Oracle® Communications Services Gatekeeper

Communication Service Reference Guide

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Preface

This book is a detailed reference for the communications services used in Oracle Communications Services Gatekeeper.

Audience

This document is for system administrators who implement communication services on Services Gatekeeper.

Documentation Accessibility

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Related Documents

For more information, see the following documents in the Oracle Communications Services Gatekeeper documentation set:

- *Oracle Communications Services Gatekeeper Alarms Handling Guide*
- *Oracle Communications Services Gatekeeper Application Developer's Guide*
- *Oracle Communications Services Gatekeeper Concepts*
- *Oracle Communications Services Gatekeeper Portal Developer's Guide*
- *Oracle Communications Services Gatekeeper Extension Developer's Guide*
- *Oracle Communications Services Gatekeeper Platform Test Environment User's Guide*
- *Oracle Communications Services Gatekeeper Statement of Compliance*
- *Oracle Communications Services Gatekeeper System Administrator's Guide*

1

Understanding Communication Services

This chapter explains the Oracle Communications Services Gatekeeper software architecture for running communication services on networks that require traditional telephony protocol.

About the Software Architecture

Services Gatekeeper is built on the Oracle WebLogic Server 12*c* product, is closely aligned with JEE standards, and tightly integrated with Oracle Communications Converged Application Server (Converged Application Server). Services Gatekeeper communication services provide access to network capabilities such as messaging, audio call, call control, terminal location, terminal status, presence information, and device capabilities. You can easily extend these communication services or create new ones by using the Platform Development Studio. Services Gatekeeper provides a secure container for running communication services.

Communication Services

When used with traditional telephony networks, all traffic in Services Gatekeeper is processed through communication services. As shown in Figure 1–1, each communication service consists of:

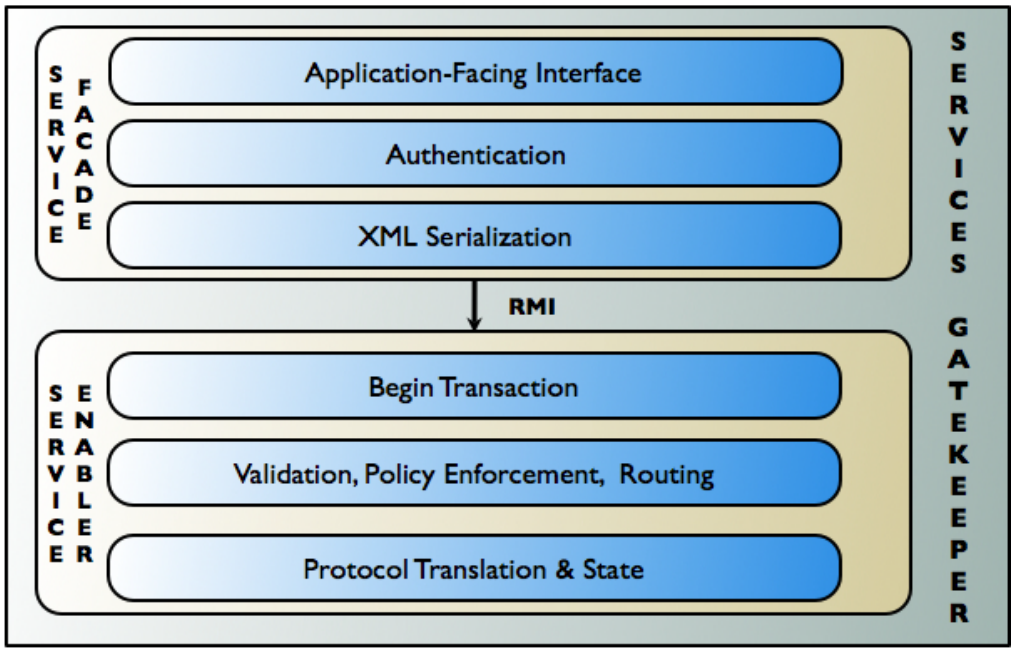
- A *service facade* layer that includes an application-facing interface used to communicate with the application, a security layer for authentication, and the XML Serialization to convert the data into a form that can be readily transported.
- A *service enabler* layer that includes a processing layer and a protocol translation layer. Transactions begin in the processing layer, where requests are validated according to service level agreements (SLAs) and are then routed to a protocol translation layer, which communicates with the underlying network element.

For details on administering and deploying communication services see *Services Gatekeeper System Administrator's Guide*.

For details on the service plug-ins available for you to use in custom communication services see *Services Gatekeeper Application Developer's Guide*.

For information on creating your own custom communication services see *Services Gatekeeper Extension Developer's Guide*.

Figure 1–1 Communication Service Components



Container Services

When used with traditional telephony networks, Services Gatekeeper provides a container in which communication services are run. The container leverages the standard container services that Oracle WebLogic Server provides, and adds services specific to communication services and Services Gatekeeper generally. Container services include:

- Budget

  Manages cross-cluster bandwidth allocation, and supports geographically redundant installations. In the context of quota and rate SLAs, it also maintains historical data on usage patterns.

- Event Data Record (EDR)

  Broadcasts events and manages their translation into charging data and alarms, as necessary.

- Storage

  Provides access to data storage using distributed caching and the database.

- Core

  Performs initial setup tasks.

- Event Channel

  Broadcasts events among modules and servers in the cluster.

- Configuration

  Stores mostly read-only data, such as configuration information.

- Statistics

  Generates system statistics.

- Geographic Redundancy

  Provides support for geographically redundant installations.

- Plug-in Manager

  Manages the service enabler processing layer.

- SNMP

  Provides SNMP service for alarms.

- Account

  Manages SLAs and sessions.

Figure 1–2 and Figure 1–3 show the interactions between the Parlay X 2.1 Short Messaging/SMPP communication service and selected container services as traffic flows through the service enabler layer of the communication service. Figure 1–2 shows this interaction for application-initiated traffic and Figure 1–3 shows this interaction for network-triggered traffic.

Figure 1–2 Interaction with Container Services for Typical Application-Initiated Traffic

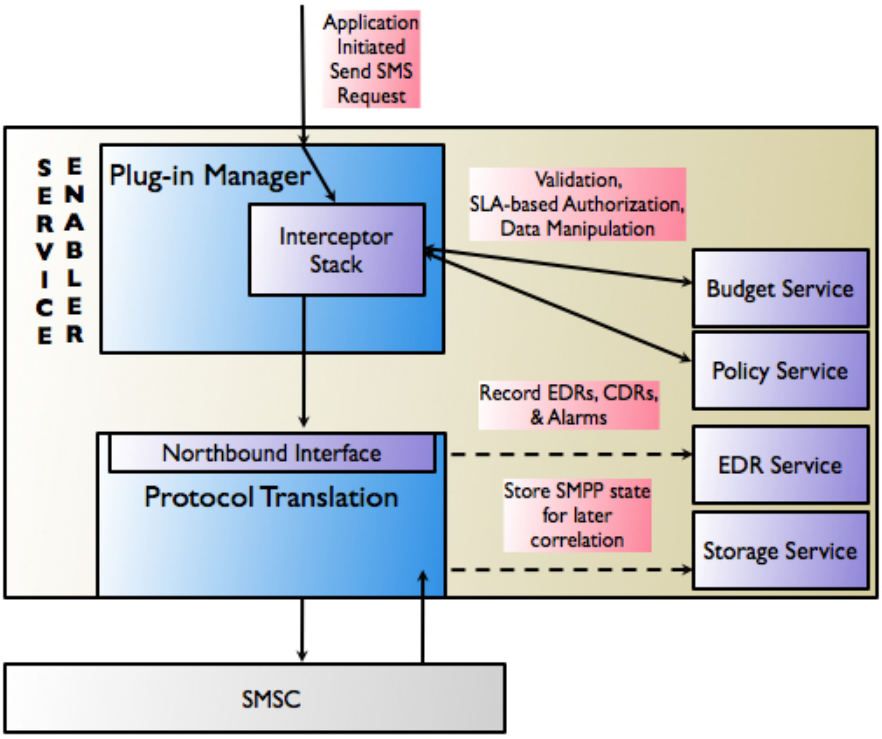
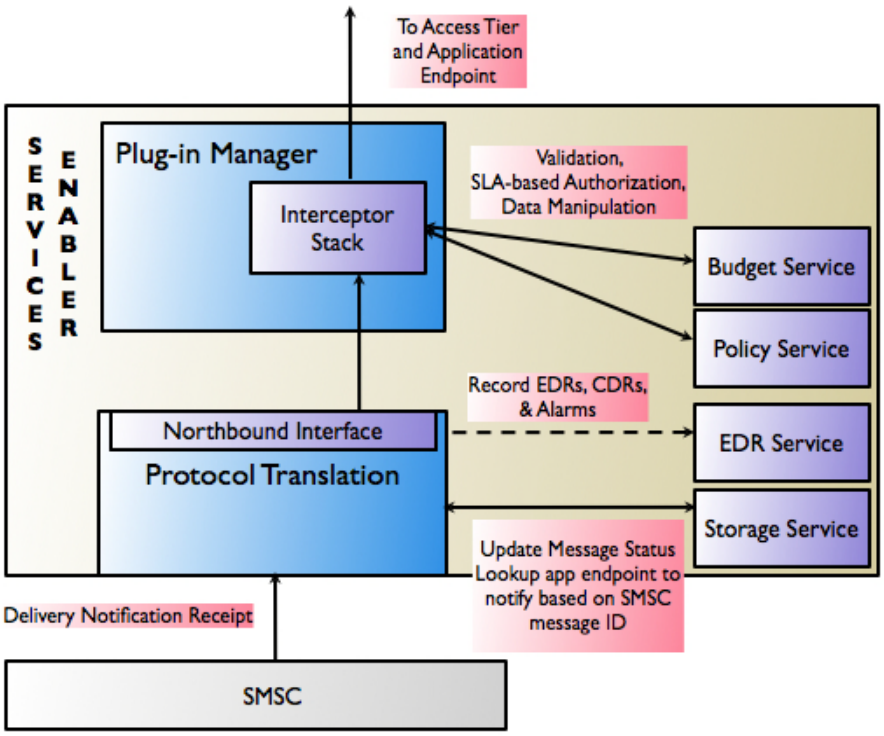


Figure 1–3 Interaction with Container Services for Typical Network-Triggered Traffic



Communication Service Deployment Model

When used with traditional telephony networks, communication services are typically deployed in two clustered tiers, an *Access Tier* and a *Network Tier,* typically separated by a firewall. In a single physical site installation, this corresponds to a single WebLogic Server administration domain. Each communication service is deployed in its own EAR file, one per tier.

Some EAR files may contain either multiple application-facing interfaces (such as the Parlay X 2.1 Short Messaging and Binary SMS/SMPP communication services) or multiple network plug-ins that support the same basic service capability.

A communication service can be installed or removed without impacting other communication services. If no interfaces are changed, existing communication services can be upgraded while traffic is running. This process is called a *hitless upgrade* and tracks traffic so that in-flight requests can be completed before the older version of the communication service is undeployed. Communication services may be deployed selectively, as needed.

2

Understanding the Communication Service Architecture

This chapter is a high level introduction to Oracle Communications Services Gatekeeper communication services. For more detailed information on communication service components, see “Understanding Communication Service Components” in *Services Gatekeeper Extension Developer’s Guide*.

Understanding How Communication Services Work

A communication service consists of a service type, such as Multimedia Messaging, Terminal Location, and so on, an application-facing interface (also called a "north" interface), and a network-facing interface (also called "south" interface).

Communication services are separated into two functional layers: the service facade and the service enabler. The service facade contains the application-facing interfaces and manages interactions with applications. The service enabler contains the mechanisms necessary for communicating with the underlying network nodes.

Application-initiated requests (also called mobile terminated, or MT requests) enter through the service facade. A facade comprises a set of application-facing interfaces of a particular type. Services Gatekeeper supplies facades for traditional SOAP Web Services interfaces, RESTful interfaces, OneAPI RESTful interfaces, and native telephony interfaces. There is also a facade specifically designed to work with the Oracle Service Bus, for SOA-style installations.

After the requests have been processed by the service facade, they are sent to the service enabler by using Remote Method Invocation (RMI). The service enabler layer manages service authorization and policy enforcement, charging, and traffic throttling and shaping. The enabler translates the request into a form appropriate for the underlying network node.

Although the operator may choose instead to run in a sessionless mode, by default Services Gatekeeper requires that applications (except those using native telephony interfaces) acquire a WebLogic session before sending request traffic. Applications do this using the Session Manager interface appropriate for their facade type. The Session Manager returns a session ID, which the application adds to the header of all its requests. Services Gatekeeper can use the session ID to keep track of all the traffic that an application sends for the duration of the session. Sessions allow correlation among sequences of operations. They are not used for authentication

Network-triggered (also called mobile originated, or MO) traffic enables applications to receive data from the telecom network. To do so, the application must first send a request to Services Gatekeeper, or have the operator perform the equivalent task using operations, administration, and management (OAM) operations, to register a

description of the types of data it is interested in such as delivery notifications, incoming messages, and any criteria that the data must be meet to be acceptable. For example, an application might specify that it is only interested in receiving incoming SMS messages that are addressed to the **12345** short code and that begin with the string **blue**.

Typical Application-Initiated Traffic Flow

The following steps describe the application-initiated traffic flow. Steps 1-3 are optional.

1. An application establishes an HTTP session using the WebLogic Session Management Web Service in the facade layer. For details on creating a session see "Using Sessions and Session Persistence" in *Fusion Middleware Developing Web Applications, Servlets, and JSPs, for WebLogic Server*.
2. A session is established, and the session ID is returned to the application. After the application has been established, it may access multiple communication services across the cluster transparently.
3. The session is valid until the application terminates it or an operator-established time period has elapsed.
4. A request for a particular operation, usually transported over Secure Sockets Layer (SSL), enters at the application-facing interface in the facade layer, either directly from the application, or, if the particular installation uses an Oracle Service Bus, from the Oracle Service Bus. The application-facing interface is implemented as a SOAP-based Web Service or a RESTful Web Service. Requests using the RESTful requests are authenticated with HTTP basic or OAuth 2.0 authentication using a user name and password. SOAP-based Web Service requests are authenticated using WebLogic Server WS-Security, which supports plain text or digest passwords, X.509 certificates, or SAML tokens.

   All requests are authenticated in this manner, whether the application uses the session mode.

   In addition, SOAP-based requests may be further secured through encryption using the W3C's standard XML encryption and through digital signatures using the W3C XML digital signature standard. The particular security requirements of the installation are specified in the WS-Policy section of the operator-published WSDL file.

   For information about W3C's standard XML encryption, see

   `http://www.w3.org/TR/xmlenc-core/`

   For information about W3C XML digital signature standard, see

   `http://www.w3.org/TR/2002/REC-xmldsig-core-20020212/`

   It is possible to use the appropriate standard Parlay X 2.1 or 3.0 WSDL to create SOAP-based requests, but the developer would then be required to ascertain the appropriate security type from the operator and insert the information manually.
5. The request is serialized and passed on to the service enabler over RMI.

   From this point on, requests that enter the communication service using the SOAP Service Facade and those using the RESTful Service Facade use the same service enablers. SLA construction, CDRs, EDRs, alarms, and so forth are same for the SOAP-based requests as they are for the RESTful requests of the same type.

The entrance point for the service enabler marks the beginning of the application-initiated transaction.

6. The request is sent to the Plug-in Manager.
7. The Plug-in Manager invokes the Interceptor Stack to evaluate the request. The Interceptor Stack is a flexible set of chained evaluation steps that:
   - Validates the request
   - Enforces a range of policy decisions based on SLAs and possibly additional rules
   - Performs any necessary data manipulation
   - Routes the request to an appropriate protocol translation module (a network plug-in): Routing can be done on a wide variety of parameters.

   If a request fails because of an unavailable module, an interceptor retries the request using one of the remaining eligible modules.
8. The request is sent to the network plug-in to be translated into the protocol suitable for the underlying network node. All state information required by the underlying network node is stored within the network plug-in.
9. The request is passed to the network.
10. When the network node acknowledges the request, charging data about the completed request is recorded.
11. The transaction commits.

Typical Network-Triggered Traffic Flow

To receive network-triggered traffic, an application must indicate to Services Gatekeeper that it is interested in receiving traffic from the network. It does this by registering for (or subscribing to) notifications, either by sending a request to Services Gatekeeper or by having the operator set up the notification using OAM operations.

For example, the application could send Services Gatekeeper a request to begin receiving SMS messages from the network, indicating that it is only interested in messages that are sent to the address **12345** and that begin with the string **blue**. SOAP-based requests indicate the URL of the Web Service that the application has implemented to receive these notifications back from Services Gatekeeper. RESTful requests indicate the channel to which the notifications should be published.

The registration for notifications is stored in the appropriate network plug-in, which in most cases passes it on to the underlying network node. In certain cases the Services Gatekeeper operator must do this manually. When a matching SMS message reaches the plug-in from the network, the plug-in sends the message to the Plug-in Manager, which invokes the Interceptor Stack for evaluation. Then, using RMI, the final interceptor passes the notification, along with the appropriate location from the registration, to the facade layer, which sends it on either to the application, the channel, or to the Oracle Service Bus.

Installations that include multiple facade layers (for example, both RESTful and SOA) can be set up to use the same service enabler layer. Special configuration is required in such installations to route network-triggered traffic to the appropriate facade layer. See the discussion on "Managing and Configuring the Tier Routing Manager" in *Services Gatekeeper System Administrator's Guide* for more information.

Common Features

The following functionality is common to all communication services:

- Service level agreements related to policy enforcement
- Service level agreements related to network protection
- Traffic security
- Events, alarms, and charging
- Statistics and transaction units

For information about service level agreements, see *Services Gatekeeper Accounts and SLAs Guide*.

For information about traffic security for SOAP-based interfaces to the communication services, see Overview of Exception Handling Using SOAP Faults and other SOAP-related chapters in *Oracle WebLogic Server Understanding Security for WebLogic Server*.

RESTFul Web Services to the communications services use either HTTP basic or OAuth 2.0 authentication with a user name and password. SSL is required. For information about basic HTTP authentication, see *HTTP Authentication: Basic and Digest Access Authentication* at:

`http://www.ietf.org/rfc/rfc2617.txt`

OAuth 2.0 is a draft open source Web authorization protocol developed by the Internet Engineering Task Force (IETF). For detailed specifications and more information see the IETF web site:

`http://tools.ietf.org/wg/oauth/`

For information about Services Gatekeeper support for OAuth 2.0 authentication, see "Services Gatekeeper OAuth 2.0 Authorization and Resource Servers".

For general information about events, alarms, and charging, see "Events, Alarms, and Charging".

For information about statistics, see the "Statistics" sections in the individual chapters in this guide.

3

Services Gatekeeper OAuth 2.0 Authorization and Resource Servers

This chapter provides an overview of the OAuth 2.0 specification and explains where to find information on how to use it with Oracle Communications Services Gatekeeper communication services to protect third-party resources.

Using OAuth 2.0 with Services Gatekeeper

Services Gatekeeper provides OAuth 2.0 Authorization and Token endpoints allowing third-party applications secure access to subscriber resources (communications services). For example, your subscribers may want to share photos on an online auction Web site, but not expose their own security credentials to do so. In cases like this, you configure OAuth 2.0 to allow them access.

Authorized applications possessing valid tokens can interact with Services Gatekeeper communication services to perform various functions, including sending messages, charging and terminal location queries. For more information on the Authorization and Token endpoints, see the discussion about OAuth endpoints in the *Services Gatekeeper OAuth Guide*.

OAuth 2.0 modules are deployed by default during installation. A basic Authentication server is also provided in Services Gatekeeper for use with OAuth 2.0.

For complete details on how to use OAuth 2.0 to secure resources, see *Services Gatekeeper OAuth Guide*.

4

Application Subscription Management

This chapter describes and explains how to use Application Subscription Management with communication services in Oracle Communications Services Gatekeeper.

Overview of the Application Subscription Management Service

Services Gatekeeper supports Open Mobile Alliance (OMA) General Service Subscription Management (GSSM) functionality including subscription management, subscription profile access and subscription validation with Application Subscription Management.

Application Subscription Management includes both a communication service and a RESTful interface for managing and querying service subscription status. Application Subscription Management grants or restricts application access to a subscriber's communication service(s) depending on subscription status. Subscription management operations are atomic.

For information on the Open Mobile Alliance GSSM specification see the OMA web site:

http://technical.openmobilealliance.org/Technical/technical-information/release-program/current-releases

Application Interfaces

Services Gatekeeper provides a RESTful interface for Application Subscription Management in addition to the Mbean interface accessible from the Administration Console or Platform Test Environment (PTE).

For more information on using the RESTful interface, see "Adding RESTful Application Subscription Management Support" in *Services Gatekeeper Application Developer's Guide*.

Support for OAuth Authentication

Services Gatekeeper supports OAuth authentication in Application Subscription Management. Services Gatekeeper generates and stores an OAuth token for subscription requests using OAuth. Subsequent application access requests for subscriber services usage require a valid OAuth accessToken. The Services Gatekeeper OAuth Interceptor uses the provided accessToken to confirm a subscriber's identity before permitting subscriber services usage.

See "Configure Application OAuth Scope" for information on enabling OAuth accessTokens in Application Subscription Management.

For information about Services Gatekeeper OAuth support, see *Services Gatekeeper OAuth Guide*.

Events and Statistics

The Application Subscription Management communication service generates event data records (EDRs) to assist system administrators and developers in monitoring the service.

Event Data Records

Table 4–1 lists the EDRs generated by Application Subscription Management operations.

Table 4–1 Application Subscription Management Class EDRs

EDR ID	Description
409001	An application created a subscription using **createSubscription**.
409002	An application deleted a subscription using **deleteSubscription**.
409003	An application confirmed a subscription using **confirmSubscription**.
409004	A subscriber list of application subscriptions was generated using **listSubscriptionsBySubscriberAddress**.
409005	An application subscription list was generated using **listSubscriptionsByApplicationName**.
409006	An application subscription was retrieved using **getSubscriptionById**.
409007	An application subscription response was sent.
409008	An application subscription request was created using **createSubscription** from SMPP.
409009	An application subscription was suspended.
409010	An application subscription was unsuspended.
409101	**createSubscription** was called in the Access Tier.
409102	**deleteSubscription** was called in the Access Tier.
409103	**confirmSubscription** was called in the Access Tier.
409104	**listSubscriptionsBySubscriberAddress** was called in the Access Tier.
409105	**listSubscriptionsByApplicationName** was called in the Access Tier.
409106	**getSubscriptionById** was called in the Access Tier.
409107	**notifySubscription** callback in the Access Tier.
409110	**suspend** was called in the Access Tier.
409111	**unsuspend** was called in the Access Tier.

Managing Application Subscription Management

This section describes the properties and workflow for setting up the Application Subscription Management plug-in instance.

The Application Subscription Management plug-in supports loading an XML configuration file that includes subscription management settings for managed

applications. Additional operations are provided for retrieving configuration, listing subscriptions and connecting to a short message service center (SMSC).

Properties for Application Subscription Management

Table 4–2 lists the technical specifications for the communication service.

Table 4–2 Properties for Application Subscription Management

Property	Description
Managed object in Administration Console	To access the managed object, select **Domain Structure**, then **OCSG**, *server_name*, **Communication Services**, and **Plugin_app_subscription** in that order.
MBean	Domain=com.bea.wlcp.wlng Name=wlng_nt _app_subscription InstanceName=Plugin_app_subscription Type=**oracle.ocsg.plug-in.subscription.management.SubscriptionPluginMbean** Documentation: See the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.
Network protocol plug-in service ID	Plugin_app_subscription
Network protocol plug-in instance ID	The ID is assigned when the plug-in instance is created. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*.
Service type	AppSubscription
Interfaces with the network nodes using	SMPP Esme System Type and Version
Deployment artifacts	**wlng_nt_app_subscription.ear** and **wlng_at_app_subscription_rest.ear**

Configuration Workflow for Application Subscription Management

The Services Gatekeeper installation includes two optional packages used with Application Subscription Management. By default, these packages are not installed. You must install and deploy the following packages before configuring Application Subscription Management:

- **wlng_at_app_subscription_rest.ear**
- **wlng_nt_app_subscription.ear**

You must create and configure a plug-in instance after installing the packages. The following lists the steps for configuring the plug-in:

1. Deploy the Application Subscription Management plug-in ear packages. See "Deploying Application Subscription Management Packages" for more information.
2. Create an Application Subscription Management plug-in instance. See "Creating an Application Subscription Management plug-in Instance" for more information.
3. Configure the Application Subscription Management plug-in attributes. See "Editing Application Subscription Management Attributes" for more information.
4. Load and retrieve application subscription configurations. See "Loading Application Subscription Configuration Files" and "Retrieving Application Subscription Configuration Files" for more information.

5. Load a list of trusted applications. See "Loading Trusted Applications" for more information.
6. Retrieve application subscription lists. See "Retrieving Application Subscription Lists" for more information.
7. Configure application OAuth scope if necessary. See "Configure Application OAuth Scope" for more information.
8. Connect to an SMSC. See "Connecting to an SMSC" for more information.

Deploying Application Subscription Management Packages

To deploy the necessary packages:

1. Log into the Administration Console.
2. Click **Deployments** under **Domain Structure**.
3. If needed, enter the path to the applications directory in **Path**.

   The default location for the **applications** directory is *Oracle_home*/**ocsg**_*release_level*/**applications**.
4. Click **Install**.
5. Select **wlng_at_app_subscription_rest.ear**.
6. Click **Next**.
7. Select **Install this deployment as an application**.
8. Click **Next**.
9. Select any optional settings that are needed in your environment. For more information on deployment settings, see the overview of deployment types in *Services Gatekeeper System Administrator's Guide*.
10. Click **Next**.
11. Review your deployment choices and click **Finish**.
12. Repeat steps 1 through 11 for the **wlng_nt_app_subscription.ear** application file.

Creating an Application Subscription Management plug-in Instance

You must create one or more instances of the Application Subscription Management plug-in to manage subscription requests. Create an instance of the Application Subscription Management plug-in as follows:

1. Log into the Administration Console.
2. Expand **OCSG** in the **Domain Structure** pane.
3. click the name of the administration or managed server you want to create the Application Subscription Management plug-in instance on.
4. Expand the **Container Services** node in the **Oracle Communications Services Gatekeeper** pane.
5. Select **PluginManager**.
6. Click the **Operations** tab.
7. In the **Select An wlngOption** pull down menu, select **createPluginInstance**.
8. Enter `Plugin_app_subscription` in the **PluginServiceId** field.
9. Enter a unique name in the **PluginInstanceId** field.

10. Click **Invoke**.
11. Add a route to the ASM plug-in using the **pluginManager** Mbean.

The Platform Test Environment MBean interface can also be used to create and manage Application Subscription Management plugins. For information on using the Platform Test Environment, see *Services Gatekeeper Platform Test Environment User's Guide*.

Editing Application Subscription Management Attributes

Each instance of the Application Subscription Management plug-in can be configured with its own attributes.

For example, you can configure an instance of the plug-in for each type of SMSC used in your environment. To do so, set field values and use the methods from the Administration Console **SubscriptionPluginMBean** or a Java application. For information on the methods and fields of the MBean, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

To configure the Application Subscription Management plug-in attributes:

1. Log into the Administration Console.
2. Expand the **OCSG** node in **Domain Structure**.
3. Select the administration or managed server where you created the Application Subscription Management plug-in.
4. Expand **Communication Services** in **Oracle Communications Services Gatekeeper**.
5. Select the Application Subscription Management plug-in instance to configure.
6. Click **Attributes**.
7. Select the checkboxes of the attributes you wish to change.
8. Enter the new values for the attribute(s).
9. Click **Update Attributes**.

Loading Application Subscription Configuration Files

Create and manage subscription configurations for application services using the **loadAppSubscriptionsXml** method of **SubscriptionPluginMBean**. For more information on the fields and methods of this MBean, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

Table 4–3 lists the configuration file elements available for use with loadAppSubscriptionsXml the operation configuration file.

Table 4–3 Subscription Management Configuration File Elements

Element Name	Unique	Description	Required
serviceNumber	Y	The target telephone number if subscribed by SMS. The number can be a service provider number, or an application number.When using a service provider number, multiple application registrations share the same number, but must use different subscription short message text.	Y
appInstanceId	Y	The application's instance ID.	Y
applicationName	Y	The application's name.	Y

Table 4–3 (Cont.) Subscription Management Configuration File Elements

Element Name	Unique	Description	Required
endpoint	N	The application's endpoint where Services Gatekeeper sends subscription notifications.	Y
reqLimit	N	The maximum request time limit.	N
expirePeriod	N	The number of seconds a subscription is valid.	Y
subscriptionChannel	N	The subscription channel. Supported values are **ALL**, **WEB_RESTFUL** or **SMS**.	N
metaInfo.key	N	The new added EDR attribute key.	N
metaInfo.value	N	The new added EDR attribute value.	N
subscribeInfo.text	N	A regular expression describing accepted SMS subscribe request format.	Y
subscribeInfo.notification	N	The notification SMS text after subscription confirmation.	N
unsubscribeInfo.text	N	A regular expression describing accepted SMS unsubscribe request format.	Y
unsubscribeInfo.notification	N	The notification SMS text after unsubscription confirmation.	N
suspendInfo.text	N	A regular expression describing accepted SMS suspendInfo request format.	Y
suspendInfo.notification	N	The notification SMS text after a subscription suspension.	N
unsespendInfo.text	N	A regular expression describing accepted SMS unsuspendInfo request format.	Y
unsuspendInfo.notification	N	The notification SMS text after a subscription unsuspension.	N
resourceId	N	The value mapped to the OAuth scopeId.	N

Example 4–1 shows a sample subscription management XML configuration file used to load application subscription data into Services Gatekeeper.

Example 4–1 Sample Subscription Management XML Configuration File

```
<?xml version="1.0" encoding="UTF-8"?>
<subscriptions xmlns="http://oracle/ocsg/appSubscription/types"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

  <!-- SP code -->
  <subscription serviceNumber="tel:1234">
  <application  appInstanceId="domain_user" applicationName="Oracle News"
                endpoint="http://www.oracle.com" expirePeriod="36000000"
subscriptionChannel="ALL">
           <metaInfo key="key1" value="value1"/>
           <metaInfo key="key2" value="value2"/>
     <subscribeInfo text="Subscribe 123" notification="You have subscribed Oracle
News successfully"/>
     <unsubscribeInfo text="Un-Subscribe 123" notification="You have unsubscribed
Oracle News successfully"/>
           <suspendInfo text="Suspend 123" notification="You have suspended Oracle
News successfully"/>
           <unsuspendInfo text="Un-Suspend 123" notification="You have unsuspended
Oracle News successfully"/>
     <resourceId>createoutboundMessage</resourceId>
  </application>
```

```
  <application  appInstanceId="domain_user_1" applicationName="Oracle Jokes"
                endpoint="http://www.oracle.com" expirePeriod="36000000"
subscriptionChannel="WEB_RESTFUL">
     <subscribeInfo text="Subscribe 456" notification="You have subscribed Oracle
Jokes successfully"/>
     <unsubscribeInfo text="Un-Subscribe 456" notification="You have unsubscribed
Oracle Jokes successfully"/>
           <suspendInfo text="Suspend 456" notification="You have suspended Oracle
Jokes successfully"/>
           <unsuspendInfo text="Un-Suspend 456" notification="You have unsuspended
Oracle Jokes successfully"/>
     <resourceId>createoutboundMessage</resourceId>
  </application>
  </subscription>

  <!--App code-->
  <subscription serviceNumber="tel:5678">
    <application  appInstanceId="domain_user_2" applicationName="Google Weather"
                endpoint="http://www.google.com" expirePeriod="36000000"
subscriptionChannel="SMS">
     <subscribeInfo text="Subscribe" notification="You have subscribed Google
Weather successfully"/>
     <unsubscribeInfo text="Un-Subscribe" notification="You have unsubscribed
Google Weather successfully"/>
           <suspendInfo text="Suspend" notification="You have suspended Oracle
Jokes successfully"/>
           <unsuspendInfo text="Un-Suspend" notification="You have unsuspended
Oracle Jokes successfully"/>
     <resourceId>createoutboundMessage</resourceId>
  </application>
  </subscription>

</subscriptions>
```

Load the new or update an existing application subscription configuration using the following procedure:

1. Log into the Administration Console.
2. Expand **OCSG** under **Domain Structure**.
3. Click the name of the administration or managed server you want to create the application subscription configuration on.
4. Expand **Communication Services**.
5. Select the Application Subscription Management plug-in instance to configure.
6. Click **Operations**.
7. In the **Select An Operation** pull down menu select **loadAppSubscriptionsXml**.
8. Copy and paste your XML configuration file contents in the **xml** field.
9. Click **Invoke**.

For more information on the fields and methods of the **SubscriptionPluginMBean** MBean, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

Loading Trusted Applications

Enter a comma-separated list of trusted applications to the **TrustedApplicationInstances** attribute. The list takes effect when you restart the domain servers. An application can not create a subscription for itself.

Trusted applications are applications that you allow to perform these operations using only basic authorization:

- **createSubscription**
- **deleteSubscriptionById**
- **suspendSubscription**
- **unsuspendSubscription**

Applications not on the trusted list must provide OAuth tokens to invoke these operations.

1. Log into the Administration Console.
2. In the **Change Center,** click **Lock & Edit**.
3. Expand **OCSG** under **Domain Structure**.
4. Click the name of the administration or managed server from where you want to retrieve the subscription configuration.
5. Expand **Communication Services**.
6. Select an Application Subscription Management plug-in instance.
7. Click **Attributes**
8. Check the box next to the **TrustedApplicationsInstances** field.
9. Enter a comma-separated list of trusted applications.
10. Click **Update Attributes**.
11. In the **Change Center**, click **Release Configuration**.

Cleaning Up Pending Requests and Expired Subscriptions

You use the **ExpiryPeriod** attribute to **SubscriptionPluginMBean** to specify how often Services Gatekeeper searches for and cleans up pending requests for subscriptions. The expiration time is also checked each time an operation tries to retrieve it. This also prevents an expired subscription from being used.

You set a value for **ExpiryPeriod** in minutes, which specifies how often Services Gatekeeper searches for:

- Application request for subscriptions a pending state (waiting to be created or deleted). If the time limit in the **appendingexpiry** column has been exceeded, the request is removed.
- Whether the **expiry** timer has expired. This timer applies to the subscription regardless of state.

If either the **appendinexpiry** or **expiry** time limits are exceeded, Services Gatekeeper removes the request.

1. Log into the Administration Console.
2. In the **Change Center,** click **Lock & Edit**.
3. Expand **OCSG** under **Domain Structure**.

4. Click the name of the administration or managed server from where you want to retrieve the subscription configuration.
5. Expand **Communication Services**.
6. Select an Application Subscription Management plug-in instance.
7. Click **Attributes**.
8. Check the box next to the **ExpiryPeriod** field.
9. Enter a timer value in minutes.
10. Click **Update Attributes**.
11. In the **Change Center**, click **Release Configuration**.

Retrieving Application Subscription Configuration Files

Retrieve the current application subscription configuration in a plug-in instance using the following procedure:

1. Log into the Administration Console.
2. Expand **OCSG** under **Domain Structure**.
3. Click the name of the administration or managed server from where you want to retrieve the subscription configuration.
4. Expand **Communication Services**.
5. Select the Application Subscription Management plug-in instance you want to retrieve the subscription configuration from.
6. Click **Operations**.
7. In the **Select An Operation** pull down menu select **retrieveAppSubscriptionsXml**.
8. Click **Invoke**.

Retrieving Application Subscription Lists

Retrieve a list of application subscriptions in Services Gatekeeper using the following procedure:

1. Log into the Administration Console.
2. Expand **OCSG** under **Domain Structure**.
3. Click the name of the administration or managed server from where you want to retrieve the subscription list.
4. Expand **Communication Services**.
5. Select the Application Subscription Management plug-in instance you want to retrieve the subscription list from.
6. Click **Operations**.
7. In the **Select An Option** pull down menu, select **retrieveAppSubscriptionsList**.
8. Click **Invoke**.

Configure Application OAuth Scope

You must configure application scope when using OAuth authentication with Application Subscription Management.

Configure the application's **resourceId** as an OAuth **scopeId** in Services Gatekeeper using the **loadAppSubscriptionResourceXml** method in the **OAuthResourceMbean**. For more information on the fields and methods of this MBean, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

To configure application OAuth scope:

1. Log into the Administration Console.
2. Expand **OCSG** under **Domain Structure**.
3. Click the name of the administration or managed server where the OAuth container service is hosted.
4. Expand **Container Services**.
5. Expand **OAuthService**.
6. Select **OAuthResourceMBean**.
7. Click **Operations**.
8. In the **Select an Option** pull down menu, select **loadAppSubscriptionResourceXml**.
9. Enter the XML string as shown in Example 4–2. Set the **resource id** to the same value used when loading the application subscription configuration. See "Loading Application Subscription Configuration Files" for more information. Set the **interfaceName**, **methodName** and **tokenExpirePeriod** as required.

Example 4–2 loadAppSubscriptionResourceXml Sample XML Configuration File

```
<?xml version="1.0" encoding="UTF-8"?>
<resources xmlns="http://oracle/ocsg/oauth2/management/xml"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <!-- amountTransaction  -->
  <resource id="OneAPIMMS" name="mms"
  interfaceName="oracle.ocsg.parlayrest.plugin.MmsPlugin" methodName="sendMessage"
  tokenExpirePeriod="3600">
  </resource>
</resources>
```

Connecting to an SMSC

Application Subscription Management plug-in instances must connect to an SMSC to accept and confirm subscription requests by SMS. Connect each plug-in instance to its SMSC using the following procedure:

1. Log into the Administration Console.
2. Expand **OCSG** under **Domain Structure**.
3. Click the name of the administration or managed server where the Application Subscription Management plug-in to connect to an SMSC is hosted.
4. Expand **Communication Services**.
5. Select the Application Subscription Management plug-in instance you want to connect to an SMSC. The plug-in **Attributes** tab contains the SMSC connection information. See "Editing Application Subscription Management Attributes" for more information on configuring SMSC connection attributes.
6. Click **Operations**.
7. In the **Select An Operation** pull down menu select **connect**.

8. Click **Invoke**.
9. Click **Attributes** and check the **ActiveStatus** value. A **true** value indicates successful connection to the configured SMSC.

Handling Traffic from Applications without Subscriptions

Application Subscription Management checks for a valid subscription before allowing an application to use a subscriber communication service. However, some applications may not use subscriptions to manage message delivery. For example, a service provider may use an application in Services Gatekeeper to send a subscriber a text message about an emergency or pending service outage.

Services Gatekeeper only validates subscription status for applications configured in the Application Subscription Management XML file. Messages originating from applications not configured in the XML file bypass subscription validation and are sent through the normal delivery pathway. See "Loading Application Subscription Configuration Files" for information on the Application Subscription Management configuration file.

For a description of the attributes and operations of the **SubscriptionPluginMBean** MBean, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

5

Parlay X 2.1 Multimedia Messaging/MM7

This chapter describes the Oracle Communications Services Gatekeeper Parlay X 2.1 Multimedia Messaging/MM7 communication service in detail.

Overview of the Parlay X 2.1 Multimedia Messaging/MM7 Communication Service

The Parlay X 2.1 Multimedia Messaging/MM7 communication service exposes the Parlay X 2.1 Multimedia Messaging set of application interfaces.

The communication service acts as a Value Added Service (VAS) application connecting to an MMS relay server using the MM7 protocol.

For the exact version of the standards that the Parlay X 2.1 Multimedia Messaging/MM7communication service supports for the application-facing interfaces and the network protocols, see *Services Gatekeeper Statement of Compliance*.

Using a Multimedia Messaging communication service, an application can:

- Send multimedia messages to one or many destination addresses. The payload in these multimedia messages can be any type that can be specified using MIME, including multipart messages.
- Sign up to be notified that delivery receipts for sent multimedia messages have been received from the network.
- Receive delivery receipts on sent multimedia messages that have arrived from the network.
- Explicitly query Services Gatekeeper for delivery receipts on sent multimedia messages.
- Sign up to be notified if specified multimedia messages for the application have been received from the network.
- Receive notifications that specified multimedia messages for the application have arrived from the network. These notifications do not include the message payload, but they do provide a message ID.
- Explicitly poll Services Gatekeeper for multimedia messages sent to the application that have arrived from the network and been stored in Services Gatekeeper.

Requests can flow in two directions. They can be application-initiated or network-triggered,

Processing Application-initiated Requests

After an application has sent a multimedia message to one or more destination addresses, two different types of response can be returned:

- Send Receipts
- Delivery Receipts

Send Receipts

Send receipts are acknowledgements that the network node has received the multimedia message from the application by means of Services Gatekeeper. Although a single multimedia message may be sent to multiple destination addresses, normally only one send receipt is returned to the application. The receipt is returned synchronously in the response message to the **sendMessage** operation.

Delivery Receipts

Delivery receipts contain the delivery status of the multimedia message. They report whether the multimedia message has actually been delivered to the mobile terminal by the network. There is one delivery receipt per destination address, with one of three possible outcomes:

- Successful.
- Unsuccessful: The multimedia message could not be delivered before it expired.
- Unsupported: Delivery notification for this address is not supported. This can occur if the originating network supports delivery receipts but is unable to acquire the appropriate information for one or more destination addresses. This status is reported for each address for which this is the case.

Because actual delivery of the multimedia message may take several hours, or even days (if, for example, the mobile terminal is turned off at the time the multimedia message is sent), delivery receipts are returned asynchronously. Applications can either choose to have delivery receipts delivered to them automatically by supplying Services Gatekeeper with a callback interface or they can chose to poll Services Gatekeeper.

If the application supplies a callback interface, there are two possible outcomes:

- Services Gatekeeper sends the delivery receipt and the application receives and acknowledges it.
- Services Gatekeeper sends the delivery receipt but the application does not acknowledge reception. In this case, Services Gatekeeper stores the delivery receipt in temporary in-memory storage. The application can poll Services Gatekeeper for these receipts. Each stored delivery receipt is time stamped and, after a configurable time period, is removed.

If the application chooses not to supply a callback interface, Services Gatekeeper stores the delivery receipt in temporary in-memory storage. The application can poll Services Gatekeeper for these receipts. Each stored delivery receipt is time stamped and, after a configurable time period, removed.

Processing Network-triggered Requests

Two types of traffic destined for an application can arrive at Services Gatekeeper from the network:

- Delivery receipts for application-initiated sent multimedia messages. See "Delivery Receipts" for more information.
- Mobile-originated multimedia messages destined for the application

For an application to receive multimedia messages from the network, it must indicate its interest in these messages by registering for online notification in Services Gatekeeper. A notification is defined by a service activation number, which is the destination address of the multimedia message. The service activation number may be translated by some mechanism, such as short codes, in the telecom network. Use the **StartMessageNotification** method of the **MessagingManagementMBean** to register for online notification of network-triggered MMS messages from the Administration console. See the "All Classes" section of *Services Gatekeeper OAM Java API Reference* for details on the **MessagingManagementMBean**.

An application can also use the following operations to register for online notifications:

- ParlayX 2.1 **StartMessageNotification**. See the 3GPP TS 29.199-05 Parlay X Web Services Part 5: Multimedia Messaging specification
- REST **Start Message Notification**. See *Services Gatekeeper Application Developer's Guide*.
- OneAPI **Subscribe to MMS Delivery Notification**. See *Services Gatekeeper Application Developer's Guide*.

An application can also register to receive multimedia messages offline. Services Gatekeeper stores the messages and delivers them when the application requests them. Use the **enableReceiveMms** method of **MessagingManagementMBean** to provision offline notification of network-triggered MMS messages.

Additional criteria can be tied to the service activation number, such as the start of the first plain/text part in the multimedia message payload or the subject of the multimedia message. For the message to be accepted by Services Gatekeeper, both the service activation number and any additional criteria must match the notification.

Mobile-originated messages to applications are routed based on the criteria that are specified when the notifications are created. The behavior for matching criteria is as follows:

- If the subject of the message is not null, the subject is used for criteria matching the specified criteria.
- If the subject of the message is null, the first word of first text attachment is used for matching the criteria.
- If the criteria is not null, messages with no subject and no text attachment are not delivered to the application.
- If the criteria is null, all messages are considered a match and delivered to the application.

Each registered notification must be unique, and notification attempts with overlapping criteria are rejected. The application can either retrieve received multimedia messages from Services Gatekeeper or include a callback interface when setting up the original notification.

Following are the possible scenarios for receipt and handling of multimedia messages.

1. The application has registered for online notification. Services Gatekeeper sends the message to the application, and the application receives the message and acknowledges receiving it.

If the MMS message is pure text, the text is included in the notification sent to the application.

If the MMS message is not pure text, the notification sent to the application includes a reference to the multimedia attachments. The application uses that reference to retrieve the attachments.

2. The application has registered for online notification. Services Gatekeeper sends the multimedia message to the application, but the application does not acknowledge receiving it.

   Offline notification has been provisioned.

   Services Gatekeeper stores the multimedia message. The application retrieves the message as described in "Retrieving Offline MMS Messages".

3. The application has registered for online notification. Offline notification has not been provisioned.

   Services Gatekeeper sends the multimedia message to the application, but the application does not acknowledge receiving it. Services Gatekeeper returns an error to the network. It is the responsibility of the network to handle any further processing of the multimedia message.

4. The application has not registered for online notification. Offline notification has been provisioned. Services Gatekeeper stores the multimedia message.

   The application retrieves the message as described in "Retrieving Offline MMS Messages".

5. The application has not registered an online subscription, and offline notification has not been provisioned.

   Services Gatekeeper returns an error to the network. It is the responsibility of the network to handle any further processing of the multimedia message.

Retrieving Offline MMS Messages

A ParlayX application fetches newly-arrived MMS messages with the **getReceivedMessages** operation. The response from this method is an array of **MessageReference** objects, one for each newly-arrived MMS message.

If an MMS message is pure text, the text message is included in the **MessageReference** object. If an MMS message is not pure text, the **MessageReference** object includes the reference to the multimedia attachments. The application then uses the reference to retrieve the attachment using the **getMessage** operation. See the *3GPP TS 29.199-05 Parlay X Web Services Part 5: Multimedia Messaging* specification for a description of this operation.

The process is similar for REST applications. For information about getting MMS messages from a REST application, see the descriptions of the **Get Received Messages** and **Get Message** operations in the multimedia messaging chapter of *Services Gatekeeper Application Developer's Guide*.

For information about getting MMS messages from a OneAPI application, see the description about "Retrieve Messages Sent to Web Application".

Table 5–1 shows the MessageReference structure defined by the *3GPP TS 29.199-05 Parlay X Web Services Part 5: Multimedia Messaging* specification. Elements related to this discussion are shown in boldface in Table 5–1.

Table 5–1 ParlayX Message Reference Structure

Element name	Element type	Optional	Description
messageIdentifier	**xsd:string**	**Yes**	If present, contains a reference to a message stored in the ParlayX gateway. If the message is pure text, this parameter is not present.
messageService ActivationNumber	xsd:string	No	Number associated with the invoked Message service, i.e. the destination address used by the terminal to send the message.
senderAddress	xsd:anyURI	No	Indicates message sender address.
subject	xsd:string	Yes	If present, indicates the subject of the received message. This parameter will not be used for SMS services.
priority	MessagePriority	No	The priority of the message: default is Normal.
message	**xsd:string**	**Yes**	If present, then the messageIdentifier is not present and this parameter contains the whole message. The type of the message is always pure ASCII text in this case. The message will not be stored in the Parlay X gateway.
dateTime	xsd:dateTime	Yes	Time when message was received by operator

Example 5–1 shows the message and **messageIdentifer** in the REST Notification Data Object.

Example 5–1 REST Notification Data Object

```
{"notifyMessageReception": {
  "correlator": "String",
  "message": {
    "messageServiceActivationNumber": "String",
    "priority": "Default|Low|Normal|High",
    "senderAddress": "URI",
    "dateTime": "Calendar",
    "message": "String" --> if message is pure text it can be found here
    "messageIdentifier": "String", --> if not pure text the reference is found
here
    "subject": "String"
  }
}}
```

Each stored multimedia message is time stamped and, after a configurable time period, removed.

The OneAPI response to a request for the full MMS message including attachments is a multipart/form-data response in which the JSON message text and metadata are separated from the multimedia attachments by a separator that has the form

====12345====

The **resourceURL** in the response is the link to the message. The application uses this value to retrieve the entire message, including the attachments. Example 5–2 shows the structure of a response.

Example 5–2 OneAPI Response Body for Retrieving Full MMS messages

```
"inboundMessage": [
{ "dateTime": "dateTime",
"destinationAddress": "String",
"messageId": "String", --> server-geenerated message identifier
"inboundMMSMessage": "String", --> subject of the message
"resourceURL": "URL", --> link to the full message and attachments
"senderAddress": "String"},

====Content Divider====

Attachment(s)
```

Polling Functionality

The polling capability for retrieving offline notifications must be provisioned in advance.

To configure the polling capability:

- Set the **RequestDeliveryReportFlag** attribute to non-zero. See this attribute of the M for information about valid values.
- Use the **enableReceiveMms** operation to allow applications to poll for mobile-originated messages. See the description of the **enableReceiveMms** method of **MessagingManagementMBean** in *Services Gatekeeper OAM Java API Reference* for more information.

Short Code Translation

Messaging-capable networks use short codes and message prefixes to help route traffic and to make access to certain features easier for the end user. Instead of having to use the entire address, users can enter a short code that is mapped to the full address in the network. The Parlay X 2.1 Multimedia Messaging/MM7 communication service supports short codes and message prefixes, which allow the same short code to be mapped to multiple addresses based on the prefix to the enclosed message.

Application Interfaces

The SOAP-based interface for the Parlay X 2.1 MultiMedia Messaging/MM7 communication service are described in the discussion of Parlay X 2.1 Part 5: Multimedia Messaging in *Services Gatekeeper Application Developer's Guide*.

For information about the RESTful Call Notification interface, see the discussion of Multimedia Messaging in *Services Gatekeeper Application Developer's Guide*.

The RESTful Service Multimedia Messaging interfaces provide RESTful access to the same functionality as the SOAP-based interfaces. The internal representations are identical, and for the purposes of creating service level agreements (SLAs), reading (charging data records) CDRs, and so on, they are the same.

Events and Statistics

The Parlay X 2.1 Multimedia Messaging/MM7 communication service generates event data records (EDRs), CDRs, alarms, and statistics to assist system administrators and developers in monitoring the service.

See "Events, Alarms, and Charging" for general information.

Event Data Records

Table 5–2 lists the IDs of the EDRs created by the Parlay X 2.1 Multimedia Messaging/MM7 communication service.

Table 5–2 EDRs Generated by Parlay X 2.1 Multimedia Messaging/MM7

EDR ID	Description
8100	A (mobile-originated) MO message has arrived from the network.
8101	An MO delivery receipt has arrived from the network.
8102	The application has requested that a notification be started.
8103	The application has requested that a notification be stopped.
8104	The application has polled for a list of received messages.
8106	The application has polled for actual messages, returned as attachments.

Charging Data Records

Multimedia Messaging/MM7-specific CDRs are generated under the following conditions:

- After Services Gatekeeper successfully sends a **sendMessage** request to the network.
- After Services Gatekeeper successfully receives and processes a delivery report sent from the network.
- After Services Gatekeeper successfully receives and processes a mobile-originated message sent from the network.

Statistics

Table 5–3 maps methods invoked from either the application or the network to the transaction types collected by the Services Gatekeeper statistics counters.

Table 5–3 Methods and Transaction Types for Parlay X 2.1 Multimedia Messaging/MM7

Method	Transaction Type
sendMessage	TRANSACTION_TYPE_MESSAGING_MMS_SEND
deliver	TRANSACTION_TYPE_MESSAGING_MMS_RECEIVE

Alarms

For the list of alarms, see *Services Gatekeeper Alarms Handling Guide*.

Tunneled Parameters for Parlay X 2.1 MM7 Rel 6.8.0

This section lists, by parameter key, the parameters that can be tunneled or defined in the `<requestContext>` element of an SLA.

ChargedParty

Description

Specifies the party to be charged for a multimedia message submitted by the Value-Added Service Provider (VASP).

If defined, the **ChargedParty** xparameter is forwarded in the SOAP header in the north-bound interface.

Validated by the plug-in.

Format
String

Value
Valid values: **Sender**, **Recipient**, **Both**, **Neither**

ChargedPartyCD

Description
Specifies the address of the third party expected to pay for the multimedia message.

If defined, the **ChargedPartyID** xparameter is forwarded in the SOAP header in the north-bound interface.

Format
String

timeStamp

Description
Specifies date and time that the multimedia message was submitted.

Format
Date/Time

expiryDate

Description
Specifies the desired time for the expiration of the multimedia message.

Format
Date/Time

allowAdaptation

Description
Specifies if VASP allows adaptation of the content.

Set to `true` to allow adaptation, `false` to prohibit it.

Format
Boolean

DeliveryCondition

Description
In the event of a single **Delivery Condition**, if the condition is met, the multimedia message is delivered to the recipient MMS User Agent. Otherwise the message is discarded.

Validated by the plug-in.

Format
Positive Integer

UAProf

Description
Specifies the UserAgent Name or URL to the UAProfile (resource description framework) RDF.

Used for transferring user agent capabilities from R/S to value-added service provider (VASP).

If not null, this parameter is forwarded to the application.

Format
String

StatusText

Description
Human-readable description of the numerical code that indicates the general type of an error.

If not null, this parameter is forwarded to the application.

Format
String

Managing Parlay X 2.1 Multimedia Messaging/MM7

This section describes the properties and workflow for Parlay X 2.1 Multimedia Messaging/MM7 plug-in instances.

Properties for Parlay X 2.1 Multimedia Messaging/MM7

Table 5–4 lists the technical specifications for the communication service.

Table 5–4 Properties for Multimedia Messaging/MM7

Property	Description
Managed object in Administration Console	To access the object, select *domain_name*, then **OCSG**, *server_name*, **Communication Services**, and then the *plug-in_instance_id*, in that order.
MBean	Domain=com.bea.wlcp.wlng Name=wlng_nt InstanceName=same as the network protocol *instance_id* assigned when the plug-in instance is created Type=**com.bea.wlcp.wlng.plugin.multimediamessaging.mm7.management.MessagingManagementMBean** Documentation: For information on **MessagingManagementMBean**, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

Table 5–4 (Cont.) Properties for Multimedia Messaging/MM7

Property	Description
Network protocol plug-in service ID	**Plugin_px21_multimedia_messaging_mm7**
Network protocol plug-in instance ID	The ID is assigned when the plug-in instance is created. See the discussion on configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*.
Supported Address Scheme	tel, mailto, short
Application-facing interfaces	**com.bea.wlcp.wlng.px21.plugin.MessageNotificationManagerPlugin** **com.bea.wlcp.wlng.px21.plugin.ReceiveMessagePlugin** **com.bea.wlcp.wlng.px21.plugin.SendMessagePlugin** **com.bea.wlcp.wlng.px21.callback.MessageNotificationCallback**
Service type	MultimediaMessaging
Exposes to the service communication layer a Java representation of:	Parlay X 3.0 Part 5: Multimedia Messaging
Interfaces with the network nodes using:	MM7
Deployment artifact: NT EAR wlng_nt_multimedia_messaging_px21.ear	**plugin_px21_multimedia_messaging_mm7.jar**, **px21_multimedia_messaging_service.jar**, **multimedia_messaging_mm7_rel5mm712.war**, and **multimedia_messaging_mm7_rel5mm715.war**
Deployment artifact: AT EAR: Normal wlng_at_multimedia_messaging_px21.ear	**px21_multimedia_messaging_callback.jar**, **px21_multimedia_messaging.war**, and **rest_multimedia_messaging.war**
Deployment artifact: AT EAR: SOAP Only wlng_at_multimedia_messaging_px21_soap.ear	**px21_multimedia_messaging_callback.jar** and **px21_multimedia_messaging.war**

Configuration Workflow for Parlay X 2.1 MultiMedia Messaging/MM7

Following is an outline for configuring the plug-in using the Administration Console or an MBean browser.

1. Create one or more instances of the plug-in service. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in service ID listed in "Properties for Parlay X 2.1 Multimedia Messaging/MM7".
2. Select the MBean for the plug-in instance. The MBean display name is the same as the plug-in instance ID given when the plug-in instance was created.
3. Configure the behavior of the plug-in instance using the following attributes in **MessagingManagementMBean**:
   - **HTTPBasicAuthentication**

If you are using HTTP basic authentication, also define:

- **HTTPBasicAuthenticationUsername**
- **HTTPBasicAuthenticationPassword**

- **DefaultPriority**
- **MM7Version**
- **Mm7relayserverAddress**
- **VaspId**
- **VasId**
- **RequestDeliveryReportFlag**
- **XSDVersion**

For more information on the fields and methods of **MessagingManagementMBean**, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

4. Specify heartbeat behavior. See the discussion about configuring heartbeats in *Services Gatekeeper System Administrator's Guide*.
5. Set up the routing rules to the plug-in instance. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in instance ID and address schemes listed in "Properties for Parlay X 2.1 Multimedia Messaging/MM7".
6. Provide the administrator of the MM7 server with the URL to which the MM7 server should deliver mobile originated messages and delivery reports. The default URL is:

   `http://IP_Address_of_NT_server:port/context-root/plug-in_instance_ID`
   If you are using the REL-5-MM7-1-2 XSD, the default *context-root* is **mmm-mm7**.

   If you are using the REL-5-MM7-1-5 XSD, the default *context-root* is **mmm-mm7-rel5mm7-1-5**.

   If you are using the REL-6-MM7-1-4 XSDm the default *context-root* is **mmm-mm7-rel6mm7-1-4**.
7. If required, create and load a node SLA. For details see the discussion about defining global node and service provider group node SLAs and managing SLAs in *Services Gatekeeper Accounts and SLAs Guide*.
8. Provision the service provider accounts and application accounts. For information, see *Services Gatekeeper Portal Developer's Guide*.

Provisioning Parlay X 2.1 MultiMedia Messaging/MM7 Communication Service

To provision the Parlay X 2.1 MultiMedia Messaging/MM7 communication service, do the following:

- Enable mobile-oriented messages to be stored in Services Gatekeeper for polling by applications, by using the **enableReceiveMms** method of **MessagingManagementMBean**.
- Set up for notifications about mobile-originated messages on behalf of an application, by using the **startMessageNotification** method of **MessagingManagementMBean**.

- Manage offline notifications, by using the following methods of **MM7NotificationMBean**:
  - **listOfflineNotificationInfo**
  - **getOfflineNotificationInfo**
  - **removeOfflineNotificationInfo**
- Manage offline notifications, by using the following methods of **MM7NotificationMBean**:
  - **listOnlineNotificationInfo**
  - **getOnlineNotificationInfo**
  - **removeOnlineNotificationInfo**

For a description of the attributes and operations of the **MessagingManagementMBean** and **MM7NotificationMBean** MBeans, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

6

Parlay X 2.1 Multimedia Messaging/SMTP, POP3, and IMAP

This chapter describes the Oracle Communications Services Gatekeeper Parlay X 2.1 Multimedia Messaging/SMTP, POP3, and IMAP protocols.

Overview of the Parlay X 2.1 Multimedia Messaging/SMTP, POP3, and IMAP Communication Service

The Parlay X 2.1 Multimedia Messaging/SMTP, POP3, and IMAP communication service exposes the Parlay X 2.1 Multimedia Messaging set of application interfaces.

The communication service acts as a Value Added Service (VAS) application connecting to an email server using the SMTP, POP3, and IMAP protocols. It provides the capability of applying policy such as throttling and black listing to manage and regulate the flow of email.

For the exact version of the standards that the Parlay X 2.1 Multimedia Messaging/SMTP, POP3, and IMAP communication service supports for the application-facing interfaces and the network protocols, see the *Services Gatekeeper Statement of Compliance*.

Using this communication service, an application can:

- Send email messages to one or more destination addresses. The attachments in these email messages can be of any type that can be specified using MIME.
- Sign up to be notified that delivery receipts for sent email messages have been delivered to the email server.
- Receive delivery receipts on sent or retrying email messages.
- Explicitly query Services Gatekeeper for delivery receipts on sent email messages.
- Sign up to be notified when specified email messages for the application have been received from the email server.
- Receive notifications that specified email messages for the application have been received from the email server. These notifications provide a message ID, but do not include the message payload.
- Explicitly poll Services Gatekeeper for email messages sent to the application that have arrived from the email server and been stored in Services Gatekeeper.

Requests can flow in two directions. They can be application-initiated or network-triggered.

Processing Application-Initiated Requests

Application-initiated requests can be:

- Send Requests
- Send Receipts
- Delivery Receipts
- Retry Requests

Send Requests

When an application sends a request using Parlay X 2.1 Multimedia Messaging protocol to Services Gatekeeper, if the sender address and destination addresses start with the schema **email:**, Services Gatekeeper transforms the request to an email and uses SMTP protocol to send the request to an email server.

- **Routing mechanism**

  For this communication service, each plug-in instance connects to an email server by SMTP. Routing should be based on sender address but not destination address. In PluginManager MBean, when adding a route for the email plug-in instance, the value should use **^.*** to match all addresses, for example, **^.***@oracle.com**$**. This means that the plug-in instance connects to oracle email server and all the requests with a sender address that matches the regular expression should be routed to this plug-in instance.

- **SMTP connections management**

  Each email plug-in instance creates an SMTP connection pool. The connections in the pool connect to SMTP server separately. Each connection can be in IDLE, BUSY, or DISCONNECT status and should send heartbeat to maintain itself. If disconnected, it should reconnect to SMTP server. When a plug-in instance receives a new request, it should select a connection in IDLE status from the pool, and set it to BUSY status. If the connection fails, enlarge the pool until it reaches the maximum connection number. If it still fails, the plug-in instance sends the request to the retry manager.

- **Email subject, body and attachments**

  When transforming the Parlay X 2.1 Multimedia Messaging request to an email message, set subject in email with the subject value in the original request. For email body and attachments, since there are only attachments in the original request, add an X-Parameter **ContentInFirstAttachment** to indicate whether there is an email body or not. If this X-Parameter is set to **true**, or is absent, then the first attachment contains the email body and other attachments are handled as regular attachments. If this X-Parameter is set to **false**, then all attachments are handled as regular attachments and the email body is blank.

- **Multiple destination addresses**

  For a request with multiple destination addresses, since Services Gatekeeper cannot use the common routing mechanism as mentioned above, the plug-in instance should be responsible for splitting single email into multiple email messages and sending it to each address.

Send Receipts

For this communication service, send receipts are acknowledgements that Services Gatekeeper has received the request from the application by means. The result values in the send receipts are UUIDs (universally unique identifiers) created by Services

Gatekeeper used to correlate subsequent delivery receipts at a later time. Although a single email message may be sent to multiple destination addresses, only one send receipt is returned to the application. The receipt is returned synchronously in the response message to the **sendMessage** operation.

Delivery Receipts

Delivery receipts contain the final delivery status of the email message. They report whether the email message has actually been delivered to the delivery recipient by the network. There is one delivery receipt per destination address, with one of four possible outcomes:

- **DeliveryUncertain** (the initial status)
- **DeliveredToNetwork**
- **MessageWaiting** (retry status)
- **DeliveryImpossible** (message could not be delivered since the retry limit was exceeded)

Applications can either choose to have delivery receipts delivered to them automatically by supplying Services Gatekeeper with a callback interface or they can choose to poll Services Gatekeeper.

When Services Gatekeeper receives a request from an application, it creates an UUID and returns that UUID in the send receipts to application. It stores the delivery receipt for each destination address with initial status in temporary in-memory storage with the UUID and callback interface (if any).

After Services Gatekeeper sends an email successfully or fails to do so, it updates the delivery receipt in the in-memory store, if a callback interface exists, and sends the delivery receipt to notify the application.

If the application does not supply a callback interface, the application can poll Services Gatekeeper with the UUID for these stored delivery receipts.

DeliveredToNetwork and **DeliveryImpossible** are final delivery statuses. The stored delivery receipt should be removed if the status for all the destination addresses belonging to one UUID is a final status and are delivered to application callback interface or have been polled by application.

Each stored delivery receipt is time stamped. After a configurable time period, the stored delivery receipt is removed.

Retry Requests

When Services Gatekeeper sends an email which temporarily fails for any reason (such as no connection), it stores the request in storage, updates the status to **MessageWaiting** for this request, and sends a delivery receipt to the application (if a callback interface was provided).

After a configurable time interval, Services Gatekeeper retrieves the failed request from the store and attempts to resend the request. The number of retry attempts are also configurable.

If retry attempt for the send request succeeds, Services Gatekeeper updates the status to **DeliveredToNetwork** for this request and sends a delivery receipt.

If the number of retry attempts are exhausted and the send request has not succeeded, Services Gatekeeper updates the status to **DeliveryImpossible** for this request and creates a delivery receipt indicating the failure.

Processing Network-Triggered Requests

For an application to receive email messages from the network, it must indicate its interest in these messages by registering for online notification in Services Gatekeeper. A notification is defined by a service activation number, which is the destination address of the email. An application can use the following operations to register for online notification:

- ParlayX 2.1 StartMessageNotification. See the Parlay X Web Services Part 5: Multimedia Messaging specification listed in *Services Gatekeeper Statement of Compliance*.
- Use the **startMessageNotification** operation of **EmailManagementMBean** to register for online notification from the Administration console.

An application can also register to receive email messages offline. Services Gatekeeper stores the messages and delivers them when the application requests them. Use the **enableReceiveEmail** operation of **EmailManagementMBean** from the Administration console to provision offline notification of network-triggered email messages. See the "All Classes" section of *Services Gatekeeper OAM Java API Reference* for details on **EmailManagementMBean.**

Extensions to ParlayX 2.1 interface include:

- X-Parameter **Password** to indicate the credential of the email service activation number. The value should be encrypted by AES (Advanced Encryption Standard) or 3DES (Triple Data Encryption Standard) algorithm.
- X-Parameter **SizeLimit** to indicate the maximum total size (in kilobyte) of an email message attachment accepted by Services Gatekeeper.
- Each registered notification must be unique, and notification attempts with overlapping service activation number are rejected.

When Services Gatekeeper receives an online/offline notification request, it starts a POP3 or IMAP process according to the configuration. When using POP3, Services Gatekeeper uses the polling mechanism and retrieves email messages from email server using a configurable interval. When using IMAP, Services Gatekeeper attempts to utilize IDLE mechanism (whereby when new email messages arrive it is notified by the email server and retrieves the email). If the email server does not support the IDLE mechanism, then Services Gatekeeper falls back to the polling solution.

When using POP3 or IMAP3 protocols, Services Gatekeeper handles email messages it receives in the following ways:

- The application has registered for online notification. Services Gatekeeper sends the message to the application, and the application receives the message and acknowledges receiving it.

  If the email only has pure text body without attachments, the text is included in the notification sent to the application.

  If the email message is not pure text, the notification sent to the application includes a reference to the attachments stored in storage. The application uses that reference to retrieve the attachments.
- Offline notification has been provisioned. Services Gatekeeper stores the email. The application retrieves the message as described in "Retrieving Offline Messages".

Retrieving Offline Messages

A ParlayX application fetches newly-arrived email messages with the **getReceivedMessages** operation. The response from this method is an array of MessageReference objects, one for each newly-arrived email message.

If an email message is pure text, the text message is included in the MessageReference object. If an email message is not pure text, the MessageReference object includes the reference to the attachments. The application then uses the reference to retrieve the attachment using the getMessage operation. See the Parlay X Web Services Part 5: Multimedia Messaging specification listed in the*Services Gatekeeper Statement of Compliance* for descriptions of this operation.

Application Interfaces

For information about the SOAP-based interface for the Parlay X 2.1 MultiMedia Messaging/MM7 communication service, see the discussion about Parlay X 2.1 Part 5: Multimedia Messaging in *Services Gatekeeper Application Developer's Guide*.

For information about the RESTful interface, see the discussion about the multimedia messaging interface in *Services Gatekeeper Application Developer's Guide*.

The RESTful Service interfaces provide RESTful access to the same functionality as the SOAP-based interfaces. The internal representations are identical, and for the purposes of creating service level agreements (SLAs), reading charging data records (CDR), and so on, they are the same.

This communication service uses a plug-in which enables applications to send email using Simple Mail Transfer Protocol (SMTP) and receive email using Post Office Protocol (POP) version 3 and Internet Message Access Protocol (IMAP).

See *Services Gatekeeper Statement of Compliance* for details on the SMTP, POP and IMAP interfaces supported.

Events and Statistics

The Parlay X 2.1 MultiMedia Messaging/SMTP, POP3, and IMAP communication service generates event data records (EDRs), CDRs, and alarms to assist system administrators and developers in monitoring the service.

See "Events, Alarms, and Charging" for general information.

Event Data Records

Table 6–1 lists the IDs of the EDRs created by the Parlay X 2.1 MultiMedia Messaging/SMTP, POP3, and IMAP communication service. It does not include EDRs created when exceptions are thrown.

Table 6–1 EDRs Generated by Email Communication Service

EDR ID	Method Called
8107	SendMessage
8108	getMessageDeliveryStatus
8102	startMessageNotification
8103	stopMessageNotification
8104	getReceivedMessages

Table 6–1 (Cont.) EDRs Generated by Email Communication Service

EDR ID	Method Called
8106	getMessage
8110	notifyMessageDeliveryReceipt
8111	notifyMessageReception
8120	submit email to email server
8121	delivery receipt for email
8122	receive email from email server

Charging Data Records

MultiMedia Messaging/SMTP, POP3, and IMAP CDRs are generated under the following conditions:

- When an email has been sent from Services Gatekeeper to the email server
- When an email received from the email server.

Alarms

For the list of alarms, see *Services Gatekeeper Alarms Handling Guide*.

Managing Parlay X 2.1 MultiMedia Messaging/SMTP, POP3, and IMAP

This section describes the properties and workflow for Parlay X 2.1 Multimedia Messaging/SMTP, POP3, and IMAP plug-in instances.

Properties for Parlay X 2.1 MultiMedia Messaging/SMTP, POP3, and IMAP

Table 6–2 lists the technical specifications for the communication service.

Table 6–2 Properties for MultiMedia Messaging/SMTP, POP3, and IMAP

Property	Description
Managed object in Administration Console	sendMessagedomain_name > OCSG > server_name > Communication Services > plug-in_instance_id
MBean	Domain=com.bea.wlcp.wlng Name=wlng_nt InstanceName=same as the network protocol instance_id assigned when the plug-in instance is created Type=**oracle.ocsg.plugin.multimediamessaging.email.management.EmailManagementMBean**
Network protocol plug-in service ID	**Plugin_px21_multimedia_messaging_email**
Network protocol plug-in instance ID	The ID is assigned when the plug-in instance is created. See the description for SGADM456
Supported Address Scheme	email

Table 6–2 (Cont.) Properties for MultiMedia Messaging/SMTP, POP3, and IMAP

Property	Description
Application-facing interfaces	**com.bea.wlcp.wlng.px21.plugin.MessageNotificationManagerPlugin** **com.bea.wlcp.wlng.px21.plugin.ReceiveMessagePlugin** **com.bea.wlcp.wlng.px21.plugin.SendMessagePlugin** **com.bea.wlcp.wlng.px21.callback.MessageNotificationCallback**
Service type	MultimediaMessaging-ParlayRestMms
Exposes to the service communication layer a java representation of:	Parlay X 2.1 Part 5: Multimedia Messaging
Protocols used for interfaces with the network nodes	SMTP, POP3, and SMTP
Deployment artifact: NT.EAR wlng_nt_multimedia_messaging_px21.ear	**Plugin_px21_multimedia_messaging_mm7.jar** **Plugin_px21_multimedia_messaging_email.jar** **px21_multimedia_messaging_service.jar** **multimedia_messaging_mm7_rel5mm712.war** **multimedia_messaging_mm7_rel5mm715.war**
Deployment artifact: AT EAR: Normal wlng_at_multimedia_messaging_px21.ear	**px21_multimedia_messaging_callback.jar** **px21_multimedia_messaging.war** **rest_multimedia_messaging.war**

Configuration Workflow for Parlay X 2.1 MultiMedia Messaging/SMTP, POP3, and IMAP

Use the following procedure to configure the plug-in instance using the Administration Console or an MBean browser:

1. Create one or more instances of the plug-in service. See the section on configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*.

   Use the plug-in service ID listed in "Properties for Parlay X 2.1 MultiMedia Messaging/SMTP, POP3, and IMAP".

2. Select the MBean for the plug-in instance. The MBean display name is the same as the plug-in instance ID given when the plug-in instance was created.
3. Configure the behavior of the plug-in instance using attributes related to the SMTP/POP3/IMAP protocols according to email server information.
4. Set up the routing rules to the plug-in instance.

   See the section on configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*.

   Use the plug-in instance ID and address schemes listed in "Properties for Parlay X 2.1 MultiMedia Messaging/SMTP, POP3, and IMAP".

5. If required, create and load a node SLA. For details see the discussion on defining global node and service provider group node SLAs and managing SLAs in *Services Gatekeeper Accounts and SLAs Guide*.
6. Provision the service provider accounts and application accounts.

Provisioning Workflow for Parlay X 2.1 MultiMedia Messaging/SMTP, POP3, and IMAP

You can provision the Parlay X 2.1 MultiMedia Messaging communication service for the supported protocols (SMTP, POP3, or IMAP) in the following way:

1. Configure the connections to the email server for the required protocol.

   Use the attributes of **EmailManagementMBean** appropriate for the protocol.

2. Enable the connection for SMPTP and IMAP3 protocols, by calling the appropriate method of **EmailManagementMBean**. For the POP3 protocol, the configuration takes effect immediately. It does not require such explicit connection activation.

   Tip: To monitor the status of each connection in the connection pool use, call the appropriate method of the MBean (**listSMTPConnection**, **listPOP3Process**, or **listImap3Process**).

3. Enable mobile-oriented messages to be stored in Services Gatekeeper for polling by applications, by using the **enableReceiveEmail** method of **EmailManagementMBean**.
4. Manage offline notifications by using the following methods of **EmailManagementMBean**:
   - **listOfflineNotificationInfo**
   - **getOfflineNotificationInfo**
   - **removeOfflineNotificationInfo**
5. Manage online notifications by using the following methods of **EmailManagementMBean**:
   - **listOnlineNotificationInfo**
   - **getOnlineNotificationInfo**
   - **removeOnlineNotificationInfo**

For a description of the fields and methods of the **EmailManagementMBean** MBean, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

7

Parlay X 2.1 Short Messaging/SMPP

This chapter describes the Oracle Communications Services Gatekeeper Parlay X 2.1 Short Messaging/Short Message Peer to Peer (SMPP) communication service in detail.

Overview of the Parlay X 2.1 Short Messaging/SMPP Communication Service

The Parlay X 2.1 Short Messaging/SMPP communication service exposes the Parlay X 2.1 Short Messaging set of application interfaces.

The communication service acts as an External Short Message Entity (ESME) that connects to a Short Messaging Service Center (SMSC) over TCP/IP.

For the exact version of the standards that the Parlay X 2.1 Short Messaging/SMPP communication service supports for the application-facing interfaces and the network protocols, see *Services Gatekeeper Statement of Compliance*.

Services Gatekeeper provides support for the billing identification identifier, **smpp_billing_id**, defined in the SMPP Specification, through the use of a tunneled parameter. It also supports the **ussd_service_operation**, which was added as an optional parameter to the **DELIVER_SM** operation as a tunneled parameter in the SMPP Specification. See "smpp_billing_id" and "ussd_service_operation" for information about these parameters.

Using a Short Messaging communication service, an application can:

- Send short messages to one or many destination addresses. The payload in these short messages can be text, logos, or ringtones. With Split and Submit messaging, short messages addressed to many recipients can be split into multiple individually-addressed messages.

  Logos must be in either Smart Messaging or Enhanced Messaging Service (EMS) format. The image is not scaled. Ringtones must be in either Smart Messaging or EMS (iMelody) format.
- Request to be notified that delivery receipts for sent short messages have been received from the network.
- Receive delivery receipts on sent short messages that have arrived from the network.
- Explicitly query Services Gatekeeper for delivery receipts on sent short messages.
- Subscribe to be notified if specified short messages for the application have been received from the network.

- Receive notifications that specified short messages for the application have arrived from the network. These notifications include the short message payload.
- Explicitly poll Services Gatekeeper for short messages sent to the application that have arrived from the network and been stored in Services Gatekeeper.

Requests can flow in two directions: from the application to the network (called application-initiated or mobile-terminated) and from the network to the application (called network-triggered or mobile-originated). Both of these scenarios are covered in the following sections.

Split and Submit Messaging

Bulk SMS messages addressed to multiple recipients can be split into a number of individually addressed SMS messages with Split and Submit Messaging regardless of the capabilities of the SMSC.

Split and Submit Messaging:

- Works with SMSCs that do not support the SUBMIT_MULTI PDU
- Supports sending to more than 254 addresses (the limit of SUBMIT_MULTI)
- Frees applications from splitting messages, improving their performance.

Delivery receipts are returned on a per-message basis, one for each individual recipient.

Processing Application-Initiated Requests

After an application has sent a short message to one or more destination addresses, two different types of responses can be returned:

- Send Receipts
- Delivery Receipts

Send Receipts

Send receipts are acknowledgements that the network node has received the short message from the application by means of Services Gatekeeper. Although a single short message may be sent to multiple destination addresses, Services Gatekeeper normally returns only one send receipt to the application. The receipt is returned synchronously in the response message to the **sendSms** operation.

Delivery Receipts

Delivery receipts contain the delivery status of the short message; that is, whether the short message has actually been delivered by the network to the mobile terminal. There is one delivery receipt per destination address, with one of three possible outcomes:

- Successful: In the case of concatenated short messages, this is returned only when all the parts have been successfully delivered.
- Unsuccessful: The short message could not be delivered before it expired.
- Unsupported: Delivery notification for this address is not supported. This can occur if the originating network supports delivery receipts but is unable to acquire the appropriate information for one or more destination addresses. This status is reported for each address for which this is the case.

Because actual delivery of the short message may take several hours, or even days (if, for example, the mobile terminal is turned off at the time the short message is sent), delivery receipts are returned asynchronously. Applications can choose either to have delivery receipts delivered to them automatically by supplying Services Gatekeeper with a callback interface or they can poll Services Gatekeeper.

If the application supplies a callback interface, there are two possible outcomes:

- Services Gatekeeper sends the delivery receipt and the application receives and acknowledges it.
- Services Gatekeeper sends the delivery receipt but the application does not acknowledge reception. In this case, Services Gatekeeper stores the delivery receipt. The application can poll Services Gatekeeper for these receipts. Each stored delivery receipt is time stamped and, after a configurable time period, is removed.

If the application chooses not to supply a callback interface, Services Gatekeeper stores the delivery receipt. The application can poll Services Gatekeeper for these receipts. Each stored delivery receipt is time stamped and, after a configurable time period, is removed.

To correlate a sent message with a delivery receipt from the network node, Services Gatekeeper stores the information about the message for a period of time. This information has a life span. If the delivery receipt does not arrive prior to the expiration of the message, a cancel request for the message is sent to the SMSC.

Processing Network-Triggered Requests

Two types of traffic destined for an application can arrive at Services Gatekeeper from the network. They are:

- Delivery receipts for application-initiated sent short messages
- Mobile-originated short messages destined for the application

For an application to receive online notification of short messages from the network, it must indicate its interest in these messages by registering for online notification in Services Gatekeeper. A notification is defined by a service activation number, which is the destination address to which the mobile sender directs the short message. This is usually a short code. Use the **startSmsNotification** method to **SmsMBean** to register for online notification of network-triggered SMS messages from the Administration console. An application can also use the following operations to register for online notifications:

- ParlayX 2.1 **StartSmsNotification**; see *Parlay X 2.1 Web Services Part 4: Short Messaging* specification
- REST **Start Sms Notification**; see *Services Gatekeeper Application Developer's Guide*.
- OneAPI **Subscribe to SMS Delivery Notification**; see *Services Gatekeeper Application Developer's Guide.*

An application can also be registered to receive short messages offline. Services Gatekeeper stores the messages and delivers them when the application requests them. Use the **enableRecieveSms** method to **SmsMBean** to provision offline notification of network-triggered SMS messages.

Additional criteria can be tied to the service activation number, such as the first word of the text in the short message payload. For Services Gatekeeper to accept a message, both the service activation number and the additional criteria must match the details in the notification. Each registered notification must be unique, and notification

attempts with overlapping criteria are rejected. The application can either request received short messages from Services Gatekeeper or include a callback interface when setting up the original notification.

Following are the possible scenarios for receipt and handling of short messages.

1. The application has registered for online notification. Services Gatekeeper sends the short message to the application, and the application receives and acknowledges it.

   In this case Services Gatekeeper acknowledges receiving the short message to the network

2. The application has registered for online notification. Services Gatekeeper sends the short message to the application, but the application does not acknowledge receiving it.

   Offline notification has been provisioned and a registration identifier has been established, so Services Gatekeeper stores the short message and acknowledges receiving the short message to the network.

3. The application has registered for online notification. Services Gatekeeper sends the short message to the application, but the application does not acknowledge receiving it.

   Offline notification has not been provisioned. Services Gatekeeper returns an error to the network. It is the responsibility of the network to handle any further processing of the short message

4. The application has not registered for online notification.

   Offline notification has been provisioned. Services Gatekeeper stores the short message and acknowledges receiving the short message to the network.

5. The application has not registered for online notification.

   Offline notification has not been provisioned. Services Gatekeeper acknowledges receiving the short message to the network with an error. It is the responsibility of the network to handle any further processing of the short message.

Each stored short message is time stamped and, after a configurable time period, removed from storage.

A SOAP application retrieves stored messages with the **getReceivedSms** operation; see the *Parlay X 2.1 Web Services Part 4: Short Messaging* specification for more information about this operation. A REST application retrieves them with the **Get Received Sms** operation; see the *Services Gatekeeper Application Developer's Guide* for information about this operation.

Connection Handling and Provisioning

The Parlay X 2.1 Short Messaging/SMPP communication service uses the Services Gatekeeper SMPP Server Service to establish and manage southbound (client) connections between Services Gatekeeper and SMSCs. The SMPP Server Service is deployed as an Oracle WebLogic Server service.

See "System Properties for SMPP Server Service" and "Reference: Attributes and Operations for SMPP Server Service" for information about configuring connections between the Services Gatekeeper SMPP server service and an SMSC.

A client connection is created when this plug-in successfully binds with an SMSC. A successful rebind changes the connection ID.

When a client connection is successfully established, the connection is verified periodically by using **ENQUIRE_LINK** requests (heartbeats). If the **ENQUIRE_LINK** requests fail a configurable number of times, Services Gatekeeper attempts to reconnect with the SMSC. If the reconnect attempts fail a configurable number of times, the client connection is closed and removed.

The plug-in instance MBean provides the following configurable timers for southbound connections between Services Gatekeeper and SMSCs:

- Connection timer: This timer sets the heartbeat interval that Services Gatekeeper uses to request the connection status on the client connection. If the **ENQUIRE_LINK** requests fail, Services Gatekeeper closes the connection and attempts to reconnect. See the **EnquireLinkTimerValue** field to **SmsMBean** for more information.
- Transaction timer: This timer establishes the interval between an SMPP request to the SMSC and the corresponding SMPP response. If the interval is reached, Services Gatekeeper does not resend the request. In this case, Services Gatekeeper removes the transaction information and discards the PDU response. See the **RequestTimerValue** field to **SmsMBean** for more information.

Multiple Connections and Multiple Plug-in Instances

A Parlay X 2.1 Short Messaging/SMPP plug-in can bind to an SMSC as an ESME transmitter/receiver or transceiver. If more than one account in the SMSC is used, create one plug-in instance for each account. If more than one SMSC is used, create a plug-in instance for each account in each of the SMSCs.

If plug-in instances have the same bind type, they can share a connection to the SMSC. If they have different bind types, each must have its own client connection.

Each plug-in instance executes on all network tier servers. Shared storage is used, so network-triggered messages and delivery notifications can be accepted by all network tier servers and match them with all application subscriptions, thus creating a configuration with high availability.

Windowing

To maximize throughput, the Parlay X 2.1 Short Messaging/SMPP communication service supports windowing on the network-facing interfaces. Windowing provides a way to specify the amount of data that can be transmitted without receiving an acknowledgment.

Windowing for requests to the SMSC is configured in the plug-in.

The **windowSize** attribute sets the number of unacknowledged requests that can be sent simultaneously.

A request moves from the windowing queue to the window. From the window it is submitted for processing. A submitted request remains in the window until its response is received. When the response is received, the request is released and another request can be moved from the windowing queue to the window.

If any one of these windowing parameters is set to a value less than zero, windowing is turned off. If all of these three parameters are greater than zero, windowing is turned on.

For descriptions of these attributes to **SmsMbean** see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*:

- **windowSize**

- **windowWaitTimeout**

If the windowing request queue is full or the timer has expired, the request is not sent and an error code is returned to the plug-in instance.

Segments

If an SMS message is larger than the maximum payload size, the message content is concatenated into segments before it is delivered to the application.

The maximum payload size defaults to the standard set by the Parlay X 2.1 Short Messaging specification. You can set the maximum payload size using the **wlng.smpp.max_payload_size** system property on the command line when starting Services Gatekeeper.

For configuration attributes regarding segments, to **SmsMbean** see the "All Classes"" section of *Services Gatekeeper OAM Java API Reference*:

- **ReceiveSegmentsWaitTime**
- **ReceiveSmsIgnoreMissingSegments**

Short Code Translation

Messaging-capable networks use short codes and message prefixes to help route traffic and to make access to certain features easier for the end user. Instead of having to use the entire address, users can enter a short code that is mapped to the full address in the network. The Parlay X 2.1 Short Messaging/ SMPP communication service supports short codes and message prefixes, which allow the same short code to be mapped to different applications based on the prefix to the enclosed message.

Load Balancing, High Availability, and Failover

To optimize system utilization, applications should load-balance application-triggered requests among all application tier servers.

When there are multiple connections to the SMSC within a single plug-in instance, the SMPP Server Service selects one of the connections to the SMSC.

A prerequisite for high-availability for the Parlay X 2.1 Short Messaging/SMPP communication service is redundant network tier servers, redundant network interface cards in each network tier server, and a redundant set of SMPP servers to connect to. High availability between Services Gatekeeper and the network is achieved by using at least two different plug-in instances per network tier server and having the plug-in instances connect to different SMPP servers.

High availability behavior is as follows:

- The SMPP server runs in every network node. If one network node is unavailable, mobile-terminated requests are automatically routed to a healthy node. Related delivery reports are routed from the healthy network node that handled the request to the application.
- If the application tier is unavailable, mobile-originated messages are routed to a healthy application tier node.
- In a Services Gatekeeper cluster, if the server becomes unavailable after sending a **SUBMIT_SM** request to and receiving the **SUBMIT_SM_RESP** from the SMSC, the SMSC routes the subsequent delivery receipt to another server. This other server retrieves the message information from cluster-level storage and processes it.

- In a Services Gatekeeper cluster, if a server becomes unavailable after sending a **SUBMIT_SM** request to and receiving the SUBMIT_SM_RESP from an application, the application routes the subsequent cancel, query, or replace request to another server. This other server retrieves the message information from cluster-level storage and processes it.

Character Set Encoding

The SMPP protocol expects the sender name value in ASCII characters. The use of non-ASCII characters can cause the request to become garbled or even to be removed at the SMSC.

The maximum size of an SMS message is 140 bytes, regardless of the type of data coding used. If the content exceeds 140 bytes, Service Gatekeeper sends it as multiple SMS messages.

Standard and Extended GSM Alphabets

The standard GSM 03.38 alphabet uses 7 bits per character, allowing for 128 different characters with hexadecimal values 0x00 to 0x7F.

If all the characters in an SMS message are from the standard GSM alphabet, it is possible to send 160 of these 7-bit encoded characters in one SMS message of 140 bytes. This is because 140 bytes equals 1120 bits and if each character uses 7-bits, 160 (1120/7) characters fit into the message.

See the **DefaultDataCoding** field to **SmsMBean** for the default alphabet settings and payload size that Oracle recommends.

There is also an extended GSM alphabet that defines an additional 10 characters along with the original 128. These characters are sent as two 7-bit encoded characters, starting with the 7-bit encoded escape character (0x1B) from the standard alphabet. For example, if a message contains the character { from the extended alphabet, this character is encoded as 1B 28 where 1B is the escape character and 28 is the { extended character.

Each extended character requires two 7-bit encoded characters (escape character + extended character). Therefore, an SMS message containing a combination of characters from the standard GSM alphabet and characters from the extended GSM alphabet will hold fewer than 160 characters. The exact number depends on the particular mix of standard and extended characters.

For a list of the characters defined in the GSM standard and extended alphabets see the GSM web site:

http://www.csoft.co.uk/sms/character_sets/gsm.htm

To indicate that only SMS messages in which all the characters are from the standard or extended GSM alphabet, the **DefaultDataCoding** attribute should be set to **0**. This is the default. setting. If the **DefaultDataCoding** attribute is set to **0** and the SMS message contains characters that are not in the standard or extended GSM alphabets, Services Gatekeeper rejects the message and throws an exception. If your SMSC sends 8-bit SMSs, set the **DefaultDataCoding** attribute to **1**, which allows a maximum of 140 characters in an SMS.

Other Alphabets

It is possible to send characters that are not in the standard or extended GSM alphabets if the **DefaultDataCoding** attribute is configured appropriately.

In addition to the standard and extended GSM alphabets (called the "SMSC Default Alphabet" in the SMPP v3.4 specification), two other common character sets are the IA5/ASCII character set and the UCS2 character set.

In the IA5/ASCII alphabet, the characters are 8-bit encoded, in other words one byte per character, so it is possible to send 140 of these 8-bit encoded characters in one SMS message that uses this coding scheme. If you are using the IA5/ASCII alphabet, set the **DefaultDataCoding** attribute for the plug-in to **1**.

Characters in the UCS2 alphabet are 16-bit encoded, requiring two bytes per character, so it is possible to send only 70 of these characters in a single SMS message. If you are using the UCS2 alphabet, set the **DefaultDataCoding** attribute for the plug-in to **8**.

For a complete list of supported character set values, see the "data_coding" section in the SMPP v3.4 specification.

Overriding the DefaultDataCoding Attribute

You can override the **DefaultDataCoding** attribute in requests using an xparameter or an SLA setting. This makes it possible, for example, to use the standard 7-bit GMS alphabet as the default but to send specific SMS messages using a different character set.

Use the **data_coding** xparameter for parameter tunneling in the header of the request or the com.bea.wlcp.wlng.plugin.sms.DataCoding parameter for defining the coding scheme in the `<requestContext>` element of an SLA.

For example, although the **DefaultDataCoding** parameter may be set to **0** for a plug-in instance, the following SOAP header sets the data coding scheme for its SMS message to **8**, stipulating that the UCS2 character set should be used for encoding the SMS message in this particular request:

```
<soapenv: Header>
. . .
    <xparams>
        <param key="data_coding" value="8" />
    <xparams>
. . .
</soapenv:Header>
```

In the next example, the `<requestContext>` element in an SLA sets the data coding scheme to **1**, stipulating that the IA5/ASCII character set should be used for encoding SMS messages initiated by the application associated with this particular SLA:

```
<requestContext>
  <contextAttribute>
    <attributeName>ccom.bea.wlcp.wlng.plugin.sms.DataCoding</attributeName>
    <attributeValue>1</attributeValue>
  </contextAttribute>
</requestContext>
```

Application Interfaces

For information about the SOAP-based interface for the Parlay X 2.1 Short Messaging/SMPP communication service, see the discussion of Parlay X 2.1 Part 4: Short Messaging interface in *Services Gatekeeper Application Developer's Guide*.

The RESTful Service Short Messaging interfaces provide RESTful access to the same functionality as the SOAP-based interfaces. The internal representations are identical, and for the purposes of creating service level agreements (SLAs), reading charging

data records (CDRs), and so on, they are the same. For information about the RESTful Short Messaging interface, see the discussion about the short messaging interface in *Services Gatekeeper Application Developer's Guide*.

Events and Statistics

The Parlay X 2.1 Short Messaging/SMPP communication service generates event data records (EDRs), CDRs, alarms, and statistics to assist system administrators and developers in monitoring the service.

See "Events, Alarms, and Charging" for more information.

Event Data

Table 7–1 lists the IDs of the EDRs created by the Parlay X 2.1 Short Messaging/SMPP communication service. This list does not include EDRs created when exceptions are thrown.

Table 7–1 EDRs Generated by Parlay X 2.1 Short Messaging/SMPP

EDR ID	Method Called
6000	notifySmsDeliveryReceipt
6001	notifiySmsReception
7000	sendSms
7001	sendSmsLogo
7002	sendSmsRingtone
7003	startSmsNotification
7004	stopSmsNotification
7011	getSmsDeliveryStatus
7012	getReceivedSms

See "Events and Statistics""Events and Statistics"for the list of EDRs generated by the SMPP Server Service.

Charging Data Records

Short Messaging/SMPP-specific generates CDRs under the following conditions:

- After Services Gatekeeper has successfully received and processed an application-originated message, and successfully sent all segments of the message to the network.
- After Services Gatekeeper receives and processes a delivery report sent from the network.
- After Services Gatekeeper successfully receives and processes a mobile-originated message sent from the network.

Statistics

Table 7–2 maps methods invoked from either the application or the network to the transaction types collected by the Services Gatekeeper statistics counters.

Table 7–2 Methods and Transaction Types for Parlay X 2.1 Short Messaging/SMPP

Method	Transaction Type
sendSms	TRANSACTION_TYPE_MESSAGING_SEND
sendSmsLogo	TRANSACTION_TYPE_MESSAGING_SEND
sendSmsRingtone	TRANSACTION_TYPE_MESSAGING_SEND
receivedMobileOriginatedSMS	TRANSACTION_TYPE_MESSAGING_RECEIVE

Alarms

For the list of alarms, see *Services Gatekeeper Alarms Handling Guide*.

Tunneled Parameters for Parlay X 2.1 Short Messaging / SMPP

This section lists the parameters that can be tunneled or defined in the `<requestContext>` element of an SLA.

The **dest_bearer_type**, **service_type**, **ussd_service_operation**, **its_session_info** parameters are used to support unstructured supplementary service data (USSD).

submit_date

You can include **submit_date** as xparam in delivery report notifications sent from Services Gatekeeper to application listeners. You must set the **ForwardXParams** MBeam attribute to true in order to include **submit_date**.

You can only include `"submit date"` when the delivery report from SMSC has the informational content inserted into the **short_message** parameter of the **DeliverSm** PDU as shown in the SMPP specification v 3.4, appendix B.

In ParlayX SOAP callbacks, the xparam is set in the SOAP header, for example:

```
<xparams xmlns="http://schemas.xmlsoap.org/soap/envelope/"
env:mustUnderstand="0"&gt;
         <param xmlns="" key="submit date" value="1411251321"/>
         <param xmlns="" key="originating_address" value="12345">
 </xparams>

For SMS OneAPI callbacks it is set in HTTP header, for example:

 X-Plugin-Param-Keys: submit_date,originating_address
 X-Plugin-Param-Values: 1411251324,12345
```

done_date

Description

This parameter returns the date and time a message was delivered to a terminal for OneAPI facade communication. Your implementation must support the SMPP v 3.3 style communication that makes this information available. Also xparams must be configured by setting the Services Gatekeeper **SmsMBean** attribute **ForwardXParams** to **true**.

This example shows an SMS OneAPI callback set in the HTTP header:

```
X-Plugin-Param-Keys: done_date,originating_address
X-Plugin-Param-Values: 1411251324,12345
```

This example shows a SOAP callback with the xparam set in the header:

```
<xparams xmlns="http://schemas.xmlsoap.org/soap/envelope/"
env:mustUnderstand="0"&gt;
     <param xmlns="" key="done_date" value="1411251321"/>
     <param xmlns="" key="originating_address" value="12345">
</xparams>
```

Format
String

sms.protocol.id

Description
This parameter defines the mandatory SMPP **protocol_id** parameter.

It is valid for application-initiated requests only.

This parameter can be set using SLAs or parameter tunneling. An SLA setting overrides a tunneled parameter.

This parameter key name can be configured in the **wlng.sms.protocol.id** system property. The default is **sms.protocol.id**.

Format
Integer

Value
Value range is **0**–**65535**.

source_port

Description
This parameter defines the optional SMPP **source_port** parameter.

It is valid for application-initiated requests.

It is valid for network-triggered requests if the forwarding parameter is enabled. See the **ForwardXParams** field to **SmsMBean** for more information.

This parameter can be set using parameter tunneling.

Format
Integer

Value
Value range is **0**–**65535**.

destination_port

Description
This parameter defines the optional SMPP **destination_port** parameter.

It is valid for application-initiated requests.

It is valid for network-triggered requests if the forwarding parameter is enabled. See the **ForwardXParams** field to **SmsMBean** for more information.

This parameter can be set using parameter tunneling.

Format
Integer

Value
Value range is **0**–**65535**.

data_coding

Description
This parameter defines the mandatory SMPP **data_coding** parameter.

Overrides the **DefaultDataCoding** configuration attribute. See the **DefaultDataCoding** field in **SmsMBean** for more information.

It is valid for application-initiated requests.

It is valid for network-triggered requests if the forwarding parameter is enabled. See the **ForwardXParams** field in **SmsMBean** for more information.

This parameter can be set using parameter tunneling.

Format
Signed Decimal

Value
Value range is **-128** – **+127**. Some values are restricted. See the SMPP specification for details.

esm_class

Description
This parameter defines the mandatory SMPP **esm_class** parameter.

It is valid for application-initiated requests only.

This parameter can be set using parameter tunneling.

Format
Signed Decimal

Value
Value range is **-128** – **+127**. Some values are restricted. See the SMPP specification for details.

sms.service.type

Description
This parameter defines the mandatory SMPP **service_type** parameter.

It is valid for application-initiated requests only.

This parameter can be set using SLAs or parameter tunneling. An SLA setting overrides a tunneled parameter.

This parameter name can be configured in the **wlng.sms.service.type** system property. The default is **sms.service.type**.

Format
String enumeration

Value
Valid values are **CMT**, **CPT**, **VMN**, **VMA**, **WAP**, **USSD**, and an empty string (**""**). See the SMPP specification for details.

sms.replace.if.present

Description
This parameter defines the mandatory SMPP **replace_if_present_flag** parameter.

It is valid for application-initiated requests only.

This parameter can be set using SLAs or parameter tunneling. An SLA setting overrides a tunneled parameter.

This parameter key name can be configured in the wlng.sms.replace.if.present system property. The default is **sms.replace.if.present**.

Format
Integer

Value
Value values are **0** and **1**. See the SMPP specification for details.

com.bea.wlcp.wlng.plugin.sms.OriginatingAddressType

Description
This parameter defines a mapping ID.

The ID is used for looking up an SMPP ESME Type Of Number (TON) and an SMPP ESME Numbering Plan Indicator (NPI). The TON and NPI are configured using OAM.

This parameter is valid for application-initiated requests only.

This parameter can be set using SLAs or parameter tunneling. An SLA setting overrides a tunneled parameter.

Format
String

com.bea.wlcp.wlng.plugin.sms.DestinationAddressType.*n*

Description
This parameter defines a mapping ID.

The ID is used for looking up an SMPP ESME Type Of Number (TON) and an SMPP ESME Numbering Plan Indicator (NPI). The TON and NPI are configured using Oracle Access Manager (OAM).

The *n* is the number of the destination address. Valid values are 0 to one less than the number of destination addresses. An example of this parameter name would be:

com.bea.wlcp.wlng.plugin.sms.DestinationAddressType.2

This parameter is valid for application-initiated requests only.

This parameter can be set using SLAs or parameter tunneling. An SLA setting overrides a tunneled parameter.

Format
String

com.bea.wlcp.wlng.plugin.sms.RequestDeliveryReportFlag

Description
This parameter defines the mandatory SMPP **registered_delivery** parameter.

It specifies whether delivery reports are requested for application-initiated requests.

It is valid for application-initiated requests only.

This parameter can be set using SLAs or parameter tunneling. An SLA setting overrides a tunneled parameter.

Format
Boolean

Value
- 0 - Delivery receipt is never requested (was the old false option).
- 1 - Delivery receipt is always requested (was the old true option).
- 2 - Delivery receipt is requested if the application requests a delivery report. It either provides a callback URL when sending the message, or by having subscribed for delivery report notifications (new option).

com.bea.wlcp.wlng.plugin.sms.DataCoding

Description
This parameter defines the mandatory SMPP **data_coding** parameter.

The plug-in uses it for encoding the message string.

It is valid for application-initiated requests only.

This parameter can be set using SLAs.

Format
Integer

Value
Value range is **0**–**255**. Some values are restricted. See the SMPP specification for details.

com.bea.wlcp.wlng.plugin.sms.Priority

Description
This parameter defines the mandatory SMPP **priority_flag** parameter.

It is valid for application-initiated requests only.

This parameter can be set using SLAs.

Format
String

Value
Valid values are:
- HIGH; Sets **priority_flag** to **3**.
- LOW; Sets **priority_flag** to **0**.
- DEFAULT; Sets **priority_flag** to **0**.

- UNDEFINED; Sets **priority_flag** to **0**.

originating_address

Description

This parameter defines the originating address of the SMS in the delivery receipt.

When this parameter is used, the SmsMBean's Boolean **forwardXParam** attribute must be set to `true` to make the parameter appear in the SOAP header. By default, **forwardXParam** is `false`. See the **ForwardXParams** field to **SmsMBean** for more information.

This parameter can be set using parameter tunneling.

Format

String

smpp_billing_id

Description

This parameter defines the billing information according to the format in the SMPP Specification 5.1, section 4.8.4.3 titled "billing_identification".

The parameter works with SMPP 5.1 SMSCs, but with not with SMPP 3.4 SMSCs.

The parameter is intended for use with Parlay X 2.1 SMPP.

Format

Hexadecimal String

Table 7–3 describes the format.

Table 7–3 Format for smpp_bliing_id Value

Field	Size (octets)	Type	Description
parameter tag	2	Integer	0x060B
length	2	Integer	Length of value part in octets
value	1 - 1024	Octet String	Bits 7.....0 0XXXXXXX (Reserved)1XXXXXXX (Vendor Specific) The first octet represents the Billing Format tag and indicates the format of the billing information contained in the remaining octets.

If the value is not sent as a hexadecimal string, it is ignored and a warning is logged.

Here is sample code for encoding the string.

```
private String getHexEncodedString(String normalString) {
  byte[] bHexStr = normalString.getBytes();
  String retVal = "";
..String sOctet = null;
  for (int i = 0; i < bHexStr.length; i++) {
    sOctet = Integer.toHexString((int) (bHexStr[i] & 0xFF));
    if (sOctet.length() == 1) {
      sOctet = "0" + sOctet;
    }
```

```
    retVal = retVal.concat(sOctet);
  }
  return retVal.toUpperCase(); }
```

dest_addr_subunit

Description

This parameter defines the **dest_addr_subunit** field in the following SMPP operations:

- **SUBMIT_SM**
- **SUBMIT_MULTI**
- **DATA_SM**

It can be set using parameter tunneling.

Format

Signed Decimal

The decimal value is automatically converted to a hexadecimal string before it is passed to the SMPP **dest_addr_subunit** field.

Value

Value range is **-128** – **+127**.

Example

```
<xparams> <param key="dest_addr_subunit" value="1"/> </xparams>
```

dest_bearer_type

Description

This parameter is used to request the desired bearer for delivery of the message to the destination address.

If the receiving system (the SMSC) does not support the indicated bearer type, it may return a response PDU reporting a failure.

For the formal definition of the parameter and section 4.7.1 for its specification as an optional parameter for the **DATA_SM** operation, see section 5.3.2.5 of the *Short Message Peer to Peer Protocol Specification v3.4* at:

http://docs.nimta.com/SMPP_v3_4_Issue1_2.pdf

This parameter can be set using parameter tunneling.

Format

Unsigned Byte [**0**–**255**]

Value

Valid values are:

- **0x00** = Unknown
- **0x01** = SMS
- **0x02** = Circuit Switched Data (CSD)
- **0x03** = Packet Data
- **0x04** = USSD
- **0x05** = CDPD

- **0x06** = DataTAC
- **0x07** = FLEX/ReFLEX
- **0x08** = Cell Broadcast (cellcast)
- **9** to **255** Reserved

service_type

Description

This parameter indicates the SMS application service associated with the message. Allows the ESME to use enhanced messaging services such as **replace_if_present** and to control the teleservice used on the air interface (for example, ANSI-136/TDMA and IS-95/CDMA).

It is used to support tunneling USSD (3G TS 23.090 version 3.0.0) messages through the SMPP protocol.

For the formal definition of the parameter and the appropriate subsections of section 4 for its specification as a mandatory parameter for **SUBMIT_SM**, **SUBMIT_MULTI**, **DELIVER_SM**, **DATA_SM**, and **CANCEL_SM**, see section 5.2.11 of the *Short Message Peer to Peer Protocol Specification v3.4* at

http://docs.nimta.com/SMPP_v3_4_Issue1_2.pdf.

This parameter can be set using parameter tunneling.

Format

Octet string

Value

The predefined generic service type value for USSD is **USSD**.

ussd_service_operation

Description

This parameter defines the USSD service operation that is required when SMPP is used as an interface to a (GSM) USSD system.

It is used to support tunneling USSD (3G TS 23.090 version 3.0.0) messages through the SMPP protocol.

It is used as an optional parameter to the SMPP **SUBMIT_SM** operation.

This parameter is defined in section 5.3.2.44 of the *Short Message Peer to Peer Protocol Specification v3.4*.

It was added to the **DELIVER_SM** operation in the SMPP 5.1 specification. See *Short Message Peer to Peer Protocol Specification Version 5.1*.

This parameter can be set using parameter tunneling.

Format

Unsigned byte [**0**–**255**]

Value

Valid values are:

- **0** = PSSD indication
- **1** = PSSR indication

- **2** = USSR request
- **3** = USSN request
- **4** to **15** Reserved
- **16** = PSSD response
- **17** = PSSR response
- **18** = USSR confirm
- **19** = USSN confirm
- **20** to **31** Reserved
- **32** to **255** Reserved for vendor-specific USSD operations

its_session_info

Description

This is a required parameter for the CDMA Interactive Teleservice as defined by the Korean PCS carriers [KORITS]. Contains control information for the interactive session between an MS and an ESME.

See section 5.3.2.43 of the *Short Message Peer to Peer Protocol Specification v3.4* for the formal definition of the parameter and the appropriate subsections of section 4 for its specification as an optional parameter for **SUBMIT_SM**, **DELIVER_SM**, and **DATA_SM**.

This parameter is also supported for native SMPP.

This parameter can be set using parameter tunneling.

Format

Unsigned Short (2 bytes) [0–65535] as an octet string

Following is a description of the octet string.

Bits 7.....0

SSSS SSSS (octet 1)

NNNN NNNE (octet 2)

Octet 1 contains the session number (0–255) encoded in binary. The session number remains constant for each session.

Octet 2 encodes the sequence number of the dialog unit (as assigned by the ESME) within the session in bits [7. . . 1].

Bit 0 of octet 2 is the End of Session Indicator, indicating that the message is the end of the conversation session. Valid values for the End of Session Indicator are:

- **0** = End of Session Indicator inactive
- **1** = End of Session Indicator active

smpp_optional_int_tlv_param_tags

Description

An application or interceptor uses this parameter to pass integer data to a plug-in in TagLengthValue (TLV) data units. A TLV data unit consists of a tag/value pair. This

parameter passes a list of comma-separated items that are the tag parts of the data units.

See "smpp_optional_octet_tlv_param_tags" for sending data that is not of type integer.

The **smpp_optional_int_tlv_param_tags** list must have the same number of entries as its corresponding **smpp_optional_int_tlv_param_values** list. See "smpp_optional_int_tlv_param_values".

Within a TLV data unit, the sizes of the **tag** and **length** fields are each 2 bytes. The value of **length** field is always "0x00, 0x04", because integer data is always encoded in 4 bytes.

An example of code to tunnel TLV integer data is:

```
injectXParam(TLV_OPTIONAL_INT_PARAM_TAGS, "5121,5124");
injectXParam(TLV_OPTIONAL_INT_PARAM_VALUES, "999,1234");
```

This parameter can be set using parameter tunneling.

Format

The tag identifiers must be in decimal format. For example, set a tag with the hexadecimal value 0x1401 as 5121.

smpp_optional_int_tlv_param_values

Description

An application or interceptor uses this parameter to pass integer data to a plug-in in TagLengthValue (TLV) data units. A TLV data unit consists of a tag/value pair. This parameter passes a list of comma-separated items that are the value parts of the data units.

See "smpp_optional_octet_tlv_param_values" for sending data that is not of type integer.

The **smpp_optional_int_tlv_param_values** list must have the same number of entries as its corresponding **smpp_optional_int_tlv_param_tags** list. See "smpp_optional_int_tlv_param_tags".

Within a TLV data unit, the sizes of the **tag** and **length** fields are each 2 bytes. The value of **length** field is always "0x00, 0x04", because integer data is always encoded in 4 bytes.

An example of code that tunnels TLV integer data is:

```
injectXParam(TLV_OPTIONAL_INT_PARAM_TAGS, "5121,5124");
injectXParam(TLV_OPTIONAL_INT_PARAM_VALUES, "999,1234");
```

This parameter can be set using parameter tunneling.

smpp_optional_octet_tlv_param_tags

Description

An application or interceptor uses this general-purpose parameter to pass any type of data to a plug-in in TagLengthValue (TLV) data units. A TLV data unit consists of a tag/value pair. This parameter passes a list of comma-separated items that are the tag parts of the data units.

See "smpp_optional_int_tlv_param_tags" for sending integer data.

The **smpp_optional_octet_tlv_param_tags** list must have the same number of entries as its corresponding **smpp_optional_octet_tlv_param_values** list. See "smpp_optional_octet_tlv_param_values".

Within a TLV data unit, the sizes of the **tag** and **length** fields are each 2 bytes. The value of **length** field is the size of the actual data in the **value** field in the corresponding smpp_optional_octet_tlv_param_values parameter.

An example of code that tunnels TLV octet data is:

```
injectXParam(TLV_OPTIONAL_OCTET_PARAM_TAGS, "5121,5124", rctx);
injectXParam(TLV_OPTIONAL_OCTET_PARAM_VALUES, "03e7,04d2", rctx);
private void injectXParam(String name, String value, RequestContext rctx){
  rctx.putXParam(name, value);
```

This parameter can be set using parameter tunneling.

Format

The tag identifiers must be in decimal format. For example, set a tag with the hexadecimal value 0x1401 as 5121.

smpp_optional_octet_tlv_param_values

Description

An application or interceptor uses this general-purpose parameter to pass any type of data to a plug-in in TagLengthValue (TLV) data units. A TLV data unit consists of a tag/value pair. This parameter passes a list of comma-separated items that are the value parts of the data units.

See "smpp_optional_int_tlv_param_values" for sending integer data.

The **smpp_optional_octet_tlv_param_values** list must have the same number of entries as its corresponding **smpp_optional_octet_tlv_param_tags** list. See "smpp_optional_octet_tlv_param_tags".

Within a TLV data unit, the sizes of the **tag** and **length** fields are each 2 bytes. The value of **length** field is the size of the actual data in the **value** field.

An example of code that tunnels TLV octet data is:

```
injectXParam(TLV_OPTIONAL_OCTET_PARAM_TAGS, "5121,5124", rctx);
injectXParam(TLV_OPTIONAL_OCTET_PARAM_VALUES, "03e7,04d2", rctx);
private void injectXParam(String name, String value, RequestContext rctx){
  rctx.putXParam(name, value);
```

This parameter can be set using parameter tunneling.

Format

The tag identifiers must be in decimal format. For example, set a tag with the hexadecimal value 0x1401 as 5121.

com.bea.wlcp.wlng.plugin.sms.smpp.schedule_delivery_time

Description

This parameter specifies the scheduled time at which the message delivery should be first attempted. It defines either the absolute date and time or relative time from the current SMSC time at which delivery of this message will be attempted by the SMSC.

The PDU parameter is **schedule_delivery_time**.

Format

ASCII string specified as **YYMMDDhhmmsstnnp** where:

- **YY**: last two digits of the year, from 00 to 99.
- **MM**: month from 1 to 12.
- **DD**: day from 01 to 31.
- **hh**: hour from 00 to 23.
- **ss**: second from 00 to 59.
- **t**: tenths of a second from 0 to 9.
- **nn**: time differential in 15 minute increments between the local time (as expressed in the first 13 octets) and Universal Time Coordinated (UTC) from 00 to 48.
- **p +**: local time is in 15 minute increments advanced in relation to UTC.
- **p -**: local time is in 15 minute increments retarded in relation to UTC.
- **p R**: local time is relative to the current SMSC time.

sms.validity.period

Description

The validity_period parameter indicates the SMSC expiration time, after which the message should be discarded if not delivered to the destination. It can be defined in absolute time format or relative time format.

The PDU parameter is **validity_period**.

Format

ASCII string specified as **YYMMDDhhmmsstnnp** where:

- **YY**: last two digits of the year, from 00 to 99.
- **MM**: month from 1 to 12.
- **DD**: day from 01 to 31.
- **hh**: hour from 00 to 23.
- **ss**: second from 00 to 59.
- **t**: tenths of a second from 0 to 9.
- **nn**: time differential in 15 minute increments between the local time (as expressed in the first 13 octets) and Universal Time Coordinated (UTC) from 00 to 48.
- **p +**: local time is in 15 minute increments advanced in relation to UTC.
- **p -**: local time is in 15 minute increments retarded in relation to UTC.
- **p R**: local time is relative to the current SMSC time.

Managing Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP

This section describes the properties and workflow for setting up Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP network protocol plug-in instances. These plug-in instances share the same configuration options.

The Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP communication services rely on an SMPP Server Service for connecting to the Small Message Service Center (SMSC).

The SMPP Server Service is also used by the Native SMPP Communication Service. See "Native SMPP" for information on managing client connections using SMPP Server Service.Configuration facilities for the SMPP Server Service are described in detail in the following sections of "Native SMPP":

- Properties for SMPP Server Service
- Reference: Attributes and Operations for SMPP Server Service

Properties for Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP

Table 7–4 lists the technical specifications for the communication service.

Table 7–4 Properties for Parlay X 2.1 Short Messaging/SMPP and EWS Binary SMS/SMPP

Property	Description
Managed object in Administration Console	To manage the object, select *domain_name*, then **OCSG**, then *server_name*. then **Communication Services**, then *plugin_instance_id* in that order.
MBean	Domain=com.bea.wlcp.wlng Name=wlng_nt InstanceName=same as the network protocol *instance_id* assigned when the plug-in instance is created Type=**oracle.ocsg.sms.smpp.management.SmsMBean** Documentation: See the "All Classes" section of *Services Gatekeeper OAM Java API Reference*
Network protocol plug-in service ID	**Plugin_px21_short_messaging_smpp**
Network protocol plug-in instance ID	The ID is assigned when the plug-in instance is created. See "Managing and Configuring the Plug-in Manager" in *Services Gatekeeper System Administrator's Guide*.
Supported Address Scheme	tel
Service type	Sms
Exposes to the service communication layer a Java representation of:	Parlay X 2.1 Short Messaging/SMPP: ■ Parlay X 2.1 Part 4: Short Messaging Extended Web Services Binary SMS/SMPP: ■ Extended Web Services Binary SMS
Interfaces with the network nodes using:	SMPP 3.4
Deployment artifacts	**wlng_nt_sms_px21.ear and wlng_at_sms_px21.ear**

Configuration Workflow for Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP

Following is an outline for configuring the plug-in using the Administration Console or an MBean browser.

1. Create one or more instances of the plug-in service. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in service ID as listed in the "Properties for Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP" section.
2. Using the Administration Console or an MBean browser, select the MBean for the plug-in instance. The MBean display name is the same as the plug-in instance ID given when the plug-in instance was created.
3. Configure the behavior of the plug-in instance. Seethe description about **SmsMBean** in the "All Classes" section of the *Services Gatekeeper Java API Reference* for the list of fields and methods.
4. If desired, configure the **supportBulkRequest** attribute to manage Split and Submit Messaging. See the discussion on attribute: **supportBulkRequest** in *Services Gatekeeper System Administrator's Guide*.
5. If the plug-in uses short code mappings, configure the Short Code Mapper. See the discussion on managing and configuring shortcode mappings in *Services Gatekeeper System Administrator's Guide*.
6. Set up the routing rules to the plug-in instance. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in instance ID and address schemes listed in the "Properties for Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP" section.
7. If required, create and load a node SLA. For details see "Defining Global Node and Service Provider Group Node SLAs and Managing SLAs in *Services Gatekeeper Portal Developer's Guide*.
8. Provision the service provider accounts and application accounts. For information, see *Services Gatekeeper Portal Developer's Guide*.

Management Operations in the SMPP Server Service

The Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP communication services use the SMPP Server Service to establish and manage client connections with the SMSC.

The SMPP Server Service establishes a client connection to the SMSC when the plug-in instance is activated or when the administrator resets the client connection by using the **resetClientConnection** SMPP Server Service operation.

The following Server Service methods to the **SMPPServiceMBean**, described in "Native SMPP" manage client connections:

- **closeClientConnection**
- **listClientConnections**
- **listPluginInstances**
- **resetClientConnection**

For a description of the attributes and operations of the **SmsMBean** and **SMPPServiceMBean**, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

8

Parlay X 3.0 Device Capabilities/LDAPv3

This chapter describes the Oracle Communications Services Gatekeeper Parlay X 3.0 Device Capabilities/Lightweight Directory Access Protocol version 3 (LDAPv3) communication service in detail.

Overview of the Parlay X 3.0 Device Capabilities/LDAPv3 Communication Service

The Device Capabilities/LDAPv3 communication service exposes the Parlay X 3.0 Device Capabilities and Configuration set of application interfaces.

The communication service acts as an LDAP client to a directory service, connecting to the directory service using the LDAPv3.

For the exact version of the standards that the Device Capabilities/LDAPv3 communication service supports for the application-facing interfaces and the network protocols, see *Services Gatekeeper Statement of Compliance*.

The Parlay X 3.0 Device Capabilities/LDAPv3 communication service sends requests to any LDAPv3-compliant directory server with a device's address (usually a phone number), and in return receives one of the following device identifiers:

- The device's unique device ID, device or model name, and a link to the User Agent Profile XML file.
- The device's equipment identifier (for example, its IMEI)

Application Interfaces

For information about the SOAP-based interface for the Parlay X 3.0 Device Capabilities communication service, see the discussion about Parlay X 3.0 Part 18 Device capabilities in *Services Gatekeeper Application Developer's Guide*.

For information about the RESTful Call Notification interface, see the discussion about RESTful device capabilities in *Services Gatekeeper Application Developer's Guide*.

The RESTful Service Call Notification interfaces provide RESTful access to the same functionality as the SOAP-based interfaces. The internal representations are identical, and for the purposes of creating service level agreements (SLAs) and reading charging data records (CDRs), and so on, they are the same.

Events and Statistics

The Parlay X 3.0 Device Capabilities/LDAPv3 communication service generates event data records (EDRs), alarms, and statistics to assist system administrators and developers in monitoring the service.

See "Events, Alarms, and Charging" for more information.

Event Data Records

Table 8–1 lists the IDs of the EDRs created by the Device Capabilities/LDAPv3 communication service. This list does not include EDRs created when exceptions are thrown.

Table 8–1 EDRs Generated by Parlay X 3.0 Device Capabilities/LDAPv3

EDR ID	Method Called
403001	getCapabilities
403002	getDeviceId

Charging Data Records

The Device Capabilities/LDAPv3 communication service does not generate any CDRs by default.

Statistics

Table 8–2 maps methods invoked from either the application or the network to the transaction types collected by the Services Gatekeeper statistics counters.

Table 8–2 Methods and Transaction Types for Parlay X 3.0 Device Capabilities/LDAPv3

Method	Transaction Type
getCapabilities	TRANSACTION_TYPE_OTHER
getDeviceId	TRANSACTION_TYPE_OTHER

Managing Parlay X 3.0 Device Capabilities/LDAPv3

This section describes the properties and workflow for the Parlay X 3.0 Device Capabilities/LDAPv3 plug-in instance.

It also includes a description of how to create an LDAP-to-XML mapping file.

Properties for Parlay X 3.0 Device Capabilities/LDAPv3 Plug-in

Table 8–3 lists the technical specifications for the communication service.

Table 8–3 Properties for Parlay X 3.0 Device Capabilities/LDAPv3

Property	Description
Managed object in Administration Console	To access the object, select *domain_name*, then **OCSG**, then *server_name*, then **Communication Services**, then *plug-in_instance_id*, in that order.

Table 8–3 (Cont.) Properties for Parlay X 3.0 Device Capabilities/LDAPv3

Property	Description
MBean	Domain=oracle.ocsg.plugin.dc.ldap.management Name=wlng_nt_device_capabilities_px30 InstanceName=Device_cap Type=**oracle.ocsg.plugin.dc.ldap.management.DeviceCapabilitiesLdapMBean**
Network protocol plug-in service ID	**Plugin_px30_decvice_capabilities_ldap**
Network protocol plug-in instance ID	The ID is assigned when the plug-in instance is created. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*.
Supported Address Formats	tel, id, imsi, ipv4/ipv6
Application-facing interface	**com.bea.wlcp.wlng.px30.plugin.DeviceCapabilitiesPlugin**
Service type	DeviceCapabilities
Exposes to the service communication layer a Java representation of:	Device Capabilities/LDAP
Interfaces with the network nodes using:	LDAP
Deployment artifact NT EAR wlng_nt_device_capabilities_px30.ear	**px30_device_capabilities.jar** and **Plugin_px30_device_capabilities_ldap.jar**.
Deployment artifact AT EAR: SOAP Only wlng_at_device_capabilities_px30_soap.ear	**Ipx30_device_capabilities.war**
Deployment artifact AT EAR: wlng_at_device_capabilities_px30.ear	**px30_device_capabilities.jar** and **Plugin_px30_device_capabilities_ldap.jar**

Configuration Workflow for Device Capabilities/LDAPv3 Plug-in

Following is an outline for configuring the plug-in using the Administration Console or an MBean browser.

1. Create one or more instances of the plug-in service. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in service ID as listed in the "Properties for Parlay X 3.0 Device Capabilities/LDAPv3 Plug-in" section.
2. Using the Administration Console or an MBean browser, select the MBean for the plug-in instance. The MBean display name is the same as the plug-in instance ID given when the plug-in instance was created.
3. Define the characteristics of the LDAP server to connect to using these attributes:

- Attribute: Port
- Attribute: BaseDN
- Attribute: AuthDN
- Attribute: AuthPassword

4. Using "Attribute: Schema", define the XML schema.

   See "Creating an LDAP-to-XML Mapping File" for a description of the schema and "Configuration Workflow for Device Capabilities/LDAPv3 Plug-in" for a description of the mappings.

5. Define the connection pool characteristics for the connection:
   - Attribute: MinConnections
   - Attribute: MaxConnections
   - Attribute: ConnTimeout
6. Set up the routing rules to the plug-in instance. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in instance ID and address schemes listed in the "Properties for Parlay X 3.0 Device Capabilities/LDAPv3 Plug-in" section.
7. If required, create and load a node SLA. For details see the discussion about defining global node and service provider group node SLAs and managing SLAs in *Services Gatekeeper Accounts and SLAs Guide*.
8. Provision the service provider and application accounts. For information, see *Services Gatekeeper Portal Developer's Guide*.

Creating an LDAP-to-XML Mapping File

You can create multiple Device Capabilities/LDAPv3 plug-in instances, each with a different LDAP configuration. Each plug-in instance could point to a different LDAP tree or even a different LDAP server.

Each Device Capabilities/LDAPv3 plug-in instance routes requests to an LDAP stack (LDAPJDK 4.1). The LDAP library (physical connection) is specified using the **instanceId** field. The LDAP stack is included as a library in the network tier EAR package.

The LDAP library must have the device capabilities (**Name**, **agentProfileRef**, and **deviceId** (IMEI)) stored as attributes in a single LDAP entry indexed by address. You can redirect a plug-in to a different LDAPv3 library by specifying a new Distinguished Name (DN) and schema as long as the device capabilities are all available from a single LDAP entry.

An XSD schema that you create maps the URI format (for example, tel: or imsi:) to an associated query string; this file does not affect the LDAP database.

You need to map the Device Capabilities communication service SOAP request data to an LDAP query string that matches the subscriber information in your LDAP directory. You do this by defining an XML file to map the data and an XSD schema to validate the XML.

Example 8–1 shows a sample LDAP query XSD schema for the sample XML data shown in Example 8–2. This XML file maps the **tel:1234 address** to **msisdn=1234,domainName=msisdnD**. The resulting LDAP query for this example is:

```
(&(msisdn=1234)(objectClass=*))
```

in

`domainName=msisdnD,%Base DN%.`

The Base DN is configured using Attribute: BaseDN.

Example 8–1 LDAP Query XSD

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
<xs:element name="LdapConfig">
<xs:complexType>
<xs:sequence>
<xs:element name="Keys" type="KeySet" minOccurs="1" maxOccurs="unbounded"/>
<xs:element name="LdapObject" type="LdapObject" minOccurs="1"
maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
</xs:element>

<xs:complexType name="KeyObject">
<xs:sequence>
<xs:element name="uriScheme" type="xs:string" minOccurs="1" maxOccurs="1"/>
<xs:element name="addressKeyName" type="xs:string" minOccurs="1" maxOccurs="1"/>
<xs:element name="objectKeyName" type="xs:string" minOccurs="0" maxOccurs="1"/>
<xs:element name="objectKeyValue" type="xs:string" minOccurs="0" maxOccurs="1"/>
</xs:sequence>
<xs:attribute name="id" type="xs:string" use="optional"/>
</xs:complexType>

<xs:complexType name="KeySet">
<xs:sequence>
<xs:element name="Key" type="KeyObject" minOccurs="1" maxOccurs="unbounded"/>
</xs:sequence>
<xs:attribute name="id" type="xs:string" use="required"/>
</xs:complexType>
<xs:complexType name="LdapObject">
<xs:sequence>
<xs:element name="ObjectKeySet" type="xs:string" minOccurs="0" maxOccurs="1"/>
</xs:sequence>
<xs:attribute name="id" type="xs:string" use="required"/>
<xs:attribute name="keyName" type="xs:string" use="required"/>
<xs:attribute name="keyValue" type="xs:string" use="required"/>
</xs:complexType>
</xs:schema>
```

Example 8–2 shows sample XML data that matches the LDAP query XSD file in Example 8–1.

Example 8–2 Sample XML Data

```
<?xml version="1.0" encoding="UTF-8"?>
<LdapConfig xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation='sp_config.xsd'>
    <Keys id="sample">
        <Key>
            <uriScheme>tel</uriScheme>
            <addressKeyName>msisdn</addressKeyName>
            <objectKeyName>domainName</objectKeyName>
            <objectKeyValue>msisdnD</objectKeyValue>
        </Key>
```

```
    </Keys>
  </LdapConfig>
```

You need to create your own LDAP query XSD file to map your LDAP SOAP request elements to your LDAP database elements. The LDAP query XSD file must define the following objects based on their elements, listed in Table 8–4:

- LdapObject: A KeySet holder.
- KeySet: A collection of KeyObjects. Sets of keys are used because there may be several ways to reach a certain node in the tree. One LDAP plug-in instance can be configured with several KeySets and can provide the link between the search key in the Extended Web Services interface and the LDAP tree.
- KeyObject: An entry point to the LDAP tree that provides the link between the search key in the Extended Web Services interface and the LDAP tree.

Table 8–4 LDAP Server Schema

Object	Element	Description
LdapObject	ObjectKeySet	Defines the KeySet through which it can be reached. Refers to the ID attribute of a defined KeySet.
LdapObject	id	The identity of the LdapObject. Can be referenced from other LdapObjects through the ParentObjectId field.
LdapObject	keyName	The name of the key through which the LdapObject can be reached.
LdapObject	keyValue	The value of the key through which the LdapObject can be reached.
KeyObject	uriScheme	Defines the URI scheme of the address for which this key applies.
KeyObject	addressKeyName	Defines the key name with which the address value is associated.
KeyObject	objectKeyName	Provides the possibility of defining the addressing key of a possible tree node above the node that is reached by the address key (that is, like the domain object in the 3DS directory information tree).
KeyObject	objectKeyValue	See objectKeyName. Defines the value of the key.
KeyObject	id	The identity of the key. Used only for descriptive purposes.
KeySet	Key	All keys in the KeySet
KeySet	id	The identity of the KeySet. Used when associating an LdapObject with a KeySet.

Reference: Attributes and Operations for Device Capabilities/LDAPv3

This section describes the attributes and operations for configuration and maintenance:

- Attribute: AuthDN
- Attribute: AuthPassword
- Attribute: BaseDN

Attribute: AuthDN

Scope: Cluster

Format: String

Specifies a Distinguished Name (DN) in the LDAP server.

Use "Operation: apply" to make changes to this attribute take effect.

Example:

```
cn=admin,o=acompany,c=uk
```

Attribute: AuthPassword

Scope: Cluster

Format: String

Specifies the password associated with theAttribute: AuthDN.

Use "Operation: apply" to make changes to this attribute take effect.

Attribute: BaseDN

Scope: Cluster

Format: String

Specifies the base Distinguished Name (DN) for the LDAP database in use.

Use "Operation: apply" to make changes to this attribute take effect.

Example:

```
o=acompany,c=uk
```

Attribute: ConnTimeout

Scope: Cluster

Unit: Seconds

Format: Integer

Specifies the maximum time to wait for an LDAP connection to be established. If the related timer expires, a retry is performed. See "Attribute: recoverTimerInterval" for more information.

Use "Operation: apply" to make changes to this attribute take effect.

Attribute: DeviceIdAttributeName

Scope: Cluster

Format: String

Specifies the **DeviceId** of the target LDAP entry.

Use "Operation: apply" to make changes to this attribute take effect.

Attribute: DeviceNameAttributeName

Scope: Cluster

Format: String

Specifies the **DeviceName** of the target LDAP entry.

Use "Operation: apply" to make changes to this attribute take effect.

Attribute: DeviceProfileURLAttributeName

Scope: Cluster

Format: String

Specifies the **DeviceProfileURL** of the target LDAP entry.

Use "Operation: apply" to make changes to this attribute take effect.

Attribute: Host

Scope: Cluster

Format: String

Specifies the host name or IP address of the LDAP server to connect to.

Use "Operation: apply" to make changes to this attribute take effect.

Examples:

```
myldapserver.mycompany.org
192.168.0.14
```

Attribute: LDAPConnectionStatus

Read-only.

Scope: Local

Unit: Not applicable

Values: **active**, **update_pending**, or **deactive**. Table 8–5 describes each of these values and their implications.

Format: String

Table 8–5 LDAP Server Connection Status

Status	Description
active	The connection is active. The plug-in instance accepts requests.
update_pending	The connection is temporarily unavailable due to an update of the configuration settings. The plug-in instance does not accept requests.
deactive	The connection is inactive. The plug-in instance does not accept requests. Reasons for this entering this state include: ■ Missing or incorrect configuration ■ LDAP server is unreachable ■ Internal errors

Use "Operation: apply" to make changes to this attribute take effect.

Attribute: MaxConnections

Scope: Cluster

Unit: Not applicable

Format: Integer

Specifies the maximum number of connections in the LDAP connection pool.

Use "Operation: apply" to make changes to this attribute take effect.

Attribute: MinConnections

Scope: Cluster

Unit: Not applicable

Format: Integer

Specifies the minimum number of connections to establish using connections from the LDAP connection pool.

Use "Operation: apply" to make changes to this attribute take effect.

Attribute: Port

Scope: Cluster

Unit: Not applicable

Format: Integer

Specifies the port number of the LDAP server to connect to.

Use "Operation: apply" to make changes to this attribute take effect.

Attribute: recoverTimerInterval

Scope: Cluster

Format: Integer

Unit: Seconds

Default Value: 300

Specifies the time to wait before performing an LDAP connection retry after an LDAP connection error. Should be at least twice the time defined in the **ConnTimeout** attribute. See "Attribute: ConnTimeout" for more information.

Use "Operation: apply" to make changes to this attribute take effect.

Attribute: Schema

Scope: Cluster

Unit: Not applicable

Format: String

The LDAP schema to use.

Use "Operation: apply" to make changes to this attribute take effect.

Operation: apply

Scope: Cluster

Applies attribute changes.

Signature:

```
apply()
```

Operation: updateSchemaURL

Scope: Cluster

Format: String

Updates the schema URL to use when performing lookups in the LDAP database.

During the update, the LDAP connection is temporarily unavailable and the connection status is **update_pending**. See Table 8–5 for more information.

Signature:

```
pdateSchemaURL(SchemaURL:String)
```

Table 8–6 explains that the **schemaURL** parameter is the LDAP database schema URL to use.

Table 8–6 updateSchemaURL Parameters

Parameter	Description
SchemaURL	The LDAP database schema URL. Examples: Windows: file:///d:/ldap/schema.xml UNIX: file://ldap/schema.xml

9

Parlay X 3.0 Payment/Diameter

This chapter describes the Oracle Communications Services Gatekeeper Parlay X 3.0 Payment/Diameter communication service in detail.

Overview of the Parlay X 3.0 Payment Communication Service

The Parlay X 3.0 Payment/Diameter communication service exposes the Parlay X 3.0 Payment set of application interfaces.

The communication service acts as a credit control client to a credit control server using the Diameter protocol.

For the exact version of the standards that the Parlay X 3.0 Payment/Diameter communication service supports for the application-facing interfaces and the network protocols, see *Services Gatekeeper Statement of Compliance*.

Using a Payment communication service, an application can:

- Charge and refund accounts directly.
- Operate on reservations, which includes:
  - Make reservations.
  - Charge reservations.
  - Release reservations.
- Charge multiple accounts concurrently.

This communication service uses templates that you use to change the list of Diameter AVPs that Services Gatekeeper sends to a Diameter server. See "Changing the List of Diameter AVPs for Your Implementation" for details on creating templates.

All charging is done on accounts. Accounts can be charged using units of charge (specified as a given currency or a charging code) or by volume of (specified by time or data). See "Amount Charging" and "Volume Based Charging" for details.

Amount Charging

A reservation expires after a given time. An expiration mechanism provided by the Storage Service is used. If the store entry expires, the reservation is cancelled.

Some Diameter servers, for example Oracle Billing and Revenue Management, mandate that a refund operation be correlated with a previous charge operation. The Payment interface does not provide any correlation between charge operations and refund operations. The **session-id** tunneled parameter has been added in order to correlate these requests. When an application calls **chargeAmount**, the tunneled

parameter **session-id** is returned in the SOAP header. An application should use this **session-id** in subsequent **refundAmount** requests to correlate the two requests. If the application does not provided the tunneled parameter, it is the responsibility of the Diameter server to either accept or deny the request. If the request is denied, the application receives a ServiceException. See "session-id" for more information.

Volume Based Charging

Volume-based charging is similar to amount charging. However volume base charging maps to these Diameter AVPs instead of **CC-Money**:

- **CC-Time** (in seconds)
- **CC-Total-Octets** (in bytes)
- **CC-Input-Octets** (in bytes)
- **CC-Output-Octets** (in bytes)
- **CC-Service-Specific-Units**

These AVPs all accept either bytes or seconds (as integers) as input. If your AVPs use something different, you also need to convert the data.

The rating parameters to use are **unit**, **contract**, **service**, or **operation** and they all map to the **Service-Parameter-Info** AVP.

Diameter servers frequently require a specific list of AVPs, or custom AVPs to process correctly, so you will probably have to modify the list of AVPs that Services Gatekeeper sends. You do this using a template file. See "Changing the List of Diameter AVPs for Your Implementation" for instructions.

Credit-control clients may need to request the price (or an estimate) of the service event in advance, and these clients should be able to handle situations where this amount may not be known.

Clients requesting cost information must:

- Set the **CC-Request-Type** AVP to **EVENT_REQUEST**
- Include a **Requested-Action** AVP set to **PRICE_ENQUIRY**, and
- Include the requested service event information in the **Service-Identifier** AVP in the CCR message

Processing Direct Queries/Application-initiated Requests

If an application makes a request to interact directly with an account, Services Gatekeeper sends the request to the network node capable of handling the request. The request does not return until the targeted account has been updated.

Processing Notifications/Network-triggered Requests

There are no notifications or other network-triggered requests for this communications service.

Validating Reservation Requests

The communication service supports the **Granted-Service-Unit Diameter** AVP that Services Gatekeeper sends to the network.

This support enables the plug-in to validate whether the number of units granted is equal to the number of reserved units requested.

After the Credit Control Answer (CCA) has been received, the plug-in checks the CCA for the **Granted-Service-Unit** AVP. If this AVP exists, the plug-in compares the number of granted units to the number of reserved units that were requested in the RSU of the Credit Control Request (CCR).

If the **Granted-Service-Unit** AVP does not exist, the plug-in assumes that the full reservation was granted.

If the **Granted-Service-Unit** value is less than the number of requested units, the plug-in performs the following actions:

- Raises the RESERVATION_NOT_GRANTED_ERROR exception (error id="000005") to notify the client that the reservation failed.
- Releases the reservation by sending a termination Credit Control Request (CCR). This CCR may or may not contain the Used-Service-Unit (USU) field, depending on whether the client has called **chargeReservation** since the last reservation.

Application Interfaces

For information about the SOAP-based interface for the Parlay X 3.0 Payment communication service, see the discussion of Parlay X 3.0 Interfaces in *Services Gatekeeper Application Developer's Guide*.

For information about the RESTful Call Notification interface, see the discussion about RESTful payment interface in *Services Gatekeeper Application Developer's Guide*.

The RESTful Service Call Notification interfaces provide RESTful access to the same functionality as the SOAP-based interfaces. The internal representations are identical, and for the purposes of creating service level agreements (SLAs) and reading charging data records (CDRs), and so on, they are the same.

Changing the List of Diameter AVPs for Your Implementation

Diameter servers vary quite a bit in their messaging requirements. You probably need to change the list of AVPs that Services Gatekeeper sends to a Diameter server to make it acceptable to that server.

You have these options for adding AVPs to your implementation:

- By adding new AVP definitions to AVP template files that you create, than loading the template files into Services Gatekeeper. This is the best method for major changes to your AVP list, and is probably most appropriate for the changes you make for the initial configuration of Services Gatekeeper. You must stop and restart Gatekeeper to make the changes take effect. See "About the AVP Template Files" for information on creating template files, and "Adding New AVPs for Diameter Payment in Template Files" for details on loading new AVPs into Services Gatekeeper.
- By adding new AVP definitions to the default AVP template file. You add AVPs to the default template file and restart Services Gatekeeper. This is probably the best method for initial testing of Services Gatekeeper. You only alter one file, but you still need to restart Services Gatekeeper. Follow the instructions in "Adding New AVPs for Diameter Payment in Template Files" but instead of creating template files just make changes to **defaultavptemplate.xml** file provided.

- By using JMX operations to add new AVP definitions during runtime. This allows you to make changes to existing AVP template files without interrupting traffic or having to stop and restart Services Gatekeeper. This is most appropriate for changes to a running implementation. See "Adding Diameter AVPs to a Template File During Runtime" for details.

Changes to template files also require XSD changes.

About the AVP Template Files

You can create separate templates for each of these operations:

- **com.bea.wlcp.wlng.px30.plugin.VolumeChargingPlugin. chargeVolume**
- **com.bea.wlcp.wlng.px30.plugin.VolumeChargingPlugin. chargeSplitVolume**
- **com.bea.wlcp.wlng.px30.plugin.VolumeChargingPlugin. getAmount**
- **com.bea.wlcp.wlng.px30.plugin.VolumeChargingPlugin. refundVolume**
- **com.bea.wlcp.wlng.px30.plugin.ReserveVolumeChargingPlugin. getAmount**
- **com.bea.wlcp.wlng.px30.plugin.ReserveVolumeChargingPlugin. reserveVolume**
- **com.bea.wlcp.wlng.px30.plugin.ReserveVolumeChargingPlugin. reserveAdditionalVolume**
- **com.bea.wlcp.wlng.px30.plugin.ReserveVolumeChargingPlugin. releaseReservation**

Each template can have three separate variations, one each for each of the **time** or **octet** data format, and a third if you use a custom data format. For example, the **chargeVolume** operation can have these templates:

- **com.bea.wlcp.wlng.px30.plugin.VolumeChargingPlugin.chargeVolumeTime**
- **com.bea.wlcp.wlng.px30.plugin.VolumeChargingPlugin.chargeVolumeTime**
- **com.bea.wlcp.wlng.px30.plugin.VolumeChargingPlugin.chargeVolumeCustom**

Adding New AVPs for Diameter Payment in Template Files

If your implementation requires multiple template files, follow the steps in this section to add them.

You must know the name, code number, and data type of each AVP to add before starting this procedure.

> **Tip:** For testing or for minor AVP additions you can simply edit and use the example template file (defaultavptemplate.xml) instead of creating new template files.

To add new AVPs to your Services Gatekeeper implementation:

1. Navigate to OCSB_home**ocsg_6.0\applications**.
2. Unpackage the **Plugin_px30_payment_diameter.ear** file.
3. Unpackage the **Plugin_px30_payment_diameter.jar** file.
4. Navigate to the **/xml** directory you just unpacked.
5. Add an **avpAttributeDefinitions** element for each new AVP to the avp-attribute.xml file.

6. Make a copy of the **defaultavptemplate.xml** template file to work on. See "About the AVP Template Files" for details on what to name template files.
7. Create a new **avpTemplate** element in your new template file for each new AVP.
8. Repeat step 6 and 7 for each template file you are creating.
9. Navigate to the xsd directory (**../xsd**).
10. Add an element for each new AVP to the **diameterAvp.xsd** file.

    An example XSD file **paymentConfig.xsd** is provided.
11. Update the **Plugin_px30_payment_diameter.jar** file to save your changes.
12. Update the **wlng_nt_payment_px30.ear** file to make your changes take effect.
13. Restart Services Gatekeeper.

Adding Diameter AVPs to a Template File During Runtime

The instructions in this section allow you to add AVPs to existing template files. Before you follow the instructions in this section you must decide on a template file to change. See "About the AVP Template Files" for details on the template files.

To add AVPs without interrupting traffic or having to restart Services Gatekeeper using JMX operations:

1. Navigate to OCSB_home**ocsg_6.0\applications**.
2. Unpackage the **Plugin_px30_payment_diameter.ear** file.
3. Unpackage the **Plugin_px30_payment_diameter.jar** file.
4. Navigate to the **/xml** directory you just unpacked.
5. Add your AVP changes to the **defaultavpTemplate.xml** file.
6. Open Service Gatekeeper in the Platform Test Environment (PTE) or anther MBean browser.
7. Navigate to navigate to **wlng**, then **AccountService** then **ServiceLevelAgreementMBean**, then to the **setupCustomSlaXSDDefinition** operation.
8. In the **SlaType**: field enter **payment_diameter_avp**.
9. In the **FileContent:** field select the **Load the contents of a file** icon.

    Select the **xml/paymentConfig.xsd** file to add.
10. Click **Record** to make your changes take effect.
11. Navigate to **wlng**, **AccountService**, then **ServiceLevelAgreementMBean**.
12. Select one of these operations:
    - **loadGlobalSlaByType**
    - **loadServiceProviderGroupSlaByType**
    - **loadApplicationGroupSlaByType**
13. In the **SlaType:** field enter payment_diameter_avp.
14. In the **FileContent:** field, enter **defaultavptemplate.xml**.
15. Click **Record** to make your changes take effect.

Forwarding AVPs as Xparams from the Charging Server to the Application

You use the **IncludeXParamAVPListInResponse** to the **PaymentMBean** to forward AVPs from your charging server to an application in a response message. The AVPs are forwarded as Xparams.

If this attribute is set to TRUE, the AVP-list in the response message from the charging server to the application is forwarded as an xparam. The xparam key name is AVP_LIST and the list of key value pairs is encoded into an XML string. For example:

```
<Avp-List>
     <Session-Id Flags="64">192.168.1.22;1417686781;1</Session-Id>
     <Origin-Host Flags="64">127.0.0.1</Origin-Host>
     <Origin-Realm Flags="64">destination.com</Origin-Realm>
     <Result-Code Flags="64">2001</Result-Code>
     <CC-Request-Type Flags="64">4</CC-Request-Type>
     <CC-Request-Number Flags="64">0</CC-Request-Number>
 </Avp-List>
```

See **PaymentMBean** in the "All Classes" section of OAM Java API Reference for details.

Events and Statistics

The Parlay X 3.0 Payment/Diameter communication service generates event data records (EDRs), charging data records (CDRs), alarms, and statistics to assist system administrators and developers in monitoring the service.

See "Events, Alarms, and Charging" for more information.

Event Data Records

Table 9–1 lists EDR IDs created by the Payment/Diameter communication service.

Table 9–1 EDRs Generated by Parlay X 3.0 Payment/Diameter

EDR ID	Interface	Method Called
15001	com.bea.wlcp.wlng.plugin.payment.diameter.north.AmountChargingPluginNorth	**chargeAmount**
15002	com.bea.wlcp.wlng.plugin.payment.diameter.north.AmountChargingPluginNorth	**refundAmount**
15003	com.bea.wlcp.wlng.plugin.payment.diameter.north.AmountChargingPluginNorth	**chargeSplitAmount**
15004	com.bea.wlcp.wlng.plugin.payment.diameter.north.ReserveAmountChargingPluginNorth	**reserveAmount**
15005	com.bea.wlcp.wlng.plugin.payment.diameter.north.ReserveAmountChargingPluginNorth	**reserveAdditionalAmount**
15006	com.bea.wlcp.wlng.plugin.payment.diameter.north.ReserveAmountChargingPluginNorth	**chargeReservation**
15007	com.bea.wlcp.wlng.plugin.payment.diameter.north.ReserveAmountChargingPluginNorth	**releaseReservation**
15013	oracle.ocsg.plugin.payment.north.VolumeChargingPluginNorth	**chargeVolume**
15014	oracle.ocsg.plugin.payment.north.VolumeChargingPluginNorth	**chargeSplitVolume**

Table 9–1 (Cont.) EDRs Generated by Parlay X 3.0 Payment/Diameter

EDR ID	Interface	Method Called
15015	oracle.ocsg.plugin.payment.north.VolumeChargingPluginNorth	**getAmount**
15016	oracle.ocsg.plugin.payment.north.VolumeChargingPluginNorth	**refundVolume**
15017	oracle.ocsg.plugin.payment.north.ReserveVolumeChargingPluginNorth	**getAmount**
15018	oracle.ocsg.plugin.payment.north.ReserveVolumeChargingPluginNorth	**reserveVolume**
15019	oracle.ocsg.plugin.payment.north.ReserveVolumeChargingPluginNorth	**reserveAdditionalVolume**
15020	oracle.ocsg.plugin.payment.north.ReserveVolumeChargingPluginNorth	**chargeReservation**
15021	oracle.ocsg.plugin.payment.north.ReserveVolumeChargingPluginNorth	**releaseReservation**

Statistics

Table 9–2 maps methods invoked from either the application or the network to the transaction types collected by the Services Gatekeeper statistics counter.

Table 9–2 Methods and Transaction Types for Parlay X 3.0 Payment/Diameter

Method	Interface	Transaction type
chargeAmount	**com.bea.wlcp.wlng.px30.plugin.AmountChargingPlugin**	TRANSACTION_TYPE_CHARGING_DIRECT
chargeSplitAmount	**com.bea.wlcp.wlng.px30.plugin.AmountChargingPlugin**	TRANSACTION_TYPE_CHARGING_DIRECT
refundAmount	**com.bea.wlcp.wlng.px30.plugin.AmountChargingPlugin**	TRANSACTION_TYPE_CHARGING_DIRECT
reserveAmount	**com.bea.wlcp.wlng.px30.plugin.ReserveAmountChargingPlugin**	TRANSACTION_TYPE_CHARGING_RESERVED
reserveAdditionalAmount	**com.bea.wlcp.wlng.px30.plugin.ReserveAmountChargingPlugin**	TRANSACTION_TYPE_CHARGING_RESERVED
chargeReservation	com.bea.wlcp.wlng.px30.plugin.ReserveAmountChargingPlugin	TRANSACTION_TYPE_CHARGING_RESERVED
chargeVolume	**com.bea.wlcp.wlng.px30.plugin.VolumeChargingPlugin**	TRANSACTION_TYPE_CHARGING_DIRECT
chargeSplitVolume	**com.bea.wlcp.wlng.px30.plugin.VolumeChargingPlugin**	TRANSACTION_TYPE_CHARGING_DIRECT
refundVolume	**com.bea.wlcp.wlng.px30.plugin.VolumeChargingPlugin**	TRANSACTION_TYPE_CHARGING_DIRECT
reserveVolume	**com.bea.wlcp.wlng.px30.plugin.ReserveVolumeChargingPlugin**	TRANSACTION_TYPE_CHARGING_RESERVED_STRING
reserveAdditionalVolume	**com.bea.wlcp.wlng.px30.plugin.ReserveVolumeChargingPlugin**	TRANSACTION_TYPE_CHARGING_RESERVED_STRING

Table 9–2 (Cont.) Methods and Transaction Types for Parlay X 3.0 Payment/Diameter

Method	Interface	Transaction type
chargeReservation	**com.bea.wlcp.wlng.px30.plugin.ReserveVolumeChargingPlugin**	TRANSACTION_TYPE_CHARGING_RESERVED_STRING

Tunneled Parameters for Parlay X 3.0 Payment / Diameter

This section lists the parameters that can be tunneled.

session-id

Description

Correlates a **refundAmount** operation with a **chargeAmount** operation.

Some billing systems, including Oracle Billing and Revenue Management, allow refund operations only on previously charged amounts. Parlay X does not have the ability to correlate charge and refund operations. This parameter provides that functionality.

The key and the value are available in the return message from a **chargeAmount** operation. It is the responsibility of the application to provide the key and the value in subsequent **refundAmount** operations to correlate the two.

If no session-id is provided in the request to the Diameter node, the Diameter node can either accept or deny the request. If the node denies the request, a ServiceException is sent back to the application.

Format

String

Example

This is an example in a SOAP header:

```
<xparams> <param key=" session-id value="12233187769"/>  </xparams>
```

Managing Parlay X 3.0 Payment /Diameter

This section describes the properties and workflow for the Parlay X 3.0 Payment/Diameter plug-in instance.

Properties for Parlay X 3.0 Payment/Diameter

Table 9–3 lists the technical specifications for the communication service.

Table 9–3 Properties for Parlay X 3.0 Payment/Diameter

Property	Description
Managed object in Administration Console	To access the object, select *domain_name*, then **OCSG**, then *server_name*, then **Communication Services**, then *plugin_instance_id*, in that order.

Table 9–3 (Cont.) Properties for Parlay X 3.0 Payment/Diameter

Property	Description
MBean	Domain=com.bea.wlcp.wlng Name=wlng_nt InstanceName=same as the network protocol *instance_id* assigned when the plug-in instance is created Type=**com.bea.wlcp.wlng.plugin.payment.diameter.management.PaymentMBean** Documentation: See the "All Classes" section of *Services Gatekeeper OAM Java API Reference*
Network protocol plug-in service ID	Plugin_px30_payment_diameter
Network protocol plug-in instance ID	The ID is assigned when the plug-in instance is created. See "Managing and Configuring the Plug-in Manager" in *Services Gatekeeper System Administrator's Guide*.
Supported Address Scheme	tel
Application-facing interfaces	**com.bea.wlcp.wlng.px30.plugin.AmountChargingPlugin** **com.bea.wlcp.wlng.px30.plugin.ReserveAmountChargingPlugin**
Service type	Payment
Exposes to the service communication layer a Java representation of:	Parlay X 3.0 Part 6: Payment
Interfaces with the network nodes using:	Diameter RFC3588 and RFC 4006
Deployment artifact NT EAR wlng_nt_payment_px30.ear	**Plugin_px30_payment_diameter.jar and px30_payment_service.jar**
Deployment artifact AT EAR: Normal wlng_at_payment_px30.ear	**rest_payment.war and px30_payment.war**
Deployment artifact AT EAR: SOAP Only wlng_at_payment_px30_soap.ear	**px30_payment.war**

Configuration Workflow for Parlay X 3.0 Payment/Diameter

Following is an outline for configuring the plug-in using the Administration Console or an MBean browser.

1. Create one or more instances of the plug-in service. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in service ID as listed in the "Properties for Parlay X 3.0 Payment/Diameter" section.

2. Add any additional or custom AVPs that your Diameter server requires. See "Changing the List of Diameter AVPs for Your Implementation" for instructions.
3. Using the Administration Console or an MBean browser, select the MBean for the plug-in instance. The MBean display name is the same as the plug-in instance ID given when the plug-in instance was created.
4. Configure the behavior of the plug-in instance using the **PaymentMBean** fields
5. Use the **PaymentMBean connect()** method to connect to the Diameter server.
6. Set up the routing rules to the plug-in instance. See the discussions about configuring and managing the plug-in manager in “Configuring and Managing Communication Service Traffic” in*Services Gatekeeper System Administrator’s Guide*. Use the plug-in instance ID and address schemes listed in the "Properties for Parlay X 3.0 Payment/Diameter" section.
7. If required, create and load a node SLA. For details see the discussion on defining global node and service provider group node SLAs and managing SLAs in *Services Gatekeeper Accounts and SLAs Guide*.
8. Provision the service provider accounts and application accounts. For information, see *Services Gatekeeper Portal Developer’s Guide*.

Provisioning Workflow for Parlay X 3.0 Payment/Diameter

The Parlay X 3.0 Payment/Diameter plug-in instance can be explicitly connected to the Diameter server. It does not connect to the server by default. The service has a connection status that will be preserved after service redeployment and server restart.

Use the connect and disconnect operations to **PaymentMBean**.

Use the **SplitChargeEnabled** field to **PaymentMBean** after any changes to the configuration attributes. Changes does not take affect until this operation is invoked.

For a description of the attributes and operations of the **PaymentMbean** MBean, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

10

Parlay X 3.0 Address List Management Interface

This chapter describes the Oracle Communications Services Gatekeeper Parlay X 3.0 Address List Management interface in detail.

Overview of the Parlay X 3.0 Address List Management Interface

Use the Services Gatekeeper Address List Management plug-in interface to create and manage groups of resource owners and to associate them with group Uniform Resource Identifiers (URIs). Group URIs can be used to authenticate requests on behalf of group members.

The Address List Management plug-in is exposed northbound through SOAP or REST using the using the Parlay X 3.0 Part 13 Address List Management interface. It allows applications to create, read, update, and delete group URIs, and to manage group URI membership. The plug-in also exposes an internal API which allows other communication services to identify and expand group URIs using the Parlay X 3.0 SOAP interface. Group URIs can be used in place of individual URIs by the both OneAPI and ParlayX MMS, SMS and Terminal Location communication services.

Group URIs are required by the SMS, MMS, and Location APIs that require authorization from multiple resource owners. For example, a parent, who is the primary subscriber in a family plan, would like to track family members using a location-based application which makes use of the Address List Management plug-in. The parent authorizes location tracking on behalf of family members. The application creates a group owner which issues an authorization grant on behalf of the resource owner members that are part of the group URI. It passes multiple resource owner addresses to the **getGroupLocation** method of the Location API to retrieve location information.

Address List Management Architecture

Address List Management interface SOAP requests are received at the Services Gatekeeper Access tier and passed to the Network tier. They are translated into EJB requests and passed to the Address List plug-in. The plug-in uses store services to access the Services Gatekeeper database when handling requests.

The Address List Management interface is grouped into the following functions:

- GroupManagement
- Group
- Member

Group URI Format

Group URIs are consistent with the style defined in RFC 2396 and are in the following format:

scheme:dept1234@mydivision.mycompany.myserviceprovider.com

Here are some examples:

```
sip:salesteam@sales.acme.anytelco.com
```

```
mailto:fieldservice@somecity.anytelco.com
```

```
group:mailroom@mybuilding.acme.anytelco.com
```

Managing Groups

Create, query and delete address list groups using the following GroupManagement API calls:

- Operation: createGroup
- Operation: queryGroups
- "Operation: deleteGroup"

Controlling Group Access

Set and query group access attributes, which assign group management permissions to group members, using the following GroupManagement API calls:

- Operation: setAccess
- Operation: queryAccess

Managing and Querying Group Members

Manage group members using the following Group API calls:

- Operation: addMember
- Operation: addMembers
- Operation: queryMembers
- Operation: deleteMember
- Operation: queryMembers

Manage individual group member attributes using the following Member API calls:

- Operation: addMemberAttribute
- Operation: queryMemberAttributes
- Operation: deleteMemberAttribute

Managing and Querying Group Attributes

Group attributes apply to the address list group itself. Add, query, and delete group attributes using the following Group API calls:

- Operation: addGroupAttribute
- Operation: queryGroupAttribute
- Operation: deleteGroupAttribute

Managing and Querying Group Member Attributes

Group member attributes apply to individual members of a group. Add, query, and delete group member attributes using the following Group API calls:

- Operation: addGroupMemberAttribute
- Operation: queryGroupMemberAttributes
- Operation: deleteGroupMemberAttribute

Application Interfaces

For information about the SOAP-based interface for the Parlay X 3.0 Address List Management communication service, see the discussion about Parlay X 3.0 Part 13: Address List Management in *Services Gatekeeper Application Developer's Guide*.

Events and Statistics

The Parlay X 3.0 Address List Management Architecture generates event data records (EDRs), charging data records (CDRs), alarms, and statistics to assist system administrators and developers in monitoring the service.

See "Events, Alarms, and Charging" for more information.

Event Data Records

Table 10–1 lists IDs of the EDRs created by the Parlay X 3.0 Address List Management Architecture. This does not include EDRs created when exceptions are thrown.

Table 10–1 EDRs Generated by Parlay X 3.0 Address List Management Architecture

EDR ID	Method Called
28001	createGroup
28002	deleteGroup
28003	queryGroups
28004	setAccess
28005	queryAccess
28006	addGroupAttribute
28007	addGroupMemberAttribute
28008	addMember
28009	addMembers
28010	deleteGroupAttribute
28011	deleteGroupMemberAttribute
28012	deleteMember
28013	deleteMembers
28014	queryGroupAttributes
28015	queryGroupMemberAttributes
28016	queryMembers
28017	addMemberAttribute

Table 10–1 (Cont.) EDRs Generated by Parlay X 3.0 Address List Management

EDR ID	Method Called
28018	deleteMemberAttribute
28019	queryMemberAttributes

Alarms

For the list of alarms, see *Services Gatekeeper Alarms Handling Guide*.

Managing Parlay X 3.0 Address List Management Architecture

This section describes properties and workflows for the Parlay X 3.0Address List Management Architecture plug-in instance.

Properties for Parlay X 3.0 Address List Management Architecture

Table 10–2 lists the technical specifications for the communication service.

Table 10–2 Properties for Parlay X 3.0 Address List Management Architecture

Property	Description
Managed object in Administration Console	To access the object, select *domain_name*, then **OCSG**, *server_name*, **Communication Services**, then **Plugin_px30_address_list#6.0**, in that order.
MBean	Domain=com.bea.wlcp.wlng Name=wlng_nt InstanceName=Plugin_px30_address_list Type=**oracle.ocsg.plugin.al.px30.management.GroupMBeanImpl**
Network protocol plug-in service ID	**Plugin_px30_address_list**
Network protocol plug-in instance ID	Plugin_px30_address_list
Supported Address Scheme	tel
Application-facing interface	**com.bea.wlcp.wlng.px30.plugin.ThirdPartyCallPlugin**
Service type	AddressList
Exposes to the service communication layer a Java representation of:	Parlay X 3.0 Part 13: Address List
Interfaces with the network nodes using:	Open Service Access (OSA); Application Programming Interface (API); *Part 4: Call Control SCF; Subpart 7: MultiParty Call Control Service*
Deployment artifacts	**Plugin_px30_address_list.jar** packaged in **wlng_at_address_list_px30.ear** **Plugin_px30_address_list.jar** packaged in **wlng_nt_address_list_px30.ear**

This plug-in service does not support multiple instantiation using the Plug-in Manager. There is a one-to-one mapping between the plug-in service and the plug-in instance. The plug-in instance is created when the plug-in service is started.

Configuration Workflow for Parlay X 3.0 Address List Management Architecture

The following procedure provides an outline to configure the Address List Management plug-in using the Administration Console or an MBean browser.

1. Select the MBean detailed in "Properties for Parlay X 3.0 Address List Management Architecture".
2. Configure the plug-in instance attributes:
   - Attribute: GroupNameMaxLength
   - Attribute: GroupSize
3. Set up the routing rules to the plug-in instance. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in instance ID and address schemes detailed in the "Properties for Parlay X 3.0 Address List Management Architecture" section.
4. If required, create and load a node SLA. For details see the discussion on defining global node and service provider group node SLAs and managing SLAs in *Services Gatekeeper Accounts and SLAs Guide*.
5. Provision the service provider accounts and application accounts. For information, see *Services Gatekeeper Portal Developer's Guide*.

Reference: Attributes and Operations for Parlay X 3.0 Address List Management Architecture

This section describes the attributes and operations for configuration and maintenance:

- Attribute: GroupNameMaxLength
- Attribute: GroupSize
- Operation: createGroup
- Operation: queryGroups
- Operation: deleteGroup
- Operation: setAccess
- Operation: queryAccess
- Operation: addMember
- Operation: addMembers
- Operation: queryMembers
- Operation: deleteMember
- Operation: deleteMembers
- Operation: addGroupAttribute
- Operation: queryGroupAttribute
- Operation: deleteGroupAttribute

Attribute: GroupNameMaxLength

Scope: Cluster

Unit: Not applicable

Format: Integer

Indicates the maximum length of an address list group name.

Valid values are **0–255**. The default value is 100.

Attribute: GroupSize

Scope: Cluster

Unit: Not applicable

Format: Integer

Indicates the maximum number of members in an address list group.

Valid values are **0–65535**. The default value is 50.

Operation: createGroup

Scope: Cluster

Creates an Address List Management group.

Signature:

```
createGroup(name: String, domain: String)
```

Table 10–3 createGroup Parameters

Parameter	Description
name	Name of the Address List Management group to create.
domain	Domain the group should be created under.

Operation: queryGroups

Scope: Cluster

Queries an Address List Management group to return details about a particular group attribute, which is specified by attributeName.

Signature:

```
queryGroups(group: String, member: String, attributeName, String)
```

Table 10–4 queryGroups Parameters

Parameter	Description
group	Name of the Address List Management group.
member	Member of the Address List Management group.
attributeName	Attribute for which details will be returned.

Operation: deleteGroup

Scope: Cluster

Deletes the specified Address List Management group.

Signature:

```
deleteGroup(group: String)
```

Table 10–5 deleteGroup Parameters

Parameter	Description
group	Name of the Address List Management group to be deleted.

Operation: setAccess

Scope: Cluster

Sets access permissions for a member of an Address List Management group. The access permissions control which group management functions the specified member is allowed to perform on the specified group.

Signature:

```
setAccess(group: String, requester: String, addPermission: Boolean,
adminPermission: Boolean, deletePermission: Boolean, queryPermissions: Boolean)
```

Table 10–6 setAccess Parameters

Parameter	Description
group	Name of the Address List Management group.
requester	Member of the Address List Management group for which you want to set permissions.
addPermission	If true, sets the permission for the requester to be able to add members to the group.
adminPermission	If true, sets the permission for the requester to be able to modify the access permissions of members to the group.
deletePermission	If true, sets the permission for the requester to be able to delete members from the group.
queryPermission	If true, sets the permission for the requester to be able to query the group and member attributes.

Operation: queryAccess

Scope: Cluster

Queries the access permissions set for the group member passed in the requester parameter.

Return:

Returns the list of access permissions for the group member passed in the requester parameter.

Signature:

```
Function(correlator: String)
```

Table 10–7 queryAccess Parameters

Parameter	Description
group	Name of the Address List Management group.
requester	Member of the Address List Management group.

Operation: addMember

Scope: Cluster

Adds a single member to an Address List Management group.

Signature:

```
addMember(group: String, member: String)
```

Table 10–8 addMember Parameters

Parameter	Description
group	Name of the Address List Management group to which to add the member.
member	Member to add to the group.

Operation: addMembers

Scope: Cluster

Adds multiple members to an Address List Management group.

Signature:

```
addMember(group: String, member1: String, [member2: String,...memberN: String])
```

Table 10–9 addMembers Parameters

Parameter	Description
group	Name of the Address List Management group to which to add the members.
member[1...unbounded]	Member(s) to add to the group.

Operation: queryMembers

Scope: Cluster

Queries an Address List Management group to obtain a list of its members.

Signature:

```
queryMembers(group: String)
```

Table 10–10 queryMembers Parameters

Parameter	Description
group	Name of the Address List Management group from which to retrieve a list of members.

Operation: deleteMember

Scope: Cluster

Deletes a single member from an Address List Management group.

Signature:

```
deleteMember(group: String, member: String)
```

Table 10–11 deleteMember Parameters

Parameter	Description
group	Name of the Address List Management group from which to delete the member.
member	Member to delete from the group.

Operation: deleteMembers

Scope: Cluster

Deletes multiple members from an Address List Management group.

Signature:

```
addMember(group: String, member1: String, [member2: String, memberN: String])
```

Table 10–12 deleteMembers Parameters

Parameter	Description
group	Name of the Address List Management group from which to delete member
members[1...unbounded]	Member(s) to remove from the group.

Operation: addGroupAttribute

Scope: Cluster

Adds an attribute to an Address List Management group.

Signature:

```
addGroupAttribute(group: String, name: String, type: String, value: String,
status: Enum)
```

Table 10–13 addGroupAttribute Parameters

Parameter	Description
group	Name of the Address List Management group.
name	Name of the attribute to be added.
type	Data type of the attribute to be added.
value	Value of the attribute.

Table 10–13 (Cont.) addGroupAttribute Parameters

Parameter	Description
status	Attribute status: Valid, Unknown, or Denied.

Operation: queryGroupAttribute

Scope: Cluster

Queries an Address List Management group for the value associated with the passed attribute name. The attribute's value and status are returned.

Signature:

```
queryGroupAttribute(group: String,attributeName: String))
```

Table 10–14 queryGroupAttribute Parameters

Parameter	Description
group	Name of the Address List Management group.
attributeName	Name of the attribute to be queried.

Operation: deleteGroupAttribute

Scope: Cluster

Deletes an attribute from an Address List Management group.

Signature:

```
deleteGroupAttribute(group: String, attributeName: String))
```

Table 10–15 deleteGroupAttribute Parameters

Parameter	Description
group	Name of the Address List Management group.
attributeName	Name of the attribute to be deleted.

Operation: addGroupMemberAttribute

Scope: Cluster

Adds an attribute to a member of a particular Address List Management group.

Signature:

```
addGroupMemberAttribute(group: String, member: String, name: String, type: String,
value: String, status: Enum)
```

Table 10–16 addGroupMemberAttribute Parameters

Parameter	Description
group	Name of the Address List Management group.
member	Name of the member to which the attribute is to be added.
name	Name of the attribute to be added.
type	Data type of the attribute to be added.
value	Value of the attribute.
status	Attribute status: Valid, Unknown, or Denied.

Operation: queryGroupMemberAttributes

Scope: Cluster

Queries a member of an Address List Management group for list of attributes attached to the member. To retrieve the value of a particular attribute, use queryMemberAttribute.

Signature:

```
queryGroupMemberAttributes(group: String, member: String))
```

Table 10–17 queryGroupMemberAttributes Parameters

Parameter	Description
group	Name of the Address List Management group.
member	Name of the member from which to retrieve attributes.

Operation: deleteGroupMemberAttribute

Scope: Cluster

Deletes an attribute from a member of a particular Address List Management group.

Signature:

```
deleteGroupMemberAttribute(group: String, member: String, attributeName: String))
```

Table 10–18 deleteGroupMemberAttribute Parameters

Parameter	Description
group	Name of the Address List Management group.
member	Name of the member from which to delete an attribute.
attributeName	Name of the attribute to be deleted.

Operation: addMemberAttribute

Scope: Cluster

Adds an attribute to a member outside of the context of a particular Address List Management group.

Signature:

```
addMemberAttribute(group: String, member: String, name: String, type: String,
value: String, status: Enum)
```

Table 10–19 addMemberAttribute Parameters

Parameter	Description
member	Name of the member to which the attribute is to be added.
name	Name of the attribute to be added.
type	Data type of the attribute to be added.
value	Value of the attribute.
status	Attribute status: Valid, Unknown, or Denied.

Operation: queryMemberAttributes

Scope: Cluster

Queries a list of attributes for a member and retrieves their values.

Signature:

```
queryMemberAttributes(member: String, attributeName1: String, [attributeName2:
String, attributeNameN: String]))
```

Table 10–20 queryMemberAttributes Parameters

Parameter	Description
member	Name of the member from which to retrieve attributes.
attributeNames[1...unbounded]	Names of the attributes to be retrieved.

Operation: deleteMemberAttribute

Scope: Cluster

Deletes an attribute from a member.

Signature:

```
deleteMemberAttribute(member: String, attributeName: String))
```

Table 10–21 deleteMemberAttribute Parameters

Parameter	Description
member	Name of the member from which to delete an attribute.
attributeName	Name of the attribute to be deleted.

11

Parlay X 4.0 Application-Driven Quality of Service/Diameter

This chapter describes the Oracle Communications Services Gatekeeper Parlay X 4.0 Application-Driven Quality of Service (QoS)/Diameter communication service, used by SOAP-based applications to request QoS changes to subscriber connections. See *Services Gatekeeper Application Developer's Guide* for information about the SOAP interface.

See "Extended Web Services Quality of Service /Diameter" for information on the REST-based QoS communication service.

Overview of the Parlay X 4.0 Application-Driven Quality of Service (QoS)/Diameter Communication Service

This communication service enables applications to dynamically change the quality of service available to subscriber network connections. It does this by requesting that predefined QoS feature profiles be applied to the connection.

The Parlay X 4.0 Application-Driven Quality of Service (QoS)/Diameter communication service provides SOAP-based applications with the ability to request QoS level changes for a subscriber connection. This communication service exposes the Parlay X 4.0 set of interfaces for application-driven QoS (Part 17). It uses the standard SOAP interfaces to communicate with web applications, and translates the SOAP traffic to Diameter Rx messages to communicate with a Policy and Charging Rules Function (PCRF).

This communication service enables an application to control QoS, however, applying QoS policy and applying quality changes to a subscriber connection require a separate PCRF working in conjunction with a Policy and Charging Enforcement Function (PCEF), which are provided by various third parties.

This communication service acts as a client to a Diameter server by using the Diameter protocol.

Using this communication service, an application can:

- Apply a QoS feature profile
- Modify an existing QoS feature profile
- Remove an existing QoS feature profile
- Retrieve the status for a subscriber's QoS feature profile
- Register and unregister for QoS-related events
- Query for the QoS feature profile change history

- Notify the application of how certain events impacted QoS feature profiles that were active on the subscriber connection when the events occurred
- Delete the QoS feature profile

This communication service does not however, support the concept of *default* QoS feature profiles listed in the specification, because the Diameter Rx specification does not share this concept. Instead, use your PCRF/PCEF product tools to set default QoS feature profiles for subscribers, and then use this communication service to change, or request information about the QoS feature profile.

This document refers to the QoS feature profiles that this communication service manages as *temporary* QoS feature profiles to distinguish them from the default QoS feature profiles that you have already created and applied.

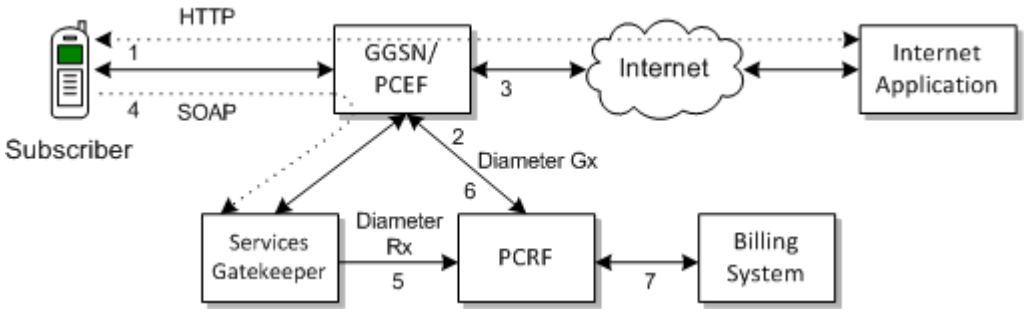
For additional information about adding QoS support to an application, see the discussion about adding SOAP-based quality of service support, and supported SOAP Parlay X 4.0 facades in *Services Gatekeeper Application Developer's Guide*.

See "Parlay X 4.0 Application-Driven Quality of Service/Diameter" in *Services Gatekeeper Statement of Compliance* for the exact version of the standards this communication service supports, and the list of supported Diameter Rx AVPs.

How it Works

Figure 11–1 shows the interaction between Services Gatekeeper and your other network nodes when this communication service is used.

Figure 11–1 Example Application-Driven QoS Implementation



In Figure 11–1:

1. A subscriber's mobile device is registered with the Gateway GPRS Support Node (GGSN) or the PCEF.
2. The GGSN or PCEF requests a default QoS plan from the PCRF.
3. Once the QoS plan is returned from the PCRF, the GGSN or PCEF executes that plan and connects the subscriber's device to the Internet.
4. A subscriber application sends a RESTful request to Services Gatekeeper for a change in QoS.
5. Services Gatekeeper sends the QoS request to the PCRF using the Rx specification.
6. The PCRF pushes the new QoS plan to the PCEF using the Gx specification, and the PCEF executes that plan.
7. The PCRF interfaces with BRM or another billing management system to charge the subscriber appropriately.

Adding SOAP-Based QoS Support to an Application

See the discussion about adding SOAP-based quality of service support in *Services Gatekeeper Application Developer's Guide*.

Managing Parlay X 4.0 Application-Driven Quality of Service (QoS)/Diameter

This section describes the properties and workflow for setting up the Parlay X 4.0 Application-Driven Quality of Service (QoS)/Diameter plug-in instance.

Your network connections and performance requirements determine how you set up this communication service. Multiple Parlay X 4.0 Application-Driven Quality of Service (QoS)/Diameter communication service implementations generally connect to a smaller number of PCRFs.

This communication service is usable with high-availability implementations. However if the PCRF-Services Gatekeeper connection is broken on a high-availability implementation, the application session is torn down and no further requests are processed. The application must open a new session if further communication with the PCRF is required.

The plug-in instance is not automatically created when the plug-in service is started, you must create is using the Plug-in Manager.

Properties for Parlay X 4.0 Application-Driven QoS/Diameter

Table 11–1 lists the technical specifications for this communication service.

Table 11–1 Properties for Parlay X 4.0 Application-Driven QoS/Diameter

Property	Description
Managed object in Administration Console	To access the object, select *domain_name*, then **OCSG**, then *server_name*, then **Communication Services**, then *plug-in_instance_id*, in that order.
MBean interfaces	Domain=oracle.ocsg Name=wlng_ntInstance Name=Plugin_qos_diameter Type=**oracle.ocsg.plugin.qos.diameter.management.QoSMBean**
Network protocol plug-in service ID	**Plugin_qos_diameter**
Supported address scheme	tel, email, ipv4, ipv6, sip, and private
Application-facing interfaces	**com.bea.wlcp.wlng.px40.plugin.ApplicationQoSPlugin** **com.bea.wlcp.wlng.px40.plugin.ApplicationQoSNotificationManagerPlugIn** **com.bea.wlcp.wlng.px40.callback.ApplicationQoSNotificationCallback**
Service type	Application-Driven QoS
Exposes to the service communication layer a Java representation of	SOAP
Interfaces with the network nodes using:	Diameter Rx

Table 11–1 (Cont.) Properties for Parlay X 4.0 Application-Driven QoS/Diameter

Property	Description
Deployment artifacts: NT EAR wlng_nt_qos.ear	**Plugin_qos_diameter.jar px40_qos_service.jar**
Deployment artifacts: AT EAR: wlng_at_qos_px40.ear	**px40_qos.war px40_qos_callback.jar**

Configuration Workflow for Parlay X 4.0 Application-Driven QoS/Diameter

The following is an outline for configuring this plug-in using the Administration console or an MBean browser. These instructions assume that you have already created the SLAs to manage services.

1. Select **wlng**, then **PluginManager**, and then **createPluginInstance**.
2. Set the following parameters:
   - Set **PluginServiceId** to **Plugin_qos_diameter**.
   - Set **PluginInstanceId** to **Plugin_qos_diameter***n* where *n* is an integer that is not already in use by an existing QoS plug-in instance.
3. Select **wlng** then **PluginManager** then **addRoute**.
4. Set the following parameters:
   - Set **PluginInstanceId** to the ID you configured in step 2.
   - Set an appropriate value for **AddressExpression** depending upon your Services Gatekeeper configuration.
5. Select the MBean **wlng_nt_qos#***version*. Where *version* is the Services Gatekeeper version.
6. Select the plug-in instance you created in step 2. Expand **QoSMBean** and configure the plug-in instance attributes:
   - Attribute: DestinationHost
   - Attribute: DestinationPort
   - Attribute: DestinationRealm
   - Attribute: OriginHost
   - Attribute: OriginPort
   - Attribute: OriginRealm
   - Attribute: Connected
   - Attribute: RecordHistory

   Note: `DestinationHost` and `DestinationPort` should be the correct values for your PCRF.
7. Ensure that your PCRF is listening on the destination port configured for this plug-in the **DestinationPort** attribute.

8. Use "Operation: loadQoSRequestTemplate" to load a QoS template for this communication service to use.

Events and Statistics

The Parlay X 4.0 Application-Driven QoS/Diameter communication service generates event data records (EDRs), charging data records (CDRs), alarms, and statistics to assist system administrators and developers in monitoring the service.

See "Event Data Records" for the list of EDRs and "Events, Alarms, and Charging" for general information.

Event Data Records

Table 11–2 lists the IDs of the EDRs created by the Parlay X 4.0 Application-Driven QoS communication service. This does not include EDRs created when exceptions are thrown.

Table 11–2 EDRs Generated by Parlay X 4.0 Application-Driven QoS

EDR ID	Operation Called
91851	applyQoSFeatureResponse, applyQoSFeature
91852	getQoSStatusResponse, getQoSStatu
91853	modifyQoSFeatureResponse, modifyQoSFeature
91854	removeQoSFeatureResponse, removeQoSFeature
91855	getQoSHistoryResponse, getQoSHistory
91856	startQoSNotificationResponse, startQoSNotification
91857	stopQoSNotificationResponse, stopQoSNotification
91808	sendInitAAR
91809	RxAAA, sendModifyAAR
91810	RxSTA, sendSTR
91811	handleRxRAR
91862	notifyQoSEventResponse, notifyQoSEvent
91863	QoSRequestReached
91864	QoSNotificationReached

Charging Data Records

This communication service does not generate any CDRs.

Reference: Attributes and Operations for Parlay X 4.0 Application-Driven Quality of Service (QoS)/Diameter

This section describes the attributes and operations for configuration and maintenance:

- Attribute: DestinationHost
- Attribute: DestinationPort
- Attribute: DestinationRealm

Attribute: DestinationHost

Scope: Cluster

Unit: Not applicable

Format: String

The host name of the PCRF Diameter server.

Valid values are either a host name or a regular expression matching a host name. The default value is **host.destination.com**.

Attribute: DestinationPort

Scope: Cluster

Unit: Not applicable

Format: Integer

Port number of the PCRF Diameter server.

Valid values are **0–65535**. The default value is 3588.

Attribute: DestinationRealm

Scope: Cluster

Unit: Not applicable

Format: String

Diameter destination realm used for requests.

Valid values are either a realm or a regular expression matching a realm. The default value is **destination.com**.

Attribute: OriginHost

Scope: Local

Unit: Not applicable

Format: String

Host name of the machine running this communication service.

Valid values are either a host name or a regular expression matching a host name. The default value is **host.origin.com**.

Attribute: OriginPort

Scope: Local

Unit: Not applicable

Format: Integer

Port number of the machine running this communication service.

Valid values are **0**–**65535**. A value of **0** indicates a random port and should be used when upgrading the plug-in. The default value is **0**.

Attribute: OriginRealm

Scope: Cluster

Unit: Not applicable

Format: String

The Diameter originating realm used for requests.

Valid values are either a realm or a regular expression matching a realm. The default value is **origin.com**.

Attribute: Connected

Scope: Local

Unit: Not applicable

Format: Boolean

Checks the connection status. Confirms that the "Operation: connect" operation was successful.

Valid values are **true** or **false**. The default value **false**.

Attribute: RecordHistory

Scope: Cluster

Unit: Not applicable

Format: Boolean

Indicates whether to record a transaction history for this communication service. A value of **true** records the history; the default value is **false**.

Operation: connect

Scope: Local

Connects this communication service to the PCRF Diameter server. If the plug-in is already connected to a Diameter server, it disconnects that server, and then reconnects using the specified parameters. The destination host, port, and realm, and origin host and port attributes must be set before using this operation.

Use "Attribute: Connected" to confirm that this operation was successful.

This operation does not use any storage.

Signature:

```
connect()
```

Operation: disconnect

Scope: Local

Disconnects this communication service from the Diameter server. If the plug-in is not currently connected to a Diameter server, this operation takes no action.

This operation does not use any storage.

Signature:

```
disconnect()
```

This operation has no parameters.

Operation: loadQoSRequestTemplate

Scope: Cluster

This operation loads instructions into a QoS feature profile (template).

Use the **Name** parameter to select a feature profile to load. **Name** takes take a QoS feature profile identifier as an argument.

Use the **Content** parameter to specify the XML-based QoS information to add to a feature profile. This operation takes a feature template formatted according to the XSD found in the **xsd** subdirectory in the **plugin_qos_diameter.jar** file, which itself is contained within the **wlng_nt_qos.ear** archive located in the *Middleware_Home***/ocsg_6.0/applications** directory.

Signature:

```
loadQoSRequestTemplate (Name: string, Content: XML)
```

Table 11–3 loadQoSRequestTemplate Parameters

Parameter	Description
Name	A QoS feature profile identifier. Identifies the QoS template that is associated with that feature.
Content	Specifies the QoS feature profile content to apply. XML

Operation: retrieveQoSRequestTemplate

Scope: Local

This operation retrieves a QoS feature profile (template) associated with a particular QoS feature profile identifier, or the names of subscribers.

Use the **Name** parameter to select a feature profile to load. **Name** takes take a QoS feature profile identifier as an argument.

Signature:

```
retrieveQoSRequestTemplate (Name: string)
```

Table 11–4 retrieveQoSRequestTemplate Parameters

Parameter	Description
Name	A QoS feature profile identifier. Identifies the QoS template that is associated with that QoS feature profile.

Operation: listQoSRequestTemplateMatchRule

Scope: Local

This operations returns a list of subscribers with a specific QoS feature profile (template).

Use the **Name** parameter to select a feature profile to load. **Name** takes take a QoS feature profile identifier as an argument.

Signature:

```
listQoSRequestTemplateMatchRule (Name: string)
```

Table 11–5 listQoSRequestTemplateMatchRule Parameters

Parameter	Description
Name	A QoS feature profile identifier. Identifies the QoS template that is associated with that QoS feature profile.

Operation: deleteQoSRequestTemplate

Scope: Cluster

This operation deletes a QoS feature profile (template) for a subscriber, or set of subscribers.

The **Name** parameter specifies a the QoS feature profile and it take a QoS feature profile identifier as an argument.

Signature:

```
deleteQoSRequestTemplate (Name: string)
```

Table 11–6 deleteQoSRequestTemplate Parameters

Parameter	Descripton
Name	A QoS feature identifier. Identifies the QoS template that is associated with that feature.

12

REST Services

This chapter describes how Oracle Communications Services Gatekeeper can be used with existing RESTFul Application Services.

Overview of REST Services

Service providers may have existing third-party or proprietary applications or platforms that communicate using REST web services. Services Gatekeeper functionality can be integrated with existing applications that support REST interfaces by creating a RESTFul communication service.

Services Gatekeeper supports two types of RESTFul communication services. A **REST2REST** service exposes an existing REST API allowing communication between RESTFul interfaces. A **REST Exposure** or **empty** service is an application bound, network-facing service used when RESTFul requests are sent to a custom network implementation for translation and processing.

Services Gatekeeper mediates traffic between users and existing REST infrastructure allowing the application of service level agreements, policy enforcement, security, alarms and statistics for more control over communication services.

For more information on using REST services, see "Using the OneAPI RESTful Services" in *Services Gatekeeper Application Developer's Guide*, and these chapters in this book:

- OneAPI Multimedia Messaging/MM7
- OneAPI Payment/Diameter
- OneAPI Short Messaging/SMPP
- OneAPI Terminal Location/MLP

You can also use the Platform Development Wizard to generate REST2REST and REST Exposure Communication Services. For more information, see "Creating Extensions with Platform Development Wizard" in *Services Gatekeeper Extension Developer's Guide*.

13

OneAPI Multimedia Messaging/MM7

This chapter describes the Oracle Communications Services Gatekeeper OneAPI Multimedia Messaging/MM7 communication service in detail.

About the OneAPI Multimedia Messaging Interface

Applications use the RESTful OneAPI MMS interface to send multimedia messages (MMS messages), to retrieve MMS messages and delivery status reports, and to start and stop notifications.

When the request body for an MMS operation contains a request for a delivery receipt, the application provides a **notifyURL** correlator for the message being sent and includes an endpoint address for returning the delivery notification.

The Services Gatekeeper OneAPI MMS interface complies with Open Mobile Alliance (OMA) specifications. See the discussion about OneAPI multimedia messaging compliance in *Services Gatekeeper Statement of Compliance* for a reference to the supported specification and RESTful bindings schema.

See "Using the OneAPI RESTful Interface" in *Services Gatekeeper Application Developer's Guide* for general information on creating applications using the OneAPI RESTful interface.

The information provided in this document is based on the OneAPI specification and is provided here for convenience.

REST Service Descriptions Available at Run-time

When the Administration Server for your Services Gatekeeper domain is in the running state, the REST service descriptions of these operations are located in:

`http://host:port/oneapi/1/messaging/application.wadl`

Where *host* and *port* are the host name and port of the machine on which the Services Services Gatekeeper Application Developer's GuideGatekeeper Access Tier (AT) is installed.

Sending MMS Messages

To send an MMS message, provide the OneAPI-formatted URI of the addresses which must receive the message in the request body. If the sender requires a delivery receipt, specify the required parameters for the receipt.

If the Send MMS operation is successful, the response will contain the request identifier in the response body for this operation).

If the application requires a receipt for delivery of the message, the application can provide the **notifyURL** in the message body, to which notifications are to be sent.

Authorization

Basic or OAuth 2.0

HTTP Method

`POST`

URI

`http://`*`host:port`*`/oneapi/1/messaging/outbound/`*`senderAddress`*`/requests`

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier is installed.
- The *senderAddress* is the subscriber for which the message is being sent.

Request Header

The MIME-type for the Content-Type header field is **multipart/form-data**.

Request Body

The request body for the OneAPI Send MMS operation accepts the following parameters:

- **address:** String. At least one address is the (optionally) URL-escaped enduser ID; in this case the MSISDN including the '**tel:**' protocol identifier and the country code optionally preceded by '**+**'. For example, **tel:+15415550100**.
- **message:** String. Must be URL-escaped as per RFC 1738.
- **senderAddress**: String. The address to whom a responding MMS may be sent.

  senderName: String. The URL-escaped name of the sender to appear on the terminal. This is the address to whom a responding MMS may be sent.
- **clientCorrelator:** String. Optional. Uniquely identifies this create MMS request. If there is a communication failure during the request, using the same client correlator when retrying the request allows the operator to avoid sending the same MMS twice.
- **notifyURL:** anyURL. The URL-escaped URL to which you want a notification of delivery sent. The format of this notification is shown in Example 13–1.

callbackData: String. will be passed back in this notification, so you can use it to identify the message the receipt relates to, or any other useful data, such as a function name.

Response Header

The Location header field contains the URI:

`http://host:port/oneapi/1/messaging/outbound/senderAddress/requests/requestID`

where *requestID* is the string identifier returned in the response body.

If the request fails, the Status-Line header field will contain the status code and the reason for the failure. For more information, see "Errors and Exceptions" in the discussion about One API Multimedia messaging in *Services Gatekeeper Application Developer's Guide*.

Response Body

The body of the response contains the request identifier as the string value for the **resourceReference** attribute. It is the request identifier returned in the **Location** header field of the response message. The application uses this request identifier to retrieve the delivery status for the sent message.

The response body for this operation is represented by the following JSON structure, where the value part of the name/value pair indicates its data type:

```
{"resourceReference": {"resourceURL": "URL"}}
```

Examples

Example 13–1 shows a sample of a OneAPI Send MMS request.

Example 13–1 OneAPI Send MMS Request

```
POST http://example.com/oneapi/1/messaging/outbound/tel%3A%2B5550102/requests
HTTP/1.1
Content-Length: 12345
Content-Type: multipart/form-data;
                    boundary="===============123456==";

MIME-Version: 1.0
Host: www.example.com
Date: Thu, 04 Jun 2009 02:51:59 GMT

--===============123456==
Content-Disposition: form-data; name="root-fields"
Content-Type: application/x-www-form-urlencoded;
address=tel%3A%2B15415550100&
address=tel%3A%2B15415550101&
senderAddress=tel:%2B5550102&
&senderName=ExampleCompany
Subject=My%20message&
notifyURL=http://example-application.com/notifications/DeliveryInfoNotification/54
311
&callbackData=
&clientCorrelator=123456
--===============123456==
Content-Disposition: form-data; name="attachments"; filename="picture.jpg"
Content-Type: image/gif
```

```
GIF89a...binary image data...
----------------123456==
```

Example 13–2 shows a sample of a OneAPI Send MMS response.

Example 13–2 OneAPI Send MMS Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Location: http://example.com/oneapi/1/messaging/outbound/
tel%3A%2B5550102/requests/abc123
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"resourceReference": {"resourceURL": " http://example.com/1/messaging/outbound/
tel%3A%2B5550102/requests/abc123"}}
```

Query Delivery Status of MMS Message

The Query Delivery Status operation retrieves the delivery status of a message that was previously sent using the system-generated **requestID** returned when the message was created.

If the Query Delivery Status is successful, the response body contains the delivery status for each of the addresses contained in the original send MMS request.

Authorization

Basic or OAuth 2.0

HTTP Method

`GET`

URI

`http://host:port/oneapi/1/messaging/outbound/senderAddress/requests/requestID/deliveryInfos`

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier is installed.
- *senderAddress* is the address to which a responding message may be sent.
- *requestID* is the identifier returned in the **result** object of the corresponding Send operation.

Request Body

There is no request body.

Response Header

Standard header fields. If the request fails, the Status-Line header field will contain the status code and the reason for the failure. For more information, see "Errors and Exceptions" in the discussion about *Using the OneAPI RESTful Interfaces*.

Response Body

The response body contains an array of structures as the value for **deliveryInfo**. Each element in the array contains values for the following parameters.

- **address:** String. The telephone number to which the initial message was sent.
- **deliveryStatus**: Enumeration value. Table 13–1 lists the possible statuses:

Table 13–1 Enumeration Values for Delivery Status

Value	Description
DeliveredToNetwork	Successful delivery to the network. For concatenated messages, returned only when all the MMS-parts have been successfully delivered to the network.

Table 13–1 (Cont.) Enumeration Values for Delivery Status

Value	Description
DeliveryUncertain	Delivery status unknown, for example, if it was handed off to another network.
DeliveryImpossible	Unsuccessful delivery; the message could not be delivered before it expired.
DeliveredToTerminal	Successful delivery to the terminal. For concatenated messages, returned only when all the MMS-parts have been successfully delivered to the terminal.
MessageWaiting	The message is still queued for delivery. This is a temporary state, pending transition to one of the preceding states.

- **resourceURL**: A reference to the response.

The response body for this operation is represented by the following JSON data structure, where the value part of each name/value pair indicates its data type:

```
{"deliveryInfoNotification": {
    "deliveryInfo": [
        {   "address": "String",
            "deliveryStatus": "String"},
        {   "address": "String",
            "deliveryStatus": "String"}],
    "resourceURL": "
http://example.com/oneapi/1/messaging/outbound/senderAddress/requests/requestID/de
liveryInfos"
}}
```

Examples

Example 13–3 shows a sample of a OneAPI Query Delivery Status request.

Example 13–3 OneAPI Query Delivery Status Request

```
GET
http://example.com/oneapi/1/messaging/outbound/tel%3A%2B5550100/requests/abc123/de
liveryInfos HTTP/1.1
Accept: application/json
Host: example.com:80
```

Example 13–4 shows a sample of a OneAPI Query Delivery Status response.

Example 13–4 OneAPI Query Delivery Status Response

```
HTTP/1.1 200 OK
Content-Type: application/json
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"deliveryInfoNotification": {
    "deliveryInfo": [
        {
            "address": "tel:15415550101",
            "deliveryStatus": "MessageWaiting"
        },
        {
            "address": "tel:15415550102",
```

```
            "deliveryStatus": "MessageWaiting"
        }
    ],
    "resourceURL": "
http://example.com/oneapi/1/messaging/outbound/tel%3A%2B5550100/requests/abc123/de
liveryInfos"
}}
```

Subscribe to MMS Delivery Notification

The Subscribe to MMS Delivery Notification operation creates a subscription to delivery notifications for an application.

To set up an MMS notification, provide a **notifyURL** for the delivery of the notifications. The request body contains the correlator for the notification, the **notifyURL** to which the call direction notifications must be sent and, optionally, the **callbackData** (a string to identify the notification).

If the subscription request is successful:

- The response header contains the URI of the publish/subscribe server.
- A data object associated with the result of the multimedia message operation is sent to the **notifyURL** address specified in the request body. This data object contains the appropriate notification (that the message was received or a delivery receipt for the call).

  In addition, the delivery report notification sent to the application contains the callback data that the application provided when it sent the message.

Authorization

Basic or OAuth 2.0

HTTP Method

`POST`

URI

`http://`*`host:port`*`/oneapi/1/messaging/outbound/`*`senderAddress`*`/subscriptions`

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier is installed.
- *senderAddress* is the address to whom a responding MMS may be sent.

Request Header

The MIME-type for the Content-Type header field is **application/x-www-form-urlencoded** or **application/json**.

Request Body

The request body for the subscription operation accepts the following parameters:

- **notifyURL**: URL. This will be used by the server to POST the notifications to you, so include the URL of your own listener application.
- **clientCorrelator:** String. Optional. Uniquely identifies this create subscription request. If there is a communication failure during the request, using the same client correlator when retrying the request allows the operator to avoid creating a duplicate subscription.

- **callbackData**: String. Optional. A function name or other data that you would like included when the POST is received. This value is returned with the notification message.

Response Header

The Location header field contains the URI of the publish/subscribe server:

`http://host:port/oneapi/1/messaging/outbound/subscriptions/subscriptionID`

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper AT is installed.
- *subscriptionID* is the reference to the created subscription.

If the request fails, the Status-Line header field contains the status code and the reason for the failure. For more information, see "Errors and Exceptions" in *Using the OneAPI RESTful Interfaces*.

Response Body

The response body contains a confirmation **deliveryReceiptSubscription** JSON data structure consisting of the parameters supplied in the subscription request.

```
{"deliveryReceiptSubscription": {
    "callbackReference": {
        "callbackData": "String",
        "notifyURL": " www.yourURL.here ",
    },
    "resourceURL": " URL "}}
```

A **resourceURL** is included as a reference to the response.

Notification Data Object for MMS Delivery Receipt Sent to notifyURL

After a OneAPI MMS subscription is made, Services Gatekeeper delivers a message receipt notification to the **notifyURL** specified in the subscription request.

This nested JSON object contains the following as the value of the attribute name **deliveryInfoNotification**:

- **deliveryInfo**: Array. Contains the following two parameters:
  - **address:** String. The message recipient's subscriber ID.
  - **deliveryStatus:** Enumeration value. Table 13–2 lists the possible statuses:

Table 13–2 Enumeration Values for Delivery Status

Value	Description
DeliveredToNetwork	Successful delivery to the network. For concatenated messages, returned only when all the MMS-parts have been successfully delivered to the network.
DeliveryUncertain	Delivery status unknown; for example, if it was handed off to another network.
DeliveryImpossible	Unsuccessful delivery; the message could not be delivered before it expired.

Table 13–2 (Cont.) Enumeration Values for Delivery Status

Value	Description
DeliveredToTerminal	Successful delivery to the terminal. For concatenated messages, returned only when all the MMS-parts have been successfully delivered to the terminal.

- **link**: Refers to the message URL (that was returned when the message was originally created).

The notification data object delivered to the **notifyURL** address is represented by the following JSON data structure, where the value part of each name/value pair indicates its data type:

```
{"deliveryInfoNotification": {
    "deliveryInfo": [
        {  "address": "String"
           "deliveryStatus": "String"},
    ],
    "link": {
        "href":   "URL",
        "rel": "String"
    },
    "resourceURL":"URL"
    }}
```

Examples

Example 13–5 shows a sample of a OneAPI Subscribe to MMS Delivery Notifications request.

Example 13–5 OneAPI Subscribe to MMS Delivery Notifications Request

```
POST http://example.com/oneapi/1/messaging/outbound/tel%3A%2B5550100/subscriptions
HTTP/1.1
Accept: application/json
Content-Type: application/json; charset=UTF-8
Host: example.com:80

{"deliveryReceiptSubscription": {
    "callbackReference": {
        "callbackData": " 12345()",
        "notifyURL": "http://www.oracle.com"
    }
}}
```

Example 13–6 shows a sample of a OneAPI Subscribe to MMS Delivery Notifications response.

Example 13–6 OneAPI Subscribe to MMS Delivery Notifications Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Location: http://example.com/oneapi/1/messaging/outbound/subscriptions/sub789
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"deliveryReceiptSubscription": {
    "callbackReference": {
        "callbackData": "doSomething()",
```

```
        "notifyURL": " www.oracle.com "
    },
    "resourceURL": "
http://example.com/oneapi/1/messaging/outbound/subscriptions/sub789"}}
```

Example 13–7 shows a sample of a OneAPI MMS Delivery Notification Message.

Example 13–7 OneAPI MMS Delivery Notification Message

```
{"deliveryInfoNotification": {
    "deliveryInfo": [
        {  "address": "tel:15415550101",
           "deliveryStatus": "DeliveredToTerminal"},
        {   "address": "tel:15415550102",
            "deliveryStatus": "DeliveredToTerminal"}
    ],
    "link": {
        "href":
"http://example.com/oneapi/1/messaging/outbound/tel%3A%2B5550100/requests/{request
Id}",
        "rel": "OutboundMessageRequest"
    },
    "resourceURL":
http://example.com/oneapi/1/messaging/outbound/tel%3A%2B5550100/requests/req123/De
liveryInfos
 }
```

Stop Subscription to Delivery Notifications

The Stop Subscription to Delivery Notification operation terminates a previously set up MMS notification for the application.

To stop a previously set up MMS notification, provide the correlator for the notification passed earlier in the Subscribe to MMS Delivery Notification request.

There is no request or response body for the Stop Subscription to Delivery Notification operation. If the request fails, the body of the error response contains the identifier for the notification and the type of exception.

Authorization

Basic or OAuth 2.0

HTTP Method

`DELETE`

URI

`http://`*`host:port`*`/oneapi/1/messaging/outbound/subscriptions/`*`subscriptionID`*

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier is installed.
- *subscriptionID* is the reference to the created subscription.

Request Body

There is no request body.

Response Header

Standard header fields. If the request fails, the Status-Line header field contains the status code and the reason for the failure. For more information, see "Errors and Exceptions" in *Using the OneAPI RESTful Interfaces*.

Response Body

There is no response body.

Examples

Example 13–8 shows a sample of a OneAPI Stop Subscription to Delivery Notification request.

Example 13–8 OneAPI Stop Subscription to Deliver Notification Request

```
DELETE http://example.com/oneapi/1/messaging/outbound/subscriptions/sub789
HTTP/1.1
Accept: application/json
Host: example.com:80
```

Example 13–9 shows a sample of a OneAPI Stop Subscription to Delivery Notification response.

Example 13–9 OneAPI Stop Subscription to Deliver Notification Response

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2009 02:51:59 GMT
```

Retrieve Messages Sent to Web Application

The OneAPI Retrieve Messages Sent to Web Application operation polls Services Gatekeeper for the MMS messages that have been received from the network for an application.

The request header for the Retrieve Messages Sent to Web application operation contains the registration identifier necessary to retrieve the MMS messages intended for the application. This registration value should have been set up with the off-line provisioning step that enables the application to receive notification that MMS messages were received.

There is no request body.

If the Retrieve Messages Sent to Web Application operation is successful, the response body contains the message, the URI of the sender, the MMS service activation number, and the date and time when the message was sent.

Authorization

Basic or OAuth 2.0

HTTP Method

`GET`

URI

`http://`*`host:port`*`/oneapi/1/messaging/inbound/registrations/`*`registrationID`*`/messages?maxBatchSize=?`

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier is installed.
- *registrationId* is the value previously set up to enable the application to receive notification that MMS messages have been received, according to specified criteria.
- **matchBatchSize** specifies the maximum number of messages to retrieve in the request batch.

Request Header

The MIME-type for the Content-Type header field is **application/x-www-form-urlencoded** or **application/json**.

Request Body

There is no request body.

Response Header

Standard header fields. If the request fails, the Status-Line header field will contain the status code and the reason for the failure. For more information, see "Errors and Exceptions" in *Using the OneAPI RESTful Interfaces*.

Response Body

The response body is an **inboundMessageList** containing an array of structures as the value for **inboundMessage**. The response body also contains the following parameters:

- **inboundMessage:** Array. Contains the following parameters:
  - **dateTime:** dateTime. The date and time when the message was received.
  - **destinationAddress**: String. The registration ID of the application.
  - **messageID:** String. A server generated message identifier.
  - **inboundMMSMessage:** String. Contains the subject of the message, which may determine whether you want to retrieve the entire MMS message.
  - **resourceURL:** URL. Link to the message.
  - **senderAddress:** String. The MSISDN of the sender.
- **numberOfMessagesInThisBatch:** Integer. The total number of messages in the batch.
- **resourceURL**: URL Self-referring resource URL.

The response body for this operation is represented by the following JSON data structure, where the value part of each name/value pair indicates its data type:

```
"inboundMessage": [
            "dateTime": "dateTime",
            "destinationAddress": "String",
            "messageId": "String",
            "inboundMMSMessage": "String",
            "resourceURL": "URL",
            "senderAddress": "String"},
]
```

Retrieving Full Messages

If an application needs to retrieve an entire MMS message, a separate GET operation is required. Use the following operation to retrieve a full message, specifying the **messageID** from the **inboundMessageList**.

URI

`http://`*`host:port`*`/oneapi/1/messaging/inbound/registrations/`*`registrationID`*`/messages/`*`messageID`*`?resFormat=JSON`

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier is installed.
- *registrationId* is the value previously set up to enable the application to receive notification that MMSs have been received, according to specified criteria.
- *messageID* specifies the MMS from the **inboundMessageList** to be retrieved.

Request Header

The **resFormat=JSON** portion of the URI ensures that the response content-type is JSON.

Request Body

There is no request body.

Response Header

Standard header fields. If the request fails, the Status-Line header field contains the status code and the reason for the failure. For more information, see "Errors and Exceptions" in *Using the OneAPI RESTful Interfaces*.

Response Body

The response body is an **inboundMessageList** containing an array of structures as the value for **inboundMessage**. The response body also contains the following parameters:

- **inboundMessage:** Array. Contains the following parameters:
  - **dateTime:** dateTime. The date and time when the message was received.
  - **destinationAddress**: String. The registration ID of the application.
  - **messageID:** String. A server generated message identifier.
  - **inboundMMSMessage:** String. Contains the subject of the message, which may determine whether you want to retrieve the entire MMS message.
  - **resourceURL:** URL. Link to the message.
  - **senderAddress:** String. The MSISDN of the sender.
- **numberOfMessagesInThisBatch:** Integer. The total number of messages in the batch.
- **resourceURL**: URL Self-referring resource URL.

The response body for this operation is represented by the following JSON data structure, where the value part of each name/value pair indicates its data type:

```
"inboundMessage": [
         {  "dateTime": "dateTime",
            "destinationAddress": "String",
            "messageId": "String",
            "inboundMMSMessage": "String",
            "resourceURL": "URL",
            "senderAddress": "String"},

====Content Divider====

One or more attachments
```

Examples

Example 13–10 shows a sample of a OneAPI Retrieve Messages request.

Example 13–10 OneAPI Retrieve Messages Request

```
GET
http://example.com/oneapi/1/messaging/inbound/registrations/3456/messages?maxBatch
Size=2  HTTP/1.1
Host: example.com:80
Accept: application/json
```

Example 13–11 shows a sample of a OneAPI Retrieve Messages response.

Example 13–11 OneAPI Retrieve Messages Response

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"inboundMessageList": {
    "inboundMessage": [
        {   "dateTime": "2010-11-19T12:00:00",
            "destinationAddress": "6789",
            "inboundMMSMessage": {"subject": "Rock Festival 2010"},
            "messageId": "msg1",
            "resourceURL":
"http://example.com/oneapi/1/messaging/inbound/registrations/3456/messages/msg1",
            "senderAddress": "tel:+5550100" },
        {   "dateTime": "2010-11-19T12:15:00",
            "destinationAddress": "6789",
            "inboundMMSMessage": {"subject": "London Marathon"},
            "messageId": "msg2",
            "resourceURL": "
http://example.com/oneapi/1/messaging/inbound/registrations/sub789/messages/msg2",
            "senderAddress": "tel:+5550101"
        }
    ],
    "numberOfMessagesInThisBatch": "2",
    "resourceURL": "
http://example.com/1/messaging/inbound/registrations/3456/messages?maxBatchSize=2
",
    "totalNumberOfPendingMessages": "20"
}
```

Example 13–12 shows a sample of a OneAPI Retrieve Full Message request.

Example 13–12 OneAPI Retrieve Full Message Request

```
GET
http://example.com/oneapi/1/messaging/inbound/registrations/3456/messages/msg1?res
Format=JSON HTTP/1.1
Host: example.com:80
```

Example 13–13 shows a sample of a OneAPI Retrieve Full Messages response.

Example 13–13 OneAPI Retrieve Full Message Response

```
HTTP/1.1 200 OK
Content-Type: multipart/form-data; boundary="=====12345===="
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

====12345====
Content-Disposition=multipart/form-data; name="root-fields"
Content-Type=application/json
Content-Length: nnnn
{"inboundMessage": {
    "dateTime": "2010-11-19T12:00:00",
    "destinationAddress": "6789",
    "messageId": "msg1",
    "inboundMMSMessage": {"subject": Rock Festival 2010"},
    "resourceURL": "
http://example.com/oneapi/1/messaging/inbound/registrations/3456/messages/msg1",
    "senderAddress": " tel:+5550100"
}}


====12345====

Content-Disposition: form-data; name="attachments"
Content-Type: multipart/mixed; boundary="====aaabbb"
====aaabbb
Content-Disposition:attachments;filename="textBody.txt";
Content-Type: text/plain; charset=UTF-8
Content-Transfer-Encoding: 8 bit

Look at the attached picture
====aaabbb
Content-Disposition:attachments;filename="image1.gif";
Content-Type: image/gif
MIME-Version: 1.0
Content-ID: <99334422@example.com>

GIF89a...binary image data...
====12345====
```

Subscribe to Notifications of Messages Sent to Application

The Subscribe to Notifications Sent to Application operation creates a subscription to delivery notifications for when an application receives a message.

To set up an application notification, provide the **destinationAddress** which triggers notifications and a **notifyURL** for the delivery of the notifications. The destinationAddress is the MSISDN, or code set up in Services Gatekeeper, to which subscribers may send an MMS to your application.

If the subscription request is successful:

- The response header contains the URI of the publish/subscribe server.
- The response body contains a **resourceURL** indicating the URI of the newly created subscription.

Authorization

Basic or OAuth 2.0

HTTP Method

`POST`

URI

`http://`*`host:port`*`/oneapi/1/messaging/inbound/subscriptions`

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier is installed.

Request Header

The MIME-type for the Content-Type header field is **application/json** or **application/x-www-form-urlencoded**.

Request Body

The request body for the subscription operation accepts the following parameters:

- **destinationAddress**: String. The MSISDN, or code agreed upon by the operator, to which people may send an MMS to your application.
- **notifyURL**: URL. This is used by the server to POST the notifications to you, so include the URL of your own listener application.
- **criteria**: String. Optional. Case-insensitive text to match against the first word of the message, ignoring any leading whitespace. This allows you to reuse a short code among various applications, each of which can register its own subscription with different criteria.
- **notificationFormat**: Content Type. Optional. The content type that notifications will be sent; for OneAPI, only JSON is supported.
- **clientCorrelator:** String. Optional. Uniquely identifies this create subscription request. If there is a communication failure during the request, using the same

client correlator when retrying the request allows the operator to avoid creating a duplicate subscription.

- **callbackData**: String. Optional. A function name or other data that you would like included when the POST is received.

Response Header

The Location header field contains the URI of the publish/subscribe server:

`http://host:port/oneapi/1/messaging/inbound/subscriptions/subscriptionID`

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier is installed.
- *subscriptionID* is the reference to the created subscription.

If the request fails, the Status-Line header field will contain the status code and the reason for the failure. For more information, see "Errors and Exceptions" in *Using the OneAPI RESTful Interfaces*.

Response Body

The response body contains a confirmation **resourceReference** JSON data structure consisting of the parameters supplied in the subscription request.

```
{"resourceReference": {"resourceURL": "URL"}}
```

The **resourceURL** indicates the URI of the newly created subscription.

Notification Data Object for Application Notification Message Sent to notifyURL

After a OneAPI Application Notification subscription is made, Services Gatekeeper will deliver a message receipt notification to the specified **notifyURL** in the subscription request for every MMS received. If **callbackData** was provided in the subscription request, the notification contains this information.

This nested JSON object contains the following parameters as the value of the attribute name **inboundMMSMessageNotification**:

- **callbackData:** String. The correlator used to identify the notification.
- **inboundMessage:** Array. Contains the following parameters:
  - **destinationAddress**: String. The number or shortcode for the application.
  - **messageID:** String. A server-generated message identifier.
  - **inboundMMSMessage:** String. Message subject or text.
  - **link**: URL. The URL of the subscription that received this message.
  - **resourceURL**: URL. Link to the message.
  - **senderAddress**: String. The MSISDN of the sender.

The notification data object delivered to the **notifyURL** address is represented by the following JSON data structure, where the value part of each name/value pair indicates its data type:

```
{"inboundMessageNotification": {
    "callbackData": "String",
    "inboundMMSMessage": {
```

```
        "destinationAddress": "String",
        "messageId": "String",
        "inboundMMSMessage": "String",
        "link": {
        "href": "String",
        "rel": "String",
        "resourceURL": "String",
        "senderAddress": "String"
    }
}}}
```

Examples

Example 13–14 shows a sample of a OneAPI Subscribe to Notifications of Messages Sent to Applications request.

Example 13–14 OneAPI Subscribe to Notifications of Messages Sent to Applications Request

```
POST http://example.com/oneapi/1/messaging/inbound/subscriptions HTTP/1.1
Host: example.com:80
Content-Type: application/x-www-form-urlencoded
Accept: application/json

destinationAddress=3456&
notifyURL=http://www.yoururl.here/notifications/DeliveryInfoNotification&
criteria=Vote&
notificationFormat=JSON&
callbackData=doSomething()&
clientCorrelator=12345
```

Example 13–15 shows a sample of a OneAPI Subscribe to Notifications of Messages Sent to Applications response.

Example 13–15 OneAPI Subscribe to Notifications of Messages Sent to Application Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Location: http://example.com/oneapi/1/messaging/inbound/subscriptions/sub123
Content-Length: 254
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"resourceReference": {"resourceURL": "
http://example.com/oneapi/1/messaging/inbound/subscriptions/sub123"}}
```

Example 13–16 shows a sample of a OneAPI Application Notification Message.

Example 13–16 OneAPI Application Notification Message

```
{"inboundMessageNotification":
{"inboundMessage": {
    "destinationAddress": "tel:+1-555-0100",
    "messageId": "msg123",
    "inboundMMSMessage": {"subject": "That Chili Relleno was delicious?"},
    "link": {
        "href":
"http://example.com/oneapi/1/messaging/inbound/subscriptions/sub123",
        "rel": "Subscription"
    },
```

```
    "resourceURL": "http://example.com/oneapi/1/
messaging/inbound/registrations/reg123/messages/msg123",
    "senderAddress": "tel:+5550101"
}}}
```

Stop Subscription to Application Message Notifications

The Stop Subscription to Application Message Notification operation terminates a previously set up subscription to an application message notification.

To stop a previously set up subscription, provide the correlator for the notification passed earlier in the Subscribe to Notifications of Messages Sent to Application request.

There is no request or response body for the Stop Subscription to Notifications of Messages Sent to Application operation. If the request fails, the body of the error response will contain the identifier for the notification and the type of exception.

Authorization

Basic or OAuth 2.0

HTTP Method

`DELETE`

URI

`http://`*`host:port`*`/oneapi/1/messaging/inbound/subscriptions/`*`subscriptionID`*

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier is installed.
- *subscriptionID* is the reference to the created subscription.

Request Body

There is no request body.

Response Header

Standard header fields. If the request fails, the Status-Line header field contains the status code and the reason for the failure. See "Errors and Exceptions" in *Using the OneAPI RESTful Interfaces* for more information.

Response Body

There is no response body.

Examples

Example 13–17 shows a sample of a OneAPI Stop Subscription to Notifications of Messages Sent to Application request.

Example 13–17 OneAPI Stop Subscription to Notifications of Messages Sent to Application Request

```
DELETE http://example.com/oneapi/1/messaging/inbound/subscriptions/sub123 HTTP/1.1
Accept: application/json
Host: example.com:80
```

Example 13–18 shows a sample of a OneAPI Stop Subscription to Notifications of Messages Sent to Application response.

Example 13–18 OneAPI Stop Subscription to Notifications of Messages Sent to Application Response

```
HTTP/1.1 204 No content
Accept: application/json
Date: Thu, 04 Jun 2009 02:51:59 GMT
```

14

OneAPI Payment/Diameter

This chapter describes the Oracle Communications Services Gatekeeper OneAPI Payment/Diameter communication service in detail.

About the Payment Interface

Applications use the RESTful Payment interface to charge an amount to an end-user's account using Diameter and to refund amounts to that account. Applications can also reserve amounts, reserve additional amounts, charge against the reservation or release the reservation.

The Services Gatekeeper OneAPI Payment interface complies with Open Mobile Alliance (OMA) specifications. See "OneAPI Payment Interface" in *Services Gatekeeper Statement of Compliance* for a reference to the supported specification and RESTful bindings schema. Note that this interface does not support volume charging.

See "Using the OneAPI RESTful Interfaces" in *Services Gatekeeper Application Developer's Guide* for general information on creating applications using the OneAPI RESTful interface.

The information provided in this document is based on the OneAPI specification and provided here for convenience.

REST Service Descriptions Available at Run-time

When the Administration Server for your Services Gatekeeper domain is in the running state, the REST service descriptions of these operations can be found at

`http://host:port/oneapi/1/payment/application.wadl`

Where *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier (AT) services are running.

Charge Amount

The Charge Amount operation charges an amount directly to an end-user's application using the Diameter protocol.

To charge an amount for a call, provide the telephone address of the end-user (**endUserId**), a reference code (**code**) in case there is any dispute regarding the charges, and the billing information to charge for the call.

Authorization

Basic or OAuth 2.0

HTTP Method

`POST`

URI

`http://host:port/oneapi/1/payment/endUserId/transactions/amount`

Where:

host and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier (AT) services are running.

endUserId is the address of the subscriber to charge (MSISDN).

Request Header

The MIME-type for the Content-Type header field can be either **application/x-www-form-urlencoded** or **application/json**.

Request Body

The request body for the Charge Amount operation accepts the following parameters:

- **endUserId:** String. The URL-escaped end user ID. For example, a MSISDN including the '**tel:**' protocol identifier and the country code preceded by '**+**'.For example, **tel:+15415550100**.
- **transactionOperationStatus:** Enumeration. This indicates the desired resource state, in this case '**charged**'. See "Resource States" for more information.
- **description:** String. The human-readable text to appear on the bill provided so the subscriber can easily see what was purchased.
- **currency:** String. The 3-figure currency code defined in ISO4217.
- **amount**: Decimal. The amount to be charged.
- **code**: String. The charging code, from an existing contractual description that references an operator price point.
- **clientCorrelator**: String. Optional. This uniquely identifies the create charge request. If there is a communication failure during the charge request, using the same client correlator when retrying the request allows the operator to avoid applying the same charge twice.
- **onBehalfOf**: String. Optional. Allows aggregators or partners to specify the actual payee.

- **purchaseCategoryCode**: String. Optional. An indication of the content type. Values meaningful to the billing system would be published by a OneAPI implementation.
- **channel**: String. Optional. Can be **Wap**, **Web**, **MMS**, or **SMS**, depending on the source of user interaction.
- **taxAmount:** Decimal. Optional. Indicates a tax amount already charged by the merchant or application.
- **serviceID:** String. Optional. The ID of the partner or merchant service.
- **productID:** String. Optional. Combines with the **serviceID** to uniquely identify the product being purchased.

Response Header

The Location header field contains the URI:

`http://host:port/oneapi/1/payment/endUserId/transactions/amount/transactionID`

Where *transactionID* is the string identifier returned in the response body.

The Status-Line header field returned indicates if the charge has been created or accepted. An accepted response indicates that additional processing is required before the transaction is complete. If the request fails, the Status-Line header field will contain the status code and the reason for the failure. See "Errors and Exceptions" in *Services Gatekeeper Application Developer's Guide* for more information.

Response Body

The response body contains a confirmation **amountTransaction** JSON data structure consisting of the parameters supplied in the payment request.

```
{"amountTransaction": {
    "clientCorrelator": "String",
    "endUserId": "String",
    "paymentAmount": {
        "chargingInformation": {
            "amount": "Decimal",
           "currency": "String",
            "description": " String"
        },
        "totalAmountCharged": "Decimal"
    },
    "code": "String",
    "resourceURL": "URL"
    "transactionOperationStatus": "String"
}}
```

A **resourceURL** is included as a reference to the response. The **transactionOperationStatus** provides the resource state. See, "Resource States" for more information.

Examples

Example 14–1 shows a sample of a OneAPI Charge Payment request.

Example 14–1 OneAPI Charge Payment Request

```
POST http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amount
HTTP/1.1
```

```
Accept: application/json
Host: example.com:80
Content-Type: application/x-www-form-urlencoded
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

endUserId= tel%3A%2B15415550100&
transactionOperationStatus=charged&
description= Alien%20%20Game&
currency=USD&
amount=10&
code=REF-12345&
clientCorrelator=54321&
onBehalfOf=Example%20Games%20Inc&
purchaseCategoryCode=Game&
channel=WAP&
taxAmount=0
```

Example 14–2 shows a sample of a OneAPI Charge Payment response.

Example 14–2 OneAPI Charge Payment Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT
Location:
http://example.com/1/payment/tel%3A%2B15415550100/transactions/amount/abc123

{"amountTransaction": {
    "clientCorrelator": "54321",
    "endUserId": "tel:+15415550100",
    "paymentAmount": {
        "chargingInformation": {
            "amount": "10",
           "currency": "USD",
            "description": " Alien Game"
        },
        "totalAmountCharged": "10"
    },
    "code": "REF-12345",
    "resourceURL": "
http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amount/abc12
3
    "transactionOperationStatus": "Charged"
}}
```

Query Transaction Status

The Query Transaction Status operation retrieves the current status of a payment transaction. This operation is useful in cases where the original charge request returns a status of **processing**. Applications may require a confirmed charge to a subscriber's account before allowing access to paid resources.

To query for a transaction's status, provide the **transactionID** of the earlier transaction.

Authorization

Basic or OAuth 2.0

HTTP Method

`GET`

URI

`http://host:port/oneapi/1/payment/endUserId/transactions/amount/transactionID`

Where *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier (AT) services are running. The *endUserId* is the address of the subscriber originally charged (MSISDN). The *transactionID* is provided by Services Gatekeeper in the original payment request response.

Request Header

The header contains the **Host** and **Authorization** code (if required).

Request Body

There is no request body for this operation.

Response Header

The header contains the response status, **Content-Type**, **Content-Length** and **Date**.

If the request fails, the **Status-Line** header field will contain the status code and the reason for the failure. See "Errors and Exceptions" in *Services Gatekeeper Application Developer's Guide* for more information.

Response Body

The response body contains the transaction's **amountTransaction** JSON data structure consisting of the parameters supplied in the payment request.

```
{"amountTransaction": {
    "clientCorrelator": "String",
    "endUserId": "String",
    "paymentAmount": {
        "chargingInformation": {
            "amount": "Decimal",
           "currency": "String",
            "description": " String"
        },
        "totalAmountCharged": "Decimal"
    },
```

```
    "code": "String",
    "resourceURL": "URL"
    "transactionOperationStatus": "String"
}}
```

A **resourceURL** is included as a reference to the response. The **transactionOperationStatus** provides the current resource state. See "Resource States" for more information.

Examples

Example 14–3 shows a sample of a OneAPI Query Transaction Status request.

Example 14–3 OneAPI Query Transaction Status Request

```
GET http://example.com/1/payment/tel%3A%2B15415550100/transactions/amount/abc123
Host: example.com
Authorization: n0t4fr4id333
```

Example 14–4 shows a sample of a OneAPI Query Transaction Status response.

Example 14–4 OneAPI Query Transaction Status Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT
Location:
http://example.com/1/payment/tel%3A%2B15415550100/transactions/amount/abc123

{"amountTransaction": {
    "clientCorrelator": "54321",
    "endUserId": "tel:+15415550100",
    "paymentAmount": {
        "chargingInformation": {
            "amount": "10",
           "currency": "USD",
            "description": " Alien Game"
        },
        "totalAmountCharged": "10"
    },
    "code": "REF-12345",
    "resourceURL": "
http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amount/abc12
3
    "transactionOperationStatus": "Charged"
}}
```

List Transactions for Application User

The List Transactions for Application User operation lists all the transactions a subscriber has performed within an application.

To list a subscriber's transactions for an application, provide a valid OAuth token provided by Services Gatekeeper to identify the application and subscriber.

The response body contains a list of applicable transactions and their current status.

Authorization

Basic or OAuth 2.0

HTTP Method

`GET`

URI

`http://host:port/oneapi/1/payment/endUserId/transactions/amount`

Where:

host and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier (AT) services are running.

endUserId is the address of the subscriber to charge (MSISDN).

Request Header

Provide a valid OAuth bearer token to identify both the end user and the application in the **Authorization** header field.

Request Body

There is no request body for this operation.

Response Header

The Location header field contains the URI:

`http://host:port/oneapi/1/payment/endUserId/transactions/amount/transactionID`

where *transactionID* is the string identifier returned in the response body.

If the request fails, the Status-Line header field will contain the status code and the reason for the failure. See "Errors and Exceptions" in *Services Gatekeeper Application Developer's Guide* for more information.

Response Body

The response body contains a list of **amountTransaction** JSON data structures consisting of the parameters supplied in the payment requests.

```
{"amountTransaction": {
    "clientCorrelator": "String",
    "endUserId": "String",
    "paymentAmount": {
        "chargingInformation": {
```

```
            "amount": "Decimal",
           "currency": "String",
            "description": " String"
        },
        "totalAmountCharged": "Decimal"
    },
    "code": "String",
    "resourceURL": "URL"
    "transactionOperationStatus": "String"
}}
```

A **resourceURL** is included as a reference to the response for each transaction. The **transactionOperationStatus** provides the resource state. See "Resource States" for more information.

Examples

Example 14–5 shows a sample of a OneAPI List Transactions for Application User request.

Example 14–5 OneAPI List Transactions for Application User Request

```
GET http://example.com/1/payment/tel%3A%2B15415550100/transactions/amount
HTTP/1.1
Accept: application/json
Authorization: n0t4fr4id333
Date: Thu, 06 Feb 1976 02:51:59 GMT
```

Example 14–6 shows a sample of a OneAPI List Transactions for Application User response.

Example 14–6 OneAPI List Transactions for Application User Response

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT
{"paymentTransactionList": {
"amountTransaction": [
   {
      "endUserId": "tel:+15415550100",
      "paymentAmount": {
        "chargingInformation": {
             "amount": "9",
            "currency": "USD",
            "code": "abc123",
            "description": "Alien%20Invaders"
        },
      },
      "code": "REF-ASM600-239238",
      "resourceURL":
"https://example.com/1/payment/tel%3A%2B15415550100/transactions/amount/tx-a3c0e4e
006da40a8a5b5-045972478cc3",
      "transactionOperationStatus": "Charged"
   },
   {
      "endUserId": "tel:+15415550100",
      "paymentAmount": {
        "chargingInformation": {
            "amount": "9",
```

```
            "currency": "USD",
            "code": "def456",
            "description": "Snakes%20Alive"
          },
        },
        "code": "REF-ASM600-239568",
        "resourceURL":
"https://example.com/1/payment/tel%3A%2B15415550100/transactions/amount/tx-134sf3e
6e6405gfd904e62d8ed84343u",
        "transactionOperationStatus": "Charged"
    },
    {
        "endUserId": "tel:+15415550100",
        "paymentAmount": {
          "chargingInformation": {
             "amount": "9",
              "currency": "USD",
              "code": "wac-c116480e-316a-44e7-be76-5fde978b2f59",
              "description": "Monkey%20Tennis."
          },
        },
        "code": "REF-ASM600-239211",
        "resourceURL":
"https://example.com/1/payment/tel%3A%2B15415550100/transactions/amount/tx-391sff4
e6401gf3f404d82d9fe954545v",
        "transactionOperationStatus": "Charged"
    },
],
"resourceURL":
"https://example.com/1/payment/tel%3A%2B15415550100/transactions/amount"
}}
```

Refund Amount

The Refund Amount operation refunds a currency amount directly to a subscriber's application using the Diameter protocol.

To refund an amount to a subscriber, submit a `POST` operation request in the same format as the Charge Amount operation.

Authorization

Basic or OAuth 2.0

HTTP Method

`POST`

URI

`http://host:port/oneapi/1/payment/endUserId/transactions/amount`

Where:

host and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier (AT) services are running.

endUserId is the address of the subscriber to refund (MSISDN).

Request Header

The MIME-type for the Content-Type header field can be either **application/x-www-form-urlencoded** or **application/json**.

Request Body

The request body for the Refund Amount operation accepts the following parameters:

- **endUserId:** String. The URL-escaped end user ID. For example, a MSISDN including the '**tel**:' protocol identifier and the country code preceded by '**+**'. For example, **tel:+15415550100**.
- **transactionOperationStatus:** Enumeration.This indicates the desired resource state, in this case '**refunded**'. See "Resource States" for more information.
- **description:** String. The human-readable text to appear on the bill, so the subscriber can easily see what was refunded.
- **currency:** String. The 3-figure currency code defined in ISO4217.
- **amount**: Decimal. The amount to be refunded.
- **code:** String. The charging code, from an existing contractual description that references an operator price point.
- **clientCorrelator**: String. Uniquely identifies this refund request. If there is a communication failure during the refund request, using the same client correlator when retrying the request allows the operator to avoid applying the same refund twice.
- **onBehalfOf**: String. Optional. Allows aggregators or partners to specify the actual payee.

- **purchaseCategoryCode**: String. Optional. An indication of the content type. Values meaningful to the billing system would be published by a OneAPI implementation.
- **channel**: String. Optional. Can be "**Wap**", "**Web**", "**MMS**", or "**SMS**", depending on the source of user interaction.
- **taxAmount:** Decimal. Optional. Indicates a tax amount already charged by the merchant or application.
- **serviceID:** String. Optional. The ID of the partner or merchant service.
- **productID:** String. Optional. Combines with the **serviceID** to uniquely identify the product being refunded.

Response Header

The Location header field contains the URI:

`http://host:port/oneapi/1/payment/endUserId/transactions/amount/transactionID`

where, *transactionID* is the string identifier returned in the response body.

If the request fails, the Status-Line header field will contain the status code and the reason for the failure. See "Errors and Exceptions" in *Using the OneAPI RESTful Interfaces* for more information.

Response Body

The response body contains a confirmation **amountTransaction** JSON data structure consisting of the parameters supplied in the refund request.

```
{"amountTransaction": {
    "clientCorrelator": "String",
    "endUserId": "String",
    "paymentAmount": {
        "chargingInformation": {
            "amount": "Decimal",
           "currency": "String",
            "description": " String"
        },
        "totalAmountRefunded": "Decimal"
    },
    "code": "String",
    "resourceURL": "URL"
    "transactionOperationStatus": "String"
}}
```

A **resourceURL** is included as a reference to the response. The **transactionOperationStatus** provides the resource state. See "Resource States" for more information.

Examples

Example 14–7 shows a sample of a OneAPI Refund request.

Example 14–7 OneAPI Refund Request

```
POST http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amount
HTTP/1.1
Accept: application/json
Host: example.com:80
```

```
Content-Type: application/x-www-form-urlencoded
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

endUserId=tel%3A%2B15415550100&
transactionOperationStatus=refunded&
description= Alien%20Game&
currency=USD&
amount=10&
code=REF-12345&
clientCorrelator=54321&
onBehalfOf=Example%20Games%20Inc&
purchaseCategoryCode=Game&
channel=WAP&
taxAmount=0
```

Example 14–8 shows a sample of a OneAPI Refund response.

Example 14–8 OneAPI Refund Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT
Location:
http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amount/efg78
9

{"amountTransaction": {
    "clientCorrelator": "54321",
    "endUserId": "tel:+15415550100",
    "paymentAmount": {
        "chargingInformation": {
            "amount": "10",
            "currency": "USD",
            "description": "Alien Invaders"
        },
        "totalAmountRefunded": "10"
    },
    "code": "REF-12345",
    "resourceURL":
"http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amount/efg7
89",
    "transactionOperationStatus": "Refunded"
}}
```

Reserve Amount

The Reserve Amount operation reserves a currency amount for a subscriber account to use as future payment.

To reserve an amount for future payment, provide the address of the enduser and the billing information for the transaction.

If the Reserve Amount operation is successful, the response body contains the string identifier for the reservation.

The default expiration or timeout of reserved amounts in Services Gatekeeper is **86400** seconds. To change the timeout duration to another value:

1. Locate and unpack the following .jar file:

   *OCSG_Domain***config\store_schema\com.bea.wlcp.wlng.plugin.payment.px30.diameter.store_5.1.0.0.jar**
2. Open the **wlng-cachestore-config-extensions.xml** file for editing.
3. Locate the **<expiry expiry_age="86400"/>** parameter.
4. Edit the value by entering the number of seconds before a reservation expires.
5. Save the file.
6. Repackage the .jar file in the original location.
7. Restart the instance of Services Gatekeeper.

Changing the default expiration setting also changes the Parlay X payment reservation timeout in Services Gatekeeper.

Authorization

Basic or OAuth 2.0

HTTP Method

`POST`

URI

`http://host:port/oneapi/1/payment/endUserId/transactions/amountReservation`

Where *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier (AT) services are running.

endUserId is the address of the subscriber to charge the reservation to (MSISDN).

Request Header

The MIME-type for the Content-Type header field can be either **application/x-www-form-urlencoded** or **application/json**.

Request Body

The request body for the Reserve Amount operation accepts the following parameters:

- **endUserId**: String. The URL-escaped enduser ID. For example, a MSISDN including the '**tel:**' protocol identifier and the country code preceded by '**+**'. For example, **tel:+15415550100**.
- **transactionOperationStatus:** Enumeration. This indicates the desired resource state, in this case '**reserved**'. See "Resource States" for more information.
- **description:** String. The human-readable text to appear on the bill, so the users can easily see what they reserved.
- **currency:** String. The 3-figure currency code defined in ISO4217.
- **amount:** Decimal. The amount to be reserved.
- **code**: String. The charging code, from an existing contractual description that references an operator price point.
- **clientCorrelator:** String. Uniquely identifies this create reservation request. If there is a communication failure during the reservation request, using the same client correlator when retrying the request allows the operator to avoid applying the same reservation twice.
- **referenceSequence:** Integer. Allows Services Gatekeeper to distinguish easily between new and repeated requests in the case of a communication failure. For each transaction within a reservation sequence, iterate the referenceSequence by 1. For example:

  initial reservation use **referenceSequence**=1

  reserve additional amount use **referenceSequence**=2

  charge reservation use **referenceSequence**=3

  release reservation use **referenceSequence**=4

  If you do not need to reserve an additional amount, then the **referenceSequence** for charge reservation is 2 and the **referenceSequence** for release reservation is 3.
- **onBehalfOf**: String. Optional. Allows aggregators or partners to specify the actual payee.
- **purchaseCategoryCode:** String. Optional. An indication of the content type. Values meaningful to the billing system would be published by a OneAPI implementation.
- **channel:** String. Optional. Can be "**Wap**", "**Web**", "**MMS**", or "**SMS**", depending on the source of user interaction.
- **taxAmount**: Decimal. Optional. Indicates a tax amount already charged by the merchant or application.
- **serviceID:** String. Optional. The ID of the partner or merchant service.
- **productID**: String. Optional. Combines with the **serviceID** to uniquely identify the product being reserved.

Response Header

The Location header field contains the URI:

`http://host:port/oneapi/1/payment/endUserId/transactions/amountReservation/transactionID`

Where:

transactionID is the string identifier returned in the response body.

If the request fails, the Status-Line header field contains the status code and the reason for the failure. See “Errors and Exceptions” in *Using the OneAPI RESTful Interfaces* for more information.

Response Body

The response body contains a confirmation **amountReservationTransaction** JSON data structure consisting of the parameters supplied in the reservation request.

```
{"amountReservationTransaction": {
    "clientCorrelator": "String",
    "endUserId": "String",
    "paymentAmount": {
        "chargingInformation": {
            "amount": "Decimal",
           "currency": "String",
            "description": " String"
        },
    },
    "code": "String",
    "resourceURL": "URL"
    "transactionOperationStatus": "String"
}}
```

A **resourceURL** is included as a reference to the response. The **transactionOperationStatus** provides the resource state. See "Resource States" for more information.

Reserving Additional Amount

The Reserve Amount operation is used to update an existing reservation to request additional funds or resources. See "Charge Amount" for more information. Change the following parameters in the request for additional funds:

- **transactionOperationStatus=reserved**: Indicates that we are not changing the resource state, just the value being reserved. See "Resource States" for more information.
- **amount**: The additional reserved amount for this request (not the total amount reserved so far).
- **referenceSequence**: Each time you reserve an additional amount against an existing reservation, make sure to iterate the **referenceSequence** each time. This ensures Services Gatekeeper can distinguish between new requests for additional amounts, and those that are being repeated due to a communication failure.

Examples

Example 14–9 shows a sample of a OneAPI Reserve Amount request.

Example 14–9 OneAPI Reserve Amount Request

```
POST
http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amountReserv
ation HTTP/1.1
Accept: application/json
Host: example.com:80
Content-Type: application/x-www-form-urlencoded
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT
```

```
endUserId= tel%3A%2B15415550100&
transactionOperationStatus=reserved&
description= Streaming%20video%20of%20the%Big%20Fight&
currency=USD&
amount=10&
referenceCode=Video-abc123&
clientCorrelator=54321&
referenceSequence=1&
onBehalfOf=Example%20Video%20Inc&
purchaseCategoryCode=Video&
channel=WAP&
taxAmount=0
```

Example 14–10 shows a sample of a OneAPI Reserve Amount response.

Example 14–10 OneAPI Reserve Amount Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT
Location:
http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amountReserv
ation/abc123

{"amountReservationTransaction": {
    "clientCorrelator": "54321",
    "endUserId": "tel:+15415550100",
    "paymentAmount": {"chargingInformation": {
        "amount": "10",
        "currency": "USD",
        "description": "Streaming video of the Big Fight"
    }},
    "code": "REF-12345",
    "referenceSequence": "1",
    "transactionOperationStatus": "Reserved"
}}
```

Example 14–11 shows a sample of a OneAPI Reserve Additional Amount request.

Example 14–11 OneAPI Reserve Additional Amount Request

```
POST
http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amountReserv
ation/abc123 HTTP/1.1
Accept: application/json
Host: example.com:80
Content-Type: application/x-www-form-urlencoded
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

transactionOperationStatus=reserved&
amount=5&
code=REF-12346&
referenceSequence=2&
```

Example 14–12 shows a sample of a OneAPI Reserve Additional Amount response.

Example 14–12 OneAPI Reserve Additional Amount Response

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"amountReservationTransaction": {
    "endUserId": "tel:+15415550100",
    "paymentAmount": {
        "amountReserved": "15",
        "chargingInformation": {
            "amount": "10",
            "currency": "USD",
            "description": "Streaming Video of the Big Fight"
        },
        "totalAmountCharged": "0"
    },
    "code": "REF-12346",
    "referenceSequence": "2",
    "resourceURL": "
http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amountReserv
ation/abc123",
    "transactionOperationStatus": "Reserved"
}}
```

Charge Reservation

The Charge Reservation operation charges a previously reserved amount against a subscriber's account.

To charge a previously reserved amount to a subscriber's account, provide the information for billing, the reservation identifier obtained from the initial request to reserve funds, and the reference code for any possible disputes.

Authorization

Basic or OAuth 2.0

HTTP Method

POST

URI

`http://host:port/oneapi/1/payment/endUserId/transactions/amountReservation/transactionID`

Where:

host and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier (AT) services are running.

endUserId is the address of the subscriber to charge (MSISDN).

transactionID is the unique value generated by Services Gatekeeper from the original reservation request.

Request

Change the following parameters in the reservation request to charge against a reservation:

- **transactionOperationStatus=charged**: Indicates a change in the resource state to charge against the reservation. See "Resource States" for more information.
- **amount**: The total amount to charge against the reservation.
- **referenceSequence**: Iterate the **referenceSequence** with the charge request. This ensures the OneAPI server can distinguish between new requests for charging against a reservation, and those that are being repeated due to a communication failure.
- **description**: Update the description to reflect the completed transaction.

The **clientCorrelator** parameter is not used as the resource has already been created.

Response Header

If the request fails, the Status-Line header field contains the status code and the reason for the failure. See "Errors and Exceptions" in *Using the OneAPI RESTful Interfaces* for more information

Response Body

The response body contains a confirmation **amountReservationTransaction** JSON data structure consisting of the parameters supplied in the charge request.

```
{"amountReservationTransaction":
    "endUserId": "String",
    "paymentAmount": {
      "amountReserved":"Decimal",
        "chargingInformation": {
            "amount": "Decimal",
           "currency": "String",
            "description": " String"
        },
        "totalAmountCharged": "Decimal"
    },
    "code": "String",
    "resourceURL": "URL"
    "transactionOperationStatus": "String"
}
```

Once the charge has been applied, the **amountReserved** parameter should have a value of zero. The **totalAmountCharged** parameter contains the final amount to charge against the reservation.

A **resourceURL** is included as a reference to the response. The **transactionOperationStatus** provides the resource state. See "Resource States" for more information.

Examples

Example 14–13 shows a sample of a OneAPI Charge Amount Against Reservation request.

Example 14–13 OneAPI Charge Amount Against Reservation Request

```
POST
http://example.com/1/payment/tel%3A%2B15415550100/transactions/amountReservation/a
bc123  HTTP/1.1
Accept: application/json
Host: example.com:80
Content-Type: application/x-www-form-urlencoded
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

transactionStatus=charged&
description= Three%20rounds%20of%20the%Big%20Fight&
amount=15&
code=REF-123457&
referenceSequence=3&
```

Example 14–14 shows a sample of a OneAPI Charge Amount Against Reservation response.

Example 14–14 OneAPI Charge Amount Against Reservation Response

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT
```

```
{"amountReservationTransaction": {
    "endUserId": "tel:+15415550100",
    "paymentAmount": {
        "amountReserved": "0",
        "chargingInformation": {
            "amount": "15",
            "currency": "USD",
            "description": " Streaming Video of the Big Fight "
        },
        "totalAmountCharged": "15"
    },
    "code": "REF-123457",
    "referenceSequence": "3",
    "resourceURL": "
http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amountReserv
ation/abc123  ",
    "transactionOperationStatus": "Charged"
}}
```

Release Reservation

The Release Reservation operation returns funds left in a reservation to the subscriber account against which the reservation was made.

To return funds left in a reservation to an account, provide the *transactionID* identifier obtained from the initial reservation request.

Authorization

Basic or OAuth 2.0

HTTP Method

`POST`

URI

`http://host:port/oneapi/1/payment/endUserId/transactions/amountReservation/transactionID`

Where:

host and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier (AT) services are running

endUserId is the address of the subscriber to charge (MSISDN).

transactionID is the unique value generated by Services Gatekeeper from the original reservation request.

Request

Change the following parameters in the reservation request to release a reservation:

- **transactionOperationStatus=released**: Indicates a change in the resource state to release the reservation. See "Resource States" for more information.
- **referenceSequence**: Iterate the **referenceSequence** when releasing a reservation. This ensures the OneAPI server can distinguish between new requests for reservation release, and those that are being repeated due to a communication failure.

Response Header

If the request fails, the Status-Line header field contains the status code and the reason for the failure. See “Errors and Exceptions” in *Using the OneAPI RESTful Interfaces* for more information.

Response Body

The response body contains a confirmation **amountReservationTransaction** JSON data structure consisting of the parameters supplied in the release reservation request.

```
{"amountReservationTransaction": {
   "endUserId": "String",
   "paymentAmount": {
     "amountReserved":"Decimal",
       "chargingInformation": {
```

```
            "amount": "Decimal",
           "currency": "String",
            "description": " String"
        },
        "totalAmountCharged": "Decimal"
    },
    "code": "String",
    "resourceURL": "URL"
    "transactionOperationStatus": "String"
}}
```

Once the resource reservation has been released the **amountReserved** parameter should have a value of zero. The **totalAmountCharged** parameter contains the final amount to charge against the reservation.

A **resourceURL** is included as a reference to the response. The **transactionOperationStatus** provides the resource state. See "Resource States" for more information.

Examples

Example 14–15 shows a sample of a OneAPI Release Reservation request.

Example 14–15 OneAPI Charge Release Reservation Request

```
POST
http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amountReserv
ation/abc123  HTTP/1.1
Accept: application/json
Host: example.com:80
Content-Type: application/x-www-form-urlencoded
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

transactionOperationStatus=released&
referenceSequence=4&
```

Example 14–16 shows a sample of a OneAPI Release Reservation response.

Example 14–16 OneAPI Release Reservation Response

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"amountReservationTransaction": {
    "endUserId": "tel:+15415550100",
    "paymentAmount": {
        "amountReserved": "0",
        "chargingInformation": {
            "amount": "10",
            "currency": "USD",
            "description": "Streaming Video of the Big Fight"
        },
        "totalAmountCharged": "5"
    },
    "code": "REF-12346",
    "referenceSequence": "4",
    "resourceURL": "
```

```
http://example.com/oneapi/1/payment/tel%3A%2B15415550100/transactions/amountReserv
ation/abc123 ",
    "transactionOperationStatus": "Released"
}}
```

Resource States

The client application passes the **transactionOperationStatus** in the request body so that the resource can be placed into a desired state. Services Gatekeeper either confirms this desired state in the **transactionStatus** response field, or instead shows a failure state as shown in Table 14–1 and Table 14–2.

Table 14–1 Resource States for Charges and Refunds

Value	Description
Charged	A successful charge was made.
Refunded	A successful refund was made.
Denied	The policy exception in the response will explain the reason. For example, insufficient balance, security issue, etc.
Refused	The charge or refund was refused, or not explicitly accepted.

Table 14–2 Resource States for Reservations

Value	Description
Reserved	A successful reservation was created.
Denied	The policy exception in the response will explain the reason. For example, insufficient balance, security issue, etc.
Refused	The reservation was refused, or not explicitly accepted.
Charged	A reservation has been charged against.
Released	The reservation has ended.

Payment Exceptions

For an overview of exceptions in the Services Gatekeeper RESTful interface, see "Errors and Exceptions" in *Using the OneAPI RESTful Interfaces* for more information. A list of service and policy exceptions specific to the payment interface is provided in Table 14–3.

Table 14–3 Service Exceptions for Payment

ID	Exception Text	Variables
SVC0270	Charging operation failed, the charge was not applied	None
SVC0271	Refunds not supported	Guidance from the implementation on what to do instead should be provided
SVC0273	Refund failed	The reason the refund failed. Valid reasons include: ■ The user did not accept the refund ■ The refund request is for an amount greater than the original charge

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OneAPI Short Messaging/SMPP

This chapter describes the Oracle Communications Services Gatekeeper OneAPI Short messaging/SMPP communication service in detail.

About the OneAPI Short Messaging Interface

Applications use the RESTful OneAPI SMS interface to send and fetch SMS messages, deliver status reports, and start and stop notifications.

When the request body for an SMS operation contains a request for a delivery receipt, the application provides a **notifyURL** correlator for the message being sent and includes an endpoint address for returning the delivery notification.

The Services Gatekeeper OneAPI SMS interface complies with Open Mobile Alliance (OMA) specifications. See the discussion on OneAPI short messaging in *Services Gatekeeper Statement of Compliance* for a reference to the supported specification and RESTful bindings schema.

See "Using the OneAPI RESTful Interfaces" in *Services Gatekeeper Application Developer's Guide* for information on using the Services Gatekeeper OneAPI interfaces.

The information provided in this chapter is based on the OneAPI specification and is provided here for convenience.

REST Service Descriptions Available at Run-time

When the Administration Server for your Services Gatekeeper domain is in the running state, the OneAPI REST service descriptions of these operations are located here:

`http://host:port/oneapi/1/smsmessaging/application.wadl`

where *host* and *port* are the host name and port of the machine on which Services Gatekeeper is installed.

Sending SMS Messages

To send an SMS message, provide the OneAPI-formatted URI of the addresses that must receive the message in the request body. If the sender requires a delivery receipt, specify the required parameters for the receipt.

If the Send SMS operation is successful, the **Location** header field in the response contains the request identifier (which is also provided in the response body for this operation).

If the application requires a receipt for delivery of the message, the application must provide the **notifyURL** to which notifications are to be sent in the message body.

Authorization

Basic or OAuth 2.0

HTTP Method

`POST`

URI

`http://`*`host:port`*`/oneapi/1/smsmessaging/outbound/`*`senderAddress`*`/requests`

Where:

host and *port* are the host name and port of the machine on which Services Gatekeeper is installed.

senderAddress is the subscriber for which the message is being sent.

Request Header

The MIME-type for the Content-Type header field can be **application/x-www-form-urlencoded**, **application/json** or **application/xml**.

Request Body

The request body for the OneAPI send SMS operation accepts the following parameters:

- **address**: String. At least one address is the URL-escaped end user ID; in this case the MSISDN including the **'tel:'** protocol identifier and the country code preceded by '**+**'. i.e., **tel:+15415550100**.
- **message:** String. Must be URL-escaped as per RFC 1738. Messages over 160 characters may be sent as two or more messages by the operator.
- **senderAddress**: String. The address to whom a responding SMS may be sent.
- **clientCorrelator**: String. Optional. Uniquely identifies this create SMS request. If there is a communication failure during the request, using the same client correlator when retrying the request allows the operator to avoid sending the same SMS twice.
- **senderName:** String. Optional. The URL-escaped name of the sender to appear on the terminal. This is the address to whom a responding SMS may be sent.

If the **senderName** parameter is present, Services Gatekeeper displays the senderName value as the sender entry in the SMS message delivered to the mobile subscriber.

If the **senderName** parameter is not present, Services Gatekeeper displays the value in the senderAddress parameter as the sender entry in the SMS message delivered to the mobile subscriber.

- **notifyURL**: anyURL. The URL-escaped URL to which a notification of delivery sent. The notifyURL will be ignored if a notification subscription already exists for the senderAddress. The format of this notification is shown in Example 15–1.

  callbackData: String. Will be passed back in this notification, so you can use it to identify the message the receipt relates to or any other useful data, such as a function name.

Response Header

The Location header field contains the URI:

`http://host:port/oneapi/1/smsmessaging/outbound/address/requests/requestID`

Where *requestID* is the string identifier returned in the response body.

If the request fails, the Status-Line header field will contain the status code and the reason for the failure. For more information, see "Errors and Exceptions" in *Services Gatekeeper Application Developer's Guide*.

Response Body

The body of the response contains the request identifier as the string value for the **resourceReference** attribute. It is the request identifier returned in the **Location** header field of the response message and is also included in the resourceReference body. The application uses this request identifier to retrieve the delivery status for the sent message.

The response body for this operation is represented by the following JSON structure, where the value part of the name/value pair indicates its data type:

```
{"resourceReference": {"resourceURL": "String"}}
```

Examples

Example 15–1 shows a sample OneAPI Send SMS request.

Example 15–1 OneAPI Send SMS Request

```
POST http://example.com/oneapi/1/smsmessaging/outbound/
tel%3A%2B5550100/requests HTTP/1.1
Host: example.com:80
Content-Type: application/x-www-form-urlencoded
Accept: application/json

address=tel%3A%2B15415550100&
address=tel%3A %2B15415550101&
senderAddress=tel:%2B5550100&
message=Hello%20World&
clientCorrelator=123456&
notifyURL=http://application.example.com/notifications/DeliveryInfoNotification&
callbackData=some-data-useful-to-the-requester&
senderName=ACME%20Inc.
```

Example 15–2 shows a sample Send SMS response.

Example 15–2 OneAPI Send SMS Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Location: http://example.com/1/smsmessaging/outbound/
tel%3A%2B5550100/requests/abc123
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"resourceReference": {"resourceURL": "
http://example.com/oneapi/1/smsmessaging/outbound/
tel%3A%2B5550100/requests/abc123"}}
```

Query Delivery Status of SMS Message

The Query Delivery Status operation retrieves the delivery status of a previously-sent message by using the system-generated **requestID** returned when the message was created.

If the Query Delivery Status is successful, the response body contains the delivery status for each of the addresses contained in the original send SMS request.

Authorization

Basic or OAuth 2.0

HTTP Method

`GET`

URI

`http://`*`host:port`*`/oneapi/1/smsmessaging/outbound/`*`senderAddress`*`/requests/`*`requestID`*`/deliveryInfos`

Where:

- *host* and *port* are the host name and port of the machine on which Services Gatekeeper is installed.
- *senderAddress* is the address to which a responding SMS may be sent.
- *requestID* is the identifier returned in the **result** object of the corresponding Send operation.

Request Body

There is no request body.

Response Header

Standard header fields. If the request fails, the Status-Line header field will contain the status code and the reason for the failure. See "Errors and Exceptions" in *Using the OneAPI RESTful Interfaces* for more information.

Response Body

The response body contains an array of structures as the value for **deliveryInfo**. Each element in the array contains values for the following parameters.

- **address:** String. The telephone number to which the initial message was sent.
- **deliveryStatus:** Enumeration value. Table 15–1 lists the possible statuses:

Table 15–1 Enumeration Values for Delivery Status

Value	Description
DeliveredToNetwork	Successful delivery to the network. For concatenated messages, returned only when all the SMS-parts have been successfully delivered to the network.

Table 15–1 (Cont.) Enumeration Values for Delivery Status

Value	Description
DeliveryUncertain	Delivery status unknown, for example, if it was handed off to another network.
DeliveryImpossible	Unsuccessful delivery; the message could not be delivered before it expired.
DeliveredToTerminal	Successful delivery to the terminal. For concatenated messages, returned only when all the SMS-parts have been successfully delivered to the terminal.
MessageWaiting	The message is still queued for delivery. This is a temporary state, pending transition to one of the preceding states.

- **resourceURL**: A reference to the response.

The response body for this operation is represented by the following JSON data structure, where the value part of each name/value pair indicates its data type:

```
{"deliveryInfoList": {
    "deliveryInfo": [
        {   "address": "String",
            "deliveryStatus": "String"},
        {   "address": "String",
            "deliveryStatus": "String"}],
    "resourceURL": "
http://example.com/oneapi/1/smsmessaging/outbound/senderAddress/requests/requestID
/deliveryInfos"
}}
```

Examples

Example 15–3 shows a sample OneAPI Query Delivery Status request.

Example 15–3 OneAPI Query Delivery Status Request

```
GET
http://example.com/oneapi/1/smsmessaging/outbound/tel%3A%2B5550100/requests/abc123
/deliveryInfos HTTP/1.1
Accept: application/json
```

Example 15–4 shows a sample OneAPI Query Delivery Status response.

Example 15–4 OneAPI Query Delivery Status Response

```
HTTP/1.1 200 OK
Content-Type: application/json
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"deliveryInfoList": {
    "deliveryInfo": [
        {   "address": "tel:+15415550100",
            "deliveryStatus": "MessageWaiting"},
        {   "address": "tel:+15415550101",
            "deliveryStatus": "MessageWaiting"}],
    "resourceURL": "
http://example.com/oneapi/1/smsmessaging/outbound/tel%3A%2B5550100/requests/abc123
/deliveryInfos "
```

```
}}
```

Subscribe to SMS Delivery Notification

The Subscribe to SMS Delivery Notification operation creates a subscription to delivery notifications for an application.

To set up an SMS notification, provide the criteria which will trigger notifications and a **notifyURL** for the delivery of the notifications. The criteria can be a string which, when matched, could be the notification of an SMS received or of a delivery receipt.

The request body contains the correlator for the notification, the **notifyURL** to which the call direction notifications must be sent and, optionally, the **callbackData** (a string to identify the notification).

If the subscription request is successful:

- The response header will contain the URI of the publish/subscribe server.
- A data object associated with the result of the short message operation will be sent to the **notifyURL** address specified in the request body. This data object will contain the appropriate notification (that the message was received or a delivery receipt for the call).

Authorization

Basic or OAuth 2.0

HTTP Method

`POST`

URI

`http://`*`host:port`*`/oneapi/1/smsmessaging/outbound/`*`senderAddress`*`/subscriptions`

where:

- *host* and *port* are the host name and port of the machine on which Services Gatekeeper is installed.
- *senderAddress* is the address to whom a responding SMS may be sent.

Request Header

The MIME-type for the Content-Type header field can be **application/json**, **application/xml**, or **application/x-www-form-urlencoded**.

Request Body

The request body for the subscription operation accepts the following parameters:

- **notifyURL:** URL. This will be used by the server to POST the notifications to you, so include the URL of your own listener application
- **clientCorrelator:** String. Optional. Uniquely identifies this create subscription request. If there is a communication failure during the request, using the same client correlator when retrying the request allows the operator to avoid creating a duplicate subscription.
- **callbackData**: String. Optional. A function name or other data that you would like included when the POST is received.

Response Header

The Location header field contains the URI of the notification server:

`http://host:port/oneapi/1/smsmessaging/outbound/subscriptions/subscriptionID`

Where:

- *host* and *port* are the host name and port of the machine on which Services Gatekeeper is installed.
- *subscriptionID* is the reference to the created subscription.

If the request fails, the Status-Line header field will contain the status code and the reason for the failure. For more information, see "Errors and Exceptions" in *Services Gatekeeper Application Developer's Guide*.

Response Body

The response body contains a confirmation **deliveryReceiptSubscription** JSON data structure consisting of the parameters supplied in the subscription request.

```
{"deliveryReceiptSubscription": {
    "callbackReference": {
        "callbackData": "String",
        "notifyURL": " www.yourURL.here ",
        "criteria":"String"
    },
    "resourceURL": " URL "}}
```

A **resourceURL** is included as a reference to the response.

Notification Data Object for SMS Delivery Receipt Sent to notifyURL

After a OneAPI SMS subscription is made, Services Gatekeeper delivers a message receipt notification to the **notifyURL** specified in the subscription request.

This nested JSON object contains the following as the value of the attribute name **deliveryInfoNotification**:

- **callbackData:** String. The correlator used to identify the notification.
- **deliveryInfo:** JSON Object. Contains the following two parameters:
  - **address:** String. The message recipient's subscriber ID.
  - **deliveryStatus:** Enumeration value. Table 15–2 lists the possible statuses:

Table 15–2 Enumeration Values for Delivery Status

Value	Description
DeliveredToNetwork	Successful delivery to the network. For concatenated messages, returned only when all the SMS-parts have been successfully delivered to the network.
DeliveryUncertain	Delivery status unknown, for example, if it was handed off to another network.
DeliveryImpossible	Unsuccessful delivery; the message could not be delivered before it expired.

Table 15–2 (Cont.) Enumeration Values for Delivery Status

Value	Description
DeliveredToTerminal	Successful delivery to the terminal. For concatenated messages, returned only when all the SMS-parts have been successfully delivered to the terminal.

The notification data object delivered to the **notifyURL** address is represented by the following JSON data structure, where the value part of each name/value pair indicates its data type:

```
{"deliveryInfoNotification": {
    "callbackData": "String",
    "deliveryInfo": {
        "address": "String",
        "deliveryStatus": "Enumeration Value"},
    }}
```

Examples

Example 15–5 shows a sample OneAPI Subscribe to SMS Delivery Notifications request.

Example 15–5 OneAPI Subscribe to SMS Delivery Notifications Request

```
POST http://example.com/oneapi/1/smsmessaging/outbound/
tel%3A%2B5550100/subscriptions HTTP/1.1
Host: example.com:80
Content-Type: application/x-www-form-urlencoded
Accept: application/json

notifyURL=http://www.oracle.com&
criteria="GIGPICS"&
callbackData=doSomething()
```

Example 15–6 shows a sample OneAPI Subscribe to SMS Delivery Notifications response.

Example 15–6 OneAPI Subscribe to SMS Delivery Notifications Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Location: http://example.com/oneapip/1/smsmessaging/outbound/subscriptions/sub789
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"deliveryReceiptSubscription": {
    "callbackReference": {
        "callbackData": "doSomething()",
        "notifyURL": " www.oracle.com ",
        "criteria":"Urgent"
    },
    "resourceURL": "
http://example.com/oneapi/1/smsmessaging/outbound/subscriptions/sub789 "}}
```

Example 15–7 shows a sample OneAPI SMS Delivery Notification message.

Example 15–7 OneAPI SMS Delivery Notification Message

```
{"deliveryInfoNotification": {
    "callbackData": "12345",
    "deliveryInfo": {
        "address": "tel:+15415550100",
        "deliveryStatus": "DeliveredToNetwork"},
    }}
```

Stop Subscription to Delivery Notifications

The Stop Subscription to Delivery Notification operation terminates a previously set up SMS notification for the application.

To stop a previously set up SMS notification, provide the correlator for the notification passed earlier in the Subscribe to SMS Delivery Notification request.

There is no request or response body for the Stop Subscription to Delivery Notification operation. If the request fails, the body of the error response will contain the identifier for the notification and the type of exception.

Authorization

Basic or OAuth 2.0

HTTP Method

`DELETE`

URI

`http://`*`host:port`*`/oneapi/1/smsmessaging/outbound/subscriptions/`*`subscriptionID`*

Where:

- *host* and *port* are the host name and port of the machine on which Services Gatekeeper is installed.
- *subscriptionID* is the reference to the created subscription.

Request Body

There is no request body.

Response Header

Standard header fields. If the request fails, the Status-Line header field will contain the status code and the reason for the failure. For more information, see "Errors and Exceptions" in *Services Gatekeeper Application Developer's Guide*.

Response Body

There is no response body.

Examples

Example 15–8 shows a sample OneAPI Stop Subscription to SMS Delivery Notifications request.

Example 15–8 OneAPI Stop Subscription to Deliver Notification Request

```
DELETE http://example.com/oneapi/1/smsmessaging/outbound/subscriptions/sub789
HTTP/1.1
Accept: application/json
Host: example.com:80
```

Example 15–9 shows a sample OneAPI Stop Subscription to SMS Delivery Notifications response.

Example 15–9 OneAPI Stop Subscription to Deliver Notification Response

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2009 02:51:59 GMT
```

Retrieve Messages Sent to Web Application

The OneAPI Retrieve Messages Sent to Web Application operation polls Services Gatekeeper for the SMS messages that have been received from the network for an application.

The request header for the Retrieve Messages SMS operation contains the registration identifier necessary to retrieve the SMS messages intended for the application. This registration value should have been set up with the off-line provisioning step that enables the application to receive notification that SMS messages have been received.

There is no request body.

If the Retrieve Messages Sent to Web Application operation is successful, the response body will contain the message, the URI of the sender, the SMS service activation number, and the date and time when the message was sent.

Authorization

Basic or OAuth 2.0

HTTP Method

`GET`

URI

`http://`*`host:port`*`/oneapi/1/smsmessaging/inbound/registrations/`*`registrationID`*`/messages?maxBatchSize=X`

where:

- *host* and *port* are the host name and port of the machine on which Services Gatekeeper is installed.
- *registrationId* is the value previously set up to enable the application to receive notification that SMS messages have been received according to specified criteria.
- The value of **maxBatchSize** is the maximum number of message to return.

Request Header

The MIME-type for the accept header field is **application/json**.

Request Body

There is no request body.

Response Header

Standard header fields. If the request fails, the Status-Line header field will contain the status code and the reason for the failure. For more information, see "Errors and Exceptions" in *Services Gatekeeper Application Developer's Guide*.

Response Body

The response body is an **inboundSMSMessageList** containing an array of structures as the value for **inboundSMSMessage**. The response body also contains the following parameters:

- **inboundSMSMessage:** Array. Contains the following parameters:
  - **dateTime:** dateTime. The date and time when the message was received.
  - **destinationAddress**: String. The number or shortcode for the application.
  - **messageID:** String. A server generated message identifier.
  - **message:** String. The SMS message.
  - **resourceURL:** URL. Link to the message.
  - **senderAddress:** String. The MSISDN of the sender.
- **numberOfMessagesInThisBatch:** Integer. The total number of messages in the batch.
- **resourceURL**: URL Self-referring resource URL.

The response body for this operation is represented by the following JSON data structure, where the value part of each name/value pair indicates its data type:

```
"inboundSMSMessage": [
        {   "dateTime": "dateTime",
            "destinationAddress": "String",
            "messageId": "String",
            "message": "String",
            "resourceURL": "URL",
            "senderAddress": "String"},
```

Examples

Example 15–10 shows a sample OneAPI Retrieve Messages request.

Example 15–10 OneAPI Retrieve Messages Request

```
GET
http://example.com/oneapi/1/smsmessaging/inbound/registrations/3456/messages?maxBa
tchSize=2  HTTP/1.1
Host: example.com:80
Accept: application/json
```

Example 15–11 shows a sample OneAPI Retrieve Messages response.

Example 15–11 OneAPI Retrieve Messages Response

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: 12345
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"inboundSMSMessageList": {
    "inboundSMSMessage": [
        {   "dateTime": "2009-11-19T12:00:00",
            "destinationAddress": "3456",
            "messageId": "msg1",
            "message": "Let's Go Sharks!!",
            "resourceURL":
"http://example.com/oneapi/1/smsmessaging/inbound/registrations/3456/messages/msg1
",
            "senderAddress": "+15415550100"},
        {   "dateTime": "2009-11-19T12:00:00",
            "destinationAddress": "3456",
```

```
            "messageId": "msg2",
            "message": "Thorton Shoots! He Scores! Goal!",
            "resourceURL": "
http://example.com/oneapi/1/smsmessaging/inbound/registrations/3456/messages/msg2"
,
            "senderAddress": "+15415550100"}
    ],
    "numberOfMessagesInThisBatch": "2",
    "resourceURL":
"http://example.com/oneapi/1/smsmessaging/inbound/registrations/3456/messages",
    "totalNumberOfPendingMessages": "20"}}
```

Subscribe to Notifications of Messages Sent to Application

The Subscribe to Notifications Sent to Application operation creates a subscription to delivery notifications for when an application receives a message.

To set up an application notification, provide the **destinationAddress** that will trigger notifications and a **notifyURL** for the delivery of the notifications. The **destinationAddress** is the MSISDN, or code set up in Services Gatekeeper, to which subscribers may send an SMS to your application.

If the subscription request is successful:

- The response header contains the URI of the publish/subscribe server.
- The response contains a **resourceURL** indicating the URI of the newly created subscription.

Authorization

Basic or OAuth 2.0

HTTP Method

`POST`

URI

`http://`*`host:port`*`/oneapi/1/smsmessaging/inbound/subscriptions`

where:

- *host* and *port* are the host name and port of the machine on which Services Gatekeeper is installed.

Request Header

The MIME-type for the Content-Type header field is **application/x-www-form-urlencoded**.

Request Body

The request body for the subscription operation accepts the following parameters:

- **destinationAddress:** String. The MSISDN, or code agreed upon by the operator, to which subscribers may send an SMS to your application.
- **notifyURL:** URL. Is used by the server to POST the notifications to you, so include the URL of your own listener application.
- **criteria**: String. Optional. Case-insensitive text to match against the first word of the message, ignoring any leading whitespace. This allows you to reuse a short code among various applications, each of which can register its own subscription with different criteria.
- **notificationFormat:** Content Type. Optional. The content type in which notifications will be sent; for OneAPI only JSON is supported.
- **clientCorrelator:** String. Optional. Uniquely identifies this create subscription request. If there is a communication failure during the request, using the same

client correlator when retrying the request allows the operator to avoid creating a duplicate subscription.

- **callbackData**: String. Optional. A function name or other data that you would like included when the POST is received.

Response Header

The Location header field contains the URI of the publish/subscribe server:

```
http://host:port/oneapi/1/smsmessaging/inbound/subscriptions/subscriptionID
```

where:

- *host* and *port* are the host name and port of the machine on which Services Gatekeeper is installed.
- *subscriptionID* is the reference to the created subscription.

If the request fails, the Status-Line header field will contain the status code and the reason for the failure. For more information, see "Errors and Exceptions" in Services Gatekeeper Application Developer's Guide.

Response Body

The response body contains a confirmation **resourceReference** JSON data structure consisting of the parameters supplied in the subscription request.

```
{"resourceReference": {"resourceURL": "URL"}}
```

The **resourceURL** indicates the URI of the newly created subscription.

Notification Data Object for Application Notification Message Sent to notifyURL

After a OneAPI Application Notification subscription is made, Services Gatekeeper delivers a message receipt notification to the specified **notifyURL** in the subscription request.

This nested JSON object contains the following parameters as the value of the attribute name **inboundSMSMessageNotification**:

- **callbackData:** String. The correlator used to identify the notification.
- **inboundSMSMessage:** Array. Contains the following parameters:
  - **dateTime:** dateTime. The date and time when the message was received.
  - **destinationAddress:** String. The number or shortcode for the application.
  - **messageID:** String. A server-generated message identifier.
  - **message:** String. The SMS message.
  - **resourceURL:** URL. A link to the message.
  - **senderAddress:** String. The MSISDN of the sender.

The notification data object delivered to the **notifyURL** address is represented by the following JSON data structure, where the value part of each name/value pair indicates its data type:

```
{"inboundSMSMessageNotification": {
    "callbackData": "String",
    "inboundSMSMessage": {
        "dateTime": "dateTime",
```

```
        "destinationAddress": "String",
        "messageId": "String",
        "message": "String",
        "senderAddress": "String"
    }
}}
```

Examples

Example 15–12 shows a sample OneAPI Subscribe to Notifications of Messages Sent to Applications request.

Example 15–12 OneAPI Subscribe to Notifications of Messages Sent to Applications Request

```
POST http://example.com/oneapi/1/smsmessaging/inbound/subscriptions HTTP/1.1
Host: example.com:80
Content-Type: application/x-www-form-urlencoded
Accept: application/json

destinationAddress=3456&
notifyURL=http://www.yoururl.here/notifications/DeliveryInfoNotification&
criteria=Vote&
notificationFormat=JSON&
callbackData=doSomething()&
clientCorrelator=12345
```

Example 15–13 shows a sample OneAPI Subscribe to Notifications of Messages Sent to Applications response.

Example 15–13 OneAPI Subscribe to Notifications of Messages Sent to Application Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Location: http://example.com/oneapi/1/smsmessaging/inbound/subscriptions/sub678
Content-Length: 254
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"resourceReference": {"resourceURL":
"http://example.com/oneapi/1/smsmessaging/inbound/subscriptions/sub678"}}
```

Example 15–14 shows a sample OneAPI Application Notification Message.

Example 15–14 OneAPI Application Notification Message

```
{"inboundSMSMessageNotification": {
    "callbackData": "12345",
    "inboundSMSMessage": {
        "dateTime": "2009-11-19T12:00:00",
        "destinationAddress": "3456",
        "messageId": "mes1234",
        "message": "Vote for Mega Boy Band",
        "senderAddress": "+15415550100"
    }
}}
```

Stop Subscription to Application Message Notifications

The Stop Subscription to Application Message Notification operation terminates a previously set up application message notification subscription.

To stop a previously set up subscription, provide the correlator for the notification passed earlier in the Subscribe to Notifications of Messages Sent to Application request.

There is no request or response body for the Stop Subscription to Notifications of Messages Sent to Application operation. If the request fails, the body of the error response will contain the identifier for the notification and the type of exception.

Authorization

Basic or OAuth 2.0

HTTP Method

`DELETE`

URI

`http://`*`host:port`*`/oneapi/1/smsmessaging/inbound/subscriptions/`*`subscriptionID`*

where:

- *host* and *port* are the host name and port of the machine on which Services Gatekeeper is installed.
- *subscriptionID* is the reference to the created subscription.

Request Body

There is no request body.

Response Header

Standard header fields. If the request fails, the Status-Line header field will contain the status code and the reason for the failure. For more information, see "Errors and Exceptions" in *Services Gatekeeper Application Developer's Guide*.

Response Body

There is no response body.

Examples

Example 15–15 shows a sample OneAPI Stop Subscription to Notifications of Messages Sent to Application request.

Example 15–15 OneAPI Stop Subscription to Notifications of Messages Sent to Application Request

```
DELETE http://example.com/oneapi/1/smsmessaging/inbound/subscriptions/sub123
HTTP/1.1
Accept: application/json
Host: example.com:80
```

Example 15–16 shows a sample OneAPI Stop Subscription to Notifications of Messages Sent to Application response.

Example 15–16 OneAPI Stop Subscription to Notifications of Messages Sent to Application Response

```
HTTP/1.1 204 No content
Accept: application/json
Date: Thu, 04 Jun 2009 02:51:59 GMT
```

16

OneAPI Terminal Location/MLP

This chapter describes the Oracle Communications Services Gatekeeper OneAPI Terminal Location/MLP communication service in detail.

About the Terminal Location Interface

Applications use the RESTful OneAPI Terminal Location interface to get a location for an individual terminal or a group of terminals.

The Services Gatekeeper OneAPI Location interface complies with Open Mobile Alliance (OMA) specifications. See the discussion about OneAPI terminal location in *Services Gatekeeper Statement of Compliance* for a reference to the supported specification and RESTful bindings schema.

See "Using the OneAPI RESTful Interfaces" in *Services Gatekeeper Application Developer's Guide* for general information on using the OneAPI RESTful interfaces.

The information provided in this document is based on the OneAPI specification and is provided here for convenience.

REST Service Descriptions Available at Run-time

When the Administration Server for your Services Gatekeeper domain is in the running state, the REST service descriptions of these operations are located here:

`http://host:port/oneapi/1/terminallocation/application.wadl`

Where *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier (AT) services are running.

Query Mobile Terminal Location

The Query Terminal Location operation retrieves the location of one or more terminals.

To retrieve the location of a specific terminal, provide its URI as the address value of the query object in the Request-URI of the GET method. Repeat the address parameter in the request for multiple terminals.

If the Query Terminal Location operation is successful, the response body contains a nested JSON data object containing the physical coordinates of each specific terminal and the date and time for when such data was last collected.

A **locationRetrievalStatus** is also provided for each terminal in the response body.

Authorization

Basic or OAuth 2.0

HTTP Method

`GET`

URI

`http://`*`host`*`:`*`port`*`/oneapi/1/terminallocation/queries/location?${`*`query`*`}`

Where:

- *host* and *port* are the host name and port of the machine on which the Services Gatekeeper Access Tier (AT) services are running.
- *${query}* contains the following parameters:
  - **address:** String. The MSISDN of the mobile device to locate. Repeat the address parameter for multiple devices. The protocol and '**+**' identifier must be used for MSISDN, and must be URL-escaped. **%3A** represents '**:**' and **%2B** represents '**+**'.
  - **requestedAccuracy:** Integer. The preferred accuracy of the result, in meters. Typically, when you request an accurate location, it will take longer to retrieve than a coarse location. For example, **requestedAccuracy=10** will take longer than **requestedAccuracy=100**.

Request Header

The MIME-type for the Content-Type header field is **application/json**.

Request Body

There is no request body.

Response Header

Standard header fields. If the request fails, the Status-Line header field contains the status code and the reason for the failure. For more information, see the discussion about "Errors and Exceptions" in *Services Gatekeeper Application Developer's Guide*.

Response Body

The location of the specific terminal is returned in the body of the response as the value of the **terminalLocation** JSON object. For more than one terminal, a **terminalLocationList** consisting of multiple **terminalLocation** objects are returned.

The parameters in this object are:

- **address:** String. Denotes the terminal located (local and international numbers are supported).
- **currentLocation:** JSON Object. Contains the following parameters:
  - **accuracy:** Integer
  - **altitude:** Integer
  - **latitude:** Number (floating point)
  - **longitude**: Number (floating point)
  - **timestamp:** String. The date and time when the terminal's geographical coordinates were collected, given in ISO 8601 extended format, `yyyy-mm-ddThh-mm-ss`.
- **locationRetrievalStatus:** String. Contains one of the possible values:
  - **Retrieved:** Successful retrieval of the terminal location for the address
  - **Not Retrieved:** Services Gatekeeper was unable to locate the terminal location for the address
  - **Error:** A service policy or exception has occurred. For more information, see the discussion about "Errors and Exceptions" in *Services Gatekeeper Application Developer's Guide*.

The response body for this operation is represented by the following JSON data structure, where the value part of the name/value pair indicates its data type. A response containing multiple terminal locations are contained in a **terminalLocationList** structure, as in Example 16–4, "Query Multiple Mobile Terminals Location Response".

```
{"terminalLocation": {
    "address": "String",
    "currentLocation": {
        "accuracy": "Integer",
        "altitude": "Float",
        "latitude": "Float",
        "longitude": "Float",
        "timestamp": "Calendar"
    },
```

Examples

Example 16–1 shows a sample of a OneAPI Single Mobile Terminal Location request.

Example 16–1 Query Single Mobile Terminal Location Request

```
GET
http://example.com/oneapi/1/terminallocation/queries/location?&address=tel&3A%2B15
415550100&requestedAccuracy=1000 HTTP/1.1
Host: example.com:80
Accept: application/json
```

Example 16–2 shows a sample of a OneAPI Single Mobile Terminal response.

Example 16–2 Query Single Mobile Terminal Location Response

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: 1234
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"terminalLocationList": {"terminalLocation": {
    "address": "tel:15415550100",
    "currentLocation": {
        "accuracy": "100",
        "altitude": "1001.0",
        "latitude": "-80.86302",
        "longitude": "41.277306",
        "timestamp": "2009-06-03T00:27:23.000Z"
    },
    "locationRetrievalStatus": "Retrieved"
}}}
```

Example 16–3 shows a sample of a OneAPI Multiple Mobile Terminals Location request.

Example 16–3 Query Multiple Mobile Terminals Location Request

```
GET
http://example.com/oneapi/1/terminallocation/queries/location?&address=tel%3A%2B15
415550100&address=tel%3A%2B15415550101&requestedAccuracy=1000 HTTP/1.1
Host: example.com:80
Accept: application/json
```

Example 16–4 shows a sample of a OneAPI Multiple Mobile Terminals Location request.

Example 16–4 Query Multiple Mobile Terminals Location Response

```
HTTP/1.1 200 OK
X-Powered-By: Servlet/2.5
Server: Example/v3
Content-Type: application/json
Content-Length: 1234
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"terminalLocationList": {"terminalLocation": [
    {   "address": "tel:15415550100",
        "currentLocation": {
            "accuracy": "100",
            "altitude": "1001.0",
            "latitude": "-80.86302",
            "longitude": "41.277306",
            "timestamp": "2009-06-03T00:27:23.000Z"},
        "locationRetrievalStatus": "Retrieved"},
    {   "address": "tel:15415550101",
        "errorInformation": {
            "messageId": "SVC0001",
            "text": "A service error occurred. %1 %2",
            "variables": ["Location information is not available for",
"tel:15415550101"]
        },
        "locationRetrievalStatus": "Error"
    }
]}}
```

17

Extended Web Services Binary SMS/SMPP

This chapter describes the Oracle Communications Services Gatekeeper Extended Web Services (EWS) Binary SMS/Short Message Peer to Peer (SMPP) Communication Service in detail.

Overview of the EWS Binary SMS/SMPP

The EWS Binary SMS/SMPP communication service allows applications to send and receive generic binary object attachment, such as vCards. It exposes the Oracle Extended Web Services Binary SMS interface.

The communication service acts as an External Short Message Entity (ESME) that connects to a Short Messaging Service Center (SMSC) over TCP/IP.

For the exact version of the standards that the EWS Binary SMS/SMPP communication service supports for the application-facing interfaces and the network protocols, see *Services Gatekeeper Statement of Compliance*.

Using the EWS Binary SMS/SMPP communication service an application can:

- Send short messages with binary attachments to one or more destination addresses.
- Subscribe and unsubscribe for network-triggered binary short messages with binary attachments.
- Receive network-triggered short messages with binary attachments.

The actual message element is made up of an array of UDH and message parts, encoded in Base64. See "3rd Generation Partnership Project; Technical Specification Group Terminals; Technical realization of the short message service (SMS); (Release 6) 3GPP 23.040 Version 6.5.0" at:

http://www.3gpp.org/ftp/Specs/html-info/23040.htm

The send message operation gives an application the flexibility to manipulate the SMPP UDH and message data. The UDH and message data elements are each optional, but both cannot be null at the same time; otherwise no data would be sent at all. The overall **binaryMessage** element is required. The contents of the UDH and the message can be of any binary data, although any byte array should be less than 140 bytes due to SMPP limitations, and the number of BinaryMessage arrays should be less than the **SegmentsLimit** specified in OAM. The default value is 1024. See the **segmentsLimit** attribute to **SmsMBean** for details.

This communication service supports automatic chunking of oversized binary SMS messages to handle messages that exceed the maximum size limits that switches enforce for a single SMS request. Oversized unsegmented messages are automatically

divided into size-conforming individual messages. This feature is supported for SMSs using user data header (UDH) and Sar headers, and you must select the header your implementation uses. The default is UDH. See *Configuring Automatic Chunking of Binary SMSs* for in *Services Gatekeeper Application Developer's Guide* for details.

The notification operation gives the application access to an array of SMPP UDHs, the SMPP DCS, the protocol identifier according to 3GPP 23.040 Version 6.5.0, and other data such as sender address, destination address and timestamp of the message.

SMPP expects the sender name value to be in ASCII characters. The use of non-ASCII characters may cause the request to become garbled or even be removed at the SMSCS

Services Gatekeeper provides support for the billing identification identifier, **smpp_billing_id**, defined in SMPP Specification 5.1, through the use of a tunneled parameter. It also supports the **ussd_service_operation**, which was added as an optional parameter to the **deliverSM** operation as a tunneled parameter in SMPP v 5.1. See the descriptions of the **smpp_billing_id** and **ussd_service_operation** tunneled parameters in "Parlay X 2.1 Short Messaging/SMPP" for more information.

Send Receipts

Send receipts are acknowledgements that the network node has received the short message from the application by Services Gatekeeper. Although a single short message may be sent to multiple destination addresses, normally only one send receipt is returned to the application by Services Gatekeeper. The receipt is returned synchronously in the response message to the **sendBinarySms** operation.

Delivery Receipts

Delivery receipt notifications can be set up using the **sendBinarySms** operation, but the actual asynchronous delivery of receipts is accomplished using the Parlay X 2.1 Short Messaging interface. See "Delivery Receipts" in "Parlay X 2.1 Short Messaging/SMPP" for information on delivery receipts.

Connection Handling and Provisioning

The EWS Binary SMS/SMPP communication service uses the Services Gatekeeper SMPP Server Service to establish and manage southbound connections between Services Gatekeeper and Short Message Service Centers (SMSCs). The SMPP Server Service is deployed as an Oracle WebLogic Server Service.

The SMPP Server Service provides these services for the Parlay X 2.1 Short Messaging and Native SMPP plug-ins as well as for EWS Binary SMS/SMPP.

For information about configuration options pertaining to these client connections, see the "System Properties for SMPP Server Service" and "Reference: Attributes and Operations for SMPP Server Service" sections.

The client connection ID is created on the plug-in's successful bind with the SMSC. The connection ID changes on a successful rebind.

For information about connection handling and provisioning, multiple connections and multiple plug-in instances, windowing, and load balancing/high availability, see the applicable sections in "Parlay X 2.1 Short Messaging/SMPP".

Application Interfaces

For information on the application interface for the EWS Binary SMS/SMPP communication service, see the discussion about extended web services binary SMS in *Services Gatekeeper Application Developer's Guide*.

For information about the RESTful Call Notification interface, see the discussion on binary short messaging in *Services Gatekeeper Application Developer's Guide*.

The RESTful Service Call Notification interfaces provide RESTful access to the same functionality as the application interfaces. The internal representations are identical, and for the purposes of creating SLAs and reading CDRs, and so on, they are the same.

Events and Statistics

For general information, see "Events, Alarms, and Charging".

The Extended Web Services Binary SMS/SMPP communication service generates event data records (EDRs), charging data records (CDRs), alarms, and statistics to assist system administrators and developers in monitoring the service.

Event Data

Table 17–1 lists the IDs of the EDRs created by the EWS Binary SMS/SMPP communication service. This list does not include EDRs created when exceptions are thrown.

Table 17–1 EDRs Generated by EWS Binary SMS /SMPP

EDRID	Method Called
7101	sendBinarySms
7201	startBinarySmsNotification
7202	stopBinarySmsNotification
7204	notifyBinarySmsDeliveryReceipt
7205	notifyBinarySmsReception

See "Events and Statistics" for the list of EDRs generated by the SMPP Server Service.

Charging Data Records

EWS Binary SMS/SMPP-specific CDRs are generated under the following conditions:

- After a mobile-terminated **sendBinarySms** request is sent from Services Gatekeeper to the network.
- After a a network-triggered binary SMS message has been successfully delivered to the application.

Statistics

Table 17–2 maps methods invoked from either the application or the network to the transaction types collected by the Services Gatekeeper statistics counters.

Table 17–2 Methods and Transaction Types for EWS Binary SMS/SMPP

Method	Transaction type
sendBinarySMS	TRANSACTION_TYPE_MESSAGING_SEND
receivedMobileOriginatedBinarySMS	TRANSACTION_TYPE_MESSAGING_RECEIVE

Alarms

For the list of alarms, see *Services Gatekeeper Alarms Handling Guide*.

Managing EWS Binary SMS/SMPP

The properties, workflow, tunneled parameters and management operations for the EWS Binary SMS/SMPP communication service are identical to those provided for the Parlay X 2.1 Short Messaging/SMPP communication service.

For details, see:

- Managing Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP
- Properties for Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP
- Configuration Workflow for Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP
- Management Operations in the SMPP Server Service
- Set the fields and methods for the **SmsMBean** from the Administration Console or a Java application. For information on the methods and fields, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*
- Tunneled Parameters for Parlay X 2.1 Short Messaging / SMPP

18

Extended Web Services Quality of Service /Diameter

This chapter describes the Oracle Communications Services Gatekeeper Extended Web Services Quality of Service (QoS)/Diameter communication service in detail.

See *Services Gatekeeper Application Developer's Guide* for information on the QoS RESTful interface.

Understanding the EWS Quality of Service/Diameter Communication Service

The Services Gatekeeper Extended Web Services Quality of Service (QoS)/Diameter communication service provides applications with a RESTful interface that allows them to control the quality of a subscriber connection. Among the connection quality aspects that the QoS feature can control include limiting and boosting subscriber connection bandwidth, as well as tuning connection latency. The QoS RESTful interface allows the application to initiate the following operations:

- Apply a QoS policy
- Apply a QoS policy based upon a pre-defined template
- Modify an existing QoS policy
- Remove an existing QoS policy
- Register and unregister for QoS-related events
- Query a QoS policy

While the Services Gatekeeper QoS feature enables an application to control QoS, actually executing the applied QoS policy and applying quality changes to a subscriber connection requires a separate Policy and Charging Rule Function (PCRF), such as Oracle Communications Policy Controller, working in conjunction with a Policy and Charging Enforcement Function (PCEF), solutions which are provided by various third parties.

Note: Services Gatekeeper applies a QoS plan to a subscriber ID and a framed IP address. Applying QoS plans to individual data streams for a particular subscriber ID is not supported.

Using Degraded Mode

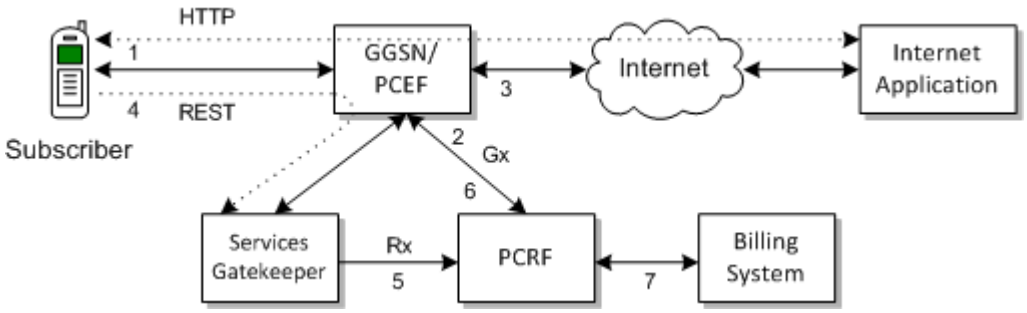
This communication service offers a degraded mode feature to multi-tier Services Gatekeeper implementations that use databases on standalone systems. Degraded mode allows your implementation to continue processing traffic using Oracle coherence storage in the event that the database becomes unavailable for any reason. Processing time is not degraded, however this is intended as a short-term solution. Your coherence memory is limited and can fill up depending on your request rate and the size of your coherence memory. Once the coherence memory is full, your implementation will no longer process requests.

To use this feature you must configure your Oracle Coherence settings; see "Configuring Coherence to Use Degraded Mode" for details.

An Example End to End QoS Solution

While Services Gatekeeper can apply and remove QoS plans, it provides no capability for actually enforcing QoS changes; instead it works in conjunction with PCRF and PCEF servers. Figure 18–1 illustrates a typical end to end QoS solution:

Figure 18–1 An Example End to End QoS Solution



In Figure 18–1:

1. A subscriber's mobile device is registered with the Gateway GPRS Support Node (GGSN) or the PCEF.
2. The GGSN or PCEF requests a default QoS plan from the PCRF.
3. Once the QoS plan is returned from the PCRF, the GGSN or PCEF executes that plan and connects the subscriber's device to the Internet.
4. A subscriber application sends a RESTful request to Services Gatekeeper for a change in QoS.
5. Services Gatekeeper sends the QoS request to the PCRF using the Rx protocol.
6. The PCRF pushes the new QoS plan to the PCEF using the Gx protocol, and the PCEF executes that plan.
7. The PCRF interfaces with BRM or another billing management system to charge the subscriber appropriately.

Application Interfaces

For information about the RESTful-based interface for the Extended Web Services Quality of Service (QoS)/Diameter communication service, see the discussion of QoS interfaces in the *Services Gatekeeper Application Developer's Guide*, another document in this set.

Events and Statistics

The Extended Web Services Quality of Service (QoS)/Diameter communication service generates Event Data Records (EDRs) and alarms, to assist system administrators and developers in monitoring the service.

For general information, see "Events, Alarms, and Charging".

Event Data Records

Table 18–1 lists IDs of the EDRs created by the Extended Web Services Quality of Service (QoS)/Diameter communication service.

Table 18–1 EDRs Generated Quality of Service/Diameter Communication Service

EDR ID	Method Called
91801	ApplyQoSFeatureResponse and applyQoSFeature
91802	QoSStatus and getQoSStatus
91803	ActualProperties and modifyQoSFeature
91804	removeQoSFeature
91805	QoSFeatureExpiration
91806	startQoSNotification
91807	stopQoSNotification
91808	sendInitAAR
91809	sendModifyAAR
91810	sendSTR
91811	handleRxRAR
91812	applicationQoSNotification_NotifyQoSEvent
91813	Application Tier: ApplyQoSFeatureResponse and applyQoSFeature
91814	Application Tier: QoSStatus and getQoSStatus
91815	Application Tier: ActualProperties and modifyQoSFeature
91816	Application Tier: removeQoSFeature
91817	Application Tier: startQoSNotification
91818	Application Tier: stopQoSNotification
91819	applyTemplateBasedQoS
91820	modifyTemplateBasedQoS
91821	Application Tier: applyTemplateBasedQos

Alarms

For the list of QoS-related alarms, see *Services Gatekeeper Alarms Handling Guide*.

Specifications for the EWS Quality of Service/Diameter Communication Service

Table 18–2 lists the technical specifications for the Extended Web Services Quality of Service (QoS)/Diameter communication service.

Table 18–2 Elements of the Extended Web Services Quality of Service/ Diameter Communication Service

Element	Description
Managed object in Administration Console	To access this object, select *domain_name*, then **OCSG**, AdminServer, **Communication Services**, and then **Plugin_qos_diameter***n* in that oder. Here, *n* is the number of the particular plug-in instance.
MBean	Domain=**com.bea.wlcp.wlng** Deployment Name=wlng_nt_qos#6.0.0.0 InstanceName=Plugin_qos_diameter*n* where *n* is the number of the particular plug-in instance Type=**oracle.ocsg.plugin.qos.diameter.management.QoSMBean**
Network protocol plug-in service ID	Plugin_qos_diameter
Network protocol plug-in instance ID	Plugin_qos_diamter*n* where *n* is the number of the particular plug-in instance
Supported address scheme	tel
Application-facing interface	RESTful
Network-facing interface	Diameter Rx
Service type	QoS RESTful management interface
Deployment artifacts	**wlng_at_qos_rest.ear**, **wlng_nt_qos_rest.ear**, **com.bea.wlcp.wlng.plugin.qos.diameter.store_6.0.0.0.jar**, and **RestfulQoSClient.jar** (PTE)

Managing the EWS Quality of Service/Diameter Communication Service

This section describes properties and workflows for the Extended Web Services Quality of Service (QoS)/Diameter communication service plug-in instance.

General Configuration Workflow

The following procedure provides an outline to configure the Extended Web Services Quality of Service (QoS)/Diameter plug-in using the Administration Console or an MBean browser.

1. Select **wlng**, then **PluginManager**, and then **createPluginInstance**.
2. Set **PluginServiceId** to *Plugin_qos_diameter* and **PluginInstanceId** to *Plugin_qos_diameter**n*** where *n* is an integer that is not already in use by an existing QoS plug-in instance.
3. Select **wlng** then **PluginManager** then **addRoute**.

4. Set **PluginInstanceId** to the id you configured in step 2 and enter an appropriate value for **AddressExpression** depending upon your Services Gatekeeper configuration.
5. Select the MBean **wlng_nt_qos#6.0.0.0** and select the plug-in instance you created in step 2.
6. Select **wlng_nt_qos#6.0.0.0** then select the plug-in you created in step 2. Expand **QoSMBean** and configure the plug-in instance attributes:
   - Attribute: DestinationHost
   - Attribute: DestinationPort
   - Attribute: DestinationRealm
   - Attribute: OriginHost
   - Attribute: OriginPort
   - Attribute: OriginRealm

   Note: `DestinationHost` and `DestinationPort` should be the correct values for your PCRF.
7. Ensure that your PCRF is listening on the **DestinationPort** configured for the QoS plug-in.

Configuring Coherence to Use Degraded Mode

Degraded mode uses coherence storage for processing in the even that an external database is unavailable. You need to configure the coherence storage cache settings from write-through to use both write-behind and refresh-ahead, and specify the database tables to use for processing.

See "Using Degraded Mode" for a discussion on when to use this option.

See "Caching Data Sources" in *Developing Applications with Oracle Coherence* for a discussion of the write-through, write-behind, and refresh-ahead options. See "Managing and Configuring the Storage Service" in *Services Gatekeeper System Administrator's Guide* for instructions on how to change this setting in Services Gatekeeper.

To configure degraded mode:

1. Open the *Gatekeeper_home*/**modules/com.bea.wlcp.wlng.storage.tc_6.0.0.0.jar/gk-coherence-cache-config.xml** file for editing.
2. Configure the coherence cache to use write-behind and refresh-ahead as shown in the example below. This example sets up a write-behind cache with a write-requeue-threshold of **10**, a refresh-ahead factor of **0.5**, and an expiry-delay of 20 seconds.

```
<distributed-scheme>
  <scheme-name>default-wlng-write-behind</scheme-name>
  <service-name>DistributedCache</service-name>
  <backing-map-scheme>
    <read-write-backing-map-scheme>
      <internal-cache-scheme>
        <local-scheme>
          <scheme-ref>default-rw-local-scheme</scheme-ref>
        </local-scheme>
```

```
            </internal-cache-scheme>
            <cachestore-scheme>
              <class-scheme>
                <scheme-ref>default-db-class-scheme</scheme-ref>
              </class-scheme>
            </cachestore-scheme>
            <read-only>false</read-only>
            <write-delay>20s</write-delay>
            <write-batch-factor>0.2</write-batch-factor>

            <write-requeue-threshold>10</write-requeue-threshold>
            <refresh-ahead-factor>0.5</refresh-ahead-factor>
            <expiry-delay>20s</expiry-delay>

          </read-write-backing-map-scheme>
        </backing-map-scheme>
        <autostart>true</autostart>
      </distributed-scheme>
```

3. Save and close the file.
4. Open the *domain_home*/**config/stora_schema/com.bea.wlcp.wlng.plugin.qos.diameter.store_5.1.0.0.jar/wlng-cachestore-config-extensions.xml** file for writing.
5. Change the table type names for these database tables in the **wlng-cachestore-config-extensions.xml** file:
   - **rest_qos_session_data**
   - **rest_qos_notification_corres**
   - **rest_qos_notification_register**
   - **rest_qos_template**

   You need to change the **type_id** of these tables from `wlng.db.`**wt** to `wlng.db.`**wb**. For example, change `wlng.db.`**wt**`.plugin.qos.diameter.session_data` to `wlng.db.`**wb**`.plugin.qos.diameter.session_data.`

   Example 18–1 shows these tables with the correct table names:

Example 18–1 Changing the rest_qos tables in wlng-cachestore-config-extensions.xml

```
- <store type_id="wlng.db.wb.plugin.qos.diameter.session_data" db_table_
name="rest_qos_session_data">
- <identifier>
  <classes key-class="java.lang.String"
value-class="oracle.ocsg.plugin.qos.diameter.store.AFSessionData" />
  </identifier>
  </store>
- <query name="com.bea.wlcp.wlng.plugin.qos.diameter.SessionDataQuery">
- <sql>
- <![CDATA[ SELECT * FROM rest_qos_session_data WHERE sessionId = ?
  ]]>
  </sql>
  <filter-class>oracle.ocsg.plugin.qos.diameter.store.FilterImpl</filter-class>
  </query>
- <query name="com.bea.wlcp.wlng.plugin.qos.diameter.SessionDataQueryByNodeId">
- <sql>
- <![CDATA[ SELECT * FROM rest_qos_session_data WHERE nodeid = ?
  ]]>
  </sql>
```

```
  <filter-class>oracle.ocsg.plugin.qos.diameter.store.FilterImpl</filter-class>
  </query>
- <db_table name="rest_qos_notification_corres" desc="qos notification
correlator">
  <key_column name="correlator" data_type="VARCHAR(255)" desc="correlator" />
  <bucket_column name="correlatorData" desc="correlator data" />
  </db_table>
- <store type_id="wlng.db.wb.plugin.qos.diameter.notification.correlator" db_
table_name="rest_qos_notification_corres">
- <identifier>
  <classes key-class="java.lang.String"
value-class="oracle.ocsg.plugin.qos.diameter.store.CorrelatorData" />
  </identifier>
  </store>
- <query name="com.bea.wlcp.wlng.plugin.qos.diameter.CorrelatorQuery">
- <sql>
- <![CDATA[ SELECT * FROM rest_qos_notification_corres
  ]]>
  </sql>
  <filter-class>oracle.ocsg.plugin.qos.diameter.store.FilterImpl</filter-class>
  </query>
- <db_table name="rest_qos_notification_register" desc="">
- <multi_key_column name="endUserId" data_type="VARCHAR(255)" desc="">
- <methods>
  <get_method name="getEndUserId" />
  <set_method name="setEndUserId" />
  </methods>
  </multi_key_column>
- <multi_key_column name="eventCriteria" data_type="INT" desc="">
- <methods>
  <get_method name="getEvent" />
  <set_method name="setEvent" />
  </methods>
  </multi_key_column>
  <bucket_column name="qoSRegisterData" desc="The register data of the qos
notification" />
- <value_column name="correlator" data_type="VARCHAR(255)" desc="correlator from
client(parlayRest)">
- <methods>
  <get_method name="getCorrelator" />
  <set_method name="setCorrelator" />
  </methods>
  </value_column>
- <value_column name="endpoint" data_type="VARCHAR(255)" desc="end point">
- <methods>
  <get_method name="getEndPoint" />
  <set_method name="setEndPoint" />
  </methods>
  </value_column>
  </db_table>
- <store type_id="wlng.db.wb.plugin.qos.diameter.qos_register_data" db_table_
name="rest_qos_notification_register">
- <identifier>
  <classes
key-class="oracle.ocsg.plugin.qos.diameter.store.QoSEventRegistrationKey"
value-class="oracle.ocsg.plugin.qos.diameter.store.QoSEventRegistration" />
  </identifier>
  </store>
- <query
name="com.bea.wlcp.wlng.plugin.qos.diameter.NotificationRegisterQueryByCorrelator"
```

```
>
- <sql>
- <![CDATA[ SELECT * FROM rest_qos_notification_register WHERE correlator = ?
  ]]>
  </sql>
  <filter-class>oracle.ocsg.plugin.qos.diameter.store.FilterImpl</filter-class>
  </query>
- <db_table name="rest_qos_template" desc="">
- <multi_key_column name="pluginInstanceId" data_type="VARCHAR(255)" desc="">
- <methods>
  <get_method name="getPluginId" />
  <set_method name="setPluginId" />
  </methods>
  </multi_key_column>
- <multi_key_column name="matchRule" data_type="VARCHAR(255)" desc="">
- <methods>
  <get_method name="getMatchRule" />
  <set_method name="setMatchRule" />
  </methods>
  </multi_key_column>
  <bucket_column name="qoSTemplateData" desc="The template data of the apply qos
request" />
- <value_column name="content" data_type="BLOB" desc="template configuration in
xml style">
- <methods>
  <get_method name="getContent" />
  <set_method name="setContent" />
  </methods>
  </value_column>
  </db_table>
```

6. Save and close the file.
7. If the domain is running, stop and restart it.

Managing Extended Web Services Quality of Service Templates

Using the Administration Console or an MBean browser such as the Platform Test Environment, you can perform the following operations on QoS templates:

- Load a QoS Template
- Retrieve an Existing QoS Template
- List Match Rules for a QoS Template
- Delete a QoS Template

The creation of QoS templates and the usage of the QoS RESTful interface is covered in detail in the *Services Gatekeeper Application Developer's Guidee*, another document in this document set.

Load a QoS Template

For more information creating QoS templates, see the discussion on template-based apply QoS in *Services Gatekeeper Application Developer's Guide*, another document in this document set. Once you have created a QoS template, to load it, do the following.

1. Select the MBean **wlng_nt_qos#6.0.0.0** and select the plug-in instance you wish to configure.
2. Expand **QoSMBean** and select **loadQoSRequestTemplate**.

3. In the **MatchRule** text box, enter a regular expression that matches the subscriber identifiers you want associated with the QoS template.
4. In the **Content** text box, paste in the contents of a valid QoS template.
5. Execute the MBean operation.

The QoS template is loaded and available for use. See "Operation: loadQoSRequestTemplate" for more details.

Retrieve an Existing QoS Template

To retrieve an existing QoS template, do the following.

1. Select the MBean **wlng_nt_qos#6.0.0.0** and select the plug-in instance you wish to configure.
2. Expand **QoSMBean** and select **retrieveQoSRequestTemplate**.
3. In the **MatchRule** text box, enter a regular expression that matches the subscriber identifiers you have associated with a QoS template. If you are not sure which MatchRules are defined, you can use the **listQoSRequestTemplateMatchRules** operation.
4. Execute the MBean operation.

The QoS template is returned in the **Output** text box. See "Operation: retrieveQoSRequestTemplate" for more details.

List Match Rules for a QoS Template

To list match rules for a QoS template, do the following.

1. Select the MBean **wlng_nt_qos#6.0.0.0** and select the plug-in instance you wish to configure.
2. Expand **QoSMBean** and select **listQoSRequestTemplateMatchRules**.
3. Execute the MBean operation.

The MatchRules configured for the plug-in are returned in the **Output** text box. See "Operation: listQoSRequestTemplateMatchRule" for more details.

Delete a QoS Template

To delete a QoS template, do the following.

1. Select the MBean **wlng_nt_qos#6.0.0.0** and select the plug-in instance you wish to configure using the Administration Console or an MBean browser.
2. Expand **QoSMBean** and select **deleteQoSRequestTemplate**.
3. In the **MatchRule** text box, enter a regular expression that matches the subscriber identifiers associated with the QoS template you want to delete.
4. Execute the MBean operation.

The QoS template is deleted. See "Operation: deleteQoSRequestTemplate" for more details.

Reference: Attributes and Operations for EWS Quality of Service/ Diameter

This section describes the attributes and operations for the configuration and maintenance of the Extended Web Services Quality of Service (QoS)/Diameter communication service:

Attribute: DestinationHost

Scope: Shared

Unit: Not applicable

Format: String

The host name of the PCRF diameter server.

Valid values are either a host name or a regular expression matching a host name. The default value is host.destination.com.

Attribute: DestinationPort

Scope: Shared

Unit: Not applicable

Format: Integer

Port number of the PCRF diameter server.

Valid values are **0–65535**. The default value is 3588.

Attribute: DestinationRealm

Scope: Shared

Unit: Not applicable

Format: String

Diameter destination realm used for requests.

Valid values are either a realm or a regular expression matching a realm. The default value is destination.com.

Attribute: OriginHost

Scope: Local

Unit: Not applicable

Format: String

Host name of the machine running the QoS plug-in.

Valid values are either a host name or a regular expression matching a host name. The default value is host.origin.com.

Attribute: OriginPort

Scope: Local

Unit: Not applicable

Format: Integer

Port number of the machine running the QoS plug-in.

Valid values are **0–65535**. A value of 0 indicates a random port and should be used when upgrading the plug-in. The default value is 0.

Attribute: OriginRealm

Scope: Local

Unit: Not applicable

Format: String

Diameter originating realm used for requests.

Valid values are either a realm or a regular expression matching a realm. The default value is origin.com.

Attribute: Connected

Scope: Local

Unit: Not applicable

Format: Boolean

Boolean value indicating whether the plug-in is connected.

Valid values are **true** or **false**. The default value false.

Operation: connect

Scope: Local

Connects the QoS plug-in to the PCRF diameter server. If the plug-in is already connected, it will first be disconnected and then reconnected using the current parameters.

Signature:

```
connect()
```

Operation: disconnect

Scope: Local

Disconnects the QoS plug-in from the PCRF diameter server. If the plug-in is not currently connected, no action is taken.

Signature:

```
disconnect()
```

Operation: loadQoSRequestTemplate

Scope: Shared

This operation loads a QoS template for use with the template-based QoS interfaces.

The MatchRule parameter is a regular expression that determines to which subscriber IDs the QoS template will apply. For example a MatchRule value of tel:1234* will match any subscriber whose ID begins with tel:1234.

The Content parameter takes a template formatted according to the XSD found in the **xsd** subdirectory in the **plugin_qos_diameter.jar** file which itself is contained within the **wlng_nt_qos.ear** archive located in *Middleware_Home*/ocsg_6.0/applications directory.

For more information on QoS templates, see the discussion on template-based apply QoS in *Services Gatekeeper Application Developer's Guide*.

Signature:

```
loadQoSRequestTemplate(MatchRule: String, Content: XML)
```

Table 18–3 lists the parameters that the **loadQoSRequestTemplate** operation accepts.

Table 18–3 loadQoSRequestTemplate Parameters

Parameter	Description
MatchRule	Literal or regular expression matching one or more subscriber IDs.
Content	A valid QoS template.

Operation: retrieveQoSRequestTemplate

Scope: Local

This operation retrieves a QoS template associated with a particular subscriber ID or a range of subscriber IDs defined by the MatchRule parameter.

The MatchRule parameter is a regular expression that determines to which subscriber IDs the QoS template is applied. For example a MatchRule value of tel:1234* will match any subscriber whose ID begins with tel:1234.

Signature:

```
retrieveQoSRequestTemplate(MatchRule: String)
```

Table 18–4 lists the parameters that the **retrieveQoSRequestTemplate** operation accepts.

Table 18–4 retrieveQoSRequestTemplate Parameters

Parameter	Description
MatchRule	Literal or regular expression matching one or more subscriber IDs.

Operation: listQoSRequestTemplateMatchRule

Scope: Local

This operation lists all of the match rules that have been defined for the plug-in.

Signature:

```
listQoSRequestTemplateMatchRule()
```

Operation: deleteQoSRequestTemplate

Scope: Shared

This operation deletes a QoS template associated with a particular subscriber ID or a range of subscriber IDs defined by the MatchRule parameter.

The MatchRule parameter is a regular expression that determines to which subscriber IDs the QoS template is applied. For example a MatchRule value of tel:1234* will match any subscriber whose ID begins with tel:1234.

Signature:

```
deleteQoSRequestTemplate(MatchRule: String)
```

Table 18–5 lists the operations that the **deleteQoSRequestTemplate** operation accepts.

Table 18–5 retrieveQoSRequestTemplate Parameters

Parameter	Description
MatchRule	Literal or regular expression matching one or more subscriber IDs.

19

Extended Web Services Subscriber Profile/LDAPv3

This chapter describes the Oracle Communications Services Gatekeeper Extended Web Services (EWS) Subscriber Profile/Lightweight Directory Access Protocol (LDAPv3) communication service in detail.

Overview of the EWS Subscriber Profile/LDAPv3 Communication Service

The EWS Subscriber Profile/LDAPv3 communication service exposes Oracle's Extended Web Services Subscriber Profile application interface.

The communication service acts as an LDAP client to a directory service, connecting to the directory service using LDAPv3.

For the exact version of the standards that the communication service supports for the application-facing interfaces and the network protocols, see *Services Gatekeeper Statement of Compliance*.

Using the EWS Subscriber Profile/LDAPv3 communication service, an application can:

- Retrieve the specific value for a particular property belonging to a subscriber profile stored in an LDAP data source.
- Retrieve an entire subscriber profile from an LDAP data source, subject to SLA filtering.

Application Interfaces

For information about the application interface for the Extended Web Services Subscriber Profile communication service, see the discussion on extended web services subscriber profile in *Services Gatekeeper Application Developer's Guide*.

For information about the RESTful Call Notification interface, see the discussion on subscriber profile in *Services Gatekeeper Application Developer's Guide*.

The RESTful Service Call Notification interfaces provide RESTful access to the same functionality as the SOAP-based interfaces. The internal representations are identical, and for the purposes of creating SLAs and reading CDRs, and so on, they are the same.

Events and Statistics

The EWS Subscriber Profile/LDAPv3 communication service generates Event Data Records (EDRs), Charging Data Records (CDRs), alarms, and statistics to assist system administrators and developers in monitoring the service

See "Events, Alarms, and Charging" for more information.

Event Data Records

Table 19–1 lists IDs of the EDRS created by the EWS Subscriber Profile/LDAPv3 communication service. This list does not include EDRs created when exceptions are thrown

Table 19–1 EDRs Generated by EWS Subscriber Profile/LDAPv3

EDR ID	Method Called
13001	get
13002	getProfile

Charging Data Records

EWS Subscriber Profile/LDAPv3-specific CDRs are generated under the following conditions:

- After Services Gatekeeper has returned a full or partial subscriber profile to an application based on one or more attributes requested by that application.
- After Services Gatekeeper has returned a subscriber profile to an application based on the ID of the profile.

Statistics

Table 19–2 maps methods invoked from either the application or the network to the transaction types collected by the Services Gatekeeper statistics counters.

Table 19–2 Methods and Transaction Types for EWS Subscriber Profile/LDAPv3

Method	Transaction Type
get	TRANSACTION_TYPE_SUBSCRIBER_PROFILE
getProfile	TRANSACTION_TYPE_SUBSCRIBER_PROFILE

Alarms

For the list of alarms, see *Services Gatekeeper Alarms Handling Guide*.

Managing EWS Subscriber Profile/LDAPv3

This section describes the properties and workflow for the EWS Subscriber Profile/LDAPv3 plug-in instance.

It includes an LDAP server schema to use in constructing LDAP queries.

A connection pool is used for connections to the LDAP server. The connection pool is shared among all plug-in instances, and any configuration settings related to this pool or schema updates are broadcast to all plug-in instances in the cluster.

Use the **updateLDAPSettings** method to force configuration changes to take effect.

Properties for EWS Subscriber Profile/LDAPv3

Table 19–3 lists the technical specifications for the communication service.

Table 19–3 Properties for EWS Subscriber Profile/LDAPv3

Property	Description
Managed object in Administration Console	To access the object, select *domain_name*, then **OCSG**, then *server_name*, then **Communication Services**, then *plugin_instance_id* in that order.
MBean	Domain=com.bea.wlcp.wlng Name=wlng_nt InstanceName=same as the network protocol *instance_id* assigned when the plug-in instance is created. Type=**com.bea.wlcp.wlng.plugin.subscriberprofile.ldap.managed plugin.management.SubscriberProfileMBean** Documentation: See the "All Classes" section of *Services Gatekeeper OAM Java API Reference*
Network protocol plug-in service ID	Plugin_ews_subscriber_profile_ldap
Network protocol plug-in instance ID	The ID is assigned when the plug-in instance is created. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*.
Supported Address Scheme	tel, id, imsi, ipv4/ipv6
Application-facing interface	**com.bea.wlcp.wlng.ews.plugin.SubscriberProfilePlugin**
Service type	SubscriberProfile
Exposes to the service communication layer a Java representation of:	Extended Web Services Subscriber Profile
Interfaces with the network nodes using:	LDAP
Deployment artifact NT EAR wlng_nt_subscriber_profile_ews.ear	**ews_subscriber_profile_service.jar and Plugin_ews_subscriber_profile_ldap.jar**
Deployment artifact AT EAR: Normal wlng_at_subscriber_profile_ews.ear	**ews_subscriber_profile.war and rest_subscriber_profile.war**
Deployment artifact AT EAR: SOAP Only wlng_at_subscriber_profile_ews_soap.ear	ews_subscriber_profile.war

LDAP Server Schema

All subscriber-profile-related operations are handed off to network nodes that accept LDAP queries according to LDAPv3. The decision concerning which node in the LDAP directory should be used to perform the query is decided at run time based on

configuration settings. The data that is handed back to the application that initiated the Subscriber Profile query is filtered using the result filter mechanism in the service provider group and application group SLAs. For more information, see the discussion about `<resultRestrictions>` in the defining service provider group and application group SLAs desction of the *Services Gatekeeper Accounts and SLAs Guide*.

A schema is used for constructing queries. See Example 19–1.

Example 19–1 LDAP Query schema XSD

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
<xs:element name="LdapConfig">
<xs:complexType>
<xs:sequence>
<xs:element name="Keys" type="KeySet" minOccurs="1" maxOccurs="unbounded"/>
<xs:element name="LdapObject" type="LdapObject" minOccurs="1"
maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
</xs:element>

<xs:complexType name="KeyObject">
<xs:sequence>
<xs:element name="uriScheme" type="xs:string" minOccurs="1" maxOccurs="1"/>
<xs:element name="addressKeyName" type="xs:string" minOccurs="1" maxOccurs="1"/>
<xs:element name="objectKeyName" type="xs:string" minOccurs="0" maxOccurs="1"/>
<xs:element name="objectKeyValue" type="xs:string" minOccurs="0" maxOccurs="1"/>
</xs:sequence>
<xs:attribute name="id" type="xs:string" use="optional"/>
</xs:complexType>

<xs:complexType name="KeySet">
<xs:sequence>
<xs:element name="Key" type="KeyObject" minOccurs="1" maxOccurs="unbounded"/>
</xs:sequence>
<xs:attribute name="id" type="xs:string" use="required"/>
</xs:complexType>
<xs:complexType name="LdapObject">
<xs:sequence>
<xs:element name="ObjectKeySet" type="xs:string" minOccurs="0" maxOccurs="1"/>
</xs:sequence>
<xs:attribute name="id" type="xs:string" use="required"/>
<xs:attribute name="keyName" type="xs:string" use="required"/>
<xs:attribute name="keyValue" type="xs:string" use="required"/>
</xs:complexType>
</xs:schema>
```

The LDAP server schema describes the following elements:

- **LdapObject**: Holder of a KeySet
- **KeySet**: Defines a collection of KeyObjects. Sets of keys are used because there may be several ways to reach a certain node in the tree. One LDAP plug-in instance can be configured with several KeySets and can provide the link between the search key in the Extended Web Services interface and the LDAP tree.
- **KeyObject**: Defines an entry point to the LDAP tree and provides the link between the search key in the Extended Web Services interface and the LDAP tree.

Table 19–4 describes the schema objects in detail.

Table 19–4 LDAP Server Schema

Object	Element	Description
LdapObject	ObjectKeySet	Defines the KeySet through which it can be reached. Refers to theID attribute of a defined KeySet.
LdapObject	id	The identity of the LdapObject. Can be referenced from other LdapObjects through the ParentObjectId field.
LdapObject	keyName	The name of the key through which the LdapObject can be reached.
LdapObject	keyValue	The value of the key through which the LdapObject can be reached.
KeyObject	uriScheme	Defines the URI scheme of the address for which this key applies.
KeyObject	addressKeyName	Defines the key name with which the address value is associated.
KeyObject	objectKeyName	Provides the possibility of defining the addressing key of a possible tree node above the node that is reached by the address key (that is, like the domain object in the 3DS directory information tree).
KeyObject	objectKeyValue	See objectKeyName. Defines the value of the key.
KeyObject	id	The identity of the key. Used only for descriptive purposes.
KeySet	Key	All keys in the KeySet
KeySet	id	The identity of the KeySet. Used when associating an LdapObject with a KeySet.

Example 19–2 shows a directory information tree built using the schema described in Table 19–4.

Example 19–2 Example of LDAP server schema

```
<?xml version="1.0" encoding="UTF-8"?>
<LdapConfig xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance
xsi:noNamespaceSchemaLocation='sp_config.xsd'>
<Keys id="myKeys">
<Key id="misidnKey">
<uriScheme>tel</uriScheme>
<addressKeyName>msisdn</addressKeyName>
<objectKeyName>domainName</objectKeyName>
<objectKeyValue>msisdnD</objectKeyValue>
</Key>
<Key id="imsiKey">
<uriScheme>imsi</uriScheme>
<addressKeyName>imsi</addressKeyName>
<objectKeyName>domainName</objectKeyName>
<objectKeyValue>imsiD</objectKeyValue>
</Key>
<Key id="subscriberIdKey">
<uriScheme>id</uriScheme>
<addressKeyName>id</addressKeyName>
<objectKeyName>domainName</objectKeyName>
```

```
<objectKeyValue>subsD</objectKeyValue>
</Key>
<Key id="ipv4Key">
<uriScheme>ipv4</uriScheme>
<addressKeyName>ipv4Addr</addressKeyName>
<objectKeyName>domainName</objectKeyName>
<objectKeyValue>ipv4D</objectKeyValue>
</Key>
</Keys>
<LdapObject id="mySchema" keyName="serviceName" keyValue="mySchema">
<ObjectKeySet>myKeys</ObjectKeySet>
</LdapObject>
</LdapConfig>
```

Configuration Workflow for EWS Subscriber Profile/LDAPv3

Following is an outline for configuring the plug-in using the Administration Console or an MBean browser.

1. Create one or more instances of the plug-in service. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in service ID as listed in the "Properties for EWS Subscriber Profile/LDAPv3" section.
2. Select the MBean for the plug-in instance. The MBean display name is the same as the plug-in instance ID given when the plug-in instance was created.
3. Define the characteristics of the LDAP server to connect to using these fields:
   - **Port**
   - **AuthDN**
   - **BaseDN**
   - **AuthPassword**
4. Define the schema using either the **Schema** field or the **updateSchemaURL** operation.

   See "LDAP Server Schema" for a description of the schema and "Configuration Workflow for EWS Subscriber Profile/LDAPv3" for a description of the mappings.
5. Define the connection pool characteristics for the connection using these fields:
   - **MinConnections**
   - **MaxConnections**
   - **ConnTimeout**
   - **RecoverTimerInterval**
6. Set up the routing rules to the plug-in instance. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in instance ID and address schemes listed in the "Properties for EWS Subscriber Profile/LDAPv3" section.
7. If required, create and load a node SLA. For details see the discussion about defining global node and service provider group node SLAs and managing SLAs in *Services Gatekeeper Accounts and SLAs Guide*.
8. Provision the service provider accounts and application accounts. For information, see *Services Gatekeeper Portal Developer's Guide*.

Management Operations for EWS Subscriber Profile/LDAPv3

There are no specific management operations, except for the **updateLDAPSettings** method, used to update the LDAP connection pool after changing any of these fields:

- MinConnections
- MaxConnections
- ConnTimeout
- RecoverTimerInterval

Provisioning for EWS Subscriber Profile/LDAPv3

If the results from the LDAP query should be filtered, use the service provider group and application group SLAs. See the discussion about `<resultRestrictions>` in the defining service provider group and application group SLAs desction of the *Services Gatekeeper Accounts and SLAs Guide*.

For a description of the attributes and operations of the **SubscriberProfileMBean** MBean, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

20

Extended Web Services WAP Push/PAP

This chapter describes the Oracle Communications Services Gatekeeper Extended Web Services (EWS) WAP Push/Push Access Protocol (PAP) communication service in detail.

Overview of the EWS WAP Push/PAP Communication Service

The EWS WAP Push/PAP communication service exposes the Oracle Extended Web Services WAP Push interface.

The communication service connects to a Push Proxy Gateway (PPG) using Push Access Protocol (PAP) 2.0. See "Push Access Protocol (PAP) 2.0" for information about this network protocol.

For the exact version of the standards that the communication service supports for the application-facing interfaces and the network protocols, see *Services Gatekeeper Statement of Compliance*.

Using the EWS WAP Push/PAP communication service, an application can:

- Send a WAP Push message to a single or multiple (bulk) destinations.
- Send a replacement WAP Push message.
- Ask to be notified asynchronously of the status of WAP Push messages that have been sent. The possible values returned include:
  - Rejected: The message was not accepted.
  - Pending: The message is in process.
  - Delivered: The message was successfully delivered to the end-user.
  - Undeliverable: The message could not be delivered because of a problem.
  - Expired: The message reached the maximum age allowed by server policy or could not be delivered by the time specified in the push submission.
  - Aborted: The mobile device aborted the message.
  - Timeout: The delivery process timed out.
  - Cancelled: The message was cancelled through the cancel operation.
  - Unknown: The server does not know the state of the message.
- Send a result notification message. This occurs only if the initial push submission was accepted for processing. One result notification message is sent per destination address.

Push Access Protocol (PAP) 2.0

EWS WAP Push/PAP supports a subset of the PAP 2.0 operations. These include:

- push-message: Submits a message to be delivered. This operation is also used to send a replacement message.
- push-response: The response to the push-message operation. This response includes a code specifying the immediate status of the message submission, of the following general types:
  - 1xxx Success: The action was successfully received, understood, and accepted
  - 2xxx Client Error: The request contains bad syntax or cannot be fulfilled
  - 3xxx Server Error: The server failed to fulfil an apparently valid request
  - 4xxx: Service Failure: The service could not be performed. The operation may be retried
- resultnotification-message: Specifies the final outcome of a specific message for a specific recipient. Sent only if the initial request includes the URL to which this notification is to be delivered. Includes both textual indication of state and a status code including the following general types:
  - 1xxx Success: The action was successfully received, understood, and accepted
  - 2xxx Client Error: The request contains bad syntax or cannot be fulfilled
  - 3xxx Server Error: The telecom network node failed to fulfil an apparently valid request
  - 4xxx: Service Failure: The service could not be performed. The operation may be retried
  - 5xxx: Mobile Device Abort: The mobile device aborted the operation.
- resultnotification-response: The response to the result notification. This response includes a code specifying the status of the notification
  - 1xxx Success: The action was successfully received, understood, and accepted
  - 2xxx Client Error: The request contains bad syntax or cannot be fulfilled
- badmessage-response: A response indicating that request is unrecognizable or is of a protocol version that is not supported. This response contains either a 3002 code (Version not supported) or a 2000 code (Bad Request). In the case of Bad Request, a fragment of the unrecognizable message is included in the response

See *Services Gatekeeper Statement of Compliance* for the exact version of the protocol standard Services Gatekeeper supports.

Application Interfaces

For information about the application interface for the Extended Web Services WAP Push communication service, see the discussion on Extended Web Services WAP Push in *Services Gatekeeper Application Developer's Guide*.

For information about the RESTful Call Notification interface, see the discussion on WAP Push in *Services Gatekeeper Application Developer's Guide*.

The RESTful Service Call Notification interfaces provide RESTful access to the same functionality as the SOAP-based interfaces. The internal representations are identical, and for the purposes of creating SLAs and reading CDRs, and so on, they are the same.

Events and Statistics

The EWS WAP Push/PAP communication service generates Event Data Records (EDRs), charging data records (CDRs), alarms, and statistics to assist system administrators and developers in monitoring the service

See "Events, Alarms, and Charging" for more information.

Charging Data Records

EWS WAP Push/PAP-specific CDRs are generated under the following conditions:

- When the **sendPushMessage** response returns from the network.
- When a **sendResultNotificationMessage** response returns from the application.

Event Data Records

Table 20–1 lists the IDs of the EDRs created by the EWS WAP Push communication service.

Table 20–1 EDRs Generated by EWS WAP Push/PAP

EDRID	Method Called
14001	sendPushMessage
14002	sendResultNotificationMessage

Statistics

Table 20–2 maps methods invoked from either the application or the network to the transaction types collected by the Services Gatekeeper statistics counters.

Table 20–2 Methods and Transaction Types for EWS WAP Push/PAP

Method	Transaction type
sendPushMessage	TRANSACTION_TYPE_MESSAGE_SENDER_SEND
sendResultNotificationMessage	TRANSACTION_TYPE_MESSAGE_SENDER_NOTIFY

Alarms

For the list of alarms, see *Services Gatekeeper Alarms Handling Guide*.

Managing the EWS WAP Push/PAP Communication Service

This section describes the properties and workflow for the EWS WAP Push/PAP plug-in instance.

Properties for EWS WAP Push/PAP

Table 20–3 lists the technical specifications for the communication service.

Table 20–3 Properties for EWS WAP Push/PAP

Property	Description
Managed object in Administration Console	To access the managed object, select *domain_name*, then **OCSG**, then *server_name*, then **Communication Services**, then *plugin_instance_id* in that order.

Table 20–3 (Cont.) Properties for EWS WAP Push/PAP

Property	Description
MBean	Domain=com.bea.wlcp.wlng Name=wlng_nt InstanceName=same as the network protocol *instance_id* assigned when the plug-in instance is created Type=**com.bea.wlcp.wlng.plugin.pushmessage.pap.management.PushMessagePAPMBean** Documentation: See the "All Classes" section of *Services Gatekeeper OAM Java API Reference*
Network protocol plug-in service ID	**Plugin_ews_push_message_pap**
Network protocol plug-in instance ID	The ID is assigned when the plug-in instance is created. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*.
Supported Address Scheme	tel, wapuser See "WAP User Address Scheme" for information on the wapuser address scheme.
Application-facing interface	**com.bea.wlcp.wlng.ews.plugin.PushMessagePlugin** **com.bea.wlcp.wlng.ews.callback.PushMessageNotificationCallback**
Service type	PushMessage
Exposes to the service communication layer a Java representation of:	Extended Web Services WAP Push
Interfaces with the network nodes using:	Push Access Protocol (PAP), 2.0. WAP-247-PAP-20010429-a
Deployment artifact: NT EAR wlng_nt_push_message_ews.ear	**ews_push_message_service.jar**, **Plugin_ews_push_message_pap.jar**, and **ews_push_message_pap.war**
Deployment artifact: AT EAR: Normal wlng_at_push_message_ews.ear	**ews_push_message.war**, **ews_push_message_callback.jar**, and **rest_push_message.war**
Deployment artifact: AT EAR: SOAP Only wlng_at_push_message_ews_soap.ear	**ews_push_message.war** and **ews_push_message_callback.jar**

WAP User Address Scheme

The wapuser address scheme supports the client address formats defined in the *Wireless Application Protocol Push Proxy Gateway Service Specification*.

To use the wapuser address scheme, the application should set the WAPPUSH and TYPE values in the **destinationAddress**. For example, given the address:

WAPPUSH=+155519990730

TYPE=PLMN@ppg.carrier.com

set the destinationAddress to:

WAPPUSH=+155519990730/TYPE=PLMN@ppg.carrier.com

Given the address:

WAPPUSH=john.doe%40wapforum.org

TYPE=USER@ppg.carrier.com

set the **destinationAddress** to:

WAPPUSH=john.doe%40wapforum.org/ TYPE=USER@ppg.carrier.com

Configuration Workflow for EWS WAP Push/PAP

Following is an outline for configuring the plug-in using the Administration Console.

1. Create one or more instances of the plug-in service. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in service ID as listed in the "Properties for EWS WAP Push/PAP" section.
2. Using the Administration Console or an MBean browser, select the MBean for the plug-in instance. The MBean display name is the same as the plug-in instance ID assigned when the plug-in instance was created.
3. Define the characteristics of the PPG server to connect to using the **PPGNotificationURL** and **PPGURL** fields.
4. Specify heartbeat behavior. See the discussion on configuring heartbeats in *Services Gatekeeper System Administrator's Guide*.
5. Set up the routing rules to the plug-in instance. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in instance ID and address schemes listed in the "Properties for EWS WAP Push/PAP" section.
6. If required, create and load a node SLA. For details see the discussion on defining global node and service provider group node SLAs and managing SLAs in *Services Gatekeeper Accounts and SLAs Guide*.
7. Provision the service provider accounts and application accounts. For information, see *Services Gatekeeper Portal Developer's Guide*.

For a description of the attributes and operations of the **PushMessagePAPMBean** MBean, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

21

Native MM7

This chapter describes the Oracle Communications Services Gatekeeper Native MM7 communication service in detail.

Overview of the Native MM7 Communication Service

The Native MM7 communication service exposes the 3GPP MM7 standard interfaces.

From the point of view of an application, the communication service acts as an MMS relay server. From the point of view of the network, it acts as an MMS VAS application.

For the exact version of the standards that the Native MM7 communication service supports for the application-facing interfaces and the network protocols, see *Services Gatekeeper Statement of Compliance*.

Using the Native MM7 communication service, an application can:

- Send a multimedia message to one or many destination addresses.

  The payload in these multimedia messages can be any type that can be specified using Multipurpose Internet Mail Extensions (MIME), including multipart messages. If a subscription for notifications has been previously set up, the request can also specify that a delivery report or a read report should be returned later in relation to this message.
- Receive delivery reports on sent multimedia messages that have arrived from the network.
- Receive read-reply reports on sent multimedia messages that have arrived from the network.
- Receive multimedia messages from the network.

Requests can flow in two directions using the Native MM7 communication service: from the application to the network and from the network to the application.

Status Reports

There are two types of status reports that can be returned to the application from the network via Services Gatekeeper. Both are returned asynchronously, using callback information provided when the notification is set up. If the network sends a report but no notification has been set up, Services Gatekeeper sends the network an error code indicating permanent failure.

- Delivery Reports
- Read-Reply Report

Delivery Reports

Delivery reports are acknowledgements that the network node has handled the message from the application that was submitted. The report indicates the status of the message: for example, Forwarded, Expired, or Rejected. There is one delivery report per destination address. If a connection error occurs within Services Gatekeeper or between Services Gatekeeper and the application, an error code is returned to the network, which resends the message.

Read-Reply Report

Read-reply reports contain the final delivery status of the multimedia message. The final delivery status reports whether the message has actually been delivered by the network to the mobile terminal. It also includes the status of the message at that terminal; for example, Read or Deleted without being read.

Because a recipient can request that read-reply reports not be generated, lack of a read-reply report does not necessarily mean that the message has not been rendered on the recipient's terminal.

There is one read-reply report per destination address. If a connection error occurs within Services Gatekeeper or between Services Gatekeeper and the application, an error code is returned to the network, which resends the message.

Network-triggered Multimedia Messages

For an application to receive multimedia messages from the network, it must register its interest in these messages by setting up a subscription. A subscription, or notification, is defined by a destination address. For the message to be accepted by Services Gatekeeper, the destination address must match the subscription. Each registered subscription must be unique, and subscription attempts with overlapping criteria are rejected. If a message with several destination addresses arrives, Services Gatekeeper iterates through the list until it reaches a match or until the list is exhausted.

Application Interfaces

For information on the application interface for the Native MM7 communication service, see the discussion about the Native Interfaces in *Services Gatekeeper Application Developer's Guide*.

Events and Statistics

The Native MM7 communication service generates Event Data Records (EDRs), Charging Data Records (CDRs), alarms, and statistics to assist system administrators and developers in monitoring the service

For general information, see Appendix A, "Events, Alarms, and Charging."

Event Data Records

Table 21–1 lists the IDs of the EDRs created by the Native MM7 communication service.

Table 21–1 EDRs Generated by Native MM7

EDR ID	Description
401000	An application-initiated message has entered the plug-in.
401001	An application-initiated message has exited the plug-in.
401002	A network-triggered message sent via v.1.0 has entered the plug-in.
401003	A network-triggered message has exited the plug-in. It is formatted according to v. 1.2.
401004	A delivery report using v. 1.0 has entered the plug-in.
401005	A delivery report has exited the plug-in. It is formatted according to v 1.2
401006	A read-reply report using v. 1.0 has entered the plug-in.
401007	A read-reply report has exited the plug-in. It is formatted according to v. 1.2

Charging Data Records

Native MM7 -specific CDRs are generated under the following conditions:

- After an MMS message has been successfully sent from the application to the network.
- After an MMS message has been successfully sent from the network to the application.
- After a delivery report has been successfully delivered to the application.
- After a read-reply report has been successfully delivered to the application.

Statistics

Table 21–2 maps methods invoked from either the application or the network to the transaction types collected by the Services Gatekeeper statistics counters.

Table 21–2 Methods and Transaction Types for Native MM7

Method	Transaction type
submit	TRANSACTION_TYPE_MESSAGING_MMS_SEND
deliver	TRANSACTION_TYPE_MESSAGING_MMS_RECEIVE

Alarms

For the list of alarms, see *Services Gatekeeper Alarms Handling Guide*.

Managing Native MM7

This section describes the properties and workflow for the Native MM7 communication service.

Properties for Native MM7

Table 21–3 lists the technical specifications for the communication service.

Table 21–3 Properties for Native MM7

Property	Description
Managed object in Administration Console	To access the managed object, select *domain_name*, then **OCSG**, then *server_name*, then **Communication Services**, and then *plugin_instance_id* in that order.
MBean	Domain=com.bea.wlcp.wlng Name=wlng_nt InstanceName=same as the network protocol *instance_id* assigned when the plug-in instance is created Type=**com.bea.wlcp.wlng.plugin.mm7.management.Mm7MBean**
Network protocol plug-in service ID	Plugin_multimedia_messaging_mm7
Network protocol plug-in instance ID	The ID is assigned when the plug-in instance is created. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*.
Supported Address Scheme	tel, mailto, short
Application-facing interfaces	**com.bea.wlcp.wlng.mm7.plugin.MmsPlugin** **com.bea.wlcp.wlng.mm7.callback.MmsVaspCallback**
Service type	Mm7
Exposes to the service communication layer a Java representation of:	3GPP TS 23.140 V5.3.0 (REL-5-MM7-1-2.xsd)
Interfaces with the network nodes using:	MM7 (REL-5-MM7-1-0 or REL-5-MM7-1-2)
Deployment artifacts	**Plugin_multimedia_messaging_mm7.jar, mm7_service.jar, 1_0_mm7_vasp.war, 1_2_mm7_vasp.war** packaged in **wlng_nt_multimedia_messaging_mm7.ear** **mm7.war, mm7_callback_client.jar** packaged in **wlng_at_multimedia_messaging_mm7.ear**

Configuration Workflow for Native MM7

Following is an outline for configuring the plug-in using the Administration Console or an MBean browser.

1. Create one or more instances of the plug-in service. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in service ID as listed in the "Properties for Native MM7" section.
2. Using the Administration Console or an MBean browser, select the MBean for the plug-in instance. The MBean display name is the same as the plug-in instance ID assigned when the plug-in instance was created.
3. Configure the behavior of the plug-in instance with these fields
   - **Mm7RelayServerAddress**
   - **HTTPBasicAuthentication**. If using HTTP basic authentication also define: these fields
     - **HTTPBasicAuthenticationUsername**
     - **HTTPBasicAuthenticationPassword**

- **XSDVersion**

4. Specify heartbeat behavior. See the discussion on configuring heartbeats in *Services Gatekeeper System Administrator's Guide*.
5. Set up the routing rules to the plug-in instance. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in instance ID and address schemes listed in the "Properties for Native MM7" section.
6. Provide the administrator of the MM7 server with the URL to which the MM7 server should deliver mobile-originated messages and delivery reports:
   - For REL-5-MM7-1-0 the default URL is:

     `http://IP_Address_of_NT_ Server:port/1_0_mm7_vasp/mms_vasp`

   - For REL-5-MM7-1-2 the default URL is:

     `http://IP_Address_of_NT Server:port/1_2_mm7_vasp/mms_vasp`

7. If required, create and load a node SLA. For details, see the discussion about defining global node and service provider group node SLAs and managing SLAs in Services Gatekeeper Accounts and SLAs Guide
8. Provision the service provider accounts and application accounts. For information, see *Services Gatekeeper Portal Developer's Guide*.

Provisioning Workflow for Native MM7

Following is an outline for provisioning Native MM7.

1. Register offline notifications. This means that mobile-originated messages should not result in notifications to an application, but instead be stored in Services Gatekeeper for polling. Use the **addVASPIDMapping** method to register offline notifications. Use the following operations to manage the offline registrations:
   - **listAllVASIDMapping**
   - **addVASPIDMapping**
   - **removeReceiveMmsNotification**
2. Register online notifications. This means that registrations for mobile-originated messages are managed on behalf of an application. Use the **addVASPIDMapping** method to register online notifications. Use the following methods to manage the online registrations:
   - **listAllVASPIDMapping**
   - **enableReceiveMmsNotification**
   - **removeStatusReporting**

For a description of the attributes and operations of the **Mm7MBean** MBean, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

22

Native SMPP

This chapter describes the Oracle Communications Services Gatekeeper Native SMPP communication service in detail.

Overview of the Native SMPP Communication Service

The Native SMPP communication service exposes the SMPP v. 3.4 standard interfaces.

The communication service acts as an External Short Message Entity (ESME) that connects to a Short Messaging Service Center (SMSC) over TCP/IP.

For the exact version of the standards that the Native SMPP communication service supports for the application-facing interfaces and the network protocols, see "Native SMPP Compliance" in *Services Gatekeeper Statement of Compliance*.

The Native SMPP communication service access the network using the following network protocols:

- SMPP v 3.4
- SMPP v 5.1

  SMPP v 5.1 supports the billing identification parameter and ussd service_ operation as optional parameters to **Deliver_SM**. See "smpp_billing_id" and "ussd_service_operation" for more information.

Using the Native SMPP communication service, an application can:

- Send a short message to one or many destination addresses.
- Cancel a previously sent message that has not yet been delivered.
- Replace a previously sent message that has not yet been delivered.
- Query the delivery status of a previously sent message.
- Receive short messages arrived from the network.
- Receive the delivery status of a previously sent message.

Requests flow in two directions: from the application to the network and from the network to the application.

All Native SMPP components are deployed in the network tier (NT).

SMPP Server Service

The core module of the Native SMPP communication service is an SMPP Server Service deployed as an Oracle WebLogic Server Service. It provides connection

services for the Native SMPP and Parlay X 2.1 Short Messaging plug-ins. The SMPP Server Service:

- Receives SMPP data from the socket.
- Constructs the SMPP protocol data unit (PDU).
- Associates the current PDU with the correct application instance.
- Invokes the plug-in.
- Manages connections between Services Gatekeeper and applications.
- Manages connections between Services Gatekeeper and Short Message Service Centers (SMSCs).

Because the SMPP Server Service is deployed in the NT, applications using the Native SMPP Native communication service must be able to connect directly to the network tier. Firewalls must be configured to allow connection to the ports defined for the SMPP Server Service.

Connection Handling and Provisioning

The Native SMPP communication service uses the Services Gatekeeper SMPP Server Service to establish and manage southbound (client) connections between Services Gatekeeper and SMSCs.

See "System Properties for SMPP Server Service" and "Reference: Attributes and Operations for SMPP Server Service" for information about configuring connections between the Services Gatekeeper SMPP server service and a short messaging service center (SMSC).

A client connection is created when this plug-in successfully binds with an SMSC. A successful rebind changes the connection ID.

About Creating and Resetting Connections

The connections between an application and Services Gatekeeper are called *server connections* and the connections between Services Gatekeeper and an SMSC are called *client connections*. Most applications require both connections to successfully operate.

- If at least one plug-in instance successfully binds with Services Gatekeeper:
  - A server connection is established between the application and Services Gatekeeper.
  - A client connection is established between Services Gatekeeper and the SMSC.
  - Services Gatekeeper sends a successful bind response to the application.
- Any plug-ins that fail to bind will periodically try to reconnect.
- If the client connection is not successfully established, Services Gatekeeper attempts to reconnect with the SMSC, and its corresponding server connection continues to receive requests from the application. However, the plug-in can not process these requests, and instead it sends an error response to the application. through the server connection. The application requests are not stored and not re-sent to the SMSC.
- By default, mobile-originated message requests fail and return an error if a client connection is established but a corresponding server connection is not. If you expect this to happen a lot, you can set the **rejectMOMessagesWithNoAppReceiverConnection** attribute to the **SMPPServiceMBean** to **true** to reduce the processing overhead of these errors and

spawn an informational alarm with a severity of **warning** instead of an error. The alarm number is 400514:

```
<alarm id="400514" severity="warning"
            description="No application receiver connection found. Rejecting
 DeliverSm with MO SMS.">
       <filter>
         <method>
           <name>processDeliverSM</name>
           <class>oracle.ocsg.protocol.smpp.south.SouthPduTask</class>
           <position>after</position>
         </method>
       </filter>
     </alarm>
```

See the “All Classes” section of the OAM Java API Reference for more information on the **SMPPServiceMBean**.

- If all plug-in instances fail to bind, Services Gatekeeper sends a failure bind response to the application, and closes and removes the server connection.
- If a client connection is successfully established with the SMSC, the connection is verified periodically using **ENQUIRE_LINK** requests (heartbeats). If the **ENQUIRE_LINK** requests fail a configurable number of times, Services Gatekeeper attempts to reconnect with the SMSC. If the client connection reconnect attempts fail a configurable number of times, the connection is closed and removed. See "Attribute: EnquireLinkMaxFailureTimes" and "Attribute: RetryTimesBeforeGiveUp" for details.

You use the **connectionId** and **pluginInstanceId** parameters to the "Operation: resetClientConnection" to establish or reestablish connections between Services Gatekeeper and SMSCs. The connection-related operations for this plug-in accept values for these parameters according to these rules:

- You reset all connections for a plug-in using **pluginInstanceId**. Any configuration changes you send in takes effect. This is the most common resetting strategy because it generally does not make sense to reset a single SMCC connection and leave the rest connecting to another SMSC.
- You reset a single connection for a plug-in using **connectionId**, and only that connection is reset. Any connection configuration settings you include are ignored to avoid resetting the connection with new, conflicting settings. You will probably only reset a single connection rarely, for example in cases where a single connection is misbehaving and you are reluctant to reset all of the others.
- If a value for the **connectionId** parameter is provided, this communication service ignores any value provided for the **pluginInstanceId** parameter. That is, *only* if **connectionId** has no value then a parameter value for **pluginInstanceId** is used.
- If **connectionId** has no value or no value that matches the fields sent, and the value for **plugininstanceid** does match, then all connections for **pluginInstanceId** are reset.
- Use "Operation: listClientConnections" to list client connections.

About Session Handling

Applications can bind to Services Gatekeeper as a transmitter, a receiver, or a transceiver. An application can establish several parallel sessions by issuing multiple bind operations.

The number of concurrent connections is provisioned for each Native SMPP plug-in, if connection-based routing is not enabled. See "Attribute: BindType", "Attribute: NumberReceiverConnections", "Attribute: NumberTransceiverConnections", and "Attribute: NumberTransmitterConnections".

The SMPP Server Service should be provisioned with the following data about the application instance:

- The port number to bind to.
- The maximum number of concurrent sessions allowed.
- Whether subsequent operations should be allowed to target a previously sent short message.
- Whether network-triggered short messages and delivery reports should be forwarded to the application.
- The address range that, when matched with the destination address of a network-triggered short message, forwards the message to the application.

See "Operation: addApplicationSpecificSettings" for details about configuring these settings.

Creating an Interceptor With a Custom Error Code

For mobile-originated (MO) traffic, you can create an interceptor that includes any checks or validation tests for the SMS DeliverSm request message. In cases where you want to reject the **DeliverSm** message, you can send the **DeliverSMResp** message back to the SMSC with the SMPP **commandStatus** of your choosing. You create and add a **DenyPluginException** to the interceptor to set the error code. For example:

```
new DenyPluginException("custom_smpp_errorcode", decimal_smpp_commandstatus);
```

Where *decimal_smpp_commandstatus* is the decimal format of a hexadecimal SMPP error code. For example, an error code value of **("custom_smpp_errorcode", 123)** translates to the 0x0000007b command status.

See "Using Service Interceptors to Manipulate Requests" in *Services Gatekeeper Extension Developer's Guide* for more information on using interceptors.

Example 22–1 shows an example interceptor that checks MO messages (ignoring delivery reports), confirms their **sourceaddress**, and if necessary, throws one of two **DenyPluginException** exception messages.

Deploy this interceptor the **MO_NORTH** interceptor point.

Example 22–1 Example SMPP interceptor

```
package com.bea.wlcp.wlng.interceptor;

import java.lang.reflect.Method;
import com.bea.wlcp.wlng.api.plugin.DenyPluginException;
import org.apache.log4j.Logger;

import com.bea.wlcp.wlng.api.interceptor.Context;
import com.bea.wlcp.wlng.api.interceptor.Interceptor;


public class NativeSMPPInterceptor implements Interceptor {
  private Logger logger = Logger.getLogger(NativeSMPPInterceptor.class);
```

```
  @Override
  public Object invoke(Context ctx) throws Exception {

    Object[] args = ctx.getArguments();
    String address = null;

    if (args == null || args.length == 0 || args[0] == null){
      //do nothing
    } else if (args[0].getClass().getName().equals(new
String("oracle.ocsg.protocol.smpp.event.DeliverSm"))){

      try {
        Class<?> c = args[0].getClass();
        Method m = c.getMethod("isDeliverReceipt", new Class[0]);
        boolean isDeliverReceipt = (boolean) m.invoke(args[0], new Object[0]);
        if (!isDeliverReceipt) { //we only want to check MO messages, not delivery
receipts
          m = c.getMethod("getSourceAddress", new Class[0]);
          Object obj = m.invoke(args[0], new Object[0]);
          Class<?> c1 = obj.getClass();
          Method m1 = c1.getMethod("getAddress", new Class[0]);
          address = (String) m1.invoke(obj, new Object[0]);
        }
      }catch(Exception e){
        e.printStackTrace();
        throw new RuntimeException();
      }

      if(address!= null && address.endsWith("9999")){
        //reject
        throw new DenyPluginException("custom_smpp_errorcode", 123);
      }else if(address!= null && address.endsWith("8888")) {
        //reject
        throw new DenyPluginException("custom_smpp_errorcode", 456);
      }else {
        //We 'approve' all other sourceaddresses
      }
    }
    return ctx.invokeNext(this);
  }
}
```

Authentication

Authentication credentials are configured in the Native SMPP plug-in instance MBean. See "Reference: Attributes and Operations for Native SMPP Plug-in" for more information.

Applications use an application instance ID as the ESME system_id and the related password when binding to Services Gatekeeper.

Connection Pooling

The SMPP Server Service maintains server and client connection pools.

Server Connection Pools

The SMPP Server Service maintains a server connection pool for application-facing (northbound) connections. The pool is created when the SMPP Server Service is started.

The plug-in obtains connections from this pool to send messages to the application.

The server connections are used to:

- Invoke the plug-in.
- Send messages to and receive messages from the application.
- Manage the application-facing SMPP timers.
- Manage windowing toward the application.
- Cache transaction mapping information for transactions between Services Gatekeeper and the application.

Client Connection Pools

The SMPP Server Service maintains a client connection pool for network-facing (southbound) connections.

The plug-in sends **BIND** and **UNBIND** requests to the client pool and obtains a client connection ID from the pool to perform SMPP transactions.

The client connections are used to:

- Invoke the plug-in.
- Send messages to and receive messages from the SMSC.
- Manage the network-facing SMPP timers.
- Manage windowing toward the SMSC.
- Cache transaction mapping information between Services Gatekeeper and the SMSC.

Timeouts

You can configure timers for both application-facing and network-facing connections. Some of the timers for application-facing and network-facing connections have the same names, but they are configured in different MBeans.

SMPP Server Service Timers

The SMPP Server Service provides the following configurable timers for connections between Services Gatekeeper and applications:

- Initiation timer: This timer ensures that when an application initiates a connection, the **BIND** occurs within a specified period after the connection is established to Services Gatekeeper. See "Attribute: InitiationTimerValue" for more information.
- Inactivity timer: This timer establishes a period of inactivity after which, if no SMPP messages are exchanged with the application, Services Gatekeeper closes the connection. See "Attribute: InactivityTimerValue" for more information.
- Connection timer: This timer sets the heartbeat interval that Services Gatekeeper uses to request the connection status on the server connection. If the **ENQUIRE_LINK** requests fail, Services Gatekeeper closes the connection and attempts to reconnect. See "Attribute: EnquireLinkTimerValue" in "Reference: Attributes and Operations for SMPP Server Service" for more information.
- Transaction timer: This timer establishes the interval between an SMPP request to the application and the corresponding SMPP response. If the interval is reached, Services Gatekeeper does not re-send the request. In this case, Services Gatekeeper removes the transaction information and discards the PDU response. See

"Attribute: RequestTimerValue" in "Reference: Attributes and Operations for SMPP Server Service" for more information.

You can disable any of these timers by setting their values to 0.

Plug-in Instance Timers

The plug-in instance MBean provides the following configurable timers for connections between Services Gatekeeper and SMSCs:

- Connection timer: This timer sets the heartbeat interval that Services Gatekeeper uses to request the connection status on the client connection. If the **ENQUIRE_LINK** requests fail, Services Gatekeeper closes the connection and attempts to reconnect. See "Attribute: EnquireLinkTimerValue" in "Reference: Attributes and Operations for Native SMPP Plug-in" for more information.
- Transaction timer: This timer establishes the interval between an SMPP request to the SMSC and the corresponding SMPP response. If the interval is reached, Services Gatekeeper does not re-send the request. In this case, Services Gatekeeper removes the transaction information and discards the PDU response. See the "Attribute: RequestTimerValue" in "Reference: Attributes and Operations for Native SMPP Plug-in" for more information.

Windowing

To maximize throughput, Native SMPP supports windowing on both the application-facing and network-facing interfaces. Windowing provides a way to specify the amount of data that can be transmitted without receiving an acknowledgment.

Requests wait in a windowing queue until they can be submitted. Two values apply to the windowing queue. The windowing maximum queue size is the size of the queue, specifying the maximum number of requests that can wait in the queue at one time. The windowing maximum wait time value specifies the maximum amount of time that a single request can wait in the windowing queue.

The windowing size value is the number of unacknowledged requests that can be sent simultaneously.

Windowing for mobile-originated requests toward the application is configured in the following parameters in the SMPP Server Service's **addApplicationSpecificSettings** operation:

- **windowingSize**
- **windowingMaxQueueSize**
- **windowingMaxWaitTime**

See "Operation: addApplicationSpecificSettings" for more information.

Windowing for mobile-terminated requests toward the SMSC is configured in the following plug-in instance MBean attributes:

- Attribute: WindowingSize
- Attribute: WindowingMaxQueueSize
- Attribute: WindowingMaxWaitTime

A request moves from the windowing queue to the window. From the window it is submitted for processing. A submitted request remains in the window until its

response is received. When the response is received, the request is released and another request can be moved from the windowing queue to the window.

If any one of these three windowing parameters is set to a value less than zero, windowing is turned off. If all of these three parameters are greater than zero, windowing is turned on.

In both directions, if the windowing request queue is full or the timer has expired, the request is not sent and an error code is returned to the plug-in instance.

Connection-Based Routing

Connection-based routing lets network operators configure geo-redundant sites to allow applications to send mobile-originated (MO), mobile-terminated (MT,) and delivery receipt (DR) traffic to and from any of the redundant sites. For example, a DR can be sent to a site other than the one through which the original message was submitted.

Enable Connection-Based Routing

To use this feature, set the **ConnectionBasedRouting** attribute in the SMPP Server Service to `true`. By default this attribute is `false`. See "Attribute: ConnectionBasedRouting" for more information.

When connection-based routing is enabled, messages from the network are routed to the application that caused or that could have caused the connection in the plug-in to be established to the SMSC. This works both for delivering a short message with a new message and delivering a short message containing a delivery receipt. This means that **DELIVER_SM** with a new message is not routed based on the destination address, and **DELIVER_SM** containing a delivery receipt is not routed based on the message identifier.

Limitations

The following are some limitations and issues pertaining to connection-based routing:

- If an application is configured to support subsequent operations (**CANCEL_SM**, **QUERY_SM** and **REPLACE_SM**), those requests must be sent to the same geographic site as the original submit requests. They will not be accepted if sent to the other site. When Services Gatekeeper checks the subsequent operations, it returns an error response if it cannot find the original **SUBMIT_SM** request in the store.
- If subsequent operations are enabled and a submit request is sent through site 1 but delivery receipt arrives on site 2, the data stored about the message in the database on site 1 is not deleted until the information is considered to be too old. The consequence is that an application can continue sending subsequent operations related to the message through site 1 even after the message was delivered.
- If connection-based routing is enabled, the **NumberReceiverConnections**, **NumberTransceiverConnections**, and **NumberTransmitterConnections** attributes in the plug-in instance are ignored, because connections to the SMSC cannot be shared among different application instances.

Short Code Translation

The Native SMPP communication service does not offer short code translations.

USSD Support

Native SMPP provides Unstructured Supplementary Services Data (USSD) through the **its_session_info**, **service_type**, and **ussd_service_operation** optional parameters.

its_session_info

Required parameter for the CDMA Interactive Teleservice as defined by the Korean PCS carriers [KORITS]. Contains control information for the interactive session between an MS and an ESME.

See Section 5.3.2.43 of the *Short Message Peer to Peer Protocol Specification v3.4* for the formal definition of the parameter and the appropriate subsections of Section 4 for its specification as an optional parameter for **SUBMIT_SM**, **DELIVER_SM**, and **DATA_SM**.

Format

Octet String

Following is a description of the octet string.

Bits 7.....0

SSSS SSSS (octet 1)

NNNN NNNE (octet 2)

Octet 1 contains the session number (0 -255) encoded in binary. The session number remains constant for each session.

The sequence number of the dialog unit (as assigned by the ESME) within the session is encoded in bits [7. . . 1] of octet 2.

The End of Session Indicator indicates the message is the end of the conversation session and is encoded in bit 0 of octet 2 as follows:

- **0** = End of Session Indicator inactive
- **1** = End of Session Indicator active

service_type

Indicates the SMS application service associated with the message. Allows the ESME to use enhanced messaging services such as "replace_if_present" (generic) and to control the teleservice used on the air interface (for example, ANSI-136/TDMA, IS-95/CDMA).

Used to support USSD (Unstructured Supplementary Service Data 3G TS 23.090 version 3.0.0) messages through the SMPP protocol.

See Section 5.2.11 of the *Short Message Peer to Peer Protocol Specification v3.4*. for the formal definition of the parameter and the appropriate subsections of Section 4 for its specification as a mandatory parameter for **SUBMIT_SM**, **SUBMIT_MULTI**, **DELIVER_SM**, **DATA_SM**, and **CANCEL_SM**.

Format

Octet String

Value

The pre-defined generic service type value for USSD is **USSD**.

ussd_service_operation

Defines the USSD service operation that is required when SMPP is used as an interface to a (GSM) USSD system.

Used to support tunneling USSD (Unstructured Supplementary Service Data 3G TS 23.090 version 3.0.0) messages through the SMPP protocol.

Used as an optional parameter to SMPP **SUBMIT_SM**.

Defined in section Section 5.3.2.44 of the *Short Message Peer to Peer Protocol Specification v3.4*.

Added to **DELIVER_SM** in the SMPP 5.1 specification. See *Short Message Peer to Peer Protocol Specification Version 5.1*.

Format

Octet String

Value

Valid values are:

- **0** = PSSD indication
- **1** = PSSR indication
- **2** = USSR request
- **3** = USSN request
- **4** to **15** Reserved
- **16** = PSSD response
- **17** = PSSR response
- **18** = USSR confirm
- **19** = USSN confirm
- **20** to **31** Reserved
- **32** to **255** Reserved for vendor-specific USSD operations

Billing Identification

The native SMPP communication service supports the **billing_identification** parameter in the format in the SMPP Specification 5.1 through an optional parameter named **smpp_billing_id**.

The parameter works with SMPP 5.1 SMSCs, but with not with SMPP 3.4 SMSCs.

smpp_billing_id

Defines the billing information according to the format in the SMPP Specification 5.1, section 4.8.4.3 titled "billing_identification".

Format

Hexadecimal string

Table 22–1 describes the format.

Table 22–1 Format for smpp_bliing_id Value

Field	Size (octets)	Type	Description
parameter tag	2	Integer	0x060B
length	2	Integer	Length of value part in octets
value	1 - 1024	Octet String	Bits 7.....0 0XXXXXXX (Reserved)1XXXXXXX (Vendor Specific) The first octet represents the Billing Format tag and indicates the format of the billing information contained in the remaining octets.

If the value is not sent as a hexadecimal string, it is ignored and a warning is logged.

Here is sample code for encoding the string.

```
private String getHexEncodedString(String normalString) {
  byte[] bHexStr = normalString.getBytes();
  String retVal = "";
..String sOctet = null;
  for (int i = 0; i < bHexStr.length; i++) {
    sOctet = Integer.toHexString((int) (bHexStr[i] & 0xFF));
    if (sOctet.length() == 1) {
      sOctet = "0" + sOctet;
    }
    retVal = retVal.concat(sOctet);
  }
  return retVal.toUpperCase(); }
```

Load Balancing, High Availability and Fail-Over

To optimize system utilization, applications should load-balance application-triggered requests among all network tier servers.

The SMSC should load-balance network-triggered requests among all network tier servers.

Load balancing is supported only among plug-in instances that are located in same network tier server and share same large account. When a request is sent to a plug-in instance, the plug-in instances use the SMPP Server Service in the same server to forward the request to the applications. When a request is sent to the SMPP Server Service, the SMPP Server Service uses a plug-in instance in the same server to process the request.

High availability and fail-over is supported between Services Gatekeeper and the SMSC. High availability between the application and Services Gatekeeper must be handled by each application.

A prerequisite for high-availability for the Native SMPP communication service is redundant network tier servers, redundant network interface cards in each network tier server, and a redundant set of SMPP servers to connect to. High availability between Services Gatekeeper and the network is achieved by using at least two different plug-in instances per network tier server and having the plug-in instances connect to different SMPP servers.

Between SMPP applications and Services Gatekeeper, the applications handle high availability and fail-over for application-initiated requests by binding to two or more

network tier servers. For network-triggered requests, the same requirement that the applications bind to two or more network tier servers applies.

High availability behavior is as follows:

- In a Services Gatekeeper cluster, if the server becomes unavailable after sending a Submit SM request to and receiving the **SUBMIT_SM_RESP** from the SMSC, the SMSC routes the subsequent delivery receipt to another server. This other server retrieves the message information from cluster-level storage and processes it.
- In a Services Gatekeeper cluster, if a server becomes unavailable after sending a **SUBMIT_ SM** request to and receiving the **SUBMIT_SM_RESP** from an application, the application routes the subsequent **CANCEL_SM**, **QUERY_SM** or **REPLACE_SM** request to another server. This other server retrieves the message information from cluster-level storage and processes it.
- In a geo-redundant configuration, all sites are connected to the SMSC. If a site becomes unavailable after sending a **SUBMIT_ SM** request to and receiving the **SUBMIT_SM_RESP** from the SMSC, the SMSC routes the subsequent delivery receipt to another site. This other site uses connection-based routing to process the delivery receipt.
- In a geo-redundant configuration, if an application is configured to support subsequent operations (**CANCEL_SM**, **QUERY_SM**, and **REPLACE_SM**) through the **subsequentOperationsAllowed** parameter to the **addApplicationSpecificSettings** operation, those requests must be sent to the same geographic site from which the original submit requests were sent. They will not be accepted if they are sent to another site.
- In a geo-redundant configuration, if an application is configured to support subsequent operations and a submit request is sent through site 1 but delivery receipt arrives on site 2, the data stored about the message in the database on site 1 is not deleted until the information is considered to be too old. The consequence is that an application can continue sending subsequent operations related to the message through site 1 even after the message was delivered.

The Native SMPP communication service can be provisioned for applications to share the same large account in the SMPP server, so that they share the same bind. However, his configuration is not recommended since it impacts high availability for network-triggered requests. When there is only one bind between Services Gatekeeper and the SMPP server, and more than one application is listening for network-triggered messages, the Native SMPP communication service must listen to incoming messages on behalf of all the applications. The bind between the plug-in and the network node is performed on all network tier servers, so network-triggered messages can be sent to any of these servers. If the network-triggered request ends up in a server that the application has not bound to, the communication service does not try to look up a server that the application has bound to. Instead, it does not see an active bind and treats the request as undeliverable to the application. Because it is common for SMPP servers to load-balance between binds, it is very likely that 50% or more of the requests will fail in this setup. The only way to ensure high availability in this scenario is to mandate that all applications bind to all network tier servers.

Application Interfaces

For information on the application interface for the Native SMPP communication service, see the discussion about Native SMPP Interfaces in *Services Gatekeeper Application Developer's Guide*.

Events and Statistics

The Native SMPP communication service generates event data records (EDRs), charging data records (CDRs), alarms, and statistics to assist system administrators and developers in monitoring the service

For general information, see "Events, Alarms, and Charging".

Event Data Records

Table 22–2 lists IDs of the EDRs created by the SMPP Server Service.

Table 22–2 EDRs Generated by the SMPP Server Service

EDR ID	Description
400000	Entering the NorthChannelProcessor recvBind method.
400001	Entering the NorthChannelProcessor recvUnbind method.
400002	Entering the NorthChannelProcessor recvSubmitSM method.
400003	Leaving the NorthChannelProcessor sendSubmitSMResp method.
400004	Entering the NorthChannelProcessor recvSubmitMulti method.
400005	Leaving the NorthChannelProcessor sendSubmitMultiResp method.
400006	Entering the NorthChannelProcessor recvQuerySM method.
400007	Leaving the NorthChannelProcessor sendQuerySMResp method.
400008	Entering the NorthChannelProcessor recvCancelSM method.
400009	Leaving the NorthChannelProcessor sendCancelSMResp method.
400010	Entering the NorthChannelProcessor recvReplaceSM method.
400011	Leaving the NorthChannelProcessor sendReplaceSMResp method.
400020	Leaving the SouthChannelProcessor sendBind method.
400021	Leaving the SouthChannelProcessor sendUnbind method.
400022	Leaving the SouthChannelProcessor sendSubmitSM method.
400023	Entering the SouthChannelProcessor recvSubmitSMResp method.
400024	Leaving the SouthChannelProcessor sendSubmitMulti method.
400025	Entering the SouthChannelProcessor recvSubmitMultiResp method.
400026	Leaving the SouthChannelProcessor sendQuerySM method.
400027	Entering the SouthChannelProcessor recvQuerySMResp method.
400028	Leaving the SouthChannelProcessor sendCancelSM method.
400029	Entering the SouthChannelProcessor recvCancelSMResp method.
400030	Leaving the SouthChannelProcessor sendReplaceSM method.

Table 22–2 (Cont.) EDRs Generated by the SMPP Server Service

EDR ID	Description
400031	Entering the SouthChannelProcessor recvReplaceSMResp method.
400051	Entering the NorthChannelProcessor recvUnbindResp method.
400054	Entering the NorthChannelProcessor recvGenericNack method.
400055	Entering the NorthChannelProcessor sendBindResp method.
400056	Leaving the NorthChannelProcessor sendUnbind method.
400057	Leaving the NorthChannelProcessor sendUnbindResp method.
400060	Leaving the NorthChannelProcessor sendGenericNack method.
400061	Entering the SouthChannelProcessor recvBindResp method.
400062	Entering the SouthChannelProcessor recvUnbind method.
400063	Entering the SouthChannelProcessor recvUnbindResp method.
400066	Entering the SouthChannelProcessor recvGenericNack method.
400067	Leaving the SouthChannelProcessor sendUnbindResp method.
400070	Leaving the SouthChannelProcessor sendGenericNack method.
400100	Leaving the NorthChannelProcessor sendDeliverSM method.
400101	Entering the NorthChannelProcessor recvDeliverSMResp method.
400108	Entering the SouthChannelProcessor recvDeliverSM method.
400109	Leaving the SouthChannelProcessor sendDeliverSMResp method.

The Native SMPP plug-in instance does not exchange events directly with the application or the SMSC, so it does not generate any EDRs.

Charging Data Records

Native SMPP plug-in-specific CDRs are generated under the following conditions:

- When a **submitSm** or **submitSmMulti** method has successfully been sent to the network, and Services Gatekeeper has received a response with OK status.
- When a **deliverSm** method with a mobile-originated message has been received by Services Gatekeeper, and a **deliverSm** has been forwarded to an application. Note that the CDR is generated regardless of **commandstatus** in **DeliverSmResp** from application.
- After Services Gatekeeper receives and processes **DeliverSm** with a delivery receipt. The CDR is generated regardless of whether Services Gatekeeper was able to forward the **deliverSm** to any applications. If the **deliverSm** was forwarded to an application, the CDR is generated regardless of **commandstatus** in **DeliverSmResp** from application.

Statistics

Table 22–3 maps methods invoked from either the application or the network to the transaction types collected by the Services Gatekeeper statistics counters.

Table 22–3 Methods and Transaction Types for Native SMPP

Method	Transaction type
submitSm	TRANSACTION_TYPE_MESSAGING_SEND
submitSmMulti	TRANSACTION_TYPE_MESSAGING_SEND
receiveMoReq	TRANSACTION_TYPE_MESSAGING_RECEIVE

Alarms

For the list of alarms, see *Services Gatekeeper Alarms Handling Guide*.

Managing Native SMPP

This section describes the properties and workflow for the Native SMPP communication service.

Properties for SMPP Server Service

Table 22–4 lists the technical specifications for the SMPP Server Service.

Table 22–4 SMPP Server Service Properties

Property	Description
Managed object in Administration Console	To access the managed object, select *domain_name*, then **OCSG**, then *server_name*, then **Container Services**, then **SMPPService**.
MBean	Domain=com.bea.wlcp.wlng Name=wlng InstanceName=SMPPService Type=**oracle.ocsg.protocol.smpp.management.SMPPServiceMBean**
Exposes this interface to applications	Short Message Peer to Peer, Protocol Specification v3.4
Deployment artifacts	**oracle.ocsg.protocol.smpp_api_5.0.0.0.jar**, **oracle.ocsg.protocol.smpp_5.0.0.0.jar**

Properties for Native SMPP Plug-in

Table 22–5 lists the technical specifications for the Native SMPP plug-in.

Table 22–5 Native SMPP Plug-in Properties

Property	Description
Managed object in Administration Console	To access the managed object, select *domain_name*, then **OCSG**, then *server_name*, then **Communication Services**, and then **Plugin_sms_smpp#5.0** in that order.
MBean	Domain=com.bea.wlcp.wlng Name=wlng_nt InstanceName=same as the network protocol *instance_id* assigned when the plug-in instance is created Type=**oracle.ocsg.plugin.nativesmpp.management.NativeSMPPPluginMBean**

Table 22–5 (Cont.) Native SMPP Plug-in Properties

Property	Description
Deployment name	wlng_nt_native_smpp_sms#5.0
Network protocol plug-in service ID	Plugin_sms_smpp
Network protocol plug-in instance ID	The ID is assigned when the plug-in instance is created. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*.
Exposes to the service communication layer a Java representation of:	SMPP v3.4, depends on common SMPP server service Short Message Peer to Peer Protocol Specification v3.4
Interfaces with the network nodes using:	SMPP v3.4, depends on common SMPP server service4 Short Message Peer to Peer Protocol Specification v3.4
Service Type	SMPP
Application-facing interfaces	**oracle.ocsg.protocol.smpp.plugin.SMPPPluginNorth** **oracle.ocsg.protocol.smpp.service.SMPPServiceNorth**
Network-facing interfaces	**oracle.ocsg.protocol.smpp.plugin.SMPPPluginSouth** **oracle.ocsg.protocol.smpp.service.SMPPServiceSouth**
Supported Address Scheme	tel
Deployment artifact	**wlng_nt_native_smpp_sms.ear**

Configuration Workflow for Native SMPP Communication Service

Following is an outline for configuring this plug-in using the Administration Console or an MBean browser. You can also accomplish these steps programmatically. See the "All Classes" section of the *OAM Java API Reference* for details on the **SMPPServiceMBean**.

1. Navigate to **Container Services** and then **SMPPService.**
2. Configure the behavior of the SMPP Server Service.

   See "Reference: Attributes and Operations for SMPP Server Service" for descriptions of the configuration options.
3. Using "Operation: updateAllServerPorts", apply the configuration settings for the Native SMPP Service.
4. Create one or more instances of the plug-in service. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the network protocol plug-in service ID as described in the "Properties for Native SMPP Plug-in" section.
5. Using the console or an MBean browser, select the MBean for the plug-in instance that you want to configure. The MBean display name is the same as the plug-in instance ID assigned when the plug-in instance was created.
6. Configure the behavior of the plug-in instance. See "Reference: Attributes and Operations for Native SMPP Plug-in" for the list of attributes that you can set.
7. Apply the configuration settings for the Native SMPP plug-in instance by restarting the plug-in or using "Operation: resetClientConnection".
8. Set up the routing rules to the plug-in instance. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System*

Administrator's Guide. Use the plug-in instance ID and address schemes listed in the "Properties for Native SMPP Plug-in" section.

9. If required, create and load a node SLA. For details see the discussion on defining global node and service provider group node SLAs and managing SLAs in *Services Gatekeeper Accounts and SLAs Guide*.
10. Provision the service provider accounts and application accounts. For information, see *Services Gatekeeper Portal Developer's Guide*.

Provisioning Workflow for Native SMPP Communication Service

Following is an outline of tasks for provisioning the communication service.

1. To register application instances to use the Native SMPP communication service, use "Operation: addApplicationSpecificSettings" in the MBean for the SMPP Server Service. Use the following operations to manage the account settings:
   - Operation: addApplicationSpecificSettings
   - Operation: deleteApplicationSpecificSettings
2. Using "Operation: updateAllServerPorts", apply the provisioning settings.

Context Attributes for Native SMPP Server

There **SMPPServiceMBean** context attributes can be checked by a custom interceptor.

Attribute: native_smpp_mo_destAddressHasAppMapping

Format: Boolean

Default Value: False

If it is set to true, Services Gatekeeper checks whether there is an application matching the destination address in the **DeliverSm** action. False means that Services Gatekeeper does not to check for a matching application in **DeliverSm**.

Attribute: native_smpp_mo_hasActiveReceiver

Format: Boolean

Default Value: False

If set to true, Services Gatekeeper checks whether the application matching the destination address in **DeliverSm** has an active receiver connection. False means that Services Gatekeeper does not check whether the application has an active receiver connection.

System Properties for SMPP Server Service

The SMPP Server Service has some system properties that cannot be modified at runtime. Set these properties on the Java command line when you start Services Gatekeeper.

These system properties are applicable to both Native SMPP and Parlay X SMS/SMPP plug-ins.

System Property: oracle.ocsg.protocol.smpp.serverservice.max_threads

Format: Integer

Maximum number of threads available to server connections.

The default is **32**.

System Property: oracle.ocsg.protocol.smpp.serverservice.min_threads

Format: Integer

Minimum number of threads available to client and server connections. Each client connection uses one thread. Each server port uses one thread.

The default is **2**.

System Property: wlng.legacy.smpp.PDUManipulationAllowed

Format: Boolean

Specifies whether an interceptor can modify a parameter passed between the SMPP Server Service and a plug-in.

Set to `true` to allow parameter modification, `false` to prohibit it.

The default is `true`.

System Property: wlng.smpp.max_payload_size

Format: Integer

Specifies the maximum number of characters in an SMS message.

The default is the maximum defined by the Parlay X 2.1 SMS specification: 160 GSM 7-bit characters or 70 Unicode characters.

Reference: Attributes and Operations for SMPP Server Service

The attributes listed in this section are used only by the Native SMPP communication service through the **SMPPServiceMBean**.

All of the operations are used by the Native SMPP communication service, but only the following four are used by the Parlay X 2.1 Short Messaging/SMPP and Extended Web Services Binary SMS/SMPP communication services:

- Operation: closeClientConnection
- Operation: listClientConnections
- Operation: listPluginInstances
- Operation: resetClientConnection

This section describes the attributes and operations for configuration and maintenance.

- Attribute: ConnectionBasedRouting
- Attribute: EnquireLinkMaxFailureTimes
- Attribute: EnquireLinkTimerValue
- Attribute: InactivityTimerValue

Attribute: ConnectionBasedRouting

Scope: Cluster

Unit: Not applicable

Format: Boolean

Enables and disables connection-based routing for Native SMPP plug-ins.

Connection-based routing lets operators configure geo-redundant sites to allow applications to send MO, MT, and DR traffic to and from either of the sites.

Set to `true` to enable, `false` to disable. The default is `false`.

For more information, see "Connection-Based Routing".

This attribute can be modified only when there are no active connections between SMPP applications and the SMPP Server Service.

Attribute: EnquireLinkMaxFailureTimes

Scope: Cluster

Unit: Not applicable

Format: Integer

Maximum number of failed **ENQUIRE_LINK** requests to the application before the connection with the application is closed.

Attribute: EnquireLinkTimerValue

Scope: Cluster

Unit: Seconds

Format: Integer

Minimum interval between the submission of **ENQUIRE_LINK** requests (heartbeats) to an application.

To disable the sending of **ENQUIRE_LINK** requests, set this value to **0** (zero).

Attribute: InactivityTimerValue

Scope: Cluster

Unit: Seconds

Format: Integer

Maximum period of inactivity for an application before the connection with the application is closed.

Use 0 (zero) for no timeout.

Attribute: InitiationTimerValue

Scope: Cluster

Unit: Seconds

Format: Integer

Maximum time between establishment a connection to the application and the **BIND** request.

If the timeout value is reached, the server connection is closed.

Use **0** (zero) for no timeout.

Attribute: LooseBinding

Scope: Server

Unit: Not applicable

Format: Boolean

Controls behavior on application **BIND** and **UNBIND**.

If `true`, the following applies:

- As long as there are transmitting-capable connections (TX, TRX) from applications, TX and TRX connections will be kept open to SMSCs.
- As long as there are receiving-capable connections (RX, TRX) from applications, RX and TRX connections will be kept open to SMSCs.

If `false`, the binding rules are more restrictive:

- As long as there are TX connections from applications, TX connections will be kept open to SMSCs.
- As long as there are RX connections from applications, RX connections will be kept open to SMSCs.
- As long as there are TRX connections from applications, TRX connections will be kept open to SMSCs.

This attribute value cannot be changed while there is an active connection with an application.

The default is `true`.

Attribute: OfflineMO

Scope: Cluster

Unit: Not applicable

Format: Boolean

Specifies whether the JMS-based routing functionality for network-triggered messages is enabled. If `true`, a message from the network to an NT server that does not have an active bind to the appropriate application can be placed in a JMS queue from which another server that does have an active bind can fetch it and send it to the application.

The default is `false`.

The time that the message stays alive in the JMS queue is configurable. The default value is **3600000** milliseconds. To change this value, in the administrative console:

1. Select **Services ->Messaging->JMS Modules**.
2. Click **WLNGJMSResource**. The **Settings** page opens.
3. On the **Configuration** tab, click **LegacySMSConnectionFactory**. The **Settings for LegacySMSConnectionFactory** page opens
4. On the **Configuration** tab, select the **Default Delivery** sub-tab.
5. Make your changes to the **Default Time-to-Live** attribute.
6. Click **Save**.
7. Click the **Activate Changes** button in the **Change Center**.

This attribute is not applicable if **ConnectionBasedRouting** is `true`.

Attribute: rejectMOMessagesWithNoAppReceiverConnection

Scope: Cluster

Format: Boolean

Default value: FALSE.

If set to true, rejects a MO **DeliverSm** request early in the processing flow.

If set to false, the request is still rejected, but much later in the processing flow, and in some cases after attempting a resend of the message.

Both cases address the condition where:

- A receiver connection exists between Services Gatekeeper and an SMSC

- No matching receiver connection between Services Gatekeeper and application exists that can handle a **DeliverSm** action.

Attribute: RequestTimerValue

Scope: Cluster

Unit: Seconds

Format: Integer

Maximum time between the submission of a request to an application and the receipt of the corresponding response, before the connection is closed.

Set to **0** (zero) for no timeout.

Attribute: ServerAddress

Scope: Server

Unit: Not applicable

Format: String

Default host name or IP address that applications use to connect to the SMPP Server Service.

Multiple addresses are supported as a comma-separated list of IP addresses.

Attribute: ServerPort

Scope: Server

Unit: Not applicable

Format: Integer **[1024–65535]**

Default port that applications use to connect to the SMPP Server Service.

Updating this attribute takes effect immediately if the old port and the new port are not in use. In this case, the SMPP Server Service closes the old port and opens the new port.

If the old port is in use when this attribute is set, it is closed after the last application instance that used it is removed by the **deleteApplicationSpecificSettings** operation. See "Operation: deleteApplicationSpecificSettings" for more information.

When a new application instance is added with the **addApplicationSpecificSettings** operation, if the **acceptPort** parameter to that operation is a negative value, all traffic from the application uses the new port. See "Operation: addApplicationSpecificSettings" for more information.

Attribute: skipAddressrangeCheckInBindRequest

Scope: Cluster

Unit: NA

Format: Boolean

Default Value: False

If set to false, Services Gatekeeper confirms that the address range provided in the bind request from a Native SMPP application exactly matches what is provisioned in the application-specific setting. The address range must exactly match.

You can remove this checking by setting this attribute to true.

Attribute: SmscSystemId

Scope: Cluster

Unit: Not applicable

Format: String; maximum 16 characters

SMSC system ID. Sent to an ESME client upon a successful **BIND**.

Operation: addApplicationSpecificSettings

Scope: Cluster

Specifies connection details for an application with the specified **applicationInstanceId**.

Required for an application instance to access the SMPP Server Service.

This operation takes effect immediately after it is invoked. The SMPP Server Service closes the old port, if it is not in use, and opens the new port, if it is not in use.

See "Windowing" for more information about the **windowingSize**, **windowingMaxQueueSize**, and **windowingMaxWaitTime** parameters.

Signature:

```
addApplicationSpecificSettings(applicationInstanceId: int, acceptPort: int,
maxSession: int, subsequentOperationsAllowed: boolean, notificationEnabled:
boolean, addressRange: String, windowingSize: int, windowingMaxQueueSize: int,
windowingMaxWaitTime: int)
```

Table 22–6 addApplicationSpecificSettings Parameters

Parameter	Description
applicationInstanceId	ID of the application instance for which the settings are valid.
acceptPort	Port to which the application is allowed to bind. A negative value allows binding to the port specified as the ServerPort. See "Attribute: ServerPort" for more information.
maxSession	Maximum number of concurrent sessions the application is allowed to establish. A negative value allows an unlimited number of concurrent sessions.

Table 22–6 (Cont.) addApplicationSpecificSettings Parameters

Parameter	Description
subsequentOperationsAllowed	Specifies if the application is allowed to perform the following operations on a previously-sent short message: ■ **QUERY_SM** ■ **REPLACE_SM** ■ **CANCEL_SM** Enter: ■ `true` to allow ■ `false` to deny Setting this attribute to `false` reduces the resource utilization by the SMPP Server Service since it does not need to track each request in its store. See "Connection-Based Routing" for details about how subsequent operations are handled in geo-redundant configurations.
notificationEnabled	Specifies if the application is allowed to receive network-triggered messages. If allowed, the application can send the **BIND_TRANSCEIVER** and **BIND_RECEIVER** operations. Enter: ■ `true` to allow ■ `false` to deny
addressRange	If the **notificationEnabled** parameter is `true`, specifies the address range for listening for network-triggered short messages. Only messages that are sent to this address range are forwarded to the application. The address range is expressed as a regular expression. When used for binding a receiver or transceiver, the address range in the bind operation must be in the specified range. Otherwise the bind is rejected. See Appendix A in *SMPP Protocol Specification v3.4*. This setting is valid only if the application is allowed to receive network-triggered messages. Example: **^1234**
windowingSize	Maximum number of concurrent mobile-originated requests.
windowingMaxQueueSize	Maximum number of mobile-originated requests allowed to wait in the windowing queue.
windowingMaxWaitTime	Maximum time in seconds that each mobile-originated request is allowed to wait in the windowing queue.

Operation: closeClientConnection

Scope: Server

Closes the specified client connection between the communication service and the SMSC.

You use the **connectionId** and pluginInstanceId parameters to establish connections. See "Connection Handling and Provisioning" for information on using these parameters.

Signature:

```
closeClientConnection(connectionId: String, pluginInstanceId: String)
```

Table 22–7 closeClientConnection Parameters

Parameter	Description
connectionId	Id of connection to be closed. Created by a previous **BIND**.
pluginInstanceId	Id of plug-in instance for which related connections are to be closed.

Operation: closeServerConnection

Scope: Server

Closes the specified server connections between the communication service and the application.

You use the **connectionId** and **pluginInstanceId** parameters to establish connections. See "Connection Handling and Provisioning" for information on using these parameters.

If the **port** parameter is matched, closes all connections to that port.

Signature:

```
closeServerConnection(connectionId: string, appInstanceId: string, port: int)
```

Table 22–8 closeServerConnection Parameters

Parameter	Description
connectionId	Id of connection to be closed. Created by a previous **BIND** operation.
appInstanceId	Id of application instance for which related connections are to be closed.
port	Port for which connections are to be closed.

Operation: closeServerPort

Scope: Server

Closes the specified server port on which the SMPP Server Service is listening. Closes all server and client connections on the specified port.

Signature:

```
closeServerPort(port: int)
```

Table 22–9 closeServerPort Parameters

Parameter	Description
port	Port to close.

Operation: deleteApplicationSpecificSettings

Scope: Cluster

Deletes application-specific settings for an application with the specified **applicationInstanceId**.

The application will no longer be able to access the SMPP Server Service.

Signature:

```
deleteApplicationSpecificSettings(applicationInstanceId: String)
```

Table 22–10 deleteApplicationSpecificSettings Parameters

Parameter	Description
applicationInstanceId	ID of the application instance for which to delete settings

Operation: listApplicationSpecificSettings

Scope: Cluster

Displays all application-specific settings.

Signature:

```
listApplicationSpecificSettings()
```

Operation: listClientConnections

Scope: Server

Displays description and status of all client connections. These are connections between the communication service and the SMSC.

Signature:

```
listClientConnections()
```

Operation: listClusterServerConnectionsForMOJumping

Scope: Cluster

Displays the description and status for cluster server connections for which the MO jumping is enabled.

For information about MO jumping, see "Attribute: OfflineMO" for more information.

Signature:

```
listClusterServerConnectionsForMOJumping()
```

Operation: listPluginInstances

Scope: Server

Displays description and status for all registered plug-in instances.

```
listPluginInstances()
```

Operation: listServerConnections

Scope: Server

Displays description and status of each server connection.

Signature:

```
listServerConnections()
```

Operation: listServerPorts

Scope: Server

Displays description and status of each server port.

Signature:

```
listServerPorts()
```

Operation: resetClientConnection

Scope: Server

Closes and restarts the specified client connection between the communication service and the SMSC. See "About Creating and Resetting Connections" for information on using the **connectionId** and **pluginstanceId** parameters to create connections.

connectionId Syntax for the Native SMPP plug-in:

plugin_instance_id#*plugin_version*

For example:

Plugin_px21_short_messaging_smpp_*myinstance*#6.0.0.0

connectionId Syntax for the Parlay X 2.1 Short Messaging/SMPP plug-in:

Plugin_px21_short_messaging_smpp_*myinstance*

For example:

plugin_instance_id

Signature:

```
resetClientConnection(connectionId: String, pluginInstanceId: String)
```

Table 22–11 resetClientConnection Parameters

Parameter	Description
connectionId	Id of the connection to be reset. Created by a previous **BIND** operation.
pluginInstanceId	Id of the plug-in instance for which related connections are to be reset.

Operation: resetServerPort

Scope: Server

Closes and restarts the specified application-facing server port on which the SMPP Server Service is listening. This operation resets all server and client connections on the specified port.

Signature:

```
resetServerPort(port: int)
```

Table 22–12 resetServerPort Parameters

Parameter	Description
port	Port to reset.

Operation: updateAllServerPorts

Scope: Server

Closes and restarts all server ports all local server ports in the current configuration.

Signature:

```
updateAllServerPorts()
```

Reference: Attributes and Operations for Native SMPP Plug-in

This section describes the attributes and operations for configuration and maintenance:

Attribute: BindType

Scope: Server

Unit: Not applicable

Format: Integer

Specifies how the plug-in binds to the SMSC.

Use:

- **1** to bind as Transceiver
- **2** to bind as Transmitter
- **3** to bind as Receiver

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: DeliverSmRespCommandStatus

Scope: Cluster

Unit: Not applicable

Format: Integer

Error code to used in the **command_status** field when the application is unavailable. See section *5.1.3 command_status* in *SMPP Protocol Specification v3.4*.

Specifies how the plug-in responds to an SMSC if a network-triggered short message cannot be delivered to an application that subscribed for notifications on incoming short messages.

The default is **ESME_RINVDSTADR**.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Table 22–13 lists the possible values for **DeliverSmRespCommandStatus**.

Table 22–13 DeliverSmRespCommandStatus Response Codes

Error Code	Definition	Possible Scenario
1	Invalid Message Length	Failed to decode the short message in deliverSm (MOAT).
6	Invalid priority flag	The priority flag is less than 0 or greater than 3.
8	System Error	An internal Services Gatekeeper error has occurred, for example, a storage exception.
10	Invalid Source Address	An invalid source address in deliverSm, for example, an empty address.
11	Invalid Address	Services Gatekeeper received a delivery receipt with an unknown address or a MOAT from an address without any registration.
12	Invalid Message ID	The messageId in deliverSm is null or unknown.
67	Invalid esm_class field data	Invalid esm_class field data in deliverSm, for example, -1.

Attribute: EnableDeleteAfterCancel

Scope: Cluster

Unit: Not applicable

Format: Boolean

Specifies whether to delete SMPP session information from storage after receipt of a **CANCEL_SM_RESP.**

The default is `true`.

Attribute: EnableDeleteAfterNotify

Scope: Cluster

Unit: Not applicable

Format: Boolean

Specifies whether to delete SMPP session information from storage after receipt of the delivery report with the final message state.

The default is `true`.

Attribute: EnableDeleteAfterQuery

Scope: Cluster

Unit: Not applicable

Format: Boolean

Specifies whether to delete SMPP session information from storage after the receipt of the query response with the final message state.

The default is `false`.

Attribute: EnquireLinkTimerValue

Scope: Cluster

Unit: Seconds

Format: Integer

Minimum interval between **ENQUIRE_LINK** requests to the SMSC.

The default is **60**.

To disable the sending of **ENQUIRE_LINK** requests, set this value to **0** (zero).

Attribute: EsmeAddressRange

Scope: Server

Unit: Not applicable

Format: String formatted as a regular expression.

ESME address range. This is the address range of the SMS messages to be sent to the plug-in instance by the SMSC.

The default is **^.*$**.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: EsmeNpi

Scope: Server

Unit: Not applicable

Format: Integer

The ESME Numbering Plan Indicator (NPI) used in a **BIND** request.

Used for destination address and as a default for originating address. Also used for both destination address and originating address during bind operation. Use:

- **0** for Unknown
- **1** for ISDN (E163/E164)
- **3** for Data (X.121)
- **4** for Telex (F.69)
- **6** for Land Mobile (E.212)
- **8** for National
- **9** for Private
- **10** for ERMES
- **14** for Internet (IP)
- **18** for WAP Client ID

The default is **0**.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: EsmePassword

Scope: Cluster

Unit: Not applicable

Format: String

Password used by the plug-in instance for connecting to the SMSC as an ESME.

Attribute: EsmeSystemId

Scope: Cluster

Unit: Not applicable

Format: String

System ID used by the plug-in instance when connecting to the SMSC as an ESME.

The default is **OCSG**.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: EsmeSystemType

Scope: Cluster

Unit: Not applicable

Format: String

System type used by the plug-in instance for connecting to the SMSC as an ESME.

The default is **mess_gateway**.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: EsmeTon

Scope: Cluster

Unit: Not applicable

Format: Integer

ESME Type Of Number (TON).

Used for destination address and as a default for originating address. Also used for both destination address and originating address in a **BIND** request. Use:

- **0** for Unknown
- **1** for International
- **2** for National
- **3** for Network
- **4** for Subscriber
- **5** for Alphanumeric
- **6** for Abbreviated
- **7** Reserved

The default is 0.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: LocalAddress

Scope: Server

Unit: Not applicable

Format: String

Local server address used by the plug-in to connect to the SMSC. The address can be expressed as an IP address or host name. The address or host name must resolve to a local address.

Enter **""** to use the default address of the server.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: LocalPort

Scope: Server

Unit: Not applicable

Format: Integer [**1** - (**65535** - *number of connections*)]

Local port used by the plug-in to connect to the SMSC.

The default is **3000**.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: MessageIdInHexFormat

Scope: Cluster

Unit: Not applicable

Format: Boolean

Specifies the message_id format used in **SUBMIT_SM_RESP**, **SUBMIT_MULTI_RESP**, **DATA_SM_RESP** operations.

If `true`, the format is hexadecimal; if `false`, it is decimal.

The default is `false`.

Attribute: NumberReceiverConnections

Scope: Cluster

Unit: Not applicable

Format: Integer

Number of connections used to connect to the SMSC if the bind type is 3.

The default is **1**.

See "Attribute: BindType" for more information.

The connections are established with the first successful **BIND** between the application and Services Gatekeeper, if connection-based routing is disabled.

If connection-based routing is enabled, connections to the SMSC cannot be shared among different application instances, so this attribute is ignored.

Attribute: NumberTransceiverConnections

Scope: Cluster

Unit: Not applicable

Format: Integer

Number of connections used to connect to the SMSC if the bind type is 1.

The default is **1**.

See "Attribute: BindType" for more information.

The connections are established with the first successful **BIND** between the application and Services Gatekeeper, if connection-based routing is disabled.

If connection-based routing is enabled, connections to the SMSC cannot be shared among different application instances, so this attribute is ignored.

Attribute: NumberTransmitterConnections

Scope: Cluster

Unit: Not applicable

Format: Integer

Number of connections used to connect to the SMSC if the bind type is or 2.

The default is **1**.

See "Attribute: BindType" for more information.

The connections are established with the first successful **BIND** between the application and Services Gatekeeper, if connection-based routing is disabled.

If connection-based routing is enabled, connections to the SMSC cannot be shared among different application instances, so this attribute is ignored.

Attribute: RequestTimerValue

Scope: Cluster

Unit: Seconds

Format: Integer

Maximum time between the submission of a request to the SMSC and the receipt of the corresponding response before the connection is terminated.

The default is **20**.

Set to **0** (zero) for no timeout.

Attribute: RetryTimesBeforeGiveUp

Scope: Cluster

Unit: Not applicable

Format: Integer

Maximum number of times for the plug-in to try to reconnect to the server service.

The default is **30**.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: RetryTimesBeforeReconnect

Scope: Cluster

Unit: Not applicable

Format: Integer

Maximum number of times for the plug-in to try to connect to the server service before attempting to reconnect.

The default is **3**.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: SmscAddress

Scope: Cluster

Unit: Not applicable

Format: String

SMSC address as an IP address or host name.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: SmppVersion

Scope: Cluster

Unit: Not applicable

Format: String

SMPP version of the communication service used between Services Gatekeeper and the SMSC.

Valid values are **3.4** and **5.1**.

3.4 is the fully-supported version.

5.1 is provided to support the **billing identification** parameter and the **ussd_service_operation** parameter for the **DELIVER_SM** operation. See "USSD Support" and "Billing Identification" for information about these parameters

The default is 3.4.

Attribute: SmscPort

Scope: Cluster

Unit: Not applicable

Format: Integer

Listening port used by the SMSC

The default is **5016**.

The setting is not applied until the plug-in is restarted or the SMPP Server Service "Operation: resetClientConnection" is performed.

Attribute: WindowingMaxQueueSize

Scope: Cluster

Unit: Not applicable

Format: Integer

Maximum number of mobile-terminated requests to the SMSC allowed in the windowing queue.

The default is **100**.

If any one of the three windowing attributes (**WindowingMaxQueueSize**, **WindowingMaxWaitTime**, or **WindowingSize**) is set to a value less than zero, windowing is turned off. If all of these three attributes have values greater than zero, windowing is turned on.

See "Windowing" for general information about windowing.

Attribute: WindowingMaxWaitTime

Scope: Cluster

Unit: Seconds

Format: Integer

Maximum time that a mobile-terminated request to the SMSC is allowed to wait in the windowing queue.

The default is **15**.

If any one of the three windowing attributes (**WindowingMaxQueueSize**, **WindowingMaxWaitTime**, or **WindowingSize**) is set to a value less than zero, windowing is turned off. If all of these three attributes have values greater than zero, windowing is turned on.

See "Windowing" for general information about windowing.

Attribute: WindowingSize

Scope: Cluster

Unit: Not applicable

Format: Integer

Maximum number of simultaneous unacknowledged mobile-terminated requests to the SMSC enforced for each connection.

The default is **5**.

If any one of the three windowing attributes (**WindowingMaxQueueSize**, **WindowingMaxWaitTime**, or **WindowingSize**) is set to a value less than zero, windowing is turned off. If all of these three attributes have values greater than zero, windowing is turned on.

See "Windowing" for general information about windowing.

23

Native UCP

This chapter describes the Oracle Communications Services Gatekeeper Native UCP communication service.

Overview of the Native UCP Communication Service

The Native UCP communication service exposes the UCP Short Message Service Center EMI-UCP standard interfaces.

The communication service acts as a Short Message Terminal (SMT) that connects to a Short Messaging Service Center (SMSC) over TCP/IP.

For the exact version of the standards that the UCP communication service supports for the application-facing interfaces and the network protocols, see *Services Gatekeeper Statement of Compliance*.

The Native UCP service can:

- Connect to a specified SMSC address.
- Open a session with the SMSC.
- Send acknowledgments to the SMSC.
- Send acknowledgments to the application.
- Send a mobile-terminated SMS message to destination addresses.
- Deliver a mobile-originated SMS message.
- Deliver a delivery notification associated with a previously sent mobile-terminated SMS message.

All Native UCP components are deployed in the network tier.

The core module of the Native UCP communication service is a Native UCP Protocol Server Service deployed as an Oracle WebLogic Server Service. The Native UCP Protocol Server Service:

- Receives UCP data from the socket.
- Constructs the UCP protocol data unit (PDU).
- Associates the current PDU with the correct application instance.
- Invokes the plug-in.

There is also a Native UCP managed plug-in module, as well as the Native UCP plug-in instances.

In addition, Native UCP uses the Connection Information Manager service to create and manage a credential map to support each plug-in instance. For information about the Connection Information Manager, see the discussion about managing and configuring native UCP connection information in *Services Gatekeeper System Administrator's Guide*.

The entire Native UCP Service is deployed in the network tier, so applications using it must connect directly to the network tier. The network and any firewall should be configured to allow connection to the ports defined for the Native UCP Service.

There is no failover between network tier servers. Redundant SMSCs and redundant network cards are required to support high-availability features.

To optimize system utilization, the application and the SMSC should load balance the requests among all network tier servers.

Hitless upgrade is not supported for the Native UCP communication service. To upgrade you must restart the server.

Connection and Credential Handling

Plug-in instances establish connections to Services Gatekeeper using facilities provided by the Protocol Server Service. They also use the Protocol Server Service to open a session and to send requests to the SMSC. The Protocol Server Service creates a new socket connection for each session management operation of subtype "open session" that is sent.

The Native UCP Protocol Server Service uses the Connection Information Manager´s **getConnectInfo** operation to get the connection information for a particular plug-in instance. When a plug-in instance sends a Native UCP PDU to the Protocol Server Service passing its plug-in instance ID, a connection ID is returned. This connection ID identifies the SMSC connection on which the request was sent.

A server-side connection connects an application to Services Gatekeeper, which is the server in this context.

A client-side connection connects an SMSC to Services Gatekeeper, which is a client in this context.

Native UCP has no unbind operation. There are no receiver, transceiver, or transmitter connection types. If a connection is lost, the Protocol Server Service automatically closes one connection to the SMSC for the current application instance. See "Multiple Connections" for more information.

Credentials

The Protocol Server Service performs network credential mappings based on a credential map set up in the Connection Information Manager.

A user/password combination is associated with a credential ID that is stored in the Connection Information Manager. See the Connection Information Manager´s **createOrUpdateUserPasswordCredentialEntry** operation. The credential ID is associated with a plug-in instance and an application instance in an entry in the Connection Information Manager's credential map. See the Connection Information Manager's **createOrUpdateCredentialMap** operation.

For detailed information on how to configure the connection information and the credential map, see the discussion about managing and configuring native UCP connection information in *Services Gatekeeper System Administrator's Guide*.

Windowing and Transaction Numbers

To maximize throughput, Native UCP supports windowing on both the application-facing and network-facing interfaces. This provides a way to specify the amount of data that can be transmitted to and from the network without receiving an acknowledgment.

On the server side, Native UCP creates a transaction number (TRN) allocation table using default values. These are used by server-side connections sending **deliver_short_message** and **deliver_notification** requests to an application.

On the client side, Native UCP creates a transaction number allocation table using values configured in the Connection Information Manager. Configure the client-side windowing behavior by setting the parameters listed in Table 23–1 using the Connection Information Manager´s **addXParamToCredentialEntry** operation. For information about this operation, see the discussion on managing and configuring connection information in *Services Gatekeeper System Administrator's Guide.*

Table 23–1 UCP Windowing Parameters in ConnectionInfoManager

Parameter	Description	Default
windowSize	Maximum number of unacknowledged transactions allowed between a plug-in instance and an SMSC	100
maxWaitAcquireTimeout	Maximum time in milliseconds that a request can wait while trying to allocate a transaction number	3000
allocationTimeout	Maximum time in milliseconds that an allocated transaction number can be held while the plug-in or the SMSC is waiting for an acknowledgment	5000
maxQueueSize	Maximum number of threads that can wait for a transaction number to be allocated	5

Behavior When the Window is Exceeded

If Services Gatekeeper tries to allocate a TRN when all the TRNs have been allocated and none is old enough to be cleaned up and **maxWaitAcquireTimeout** has expired, an exception is thrown causing Services Gatekeeper to respond with a **NACK**.

Behavior When TRNs Are Not Released

When a TRN is allocated, values that have already been allocated are checked to see whether they have expired. Entries older than **allocationTimeout** are cleaned and automatically released. An error is logged, but no alarm is generated. No **NACK** is triggered for a request that was originally associated with the expired TRN.

Multiple Connections

An application instance can establish multiple TCP connections to Services Gatekeeper. Multiple application instances, those with different application instance names, cannot share a connection to the SMSC.

If one connection between an application instance and an SMSC is dropped, Services Gatekeeper does not automatically close associated application instance connections as long as there are other SMSC connections available for that same application instance. If all connections to the SMSC for a particular application instance are dropped, Services Gatekeeper terminates all of that application instance's connections.

Connection Pooling

When an application instance sends an **open session** operation on a new connection, the Protocol Server Service tries to establish a connection to the underlying SMSCs and then to open the session. It does not automatically establish connection pools to the underlying SMSCs. It establishes additional connections only when an application instance establishes multiple connections with Services Gatekeeper.

Because an application may establish multiple connections, a request sent from the Protocol Server Service to a plug-in includes a server-side connection identifier. This identifier is then included when the plug-in uses the Protocol Server Service to send acknowledgments back to the application. Acknowledgments must be sent on the same connection as the corresponding request. Delivery reports can be sent on a different connection.

Windowing and Transaction Numbers

To maximize throughput, Native UCP supports windowing on both the application-facing and network-facing interfaces. This provides a way to specify the amount of data that can be transmitted to and from the network without receiving an acknowledgment.

On the server side, Native UCP creates a transaction number (TRN) allocation table using default values. These are used by server-side connections sending **deliver_short_message** and **deliver_notification** requests to an application.

On the client side, Native UCP creates a transaction number allocation table using values configured in the Connection Information Manager. Configure the client-side windowing behavior by setting the parameters listed in Table 23–2 using the Connection Information Manager´s **addXParamToCredentialEntry** operation. For information about this operation, see the discussion about managing and configuring native UCP connection information in *Services Gatekeeper System Administrator's Guide*.

Table 23–2 UCP Windowing Parameters in ConnectionInfoManager

Parameter	Description	Default
windowSize	Maximum number of unacknowledged transactions allowed between a plug-in instance and an SMSC	100
maxWaitAcquireTimeout	Maximum time in milliseconds that a request can wait while trying to allocate a transaction number	3000
allocationTimeout	Maximum time in milliseconds that an allocated transaction number can be held while the plug-in or the SMSC is waiting for an acknowledgment	5000
maxQueueSize	Maximum number of threads that can wait for a transaction number to be allocated	5

Behavior When the Window is Exceeded

If Services Gatekeeper tries to allocate a TRN when all the TRNs have been allocated and none is old enough to be cleaned up and **maxWaitAcquireTimeout** has expired, an exception is thrown causing Services Gatekeeper to respond with a **NACK**.

Behavior When TRNs Are Not Released

When a TRN is allocated, values that have already been allocated are checked to see whether they have expired. Entries older than **allocationTimeout** are cleaned and automatically released. An error is logged, but no alarm is generated. No **NACK** is triggered for a request that was originally associated with the expired TRN.

Authentication

Applications are authenticated on receipt of the **openSession** PDU, after which the connection is associated with the authenticated identity.

Subsequent requests on the connection trigger an identity assertion associating the request with the identity that was authenticated with the receipt of the **open session** PDU. A consequence of this behavior is that an application can continue to send messages after the password has been changed. To force a new authentication, close the connection.

Table 23–3 describes the mapping between the Native UCP authentication parameters and the Services Gatekeeper parameters.

Table 23–3 Authentication Parameters

Native UCP Parameter	Services Gatekeeper ConnectionInfoManager Credential Parameter
originating address (OAdC)	application instance name
password	password

The password is stored in the Connection Information Manager. No password information is stored by the Protocol Server Service or by the plug-in.

Availability and Retry

The availability and retry behavior of the Protocol Server Service is as follows.

Application-Initiated traffic

If there is no acknowledgment from the network, the UCP Protocol Server Service does not start any timers per request, does not perform any retries, and does not report an acknowledgment back to the application.

The only exception to this behavior is when the wait on an openSession request exceeds the configured Native UCP **OpenSessionTimeout** maximum. See the **OpenSessionTimeout** field for more information.

If the Protocol Server Service receives an exception when calling the **submit_short_message** operation, it sends a **NACK** to the application.

Network-Initiated traffic

If the underlying SMSC does not receive an acknowledgment from Services Gatekeeper, the SMSC should resend the request.

If a message is sent to an application but no acknowledgment is returned from the application, the UCP Protocol Server Service does not start any per request timers, does not perform any retries, and does not send back an acknowledgment to the application.

If the Protocol Server Service receives an exception when calling the **deliver_short_message** or **deliver_notification** operation, it sends a **NACK** to the SMSC.

Delivery reports do not have to be sent on the same server that sent the original delivery request, even in a geo-redundant setup. In a clustered configuration, if the server that submits an SMS fails, another server can handle the delivery report for that SMS.

Client-Side Retry Handling

Native UCP automatically tries to re-establish a dropped connection when an initial openSession attempt or an established session fails. The number of retries attempted is configured by the **maxReconnectAttempts** attribute and the number of milliseconds between retries by the **timeBetweenReconnectAttempts** attribute.

The retry behavior is as follows:

- **Initial openSession failure:** When an application sends the initial **open session** request, Services Gatekeeper sends one **open session** request to each SMSC that matches the current configuration in terms of plug-ins, routes, SLAs, and so on. If one of the SMSCs responds with an **ACK**, Services Gatekeeper returns an **ACK** to the application.

  For all SMSCs that Services Gatekeeper cannot connect to or receive an acknowledgment from, it tries to re-establish a connection. Specifically, retry is triggered in the following cases:

  - Services Gatekeeper receives a **NACK** in response to the **open session** request.
  - The socket to the SMSC cannot be set up.
  - The socket is closed before the acknowledgment is received.
  - The timeout period, configured by the **OpenSessionTimeout** attribute, expires before an acknowledgment is received.

- **Established session failure:** If the client-side connection is dropped and the Services Gatekeeper application instance associated with the dropped connection still has other working connections, Services Gatekeeper sends an **open session** request to each SMSC that matches the current configuration, following the same procedure as described above for an initial openSession failure.

Use the **dumpOngoingClientConnectionsRetryInfo** and **stopOngoingClientConnectionRetry** operations to manage connections that are in the retry state.

Heartbeat Support

Native UCP provides heartbeat support by sending UCP operation "31" (SMT alert) requests at regular intervals. This prevents firewalls and the SMSC from closing an idle connection.

Server-Side Heartbeat Support

Heartbeat support for Native UCP server-side connections has the following characteristics:

- In response to a UCP operation type "31"(SMT Alert), the corresponding acknowledgment is sent.
- There are no timeouts associated with heartbeats.
- Services Gatekeeper does not close any connections because of missing heartbeat requests.
- Heartbeats received on server-side connections are not forwarded to client-side connections.
- There are no configuration attributes associated with server-side heartbeat functions.

Client-Side Heartbeat Support

Heartbeat support for Native UCP client-side connections has the following characteristics:

- Heartbeats are not enabled by default for a client-side connection.
- Heartbeats are enabled by setting the **heartbeatInterval** parameter in the Connection Information Manager. This parameter defines the interval, in milliseconds, between UCP operation type 31 requests. The value is configured with the **addXParamToCredentialEntry** method of the **ConnectionInfoManager MBean**.

  For information about this operation, see discussion on managing and configuring connection information in *Services Gatekeeper System Administrator's Guide*.
- Services Gatekeeper does not close any client-side connections because of missing acknowledgments on heartbeat requests.
- Received client-side heartbeat acknowledgments are not forwarded to server-side connections.

Storage Provider

The Native UCP Protocol Server Service and the Native UCP plug-in use the default Services Gatekeeper store.

Application Interfaces

For information about the application interface for the Native UCP communication service, see the discussion about Native UCP Interfaces in *Services Gatekeeper Application Developer's Guide*.

Events and Statistics

The Native UCP communication service generates event data records (EDRs), charging data records (CDRs), alarms, and statistics to assist system administrators and developers in monitoring the service

For general information, see Appendix A, "Events, Alarms, and Charging."

Event Data Records

Table 23–4 lists IDs of the EDRs created by the Native UCP communication service.

When there are multiple SMSCs, it is possible that EDR data generated for **open session** requests may contain the wrong data for some of the EDRs because EDR data is stored in the current context.

Table 23–4 EDRs Generated by Native UCP

EDR ID	Description
402001	application-initiated openSession to the SMSC
402002	application-initiated submitSM to the SMSC
402003	application-initiated ACK to the SMSC
402004	application-initiated NACK to the SMSC
402010	network-triggered deliverSM to the application

Table 23–4 (Cont.) EDRs Generated by Native UCP

EDR ID	Description
402011	network-triggered deliveryNotification to the application
402012	network-triggered ACK to the application
402013	network-triggered NACK to the application

Table 23–5 describes Native UCP-specific fields included in the Native UCP EDRs.

Table 23–5 Native UCP-Specific EDR Fields

EDR Parameter	Description
UCP_isOperation	`true` if EDR is for an operation, `false` if for an acknowledgment
UCP_opType	UCP operation type; for example, 51 for a submit_short_message request
UCP_trn	UCP transaction number; see "About UCP_trn/UCP_mappedTrn"
UCP_mappedTrn	mapped transaction number; see "About UCP_trn/UCP_mappedTrn"
UCP_sourceConnID	source connection ID; for the connection that received the PDU
UCP_outgoingConnID	outgoing connection ID for the connection on which the PDU was sent
UCP_adc	AdC parameter in the UCP PDU
UCP_oadc	OAdC parameter in the UCP PDU; see "About UCP_oadc"
UCP_scts	Service Center Timestamp (SCTS) parameter in the UCP PDU

About UCP_trn/UCP_mappedTrn

Transaction numbers must be mapped in the following cases:

- When sending a **submit_short_message** operation (51) to the SMSC and receiving the corresponding acknowledgment
- When sending a **deliver_notification** operation (53) to the application and receiving the corresponding acknowledgment
- When sending a **deliver_short_message** operation (52) to the application and receiving the corresponding acknowledgment

A **UCP_mappedTrn** is required in the following circumstances because pooled connections create the possibility of sending conflicting or overlapping transaction numbers were they not mapped:

- When a **submit_short_message** request is sent:
  - **UCP_trn** holds the original transaction number as received by the application.
  - **UCP_mappedTrn** holds the transaction number that was used in the request to the SMSC.
- When the acknowledgment for the **submit_short_message** request is received:
  - **UCP_trn** holds the original transaction number, which is then used to forward the acknowledgment to the application.
  - **UCP_mappedTrn** holds the transaction number that was included in the acknowledgment from the SMSC.

About UCP_oadc

The **UCP_oadc** parameter used in a **deliver_notification** operation (53) identifies the recipient of a message that was previously sent by the **submit_short_message** operation (51).

The **UCP_oadc** parameter normally contains the large account/originator number.

Charging Data Records

The Native UCP communication service generates charging data records (CDRs) under the following conditions:

- After a mobile-originated **SMS UCP** PDU has been processed by the plug-in.
- After a mobile-terminated **SMS UCP** PDU has been processed by the plug-in.
- When an **ACK** is received.

  The CDR includes the service center timestamp (SCTS). The **ACK** is correlated with **submit_short_message** using the connection identifiers and the transaction number (TRN).
- When a delivery report for a mobile-terminated SMS message is received.

  The CDR includes the SCTS for correlation with submit (and submit **ACK**) using SCTS and **AdC** and **OAdC** parameters.

Statistics

Table 23–6 maps methods invoked from either the application or the network to the transaction types collected by the Services Gatekeeper statistics counter.

Table 23–6 Methods and Transaction Types for Native UCP

Method	Transaction Type
submit_short_message	TRANSACTION_TYPE_MESSAGING_SEND
deliver_short_message	TRANSACTION_TYPE_MESSAGING_RECEIVE

Alarms

For the list of alarms, see *Services Gatekeeper Alarms Handling Guide*.

Managing Native UCP

This section describes the properties and workflow for the Native UCP communication service.

Native UCP relies upon facilities in Services Gatekeeper Connection Information Manager to create and store connection and credential information for a UCP plug-in instance. For information about this manager, see discussion on managing and configuring connection information in *Services Gatekeeper System Administrator's Guidee*.

Plug-in instances are associated with application instances and authentication credentials through the **createOrUpdateCredentialMap** operation in the Connection Information Manager.

There can be only one application instance per large account.

The work manager is registered when the managed plug-in is started. Settings in the Native UCP managed plug-in provide the IP address and port where the plug-in

registers its work manager. These settings apply to all the Native UCP plug-in instances. If these settings are changed, a restart is required.

Properties for Native UCP Protocol Server Service

Table 23–7 lists the technical specifications for the UCP protocol server service.

Table 23–7 Native UCP Protocol Server Service Properties

Property	Description
Managed object in Administration Console	To manage the object, select *domain_name* , then OCSG, then *server_name*, then **Container Services**, and then **UCPService**.
MBean	Domain=com.bea.wlcp.wlng Name=wlng InstanceName=UCPService Type=**oracle.ocsg.protocol.ucp.management.UCPServerMBean** Documentation: See the "All Classes" section of *Services Gatekeeper OAM Java API Reference*
Exposes this interface to applications	EMI-UCP 5.1
Deployment artifacts	oracle.ocsg.protocol.ucp_6.0.0.0.jar, oracle.ocsg.protocol.ucp_api_6.0.0.0.jar

Properties for Native UCP Managed Plug-in

Table 23–8 lists the technical specifications for the Native UCP managed plug-in.

Table 23–8 Native UCP Managed Plug-in Properties

Property	Description
Managed object in Administration Console	To manage the object, select *domain_name*, then **OCSG**, then *server_name*, then **Communication Services**, and then **oracle.ocsg.native_ucp_sms**
MBean	Domain=com.bea.wlcp.wlng AppName=native_ucp_sms#6.0.0 InstanceName = oracle.ocsg.native_ucp_sms Type = **oracle.ocsg.plugin.nativefacade.ucp.management.NativeUCPManagedPluginMBean** Documentation: See the "All Classes" section of *Services Gatekeeper OAM Java API Reference*
Supported Network Interface	UCP v5.1
Supported Application Interface	UCP v5.1
Deployment artifact	**wlng_nt_native_ucp_sms.ear**

Properties for Native UCP Plug-in Instance

Table 23–9 lists the technical specifications for the plug-in instance.

Table 23–9 Native UCP Plug-in Instance Properties

Property	Description
Managed object in Administration Console	To manage the object, select *domain_name*, then **OCSG**, then *server_name*, then **Communication Services**, then *plugin_instance_id* in that order.
MBean	Domain=com.bea.wlcp.wlng AppName=native_ucp_sms#5.1.0 Instance Name=same as the network protocol *instance_id* assigned when the plug-in instance is created Type=**oracle.ocsg.plugin.nativefacade.ucp.management.NativeUCPPluginMBean** Documentation: See the "All Classes" section of *Services Gatekeeper OAM Java API Reference*
Supported network interface	UCP v5.1
Supported application interface	UCP v5.1
Supported character sets	7-bit GSM charset + Unicode (16-bit UCS2)
Supported address scheme	tel
Deployment artifact	**wlng_nt_native_ucp_sms.ear**

Configuration Workflow for Native UCP Communication Service

Following is an outline for configuring the plug-in using the Administration Console or an MBean browser.

1. Configure the listen address and the listen port in the Native UCP managed plug-in MBean, **NativeUCPManagedPluginMBean**. All the Native UCP plug-in instances use these fields.
   - **listenAddress**
   - **listenPort**

   See "Reconfiguring Native UCP Listen Ports" if you need to change these values.
2. [Optional] Configure the Native UCP address routing interceptor if there is a possibility of multiple SMSCs owning the same address. This ensures that messages sent to the same address are sent to the same SMSC. It also ensures that all message segments for a concatenated SMS message are sent to the same SMSC.

   This interceptor is not enabled by default.

   To enable it, edit the interceptor chain to include the NativeUCPAddressRouting class:

   a. Open the **config.xml** file that is bundled in the interceptors.ear file in the Services Gatekeeper installation.

      This is the file in which the interceptor chain is defined.

   b. Locate the **RoundRobinPluginList** routing interceptor in the file. The line looks like this:

      ```
      <interceptor class="com.bea.wlcp.wlng.interceptor.RoundRobinPluginList"
      index="1000"/>
      ```

c. Add the **NativeUCPAddressRouting** class interceptor immediately before the **RoundRobinPluginList** routing interceptor. The line for the **NativeUCPAddressRouting** interceptor looks like this:

```
<interceptor class="com.bea.wlcp.wlng.interceptor.NativeUCPAddressRouting"
index="950"/>
```

The resulting interceptor chain should look like this:

```
 ...
  <interceptor
class="com.bea.wlcp.wlng.interceptor.FilterPluginListUsingCustomMatch"
index="800"/>
  <interceptor class="com.bea.wlcp.wlng.interceptor.RemoveOptional"
index="900"/>
  <interceptor
class="com.bea.wlcp.wlng.interceptor.NativeUCPAddressRouting" index="950"/>
  <interceptor class="com.bea.wlcp.wlng.interceptor.RoundRobinPluginList"
index="1000"/>
  <interceptor
class="com.bea.wlcp.wlng.interceptor.InvokeServiceCorrelation"
index="1100"/>
  ...
```

The interceptor verifies that the request it is intercepting is a Native UCP request before it modifies the plug-in list. If it is not a Native UCP request, the list is not modified.

Provisioning Workflow for Native UCP Communication Service

Perform steps 1 through 5 in the Connection Information Manager. The operations and attributes used in these steps are described in the discussion about managing and configuring connection information in *Services Gatekeeper System Administrator's Guide*.

1. Create one or more Native UCP plug-in instances. See the discussion about configuring and managing the plug-in manager in *Services Gatekeeper System Administrator's Guide*. Use the plug-in service ID described in the "Properties for Native UCP Plug-in Instance" section.
2. Set up the network connection mapping for the plug-in instance using the Connection Information Manager.
   - **createOrUpdateLocalHostAddress**
   - **createOrUpdateRemoteHostAddress**
   - **createOrUpdateListenAddress**
3. Set up the network credential mapping. This associates a user and password with a credential ID. Use the following operation:
   - **createOrUpdateUserPasswordCredentialEntry**
4. Create or update the credential map for the plug-in instance. This entry associates the credential ID with the application instance ID and the plug-in instance ID. Use the following operation:
   - **createOrUpdateCredentialMap**
5. Add any connection-specific parameters needed to support windowing and heartbeats. See "Windowing and Transaction Numbers" and "Heartbeat Support" for more information. Use the **addXParamToCredentialEntry** method.

6. Configure the retry behavior for the Native UCP Protocol Server Service with the **MaxReconnectAttempts** and **TimeBetweenReconnectAttempts** fields.
7. Configure the timeout limit for the plug-in instance with the OpenSessionTimeout field.
8. If required, create and load a node SLA. For details see the discussion on defining global node and service provider group node SLAs and managing SLAs in *Services Gatekeeper Accounts and SLAs Guide*.
9. Provision the service provider accounts and application accounts. For information, see *Services Gatekeeper Portal Developer's Guide*.

Reconfiguring Native UCP Listen Ports

The listen port and address is used by the Native UCP plug-in upon startup to register a work manager in the UCP Protocol Server Service.

To reconfigure the listen port and listen address:

1. In the Connection Information Manager, create the new listen address and port using the **createOrUpdateListenAddress** operation.
2. Remove the old listen address and port using the Connection Information Manager's **removeListenAddress** operation.
3. View the new listen address configuration using the Connection Information Manager's **getAllListenAddress operation**.
4. In the Native UCP Managed Plug-in, change the **listenAddress** and **listenPort** attributes to match the new values that you just configured in the Connection Information Manager. See the **listenAddress** and **listenPort** fields for more information.
5. Register the work manager at the new port using the **reRegisterWorkManager** operation. See the **reRegisterWorkManager** method for more information.

   Services Gatekeeper cannot accept new server-side connections on the new ports until you restart the ports using the **restartPorts** operation. See the **restartPorts** method for more information.
6. Using **thelistUCPServersString** method in the Native UCP Protocol Server Service, view the currently running listen ports.
7. Using the **restartports** method, close and restart all current listening ports. This closes all server-side and client-side connections.
8. Using the **listUCPServersString**, verify that Native UCP is listening on the new ports.
9. Using **thedumpServerSideconnectionsInfo** method, verify that applications are reconnecting on the new listen ports.
10. Using the **dumpClientSideConnectionsInfo** method, verify that connections to the SMSCs have been re-established.

Reference: Attributes and Operations for Native UCP Protocol Server Service

This section describes the attributes and operations for configuration and maintenance:

Attribute: MaxReconnectAttempts

Scope: Cluster

Unit: Not applicable

Format: Integer

Specifies the maximum number of reconnect retries permitted.

Table 23–10 MaxReconnectAttempts Values

Value	Meaning
-1	retry forever; no maximum
0	no retries
< 0	maximum number of retries
-1	retry forever; no maximum

See "Attribute: TimeBetweenReconnectAttempts" and "Client-Side Retry Handling" for information about how dropped connections are handled.

Attribute: TimeBetweenReconnectAttempts

Scope: Cluster

Unit: Milliseconds

Format: Integer

Specifies the time, in milliseconds, between reconnect attempts.

See "Attribute: TimeBetweenReconnectAttempts" and "Client-Side Retry Handling" for information about how dropped connections are handled.

Attribute: UCPProtocol (read-only)

Scope: Cluster

Unit: Not applicable

Format: String

Specifies the UCP protocol string.

This value must match a protocol string defined for a listen address in the Connection Information Manager.

Operation: closeClientSideConnection

Scope: Server

Closes a client-side connection between Services Gatekeeper (the client in this relationship) and an SMSC.

After this method is used to close a client-side connection, no retries are attempted on the closed connection.

Does not implicitly close any server-side connections.

Use "Operation: dumpClientSideConnectionsInfo" to see information about the open client-side connections

Signature:

```
closeClientSideConnection(pluginInstanceID: String, ocsgUser: String,
connectionID: String)
```

Table 23–11 closeClientSideConnection Parameters

Parameter	Description
pluginInstanceID	Instance ID of the connected plug-in instance
ocsgUser	User name used to connect
connectionID	Connection ID the request was sent on
pluginInstanceID	Instance ID of the connected plug-in instance

Operation: closeServerSideConnection

Scope: Server

Closes a server-side connection between an application and Services Gatekeeper (the server in this relationship).

Does not implicitly close any client-side connections

Use "Operation: dumpServerSideConnectionsInfo" to see information about the open server-side connections.

Signature:

```
closeServerSideConnection(pluginInstanceID: String, ocsgUser: String,
connectionID: String)
```

Table 23–12 closeServerSideConnection Parameters

Parameter	Description
pluginInstanceID	Instance ID of the connected plug-in instance
ocsgUser	User name used to connect
connectionID	Connection ID the request was sent on
pluginInstanceID	Instance ID of the connected plug-in instance

Operation: dumpClientSideConnectionsInfo

Scope: Server

Lists information for all the current client-side connections. These are the connections between Services Gatekeeper and SMSCs.

Dumped information includes pluginInstanceID, ocsgUser, and connectionID for all current connections.

Signature:

```
dumpClientSideConnectionInfo()
```

Operation: dumpOngoingClientConnectionsRetryInfo

Scope: Server

Lists current client-side connections that are experiencing periodic retry attempts.

The following sample output shows a dump for a connection that has already performed seven retries and is configured to perform an infinite number of retries ("Attribute: MaxReconnectAttempts" = -1), with 60 seconds between retry attempts ("Attribute: TimeBetweenReconnectAttempts"= 60000):

```
<pluginInstance id="native_ucp_sms_plugin_2">
<user name="1234567">
<connection max_retries="-1" current_retries="7" retry_interval="60000" id="c_
localhost:9887_tmp_8237645"/>
</user>
</pluginInstance>
```

Signature:

```
dumpOngoingClientConnectionsRetryInfo()
```

Operation: dumpServerSideConnectionsInfo

Scope: Server

Lists information for all the current server-side connections. These are the connections between Services Gatekeeper and applications.

Dumped information includes pluginInstanceID, ocsgUser, and connectionID for all current connections.

Signature:

```
dumpServerSideConnectionInfo()
```

Operation: listUCPServersString

Scope: Server

Lists the currently running UCP servers as a comma-separated list of strings in the format *host*:*port*.

Signature:

```
listUCPServersString()
```

Operation: restartPorts

Scope: Server

Restarts the Native UCP listen ports.

This operation must be performed if users of the Native UCP Protocol Server Service have reregistered their work managers at new ports. See the **reRegisterWorkManager** method for more information.

The new ports must have been configured in the Connection Information Manager MBean for the UCP protocol. See the **createOrUpdateListenAddress** and **removeListenAddress** operations in managing and configuring connection information in *Services Gatekeeper System Administrator's Guide*.

This operation abruptly terminates all ongoing traffic and closes all server-side and client-side connections.

Signature:

```
restartPorts()
```

Operation: stopOngoingClientConnectionRetry

Scope: Server

Stops ongoing retry attempts for the specified connection.

Use "Operation: dumpOngoingClientConnectionsRetryInfo" to see information about the current client-side connections that are in the retry state.

See "Client-Side Retry Handling" for more information.

Signature:

```
stopOngoingClientConnectionRetry(pluginInstanceID: String, ocsgUser: String,
connectionID: String)
```

Table 23–13 stopOngoingClientConnectionRetry Parameters

Parameter	Description
pluginInstanceID	Instance ID of the plug-in instance that is trying to reconnect
ocsgUser	User name used to connect
connectionID	Connection ID the request was sent on
pluginInstanceID	Instance ID of the plug-in instance that is trying to reconnect

For descriptions of the attributes and operations of the **NativeUCPManagedPluginMBean** and **NativeUCPPluginMBean** MBeans, see the "All Classes" section of *Services Gatekeeper OAM Java API Reference*.

A

Events, Alarms, and Charging

This appendix describes the features common to the handling of events, alarms, and charging in Oracle Communications Services Gatekeeper.

Events

Events are handled differently in the access tier and the network tier.

Event handling in the Access Tier

The access tier runs in the WebLogic Server's Web Services Container, so events or alarms that are raised there can be monitored through standard JMX mechanisms or by using the WebLogic Diagnostics Framework.

For more information on how this works, see:

- Designing Manageable Applications in *Oracle Fusion Middleware Developing Manageable Applications With JMX for Oracle WebLogic Server*
- *Oracle Fusion Middleware Developing Manageable Applications With JMX for Oracle WebLogic Server*

Event handling in the Network Tier

In the network tier, much of the functionality comes from the interaction between communication services and the Services Gatekeeper Container Services. To capture this specialized level of information, and other pertinent information about the status of the tier, Services Gatekeeper has developed specific mechanisms to record the data.

In standard communication services, all status information generated by the network tier - events, alarms, charging data, and usage statistics - begins as an event, which is fired whenever designated methods are called or exceptions are thrown. These events are then sent to the EDR Service.

In the EDR Service, events are processed through XML-based filters, which provide the criteria by which the events are classified into types. The filters can also be used to transform the data in the original event, including adding other useful information. When the information has been processed by the filters, it is delivered to type-specific listeners. There are three types of filters that are all found in the **wlng-edr.xml** file. They produce three distinct types of data: Event Data Records (EDRs), Charging Data Records (CDRs), and Alarms. All three of these filters can be customized as desired, using the Administrative Console. These filters can also deliver desired event-based information to external JMS-based listeners. Such listeners are set up as standard JMS topic subscribers and can be anywhere on the network. See *Services Gatekeeper System Administrator's Guide* for more information on setting up these filters.

Each EDR always includes the data in Table A–1.

Table A–1 EDR Data

Element	Represents
ServiceName	The service type (SMS, Call Handling, etc.) that produced the event
ServerName	The name of the WLS host
Timestamp	The time at which the event was triggered (in milliseconds from midnight 1 January 1970)
ContainerTransactionID	The transaction ID from WebLogic Server, if available. This identifies the thread on which the request is executed
Class	The name of the class that logged the event
Method	The name of the method that logged the event
Source	The kind of event. There are two possible values for this field: ▪ Method: the event was fired in relation to a method call ▪ Exception: the event was fired in relation to an exception being thrown

In addition, most events include the data in Table A–2.

Table A–2 Event Data

Element	Represents
Direction	The direction in which the request is traveling. There are two possible values for this field: ▪ **South**: traveling toward the network node ▪ **North:** traveling toward the application
Position	The position of the EDR relative to the method that logged the EDR. There are two possible values for this field: ▪ **Before**: the event occurred before the method ▪ **After**: the event occurred after the method
Interface	The interface at which the EDR is logged. There are three possible values for this field: ▪ **North**: the event was logged at the north plug-in interface ▪ **South**: the event was logged at the south plug-in interface ▪ **Other**: the event was logged someplace other than the north or south interfaces
State	Indicates where the EDR was dispatched: ▪ **ENTER_AT**: upon entering the AT layer, southbound ▪ **ENTER_NT**: upon entering the NT layer, southbound ▪ **ENTER_NET**: upon entering the network layer, southbound ▪ **EXIT_AT**: upon exiting the AT layer, northbound ▪ **EXIT_NT**: upon exiting the NT layer, northbound ▪ **EXIT_NET**: upon exiting the network layer, northbound
Exception	The name of the exception that triggered the EDR
SessionId	The application's session identifier
ServiceProviderId	The service provider account identifier

Table A–2 (Cont.) Event Data

Element	Represents
ApplicationId	The application account identifier
AppInstanceId	Current application instance ID. If current traffic is Oauth enabled and the EDR is triggered by AT, the value is "OAuth_ User".
TransactionId	Transaction Id. Correlates completed traffic among all three EDR states
Facade	The facade, either "REST" or "SOAP"
OrigAddress	The originating address with scheme. For example: tel:12123334444
DestAddress	The destination address. If this is a send list, the first address will be listed here. Additional addresses are stored in the **AdditionalInfo** field.
AdditionalInfo	Variable information depending on the communication service. Stored as “key=value\n” pairs.
PluginID	The unique ID of the plug-in instance
URL	The URL of the current web service
WebAppName	Name of the current web application
HttpMethod	HTTP request method. For example "POST", or "GET".
RequestContext	Attributes in the request context map. (Name/Value pairs)
InterceptorChain	List of all of the interceptors that are triggered
SubscriberId	Subscriber identifier (using route address)

Alarms

Network tier alarms are those events that are of immediate interest to the operator. They are EDRs that are defined via filters created in the internal configuration file. While each alarm begins as an EDR, not all the information available in the EDR is stored when the alarm is written to the database (although that information can be retrieved using an external listener). Each alarm entry in the database includes the information described in Table A–3.

Table A–3 Alarm Data

Element	Represents
alarm_id	A unique sequential identifier
source	The name of the software module that raised the alarm and the IP address of the server in which the module runs. This is *not* the same as the Source field in the event
timestamp	The time at which the event was triggered (in milliseconds from midnight 1 January 1970)
severity	The importance of the alarm. There are four possible values for this field: ■ 4 for warning ■ 3 for minor ■ 2 for major ■ 1 for critical

Table A–3 (Cont.) Alarm Data

Element	Represents
identifier	The alarm type
alarm_info	Information provided by the module that raised the alarm
additional_info	This field includes: ■ Service Provider ID ■ Application ID ■ Application Instance ID ■ Plug-in instance ID ■ Other information depending on context

Management integration

Services Gatekeeper supports integration of its alarm and event mechanisms with external management tools.

OSS

An Operation Support System (OSS) can integrate with Services Gatekeeper alarm and event services through the creation of external JMS listeners. Integration can be managed by OAM scripts through the use of JMX-based tools.

SNMP

Services Gatekeeper supports the sending of alarms as SNMP traps to SNMP managers. The alarms sent to the SNMP managers can be filtered on alarm severity.

Charging Data Records

CDRs originate as filtered EDRs. While each CDR begins as an EDR, not all the information available in the EDR is stored when the CDR is written to the database, although that information can be retrieved using an external listener. Table A–4 lists information that each CDR in the database contains.

Table A–4 CDR Data

Element	Represents
transaction_id	The Services Gatekeeper transaction sequence number
service_name	The communication service whose use is being tracked
service_provider	The Service Provider ID
application_id	The Application ID
application_instance_id	The user name of the Application Account. This is a string that is equivalent to the 2.2 value: Application Instance Group ID
container_transaction_id	The transaction ID from WebLogic Server, if available. This identifies the thread on which the request is executed
server_name	The name of the server in which the CDR was generated
timestamp	The time at which the event was triggered (in milliseconds from midnight 1 January 1970)
service_correlation_ID	An identifier that allows the usage of multiple service types to be correlated into a single charging unit

Table A–4 (Cont.) CDR Data

Element	Represents
charging_session_id	An ID correlating related transactions within a service capability module that belong to one charging session. For example, a call containing three call legs will produce three separate transactions within the same session In installations where sessions are not used, this field contains only a placeholder value.
start_of_usage	The date and time the request began to use the services of the underlying network
connect_time	The date and time the destination party responded. Used for Call Control traffic only
end_of_usage	The date and time the request stopped using the services of the underlying network
duration_of_usage	The total time the request used the services of the underlying network
amount_of_usage	The used amount. Used when charging is not time dependent, as in, for example, flat rate services
originating_party	The originating party's address
destination_party	The destination party's address. This is the first address in the case of send lists, with all additional addresses placed in the additional_info field.
charging_info	A service code added by the application or by policy service
additional_info	If the communication service supports send lists, all destination addresses other than the first, under the **destinationParty** key. In addition any other information provided by the communication service