Oracle® Communications Services Gatekeeper

Concepts Guide

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Preface

This book gives a high-level overview of Oracle® Communications Services Gatekeeper.

Audience

This document is intended for anyone who needs a high-level understanding of how Oracle Communications Services Gatekeeper works.

This includes:

- System administrators charged with installing and maintaining Oracle Communications Services Gatekeeper
- Third-party application developers who wish to integrate telephony-based functionality into their products
- Operator-based system developers who wish to extend the functionality of Oracle Communications Services Gatekeeper or to integrate it with Partner Relationship Management (PRM) or Operations Support Systems (OSS) tools
- Managers, support engineers, and sales and marketing personnel for network operators and service providers

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Related Documents

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

- *Accounts and SLAs Guide*
- *Alarm Handling Guide*
- *Application Developer's Guide*
- *Communication Service Guide*
- *Installation Guide*
- *Licensing Guide*
- *Partner Relationship Management Guide*
- *Platform Development Studio Developer's Guide*
- *Platform Test Environment Guide*
- *RESTful Application Development Guide*
- *SDK User's Guide*
- *Statement of Compliance*
- *System Administrator's Guide*
- *System Backup and Restore Guide*

1

Introducing Oracle Communications Services Gatekeeper

Services Gatekeeper helps operators meet the challenges that arise in the continued convergence of the worlds of TCP/IP applications and of telephony networks.

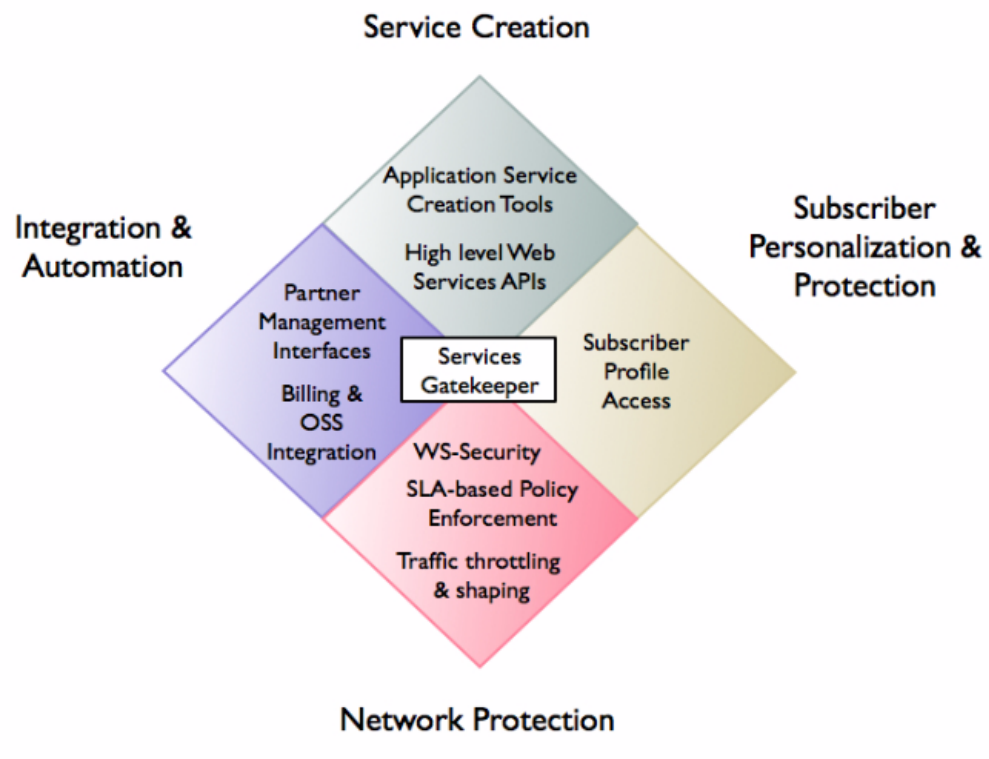
Subscribers continue to require services that provide them with functionality and flexibility that cross the traditional boundaries between the world of the Internet and the world of their phones. Operators want to be responsive to the desires of their subscribers, and to provide services that will satisfy subscriber demands, promote subscriber loyalty, increase average revenue per user (ARPU), and drive traffic to their networks.

Services Gatekeeper enables operators to:

- Offer simplified access to their network's capabilities, for both internal developers and external partners
- Provide tooling and support for application service development and testing
- Manage external partners efficiently
- Protect the security and stability of the underlying network
- Integrate new services with their existing operations and management facilities
- Protect subscriber privacy and control
- Support flexibility of access as networks change and grow
- Do all this in a way that scales and meets the performance needs subscribers have come to expect

With the help of Services Gatekeeper, operations can effectively reduce the overhead of creating the applications that provide required services and enable a wider ranging development community to contribute to a better subscriber experience.

Figure 1–1 Oracle Communications Services Gatekeeper in Context



What Oracle Communications Services Gatekeeper Provides

Services Gatekeeper offers a host of benefits for both application service developers and operators. It is built using a version of Oracle WebLogic Server 11g (http://download.oracle.com/docs/cd/E15523_01/wls.htm) that has been hardened and extended to support the specialized needs of telecom networks.

Access to Telecom Network Service Capabilities Using APIs Based on Well-Known Standards

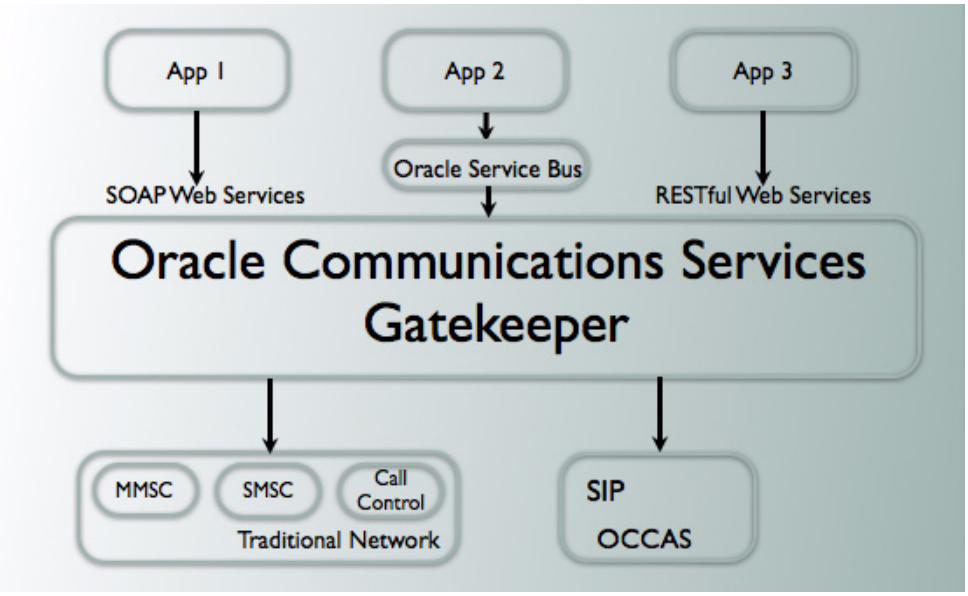
The protocols required by underlying telecom network capabilities are often complex, and the learning curve associated with using them is steep. To make it easier for application service developers, Services Gatekeeper includes standard network capabilities such as Short Message Service (SMS), Multimedia Messaging Service (MMS) or Call Control through a set of easy-to-use interfaces (called *facades* in Services Gatekeeper).

- Services Gatekeeper offers SOAP-style facades based on well-known standards such as Parlay X 2.1 and 3.0, RESTful, and some native protocol interfaces.
- The Oracle Service Bus environment also contains SOAP-style interfaces that pre-integrated, offering application developers SOAP-based functionality and the flexibility of SOA.
- Oracle's Extended Web Services supports protocols which have not yet been incorporated into standardized forms (WAP Push, Binary SMS, and Subscriber Profile). These extended Web Services interfaces are published as standard Web Services Definition Language (WSDL) files, so application service developers can use their choice of toolsets.

- RESTful Web Services interfaces are designed for ease of use in pure HTTP environments

Developers can focus on creating compelling and innovative services, leaving the Communication Services components of Services Gatekeeper to handle the mechanics of interacting with the various underlying network elements.

Figure 1–2 Standardized Application Interfaces



Access to Oracle Communications Converged Application Server for Connectivity to SIP Network Infrastructure

In addition to providing access to traditional telecom network functionality, Services Gatekeeper can also connect application services to SIP-based functionality, using Converged Application Server. Calls set up using the Parlay X 2.1 or RESTful Third Party Call communication services can be routed through SIP. Parlay X 2.1 or RESTful Call Notifications can be established using SIP and Parlay X 2.1 or RESTful Presence *watchers* (consumers of presence information) and *presentities* (providers of presence information) can be set up.

Application Development Tools

Services Gatekeeper provides:

- Web Services WSDL files
- *Application Developer's Guide*
- *RESTful Application Developer's Guide*

To further assist application service developers, Services Gatekeeper can optionally provide the Services Gatekeeper SDK, which supports early application development without requiring the developer to run an installed Services Gatekeeper.

Support for Automating Partner Management Using Web Services

Managing a large number of services, particularly when the providers are third-party partners, can be time and effort intensive. As the market expands, Services Gatekeeper

can supply its Partner Relationship Management interfaces to assist operators in handling processes such as partner registration, service activation and provisioning. These Web Services interfaces support the automating of a wide range of partner-related tasks and provide partners with easily available access to information about their accounts. The interfaces also allow operators to create groups of partners sharing sets of data, which can be used for tiering or segmentation of partners. Operators can then focus their administrative and partner management resources on their most rewarding partners.

Common Access Control for Both Internal and Third Party Applications

Services Gatekeeper can function as a single point of contact for access to the functionality of the underlying network, providing common authentication, authorization, and access control procedures for all applications, both internal and third-party based. For SOAP-based interfaces, Services Gatekeeper leverages the flexible security framework of Oracle Web Logic Server to provide robust system protection. Applications can be authenticated using plaintext or digest passwords, X.509 certificates, or SAML 1.0/1.1 tokens. Service requests can use XML encryption, based on the W3C standard, for either the whole request message or specific parts of it. And, to ensure message integrity, requests can be digitally signed, using the W3C XML digital signature standard. For RESTful interfaces, Services Gatekeeper uses HTTP basic authentication of username/password and SSL.

Flexible Authorization Control Based on Fine-Grained Policy Decisions

Services Gatekeeper's powerful and responsive policy enforcement mechanism uses service level agreements (SLAs) to regulate service provider and application access to particular communication service functionality down to the level of supported operations and parameters. It also supports a range of quality-of-service guarantees that can be modulated by Time of Day/Day of Week, Rates, and Quotas. If desired, further rules covering access can also be added. SLA management and maintenance can be simplified by organizing service provider and application accounts into groups. Custom SLA versions can also be created to enhance the set of broadly comprehensive SLAs provided by Services Gatekeeper.

In addition, subscriber permissions and preferences can be reflected in a separate Subscriber SLA, created by the operator or an integrator using tools available in the Platform Development Studio. Subscribers can indicate, for example, that they wish to allow Service Provider X to query for the location of their mobile terminals, but not Service Provider Y.

Enhanced Network Protection

In addition to the service level agreements that cover access to functionality within Services Gatekeeper itself, other SLAs explicitly define service provider access to underlying network nodes. In conditions of heavy load, Services Gatekeeper employs throttling and shaping to protect the underlying network, prioritizing traffic based on these Node SLAs.

Built-in Network Routing

Services Gatekeeper provides an internal system for the routing of service requests directly to appropriate network nodes, based on a variety of parameters, including sending application, destination address, or any arbitrary request parameter. Services Gatekeeper supports in-production deployment of multiple instances of most network

protocol plug-ins (the module that interacts most directly with the underlying nodes) on an as needed basis.

As a result, routing can be managed in a very fine-grained and powerful way.

Carrier Grade and Fully Scalable Architecture

Based on Oracle WebLogic Server 11g's rock solid performance and superior clustering support, Services Gatekeeper's architecture is designed to support the rigorous demands of telecom operators:

- Tiering:

  Services Gatekeeper is deployed in two tiers, which can be separated by a firewall for increased security. State is held only in the network-facing tier, and each tier can be built out independently of the other.

- High availability and failover

  Services Gatekeeper is designed throughout to ensure multi-level protection against single points of failure.

- Geo-redundancy

  To protect the system in the face of catastrophic failure, geographically distant sites can be set up as site pairs. Service Provider and Application Group SLA enforcement is synchronized across geographic sites and SLAs are enforced between the site pairs. Any changes in account configuration information are also replicated across sites.

- Storage Service

  All traffic that passes through Services Gatekeeper is transactionally wrapped. Maintaining state consistently and durably in clustered and high performance environments is traditionally difficult, but Services Gatekeeper's Storage Service uses a sophisticated strategy of optimizing storage based on state access patterns. An in-memory store distributed among all the nodes serves as the entrance to data access. Reading from disk, and its attendant overhead, is reduced because the disk-based database functions as an archive rather than as a system of first use. This has two important benefits:

  - Speed: Because the data is available in memory, access is extremely rapid.
  - Scalability: As a system scales out, relying exclusively on disk-based database access often becomes a performance bottleneck. Because the data in Services Gatekeeper is distributed among the network tier nodes, adding additional servers to the network tier actually increases data availability.

  In addition, the Storage Service optimizes access to exactly the kinds of data that matter most in telecom traffic processing. Designed as a POJO java.util.Map-based API, client access is simplified for both storing data and making retrieval queries.

  Coherence is used as the storage provider for configuration, core services, and a set of communication services.

OSS and Billing System Integration

All or selected parts of the Services Gatekeeper management mechanism can be integrated with an operator's external Operation Support Systems through JMX/JMS or SNMP interfaces. The tasks associated with administering current service providers and adding new ones can be simply folded into existing systems.

Services Gatekeeper's internal charging mechanisms can also be integrated with an operator's existing billing systems. Offline and online (using the Parlay X 3.0 Payment API) Diameter-based charging is supported.

Subscriber Personalization and Protection

Using Services Gatekeeper, applications can customize their offerings by accessing subscriber profile information stored on network LDAP servers. At the same time, operators can protect subscriber privacy by using filters based on those same profiles to regulate the access that applications have, limiting the information that applications can acquire to what the subscriber wants to make available.

In addition, if they choose, operators can define a Subscriber SLA, which creates service provider groupings called service classes that can be associated with individual subscriber URIs. The mechanism to do this is created by the operator or integrator using the Profile Provider SPI provided as part of the Platform Development Studio. The use of a Subscriber SLA allows subscribers to customize their interactions with application service providers while keeping all their subscriber data within the confines of the operator's domain.

Extensible Architecture

A flexible architecture using the robust capabilities of Oracle WebLogic Server means that operators can extend existing communication services to support new network interfaces, for example, Unstructured Supplementary Service Data. They can also create entirely new communication services to allow application service developers access to their network's unique features, using Services Gatekeeper's Platform Development Studio.

2

Introducing Communication Service Features

This chapter presents a high level introduction to Oracle Communications Services Gatekeeper's communication service features.

Overview

All application service request data flows through Services Gatekeeper using communication services. A communication service consists of a service type (Multimedia Messaging, Terminal Location, etc.), an application-facing interface (also called a "north" interface), and a network-facing interface (also called "south" interface).

For complete information on supported communication services, see *Communication Service Reference*, another document in this set.

Some functionality is common to all communication services. This functionality includes:

- Service Level Agreements and Policy Enforcement
- Service Level Agreements and Network Protection
- Traffic Security
- Events, Alarms, and Charging
- Statistics and Transaction Units

Service Level Agreements and Policy Enforcement

A set of service level agreements (SLAs) between the application service provider and the Services Gatekeeper operator governs all application access to Services Gatekeeper's communication services. Services Gatekeeper uses a two-tiered account grouping system to categorize application services and their providers and to simplify the creation and maintenance of SLAs:

- Service Provider Group
- Application Group

For more information on the account system, see "The Administration Model", a section in this document. Services Gatekeeper provides standard SLAs for both service provider and application groups. Custom SLAs for both types can also be created.

These SLAs define whether a member of a service provider group or application group:

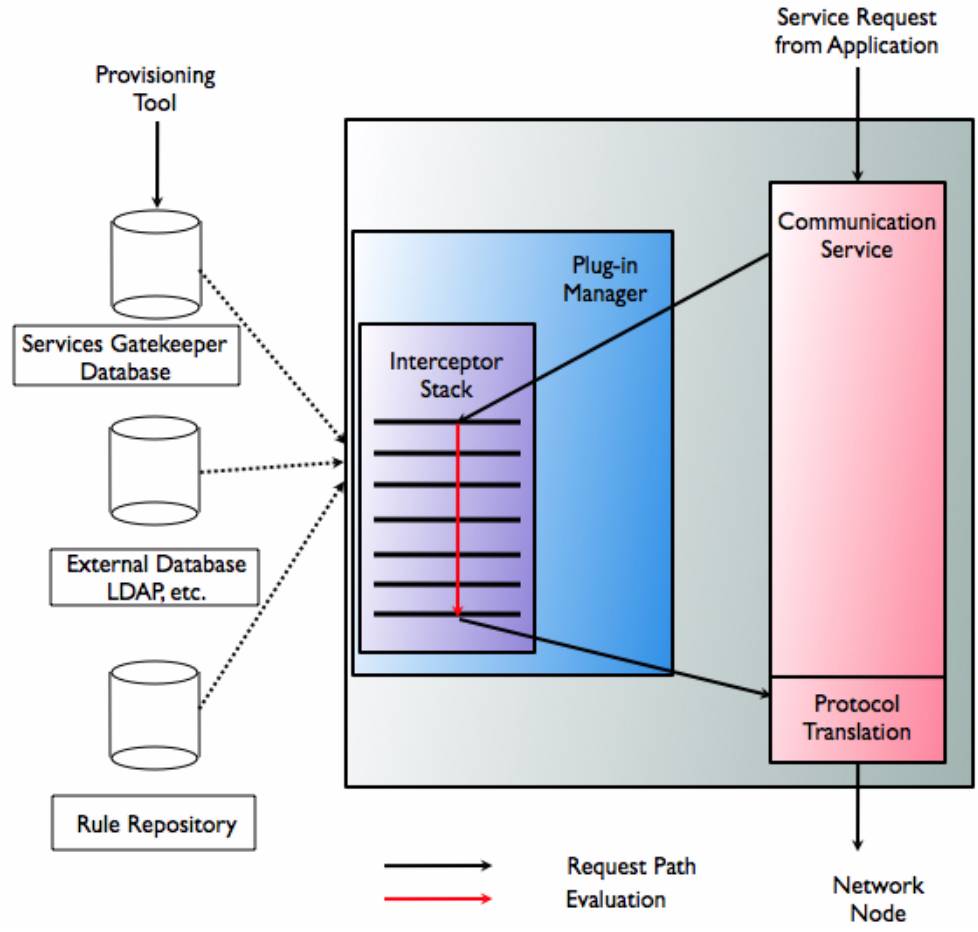
- Has access to a particular communication service. Access to a service can be regulated down to supported methods and parameters
- Participates in any quality of service (QoS) agreements such as:
  - Specifying the guaranteed number of requests a service provider may send through a particular communication service in a given period of time. These guarantees may be modulated by:
    - Time of Day/Day of Week
    - Rate (Invocations per time period)
    - Quota (Aggregated number of invocations)

For a more detailed look at Service Provider and Application SLA structure, see the discussion on managing SLAs in *Accounts and SLAs Guide*. For a communication service-focused description, see *Communication Service Reference*. These books are separate documents in this set.

SLA enforcement for communication services is provided by the Interceptor Stack. It is also possible to create extended *rules* that are evaluated using external policy engines. These rules represent operator specific policies defined by the operator and implemented by Oracle or a selected partner

A simplified version of the flow is illustrated in Figure 2–1 below.

Figure 2–1 Simplified Communication Service Policy Execution Flow



Network-triggered requests are also evaluated using the Interceptor Stack.

Service Level Agreements and Network Protection

There are also SLAs that help protect the underlying network node by setting priorities for sending requests on the level of a particular service provider group, or of Services Gatekeeper as a whole. Depending on the status of the underlying network, traffic can be throttled and shaped. If a particular node is overloaded, lower-priority traffic can be rejected altogether. For general information on these traffic-based (called *Node*) SLAs, see "The Administration Model" in this document. For more detailed information, see the "Defining Global Node and Service Provider Group Node SLAs" chapter in *Accounts and SLAs Guide*. Services Gatekeeper provides standard SLAs for global and service provider nodes. Custom SLAs for the Global Node type can also be created.

Traffic Security

For SOAP-based Web Services interfaces, Services Gatekeeper uses special SOAP headers to authenticate service provider applications. These headers are documented in the WS-Policy section of each interface's WSDL file. Processing is managed by WebLogic Server's WS-Security, which supports plaintext or digest passwords, X.509 certificates, or SAML tokens for authentication. To guarantee the confidentiality of communication between Services Gatekeeper and the application, traffic can be encrypted - fully or partially - using W3C's standard XML encryption. Message integrity can be assured using the W3C XML digital signature standard. The WS-Policy section of the published WSDL for each interface describes if and how either of these standards is being used. For more information on WebLogic Server's capabilities, see *Oracle® Fusion Middleware Securing Oracle WebLogic Server* at:

`http://download.oracle.com/docs/cd/E15523_01/web.1111/e13707/toc.htm`

Access to a particular communication service is based on the two types of SLAs discussed in "Service Level Agreements and Policy Enforcement".

For RESTful Web Services interfaces, Services Gatekeeper supports HTTP basic authentication, using username/password. SSL is required.

For general information about HTTP basic authentication, see

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

In addition, if the underlying network node provides an authentication interface, Services Gatekeeper protocol plug-ins can register with it and be authenticated, making the request's transfer to the network secure. This capability is highly dependent on the protocol and the specific implementation in the node and the plug-in.

Events, Alarms, and Charging

All Services Gatekeeper modules can produce general events, alarms and charging events. General events are expected system occurrences that are of importance to the operator but do not need corrective action. Alarms are system occurrences that are unexpected and may require corrective action. Charging events are the basis for CDRs, the records that provide the information needed to charge for services. CDRs are written only when the transaction that brackets the request's flow through the Network Tier commits. For more information on events and charging, see "Events,

Alarms, and Charging" in *Communication Service Reference*. For more information on alarms, see *Alarm Handling Guide*. These books are separate documents in this set.

Statistics and Transaction Units

Usage costs for Services Gatekeeper are based on a maximum allowed rate (measured in *transaction units per second* or TUPS) during a specific time period per 24-hour interval. Two TUPS rates are measured:

- Base Platform (the more general rate)
- Oracle Module (which covers only Services Gatekeeper-supplied communication services)

For more information on how these statistics are gathered, see *Licensing Guide*, another document in this set.

3

Software Architecture Overview

The following chapter provides an overview of Oracle Communications Services Gatekeeper's software architecture.

Overview

Services Gatekeeper is built on Oracle WebLogic Server 11g, closely aligned with JEE standard, and tightly integrated with Oracle Communications Converged Application Server. Services Gatekeeper supplies communication services providing access to such network capabilities 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 with the Platform Development Studio.Services Gatekeeper provides a secure, high-performance container for running communication services.

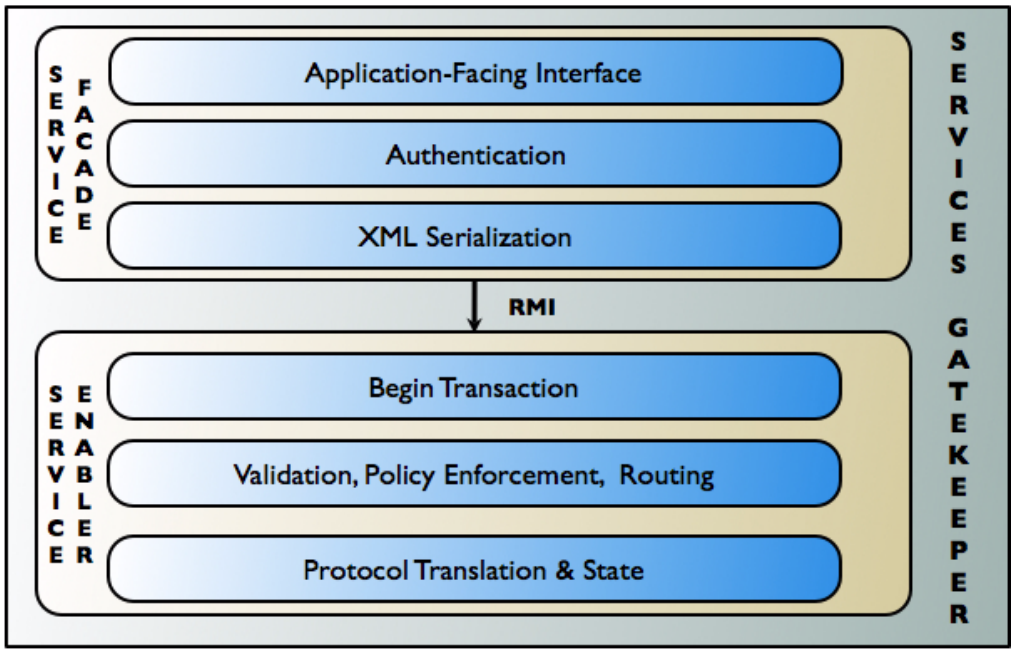
Communication Services

All traffic in Services Gatekeeper is processed through these communication services. A communication service consists of:

- A *service facade*, that includes an application-facing interface to communicate with the application, and a security layer for authentication.
- A *service enabler*, consisting of a processing layer where requests are validated according to service level agreements (SLAs), and routed.
- A protocol translation layer, which communicates with the underlying network element.

Communication services are described in detail in *Communication Service Reference*, another document in this set.

Figure 3–1 Communication service structure



Container Services

Services Gatekeeper provides a container that is highly optimized for running communication services. The container leverages the many standard container services that Oracle WebLogic Server provides, but adds a number of services designed for the specialized needs of communication services and Services Gatekeeper generally. See Figure 3–2 and Figure 3–3 for some typical uses of these services. They include:

- Budget

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

- Event Data Record (EDR)

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

- Storage

  Provides transparent 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 largely read-only data, such as configuration information

- Statistics

  Generates system statistics

- Geo-Redundancy

  Provides support for geo-redundant installations

- Plug-in Manager

  Manages the processing layer

- SNMP

  Provides SNMP service for alarms

- Account

  Manages Service Level Agreements and sessions.

The examples below show interactions between the Parlay X 2.1 Short Messaging to SMPP communication service and selected container services.

Figure 3–2 Container Services in Typical Application-Initiated Traffic

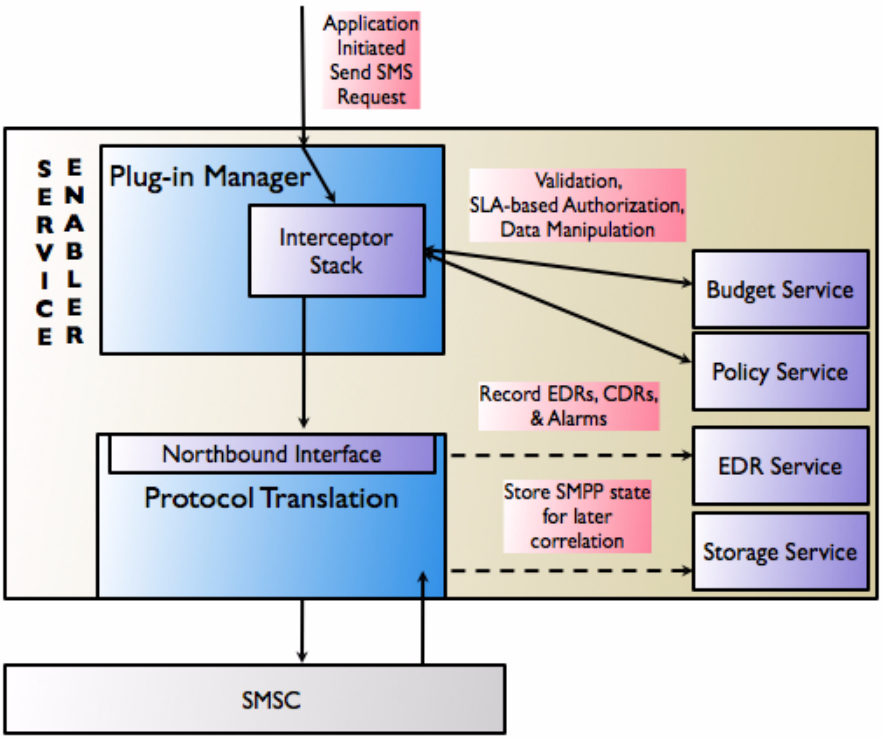
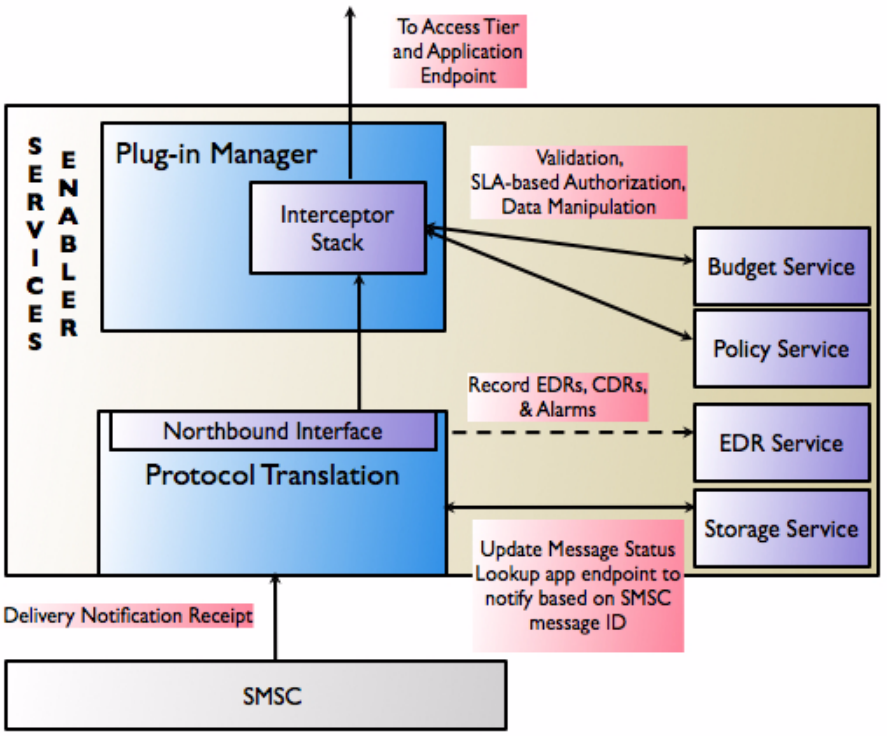


Figure 3–3 Container Services In Typical Network Triggered Traffic



Deployment Model

In production mode, communication services are typically deployed in two clustered tiers, an Access Tier and a Network Tier, separated, if desired, 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 EARs may contain either multiple application-facing interfaces (Parlay X 2.1 Short Messaging and Binary SMS/SMPP) or multiple network plug-ins (Parlay X 2.1 Third Party Call/SIP and INAP) that support the same basic service capability.

Single communication services can be installed or removed without having an impact on 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 is undeployed. Communication services may be deployed selectively, as needed.

4

Developing Applications

This chapter explains the interfaces and tools available when you develop client applications that interact with Oracle Communications Services Gatekeeper.

Overview of Interfaces

Services Gatekeeper allows operators to provide client application developers with a choice of interface types, based on the needs of their applications. Services Gatekeeper provides:

- SOAP-based interfaces, for both traditional Web Services and Oracle Service Bus environments
- RESTful interfaces
- Native telephony interfaces (MM7, SMPP, and UCP).

SOAP-Based Interfaces

The SOAP-based Web Services APIs are based on the Parlay X 2.1 and 3.0 standards and also include three additional Extended Web Services to cover Binary SMS, Subscriber Profile, and WAP Push, functionality which is not supported by Parlay X. These interfaces include:

- Third Party Call (Parlay X 2.1 and 3.0) (Part 2)

  Using the communication services based on these interfaces, an application can set up a call between two parties (the caller and the callee), poll for the status of the call, and end the call. In addition, applications that use the Parlay X 3.0 based communication service can also add or delete additional parties, transfer call participants, get the call session information associated with a call participant, and interact with Audio Call and Call Notification communication services.

- Call Notification (Parlay X 2.1 and 3.0) (Part 3)

  Using the communication services based on these interfaces, an application can set up and end notifications on call events, such as a callee in a third-party call attempt being busy. If desired, the application can then reroute the call to another party. In addition, the Parlay X 3.0 communication service can work in concert with Third Party Call or Audio Call communication services.

- Short Messaging (Parlay X 2.1) (Part4)

  Using the communication service based on this interface, an application can send SMS text messages, ringtones, or logos to one or multiple addresses, set up and receive notifications for final delivery receipts of those sent items, and arrange to receive SMSs meeting particular criteria from the network.

- Multimedia Messaging (Parlay X 2.1) (Part 5)

  Using the communication service based on this interface, an application can send multimedia messages to one or multiple addresses, set up and receive notifications for final delivery receipts of those sent items, and arrange to receive MMSs meeting particular criteria from the network.

- Terminal Status (Parlay X 2.1) (Part 8)

  Using the communication service based on this interface, an application can request the status (reachable, unreachable, or busy) of a single terminal; request the statuses of a group of terminals; or request to be notified if a terminal status changes within a specified time period (or within a specific number of status queries).

- Terminal Location (Parlay X 2.1) (Part 9)

  Using the communication service based on this interface, an application can request the position of one or more terminals or the distance between a given position and a terminal. It can also set up and receive notifications based on geographic location or time intervals.

- Audio Call (Parlay X 2.1) (Part 11)

  Using the communication service based on this interface, an application can play an audio file to a terminal in a call session that was set up using Parlay X 2.1.

- Audio Call (Parlay X 3.0) (Part 11)

  Using the communication service based on this interface, an application can play audio to one or more call participants in a call session that was set up using Parlay X 3.0 Third Party Call service. It is also possible to collect digits from the participant in response to the audio, which can be delivered to the application using the Parlay X 3.0 Call Notification communication service.

- Presence (Parlay X 2.1) (Part 14)

  Using the communication service based on this interface, an application can act as either of two different parties to a presence interaction: as a *presentity* or as a *watcher*. A presentity agrees to have certain data (called attributes) such as current activity, available communication means, and contact addresses made available to others while a watcher is a consumer of such information. As a watcher, an application can request to subscribe to all or a subset of a presentity's data, poll for that data, and start and end presence notifications. As a presentity, an application can publish presence data about itself, check to see if any new watchers wish to subscribe to its presence data, authorize those watchers it chooses to authorize, block those it wishes not to have access, and get a list of currently subscribed watchers.

- Payment (Parlay X 3.0) (Part 6)

  Using the communication service based on this interface, an application can charge an amount to an end-user's account using Diameter, refund amounts to that account, and split charge amounts among multiple end-users. An application can also reserve amounts, reserve additional amounts, charge against the reservation or release the reservation.

- Device Capabilities and Configuration (Parlay X 3.0) (Part 18)

  The communication service based on this interface allows an application to send a device's address (usually telephone number) to an LDAP server and receive device capability information in return. The returned information can either be the device's equipment identifier (for example, an IMEI number), or device capability

information (the device's unique ID, device/model name, and a link to the User Agent Profile XML file).

- Binary SMS (EWS)

  Using the communication service based on this interface, an application can send and receive generic binary objects (for example, a vCard) using SMS mechanisms, and set up and receive notifications. This interface is not based on the Parlay X standards, but instead belongs to the Oracle Extended Web Services set.

- WAP Push (EWS)

  The application-facing interface of this communication service is not based on the Parlay X 2.1 specification. Many elements within it, however, are based on widely distributed standards. Using the communication service based on this interface, an application can send a WAP Push message, send a replacement WAP Push message, or set up status notifications about previously sent messages.

- Subscriber Profile (EWS)

  The application-facing interface of this communication service is based on a subset of that in a proposed Parlay X version. Using the communication service based on this interface, an application can retrieve either individual properties associated with a subscriber profile record stored in an LDAP data source in the underlying network or entire profiles from that data source.

- Session Manager (EWS)

  Using this communication service, an application can establish a Services Gatekeeper session.

RESTful Interfaces

The RESTful APIs provide access to functionality similar to the SOAP Facade. The interfaces include:

- Audio Call (Parlay X 2.1)

  Using the communication service based on this interface, an application can play an audio file to a terminal.

- Audio Call (Parlay X 3.0)

  Using the communication service based on this interface, an application can play an audio file one or more call participants in a call session. It is also possible to collect digits from the participant in response to the audio, and return them to the application.

- Call Notification

  Using the communication service based on this interface enables an application to set up and remove call notifications (in which the application is informed of a particular state - busy, unreachable, etc. - of the call) or to set up and remove call direction notifications (in which the application is queried for information on handling a call that is in a particular state)

- Device Capabilities and Configuration

  Using the communication service based on this interface allows an application to send a device's address (usually telephone number) to an LDAP server and receive device capability information in return. The returned information can either be the device's equipment identifier (for example, an IMEI number), or

device capability information (the device's unique ID, device/model name, and a link to the User Agent Profile XML file).

- Multimedia Messaging

  Using the communication service based on this interface enables an application to send an MMS and to fetch information on MMSs for the application that have been received and stored on Services Gatekeeper. It also allows the application to fetch those messages. The application can also get delivery status on sent messages, and start and stop a notification

- Payment

  Using the communication service based on this interface enables an application to charge an amount to an end-user's account using Diameter, refund amounts to that account, and split charge amounts among multiple end-users. An application can also reserve amounts, reserve additional amounts, charge against the reservation or release the reservation.

- Presence

  Using the communication service based on this interface enables an application to act as either of two different parties to a presence interaction: as a presentity or as a watcher. A presentity agrees to have certain data (called *attributes*) such as current activity, available communication means, and contact addresses made available to others while a watcher is a consumer of such information. As a watcher, an application can request to subscribe to all or a subset of a presentity's data, poll for that data, and start and end presence notifications. As a presentity, an application can publish presence data about itself, check to see if any new watchers wish to subscribe to its presence data, authorize those watchers it chooses to authorize, block those it wishes not to have access, and get a list of currently subscribed watchers.

- Short Messaging

  Using the communication service based on this interface enables an application to send an SMS, a ringtone, or a logo, and to fetch SMSs and delivery status reports for the application that have been received and stored on Services Gatekeeper. It also allows an application to start and stop a notification.

- Terminal Status (Parlay X 2.1)

  Using the communication service based on this interface, an application can request the status (reachable, unreachable, or busy) of a single terminal; request the status of a group of terminals; or request to be notified if a terminal status changes within a specified time period.

- Terminal Location

  Using the communication service based on this interface enables an application to get a location for an individual terminal or a group of terminals; to get the distance of the terminal from a specific location; and to start and stop notifications, based on geographic location or on a periodic interval

- Third Party Call

  Using the communication service based on this interface enables an application to set up a call, get information on that call, cancel the call request before it is successfully completed, or end a call that has been successfully set up

- WAP Push

Using the communication service based on this interface enables an application to send a WAP Push message.

- Session Manager

  Using the communication service based on this interface enables an application to get a session ID, get the time remaining in a session's lifetime, and destroy a session

Native Interfaces

The Native interfaces provides access to native telecom-specific protocols. The interfaces include:

- Native MM7

  The application-facing interface of this communication service is based on the 3GPP MM7 standard. Using the communication service based on this interface, an application can send and receive MMSs and receive status notifications about previously sent messages.

- Native SMPP

  The application-facing interface of this communication service is based on the SMS Forum standard. Using the communication service based on this interface, an application can send and receive SMSs and receive status notifications about previously sent messages.

- Native UCP

  The application-facing interface of the native UCP communication service is based on the Short Message Service Center EMI-UCP Interface 5.0 specification. This communication service exposes UCP protocol to applications and uses UCP to connect to a Short Message Service Center (SMSC). Using this service, an application can establish a session with application clients and the network, submit and receive SMSs, and receive status notifications about previously sent messages.

References

Services Gatekeeper ships with *Application Developer's Guide* and *RESTful Application Developer's Guide*, separate documents in this set, which cover both the APIs themselves and some additional information an application developer needs. Because the SOAP and Restful APIs are Web Services based, applications can be developed using any environment that the developer chooses.

SDK

As an option, application developers can use the Services Gatekeeper SDK to test their applications. The SDK consists of a feature called the Application Test Environment (ATE).

The ATE is a lightweight tool that enables application developers to test their applications on a simulation of Services Gatekeeper called the Virtual Communication Service (VCS). The VCS exposes both SOAP and RESTful interfaces.

Developers can perform functional tests on tasks involving communication with Services Gatekeeper, such as opening sessions, sending and receiving messages, and examining delivery reports through the simulator without having to connect to the network operator's actual Services Gatekeeper installation. When the time comes to

test and later deploy the application with a real Services Gatekeeper, the developer needs only to change a few URLs in the application to run against a real installation.

Application developers configure their applications to interface with the ATE and then monitor their activity both in the ATE interface by checking whether messages have been received and by examining information returned to the application. The interface presents a map in which users can delineate geographic regions, insert and move terminals, and send messages to and receive messages from the terminals as if they were mobile devices in the real world.

For more information, see the *SDK User's Guide*, another document in this set.

5

Managing Application Service Providers

This chapter describes the framework for managing service providers and applications Oracle Communications Services Gatekeeper.

Overview

Managing partner relationships is key to the successful convergence of third-party application services and telecom network operations. Services Gatekeeper provides a partner administration model to help operators handle the needs and demands of their partners in a flexible and powerful way:

- Application service providers are registered with Services Gatekeeper, by service provider account and application account.
- Each account type is associated with a group that is tied to an SLA that defines its access to both Services Gatekeeper and underlying network nodes.

The service provider and application registration are performed either internally through the Services Gatekeeper Administration Console or through external management systems integrated using the Services Gatekeeper Partner Relationship Management Interfaces or JMX.

The Administration Model

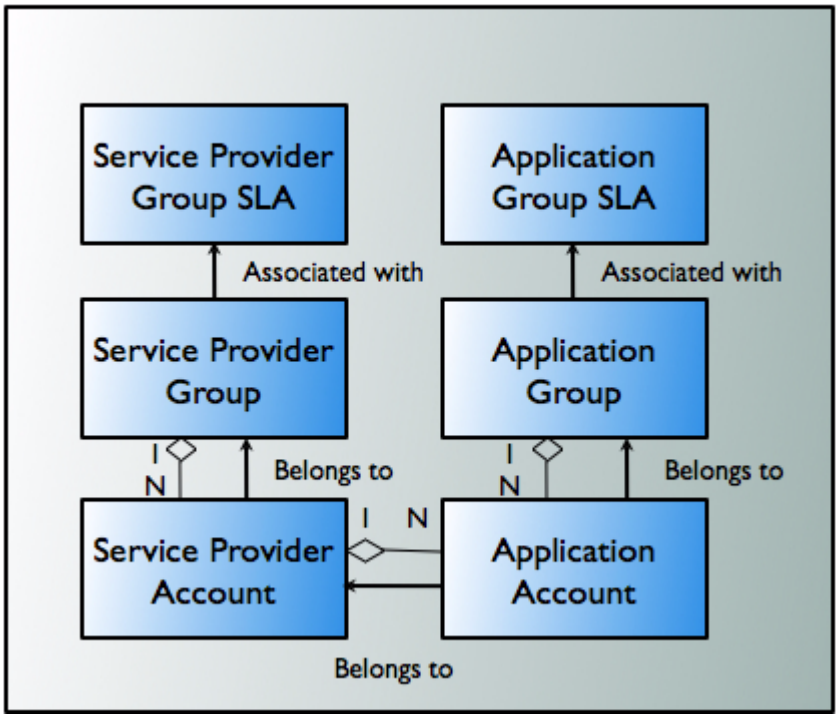
The Services Gatekeeper administration model allows operators to manage application-service-provider access at increasingly granular levels of control. An application service provider registers with Services Gatekeeper and is given a service provider account. To support tiering, service provider accounts belong to account groups. These account groups are then associated with their own Services Gatekeeper SLAs.

Within a service provider account are individual application accounts, registered on their respective service provider accounts. As in the case of service provider accounts, these application accounts belong to account groups, each of which is associated with its own SLA.

Services Gatekeeper SLAs on the service-provider and application level regulate, for example, the type of service capability made available and the maximum bandwidth use allowed. They may also specify access to charging capabilities and revenue sharing schema. Services Gatekeeper provides support for standard versions of SLAs of both these types. Custom SLAs of both types can also be created by the operator or integrator. See Figure 5–1 for more information.

Using the Platform Development Studio, integrators can extend this model to include subscribers as well. For more information, see *Platform Development Studio Developer's Guide*, another document in this set.

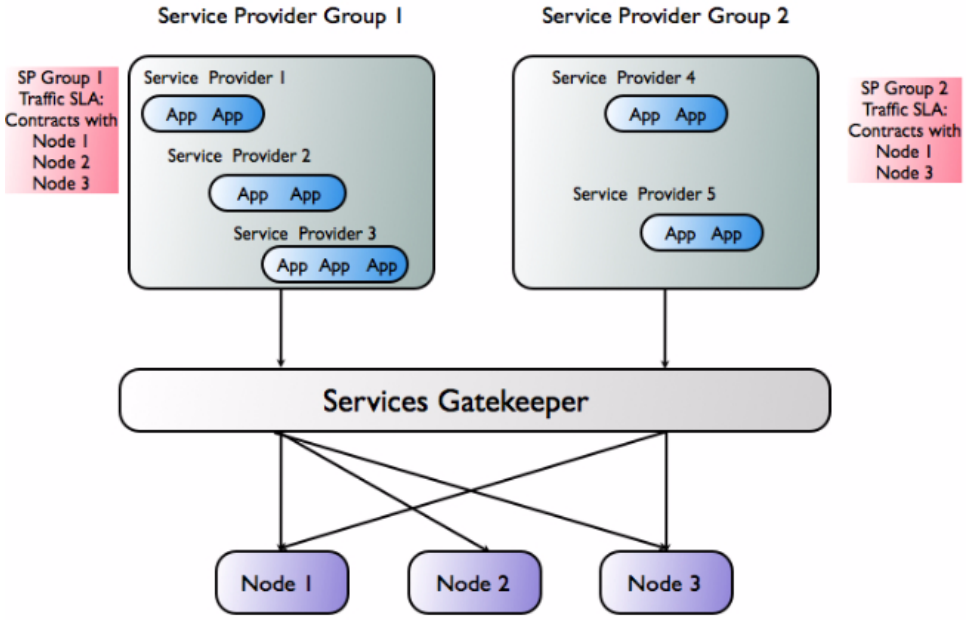
Figure 5–1 Service Provider and Application Administration Model



In addition to these account SLAs, Services Gatekeeper supports two types of traffic SLAs: Service Provider Node SLAs and Global Node SLAs. Global Node custom SLAs can also be created. These are contracts designed to protect the underlying telecom network.

Service provider node SLAs regulate the relationship between a service provider group and the network nodes to which it has access. See Figure 5–2 for more information.

Figure 5–2 Service Provider Traffic SLAs



In Figure 5–2 above, service providers in service provider group 1 are allowed to access all network nodes because their service provider node SLA (valid for all service providers within the group) contains node contracts for all nodes.

Service providers in service provider group 2 are allowed to access only network nodes 1 and 3 because their service provider node SLA contains node only contracts for node 1 and 3.

The second type of traffic SLA, the Global Node SLA, regulates the overall relationship between Services Gatekeeper and the underlying nodes.

Partner Relationship Management Interfaces

The Services Gatekeeper Partner Relationship Management Interfaces provide support for the automation of the traditionally work-intensive tasks related to service provider and application administration (including supporting on-boarding workflows) using request/approve. Most of the work of registration can be shifted to the service provider, allowing the operator's role to change from that of entering registration data to that of approving the registration. Large numbers of service provider and application accounts can be managed without increasing administration overhead. Service providers are also provided with a defined and structured channel to communicate desired account changes and to retrieve usage statistics for the accounts.

For a detailed description of the Partner Relationship Management Interfaces, see *Partner Relationship Management Guide*, another document in this set.

Other Tasks Associated with Administering Service Providers

For an application to use Audio Call-based services, announcements must be recorded and installed in the network. For more information on these areas, see *System Administrator's Guide*, another document this set.

6

Managing Oracle Communications Services Gatekeeper

This chapter describes Operation, Administration, and Maintenance (OAM) functionality for Oracle Communications Services Gatekeeper.

Overview

Services Gatekeeper is controlled through the Services Gatekeeper Administration Console, a specialized extension of the general WebLogic Server Administration Console. The console is a Web-based tool and can be run in any environment that supports appropriate Web browsers. For general information on the administration console, see *Oracle Fusion Middleware Introduction to Oracle WebLogic Server* at:

`http://download.oracle.com/docs/cd/E15523_01/web.1111/e13752/toc.htm`

For some tasks, you can also use scripts that run in the WebLogic Scripting Tool. For details, see "Oracle WebLogic Scripting Tool" in *Oracle Fusion Middleware Concepts Guide* at:

`http://download.oracle.com/docs/cd/E15523_01/core.1111/e10103/administration.htm`

In addition, all or selected parts of the management application can be integrated with external OSS using JMX/JMS. Additionally, alarms can be distributed using SNMP traps.

Finally, the application service provider management tool functionality can be integrated with PRM and CRM systems using the Services Gatekeeper Partner Relationship Management Interfaces.

Administrative users can be divided into user groups with access to different aspects of the administrative functionality. Within user groups, individual users can have differing levels of access. See *System Administrator's Guide* for more information.

The WebLogic and Services Gatekeeper Administration Console

As stated earlier, the Services Gatekeeper Administration Console is a Web browser-based, graphical user interface that you use to manage a WebLogic Server domain.

A standard production installation for Services Gatekeeper consists of at least one WebLogic Server domain. One instance of WebLogic Server in each domain is configured as an Administration Server.

The Administration Server hosts the Administration Console and provides a central point for managing a Services Gatekeeper domain. All other server instances in the domain are called Managed Servers. In Services Gatekeeper, they are divided into Access Tiers and Network Tiers. In a domain that contains only a single WebLogic Server instance, such as a development environment, that server functions as the Administration Server and both Managed Servers, that is, the Access Tier and the Network Tier.

OAM Tasks Overview

Use the Administration Console to:

- Configure, start, and stop Services Gatekeeper instances
- Configure Services Gatekeeper clusters
- Configure Services Gatekeeper services, such as database connectivity (JDBC) and messaging (JMS)
- Monitor server and application performance
- View server and domain log files
- View application deployment descriptors
- Edit selected run-time application deployment descriptor elements
- Upgrade communication services
- Configure security parameters and roles

Use the Services Gatekeeper-specific section (accessed through the Domain Structure tree on the left side of the Administration Console) to:

- Configure Services Gatekeeper communication services
- Manage administrative users and groups
- Provision Application Service Providers, Applications, Application Instances, and related SLAs.
- Monitor alarms, CDRs, and EDRs
- Create multiple plug-in instances, set up plug-in routing, and so on.

Tasks performed outside the Console

- Extend Services Gatekeeper's functionality
- Back up and restore the system
- Upgrade the system

See *Communication Service Guide* for information about configuring and managing communication services.

See *System Administrator's Guide* for information about configuring and managing other aspects of Services Gatekeeper.

OSS Integration

- All or selected parts of the management application can also be integrated with external OSS through secured JMX/JMS interfaces. For more information on working with JMX, see *Developing Manageable Applications With JMX for Oracle WebLogic Server* at:

http://download.oracle.com/docs/cd/E15523_01/web.1111/e13729/designapp.htm and *Oracle Fusion Middleware Configuring and Using the Diagnostics Framework for Oracle WebLogic Server* at:

http://download.oracle.com/docs/cd/E15523_01/web.1111/e13714/title.htm. Alarm supervision systems can set up external JMS listeners to receive user definable types of event-based data, including standard alarms. SNMP traps are sent to any registered SNMP managers.

7

Charging and Billing Integration

The following describes Oracle Communications Services Gatekeeper's charging functionality.

Overview

Services Gatekeeper makes it possible to tailor the type of charging associated with each application service. An application can use one or more of the following alternatives:

- Charging based on time used or per-use services (CDR based)
- Charging based on the content or value of the used service (CBC)

CDR-Based Charging

CDRs are used for charging based either on time used or on access to certain per-use services. Charging based on time used is typically employed for calls. Per-use might be employed, for example, to charge for a locating a terminal.

CDR data can be stored in Gatekeeper's internal charging database or retrieved in real-time by billing and post processing systems through a billing gateway (this requires integration with the billing gateway. For more information, see "Billing System Integration").

Data Generation

Charging data is generated every time an application uses a communication service. The charging data is recorded by the communication service during the period the application interacts with the network. When the interaction is closed, the communication service stores the charging data as a CDR in the Services Gatekeeper's database. (If Services Gatekeeper is integrated with a billing gateway, the charging data is sent directly to the billing gateway.)

Content-Based Charging and Accounting

Content or value based charging makes it is possible to charge an end-user based on the variable value of a used service rather than on time used or flat rates. This can be used, for example, when downloading music video clips or in m-commerce applications. Services Gatekeeper supports both prepaid and postpaid end-user accounts.

Billing System Integration

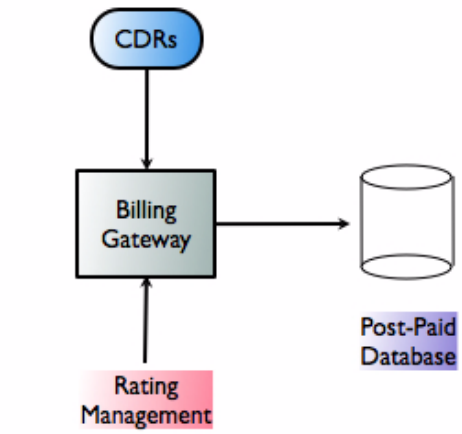
Services Gatekeeper can be integrated with external billing systems, either those that receive charging data directly or those that automatically retrieve information from Services Gatekeeper's database. CDRs can be customized to fit the requirements of these systems, both in terms of format and behavior. Services Gatekeeper has support for integration with Billing and Revenue management (BRM), but can be used with any system that supports Diameter, both offline (Rf), using the CDR to Diameter functionality, and online (Ro), using either the credit control interceptors for in-traffic credit checks or the Payment communication service for direct billing.

Billing Gateways

Real-time settlement of prepaid accounts using CDR-based charging requires integration through a billing gateway. This method can also be used to support postpaid services.

When integrating through a billing gateway, the billing gateway retrieves the CDRs in real-time through an external JMS-based charging listener. Rating, rating management, billing information storage, and prepaid accounts settlement are handled by the billing gateway. The flow is shown in Figure 7–1.

Figure 7–1 Billing Integration Through Billing Gateway

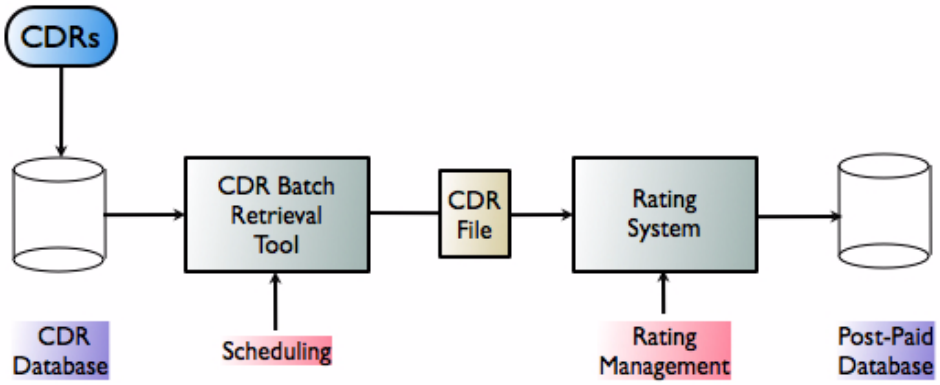


CDR Database

If an application uses postpaid accounts, it is possible to integrate billing by retrieving CDRs that have been stored in the Services Gatekeeper database.

When integrating using this method, a CDR batch retrieval tool retrieves the CDRs from the database and stores them in a file format. The CDR file is processed by a rating system that transforms it into billing information and then stores it in a post-paid accounts database. The flow is shown in Figure 7–2.

Figure 7–2 Billing Integration Using the Database



Charging Using Diameter

Services Gatekeeper has specific support for using the Diameter protocol for online (Ro) and offline (Rf) charging. The Parlay X 3.0 Payment communications services can be used for online charging using Diameter. Offline charging can be integrated using the CDR to Diameter module, which converts CDRs generated by Services Gatekeeper into the appropriate format for Diameter charging requests and then sends them on to an Offline Diameter server.

8

Redundancy, Load Balancing, and High Availability

This chapter explains the redundancy, load balancing, and high availability functionality in Oracle Communications Services Gatekeeper. Services Gatekeeper uses both software and hardware components to support these important capabilities.

Services Gatekeeper's high-availability mechanisms are supported by the clustering mechanisms made available by Oracle WebLogic Server. For general information about Oracle WebLogic Server and clustering, see *Oracle® Fusion Middleware Using Clusters for Oracle WebLogic Server* at:

http://download.oracle.com/docs/cd/E15523_01/web.1111/e13709/toc.htm

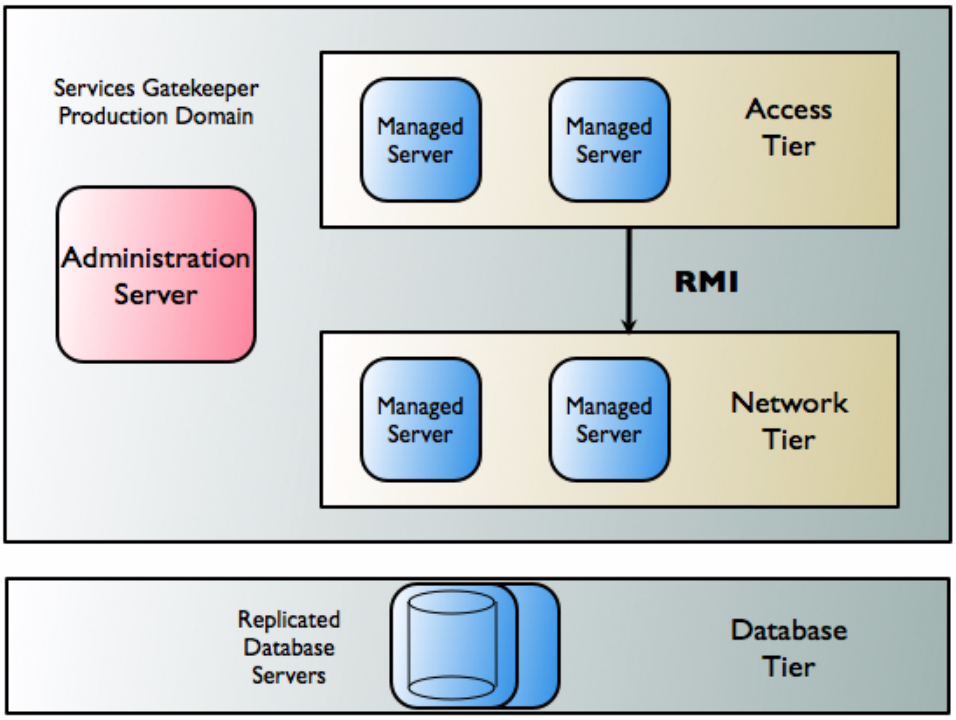
Tiering

For both high-availability and security reasons, Services Gatekeeper is split into two tiers: the Access Tier and the Network Tier.

Native SMPP and native UCP operate entirely in the Network Tier. In these cases access to applications is performed by a Server Service in the Network Tier.

Each tier consists of at least one cluster, with at least two server instances per cluster, and all server instances run in active mode, independently of each other. The servers in all clusters are, in the context of Oracle WebLogic Server, Managed Servers. Together the clusters make up a single WebLogic Server administrative domain, controlled through an Administration Server.

Figure 8–1 Sample Production Domain



Communication between the Access Tier and the Network Tier takes place using Java RMI. Application requests are load balanced between the Access Tier and the Network Tier and failover mechanisms are present between the two. See "Traffic Management Inside Services Gatekeeper" for more information on these mechanisms in application-initiated and network-triggered traffic flows.

There is an additional tier containing the database. Within the cluster, data is made highly available using a cluster-aware storage service which ensures that all state data is made available across all Network Tier instances.

Traffic Management Inside Services Gatekeeper

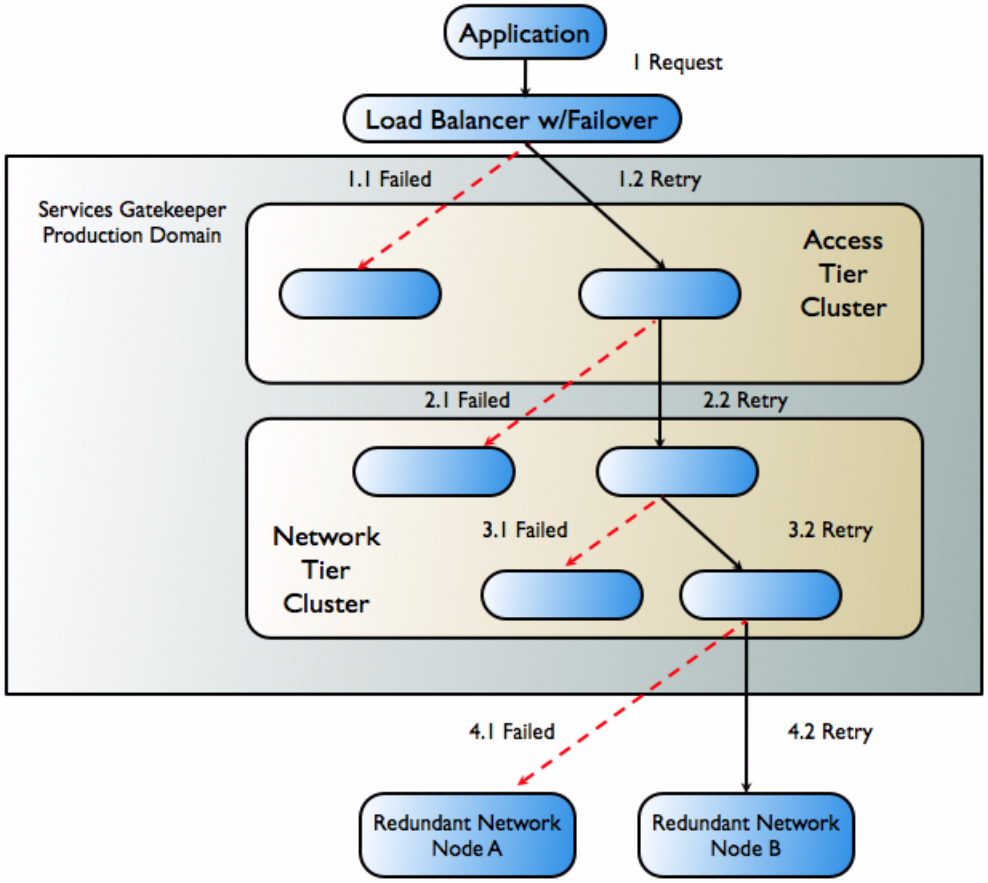
Potential failure is possible at many stages in traffic workflow in Gatekeeper. The following sections detail, tier by tier, how Services Gatekeeper deals with problems that might arise in both application-initiated and network-triggered traffic.

Application-Initiated Traffic

Application-initiated traffic consists of all requests that travel from applications through Services Gatekeeper to underlying network nodes.

Figure 8–2 below follows the worst-case scenario for application-initiated traffic as it passes through Services Gatekeeper and the failover mechanisms that attempt to keep the request alive.

Figure 8–2 Failover Mechanisms in Application-Initiated Traffic



1. The application sends a request to Services Gatekeeper. In a production environment, this request is routed through a hardware load balancer that is usually protocol-aware. If the request towards the initial Access Tier server fails (1.1 in Figure 8–2), either a time out or a failure is reported. The load-balancer, or the application itself, is responsible for retrying the request.
2. The request is retried on a second server in the cluster (1.2 in Figure 8–2) and it succeeds. That server then attempts to send the request on to the Network Tier.
3. The request either fails to reach the Network Tier or fails during the process of marshalling/unmarshalling the request as it travels to the Network Tier server (2.1 in Figure 8–2).
4. A failover mechanism in the Access Tier sends the request to a different server in the Network Tier cluster and it succeeds (2.2 in Figure 8–2). That server then attempts to send the request on to the network node.
5. The request is sent to a plug-in in the Network Tier that is unavailable (3.1 in Figure 8–2). An interceptor from the stack retries the remaining eligible plug-ins in the same server and succeeds (3.2 in Figure 8–2).
6. The attempt to send the request to the telecom network node fails (4.1 in Figure 8–2).
7. If a redundant pair of network nodes exists, the request is forwarded to the redundant node (4.2 in Figure 8–2). If this request fails, the failure is reported to the application.

Note: In addition to the mechanisms described above, Services Gatekeeper also allows the creation of multiple instances of a single SMPP plug-in type, with multiple binds, which can set up redundant connections to one or more network nodes. Such mechanisms can also increase throughput, and help optimize traffic to SMSCs with small transport windows.

Network-triggered Traffic

Network-triggered traffic can consist of the following:

- Requests that contain a payload, such as terminal location or an SMS
- Acknowledgements from the underlying network node that an application-initiated request has been processed by the network node itself. A typical example might indicate that an SMS has reached the SMSC. From an application's perspective, this is normally processed as part of a synchronous request, although it may be asynchronous from the point of view of the network.
- Acknowledgements from the underlying network node that the request has been processed by the destination end-user terminal; for example, an SMS delivery receipt indicating that the SMS has been delivered to the end-user terminal. From an application's perspective, this is normally handled as an incoming notification.

For network-triggered traffic, Services Gatekeeper relies on internal mechanisms in concert with the capabilities of the telecom network node or other external artifacts such as load-balancers with failover capabilities to do failover.

Some network nodes can handle the registration of multiple callback interfaces. In such cases, Services Gatekeeper registers one primary and one secondary callback interface. If the node is unable to send a request to the network plug-in registered as the primary callback interface, it is responsible for retrying the request by sending it to the plug-in that is registered as the secondary callback interface. This plug-in resides in another Network Tier instance. The plug-ins themselves are responsible for communicating with each other and making sure that both callback interfaces are registered. See "When the Network Node Supports Primary and Secondary Notification" for more information.

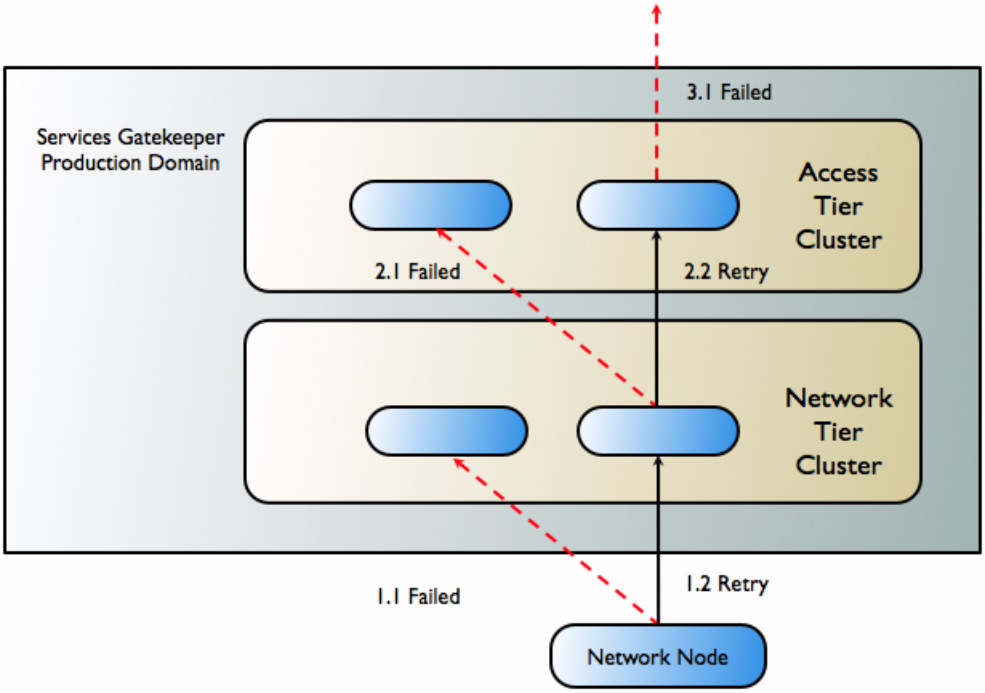
In the case of communication services using SMPP, all Services Gatekeeper plug-ins can function equally as receivers for any transmission from the network node.

Finally, for HTTP-based protocols, such as MM7, MLP, and PAP, Services Gatekeeper relies on an HTTP load balancer with failover functionality between the telecom network node and Services Gatekeeper. See "When the Network Node Supports Only Single Notification" for more information.

If a telecom network protocol does not support load balancing and high availability, a single point of failure is unavoidable. In this case, all traffic associated with a specific application is routed through the same Network Tier server and each plug-in has one single connection to one telecom network node.

The worst-case scenario for network-triggered traffic for medium life span notifications using a network node that supports primary and secondary callback interfaces is described in Figure 8–3.

Figure 8–3 Failover Mechanisms in Network-Triggered Traffic



1. A telecom network node sends a request to the Services Gatekeeper network plug-in that has been registered as the primary. It fails (1.1 in Figure 8–3) due to either a communication or server failure.
2. The telecom network node resends the request, this time to the plug-in that is registered as the secondary callback interface (1.2 in Figure 8–3). This plug-in is in a different server instance within the Network Tier cluster. It succeeds.
3. The Network Tier attempts to send the message to the callback mechanism in the Access Tier. It fails (2.1 in Figure 8–3).
4. If the request fails to reach the Access Tier, or failure occurs during the marshalling/unmarshalling process (2.1 in Figure 8–3), the Network Tier retries, targeting another server in the Access Tier. It succeeds (2.2 in Figure 8–3).

> **Note:** If, however, the failure occurs after processing has begun in the Access Tier, failover does not occur and an error is reported to the network node.

5. The callback mechanism in the Access Tier attempts to send the request to the application (3.1 in Figure 8–3). If the application is unreachable or does not respond, the request is considered as having failed, and an error is reported to the network node.

Registering Notifications with Network Nodes

Before applications can receive network-triggered traffic, or notifications, they must register their interest in doing so with Services Gatekeeper, either by sending a request or having the operator set the notification up using OAM methods. In turn, these notifications must be registered with the underlying network node that will be

supplying them. The form of this registration is dependent on the capabilities of that node.

If registration for notifications is supported by the underlying network node protocol, the communication service's network plug-in is responsible for performing it, whether the registration is the result of an application-initiated registration request or an online provisioning step in Services Gatekeeper. For example, all OSA/Parlay Gateway interfaces support such registration for notifications.

Note: Some network protocols support some, but not all registration types. For example, in MM7 an application can register to receive notifications for delivery reports on messages sent *from* the application, but not to receive notifications on messages sent *to* the application from the network. In this case, registration for such notifications can be done as an off-line provisioning step in the MMSC.

Whether the plug-in sets up the notification in the network or it is done using OAM, Services Gatekeeper is responsible for correlating all network-triggered traffic with its corresponding application.

Notification Life Span

Notifications are placed into three categories, based on the expected life span of the notification. These categories determine the failover strategies used:

- Short life span

  These notifications have an expected life span of a few seconds. Typically these are delivery acknowledgements for hand-off of the request to the network node, where the response to the request is reported asynchronously. For this category, a single plug-in, the originating one, is deemed sufficient to handle the response from the network node.

- Medium life span

  These notifications have an expected life span of minutes up to a few days. Typically these are delivery acknowledgements for message delivery to an end-user terminal. For this category, the delivery notification criteria that have been registered are replicated to exactly one additional instance of the network protocol plug-in. The plug-in that receives the notification is responsible for registering a secondary notification with the network node, if possible.

- Long life span

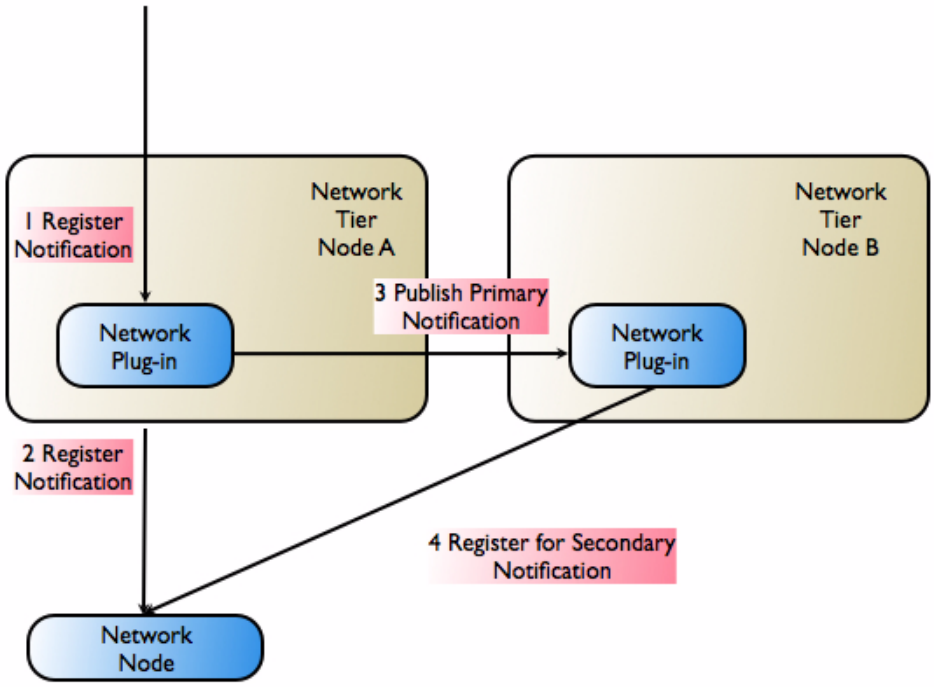
  These notifications have an expected life span of more than a a few days. Typically these are registrations for notifications for network-triggered SMS and MMS messages or calls that need to be handled by an application. For this category, the delivery notification criteria are replicated to all instances of the network plug-in. Each plug-in that receives the notification is responsible for registering an interface with the network node.

When the Network Node Supports Primary and Secondary Notification

Figure 8–4 illustrates how Services Gatekeeper registers both primary and secondary notifications with network nodes that support it. This capability must be supported by the network protocol in the abstract and in the implementation of the protocol as it exists in both the network node and the communication service's network plug-in.

Note: The scenario assumes that the network node supports registration for notifications with overlapping criteria (primary/secondary).

Figure 8–4 Network Node Supports Primary/Secondary Notifications



1. The request to register for notifications enters the network protocol plug-in from the application.
2. The primary notification is registered with the telecom network node.
3. The notification information is propagated to another instance of the network protocol plug-in.
4. The secondary notification is registered with the telecom network node.

Note: The concept of primary/secondary notification is not necessarily ordered. The most recently registered notification may, for example, be designated the primary notification.

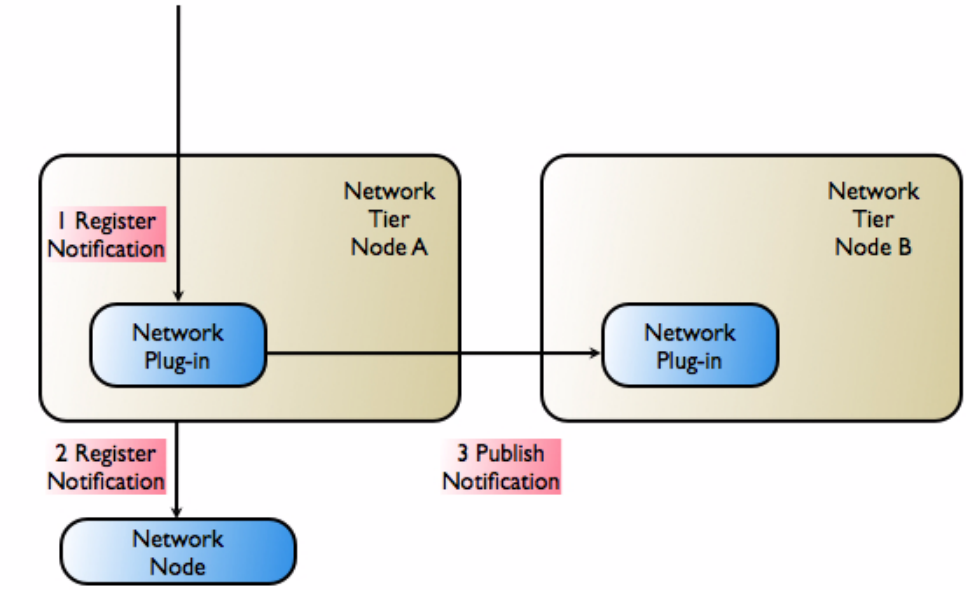
When a network-triggered request that matches the criteria in a previously registered notification reaches the telecom network node, the node first tries the network plug-in that registered the primary notification. If that request fails, the network node has the responsibility of retrying, using the plug-in that registered the secondary notification. The secondary plug-in will have all necessary information to propagate the request through Services Gatekeeper and on to the correct application.

When the Network Node Supports Only Single Notification

Figure 8–5 illustrates the registration step in Services Gatekeeper if the underlying network node does not support primary/secondary notification registration.

Note: The scenario assumes that the network node does not support registration for notifications with overlapping criteria. Only one notification for a given criteria is allowed.

Figure 8–5 Network Node Supports Only Single Notification



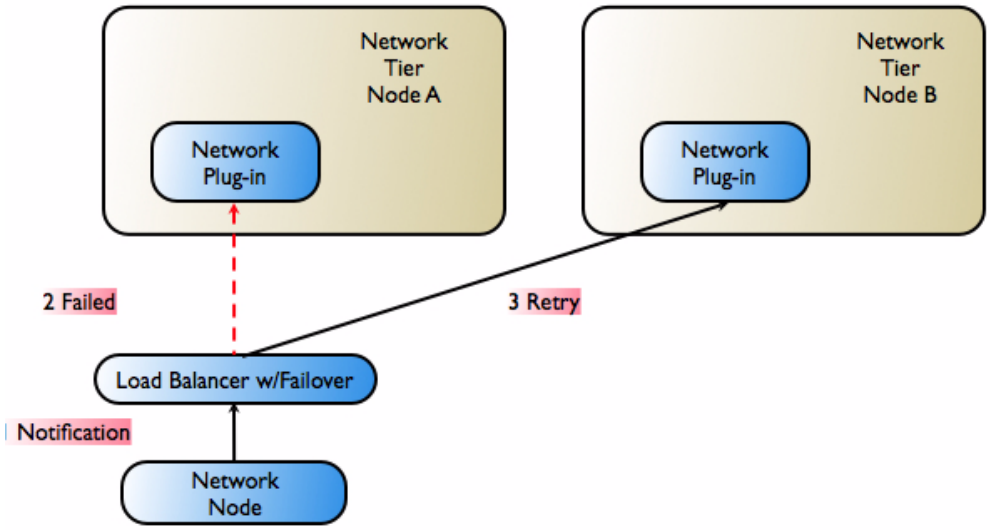
1. The request to register for notifications enters the network protocol plug-in from the application.
2. The notification is registered with the telecom network node.
3. The notification information (matching criteria, target URL, etc.) is propagated to another instance of the network protocol plug-in. The plug-in makes the necessary arrangements to be able to receive notifications.

There are two possibilities for high-availability and failover support in this case:

- All plug-ins can receive notifications from the network node. This is the case with SMPP, in which all plug-ins can function as receivers for any transmission from the network node.
- A load balancer with failover support is introduced between the network protocol plug-in and the network node. This is the case with HTTP- based protocols, as in Figure 8–6.

Note: Whether or not this is possible depends on the network protocol, because the load-balancer must be protocol aware.

Figure 8–6 Traffic With a Single Notification Only Node: Load-Balancer With Failover Support



Network Configuration

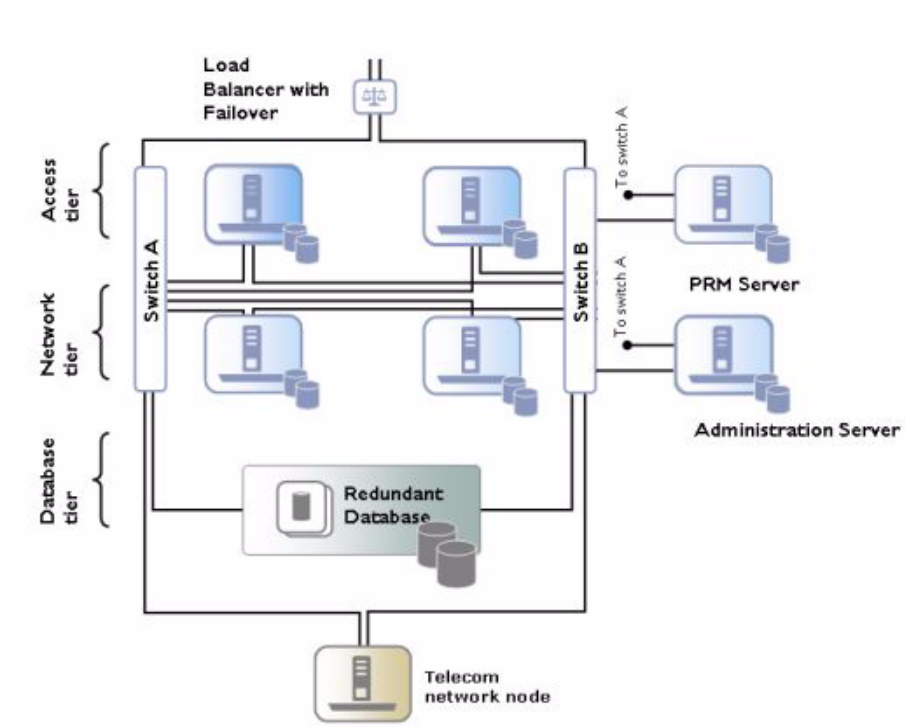
The general structure of a production Services Gatekeeper installation is also designed to support redundancy and high availability. A typical installation consists of a number of UNIX/Linux servers connected through duplicated switches. Each server has redundant network cards connected to separate switches. The servers are organized into clusters, with the number of servers in the cluster determined by the needed capacity.

As described previously, Services Gatekeeper is deployed on an Access Tier, which manages connections to applications, and a Network Tier, which manages connections to the underlying telecom network. For security, the Network Tier is usually connected only to Access Tier servers, the appropriate underlying network nodes, and the Oracle WebLogic Server Administration Server, which manages the domain. A third tier hosts the database. This tier should be hosted on dedicated, redundant servers. For physical storage, a Network Attached Storage using fibre channel controller cards is an option.

Because the different tiers perform different tasks, their servers should be optimized with different physical profiles, including amount of RAM, disk-types, and CPUs. Each tier scales individually, so the number of servers in a specific tier can be increased without affecting the other tiers.

A sample configuration is shown in Figure 8–7. Smaller systems in which the Access Tier and the Network Tier are co-located in the same physical servers are possible but only for non-production systems. Particular hardware configurations depend on the specific deployment requirements and are worked out in the dimensioning and capacity planning stage.

Figure 8–7 Sample Hardware Configuration



In high-availability mode, all hardware components are duplicated, eliminating any single point of failure. This means that there are at least two servers executing the same software modules, that each server has two network cards, and that each server has a fault-tolerant disk system, as, for example, RAID.

The Administration Server may have duplicate network cards, connected to each switch.

For security reasons, the servers used for the Access Tier can be separated from the Network Tier servers using firewalls. The Access Tier servers reside in a Demilitarized Zone (DMZ) while the Network Tier servers are in a trusted environment.

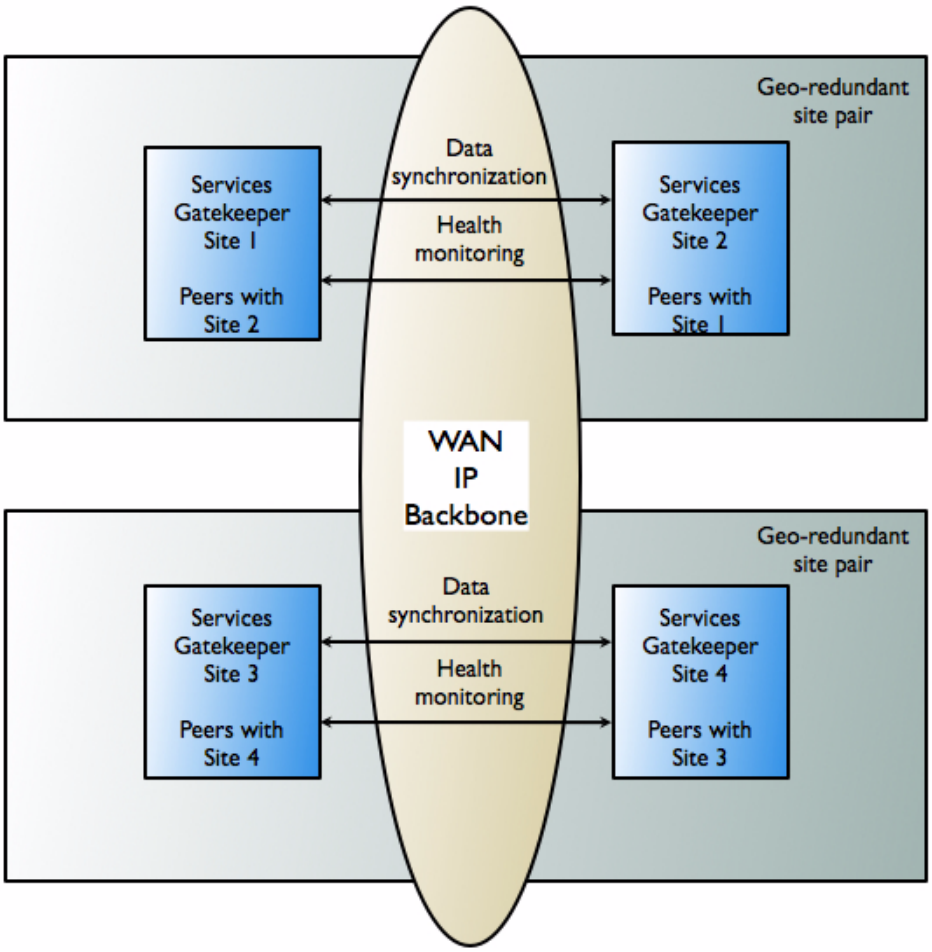
Geographic Redundancy

All Services Gatekeeper modules in production systems are deployed in clusters to ensure high availability. This prevents single points of failure in general usage. Within a cluster, a Budget Service cluster-local master regulates the enforcement of SLAs. The enforcement service is highly available and is migrated to another server should the cluster-local master node fail. See"Managing and Configuring Budgets" in *System Administrator's Guide* for more information on this mechanism.

However, to prevent service failure in the face of catastrophic events - natural disasters or massive system outages like power failures - Services Gatekeeper can also be deployed at two geographically distant sites that are designated as site pairs. Each site, which is a Services Gatekeeper domain, has another site as its peer. See Figure 8–8 for an overview. Application and service provider configuration information, including related SLAs and budget information, is replicated and enforced across sites.

Note: Custom, Subscriber, Service Provider Node, and Global Node SLAs cannot be replicated across sites.

Figure 8–8 Overview of Geographically Redundant Site Pairs



Geo-Redundant Sites

In a geo-redundant setup, all sites have a geographic site name and each site is configured to have a reference to its peer site using that name. The designated set of information is synchronized between these site peers.

One site is defined as the geomaster, the other as the slave. Checks are run periodically between the site pairs to verify data consistency and an alarm is triggered if mismatches are found, at which point the administrator can force the slave to re-sync to the geomaster, using the `syncFromGeoMaster` operation. Any relevant configuration changes made to either site are written synchronously across the site pairs, so that a failure to write to either the geomaster or the slave causes the write to fail and an alarm to fire.

During the period in which the slave is syncing up with the geomaster, both the geomaster and the slave sites are in read-only mode. No configuration changes can be made. If a slave site becomes unavailable for any reason, the geomaster site becomes read-only either until the slave site is available and has completed all data replication,

or until the slave site has been removed from the geomaster site's configuration, terminating geo-redundancy.

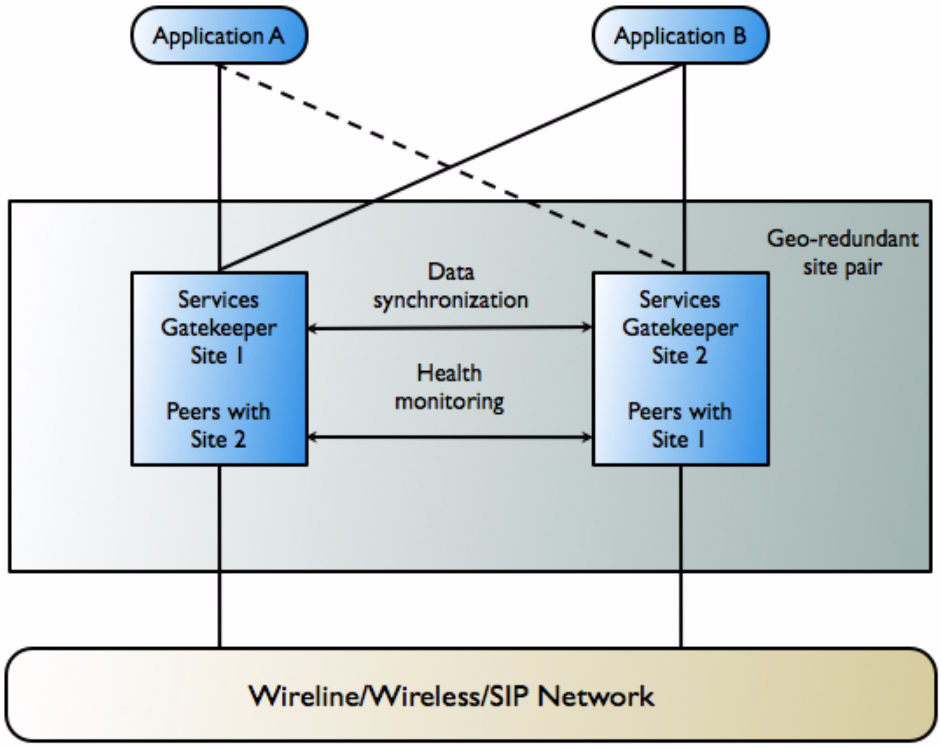
> **Note:** If a new site is then added to replace the terminated site, it must be added as a slave site. The site that is designated the geomaster site must remain the geomaster site for the lifetime of the site configuration.
>
> If a geomaster site fails permanently, the failed site should be removed from the configuration using the GeoRedundantService. If a replacement site is added to the configuration, the remaining operating site must be reconfigured to be the geomaster and the replacement site must be added as the slave.

If a geomaster site fails permanently, the failed site should be removed from the configuration using the GeoRedundantService. If a replacement site is added to the configuration, the remaining operating site must be reconfigured to be the geomaster and the replacement site must be added as the slave.

Applications and Geo-Redundancy

For applications, geo-redundancy means that their traffic can continue to flow in the face of a catastrophic failure at an operator site. Even applications that normally use only a single site for their traffic can fail over to a peer site while maintaining ongoing SLA enforcement for their accounts. This scenario is particularly relevant for SLA aspects that have longer term impact, such as quotas.

Figure 8–9 Geographically Redundant Site Pairs and Applications



In many respects, the geo-redundancy mechanism is *not* transparent to applications. There is no single sign-on mechanism across sites, and an application must establish a session with each site it intends to use. In case of site failure, an application must manually fail over to a different site.

While application and service provider budget and configuration information are maintained across sites, state for *ongoing conversations* is not maintained. Conversations in this sense are defined in terms of the correlation identifiers that are returned to the applications by Services Gatekeeper or passed into Services Gatekeeper from the applications. Any state associated with a correlation identifier exists on only a single geographic site and is lost in the event of a site-wide disaster. Conversational state includes, but is not limited to, call state and registration for network-triggered notifications. This type of state is considered volatile, or transient, and is not replicated at the site level.

This means that conversations must be conducted and complete on their site of origin. If an application wishes to maintain conversational state cross-site - for example, to maintain a registration for network-triggered traffic - it must register with each site individually.

> **Note:** On the other hand, this type of affinity does allow load balancing between sites for different or new conversations. For example, because each request to send an SMS message constitutes a new conversation, sending SMS messages can be balanced between the sites.

Below is a high-level outline of the redundancy functionality:

- The contractual usage relationships represented by SLAs can be enforced across geographic site domains. The mechanism covers SLAs on both the service provider group and application group level.
- Service provider and application account configuration data, including any changes to this information, can be replicated across sites, reducing the administrative overhead in setting up geo-redundant site pairs.
- When peer sites fail to establish connection a configurable number of times, a connection-lost alarms is raised.
- Alarms are also generated:
  - If there is a site configuration mismatch between the two sites; for example if site A treats site B as a peer, but site B does not recognize site A as a peer
  - If the paired sites do not have identical application and service provider configuration information, including related SLAs and budget information
  - If the master site fails to complete a configuration update to the slave site

9

Service Extensibility

This chapter describes how to extend the Oracle Communications Services Gatekeeper functionality.

Overview

Networks change, existing functionality is parsed in new ways to support new features and new nodes with new or modified abilities are added. Because of Service Gatekeeper's highly modular design, exposing these new features to partners is straightforward. There are several ways to extend Services Gatekeeper:

- Entirely new communication services
- New network plug-ins that can work with existing application facing interfaces
- New application-facing-interface types (facades) for existing network plug-ins
- New or reordered interceptors
- Integration with the existing network mechanisms with EDR listeners and SMNP MIBs.

The Platform Development Studio

To help operators and systems integrators, Services Gatekeeper ships with the Services Gatekeeper Platform Development Studio (PDS). The PDS comprises the following features:

- *Platform Development Studio Developer's Guide*

  A detailed guide covering how to:

  - Install the PDS
  - Use the Eclipse wizard to generate a project
  - Understand the example communication service
  - Use Service Gatekeeper's container services
  - Create Subscriber SLAs for subscriber-based policy
  - Update EDR filters and add JMS-based listeners
  - Reorder the Interceptor Stack or create new interceptors
- *Platform Test Environment Guide*

  A detailed guide covering how to:

    - Load the Platform Test Environment (PTE)
        - In standalone mode, with a Java Swing-based GUI
        - In console mode, particularly for use with the Unit Test Framework
    - Run the Application Service Clients
    - Use the Network Simulators
    - Utilize the utilities such as the MBean browser and the JMS-based EDR listeners
    - Understand the example module and extend the PTE
- Example Communication Service, including:
    - Source code
    - WSDLs
    - Build files
    - Example unit test
    - Example Subscriber SLA/Profile Provider
- The Eclipse Communications Service wizard

  The developer supplies information to an Eclipse plug-in wizard, which automatically sets up an Extension Project. Included within this project can be a substantial amount of generated code, including:
    - The entire Access Tier, with the Web Service implementation and any callback modules (EJBs) that are necessary

      Note: The Eclipse wizard supports building communication services based only on Web Services application-facing interfaces. Both SOAP and RESTful facade types are supported.

    - Most of the code for the common services code in the Network Tier
    - A skeleton of the code required for the network plug-in layer of the Network Tier
- Example Virtual Communications Service
- The Eclipse Virtual Communications Service wizard
- A complete Javadoc reference
- Specialized templates and Ant tasks
- The Unit Test Framework, providing:
    - A base test class, derived from JUnit
    - Simple-to-use mechanisms for connecting to the Platform Test Environment
    - An example unit test bundled with the Communication Service Example
- The Profile Provider SPI, which allows operators and integrators to create subscriber-centric policy, associating subscribers with service provider and application groups based on individualized subscriber preferences and permissions.

A

Standards and Specifications

This appendix describes the specific standards that Services Gatekeeper supports, and provides, where possible, links to the actual specifications.

Application-Facing Interfaces

The standards supported by application-facing interfaces are described here.

Parlay X 2.1

The Services Gatekeeper application-facing interfaces support the following parts of the Parlay X 2.1 specification. For links to the specifications, see:

http://docbox.etsi.org/TISPAN/Open/OSA/ParlayX21.html

- **Common**, ETSI ES 202 391-1 V1.2.1 (2006-12), Open Service Access (OSA); Parlay X Web Services; Part 1: Common (Parlay X 2).
- **Third Party Call**, ETSI ES 202 391-2 V1.2.1 (2006-12), Open Service Access (OSA); Parlay X Web Services; Part 2: Third Party Call (Parlay X 2).
- **Call Notification**, ETSI ES 202 391-3 V1.2.1 (2006-12), Open Service Access (OSA); Parlay X Web Services; Part 3: Call Notification (Parlay X 2).
- **Short Messaging**, ETSI ES 202 391-4 V1.2.1 (2006-12), Open Service Access (OSA); Parlay X Web Services; Part 4: Short Messaging (Parlay X 2).
- **Multimedia Messaging**, ETSI ES 202 391-5 V1.2.1 (2006-12), Open Service Access (OSA); Parlay X Web Services; Part 5: Multimedia Messaging (Parlay X 2).
- **Terminal Location**, ETSI ES 202 391-9 V1.2.1 (2006-12), Open Service Access (OSA); Parlay X Web Services; Part 9: Terminal Location (Parlay X 2).
- **Terminal Status**, ETSI ES 202 391-8 V1.2.1 (2006-12), Open Service Access (OSA); Parlay X Web Services; Part 8: Terminal Status (Parlay X 2).
- **Audio Call**, ETSI ES 202 391-11 v.1.2.1 (2006-12), Open Service Access (OSA); Parlay X Web Services; Part 11: Audio Call (Parlay X 2).
- **Presence**, ETSI ES 202 391-14 V1.2.1 (2006-12), Open Service Access (OSA); Parlay X Web Services; Part 14: Presence (Parlay X 2).

Parlay X 3.0

The Services Gatekeeper application-facing interfaces support the following parts of the Draft Parlay X 3.0 specification.

- **Common, Draft ETSI ES 202 504-1 v.0.0.3 (2007-06), Open Service Access (OSA); Parlay X Web Services; Part 1: Common (Parlay X 3).**
- **Third Party Call**, Draft ETSI ES 202 504-2 v0.0.5 (2007-06), Open Service Access (OSA); Parlay X Web Services; Part 2; Third Party Call (Parlay X 3).
- **Call Notification**, Draft ETSI ES 202 504-3 v0.0.3 (2007-06), Open Service Access (OSA); Parlay X Web Services; Part 3: Call Notification (Parlay X 3).
- **Audio Call**, Draft ETSI ES 202 504-11 v.0.0.3 (2007-06), Open Service Access (OSA); Parlay X Web Services; Part 11: Audio Call (Parlay X 3).
- **Payment**, 3GPP TS 29.199-6 V7.2.2 (2007-06), Open Service Access (OSA); Parlay X Web Services; Part 6: Payment (Release 7)
- **Device Capabilities**, 3GPP TS 29.199-18 V7.0.0 (2007-06), Open Service Access (OSA); Parlay X Web Services; Part 18: Device capabilities and configuration (Release 7)

Extended Web Services

The Extended Web Services are Services Gatekeeper's proprietary application-facing interfaces. These interfaces are implementations of commonly requested functionality, including, in this release, WAP Push, Binary SMS, and Subscriber Profile. Although the interfaces themselves are not standardized, they use standardized elements.

Binary SMS

Note: For links to the specification, see

http://www.3gpp.org/ftp/Specs/html-info/23040.htm

The payload, protocol identifier, and validity period rely on:

- 3GPP TS 23.040 version 6.5.0, Technical realization of Short Message Service (SMS)

WAP Push

Note: See http://www.openmobilealliance.org/tech/affiliates/wap/wapindex.html for links to the specifications.

The payload of a WAP Push message shall adhere to:

- **WAP Service Indication Specification**, as specified in Service Indication Version 31-Jul-2001 Wireless Application Protocol WAP-167-ServiceInd-20010731-a.
- **WAP Service Loading Specification**, as specified in Service Loading Version 31-Jul-2001 Wireless Application Protocol WAP-168-ServiceLoad-20010731-a.
- **WAP Cache Operation Specification**, as specified in Cache Operation Version 31-Jul-2001 Wireless Application Protocol WAP-175-CacheOp-20010731-a.

Note: The Extended Web Services WAP Push communication service does not verify the payload; it passes it on to the underlying network node.

Subscriber Profile LDAP

There is no current specifications covering subscriber-profile LDAP access, although a draft version exists. Gatekeeper's implementation is based on that draft.

RESTful APIs

There are no current specifications covering RESTful access to underlying telephony network functionality.

Native

Gatekeeper also supports some native telephony messaging application-facing interfaces. The following specifications are supported:

- MM7: 3GPP TS 23.140 V5.3.0 (REL-5-MM7-1-2.xsd)
- SMPP: SMPP v3.4
- UCP: UCP Short Message Service Center EMI-UCP Interface 5.0

Network Protocol Plug-Ins

By default, Services Gatekeeper supports the network protocols listed in Table A–1 through the use of network plug-ins. Although each plug-in is a part of a communication service, certain protocols can be used by multiple communication services for different purposes. There may be multiple implementations of the same protocol for use in different communication services.

Table A–1 is a list of supported network protocols organized per communication service.

Table A–1 Network Plug-Ins Organized by Communication Service

Communication service	Network protocol plug-in	Specification
Parlay X 2.1 Third Party Call (Part 2)	SIP	RFC 3261. See http://www.ietf.org/rfc/rfc3261.txt
Parlay X 2.1 Third Party Call (Part 2)	INAP/SS7	ETSI 94 INAP CS1, ETS 300 374-1, Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network Application Protocol (INAP) http://pda.etsi.org/pda/queryform.asp
Parlay X 3.0 Third Party Call (Part 2)	Parlay 3.3 MultiParty Call Control	ETSI ES 201 915-4 V1.4.1 (2003-07), Open Service Access (OSA); Application Programming Interface (API); Part 4: Call Control SCF (Parlay 3), part MultiParty Call Control Service. Section MultiParty Call Control Service http://docbox.etsi.org/TISPAN/Open/OSA/ParlayX30.html
RESTful Third Party Call	SIP	RFC 3261. See http://www.ietf.org/rfc/rfc3261.txt
Parlay X 2.1 Call Notification (Part 3)	SIP	RFC 3261. See http://www.ietf.org/rfc/rfc3261.txt

Table A–1 (Cont.) Network Plug-Ins Organized by Communication Service

Communication service	Network protocol plug-in	Specification
Parlay X 3.0 Call Notification (Part 3)	Parlay 3.3 MultiParty Call Control	ETSI ES 201 915-4 V1.4.1 (2003-07), Open Service Access (OSA); Application Programming Interface (API); Part 4: Call Control SCF (Parlay 3), part MultiParty Call Control Service. Section MultiParty Call Control Service. http://docbox.etsi.org/TISPAN/Open/OSA/ParlayX30.html
RESTful Call Notification	SIP	RFC 3261. See http://www.ietf.org/rfc/rfc3261.txt
Parlay X 2.1 Short Messaging (Part 4)	SMPP v3.4	Short Message Peer to Peer, Protocol Specification v3.4, Document Version:- 12-Oct-1999 Issue 1.2. http://smsforum.net/
RESTful Short Messaging	SMPP v3.4	Short Message Peer to Peer, Protocol Specification v3.4, Document Version:- 12-Oct-1999 Issue 1.2. See http://smsforum.net/
Parlay X 2.1 Multimedia Messaging (Part 5)	MM7 v 5.5.0	3rd Generation Partnership Project; Technical Specification Group Terminals; Multimedia Messaging Service (MMS); Functional description; Stage 2 (Release 5), 3GPP TS 23.140 V5.3.0. Messages are compliant with the schema defined by one of REL-5-MM7-1-0.xsd, REL-5-MM7-1-2.xsd, or REL-5-MM7-1-5.xsd, depending on management settings. See http://www.3gpp.org/ftp/Specs/html-info/23140.htm
RESTful Multimedia Messaging	MM7 v 5.5.0	3rd Generation Partnership Project; Technical Specification Group Terminals; Multimedia Messaging Service (MMS); Functional description; Stage 2 (Release 5), 3GPP TS 23.140 V5.3.0. Messages are compliant with the schema defined by one of REL-5-MM7-1-0.xsd, REL-5-MM7-1-2.xsd, or REL-5-MM7-1-5.xsd, depending on management settings. See http://www.3gpp.org/ftp/Specs/html-info/23140.htm
Parlay X 2.1 Terminal Location (Part 9)	MLP 3.0 MLP 3.2 Only one of the above listed protocols can be used at the same moment for a given node in a domain.	Location Inter-operability Forum (LIF) Mobile Location Protocol, LIF TS 101 Specification Version 3.0.0 and Mobile Location Protocol 3.2 Candidate Version 3.2 Open Mobile Alliance, OMA-TS-MLP-V3_2-20051124-C. For information on MLP 3.0, see http://www.openmobilealliance.org/tech/affiliates/lif/lifindex.html For information on MLP 3.2, see http://www.openmobilealliance.org

Table A–1 (Cont.) Network Plug-Ins Organized by Communication Service

Communication service	Network protocol plug-in	Specification
RESTful Terminal Location	MLP 3.0 MLP 3.2 Only one of the above listed protocols can be used at the same moment for a given node in a domain.	Location Inter-operability Forum (LIF) Mobile Location Protocol, LIF TS 101 Specification Version 3.0.0 and Mobile Location Protocol 3.2 Candidate Version 3.2 Open Mobile Alliance, OMA-TS-MLP-V3_2-20051124-C. For information on MLP 3.0, see http://www.openmobilealliance.org/tech/affiliates/lif/lifindex.html For information on MLP 3.2, see http://www.openmobilealliance.org
Parlay X 2.1 Terminal Status (Part 8)	MAP	3rd Generation Partnership Project;Technical Specifications Group Core Network; Mobile Application Part (MAP) specification; (Release 4) 3GPP TS 29.002 v4.18.0. See http://www.arib.or.jp/IMT-2000/V730Jul09/5_Appendix/Rel4/29/29002-4i0.pdf
RESTful Terminal Status	MAP	3rd Generation Partnership Project;Technical Specifications Group Core Network; Mobile Application Part (MAP) specification; (Release 4) 3GPP TS 29.002 v4.18.0. See http://www.arib.or.jp/IMT-2000/V730Jul09/5_Appendix/Rel4/29/29002-4i0.pdf
Parlay X 2.1 Audio Call (Part 11)	SIP	Session Initiation Protocol RFC 3261. See http://www.ietf.org/rfc/rfc3261.txt
RESTful ParlayX 2.1 Audio Call	SIP	Session Initiation Protocol RFC 3261. See http://www.ietf.org/rfc/rfc3261.txt
Parlay X 3.0 Audio Call (Part 11)	Parlay 3.3 Call User Interaction and Parlay 3.3 MultiParty Call Control	ETSI ES 201 915-5 V1.4.1 (2003-07), Open Service Access (OSA); Application Programming Interface (API); Part 5: User Interaction SCF (Parlay 3). Call user interaction parts. ETSI ES 201 915-4 V1.4.1 (2003-07), Open Service Access (OSA); Application Programming Interface (API); Part 4: Call Control SCF (Parlay 3). Section MultiParty Call Control Service. See http://docbox.etsi.org/TISPAN/Open/OSA/ParlayX30.html
Parlay X 2.1 Presence (Part 14)	SIP	RFC 3261. See http://www.ietf.org/rfc/rfc3261.txt
RESTful Presence	SIP	RFC 3261. See http://www.ietf.org/rfc/rfc3261.txt
Parlay X 3.0 Device Capabilities and Configuraton (Part 18)	LDAP	ETSI ES 202 504-18 V0.0.1 (2006-2007), Open Service Access (OSA); Parlay X Web Services; Part 18: Device Capabilities and Configuration (Parlay X 3). See http://docbox.etsi.org/TISPAN/Open/OSA/ParlayX30.html

Table A–1 (Cont.) Network Plug-Ins Organized by Communication Service

Communication service	Network protocol plug-in	Specification
Parlay X 3.0 Payment	Diameter	RFC3588. See http://tools.ietf.org/html/rfc3588 RFC4006. See http://tools.ietf.org/html/rfc4006 3GPP TS 32.299 version 6.6.0 Release 6. See http://www.3gpp.org/ftp/Specs/html-info/32299.htm
RESTful Payment	Diameter	RFC3588. See http://tools.ietf.org/html/rfc3588 RFC4006. See http://tools.ietf.org/html/rfc4006 3GPP TS 32.299 version 6.6.0 Release 6. See http://www.3gpp.org/ftp/Specs/html-info/32299.htm
Extended Web Services WAP Push	PAP 2.0	Push Access Protocol, WAP Forum, WAP-247-PAP-20010429-a. See http://www.openmobilealliance.org
RESTful WAP Push	PAP 2.0	Push Access Protocol, WAP Forum, WAP-247-PAP-20010429-a. See http://www.openmobilealliance.org
Extended Web Services Binary SMS	SMPP v3.4	Short Message Peer to Peer, Protocol Specification v3.4, Document Version:- 12-Oct-1999 Issue 1.2. http://smsforum.net/
Extended Web Services Subscriber Profile	LDAPv3	Lightweight Directory Access Protocol, RFC 4510: June 2006. See http://tools.ietf.org/html/rfc4510
Native MM7	MM7 v 5.3.0	3rd Generation Partnership Project; Technical Specification Group Terminals; Multimedia Messaging Service (MMS); Functional description; Stage 2 (Release 5), 3GPP TS 23.140 V5.3.0. Messages are compliant with one of two schemas: either REL-5-MM7-1-2.xsd or a slightly modified version of REL-5-MM7-1-0.xsd, both available at: http://www.3gpp.org/ftp/Specs/html-info/23140.htm
Native SMPP	SMPP v3.4	Short Message Peer to Peer, Protocol Specification v3.4, Document Version:- 12-Oct-1999 Issue 1.2. See http://smsforum.net/
Native UCP	EMI-UCP Interface 5.0	Short Message Service Center EMI-UCP Interface 5.0 specification

Table A–1 (Cont.) Network Plug-Ins Organized by Communication Service

Communication service	Network protocol plug-in	Specification
Not applicable	Parlay 3.3 Framework This is a network-facing protocol that does not belong to a certain communication service. It is used by all Parlay plug-ins.	ETSI ES 201 915-3 V1.4.1 (2003-07), Open Service Access (OSA); Application Programming Interface (API); Part 3: Framework (Parlay 3).

Security

Services Gatekeeper supports the security standards listed below. The security standards are applicable for the application-facing interfaces. Services Gatekeeper leverages Web Services Security mechanisms provided by WebLogic Server. For more information, see:

- *Oracle® Fusion Middleware Securing Oracle WebLogic Server* at: http://download.oracle.com/docs/cd/E15523_01/web.1111/e13707/toc.htm
- "Securing Web Services" in *Oracle® Fusion Middleware Security and Administrator's Guide for Web Service*s at: http://download.oracle.com/docs/cd/E15523_01/web.1111/b32511/intro_security.htm

> **Note:** See http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=wss for links to the specifications.

- WS-Security Core Specification 1.1
- WS-Security 1.0 and 1.1
- UsernameToken Profile 1.1
- X.509 Certificate Token Profile 1.1
- SAML Token Profile 1.1
- SOAP Message Security 1.0
- SOAP with Attachments (SWA) 1.1

In addition, the following standards are also supported:

- WS-Addressing 1.0, http://www.w3.org/2002/ws/addr/
- WS-Policy 1.1
- WS-SecurityPolicy 1.2, http://docs.oasis-open.org/ws-sx/ws-securitypolicy/200702

- WS-Trust 1.3, http://docs.oasis-open.org/ws-sx/ws-trust/200512/ws-trust-1.3-os.html
- WS-SecureConversation 1.3, http://docs.oasis-open.org/ws-sx/ws-secureconversation/200512/ws-secureconversation-1.3-os.html
- WS-ReliableMessaging 1.0
- WS-PolicyAttachment 1.0

Transport-level security mechanisms such as 1- or 2-way SSL or VPN tunneling can be used for the PRM interfaces.

Identity and Trust

Services Gatekeeper leverages the robust identity management capabilities of Web Logic Server, including:

- Private Keys
- X.509 v3 Digital Certificates
- Symmetric & Asymmetric Key Algorithms
  - DES-CBC
  - Two-Key Triple DES
  - RC4
  - RSA
- Message Digest:
  - MD5
  - SHA
- JEE 5 & Weblogic Security Packages
  - Java Secure Socket Extension (JSSE)
  - Java Authentication & Authorization Services (JAAS)
  - Java Security Manager
  - Java Cryptography Architecture and Java Cryptography Extensions (JCE)
  - Java Authorization Contract for Containers (JACC)
  - Common Secure Interoperability Version 2 (CSIv2)

Glossary

This glossary defines terminology used throughout the Oracle Communications Services Gatekeeper documentation set.

3GPP

3rd Generation Partnership Project, a collaborative group of telecom standards bodies.

Account

A registered application or service provider. An account belongs to an account group, which is tied to a common SLA.

Account group

Multiple registered service providers or applications that share a common SLA.

Administrative User

Someone who has privileges on the Services Gatekeeper management tool. This person has an administrative user name and password.

Alarm

The result of an unexpected event in the system, often requiring corrective action.

API

Application Programming Interface.

Application

A TCP/IP based, telecom-enabled program accessed from either a telephony terminal or a computer.

Application-facing Interface

The Application Services Provider facing interface.

Application Instance

An Application Service Provider from the perspective of internal Services Gatekeeper administration. An Application Instance has a user name and password or certificate.

Application Service Provider

An organization offering application services to users through a telephony network.

Application Test Environment

A tool that lets application developers test their applications on a simulated Services Gatekeeper.

AS

Application Server.

ATE

Application Test Environment.

CBC

Content based charging. Charging based on the nature of the content delivered, not on time used or simple per-use cost.

CDR

Charging Data Record.

Communication Service

Mechanism by which a particular telecom network capability is made available to Internet-based applications. It consists of an application-facing interface (north), a generic capability, and a network-facing interface (south).

CPU

Central Processing Unit.

CORBA

Common Object Request Broker Architecture.

CRM

Customer Relationship Management.

DMZ

Demilitarized Zone, a physical or logical subnetwork that contains and exposes an organization's external services to a larger, untrusted network.

EAR

Enterprise Archive file.

EDR

Event Data Record.

EJB

Enterprise Java Bean.

Enabler

The Services Gatekeeper layer that performs routing and protocol translation. It provides network-facing interfaces.

End User

The ultimate consumer of the services that an application provides. An end user can be a network subscriber, such as a prepaid service customer or it a non-subscriber, as such as an automated bulk-message application.

Enterprise Operator

See **Application Service Provider**.

Enterprise Service Bus

A middleware component that supports messaging, routing, XML data transformation, and service orchestration.

ETSI

The European Telecommications Standards Institute, a telecom standards body.

Event

A traceable, expected occurrence in the system, of interest to the operator.

EWS

Extended Web Services, a set of Web Services interfaces developed by Oracle offering access to network functionality not covered by Parlay X.

Facade

A set of interfaces exposed to application service developers. A facade functions as a view of an enabler.

HA

High Availability.

HTML

Hypertext Markup Language.

HTTP

Hypertext Transfer Protocol.

INAP

Intelligent Network Application Part, a telephony signalling protocol.

Interceptor

A mechanism that intercepts and manipulates a request flowing through a Communication Service in Services Gatekeeper. Deployed in the Network Tier.

Interceptor Stack

A flexible set of chained evaluation steps used in Services Gatekeeper.

IP

Internet Protocol.

JDBC

Java Database Connectivity, the Java API for database access.

JEE

Java Enterprise Edition.

JMS

Java Message Service.

JMX

Java Management Extensions.

LDAP

Lightweight Directory Access Protocol.

Location Uncertainty Shape

A geometric shape surrounding a base point specified in terms of latitude and longitude. Used in terminal location.

MAP

Mobile Application Part.

Marshall

To record the state and codebase(s) of an object in such a way that when the marshalled object is "unmarshalled," a copy of the original object is obtained, possibly by automatically loading the class definitions of the object.

Mated pair

Two physically distributed installations of Services Gatekeeper nodes sharing a subset of data allowing for high availability between the nodes.

MIB

Management Information Base.

MLP

Mobile Location Protocol.

MM7

A multimedia messaging protocol specified by 3GPP.

MMS

Multimedia Message Service or an instance of this service.

MMSC

Multimedia Message Service Center.

MPP

Mobile Positioning Protocol.

Network Plug-in

The Services Gatekeeper module that implements the interface to a network node or OSA/Parlay SCS through a specific protocol.

NS

Network Simulator.

OAM

Operation, Administration, and Maintenance.

OASIS

Organization for the Advancement of Structured Information Standards, an e-business and web standards consortium.

OCSG

Oracle Communications Services Gatekeeper.

On-boarding

Registering applications and service providers to enable their access to Services Gatekeeper and the underlying network.

Operator

The party that manages Services Gatekeeper. Usually the network operator.

Oracle Communications Services Gatekeeper Container

The container hosting communication services.

Oracle Communications Services Gatekeeper Core Utilities

A set of utilities common to all communication services.

Oracle Communications Services Gatekeeper Core

The container that holds the Core Utilities.

ORB

Object Request Broker.

OSA

Open Service Access.

OSA/Parlay

The Open Service Access interfaces used by Parlay gateways.

OSS

Operation Support Systems.

Out of the box

The level of functionality available in the default installation of Services Gatekeeper.

PAP

Push Access Protocol.

Parlay

The Parlay Group, a telecom standards body.

Parlay Gateway

A telecom gateway implementing Parlay interface.

Parlay X

A set of telecom Web Services interfaces specified by the Parlay Group.

Plug-in

See **Network Plug-in**.

Plug-in Manager

The Services Gatekeeper module charged with routing an application-initiated request to the appropriate network plug-in.

POJO

Plain Old Java Object.

Presence information

A status indicator that conveys the accessibility and the willingness of a potential communication partner.

Presentity

A supplier of presence information.

PRM

Partner Relationship Management.

Quotas

An access rule based on an aggregated number of invocations. See also **Rates**.

RAID

Redundant Array of Independent Disk.

RAM

Random Access Memory.

Rates

An access rule based on allowable invocations per time period. See also **Quotas**.

RESTful

Interfaces that follow Representation State Transfer style.

Rf

The Diameter offline charging mode.

RMI

Remote Method Invocation.

Ro

The Diameter online charging mode.

Rules

The customizable set of criteria - based on SLAs and operator-desired additions - according to which requests are evaluated.

SAML

Security Assertion Markup Language.

SCF

Service Capability Function or Service Control Function, in the OSA/Parlay sense.

SCS

Service Capability Server, in the OSA/Parlay sense. Services Gatekeeper can interact with these on its network-facing interface.

Service Capability

Support for a specific kind of traffic within Services Gatekeeper. Defined in terms of Communication Services.

Service Provider

See **Application Service Provider**.

SIP

Session Initiation Protocol.

SLA

Service Level Agreement.

SMPP

Short Message Peer-to-Peer Protocol.

SMSC

Short Message Service Center.

SMS

Short Message Service or an instance of this service.

SNMP

Simple Network Management Protocol.

SOA

Service Oriented Architecture.

SOAP

Simple Object Access Protocol. A protocol for exchanging Web Services messages.

SPA

Service Provider APIs.

SPI

Service Provider Interface.

SQL

Structured Query Language.

SS7

Signalling System #7, a signaling protocol used in traditional telecom networks.

Subscriber

A person or organization that signs up for access to an application. The subscriber is charged for the application service usage. See also **End User**.

TCP

Transmission Control Protocol.

TUPS

Transaction Units Per Second.

URI

Uniform Resource Identifier.

URL

Uniform Resource Locator.

USSD

Unstructured Supplementary Service Data.

UCP

Universal Computer Protocol.

VAS

Value Added Service.

VASP

Value Added Service Provider.

VCS

Virtual Communication Service.

Virtual Communication Service

Simulated Services Gatekeeper that runs inside the ATE.

VLAN

Virtual Local Area Network.

VPN

Virtual Private Network.

W3C

The World Wide Web Consortium, a web standards group.

WAP

Wireless Application Protocol.

WAP Push

A protocol for sending WAP content (an encoded message including a link to a WAP address) that is pushed to a subscriber's handset.

Watcher

A consumer of presence information.

WSDL

Web Services Description Language.

WS-Security

An OASIS security standard for Web Services.

XML

Extensible Markup Language.