

Oracle® Communications Subscriber Database Server Provisioning Interface



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Oracle Communications Subscriber Database Server Provisioning Interface, Release 9.0.0.0.0

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1

Introduction

This chapter contains general information about the XML/SOAP provisioning documentation, the organization of this manual, and how to get technical assistance.

1.1 Revision History

| Date | Description |
|--------------|-----------------------------------|
| April 2022 | No changes done in this release. |
| January 2017 | Accessibility changes throughout. |

1.2 Overview

This documentation:

- Describes Subscriber Database Server (SDS) Provisioning Interfaces that can be used by local and remote provisioning client applications. Remote applications include independent Customer Provisioning Systems (CPS), which are supplied and maintained by the customer. Through XML or SOAP interfaces, the CPS can add, change, delete, or retrieve information about any IMSI/MSISDN/NAI association.
- Describes SDS SOAP, XML, and import/export interfaces.
- Provides information about XML and SOAP message definitions.
- Explains the organization of, and how to use, the documentation.

1.3 Scope and Audience

This manual is intended for customers, customer service, software development, product verification organizations, and any other personnel who need to understand the XML or SOAP interfaces. Users of this manual and the others in the SDS family of documents must have a working knowledge or telecommunications and network installations.

1.4 Manual Organization

This document is organized into the following chapters:

- [Introduction](#) contains general information about the SDS documentation, the organization of this manual, and how to get technical assistance.
- [System Architecture](#) gives an overview of XML/SOAP system architecture.
- [Interface Description](#) provides a high level overview of the interface provided by the XML Data Server (XDS) and the SOAP server.
- [SOAP Message Definitions](#) describes the SOAP operations syntax and parameters.

- [XML Message Definitions](#) describes XML requests and responses syntax and parameters.
- [SDS Response Message Error Codes](#) describes the XML/SOAP error codes that are returned by the XDS/SOAP server.
- [XML/SOAP Interface System Variables](#) describes the XML/SOAP interfaces that have a set of system variables that affect the operation as it runs.
- [Database Object Model](#) describes the database object model and shows all tables associated with SDS provisioning.

1.5 My Oracle Support

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Call the Customer Access Support main number at 1-800-223-1711 (toll-free in the US), or call the Oracle Support hotline for your local country from the list at <http://www.oracle.com/us/support/contact/index.html>. When calling, make the selections in the sequence shown below on the Support telephone menu:

1. Select **2** for New Service Request.
2. Select **3** for Hardware, Networking and Solaris Operating System Support.
3. Select one of the following options:
 - For Technical issues such as creating a new Service Request (SR), select **1**.
 - For Non-technical issues such as registration or assistance with My Oracle Support, select **2**.

You are connected to a live agent who can assist you with My Oracle Support registration and opening a support ticket.

My Oracle Support is available 24 hours a day, 7 days a week, 365 days a year.

2

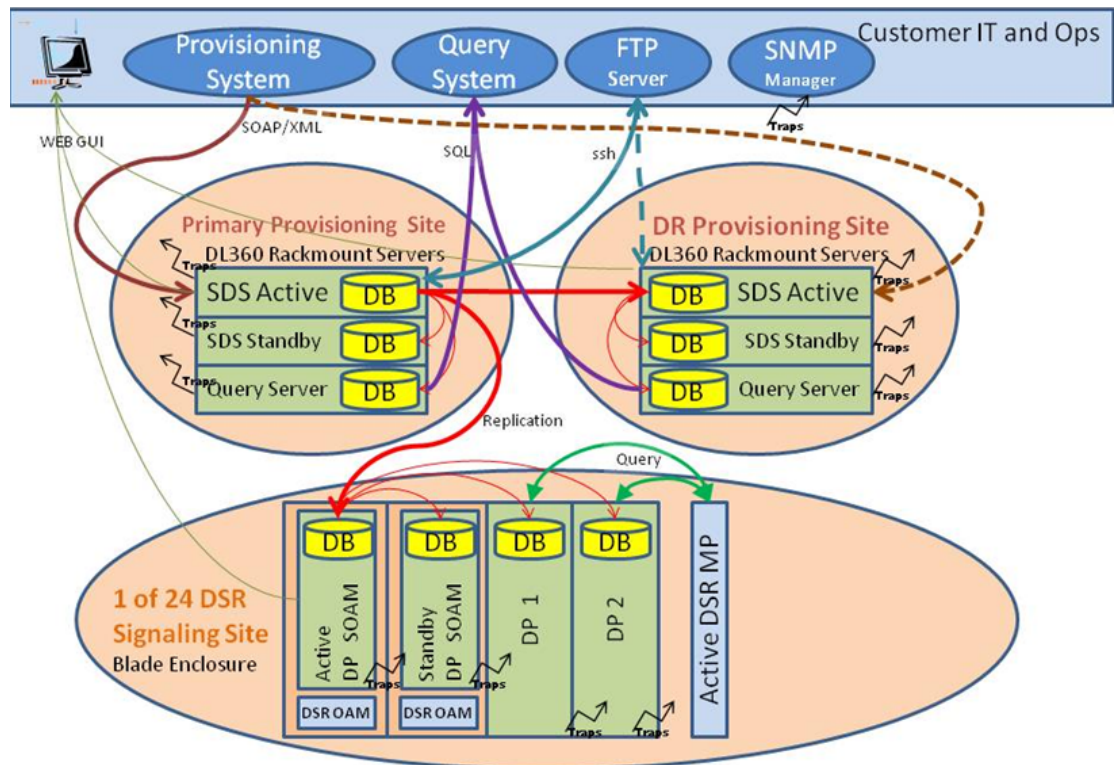
System Architecture

This chapter provides an overview of XML/SOAP system architecture.

2.1 System Architecture Overview

Figure 2-1 provides an overview of the SDS architecture.

Figure 2-1 SDS Architecture Overview



The SDS system consists of a Primary Provisioning Site, a Disaster Recovery (DR) Provisioning Site, and up to 24 Signaling Site servers with redundant data processor Site Operation Administration and Maintenance (SOAM) servers and up to 2 data processing blades. Each provisioning site has an active/standby pair of servers in a High Availability (HA) configuration and a third server configured as a Query server.

The SDS system is built on a platform that provides a variety of services such as site-based GUI, HA capabilities (active/standby switchover and DR switchover), and database functionality (replication, backup, restore).

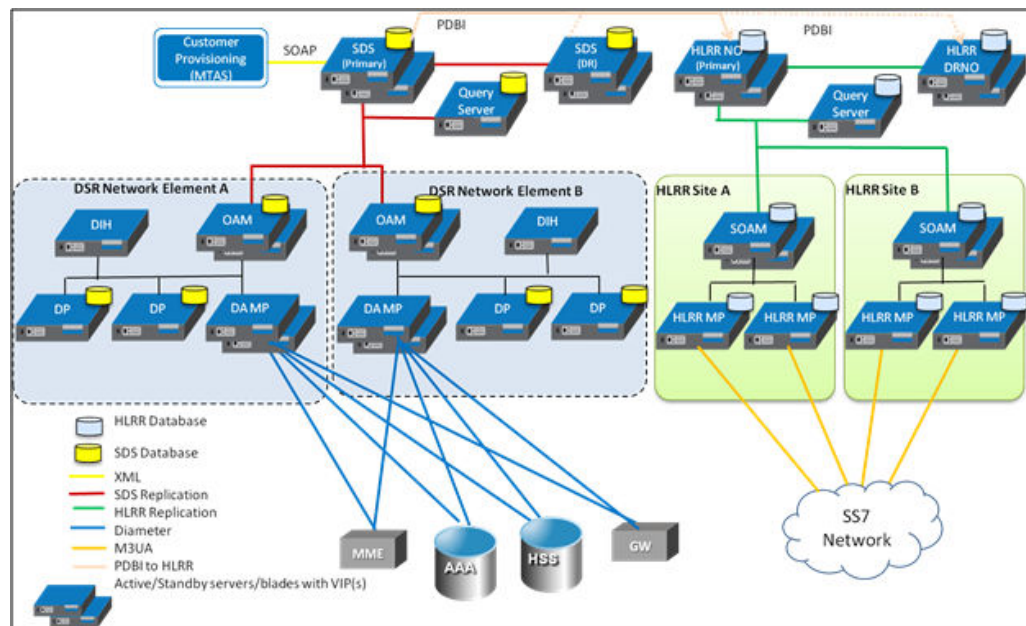
Every server within the SDS system collects measurements, alarms, and events data. Every server sends its traps directly to the Customer SNMP Manager.

Every server can also collect measurement data. Data processing measurements are sent to the active SOAM server, which sends the measurements from all data processing servers and itself to the Active SDS server on the Primary Provisioning Site. The measurements can be viewed on the GUIs for the active SDS server on the Primary Provisioning Site and the data processing SOAM server on the Signaling Site.

2.2 SDS/HLRR Architecture Overview

Figure 2-2 shows a high-level overview for various products.

Figure 2-2 SDS/HLRR Architecture Overview



The SDS for HLRR components consists of a SDS Primary Provisioning site, SDS DR Provisioning site, HLRR Primary NO site, and HLRR Disaster Recovery NO site. The SDS sites replicate data to other SDS systems (such as Query server and data processing SOAM). The HLRR sites replicate data to other HLRR systems (such as the Query server and SOAM).

The SDS Primary Provisioning site relays specific data to the HLRR Primary NO site and can send data to the HLRR DR NO site. The SDS DR Provisioning site can also relay specific data to the HLRR Primary or DR NO site, and does so if it becomes the SDS Primary Provisioning site.

The type of data relayed and additional information on this process is described in [Relaying Data to the HLR Router](#). The data is relayed over the HLRR PDBI interface by the pdbrelay and pdbauidit (for remote audit) processes.

2.3 Customer IT and Ops

The Customer IT and Ops layer contain the customer provisioning system, query system, Web GUI, FTP server, and SNMP agent. These components belong to the

customer and are external to the Oracle SDS system. The customer is responsible for configuring their systems to connect to the SDS system.

2.3.1 Web GUI

The customer uses the Virtual IP address (VIP) for the active SDS server on the Primary Provisioning Site to access the SDS GUI and the VIP for the appropriate SOAM to access the SOAM GUI for the Signaling Site server.

To connect to the SDS application:

1. Launch Internet Explorer 7.x, 8.x, or 9.x and connect to the VIP assigned to the active SDS server on the Primary Provisioning Site.
2. Login to the GUI using your username and password.

The VIP address of the desired server is used to connect to the active SDS server on the DR Provisioning Site or to an SOAM server on a Signaling Site. Data can only be viewed on these servers.

2.3.2 Provisioning System

The customer provisioning system must be configured so that it can have SOAP and/or XML connections to the Primary and DR Provisioning sites. The provisioning system establishes active connections to the active site (usually the Primary Provisioning Site). The VIP addresses are used to connect to the Primary and DR Provisioning sites. The SOAP and/or XML ports can also be configured.

2.3.3 Query System

MySQL client must be installed on the customer system. The customer system can connect to the Query servers on the Primary and/or DR Provisioning Sites using the Query server IP address and IP port=15616.

2.3.4 FTP Server

The customer FTP server is used by the import and export processes and to store performance data.

2.3.5 SNMP Manager

The customer SNMP Manager is used to accept traps for the servers. All servers send SNMP traps to the SNMP Manager for alarms and events.

2.4 Primary Provisioning Site

The Primary Provisioning Site is used for SDS OAM. All provisioning is done using a Web GUI or from the customer provisioning system, using a SOAP and/or XML interface.

The Primary Provisioning Site uses three rack mount servers:

- Active SDS server
- Standby SDS server
- Query server

Each server has the identical software but a different role. Only the SDS server runs the XML Data Server (XDS) and SOAP server applications. These applications run within the same process referred to as XDS.

2.4.1 Active SDS Server

The active SDS server on the Primary Provisioning Site accepts input from the Web GUI and from a SOAP and/or XML interface. The active SDS server is responsible for applying all database updates (adds, changes, and deletes) and replicating appropriate updates to the:

- Primary Provisioning Site Standby SDS server
- Primary Provisioning Site Query server
- DR Provisioning Site Active SDS server
- All subtending DP SOAMs at the Signaling Sites

The active SDS server on the Primary Provisioning Site provides a GUI which is used for configuration, user administration, and viewing of alarms and measurements. The active SDS server distributes all successful incoming subscriber provisioning data, independent of source, to all downstream Network Elements (Query server and DP SOAMs on the Signaling Sites) and the DR Provisioning Site.

To ensure that the database levels of the Network Elements are no more recent than the database levels of the SDS servers on the Primary and DR Provisioning Sites, the active SDS Server on the Primary Provisioning Site provisions the active SDS server on the DR Provisioning Site before updating the Signaling Sites (data processing (DP) SOAM and DPs).

Both the active and standby SDS servers share a VIP address. The active SDS server owns the VIP address. If the current standby SDS server becomes active, it acquires the VIP address.

2.4.2 Standby SDS Server

The standby SDS server receives updates from the active SDS server, keeping the active SDS server and standby SDS server in sync. If the active SDS server fails, then the standby SDS server automatically performs a switchover, becomes the active SDS server, and acquires the VIP address.

2.4.3 Query Server

The SDS Query server provides a secure MySQL interface that allows the customer to query subscriber data using the previously configured [Query System](#).

The SDS Query server accepts replicated subscriber data from the active SDS server and stores it in a customer-accessible MySQL database. The SDS Query server provides a free-form read-only query capability using the MySQL interface and limited MySQL user management. The SDS Query server is located in the same physical frame as the SDS server components at the Primary and DR Provisioning Sites.

2.5 Disaster Recovery Provisioning Site

The Disaster Recovery (DR) Provisioning Site is an SDS Provisioning Site. Configuring a DR Provisioning Site is optional. If the site is configured, then a geo-diverse DR Provisioning site is recommended.

The DR Provisioning Site has the same hardware configuration and network accessibility as the Primary Provisioning Site. The Primary and DR Provisioning Sites have different VIP addresses for their active SDS servers.

The active SDS server on the DR Provisioning Site accepts updates from the Active SDS server on the Primary Provisioning Site. The DR Provisioning Site does not have an active SOAP or XML connection opened. This connection can be established when the DR Provisioning Site is promoted to be the Primary Provisioning Site.

DR Provisioning Site databases are kept current through real-time replication of subscriber and application data from the active SDS server on the Primary Provisioning Site. Under normal operating conditions, the active SDS server on the DR Provisioning Site does not provision any downstream systems. If this server is made Active, then the server takes over all functions of the active SDS server on the Primary Provisioning site, including the provisioning interfaces and database replication to subtending SOAMs. If the active and Standby SDS servers on the Primary Provisioning Site fail, then the customer must manually force a switchover to the active SDS server on the DR Provisioning Site.

2.6 DP SOAM

The data processing (DP) SOAM is the single point of entry for the replication stream of subscriber data into a Signaling Site. The DP SOAM consists of a combination of an active and a standby server running the DP SOAM application and operating in a high availability configuration.

The active DP SOAM server receives subscriber data replicated from the Active SDS server on the Primary Provisioning Site and replicates the data to the standby DP SOAM server and to all subtending data processors located in the same physical frame. Provisioning data, alarms, and measurements can be viewed or queried using a GUI connected to the VIP address for the DP SOAM.

2.7 Data Processors

Data Processors (DPs) are servers configured for DP functionality. These servers accept replicated subscriber data from the local DP SOAM and store it in a subscriber database. The DPs are used for processing queries from the Message Processor for destination address resolution. The DP receives database queries that include user identities such as MSISDN, IMSI, URI, and destination types and returns the resolved destination address FQDN and/or realm values.

Each Signaling Site can support up to 10 DP servers deployed in a single frame to scale query capacity. Two DP servers are supported currently.

Each DP server contains a copy of the same SDS data, configured in an active/active mode. The Message Processor is responsible for load-balancing requests across DP servers.

Each DP server runs on an HP C-Class blade. The DP server is configured in an active/active mode and is deployed at each Signaling Site on blades with n+m redundancy. Initially, n=1 and m=1.

A GUI is not available for DP servers. A GUI can be connected to the DP SOAM VIP address to view or query provisioning data, alarms, and measurements.

3

Interface Description

This chapter provides an overview of the interface provided by the XML data server and the SOAP server.

3.1 Provisioning Interface Overview

Data can be provisioned or exported using one of the following interfaces:

- GUI – Add, change, delete, and query routing-related data and internal tables. Internal tables contain information such as NPA-NXX split data and export schedules.
- SOAP – Add, change, delete, and read MSISDN, IMSI and NAI user data.
- XML – Add, change, delete, and read MSISDN, IMSI and NAI user data.
- SQL – View or query routing-related data. This interface is provided by the SDS Query server.
- Import – Import data in CSV or XML format.
- Export – Export data in CSV, XML, or HLRR format.
- PDB Relay – Add, change, and delete MSISDN and IMSI routing entities with destinations that have an E.164 network entity value on SDS. Automatically send those provisioning commands from SDS to HLR Router (HLRR).

The method used to provision data varies, depending on the type of data. All data can be provisioned using the GUI. [Table 3-1](#) shows which interfaces are available for each type of data.

Table 3-1 Data Provisioning Interfaces

| Data Type | GUI | SOAP/XML | XML Import/ Export | CSV Import/ Export | HLRR Export and PDB Relay | SQL Query |
|----------------------|-----|----------|-----------------------|-----------------------|---------------------------------|-----------|
| MSISDN | yes | yes | yes | yes | yes | yes |
| IMSI | yes | yes | yes | yes | yes | yes |
| NAI User | yes | yes | yes | yes | no | yes |
| Wildcard NAI User | yes | no | no | yes | no | yes |
| NAI Host | yes | no | no | yes | no | yes |
| Destination | yes | no | no | yes | no | yes |
| Destination Map | yes | no | no | no | no | yes |
| MSISDN Prefix | yes | no | no | yes | no | yes |
| IMSI Prefix | yes | no | no | yes | no | yes |
| MSISDN Blacklist | yes | no | no | yes | no | yes |

Table 3-1 (Cont.) Data Provisioning Interfaces

| Data Type | GUI | SOAP/XML | XML Import/ Export | CSV Import/ Export | HLRR Export and PDB Relay | SQL Query |
|----------------|-----|----------|-----------------------|-----------------------|---------------------------------|-----------|
| IMSI Blacklist | yes | no | no | yes | no | yes |
| Subscriber | yes | yes | yes | yes | no | yes |



Note:

Only MSISDN and IMSI routing entities with destinations that have an E.164 network entity value can be relayed or exported in HLRR format.

A history of the commands and their responses can be viewed from the SDS GUI. We recommend you see the *SDS Online Help* for more information. All provisioning requests are stored in the Command Log for all interfaces.

3.2 Customer Provisioning System to SDS Overview

Each SDS server has identical software. Two of the applications that exist on each SDS server are the XML Data server and the SOAP server. These applications run within the same process named XDS.

The customer's provisioning system must be configured so it can have SOAP and/or XML connections to the Primary and Disaster Recovery (DR) Provisioning sites by using the Virtual IP (VIP) address for each site. The SOAP and/or XML ports are also configurable.

The customer's provisioning system only establishes active connections to the active site (usually the Primary Provisioning Site). In the event of a failure of the active SDS server, the Standby SDS server is activated, and the VIP is moved over to that server.

In the event of a failure of the Primary Provisioning Site, the DR Site becomes active. The Client Provisioning Systems must manually switchover from the Primary SDS VIP to the DR SDS VIP.

3.2.1 XML Data Server

The XML Data server runs in the XML Data server (XDS) process on the active SDS server on the Primary Provisioning Site. The XML Data server implements XML over a TCP interface.

Each XML request and response message (see [XML Message Definitions](#)) consists of a 4-byte binary length value, followed by the indicated number of ASCII characters that form the XML request. There is no need to terminate the XML request with any terminating character(s).

The XML Data server is responsible for:

- Accepting and authorizing XML/TCP provisioning client connections.
- Processing and responding to XML requests received from provisioning clients.

- Updating and maintaining the provisioning database, located on the active SDS server on the Primary Provisioning Site. MSISDN, IMSI, and NAI user routing entities can be read and provisioned, including destinations for the routing entities.

 **Note:**

All specified destinations and NAI Hosts must already be defined (using the GUI or CSV import).

XML provisioning can occur via an XML client or an XML import file. SDS also supports exporting MSISDN, IMSI, and NAI User data into an export file.

3.2.2 SOAP Server

The SOAP server runs in the XDS process on the active SDS server on the Primary Provisioning Site. The SOAP server implements SOAP over an HTTP interface.

The SOAP server is responsible for:

- Accepting and authorizing SOAP/HTTP provisioning client connections.
- Processing and responding to SOAP requests received from provisioning clients.
- Updating and maintaining the provisioning database, located on the Active SDS server on the Primary Provisioning Site. MSISDN, IMSI, and NAI user routing entities can be read and provisioned, including the destinations for these routing entities.

 **Note:**

All specified destinations and NAI Hosts must already be defined (using the GUI or CSV import).

3.2.3 Provisioning Clients

The provisioning clients, which are owned by the customer, establish TCP/IP connections to the XML Data server or SOAP server, using the VIP for the active SDS server on the Primary Provisioning Site. The provisioning clients use XML or SOAP to send requests to manipulate and query data in the Provisioning Database and then process the XML or SOAP response messages.

Provisioning clients must re-establish connections with the XML Data server or SOAP server using the Primary SDS VIP on switchover from the Primary Active to Standby SDS server. Provisioning clients must also redirect connections to the Secondary VIP on switchover from the Primary SDS Site to the DR SDS Site.

Provisioning clients must run a timeout for the response to a request, in case a response is not sent. If no response is received, a client drops and re-establishes the connection before trying again.

 **Note:**

By dropping the connection, any transaction that is in progress on that connection is automatically rolled back. Consequently, the entire transaction must be started and resent again.

Provisioning clients are expected to re-send XML/SOAP requests for database manipulation requests that resulted in a temporary error or for which no responses were received.

The SDS GUI is used to configure connections to the provisioning clients. We recommend you see the *SDS Online Help* for more information.

3.3 Security

The following forms of security are provided for securing connections between the XML/SOAP Interfaces and provisioning clients in an unsecure/untrusted network:

- Client server IP Address White List
- Secure Connections using SSLv3 (SOAP Interface only)

3.3.1 Client Server IP Address White List

The XML/SOAP Interfaces maintain a list of server IP addresses that clients can use to establish a TCP/IP connection. Each IP address on the list has read-only or read/write permissions. The SDS GUI is used to administer the list. We recommend you see the *SDS Online Help* for more information.

Any connect request coming from an IP address that is not on the list is denied, and the connection is immediately closed. If an IP address is removed from the list, then any active connection established from that IP address is immediately closed.

3.3.2 Secure Connection Using TLS

The SOAP server supports secure connections between provisioning clients and the SOAP server using the Transport Layer Security (TLS) protocol.

TLS is an industry standard protocol for clients needing to establish secure (TCP-based) TLS network connections.

TLS capabilities address several fundamental concerns about communication over TCP/IP networks:

- TLS server authentication allows a client application to confirm the identity of the server application. The client application through TLS uses standard public-key cryptography to verify that the server's certificate and public key are valid and have been signed by a trusted certificate authority (CA) that is known to the client application.
- TLS client authentication allows a server application to confirm the identity of the client application. The server application through TLS uses standard public-key cryptography to verify that the client's certificate and public key are valid and have been signed by a trusted CA that is known to the server application.

- An encrypted TLS connection requires all information being sent between the client and server application to be encrypted. The sending application is responsible for encrypting the data and the receiving application is responsible for decrypting the data. In addition to encrypting the data, TLS provides message integrity, which provides a means to determine if the data has been tampered with since it was sent by the partner application.

Depending on whether the SOAP server is configured to operate in a secure or unsecure mode, provisioning clients can connect using unsecure or secure connections to the SOAP server TCP/TLS listening port. The SDS GUI is used to configure this functionality. We recommend you see the *SDS Online Help* for more information.



Note:

An TLS connection is slower than an unsecure TCP/IP connection due to providing adequate security.

3.3.2.1 TLS Certificates and Public/Private Key Pairs

TLS connections require digital certificates. Certificates rely on asymmetric encryption (or public-key encryption) algorithms that have two encryption keys (a public key and a private key). A certificate owner can show the certificate to another party as proof of identity. A certificate consists of its owner's public key. Any data encrypted with this public key can be decrypted only using the corresponding, matching private key, which is held by the owner of the certificate.

Oracle issues Privacy Enhanced Mail (PEM)-encoded TLS X.509v3 certificates and encryption keys to the SOAP server and provisioning clients needing to establish an TLS connection with the SOAP server. These files can be found on the SDS server under `/usr/TKLC/sds/ss1`. These files should be copied to the server running the provisioning client.

Table 3-2 TLS X.509 Certificate and Key PEM-encoded Files

| Certificate and Key PEM-Encoded Files | Description |
|---------------------------------------|---|
| tklcCaCert.pem | Self-signed trusted root Certification Authority (CA) X.509v3 certificate. |
| serverCert.pem | The SOAP servers X.509v3 certificate and 2,048-bit RSA public key digitally signed by Certification Authority (CA) using SHA-1 message digest algorithm. |
| serverKey.nopass.pem | The SOAP servers corresponding, matching 2,048-bit RSA private key without passphrase digitally signed by Certification Authority (CA) using SHA-1 message digest algorithm. |
| clientCert.pem | Provisioning client's X.509v3 certificate and 2,048-bit RSA public key digitally signed by Certification Authority (CA) using SHA-1 message digest algorithm. |
| clientKey.nopass.pem | Provisioning client's corresponding, matching 2,048-bit RSA private key without passphrase digitally signed by Certification Authority (CA) using SHA-1 message digest algorithm. |

Provisioning clients are required to send an TLS authenticating X.509v3 certificate when requested by the SOAP server during the secure connection handshake protocol for mutual (two-way) authentication. If the provisioning client does not submit a certificate that is issued/signed by Certification Authority (CA), it will not be able to establish a secure connection with the SOAP server.

3.3.2.2 Supported TLS Cipher Suites

A cipher suite is a set/combination of lower-level algorithms that an TLS connection uses to do authentication, key exchange, and stream encryption. The following table lists the set of cipher suites that are supported by the SOAP server to secure an TLS connection with provisioning clients. The cipher suites are listed and selected for use in the order of key strength, from highest to lowest. This ensures that during the handshake protocol of an TLS connection, cipher suite negotiation selects the most secure suite possible from the list of cipher suites the client wishes to support, and if necessary, back off to the next most secure, and so on down the list.

Note:

Cipher suites containing anonymous DH ciphers, low bit-size ciphers (currently those using 64 or 56 bit encryption algorithms but excluding export cipher suites), export-crippled ciphers (including 40 and 56 bits algorithms), or the MD5 hash algorithm are not supported due to their algorithms having known security vulnerabilities.

Table 3-3 TLS Supported Cipher Suites

| Cipher Suite | Key Exchange | Signing/ Authentication | Encryption (Bits) | MAC (Hash) Algorithms |
|-------------------|--------------|----------------------------|----------------------|--------------------------|
| AES256-SHA | RSA | RSA | AES (256) | SHA-1 |
| DES-CBC3-SHA | RSA | RSA | 3DES (168) | SHA-1 |
| AES128-SHA | RSA | RSA | AES (128) | SHA-1 |
| KRB5-RC4-SHA | KRB5 | KRB5 | RC4 (128) | SHA-1 |
| RC4-SHA | RSA | RSA | RC4 (128) | SHA-1 |
| KRB5-DES-CBC3-SHA | KRB5 | KRB5 | 3DES (168) | SHA-1 |

3.4 Multiple Session Connectivity

Multiple provisioning systems may be connected via the XML/SOAP Interfaces simultaneously. All systems can issue commands that do read or write. If more than one system requests to start a transaction, or issues an update/delete request, contention for write access will be handled as follows:

- The first system to submit a write request will be granted access, if it is authorized for write access.
- If a second system submits a write request while the first transaction is still open, it will either be immediately rejected with `WRITE_UNAVAIL` error code, or will be queued for a specified time out period to wait on the first system's transaction to complete.

- The time out period can be specified by the user in the start transaction/update/delete request. Valid value are from 0 to 3600 seconds. If the value is not included or is set to 0, the second request will be immediately rejected with `WRITE_UNAVAIL` error code.
- If the time out value is set to any non-zero value, the second start transaction or update/delete request will be held for that time period before being rejected. If the first user releases the transaction before the second user's time out period has expired, the second user will then be granted write access.
- If a third user submits a start transaction or update/delete request after the second user with a specified time out period, the third user's request will be queued behind the second user's request. Once the first user releases the transaction, the second user is granted access. After the second user releases the transaction, the third user is granted access and so forth. If any user's time out period expires, that request will be immediately rejected with `WRITE_UNAVAIL` error code.
- If the third user sets a time out period longer than the second user, and the second user's time out period expires before the first user releases the transaction, the second user's request will be dropped from the queue and the third user will move up in the queue. Thus, if the first user then releases the transaction before the third user's time out has expired; the third user will be granted access.

3.5 Request Queue Management

If multiple clients simultaneously issue requests, then each request is queued and processed in the order received on a per connection basis. The client does not have to wait for a response from one request before issuing another.

Incoming requests are not prioritized. Multiple requests from a single client are handled on a first-in, first-out basis. Generally, requests are answered in the order received. Invalid requests are responded to immediately, despite any other valid requests in the queue.

3.6 Synchronous/Asynchronous Mode

As described in [Request Queue Management](#), a client that sends multiple requests before waiting for the response from a previous request is not guaranteed to receive the responses in the order they were sent.

If a client wishes to send a request before waiting for the response to the previous one (asynchronous mode), then the client must populate the `id` attribute in the request with a transaction ID value that will be passed back in the response. The `id` attribute needs to be unique enough to the client to correlate a response to a request that was sent. The XML Data server will return the `id` passed in the response.

If a client wishes to send a single request and wait for the response before sending another one (synchronous mode), then the client does not need to populate the `id` attribute in the request, because the response will always be for the request last sent. The `id` attribute can be populated if desired, and it will be passed back in the response just as in asynchronous mode.

3.7 Message Processing (Transactions)

All subscription-related requests are performed within the context of a database transaction. The XML/SOAP Interfaces use a transaction-based API.

The SDS GUI is used to configure the transaction options. We recommend you see the *SDS Online Help* for more information.

3.7.1 Transaction Modes

The XML Interface supports the following database transaction modes:

- Normal Transaction Mode
- Block Transaction Mode
- Single Transaction Mode (default)

The SOAP Interface supports the following database transaction modes:

- Normal Transaction Mode
- Single Transaction Mode (default)

The provisioning client controls which transaction mode will be used by the commands it sends.

3.7.1.1 Normal Database Transaction Mode

The normal database transaction mode requires an explicit `<startTransaction/>` request paired with `<commit/>` or `<rollback/>` request to complete the transaction.

A normal sequence of events might be:

- `<startTransaction/>`
- `<updateSubscriber ... />`
- `<.../>`
- `<updateSubscriber ... />`
- `<commit/>`

Or:

- `<startTransaction/>`
- `<updateSubscriber ... />`
- `<.../>`
- `<updateSubscriber ... />`
- `<rollback/>`

All requests within a transaction must be sent on the same TCP/IP connection, for both XML and SOAP interfaces. If the TCP/IP connection is disconnected when a transaction is in progress, the transaction is automatically rolled back.

In normal database transaction mode, many updates can be sent and committed to the database at once when the transaction is completed. This results in a much faster rate of updates per second.

Transaction integrity is ensured by allowing updates to be aborted or rolled back if there is an unexpected failure before the transaction is completed. Updates are not committed to the database until the `<commit/>` request is issued. If an unexpected failure occurs, or if the transaction is explicitly aborted by the `<rollback/>` request,

the database is maintained in the state it was in prior to the beginning of the transaction.

Data across all requests performed inside a transaction is consistent. A transaction can only be opened by one client connection at a time, preventing multiple clients from updating the database at the same time.

 **Note:**

A block transaction (`<tx> ... </tx>`) cannot be sent during a normal database transaction, for example, after a `<startTransaction/>` request has been sent and before a `<commit/>` or `<rollback/>` request is sent. If a block transaction request is sent during this period, then the request is rejected with a `INV_REQ_IN_NORMAL_TX` error. This error does not affect or abort the open transaction.

3.7.1.2 Block Transaction Mode

The block transaction mode requires explicit `<tx>` tags around all of the requests in a transaction.

The block transaction is sent as one XML request, and all requests contained within the block are executed in sequence within a database transaction. If any request fails, then the entire transaction is automatically rolled back. If all requests are successful, then the transaction is automatically committed.

If a block transaction fails, then the request within the block that encountered an error will have the appropriate error code set. All requests after the failed request will have the error code set to `NOT_PROCESSED`. Any requests before the failed request will indicate success, and the number of affected rows.

All transactions must also satisfy limits indicated by the `Max Transaction Size`, `Maximum Transaction Lifetime`, and `Transaction Durability Timeout` system variables, which are defined in [XML/SOAP Interface System Variables](#). If any of those limits are exceeded, the transaction is aborted and automatically rolled back.

 **Note:**

A block transaction cannot be sent in the context of a normal database transaction, for example, after a `<startTransaction/>` request has been sent and before a `<commit/>` or `<rollback/>` request is sent. Normal database transaction requests, such as `<startTransaction/>`, `<commit/>` or `<rollback/>`, cannot be sent within a block transaction. If any normal requests are sent, then the block transaction fails with an `INV_REQ_IN_BLOCK_TX` error.

When incrementing measurements related to block transactions, the whole block is treated as a single provisioning command. If a block contains four requests (such as `<updateSubscriber>`), then the subsequent measurements are incremented by one.

3.7.1.3 Single Database Transaction Mode

Single database transaction mode implicitly begins and ends a transaction for each individual update request.

In single database transaction mode, database manipulation and query requests are sent without being enclosed by `<startTransaction/>` and `<commit/>` requests.

When sending Single Database Transaction Mode update or delete requests, each command is implicitly done within a transaction by the SDS, such as when sending `<startTransaction/>`, `<request>`, and `<commit/>` requests. For read requests, no transaction is used by the SDS.

3.7.2 ACID-Compliant Transactions

The SOAP Interfaces support Atomicity, Consistency, Isolation, and Durability (**ACID**)-compliant database transactions which guarantee transactions are processed reliably.

3.7.2.1 Atomicity

Database manipulation requests are atomic. If one database manipulation request in a transaction fails, all of the pending changes can be rolled back by the client, leaving the database as it was before the transaction was initiated. However, the client also has the option to close the transaction, committing only the changes within that transaction which were executed successfully. If any database errors are encountered while committing the transaction, all updates are rolled back and the database is restored to its previous state.

3.7.2.2 Consistency

Data across all requests performed inside a transaction is consistent.

3.7.2.3 Isolation

All database changes made within a transaction by one client are not viewable by any other clients until the changes are committed by closing the transaction. In other words, all database changes made within a transaction cannot be seen by operations outside of the transaction.

3.7.2.4 Durability

Once a transaction has been committed and become durable, it will persist and not be undone. Durability is achieved by completing the transaction with the persistent database system before acknowledging commitment. Provisioning clients only receive **SUCCESS** responses for transactions that have been successfully committed and have become durable.

The system recovers committed transaction updates in spite of system software or hardware failures. If a failure (for example, loss of power) occurs in the middle of a transaction, the database returns to a consistent state when it is restarted.

Data durability signifies the replication of the provisioned data to different parts of the system before a response is provided for a provisioning transaction. The following additive configurable levels of durability are supported:

1. Durability to the disk on the active provisioning server (for example, just 1)
2. Durability to the local standby server memory (for example, 1 + 2)
3. Durability to the active server memory at the Disaster Recovery site (for example, 1 + 2 + 3)

3.8 Data Import

SDS provides automatic file-based bulk import of provisioning data. Files from a remote directory can be imported and the values within the files used to populate the database. The files can contain data in CSV or XML format. The type of data that can be imported for each format type is defined in [Table 3-1](#).

Import options are configured using the SDS GUI. We recommend you see the *SDS Online Help* for more information.

Imports are not scheduled through the GUI. The imports are initiated by the presence of a file placed in the Remote Import Directory.

Import files that are placed in the specified location on the remote server are detected within five minutes and automatically downloaded using SSH File Transfer Protocol (SFTP) to the file management storage area on the active server. For a file to be imported it must:

- Be named correctly. CSV import files must match the file names shown in xxx XML import files must have *.xml file extensions.
- Have been placed in the remote directory after the time when the import last ran.
- Not have been previously imported. A file that has already been imported into the local directory will not be imported again, even if the status is failed. To import a previously failed file, correct the file as necessary, rename the file, and place the renamed file in the remote directory.

Once fully downloaded, each file is automatically imported into the Provisioning Database in the order of their time stamps from the remote server.

The import file is an ASCII text file that contains a series of database manipulation requests. Each request must be formatted on a single line.

An import log file is created for each file that is imported, and a copy is automatically uploaded to the same location the import file was downloaded from on the remote server. The log file has the same name as its corresponding import file with .log appended. Import log files on the local system are viewable for up to 7 days or until manually removed.

The import log file contains:

- Date and time (in UTC) the import operation started and completed including percentage of the import file (lines) complete.
- The time started is blank for the imports which are queued, but not yet started. The time completed is blank for the imports that are in-progress.
- All requests that resulted in failure along with associated error code (value and string representation), and line of the import file containing the failure.
- Total number of requests successfully committed and failed.

The format of XML or CSV import logs:

```
mm/dd/yy hh:mm:ss Started (0 of linesToImport) 0% complete

reqMsg
[error errorValue errorString : line lineOfFailure] [description]

. . .

reqMsg
[error errorValue errorString : line lineOfFailure] [description]

mm/dd/yy hh:mm:ss <Completed|Interrupted> (linesImported of
linesToImport) percentCplt% complete

Successful: successfulCmds Failures: failedCmds Total: totalCmds
```

The [Table 3-4](#) describes the import log file parameters.

Table 3-4 Import Log File Parameters

| Parameter | Description | Values |
|----------------|---|---|
| mm/dd/yy | Date, in UTC, that the entry was logged. | <ul style="list-style-type: none"> mm = 01-12 (month) dd = 01-31 (day of month) yy = 00-99 (last two digits of the year) |
| hh:mm:ss | Time, in UTC, the entry was logged. | <ul style="list-style-type: none"> hh = 00-23 (hours) mm = 00-59 (minutes) ss = 00-59 (seconds) |
| linesImported | Number of lines of the import file that have been processed | |
| linesToImport | Total number of lines of the import file to be processed | |
| percentCplt | Percentage of import file (lines) processed | |
| reqMsg | Request Message that resulted in error | |
| errorValue | Message Response Error Value | |
| errorString | Message Response Error String | |
| lineOfFailure | Line number of the failed Request Message | |
| description | Description of any Request Message failure. | |
| successfulCmds | Total number of Request Messages successfully committed | |
| failedCmds | Total number of Request Messages that resulted in failure | |

Table 3-4 (Cont.) Import Log File Parameters

| Parameter | Description | Values |
|-----------|--|--------|
| totalCmds | Total number of Request Messages that were processed | |

Example of a successfully completed import log file:

```
02/06/13 13:28:01 Started (0 of 200) 0% complete

<removeSubscriber ent="subscriberRouting" ns="dsr"><imsi>310910421000102</imsi></removeSubscriber>
[error 2001 INV_REQUEST_NAME : line 5]

<updateSubscriber ent="subscriberRouting" ns="dsr"><imsi>310910421000102</imsi><lthss>LTE_HSS_9 </lthss></updateSubscriber>
[error 2006 DEST_NOT_FOUND : line 17]

<deleteSubscriber ent="subscriberRouting" ns="dsr"><imsi>310910421000199</imsi> </deleteSubscriber>
[error 2007 IMSI_NOT_FOUND : line 36]

<startTransaction/
[error 1028 BAD_IMPORT_CMD : line 77]

02/06/13 13:28:03 Completed (200 of 200) 100% complete

Successful: successfulCmds Failures: failedCmds Total: totalCmds
```

Example of an interrupted import log file:

```
02/06/13 13:28:01 Started (0 of 200) 0% complete

02/06/13 13:28:03 Connection terminated

02/06/13 13:28:03 Interrupted (100 of 200) 50% complete

Successful: 100 Failures: 0 Total: 100
```

The status of all imported files can be viewed from the SDS GUI. We recommend you see the *SDS Online Help* for more information.

3.8.1 Provisioning Data Import (XML)

Data can be imported from an XML import file to add, update, or delete existing data in the provisioning database.

An XML import file is an ASCII text file that contains a series of database manipulation requests in XML format as specified in [XML Message Definitions](#). An import file may contain as many requests as the storage media used to hold the import file allows. [Table 3-5](#) shows the database manipulation requests that are supported in an XML import file.

 **Note:**

You can only add a subscriber to a subscriber table, if the Account ID, IMSI, or MSISDN is not already in the table. If the table already contains any of these values, the add function fails and an error condition report is generated that contains the reason for the failure.

Table 3-5 Supported Database Requests for XML Import Files

| XDS Operation | Description | Section |
|---------------------|---|---------------------------------------|
| updateSubscriber | Update Subscriber Routing Data (type IMSI/MSISDN) | Update Subscriber |
| deleteSubscriber | Delete Subscriber Routing Data (type IMSI/MSISDN) | Delete Subscriber |
| updateSubscriberNAI | Update Subscriber Routing Data (type NAI) | Update Subscriber NAI |
| deleteSubscriberNAI | Delete Subscriber Routing Data (type NAI) | Delete Subscriber NAI |

Unsupported requests are skipped, and each occurrence is recorded as `BAD_IMPORT_CMD` in the import log file. Errors encountered while processing the import file are recorded in the import log. Unknown/invalid requests are skipped with each occurrence recorded as `INV_REQUEST_NAME` in the import log file.

Blank and comment lines are skipped. The format of a XML comment line is:

```
<!-- comment -->
```

XML requests are processed in the order that they are read from the import file and must be ordered to satisfy any data dependencies.

Import file names on the remote server must be suffixed with `.xml` to be automatically downloaded and imported into the provisioning database.

```
<filename>.xml
```

Update requests may be unavailable to other clients for the duration of an import operation, if the import mode is set to `blocking` (see the Export Mode configuration variable in [XML/SOAP Interface System Variables](#)). Read requests are always available.

3.8.2 Provisioning Data Import (CSV)

A CSV import file consists of an ASCII text file that contains a series of database manipulation requests in CSV format. Each request must be on a separate line.

An import file can contain as many requests as the storage media used to hold the import file allows. The CSV import process ignores all blank lines and lines that begin with a `#` character, which are treated as comments.

[Table 3-6](#) shows the supported CSV import formats, examples of each update and delete command, and the import file names.

If the import line has fewer values separated by commas than the number of fields listed in the Format column, the missing fields are treated as unspecified and contain no value. The file names must have the format shown in the table, where *x* is at least one alpha-numeric character.

 **Note:**

You can only add a subscriber to a subscriber table, if the Account ID, MSISDN, or IMSI is not already in the table. If the table already contains any of these values, the add function fails and an error condition report is generated that contains the reason for the failure.

Table 3-6 CSV Import Formats

| Import Type | Format/Example | File Name |
|-------------------|--|--------------------------|
| Destination | <U D>, <NAME>, <TYPE>, <FQDN>, <REALM> U,imsgroup1,imshss,operator.com,imswest D,aaagroup2 | import_X_destination.csv |
| IMSI | <U D>, <IMSI>, <IMSHSSname>, <LTEHSSname>, <PCRfname>, <OCSname>, <OFCSname>, <AAAname>, <UserDef1Name>, <UserDef2Name>, <MTCHSSName> I,7857857802,,dest2,,,,,,dest9 U,7857857802,,dest2,,,,,,dest9 D,7857857803 | import_X_imsi.csv |
| MSISDN | <U D>, <MSISDN>, <IMSHSSname>, <LTEHSSname>, <PCRfname>, <OCSname>, <OFCSname>, <AAAname>, <UserDef1Name>, <UserDef2Name>, <MTCHSSName> I,17857853013,imsgroup13,dest2,,,,,,dest9 U,17857853013,imsgroup13,dest2,,,,,,dest9 D,17857853014 | import_X_msisdn.csv |
| NAI User | <U D>, <USER>, <HOST>, <IMSHSSname>, <LTEHSSname>, <PCRfname>, <OCSname>, <OFCSname>, <AAAname>, <UserDef1Name>, <UserDef2Name>, <MTCHSSName> U,dptestUser03,dptestHost0,,dest3 D,dptestUser07,dptestHost0 | import_X_naiuser.csv |
| Wildcard NAI User | <U D>, <WCUSER>, <HOST>, <IMSHSSname>, <LTEHSSname>, <PCRfname>, <OCSname>, <OFCSname>, <AAAname>, <UserDef1Name>, <UserDef2Name>, <MTCHSSName> U,dptestUser2,dptestHost0,,,,,,dest20,dest28 D,dptestUser3,dptestHost0 | import_X_wcnaiuser.csv |
| NAI Host | <U D>, <HOST> | import_X_naihost.csv |

Table 3-6 (Cont.) CSV Import Formats

| Import Type | Format/Example | File Name |
|---------------------|---|---------------------------------|
| | U,dptestHost0 D,dptestHost1 | |
| Domain Identifier | <U D I>, <DOMAINID>, <IMSHSSname>, <LTEHSSname>, <PCRfname>, <OCSname>, <OFCsname>, <AAAname>, <UserDef1Name>, <UserDef2Name>, <MTCHSSName> | import_X_domainIdentifier.csv |
| | I,tekelec.com,dest1,,,,,,,,,dest9 U,tekelec.com,dest1,,,,,,,,,dest9 D,tekelec.com | |
| External Identifier | <U D I>, <EXTID>, <IMSHSSname>, <LTEHSSname>, <PCRfname>, <OCSname>, <OFCsname>, <AAAname>, <UserDef1Name>, <UserDef2Name>, <MTCHSSName> | import_X_externalIdentifier.csv |
| | I,test1@tekelec.com,dest1,,,,,,,,,dest9 U,test1@tekelec.com,dest1,,,,,,,,,dest9 D,test1@tekelec.com | |
| IMSI Prefix | <U D>, <IMSIprefix>, <IMSHSSname>, <LTEHSSname>, <PCRfname>, <OCSname>, <OFCsname>, <AAAname>, <UserDef1Name>, <UserDef2Name>, <MTCHSSName> | import_X_imsiprefix.csv |
| | U,78578520,imsgroup22 D,78578540 | |
| MSISDN Prefix | <U D>, <MSISDNprefix>, <IMSHSSname>, <LTEHSSname>, <PCRfname>, <OCSname>, <OFCsname>, <AAAname>, <UserDef1Name>, <UserDef2Name>, <MTCHSSName> | import_X_msisdnprefix.csv |
| | U,17857852012,imsgroup24 D,178578540 | |
| IMSI Blacklist | <U D>, <IMSI> | import_X_imsiblacklist.csv |
| | U,7857851011 D,7857852012 | |
| MSISDN Blacklist | <U D>, <MSISDN> | import_X_msisdnblacklist.csv |
| | U,17857851011 D,17857852012 | |

Table 3-6 (Cont.) CSV Import Formats

| Import Type | Format/Example | File Name |
|-------------|---|-------------------------|
| Subscriber | <U D I>, <AccountId>, <IMSI1>, <IMSI2>, <IMSI3>, <IMSI4>, <IMSI5>, <IMSI6>, <MSISDN1>, <MSISDN2>, <MSISDN3>, <MSISDN4>, <MSISDN5>, <MSISDN6>, <ExtId1>, <ExtId2>, <ExtId3>, <ExtId4>, <ExtId5>, <ExtId6>, <ExtId7>, <ExtId8>, <ExtId9>, <ExtId10>, <IMSHSSname>, <LTEHSSname>, <PCRFname>, <OCSname>, <OFCsname>, <AAAname>, <UserDef1Name>, <UserDef2Name>, <MTCHSSName> I,7777777777777777777777777777777711111,77746055 00, 7774605501,,,,,777771111122222, 777771111133333,,,,,user1@oracle.com,use r2@oracle.com,,,,,,,,,imgroup1,ltehss2,dest3 ,dest4,,,dest7,dest8,dest9 U,7777777777777777777777777777777711111,77746055 00, 7774605501,,,,,777771111122222, 777771111133333,,,,,user1@oracle.com,usr e2@oracle.com,,,,,,,,,imgroup1,ltehss2,dest 3,dest4,,,dest7,dest8,dest9 D,7777777777777777777777777777777722222,,,,,,,,,,,,, | import_X_subscriber.csv |

Table 3-7 defines the Import Type fields.

Table 3-7 CSV Import Fields

| Field | Description |
|----------------|--|
| <I U D> | Update or delete record. (I=Insert, U=Update, D=Delete) |
| <NAME> | A unique string of 1-32 characters to identify the Destination |
| <IMSI> | A unique string of 10-15 decimal digits |
| <IMSIprefix> | A unique string of 1-15 decimal digits |
| <TYPE> | Destination type. Values: imshss, ltehss, pcrf, ocs, ofcs, aaa, userdef1, userdef2, or mtchss) |
| <FQDN> | A 1-255 character string for the Diameter FQDN for the destination |
| <REALM> | A 1-255 character string for the Diameter Realm for the destination. Optional |
| <MSISDN> | A unique string of 8-15 decimal digits |
| <MSISDNprefix> | A unique string of 1-15 decimal digits |
| <IMSHSSname> | Name of an IMS HSS destination |
| <LTEHSSname> | Name of an LTE HSS destination |
| <PCRFname> | Name of a PCRF destination |
| <OCSname> | Name of an OCS destination |

Table 3-7 (Cont.) CSV Import Fields

| Field | Description |
|----------------|---|
| <OFCSname> | Name of an OFCS destination |
| <AAAname> | Name of an AAA destination |
| <UserDef1Name> | Name of a UserDef1 destination |
| <UserDef2Name> | Name of a UserDef2 destination |
| <MTCHSSName> | Name of a MTC HSS destination |
| <USER> | A string of 1-64 characters for the NAI User Name |
| <WCUSER> | A string of 1-64 characters for the wild carded NAI User Name |
| <HOST> | A unique string of 1-64 characters for the NAI Host Name |
| <ExtId> | A string of 3-257 characters for the External Identifier |
| <DomainId> | A unique string of 1-128 characters for the Domain Identifier |
| <AccountId> | A unique string of 1-26 decimal digits, if present |

An import can be specified to run in one of the following modes:

- **Blocking** – An import runs while updates are blocked on all other PDBI connections. This allows for a logically complete import file created in the fastest time possible at the cost of delaying any new provisioning updates until the import is completed and the transaction is closed.
- **Non-Blocking (Real-time)** – An import runs while updates are continued to be received and committed to the database.

Import file names on the remote server must have a suffix of .csv to be automatically downloaded and imported into the provisioning database.

3.8.2.1 CSV Data Import for Subscribers

Each line in the subscriber import file is for one subscriber, which is defined as a group of related routing entities.

The update commands in the subscriber import file contain all of the routing entities and Account ID values for one subscriber. During the import process, all specified routing entities and Account ID values are added to a new subscriber, or an existing subscriber is updated to contain only the specified values.

For example, if an existing subscriber has an IMSI, MSISDN, or External Identifier value that was not specified in the CSV import file, that IMSI, MSISDN, or External Identifier routing entity is removed from the subscriber and deleted.

The delete commands in the subscriber import file must indicate at least one Account ID, IMSI, MSISDN, or External Identifier value for each subscriber. The delete commands delete the whole subscriber, including all routing entities related to that subscriber.

By default, the IMSI, MSISDN, and External Identifier routing entity CSV files are for stand-alone routing entities. The import command adds a new stand-alone routing entity, updates an existing routing entity, or deletes a routing entity.

If an update command is for an IMSI, MSISDN, or External Identifier value that is part of a subscriber, then the updated destination values are automatically applied to all other routing entities for the subscriber.

If a delete command is for an IMSI, MSISDN, or External Identifier value that is part of a subscriber, the delete affects only a single routing entity. The delete command cannot delete the last routing entity for a subscriber. The user must delete the whole subscriber.

3.9 Data Export

The export feature allows a full text export of the database. Exported records can be used to perform data manipulation of subscriber data. Exports can be scheduled as one-time or recurring. Exported data can be offloaded to a remote server. The exported text file can be downloaded from the file transfer area.



Note:

Export is a time consuming operation recommended to be scheduled during off-peak hours.

Export options and scheduling are configured using the GUI on the Active SDS server on the Primary Provisioning Site. The GUI is also used to view the status of all in-progress or completed exports. We recommend you see the SDS Online Help for more information.

The type of data that can be exported is defined in [Table 3-1](#). All export formats allow all available data to be exported for the given format.

The XML and CSV exports use the same format as the imports. See [Provisioning Data Import \(XML\)](#) and [Provisioning Data Import \(CSV\)](#) for more information.

The HLRR Export creates ent_sub HLRR PDBI commands. If data is exported in the HLRR format, only the MSISDN and/or IMSI values that have E.164 addresses are exported. The HLRR format produces commands that are in HLR Router's PDBI format.

If the All option is selected for export in the XML or CSV format, then each IMSI, MSISDN, and External Identifier value is exported once. If the MSISDN value is assigned to a subscriber, then the MSISDN value is exported with the subscriber data. If the MSISDN value is not assigned to a subscriber, then the MSISDN value is exported with the MSISDN data. The IMSI value is also exported with subscriber or IMSI data. Likewise for the External Identifier values - the External Identifier value is either exported with Subscriber or Local Identifier data.

The export file is an ASCII text file with 1 line per entry. The first line of the export file contains a comment that indicates the export mode, the data base level when export was started, and the time the export was started. Before each type of data is exported, a comment line indicates the type of data that follows. The last line of the export file contains a comment that indicates when the export finished. If the export was run in non-blocking mode, then the database level at the end of the export is listed before the time value within the comment.

Export file formats vary, depending on the export format type as shown in the following sections.

Export XML File Format in Non-Blocking Mode

```

<!-- mode, level, yyyyymmddhhmmss -->
<!-- type -->
reqMsg
. . .
reqMsg
. . .
<!-- type -->
reqMsg
. . .
reqMsg
<!-- level, yyyyymmddhhmmss -->

```

Export CSV File Format in Non-Blocking Mode

```

# mode, db level=level, start time=yyyyymmddhhmmss
# type
reqMsg
. . .
reqMsg
. . .
# type
reqMsg
. . .
reqMsg
# db level=level, finish time=yyyyymmddhhmmss

```

Export HLRR File Format in Non-Blocking Mode

```

# mode, db level=level, start time=yyyyymmddhhmmss
reqMsg
. . .
reqMsg
# db level=level, finish time=yyyyymmddhhmmss

```

Export Log File Parameters

| Parameter | Description | Values |
|------------------|--|--|
| mode | Export Mode | blocking = Updates are blocked during export realtime = Updates are allowed during export |
| level (Optional) | Durable database level (at start or end of export). If exporting in blocking mode, the level is not displayed on the last line of file. | 0-4294967295 |

| Parameter | Description | Values |
|-----------------|---|--|
| yyyymmddhhmmss | Date and time (in UTC) export started or completed. | yyyy = 1970 - 2099 (year) mm = 01 - 12 (month) dd = 01 - 31 (day of month) hh = 00 - 23 (hours) mm = 00 - 59 (minutes) ss = 00 - 59 (seconds) |
| type (Optional) | Comment with type of data being exported. Export in hlrr format does not have this field because hlrr format only exports one type of command. | |
| reqMsg | Exported data in an update request message format. | |

3.10 Relaying Data to the HLR Router

SDS provides two ways to send data to the HLR router:

- PDB Relay
- Bulk Load Between SDS and HLR Router

These methods allow the MSISDN and IMSI routing entities to be provisioned once on the SDS server instead of provisioning the data on both SDS and the HLR router.

3.10.1 PDB Relay

The MSISDN and IMSI routing entities can be provisioned with destinations that have an E.164 network entity value. These provisioning commands are automatically sent from the Active SDS server on the Primary Provisioning Site to HLRR.

The PDBA client called `pdbrelay` connects to a remote PDBA running on the HLR Router system and relays the desired provisioning received from the customer provisioning system. Only commands that could affect HLR Router subscribers are relayed.

3.10.2 Bulk Load

Data can be transferred between the SDS and the HLR Router by exporting SDS data and then importing the file on the Active Network OAM&P HLR Router server.



Note:

The data transfer is performed from the SDS GUI. We recommend you see the *SDS Online Help* for more information.

To transfer the data:

1. Disable PDB Relay Enabled and set the Export Mode configuration option value to Blocking on the SDS GUI.
2. Schedule an export on the SDS GUI.
3. After the export, check the Relay Exception Log for any new `pdbexport` exceptions on the SDS GUI.
4. Transfer the export file to the HLR Router.
5. Store the file on the Remote Import server and directory displayed on the HLR Router GUI. We recommend you refer to *Online Help* for the current version of the HLR Router for more information.
6. Rename the file on the HLR Router server by changing the `.hlrr` extension to `.pdbi`.
7. The HLR Router automatically imports the file. Verify successful import.
8. Enable PDB Relay Enabled and set the Export Mode configuration option to Blocking or Non-Blocking on the SDS GUI.

3.11 Measurements

XML Data server and SOAP server specific measurements are collected and made available to the user via the SDS GUI. We recommend you see the *SDS Online Help* for more information. The XML Data server, SOAP server, and bulk import/export tools all update the same measurements.



Note:

The format of this information conforms to SDM practices, so may vary from the format described here.

Table 3-8 SDS Measurements

| ID | Group | Tag | Coll Interval | Description |
|------|-------|-----------------------|---------------|--|
| 4100 | PROV | ProvConnectsAttempted | 5 min | The total number of client-initiated connect attempts to establish a connection with the server. |
| 4101 | PROV | ProvConnectsAccepted | 5 min | The total number of client-initiated connect attempts that have been accepted. |

Table 3-8 (Cont.) SDS Measurements

| ID | Group | Tag | Coll Interval | Description |
|------|-------|----------------------------|---------------|---|
| 4102 | PROV | ProvConnectsDenied | 5 min | The total number of client initiated connect attempts that have been denied due to clients not running on an authorized server, maximum number of allowed connections already established, or the provisioning interface is disabled. |
| 4103 | PROV | ProvConnectsFailed | 5 min | The total number of client initiated connect attempts that failed due to errors during initialization. |
| 4105 | PROV | ProvConnectionIdleTimeouts | 5 min | Total number of connections that have timed out and terminated due to idleness. Timeout period is specified by <i>XML Interface Idle Timeout</i> as described in XML/SOAP Interface System Variables . |
| 4110 | PROV | ProvMsgsReceived | 5 min | The total number of provisioning messages that have been received. |
| 4111 | PROV | ProvMsgsSuccessful | 5 min | The total number of provisioning messages that have been successfully processed. |

Table 3-8 (Cont.) SDS Measurements

| ID | Group | Tag | Coll Interval | Description |
|------|-------|-------------------|---------------|---|
| 4112 | PROV | ProvMsgsFailed | 5 min | The total number of provisioning messages that have failed to be processed due to errors. See SDS Response Message Error Codes for a list and description of possible errors. |
| 4113 | PROV | ProvMsgsSent | 5 min | The total number of provisioning messages that have been sent. |
| 4114 | PROV | ProvMsgsDiscarded | 5 min | The total number of provisioning messages that have been discarded due to the connection being shut down, server being shutdown, server's role switching from active to standby, or transaction not becoming durable within the allowed amount of time. |
| 4120 | PROV | ProvMsgsImported | 5 min | The total number of provisioning messages that have been received from an import operation. |
| 4140 | PROV | ProvTxnCommitted | 5 min | The total number of transactions that have been successfully committed to the database (memory and on disk) on the active server of the primary SDS site. |

Table 3-8 (Cont.) SDS Measurements

| ID | Group | Tag | Coll Interval | Description |
|------|-------|---------------------------|---------------|--|
| 4141 | PROV | ProvTxnWriteMutexTimeouts | 5 min | The total number of transactions that have failed to be processed due to timing out while waiting to acquire the transaction mutex. |
| 4142 | PROV | ProvTxnFailed | 5 min | The total number of transactions that have failed to be started, committed, or aborted due to errors. See SDS Response Message Error Codes for a list and description of possible errors. |
| 4143 | PROV | ProvTxnAborted | 5 min | The total number of transactions that have been successfully aborted. |
| 4144 | PROV | ProvTxnTotal | 5 min | The total number of transactions that have been attempted. It is the sum of ProvTxnCommitted, ProvTxnTimeouts, ProvTxnAborted, and ProvTxnFailed counters. |
| 4145 | PROV | ProvTxnDurabilityTimeouts | 5 min | The total number of committed, non-durable transaction that have failed to become durable within the amount of time specified by <i>Transaction Durability Timeout</i> , as described in XML/SOAP Interface System Variables . |

Table 3-8 (Cont.) SDS Measurements

| ID | Group | Tag | Coll Interval | Description |
|------|-------|-------------------------|---------------|--|
| 4155 | PROV | RemoteAuditStarted | 5 min | The number of started remote audit requests. |
| 4156 | PROV | RemoteAuditCompleted | 5 min | The number of successfully completed remote audit requests. |
| 4157 | PROV | ProvRelayMsgsSent | 5 min | The total number of relayed PROVISIONING messages sent to the remote system. |
| 4158 | PROV | ProvRelayMsgsSuccessful | 5 min | The total number of relayed PROVISIONING messages that have been successfully processed on the remote system. |
| 4159 | PROV | ProvRelayMsgsFailed | 5 min | The total number of relayed PROVISIONING messages that have failed to be processed due to errors on the remote system. |
| 4160 | PROV | ProvImportsSuccessful | 5 min | The total number of files imported successfully. |
| 4161 | PROV | ProvImportsFailed | 5 min | The total number of files that had failed to be imported due to errors. |
| 4162 | PROV | ProvExportsSuccessful | 5 min | The total number of successful CSV/XML export requests. |
| 4163 | PROV | ProvExportsFailed | 5 min | The total number of CSV/XML export requests that have failed due to errors. |
| 4174 | PROV | ProvDnSplitCreated | 5 min | The number of MSISDN records successfully created by an Active Split. |

Table 3-8 (Cont.) SDS Measurements

| ID | Group | Tag | Coll Interval | Description |
|------|-------|-------------------------|---------------|---|
| 4175 | PROV | ProvDnSplitRemoved | 5 min | The number of MSISDN records successfully removed by a Completing Split. |
| 4176 | PROV | ProvNpaSplitStarted | 5 min | The number of NPA split records successfully starting a PDP. |
| 4177 | PROV | ProvNpaSplitCompleted | 5 min | The number of NPA split records successfully completing a PDP. |
| 4179 | PROV | ProvRemoteAuditMsgsSent | 5 min | The number of IMSI and MSISDN records audited. |
| 4189 | PROV | ProvRelayTimeLag | 5 min | The time in seconds between timestamps of last record PdbRelay processed and latest entry in the Command Log. |
| 4198 | PROV | ProvDbException | 5 min | Number of DB Exception errors. |

3.12 Key Performance Indicators

Table 3-9 shows the provisioning-specific Key Performance Indicators (KPIs) that are available to the user on the SDS GUI. Table 3-10 shows the process-based KPIs.

For all Provisioning Interface KPIs, the Scope has a value of 'A'.



Note:

The format of this information conforms to SDM practices, so may vary from the format described here.

Table 3-9 Provisioning Interface KPI Measurements

| ID | Name | Avg. Interval | Description |
|------|--------------------|---------------|---|
| 4104 | ProvConnections | 60 sec | The number of provisioning client connections currently established. A single connection includes a client having successfully established a TCP/IP connection, sent a provisioning connect message, and having received a successful response. |
| 4110 | ProvMsgsReceived | 60 sec | The number of provisioning messages that have been received per second. |
| 4111 | ProvMsgsSuccessful | 60 sec | The number of provisioning messages that have been successfully processed per second. |
| 4112 | ProvMsgsFailed | 60 sec | The number of provisioning messages per second that have failed to be processed due to errors. See SDS Response Message Error Codes for a list and description of possible errors. |
| 4113 | ProvMsgsSent | 60 sec | The number of provisioning messages sent per second. |
| 4114 | ProvMsgsDiscarded | 60 sec | The number of provisioning messages discarded per second. Provisioning messages are discarded due to the connection being shutdown, server being shutdown, server's role switching from active to standby, or transaction not becoming durable within the allowed amount of time. |

Table 3-9 (Cont.) Provisioning Interface KPI Measurements

| ID | Name | Avg. Interval | Description |
|------|--------------------------|---------------|---|
| 4120 | ProvMsgsImported | 60 sec | The number of provisioning messages imported per second. |
| 4140 | ProvTxnCommitted | 60 sec | The number of provisioning transactions per second that have been successfully committed to the database (memory and on disk) on the active server of the primary SDS cluster. |
| 4142 | ProvTxnFailed | 60 sec | The number of provisioning transactions per second that have failed to be started, committed, or aborted due to errors. See SDS Response Message Error Codes for a list and description of possible errors. |
| 4143 | ProvTxnAborted | 60 sec | The number of provisioning transactions aborted per second. |
| 4150 | ProvTxnActive | 60 sec | The number of provisioning transactions that are currently active (normal transaction mode only). |
| 4151 | ProvTxnNonDurable | 60 sec | The number of transactions that have been committed, but are not yet durable. Responses for the associated requests are not sent until the transaction has become durable. |
| 4157 | ProvRelayMsgsSent | 60 sec | The number of relayed provisioning messages sent per second. |
| 4158 | ProvRelayMsgs Successful | 60 sec | The number of relayed provisioning messages that have been successfully processed per second. |

Table 3-9 (Cont.) Provisioning Interface KPI Measurements

| ID | Name | Avg. Interval | Description |
|------|--------------------------|---------------|---|
| 4159 | ProvRelayMsgs Failed | 60 sec | The number of relayed provisioning messages per second that have failed to be processed due to errors. |
| 4179 | ProvRemoteAudit MsgsSent | 60 sec | The number of IMSI and MSISDN records audited per second. |
| 4189 | ProvRelayTimeLag | 60 sec | Time in seconds between timestamps of last record PdbRelay processed and latest entry in the Command Log. |
| 4198 | ProvDb Exception | 60 sec | Number of DB Exception errors per second. |

For all process-based KPIs, the Scope has a value of 'A'.

Table 3-10 Process-based KPIs

| ID | Name | Avg. Interval | Description |
|------|------------------------|---------------|--|
| 4165 | provimport.Cpu | 60 sec | CPU usage of provimport process |
| 4166 | provimport.MemHeap | 60 sec | Heap memory usage of provimport process |
| 4167 | provimport.MemBasTotal | 60 sec | Memory usage of the provimport process |
| 4168 | provimport.MemPerTotal | 60 sec | Percent memory usage of provimport process |
| 4170 | provexport.Cpu | 60 sec | CPU usage of provexport process |
| 4171 | provexport.MemHeap | 60 sec | Heap memory usage of provexport process |
| 4172 | provexport.MemBasTotal | 60 sec | Memory usage of the provexport process |
| 4173 | provexport.MemPerTotal | 60 sec | Percent memory usage of provexport process |
| 4180 | pdbrelay.Cpu | 60 sec | CPU usage of pdbrelay process |
| 4181 | pdbrelay.MemHeap | 60 sec | Heap memory usage of pdbrelay process |
| 4182 | pdbrelay.MemBasTotal | 60 sec | Memory usage of the pdbrelay process |

Table 3-10 (Cont.) Process-based KPIs

| ID | Name | Avg. Interval | Description |
|-----------|----------------------|----------------------|--|
| 4183 | pdbrely.MemPerTotal | 60 sec | Percent memory usage of pdbrely process |
| 4184 | pdbaudit.Cpu | 60 sec | CPU usage of pdbaudit process |
| 4185 | pdbaudit.MemHeap | 60 sec | Heap memory usage of pdbaudit process |
| 4186 | pdbaudit.MemBasTotal | 60 sec | Memory usage of the pdbaudit process |
| 4187 | pdbaudit.MemPerTotal | 60 sec | Percent memory usage of pdbaudit process |
| 4190 | pdba.Cpu | 60 sec | CPU usage of pdba process |
| 4191 | pdba.MemHeap | 60 sec | Heap memory usage of pdba process |
| 4192 | pdba.MemBasTotal | 60 sec | Memory usage of the pdba process |
| 4193 | pdba.MemPerTotal | 60 sec | Percent memory usage of pdba process |
| 4194 | xds.Cpu | 60 sec | CPU usage of xds process |
| 4195 | xds.MemHeap | 60 sec | Heap memory usage of xds process |
| 4196 | xds.MemBasTotal | 60 sec | Memory usage of the xds process |
| 4197 | xds.MemPerTotal | 60 sec | Percent memory usage of xds process |
| 4200 | dpserver.Cpu | 60 sec | CPU usage of dpserver process on DP |
| 4201 | dpserver.MemHeap | 60 sec | Heap memory usage of dpserver process on DP |
| 4202 | dpserver.MemBasTotal | 60 sec | Memory usage of the dpserver process on DP |
| 4203 | dpserver.MemPerTotal | 60 sec | Percent memory usage of dpserver process on DP |
| 4310 | era.Cpu | 60 sec | CPU usage of era process |
| 4311 | era.MemHeap | 60 sec | Heap memory usage of era process |
| 4312 | era.MemBasTotal | 60 sec | Memory usage of the era process |
| 4313 | era.MemPerTotal | 60 sec | Percent memory usage of era process |

3.13 Alarms

XML Data server and SOAP server specific alarms are available to the user via the SDS GUI and Network Operation Center (NOC) console(s) if SNMP is configured by the SDS GUI. We recommend you see the *SDS Online Help* for more information.

Alarms for Provisioning Group

The HA Score for all IDs in this group is Normal.

Table 3-11 Alarms for Provisioning Group

| ID | Name | Addl Info | Severity | Instance | Throttle Secs | Auto Clear Secs | Assert/Clear Condition(s) |
|-------|-----------------------|---|----------|---------------------------|---------------|-----------------|---|
| 14100 | Interface Disabled | PROV Interface manually disabled | Critical | N/A | 5 | 0 | Provisioning interface is manually disabled. |
| | | PROV Interface manually enabled | Clear | | | | Provisioning interface is manually enabled. |
| 14101 | No Remote Connections | No remote provisioning clients are connected | Major | N/A | 5 | 0 | Provisioning interface is enabled and no remote provisioning clients are connected. |
| | | One or more remote provisioning clients are connected | Clear | | | | Provisioning interface is enabled and one or more remote provisioning clients are connected. |
| 14102 | Connection Failed | Initialization Failed (CID Connection ID, IP Address) | Major | Connection ID: IP Address | 5 | 300 | Provisioning connection establishment failed due to an error specified in additional information. |

Table 3-11 (Cont.) Alarms for Provisioning Group

| ID | Name | Addl Info | Severity | Instance | Throttle Secs | Auto Clear Secs | Assert/Clear Condition(s) |
|-------|------------------------------|---|----------|------------|---------------|-----------------|--|
| | | Initialization Successful (CID Connection ID, IP Address) | Clear | | | | Alarm automatically cleared after 5 minutes. |
| 14103 | Both Port Identical | Provisioning ports are the same | Major | N/A | 5 | 0 | XML and SOAP Provisioning interfaces are disabled since same port is configured for both interfaces. |
| | | One provisioning port is changed to a different value | Clear | | | | XML and SOAP Provisioning interfaces are enabled. |
| 14140 | Import Throttled | Import operation throttled (CID Connection ID) | Major | provimport | 5 | 5 | Provisioning import throttled to prevent overrunning idb service processes. |
| | | Import operation throttled (CID Connection ID) cleared | Clear | | | | Alarm automatically cleared in 5 seconds after throttling subsides. |
| 14150 | Import Initialization Failed | Initialization error, see trace log for details | Major | provimport | 5 | 0 | Provisioning import initialization failed due to an error specified in additional information. |

Table 3-11 (Cont.) Alarms for Provisioning Group

| ID | Name | Addl Info | Severity | Instance | Throttle Secs | Auto Clear Secs | Assert/Clear Condition(s) |
|-------|------------------------------|---|----------|------------|---------------|-----------------|--|
| | | Initialization error cleared | Clear | | | | Provisioning import initialization completed successfully . |
| 14151 | Import Generation Failed | Failed to import file, see trace log for details | Major | provimport | 5 | 0 | Provisioning import operation failed due to an error specified in additional information. |
| | | Generation error cleared | Clear | | | | Provisioning import operation completed successfully . |
| 14152 | Import Transfer Failed | Failed to transfer file from remote host, see trace log for details | Major | provimport | 5 | 0 | Provisioning import operation failed due to a file transfer error specified in additional information. |
| | | Transfer error cleared | Clear | | | | Provisioning import operation completed successfully . |
| 14153 | Export Initialization Failed | Initialization error, see trace log for details | Major | provimport | 5 | 0 | Provisioning export initialization failed due to an error specified in additional information. |
| | | Initialization error cleared | Clear | | | | Provisioning export initialization completed successfully . |

Table 3-11 (Cont.) Alarms for Provisioning Group

| ID | Name | Addl Info | Severity | Instance | Throttle Secs | Auto Clear Secs | Assert/Clear Condition(s) |
|-------|--------------------------|---|----------|------------|---------------|-----------------|--|
| 14154 | Export Generation Failed | Scheduled export failed, see trace log for details | Major | provimport | 5 | 0 | Provisioning export operation failed due to an error specified in additional information. |
| | | Generation error cleared | Clear | | | | Provisioning export operation completed successfully |
| 14155 | Export Transfer Failed | Failed to transfer file to remote host, see trace log for details | Major | provimport | 5 | 0 | Provisioning export operation failed due to a file transfer error specified in additional information. |
| | | Transfer error cleared | Clear | | | | Provisioning export operation completed successfully |

Table 3-11 (Cont.) Alarms for Provisioning Group

| ID | Name | Addl Info | Severity | Instance | Throttle Secs | Auto Clear Secs | Assert/Clear Condition(s) |
|-------|------------------------|--|----------|----------|---------------|-----------------|--|
| 14188 | Pdbrelay not connected | Bulk load of remote system required: Cannot find last Prov Relay Timestamp in Command Log or No relay remote system IP address defined in configuration options or Timeout while connecting to server | Major | pdbrelay | 0 | 0 | Pdbrelay feature is enabled, but the connection to the remote HLRR system is not established. To remedy, 1) perform Bulk Load Procedure at the HLRR, 2) configure the HLRR address in the SDS GUI, or 3) verify network connectivity with the HLRR. Pdbrelay feature is enabled, and the connection to the remote HLRR system is established. |
| | | Remote HLRR is connected | Clear | | | | |

Table 3-11 (Cont.) Alarms for Provisioning Group

| ID | Name | Addl Info | Severity | Instance | Throttle Secs | Auto Clear Secs | Assert/Clear Condition(s) |
|-------|-------------------|---|----------|----------|---------------|-----------------|--|
| 14189 | PdbRelay Time Lag | ProvRelay time lag above critical threshold | Critical | pdbrelay | 300 | 0 | Pdbrelay feature is enabled and the time between timestamps of the last record processed and the latest entry in the Command Log exceeds 28.5 minutes. |
| | | ProvRelay time lag above major threshold | Major | | | | Pdbrelay feature is enabled and the time between timestamps of the last record processed and the latest entry in the Command Log exceeds 15 minutes. |
| | | ProvRelay time lagg above minor threshold | Minor | | | | Pdbrelay feature is enabled and the time between timestamps of the last record processed and the latest entry in the Command Log exceeds 4.5 minutes. |

Table 3-11 (Cont.) Alarms for Provisioning Group

| ID | Name | Addl Info | Severity | Instance | Throttle Secs | Auto Clear Secs | Assert/Clear Condition(s) |
|-------|------------------|---|----------|-----------------------|---------------|-----------------|---|
| | | ProvRelay time lag within acceptable time | Clear | | | | Pdbrelay feature is not enabled or the time between timestamps of the last record processed and the latest entry in the Command Log is less than 3 minutes. |
| 14198 | ProvDb Exception | ProvDb Exception rate above critical threshold | Critical | ProvDb Exception, SDS | 3600 | 3600 | Rate of ProvDb Exception errors has exceeded 1000 per second. |
| | | ProvDb Exception rate above critical threshold | Major | | | | Rate of ProvDb Exception errors has exceeded 100 per second. |
| | | ProvDb Exception rate above critical threshold | Minor | | | | At least one ProvDb Exception has occurred. |
| | | ProvDb Exception automatically cleared after one hour | Clear | | | | Alarm automatically cleared after one hour. |

Alarms for ERA Group

The HA Score for all IDs in this group is Normal.

Table 3-12 Alarms for EPA Group

| ID | Name | Addl Info | Severity | Instance | Throttle Secs | Auto Clear Secs | Assert/Clear Condition(s) |
|-------|----------------------|-------------------------------|----------|----------|---------------|-----------------|---|
| 14301 | ERA_Responder Failed | Event responder failed | Major | N/A | 300 | 0 | Internal error occurred – contact My Oracle Support . |
| | | Event responder error cleared | Clear | | | | Internal error cleared. |

3.14 Events

XML Data server and SOAP server specific events are available to the user via the SDS GUI and Network Operation Center (NOC) console(s) if SNMP is configured by the SDS GUI. We recommend you see the *SDS Online Help* for more information.



Note:

The format of this information will conform to SDM practices, so may vary from the format described here.

The following parameters apply to all events listed in [Table 3-13](#):

- Severity - Info
- Instance - N/A
- HA Score - Normal
- Auto Clear Seconds - 0
- Assert/Clear Conditions - N/A

Table 3-13 Events

| ID | Name/Descr Text | Addl Info | Throttle Secs |
|-------|----------------------------|---|---------------|
| 14120 | Connection Established | Provisioning client connection established. | 5 |
| 14121 | Connection Terminated | Provisioning client connection terminated. | 5 |
| 14122 | Connection Denied | Provisioning client connection denied. | 5 |
| 14160 | Import Operation Completed | See XML Import screen for details. | 5 |
| 14161 | Export Operation Completed | See XML Export screen for details. | 5 |

Table 3-13 (Cont.) Events

| ID | Name/Descr Text | Addl Info | Throttle Secs |
|-------|--------------------------------------|---|---------------|
| 14170 | Remote Audit started and in progress | Remote Audit started and is in progress. | 30 |
| 14171 | Remote Audit aborted | Remote Audit aborted | 30 |
| 14172 | Remote Audit failed to complete | Remote Audit failed to complete | 30 |
| 14173 | Remote Audit completed | Remote Audit completed | 30 |
| 14174 | NPA Split pending request deleted | NPA Split pending request deleted | 0 |
| 14175 | NPA Split activation failed | NPA Split activation failed | 0 |
| 14176 | NPA Split started and is Active | NPA Split started and is Active | 0 |
| 14177 | NPA Split completion failed | NPA Split completion failed | 0 |
| 14178 | NPA Split completed | NPA Split completed | 0 |
| 14179 | MSISDN deleted from Blacklist | Previously Blacklisted MSISDN is now a Routing Entity | 0 |
| 14180 | IMSI deleted from Blacklist | Previously Blacklisted IMSI is now a Routing Entity | 0 |

4

SOAP Message Definitions

This chapter describes the SOAP message syntax and parameters.

4.1 Message Conventions

Message specification syntax follows several conventions to convey what parameters are required or optional and how they and their values must be specified.

Table 4-1 Message Conventions

| Symbol | Description |
|--|--|
| <code>monospace with background</code> | All code examples. |
| <code>monospace</code> | Names of commands when provided outside of a code example. |
| <i>italics</i> | Variable names when provided outside of a code example or value list. |
| spaces | Spaces (for example, zero or more space characters, " ") may be inserted anywhere except within a single name or number. At least one space is required to separate adjacent names or numbers. |
| ... | Ellipses represent a variable number of repeated entries. For example: dn DN1 , dn DN2, ..., dn DN7, dn DN8 |

Table 4-1 (Cont.) Message Conventions

| Symbol | Description |
|--------|---|
| < > | <p>Angle brackets are used to enclose parameter values that are choices or names. In the following example, the numbers represent specific value choices.</p> <pre>parameter1 <1 2 3></pre> <p>In the following example, <code>ServerName</code> represents the actual value.</p> <pre>parameter2 <ServerName></pre> <p>In the following example, the numbers represent a choice in the range from 0 to 3600.</p> <pre>parameter3 <0..3600></pre> |
| [] | <p>Square brackets are used to enclose an optional parameter and its value.</p> <pre>[, parameter1 < 1 2 3 >]</pre> <p>A parameter and its value that are not enclosed in square brackets are mandatory.</p> |
| | <p>The pipe symbol is used in a parameter value list to indicate a choice between available values.</p> <pre>Parameter1 <1 2 3></pre> |
| , | <p>A literal comma is used in the message to separate each parameter that is specified.</p> |

4.2 SOAP Request Messages

A SOAP request message is sent to the SDS SOAP provisioning client as a series of ASCII characters. The SDS SOAP provisioning client sends back a SOAP response message.

Every SOAP message sent to SDS must be sent in a SOAP envelope. Each SOAP envelope has a `<soapenv:Body>` XML tag. The SDS provisioning or query request is embedded within the `<soapenv:Body>` tag. The tags and values within the `<soapenv:Body>` tag vary for each SDS request.

SOAP Request Message Format

This example shows the format for all SOAP requests. The bolded text varies for each provisioning request.

```

POST / HTTP/1.1
Host: ipAddress:port
Accept-Encoding: identity
Content-Length: lengthInBytes
SOAPAction: ""
Content-Type: text/xml; charset="UTF-8"

<soapenv:Envelope
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/">
  <soapenv:Header/>
  <soapenv:Body>
    <requestName>
      [
        <requestParameters>
          ...
        </requestParameters>
        ...
        <requestParameters>
          ...
        </requestParameters>
      ]
    </requestName>
  </soapenv:Body>
</soapenv:Envelope>

```

SOAP Message Request Parameters

Table 4-2 Request Message Parameters (SOAP)

| Parameter | Description | Value |
|-------------------|---|-----------------------------------|
| ipAddress | IP address of the SDS Provisioning server that received the SOAP request. | |
| port | Port of the SDS Provisioning server that received the SOAP request. | |
| lengthInBytes | Number of bytes in the SOAP request. | 0-4294967295 |
| requestName | The name of the SDS provisioning request. | A string with 1 to 64 characters. |
| requestParameters | The parameters (tag/value pairs) needed for each request. These parameters vary for each SDS Provisioning or query request. | |

4.3 SOAP Response Messages

A SOAP response message is sent by the SOAP provisioning client in response to a SOAP request. Each response contains a series of ASCII characters.

A rowset, contained between the `<rsset>` tags, is present if data is to be returned (for example, for `<readSubscriberRequest>`, `<readSubscriberNaiRequest>`, and `<readDomainRequest>`).

A generic response type can be generated if a SOAP request cannot be parsed, the request is not valid, etc. The `responsename` for this generic response is `errorResponse`.

```
<res error="error" affected="affected" [description="description"]/>
```

Response Format (`<readSubscriberResponse>`, `<readSubscriberNaiResponse>`, and `<readDomainRequest>` requests)

The bolded text differs for each response message.

```
HTTP/1.1 200 OK
Server: gSOAP/2.7
Content-Type: text/xml; charset=utf-8; action=""
Content-Length: lengthInBytes
Connection: keep-alive
```

```
<?xml version="1.0" encoding="UTF-8"?>
<SOAP-ENV:Envelope
xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:ns2="http://www.tekelec.com/sds/"
xmlns:ns4="http://www.tekelec.com/sds/dsr/"
xmlns:ns3="http://www.tekelec.com/sds/dsr/soap/"
xmlns:ns5="http://www.tekelec.com/sds/soap"
  <SOAP-ENV:Header></SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <respName>
      <result affected="affected" error="error"
        [description="description"]>
      </result>
    [
      <resultSet>
        <rowName> [ [rowAttributeName]="rowAttributeValue" ] ...
          [rowAttributeName]="rowAttributeValue" ] ]>
          <rowValueName>rowValue</rowValueName>
          ...
          <rowValueName>rowValue</rowValueName>
        </rowName>
        ...
        <rowName> [ [rowAttributeName]="rowAttributeValue" ] ...
          [rowAttributeName]="rowAttributeValue" ] ]>
```



```

        <rowValueName>rowValue</rowValueName>
        ...
        <rowValueName>rowValue</rowValueName>
    </rowName>
</resultSet>
]
</respName>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

Response Format (All Other Requests)

This example shows the format for all SOAP responses. The bolded text varies for each response message.

```

HTTP/1.1 200 OK
Server: gSOAP/2.7
Content-Type: text/xml; charset=utf-8; action=""
Content-Length: lengthInBytes
Connection: keep-alive

<?xml version="1.0" encoding="UTF-8"?>
<SOAP-ENV:Envelope
xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:ns2="http://www.tekelec.com/sds/"
xmlns:ns4="http://www.tekelec.com/sds/dsr/"
xmlns:ns3="http://www.tekelec.com/sds/dsr/soap/"
xmlns:ns5="http://www.tekelec.com/sds/soap"
  <SOAP-ENV:Header></SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <ns2:sdsResult affected="affected" error="error"
      [description="description"]>
    </ns2:sdsResult>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

SOAP Response Message Parameters

Table 4-3 Response Message Parameters (SOAP)

| Parameter | Description | Value |
|---------------|--|-------------------------------------|
| lengthInBytes | Number of bytes in the SOAP request. | 0-4294967295 |
| error | Error code that indicates whether or not operation was successfully executed. See SDS Response Message Error Codes . | 0 for success, non-zero for failure |

Table 4-3 (Cont.) Response Message Parameters (SOAP)

| Parameter | Description | Value |
|------------------------|--|---|
| affected | The number of routing entities or subscribers (when <code>group="Y"</code>) created/updated/deleted/read. This number does not contain number of subscriber records created/update/deleted because "subscriber" data is not used for routing. It is possible to have <code>affected=0</code> and <code>error=0</code> . | 0-10 |
| description (Optional) | A textual description associated with the response. This field may contain more information as to why a request failed or describe the changes if a request succeeds. | A string with 1 to 1024 characters |
| respName (Optional) | The name of the response. | This field is only used for read responses and errors |
| rowName | The name of the row type returned. | The value is dependent on the result set returned |
| rowValue | The value of the row type returned. | The value is dependent on the result set returned |
| rowAttributeName | The name of the row attribute name returned. | The value is dependent on the result set returned |
| rowAttributeValue | The value of the row attribute name returned. | The value is dependent on result set returned |

4.3.1 Successful SOAP Subscriber Commands

If the SOAP command successfully updates or deletes a subscriber, then the response description text indicates the deleted/created/changed IMSI and/or MSISDN and/or External Identifier values and optionally a list of the subscriber's destination values.



Note:

Destination values are listed only if there were created or modified IMSI and/or MSISDN and/or External Identifier routing entities.

Description Text Format

```
[description="[deleted ({imsi nnnn|dn nnnn|externalId eeee}{, {imsi
nnnn|dn nnnn|externalId eeee}}...)]
[, created ({imsi nnnn|dn nnnn|externalId eeee}{, {imsi nnnn|,dn nnnn|
externalId eeee}}...)]
[, changed ({imsi nnnn|dn nnnn|externalId eeee}{, {imsi nnnn|,dn nnnn|
externalId eeee}}...)]
[, imshss nnnn][, ltehss nnnn][, pcrf nnnn][, ocs nnnn][, ofcs nnnn]
[, aaa nnnn][, userdef1 nnnn][, userdef2 nnnn][, mtchss nnnn]"
```

Example Description Text from an updateSubscriberRequest Command

```
description="deleted (imsi 444444444444440, dn 19195550000), externalId
jon@oracle.com), created (imsi 444444444444441, dn 19195550001, dn
19195550002, externalId trump@oracle.com), imshss imshss2, ltehss ltehss1"
```

4.4 List of Request Operations

Table 4-4 lists the supported SOAP requests.

Table 4-4 Supported SOAP Requests

| Operation Name | Description | Section |
|----------------------------|---|---------------------------------------|
| startTransactionRequest | Start Database Transaction | Start Transaction |
| commitRequest | Commit Database Transaction | Commit Transaction |
| rollbackRequest | Abort Database Transaction | Rollback Transaction |
| insertSubscriberRequest | Insert IMSI/MSISDN/External Identifier routing data and can provision subscriber data if, and only if, IMSI and MSISDN do not already exist in the database | Insert Subscriber |
| updateSubscriberRequest | Create/Update IMSI/MSISDN/ External Identifier Routing | Update Subscriber |
| deleteSubscriberRequest | Delete IMSI/MSISDN/External Identifier Routing | Delete Subscriber |
| readSubscriberRequest | Get IMSI/MSISDN/External Identifier Routing | Read Subscriber |
| updateSubscriberNaiRequest | Create/Update NAI Routing | Update Subscriber NAI |
| deleteSubscriberNaiRequest | Delete NAI Routing | Delete Subscriber NAI |
| readSubscriberNaiRequest | Get NAI Routing | Read Subscriber NAI |

4.5 Start Transaction

4.5.1 Request

The `<startTransactionRequest>` message is sent to begin a database transaction. Database manipulation and query requests (update, delete, and read) can be sent within the context of the transaction.

If a `<startTransactionRequest>` is sent, and the connection is lost or the user logs off without sending a `<commitRequest>` or `<rollbackRequest>`, all pending requests are rolled back.

A provisioning session can have one transaction open at a time. If a `<startTransactionRequest>` is sent, another `<startTransactionRequest>` will fail with an `ACTIVE_TXN` error.

A timeout can occur between the `<startTransactionRequest>` and the `<commitRequest>`. If the `<commitRequest>` is not sent out within the configured Maximum Transaction Lifetime (we recommend you see the *SDS Online Help* for more

information) after the `<startTransactionRequest>`, the SOAP provisioning requests are rolled back (changes not applied to database).

A transaction can only be opened by one client at a time. If a transaction is already opened by another client, the `<startTransactionRequest>` is rejected immediately with `WRITE_UNAVAIL` or is queued up for the time specified by the `timeout` parameter. If the `timeout` parameter is specified with a non-zero value and that period of time elapses before the transaction is opened, the `<startTransactionRequest>` is rejected with `WRITE_UNAVAIL`.

Data manipulation requests are evaluated for validity and applied to a local database view which is a virtual representation of the main database plus local modifications made within this active transaction.

Local database view changes are not committed to the main database until the transaction is ended with a `<commitRequest>`.

The request can be aborted and rolled back with a `<rollbackRequest>` request any time before the transaction is ended with a `<commitRequest>`.

Request Format

The request must be inserted between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP request message, as shown in [SOAP Request Messages](#).

```
<startTransactionRequest>timeout</startTransactionRequest>
```

Request Parameters

Table 4-5 `<startTransactionRequest>` Parameters (SOAP)

| Parameter | Description | Value |
|-----------|---|---|
| timeout | The amount of time (in seconds) to wait to open a transaction if another connection already has one open. Clients waiting to open a transaction will be processed in the order that their requests were received. | 0 (return immediately if not available) to 3600 seconds. The default is 0. |

4.5.2 Response

The start transaction response is returned as a generic `<ns2:sdsResult>` response. This response returns the result of starting a database transaction. If the response error code indicates success, then the database transaction was successfully started. If any failure response is returned, then the database transaction was not started.

Response Format

The response is displayed between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP response message, as shown in [SOAP Response Messages](#).

```
<ns2:sdsResult affected="affected" error="error" [description="description"]>
</ns2:sdsResult>
```

Response Parameters

The parameters for all of the response commands are shown in [SOAP Response Messages](#).

Start Transaction Response Error Codes

[Table 4-6](#) shows common error codes for the `<startTransactionResponse>` message. See [SDS Response Message Error Codes](#) for a full list of error codes.

Table 4-6 `<startTransactionResponse>` Error Codes (SOAP)

| Error Code | Description |
|---------------------|--|
| SUCCESS | Transaction was successfully started. |
| NO_WRITE_PERMISSION | The client making the connection does not have write access permissions. |
| WRITE_UNAVAILABLE | Another client already has a transaction open. This is only returned to clients who have write access permissions. |
| ACTIVE_TXN | A read or write transaction is already open on this connection or an open transaction was aborted prior to terminating the connection. |

4.5.3 Examples

These examples show the full SDS provisioning request and response contents.

Start a Transaction Within 2 Minutes (success)

This example successfully starts a transaction within 2 minutes.

Request:

```
POST / HTTP/1.1
Host: localhost:9090
Accept-Encoding: identity
Content-Length: 211
SOAPAction: ""
Content-type: text/xml; charset="UTF-8"

<soapenv:Envelope
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/">
  <soapenv:Header/>
  <soapenv:Body>
    <startTransactionRequest>120</startTransactionRequest>
```

```
</soapenv:Body>
</soapenv:Envelope>
```

Result:

```
POST / HTTP/1.1 200 OK
Server: gSOAP/2.7
Content-Type: text/xml; charset=utf-8; action=""
Content-Length: 592
Connection: keep-alive
```

```
<?xml version="1.0" encoding="UTF-8"?>
<SOAP-ENV:Envelope
xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:ns2="http://www.tekelec.com/sds/"
xmlns:ns4="http://www.tekelec.com/sds/dsr/"
xmlns:ns3="http://www.tekelec.com/sds/dsr/soap/"
xmlns:ns5="http://www.tekelec.com/sds/soap">
  <SOAP-ENV:Header></SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <ns2:sdsResult affected="0" error="0">
      </ns2:sdsResult>
    </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

Start a Transaction Immediately (fail)

This example attempts to immediately start a transaction but fails due to another client having a transaction open.

Request:

```
POST / HTTP/1.1
Host: localhost:9090
Accept-Encoding: identity
Content-Length: 209
SOAPAction: ""
Content-type: text/xml; charset="UTF-8"
```

```
<soapenv:Envelope
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/">
  <soapenv:Header/>
  <soapenv:Body>
    <startTransactionRequest>0</startTransactionRequest>
  </soapenv:Body>
</soapenv:Envelope>
```

Response:

```
POST / HTTP/1.1 200 OK
Server: gSOAP/2.7
```

```
Content-Type: text/xml; charset=utf-8; action=""
Content-Length: 595
Connection: keep-alive

<?xml version="1.0" encoding="UTF-8"?>
<SOAP-ENV:Envelope
xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:ns2="http://www.tekelec.com/sds/"
xmlns:ns4="http://www.tekelec.com/sds/dsr/"
xmlns:ns3="http://www.tekelec.com/sds/dsr/soap/"
xmlns:ns5="http://www.tekelec.com/sds/soap">
  <SOAP-ENV:Header></SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <ns2:sdsResult affected="0" error="1005">
      </ns2:sdsResult>
    </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

4.6 Commit Transaction

4.6.1 Request

The `<commitRequest>` message is sent to commit a database transaction.

If the open transaction has one or more successful updates, then committing the transaction causes all the database changes to be committed.

Note:

All previous updates, even if they received a successful error code, are not committed to the database until the `<commitRequest>` is received.

Request Format

The request must be inserted between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP request message, as shown in [SOAP Request Messages](#).

```
<commitRequest> </commitRequest>
```

4.6.2 Response

The commit response is returned as a generic `<ns2:sdsResult>` response. This response returns the result of the request to commit a database transaction.

If the response error code indicates success, then the database transaction was successfully committed in the database. If any failure response is returned, then the database commit failed. The commit operation causes the transaction to end regardless of whether any updates were actually made to the database.

 **Note:**

The affected row count in the SOAP response is always 0. It does not indicate how many rows were modified within the transaction.

Response Format

The response is displayed between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP response message, as shown in [SOAP Response Messages](#).

```
<ns2:sdsResult affected="affected" error="error"
[description="description"]>
</ns2:sdsResult>
```

Parameters

The parameters for all of the response commands are shown in [SOAP Response Messages](#).

Error Codes

[Table 4-7](#) shows common error codes for the `<commitResponse>` message. See [SDS Response Message Error Codes](#) for a full list of error codes.

Table 4-7 `<commitResponse>` Error Codes (SOAP)

| Error Code | Description |
|---------------|--|
| SUCCESS | Transaction was successfully committed. |
| NO_ACTIVE_TXN | A read or write transaction is not currently open for this connection. |

4.6.3 Examples

These examples show the SDS provisioning request and response contents that are stored within the `<soapenv:Body>` or `<SOAP-ENV:Body>` tags. See [Start Transaction Examples](#) for an example that contains the entire SOAP request/response text.

Commit a Transaction (success)

This example successfully commits a transaction.

Request:

```
<commitRequest> </commitRequest>
```

Response:

```
<ns2:sdsResult affected="15" error="0">
</ns2:sdsResult>
```


Commit a Transaction that is not Open (fail)

This example attempts to commit a transaction but fails because a transaction was not open.

Request:

```
<commitRequest> </commitRequest>
```

Response:

```
<ns2:sdsResult affected="0" error="1009">  
</ns2:sdsResult>
```

4.7 Rollback Transaction

4.7.1 Request

The `<rollbackRequest>` message is sent to abort a database transaction. Any updates are rolled back before closing the transaction.

Request Format

The request must be inserted between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP request message, as shown in [SOAP Request Messages](#).

```
<rollbackRequest> </rollbackRequest>
```

4.7.2 Response

The rollback response is returned as a generic `<ns2:sdsResult>` response. This response returns the results of rolling back (aborting) a database transaction. The rollback request causes the transaction to end regardless of whether any updates were actually made to the database.

 **Note:**

The affected row count in the SOAP response is always 0. The affected row count does not indicate how many rows were modified within the transaction.

If the response error code indicates success, then the database transaction was successfully aborted. If any failure response is returned, then the database rollback failed.

Response Format

The response is displayed between the `<soapenv:Body>` and `</soapenv:Body>` XML tags, as shown in [SOAP Response Messages](#).

```
<ns2:sdsResult affected="affected" error="error" [description="description"]>  
</ns2:sdsResult>
```

Response Parameters

The parameters for all of the response commands are shown in [SOAP Response Messages](#).

Response Error Codes

[Table 4-8](#) lists common error codes for the rollback response. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 4-8 <rollback> Response Error Codes (SOAP)

| Error Code | Description |
|---------------|--|
| SUCCESS | Transaction was successfully rolled back. |
| NO_ACTIVE_TXN | A read or write transaction is already open on this connection or an open transaction was aborted prior to terminating the connection. |

4.7.3 Examples

These examples show the SDS provisioning request and response contents that are stored within the <soapenv:Body> or <SOAP-ENV:Body> tags. See the [Start Transaction Examples](#) for examples that contain the entire SOAP request/response text.

Rollback a Transaction (success)

This example successfully rolls back a transaction.

Request:

```
<rollbackRequest> </rollbackRequest>
```

Response:

```
<ns2:sdsResult affected="15" error="0">  
</ns2:sdsResult>
```

Rollback a Transaction that is not Open (fail)

This example attempts to rollback a transaction but fails because a transaction was not open.

Request:

```
<rollbackRequest> </rollbackRequest>
```

Response:

```
<ns2:sdsResult affected="0" error="1009">  
</ns2:sdsResult>
```

4.8 Insert Subscriber

4.8.1 Subscriber and Routing Data Concepts

The information in this section is applicable to all subscriber requests.

A routing entity contains the IMSI, MSISDN, or External Identifier value along with up to nine destination names that refer to destination data, which contains FQDN and realm values used for routing messages.

A subscriber is a group of related IMSI, MSISDN, and/or External Identifier routing entities and an optional Account ID value. All routing entities within a subscriber have the same destination values.

A standalone routing entity is a routing entity that is not assigned to any subscriber.

Each IMSI, MSISDN, or External Identifier routing entity is either a standalone routing entity or is assigned to a single subscriber.



Note:

You can only add a subscriber to a subscriber table, if the Account ID, MSISDN, IMSI, or External Identifier is not already in the table. If the table already contains any of these values, the add function fails and an error condition report is generated that contains the reason for the failure.

4.8.2 Insert Subscriber Request

The `<insertSubscriberRequest>` request provisions stand-alone IMSI and MSISDN routing entities or groups of related IMSI/MSISDN routing entities. This is referred to as subscriber data. This data contains relationships between IMSI and MSISDN routing entities along with an optional Account ID value. Each routing entity contains up to eight destination names. Each destination contains FQDN and realm values, which are used for routing messages.

When the `group="y"` attribute is specified, the `<insertSubscriberRequest>` request establishes relationships between IMSI, MSISDN and Account ID values. When adding a new IMSI or MSISDN value to a subscriber, the `<insertSubscriberRequest>` request creates a new IMSI or MSISDN routing entity. If any IMSI or MSISDN exists in the SDS database, the request fails, regardless of the `group="y"` attribute specification.

After a subscriber is created, all subsequent requests can use any of the subscriber's IMSI, MSISDN, or Account ID values to update, delete, or read the subscriber.

If the `group="n"` attribute is specified, the request establishes stand-alone entries of IMSI and MSISDN.

The request can also be used to remove a destination value from existing IMSI and/or MSISDN routing entities by specifying `"none"` as the destination name.

Semantic Rules (all requests)

- Each IMSI and MSISDN routing entity can be assigned to a maximum of 1 subscriber.

- All specified destination names must already exist in the database.
- Each destination name type can only be specified once.

Semantic Rules (requests that do not specify the group attribute or specify `group="n"`)

- The `accountId`, `deleteAccountId`, `deleteImsi`, and `deleteMsisdn` parameters cannot be specified.
- All specified existing IMSI and MSISDN values must be for stand-alone routing entities or must all be assigned to one subscriber. There cannot be a mixture of stand-alone routing entities and routing entities that are part of a subscriber.
- At least one routing entity (IMSI or MSISDN) value must be specified within the `insertAddressList`.
- A maximum of 10 routing entities (IMSI, MSISDN, or combinations) can be specified within the `insertAddressList`.
- At least one destination must be specified.
- All specified routing entities will be provisioned with the same destination value or value.

Semantic Rules (requests that specify `group="y"`)

- The `accountId` parameter can be specified.
- The `deleteAccountId`, `deleteImsi`, or `deleteMsisdn` parameters cannot be specified.
- All specified `accountID`, `imsi`, or `msisdn` values must be either be assigned to the same subscriber, or they can exist in a stand-alone routing entity. After the command successfully completes, all specified values are assigned to the same subscriber. All routing entities must not exist in the SDS database.
- All account of the `accountID`, `imsi`, or `msisdn` values must also be assigned to the same subscriber or either not assigned to any subscriber.
- At least one `imsi`, `msisdn`, or `accountId` value must be specified within the `insertAddressList`.
- All of the destination tags and values are optional.
- The `insertaddressList` can have a maximum of one `accountId`, six `imsi`, six `msisdn` values specified. If any of these limits are exceeded, the request fails.
- All `accountId`, `imsi`, and `msisdn` values specified within the `insertaddressList` are associated with a new subscriber and all specified routing entities will be provisioned with the specified destination values.
- Existing stand-alone or grouped routing entities cannot be added using the insert subscriber request.
- If a new routing entity is created, at least one of its destination values must not be equal to none.
- The insert subscriber request must have at least one IMSI or MSISDN routing entity.
- The updated subscriber can have zero or one Account ID value, 0-6 IMSI values, and 0-6 MSISDN values, as long as there is at least one IMSI or MSISDN value; otherwise, the request fails.

Insert Subscriber Request Format

The request must be inserted between the `<soapenv:Body>` and `</soapenv:Body>` XML tags as shown in [SOAP Request Messages](#).

```
<insertSubscriberRequest [timeout="timeout"] [group="group"]>

  <insertAddressList>
  [   <accountId>accountId</accountId> ]
  [
    <imsi>imsi</imsi>
    ...
    <imsi>imsi</imsi>
  ]
  [
    <msisdn>msisdn</msisdn>
    ...
    <msisdn>msisdn</msisdn>
  ]

</insertAddressList>
<destinationList>
[   <imshss>imshss</imshss>           ]
[   <ltehss>ltehss</ltehss>          ]
[   <pcrf>pcrf</pcrf>                 ]
[   <ocs>ocs</ocs>                    ]
[   <ofcs>ofcs</ofcs>                 ]
[   <aaa>aaa</aaa>                     ]
[   <userdef1>userdef1</userdef1>    ]
[   <userdef2>userdef2</userdef2>    ]
</destinationList>
</updateSubscriberRequest>
```

Insert Subscriber Request Parameters

Table 4-9 `<insertSubscriberRequest>` Parameters (SOAP)

| Parameter | Description | Values |
|--------------------|---|---|
| timeout (Optional) | The amount of time (in seconds) to wait before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write will be processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds (default is 0). |

Table 4-9 (Cont.) <insertSubscriberRequest> Parameters (SOAP)

| Parameter | Description | Values |
|----------------------------|---|--|
| group (Optional) | Indicates if relationships between a group of related IMSI and/or MSISDN routing entities and Account ID value should be created/updated. | <ul style="list-style-type: none"> y –Create new subscriber relationships with specified destinations. n –Create stand-alone routing entities (default). |
| insertAddressList | XML tag that contains a list of addresses to be created or updated. | Must have at least 1 of the following tags and values: <ul style="list-style-type: none"> 0-1 – accountId 0-6 – imsi 0-6 – msisdn |
| accountId (Optional) | A user-defined Account ID value to add or update. | 1 to 26 numeric digits. |
| imsi (Optional) | An IMSI (specified in E.212 format) value to add or update. | 10 to 15 numeric digits. |
| msisdn (Optional) | An MSISDN (specified in E.164 international public telecommunication numbering plan format) value to add or update. | 8 to 15 numeric digits. |
| destinationList (Optional) | XML tag that contains a list of destination values to update or set in the routing entity(s). | Can be empty, or contain any of the following destination tags and values: imshss, ltehss, pcrf, ocs, ofcs, aaa, userdef1, and/or userdef2. |
| imshss (Optional) | The name of the IMS HSS destination. | A string with 1 to 32 characters. |
| ltehss (Optional) | The name of the LTE HSS destination. | A string with 1 to 32 characters. |
| pcrf (Optional) | The name of the PCRF destination. | A string with 1 to 32 characters. |
| ocs (Optional) | The name of the OCS destination. | A string with 1 to 32 characters. |
| ofcs (Optional) | The name of the OFCS destination. | A string with 1 to 32 characters. |
| aaa (Optional) | The name of the AAA server destination. | A string with 1 to 32 characters. |
| userdef1 (Optional) | The name of the first user defined destination. | A string with 1 to 32 characters. |
| userdef2 (Optional) | The name of the second user defined destination. | A string with 1 to 32 characters. |

4.8.3 Insert Subscriber Response

The insert subscriber response is returned as a generic `<ns2:sdsResult>` response. This response returns the result of the request to provision subscriber and/or routing entities. A single result applies to all routing entities supplied. Either all subscriber and/or routing entities were successfully inserted, or no updates were made.

If applying all of the provisioning changes results in no database records being modified because the database already contained the updated values, the CONFLICT_FOUND error code is returned and the number of affected records is 0.

If a subscriber is successfully created, the description field contains lists of created IMSI and MSISDN values.

Insert Subscriber Response Format

The response is displayed between the `<SOAP-ENV::Body>` and `</SOAP-ENV:Body>` XML tags as shown in [SOAP Response Messages](#).

```
<ns2:sdsResult affected="affected" error="error" [description="description"]>
</ns2:sdsResult>
```

Insert Subscriber Response Parameters

The parameters for all of the response commands are shown in [SOAP Response Messages](#).

Insert Subscriber Response Error Codes

[Table 4-10](#) lists common error codes for this command. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 4-10 `<insertSubscriberResponse>` Error Codes (SOAP)

| Error Code | Description |
|-----------------------------|--|
| SUCCESS | The update request was successfully completed. |
| CONFLICT_FOUND | The routing entity already exists in the database. |
| DEST_NOT_FOUND | Destination name does not exist. |
| DEST_TYPE_MISMATCH | Destination has a different destination type than the desired destination type. |
| MULTIPLE_SUBSCRIBERS | Specified parameters refer to multiple subscribers. |
| SUBSCRIBER_TOO_BIG | Resulting subscriber would exceed 6 IMSI or 6 MSISDN limit. |
| ACCTID_UPDATE_PROHIBITED | An attempt was made to change an <code>accountId</code> without specifying <code><deleteAccountId></code> tag. |
| ROUTE_TYPE_MISMATCH | Standalone and subscriber routes are not allowed in same command. |
| DEL_ROUTE_NOT_PERMITTED | Cannot delete last route from subscriber. |
| NO_ROUTES_SPECIFIED | At least one MSISDN or IMSI must be specified. |
| ROUTE_DEST_MISMATCH | Specified routes have different destinations. |
| DOMAIN_IDENTIFIER_NOT_FOUND | Domain Identifier does not exist. |

4.8.4 Insert Subscribers Examples

Below are examples of how to use the `<insertSubscriberrequest>` request and likely response. Some of these examples are based on previous requests; therefore, the order of the requests could be important.

These examples show the SDS provisioning request and response contents that are stored within the `<soapenv:Body>` or `<SOAP-ENV:Body>` tags. See the [Start Transaction Examples](#) for examples of the entire SOAP request/response text.

Insert new Add Stand-Alone Routing Entities (Success)

This example inserts new stand-alone IMSI and MSISDN routing entities and sets their destination values to the specified values.

The result of this request is:

- New IMSI and MSISDN routing entities are created.
- All of the destination values for each routing entity are set to specified values.

Request:

```
<insertSubscriberRequest>
  <insertAddressList>
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <imsi>111111111100003</imsi>
    <msisdn>8004605500</msisdn>
    <msisdn>8004605503</msisdn>
  </insertAddressList>
  <destinationList>
    <ltehss>LTE_HSS_1</ltehss>
  </destinationList>
</insertSubscriberRequest>
```

Result:

```
<ns2:sdsResult affected="5" error="0"
</ns2:sdsResult>
```

Insert Existing Stand-Alone Routing Entities with Different Destinations Failure

This example inserts existing stand-alone IMSI and MSISDN routing entities with new destination values.

This request will fail with error code 1014 and the IMSI and MSISDN routing entities are not updates with the specified values.

Request:

```
<insertSubscriberRequest>
  <insertAddressList>
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <imsi>111111111100003</imsi>
    <msisdn>8004605500</msisdn>
  </insertAddressList>
  <destinationList>
    <ltehss>LTE_HSS_4</ltehss>
    <aaa>AAA_4</aaa>
  </destinationList>
</insertSubscriberRequest>
```


Result:

```
<ns2:sdsResult affected="0" error="1014"
</ns2:sdsResult>
```

Create Subscriber Using Existing Routing Entities (Success)

This example inserts a subscriber using new routing entities that all have the same destination values.

After this request is completed:

- A new subscriber is created and all of the routing entities are assigned to that subscriber
- A new subscriber is created with the specified Account ID, IMSI, and MSISDN values
- New IMSI and MSISDN routing entities are created with the specified destinations

Request:

```
<insertSubscriberRequest group="y">
  <insertAddressList>
    <accountID>1111122223333344444555556</accountId.
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
  </insertAddressList>
  <destinationList>
</destinationList>
    <ltehss>LTE_HSS_4</ltehss>
    <aaa>AAA_4</aaa>
  <destinationList>
</insertSubscriberRequest>
```

Result:

```
<ns2:sdsResult affected="1" error="0">
</ns2:sdsResult>
```

Create Subscriber Using New Routing Entities without Destination (Failure)

This example fails when creating a subscriber using new routing entities without specifying the destination values.

No changes are made to the database because the request failed.

Request:

```
<insertSubscriberRequest group="y">
  <insertAddressList>
    <accountId>1111122222</accountId>
    <imsi>333333333300093</imsi>
    <imsi>333333333300094</imsi>
    <msisdn>9198675399</msisdn>
  </insertAddressList>
  <destinationList>
```

```
</destinationList>  
</insertSubscriberRequest>
```

Result:

```
<ns2:sdsResult affected="0" error="2013" description=  
"at least one destination must be specified">  
</ns2:sdsResult>
```

Create Subscriber Using Existing Routing Entities (Failure)

This example inserts a subscriber using existing routing entities.

The result of this request is that the request fails with error code 1014.

Request:

```
<insertSubscriberRequest group="y">  
  <insertAddressList>  
    <imsi>11111111100001</imsi>  
    <imsi>11111111100002</imsi>  
    <msisdn>8004605500</msisdn>  
  </insertAddressList>  
  <destinationList>  
    <ltehss>LTE_HSS_4</ltehss>  
    <aaa>AAA_4</aaa>  
  </destinationList>  
</insertSubscriberRequest>
```

Result:

```
<ns2:sdsResult affected="0" error="1014">  
</ns2:sdsResult>
```

Add Account ID to Existing Subscriber (Failure)

This example adds an Account ID to an existing subscriber. Any of the subscriber IMSI or MSISDN values can be used. For this example, the MSISDN value is used.

The result of this request is that the request fails with error code 1014.

Request:

```
<insertSubscriberRequest group="y">  
  <insertAddressList>  
    <accountId>80044400001234567890111112</accountId>  
    <msisdn>8004605500</msisdn>  
  </insertAddressList>  
  <destinationList>  
  </destinationList>  
</insertSubscriberRequest>
```

Result:

```
<ns2:sdsResult affected="0" error="1014">
</ns2:sdsResult>
```

Modify Destinations for Existing Subscriber (Failure)

This example modifies one of the destination values for an existing subscriber. Any of the subscriber's IMSI, MSISDN or Account ID values can be used. For this example, an IMSI value is used.

The result of this request is that the request fails with error code 1014.

Request:

```
<insertSubscriberRequest>
  <insertAddressList>
    <imsi>111111111100002</imsi>
  </insertaddressList>
  <destinationList>
    <ltehss>LTE_HSS_99</ltehss>
  </destinationList>
</insertSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="0" error="1014"
</ns2:sdsResult>
```

4.9 Update Subscriber

4.9.1 Subscriber and Routing Data

A routing entity contains the IMSI or MSISDN value along with up to eight destination names that refer to destination data which contains FQDN and realm values that are used for routing messages.

A subscriber is a group of related IMSI and/or MSISDN routing entities and an optional Account ID value. All routing entities within a subscriber have the same destination values.

A stand-alone routing entity is a routing entity that is not assigned to any subscriber.

Each IMSI or MSISDN routing entity is either a stand-alone routing entity or is assigned to a single subscriber.

**Note:**

You can only add a subscriber to a subscriber table, if the Account ID, MSISDN, or IMSI is not already in the table. If the table already contains any of these values, the add function fails and an error condition report is generated that contains the reason for the failure.

4.9.2 Request

The `<updateSubscriber>` request provisions IMSI, MSISDN, and External Identifier routing data and can provision subscriber data. See [Subscriber and Routing Data](#) for a description of subscriber and routing data.

This request provisions standalone IMSI, MSISDN, and External Identifier routing entities and/or subscriber data. Each routing entity contains up to nine destination names. Each destination contains FQDN and realm values, which are used for routing messages.

When the `group="y"` attribute is specified, the request establishes or removes relationships between Account ID, IMSI, MSISDN, and External Identifier values. When adding new Account ID, IMSI, MSISDN, or External Identifier values to a subscriber, the request can also create a new IMSI, MSISDN, or External Identifier routing entity. When an IMSI, MSISDN, or External Identifier value is removed from a subscriber, the request deletes IMSI, MSISDN, or External Identifier routing entities. Once a subscriber is created, all subsequent subscriber requests can use any of the subscriber's Account ID, IMSI, MSISDN, or External Identifier values to update, delete or read the subscriber.



Note:

You can only add a subscriber to a subscriber table, if the Account ID, IMSI, MSISDN, or External Identifier is not already in the table. If the table already contains any of these values, the add function fails and an error condition report is generated that contains the reason for the failure.

The request can also be used to update destination names in existing routing entities or create new routing entities, regardless of whether the `group="y"` attribute is specified. These destination changes are applied to all specified IMSI, MSISDN, and External Identifier routing entities. If all of the specified Account ID, IMSI, MSISDN, and External Identifier values are assigned to one subscriber, the destination changes are also applied to all of the subscriber's routing entities.

If the `group="y"` attribute is specified, then the changes are also applied to any specified new or existing standalone routing entities, which are assigned to the subscriber.

The request can also be used to remove a destination value from existing IMSI and/or MSISDN and/or External Identifier routing entities by specifying "none" as the destination name.

Semantic Rules (All Requests)

- Each IMSI, MSISDN, and External Identifier routing entity can be assigned to a maximum of 1 subscriber.
- All specified destination names must already exist in the database.
- Each destination name type can only be specified once.
- Any existing destination(s) for a routing entity will not be changed/removed if not specified in the request.

- Specifying a destination name of "none" removes the association of that destination from the specified routing entity(s).

Semantic Rules (requests that do not specify the group attribute or specify group="n")

- The `accountId`, `deleteAccountId`, `deleteImsi`, `deleteMsisdn`, and `deleteExternalIdentifier` parameters cannot be specified.
- All specified existing IMSI, MSISDN, and External Identifier values must be for standalone routing entities or must all be assigned to one subscriber. There cannot be a mixture of standalone routing entities and routing entities that are part of a subscriber.
- At least one routing entity (IMSI, MSISDN, or External Identifier) value must be specified within the `addressList`.
- A maximum of 10 routing entities (IMSI, MSISDN, External Identifier, or combinations) can be specified within the `addressList`.
- At least one destination must be specified within the `destinationList`.
- All specified routing entities will be provisioned with the same destination value(s).

Semantic Rules (requests that specify group="y")

- The `accountId`, `deleteAccountId`, `deleteImsi`, `deleteMsisdn`, and `deleteExternalIdentifier` parameters can be specified.
- All specified, existing `accountID`, `imsi`, `msisdn`, or `externalIdentifier` values must be assigned to the same subscriber or they can exist in a standalone routing entity. After the command successfully completes, all specified values are assigned to the same subscriber.
- All specified addresses within the `deleteAccountId`, `deleteImsi`, `deleteMsisdn`, and `deleteExternalIdentifier` tags that exist in the database must be assigned to the same subscriber. All specified addresses within the `addressList` (Account ID, IMSI, MSISDN, or External Identifier values) must also be assigned to the same subscriber or not assigned to any subscriber.
- At least one `imsi`, `msisdn`, `externalIdentifier`, or `accountId` value must be specified within the `addressList`.
- The `destinationList` tag is mandatory, but no values are required within it. This allows the user to add an Account ID to an existing MSISDN and/or IMSI and or External Identifier values. This allows the user to create a Subscriber using existing MSISDN/IMSI/ External Identifier and also allows the user to create a Subscriber with a mix of existing MSISDN/IMSI/External Identifier and new MSISDN/IMSI/External Identifier. In this case same destination(s) has to set to all routing entities.
- The `addressList` can have a maximum of one `accountId`, six `imsi`, six `msisdn`, ten `externalIdentifier`, one `deleteAccountId`, six `deleteImsi`, and/or six `deleteMsisdn` values specified. If any of these limits are exceeded, the request fails.
- All `accountId`, `imsi`, `msisdn`, and `externalIdentifier` values specified within the `addressList` that are not currently associated with a subscriber will be assigned to the same subscriber. They are added to an existing subscriber or new subscriber.
- If a new subscriber is being created with all new routing entities, all specified routing entities will be provisioned with the specified destination values

- If a new subscriber is being created with at least one existing standalone routing entity, all destination values from existing standalone routing entities must be the same prior to applying any specified destination changes. All new routing entities will inherit their destination values from an existing standalone routing entity with the applied destination changes.
- If existing standalone routing entities are being added to an existing subscriber, the destination values in each standalone routing entity must match the destination values for the subscriber (extracted from any of the subscriber routing entities) prior to applying any specified destination changes.
- If new routing entities are being added to an existing subscriber, the new routing entities will inherit the destination values for the subscriber (extracted from any of the subscriber routing entities).
- If a new routing entity is being created, at least one of its destination values cannot be equal to "none".
- The updated subscriber must have at least one IMSI, MSISDN, or External Identifier routing entity.
- The updated subscriber can have 0 or 1 `accountID` values, 0-6 `imsi` values, and 0-6 `msisdn` values, as long as there is at least 1 IMSI, MSISDN, or External identifier value. If the result of the update (deleting and then adding Account ID, IMSI and/or MSISDN and/or External Identifier values) would cause too many Account ID, IMSI, MSISDN, External Identifier values, the request fails.
- The subscriber Account ID value can be updated only if it is currently `null` or deleted within the request (as specified by the `deleteAccountId` parameter).
- If any of the `deleteAccountId`, `deleteImsi`, `deleteMsisdn`, or `deleteExternalIdentifier` values do not exist in the database, they are ignored. If nothing else changes for the subscriber, then `NO_UPDATES` is returned.
- If any of the `deleteAccountId`, `deleteImsi`, `deleteMsisdn`, or `deleteExternalIdentifier` values exist in the database, they must be assigned to the subscriber being updated or the command fails.
- If any of the `deleteImsi`, `deleteMsisdn`, or `deleteExternalIdentifier` values exist, the routing entity is deleted unless it is the last IMSI, MSISDN, or External Identifier routing entity for the subscriber, in which case the command fails.

Request Format

The request must be inserted between the `<soapenv:Body>` and `</soapenv:Body>` XML tags as shown in [SOAP Request Messages](#).

```
<updateSubscriberRequest [timeout="timeout"] [group="group"]>
  <addressList>
    [ <deleteAccountId>deleteAccountId</deleteAccountId> ]
    [
      <deleteImsi>deleteImsi</deleteImsi>
      ...
      <deleteImsi>deleteImsi</deleteImsi>
    ]
    [
      <deleteMsisdn>deleteMsisdn</deleteMsisdn>
```

```
    ...
    <deleteMsisdn>deleteMsisdn</deleteMsisdn>
  ]
  [
    <deleteExternalId>deleteExtIdentifier<deleteExternalId>
    ...
    <deleteExternalId>deleteExtIdentifier</deleteExternalId>
  ]
  [ <accountId>accountId</accountId> ]
  [
    <imsi>imsi</imsi>
    ...
    <imsi>imsi</imsi>
  ]
  [
    <msisdn>msisdn</msisdn>
    ...
    <msisdn>msisdn</msisdn>
  ]
  [
    <externalId>extIdentifier</externalId>
    ...
    <externalId>extIdentifier</externalId>
  ]
</addressList>
<destinationList>
  [ <imshss>imshss</imshss> ]
  [ <ltehss>ltehss</ltehss> ]
  [ <pcrf>pcrf</pcrf> ]
  [ <ocs>ocs</ocs> ]
  [ <ofcs>ofcs</ofcs> ]
  [ <aaa>aaa</aaa> ]
  [ <userdef1>userdef1</userdef1> ]
  [ <userdef2>userdef2</userdef2> ]
  [ <mtchss>mtchss</mtchss> ]
</destinationList>
</updateSubscriberRequest>
```

Request Parameters

Table 4-11 <updateSubscriberRequest> Parameters (SOAP)

| Parameter | Description | Values |
|-----------------------------|--|---|
| timeout (Optional) | The amount of time (in seconds) to wait before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write are processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds (default is 0). |
| group (Optional) | Indicates if relationships between a group of related IMSI and/or MSISDN and/or External Identifier routing entities and Account ID value should be created/updated. | y – Create new or update existing subscriber relationships and update destinations. n – Only update destinations, not relationships between routing entities (default). |
| addressList | XML tag that contains a list of addresses to be created or updated. | Must have at least 1 of the following tags and values: <ul style="list-style-type: none"> • 0-1 – deleteAccountId • 0-6 – deleteImsi • 0-6 – deleteMsisdn • 0-10 – deleteExternalIdentifier • 0-1 – accountId • 0-6 – imsi • 0-6 – msisdn • 0-10 – externalIdentifier |
| deleteAccountId (Optional) | A user-defined Account ID value to delete. | 1 to 26 numeric digits. |
| deleteImsi (Optional) | An IMSI (specified in E.212 format) value to delete. | 10 to 15 numeric digits. |
| deleteMsisdn (Optional) | An MSISDN (specified in E.164 international public telecommunication numbering plan format) value to delete. | 8 to 15 numeric digits. |
| deleteExternalId (Optional) | An ExternalIdentifier (specified in NAI format) value to delete. | A string with 3 to 257 characters. |
| accountId (Optional) | A user-defined Account ID value to add or update. | 1 to 26 numeric digits. |
| imsi (Optional) | An IMSI (specified in E.212 format) value to add or update. | 10 to 15 numeric digits. |

Table 4-11 (Cont.) <updateSubscriberRequest> Parameters (SOAP)

| Parameter | Description | Values |
|----------------------------|---|--|
| msisdn (Optional) | An MSISDN (specified in E.164 international public telecommunication numbering plan format) value to add or update. | 8 to 15 numeric digits. |
| ExternalId (Optional) | An ExternalIdentifier (specified in NAI format)value to add or update. | A string with 3 to 257 characters. |
| destinationList (Optional) | XML tag that contains a list of destination values to update or set in the routing entity(s). | Can be empty, or contain any of the following destination tags and values: imshss, ltehss, pcrf, ocs, ofcs, aaa, userdef1, userdef2 and/or mtchss. |
| imshss (Optional) | The name of the IMS HSS destination. | A string with 1 to 32 characters. |
| ltehss (Optional) | The name of the LTE HSS destination. | A string with 1 to 32 characters. |
| pcrf (Optional) | The name of the PCRF destination. | A string with 1 to 32 characters. |
| ocs (Optional) | The name of the OCS destination. | A string with 1 to 32 characters. |
| ofcs (Optional) | The name of the OFCS destination. | A string with 1 to 32 characters. |
| aaa (Optional) | The name of the AAA server destination. | A string with 1 to 32 characters. |
| userdef1 (Optional) | The name of the first user defined destination. | A string with 1 to 32 characters. |
| userdef2 (Optional) | The name of the second user defined destination. | A string with 1 to 32 characters. |
| mtchss (Optional) | The name of the MTCHSS destination. | A string with 1 to 32 characters. |

4.9.3 Response

The update subscriber response is returned as a generic `<ns2:sdsResult>` response. This response returns the result of the request to provision subscriber and/or routing entities. A single result applies to all routing entities supplied. Either all subscriber and/or routing entities were successfully updated, or no updates were made.

If applying all of the provisioning changes results in no database records being modified because the database already contained the updated values, then `NO_UPDATES` error code is returned and the number of affected records is 0.

If a subscriber is successfully created or updated, the description field contains lists of deleted, created and changed IMSI, MSISDN, and External Identifier values.

Response Format

The response is displayed between the `<soapenv:Body>` and `</soapenv:Body>` XML tags as shown in [SOAP Response Messages](#).

```
<ns2:sdsResult affected="affected" error="error"
[description="description"]>
</ns2:sdsResult>
```

Response Parameters

The parameters for all of the response commands are shown in [SOAP Response Messages](#).

Response Error Codes

[Table 4-12](#) lists common error codes for this command. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 4-12 <updateSubscriberResponse Error Codes (SOAP)

| Error Code | Description |
|-----------------------------|--|
| SUCCESS | The update request was successfully completed. |
| NO_UPDATES | The request does not have an update to the database. |
| DEST_NOT_FOUND | Destination name does not exist. |
| DEST_TYPE_MISMATCH | Destination has a different destination type than the desired destination type. |
| MULTIPLE_SUBSCRIBERS | Specified parameters refer to multiple subscribers. |
| SUBSCRIBER_TOO_BIG | Resulting subscriber would exceed 6 IMSI, 6 MSISDN, or 10 External Identifier limit. |
| ACCTID_UPDATE_PROHIBITED | An attempt was made to change an <code>accountId</code> without specifying <code><deleteAccountId></code> tag. |
| ROUTE_TYPE_MISMATCH | Standalone and subscriber routes are not allowed in same command. |
| DEL_ROUTE_NOT_PERMITTED | Cannot delete last route from subscriber. |
| NO_ROUTES_SPECIFIED | At least one MSISDN or IMSI must be specified. |
| ROUTE_DEST_MISMATCH | Specified routes have different destinations. |
| DOMAIN_IDENTIFIER_NOT_FOUND | Domain Identifier does not exist. |

4.9.4 Examples

Below are examples of how to use the `<updateSubscriber>` request and likely response. Some of these examples are based on previous requests; hence, the order of the requests could be important.

These examples show the SDS provisioning request and response contents that are stored within the `<soapenv:Body>` or `<SOAP-ENV:Body>` tags. See the Start Transaction [Examples](#) for examples of the entire SOAP request/response text.

Add Standalone Routing Entities

This example creates new standalone IMSI and MSISDN routing entities and sets their destination values to the specified values.

The result of this request is:

- New IMSI and MSISDN routing entities are created.
- All of the destination values for each routing entity are set to specified values.

Request:

```
<updateSubscriberRequest>
  <addressList>
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <imsi>111111111100003</imsi>
    <msisdn>8004605500</msisdn>
    <msisdn>8004605503</msisdn>
  </addressList>
  <destinationList>
    <ltehss>LTE_HSS_1</ltehss>
  </destinationList>
</updateSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="5" error="0"
</ns2:sdsResult>
```

Update Standalone Routing Entities Destinations

This example updates existing standalone IMSI and MSISDN routing entities with new destination values.



Note:

This request does not update all IMSI values that were specified in the previous request.

The result of this request is that the IMSI and MSISDN routing entities are updated with specified values.

Request:

```
<updateSubscriberRequest>
  <addressList>
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
```

```

    <imsi>111111111100003</imsi>
    <msisdn>8004605500</msisdn>
  </addressList>
  <destinationList>
    <ltehss>LTE_HSS_4</ltehss>
    <aaa>AAA_4</aaa>
  </destinationList>
</updateSubscriberRequest>

```

Response:

```

<ns2:sdsResult affected="4" error="0"
</ns2:sdsResult>

```

This example updates existing standalone IMSI, MSISDN, and External Identifier routing entities with new destination values.

The result of this request is that the IMSI, MSISDN, and External Identifier routing entities are updated with specified values.

Request:

```

<updateSubscriberRequest>
  <addressList>
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <imsi>111111111100003</imsi>
    <msisdn>8004605500</msisdn>
    <externalId>user@oracle.com</externalId>
    <externalId>abc@test.com</externalId>
  </addressList>
  <destinationList>
    <ltehss>LTE_HSS_4</ltehss>
    <aaa>AAA_4</aaa>
  </destinationList>
</updateSubscriberRequest>

```

Response:

```

<ns2:sdsResult affected="6" error="0"
</ns2:sdsResult>

```

Create Subscriber Using Existing Routing Entities (Success)

This example creates a subscriber using existing routing entities that all have the same destination values.

After this request is completed, a new subscriber is created and all of the routing entities are assigned to that subscriber.

Request:

```

<updateSubscriberRequest group="y">
  <addressList>

```

```
<imsi>111111111100001</imsi>
<imsi>111111111100002</imsi>
<msisdn>8004605500</msisdn>
</addressList>
<destinationList>
</destinationList>
</updateSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="1" error="0">
</ns2:sdsResult>
```

Create Subscriber Using Existing Routing Entities (Failure)

This example fails when creating a subscriber using existing routing entities because the existing routing entities have different destination values.

No changes are made to the database because the request failed.

Request:

```
<updateSubscriberRequest group="y">
  <addressList>
    <imsi>111111111100003</imsi>
    <msisdn>8004605503</msisdn>
  </addressList>
  <destinationList>
  </destinationList>
</updateSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="0" error="2029" description="all routes must have
the same destination values">
</ns2:sdsResult>
```

Add Account ID to Existing Subscriber

This example adds an Account ID to an existing subscriber. Any of the subscriber IMSI or MSISDN values can be used. For this example, the MSISDN value is used.

The result of this request is that the subscriber will have an Account ID value.

Request:

```
<updateSubscriberRequest group="y">
  <addressList>
    <accountId>80044400001234567890111112</accountId>
    <msisdn>8004605500</msisdn>
  </addressList>
  <destinationList>
  </destinationList>
</updateSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="1" error="0">
</ns2:sdsResult>
```

Modify Destinations for Existing Subscriber

This example modifies one of the destination values for an existing subscriber. Any of the subscriber's Account ID, IMSI, MSISDN, or External Identifier values can be used. For this example, an IMSI value is used.

 **Note:**

It does not matter if `group="Y"` is specified. The same changes are always applied to the whole subscriber.

The result of this request is that all of the subscriber's IMSI, MSISDN, and External Identifier routing entities will have a new destination value.

Request:

```
<updateSubscriberRequest>
  <addressList>
    <imsi>111111111100002</imsi>
  </addressList>
  <destinationList>
    <ltehss>LTE_HSS_99</ltehss>
  </destinationList>
</updateSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="3" error="0"
</ns2:sdsResult>
```

Replace MSISDN value

This example replaces an MSISDN value for an existing subscriber. The new MSISDN routing entity inherits the destination values from an old IMSI or MSISDN routing entity. It does not matter which of the subscriber's routing entities is used. All entities have the same destination values.

The result of this request is:

- The old MSISDN routing entity is deleted from the database
- The new MSISDN routing entity is added to the database, its destination values are set to the subscriber destination values, and the new MSISDN value is assigned to the subscriber (relationships are established).

 **Note:**

If the new MSISDN routing entity already exists in the database, and it has the same destination values as the subscriber, the only change is that the routing entity is assigned to the subscriber.

Request:

```
<updateSubscriberRequest group="y">
  <addressList>
    <deleteMsisdn>8004605500</deleteMsisdn>
    <msisdn>8884605500</msisdn>
  </addressList>
  <destinationList>
  </destinationList>
</updateSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="1" error="0">
</ns2:sdsResult>
```

Replace Account ID, Two IMSI Values, and One MSISDN Value

This example replaces several identification values for an existing subscriber. The new IMSI, MSISDN, and External Identifier routing entities inherit the destination values from the old IMSI, MSISDN, and External Identifier routing entities. It does not matter which of the Subscriber's routing entities is used. All routing entities have the same destination values.

The result of this request is:

- The old IMSI, MSISDN, and External Identifier routing entities are deleted from the database.
- The new IMSI, MSISDN, and External Identifier routing entities are added to the database, their destination values are set to the subscriber's destination values, and the routing entities are assigned to the subscriber (relationships are established).

 **Note:**

If the new IMSI, MSISDN, and External Identifier routing entities already exist in the database and they have the same destination values as the subscriber, the only change is that the new IMSI, MSISDN, and External Identifier values are assigned to the subscriber.

- The subscriber Account ID value is changed.

Request:

```
<updateSubscriberRequest>
  <addressList>
    <deleteImsi>111111111100001</deleteImsi>
    <deleteImsi>111111111100002</deleteImsi>
```

```

    <deleteMsisdn>8884605500</deleteMsisdn>
    <imsi>8888888888800001</imsi>
    <imsi>8888888888800002</imsi>
    <msisdn>8884605555</msisdn>
  </addressList>
  <destinationList>
</destinationList>
</updateSubscriberRequest>

```

Response:

```

<ns2:sdsResult affected="1" error="0">
</ns2:sdsResult>

```

Create Subscriber Using New Routing Entities (Success)

This example creates a subscriber using new routing entities with specified destinations.

The result of this request is:

- A new subscriber is created with the specified Account ID, IMSI and MSISDN values.
- New IMSI and MSISDN routing entities are created with the specified destinations.

Request:

```

<updateSubscriberRequest group="y">
  <addressList>
    <accountId>1111222223333344444555556</accountId>
    <imsi>333333333300001</imsi>
    <imsi>333333333300002</imsi>
    <msisdn>9198675309</msisdn>
  </addressList>
  <destinationList>
    <ltehss>LTE_HSS_3</ltehss>
    <aaa>AAA_3</aaa>
  </destinationList>
</updateSubscriberRequest>

```

Response:

```

<ns2:sdsResult affected="1" error="0">
</ns2:sdsResult>

```

This example creates a subscriber using new routing entities with specified destinations.

The result of this request is:

- A new subscriber is created with the specified Account ID, IMSI, MSISDN, and External Identifier values.
- New IMSI, MSISDN, and External Identifier routing entities are created with the specified destinations.

Request:

```
<updateSubscriberRequest group="y">
  <addressList>
    <accountId>11111222223333344444555556</accountId>
    <imsi>333333333300001</imsi>
    <imsi>333333333300002</imsi>
    <msisdn>9198675309</msisdn>
    <externalId>user@oracle.com</externalId>
    <externalId>abc@test.com</externalId>
  </addressList>
  <destinationList>
    <ltehss>LTE_HSS_3</ltehss>
    <aaa>AAA_3</aaa>
  </destinationList>
</updateSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="1" error="0">
</ns2:sdsResult>
```

Create Subscriber Using New Routing Entities (Failure)

This example fails when creating a subscriber using new routing entities because no destinations were specified.

No changes are made to the database because the request failed.

Request:

```
<updateSubscriberRequest group="y">
  <addressList>
    <accountId>1111122222</accountId>
    <imsi>333333333300003</imsi>
    <imsi>333333333300004</imsi>
    <msisdn>9198675309</msisdn>
  </addressList>
  <destinationList>
  </destinationList>
</updateSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="0" error="2013" description="at least one
destination must be specified">
</ns2:sdsResult>
```

4.10 Delete Subscriber

4.10.1 Request

The `<deleteSubscriberRequest>` request removes IMSI, MSISDN, and External Identifier routing data and can remove subscriber data. See [Subscriber and Routing Data](#) for a description of subscriber and routing data. Each routing entity contains up to nine destination names. Each destination contains FQDN and realm values.

If the `group="y"` attribute is specified, then the request deletes all data associated with the subscriber. The Account ID, all relationships, and all IMSI, MSISDN, and External Identifier routing entities that were assigned to the subscriber are deleted.

If `group="y"` is not specified or if `group="n"` is specified, only IMSI, MSISDN, and External Identifier routing entities are deleted. If the IMSI or MSISDN value is assigned to a subscriber and there is at least one more IMSI, MSISDN, or External Identifier value assigned to the subscriber, then the IMSI, MSISDN, or External Identifier value is removed from the subscriber.



Note:

The last IMSI, MSISDN, or External Identifier value cannot be removed from a subscriber. The user must delete the whole subscriber by specifying the `group="y"` attribute.

Semantic Rules (requests that do not specify the group attribute or specify `group="n"`)

- All specified `imsi`, `msisdn`, or `extenderIdentifier` values must be assigned to one subscriber or exist as a standalone routing entity.
- The `accountID` parameter cannot be specified.
- At least one routing entity (IMSI, MSISDN, or External Identifier) must be specified.
- A maximum of 10 routing entities (IMSI, MSISDN, External Identifier, or combinations of the two) can be specified.
- The last IMSI, MSISDN, or External Identifier for a subscriber cannot be deleted. Use `group="y"` to delete the whole subscriber.

Semantic Rules (requests that specify `group="y"`)

- All specified `accountId`, `imsi`, `msisdn`, or `extenderIdentifier` values must be assigned to the same subscriber. The specified `imsi` or `msisdn` values cannot exist in a standalone routing entity.
- The `accountId` parameter can be specified.
- At least one `accountId`, `imsi`, `msisdn`, or `extenderIdentifier` value must be specified.
- A maximum of six `imsi`, six `msisdn`, ten `extenderIdentifier`, and one `accountId` values can be specified.

Request Format

The request must be inserted between the `<soapenv:Body>` and `</soapenv:Body>` XML tags, as shown in [SOAP Request Messages](#).

```

<deleteSubscriberRequest [timeout="timeout"] [group="group"]>
  <addressList>
    [
      <accountId>accountId</accountId>
    ]
    [
      <imsi>imsi</imsi>
      ...
      <imsi>imsi</imsi>
    ]
    [
      <msisdn>msisdn</msisdn>
      ...
      <msisdn>msisdn</msisdn>
    ]
    [
      <externalId>extId</externalId>
      ...
      <externalId>extId</externalId>
    ]
  </addressList>
</deleteSubscriberRequest>

```

Request Parameters

Table 4-13 <deleteSubscriberRequest> Parameters (SOAP)

| Parameter | Description | Values |
|--------------------|--|---|
| timeout (Optional) | The amount of time (in seconds) to wait before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write will be processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds (default is 0). |
| group (Optional) | Indicates if all of the subscriber's data should be deleted or just specified IMSI, MSISDN, or Extender Identifier routing entities. | y - Delete subscriber and all of its IMSI, MSISDN, and Extender Identifier routing entities. n - Only delete specified IMSI, MSISDN, and Extender Identifier routing entities (default). |

Table 4-13 (Cont.) <deleteSubscriberRequest> Parameters (SOAP)

| Parameter | Description | Values |
|-----------------------|---|------------------------------------|
| accountId (Optional) | A user-defined Account ID value to delete. | 1 to 26 numeric digits. |
| imsi (Optional) | An IMSI (specified in E.212 format) value to delete. | 10 to 15 numeric digits. |
| msisdn (Optional) | An MSISDN (specified in E.164 format) value to delete. | 8 to 15 numeric digits. |
| externalId (Optional) | An External Identifier (specified in NAI format) value to delete. | A string with 3 to 257 characters. |

4.10.2 Response

The delete Subscriber response is returned as a generic `<ns2:sdsResult>` response. This response returns the result of the request to delete subscriber and/or routing entities. A single result applies to all routing entities supplied. Either all subscriber and/or routing entities were successfully deleted, or no deletes were made.

If applying all of the delete changes results in no routing entities being deleted (because the database already did not contain the specified values), the `NO_UPDATES` error code is returned and the number of affected records is 0.

If a subscriber is successfully deleted, the `description` field contains lists of deleted IMSI, MSISDN, and External Identifier values.

Response Format

The response is displayed between the `<soapenv:Body>` and `</soapenv:Body>` XML tags, as shown in [SOAP Response Messages](#).

```
<ns2:sdsResult affected="affected" error="error"
[description="description"]>
</ns2:sdsResult>
```

Response Error Codes

[Table 4-14](#) displays common error codes for the `<deleteSubscriber>` response. See [SDS Response Message Error Codes](#) for a full list of error codes.

Table 4-14 <deleteSubscriberResponse> Error Codes (SOAP)

| Error Code | Description |
|----------------------|---|
| SUCCESS | The delete request was successfully completed. |
| NO_UPDATES | The record does not exist in the database. |
| MULTIPLE_SUBSCRIBERS | Specified parameters refer to multiple subscribers. |
| ROUTE_TYPE_MISMATCH | Standalone and subscriber routes are not allowed in same command. |

Table 4-14 (Cont.) <deleteSubscriberResponse> Error Codes (SOAP)

| Error Code | Description |
|-------------------------|---|
| DEL_ROUTE_NOT_PERMITTED | The last route from a subscriber cannot be deleted. |

4.10.3 Examples

These examples show the SDS provisioning request and response contents that are stored within the <soapenv:Body> or <SOAP-ENV:Body> tags. See Start Transaction [Examples](#) for an example of the whole SOAP request/response text.

Delete Standalone Routing Entities

This example deletes standalone IMSI and MSISDN routing entities.

Request:

```
<deleteSubscriberRequest>
  <addressList>
    <imsi>111111111100021</imsi>
    <imsi>111111111100022</imsi>
    <msisdn>8004605520</msisdn>
  </addressList>
</deleteSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="3" error="0">
</ns2:sdsResult>
```

Delete Several Routing Entities

This example successfully deletes two standalone IMSI routing entities. Other IMSI values were not found and were not deleted.

Request:

```
<deleteSubscriberRequest>
  <addressList>
    <imsi>777777777777777</imsi>
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <imsi>888888888888888</imsi>
  </addressList>
</deleteSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="2" error="0">
</ns2:sdsResult>
```

Delete Routing Entities Assigned to the Same Subscriber

This example deletes IMSI and MSISDN routing entities that are assigned to the same subscriber. The example assumes that the subscriber has at least one more routing entity other than the specified values.

Request

```
<deleteSubscriberRequest>
  <addressList>
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
  </addressList>
</deleteSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="2" error="0">
</ns2:sdsResult>
```

Delete Last Routing Entity for a Subscriber (Success)

This example successfully deletes the subscriber and all IMSI and MSISDN routing entities assigned to the subscriber. Any of the subscriber's Account ID, MSISDN or IMSI values can be specified. In this example, all of the IMSI and MSISDN values are specified even though only 1 value is required.

Request:

```
<deleteSubscriberRequest timeout="10" group="y">
  <addressList>
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
  </addressList>
</deleteSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="1" error="0">
</ns2:sdsResult>
```

Delete Last Routing Entity for a Subscriber (Failure)

This example attempts to delete IMSI and MSISDN routing entities that are assigned to the same subscriber. The example fails because the subscriber does not have any more routing entities.

No changes are made to the database because the request failed.

Request:

```
<deleteSubscriberRequest timeout="10">
  <addressList>
```

```
<imsi>111111111100001</imsi>
<imsi>111111111100002</imsi>
<msisdn>8004605500</msisdn>
</addressList>
</deleteSubscriberRequest>
```

Response:

```
<ns2:sdsResult description="cannot delete the last route from subscriber"
affected="0" error="2027">
</ns2:sdsResult>
```

Delete a Subscriber (Success)

This example successfully deletes the subscriber and all IMSI and MSISDN routing entities assigned to the subscriber. Any of the subscriber's Account ID, MSISDN, or IMSI values can be specified. In this example, the Account ID is specified.

Request:

```
<deleteSubscriberRequest timeout="10" group="y">
  <addressList>
    <accountId>80044400001234567890111112</accountId>
  </addressList>
</deleteSubscriberRequest>
```

Response:

```
<ns2:sdsResult affected="1" error="0">
</ns2:sdsResult>
```

4.11 Read Subscriber

4.11.1 Request

The `<readSubscriberRequest>` request extracts IMSI, MSISDN, and External Identifier routing data and subscriber data. See [Subscriber and Routing Data](#) for a description of subscriber and routing data. Each routing entity contains up to nine destination names.

If the `group="y"` attribute is specified, then the request extracts and displays all data associated with the subscriber. The returned response will have the Subscriber's Account ID, all IMSI, MSISDN, and External Identifier values, and the nine destination values from any of the subscriber's routing entities is returned in the response. All of a subscriber's routing entities have the same destination values, so any routing entity can be used to extract the values.

If `group="y"` is not specified or if `group="n"` is specified, then only the specified IMSI, MSISDN, and External Identifier routing entities are retrieved. The returned response will have each IMSI, MSISDN, or External Identifier value along with its individual up to nine destination values.

Semantic Rules (requests that do not specify the group attribute or specify group="n")

- The `accountId` parameter cannot be specified.
- At least one routing entity (IMSI, MSISDN, or External Identifier) must be specified.
- A maximum of 10 routing entities (IMSI, MSISDN, External Identifier, or combinations of the two) can be specified.

Semantic Rules (requests that specify group="y")

- All specified `accountId`, `imsi`, `msisdn`, or `externalIdentifier` values must be assigned to one subscriber. The specified IMSI, MSISDN, and External Identifier values cannot exist in a standalone routing entity.
- The `accountId` parameter can be specified.
- A maximum of six `imsi`, six `msisdn`, ten `externalIdentifier`, and one `accountId` values can be specified.

Request Format

The request must be inserted between the `<soapenv:Body>` and `</soapenv:Body>` XML tags, as shown in [SOAP Request Messages](#).

```
<readSubscriberRequest [group="group"]>
  <addressList>
    [
      <accountId>accountId</accountId>
    ]
    [
      <imsi>imsi</imsi>
      ...
      <imsi>imsi</imsi>
    ]
    [
      <msisdn>msisdn</msisdn>
      ...
      <msisdn>msisdn</msisdn>
    ]
    [
      <externalId>extId</externalId>
      ...
      <externalId>extId</externalId>
    ]
  </addressList>
</readSubscriberRequest>
```


Request Parameters

Table 4-15 <readSubscriberRequest> Parameters (SOAP)

| Parameter | Description | Values |
|-----------------------|--|---|
| group (Optional) | Indicates if all of the subscriber's data should be retrieved or just specified IMSI, MSISDN, or External Identifier routing entities. | y - Read subscriber and all of its IMSI, MSISDN, and External Identifier routing entities. n - Only read specified IMSI, MSISDN, and External Identifier routing entities (default). |
| accountId (Optional) | A user-defined Account ID value to read. | 1 to 26 numeric digits. |
| imsi (Optional) | An IMSI (specified in E.212 format) value to read. | 10 to 15 numeric digits. |
| msisdn (Optional) | An MSISDN (specified in E.164 format) value to read. | 8 to 15 numeric digits. |
| externalId (Optional) | An External Identifier (specified in NAI format) value to read. | A string with 3 to 257 characters. |

4.11.2 Response

The <readSubscriberResponse> message returns the result of the request to read subscriber routing entities. Only those subscribers or routing entities that are found are returned. The response message contains up to nine destinations (one for each destination type, such as <lteHss>) for each routing entity or subscriber. Only provisioned destination names are displayed. (for example, destination names= "none" are not displayed).

Some variations in the response occur, depending on whether a subscriber or routing entities are being retrieved.

Routing entities are retrieved (group="y" is not specified or group="n" is specified):

- No <subscriber> or <accountId> tags are used.
- The destination values are listed within each IMSI, MSISDN, or External Identifier routing entity value.

A subscriber is retrieved (group="y" was specified):

- The <subscriber> tag is used within the <resultSet> tag.
- The <accountId> tag is displayed if the subscriber has an Account ID value defined.
- The destination values are listed one time, after the last routing entity.

Response Format (group="y" is not specified)

The response is displayed between the <soapenv:Body> and </soapenv:Body> XML tags of a SOAP response message, as shown in [SOAP Response Messages](#).

```
<readSubscriberResponse>
  <result affected="affected" error="error" [description="description"]>
  </result>
  [
```

```
<resultSet>
[
  <imsi imsi="imsi">
    [ <imshss>imshss</imshss> ]
    [ <ltehss>ltehss</ltehss> ]
    [ <pcrf>pcrf</pcrf> ]
    [ <ocs>ocs</ocs> ]
    [ <ofcs>ofcs</ofcs> ]
    [ <aaa>aaa</aaa> ]
    [ <userdef1>userdef1</userdef1> ]
    [ <userdef2>userdef2</userdef2> ]
    [ <mtchss>mtchss</mtchss> ]
  </imsi>
  ...
  <imsi imsi="imsi">
    [ <imshss>imshss</imshss> ]
    [ <ltehss>ltehss</ltehss> ]
    [ <pcrf>pcrf</pcrf> ]
    [ <ocs>ocs</ocs> ]
    [ <ofcs>ofcs</ofcs> ]
    [ <aaa>aaa</aaa> ]
    [ <userdef1>userdef1</userdef1> ]
    [ <userdef2>userdef2</userdef2> ]
    [ <mtchss>mtchss</mtchss> ]
  </imsi>
]
[
  <msisdn msisdn="msisdn">
    [ <imshss>imshss</imshss> ]
    [ <ltehss>ltehss</ltehss> ]
    [ <pcrf>pcrf</pcrf> ]
    [ <ocs>ocs</ocs> ]
    [ <ofcs>ofcs</ofcs> ]
    [ <aaa>aaa</aaa> ]
    [ <userdef1>userdef1</userdef1> ]
    [ <userdef2>userdef2</userdef2> ]
    [ <mtchss>mtchss</mtchss> ]
  </msisdn>
  ...
  <msisdn msisdn="msisdn">
    [ <imshss>imshss</imshss> ]
    [ <ltehss>ltehss</ltehss> ]
    [ <pcrf>pcrf</pcrf> ]
    [ <ocs>ocs</ocs> ]
    [ <ofcs>ofcs</ofcs> ]
    [ <aaa>aaa</aaa> ]
    [ <userdef1>userdef1</userdef1> ]
    [ <userdef2>userdef2</userdef2> ]
    [ <mtchss>mtchss</mtchss> ]
  </msisdn>
]
[
  <externalId externalId="extId">
    [ <imshss>imshss</imshss> ]
    [ <ltehss>ltehss</ltehss> ]
  ]
]
```

```

    [ <pcrf>pcrf</pcrf> ]
    [ <ocs>ocs</ocs> ]
    [ <ofcs>ofcs</ofcs> ]
    [ <aaa>aaa</aaa> ]
    [ <userdef1>userdef1</userdef1> ]
    [ <userdef2>userdef2</userdef2> ]
    [ <mtchss>mtchss</mtchss> ]
</externalId>
    ...
<externalId externalId="extId">
    [ <imshss>imshss</imshss> ]
    [ <ltehss>ltehss</ltehss> ]
    [ <pcrf>pcrf</pcrf> ]
    [ <ocs>ocs</ocs> ]
    [ <ofcs>ofcs</ofcs> ]
    [ <aaa>aaa</aaa> ]
    [ <userdef1>userdef1</userdef1> ]
    [ <userdef2>userdef2</userdef2> ]
    [ <mtchss>mtchss</mtchss> ]
</externalId>
]
</resultSet>
]
</readSubscriberResponse>

```

Response Format (group="y" is specified)

The response is displayed between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP response message, as shown in [SOAP Response Messages](#).

```

<readSubscriberResponse>
  <result affected="affected" error="error" [description="description"]/>
  [
    <resultSet>
      <subscriber>
        [ <accountId>accountId</accountId> ]
        [
          <imsi>imsi</imsi> ]
          ...
          [ <imsi>imsi</imsi> ]
          [ <msisdn>msisdn</msisdn> ]
          ...
          [ <msisdn>msisdn</msisdn> ]
          [ <externalId>extId1</externalId> ]
          ...
          [ <externalId>extIdn</externalId> ]
          [ <imshss>imshss</imshss> ]
          [ <ltehss>ltehss</ltehss> ]
          [ <pcrf>pcrf</pcrf> ]
          [ <ocs>ocs</ocs> ]
          [ <ofcs>ofcs</ofcs> ]
          [ <aaa>aaa</aaa> ]
          [ <userdef1>userdef1</userdef1> ]
          [ <userdef2>userdef2</userdef2> ]
          [ <mtchss>mtchss</mtchss> ]
        ]
      ]
    ]
  ]

```

```

        </subscriber>
    </resultSet>
}
</readSubscriberResponse>

```

Response Parameters

Table 4-16 <readSubscriberResponse> Parameters (SOAP)

| Parameter | Description | Values |
|-----------------------|--|---|
| group (Optional) | Indicates if all of the subscriber's data should be retrieved or just specified IMSI, MSISDN, or External Identifier routing entities. | y - Read subscriber and all of its IMSI, MSISDN, and External Identifier routing entities. n - Only read specified MSISDN, IMSI, and External Identifier routing entities (default). |
| error | Error code that indicates whether or not operation was successfully executed. | 0 for success, non-zero for failure. |
| affected | The number of routing entities or subscribers (for group="y") read. | 0-12 |
| description | A textual description associated with the response. This field may contain more information as to why a request failed. | A string with 1 to 1024 characters. |
| resultSet | Contains 1 row for each extracted record. Each row contains a standalone routing entity (IMSI, MSISDN, or External Identifier value and its destination values) or a subscriber (list of related IMSI, MSISDN, External Identifier, and Account ID values and the destination values used by all routing entities assigned to the subscriber). | |
| subscriber (Optional) | Contains all of the IMSI, MSISDN, and External Identifier values for a specific subscriber, an optional Account ID, and all destinations defined for the subscriber. | |
| accountId (Optional) | A user-defined Account ID value. | 1 to 26 numeric digits. |
| imsi (Optional) | An IMSI (specified in E.212 format) value. | 10 to 15 numeric digits. |

Table 4-16 (Cont.) <readSubscriberResponse> Parameters (SOAP)

| Parameter | Description | Values |
|-----------------------|--|------------------------------------|
| msisdn (Optional) | An MSISDN (specified in E.164 international public telecommunication numbering plan format) value. | 8 to 15 numeric digits. |
| externalId (Optional) | An External Identifier (specified in NAI format) value. | A string with 3 to 257 characters. |
| imshss (Optional) | The name of the IMS HSS destination. | A string with 1 to 32 characters. |
| ltehss (Optional) | The name of the LTE HSS destination. | A string with 1 to 32 characters. |
| pcrf (Optional) | The name of the PCRF destination. | A string with 1 to 32 characters. |
| ocs (Optional) | The name of the OCS destination. | A string with 1 to 32 characters. |
| ofcs (Optional) | The name of the OFCS destination. | A string with 1 to 32 characters. |
| aaa (Optional) | The name of the AAA server destination. | A string with 1 to 32 characters. |
| userdef1 (Optional) | The name of the first user defined destination. | A string with 1 to 32 characters. |
| userdef2 (Optional) | The name of the second user defined destination. | A string with 1 to 32 characters. |
| mtchss (Optional) | The name of the MTC HSS destination. | A string with 1 to 32 characters. |

Error Codes

Table 4-17 lists common errors for the <readSubscriberResponse> command. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 4-17 <readSubscriberResponse> Error Codes (SOAP)

| Error Code | Description |
|-------------------------------|--|
| SUCCESS | The read request was successfully completed. |
| IMSI_NOT_FOUND | IMSI does not exist. |
| MSISDN_NOT_FOUND | MSISDN does not exist. |
| SUBSCRIBER_NOT_FOUND | The subscriber could not be found in the database. |
| MULTIPLE_SUBSCRIBERS | Specified parameters refer to multiple subscribers. |
| ROUTE_TYPE_MISMATCH | Standalone and subscriber routes are not allowed in same command. |
| NO_ROUTES_SPECIFIED | At least one IMSI, MSISDN, or External Identifier must be specified. |
| DOMAIN_IDENTIFIER_NOT_FOUND | Domain Identifier does not exist. |
| EXTERNAL_IDENTIFIER_NOT_FOUND | External Identifier does not exist. |

4.11.3 Examples

These examples show the SDS provisioning request and response contents that are stored within the `<soapenv:Body>` or `<SOAP-ENV:Body>` tags. See [Start Transaction Examples](#) for an example of the whole SOAP request/response text.

The format of the response differs depending on whether the `group="y"` attribute is specified.

If `group="y"` is not specified, then each routing entity that was found is displayed with its destination values.

If `group="y"` is specified, then the result response includes an optional Account ID value, all IMSI, MSISDN, and External Identifier values for that subscriber, and one set of destination values (all routing entities within a subscriber have the same destination values).

Read Routing Entities (not subscribers)

This example reads IMSI and MSISDN routing entities and displays their destination values. It does not matter if any of the routing entities are assigned to a subscriber because the same result will occur.

Request:

```
<readSubscriberRequest>
  <addressList>
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
  </addressList>
</readSubscriberRequest>
```

Response:

```
<ns3:readSubscriberResponse>
  <result affected="3" error="0"></result>
  <resultSet>
    <imsi imsi="111111111100001">
      <ltehss>LTE_HSS_4</ltehss>
      <aaa>AAA_4</aaa>
    </imsi>
    <imsi imsi="111111111100002">
      <ltehss>LTE_HSS_4</ltehss>
      <aaa>AAA_4</aaa>
    </imsi>
    <msisdn msisdn="8004605500">
      <ltehss>LTE_HSS_4</ltehss>
      <aaa>AAA_4</aaa>
    </msisdn>
  </resultSet>
</ns3:readSubscriberResponse>
```

Read Routing Entities with Not Found IMSI/MSISDN Values

This example reads IMSI and MSISDN routing entities and displays their destination values. In this example, one IMSI and one MSISDN value do not exist, so the response returns the two values that do exist. The same result will occur if any of the routing entities are assigned to a subscriber.

Request:

```
<readSubscriberRequest>
  <addressList>
    <imsi>7777777777777777</imsi>
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
    <msisdn>8888888888888888</msisdn>
  </addressList>
</readSubscriberRequest>
```

Response:

```
<ns3:readSubscriberResponse>
  <result affected="2" error="0"></result>
  <resultSet>
    <imsi imsi="111111111100002">
      <ltehss>LTE_HSS_4</ltehss>
      <aaa>AAA_4</aaa>
    </imsi>
    <msisdn msisdn="8004605500">
      <ltehss>LTE_HSS_4</ltehss>
      <aaa>AAA_4</aaa>
    </msisdn>
  </resultSet>
</ns3:readSubscriberResponse>
```

Read Subscriber (Success)

This example reads a subscriber and displays all of the subscriber data. Any of the subscriber Account ID, IMSI, or MSISDN values can be specified. In this example, the MSISDN value is specified.

Request:

```
<readSubscriberRequest group="y">
  <addressList>
    <msisdn>8004605500</msisdn>
  </addressList>
</readSubscriberRequest>
```

Response:

```
<ns3:readSubscriberResponse>
  <result affected="1" error="0"></result>
  <resultSet>
```

```
<subscriber>
  <accountId>80044400001234567890111112</accountId>
  <imsi>111111111100001</imsi>
  <imsi>111111111100002"</imsi>
  <msisdn>8004605500</msisdn>
  <lthss>LTE_HSS_4</lthss>
  <aaa>AAA_4</aaa>
</subscriber>
</resultSet>
</ns3:readSubscriberResponse>
```

Read Subscriber Fails for Standalone Routing Entity

This example attempts to read a subscriber. The request fails because the specified MSISDN value is for a standalone routing entity.

Request:

```
<readSubscriberRequest group="y">
  <addressList>
    <msisdn>9198675309</msisdn>
  </addressList>
</readSubscriber>
```

Response:

```
<ns3:readSubscriberResponse>
  <result description="subscriber not found" affected="0"
error="2022"></result>
</ns3:readSubscriberResponse>
```

4.12 Update Subscriber NAI

4.12.1 Request

The `<updateSubscriberNaiRequest>` provisions NAI routing entities. Each NAI value is defined as a combination of an NAI host and NAI user value. For example, John.Smith@oracle.com would have John.Smith as the NAI user value and oracle.com as the NAI host value.

Each routing entity contains up to nine destination names. Each destination contains FQDN and realm values, which are used for routing messages. The request can remove a destination value from existing NAI routing entities by specifying `none` as the destination name.

The request can add new routing entities or update destination names in existing routing entities. These destination changes are applied to all specified NAI routing entities.

Semantic Rules

- The host name must already exist in the database.
- Between 1 and 10 user names must be specified.

- At least one destination must be specified.
- All specified destination names must already exist in the database.
- Each destination name type can only be specified once.
- Specifying a destination name of "none" removes the association of that destination from the specified routing entity.
- All specified routing entities will be provisioned with the same destination value(s).

Request Format

The request must be inserted between the `<soapenv:Body>` and `</soapenv:Body>` XML tags, as shown in [SOAP Request Messages](#).

```
<updateSubscriberNaiRequest [timeout="timeout"]>
  <naiList>
    <host>host</host>
    <user>user</user>
  [
    <user>user</user>
    ...
    <user>user</user>
  ]
  </naiList>
  <destinationList>
[ <imshss>imshss</imshss> ]
[ <ltehss>ltehss</ltehss> ]
[ <pcrf>pcrf</pcrf> ]
[ <ocs>ocs</ocs> ]
[ <ofcs>ofcs</ofcs> ]
[ <aaa>aaa</aaa> ]
[ <userdef1>userdef1</userdef1> ]
[ <userdef2>userdef2</userdef2> ]
[ <mtchss>mtchss</mtchss> ]
  </destinationList>
</updateSubscriberNaiRequest>
```

Request Parameters

Table 4-18 <updateSubscriberNaiRequest> Parameters (SOAP)

| Parameter | Description | Values |
|---------------------|--|---|
| timeout (Optional) | The amount of time (in seconds) to wait before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write will be processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds (default is 0). |
| host | The host name, which is used with all user values. | A string with 1 to 64 characters. |
| user | The NAI user name to be associated with the host to form an NAI. | A string with 1 to 64 characters. Must have 1-10 user values. |
| imshss (Optional) | The name of the IMS HSS destination. | A string with 1 to 32 characters. |
| ltehss (Optional) | The name of the LTE HSS destination. | A string with 1 to 32 characters. |
| pcrf (Optional) | The name of the PCRF destination. | A string with 1 to 32 characters. |
| ocs (Optional) | The name of the OCS destination. | A string with 1 to 32 characters. |
| ofcs (Optional) | The name of the OFCS destination. | A string with 1 to 32 characters. |
| aaa (Optional) | The name of the AAA server destination. | A string with 1 to 32 characters. |
| userdef1 (Optional) | The name of the first user defined destination. | A string with 1 to 32 characters. |
| userdef2 (Optional) | The name of the second user defined destination. | A string with 1 to 32 characters. |

4.12.2 Response

The update subscriber NAI response is returned as a generic `<ns2:sdsResult>` response. This response returns the result of the request to provision NAI subscriber routing entities. A single result applies to all routing entities supplied. Either all routing entities were successfully updated, or no updates were made.

 **Note:**

If applying all of the provisioning changes results in no database records being modified (because the database already contained the updated values), the NO_UPDATES error code is returned and the number of affected records is 0.

Response Format

The response is displayed between the `<soapenv:Body>` and `</soapenv:Body>` XML tags, as shown in [SOAP Response Messages](#).

```
<ns2:sdsResult affected="affected" error="error" [description="description"]>
</ns2:sdsResult>
```

Response Parameters

The parameters for all of the SOAP response commands are shown in [SOAP Response Messages](#).

Response Error Codes

[Table 4-19](#) lists common error codes for the `<updateSubscriberNaiResponse>` command. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 4-19 <updateSubscriberNaiResponse> Error Codes (SOAP)

| Error Code | Description |
|--------------------|---|
| SUCCESS | The update request was successfully completed. |
| NO_UPDATES | The request does not have updates to the database. |
| NAI_HOST_NOT_FOUND | Host name does not exist. |
| DEST_NOT_FOUND | Destination name does not exist. |
| DEST_TYPE_MISMATCH | Destination has a different destination type than the desired destination type. |

4.12.3 Examples

Some of the following examples are based upon previous requests. The order of the requests can be important.

These examples show the SDS provisioning request and response contents that are stored within the `<soapenv:Body>` or `<SOAP-ENV:Body>` tags. See [Start Transaction Examples](#) for an example of the whole SOAP request/response text.

Add New NAI Routing Entities

This example creates three new NAI routing entities and sets their destination values to the specified values. This example assumes that the host and destination values already exist.

The result of this request is:

- New NAI routing entities are created.

- All destination values for each routing entity are set to specified values.

Request:

```
<updateSubscriberNaiRequest timeout="10">
  <naiList>
    <host>oracle.com</host>
    <user>John.Smith</user>
    <user>Jane.Doe</user>
    <user>Mike.Jones</user>
  </naiList>
  <destinationList>
    <imshss>IMS_HSS_1</imshss>
    <ltehss>LTE_HSS_1</ltehss>
    <aaa>AAA_Texas</aaa>
  </destinationList>
</updateSubscriberNaiRequest>
```

Response:

```
<ns2:sdsResult affected="3" error="0">
</ns2:sdsResult>
```

Update NAI Routing Entities Destinations (Success)

This example updates existing NAI routing entities with new destination values.

**Note:**

This request does not update all NAI values that were specified in the previous request.

The result of this request is that the specified NAI routing entities are updated with specified values.

Request:

```
<updateSubscriberNaiRequest timeout="10">
  <naiList>
    <host>oracle.com</host>
    <user>Jane.Doe</user>
    <user>Mike.Jones</user>
  </naiList>
  <destinationList>
    <ltehss>LTE_HSS_4</ltehss>
    <pcrf>PCRF_Ohio</pcrf>
  </destinationList>
</updateSubscriberNaiRequest>
```

Response:

```
<ns2:sdsResult affected="2" error="0">
</ns2:sdsResult>
```

Update NAI Routing Entities Destinations (Failure)

This example fails to update existing NAI routing entities with new destination values because the destination does not exist.

No changes are made to the database because the request failed.

Request:

```
<updateSubscriberNaiRequest timeout="10">
  <naiList>
    <host>oracle.com</host>
    <user>Jane.Doe</user>
  </naiList>
  <destinationList>
    <ltehss>junk</ltehss>
  </destinationList>
</updateSubscriberNaiRequest>
```

Response:

```
<ns2:sdsResult description="destination not found"
  affected="0" error="2006">
</ns2:sdsResult>
```

4.13 Delete Subscriber NAI

4.13.1 Request

The `<deleteSubscriberNaiRequest>` message deletes NAI routing entities. Each NAI value is defined as a combination of a NAI host and NAI user value. For example, "John.Smith@oracle.com" would have "John.Smith" as the NAI user value and "oracle.com" as the NAI host value. The `<deleteSubscriberNaiRequest>` removes the NAI user value, but does not affect the NAI host value.

Semantic Rules

- The host name must already exist in the database.
- Between 1 and 10 user names must be specified.

Request Format

The request must be inserted between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP request message, as shown in [SOAP Request Messages](#).

```
<deleteSubscriberNaiRequest [timeout="timeout"]>
  <naiList>
```

```

        <host>host</host>
        <user>user</user>
    [
        <user>user</user>
        ...
        <user>user</user>
    ]
    </naiList>
</deleteSubscriberNaiRequest>

```

Request Parameters

Table 4-20 <deleteSubscriberNaiRequest> Parameters (SOAP)

| Parameter | Description | Values |
|--------------------|--|---|
| timeout (Optional) | The amount of time (in seconds) to wait before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write will be processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds (default is 0). |
| host | The host name, which is used with all user values. | A string with 1 to 64 characters. |
| user | The NAI user name to be associated with the host to form an NAI. | A string with 1 to 64 characters. Must have 1-10 user values. |

4.13.2 Response

The delete subscriber NAI response is returned as a generic `<ns2:sdsResult>` response. This response returns the result of the request to delete NAI subscriber routing entities. A single result applies to all routing entities supplied. The response returns the number actually deleted. Any that do not exist are not included in the count. However, if any actual delete fails, then the whole command fails and no changes are made.

Note:

If applying all of the delete requests results in no database records being deleted (because they already did not exist in the database), the `NO_UPDATES` error code is returned and the number of affected records is 0.

Response Output

The response is displayed between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP response message, as shown in [SOAP Response Messages](#).

```
<ns2:sdsResult affected="affected" error="error" [description="description"]>
</ns2:sdsResult>
```

Response Parameters

The parameters for all of the SOAP response commands are shown in [SOAP Response Messages](#).

Error Codes

[Table 4-21](#) lists the common error codes for the SOAP `<deleteSubscriberNaiResponse>` message. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 4-21 `<deleteSubscriberNaiResponse>` Error Codes (SOAP)

| Error Code | Description |
|--------------------|--|
| SUCCESS | The delete request was successfully completed. |
| NO_UPDATES | The record does not exist in the database. |
| NAI_HOST_NOT_FOUND | The Host name does not exist. |

4.13.3 Examples

These examples show the SDS provisioning request and response contents that are stored within the `<soapenv:Body>` or `<SOAP-ENV:Body>` tags. See [Start Transaction Examples](#) for an example of the whole SOAP request/response text.

Delete NAI Routing Entities

This example successfully deletes three NAI routing entities.

Request:

```
<deleteSubscriberNaiRequest timeout="10">
  <naiList>
    <host>oracle.com</host>
    <user>John.Smith</user>
    <user>Jane.Doe</user>
    <user>Mike.Jones</user>
  </naiList>
</deleteSubscriberNaiRequest>
```

Response:

```
<ns2:sdsResult affected="3" error="0">
</ns2:sdsResult>
```

Delete Several NAI Routing Entities

This example successfully deletes two NAI routing entities. Other NAI values were not found and were not deleted.

Request:

```
<deleteSubscriberNaiRequest timeout="10">
  <naiList>
    <host>oracle.com</host>
    <user>John.Smith</user>
    <user>Ann.Jones</user>
    <user>Jane.Doe</user>
    <user>Mike.Jackson</user>
  </naiList>
</deleteSubscriberNaiRequest>
```

Response:

```
<ns2:sdsResult affected="2" error="0">
</ns2:sdsResult>
```

Delete NAI Routing Entities (failure)

This example fails because no NAI subscribers are found.

Request:

```
<deleteSubscriberNaiRequest>
  <naiList>
    <host>junk.com</host>
    <user>John.Smith</user>
    <user>Jane.Doe</user>
  </naiList>
</deleteSubscriberNaiRequest>
```

Response:

```
<ns3:deleteSubscriberNaiResponse>
  <result description="host not found" affected="0" error="2010">
  </result>
</ns3:deleteSubscriberNaiResponse>
```

4.14 Read Subscriber NAI

4.14.1 Request

The `<readSubscriberNaiRequest>` message extracts (reads) NAI routing entities and displays the 1-9 destination values for each routing entity.

Semantic Rules

- The host name must already exist in the database.
- Between 1 and 10 user names must be specified.

Request Format

The request must be inserted between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP request message, as shown in [SOAP Request Messages](#).

```
<readSubscriberNaiRequest [timeout="timeout"]>
  <naiList>
    <host>host</host>
    <user>user</user>
    [
      <user>user</user>
      ...
      <user>user</user>
    ]
  </naiList>
</readSubscriberNaiRequest>
```

Request Parameters

Table 4-22 `<readSubscriberNaiRequest>` Parameters (SOAP)

| Parameters | Description | Values |
|--------------------|---|---|
| timeout (Optional) | The amount of time (in seconds) to wait before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write will be processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds (default is 0). |
| host | The host name, which is used with all user values. | A string with 1 to 64 characters. |
| user | The NAI user name to be associated with the host to form an NAI. | A string with 1 to 64 characters. Must have 1-10 user values. |

4.14.2 Response

The `<readSubscriberNaiResponse>` response returns the result of the request to read NAI subscriber routing entities. Only those NAI subscriber routing entities that are found are returned. The response message contains up to nine destinations (one for each destination type, such as `<ltehss>`) for each routing entity. Only provisioned destination names are displayed. (for example, destination names= "none" are not displayed).

Response Format

The response is displayed between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP response message, as shown in [SOAP Response Messages](#).

```

<ns3:readSubscriberNaiResponse>
  <result affected="affected" error="error"
[description="description"]>
  </result>
  [
    <resultSet>
      <user="user" nai host="host">
        [ <imshss>imshss</imshss> ]
        [ <ltehss>ltehss</ltehss> ]
        [ <pcrf>pcrf</pcrf> ]
        [ <ocs>ocs</ocs> ]
        [ <ofcs>ofcs</ofcs> ]
        [ <aaa>aaa</aaa> ]
        [ <userdef1>userdef1</userdef1> ]
        [ <userdef2>userdef2</userdef2> ]
        [ <mtchss>mtchss</mtchss> ]
      </nai>
    ]
    ...
    <user="user" nai host="host">
      [ <imshss>imshss</imshss> ]
      [ <ltehss>ltehss</ltehss> ]
      [ <pcrf>pcrf</pcrf> ]
      [ <ocs>ocs</ocs> ]
      [ <ofcs>ofcs</ofcs> ]
      [ <aaa>aaa</aaa> ]
      [ <userdef1>userdef1</userdef1> ]
      [ <userdef2>userdef2</userdef2> ]
      [ <mtchss>mtchss</mtchss> ]
    </nai>
  ]
</resultSet>
]
</ns3:readSubscriberNaiResponse>

```

Response Parameters

Table 4-23 `<readSubscriberNaiResponse>` Parameters (SOAP)

| Parameter | Description | Values |
|-----------|---|--------------------------------------|
| error | Error code that indicates whether or not operation was successfully executed. | 0 for success, non-zero for failure. |
| affected | The number of routing entities read. | 0-10 |

Table 4-23 (Cont.) <readSubscriberNaiResponse> Parameters (SOAP)

| Parameter | Description | Values |
|---------------------------------|--|--|
| description (Optional) | A textual description associated with the response. This field may contain more information as to why a request failed or a description of the changes if the request succeeded. | A string with 1 to 1024 characters. |
| <resultSet> SOAP tag (optional) | Indicates rows of data are returned. If no records are being returned, this tag is not present. | A string with 1 to 1024 characters. |
| host | The host name, which is used with all user values. | A string with 1 to 64 characters. |
| user | The NAI user name to be associated with the host to form an NAI. | A string with 1 to 64 characters. Must have 1-10 user values. |
| imshss (Optional) | The name of the IMS HSS destination. | A string with 1 to 32 characters. |
| ltehss (Optional) | The name of the LTE HSS destination. | A string with 1 to 32 characters. |
| pcrf (Optional) | The name of the PCRF destination. | A string with 1 to 32 characters. |
| ocs (Optional) | The name of the OCS destination. | A string with 1 to 32 characters. |
| ofcs (Optional) | The name of the OFCS destination. | A string with 1 to 32 characters. |
| aaa (Optional) | The name of the AAA server destination. | A string with 1 to 32 characters. |
| userdef1 (Optional) | The name of the first user defined destination. | A string with 1 to 32 characters. |
| userdef2 (Optional) | The name of the second user defined destination. | A string with 1 to 32 characters. |

Error Codes

[Table 4-24](#) lists the common error codes for the <readSubscriberNaiResponse> command. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 4-24 <readSubscriberNaiResponse> Error Codes (SOAP)

| Error Code | Description |
|--------------------|--|
| SUCCESS | The read request was successfully completed. |
| NAI_HOST_NOT_FOUND | Host name does not exist. |
| NAI__NOT_FOUND | None of the specified NAIs exist. |

4.14.3 Examples

These examples show the SDS provisioning request and response contents that are stored within the `<soapenv:Body>` or `<SOAP-ENV:Body>` tags. See [Start Transaction Examples](#) for an example of the whole SOAP request/response text.

Read NAI Routing Entities

This example successfully reads three NAI routing entities.

Request:

```
<readSubscriberNaiRequest>
  <naiList>
    <host>oracle.com</host>
    <user>John.Smith</user>
    <user>Jane.Doe</user>
    <user>Mike.Jones</user>
  </naiList>
</readSubscriberNaiRequest>
```

Response:

```
<ns3:readSubscriberNaiResponse>
  <result affected="3" error="0">
  </result>
  <resultSet>
    <nai host="oracle.com" user="John.Smith">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_1</ltehss>
      <aaa>AAA_Texas</aaa>
    </nai>
    <nai host="oracle.com" user="Jane.Doe">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_4</ltehss>
      <pcrf>PCRF_Ohio</pcrf>
      <aaa>AAA_Texas</aaa>
    </nai>
    <nai host="oracle.com" user="Mike.Jones">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_4</ltehss>
      <pcrf>PCRF_Ohio</pcrf>
      <aaa>AAA_Texas</aaa>
    </nai>
  </resultSet>
</ns3:readSubscriberNaiResponse>
```

Read NAI Routing Entities

This example successfully reads two NAI routing entities. Other NAI values are not found.

Request:

```
<readSubscriberNaiRequest>
  <naiList>
    <host>oracle.com</host>
    <user>John.Smith</user>
    <user>Ann.Jones</user>
    <user>Jane.Doe</user>
    <user>Mike.Jackson</user>
  </naiList>
</readSubscriberNaiRequest>
```

Response:

```
<ns3:readSubscriberNaiResponse>
  <result affected="2" error="0">
</result>
  <resultSet>
    <nai host="oracle.com" user="John.Smith">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_1</ltehss>
      <aaa>AAA_Texas</aaa>
    </nai>
    <nai host="oracle.com" user="Jane.Doe">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_4</ltehss>
      <pcrf>PCRF_OHIO</pcrf>
      <aaa>AAA_Texas</aaa>
    </nai>
  </resultSet>
</ns3:readSubscriberNaiResponse>
```

Read NAI Routing Entities (Failure)

This example fails because no NAI subscribers are found.

Request:

```
<readSubscriberNaiRequest>
  <naiList>
    <host>oracle.com</host>
    <user>Kevin.Smith</user>
    <user>John.Doe</user>
  </naiList>
</readSubscriberNaiRequest>
```

Response:

```
<ns3:readSubscriberNaiResponse>
  <result description="nai not found" affected="0" error="2009">
</result>
</ns3:readSubscriberNaiResponse>
```

4.15 Message Flow Example Sessions

The following sections contain example usages of the exchanging messages between the Customer Provisioning System (CPS) and the XDS process on the Active SDS server on the Primary Provisioning Site. All scenarios assume that a TCP/IP connection has already been established between the client and SDS.

The examples only show the text that is between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP request message.

The first column in the tables is the direction that the message is going. The strings displayed in the Message column are the actual ASCII text that is between the `<soapenv:Body>` and `</soapenv:Body>` XML tags of a SOAP request that would flow over the connection.

The actual request and response messages are just a series of characters with no extra spaces or new line characters. New lines and extra spaces were added to the examples for readability purposes.

4.15.1 Single Command Transaction

This example shows three request/response pairs that are exchanged between the CPS and SDS. These requests are processed as single command transactions, which means that each request is immediately committed to the database. This example creates IMSI and MSISDN routing entities.

Table 4-25 Single Command Transaction Message Flow Example (SOAP)

| Message | | Description |
|---------|--|---|
| CPS→SDS | <pre> <updateSubscriberRequest > <addressList> <imsi>310910421000106</ imsi> <imsi>310910421000307</ imsi> <imsi>310910421000309</ imsi> <msisdn>15634210106</ msisdn> <msisdn>15634210107</ msisdn> </addressList> <destinationList> <ltehss>LTE_HSS_2</ ltehss> <aaa>AAA_4</aaa> </destinationList> </ updateSubscriberRequest> </pre> | <p>Request to create 5 stand-alone routing entities - 3 IMSIs and 2 MSISDNs with an LTE HSS and AAA server destinations.</p> <p>Note: Request is made to include the original request in the response.</p> <p>Response to create stand-alone routing entities - success. Affected rows = 5 (as 5 new entries created for 3 IMSIs and 2 MSISDNs).</p> |
| CPS←SDS | <pre> <ns2:sdsResult affected="5" error="0"> </ns2:sdsResult> </pre> | |
| CPS→SDS | <pre> <updateSubscriberRequest > <addressList> <imsi>310910421000106</ imsi> <msisdn>15634210106</ msisdn> </addressList> <destinationList> <ltehss>LTE_HSS_5</ ltehss> </destinationList> </ updateSubscriberRequest> </pre> | <p>Request to update existing IMSI and MSISDN subscriber routing entities with a new LTE HSS value.</p> <p>Response to update subscriber routing entities - success. Affected rows = 2 (2 entries for an IMSI and MSISDN were updated with new LTE HSS value).</p> |

Table 4-25 (Cont.) Single Command Transaction Message Flow Example (SOAP)

| Message | Description |
|----------|---|
| CPS←—SDS | <pre><ns2:sdsResult affected="2" error="0"> </ns2:sdsResult></pre> |
| CPS—>SDS | <pre><updateSubscriberRequest > <addressList> <imsi>310910421000102</ imsi> </addressList> <destinationList> <ltehss>BAD_VALUE</ ltehss> </destinationList> </ updateSubscriberRequest></pre> <p>Request to create a stand-alone routing entity with an invalid LTE HSS destination value. Request fails, as the destination does not exist.</p> |
| CPS←—SDS | <pre><ns2:sdsResult description="destination not found" affected="0" error="2006"></ ns2:sdsResult></pre> |

4.15.2 Multiple Commands Transaction Committed

This example issues several requests within one transaction which is then committed successfully.

Table 4-26 Multiple Commands Transaction Committed Message Flow Example (SOAP)

| Message | Description |
|----------|---|
| CPS—>SDS | <pre><startTransactionReque st>0</ startTransactionReques t></pre> <p>Request to start a transaction immediately. Response to start transaction - success.</p> |

Table 4-26 (Cont.) Multiple Commands Transaction Committed Message Flow Example (SOAP)

| Message | Description |
|----------|---|
| CPS←—SDS | <pre><ns2:sdsResult affected="0" error="0"> </ns2:sdsResult></pre> |
| CPS→—SDS | <pre><updateSubscriberReque st <addressList> <imsi>310910421000444< /imsi> <msisdn>15634210444</ msisdn> </addressList> <destinationList> <ltehss>LTE_HSS_1</ ltehss> </destinationList> </ updateSubscriberReques t></pre> <p>Request to add new standalone IMSI and MSISDN - success.</p> |
| CPS←—SDS | <pre><ns2:sdsResult affected="2" error="0"/> </ns2:sdsResult></pre> |

Table 4-26 (Cont.) Multiple Commands Transaction Committed Message Flow Example (SOAP)

| Message | | Description |
|---------|---|--|
| CPS→SDS | <pre> <updateSubscriberRequest> <addressList> <imsi>310910421000555< /imsi> <msisdn>15634210555</ msisdn> </addressList> <destinationList> <ltehss>LTE_HSS_2</ ltehss> </destinationList> </ updateSubscriberRequest> </pre> | Request to update existing standalone IMSI and MSISDN - success. |
| CPS←SDS | <pre> <ns2:sdsResult affected="2" error="0"/> </ns2:sdsResult> </pre> | |
| CPS→SDS | <pre> <updateSubscriberNaiRequest> <naiList> <host>operator.com</ host> <user>roger.brown</ user> </naiList> <destinationList> <ltehss>LTE_HSS_1</ ltehss> </destinationList> </ updateSubscriberNaiRequest> </pre> | Request to update an NAI - success. |

Table 4-26 (Cont.) Multiple Commands Transaction Committed Message Flow Example (SOAP)

| Message | Description |
|----------|--|
| CPS←—SDS | <pre><ns2:sdsResult affected="1" error="0"> </ns2:sdsResult></pre> |
| CPS—→SDS | <pre><commitRequest> </ commitRequest></pre> |
| CPS←—SDS | <pre><ns2:sdsResult affected="0" error="0"> </ns2:sdsResult></pre> |

Request to commit the transaction.
Response to commit transaction - success. All updates were successfully performed.

4.15.3 Multiple Commands Transaction Rolled Back

This example issues several requests within one transaction which is rolled back.

Table 4-27 Multiple Commands Transaction Rolled Back Message Flow Example (SOAP)

| Message | Description |
|----------|--|
| CPS—→SDS | <pre><startTransactionRequest >10</ startTransactionRequest></pre> |
| CPS←—SDS | <pre><ns2:sdsResult affected="0" error="0"> </ns2:sdsResult></pre> |

Request to start a transaction within 10 seconds.
Response to start transaction - success.

Table 4-27 (Cont.) Multiple Commands Transaction Rolled Back Message Flow Example (SOAP)

| Message | | Description |
|---------|--|--|
| CPS→SDS | <pre><updateSubscriberRequest> <addressList> <imsi>310910421000777</imsi> <msisdn>15634210777</msisdn> </addressList> <destinationList> <ltehss>LTE_HSS_7</ltehss> </destinationList> </updateSubscriberRequest></pre> | Request to update existing stand-alone IMSI and MSISDN - success. |
| CPS←SDS | <pre><ns2:sdsResult affected="2" error="0"/> </ns2:sdsResult></pre> | |
| CPS→SDS | <pre><updateSubscriberNaiRequest> <naiList> <host>operator.com</host> <user>david.leno</user> </naiList> <destinationList> <ltehss>LTE_HSS_1</ltehss> </destinationList> </updateSubscriberNaiRequest></pre> | Request to create an NAI - success. |
| CPS←SDS | <pre><ns2:sdsResult affected="1" error="0"> </ns2:sdsResult></pre> | |
| CPS→SDS | <pre><rollbackRequest></rollback></pre> | Transaction is rolled back by the client. None of the previous IMSI, MSISDN or NAI entities will be created. |

Table 4-27 (Cont.) Multiple Commands Transaction Rolled Back Message Flow Example (SOAP)

| Message | | Description |
|----------|--|---|
| CPS←—SDS | <pre><ns2:sdsResult affected="0" error="0"> </ns2:sdsResult></pre> | Rollback is successful; no creations/updates are made. The client could have sent a commit instead of the rollback, which would have resulted in the 2 IMSIs, 2 MSISDNs, and 1 NAI being created. |

5

XML Message Definitions

This chapter describes XML requests and responses syntax and parameters.

5.1 Message Conventions

Message specification syntax follows several conventions to convey what parameters are required or optional and how they and their values must be specified.

Table 5-1 Message Conventions

| Symbol | Description |
|--|--|
| <code>monospace with background</code> | All code examples. |
| <code>monospace</code> | Names of commands when provided outside of a code example. |
| <i>italics</i> | Variable names when provided outside of a code example or value list. |
| spaces | Spaces (for example, zero or more space characters, " ") may be inserted anywhere except within a single name or number. At least one space is required to separate adjacent names or numbers. |
| ... | Ellipses represent a variable number of repeated entries. For example: dn DN1 , dn DN2, ..., dn DN7, dn DN8 |

Table 5-1 (Cont.) Message Conventions

| Symbol | Description |
|--------|--|
| < > | <p>Angle brackets are used to enclose parameter values that are choices or names.</p> <p>In the following example, the numbers represent specific value choices.</p> <pre>parameter1 <1 2 3></pre> <p>In the following example, <code>ServerName</code> represents the actual value.</p> <pre>parameter2 <ServerName></pre> <p>In the following example, the numbers represent a choice in the range from 0 to 3600.</p> <pre>parameter3 <0..3600></pre> |
| [] | <p>Square brackets are used to enclose an optional parameter and its value.</p> <pre>[, parameter1 < 1 2 3 >]</pre> <p>A parameter and its value that are not enclosed in square brackets are mandatory.</p> |
| | <p>The pipe symbol is used in a parameter value list to indicate a choice between available values.</p> <pre>Parameter1 <1 2 3></pre> |
| , | <p>A literal comma is used in the message to separate each parameter that is specified.</p> |

5.2 XML-based Interface

The XML Data server uses an XML based protocol, in which a client communicates with the XML Data server by issuing request message strings over an underlying TCP/IP network connection. A session consists of a series of XML commands, initiated by the client, and responses from the XML Data server.

Every XML request/response consists of a 4-byte binary length value, followed by the indicated number of ASCII characters that form the XML request. There is no need to terminate the XML request with any terminating character(s).

The length value is a 4 byte integer in network byte order indicating the size in bytes of the XML part.

 **Note:**

“Network byte order” refers to the standard byte order defined in the IP protocol. It corresponds to big-endian (most significant first). It is a zero-padded 4 byte value.

The following data-stream Hex dump provides an example of an update subscriber request sent from an XML Data server client to the XML Data server.

```
00000000 00 00 00 8d 3c 75 70 64 61 74 65 53 75 62 73 63 ....<updateSubsc
00000010 72 69 62 65 72 20 65 6e 74 3d 22 73 75 62 73 63 riber ent="subsc
00000020 72 69 62 65 72 52 6f 75 74 69 6e 67 22 20 6e 73 riberRouting" ns
00000030 3d 22 64 73 72 22 3e 3c 69 6d 73 69 3e 33 31 30 ="dsr"><imsi>310
00000040 39 31 30 34 32 31 30 30 30 30 31 30 33 3c 2f 69 9104210000103</i
00000050 6d 73 69 3e 3c 6c 74 65 68 73 73 3e 4c 54 45 5f msi><ltehss>LTE_
00000060 48 53 53 5f 32 3c 2f 6c 74 65 68 73 73 3e 3c 61 HSS_2</ltehss><a
00000070 61 61 3e 41 41 41 5f 34 3c 2f 61 61 61 3e 3c 2f aa>AAA_4</aaa></
00000080 75 70 64 61 74 65 53 75 62 73 63 72 69 62 65 72
updateSubscriber00000090 3e
```

Like the XML request message, an XML response message consists of a 4 byte binary length value, followed by the indicated number of ASCII characters that form the XML response. There is no terminator to the XML response.

The following data-stream Hex dump provides an example of an update subscriber response message string sent from an XML Data server client to the XML Data server client.

```
00000000 00 00 00 4a 3c 75 70 64 61 74 65 53 75 62 73 63 ....<updateSubsc
00000010 72 69 62 65 72 52 65 73 70 3e 3c 72 65 73 20 65 riberResp><res e
00000020 72 72 6f 72 3d 22 30 22 20 61 66 66 65 63 74 65 rror="0" affecte
00000030 64 3d 22 31 22 2f 3e 3c 2f 75 70 64 61 74 65 53 d="1"/></updateS
00000040 75 62 73 63 72 69 62 65 72 52 65 73 70 3e      ubscriberResp>
```

5.3 Transaction ID

Each message can have a Transaction ID called the `id` as an attribute. The `id` attribute is used by the XML Data server client to correlate request and response messages. The `id` attribute is optional and if specified, is an integer between 1 and 4294967295, expressed as a decimal number in ASCII. If the `id` attribute is specified in a request, the same `id` attribute and value are returned by the XML Data server in the corresponding response. A unique `id` value must be used in each request message to differentiate responses.

5.4 XML Response Messages

An XML response message is sent by the SDS XML provisioning client in response to an XML request.

Each response message consists of a 4-byte binary length value, followed by the XML response in ASCII characters. The length value contains the number of bytes in the XML response, excluding the 4-bytes for the length.

The original XML request is included in the response only if indicated in the initiating request.

A rowset, contained between the `<rset>` tags, is only present if data is to be returned, such as in the `<readSubscriber>` and `<readSubscriberNai>` requests.

A generic response type can be generated if the XML request cannot be parsed, the request is not valid, and in some other cases. The response name of a generic response type is `errorResp`. The `id` field, if supplied in the original request, may be included if it was possible to extract it, but this cannot be guaranteed, depending on the error condition.

Response Message Format (`<readSubscriberResp>` and `<readSubscriberNaiResp>` messages)

```
lengthInBytes
<respName [id="id"]>
[
    originalXMLRequest
]
    <res error="error" affected="affected"
[description="description"]/>
[
    <rset>
        <rowName [ [rowAttributeName]="rowAttributeValue" ] ...
            [rowAttributeName]="rowAttributeValue" ]>
            <rowValueName>rowValue</rowValueName>
            ...
            <rowValueName>rowValue</rowValueName>
        </rowName>
        ...
        <rowName [ [rowAttributeName]="rowAttributeValue" ] ...
            [rowAttributeName]="rowAttributeValue" ]>
            <rowValueName>rowValue</rowValueName>
            ...
            <rowValueName>rowValue</rowValueName>
        </rowName>
    </rset>
]
</respName>
```

Response Message Format (all other requests)

```
lengthInBytes
<respName [id="id"]>
[
    originalXMLRequest
]
    <res error="error" affected="affected"
[description="description"]/>
</respName>
```

Response Message Parameters

Table 5-2 Response Message Parameters (XML)

| Parameter | Description | Values |
|-------------------------------|--|---|
| lengthInBytes | Number of bytes following to form XML request. This is a 4-byte binary value. | 0-4294967295 |
| respName | The name of the response based on the original XML request sent. | A string with 1 to 64 characters. The value is the request name appended with <code>Resp</code> , for example, for the <code><updateSubscriber></code> request, the response name is <code>updateSubscriberResp</code> . If the request name is invalid, or the XML cannot be parsed, the response name is <code>errorResp</code> . |
| id (Optional) | Transaction ID value provided in the request and passed back in the response. | 1-4294967295 |
| originalXMLRequest (Optional) | The text of the original XML request that was sent. This parameter is present only if the <code>resonly=n</code> attribute is set in the original request. | A string with 1 to 4096 characters. |
| error | Whether or not operation was successfully executed by the XML Data server. | 0 - success; non zero - failure. |
| affected | The number of routing entities (or subscribers if <code>group="y"</code>) created/updated. | 0-10 |
| description (Optional) | A textual description associated with the response. This may contain more information as to why a request failed or describe the changes if it succeeds. | A string with 1 to 1024 characters. |
| rowName | The name of the row type returned. | This value is dependant on the result set returned. |
| rowValue | The value of the row type returned. | This value is dependant on the result set returned. |
| rowAttributeName | The name of the row attribute name returned. | This value is dependant on the result set returned. |
| rowAttributeValue | The value of the row attribute name returned. | This value is dependant on the result set returned. |

5.4.1 Update and Delete Subscriber Command

If the XML command successfully updates or deletes a subscriber, the response description text indicates the deleted/created/changed IMSI and/or MSISDN and/or Extender Identifier values and a list of the subscriber destination values.

**Note:**

Destination values are listed only if there were created or modified IMSI and/or MSISDN and/or Extender Identifier routing entities.

Description text format

```
[description="[deleted ({imsi nnnn|dn nnnn|extid nnnn }[, imsi
nnnn|,dn nnnn|,extid nnnn]...)]
[, created ({imsi nnnn|dn nnnn|extid nnnn }[, imsi nnnn|,dn
nnnn|,extid nnnn]...)]
[, changed ({imsi nnnn|dn nnnn|extid nnnn }[, imsi nnnn|,dn
nnnn|,extid nnnn]...)]
[, imshss nnnn][, ltehss nnnn][, pcrf nnnn][, ocs nnnn]
[, ofcs nnnn][, aaa nnnn][, userdef1 nnnn][, userdef2 nnnn]
[, mtchss nnnn]"
```

<updateSubscriber> description text example

```
description="deleted (imsi 444444444444440, dn 19195550000, extid
test@oracle.com), created (imsi 444444444444441, dn 19195550001, dn
19195550002, extid test1@oracle1.com), imshss imshss2, ltehss ltehss1"
```

5.5 Supported Request Messages

Table 5-3 lists the requests supported by the XML Data server. Unsupported operations/requests are rejected with an INV_REQUEST_NAME error code. XML Data server clients are to construct requests as specified in the sections referenced in Table 5-3.

Table 5-3 Supported XML Data Server Requests

| Request | Description | Section |
|---------------------|---|---------------------------------------|
| startTransaction | Start Database Transaction | Start Transaction |
| commit | Commit Database Transaction | Commit Transaction |
| rollback | Abort Database Transaction | Rollback Transaction |
| tx | Block Transaction | Block Transactions |
| updateSubscriber | Create/Update IMSI/MSISDN/External Identifier Routing | Update Subscriber |
| deleteSubscriber | Delete IMSI/MSISDN/External Identifier Routing | Delete Subscriber |
| readSubscriber | Get IMSI/MSISDN/External Identifier Routing | Read Subscriber |
| updateSubscriberNai | Create/Update NAI Routing | Update Subscriber NAI |
| deleteSubscriberNai | Delete NAI Routing | Delete Subscriber NAI |
| readSubscriberNai | Get NAI Routing | Read Subscriber NAI |
| updateDomain | Create/Update Domain Identifier Routing | Update Domain |

Table 5-3 (Cont.) Supported XML Data Server Requests

| Request | Description | Section |
|--------------|----------------------------------|-------------------------------|
| deleteDomain | Delete Domain Identifier Routing | Delete Domain |
| readDomain | Get Domain Identifier Routing | Read Domain |

5.6 Start Transaction

5.6.1 Request

The `<startTransaction>` request begins a database transaction.

Data manipulation and query requests (update, delete, and read) can be sent within the context of a transaction. A client connection can only have one transaction open at a time.

Data manipulation requests are evaluated for validity and applied to a local database view, which is a virtual representation of the main database plus local modifications made within this active transaction. Local database view changes are not committed to the main database until the transaction is ended with a `<commit>` request.

If a `<startTransaction>` request is sent, and then the connection is lost or the user logs off without sending a `<commit>` or `<rollback>` request, all pending requests are rolled back.

A provisioning session can have one transaction open at a time. If a `<startTransaction>` request is sent, another `<startTransaction>` request will fail with an `ACTIVE_TXN` error.

A timeout occurs between the `<startTransaction>` and `<commit>` requests. If the `<commit>` request is not sent out within the configured "Maximum Transaction Lifetime" on the SDS GUI (we recommend you see the *SDS Online Help* for more information) of the `<startTransaction>` request, the XML provisioning requests are rolled back (changes not applied to database).

A transaction can only be opened by one client at a time. If a transaction is already opened by another client, the `<startTransaction>` request is rejected immediately with `WRITE_UNAVAIL` or is queued up for the time specified by the `timeout` parameter. If the `timeout` parameter is specified with a non-zero value and that period of time elapses before the transaction is opened, the `<startTransaction>` request is rejected with `WRITE_UNAVAIL`.

Data manipulation requests are evaluated for validity and applied to a local database view which is a virtual representation of the main database plus local modifications made within this active transaction.

Local database view changes are not committed to the main database until the transaction is ended with a `<commit>` request.

The request can be aborted and rolled back with a `<rollback>` request any time before the transaction is ended with a `<commit>` request.

A block transaction (`<tx> ... </tx>`) is not allowed with a normal transaction, and will result in an `INV_REQ_IN_NORMAL_TX` error being returned for that request.

Request Format

```
<startTransaction [resonly="resonly"] [id="id"] [timeout="timeout"]/>
```

Parameters

Table 5-4 <startTransaction> Parameters (XML)

| Parameter | Description | Values |
|--------------------|---|--|
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | y - Only provide the result, do not include the original request (default). n - Include the original request in the response. |
| id (Optional) | Transaction ID value provided in request, and will be passed back in the response. | 1-4294967295 |
| timeout (Optional) | The amount of time (in seconds) to wait to open a transaction if another connection already has one open. Clients waiting to open a transaction will be processed in the order that the requests were received. | 0 (return immediately if not available) to 3600 seconds (default is 0). |

5.6.2 Response

The `<startTransactionResp>` response returns the result of starting a database transaction. If the response error code indicates success, then the database transaction was successfully started. If any failure response is returned, then the database transaction was not started.

Response Format

```
lengthInBytes
<startTransactionResp [id="id"]>
[
  originalXMLRequest
]
  <res error="error" affected="affected"
[description="description"]/>
</startTransactionResp>
```

Response Parameters

The parameters for all of the response commands are shown in [XML Response Messages](#).

Error Codes

Table 5-5 shows the common error codes for the `<startTransactionResponse>`. See [SDS Response Message Error Codes](#) for a full list of error codes.

Table 5-5 `<startTransactionResp>` Error Codes (XML)

| Error Code | Description |
|---------------------|--|
| SUCCESS | Transaction was successfully started. |
| NO_WRITE_PERMISSION | The client making the connection does not have write access permissions. |
| WRITE_UNAVAILABLE | Another client already has a transaction open. This will only be returned to clients who do have write access permissions. |
| ACTIVE_TXN | A transaction is already open on this connection. |

5.6.3 Examples

Start a Transaction Within 2 Minutes (success)

This example successfully starts a transaction within 2 minutes.

Request:

```
<startTransaction id="101" timeout="120"></startTransaction>
```

Response:

```
<startTransactionResp id="101">
  <res error="0" affected="0"/>
</startTransactionResp>
```

Start a Transaction Immediately (fail)

This example attempts to immediately start a transaction but fails due to another client having a transaction open.

Request:

```
<startTransaction resonly="n" id="102"></startTransaction>
```

Response:

```
<startTransactionResp id="102">
  <startTransaction resonly="n" id="102"></startTransaction>
  <res error="1005" affected="0"/>
</startTransactionResp>
```

5.7 Commit Transaction

5.7.1 Request

The `<commit>` request commits an active database transaction.

If the currently opened transaction has one or more successful updates, then committing the transaction will cause all the database changes to be committed. All previous updates, even though they received a successful error code, are not committed to the database until the `<commit>` request is received.

Request Format

```
<commit [resonly="resonly"] [id="id"]/>
```

Parameters

Table 5-6 `<commit>` Request Parameters (XML)

| Parameter | Description | Values |
|--------------------|---|--|
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | y - Only provide the result, do not include the original request (default). n - Include the original request in the response. |
| id (Optional) | Transaction ID value provided in the request and passed back in the response. | 1-4294967295 |

5.7.2 Response

The `<commitResp>` response returns the results of committing a database transaction. If the response error code indicates success, then the update was successfully committed in the database. If any failure response is returned, then the database commit failed. The `<commit>` request causes the transaction to end regardless of whether any updates were actually made to the database.



Note:

The affected row count in the XML response will always be 0. It does not indicate how many rows were modified within the transaction.

Response Format

```
lengthInBytes
<commitResp [id="id"]>
[
    originalXMLRequest
```

```
]
  <res error="error" affected="affected" [description="description"]/>
</commitResp>
```

Response Parameters

The parameters for all of the response commands are shown in [XML Response Messages](#).

Error Codes

[Table 5-7](#) lists the common error codes for the `<commitResp>` response. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 5-7 `<commitResp>` Error Codes (XML)

| Return Code | Description |
|---------------|---|
| SUCCESS | Database transaction was committed successfully. |
| NO_ACTIVE_TXN | A transaction is not currently open on this connection. |

5.7.3 Examples

Commit a Transaction (success)

This example successfully commits a transaction.

Request:

```
<commit id="101"></commit>
```

Response:

```
<commitResp id="101">
  <res error="0" affected="0"/>
</commitResp>
```

Commit a Transaction that is not Open (fail)

This example attempts to commit a transaction but fails because a transaction was not open.

Request:

```
<commit resonly="n" id="102"></commit>
```

Response:

```
<commitResp id="102">
  <commit resonly="n" id="102"></commit>
  <res error="1009" affected="0"/>
</commitResp>
```


5.8 Rollback Transaction

5.8.1 Request

The `<rollback>` request aborts the currently active database transaction. Any updates are rolled back prior to closing the transaction.

Request Format

```
<rollback [resonly="resonly"] [id="id"]/>
```

Request Parameters

Table 5-8 `<rollback>` Parameters (XML)

| Parameter | Description | Values |
|--------------------|---|--|
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | y - Only provide the result. Do not include the original request (default). n - Include the original request in the response. |
| id (Optional) | Transaction ID value provided in request, and passed back in the response. | 1-4294967295 |

5.8.2 Response

The `<rollbackResp>` response returns the results of aborting a database transaction.

Response Format

```
lengthInBytes
<rollbackResp [id="id"]>
[
  originalXMLRequest
]
  <res error="error" affected="affected"
[description="description"]/>
</rollbackResp>
```

Parameters

The parameters for all of the XML response commands are shown in [XML Response Messages](#).

Error Codes

[Table 5-9](#) lists the common error codes for the `<rollbackResp>` command. See [SDS Response Message Error Codes](#) for a full list of error codes.

Table 5-9 <rollbackResp> Error Codes (XML)

| Return Code | Description |
|---------------|---|
| SUCCESS | Database transaction was aborted successfully. |
| NO_ACTIVE_TXN | A transaction is not currently open on this connection. |

5.8.3 Examples

Rollback a Transaction (success)

This example successfully rolls back a transaction.

Request:

```
<rollback resonly="n" id="101"></rollback>
```

Response:

```
<rollbackResp id="101">  
  <rollback resonly="n" id="101"></rollback>  
  <res error="0" affected="0"/>  
</rollbackResp>
```

Rollback a Transaction that is not Open (fail)

This example attempts to rollback a transaction but fails because a transaction was not open.

Request:

```
<commit resonly="n" id="102"></rollback>
```

Response:

```
<rollbackResp id="102">  
  <rollback resonly="n" id="102"></rollback>  
  <res error="1009" affected="0"/>  
</rollbackResp>
```

5.9 Block Transactions

A block transaction allows the user to group a number of requests within a transaction and send them as a single unit of data. Requests are executed when the whole unit has been sent.

The data unit consists of the block transaction tags, with a number of requests contained within the tags.

It is possible to select if the result to each request is included in the response, by use of the `resonly` attribute. The selection, even the default when not included, is applied to every

request within the block transaction. If an individual request sets the `resonly` attribute, the attribute is overridden with the value from the block transaction.

The following requests are not permitted within a block transaction, and will result in a `INV_REQ_IN_BLOCK_TX` error being returned:

- `<startTransaction>`
- `<commit>`
- `<rollback>`

5.9.1 Request

A block transaction allows the user to group a number of requests within a transaction and send them as one "chunk" of data. Requests are executed when the whole "chunk" has been sent. A "chunk" consists of the block transaction tags with a number of requests contained within it.

It is possible to select if each individual request is included within its individual response in the block transaction response or not by using the `resonly` attribute in the `<tx>` entity. The selection (even the default when not included) is applied to every request within the block transaction. If any request itself sets the `resonly` attribute, this it is overridden with the value from the block transaction.

The following requests are not permitted within a block transaction and result in a `INV_REQ_IN_BLOCK_TX` error being returned:

- `<startTransaction>`
- `<commit>`
- `<rollback>`

Request Format

```
<tx [resonly="resonly"] [id="id"] [timeout="timeout"]>
[
  <requestName ...>
  ...
  </requestName>

  ...

  <requestName ...>
  ...
  </requestName>
]
</tx>
```

Request Parameters

Table 5-10 <tx> Request Parameters (XML)

| Parameter | Description | Values |
|------------------------|---|--|
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | y - Only provide the result, do not include the original request (default). n - Include the original request in the response. |
| id (Optional) | Transaction ID value provided in the request and passed back in the response. | 1-4294967295 |
| timeout (Optional) | The amount of time (in seconds) to wait to open a transaction if another connection already has one open. Clients waiting to open a transaction will be processed in the order that their requests were received. | 0 (return immediately if not available) to 3600 seconds. The default is 0. |
| requestName (Optional) | Contains 0-50 occurrences of the following XML requests: <updateSubscriber>, <deleteSubscriber>, <readSubscriber>, <updateSubscriberNai>, <deleteSubscriberNai>, <readSubscriberNai> | |

5.9.2 Response

The <txResp> response returns the number of requests within the transaction, and a response message for each request.

If an error occurred performing one request, then all requests within the transaction, up to and including the failed request will automatically be rolled back. If all requests are successful, then all requests within the transaction are automatically committed.

Response Format

```
lengthInBytes
<txResp nbreq="nbreq" [id="id"]>
[
  <requestResp ...>
    ...
    <res error=...>
  </requestResp>

  ...

  <requestResp ...>
    ...
    <res error=...>
```

```

    </requestResp>
  ]
</txResp>

```

Response Parameters

Table 5-11 <txResp> Parameters (XML)

| Parameter | Description | Values |
|---------------|---|--------------|
| lengthinbytes | Number of bytes following to form XML request. This is a 4 byte binary value. | 0-4294967295 |
| nbreq | Number of requests within the transaction. The response will contain responses and optionally the requests themselves for each request. | 0-50 |
| id (Optional) | Transaction ID value provided in request and passed back in the response. | 1-4294967295 |
| requestResp | Contains 0-50 occurrences of the following XML request responses: <updateSubscriberResp>, <deleteSubscriberResp>, <readSubscriberResp>, <updateSubscriberNaiResp>, <deleteSubscriberNaiResp>, <readSubscriberNaiResp> | |

Response Error Codes

[Table 5-12](#) lists the common error codes for the Block Transaction response. See [SDS Response Message Error Codes](#) for a full list of error codes.

Table 5-12 <txResp> Error Codes (XML)

| Error Code | Description |
|--------------|---|
| SUCCESS | Database transaction was committed successfully. |
| ACTIVE_TXN | A transaction is already open on this connection. |
| TXN_TOO_BIG | Transaction too big (more than the configured maximum number of requests). |
| DB_EXCEPTION | An unexpected exception was thrown during the database commit. The entire transaction was rolled back to ensure predictable behavior. Contact My Oracle Support . |

Table 5-12 (Cont.) <txResp> Error Codes (XML)

| Error Code | Description |
|--------------------|--|
| NOT_PROCESSED | Not processed. The request was within a block transaction, and was not processed due to an error with another request within the same block transaction. |
| NV_REQ_IN_BLOCK_TX | An invalid request has been sent in a block transaction (for example, <startTransaction>, <commit>, or <rollback>). |

5.9.3 Examples

Start a Block Transaction Within 2 Minutes (success)

This example successfully starts a block transaction within two minutes and successfully runs requests.

Request:

```
<startTransaction id="101" timeout="120">
  <updateSubscriber ent="subscriberRouting" ns="dsr" id="201">
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
    <ltehss>LTE_HSS_1</ltehss>
  </updateSubscriber>
  <updateSubscriber ent="subscriberRouting" ns="dsr" id="202">
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
    <imshss>none</imshss>
    <ltehss>LTE_HSS_4</ltehss>
    <aaa>AAA_4</aaa>
  </updateSubscriber>
  <deleteSubscriber ent="subscriberRouting" ns="dsr" id="203">
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
  </deleteSubscriber>
</tx>
```

Response:

```
<txResp nbreq="3" id="101">
  <updateSubscriberResp id="201">
    <res error="0" affected="3"/>
  </updateSubscriberResp>
  <updateSubscriberResp id="202">
    <res error="0" affected="2"/>
  </updateSubscriberResp>
  <deleteSubscriberResp id="203">
    <res error="0" affected="2"/>
  </deleteSubscriberResp>
</txResp>
```

```

    </deleteSubscriberResp>
</txResp>

```

Block Transaction Failed (and Rolled Back)

This example attempts to run requests within a block transaction, but the second request fails. All requests are rolled back.

Request:

```

<tx id="102">
  <updateSubscriber ent="subscriberRouting" ns="dsr" id="201">
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
    <ltehss>LTE_HSS_1</ltehss>
  </updateSubscriber>
  <updateSubscriber ent="subscriberRouting" ns="dsr" id="202">
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
    <imshss>none</imshss>
    <ltehss>BAD_VALUE</ltehss>
    <aaa>AAA_4</aaa>
  </updateSubscriber>
  <deleteSubscriber ent="subscriberRouting" ns="dsr" id="203">
    <imsi>111111111100002</imsi>
    <msisdn>8004605500</msisdn>
  </deleteSubscriber>
</tx>

```

Response:

```

<txResp nbreq="3" id="102">
  <updateSubscriberResp id="201">
    <res error="0" affected="3"/>
  </updateSubscriberResp>
  <updateSubscriberResp id="202">
    <res error="2006" affected="0"/>
  </updateSubscriberResp>
  <deleteSubscriberResp id="203">
    <res error="1" affected="0"/>
  </deleteSubscriberResp>
</txResp>

```

5.10 Insert Subscriber

Insert Subscriber functionality is basically the same for XML Message Definitions as it is for SOAP Response Messages. See the following sections for pertinent information.

**Note:**

The `insertAddressList` tag is not required in the XML insert subscriber requests.

- [Subscriber and Routing Data Concepts](#)
- [Insert Subscriber Request](#)
- [Insert Subscriber Response](#)
- [Insert Subscribers Examples](#)

5.11 Update Subscriber

5.11.1 Subscriber and Routing Data

A routing entity contains the IMSI or MSISDN value along with up to eight destination names that refer to destination data which contains FQDN and realm values that are used for routing messages.

A subscriber is a group of related IMSI and/or MSISDN routing entities and an optional Account ID value. All routing entities within a subscriber have the same destination values.

A stand-alone routing entity is a routing entity that is not assigned to any subscriber.

Each IMSI or MSISDN routing entity is either a stand-alone routing entity or is assigned to a single subscriber.

**Note:**

You can only add a subscriber to a subscriber table, if the Account ID, MSISDN, or IMSI is not already in the table. If the table already contains any of these values, the add function fails and an error condition report is generated that contains the reason for the failure.

5.11.2 Request

The `<updateSubscriber>` request provisions IMSI and MSISDN routing data and can provision subscriber data. The request updates existing routing entities, and creates any new routing entities that do not exist.

The request allows for the provisioning of IMSI, MSISDN, or combinations of IMSI and MSISDNs to be associated with eight different destinations.

A destination name can be specified as *"none"*, which removes the association of that destination from the specified routing entity(s).

Semantic Rules (all requests)

- At least one routing entity (IMSI or MSISDN) must be specified.

- No more than 10 routing entities (IMSI, MSISDN, or combinations of the two) can be specified.
- A destination name must already exist in the database.
- Each destination name type can only be specified once.
- All specified routing entities will be provisioned with the same destination value(s).
- Any existing destination(s) for a routing entity will not be changed/removed if not specified in the request.
- Specifying a destination name of "none" removes the association of that destination from the specified routing entity(s).

Semantic Rules (requests that do not specify the group attribute or specify `group="n"`)

- The `accountId`, `deleteAccountId`, `deleteImsi`, and `deleteMsisdn` parameters cannot be specified.
- All specified IMSI and MSISDN values must be for stand-alone routing entities or they all must be assigned to one subscriber. There cannot be a mixture of stand-alone routing entities and routing entities that are part of a subscriber.
- At least one routing entity (IMSI or MSISDN) must be specified.
- A maximum of 10 routing entities (IMSI, MSISDN, or combinations of the two) can be specified.
- At least one destination must be specified.
- All specified routing entities will be provisioned with the same destination value(s).

Semantic (requests that specify attribute `group="y"`)

- The `accountId`, `deleteAccountId`, `deleteImsi`, and `deleteMsisdn` parameters can be specified.
- All specified Account ID, IMSI, or MSISDN values must be assigned to one subscriber or must exist in stand-alone routing entities. After the command successfully completes, all specified values will be assigned to one subscriber.
- All specified `deleteAccountId`, `deleteImsi`, or `deleteMsisdn` values that exist in the database must be assigned to the same subscriber. All Account ID, IMSI or MSISDN values must be assigned to the same subscriber or not assigned to any subscriber.
- At least one IMSI, MSISDN, or Account ID value must be specified.
- The `deleteAccountId`, `deleteImsi`, `deleteMsisdn` values and all destination tags and values are optional. This allows a user to just add an Account ID or MSISDN and/or IMSI values to a subscriber.
- A maximum of one `accountId`, one `deleteAccountId`, six `imsi`, six `deleteImsi`, six `msisdn`, and/or six `deleteMsisdn` values can be specified. If any of these limits are exceeded, the request fails.
- All specified `accountId`, `imsi`, and `msisdn` values that are not currently associated with a subscriber will be assigned to the same subscriber. They are added to an existing subscriber or new subscriber.
- If a new subscriber is being created with all new routing entities, all specified routing entities will be provisioned with the specified destination values.

- If a new subscriber is being created with at least one existing stand-alone routing entity, all destination values from existing stand-alone routing entities must be the same prior to applying any specified destination changes. All new routing entities will inherit their destinations values from an existing stand-alone routing entity with the applied destination changes.
- If existing stand-alone routing entities are being added to an existing subscriber, the destination values in each stand-alone routing entity must match the destination values for the subscriber (extracted from any of the subscriber's routing entities) prior to applying any specified destination changes.
- If new routing entities are being added to an existing subscriber, the new routing entities will inherit the destination values for the subscriber (extracted from any of the subscriber's routing entities).
- If a new routing entity is being created, at least 1 of its destination values must not be equal to `none`.
- The updated subscriber must have at least 1 IMSI or MSISDN routing entity.
- The updated subscriber can have 0 or 1 Account ID values, 0-6 IMSI values and 0-6 MSISDN values, as long as there is at least one IMSI or MSISDN value. If the result of the update (deleting and then adding new Account ID, IMSI, and/or MSISDN values) would cause too many Account ID, IMSI or MSISDN values, the request will fail.
- The subscriber's Account ID value can be updated only if it is currently null or deleted within the request (as specified by the `deleteAccountId` parameter).
- If any of the values specified in the `deleteAccountId`, `deleteImsi`, or `deleteMsisdn` parameters do not exist in the database, they will be ignored. If nothing else changes for the subscriber, the `NO_UPDATES` is returned.
- If any of the values specified in the `deleteAccountId`, `deleteImsi`, or `deleteMsisdn` parameters exist in the database, they must be assigned to the subscriber being updated or the command will fail.
- If any of the values specified in the `deleteImsi` or `deleteMsisdn` parameters exist, the routing entity will be deleted unless it is the last IMSI or MSISDN routing entity for the subscriber, in which case the command will fail.

Request Format

```
<updateSubscriber ent="subscriberRouting" ns="dsr" [resonly="resonly"]
    [id="id"] [timeout="timeout"] [group="group"]>
[   <deleteAccountId>deleteAccountId</deleteAccountId> ]
[
    <deleteImsi>deleteImsi</deleteImsi>
    ...
    <deleteImsi>deleteImsi</deleteImsi>
]
[
    <deleteMsisdn>deleteMsisdn</deleteMsisdn>
    ...
    <deleteMsisdn>deleteMsisdn</deleteMsisdn>
]
[   <accountId>accountId</accountId> ]
[
    <imsi>imsi</imsi>
    ...

```

```

    <imsi>imsi</imsi>
  ]
  [
    <msisdn>msisdn</msisdn>
    ...
    <msisdn>msisdn</msisdn>
  ]
  [ <imshss>imshss</imshss> ]
  [ <ltehss>ltehss</ltehss> ]
  [ <pcrf>pcrf</pcrf> ]
  [ <ocs>ocs</ocs> ]
  [ <ofcs>ofcs</ofcs> ]
  [ <aaa>aaa</aaa> ]
  [ <userdef1>userdef1</userdef1> ]
  [ <userdef2>userdef2</userdef2> ]
</updateSubscriber>

```

Request Parameters

Table 5-13 <updateSubscriber> Request Parameters (XML)

| Parameter | Description | Values |
|--------------------|---|--|
| ent | The entity name within the global schema. | subscriberRouting |
| ns | The namespace within the global schema | dsr |
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response | <ul style="list-style-type: none"> y - Only provide the result, do not include the original request (default) n - Include the original request in the response |
| id (Optional) | Transaction id value provided in request and passed back in the response | 1-4294967295 |
| timeout (Optional) | The amount of time (in seconds) to wait to before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write are processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds (default is 0) |

Table 5-13 (Cont.) <updateSubscriber> Request Parameters (XML)

| Parameter | Description | Values |
|----------------------------|--|--|
| group (Optional) | Indicates if relationships between a group of related IMSI and/or MSISDN routing entities and Account ID value should be created/updated | <ul style="list-style-type: none"> y - Create new or update existing subscriber relationships and update destinations n - Only update destinations, not relationships between routing entities (default) |
| deleteAccountId (Optional) | A user-defined Account ID value to delete | 1 to 26 decimal digits |
| deleteImsi (Optional) | An IMSI (specified in E.212 format) value to delete | 10 to 15 numeric digits |
| deleteMsisdn (Optional) | An MSISDN (specified in E.164 international public telecommunication numbering plan format) value to delete | 8 to 15 decimal digits |
| accountId (Optional) | A user-defined Account ID value to add or update | 1 to 26 numeric digits |
| imsi (Optional) | An IMSI (specified in E.212 format) to add or update | 10 to 15 numeric digits |
| msisdn (Optional) | An MSISDN (specified in E.164 international public telecommunication numbering plan format) to add or update | 8 to 15 numeric digits |
| imshss (Optional) | The name of the IMS HSS destination | A string with 1 to 32 characters |
| ltehss (Optional) | The name of the LTE HSS destination | A string with 1 to 32 characters |
| pcrf (Optional) | The name of the PCRF destination | A string with 1 to 32 characters |
| ocs (Optional) | The name of the OCS destination | A string with 1 to 32 characters |
| ofcs (Optional) | The name of the OFCS destination | A string with 1 to 32 characters |
| aaa (Optional) | The name of the AAA server destination | A string with 1 to 32 characters |
| userdef1 (Optional) | The name of the first user defined destination | A string with 1 to 32 characters |
| userdef2 (Optional) | The name of the second user defined destination | A string with 1 to 32 characters |

5.11.3 Response

The <updateSubscriberResp> response returns the result of the request to provision subscriber routing entities. There is a single result that applies to all routing entities supplied. Either all routing entities were successfully updated, or no updates were made to any routing entity.

 **Note:**

If an IMSI/MSISDN is updated with destination values that already exist, this may result in NO_UPDATES being returned, which is not treated as an error. When a routing entity is not updated, the count of affected rows in the command is not incremented for that IMSI/MSISDN.

If applying all of the provisioning changes results in no database records being modified (because the database already contained the updated values), the NO_UPDATES error code is returned and the number of affected records is 0.

If a subscriber is successfully created or updated, the `description` field contains lists of deleted, created and changed IMSI, MSISDN, and External Identifier values.

Response Format

```
lengthInBytes
<updateSubscriberResp [id="id"]>
[
  originalXMLRequest
]
  <res error="error" affected="affected"
[description="description"]/>
</updateSubscriberResp>
```

Parameters

The parameters for all of the response commands are shown in [XML Response Messages](#).

Error Codes

[Table 5-14](#) lists the common error codes for the `<updateSubscriberResp>` response. See [SDS Response Message Error Codes](#) for a full list of error codes.

Table 5-14 <updateSubscriberResp> Error Codes (XML)

| Error Code | Description |
|----------------------|--|
| SUCCESS | The update request was successfully completed. |
| NO_UPDATES | The request does not have updates to the database. |
| DEST_NOT_FOUND | Destination name does not exist. |
| TOO_MANY_ADDR | Too many address values supplied. |
| NO_DEST_VAL | No destination name supplied. |
| MISSING_PARAMETER | A mandatory parameter is missing. |
| DEST_TYPE_MISMATCH | Destination has a different destination type than the desired destination type. |
| MULTIPLE_SUBSCRIBERS | Specified parameters refer to multiple subscribers. |
| SUBSCRIBER_TOO_BIG | Resulting subscriber would exceed 6 IMSI, 6 MSISDN, or 10 External Identifier limit. |

Table 5-14 (Cont.) <updateSubscriberResp> Error Codes (XML)

| Error Code | Description |
|-----------------------------|---|
| ACCTID_UPDATE_PROHIBITED | An attempt was made to change an Account ID without specifying the <deleteAccountId> tag. |
| ROUTE_TYPE_MISMATCH | Standalone and subscriber routes are not allowed in same command. |
| DEL_ROUTE_NOT_PERMITTED | Cannot delete last route from subscriber. |
| NO_ROUTES_SPECIFIED | At least one IMSI, MSISDN, or External Identifier must be specified. |
| ROUTE_DEST_MISMATCH | Specified routes have different destinations. |
| DOMAIN_IDENTIFIER_NOT_FOUND | Domain Identifier does not exist. |

5.11.4 Examples

Below are examples of how to use the <updateSubscriber> request and likely response. Some of these examples are based upon previous requests; hence, the order of the requests could be important.

Add Standalone Routing Entities

This example creates new standalone IMSI and MSISDN routing entities and sets their destination values to the specified values.

The result of this request is:

- New IMSI and MSISDN routing entities are created.
- All of the destination values for each routing entity are set to specified values.

Request:

```
<updateSubscriber ent="subscriberRouting" ns="dsr" resonly="n" id="101">
  <imsi>111111111100001</imsi>
  <imsi>111111111100002</imsi>
  <imsi>111111111100003</imsi>
  <msisdn>8004605500</msisdn>
  <msisdn>8004605503</msisdn>
  <ltehss>LTE_HSS_1</ltehss>
</updateSubscriber>
```

Response:

```
<updateSubscriberResp id="101">
  <updateSubscriber ent="subscriberRouting" ns="dsr" resonly="n" id="101">
    <imsi>111111111100001</imsi>
    <imsi>111111111100002</imsi>
    <imsi>111111111100003</imsi>
    <msisdn>8004605500</msisdn>
    <msisdn>8004605503</msisdn>
    <ltehss>LTE_HSS_1</ltehss>
  </updateSubscriber>
```

```
<res error="0" affected="5">
</updateSubscriberResp>
```

Update Standalone Routing Entities Destinations

This example updates existing standalone IMSI and MSISDN routing entities with new destination values.



Note:

This request does not update all NAI values that were specified in the previous request.

The result of this request is that the IMSI and MSISDN routing entities are updated with specified values.

Request:

```
<updateSubscriber ent="subscriberRouting" ns="dsr" id="102">
  <imsi>111111111100001</imsi>
  <imsi>111111111100002</imsi>
  <imsi>111111111100003</imsi>
  <msisdn>8004605500</msisdn>
  <ltehss>LTE_HSS_4</ltehss>
  <aaa>AAA_4</aaa>
</updateSubscriber>
```

Response:

```
<updateSubscriberResp id="102">
  <res error="0" affected="4"/>
</updateSubscriberResp>
```

Create Subscriber Using Existing Routing Entities (Success)

This example creates a subscriber using existing routing entities that all have the same destination values.

After this request is completed, a new subscriber is created and all of the routing entities are assigned to that subscriber.

Request:

```
<updateSubscriber ent="subscriberRouting" ns="dsr" id="103" group="y">
  <imsi>111111111100001</imsi>
  <imsi>111111111100002</imsi>
  <msisdn>8004605500</msisdn>
</updateSubscriber>
```

Response:

```
<updateSubscriberResp id="103">
  <res error="0" affected="1"/>
</updateSubscriberResp>
```

Create Subscriber Using Existing Routing Entities (Failure)

This example fails when creating a subscriber using existing routing entities because the existing routing entities have different destination values.

No changes are made to the database because the request failed.

Request:

```
<updateSubscriber ent="subscriberRouting" ns="dsr" id="104" group="y">
  <imsi>111111111100003</imsi>
  <msisdn>8004605503</msisdn>
</updateSubscriber>
```

Response:

```
<updateSubscriberResp id="104">
  <res error="2029" affected="0" description="all routes must have the same
destination values"/>
</updateSubscriberResp>
```

Add Account ID to Existing Subscriber

This example adds an Account ID to an existing subscriber. Any of the subscriber's IMSI or MSISDN values can be used. For this example, the MSISDN value is used.

The result of this request is that the subscriber will have an Account ID value.

Request:

```
<updateSubscriber ent="subscriberRouting" ns="dsr" id="105" group="y">
  <accountId>80044400001234567890111112</accountId>
  <msisdn>8004605500</msisdn>
</updateSubscriber>
```

Response:

```
<updateSubscriberResp id="105">
  <res error="0" affected="1">
</updateSubscriberResp>
```

Modify Destinations for Existing Subscriber

This example modifies a destination value for an existing subscriber. Any of the subscriber's IMSI, MSISDN or Account ID values can be used. For this example, an IMSI value is used.

 **Note:**

It does not matter if `group="y"` is specified. The same changes are always applied to the whole subscriber.

The result of this request is that all of the subscriber's IMSI and MSISDN routing entities will have a new destination value

Request:

```
<updateSubscriber ent="subscriberRouting" ns="dsr" id="106">
  <imsi>111111111100002</imsi>
  <ltehss>LTE_HSS_99</ltehss>
</updateSubscriber>
```

Response:

```
<updateSubscriberResp id="106">
  <res error="0" affected="3"/>
</updateSubscriberResp>
```

Replace Subscriber's MSISDN value

This example replaces an MSISDN value for an existing subscriber. The new MSISDN routing entity inherits the destination values from an old IMSI or MSISDN routing entity. (It doesn't matter which of the Subscriber's routing entities is used because they all have the same destination values.)

The result of this request is:

- The old MSISDN routing entity is deleted from the database.
- The new MSISDN routing entity is added to the database, its destination values are set to the subscriber's destination values, and the new MSISDN value is assigned to the subscriber (relationships are established).

 **Note:**

If the new MSISDN routing entity already exists in the database, and it has the same destination values as the subscriber, the only change is that the routing entity is assigned to the subscriber.

Request:

```
<updateSubscriber ent="subscriberRouting" ns="dsr" id="107" group="y">
  <deleteMsisdn>8004605500</deleteMsisdn>
  <msisdn>8884605500</msisdn>
</updateSubscriber>
```

Response:

```
<updateSubscriberResp id="107">
  <res error="0" affected="1"/>
</updateSubscriberResp>
```

Replace Subscriber's Account ID, 2 IMSIs, and 1 MSISDN Values

This example replaces several identification (Account ID, IMSI and MSISDN) values for an existing subscriber. The new IMSI and MSISDN routing entities inherit the destination values from the old IMSI and MSISDN routing entities. It does not matter which of the Subscriber's routing entities is used because they all have the same destination values.

The result of this request is:

- The old IMSI and MSISDN routing entities are deleted from the database.
- The new IMSI and MSISDN routing entities are added to the database, their destination values are set to the subscriber's destination values, and the routing entities are assigned to the subscriber (relationships are established).

Note:

If the new IMSI and MSISDN routing entities already exist in the database and they have the same destination values as the subscriber, the only change is that the new IMSI and MSISDN values are assigned to the subscriber.

- The subscriber's Account ID value is changed.

Request:

```
<updateSubscriber ent="subscriberRouting" ns="dsr" id="108" group="y">
  <deleteAccountId>80044400001234567890111112</deleteAccountId>
  <deleteImsi>11111111100001</deleteImsi>
  <deleteImsi>11111111100002</deleteImsi>>
  <deleteMsisdn>8884605500</deleteMsisdn>
  <imsi>8888888880001</imsi>
  <imsi>8888888880002</imsi>
  <msisdn>8884605555</msisdn>
</updateSubscriber>
```

Response:

```
<updateSubscriberResp id="108">
  <res error="0" affected="1"/>
</updateSubscriberResp>
```

Create Subscriber Using New Routing Entities (Success)

This example creates a subscriber using new routing entities with specified destinations.

The result of this request is:

- A new subscriber is created with the specified Account ID, IMSI and MSISDN values.

- New IMSI and MSISDN routing entities are created with the specified destinations.

Request:

```
<updateSubscriber ent="subscriberRouting" ns="dsr" id="109" group="y">
  <accountId>11111222223333344444555556</accountId>
  <imsi>333333333300001</imsi>
  <imsi>333333333300002</imsi>
  <msisdn>9198675309</msisdn>
  <ltehss>LTE_HSS_3</ltehss>
  <aaa>AAA_3</aaa>
</updateSubscriber>
```

Response:

```
<updateSubscriberResp id="109">
  <res error="0" affected="1"/>
</updateSubscriberResp>
```

Create Subscriber Using New Routing Entities (Failure)

This example fails when creating a subscriber using new routing entities because no destinations were specified.

No changes are made to the database because the request failed.

Request:

```
<updateSubscriber ent="subscriberRouting" ns="dsr" id="110" group="y">
  <accountId>1111122222</accountId>
  <imsi>333333333300003</imsi>
  <imsi>333333333300004</imsi>
  <msisdn>9198675309</msisdn>
</updateSubscriber>
```

Response:

```
<updateSubscriberResp id="110">
  <res error="2013" affected="0" description="at least one destination
must be specified"/>
</updateSubscriberResp>
```

5.12 Delete Subscriber

5.12.1 Request

The `<deleteSubscriber>` request can be used to delete IMSI, MSISDN, and External Identifier routing data and subscriber data. See [Subscriber and Routing Data](#) for a description of subscriber and routing data.

The request allows for the removal of IMSI, MSISDN, External Identifier, or combinations of IMSI, MSISDN, and External Identifier routing entities. Each routing entity contains up to nine destination names.

When the `group="y"` attribute is specified, the request deletes all data associated with the subscriber, including the Account ID, all relationships, and all IMSI, MSISDN, and External Identifier routing entities that were assigned to the subscriber.

When `group="y"` is not specified or when `group="n"` is specified, only IMSI, MSISDN, and External Identifier routing entities are deleted. If the IMSI, MSISDN, or External Identifier value is assigned to a subscriber and there is at least one more IMSI, MSISDN, or External Identifier value assigned to the subscriber, the IMSI, MSISDN, or External Identifier value is removed from the subscriber.

The last IMSI, MSISDN, or External Identifier value cannot be removed from a subscriber - the user must delete the whole subscriber by specifying the `group="y"` attribute.

Semantic Rules (requests that do not specify the group attribute or specify `group="n"`)

- All specified IMSI, MSISDN, or External Identifier values must be assigned to one subscriber or must exist in standalone routing entities.
- The `accountID` parameter cannot be specified.
- At least one routing entity (IMSI, MSISDN, or External Identifier) must be specified.
- A maximum of 10 routing entities (IMSI, MSISDN, External Identifier, or combinations of the two) can be specified.
- The last IMSI, MSISDN, or External Identifier for a subscriber cannot be deleted. Use `group="y"` to delete whole subscriber).

Semantic Rules (requests that specify `group="y"`)

- All specified `accountId`, `imsi`, `msisdn`, and `externalIdentifier` values must be assigned to one subscriber. The specified `imsi`, `msisdn`, or `externalIdentifier` values cannot exist in a standalone routing entity.
- The `accountID` parameter can be specified.
- At least 1 `imsi`, `msisdn`, `externalIdentifier`, or `accountId` value must be specified.
- A maximum of 6 `imsi`, 6 `msisdn`, 10 `externalIdentifier`, and 1 `accountId` value can be specified.

Request Format

```
<deleteSubscriber ent="subscriberRouting" ns="dsr" [resonly="resonly"]
    [id="id"] [timeout="timeout"] [group="group"]>
[
  <accountId>accountId</accountiId> ]
[
  <imsi>imsi</imsi>
  ...
  <imsi>imsi</imsi>
]
[
  <msisdn>msisdn</msisdn>
```

```

    ...
    <msisdn>msisdn</msisdn>
  ]
  [
    <externalId>externalIdentifier</externalId>
    ...
    <externalId>externalIdentifier</externalId>
  ]
</deleteSubscriber>

```

Request Parameters

Table 5-15 <deleteSubscriber> Request Parameters (XML)

| Parameter | Definition | Values |
|--------------------|--|---|
| ent | The entity name within the global schema. | subscriberRouting |
| ns | The namespace within the global schema. | dsr |
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | y - Only provide the result, do not include the original request (default). n - Include the original request in the response. |
| id (Optional) | Transaction ID value provided in request and passed back in the response. | 1-4294967295 |
| timeout (Optional) | The amount of time (in seconds) to wait to before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write are processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds (default is 0). |
| group (Optional) | Indicates if all of the subscriber's data should be deleted or just specified IMSI, MSISDN, or External Identifier routing entities. | y - Delete subscriber and all of its IMSI, MSISDN, and External Identifier routing entities. n - Only delete specified IMSI, MSISDN, and External Identifier routing entities (default). |
| accountId | A user-defined Account ID value to delete. | 1 to 26 numeric digits. |
| imsi (Optional) | An IMSI (specified in E.212 format). | 10 to 15 numeric digits. |

Table 5-15 (Cont.) <deleteSubscriber> Request Parameters (XML)

| Parameter | Definition | Values |
|-----------------------|--|------------------------------------|
| msisdn (Optional) | An MSISDN (specified in E.164 international public telecommunication numbering plan format). | 8 to 15 numeric digits. |
| externalId (Optional) | An External Identifier (specified in NAI format) value to add or update. | A string with 3 to 257 characters. |

5.12.2 Response

The <deleteSubscriberResp> response returns the result of the request to delete subscriber routing entities. There is a single result that applies to all routing entities supplied. Either all subscriber and/or routing entities were successfully deleted, or no deletes are made.

If applying all of the delete changes results in no routing entities being deleted (because the database already did not contain the specified values), the NO_UPDATES error code is returned and the number of affected records is 0. If a subscriber is successfully deleted, the description field contains lists of deleted IMSI and MSISDN values.

When a routing entity does not exist, this means that the affected rows count is not incremented for that IMSI/MSISDN.

Response Format

```
lengthInBytes
<deleteSubscriberResp [id="id"]>
[
  originalXMLRequest
]
  <res error="error" affected="affected" [description="description"]/>
</deleteSubscriberResp>
```

Parameters

The parameters for all of the XML response commands are shown in [XML Response Messages](#).

Error Codes

[Table 5-16](#) lists the common error codes for the <deleteSubscriberResp> command. See [SDS Response Message Error Codes](#) for a full list of error codes.

Table 5-16 <deleteSubscriberResp> Error Codes (XML)

| Error Code | Description |
|---------------|--|
| SUCCESS | The delete request was successfully completed. |
| NO_UPDATES | The record does not exist in the database. |
| TOO_MANY_ADDR | Too many address values supplied. |

Table 5-16 (Cont.) <deleteSubscriberResp> Error Codes (XML)

| Error Code | Description |
|------------------------------|---|
| TOO_MANY_EXTERNAL_IDENTIFIER | Too many external identifier address values supplied. |
| MISSING_PARAMETER | A mandatory parameter is missing. |
| MULTIPLE_SUBSCRIBERS | Specified parameters refer to multiple subscribers. |
| ROUTE_TYPE_MISMATCH | Standalone and subscriber routes are not allowed in same command. |
| DEL_ROUTE_NOT_PERMITTED | Cannot delete last route from subscriber. |

5.12.3 Examples

Delete Stand-Alone Routing Entities

This example deletes stand-alone IMSI and MSISDN routing entities.

Request:

```
<deleteSubscriber ent="subscriberRouting" ns="dsr" id="101">
  <imsi>111111111100021</imsi>
  <imsi>111111111100022</imsi>
  <msisdn>8004605520</msisdn>
</deleteSubscriber>
```

Response:

```
deleteSubscriberResp id="101">
  <res error="0" affected="3"/>
</deleteSubscriberResp>
```

Delete Several Routing Entities

This example successfully deletes two stand-alone IMSI routing entities. Other IMSI values were not found and were not deleted.

Request:

```
<deleteSubscriber ent="subscriberRouting" ns="dsr" id="102">
  <imsi>777777777777777</imsi>
  <imsi>111111111100001</imsi>
  <imsi>111111111100002</imsi>
  <imsi>888888888888888</imsi>
</deleteSubscriber>
```

Response:

```
<deleteSubscriberResp id="102">
  <res error="0" affected="2"/>
</deleteSubscriberResp>
```

Delete Routing Entities Assigned to the Same Subscriber

This example deletes IMSI and MSISDN routing entities that are assigned to the same subscriber. The example assumes that the subscriber has at least one more routing entity other than the specified values.

Request:

```
<deleteSubscriber ent="subscriberRouting" ns="dsr" id="103">
  <imsi>111111111100002</imsi>
  <msisdn>8004605500</msisdn>
</deleteSubscriber>
```

Response:

```
<<deleteSubscriberResp id="103">
  <res error="0" affected="2"/>
</deleteSubscriberResp>
```

Delete Last Routing Entity for a Subscriber (success)

This example successfully deletes the subscriber and all IMSI and MSISDN routing entities assigned to the subscriber. Any of the subscriber's Account ID, MSISDN or IMSI values can be specified. In this example, all of the IMSI and MSISDN values are specified even though only one value is required.

Request:

```
<deleteSubscriber ent="subscriberRouting" ns="dsr" id="105"
  timeout="10" group="y">
  <imsi>111111111100001</imsi>
  <imsi>111111111100002</imsi>
  <msisdn>8004605500</msisdn>
</deleteSubscriber>
```

Response:

```
<deleteSubscriberResp id="105">
  <res error="0" affected="1"/>
</deleteSubscriberResp>
```

Delete Last Routing Entity for a Subscriber (failure)

This example attempts to delete IMSI and MSISDN routing entities that are assigned to the same subscriber. The example fails because the subscriber does not have any more routing entities.

No changes are made to the database because the request failed.

Request:

```
<deleteSubscriber ent="subscriberRouting" ns="dsr" id="104" timeout="10">
  <imsi>111111111100001</imsi>
  <imsi>111111111100002</imsi>
```



```
<msisdn>8004605500</msisdn>
</deleteSubscriber>
```

Response:

```
deleteSubscriberResp id="104">
  <res error="2028" affected="0" description=
    "cannot delete the last route from subscriber"/>
</deleteSubscriberResp>
```

Delete a Subscriber (success)

This example successfully deletes the subscriber and all IMSI and MSISDN routing entities assigned to the subscriber. Any of the subscriber's Account ID, MSISDN or IMSI values can be specified. In this example, the Account ID is specified.

Request:

```
<deleteSubscriber ent="subscriberRouting" ns="dsr" id="106" group="y">
  <accountId>80044400001234567890111112</accountId>
</deleteSubscriber>
```

Response:

```
<deleteSubscriberResp id="106">
  <res error="0" affected="1"/>
</deleteSubscriberResp>
```

5.13 Read Subscriber

5.13.1 Request

The `<readSubscriber>` request extracts IMSI and MSISDN routing and subscriber data. See [Subscriber and Routing Data](#) for a description of subscriber and routing data. Each routing entity contains up to eight destination names.

When the `group="y"` attribute is specified, the request extracts and displays all data associated with the subscriber. The returned response will have the Subscriber Account ID, all IMSI and MSISDN values, and the eight destination values from any of the subscriber routing entities is returned in the response. All routing entities for a subscriber have the same destination values; hence, any routing entity can be used to extract the values.

When `group="y"` is not specified or when `group="n"` is specified, only the specified IMSI and MSISDN routing entities are retrieved. The returned response will have each IMSI or MSISDN value along with individual up to eight destination values.

Semantic Rules (requests that do not specify the group attribute or specify `group="n"`)

- All specified `imsi` or `msisdn` values must be assigned to one subscriber or must exist in stand-alone routing entities.

- The `accountId` parameter cannot be specified.
- At least one routing entity (IMSI or MSISDN) must be specified.
- A maximum of 10 routing entities (IMSI, MSISDN, or combinations of the two) can be specified.

Semantic Rules (requests that specify `group="y"`)

- All specified `accountId`, `imsi`, or `msisdn` values must be assigned to one subscriber. The specified `imsi` or `msisdn` values cannot exist in a stand-alone routing entity.
- The `accountId` parameter can be specified.
- A maximum of 6 `imsi`, 6 `msisdn`, and 1 `accountId` values can be specified.

Request Format

```
<readSubscriber ent="subscriberRouting" ns="dsr" [resonly="resonly"]
[id="id"]
      [timeout="timeout" ] [group="group"]>
[   <accountId>accountId</accountId> ]
[
  <imsi>imsi</imsi>

  <imsi>imsi</imsi>
]
[
  <msisdn>msisdn</msisdn>
  ...
  <msisdn>msisdn</msisdn>
]
</readSubscriber>
```

Request Parameters

Table 5-17 `<readSubscriber>` Request Parameters (XML)

| Parameter | Description | Values |
|---------------------------------|---|--|
| <code>ent</code> | The entity name within the global schema. | <code>subscriberRouting</code> |
| <code>ns</code> | The namespace within the global schema. | <code>dsr</code> |
| <code>resonly</code> (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | <ul style="list-style-type: none"> • <code>y</code> - Only provide the result, do not include the original request (default). • <code>n</code> - Include the original request in the response. |
| <code>id</code> (Optional) | Transaction ID value provided in request and passed back in the response. | 1-4294967295 |

Table 5-17 (Cont.) <readSubscriber> Request Parameters (XML)

| Parameter | Description | Values |
|----------------------|---|---|
| timeout (Optional) | The amount of time (in seconds) to wait before being able to perform a read if another connection is performing a write, or has a transaction open. Clients waiting to read will be processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds. The default is 0. |
| group (Optional) | Indicates if all subscriber data should be retrieved or just specified IMSI or MSISDN routing entities. | <ul style="list-style-type: none"> y - Read subscriber and all of its IMSI and MSISDN routing entities. n - Only read specified MSISDN and IMSI routing entities (default). |
| accountId (Optional) | A user-defined Account ID value to read. | 1 to 26 numeric digits. |
| imsi (Optional) | An IMSI (specified in E.212 format). | 10 to 15 numeric digits. |
| msisdn (Optional) | An MSISDN (specified in E.164 international public telecommunication numbering plan format). | 8 to 15 numeric digits. |

5.13.2 Response

The <readSubscriberResp> response returns the result of the request to read subscriber routing entities. Only those subscribers or routing entities that are found are returned. The response message contains up to nine destinations (one for each destination type, such as <ltehss>) for each routing entity or subscriber. Only provisioned destination names are displayed. (for example, destination names="none" are not displayed).

Variations can occur in the response, depending on whether a subscriber is being retrieved or routing entities are being retrieved.

If routing entities are retrieved (group="y" was not specified or group="n" was specified):

- There will not be any <subscriber> or <accountId> tags.
- The destination values are listed within each IMSI, MSISDN, or External Identifier routing entity value.

If a subscriber is retrieved (group="y" is specified):

- The <subscriber> tag is used within the <rset> tag.

- The <accountId> tag is displayed if the subscriber has an Account ID value defined.
- The destination values are listed once, after the last routing entity.

Response Format (group="y" is not specified)

```
lengthInBytes
<readSubscriberResp [id="id"]>
[
  originalXMLRequest
]
<res error="error" affected="affected" [description="description"]/>
[
  <rset>
  [
    <imsi imsi="imsi">
      [ <imshss>imshss</imshss> ]
      [ <ltehss>ltehss</ltehss> ]
      [ <pcrf>pcrf</pcrf> ]
      [ <ocs>ocs</ocs> ]
      [ <ofcs>ofcs</ofcs> ]
      [ <aaa>aaa</aaa> ]
      [ <userdef1>userdef1</userdef1> ]
      [ <userdef2>userdef2</userdef2> ]
      [ <mtchss>mtchss</mtchss> ]
    </imsi>
    ...
    <imsi imsi="imsi">
      [ <imshss>imshss</imshss> ]
      [ <ltehss>ltehss</ltehss> ]
      [ <pcrf>pcrf</pcrf> ]
      [ <ocs>ocs</ocs> ]
      [ <ofcs>ofcs</ofcs> ]
      [ <aaa>aaa</aaa> ]
      [ <userdef1>userdef1</userdef1> ]
      [ <userdef2>userdef2</userdef2> ]
      [ <mtchss>mtchss</mtchss> ]
    </imsi>
  ]
  [
    <msisdn msisdn="msisdn">
      [ <imshss>imshss</imshss> ]
      [ <ltehss>ltehss</ltehss> ]
      [ <pcrf>pcrf</pcrf> ]
      [ <ocs>ocs</ocs> ]
      [ <ofcs>ofcs</ofcs> ]
      [ <aaa>aaa</aaa> ]
      [ <userdef1>userdef1</userdef1> ]
      [ <userdef2>userdef2</userdef2> ]
      [ <mtchss>mtchss</mtchss> ]
    </msisdn>
    ...
    <msisdn msisdn="msisdn">
      [ <imshss>imshss</imshss> ]
      [ <ltehss>ltehss</ltehss> ]
  ]
]
```

```

    [ <pcrf>pcrf</pcrf> ]
    [ <ocs>ocs</ocs> ]
    [ <ofcs>ofcs</ofcs> ]
    [ <aaa>aaa</aaa> ]
    [ <userdef1>userdef1</userdef1> ]
    [ <userdef2>userdef2</userdef2> ]
    [ <mtchss>mtchss</mtchss> ]
</msisdn>
]
[
  <externalId externalId="externalIdentifier">
    [ <imshss>imshss</imshss> ]
    [ <ltehss>ltehss</ltehss> ]
    [ <pcrf>pcrf</pcrf> ]
    [ <ocs>ocs</ocs> ]
    [ <ofcs>ofcs</ofcs> ]
    [ <aaa>aaa</aaa> ]
    [ <userdef1>userdef1</userdef1> ]
    [ <userdef2>userdef2</userdef2> ]
    [ <mtchss>mtchss</mtchss> ]
  </externalId>
  ...
  <externalId externalId="externalIdentifier">
    [ <imshss>imshss</imshss> ]
    [ <ltehss>ltehss</ltehss> ]
    [ <pcrf>pcrf</pcrf> ]
    [ <ocs>ocs</ocs> ]
    [ <ofcs>ofcs</ofcs> ]
    [ <aaa>aaa</aaa> ]
    [ <userdef1>userdef1</userdef1> ]
    [ <userdef2>userdef2</userdef2> ]
    [ <mtchss>mtchss</mtchss> ]
  </externalId>
]
</rset>
]
</readSubscriberResp>

```

Response Format (group="y") is specified

```

lengthInBytes
<readSubscriberResp [id="id"]>
[
  originalXMLRequest
]
  <res error="error" affected="affected"
[description="description"]/>
[
  <rset>
    <subscriber>
      [ <accountId>accountId</accountId> ]
      [ <imsi>imsi</imsi> ]
      ...
      [ <imsi>imsi</imsi> ]
    </subscriber>
  </rset>
]

```

```

    [ <msisdn>msisdn</msisdn> ]
      ...
    [ <msisdn>msisdn</msisdn> ]
    [ <imshss>imshss</imshss> ]
    [ <externalId>extId</externalId> ]
      ...
    [ <externalId>extId</externalId> ]
    [ <ltehss>ltehss</ltehss> ]
    [ <pcrf>pcrf</pcrf> ]
    [ <ocs>ocs</ocs> ]
    [ <ofcs>ofcs</ofcs> ]
    [ <aaa>aaa</aaa> ]
    [ <userdef1>userdef1</userdef1> ]
    [ <userdef2>userdef2</userdef2> ]
    [ <mtchss>mtchss</mtchss> ]
  </subscriber>
</rset>
]
</readSubscriberResp>

```

Response Parameters

Table 5-18 <readSubscriberResp> Parameters (XML)

| Parameter | Description | Response |
|-------------------------------|---|-------------------------------------|
| lengthinbytes | Number of bytes following to form XML request. This is a 4 byte binary value. | 0-4294967295 |
| id (Optional) | Transaction ID value provided in request and passed back in the response. | 1-4294967295 |
| originalXMLRequest (Optional) | The text of the original <readSubscriber> XML request that was sent. Note: This is only present if the <code>resonly="n"</code> attribute is set in the original request. | A string with 1 to 4096 characters. |
| error | Error code. Whether or not operation was successfully executed by the XDS. | 0 - success, non zero - failure. |
| affected | If <code>group="y"</code> , then the number of subscribers read (0 or 1). Otherwise, the number of routing entities read (0 - 10). | 0-10 |
| description (Optional) | A textual description associated with the response. This may contain more information as to why a request failed. | A string with 1 to 1024 characters. |

Table 5-18 (Cont.) <readSubscriberResp> Parameters (XML)

| Parameter | Description | Response |
|-----------------------|---|------------------------------------|
| rset | Contains 1 row for each extracted record. Each row contains a standalone routing entity (MSISDN or IMSI value with its destination values) or a subscriber (list of related MSISDN, IMSI and Account ID values with the destination values that are used by all routing entities assigned to the subscriber.) | |
| subscriber (Optional) | Contains all IMSI and MSISDN values for a specific subscriber with an optional Account ID and all destinations defined for the subscriber. | |
| accountId (Optional) | A user-defined Account ID value. | 1 to 26 numeric digits. |
| imsi (Optional) | An IMSI (specified in E.212 format). | 10 to 15 numeric digits. |
| msisdn (Optional) | An MSISDN (specified in E.164 international public telecommunication numbering plan format). | 8 to 15 numeric digits. |
| externalId (Optional) | An External Identifier (specified in NAI format) value. | A string with 3 to 257 characters. |
| imshss (Optional) | The name of the IMS HSS destination. | A string with 1 to 32 characters. |
| ltehss (Optional) | The name of the LTE HSS destination. | A string with 1 to 32 characters. |
| pcrf (Optional) | The name of the PCRF destination. | A string with 1 to 32 characters. |
| ocs (Optional) | The name of the OCS destination. | A string with 1 to 32 characters. |
| ofcs (Optional) | The name of the OFCS destination. | A string with 1 to 32 characters. |
| aaa (Optional) | The name of the AAA server destination. | A string with 1 to 32 characters. |
| userdef1 (Optional) | The name of the first user defined destination. | A string with 1 to 32 characters. |
| userdef2 (Optional) | The name of the second user defined destination. | A string with 1 to 32 characters. |
| mtchss (Optional) | The name of the MTC HSS destination. | A string with 1 to 32 characters. |

Response Error Codes

[Table 5-19](#) lists the common error codes for the <readSubscriberResp> command. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 5-19 <readSubscriberResp> Error Codes (XML)

| Error Code | Description |
|-------------------------------|---|
| SUCCESS | The read request was successfully completed. |
| TOO_MANY_ADDR | Too many address values supplied. |
| TOO_MANY_EXTERNAL_IDENTIFIER | Too many external identifier address values supplied. |
| MISSING_PARAMETER | A mandatory parameter is missing. |
| IMSI_NOT_FOUND | The specified IMSI does not exist. |
| MSISDN_NOT_FOUND | The specified MSISDN does not exist. |
| EXTERNAL_IDENTIFIER_NOT_FOUND | External Identifier does not exist. |
| SUBSCRIBER_NOT_FOUND | The subscriber does not exist. |
| MULTIPLE_SUBSCRIBERS | Specified parameters refer to multiple subscribers. |
| ROUTE_TYPE_MISMATCH | Standalone and subscriber routes are not allowed in same command. |

5.13.3 Examples

The format of the response differs depending on whether the `group="y"` attribute is specified.

If `group="y"` is NOT specified, then each routing entity that was found is displayed with its destination values.

If `group="y"` is specified, then the result response includes an optional Account ID value (if it exists), all MSISDN and IMSI values for that subscriber, and one set of destination values (all routing entities within a subscriber have the same destination values).

Read Routing Entities (not subscribers)

This example reads IMSI and MSISDN routing entities and displays their destination values. It does not matter if any of the routing entities are assigned to a subscriber because the same result will occur.

Request:

```
<readSubscriber ent="subscriberRouting" ns="dsr" id="101">
  <imsi>111111111100001</imsi>
  <imsi>111111111100002</imsi>
  <msisdn>8004605500</msisdn>
</readSubscriber>
```

Response:

```
<readSubscriberResp>
  <res error="0" affected="3"/>
  <rset>
    <imsi imsi="111111111100001">
      <ltehss>LTE_HSS_4</ltehss>
      <aaa>AAA_4</aaa>
    </imsi>
    <imsi imsi="111111111100002">
```



```

    <ltehss>LTE_HSS_4</ltehss>
    <aaa>AAA_4</aaa>
  </imsi>
  <msisdn msisdn="8004605500">
    <ltehss>LTE_HSS_4</ltehss>
    <aaa>AAA_4</aaa>
  </msisdn>
</rset>
</readSubscriberResp>

```

Read Routing Entities with Not Found MSISDN/IMSI Values

This example reads IMSI and MSISDN routing entities and displays their destination values. In this example, one MSISDN and one IMSI value do not exist, so the response returns the two values that do exist. The same result will occur if any of the routing entities are assigned to a subscriber.

Request:

```

<readSubscriber ent="subscriberRouting" ns="dsr" id="102">
  <imsi>7777777777777777</imsi>
  <imsi>111111111100002</imsi>
  <msisdn>8004605500</msisdn>
  <msisdn>8888888888888888</msisdn>
</readSubscriber>

```

Response:

```

<readSubscriberResp>
  <res error="0" affected="2"/>
  <rset>
    <imsi imsi="111111111100002">
      <ltehss>LTE_HSS_4</ltehss>
      <aaa>AAA_4</aaa>
    </imsi>
    <msisdn msisdn="8004605500">
      <ltehss>LTE_HSS_4</ltehss>
      <aaa>AAA_4</aaa>
    </msisdn>
  </rset>
</readSubscriberResp>

```

Read Subscriber (success)

This example reads a subscriber and displays all of the subscriber data. Any of the subscriber Account ID, MSISDN or IMSI values can be specified. In this example, the MSISDN value is specified.

Request:

```

<readSubscriber ent="subscriberRouting" ns="dsr" id="103" group="y">
  <msisdn>8004605500</msisdn>
</readSubscriber>

```

Response:

```

<readSubscriberResp>
  <res error="0" affected="1"/>
  <rset>
    <subscriber>
      <accountId>80044400001234567890111112</accountId>
      <imsi>"111111111100001"</imsi>
      <imsi>111111111100002</imsi>
      <msisdn>8004605500</msisdn>
      <ltehss>LTE_HSS_4</ltehss>
      <aaa>AAA_4</aaa>
    </subscriber>
  </rset>
</readSubscriberResp>

```

Read Subscriber Fails for Stand-alone Routing Entity

This example attempts to read a subscriber. The request fails because the specified MSISDN value is for a stand-alone routing entity.

Request:

```

<readSubscriber ent="subscriberRouting" ns="dsr" id="1041" group="y">
  <msisdn>8004605503</msisdn>
</readSubscriber>

```

Response:

```

<readSubscriberResp>
  <res error="2022" affected="0" description="subscriber not found"/>
</readSubscriberResp>

```

5.14 Update Subscriber NAI

5.14.1 Request

The `<updateSubscriberNai>` request provisions NAI routing entities. Each NAI value is defined as a combination of an NAI host and NAI user value. For example, "John.Smith@oracle.com" would have "John.Smith" as the NAI user value and "oracle.com" as the NAI host value.

Each routing entity contains up to nine destination names. Each destination contains FQDN and realm values, which are used for routing messages. The request can remove a destination value from existing NAI routing entities by specifying "none" as the destination name.

The request can add new routing entities or update destination names in existing routing entities. These destination changes are applied to all specified NAI routing entities.

Semantic Rules

- Between 1 and 10 user names must be specified.

- At least one destination must be specified.
- The host name must already exist in the database.
- A destination name must already exist in the database.
- Each destination name type may only be specified once.
- All specified routing entities will be provisioned with the same destination value(s).
- Any existing destination(s) for a routing entity will not be changed/removed if not specified in the request.
- Specifying a destination name of "none" will remove the association of that destination from the specified routing entity(s).

Request Format

```
<updateSubscriberNai ent="subscriberRouting" ns="dsr"
[resonly="resonly"]
      [id="id"] [timeout="timeout"]>
  <host>host</host>
  <user>user</user>
  [
    <user>user</user>
    ...
    <user>user</user>
  ]
  [ <imshss>imshss</imshss>          ]
  [ <ltehss>ltehss</ltehss>          ]
  [ <pcrf>pcrf</pcrf>                ]
  [ <ocs>ocs</ocs>                  ]
  [ <ofcs>ofcs</ofcs>                ]
  [ <aaa>aaa</aaa>                  ]
  [ <userdef1>userdef1</userdef1>    ]
  [ <userdef2>userdef2</userdef2>    ]
  [ <mtchss>mtchss</mtchss>         ]
</updateSubscriberNai>
```

Request Parameters

Table 5-20 <updateSubscriberNai> Request Parameters (XML)

| Parameter | Description | Values |
|--------------------|---|--|
| ent | The entity name within the global schema. | subscriberRouting |
| ns | The namespace within the global schema. | dsr |
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | y - Only provide the result, do not include the original request (default). n - Include the original request in the response. |
| id (Optional) | Transaction id value provided in request, and will be passed back in the response | 1-4294967295 |

Table 5-20 (Cont.) <updateSubscriberNai> Request Parameters (XML)

| Parameter | Description | Values |
|---------------------|---|--|
| timeout (Optional) | The amount of time (in seconds) to wait to before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write will be processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds. The default is 0. |
| host | A host name. | A string with 1 to 64 characters. |
| user | A user name to be associated with the host to form an NAI. | A string with 1 to 64 characters. |
| imshss (Optional) | The name of the IMS HSS destination. | A string with 1 to 32 characters. |
| ltehss (Optional) | The name of the LTE HSS destination. | A string with 1 to 32 characters. |
| pcrf (Optional) | The name of the PCRF destination. | A string with 1 to 32 characters. |
| ocs (Optional) | The name of the OCS destination. | A string with 1 to 32 characters. |
| ofcs (Optional) | The name of the OFCS destination. | A string with 1 to 32 characters. |
| aaa (Optional) | The name of the AAA server destination. | A string with 1 to 32 characters. |
| userdef1 (Optional) | The name of the first user defined destination. | A string with 1 to 32 characters. |
| userdef2 (Optional) | The name of the second user defined destination. | A string with 1 to 32 characters. |
| mtchss (Optional) | The name of the MTC HSS destination. | A string with 1 to 32 characters. |

5.14.2 Response

The <updateSubscriberNaiResp> response returns the result of the request to provision subscriber routing entities. There is a single result that applies to all routing entities supplied. Either all routing entities were successfully updated, or no updates were made to any routing entity.

 **Note:**

If applying all of the provisioning changes results in no database records being modified because the database already contained the updated values, then the NO_UPDATES error code is returned, and the number of affected records is 0.

Response Format

```
lengthInBytes
<updateSubscriberNaiResp [id="id"]>
[
  originalXMLRequest
]
  <res error="error" affected="affected"
[description="description"]/>
</updateSubscriberNaiResp>
```

Response Parameters

The parameters for all of the XML response commands are shown in [XML Response Messages](#).

Response Error Codes**Table 5-21** <updateSubscriberNaiResp> Error Codes (XML)

| Error Code | Description |
|--------------------|---|
| SUCCESS | The update request was successfully completed. |
| NO_UPDATES | All of the changes were already in the database. |
| NAI_HOST_NOT_FOUND | Host name does not exist. |
| TOO_MANY_NAI | Too many NAI values supplied. |
| NO_DEST_VAL | No destination name supplied. |
| MISSING_PARAMETER | A mandatory parameter is missing. |
| DEST_NOT_FOUND | Destination name does not exist. |
| DEST_TYPE_MISMATCH | Destination has a different destination type than the desired destination type. |

5.14.3 Examples

Some of the following examples are based upon previous requests. The order of the requests can be important.

Add New NAI Routing Entities

This example creates three new NAI routing entities and sets their destination values to the specified values. This example assumes that the host and destination values already exist.

The result of this request is:

- New NAI routing entities are created.
- All destination values for each routing entity are set to specified values.

Request:

```
<updateSubscriberNai ent="subscriberRouting" ns="dsr" id="101">
  <host>oracle.com</host>
  <user>John.Smith</user>
  <user>Jane.Doe</user>
  <user>Mike.Jones</user>
  <imshss>IMS_HSS_1</imshss>
  <ltehss>LTE_HSS_1</ltehss>
  <aaa>AAA_Texas</aaa>
</updateSubscriberNai>
```

Response:

```
<updateSubscriberNaiResp id="101">
  <res error="0" affected="3"/>
</updateSubscriberNaiResp>
```

Update NAI Routing Entities Destinations (success)

This example updates existing NAI routing entities with new destination values.



Note:

This request does not update all NAI values that were specified in the previous request.

The result of this request is that the specified NAI routing entities are updated with specified values.

Request:

```
<updateSubscriberNai ent="subscriberRouting" ns="dsr" id="102">
  <host>oracle.com</host>
  <user>Jane.Doe</user>
  <user>Mike.Jones</user>
  <ltehss>LTE_HSS_4</ltehss>
  <pcrf>PCRF_Ohio</pcrf>
</updateSubscriberNai>
```

Response:

```
<updateSubscriberNaiResp id="102">
  <res error="0" affected="2"/>
</updateSubscriberNaiResp>
```

Update NAI Routing Entities Destinations (failure)

This example fails to update existing NAI routing entities with new destination values because the destination does not exist.

No changes are made to the database because the request failed.

Request:

```
<updateSubscriberNai ent="subscriberRouting" ns="dsr" id="103">
  <host>oracle.com</host>
  <user>Jane.Doe</user>
  <ltehss>junk</ltehss>
</updateSubscriberNai>
```

Response:

```
<updateSubscriberNaiResp id="102">
  <res error="2006" affected="0" description="destination not found"/>
</updateSubscriberNaiResp>
```

5.15 Delete Subscriber NAI

5.15.1 Request

The `<deleteSubscriberNai>` request removes NAI routing data.

Each NAI value is defined as a combination of an NAI host and NAI user value. For example, "John.Smith@oracle.com" would have "John.Smith" as the NAI user value and "oracle.com" as the NAI host value. The `<deleteSubscriberNai>` command removes the NAI user value, but does not affect the NAI host value.

Semantic Rules

- Between 1 and 10 user names must be specified.
- The host name must already exist in the database.

Request Format

```
<deleteSubscriberNai ent="subscriberRouting" ns="dsr"
[resonly="resonly"]
[id="id"] [timeout="timeout"]>
  <host>host</host>
  <user>user</user>
  [
    <user>user</user>
    ...
    <user>user</user>
  ]
</deleteSubscriberNai>
```

Request Parameters

Table 5-22 <deleteSubscriberNai> Request Parameters (XML)

| Parameter | Description | Values |
|--------------------|---|--|
| ent | The entity name within the global schema. | subscriberRouting |
| ns | The namespace within the global schema. | dsr |
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | y - Only provide the result, do not include the original request (default). n - Include the original request in the response. |
| id (Optional) | Transaction ID value provided in request and passed back in the response. | 1-4294967295 |
| timeout (Optional) | The amount of time (in seconds) to wait to before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write will be processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds. The default is 0. |
| host | A host name. | A string with 1 to 64 characters. |
| user | A user name to be associated with the host to form an NAI. | A string with 1 to 64 characters. |

5.15.2 Response

The <deleteSubscriberNaiResp> response returns the result of the request to delete subscriber routing entities. A single result that applies to all routing entities supplied. Either all routing entities were successfully deleted, or no deletes were made.

If applying all of the delete requests results in no database records being deleted (because they already did not exist in the database), the NO_UPDATES error code is returned and the number of affected records is 0.

Response Format

```
lengthInBytes
<deleteSubscriberNaiResp [id="id"]>
[
  originalXMLRequest
]
```



```
<res error="error" affected="affected"
[description="description"]/>
</deleteSubscriberNaiResp>
```

Response Parameters

The parameters for all of the XML response commands are shown in [XML Response Messages](#).

Response Error Codes

[Table 5-23](#) lists the common error codes for `<deleteSubscriberNaiResp>`. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 5-23 `<deleteSubscriberNaiResp>` Error Codes (XML)

| Error Code | Description |
|--------------------|--|
| SUCCESS | The delete request was successfully completed. |
| NO_UPDATES | All of the records were already deleted from the database. |
| NAI_HOST_NOT_FOUND | Host name does not exist. |
| TOO_MANY_NAI | Too many NAI values supplied. |
| NO_NAI_VAL | No NAI value supplied. |

5.15.3 Examples

Delete NAI Routing Entities

This example successfully deletes three NAI routing entities.

Request:

```
<deleteSubscriberNai ent="subscriberRouting" ns="dsr" id="101">
  <host>oracle.com</host>
  <user>John.Smith</user>
  <user>Jane.Doe</user>
  <user>Mike.Jones</user>
</deleteSubscriberNai>
```

Response:

```
<deleteSubscriberNaiResp id="101">
  <res error="0" affected="3"/>
</deleteSubscriberNaiResp>
```

Delete Several NAI Routing Entities

This example successfully deletes two NAI routing entities. Other NAI values were not found and were not deleted.

Request:

```
<deleteSubscriberNai ent="subscriberRouting" ns="dsr" id="102">
  <host>oracle.com</host>
  <user>John.Smith</user>
  <user>Ann.Jones</user>
  <user>Jane.Doe</user>
  <user>Mike.Jackson</user>
</deleteSubscriberNai>
```

Response:

```
<deleteSubscriberNaiResp id="102">
  <res error="0" affected="2"/>
</deleteSubscriberNaiResp>
```

5.16 Read Subscriber NAI

5.16.1 Request

The `<readSubscriberNai>` request extracts (reads) NAI routing entities and displays the first eight destination values for each routing entity.

Semantic Rules

- Between 1 and 10 user names must be specified.
- The host name must already exist in the database.

Request Format

```
<readSubscriberNai ent="subscriberRouting" ns="dsr" [resonly="resonly"]
  [id="id"]>
  <host>host</host>
  <user>user</user>
  [
    <user>user</user>
    ...
    <user>user</user>
  ]
</readSubscriberNai>
```

Request Parameters**Table 5-24** `<readSubscriberNai>` Request Parameters (XML)

| Parameter | Description | Values |
|-----------|---|-------------------|
| ent | The entity name within the global schema. | subscriberRouting |
| ns | The namespace within the global schema. | dsr |

Table 5-24 (Cont.) <readSubscriberNai> Request Parameters (XML)

| Parameter | Description | Values |
|--------------------|--|--|
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | <ul style="list-style-type: none"> y - Only provide the result, do not include the original request (default). n - Include the original request in the response. |
| id (Optional) | Transaction id value provided in request and passed back in the response. | 1-4294967295 |
| timeout (Optional) | The amount of time (in seconds) to wait before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write will be processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds. The default is 0. |
| host | A host name. | A string with 1 to 64 characters. |
| user | A user name to be associated with the host to form an NAI. | A string with 1 to 64 characters. |

5.16.2 Response

The <readSubscriberNaiResp> response returns the result of the request to read NAI subscriber routing entities. Only those NAI subscriber routing entities that are found are returned. The response message contains up to eight destinations (one for each destination type, such as <ltehss>) for each routing entity. Only provisioned destination names are displayed. (for example, destination names="none" are not displayed).

Response Format

```
lengthInBytes
<readSubscriberNaiResp [id="id"]>
[
  originalXMLRequest
]
  <res error="error" affected="affected"
[description="description"]/>
[
  <rset>
    <nai host="host" user="user">
      [ <imshss>imshss</imshss> ]
      [ <ltehss>ltehss</ltehss> ]
      [ <pcrf>pcrf</pcrf> ]
      [ <ocs>ocs</ocs> ]
    </nai>
  </rset>
</readSubscriberNaiResp>
```

```

[      <ofcs>ofcs</ofcs>          ]
[      <aaa>aaa</aaa>            ]
[      <userdef1>userdef1</userdef1> ]
[      <userdef2>userdef2</userdef2> ]
[      </nai>                    ]
[
[      ...
[      <nai host="host" user="user">
[      <imshss>imshss</imshss>    ]
[      <ltehss>ltehss</ltehss>    ]
[      <pcrf>pcrf</pcrf>          ]
[      <ocs>ocs</ocs>            ]
[      <ofcs>ofcs</ofcs>          ]
[      <aaa>aaa</aaa>            ]
[      <userdef1>userdef1</userdef1> ]
[      <userdef2>userdef2</userdef2> ]
[      </nai>                    ]
[
[      </rset>
]
</readSubscriberResp>

```

Response Parameters

Table 5-25 <readSubscriberNaiResp> Parameters (XML)

| Parameter | Description | Values |
|-------------------------------|--|-------------------------------------|
| lengthInBytes | Number of bytes following to form XML request. This is a 4 byte binary value. | 0-4294967295 |
| id (Optional) | Transaction id value provided in request and passed back in the response. | 1-4294967295 |
| originalXMLRequest (Optional) | The text of the original <readSubscriber> XML request that was sent. This is only present if the resonly="n" attribute is set in the original request. | A string with 1 to 4096 characters. |
| error | Whether or not operation was successfully executed by the SDS. | 0 - success, non zero - failure. |
| affected | The number of routing entities read. | 0-10 |
| description (Optional) | A textual description associated with the response. This may contain more information as to why a request failed. Only present when the request fails. | A string with 1 to 1024 characters. |
| <rset> XML tag (Optional) | Indicates rows of data are returned. If no records are being returned, this tag is not be present. | |

Table 5-25 (Cont.) <readSubscriberNaiResp> Parameters (XML)

| Parameter | Description | Values |
|---------------------|--|---|
| host | A host name, which is used with all user values. | A string with 1 to 64 characters. |
| user | The NAI user name to be associated with the host to form an NAI. | A string with 1 to 64 characters. Must have 1-10 user values. |
| imshss (Optional) | The name of the IMS HSS destination. | A string with 1 to 32 characters. |
| ltehss (Optional) | The name of the LTE HSS destination. | A string with 1 to 32 characters. |
| pcrf (Optional) | The name of the PCRF destination. | A string with 1 to 32 characters. |
| ocs (Optional) | The name of the OCS destination. | A string with 1 to 32 characters. |
| ofcs (Optional) | The name of the OFCS destination. | A string with 1 to 32 characters. |
| aaa (Optional) | The name of the AAA server destination. | A string with 1 to 32 characters. |
| userdef1 (Optional) | The name of the first user defined destination. | A string with 1 to 32 characters. |
| userdef2 (Optional) | The name of the second user defined destination. | A string with 1 to 32 characters. |

Response Error Codes

Table 5-26 lists the common error codes for the <readSubscriberNaiResp> command. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 5-26 <readSubscriberNaiResp> Error Codes (XML)

| Error Code | Description |
|--------------------|--|
| SUCCESS | The delete request was successfully completed. |
| NAI_HOST_NOT_FOUND | Host name does not exist. |
| NAI_NOT_FOUND | None of the specified NAI exists. |
| TOO_MANY_NAI | Too many NAI values supplied. |
| MISSING_PARAMETER | A mandatory parameter is missing. |

5.16.3 Examples

Read NAI Routing Entities

This example successfully reads three NAI routing entities.

Request:

```
<readSubscriberNai ent="subscriberRouting" ns="dsr" id="101">
  <host>oracle.com</host>
```

```

    <user>John.Smith</user>
    <user>Jane.Doe</user>
    <user>Mike.Jones</user>
</readSubscriberNai>

```

Response:

```

<readSubscriberNaiResp id="101">
  <res error="0" affected="3"/>
  <rset>
    <nai host="oracle.com" user="John.Smith">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_1</ltehss>
      <aaa>AAA_Texas</aaa>
    </nai>
    <nai host="oracle.com" user="Jane.Doe">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_4</ltehss>
      <pcrf>PCRF_Ohio</pcrf>
      <aaa>AAA_Texas</aaa>
    </nai>
    <nai host="oracle.com" user="Mike.Jones">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_4</ltehss>
      <pcrf>PCRF_Ohio</pcrf>
      <aaa>AAA_Texas</aaa>
    </nai>
  </rset>
</readSubscriberNaiResp>

```

Read NAI Routing Entities

This example successfully reads two NAI routing entities. Other NAI values are not found

Request:

```

<readSubscriberNai ent="subscriberRouting" ns="dsr" id="102">
  <host>oracle.com</host>
  <user>John.Smith</user>
  <user>Ann.Jones</user>
  <user>Jane.Doe</user>
  <user>Mike.Jackson</user>
</readSubscriberNai>

```

Response:

```

<readSubscriberNaiResp id="102">
  <res error="0" affected="2"/>
  <rset>
    <nai host="oracle.com" user="John.Smith">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_1</ltehss>
      <aaa>AAA_Texas</aaa>
    </nai>

```

```
<nai host="oracle.com" user="Jane.Doe">
  <imshss>IMS_HSS_1</imshss>
  <ltehss>LTE_HSS_4</ltehss>
  <pcrf>PCRF_Ohio</pcrf>
  <aaa>AAA_Texas</aaa>
</nai>
</rset>
</readSubscriberNaiResp>
```

Read NAI Routing Entities (Failure)

This example fails because no NAI subscribers are found.

Request:

```
<readSubscriberNai ent="subscriberRouting" ns="dsr" id="103">
  <host>oracle.com</host>
  <user>Kevin.Smith</user>
  <user>John.Doe</user>
</readSubscriberNai>
```

Response:

```
<readSubscriberNaiResp id="103">
  <res error="2009" affected="0" description="nai not found" />
</readSubscriberNaiResp>
```

5.17 Update Domain

5.17.1 Request

The `<updateDomainRequest>` request provisions domain identifiers. For example, `John.Smith@tekelec.com` would have `John.Smith` as the local identifier value and `tekelec.com` as the domain identifier value.

Each domain identifier contains up to nine destination names. Each destination contains FQDN and realm values, which are used for routing messages. The `<updateDomainRequest>` request can remove a destination value from existing domain identifier by specifying `"none"` as the destination name.

The `<updateDomainRequest>` request can add new domain identifier value or update destination names in existing domain identifier records. These destination changes are applied to the specific domain identifier.

Semantic Rules

- There must be at least one destination specified.
- There must be one domain identifier values specified, and supported up to 10 values.
- All specified destination names must already exist in the database.
- Each destination name type may only be specified once.

- Specifying a destination name of "none" removes the association of that destination from the specified routing entity(s).

Request Format

```
<updateDomain ent="subscriberRouting" ns="dsr" [resonly="resonly"] [id="id"]
[timeout="timeout"] >
  <domain>domainIdentifier</domain>
[
  <domain>domainIdentifier</domain>
  ...
  <domain>domainIdentifier</domain>
]
[ <imshss>imshss</imshss>          ]
[ <ltehss>ltehss</ltehss>         ]
[ <pcrf>pcrf</pcrf>              ]
[ <ocs>ocs</ocs>                  ]
[ <ofcs>ofcs</ofcs>              ]
[ <aaa>aaa</aaa>                  ]
[ <userdef1>userdef1</userdef1> ]
[ <userdef2>userdef2</userdef2> ]
[ <mtchss>mtchss</mtchss>       ]
</updateDomain>
```

Request Parameters

Table 5-27 <updateDomain> Parameters (XML)

| Parameter | Description | Values |
|--------------------|--|--|
| ent | The entity name within the global schema. | subscriberRouting |
| ns | The namespace within the global schema. | dsr |
| resonly (Optional) | Indicates if the response should consist of the result only, without including the original request in the response. | y - only provide the result, do NOT include the original request (default). n - include the original request in the response. |
| id (Optional) | Transaction ID value provided in request and passed back in the response. | 1 to 4294967295 |
| timeout (Optional) | The amount of time (in seconds) to wait before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write are processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds (default is 0) |

Table 5-27 (Cont.) <updateDomain> Parameters (XML)

| Parameter | Description | Values |
|---------------------|---|------------------------------------|
| domain | The domain Identifier name, which is used for configuring external identifier by associating them with local identifier values. Must have one or up to 10 domain identifier values. | A string with 1 to 128 characters. |
| imshss (Optional) | The name of the IMS HSS destination. | A string with 1 to 32 characters. |
| ltehss (Optional) | The name of the LTE HSS destination. | A string with 1 to 32 characters. |
| pcrf (Optional) | The name of the PCRF destination. | A string with 1 to 32 characters. |
| ocs (Optional) | The name of the OCS destination. | A string with 1 to 32 characters. |
| ofcs (Optional) | The name of the OFCS destination. | A string with 1 to 32 characters. |
| aaa (Optional) | The name of the AAA server destination. | A string with 1 to 32 characters. |
| userdef1 (Optional) | The name of the first user defined destination. | A string with 1 to 32 characters. |
| userdef2 (Optional) | The name of the fsecond user defined destination. | A string with 1 to 32 characters. |
| mtchss (Optional) | The name of the MTC HSS destination. | A string with 1 to 32 characters. |

5.17.2 Response

The <updateDomainResp> response returns the result of the request to provision domain identifier values. A single result applies to all domain identifier values supplied. Either all domain identifier values were successfully updated, or no updates were made.

If applying all of the provisioning changes results in no database records being modified because the database already contained the updated values, then NO_UPDATES error code is returned and the number of affected records is 0.

Response Format

The syntax of the response is the same for all requests. For more information, see [XML Response Messages](#).

```
lengthInBytes
<updateDomainResp [id="id"]>
[
  originalXMLRequest
]
  <res error="error" affected="affected"
[description="description"]/>
</updateDomainResp>
```

Response Parameters

The parameters for all of the response commands are shown in [XML Response Messages](#).

Response Error Codes

[Table 5-28](#) lists common error codes for this command. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 5-28 <updateDomainResp> Error Codes (XML)

| Error Code | Description |
|-----------------------------|---|
| SUCCESS | The update request was successfully completed. |
| NO_UPDATES | The request does not have an update to the database. |
| DOMAIN_IDENTIFIER_NOT_FOUND | Domain Identifier does not exist. |
| NO_DEST_VAL | No destination name supplied. |
| MISSING_PARAMETER | A mandatory parameter is missing. |
| DEST_NOT_FOUND | Destination name does not exist. |
| DEST_TYPE_MISMATCH | Destination has a different destination type than the desired destination type. |
| TOO_MANY_ADDR | Too many address values supplied. |
| NO_DOMAIN_VAL | No Domain Identifier value supplied |

5.17.3 Examples

Below are some examples of how to use the <updateDomain> request and likely response. Some of these examples are based upon previous requests; hence, the order of the requests could be important.

Add New Domain Values

This example creates 3 new Domain Identifier values and sets their destination values to the specified values.

The result of this request is

- New Domain Identifier values are created.
- All of the destination values for each routing entity are set to specified values.

Request:

```
<updateDomain ent="subscriberRouting" ns="dsr" id="101">
  <domain>tekelec.com</domain>
  <domain>oracle.com</domain>
  <domain>cgbu-oracle.com</domain>
  <imshss>IMS_HSS_1</imshss>
  <ltehss>LTE_HSS_1</ltehss>
  <aaa>AAA_Texas</aaa>
</updateDomain>
```

Response:

```
<updateDomainResp id="101">
  <res error="0" affected="3"/>
</updateDomainResp>
```

Update Domain Identifier Destinations (Success)

This example updates existing Domain Identifiers with new destination values.

**Note:**

This request does not update all Domain Identifier values that were specified in the previous request.

The result of this request is that the specified Domain Identifier values are updated with specified destination values.

Request:

```
<updateDomain ent="subscriberRouting" ns="dsr" id="102">
  <domain>tekelec.com</domain>
  <domain>oracle.com</domain>
  <ltehss>LTE_HSS_4</ltehss>
  <pcrf>PCRF_Ohio</pcrf>
</updateDomain>
```

Result:

```
<updateDomainResp id="102">
  <res error="0" affected="2"/>
</updateDomainResp>
```

Update Domain Identifier Destinations (Failure)

This example fails to update existing Domain Identifiers with new destination values because the destination does not exist.

No changes are made to the database because the request fails.

Request:

```
<updateDomain ent="subscriberRouting" ns="dsr" id="103">
  <domain>tekelec.com</domain>
  <domain>oracle.com</domain>
  <ltehss>junk</ltehss>
</updateDomain>
```

Result:

```
<updateDomainResp id="103">
  <res error="2006" affected="0" description="destination not found"/>
</updateDomainResp>
```

5.18 Delete Domain

5.18.1 Request

The `<deleteDomain>` request removes domain identifier values. For example, external identifier John.Smith@tekelec.com would have John.Smith as the local identifier value and tekelec.com as the domain identifier value. The `<deleteDomain>` removes the domain identifier value, but only when there are no local identifier values are associated with it.

Semantic Rules

- All domain identifier names must already exist in the database.
- There must be one domain identifier value specified and support up to 10 values.

Request Format

```
<deleteDomain ent="subscriberRouting" ns="dsr" [resonly="resonly"] [id="id"]
[timeout="timeout"]>
  <domain>domainIdentifier</domain>
  [
    <domain>domainIdentifier</domain>
    ...
    <domain>domainIdentifier</domain>
  ]
</deleteDomain>
```

Request Parameters**Table 5-29 <deleteDomain> Parameters (XML)**

| Parameter | Description | Values |
|--------------------|---|--|
| ent | The entity name within the global schema. | subscriberRouting |
| ns | The namespace within the global schema. | dsr |
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | y - only provide the result, do NOT include the original request (default). n - include the original request in the response. |
| id (Optional) | Transaction ID value provided in request and passed back in the response. | 1 to 4294967295 |

Table 5-29 (Cont.) <deleteDomain> Parameters (XML)

| Parameter | Description | Values |
|--------------------|--|--|
| timeout (Optional) | The amount of time (in seconds) to wait before being able to perform a write if another connection is performing a write, or has a transaction open. Clients waiting to write will be processed in the order that their requests were received. If the request is being performed within a transaction, this parameter will have no effect, as the client already has a transaction open. | 0 (return immediately if not available) to 3600 seconds (default is 0) |
| domain | The Domain Identifier name, which is used for configuring external identifier by associating them with local identifier values. Must have one or up to 10 domain identifier values. | A string with 1 to 128 characters. |

5.18.2 Response

This is the start of your topic.

The <deleteDomainResp> response returns the result of the request to delete domain identifiers. There is a single result that applies to all domain identifiers supplied. Either all domain identifiers were successfully deleted, or no deletes were made.

Note:

If applying all of the delete requests results in no database records being deleted (because they already did not exist in the database), the NO_UPDATES error code is returned and the number of affected records is 0.

Response Format

The syntax for the <deleteDomainResp> request is shown here. For more information, see [XML Response Messages](#).

```
lengthInBytes
<deleteDomainResp [id="id"]>
[
  originalXMLRequest
]
<res error="error" affected="affected"
```

```
[description="description"]/>
</deleteDomainResp>
```

Response Parameters

The parameters for all of the response commands are shown in [XML Response Messages](#).

Response Error Codes

[Table 5-30](#) lists the common error codes for the `<deleteDomainResp>` response. See [SDS Response Message Error Codes](#) for a full list of error codes.

Table 5-30 `<deleteDomainResponse>` Error Codes (XML)

| Error Code | Description |
|---------------|--|
| SUCCESS | The update request was successfully completed. |
| NO_UPDATES | The request does not have an update to the database. |
| TOO_MANY_ADDR | Too many address values supplied. |
| NO_DOMAIN_VAL | No Domain Identifier value supplied. |

5.18.3 Examples

These examples show how to use the `<deleteDomain>` request and likely response.

Delete Domains

This example successfully deletes three Domain Identifiers.

Request:

```
<deleteDomain ent="subscriberRouting" ns="dsr" id="101">
  <domain>tekelec.com</domain>
  <domain>oracle.com</domain>
  <domain>cgbu-oracle.com</domain>
</deleteDomain>
```

Result:

```
<deleteDomainResp id="101">
  <res error="0" affected="3"/>
</deleteDomainResp>
```

Delete Some, but not all, Domains

This example successfully deletes two Domain Identifiers, but other Domain Identifiers were not found; hence, they were not deleted.

Request:

```
<deleteDomain ent="subscriberRouting" ns="dsr" id="102">
  <domain>tekelec.com</domain>
  <domain>oracle.com</domain>
```

```

    <domain>redoracle.com</domain>
    <domain>myoracle.com</domain>
    <domain>oracletest.com</domain>
</deleteDomain>

```

Result:

```

<deleteDomainResp id="102">
  <res error="0" affected="2"/>
</deleteDomainResp>

```

5.19 Read Domain

5.19.1 Request

The `<readDomain>` request extracts (reads) Domain Identifiers and displays up to nine destination values for each domain identifier.

Semantic Rules

- All domain identifier names must already exist in the database.
- There must be one domain identifier value specified and support up to 10 values.

Request Format

```

<readDomain ent="subscriberRouting" ns="dsr" [resonly="resonly"]
[id="id"]>
  <domain>domainidentifier</domain>
  [
    <domain>domainidentifier</domain>
    ...
    <domain>domainidentifier</domain>
  ]
</readDomain>

```

Request Parameters**Table 5-31 <readDomain> Parameters (XML)**

| Parameter | Description | Value |
|--------------------|---|--|
| ent | The entity name within the global schema. | subscriberRouting |
| ns | The namespace within the global schema. | dsr |
| resonly (Optional) | Indicates whether the response should consist of the result only, without including the original request in the response. | y - Only provide the result, do not include the original request (default). n - Include the original request in the response. |

Table 5-31 (Cont.) <readDomain> Parameters (XML)

| Parameter | Description | Value |
|---------------|---|--------------|
| id (Optional) | Transaction ID value provided in the request and passed back in the response. | 1-4294967295 |

5.19.2 Response

This is the start of your topic.

The <readDomainResp> response returns the result of the request to read Domain Identifiers. Only those Domain Identifiers that are found are returned. The response message contains up to nine destinations (1 for each destination type, such as <ltehss>) for each domain identifier value. Only provisioned destination names are displayed. (that is, destination names="none" are not displayed).

Response Format

The syntax of the <readDomainResp> request is show here. For more information, see [XML Response Messages](#).

```
lengthInBytes
<readDomainResp [id="id"]>
[
  originalXMLRequest
]
  <res error="error" affected="affected" [description="description"]/>
[
  <rset>
    <domain="domainidentifier">
      [ <imshss>imshss</imshss> ]
      [ <ltehss>ltehss</ltehss> ]
      [ <pcrf>pcrf</pcrf> ]
      [ <ocs>ocs</ocs> ]
      [ <ofcs>ofcs</ofcs> ]
      [ <aaa>aaa</aaa> ]
      [ <userdef1>userdef1</userdef1> ]
      [ <userdef2>userdef2</userdef2> ]
      [ <mtchss>mtchss</mtchss> ]
    </domain>
  [
    ...
    <domain="domainidentifier">
      [ <imshss>imshss</imshss> ]
      [ <ltehss>ltehss</ltehss> ]
      [ <pcrf>pcrf</pcrf> ]
      [ <ocs>ocs</ocs> ]
      [ <ofcs>ofcs</ofcs> ]
      [ <aaa>aaa</aaa> ]
      [ <userdef1>userdef1</userdef1> ]
      [ <userdef2>userdef2</userdef2> ]
    ]
  ]
]
</readDomainResp>
```



```

        [ <mtchss>mtchss</mtchss>          ]
      </domain>
    ]
  </rset>
]
</readDomainResp>

```

Response Parameters

Table 5-32 <readDomainResp> Parameters (XML)

| Parameter | Description | Value |
|-------------------------------|---|--------------------------------------|
| lengthInBytes | Number of bytes following to form XML request. This is a 4 byte binary value. | 0-4294967295 |
| respName | The name of the response based on the original XML request sent. Value is the request name appended with "Resp". For example, for the <readDomain> request, the response name is <readDomainResp>. <p>Note: This is only present if the <code>resonly="n"</code> attribute is set in the original request.</p> | A string with 64 characters. |
| id | Transaction ID value provided in request and passed back in the response. | 0-4294967295 |
| originalXMLRequest (Optional) | The text of the original <readDomain> XML request that was sent. <p>Note: This is only present if the <code>resonly="n"</code> attribute is set in the original request.</p> | A string with 1 to 4096 characters. |
| error | Error code that indicates whether or not operation was successfully executed. | 0 for success, non-zero for failure. |
| affected | The number of routing entities read. | 0-10 |
| description (Optional) | A textual description associated with the response. This field may contain more information as to why a request failed. | A string with 1 to 1024 characters. |
| <rset> XML tag (Optional) | Indicates rows of data are returned. If no records are being returned, this tag will not be present. | |

Table 5-32 (Cont.) <readDomainResp> Parameters (XML)

| Parameter | Description | Value |
|---------------------|---|------------------------------------|
| domain | The domain Identifier name, which is used for configuring external identifier by associating them with local identifier values. Must have one or up to 10 domain identifier values. | A string with 1 to 128 characters. |
| imshss (Optional) | The name of the IMS HSS destination. | A string with 1 to 32 characters. |
| ltehss (Optional) | The name of the LTE HSS destination. | A string with 1 to 32 characters. |
| pcrf (Optional) | The name of the PCRF destination. | A string with 1 to 32 characters. |
| ocs (Optional) | The name of the OCS destination. | A string with 1 to 32 characters. |
| ofcs (Optional) | The name of the OFCS destination. | A string with 1 to 32 characters. |
| aaa (Optional) | The name of the AAA server destination. | A string with 1 to 32 characters. |
| userdef1 (Optional) | The name of the first user defined destination. | A string with 1 to 32 characters. |
| userdef2 (Optional) | The name of the second user defined destination. | A string with 1 to 32 characters. |
| mtchss (Optional) | The name of the MTC HSS destination. | A string with 1 to 32 characters. |

Response Error Codes

[Table 5-33](#) lists common error codes for this command. See [SDS Response Message Error Codes](#) for a complete list of error codes.

Table 5-33 <readDomainResp> Error Codes (XML)

| Error Code | Description |
|-----------------------------|--|
| SUCCESS | The update request was successfully completed. |
| DOMAIN_IDENTIFIER_NOT_FOUND | Domain Identifier does not exist. |
| NO_DOMAIN_VAL | No Domain Identifier value supplied. |
| TOO_MANY_ADDR | Too many address values supplied. |

5.19.3 Examples

Below are examples of how to use the `<readDomain>` request and likely response.

Read Domain

This example successfully reads 3 Domain Identifiers.

Request:

```
<readDomain ent="subscriberRouting" ns="dsr" id="101">
  <domain>tekelec.com</domain>
  <domain>oracle.com</domain>
  <domain>cgbu-oracle.com</domain>
</readDomain>
```

Result:

```
<readDomainResp id="101">
  <res error="0" affected="3"/>
  <rset>
    <domain="tekelec.com">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_1</ltehss>
      <aaa>AAA_Texas</aaa>
    </domain>
    <domain="oracle.com">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_4</ltehss>
      <pcrf>PCRF_Ohio</pcrf>
      <aaa>AAA_Texas</aaa>
    </domain>
    <domain="cgbu-oracle.com">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_4</ltehss>
      <pcrf>PCRF_Ohio</pcrf>
      <aaa>AAA_Texas</aaa>
    </domain>
  </rset>
</readDomainResp>
```

Read Domain

This example successfully reads 2 Domain Identifiers, but other domain identifier is not found.

Request:

```
<readDomain ent="subscriberRouting" ns="dsr" id="102">
  <domain>tekelec.com</domain>
  <domain>oracle.com</domain>
</readDomain>
```

Result:

```
<readDomainResp id="102">
  <res error="0" affected="2"/>
  <rset>
    <domain="tekelec.com">
      <imshss>IMS_HSS_1</imshss>
      <ltehss>LTE_HSS_1</ltehss>
      <aaa>AAA_Texas</aaa>
```

```
</domain>
<domain="oracle.com">
  <imshss>IMS_HSS_1</imshss>
  <ltehss>LTE_HSS_4</ltehss>
  <pcrf>PCRF_Ohio</pcrf>
  <aaa>AAA_Texas</aaa>
</domain>
</rset>
</readDomainResp>
```

Read Domain (Failure)

This example fails because no Domain Identifiers are found.

Request:

```
<readDomain ent="subscriberRouting" ns="dsr" id="103">
  <domain>tekelec.com</domain>
  <domain>oracle.com</domain>
  <domain>cgbu-oracle.com</domain>
</readDomain>
```

Result:

```
<readDomainResp id="103">
  <res error="2032" affected="0" description="domain id not found" />
</readDomainResp>
```

5.20 Message Flow Example Sessions

The following sections contain examples of exchanging messages between the Customer Provisioning System (CPS) and the XML Data server process on the Active SDS server on the Primary Provisioning Site.

All scenarios assume that a TCP/IP connection has already been established between the client and SDS. The first column in the tables is the direction that the message is going. The strings displayed in the Message column are the actual ASCII that would flow over the connection, but do not include the 4 byte binary length which is sent before the XML itself.

The actual request and response messages are a series of characters with no extra spaces or new line characters. New lines and extra spaces were added to these examples for readability purposes.

5.20.1 Single Command Transaction

This example shows three request/response pairs that are exchanged between the CPS and SDS. These requests are processed as "single command transactions," which means that each request is immediately committed to the database. This example creates IMSI, MSISDN, and External Identifier routing entities.

Table 5-34 Single Command Transaction (XML)

| Message | Description |
|---------|--|
| CPS→SDS | <p>Request to create 5 standalone routing entities - 3 IMSIs and 2 MSISDNs with an LTE HSS and AAA server destinations.</p> <p>Note: Request is made to include the original request in the response.</p> |
| | <pre> <updateSubscriber ent="subscriberRouting" ns="dsr" resonly="n"> <imsi>310910421000106</imsi> <imsi>310910421000307</imsi> <imsi>310910421000309</imsi> <msisdn>15634210106</msisdn> <msisdn>15634210107</msisdn> <ltehss>LTE_HSS_2</ltehss> <aaa>AAA_4</aaa> </updateSubscriber> </pre> |
| CPS←SDS | <p>Response to create subscriber routing entities - success. Affected rows = 5 (as 5 new entries created for 3 IMSIs and 2 MSISDNs).</p> <p>Note: As requested, the original XML request is included in the response.</p> |
| | <pre> <updateSubscriberResp> <updateSubscriber ent="subscriberRouting" ns="dsr" resonly="n"> <imsi>310910421000106</ imsi> <imsi>310910421000307</ imsi> <imsi>310910421000309</ imsi> <msisdn>15634210106</ msisdn> <msisdn>15634210107</ msisdn> <ltehss>LTE_HSS_2</ltehss> <aaa>AAA_4</aaa> </updateSubscriber> <res error="0" affected="5"> </updateSubscriberResp> </pre> |

Table 5-34 (Cont.) Single Command Transaction (XML)

| Message | Description |
|---------|--|
| CPS→SDS | <p>Request to create seven standalone routing entities - 3 IMSIs, 2 MSISDNs, and 2 External Identifiers with LTE HSS and MTC HSS server destinations.</p> <p>Note: Request is made to include the original request in the response.</p> |
| | <pre> <updateSubscriber ent="subscriberRouting" ns="dsr" resonly="n"> <imsi>310910421000106</imsi> <imsi>310910421000307</imsi> <imsi>310910421000309</imsi> <msisdn>15634210106</msisdn> <msisdn>15634210107</ msisdn> <externalId>test1@oracle.com</ externalId> <externalId>test2@oracle.com</ externalId> <ltehss>LTE_HSS_2</ltehss> <mtchss>MTC_HSS_4</mtchss> </updateSubscriber> </pre> |
| CPS←SDS | <p>Response to create standalone routing entities - success. Affected rows = 7 (as 7 new entries created for 3 IMSIs, 2 MSISDNs, and 2 External Identifiers).</p> <p>Note: As requested, the original XML request is included in the response.</p> |
| | <pre> <updateSubscriberResp> <updateSubscriber ent="subscriberRouting" ns="dsr" resonly="n"> <imsi>310910421000106</ imsi> <imsi>310910421000307</ imsi> <imsi>310910421000309</ imsi> <msisdn>15634210106</ msisdn> <msisdn>15634210107</ msisdn> <externalId>test1@oracle.com</ externalId> <externalId>test2@oracle.com</ externalId> <ltehss>LTE_HSS_2</ltehss> <aaa>MTC_HSS_4</aaa> </updateSubscriber> <res error="0" affected="7"> </updateSubscriberResp> </pre> |

Table 5-34 (Cont.) Single Command Transaction (XML)

| Message | Description |
|---------|---|
| CPS→SDS | <p>Request to update existing IMSI and MSISDN standalone routing entities with a new LTE HSS value.</p> <pre><updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000106</imsi> <msisdn>15634210106</msisdn> <ltehss>LTE_HSS_5</ltehss> </updateSubscriber></pre> |
| CPS←SDS | <p>Response to update subscriber routing entities - success. Affected rows = 2 (as 2 entries for an IMSI and MSISDN were updated with new LTE HSS value).</p> <pre><updateSubscriberResp> <res error="0" affected="2"/> </updateSubscriberResp></pre> |
| CPS→SDS | <p>Request to update existing IMSI, MSISDN, and External Identifier standalone routing entities with a new MTC HSS value.</p> <pre><updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000106</imsi> <msisdn>15634210106</msisdn> <externalId>test1@oracle.com</ externalId> <externalId>test2@oracle.com</ externalId> <mtchss>MTC_HSS_5</mtchss> </updateSubscriber></pre> |
| CPS←SDS | <p>Response to update standalone routing entities - success. Affected rows = 4 (as 4 entries for an IMSI, MSISDN, and External Identifier were updated with new MTC HSS value).</p> <pre><updateSubscriberResp> <res error="0" affected="4"/> </updateSubscriberResp></pre> |
| CPS→SDS | <p>Request to create a subscriber routing entity with an invalid LTE HSS destination value. Request fails, as the destination does not exist.</p> <pre><updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000102</imsi> <ltehss>BAD_VALUE</ltehss> </updateSubscriber></pre> |

Table 5-34 (Cont.) Single Command Transaction (XML)

| Message | Description |
|----------|--|
| CPS←—SDS | <pre><updateSubscriberResp> <res description="destination not found" error="2006" affected="0"/> </updateSubscriberResp></pre> |

5.20.2 Multiple Commands Transaction Committed

This example issues several requests within one transaction, which is then committed successfully.

Table 5-35 Multiple Commands Transaction Committed Message Flow Example (XML)

| Message | Description |
|----------|--|
| CPS→→SDS | <pre><startTransaction/></pre> |
| CPS←—SDS | <pre><startTransactionResp> <res error="0" affected="0"/> </startTransactionResp></pre> |
| CPS→→SDS | <pre><updateSubscriberDomain ent="subscriberRouting" ns="dsr"> <domainIdentifier>operator.com< /domainIdentifier> <ltehss>LTE_HSS_11</ltehss> </updateSubscriberDomain></pre> |
| CPS←—SDS | <pre><updateSubscriberDomainResp> <res error="0" affected="1"/> </updateSubscriberDomainResp></pre> |

Table 5-35 (Cont.) Multiple Commands Transaction Committed Message Flow Example (XML)

| Message | | Description |
|---------|---|--|
| CPS→SDS | <pre><updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000444</imsi> <msisdn>15634210444</msisdn> <externalId>test1@oracle.com</ externalId> <ltehss>LTE_HSS_1</ltehss> </updateSubscriber></pre> | Request to add new standalone IMSI, MSISDN, and External Identifier - success. |
| CPS←SDS | <pre><updateSubscriberResp> <res error="0" affected="3"/> </updateSubscriberResp></pre> | |
| CPS→SDS | <pre><updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000555</imsi> <msisdn>15634210555</msisdn> <externalId>test1@oracle.com</ externalId> <ltehss>LTE_HSS_2</ltehss> </updateSubscriber></pre> | Request to update existing standalone IMSI, MSISDN, and External Identifier - success. |
| CPS←SDS | <pre><updateSubscriberResp> <res error="0" affected="3"/> </updateSubscriberResp></pre> | |
| CPS→SDS | <pre><updateSubscriberNai ent="subscriberRouting" ns="dsr"> <host>operator.com</host> <user>roger.brown</user> <ltehss>LTE_HSS_1</ltehss> </updateSubscriberNai></pre> | Request to update an NAI - success. |

Table 5-35 (Cont.) Multiple Commands Transaction Committed Message Flow Example (XML)

| Message | Description |
|----------|---|
| CPS←—SDS | <pre><updateSubscriberNaiResp> <res error="0" affected="1"/> </updateSubscriberNaiResp></pre> |
| CPS—→SDS | <pre><commit/></pre> |
| CPS←—SDS | <pre><commitResp> <res error="0" affected="0"/> </commitResp></pre> |

5.20.3 Multiple Commands Transaction Rolled Back

This example issues several requests within one transaction which is rolled back.

Table 5-36 Multiple Commands Transaction Rolled Back Message Flow Example (XML)

| Message | Description |
|----------|---|
| CPS—→SDS | <pre><startTransaction timeout="10"> </startTransaction></pre> |
| CPS←—SDS | <pre><startTransactionResp> <res error="0" affected="0"/> </startTransactionResp></pre> |

Table 5-36 (Cont.) Multiple Commands Transaction Rolled Back Message Flow Example (XML)

| Message | | Description |
|---------|---|---|
| CPS→SDS | <pre><updateSubscriberDomain ent="subscriberRouting" ns="dsr"> <domainIdentifier>operat or.com</ domainIdentifier> <ltehss>LTE_HSS_11</ ltehss> </ updateSubscriberDomain></pre> | Request to create an Domain Identifier - success. |
| CPS←SDS | <pre><updateSubscriberDomainR esp> <res error="0" affected="1"/> </ updateSubscriberDomainRe sp></pre> | |
| CPS→SDS | <pre><updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000777</ imsi> <msisdn>15634210777</ msisdn> <externalId>test1@oracle .com</externalId> <ltehss>LTE_HSS_7</ ltehss> </updateSubscriber></pre> | Request to update existing stand-alone IMSI, MSISDN, and External Identifier - success. |
| CPS←SDS | <pre><updateSubscriberResp> <res error="0" affected="3"/> </updateSubscriberResp></pre> | |

Table 5-36 (Cont.) Multiple Commands Transaction Rolled Back Message Flow Example (XML)

| Message | | Description |
|---------|--|--|
| CPS→SDS | <pre><updateSubscriberNai ent="subscriberRouting" ns="dsr"> <host>operator.com</ host> <user>david.leno</ user> <ltehss>LTE_HSS_1</ ltehss> </updateSubscriberNai></pre> | Request to create an NAI - success. |
| CPS←SDS | <pre><updateSubscriberNaiResp > <res error="0" affected="1"/> </ updateSubscriberNaiResp></pre> | |
| CPS→SDS | <pre><rollback/></pre> | Transaction is rolled back by the client. None of the previous IMSI, MSISDN or NAI entities will be created. |
| CPS←SDS | <pre><rollbackResp> <res error="0" affected="0"/> </rollbackResp></pre> | Rollback is successful; no creations/updates are made. At this point the client could still have sent commit if they wanted, which would have resulted in the 2 IMSIs, 2 MSISDNs, and 1 NAI being created. |

5.20.4 Block Transaction Committed

This example issues several requests within a block transaction. All of the requests succeed; therefore, the transaction is automatically committed.

Table 5-37 Block Transaction Committed Message Flow Example

| Message | Description |
|---------|--|
| CPS→SDS | <pre> <tx> <updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000109</ imsi> <ltehss>LTE_HSS_2</ ltehss> </updateSubscriber> <updateSubscriber ent="subscriberRouting" ns="dsr"> <msisdn>156342101009</ msisdn> <ltehss>LTE_HSS_2</ ltehss> </updateSubscriber> <updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000110</ imsi> <msisdn>15634210110</ msisdn> <ltehss>LTE_HSS_6</ ltehss> </updateSubscriber> <updateSubscriber ent="subscriberRouting" ns="dsr"> <ltehss>LTE_HSS_6</ ltehss> </updateSubscriber> </tx> </pre> |

A single request is sent contain 3 different <updateSubscriber> requests for existing stand-alone IMSI or MSISDN routing entities. Response indicates that 3 requests were within the transaction. Each request indicates that 1 row was affected for each, and every request was successful (as error="0" in all response).

Table 5-37 (Cont.) Block Transaction Committed Message Flow Example

| Message | Description |
|----------|--|
| CPS←—SDS | <pre><txResp nbreq="3"> <updateSubscriberResp> <res error="0" affected="1"/> </updateSubscriberResp> <updateSubscriberResp> <res error="0" affected="1"/> </updateSubscriberResp> <updateSubscriberResp> <res error="0" affected="2" description= "changed (imsi 310910421000110, dn 15634210110), ltehss LTE_HSS_6"/> </updateSubscriberResp> </txResp></pre> |

5.20.5 Block Transaction Rolled Back

This example issues several requests within a block transaction. One of the requests fails; therefore, the transaction is automatically rolled back.

Table 5-38 Block Transaction Rolled Back Message Flow Example

| Message | Description |
|--|---|
| <p>CPS→SDS</p> <pre> <tx resonly="n"> <updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000111</ imsi> <ltehss>LTE_HSS_2</ ltehss> </updateSubscriber> <updateSubscriber ent="subscriberRouting" ns="dsr"> <msisdn>156342101011</ msisdn> <ltehss>LTE_HSS_2</ ltehss> </updateSubscriber> <updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000112</ imsi> <ltehss>LTE_HSS_99</ ltehss> </updateSubscriber> <updateSubscriber ent="subscriberRouting" ns="dsr"> <msisdn>15634210112</ msisdn> <ltehss>LTE_HSS_6</ ltehss> </updateSubscriber> </tx> </pre> | <p>A single request is sent containing 4 different updateSubscriber requests for existing standalone IMSI or MSISDN routing entities. The request is made to include each request in the response for the entire transaction (indicated by the resonly="n" attribute).</p> <p>Response to create subscriber routing entities - success. Affected rows = 1 (as 1 NAI entry was updated).</p> <p>The first two requests that were successful, indicate no error and the correct number of affected rows. The third request that fails gives the correct error and no affected rows. The fourth request that has not been executed has an error code indicating NOT_PROCESSED. All requests are rolled back.</p> |

Table 5-38 (Cont.) Block Transaction Rolled Back Message Flow Example

| Message | Description |
|----------|---|
| CPS←—SDS | <pre> <txResp nbreq="4"> <updateSubscriberResp> <updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000111</ imsi> <ltehss>LTE_HSS_2</ ltehss> </updateSubscriber> <res error="0" affected="1"/> </updateSubscriberResp> <updateSubscriberResp> <updateSubscriber ent="subscriberRouting" ns="dsr"> <msisdn>156342101011</ msisdn> <ltehss>LTE_HSS_2</ ltehss> </updateSubscriber> <res error="0" affected="1"/> </updateSubscriberResp> <updateSubscriberResp> <updateSubscriber ent="subscriberRouting" ns="dsr"> <imsi>310910421000112</ imsi> <ltehss>LTE_HSS_99</ ltehss> </updateSubscriber> <res description="destination not found" error="2006" affected="0"/> </updateSubscriberResp> <updateSubscriberResp> <updateSubscriber ent="subscriberRouting" ns="dsr"> <msisdn>15634210112</ </pre> |

Table 5-38 (Cont.) Block Transaction Rolled Back Message Flow Example

| Message | Description |
|---|-------------|
| <pre>msisdn> <ltehss>LTE_HSS_6</ ltehss> </updateSubscriber> <res error="1" affected="0"/> </updateSubscriberResp> </txResp></pre> | |

A

SDS Response Message Error Codes

This section describes the XML/SOAP error codes that are returned by the XDS/SOAP server.

A.1 SDS Response Message Error Codes

XML/SOAP error codes are returned by the XDS/SOAP server in the `error` attribute parameter of the `<requestResp>` messages (see [XML Response Messages](#)) or in the SOAP Response message (see [SOAP Response Messages](#)). The `error` parameter of a response message indicates the success or failure of a request.

The complete set of response error codes and their associated values are defined in the following table.

Table A-1 SDS Response Message Error Codes

| Error Code | Value | Description |
|---------------------|-------|--|
| SUCCESS | 0000 | Request was successful. |
| NOT_PROCESSED | 0001 | Not processed. The request was within a block transaction, and was not processed due to an error with another request within the same block transaction. |
| NO_RESPONSE | 1000 | A timeout was exceeded without a response being received. Retry the command or reconnect. |
| INTERNAL_ERROR | 1001 | An internal error occurred. Contact My Oracle Support . |
| NOT_CONNECTED | 1002 | The message was not sent because the connection is closed. |
| ALREADY_CONNECTED | 1003 | A connect message failed because already connected. |
| PARSE_FAILED | 1004 | The message is in an invalid format and cannot be parsed. This can be caused by a missing symbol or misspelled keyword, for example. |
| WRITE_UNAVAILABLE | 1005 | Another client already has a transaction open. This will only be returned to clients who do have write access permissions. |
| NO_WRITE_PERMISSION | 1006 | The client making the connection does not have write access permissions. |
| STANDBY_SIDE | 1008 | The commit failed because this is the Standby server, not the Active server. |
| NO_ACTIVE_TXN | 1009 | A read or write transaction is not currently open for this connection. |
| ACTIVE_TXN | 1010 | A read or write transaction is already open on this connection, or an open transaction was aborted prior to terminating the connection. |
| WRITE_IN_READ_TXN | 1011 | A write command failed because the current transaction is read-only. |

Table A-1 (Cont.) SDS Response Message Error Codes

| Error Code | Value | Description |
|----------------------|-------|--|
| INVALID_VALUE | 1012 | One of the fields in the request has a invalid value. |
| NOT_FOUND | 1013 | The command failed because the file or connection could not be found. |
| CONFLICT_FOUND | 1014 | The command failed because of a conflict or incompatibility between otherwise individually acceptable arguments. |
| ITEM_EXISTS | 1015 | A command to create or update a database entry was not executed because an entry with the same keys already exists. |
| PARTIAL_SUCCESS | 1016 | The request has succeeded, but this is one of several responses. This error code is used for indicating status while processing import files. |
| NO_UPDATES | 1017 | All of the changes were already in the database. |
| INTERRUPTED | 1018 | The command was interrupted and did not finish. |
| BAD_ARGS | 1019 | The command failed because of invalid, missing, or otherwise unacceptable arguments. |
| CONNECTION_DENIED | 1020 | The connection is not permitted for the reason shown in the error. |
| UNKNOWN_VERSION | 1023 | The version given is not compatible with the database server. |
| DURABILITY_TIMEOUT | 1024 | The update was not made durable in the database within the configured time interval. |
| UNIMPLEMENTED | 1025 | This command is not implemented. |
| BAD_IMPORT_CMD | 1028 | The command is not supported by the Import operation. |
| TXN_TOO_BIG | 1029 | Transaction too big (more than the configured maximum number of requests). The maximum number of requests within a transaction is configured on the SDS GUI. We recommend you see the <i>SDS Online Help</i> for more information. |
| DURABILITY_DEGRADED | 1030 | The system's transaction durability is degraded and updates will not be accepted until the transaction durability level is restored. Contact My Oracle Support . The transaction durability level can be temporarily adjusted until the problem is resolved. The associated request should be resent after durability is restored or manually adjusted since it has not been committed or is no longer committed to the database due to a rollback when the system durability became degraded. |
| DB_EXCEPTION | 1031 | An unexpected exception was thrown during the database operation. Contact My Oracle Support . |
| MAX_DN_LIMIT | 1033 | The type of object being created (MSISDN, IMSI, Destination, etc.)has reached the maximum number allowed in the database. |
| MAX_SUB_MSISDN_LIMIT | 1036 | The maximum allowed number of MSISDNs associated with a Subscriber would have been exceeded. |
| MAX_SUB_IMSI_LIMIT | 1037 | The maximum allowed number of IMSIs associated with a Subscriber would have been exceeded. |

Table A-1 (Cont.) SDS Response Message Error Codes

| Error Code | Value | Description |
|----------------------|--------------|--|
| PROV_PROHIBITED | 1051 | Database access has been manually disabled. |
| NPA_SPLIT_NOT_ACTIVE | 1061 | Completion is only allowed when an NPA Split is Active |
| NPA_SPLIT_ACTIVE | 1062 | This action is not allowed when an NPA Split is Active. |
| NPA_SPLIT_COMPLETE | 1063 | No other action (besides deletion) is allowed when an NPA Split is Completed. |
| MPA_SPLIT_LIMIT | 1064 | The number of NPA Split objects has reached the maximum number allowed in the database. |
| DEST_TYPE_MISMATCH | 1065 | This Destination Type is different from the Type of the Destination in the database. |
| IN_USE | 1066 | This action is invalid because the object is currently being used. |
| INV_REQUEST_NAME | 2001 | The XML request name does not indicate a valid request. |
| INVALID_XML | 2002 | The request does not contain a valid XML data structure and cannot be parsed. |
| MISSING_PARAMETER | 2003 | A mandatory parameter is missing. |
| INVALID_MULT_INST | 2004 | Multiple instances of a parameter that only allows a single instance has occurred. |
| UNKNOWN_PARAM_NAME | 2005 | The specified parameter name is unknown for this request. |
| DEST_NOT_FOUND | 2006 | The specified destination name does not exist. |
| IMSI_NOT_FOUND | 2007 | The specified IMSI does not exist. |
| MSISDN_NOT_FOUND | 2008 | The specified MSISDN does not exist. |
| NAI_NOT_FOUND | 2009 | The specified NAI (host/user) does not exist. |
| NAI_HOST_NOT_FOUND | 2010 | The specified host name does not exist. |
| TXN_TIMED_OUT | 2011 | The Transaction that was in progress has timed out, and automatically rolled back. |
| TOO_MANY_ADDR | 2012 | Too many IMSI/MSISDN routing entities were specified in the request. |
| NO_DEST_VAL | 2013 | At least one destination value must be specified. |
| NO_ADDR_VAL | 2014 | No IMSI/MSISDN value and no Account ID value was supplied. |
| TOO_MANY_NAI | 2015 | Too many NAI routing entities were specified. |
| NO_NAI_VAL | 2016 | No NAI value was supplied. |
| DEST_TYPE_MISMATCH | 2017 | Destination has a different destination type than the desired destination type. |
| INVALID_ARG | 2018 | The arguments are not valid. Each individual value is valid, but the combination of specified values and database values is not allowed. |
| INSTANCE_LIMIT | 2019 | Operation would exceed the maximum number of allowed records in the table. |
| INV_REQ_IN_BLOCK_TX | 2020 | An invalid request has been sent in a block transaction (for example, startTransaction, commit, or rollback). |
| INV_REQ_IN_NORMAL_TX | 2021 | An invalid request has been sent in a normal transaction (for example, a block transaction). |
| SUBSCRIBER_NOT_FOUND | 2022 | The specified subscriber does not exist. |

Table A-1 (Cont.) SDS Response Message Error Codes

| Error Code | Value | Description |
|--------------------------|--------------|--|
| MULTIPLE_SUBSCRIBERS | 2023 | The specified parameters refer to multiple subscribers. |
| SUBSCRIBER_TOO_BIG | 2024 | The resulting subscriber would exceed the 6 IMSI or 6 MSISDN limit. |
| ACCTID_UPDATE_PROHIBITED | 2025 | An attempt was made to change an accountId without specifying the <deleteAccountId> tag. |
| ROUTE_TYPE_MISMATCH | 2026 | Standalone and subscriber routes are not allowed in same command. |
| DEL_ROUTE_NOT_PERMITTED | 2027 | Cannot delete the last route from a subscriber. |
| NO_ROUTES_SPECIFIED | 2028 | At least one MSISDN or IMSI must be specified. |
| ROUTE_DEST_MISMATCH | 2029 | Specified routes have different destinations. |

B

XML/SOAP Interface System Variables

This section describes the XML/SOAP interfaces that have a set of system variables that affect the operation as it runs.

B.1 XML/SOAP Interface System Variables

The XML/SOAP Interfaces have a set of system variables that affect its operation as it runs. XML/SOAP Interface System variables (shown below in [Table B-1](#)) can be set via the SDS GUI and can be changed at runtime to effect dynamic server reconfiguration. We recommend you see the *SDS Online Help* for more information.

Table B-1 XML/SOAP Interface System Variables

| Parameter | Description |
|-----------------------------|---|
| XML Interface Port | XML Interface TCP (unsecure) Listening Port. The TCP listening port can be disabled by setting it to 0. NOTE: Changes to the TCP listening port do not take affect until the 'xds' process is restarted. Also, you must specify a different port than the SOAP interface. DEFAULT = 5875; RANGE = 0-65535 |
| SOAP Interface Port | SOAP Interface TCP Listening Port. The TCP listening port can be disabled by setting it to 0. NOTE: Changes to the TCP listening port do not take affect until the 'xds' process is restarted. Also, you must specify a different port than the XML interface. DEFAULT = 5876 (when SOAP Secure Mode is set to UNSECURE) or 5877 (when SOAP Secure Mode is set to SECURE) RANGE = 0-65535 |
| XML Interface Idle Timeout | The maximum time (in seconds) that an open XML connection will remain active without a request being sent, before the connection is dropped. DEFAULT = 1200; RANGE = 1-86400 |
| SOAP Interface Idle Timeout | The maximum time (in seconds) that an open SOAP connection will remain active without a request being sent, before the connection is dropped. DEFAULT = 1200; RANGE = 1-86400 |
| Maximum XML Connections | Maximum number of simultaneous XML Interface client connections. DEFAULT = 120; RANGE = 1-120 |
| Maximum SOAP Connections | Maximum number of simultaneous SOAP Interface client connections. DEFAULT = 120; RANGE = 1-120 |

Table B-1 (Cont.) XML/SOAP Interface System Variables

| Parameter | Description |
|---------------------------------|--|
| SOAP Secure Mode | Whether the SOAP Interface operates in secure mode (using SSL), or unsecure mode (plain text). NOTE: Changes to the SOAP Secure Mode do not take affect until the 'xds' process is restarted. DEFAULT = UNSECURE |
| Allow Connections* | Whether or not to allow incoming connections on the XML/SOAP Interface. DEFAULT = ALLOWED |
| Max Transaction Size* | Maximum number of database manipulation commands per transaction. DEFAULT = 50; RANGE = 10-1000 |
| Maximum Transaction Lifetime | The maximum time (in seconds) that a transaction can remain open before automatically being rolled back if a commit or rollback is not explicitly performed. Timeout can be disabled by setting to 0. DEFAULT=60; RANGE = 0-3600 |
| Remote Import Mode* | Whether updates are allowed (Non-Blocking) or not allowed (Blocking) on all XDS connections while the remote import operation is in progress. In blocking mode, XML and SOAP provisioning requests will be rejected if a bulk import is in operation. In non-blocking mode, XML and SOAP provisioning requests will be allowed as normal. DEFAULT = NON-BLOCKING |
| Export Mode* | Whether updates are allowed (Non-Blocking) or not allowed (Blocking) on all XDS connections while the export operation is in progress. In blocking mode, XML and SOAP provisioning requests will be rejected if a bulk export is in operation. In non-blocking mode, XML and SOAP provisioning requests will be allowed as normal. DEFAULT = NON-BLOCKING |
| Transaction Durability Timeout* | The amount of time (in seconds) allowed between a transaction being committed and it becoming durable. If Transaction Durability Timeout lapse, DURABILITY_TIMEOUT response is sent to the originating client. The associated request should be resent to ensure that the request was committed. DEFAULT = 5; RANGE = 2-3600 |



Note:

Parameters labeled with a “*” are existing system variables defined and used by other components.

C

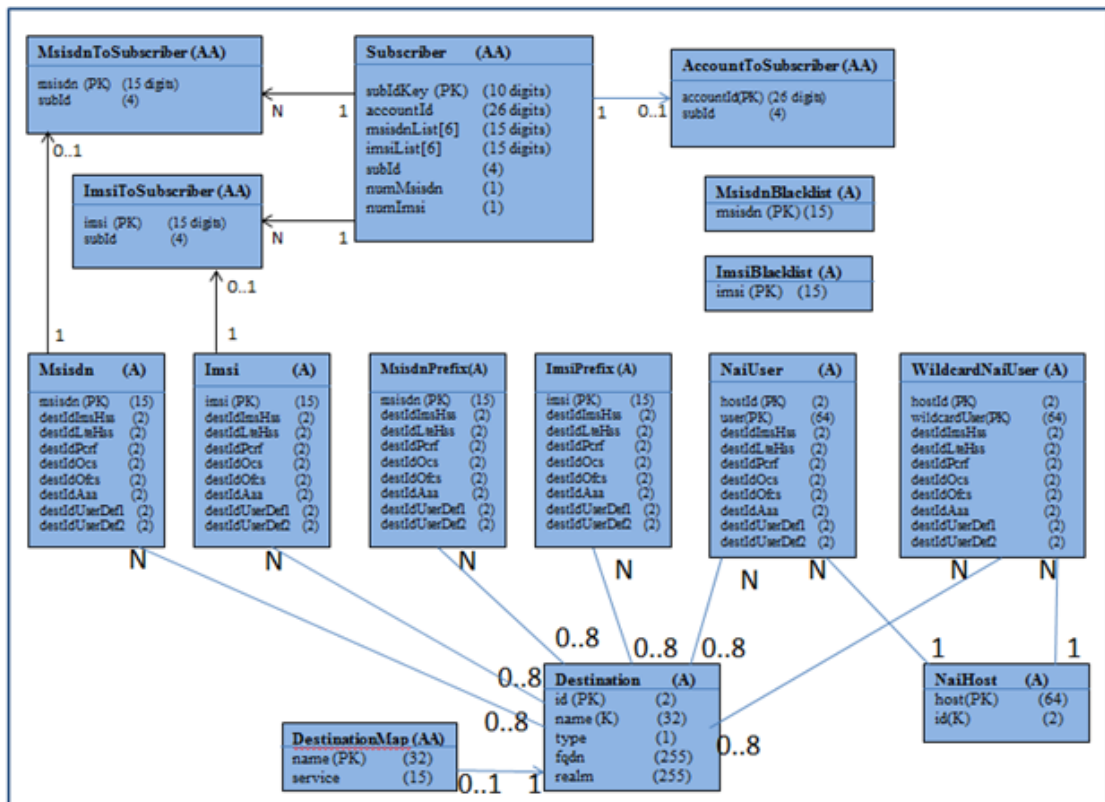
Database Object Model

This section describes the database object model and shows all tables associated with SDS provisioning.

C.1 Database Object Model

Figure C-1 shows the database object model for subscriber-related data. All of the tables are available to the user.

Figure C-1 SDS Provisioning Database Object Model



MsisdnBlacklist

Table C-1 MsisdnBlacklist Table Attributes

| Attribute | Description |
|-----------|---|
| msisdn | A unique string of 8-15 decimal digits. |

ImsiBlacklist

Table C-2 ImsiBlacklist Table Attributes

| Attribute | Description |
|-----------|--|
| imsi | A unique string of 10-15 decimal digits. |

Msisdn

Table C-3 Msisdn Table Attributes

| Attribute | Description |
|--|---|
| msisdn | A unique string of 8-15 decimal digits. |
| List of Destinations as per Table C-19 . | |

Imsi

Table C-4 Imsi Table Attributes

| Attribute | Description |
|--|---|
| imsi | A unique string of 8-15 decimal digits. |
| List of Destinations as per Table C-19 . | |

MsisdnPrefix

Table C-5 MsisdnPrefix Table Attributes

| Attribute | Description |
|--|---|
| msisdnPrefix | A unique string of 1-15 decimal digits. Can have overlapping prefix values. |
| List of Destinations as per Table C-19 . | |

ImsiPrefix

Table C-6 ImsiPrefix Table Attributes

| Attribute | Description |
|--|---|
| imsiPrefix | A unique string of 1-15 decimal digits. Can have overlapping prefix values. |
| List of Destinations as per Table C-19 . | |

NaiUser

Table C-7 NaiUser Table Attributes

| Attribute | Description |
|--|---|
| user | A string of 1-64 characters for the NAI User Name. |
| hostId | Index to an existing NAI Host record. The user/hostId combination must be unique. |
| List of Destinations as per Table C-19 . | |

WildcardNaiUser

Table C-8 WildcardNaiUser Table Attributes

| Attribute | Description |
|--|---|
| wildcardUser | A string of 1-64 characters for the wild-carded NAI User Name. |
| hostId | Index to an existing NAI Host record. The wildcardUser/hostId combination must be unique. |
| List of Destinations as per Table C-19 . | |

Destination

Table C-9 Destination Table Attributes

| Attribute | Description |
|-----------|---|
| name | A unique string of 1-32 characters to identify the Destination. |
| id | A unique, generated number used to identify a Destination record |
| type | Destination type |
| fqdn | A 1-255 character string for the Diameter FQDN for the Destination. The value can be null. |
| realm | A 1-255 character string for the Diameter Realm for the Destination. The value can be null. |

destinationMap

Table C-10 DestinationMap Table Attributes

| Attribute | Description |
|-----------|--|
| name | A unique string of 1-32 characters to identify an existing Destination record. |
| service | A string of 8-15 decimal digits that contains the E.164 node address of an HLR Router. |

NaiHost

Table C-11 NaiHost Table Attributes

| Attribute | Description |
|-----------|---|
| host | A unique string of 1-64 characters for the NAI Host Name. |
| id | A unique, generated number used to identify a NaiHost record. |

Identifiers

Table C-12 DomainIdentifier Table Attributes

| Attribute | Description |
|--|--|
| DomainIdentifier | A UTF8 string of 1-128 characters |
| DomainId | A unique, generated number used to identify a Domain Identifier record. |
| domainToLocalRefCount | Reference count of how many local identifiers are referring to this Domain |
| List of Destinations as per Table C-19 . | |

Table C-13 LocalIdentifier Table Attributes

| Attribute | Description |
|--|---|
| LocalIdentifier | A UTF8 string of 1-128 characters |
| DomainId | A unique, generated number used to identify a Domain Identifier record. |
| SubId | A internal, numeric Subscriber ID. This number is assigned by SDS software. |
| List of Destinations as per Table C-19 . | |

Subscriber

Table C-14 Subscriber Table Attributes

| Attribute | Description |
|---------------|--|
| subIdKey | A unique string of 1-10 decimal digits. This string is based on the numeric subId value. |
| subId | A unique, internal, numeric Subscriber ID. This number is assigned by SDS software. |
| accountId | An optional unique string of 6-26 decimal digits. This value is assigned by the customer. |
| msisdNList[6] | A list of MSISDN values for the Subscriber. Each MSISDN value must be 8-15 decimal digits. |
| imsiList[6] | A list of IMSI values for the Subscriber. Each IMSI value must be 10-15 decimal digits. |

Table C-14 (Cont.) Subscriber Table Attributes

| Attribute | Description |
|-----------|---|
| numMsisdn | Number of MSISDN values defined for the Subscriber. |
| numImsi | Number of IMSI values defined for the Subscriber. |

AccountToSubscriber**Table C-15 AccountToSubscriber Table Attributes**

| Attribute | Description |
|-----------|---|
| accountId | An optional unique string of 6-26 decimal digits. This value is assigned by the customer. |
| subId | An internal, numeric Subscriber ID. This number is assigned by SDS software. |

MsisdnToSubscriber**Table C-16 MsisdnToSubscriber Table Attributes**

| Attribute | Description |
|-----------|--|
| msisdn | A unique string of 8-15 decimal digits |
| subId | An internal, numeric Subscriber ID. This number is assigned by SDS software. |

ImsiToSubscriber**Table C-17 ImsiToSubscriber Table Attributes**

| Attribute | Description |
|-----------|--|
| imsi | A unique string of 10-15 decimal digits. |
| subId | An internal, numeric Subscriber ID. This number is assigned by SDS software. |

External Identifier**Table C-18 SubscriberToExternalId Table Attributes**

| Attribute | Description |
|-----------|---|
| subId | An internal numeric Subscriber ID. This number is assigned by SDS software. |

Table C-18 (Cont.) SubscriberToExternalId Table Attributes

| Attribute | Description |
|------------------------|--|
| ExternalIdentifierList | A string comprising of multiple domainId's and LocalId's up to 2580 characters, assigned to given subscriber. The string could comprise of 10 External Identifier values for Subscriber. For example: domainId1>loclId1,loclId2,loclId3,loclId4;domainId2>loclId4,loclId5,loclId6,loclId7 |

Destination List

Table C-19 Destination List for Routing Entities

| Attribute | Description |
|----------------|--|
| destIdImsHss | Index to an existing IMS HSS Destination record (with type= imsHss) or 0 (for none) |
| destIdLteHss | Index to an existing LTE HSS Destination record (with type= lteHss) or 0 (for none) |
| destIdMtcHss | Index to an existing MTC HSS Destination record (with type= mtcHss) or 0 (for none) |
| destIdPcrf | Index to an existing PCRF Destination record (with type= pcrf) or 0 (for none) |
| destIdOcs | Index to an existing OCS Destination record (with type= ocs) or 0 (for none) |
| destIdOfcs | Index to an existing OFCS Destination record (with type= ofcs) or 0 (for none) |
| destIdAaa | Index to an existing AAA Destination record (with type= aaa) or 0 (for none) |
| destIdUserDef1 | Index to an existing UserDef1 Destination record (with type= userDef1) or 0 (for none) |
| destIdUserDef2 | Index to an existing UserDef2 Destination record (with type= userDef2) or 0 (for none) |