriber.	6 digits		S	O
CHRG_TYPE	Indicates the charging type. ◆ 0 - Prepaid ◆ 1 - Postpaid	1 digit		S	O
SCPID	Charging node ID for prepaid subscribers.	2 digits		S	O
EXTERNAL_ACCOUNT_ID	External account ID			S	O

MML Commands

```
add(netscape.ldap.LDAPEntry entry)
```

Output Parameters

None.

A_NOK-NSM_1-0_DELETE_ENTRY

Deletes an entry from the directory for the given DN.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.deleteEntry

Table 9: A_NOK-NSM_1-0_DELETE_ENTRY

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
DN	Distinguished name of the entry to be queried.			S	R

MML Commands

```
delete(java.lang.String dn)
```

Output Parameters

None.

A_NOK-NSM_1-0_DELETE_SUBSCRIBER

Deletes an existing subscriber from the Nokia Subscription Manager.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.deleteSubscriber

Table 10: A_NOK-NSM_1-0_DELETE_SUBSCRIBER

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
IMSI	International mobile subscriber identity.	Digit string: 15 digits		S	R

MML Commands

```
delete(java.lang.String dn)
```

Output Parameters

None.

A_NOK-NSM_1-0_MODIFY_ENTRY

Modifies an entry (add or delete an attribute, add or delete attribute values, replace an attribute value etc) in the directory.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.modifyEntry

Table 11: A_NOK-NSM_1-0_MODIFY_ENTRY

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
DN	Distinguished name of the entry to be queried.			S	R
ATTRIBUTE	This compound parameter contains the attribute types and values of the entries to be added.			C	R

MML Commands

```
modify(java.lang.String dn, netscape.ldap.LDAPModification[] mods)
```

Output Parameters

None.

A_NOK-NSM_1-0_MODIFY_ENTRY-RB

Roll back action for the "modify entry" feature.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.modifyEntryRB

Table 12: A_NOK-NSM_1-0_MODIFY_ENTRY-RB

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
OLD_DN	Distinguished name of the entry to be queried.			S	R
OLD_ATTRIBUTE	This compound parameter contains the attribute types and values of the entry to be added.			C	R

MML Commands

```
modify(java.lang.String dn, netscape.ldap.LDAPModification[] mods)
```

Output Parameters

None.

A_NOK-NSM_1-0_MODIFY_SUBSCRIBER

Modifies the subscriber's attributes on the Nokia Subscription Manager.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.modifySubscriber

Table 13: A_NOK-NSM_1-0_MODIFY_SUBSCRIBER

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
IMSI	International mobile subscriber identity.	Digit string: 15 digits		S	O

Table 13: A_NOK-NSM_1-0_MODIFY_SUBSCRIBER

Parameter Name	Description	Range	Default Value	Type	Class
MSISDN	Mobile station ISDN.	5 to 15 digits		S	R
RATE_PLAN	Indicates the rate plan for the subscriber.	6 digits		S	O
CHRG_TYPE	Indicates the charging type. ◆ 0 - Prepaid ◆ 1 - Postpaid	1 digit		S	O
SCPID	Charging node ID for prepaid subscribers.	2 digits		S	O
EXTERNAL_ACCOUNT_ID	External account ID			S	O

MML Commands

```
modify(java.lang.String dn, netscape.ldap.LDAPModification[] mods)
```

Output Parameters

None.

A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN

Modifies the DN of an entry.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.modifySubscriberDN

Table 14: A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
IMSI	International mobile subscriber identity.	Digit string: 15 digits		S	R

Table 14: A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN

Parameter Name	Description	Range	Default Value	Type	Class
NEW_RDN	The new relative distinguished name of the entry.			S	R
NEW_PARENT_DN	The DN of the new parent, if the entry is to be relocated under a new parent.			S	O
DELETE_OLD_RDN	Flag which indicates whether the old rdn attribute has to be deleted.			S	O

MML Commands

```
rename(java.lang.String dn,java.lang.String newRDN, java.lang.String
newParentDN, boolean deleteOldRDN)
```

Output Parameters

None.

A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN-RB

Roll back action for the "modify subscriber DN" feature.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.modifySubscriberDNRB

Table 15: A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN-RB

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
IMSI	International mobile subscriber identity.	Digit string: 15 digits		S	R
NEW_RDN	The new relative distinguished name of the entry.			S	R

Table 15: A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN-RB

Parameter Name	Description	Range	Default Value	Type	Class
NEW_PARENT_DN	The DN of the new parent, if the entry is to be relocated under a new parent.			S	O

MML Commands

```
rename(java.lang.String dn, java.lang.String newRDN, java.lang.String
newParentDN, boolean deleteOldRDN)
```

Output Parameters

None.

A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-RB

Roll back action for the "modify subscriber" feature.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.modifySubscriberRB

Table 16: A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-RB

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
OLD_IMSI	International mobile subscriber identity.	Digit string: 15 digits		S	O
MSISDN	Mobile station ISDN.	5 to 15 digits		S	R
OLD_RATE_PLAN	Indicates the rate plan for the subscriber.	6 digits		S	O

Table 16: A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-RB

Parameter Name	Description	Range	Default Value	Type	Class
OLD_CHRG_TYPE	Indicates the charging type. ◆ 0 - Prepaid ◆ 1 - Postpaid	1 digit		S	O
OLD_SCPID	Charging node ID for prepaid subscribers.	2 digits		S	O
OLD_EXTERNAL_ACCOUNT_ID	External account ID			S	O

MML Commands

```
modify(java.lang.String dn, netscape.ldap.LDAPModification[] mods)
```

Output Parameters

None.

A_NOK-NSM_1-0_QUERY_DN

Queries the LDAP directory for a given DN. Equivalent to reading the entry with a given DN.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.queryDN

Table 17: A_NOK-NSM_1-0_QUERY_DN

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
DN	Distinguished name of the entry to be queried.			S	R

MML Commands

```
search(java.lang.String base,int scope, java.lang.String
filter,java.lang.String[] attrs, boolean attrsOnly)
```

Output Parameters

Parameter Name	Parameter Description
DN[n]	Distinguished name of the entry.
DN[n].ATTRIBUTE[m].TYPE	Attribute type.
DN[n].ATTRIBUTE[m].VALUES	Delimiter separated string of attribute values.

A_NOK-NSM_1-0_QUERY_SCHEMA

Queries the LDAP schema for all object classes, attribute types and matching rules.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.querySchema

Table 18: A_NOK-NSM_1-0_QUERY_SCHEMA

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R

MML Commands

```
fetchSchema(LDAPConnection ld);
```

Output Parameters

Parameter name	Parameter description
OBJECTCLASS[n].OID	Object identifier of the object class.
OBJECTCLASS[n].NAME	Name of the object class.
OBJECTCLASS[n].DESCRIPTION	Description of the object class.
OBJECTCLASS[n].PARENT	Name of the parent object class.
OBJECTCLASS[n].REQ_ATTRIBUTES	Required attributes name.
OBJECTCLASS[n].OPT_ATTRIBUTES	Optional attributes name.
ATTRIBUTE[m].OID	Object identifier of the attribute.
ATTRIBUTE[m].NAME	Name of the attribute.
ATTRIBUTE[m].DESCRIPTION	Description of the attribute.
ATTRIBUTE[m].SYNTAX	Attribute syntax.
ATTRIBUTE[m].IS_SINGLE_VALUED	Flag indicating whether the attribute is single valued or multi valued. Possible values: True, False
MATCHING_RULE[k].OID	Object identifier of the matching rule.
MATCHING_RULE[k].NAME	Name of the matching rule.
MATCHING_RULE[k].DESCRIPTION	Description of the matching rule.
MATCHING_RULE[k].SYNTAX	Syntax of the matching rule.

A_NOK-NSM_1-0_QUERY_SUBSCRIBER

Queries the subscriber information on the Nokia Subscription Manager.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.querySubscriber

Table 19: A_NOK-NSM_1-0_QUERY_SUBSCRIBER

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
MSISDN	Mobile station ISDN.	5 to 15 digits		S	R

MML Commands

```
search(java.lang.String base,int scope, java.lang.String
filter,java.lang.String[] attrs, boolean attrsOnly)
```

Output Parameters

Parameter Name	Parameter Description
MSISDN	MSISDN of the subscriber found.
IMSI	IMSI attribute value.
RATE_PLAN	RATE_PLAN attribute value.
CHRG_TYPE	CHRG_TYPE attribute value.
SCPID	SCPID attribute value.
EXTERNAL_ACCOUNT_ID	External account ID.
SUB_FOUND	Flag indicating whether the subscriber is found based on the MSISDN.

Note: The output will contain values for all the attributes defined in the NSM for the subscriber.

A_NOK-NSM_1-0_QUERY_SUBSCRIBER-RB

Roll back action for the "query subscriber" feature.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.querySubscriberRB

Table 20: A_NOK-NSM_1-0_QUERY_SUBSCRIBER-RB

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
MSISDN	Mobile station ISDN.	5 to 15 digits		S	R

MML Commands

```
search(java.lang.String base,int scope, java.lang.String
filter,java.lang.String[] attrs, boolean attrsOnly)
```

Output Parameters

Parameter Name	Parameter Description
MSISDN	MSISDN of the subscriber found.
IMSI	IMSI attribute value.
OLD_IMSI	IMSI attribute value.
OLD_RATE_PLAN	RATE_PLAN attribute value.
OLD_CHRG_TYPE	CHRG_TYPE attribute value.
OLD_SCPID	SCPID attribute value.
OLD_EXTERNAL_ACCOUNT_ID	External account ID.
SUB_FOUND	Flag indicating whether the subscriber is found based on the MSISDN.

Note: The output will contain values for all the attributes defined in the NSM for the subscriber.

A_NOK-NSM_1-0_QUERY_WITH-SEARCH-FILTER

Queries the LDAP directory for all matching entries of a search filter.

It is implemented by the following Java method:

com.metasolv.cartridge.oss.nok_nsm_1_0.prov.NokiaNsmProvisioning.queryWithSearchFilter

Table 21: A_NOK-NSM_1-0_QUERY_WITH-SEARCH-FILTER

Parameter Name	Description	Range	Default Value	Type	Class
MCLI	The remote network element name.			S	R
BASE_DN	The base DN from where the search should start.			S	R
SEARCH_SCOPE	Search scope. Possible values are: ◆ SCOPE_BASE ◆ SCOPE_ONE ◆ SCOPE_SU			S	R
SEARCH_FILTER	Search filter string. Example: cn=Jensen			S	R

MML Commands

```
search(java.lang.String base,int scope, java.lang.String
filter,java.lang.String[] attrs, boolean attrsOnly)
```

Output Parameters

Parameter Name	Parameter Description
DN[n]	Distinguished name.
DN[n].ATTRIBUTE[m].TYPE	Attribute type.
DN[n].ATTRIBUTE[m].VALUES	Comma separated string of attribute values.

User exit types

User exit types allow cartridge developers and systems administrators to map ASDL exit codes to one of the predefined base exit types. Base exit types determine the product behavior.

Cartridges map return codes and status values from a network element to a user defined exit type.

Regular expressions (regex) are used to perform pattern searches on responses from network elements. The pattern is stored in "tbl_user_err" in the SARM database. The user exit type contains a regex pattern that is applied at runtime.

Regular expressions enable users to associate a series of responses to a specific base type. For example, a regular expression "6." can identify a pattern where any response with the character "6" followed by any number of characters will translate to base type of FAIL.

Regular expressions can also allow very specific searches within a response from a network element. Regular expressions are typically compiled before being executed. Compilation produces a binary version of the expression and ensures that the syntax of the regular expression is correct. This compilation occurs using SACT\SADT when user exit types are deployed into ASAP. If the syntax is deemed to be incorrect during compilation, SADT displays an error message and the deployment of the user exit type will fail.

For more information on pattern matching, refer to the *ASAP Developer Reference* and the *ASAP Administration Guide*.

Understanding user exit type XML files

```
…
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>DYNAMIC_SL</softwareLoad>
        <technology>DYNAMIC_VENDOR-DYNAMIC_TECH</technology>
    </neDescriptor>
    <searchPattern>SUCCESS.</searchPattern>[1]
    <userType>U_SUCCEED</userType>[2]
    <baseType>SUCCEED</baseType>[3]
    <description>The ASDL provisioning was successful</description>
</userDefinedExitType>
<userDefinedExitType>
    <searchPattern>90.</searchPattern>
    <userType>U_FAIL</userType>
    <baseType>FAIL</baseType>
    <description>The ASDL failed - fail the current order
```

1. Pattern searches accommodate situations in which responses from the device contain small variants that represent the same meaning. The user type contains an associated search pattern that is applied at runtime. Using regular expressions, you can default a series of responses. For example a regular expression "90." can specify a pattern where any response with the character "90" followed by any character will translate to base type of FAIL. If the regular expression is defined as "90*", then any response with the character "90" followed by any number of characters will translate to base type of FAIL
2. The user type that the search pattern maps to.
3. The base type that maps to the user type.

```
            and stop processing.</description>
    </userDefinedExitType>
    <userDefinedExitType>

        <searchPattern>101-110[201-215]</searchPattern>¹
        <userType>U_SOFT_FAIL</userType>
        <baseType>SOFT_FAIL</baseType>
        <description>The ASDL has encountered a soft failure. Processing will
            continue.</description>
    </userDefinedExitType>
    <userDefinedExitType>

        <searchPattern>801-850</searchPattern>²
        <userType>U_MINOR_ERROR</userType>
        <baseType>SOFT_FAIL</baseType>
        <description>The ASDL has encountered a soft failure. Processing will
            continue.</description>
    </userDefinedExitType>
    <userDefinedExitType>

        <searchPattern>251-275&&[^261-265]</searchPattern>³
        <userType>U_DELAYED_FAIL</userType>
        <baseType>DELAYED_FAIL</baseType>
        <description>The ASDL has failed during provisioning.</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>BCS36</softwareLoad>
            <technology>NORTEL_DMS</technology>
            <neVendor>Nortel</neVendor>
        </neDescriptor>
        <searchPattern>*.</searchPattern>
        <userType>U_MAINTAIN</userType>
        <baseType>MAINTENANCE</baseType>
        <description>The ASDL will Wait until the NE comes out of
            Maintenance Mode</description>
    </userDefinedExitType>
```

The previous code sample shows some typical search pattern examples. Some additional examples follow:

◆ ^.*\b(one|two|three)\b.*$ = matches a complete line of text that contains any of the words "one", "two" or "three"

◆ ^(?=.*?\bone\b)(?=.*?\btwo\b)(?=.*?\bthree\b).*$ matches a complete line of text that contains all of the words "one", "two" and "three"

◆ "[^"\r\n]*" matches a single-line string that does not allow the quote character to appear inside the string.

---

1. 101 to 110 and 201 to 215 will translate to a base type of SOFT_FAIL
2. 801-850 will translate to a base type of SOFT_FAIL. Note that the user type differs from the previous range.
3. 251 to 275 but not 261 to 265 will translate to a base type of DELAYED_FAILURE.

◆ \b\d{1,3}\.\d{1,3}\.\d{1,3}\.\d{1,3}\b matches any IP address.

For more information on search patterns, refer to http://java.sun.com/j2se/1.4.2/docs/api/java/util/regex/Pattern.html.

For more information on user exit types, refer to chapter 3 of the *ASAP Developer Reference*.

User defined ASDL exit types

The following table lists the user defined ASDL exit types.

Table 22: User defined ASDL exit types

Search pattern	User_type	Base_type	Description
0	NOKNSM_SUCCESS	SUCCEED	Success.
1	NOKNSM_OPR_ERROR	FAIL	Operations error.
2	NOKNSM_PROTOCOL_ERR	FAIL	Protocol error.
3	NOKNSM_TIME_EXCEED	FAIL	Time limit exceeded.
4	NOKNSM_SIZE_EXCEED	FAIL	Size limit exceeded.
5	NOKNSM_CMP_FALSE	FAIL	Compare false.
6	NOKNSM_CMP_TRUE	FAIL	Compare true.
7	NOKNSM_AUTH_NOSUP	FAIL	Strong authorization not supported.
8	NOKNSM_AUTH_REQ	FAIL	Strong authorization required.
9	NOKNSM_PARTIAL_RSLT	FAIL	Partial results.
10	NOKNSM_REFERRAL	FAIL	Referral.
11	NOKNSM_ADMLT_EXCEED	FAIL	Admin limit exceeded.
12	NOKNSM_NO_CRT_EXT	FAIL	Unavailable critical extension.
13	NOKNSM_CONF_REQ	FAIL	Confidentiality required.
14	NOKNSM_SASL_INPRG	FAIL	SASL bind in progress.
15	NOKNSM_NO_ATTR	FAIL	No such attribute.
17	NOKNSM_UNDEF_ATTR	FAIL	Undefined type.

Table 22: User defined ASDL exit types

Search pattern	User_type	Base_type	Description
18	NOKNSM_NO_MATCH	FAIL	Inappropriate matching.
19	NOKNSM_CONS_VIOL	FAIL	Constraint violation.
20	NOKNSM_ATTRVAL_EXIST	FAIL	Type or value exists.
21	NOKNSM_INVLD_ATTR	FAIL	Invalid syntax.
32	NOKNSM_NO_OBJ	FAIL	No such object.
33	NOKNSM_ALIAS_PROB	FAIL	Alias problem.
34	NOKNSM_INVLD_DN	FAIL	Invalid DN syntax.
35	NOKNSM_IS_LEAF	FAIL	Is leaf.
36	NOKNSM_DEREF_PROB	FAIL	Alias dereference problem.
48	NOKNSM_INAPP_AUTH	FAIL	Inappropriate auth.
49	NOKNSM_INVLD_CRED	FAIL	Invalid credentials.
50	NOKNSM_INSUF_RIGHTS	FAIL	Insufficient access.
51	NOKNSM_BUSY	FAIL	Busy.
52	NOKNSM_UNAVAIL	FAIL	Unavailable.
53	NOKNSM_UNWIL_PERF	FAIL	Unwilling to perform.
54	NOKNSM_LOOP_DET	FAIL	Loop detect.
60	NOKNSM_CTRL_MISSING	FAIL	Sort Control missing.
61	NOKNSM_INDEX_ERROR	FAIL	Index range error.
64	NOKNSM_NAM_VIOL	FAIL	Naming violation.
65	NOKNSM_OBJCLASS_VIOL	FAIL	Object class violation.
66	NOKNSM_NOALOW_NOLEAF	FAIL	Not allowed on nonleaf.
67	NOKNSM_NOALLOW_RDN	FAIL	Not allowed on RDN.
68	NOKNSM_ENTRY_EXISTS	FAIL	Already exists.
69	NOKNSM_MOD_PROHIBIT	FAIL	No object class mods.

Table 22: User defined ASDL exit types

Search pattern	User_type	Base_type	Description
70	NOKNSM_RES_TOO_LARGE	FAIL	Results too large.
71	NOKNSM_AFFECTS_DSAS	FAIL	Affects multiple DSAS.
80	NOKNSM_OTHER	FAIL	Other.
81	NOKNSM_SVR_DOWN	FAIL	Server Down.
82	NOKNSM_LOCAL_ERR	FAIL	Local error.
83	NOKNSM_ENCODING_ERR	FAIL	Encoding error.
84	NOKNSM_DECODING_ERR	FAIL	Decoding error.
85	NOKNSM_TIMEOUT	FAIL	Timeout.
86	NOKNSM_AUTH_UNKNOWN	FAIL	Auth unknown.
87	NOKNSM_FILTER_ERR	FAIL	Filter error.
88	NOKNSM_USR_CANCELLED	FAIL	User cancelled.
89	NOKNSM_PARM_ERR	FAIL	Parameter error.
90	NOKNSM_NO_MEMORY	FAIL	No memory.
91	NOKNSM_CONN_ERR	FAIL	Connect error.
92	NOKNSM_NOT_SUPP	FAIL	Not supported.
93	NOKNSM_CTRL_NOFND	FAIL	Control not found.
94	NOKNSM_NO_RESULTS	FAIL	No results returned.
95	NOKNSM_MORE_RSLTS	FAIL	More results to return.
96	NOKNSM_CLI_LOOP	FAIL	Client loop.
97	NOKNSM_REFLT_EXCEED	FAIL	Referral limit exceeded.
((?s).)*NumberFormatException((?s).)*	NOKNSM_NF_EXCEP	FAIL	The NE command was denied due to number format exception.
((?s).)*IOException((?s).)*	NOKNSM_IO_EXCEPTION	RETRY_DIS	The NE command was denied due to IO exception.

Table 22: User defined ASDL exit types

Search pattern	User_type	Base_type	Description
((?s).)*Generic Exception((?s).)*	NOKNSM_GEN_EXCEP	FAIL	The NE command was denied due to general exception.
Required parameter DN not specified in work order	NOKNSM_MISS_DN	FAIL	Required parameter DN not specified in work order.
Required parameter SEARCH_SCOPE not specified in work order	NOKNSM_MISS_SSCOPE	FAIL	Required parameter SEARCH_SCOPE not specified in work order.
Invalid search scope specified	NOKNSM_INV_SEARCH	FAIL	Invalid search scope specified.
Required parameter SEARCH_FILTER not specified in work order	NOKNSM_MISS_SFILTER	FAIL	Required parameter SEARCH_FILTER not specified in work order.
Invalid MODIFY_ACTION parameter specified in the work order	NOKNSM_INV_MOD	FAIL	Invalid MODIFY_ACTION parameter specified in the work order.
Required Communication Parameter BASEDN not Specified	NOKNSM_MISS_BASEDN	FAIL	Required communication parameter BASEDN not Specified.
Required parameter IMSI not specified in work order	NOKNSM_MISS_IMSI	FAIL	Required parameter IMSI not specified in work order.
Required parameter NEW_RDN not specified in work order	NOKNSM_MISS_NEWRDN	FAIL	Required parameter NEW_PARENT not specified in work order.
Required parameter RATE_PLAN not specified in work order	NOKNSM_MISSS_RPLAN	FAIL	Required parameter RATE_PLAN not specified in work order.
Required parameter CHRG_TYPE not specified in work order	NOKNSM_MISS_CTYPE	FAIL	Required parameter CHRG_TYPE not specified in work order.

Table 22: User defined ASDL exit types

Search pattern	User_type	Base_type	Description
Required parameter MSISDN not specified in work order	NOKNSM_MISS_MSISDN	FAIL	Required parameter MSISDN not specified in work order.
Required parameter OLD_RATE_PLAN not specified in work order	NOKNSM_MISS_OLDRPLAN	FAIL	Required parameter OLD_RATE_PLAN not specified in work order.
Required parameter OLD_CHRG_TYPE not specified in work order	NOKNSM_MISS_OLDCTYPE	FAIL	Required parameter OLD_CHRG_TYPE not specified in work order.
Invalid DELETE_OLD_RDN value specified in the work order	NOKNSM_INV_DOLDRDN	FAIL	Invalid DELETE_OLD_RDN value specified in the work order.

UserExitType.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<serviceModel xmlns:fo="http://www.w3.org/1999/XSL/Format" xmlns="http://
www.metasolv.com/ServiceActivation/2003/ServiceModel" xmlns:xsi="http://
www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://
www.metasolv.com/ServiceActivation/2003/ServiceModel
C:\ASAP471\ServiceModel.xsd">
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>0</searchPattern>
        <userType>NOKNSM_SUCCESS</userType>
        <baseType>SUCCEED</baseType>
        <description>Success</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>1</searchPattern>
        <userType>NOKNSM_OPR_ERROR</userType>
        <baseType>FAIL</baseType>
        <description>Operations Error</description>
```

```
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>2</searchPattern>
    <userType>NOKNSM_PROTOCOL_ERR</userType>
    <baseType>FAIL</baseType>
    <description>Protocol Error</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>3</searchPattern>
    <userType>NOKNSM_TIME_EXCEED</userType>
    <baseType>FAIL</baseType>
    <description>Time limit exceeded</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>4</searchPattern>
    <userType>NOKNSM_SIZE_EXCEED</userType>
    <baseType>FAIL</baseType>
    <description>Size limit exceeded</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>5</searchPattern>
    <userType>NOKNSM_CMP_FALSE</userType>
    <baseType>FAIL</baseType>
    <description>Compare False</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>6</searchPattern>
```

```
            <userType>NOKNSM_CMP_TRUE</userType>
            <baseType>FAIL</baseType>
            <description>Compare True</description>
        </userDefinedExitType>
        <userDefinedExitType>
            <neDescriptor>
                <softwareLoad>1-0</softwareLoad>
                <technology>NSM</technology>
                <neVendor>NOK</neVendor>
            </neDescriptor>
            <searchPattern>7</searchPattern>
            <userType>NOKNSM_AUTH_NOSUP</userType>
            <baseType>FAIL</baseType>
            <description>Strong Authorization not Supported</description>
        </userDefinedExitType>
        <userDefinedExitType>
            <neDescriptor>
                <softwareLoad>1-0</softwareLoad>
                <technology>NSM</technology>
                <neVendor>NOK</neVendor>
            </neDescriptor>
            <searchPattern>8</searchPattern>
            <userType>NOKNSM_AUTH_REQ</userType>
            <baseType>FAIL</baseType>
            <description>Strong Authorization required</description>
        </userDefinedExitType>
        <userDefinedExitType>
            <neDescriptor>
                <softwareLoad>1-0</softwareLoad>
                <technology>NSM</technology>
                <neVendor>NOK</neVendor>
            </neDescriptor>
            <searchPattern>9</searchPattern>
            <userType>NOKNSM_PARTIAL_RSLT</userType>
            <baseType>FAIL</baseType>
            <description>Partial Results</description>
        </userDefinedExitType>
        <userDefinedExitType>
            <neDescriptor>
                <softwareLoad>1-0</softwareLoad>
                <technology>NSM</technology>
                <neVendor>NOK</neVendor>
            </neDescriptor>
            <searchPattern>10</searchPattern>
            <userType>NOKNSM_REFERRAL</userType>
            <baseType>FAIL</baseType>
            <description>Referral</description>
        </userDefinedExitType>
        <userDefinedExitType>
            <neDescriptor>
                <softwareLoad>1-0</softwareLoad>
                <technology>NSM</technology>
```

```
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>11</searchPattern>
        <userType>NOKNSM_ADMLT_EXCEED</userType>
        <baseType>FAIL</baseType>
        <description>Admin limit exceeded</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>12</searchPattern>
        <userType>NOKNSM_NO_CRT_EXT</userType>
        <baseType>FAIL</baseType>
        <description>Unavailable Critical Extension</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>13</searchPattern>
        <userType>NOKNSM_CONF_REQ</userType>
        <baseType>FAIL</baseType>
        <description>Confidentiality Required</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>14</searchPattern>
        <userType>NOKNSM_SASL_INPRG</userType>
        <baseType>FAIL</baseType>
        <description>Sasl bind in progress</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>16</searchPattern>
        <userType>NOKNSM_NO_ATTR</userType>
        <baseType>FAIL</baseType>
        <description>No such Attribute</description>
    </userDefinedExitType>
    <userDefinedExitType>
```

```
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>17</searchPattern>
        <userType>NOKNSM_UNDEF_ATTR</userType>
        <baseType>FAIL</baseType>
        <description>Undefined type</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>18</searchPattern>
        <userType>NOKNSM_NO_MATCH</userType>
        <baseType>FAIL</baseType>
        <description>Inappropriate matching</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
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            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>19</searchPattern>
        <userType>NOKNSM_CONS_VIOL</userType>
        <baseType>FAIL</baseType>
        <description>Constraint violation</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
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            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>20</searchPattern>
        <userType>NOKNSM_ATTRVAL_EXIST</userType>
        <baseType>FAIL</baseType>
        <description>Type or value exists</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
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            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>21</searchPattern>
        <userType>NOKNSM_INVLD_ATTR</userType>
        <baseType>FAIL</baseType>
```

```
                    <description>Invalid Syntax</description>
            </userDefinedExitType>
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                <neDescriptor>
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                    <neVendor>NOK</neVendor>
                </neDescriptor>
                <searchPattern>32</searchPattern>
                <userType>NOKNSM_NO_OBJ</userType>
                <baseType>FAIL</baseType>
                <description>No such object</description>
            </userDefinedExitType>
            <userDefinedExitType>
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                    <softwareLoad>1-0</softwareLoad>
                    <technology>NSM</technology>
                    <neVendor>NOK</neVendor>
                </neDescriptor>
                <searchPattern>33</searchPattern>
                <userType>NOKNSM_ALIAS_PROB</userType>
                <baseType>FAIL</baseType>
                <description>Alias problem</description>
            </userDefinedExitType>
            <userDefinedExitType>
                <neDescriptor>
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                    <technology>NSM</technology>
                    <neVendor>NOK</neVendor>
                </neDescriptor>
                <searchPattern>34</searchPattern>
                <userType>NOKNSM_INVLD_DN</userType>
                <baseType>FAIL</baseType>
                <description>Invalid DN syntax</description>
            </userDefinedExitType>
            <userDefinedExitType>
                <neDescriptor>
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                    <technology>NSM</technology>
                    <neVendor>NOK</neVendor>
                </neDescriptor>
                <searchPattern>35</searchPattern>
                <userType>NOKNSM_IS_LEAF</userType>
                <baseType>FAIL</baseType>
                <description>Is leaf</description>
            </userDefinedExitType>
            <userDefinedExitType>
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                    <neVendor>NOK</neVendor>
                </neDescriptor>
```

```
                    <searchPattern>36</searchPattern>
                    <userType>NOKNSM_DEREF_PROB</userType>
                    <baseType>FAIL</baseType>
                    <description>Alias derefernce problem</description>
            </userDefinedExitType>
            <userDefinedExitType>
                    <neDescriptor>
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                        <technology>NSM</technology>
                        <neVendor>NOK</neVendor>
                    </neDescriptor>
                    <searchPattern>48</searchPattern>
                    <userType>NOKNSM_INAPP_AUTH</userType>
                    <baseType>FAIL</baseType>
                    <description>Inappropriate Authorization</description>
            </userDefinedExitType>
            <userDefinedExitType>
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                        <neVendor>NOK</neVendor>
                    </neDescriptor>
                    <searchPattern>49</searchPattern>
                    <userType>NOKNSM_INVLD_CRED</userType>
                    <baseType>FAIL</baseType>
                    <description>Invalid Credentials</description>
            </userDefinedExitType>
            <userDefinedExitType>
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                        <neVendor>NOK</neVendor>
                    </neDescriptor>
                    <searchPattern>50</searchPattern>
                    <userType>NOKNSM_INSUF_RIGHTS</userType>
                    <baseType>FAIL</baseType>
                    <description>Insufficient Access</description>
            </userDefinedExitType>
            <userDefinedExitType>
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                        <neVendor>NOK</neVendor>
                    </neDescriptor>
                    <searchPattern>51</searchPattern>
                    <userType>NOKNSM_BUSY</userType>
                    <baseType>FAIL</baseType>
                    <description>Busy</description>
            </userDefinedExitType>
            <userDefinedExitType>
                    <neDescriptor>
                        <softwareLoad>1-0</softwareLoad>
```

```
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>52</searchPattern>
    <userType>NOKNSM_UNAVAIL</userType>
    <baseType>FAIL</baseType>
    <description>Unavailable</description>
</userDefinedExitType>
<userDefinedExitType>
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        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>53</searchPattern>
    <userType>NOKNSM_UNWIL_PERF</userType>
    <baseType>FAIL</baseType>
    <description>Unwilling to perform</description>
</userDefinedExitType>
<userDefinedExitType>
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        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>54</searchPattern>
    <userType>NOKNSM_LOOP_DET</userType>
    <baseType>FAIL</baseType>
    <description>Loop detect</description>
</userDefinedExitType>
<userDefinedExitType>
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        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>60</searchPattern>
    <userType>NOKNSM_CTRL_MISSING</userType>
    <baseType>FAIL</baseType>
    <description>Sort Control missing</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
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        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>61</searchPattern>
    <userType>NOKNSM_INDEX_ERROR</userType>
    <baseType>FAIL</baseType>
    <description>Index range error</description>
</userDefinedExitType>
```

```
<userDefinedExitType>
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        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>64</searchPattern>
    <userType>NOKNSM_NAM_VIOL</userType>
    <baseType>FAIL</baseType>
    <description>Naming violation</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
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        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>65</searchPattern>
    <userType>NOKNSM_OBJCLASS_VIOL</userType>
    <baseType>FAIL</baseType>
    <description>Object class violation</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
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        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>66</searchPattern>
    <userType>NOKNSM_NOALOW_NOLEAF</userType>
    <baseType>FAIL</baseType>
    <description>Not allowed on nonleaf</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>67</searchPattern>
    <userType>NOKNSM_NOALLOW_RDN</userType>
    <baseType>FAIL</baseType>
    <description>Non allowed on RDN</description>
</userDefinedExitType>
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        <softwareLoad>1-0</softwareLoad>
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        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>68</searchPattern>
    <userType>NOKNSM_ENTRY_EXISTS</userType>
```

```
            <baseType>FAIL</baseType>
            <description>Already exists</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>69</searchPattern>
        <userType>NOKNSM_MOD_PROHIBIT</userType>
        <baseType>FAIL</baseType>
        <description>No object class mods</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>71</searchPattern>
        <userType>NOKNSM_RES_TOO_LARGE</userType>
        <baseType>FAIL</baseType>
        <description>Results too large</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>71</searchPattern>
        <userType>NOKNSM_AFFECTS_DSAS</userType>
        <baseType>FAIL</baseType>
        <description>Affects multiple DSAS</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>80</searchPattern>
        <userType>NOKNSM_OTHER</userType>
        <baseType>FAIL</baseType>
        <description>Other</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
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            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
```

```
        </neDescriptor>
        <searchPattern>81</searchPattern>
        <userType>NOKNSM_SVR_DOWN</userType>
        <baseType>FAIL</baseType>
        <description>Server Down</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>82</searchPattern>
        <userType>NOKNSM_LOCAL_ERR</userType>
        <baseType>FAIL</baseType>
        <description>Local error</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>83</searchPattern>
        <userType>NOKNSM_ENCODING_ERR</userType>
        <baseType>FAIL</baseType>
        <description>Encoding error</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>84</searchPattern>
        <userType>NOKNSM_DECODING_ERR</userType>
        <baseType>FAIL</baseType>
        <description>Decoding error</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>85</searchPattern>
        <userType>NOKNSM_TIMEOUT</userType>
        <baseType>FAIL</baseType>
        <description>Timeout</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
```

```
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>86</searchPattern>
    <userType>NOKNSM_AUTH_UNKNOWN</userType>
    <baseType>FAIL</baseType>
    <description>Auth unknown</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>87</searchPattern>
    <userType>NOKNSM_FILTER_ERR</userType>
    <baseType>FAIL</baseType>
    <description>Filter error</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>88</searchPattern>
    <userType>NOKNSM_USR_CANCELLED</userType>
    <baseType>FAIL</baseType>
    <description>User cancelled</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>89</searchPattern>
    <userType>NOKNSM_PARM_ERR</userType>
    <baseType>FAIL</baseType>
    <description>Parameter error</description>
</userDefinedExitType>
<userDefinedExitType>
    <neDescriptor>
        <softwareLoad>1-0</softwareLoad>
        <technology>NSM</technology>
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>90</searchPattern>
    <userType>NOKNSM_NO_MEMORY</userType>
    <baseType>FAIL</baseType>
    <description>No memory</description>
```

```
        </userDefinedExitType>
        <userDefinedExitType>
            <neDescriptor>
                <softwareLoad>1-0</softwareLoad>
                <technology>NSM</technology>
                <neVendor>NOK</neVendor>
            </neDescriptor>
            <searchPattern>91</searchPattern>
            <userType>NOKNSM_CONN_ERR</userType>
            <baseType>FAIL</baseType>
            <description>Connect error</description>
        </userDefinedExitType>
        <userDefinedExitType>
            <neDescriptor>
                <softwareLoad>1-0</softwareLoad>
                <technology>NSM</technology>
                <neVendor>NOK</neVendor>
            </neDescriptor>
            <searchPattern>92</searchPattern>
            <userType>NOKNSM_NOT_SUPP</userType>
            <baseType>FAIL</baseType>
            <description>Not supported</description>
        </userDefinedExitType>
        <userDefinedExitType>
            <neDescriptor>
                <softwareLoad>1-0</softwareLoad>
                <technology>NSM</technology>
                <neVendor>NOK</neVendor>
            </neDescriptor>
            <searchPattern>93</searchPattern>
            <userType>NOKNSM_CTRL_NOFND</userType>
            <baseType>FAIL</baseType>
            <description>Control not found</description>
        </userDefinedExitType>
        <userDefinedExitType>
            <neDescriptor>
                <softwareLoad>1-0</softwareLoad>
                <technology>NSM</technology>
                <neVendor>NOK</neVendor>
            </neDescriptor>
            <searchPattern>94</searchPattern>
            <userType>NOKNSM_NO_RESULTS</userType>
            <baseType>FAIL</baseType>
            <description>No results returned</description>
        </userDefinedExitType>
        <userDefinedExitType>
            <neDescriptor>
                <softwareLoad>1-0</softwareLoad>
                <technology>NSM</technology>
                <neVendor>NOK</neVendor>
            </neDescriptor>
            <searchPattern>95</searchPattern>
```

```
        <userType>NOKNSM_MORE_RSLTS</userType>
        <baseType>FAIL</baseType>
        <description>More results to return</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>96</searchPattern>
        <userType>NOKNSM_CLI_LOOP</userType>
        <baseType>FAIL</baseType>
        <description>Client loop</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>97</searchPattern>
        <userType>NOKNSM_REFLT_EXCEED</userType>
        <baseType>FAIL</baseType>
        <description>Referral limit exceeded</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>((?s).)*IOException((?s).)*</searchPattern>
        <userType>NOKNSM_IO_EXCEPTION</userType>
        <baseType>RETRY_DIS</baseType>
        <description>The NE command was denied due to IO Exception</
description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>((?s).)*NumberFormatException((?s).)*</searchPattern>
        <userType>NOKNSM_NF_EXCEP</userType>
        <baseType>FAIL</baseType>
        <description>The NE command was denied due to number format exception
        </description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
```

```
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>((?s).)*Generic Exception((?s).)*</searchPattern>
        <userType>NOKNSM_GEN_EXCEP</userType>
        <baseType>FAIL</baseType>
        <description>The NE command was denied due to general Exception
        </description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>((?s).)*Required parameter DN not specified in work
        order((?s).)*</searchPattern>
        <userType>NOKNSM_MISS_DN</userType>
        <baseType>FAIL</baseType>
        <description>Required parameter DN not specified in work order
        </description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>((?s).)*Required parameter SEARCH_SCOPE not specified
        in work order((?s).)*</searchPattern>
        <userType>NOKNSM_MISS_SSCOPE</userType>
        <baseType>FAIL</baseType>
        <description>Required parameter SEARCH_SCOPE not specified in work
        order</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>((?s).)*Invalid search scope specified((?s).)*
        </searchPattern>
        <userType>NOKNSM_INV_SEARCH</userType>
        <baseType>FAIL</baseType>
        <description>Invalid search scope specified</description>
    </userDefinedExitType>
    <userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
```

```
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        in work order((?s).)*</searchPattern>
        <userType>NOKNSM_MISS_SFILTER</userType>
        <baseType>FAIL</baseType>
        <description>Required parameter SEARCH_FILTER not specified in work
        order</description>
</userDefinedExitType>
<userDefinedExitType>
        <neDescriptor>
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            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>((?s).)*Invalid MODIFY_ACTION parameter specified in
        the work order((?s).)*</searchPattern>
        <userType>NOKNSM_INV_MOD</userType>
        <baseType>FAIL</baseType>
        <description>Invalid MODIFY_ACTION parameter specified in the work
        order</description>
</userDefinedExitType>
<userDefinedExitType>
        <neDescriptor>
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            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
        <searchPattern>((?s).)*Required Communication Parameter BASEDN not
        Specified((?s).)*</searchPattern>
        <userType>NOKNSM_MISS_BASEDN</userType>
        <baseType>FAIL</baseType>
        <description>Required Communication Parameter BASEDN not Specified
        </description>
</userDefinedExitType>
<userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
            <neVendor>NOK</neVendor>
        </neDescriptor>
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        order((?s).)*</searchPattern>
        <userType>NOKNSM_MISS_IMSI</userType>
        <baseType>FAIL</baseType>
        <description>Required parameter IMSI not specified in work order
        </description>
</userDefinedExitType>
<userDefinedExitType>
        <neDescriptor>
            <softwareLoad>1-0</softwareLoad>
            <technology>NSM</technology>
```

```
                    <neVendor>NOK</neVendor>
                </neDescriptor>
                <searchPattern>((?s).)*Required parameter NEW_RDN not specified in
                work order((?s).)*</searchPattern>
                <userType>NOKNSM_MISS_NEWRDN</userType>
                <baseType>FAIL</baseType>
                <description>Required parameter NEW_RDN not specified in work order
                </description>
            </userDefinedExitType>
            <userDefinedExitType>
                <neDescriptor>
                    <softwareLoad>1-0</softwareLoad>
                    <technology>NSM</technology>
                    <neVendor>NOK</neVendor>
                </neDescriptor>
                <searchPattern>((?s).)*Required parameter RATE_PLAN not specified in
                work order((?s).)*</searchPattern>
                <userType>NOKNSM_MISSS_RPLAN</userType>
                <baseType>FAIL</baseType>
                <description>Required parameter RATE_PLAN not specified in work
                order</description>
            </userDefinedExitType>
            <userDefinedExitType>
                <neDescriptor>
                    <softwareLoad>1-0</softwareLoad>
                    <technology>NSM</technology>
                    <neVendor>NOK</neVendor>
                </neDescriptor>
                <searchPattern>((?s).)*Required parameter CHRG_TYPE not specified in
                work order((?s).)*</searchPattern>
                <userType>NOKNSM_MISS_CTYPE</userType>
                <baseType>FAIL</baseType>
                <description>Required parameter CHRG_TYPE not specified in work
                order</description>
            </userDefinedExitType>
            <userDefinedExitType>
                <neDescriptor>
                    <softwareLoad>1-0</softwareLoad>
                    <technology>NSM</technology>
                    <neVendor>NOK</neVendor>
                </neDescriptor>
                <searchPattern>((?s).)*Required parameter MSISDN not specified in work
                order((?s).)*</searchPattern>
                <userType>NOKNSM_MISS_MSISDN</userType>
                <baseType>FAIL</baseType>
                <description>Required parameter MSISDN not specified in work order
                </description>
            </userDefinedExitType>
            <userDefinedExitType>
                <neDescriptor>
                    <softwareLoad>1-0</softwareLoad>
                    <technology>NSM</technology>
```

```
        <neVendor>NOK</neVendor>
    </neDescriptor>
    <searchPattern>((?s).)*Required parameter OLD_RATE_PLAN not specified
    in work order((?s).)*</searchPattern>
    <userType>NOKNSM_MISS_OLDRPLAN</userType>
    <baseType>FAIL</baseType>
    <description>Required parameter OLD_RATE_PLAN not specified in work
    order</description>
    </userDefinedExitType>
</serviceModel>
```

4

Service Definition

The Nokia NSM cartridge contains a set of CSDLs that map to one or more ASDL commands. You can also create additional CSDLs that map to existing and newly-created ASDLs. An upstream system can assemble any of these CSDL commands onto a work order for provisioning.

This chapter presents detailed information on the CSDL parameters that we provide in this cartridge. The following table lists and describes the type of parameter information that is included.

Table 23: ASDL parameter information

Item	Description
Parameter Name	Identifies the parameter that is configured for the stated service.
Description	Describes the parameter.
Range	Describes or lists the range of values that can be used to satisfy this parameter.
Default Value	Configures a default value for the parameter so that it is not mandatory for the upstream system to provide a value.

Table 23: ASDL parameter information

Item	Description
Type	Indicates one of the following parameter types: ◆ S—Scalar, specifies the parameter label transmitted on the ASDL command. Scalar parameters are conventional name-value pair parameters. ◆ C—Compound, specifies the base name of the compound parameter transmitted on the ASDL command. A compound parameter contains structures or arrays of information that are represented by a particular structure name or compound parameter name. Each compound parameter can contain a large number of elements. If you use compound parameters, you only require a single entry in the ASAP translation tables to call the compound parameter and all its associated parameter elements. ◆ I—Indexed, identifies a parameter that contains a sequential numerical index value to tell the SARM that it should execute the same operation (for example, an ASDL command) for all occurrences of that index. Consequently, if there are several options on a particular CSDL command (OPT1, OPT2, OPT3, etc.), you can specify the OPT parameter as an indexed parameter. When you specify the OPT parameter as an indexed parameter, the SARM generates several occurrences of that same ASDL command and each command has a different value for the option being transmitted to the NEP. For more information on parameter types, refer to the *ASAP Developer Reference*.
Class	Indicates one of the following parameter classifications: ◆ R—Required scalar parameter ◆ O—Optional scalar parameter ◆ C—Required compound parameter ◆ N—Optional compound parameter ◆ M—Mandatory indexed parameter ◆ I—Optional indexed parameter ◆ S—Parameter count

For a detailed description of the Required and Optional parameter classifications, refer to the *ASAP Administration Guide.*

CSDL commands

This cartridge provides the following CSDL Commands:

◆ C_NOK-NSM_1-0_ADD_ENTRY
◆ C_NOK-NSM_1-0_ADD_SUBSCRIBER
◆ C_NOK-NSM_1-0_DELETE_ENTRY
◆ C_NOK-NSM_1-0_DELETE_SUBSCRIBER
◆ C_NOK-NSM_1-0_MODIFY_ENTRY
◆ C_NOK-NSM_1-0_MODIFY_SUBSCRIBER
◆ C_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN
◆ C_NOK-NSM_1-0_QUERY_DN
◆ C_NOK-NSM_1-0_QUERY_SCHEMA
◆ C_NOK-NSM_1-0_QUERY_SUBSCRIBER
◆ C_NOK-NSM_1-0_QUERY_WITH-SEARCH-FILTER

C_NOK-NSM_1-0_ADD_ENTRY

Add an entry to the directory for the given DN, object class and attributes.

Table 24: C_NOK-NSM_1-0_ADD_ENTRY

Parameter Name	Description	Range	Default Value	Type	Class
ATTRIBUTE	This compound parameter contains the attribute types and values of the entries to be added.			C	R
DN	Distinguished name of the entry to be queried.			S	R
NE_ID_NOK-NSM	The remote network element name.			S	R

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 25: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_ADD_ENTRY	A_NOK-NSM_1-0_ADD_ENTRY

C_NOK-NSM_1-0_ADD_SUBSCRIBER

Adds a subscriber on the Nokia Subscription Manager.

Table 26: C_NOK-NSM_1-0_ADD_SUBSCRIBER

Parameter Name	Description	Range	Default Value	Type	Class
CHRG_TYPE	Indicates the charging type. ◆ 0 - Prepaid ◆ 1 - Postpaid	1 digit		S	O
EXTERNAL_ACCOUNT_ID	External account ID			S	O
IMSI	International mobile subscriber identity.	Digit string: 15 digits		S	R
MSISDN	Mobile station ISDN.	5 to 15 digits		S	R
NE_ID_NOK-NSM	The remote network element name.			S	R
RATE_PLAN	Indicates the rate plan for the subscriber.	6 digits		S	O
SCPID	Charging node ID for prepaid subscribers.	2 digits		S	O

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 27: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_ADD_SUBSCRIBER	A_NOK-NSM_1-0_ADD_SUBSCRIBER

C_NOK-NSM_1-0_DELETE_ENTRY

Deletes an entry from the directory for the given DN.

Table 28: C_NOK-NSM_1-0_DELETE_ENTRY

Parameter Name	Description	Range	Default Value	Type	Class
DN	Distinguished name of the entry to be queried.			S	R
NE_ID_NOK-NSM	The remote network element name.			S	R

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 29: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_DELETE_ENTRY	A_NOK-NSM_1-0_DELETE_ENTRY

C_NOK-NSM_1-0_DELETE_SUBSCRIBER

Deletes an existing subscriber from the Nokia Subscription Manager.

Table 30: C_NOK-NSM_1-0_DELETE_SUBSCRIBER

Parameter Name	Description	Range	Default Value	Type	Class
IMSI	International mobile subscriber identity.	Digit string: 15 digits		S	R
MSISDN	Mobile station ISDN.	5 to 15 digits		S	R
NE_ID_NOK-NSM	The remote network element name.			S	R

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 31: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_DELETE_SUBSCRIBER	A_NOK-NSM_1-0_QUERY_SUBSCRIBER
	A_NOK-NSM_1-0_DELETE_SUBSCRIBER

C_NOK-NSM_1-0_MODIFY_ENTRY

Modifies an entry (add or delete an attribute, add or delete attribute values, replace an attribute value etc) in the directory.

Table 32: C_NOK-NSM_1-0_MODIFY_ENTRY

Parameter Name	Description	Range	Default Value	Type	Class
ATTRIBUTE	This compound parameter contains the attribute types and values of the entries to be added.			C	R

Table 32: C_NOK-NSM_1-0_MODIFY_ENTRY

Parameter Name	Description	Range	Default Value	Type	Class
DN	Distinguished name of the entry to be queried.			S	R
NE_ID_NOK-NSM	The remote network element name.			S	R

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 33: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_MODIFY_ENTRY	A_NOK-NSM_1-0_MODIFY_ENTRY

C_NOK-NSM_1-0_MODIFY_SUBSCRIBER

Modifies the subscriber's attributes and/or renames the distinguished name on the Nokia Subscription Manager.

Table 34: C_NOK-NSM_1-0_MODIFY_SUBSCRIBER

Parameter Name	Description	Range	Default Value	Type	Class
CHRG_TYPE	Indicates the charging type. ◆ 0 - Prepaid ◆ 1 - Postpaid	1 digit		S	O
EXTERNAL_ACCOUNT_ID	External account ID			S	O
IMSI	International mobile subscriber identity.	Digit string: 15 digits		S	O
MSISDN	Mobile station ISDN.	5 to 15 digits		S	R
NE_ID_NOK-NSM	The remote network element name.			S	R

Table 34: C_NOK-NSM_1-0_MODIFY_SUBSCRIBER

Parameter Name	Description	Range	Default Value	Type	Class
RATE_PLAN	Indicates the rate plan for the subscriber.	6 digits		S	O
SCPID	Charging node ID for prepaid subscribers.	2 digits		S	O

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 35: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_MODIFY_SUBSCRIBER	A_NOK-NSM_1-0_QUERY_SUBSCRIBER-RB
	A_NOK-NSM_1-0_MODIFY_SUBSCRIBER

C_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN

Modifies the distinguished name on the Nokia Subscription Manager.

Table 36: C_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN

Parameter Name	Description	Range	Default Value	Type	Class
DELETE_OLD_RDN	Flag which indicates whether the old rdn attribute has to be deleted.			S	O
IMSI	International mobile subscriber identity.	Digit string: 15 digits		S	R
NEW_PARENT_DN	The DN of the new parent, if the entry is to be relocated under a new parent.			S	O
NEW_RDN	The new relative distinguished name of the entry.			S	R

Table 36: C_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN

Parameter Name	Description	Range	Default Value	Type	Class
NE_ID_NOK-NSM	The remote network element name.			S	R

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 37: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN	A_NOK-NSM_1-0_MODIFY_SUBSCRIBER-DN

C_NOK-NSM_1-0_QUERY_DN

Queries the LDAP directory of a given DN. Equivalent to reading the entry with a given DN.

Table 38: C_NOK-NSM_1-0_QUERY_DN

Parameter Name	Description	Range	Default Value	Type	Class
DN	Distinguished name of the entry to be queried.			S	R
NE_ID_NOK-NSM	The remote network element name.			S	R

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 39: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_QUERY_DN	A_NOK-NSM_1-0_QUERY_DN

C_NOK-NSM_1-0_QUERY_SCHEMA

Queries the LDAP schema for all object classes, attribute types and matching rules.

Table 40: C_NOK-NSM_1-0_QUERY_SCHEMA

Parameter Name	Description	Range	Default Value	Type	Class
NE_ID_NOK-NSM	The remote network element name.			S	R

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 41: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_QUERY_SCHEMA	A_NOK-NSM_1-0_QUERY_SCHEMA

C_NOK-NSM_1-0_QUERY_SUBSCRIBER

Queries the subscriber information on the NSM.

Table 42: C_NOK-NSM_1-0_QUERY_SUBSCRIBER

Parameter Name	Description	Range	Default Value	Type	Class
MSISDN	Mobile station ISDN.	5 to 15 digits		S	R
NE_ID_NOK-NSM	The remote network element name.			S	R

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 43: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_QUERY_SUBSCRIBER	A_NOK-NSM_1-0_QUERY_SUBSCRIBER

C_NOK-NSM_1-0_QUERY_WITH-SEARCH-FILTER

Queries the LDAP directory for all matching entries of a search filter.

Table 44: C_NOK-NSM_1-0_QUERY_WITH-SEARCH-FILTER

Parameter Name	Description	Range	Default Value	Type	Class
BASE_DN	The base DN from where the search should start.			S	R
NE_ID_NOK-NSM	The remote network element name.			S	R
SEARCH_FILTER	Search filter string. Example: cn=Jensen			S	R
SEARCH_SCOPE	Search scope. Possible values are: ◆ SCOPE_BASE ◆ SCOPE_ONE ◆ SCOPE_SU			S	R

Mapping to ASDLs

The following table illustrates the CSDL to ASDL mapping for this service.

Table 45: CSDL to ASDL Mapping

CSDL	ASDL
C_NOK-NSM_1-0_QUERY_WITH-SEARCH-FILTER	A_NOK-NSM_1-0_QUERY_WITH-SEARCH-FILTER

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Configuring ASAP to Support Additional NE Instances

You can configure ASAP to support the Nokia NSM - NEP configuration using the Service Activation Configuration Tool (SACT). Refer to the *ASAP Administration Guide* for more information.

Below is an example of the Activation.Configuration.XML file for the Nokia NSM cartridge.

```
<?xml version="1.0" encoding="UTF-8"?>
<activationConfig xmlns="http://www.metasolv.com/ServiceActivation/2003/
ActivationConfig" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.metasolv.com/ServiceActivation/2003/
ActivationConfig
D:\XSD\ActivationConfig.xsd">
    <connectionPool name="NOKNSMPL">
        <device name="nokia_nsm_1_0_ldap_dev1">
            <environment>MY_ASAP_SYS</environment>
            <lineType>LDAP_CONNECTION</lineType>
        </device>
    </connectionPool>
    <element name="NOK-NSM_1-0-HOST">
        <technology>NOK-NSM</technology>
        <softwareLoad>1-0</softwareLoad>
        <nepServerName>$NEP</nepServerName>
        <primaryPool>NOKNSMPL</primaryPool>
        <maximumConnections>1</maximumConnections>
        <dropTimeout>2</dropTimeout>
        <spawnThreshold>10</spawnThreshold>
        <killThreshold>8</killThreshold>
        <routingElement name="NOK-NSM_1-0-HOST">
            <atomicService/>
        </routingElement>
        <communicationParameter>
            <label>HOST_IPADDR</label>
            <value>
                <value>10.201.140.131</value>
            </value>
            <description>The host name or IP Address of the remote NE.
            </description>
            <deviceName>COMMON_DEVICE_CFG</deviceName>
            <lineType>LDAP_CONNECTION</lineType>
        </communicationParameter>
```

```
<communicationParameter>
    <label>PORT</label>
    <value>
        <value>389</value>
    </value>
    <description>Port number to connect on remote NE host.
    </description>
    <deviceName>COMMON_DEVICE_CFG</deviceName>
    <lineType>LDAP_CONNECTION</lineType>
</communicationParameter>
<communicationParameter>
    <label>OPEN_TIMEOUT</label>
    <value>
        <value>20</value>
    </value>
    <description>Connection timeout in seconds.</description>
    <deviceName>COMMON_DEVICE_CFG</deviceName>
    <lineType>LDAP_CONNECTION</lineType>
</communicationParameter>
<communicationParameter>
    <label>READ_TIMEOUT</label>
    <value>
        <value>30</value>
    </value>
    <description>Read timeout in seconds.</description>
    <deviceName>COMMON_DEVICE_CFG</deviceName>
    <lineType>LDAP_CONNECTION</lineType>
</communicationParameter>
<communicationParameter>
    <label>HOST_USERID</label>
    <value>
        <value>uid=noscuser,dc=itelcel,dc=com</value>
    </value>
    <description>Login User Name.</description>
    <deviceName>COMMON_DEVICE_CFG</deviceName>
    <lineType>LDAP_CONNECTION</lineType>
</communicationParameter>
<communicationParameter>
    <label>HOST_PASSWORD</label>
    <value>
        <value>noscuser123</value>
    </value>
    <description>Password for the User.</description>
    <deviceName>COMMON_DEVICE_CFG</deviceName>
    <lineType>LDAP_CONNECTION</lineType>
</communicationParameter>
<communicationParameter>
    <label>RESPONSELOG</label>
    <value>
        <value>TRUE</value>
    </value>
    <description>Flag to turn off or on Response log.</description>
```

```
            <deviceName>COMMON_DEVICE_CFG</deviceName>
            <lineType>LDAP_CONNECTION</lineType>
        </communicationParameter>
        <communicationParameter>
            <label>BASEDN</label>
            <value>
                <value>o=nosc,dc=itelcel,dc=com</value>
            </value>
            <description>Base Distinguished Name.</description>
            <deviceName>COMMON_DEVICE_CFG</deviceName>
            <lineType>LDAP_CONNECTION</lineType>
        </communicationParameter>
    </element>
</activationConfig>
```

Extracting source files

Before you can access an XML file to modify it, you must extract it from the .sar file. Use the following procedure to extract source files from the sar file.

To extract source files

1. If necessary, create a repository directory under /Nokia, copy the .sar file to the new directory and un-jar the sar file.

2. After you un-jar the sar file, you can access the XML files.

Loading a new XML file

When you finish modifying an XML, you must create a new sar file, then restart the cartridge using the new file.

Follow the instructions in for directions on how to load a new XML file.

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Appendix

This appendix section describes the compound parameters and its possible values.

Compound parameters

Compound parameter attributes for A_NOK-NSM_1-0_ADD_ENTRY consists of:

Table 46: Compound parameters

Compound Parameter Name	Description	Range values
ATTRIBUTE[n].TYPE	Attribute type for attribute 1.	
ATTRIBUTE[n].VALUE	Attribute values for attribute 1.	Comma separated string of values.

Compound parameter attributes for A_NOK-NSM_1-0_MODIFY_ENTRY consists of:

Table 47: Compound parameters

Compound Parameter Name	Description	Range values
ATTRIBUTE[n].MODIFY_ACTION	The modification type.	add, delete, replace.
ATTRIBUTE[n].TYPE	Attribute type.	
ATTRIBUTE[n].VALUE	Attribute values.	Comma separated string of values.