Oracle® Communications Service Broker

Concepts Guide

Release 6.0

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Preface

This document provides an overview of Oracle Communications Service Broker.

Audience

This document is intended for anyone who installs, configures, or administers Service Broker. It may also be used by users who want to understand key concepts of Service Broker.

This document is based on the assumption that the reader is already familiar with telecommunications network architectures and technologies, such as IP Multimedia Subsystem (IMS) and SS7-based networks, and with telecommunications network protocols, especially the Session Initiation Protocol (SIP), Diameter and SS7-based protocols.

Related Documents

For more information, see the following documents in the Service Broker Release 6.0 documentation set:

- *Oracle Communications Service Broker Release 6.0 Installation Guide*
- *Oracle Communications Service Broker Release 6.0 Online Mediation Controller Implementation Guide*
- *Oracle Communications Service Broker Release 6.0 Policy Controller Implementation Guide*
- *Oracle Communications Service Broker Release 6.0 Signaling Domain Configuration Guide*
- *Oracle Communications Service Broker Release 6.0 Processing Domain Configuration Guide*
- *Oracle Communications Service Broker Release 6.0 System Administrator's Guide*
- *Oracle Communications Service Broker Release 6.0 Subscriber Store User's Guide*
- *Oracle Communications Service Broker Release 6.0 Orchestration Studio User's Guide*
- *Oracle Communications Service Broker Release 6.0 Release Notes*

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http://edelivery.oracle.com/

Additional Oracle Communication documentation is available from Oracle Technology Network:

http://www.oracle.com/technetwork/index.html

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1

Service Broker Overview

This chapter introduces Oracle Communications Service Broker. It provides an overview of the Service Broker features and the different Service Broker solutions.

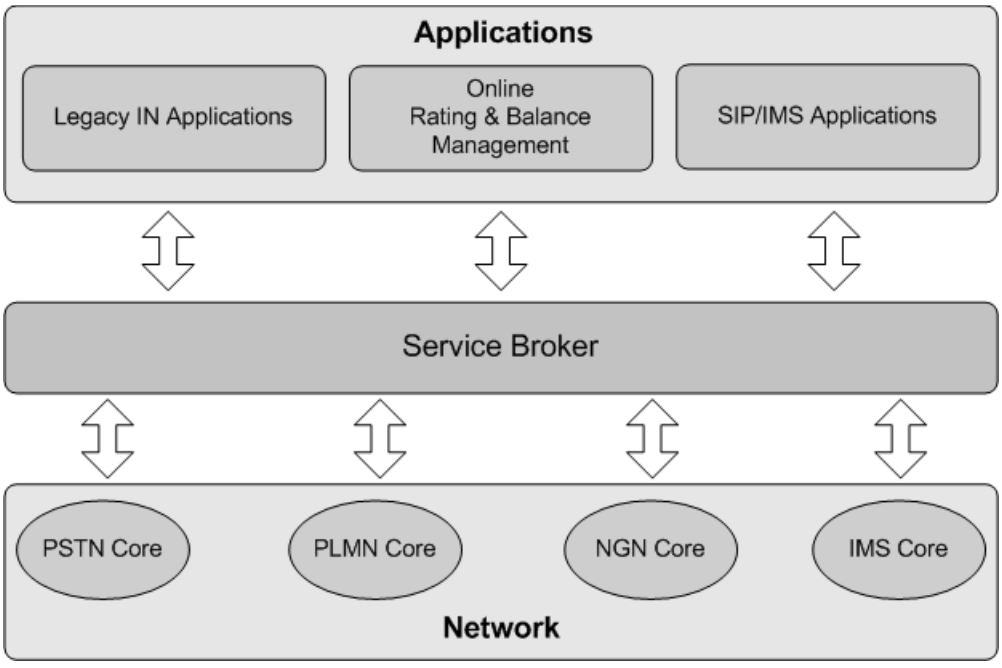
This chapter also describes the functional architecture of the Service Broker and fundamental concepts of a Service Broker deployment.

About Service Broker

Service Broker enables service delivery for sessions, calls, and events in the network. It controls service delivery across multiple networks, in the legacy and IMS domains, supporting a wide range of protocols, such as SS7-based protocols, SIP, Diameter, RADIUS and more.

Figure 1–1 shows the position of Service Broker in the network.

Figure 1–1 Service Delivery Across Multiple Domains



Service Broker supports a large range of deployment scenarios. The following sections describes the primary functions provided by Service Broker.

Service Controller

Positioned between the application layer and the session control layer, Service Broker controls service delivery for sessions executed in the network, providing protocol mediation and service orchestration.

Using Service Controller, applications such as Service Control Points (SCPs) and SIP application servers, gain access to and control of sessions running in session control layers in different network domains.

For example, the Service Broker NG-IN solution implements stateful mediation between SIP application server and Mobile Switching Centers (MSCs) in the legacy network, providing SIP application servers control of calls executed in the MSC.

Service Controller can also invoke two or more applications, combining and delivering multiple services to sessions in the network. The Service Controller supports mixed orchestration of SIP-based and IN-based applications, supporting orchestration logic which routes a session through a number of applications, invoking the applications in a particular order, according to conditions that determine which application to invoke and in which order.

Using application orchestration, legacy IN applications can work together with new SIP applications, integrating new applications while leveraging existing ones, and enhancing service capabilities. Specifically in legacy networks, this function circumvents IN limitations that allow only one IN application to control a call or a session.

Integrated with the Online Mediation Controller, Service Controller supports mixed orchestration also with Diameter-based charging applications.

Online Mediation Controller

Online Mediation Controller provides network connectivity for Oracle Communications Billing and Revenue Management (BRM) and third party Online Charging Systems (OCSs).

Online Mediation Controller acts as the front end for OCSs, providing connectivity to the network and mediating network protocols, supporting the Diameter and RADIUS protocols and enabling delivery of online charging services for sessions in the network.

Online Mediation Controller also extends the OCS functionality traditionally associated with balance management and rating, with additional charging reliant features.

See *Oracle Communications Service Broker Online Mediation Controller Implementation Guide* for more information.

Policy Controller

Policy Controller implements network, subscriber, and service policies, providing control of data usage, quality of service and charging.

Using the Policy Controller you control the service experience of individual subscribers. Policy Controller controls the bandwidth, quality of service, charging, and other service characteristics for each subscriber.

Policy Controller is a fully compliant 3GPP Policy and Charging Rule Function (PCRF), and includes a rule engine that you use to define how resources are allocated among your subscribers. The PCRF makes those decisions based on rules that you set up, information from applications, and subscriber-specific information.

Policy Controller also includes an on-board Subscription Profile Repository (SPR).

Together with the Service Broker Online Mediation Controller and Oracle Communications BRM, Policy Controller provides a complete policy and charging management solution.

See *Oracle Communications Service Broker Policy Controller Implementation Guide* for more information.

Social Voice Communicator

Social Voice Communicator (SVC) is an application that you use to offer subscribers social communications services.

SVC provides a way to connect friends, colleagues, and family with social voice, voicemail, and other features.

See *Oracle Communications Service Broker SVC Implementation Guide* for more information.

Virtual Private Network

Virtual Private Network (VPN) is an application that you use to provide custom voice VPN services to subscribing organizations.

It makes traditional PBX-based VPN feature, such as private extension dialing, calling line identity presentation, and reduced charging rate, available to mobile device users even while away from their home office, city, or country.

VPN allows replacement of IN services running on end-of-life systems. It supports migration from legacy infrastructure and consolidation to IP-based services.

See *Oracle Communications Service Broker VPN Implementation Guide* for more information.

Functional Architecture

The Service Broker architecture reflects the Service Broker need to interact with session control entities on one side, and applications on the other side.

On each side, Service Broker interacts through various protocols. Internally, Service Broker performs protocol mediation and optionally service orchestration.

The Service Broker architecture is composed of:

- Interworking Modules (IMs)

  IMs are a set of interchangeable modules through which Service Broker communicates with applications and session control entities. Each IM provides connectivity to a single application or network entity, through their native protocol.

  There are two types of IMs:

  - Network-facing IMs, connecting Service Broker to session control entities, such as MSCs and Call Session Control Functions (CSCFs). Network-facing IMs provide a stateful front-end to session control entities, thereby entities interact with Service Broker in the same way they interact with application. For a session control entity, connecting to Service Broker is identical to connecting an application. For example, IM-SCF provides a front-end that appears as a standard Service Control Point (SCP) to switches.

- Application-facing IMs, connecting Service Broker to applications, such as IN SCPs, SIP ASs, and OCSs. Application-facing IMs provide a stateful front-end to applications, thereby applications interact with Service Broker in the same way they interact with session control entities. For example, IM-OCF provides a front-end that appears as a standard CSCF to OCSs.

While externally IMs communicate with session control entities and applications through a wide range of protocols, inside Service Broker they communicate with the "Orchestration Engine (OE)" through an internal, proprietary, Session Abstraction Layer (SAL) protocol.

- Orchestration Engine (OE)

  The OE resides at the center of the Service Broker architecture. Sessions arriving through IMs, invoke the OE, which routes the sessions through one or more applications based on an orchestration logic that the OE obtains for each session. The OE invokes applications in a specific order, according to conditions that determine which application to invoke and in which order.

- Supplementary Modules (SMs)

  SMs are interchangeable modules that facilitate and complement Service Broker solutions in certain deployments. The use of SMs is optional.

- Applications

  Service Broker includes a number of out-of-the-box applications that run in the environment of the Service Broker deployment. When deployed with these services, Service Broker acts as a complete Service Control Point (SCP) and provisioning environment for telecommunication networks.

  Applications are available that provide the following services:

  - Virtual private networking, which provides custom voice VPN services to subscribing organizations. See "Virtual Private Network" for more information.
  - Social voice communication, which provides end users with social networking communication services such as phone number management, personal contact management, and voicemail. See "Social Voice Communicator" for more information.

  Applications are also available in the Online Mediation Controller, that facilitate charging features provided by the OCS.

- Mediators

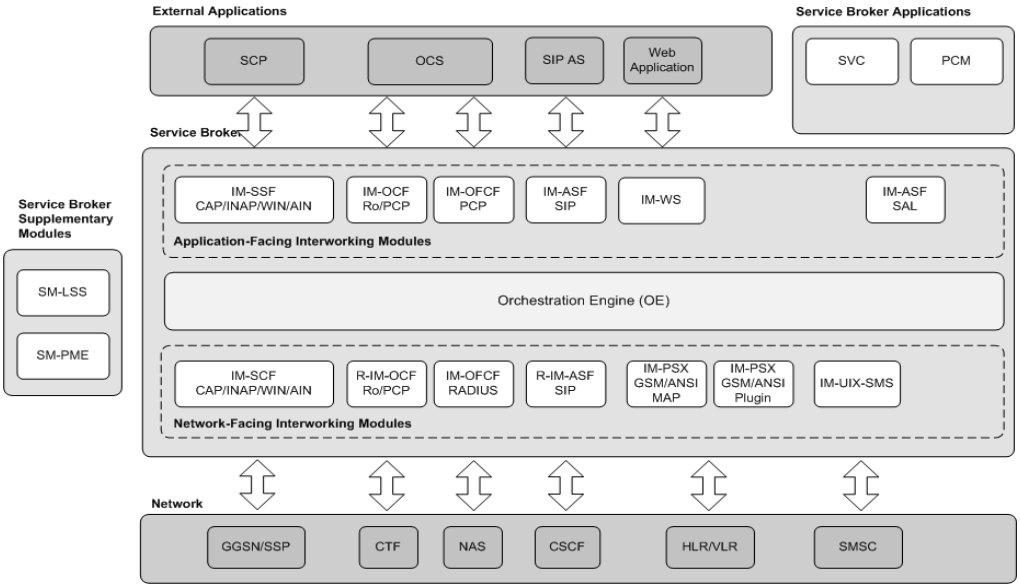
  The Online Mediation Controller and Policy Controller include also mediators that bypass the OE and IMs, performing direct mediation between protocols. Those are used when service orchestration is not required.

Inside Service Broker, communication between the OE and IMs is normalized, and communicate is based on the SAL protocol. Each IM provides the conversion between the Service Broker internal SAL representation of the session and the applicable external protocol.

Passing a session through the OE allows Service Broker to apply service orchestration on sessions.

Figure 1–2 shows the full architecture of Service Broker with the Orchestration Engine at the center and a complete set of IMs.

Figure 1–2 Service Broker Functional Architecture



Orchestration Engine

The OE resides at the center of the Service Broker architecture and implements the service orchestration functionality.

The OE takes each session through one or more applications, sequentially, where each application in its turn supplies the service that the application was created for. You specify the applications that the OE invokes, the order in which the OE invokes the applications, and the conditions that determine whether to invoke an application or not, using an orchestration logic.

The OE handles a session as follows:

1. The OE is invoked, through network-facing IMs, by session control entities. It can be a session control entity in either the legacy domain or the IMS domain.

   IM-SCF enables triggering from a legacy domain, and R-IM-ASF SIP and R-IM-OCF Ro enable triggering from an IMS domain.

2. The OE routes the session sequentially through multiple applications. It uses application-facing IMs to communicate the applications.

   Interaction with applications is provided through the following IMs:

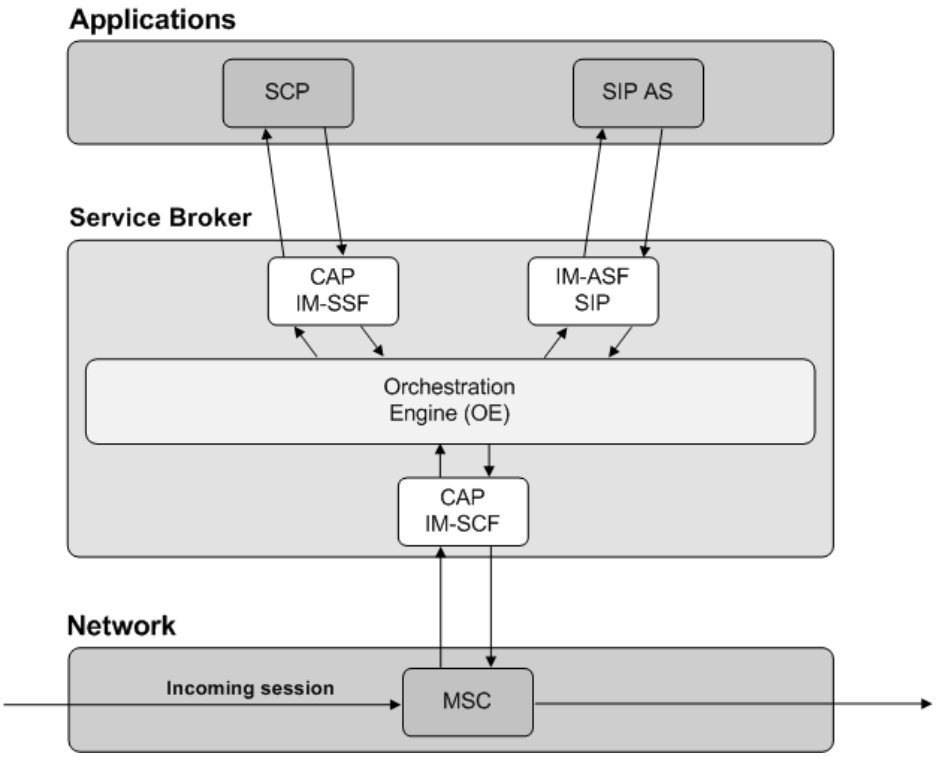
   - IM-SSF to interact with IN SCPs
   - IM-OCF to interact with OCSs
   - IM-WS to interact with Web applications
   - IM-ASF SIP to interact with SIP applications
   - IM-ASF SAL to interact with Service Broker applications

   Routing through multiple applications is not static, but rather determined in real-time based on an orchestration logic, which the OE selects and downloads dynamically. (For more information on how the OE selects and obtains orchestration logic, see "Service Broker Service Orchestration".)

3. After the session passes the last application in the chain, the OE returns the session back to the session control entity.

Figure 1–3 shows an example of how the OE routes a session.

Figure 1–3 Routing a Session Sequentially through Multiple Applications



Interworking Modules

Interworking modules are fundamental elements in the Service Broker architecture that allow Service Broker to communicate with the various service platforms and session control platforms in the network.

Each interworking module implements functionality that allows Service Broker to act as a specific network entity towards service platforms and session control platforms, through their native protocole. For example, with IM-SCF, Service Broker acts as an SCP towards SSPs in the network.

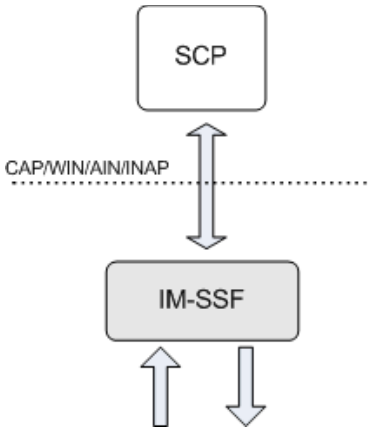
IMs normalize the external network interface to a common session and event model interface, the Session Abstraction Layer (SAL) protocols, which is used internally by Service Broker.

IM-SSF

The IM-SSF implements the SSP part of the IN call state model and provides the interface between an IN SCP and Service Broker. From the SCP perspective, Service Broker acts as an MSC/SSP, implementing the Service Switching Function, generating IN triggers, and interacting with the SCP.

Figure 1–4 shows the IN interface between the IM-SSF and SCP, supporting the various IN protocols: CAP, WIN, AIN and INAP.

Figure 1–4 IM-SSF



IM-SSF modules are available for a variety of IN protocols and protocol variants including CAP, AIN, INAP, and WIN.

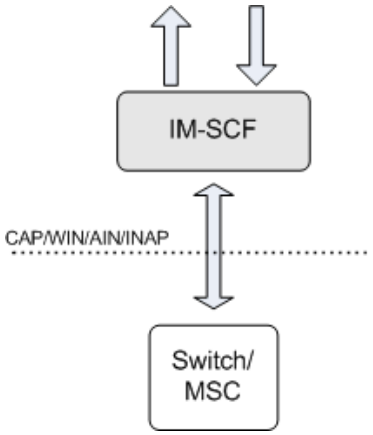
For example, the IM-SSF CAP supports the complete GSM SSF Call State Model allowing full CAMEL trigger interaction with any CAMEL SCP over CAP protocol.

IM-SCF (Reverse IM-SSF)

The IM-SCF implements the SCP part of the IN call state model for each IN protocol and variant it handles and provides the interface between the MSC/SSP in the legacy network and Service Broker.

Figure 1–5 shows the IN interface between the IM-SCF and MSC, supporting the various IN protocols: CAP, WIN, AIN and INAP.

Figure 1–5 IM-SCF



For example, the IM-SCF CAP supports the complete CAP Service Control Function (SCF) and IN state model, allowing interaction with any MSC using CAP protocol.

Acting as an SCP, it receives and arms IN triggers from an MSC/SSP and generates internal sessions to Service Broker, based on the trigger information.

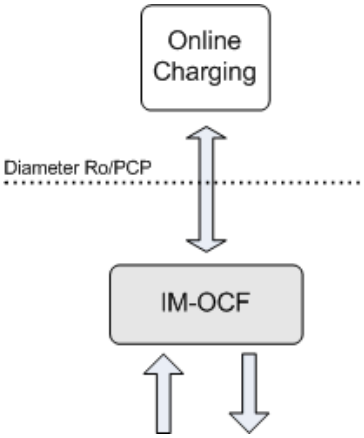
IM-SCF modules are available for a variety of IN protocols including CAP, AIN, INAP and WIN.

IM-OCF

The IM-OCF module implements the mediation module towards any external Diameter-based OCS, acting as 3GPP-compliant Charging Trigger Function (CTF).

Figure 1–6 shows the interface between the IM-OCF and OCS. IM-OCF provides interfaces for the Ro and PCP protocols.

Figure 1–6 IM-OCF



OCS is a telecom platform providing online rating and charging, as well as subscriber balance management. IM-OCF is an application-facing module that communicates with OCS using Diameter Ro, allowing real-time charging for sessions running through Service Broker. With IM-OCF you can implement charging for sessions in any network domain. Another type of IM-OCF supports specific communication with Oracle Communications BRM through PCP.

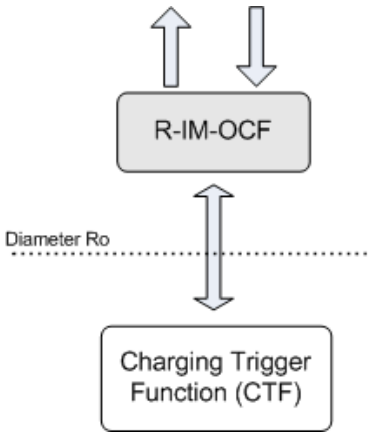
Deploying IM-OCF with Service Broker's IM-SCF provides a complete online charging solution for SS7-based networks using various IN protocols. Combining IM-OCF with Service Broker's R-IM-ASF SIP provides a complete online charging solution for SIP-based networks, effectively acting as a 3GPP IMS Gateway Function (IMS-GWF).

R-IM-OCF

Reverse IM-OCF (R-IM-OCF) is a network-facing IM. It provides an IMS Online Charging Function (OCF) frontend to the network. R-IM-OCF connects Service Broker with IMS core elements that implement 3GPP-compliant Charging Trigger Function (CTF), such as IMS-Gateway Function (IMS-GWF), using the Diameter Credit Control Application interface. It converts charging triggers for online rating and charging to an internal Service Broker representation.

Figure 1–7 shows the Diameter interface between the R-IM-OCF and CTF, supporting Ro.

Figure 1–7 R-IM-OCF



Deploying R-IM-OCF with Service Broker's IM-SSF provides an online charging solution for IMS-based networks using legacy SS7 IN-based charging, that is SCPs. Deploying R-IM-OCF with Service Broker's IM-OCF provides an online charging solution for IMS-based networks that require mediation towards IMS OCFs. Therefore, R-IM-OCF allows real-time charging for IMS-based sessions using any charging function, whether IN or IMS.

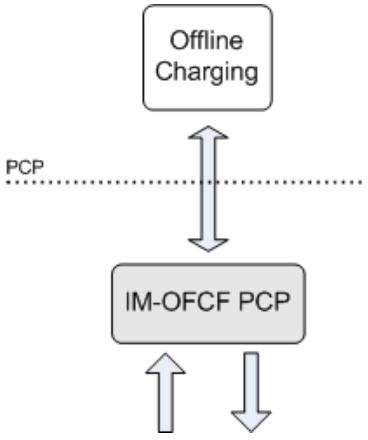
R-IM-OCF allows Service Broker's OE to orchestrate real-time charging requests.

IM-OFCF PCP

IM-OFCF is an application-facing IM. IM-OFCF enables Service Broker to send accounting requests to, and receive accounting answers, from the Oracle BRM application through the PCP interface. From the perspective of a billing application, IM-OFCF acts as a 3GPP-compliant Charging Trigger Function (CTF).

Figure 1–8 shows the PCP interface between IM-OFCF and the BRM application.

Figure 1–8 IM-OFCF



To deploy a complete offline solution, you need to use IM-OFCF PCP with R-IM-OFCF RADIUS. See "R-IM-OFCF RADIUS" for more information.

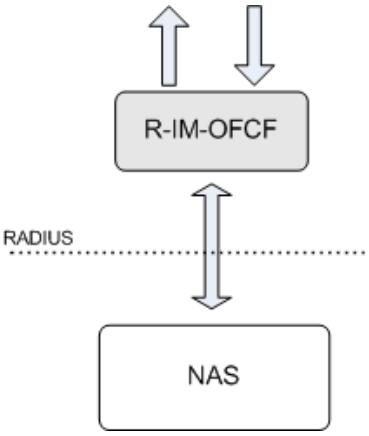
R-IM-OFCF RADIUS

R-IM-OFCF RADIUS is a network-facing IM. R-IM-OFCF enables Service Broker to receive Accounting-Requests messages from, and send Accounting-Respond messages

to, network entities through the Radius interface. From the perspective of a network entity, R-IM-OFCF Radius acts as a 3GPP-compliant Charging Data Function (CDF).

Figure 1–9 shows the Radius interface between R-IM-OFCF and a network entity.

Figure 1–9 R-IM-OFCF



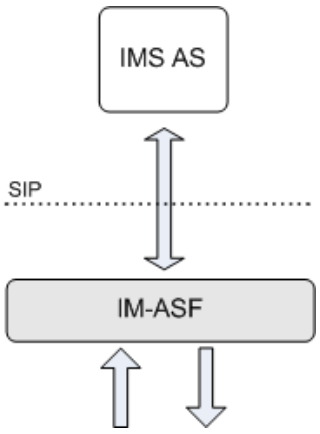
To deploy a complete offline solution, you need to use R-IM-OFCF Radius with IM-OFCF PCP. See "IM-OFCF PCP" for more information.

IM-ASF SIP

IM-ASF-SIP is an application-facing module connecting Service Broker with SIP applications. Each instance of IM-ASF-SIP provides an interface to one SIP application. You deploy an IM-ASF-SIP instance to add a SIP application to the orchestration sequence, and allow the OE to route sessions through that application.

Figure 1–10 shows the SIP interface between the IM-ASF SIP and application server, supporting SIP.

Figure 1–10 IM-ASF SIP



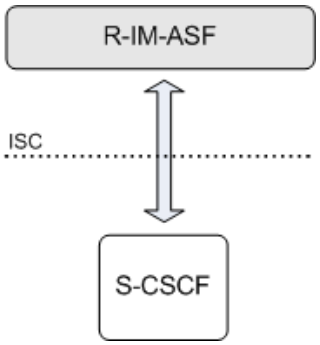
R-IM-ASF SIP

R-IM-ASF SIP is a network-facing module that enables IMS elements, such as Serving Call Session Control Function (S-CSCF), soft switches and Media Gateway Controllers (MGCs), to invoke Service Broker. Each instance of R-IM-ASF SIP provides an interface

to one IMS session control entity. You deploy a R-IM-ASF SIP instance to run IMS network sessions run through Service Broker.

Figure 1–11 shows the SIP interface between the R-IM-ASF SIP and S-CSCF, supporting SIP.

Figure 1–11 R-IM-ASF SIP

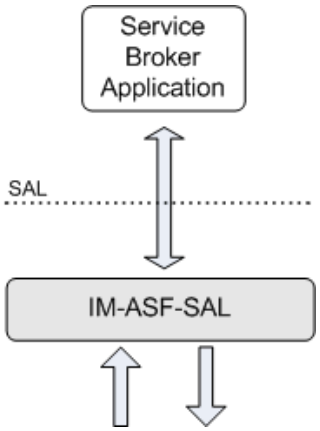


IM-ASF SAL

IM-ASF-SAL connects Service Broker with Service Broker applications, that is either out-of-the-box Service Broker applications, such as VPN and SVC, or applications that you implement using the SAL API. Each instance of IM-ASF-SAL provides an internal interface between the OE and one application. You deploy an IM-ASF-SAL instance to add a Service Broker application to the orchestration sequence, and allow the OE to route a session through that application.

Figure 1–12 shows the SAL interface between a Service Broker application and IM-ASF SAL.

Figure 1–12 IM-ASF SAL



IM-PSX

IM-PSX is a network-facing module that enables Service Broker to communicate with HLRs and VLRs in GSM and CDMA networks.

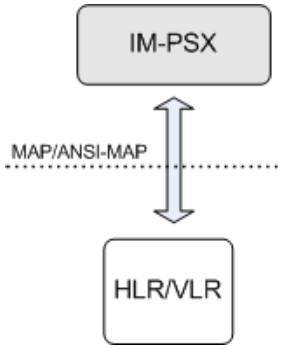
Integrating IM-PSX into Service Broker enables SIP applications to:

- Query legacy SS7 networks for information about subscribers, such as state, location, and the services a subscriber owns

- Receive notifications from an HLR when a subscriber, who was previously unaccessible, becomes accessible
- Modify subscriber information in an SS7 legacy network (in GSM networks only)

Figure 1–13 shows the MAP interface between the IM-PSX and HLR or VLR, supporting GSM MAP and ANSI MAP.

Figure 1–13 IM-PSX



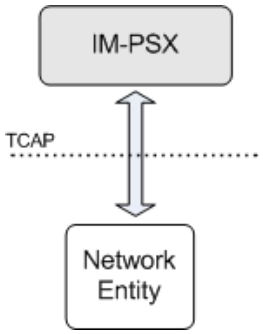
From the HLR's perspective, Service Broker acts as a standard entity in the same network. HLRs can communicate with Service Broker using the MAP protocol (in GSM networks) or ANSI-41 protocol (in CDMA networks). IM-PSX provides interfaces for both MAP and ANSI-41.

IM-PSX Plugin

IM-PSX Plugin is a network-facing module that enables Service Broker to handle messages which existing IMs do not support. Unlike other network-facing IMs that communicate with TCAP users (such as CAP, INAP, WIN, or MAP), IM-PSX Plugin communicates with TCAP directly.

Figure 1–14 shows the interface that IM-PSX Plugin provides to receive messages from, and send messages to, an SS7-based network.

Figure 1–14 IM-PSX Plugin



IM-PSX Plugin provides interfaces for both ANSI and ETSI networks.

To forward TCAP messages from IM-PSX Plugin to a SIP application, you need to deploy IM-PSX Plugin together with IM-ASF and R-IM-ASF SIP that provide the interface with SIP applications. See "IM-ASF SIP" and "R-IM-ASF SIP" for more information about these modules.

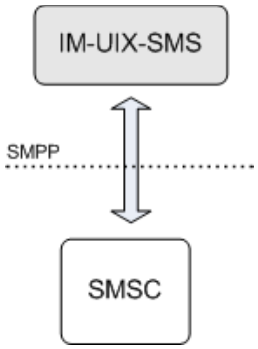
IM-UIX-SMS

IM-UIX-SMS is a network-facing module that Service Broker use to receive messages from, and send messages to, Short Message Service Centers (SMSCs) through the Short Message Peer-to-Peer Protocol (SMPP).

In conjunction with application-facing IMs (for example, IM-ASF), IM-UIX-SMS provides a solution for routing messages between SMSCs and applications.

Figure 1–15 shows the interface that IM-UIX-SMS provides to receive messages from, and send messages to, SMSCs.

Figure 1–15 IM-UIX-SMS



IM-UIX-SMS communicates with SMSCs as follows:

- Sending messages from an SMSC to IM-UIX-SMS:

  IM-UIX-SMS receives a **deliver_sm** request sent by an SMSC through the SMPP SSU. IM-UIX-SMS translates the request to a SAL message and sends it to the OE. The OE routes the message to an appropriate IM based on the orchestration logic.

- Sending messages from IM-UIX-SMS to an SMSC:

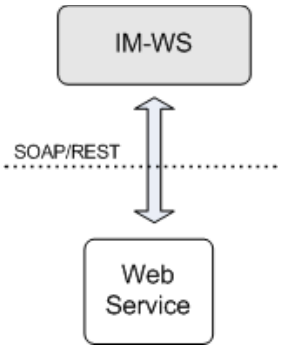
  IM-UIX-SMS receives a message from an application, through an application-facing IM supporting the appropriate protocol (for example, through IM-ASF when a message is sent over SIP). Based on this message, IM-UIX-SMS generates a **submit_sm** message and sends it to an SMSC through the SMPP SSU.

IM-WS

IM-WS is a network-facing module that Service Broker use to receive messages from, and send messages to, web services using Simple Object Access Protocol (SOAP).

Figure 1–16 shows the interface that IM-WS provides to receive messages from, and send messages to, web services.

Figure 1–16 IM-WS



IM-WS communicates with web services as follows:

- Sending messages from IM-WS to a web service:

  IM-WS receives an event notification submitted by an application in the SAL format. IM-WS translates this message into a SOAP or REST message and send it to a web service through the WS SSU.

- Sending messages from a web service to IM-WS:

  IM-WS receives a SOAP message sent by a web service through the WS SSU. IM-WS translates this message from SOAP or REST to a SAL message and sends it to the OE. The OE routes the message to an appropriate IM based on the orchestration logic.

Supplementary Modules

Supplementary Modules (SMs) are optional on-board modules, each facilitating Service Broker solutions in a different manner.

SM-LSS

SM-Local Subscriber Server (LSS) is an implementation of a profile server that can be used as a source for service orchestration logic. LSS can store subscriber profiles, including orchestration logic defined in Initial Filter Criteria (iFC) format. When this supplementary module is deployed, the OE can retrieve orchestration logic from the LSS.

SM-PME

SM-Parameter Mapping Engine (PME) is a flexible XML-based engine that manipulates parameters in the headers and body of internal Service Broker SAL messages. SM-PME complements generic solutions with specific requirements and allows fine tuning of parameter mediation for standard and non-standard protocol parameters.

For example, SM-PME can manipulate XER representation of IN messages, allowing CAMEL Furnish Charging Information to update from one format to another Service Broker' OE can chain SM-PME at any point of the service orchestration in the same way that it chains Interworking Modules.

Signaling Server Units

Signaling Server Unit (SSU) is a Service Broker component that enables Service Broker to connect to SS7-based networks and IMS-based networks through standard software

and hardware interfaces. There is a specific SSU implementation to support connection to each network domain.

Service Broker includes the following SSUs:

- SS7 SSU for TDM, which provides Service Broker with access to a legacy SS7 network through MTP protocols.
- SS7 SSU for SIGTRAN, which provides Service Broker with access to a legacy SS7 network through M3UA protocols.
- SIP SSU, which provides Service Broker with access to SIP-based networks.
- Diameter SSU, which provides Service Broker with access to network entities that interact using the Diameter protocol.
- PCP SSU, which provides Service Broker with access to the Oracle BRM application through the Portal Communications Protocol (PCP)
- SMPP SSU, which provides Service Broker with access to Short Message System Centers (SMSC) through the Short Message Peer-to-Peer (SMPP) protocol.
- Web Services SSU, which enables Service Broker to interact with external entities that use SOAP or REST-based communication.

For more information about SSUs, see "Service Broker Signaling Server Units".

Tiered Deployment Architecture

A Service Broker deployment includes two logical tiers as shown in Figure 1–17:

- Signaling tier

  The signaling tier consists of one or more servers where SSUs run.

- Processing tier

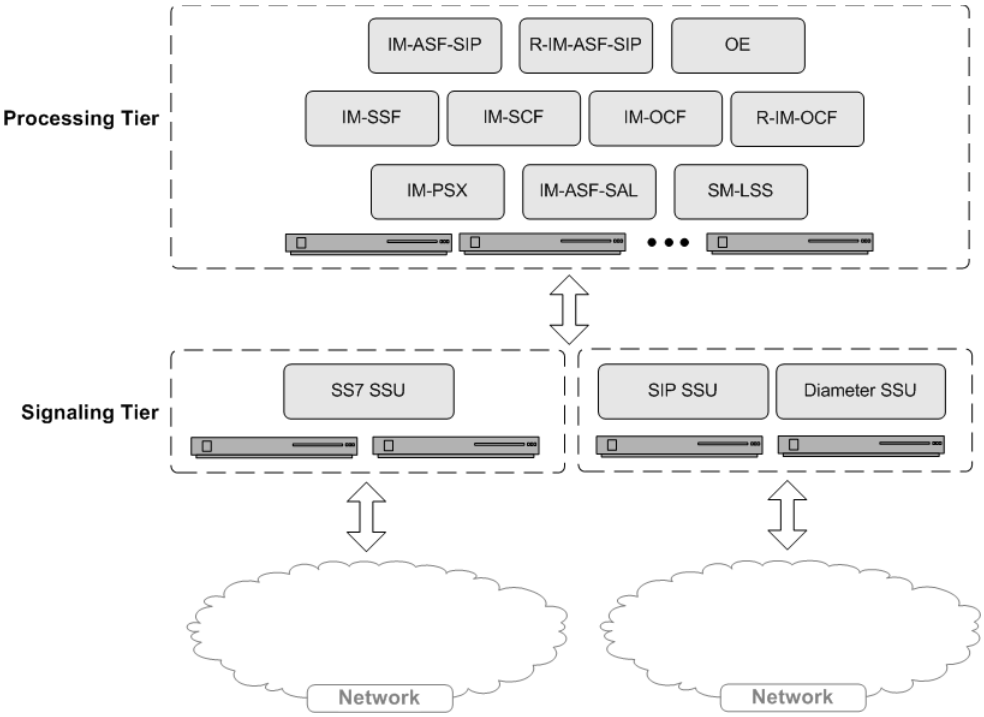
  The processing tier is a set of servers running functional Service Broker components, that is IMs, OE, SMs, applications and mediators.

  Components of the processing tier are stateful. State information is maintained and distributed across the processing tier. Components retrieve and store session state in an in-memory storage. When one server fails, functioning servers continue to retrieve and process all messages, including those stored in the in-memory state of the failing server.

Both signaling and processing tiers are scalable; you can add as many servers as you need to each of the tiers. One exception applies to a signaling tier running TDM SS7 SSUs - in this case you need exactly two servers in the signaling tier.

Normally, a production deployment includes at least four servers, two for each tier, for redundancy purposes.

Figure 1–17 An Example Deployment Architecture



Service Broker Domains

Service Broker deployments are implemented and administered using domains. To understand the domain-based administration model and how Service Broker is deployed, see the discussion about domains in *Oracle Communications Service Broker Installation Guide*.

Open Services Gateway Initiative (OSGi) Framework

Service Broker is implemented using the Open Services Gateway initiative (OSGi) framework. Service Broker components: IMs, SMs, OE and SSUs, are packaged and deployed as OSGi bundles.

You can install, start, stop, update and uninstall Service Broker bundles without rebooting Signaling Servers and Processing Servers.

The use of OSGi simplifies the Service Broker upgrade procedure and reduces its memory consumption.

For more information about OSGi, see the OSGi Alliance Web site:

http://www.osgi.org

Netra 6000 High Availability Manager

Netra 6000 High Availability Manager (HA Manager) is a software module providing management of a complete Service Broker deployment, including hardware and software components.

HA Manager consists of the Service Broker software and an integrated management software operating the hardware and software processes of a Service Broker deployment.

HA Manager is specifically targeted for SUN Netra 6000 hardware, and engineered to work with Oracle Enterprise Linux.

See *Oracle Communications Service Broker Netra 6000 High Availability Manager Administrator's Guide* for more information.

Standard Compliancy

Service Broker is fully compliant with telecom and other standards. See "Supported Standards" for more information.

2

Service Broker Interworking Modules

This chapter describes the purpose and key functionality of each of the Service Broker interworking modules.

IM-SCF

IM-SCF is a network-facing IM, acting as a standard SCP towards legacy MSCs/SSPs, providing MSCs/SSPs with an IN interface to Service Broker (see "IM-SCF").

Service Broker IM-SCF supports the following protocols:

- IM-SCF CAP Phase-1
- IM-SCF CAP Phase-2
- IM-SCF CAP Phase-3
- IM-SCF CAP Phase-4
- IM-SCF INAP CS-1
- IM-SCF WIN Phase 1
- IM-SCF WIN Phase 2
- IM-SCF AIN 0.1
- IM-SCF AIN 0.2

IM-SCF CAP Phase-1

This section describes the IM-SCF that supports CAP phase 1 protocol (*ETSI TS 101 046 V5.7.0, CAMEL Application Part (CAP) Phase 1*).

Key Functionality

This section describes the key functionality of IM-SCF CAP Phase 1:

- Basic call control for initial and full call treatment

  The IM-SCF enables applications to interact with MSCs in one of the following modes:

  - Initial call control mode—Service Broker invokes the application based on the IN trigger received by IM-SCF. According to the application's response, the IM-SCF instructs the MSC to route the call by responding to the trigger without requesting the loading of additional triggers.

- Full call control mode—IM-SCF manages the arming of IN Detection Points (DPs) in the MSC and maintains an updated session view of the underlying call.

In this way, IM-SCF enables applications to apply additional logic at various call stages. In addition, IM-SCF can deliver services that influence the entire life cycle of the call.

- Originating and terminating full BCSM implementation

  IM-SCF includes a complete standard implementation of the CAP phase 1 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN applications to interact with MSCs and act as if they were standard SCPs. IM-SCF forwards the call type (originating/terminating) to the application, enabling the application logic to differentiate between originating-side and terminating-side calls, providing each call with corresponding treatment.

- Configurable IN messages/parameters tunnelling

  IM-SCF provides support for IN information tunnelling models. The tunnelling model enables applications to use specific IN parameters and operations. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from any application logic that requires such exposure.

- SCP management procedures

  IM-SCF implements CAP phase 1 SCP management capabilities and supports management operations, such as ActivityTest. These operations enable applications to manage availability of the service to the network and perform other auxiliary functions.

- Charging services

  IM-SCF provides the following charging services:

  - Credit reservation requests generation

    IM-SCF sends these requests to IM-OCF through the OE. IM-OCF translates credit reservation requests to Diameter CCR and sends these CCRs to a billing application.

  - Session monitoring and charging

    IM-SCF monitors and charges a session on its own.

  - Quota reauthorization

    You can specify whether IM-SCF reauthorizes a quota upon receiving various triggers from an MSC.

Supported Operations

Table 2–1 lists the operations supported by IM-SCF CAP Phase-1.

Table 2–1 Operations Supported by IM-SCF CAP Phase-1

Operation	Direction
ActivityTest	Service Broker to MSC
Connect	Service Broker to MSC
Continue	Service Broker to MSC
EventReportBCSM	MSC to Service Broker

Table 2–1 (Cont.) Operations Supported by IM-SCF CAP Phase-1

Operation	Direction
InitialDP	MSC to Service Broker
ReleaseCall	Service Broker to MSC
RequestReportBCSMEvent	Service Broker to MSC

Supported Events

Table 2–2 lists the event types supported by IM-SCF CAP phase 1.

Table 2–2 BCSM Event Types Supported by IM-SCF CAP Phase-1

BCSM Event Type	Detection Point
collectedInfo	DP(2)
oAnswer	DP(7)
oDisconnect	DP(9)
termAttemptAuthorized	DP(12)
tAnswer	DP(15)
tDisconnect	DP(17)

IM-SCF CAP Phase-2

This section describes the IM-SCF that supports CAP phase 2 protocol (*ETSI TS 101 046 V7.1.0, CAMEL Application Part (CAP) Phase 2*).

Key Functionality

This section describes the key functionality of IM-SCF CAP phase 2:

- Basic call control for initial and full call treatment

  The IM-SCF enables northbound applications to interact with MSCs in one of the following modes:

  - Initial call control mode—Service Broker invokes the application based on the IN trigger received by IM-SCF. According to the application's response, IM-SCF instructs the MSC to route the call by responding to the trigger without requesting the loading of additional triggers.
  - Full call control mode—IM-SCF manages the arming of IN Detection Points (DPs) in the MSC and maintains an updated session view of the underlying call.

  In this way, the IM-SCF enables applications to apply additional logic at various call stages. In addition, IM-SCF can deliver services that influence the entire life cycle of the call.

- Originating and terminating full BCSM implementation

  IM-SCF includes a complete standard implementation of the CAP phase 2 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN applications to interact with MSCs and act as if they were standard SCPs. IM-SCF forwards the call type (originating/terminating) to the application, enabling the application logic to differentiate between originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP interactions

  IM-SCF interacts with internal, switch-based media resources (internal SRF) and external Intelligent Peripherals (IP). This enables applications to use these resources for announcements and user interactions (for example, to collect subscriber input) based on application instructions.

- Configurable IN messages/parameters tunnelling

  IM-SCF provides support for IN information tunnelling models. The tunnelling model enables applications to use specific IN parameters and operations. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from any application logic that requires such exposure.

- Switch-based charging timers and CDRs

  IM-SCF enables applications to use MSC charging capabilities by invoking CAP phase 2 charging operations (for example, Furnish Charging Information or ApplyCharging). This enables the application to control charging information generated by the MSC into CDRs, and leverage switch-based timers for implementing online charging services, including prepaid services.

- SCP management procedures

  The IM-SCF implements CAP phase 2 SCP management capabilities and supports management operations, such as ActivityTest. These operations enable applications to manage availability of the service to the network and perform other auxiliary functions.

- Charging services

  IM-SCF provides the following charging services:

  - Credit reservation requests generation

    IM-SCF sends these requests to IM-OCF through the OE. IM-OCF translates credit reservation requests to Diameter CCRs, which are then forwarded to a billing application.

  - Session monitoring and charging

    You can specify whether a session is monitored by IM-SCF or by an MSC. In the former case, IM-SCF generates an ApplyCharging message based on the Granted-Service-Unit AVP of the CCA received from a billing application. IM-SCF sends this ApplyCharging message to an MSC. Then the MSC applies charging. If the session is monitored by IM-SCF, IM-SCF applies charging on its own.

  - Quota reauthorization

    You can specify whether IM-SCF reauthorizes a quota upon receiving various triggers from an MSC.

Supported Operations

Table 2–3 lists the operations supported by IM-SCF CAP phase 2.

Table 2–3 Operations Supported by IM-SCF CAP Phase 2

Operation	Direction
ActivityTest	Service Broker to MSC
ApplyCharging	Service Broker to MSC

Table 2–3 (Cont.) Operations Supported by IM-SCF CAP Phase 2

Operation	Direction
ApplyChargingReport	MSC to Service Broker
AssistRequestInstructions	MSC/SRF to Service Broker
CallInformationReport	MSC to Service Broker
CallInformationRequest	Service Broker to MSC
Cancel	Service Broker to MSC/SRF
Connect	Service Broker to MSC
ConnectToResource	Service Broker to MSC
Continue	Service Broker to MSC
DisconnectForwardConnection	Service Broker to MSC
EstablishTemporaryConnection	Service Broker to MSC
EventReportBCSM	MSC to Service Broker
FurnishChargingInformation	Service Broker to MSC
InitialDP	MSC to Service Broker
PlayAnnouncement	Service Broker to MSC/SRF
PromptAndCollectUserInformation	Service Broker to MSC/SRF
ReleaseCall	Service Broker to MSC
RequestReportBCSMEvent	Service Broker to MSC
ResetTimer	Service Broker to MSC
SendChargingInformation	Service Broker to MSC
SpecializedResourceReport	SRF to Service Broker

Supported BCSM Event Types

Table 2–4 lists the event types supported by IM-SCF CAP phase 2.

Table 2–4 BCSM Event Types Supported by IM-SCF CAP Phase 2

BCSM Event Type	Detection Point
collectedInfo	DP(2)
routeSelectFailure	DP(4)
oCalledPartyBusy	DP(5)
oNoAnswer	DP(6)
oAnswer	DP(7)
oDisconnect	DP(9)
oAbandon	DP(10)
termAttemptAuthorized	DP(12)
tBusy	DP(13)
tNoAnswer	DP(14)
tAnswer	DP(15)
tDisconnect	DP(17)

Table 2–4 (Cont.) BCSM Event Types Supported by IM-SCF CAP Phase 2

BCSM Event Type	Detection Point
tAbandon	DP(18)

IM-SCF CAP Phase-3

This section describes the IM-SCF that supports the CAP phase 3 protocol (*ETSI TS 129 078 V4.8.0, CAMEL Application Part (CAP) Phase 3*).

Key Functionality

This section describes the key functionality of IM-SCF CAP Phase 3:

- Basic call control for initial and full call treatment

  The IM-SCF enables applications to interact with MSCs in one of the following modes:

  - Initial call control mode—Service Broker invokes the application based on the IN trigger received by IM-SCF. According to the application's response, IM-SCF instructs the MSC to route the call by responding to the trigger without requesting the loading of additional triggers.
  - Full call control mode—IM-SCF manages the arming of IN Detection Points (DPs) in the MSC and maintains an updated session view of the underlying call.

  In this way, IM-SCF enables applications to apply additional logic at various call stages. In addition, IM-SCF can deliver services that influence the entire life cycle of the call.

- Originating and terminating full BCSM implementation

  IM-SCF includes a complete standard implementation of the CAP phase 3 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN applications to interact with MSCs and act as if they were standard SCPs. IM-SCF forwards the call type (originating/terminating) to the application, enabling the application logic to differentiate between originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP interactions

  IM-SCF interacts with internal switch-based media resources (internal SRF) and external Intelligent Peripherals (IP). This enables applications to use these resources for announcements and user interactions (for example, to collect subscriber input) based on application instructions.

- GGSN Data triggers

  IM-SCF fully supports GGSN triggers for GPRS control. This support enables applications to control data sessions. It also includes support for session authorization and continuous monitoring of ongoing data sessions, as exposed in CAP phase 3 triggers.

- Originating SMS triggers

  IM-SCF supports originating-side SMS triggers, enabling applications to control SMS sessions. This includes support for message approval/authorizations and support for SMS routing by the application, as supported by CAP phase 3 triggers.

- Configurable IN messages/parameters tunnelling

IM-SCF provides support for IN information tunnelling models. The tunnelling model enables applications to use specific IN parameters and operations. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from any application logic that requires such exposure.

- Switch-based charging timers and CDRs

  IM-SCF enables applications to use MSC charging capabilities by invoking CAP phase 3 charging operations (for example, Furnish Charging Information or ApplyCharging). This enables the application to control charging information generated by the MSC into CDRs, and leverage switch-based timers for implementing online charging services, including prepaid services.

- SCP management procedures

  IM-SCF implements CAP phase 3 SCP management capabilities and supports management operations, such as ActivityTest. These operations enable applications to manage availability of the service to the network and perform other auxiliary functions.

- Charging services

  IM-SCF provides the following charging services:

  - Credit reservation requests generation

    IM-SCF sends these requests to IM-OCF through the OE. IM-OCF translates credit reservation requests to Diameter CCRs, which are then forwarded to a billing application.

  - Session monitoring and charging

    You can specify whether a session is monitored by IM-SCF or by an MSC. In the former case, IM-SCF generates an ApplyCharging message based on the Granted-Service-Unit AVP of the CCA received from a billing application. IM-SCF sends this ApplyCharging message to an MSC. Then the MSC applies charging. If the session is monitored by IM-SCF, IM-SCF applies charging on its own.

  - Quota reauthorization

    You can specify whether IM-SCF reauthorizes a quota upon receiving various triggers from an MSC.

Supported Operations for Circuit Switched Call Control

Table 2–5 lists the operations supported by IM-SCF CAP phase 3 for circuit switched call control.

Table 2–5 Operations Supported by IM-SCF CAP Phase 3 for Circuit Switched Call Control

Operation	Direction
ActivityTest	Service Broker to MSC
ApplyCharging	Service Broker to MSC
ApplyChargingReport	MSC to Service Broker
AssistRequestInstructions	MSC/SRF to Service Broker
CallInformationReport	MSC to Service Broker
CallInformationRequest	Service Broker to MSC

Table 2–5 (Cont.) Operations Supported by IM-SCF CAP Phase 3 for Circuit Switched Call Control

Operation	Direction
Cancel	Service Broker to MSC/SRF
Connect	Service Broker to MSC
ConnectToResource	Service Broker to MSC
Continue	Service Broker to MSC
ContinueWithArgument	Service Broker to MSC
DisconnectForwardConnection	Service Broker to MSC
EstablishTemporaryConnection	Service Broker to MSC
EventReportBCSM	MSC to Service Broker
FurnishChargingInformation	Service Broker to MSC
InitialDP	MSC to Service Broker
PlayAnnouncement	Service Broker to MSC/SRF
PromptAndCollectUserInformation	Service Broker to MSC/SRF
ReleaseCall	Service Broker to MSC
RequestReportBCSMEvent	Service Broker to MSC
ResetTimer	Service Broker to MSC
SendChargingInformation	Service Broker to MSC
SpecializedResourceReport	SRF to Service Broker

Supported Operations for SMS Control

Table 2–6 lists the operations supported by IM-SCF CAP phase 3 for SMS control.

Table 2–6 Operations Supported by IM-SCF CAP Phase 3 for SMS Control

Operation	Direction
ConnectSMS	Service Broker to MSC
ContinueSMS	Service Broker to MSC
EventReportSMS	MSC to Service Broker
FurnishChargingInformationSMS	Service Broker to MSC
InitialDPSMS	MSC to Service Broker
ReleaseSMS	Service Broker to MSC
RequestReportSMSEvent	Service Broker to MSC
ResetTimerSMS	Service Broker to MSC

Supported Operations for GPRS Control

Table 2–7 lists the operations supported by IM-SCF CAP phase 3 for GPRS control.

Table 2–7 Operations Supported by IM-SCF CAP Phase 3 for GPRS Control

Operation	Direction
ActivityTestGPRS	Service Broker to MSC

Table 2–7 (Cont.) Operations Supported by IM-SCF CAP Phase 3 for GPRS Control

Operation	Direction
ApplyChargingGPRS	Service Broker to MSC
ApplyChargingReportGPRS	MSC to Service Broker
CancelGPRS	Service Broker to MSC
ConnectGPRS	Service Broker to MSC
ContinueGPRS	Service Broker to MSC
EntityReleasedGPRS	MSC to Service Broker
EventReportGPRS	MSC to Service Broker
FurnishChargingInformationGPRS	Service Broker to MSC
InitialDPGPRS	MSC to Service Broker
ReleaseGPRS	Service Broker to MSC
RequestReportGPRSEvent	Service Broker to MSC
ResetTimerGPRS	Service Broker to MSC
SendChargingInformationGPRS	Service Broker to MSC

Supported BCSM Event Types

Table 2–8 lists the BCSM event types supported by IM-SCF CAP phase 3.

Table 2–8 BCSM Event Types Supported by IM-SCF CAP Phase 3

BCSM Event Type	Detection Point
collectedInfo	DP(2)
analyzedInformation	DP(3)
routeSelectFailure	DP(4)
oCalledPartyBusy	DP(5)
oNoAnswer	DP(6)
oAnswer	DP(7)
oDisconnect	DP(9)
oAbandon	DP(10)
termAttemptAuthorized	DP(12)
tBusy	DP(13)
tNoAnswer	DP(14)
tAnswer	DP(15)
tDisconnect	DP(17)
tAbandon	DP(18)

Supported SMS Event Types

Table 2–9 lists the SMS event types supported by IM-SCF CAP phase 3.

Table 2–9 SMS Event Types Supported by IM-SCF CAP Phase 3

SMS Event Type	Detection Point
sms-CollectedInfo	DP(1)
o-smsFailure	DP(2)
o-smsSubmitted	DP(3)

IM-SCF CAP Phase-4

This section describes the IM-SCF that supports the CAP Phase-4 protocol (*ETSI TS 129 078 V4.8.0, CAMEL Application Part (CAP) Phase 4*).

Key Functionality

This section describes the key functionality of IM-SCF CAP phase 4:

- Basic call control for initial and full call treatment

  IM-SCF enables applications to interact with MSCs in one of the following modes:

  - Initial call control mode: Service Broker invokes the application based on the IN trigger received by IM-SCF. According to the application's response, IM-SCF instructs the MSC to route the call by responding to the trigger without requesting the loading of additional triggers.
  - Full call control mode: IM-SCF manages the arming of IN Detection Points (DPs) in the MSC and maintains an updated session view of the underlying call to the application.

  In this way, IM-SCF enables applications to apply additional logic at various call stages. In addition, IM-SCF can deliver services that influence the entire life cycle of the call.

- Originating and terminating full BCSM implementation

  IM-SCF includes a complete standard implementation of the CAP phase 4 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN applications to interact with MSCs and act as if they were standard SCPs. IM-SCF forwards the call type (originating/terminating) to the application, enabling the application logic to differentiate between originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP interactions

  IM-SCF interacts with internal switch-based media resources (internal SRF) and external Intelligent Peripherals (IP). This enables applications to use these resources for announcements and user interactions (for example, to collect subscriber input) based on application instructions.

- Multi-leg management

  The IM-SCF fully supports CAP phase 4 capabilities for managing multiple call legs for a single call. Based on this support, IM-SCF provides applications with an ability to manipulate call legs for complex service scenarios. This includes performing operations, such as disconnecting a leg, splitting a leg out from a call and moving a leg into a call.

- Service initiated calls

  IM-SCF enables applications to initiate a new call (for example, a wake-up call service) and create new call legs that can be added to existing calls. When

integrated with multi-leg management functionality, this capability maximizes the call control flexibility provided to applications and enables delivering advanced call services, such as a customized ringback tone or auto-attendant service.

IM-SCF uses IM-SCF CAP Phase 4 InitiateCallAttempt operation to set up a call to a destination provided by the application.

- GGSN Data triggers

  IM-SCF fully supports GGSN triggers for GPRS control. This support enables applications to control data sessions. It also includes support for session authorization and continuous monitoring of ongoing data sessions, as exposed in CAP phase 4 triggers.

- Originating and Terminating SMS triggers

  IM-SCF fully supports SMS triggers. This support enables applications to control SMS sessions. It also includes support for message approval/authorizations as well as support for SMS routing by the application, as supported by CAP phase 4 triggers.

- Configurable IN messages/parameters tunnelling

  IM-SCF provides support for IN information tunnelling models. The tunnelling model enables applications to use specific IN parameters and operations. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from any application logic that requires such exposure.

- Switch-based charging timers and CDRs

  IM-SCF enables applications to use the MSC charging capabilities by invoking CAP phase 4 charging operations (for example, FurnishChargingInformation or ApplyCharging). This enables the application to control charging information generated by the MSC into CDRs, and leverage switch-based timers for implementing online charging services, including prepaid services.

- SCP management procedures

  IM-SCF implements CAP phase 4 SCP management capabilities and supports management operations, such as ActivityTest. These operations enable applications to manage availability of the service to the network and perform other auxiliary functions.

- Charging services

  IM-SCF provides the following charging services:

  - Credit reservation requests generation

    IM-SCF sends these requests to IM-OCF through the OE. IM-OCF translates credit reservation requests to Diameter CCRs, which are then forwarded to a billing application.

  - Session monitoring and charging

    You can specify whether a session is monitored by IM-SCF or by an MSC. In the former case, IM-SCF generates an ApplyCharging message based on the Granted-Service-Unit AVP of the CCA received from a billing application. IM-SCF sends this ApplyCharging message to an MSC. Then the MSC applies charging. If the session is monitored by IM-SCF, IM-SCF applies charging on its own.

  - Quota reauthorization

You can specify whether IM-SCF reauthorizes a quota upon receiving various triggers from an MSC.

Supported Operations for Circuit Switched Call Control

Table 2–10 lists the operations supported by IM-SCF CAP phase 4 for circuit switched call control.

Table 2–10 Operations Supported by IM-SCF CAP Phase 4 for Circuit Switched Call Control

Operation	Direction
ActivityTest	Service Broker to MSC
ApplyCharging	Service Broker to MSC
ApplyChargingReport	MSC to Service Broker
AssistRequestInstructions	MSC/SRF to Service Broker
CallInformationReport	MSC to Service Broker
CallInformationRequest	Service Broker to MSC
Cancel	Service Broker to MSC/SRF
Connect	Service Broker to MSC
ConnectToResource	Service Broker to MSC
Continue	Service Broker to MSC
ContinueWithArgument	Service Broker to MSC
DisconnectForwardConnection	Service Broker to MSC
DisconnectForwardConnectionWithArgument	Service Broker to MSC
DisconnectLeg	Service Broker to MSC
EstablishTemporaryConnection	Service Broker to MSC
EventReportBCSM	MSC to Service Broker
FurnishChargingInformation	Service Broker to MSC
InitialDP	MSC to Service Broker
InitiateCallAttempt	Service Broker to MSC
MoveLeg	Service Broker to MSC
PlayAnnouncement	Service Broker to MSC/SRF
PromptAndCollectUserInformation	Service Broker to MSC/SRF
ReleaseCall	Service Broker to MSC
RequestReportBCSMEvent	Service Broker to MSC
ResetTime	Service Broker to MSC
SendChargingInformation	Service Broker to MSC
SpecializedResourceReport	SRF to Service Broker
SplitLeg	Service Broker to MSC

Supported Operations for SMS Control

Table 2–11 lists the operations supported by IM-SCF CAP phase 4 for SMS control.

Table 2–11 Operations Supported by IM-SCF CAP Phase 4 for SMS Control

Operation	Direction
ConnectSMS	Service Broker to MSC
ContinueSMS	Service Broker to MSC
EventReportSMS	MSC to Service Broker
FurnishChargingInformationSMS	Service Broker to MSC
InitialDPSMS	MSC to Service Broker
ReleaseSMS	Service Broker to MSC
RequestReportSMSEvent	Service Broker to MSC
ResetTimerSMS	Service Broker to MSC

Supported Operations for GPRS Control

Table 2–12 lists the operations supported by IM-SCF CAP phase 4 for GPRS control.

Table 2–12 Operations Supported by IM-SCF CAP Phase 4 for GPRS Control

Operation	Direction
ActivityTestGPRS	Service Broker to MSC
ApplyChargingGPRS	Service Broker to MSC
ApplyChargingReportGPRS	MSC to Service Broker
CancelGPRS	Service Broker to MSC
ConnectGPRS	Service Broker to MSC
ContinueGPRS	Service Broker to MSC
EntityReleasedGPRS	MSC to Service Broker
EventReportGPRS	MSC to Service Broker
FurnishChargingInformationGPRS	Service Broker to MSC
InitialDPGPRS	MSC to Service Broker
ReleaseGPRS	Service Broker to MSC
RequestReportGPRSEvent	Service Broker to MSC
ResetTimerGPRS	Service Broker to MSC
SendChargingInformationGPRS	Service Broker to MSC

Supported BCSM Event Types

Table 2–13 lists the BCSM Event Types supported by IM-SCF CAP phase 4:

Table 2–13 BCSM Event Types Supported by IM-SCF CAP Phase 4

BSCM Event Type	Detection Point
collectedInfo	DP(2)
analyzedInformation	DP(3)
routeSelectFailure	DP(4)
oCalledPartyBusy	DP(5)
oNoAnswer	DP(6)

Table 2–13 (Cont.) BCSM Event Types Supported by IM-SCF CAP Phase 4

BSCM Event Type	Detection Point
oAnswer	DP(7)
oMidCall	DP(8)
oDisconnect	DP(9)
oAbandon	DP(10)
termAttemptAuthorized	DP(12)
tBusy	DP(13)
tNoAnswer	DP(14)
tAnswer	DP(15)
tMidCall	DP(16)
tDisconnect	DP(17)
tAbandon	DP(18)
oTermSeized	DP(19)
callAccepted	DP(27)
oChangeOfPosition	DP(50)
tChangeOfPosition	DP(51)
oServiceChange	DP(52)
tServiceChange	DP(53)

Supported SMS Event Types

Table 2–14 lists the SMS Event Types supported by IM-SCF CAP phase 4:

Table 2–14 SMS Event Types Supported by Service Broker IM-SCF CAP Phase 4

SMS Event Type	Detection Point
sms-CollectedInfo	DP(1)
o-smsFailure	DP(2)
o-smsSubmission	DP(3)
sms-DeliveryRequested	DP(11)
t-smsFailure	DP(12)
t-smsDelivery	DP(13)

IM-SCF INAP CS-1

This section describes the IM-SCF that supports INAP CS-1 protocol (*ITU-T Q.1218, Interface Recommendation for Intelligent Network CS-1*).

Key Functionality

This section describes the key functionality of IM-SCF INAP CS-1:

- Basic call control for initial and full call treatment

  The IM-SCF enables northbound applications to interact with SSPs in one of the following modes:

  - Initial call control mode: Service Broker invokes the application based on the IN trigger received by IM-SCF. According to the application's response, IM-SCF instructs the SSP to route the call by responding to the trigger without requesting the loading of additional triggers.
  - Full call control mode: IM-SCF manages the arming of IN Detection Points (DPs) in the SSP and maintains an updated session view of the underlying call.

  In this way, the IM-SCF enables applications to apply additional logic at various call stages. In addition, IM-SCF can deliver services that influence the entire life cycle of the call.

- Originating and terminating full BCSM implementation

  IM-SCF includes a complete standard implementation of the INAP CS-1 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN applications to interact with SSPs and act as if they were standard SCPs. IM-SCF forwards the call type (originating/terminating) to the application, enabling the application logic to differentiate between originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP interactions

  IM-SCF interacts with internal switch-based media resources (internal SRF) and external Intelligent Peripherals (IP). This enables applications to use these resources for announcements and user interactions (for example, to collect subscriber input) based on application instructions.

- Service initiated calls

  IM-SCF enables applications to initiate a new call (for example, a wake-up call service). IM-SCF uses the INAP CS-1 InitiateCallAttempt operation to set up a call to a destination provided by the application.

- Configurable IN messages/parameters tunnelling

  IM-SCF provides support for IN information tunnelling models. The tunnelling model enables applications to use specific IN parameters and operations. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from any application logic that requires such exposure.

- Switch-based charging timers and CDRs

  IM-SCF enables applications to use the SSP charging capabilities by invoking INAP CS-1 charging operations (for example, FurnishChargingInformation or ApplyCharging). This enables the application to control charging information generated by the SSP into CDRs, and leverage switch-based timers for implementing online charging services, including prepaid services.

- SCP management procedures

  IM-SCF implements INAP CS-1 SCP management capabilities and supports management operations, such as ActivityTest. These operations enable applications to manage availability of the service to the network and perform other auxiliary functions.

- Charging services

  IM-SCF provides the following charging services:

  - Credit reservation requests generation

IM-SCF sends these requests to IM-OCF through the OE. IM-OCF translates credit reservation requests to Diameter CCR and sends these CCRs to a billing application.

- Session monitoring and charging

  You can specify whether a session is monitored by IM-SCF or by an MSC. In the former case, IM-SCF requests an MSC to apply charging by sending an ApplyCharging message to the MSC. IM-SCF generates an ApplyCharging message based on the Granted-Service-Unit AVP of the CCA received from a billing application. If session is monitored by IM-SCF, IM-SCF applies charging on its own.

- Quota reauthorization

  You can specify whether IM-SCF reauthorizes a quota upon receiving various triggers from an MSC.

Supported Operations

Table 2–15 lists the operations supported by IM-SCF INAP CS-1.

Table 2–15 Operations Supported by IM-SCF INAP CS-1

Operation	Direction
ActivateServiceFiltering	Service Broker to SSP
ApplyCharging	Service Broker to SSP
ApplyChargingReport	SSP to Service Broker
AssistRequestInstructions	SRF to Service Broker
CallInformationReport	SSP to Service Broker
CallInformationRequest	Service Broker to SSP
Cancel	Service Broker to SSP/SRF
CollectInformation	Service Broker to SSP
Connect	Service Broker to SSP
ConnectToResource	Service Broker to SSP
EstablishTemporaryConnection	Service Broker to SSP
EventNotificationCharging	SSP to Service Broker
EventReportBCSM	SSP to Service Broker
FurnishChargingInformation	Service Broker to SSP
InitialDP	SSP to Service Broker
InitiateCallAttempt	Service Broker to SSP
PlayAnnouncement	Service Broker to SSP/SRF
PromptAndCollectUserInformation	Service Broker to SSP/SRF
ReleaseCall	Service Broker to SSP
RequestNotificationChargingEvent	Service Broker to SSP
RequestReportBCSMEvent	Service Broker to SSP
ResetTimer	Service Broker to SSP
SendChargingInformation	Service Broker to SSP

Table 2–15 (Cont.) Operations Supported by IM-SCF INAP CS-1

Operation	Direction
ServiceFilteringResponse	SSP to Service Broker
SpecializedResourceReport	SSP/SRF to Service Broker

Supported Events

Table 2–16 lists the event types supported by IM-SCF INAP CS-1.

Table 2–16 BCSM Event Types Supported by the IM-SCF INAP CS-1

BCSM Event Type	Detection Point
origAttemptAuthorized	DP(1)
collectedInfo	DP(2)
analysedInformation	DP(3)
routeSelectFailure	DP(4)
oCalledPartyBusy	DP(5)
oNoAnswer	DP(6)
oAnswer	DP(7)
oMidCall	DP(8)
oDisconnect	DP(9)
oAbandon	DP(10)
termAttemptAuthorized	DP(12)
tBusy	DP(13)
tNoAnswer	DP(14)
tAnswer	DP(15)
tMidCall	DP(16)
tDisconnect	DP(17)
tAbandon	DP(18)

IM-SCF WIN Phase 1

This section describes the IM-SCF that supports the WIN phase 1 protocol (*TIA/EIA Wireless Intelligent Network (WIN) IS-771*).

Key Functionality

This section describes the key functionality of IM-SCF WIN phase 1:

- Basic call control and full call treatment

  IM-SCF enables applications to interact with MSCs in an initial call control mode. Service Broker invokes the application based on the IN trigger received by IM-SCF. According to the application's response, IM-SCF instructs the MSC to route the call by responding to the trigger without requesting the loading of additional triggers.

- Originating and terminating full BCSM implementation

The IM-SCF includes a complete standard implementation of the WIN phase 1 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN applications to interact with MSCs and act as if they were standard SCPs. IM-SCF forwards the call type (originating/terminating) to the application, enabling the application logic to differentiate between originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP interactions

  IM-SCF interacts with internal switch-based media resources (internal SRF) and external Intelligent Peripherals (IP). This enables applications to use these resources for announcements and user interactions (for example, to collect subscriber input) based on application instructions.

- Configurable IN messages/parameters tunnelling

  The IM-SCF provides support for IN information tunnelling models. The tunnelling model enables applications to use specific IN parameters and operations. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from any application logic that requires such exposure.

Supported Operations

Table 2–17 lists the operations supported by IM-SCF WIN phase 1.

Table 2–17 Operations Supported by IM-SCF WIN Phase 1

Operation	Direction
OriginationRequest (Invoke)	MSC to Service Broker
OriginationRequest (Return-Result)	Service Broker to MSC
AnalyzedInformation (Invoke)	MSC to Service Broker
AnalyzedInformation (Return-Result)	Service Broker to MSC
ConnectResource (Invoke)	Service Broker to MSC
DisconnectResource (Invoke)	Service Broker to MSC
FacilitySelectedAndAvailable (Invoke)	Service Broker to MSC
FacilitySelectedAndAvailable (Return-Result)	MSC to Service Broker
IntructionRequest (Invoke)	MSC to Service Broker
InstructionRequest (Return-Result)	Service Broker to MSC
ResetTimer (Invoke)	Service Broker to MSC
SeizeResource (Invoke)	Service Broker to MSC
SeizeResource (Return-Result)	MSC to Service Broker
SRFDirective (Invoke)	Service Broker to MSC
SRFDirective (Return-Result)	MSC to Service Broker
TBusy (Invoke)	MSC to Service Broker
TBusy (Return-Result)	Service Broker to MSC
TNoAnswer (Invoke)	MSC to Service Broker
TNoAnswer (Return-Result)	Service Broker to MSC

IM-SCF WIN Phase 2

This section describes the IM-SCF that supports the WIN Phase-2 protocol (*TIA/EIA Wireless Intelligent Network (WIN) IS-826*).

Key Functionality

This section describes the key functionality of IM-SCF WIN phase 2:

- Basic call control for initial and full call treatment

  The IM-SCF enables northbound applications to interact with MSCs in one of the following modes:

  - Initial call control mode: Service Broker invokes the application based on the IN trigger received by IM-SCF. According to the application's response, the IM-SCF instructs the MSC to route the call by responding to the trigger without requesting the loading of additional triggers
  - Full call control mode: IM-SCF manages the arming of IN Detection Points (DPs) in the MSC and maintains an updated session view of the underlying call.

  In this way, IM-SCF enables applications to apply additional logic at various call stages. In addition, IM-SCF can deliver services that influence the entire life cycle of the call.

- Originating and terminating full BCSM implementation

  IM-SCF includes a complete standard implementation of the WIN phase 2 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN applications to interact with MSCs and act as if they were standard SCPs. IM-SCF forwards the call type (originating/terminating) to the application, enabling the application logic to differentiate between originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP interactions

  IM-SCF interacts with internal switch-based media resources (for example, by using the empty CallControlDirective operation) and external SRF. This enables applications to use these resources for announcements and user interactions (for example, to collect subscriber input) based on application instructions.

- Configurable IN messages/parameters tunnelling

  IM-SCF provides support for IN information tunnelling models. The tunnelling model enables applications to use specific IN parameters and operations. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from any application logic that requires such exposure.

- SCP management procedures

  IM-SCF implements WIN phase 2 SCP management capabilities and supports management operations, such as CallControlDirective.

Supported Operations

Table 2–18 lists the operations supported by IM-SCF WIN phase 2.

Table 2–18 Operations Supported by IM-SCF WIN Phase 2

Operation	Direction
OriginationRequest (Invoke)	MSC to Service Broker
OriginationRequest (Return-Result)	Service Broker to MSC
AnalyzedInformation (Invoke)	MSC to Service Broker
AnalyzedInformation (Return-Result)	Service Broker to MSC
ConnectResource (Invoke)	Service Broker to MSC
DisconnectResource (Invoke)	Service Broker to MSC
FacilitySelectedAndAvailable (Invoke)	MSC to Service Broker
FacilitySelectedAndAvailable (Return-Result)	Service Broker to MSC
IntructionRequest (Invoke)	MSC to Service Broker
InstructionRequest (Return-Result)	Service Broker to MSC
ResetTimer (Invoke)	Service Broker to MSC
SeizeResource (Invoke)	Service Broker to MSC
SeizeResource (Return-Result)	MSC to Service Broker
SRFDirective (Invoke)	Service Broker to MSC
TBusy (Invoke)	MSC to Service Broker
TBusy (Return-Result)	Service Broker to MSC
TNoAnswer (Invoke)	MSC to Service Broker
TNoAnswer (Return-Result)	Service Broker to MSC
CallControlDirective (Invoke)	Service Broker to MSC
CallControlDirective (Return-Result)	MSC to Service Broker
OAnswer (Invoke)	MSC to Service Broker
ODisconnect (Invoke)	MSC to Service Broker
ODisconnect (Return-Result)	Service Broker to MSC
TAnswer (Invoke)	MSC to Service Broker
TDisconnect (Invoke)	MSC to Service Broker
TDisconnect (Return-Result)	Service Broker to MSC

IM-SCF AIN 0.1

This section describes the IM-SCF that supports the AIN 0.1 protocol (*Bellcore, TR-NWT-1284, Advanced Intelligent Network (AIN) 0.1* and *Bellcore, TR-NWT-1285, Advanced Intelligent Network (AIN) 0.1*).

Key Functionality

This section describes the key functionality supported by IM-SCF AIN 0.1 supports.

- Basic call control for initial and full call treatment

  IM-SCF enables applications to interact with SSPs in one of the following modes:

  - Initial call control mode: Service Broker invokes the application based on the IN trigger received by IM-SCF. According to the application's response,

IM-SCF instructs the SSP to route the call by responding to the trigger without requesting the loading of additional triggers.

- Full call control mode: IM-SCF manages the arming of IN Detection Points (DPs) in the SSP and maintains an updated session view of the underlying call.

In this way, IM-SCF enables applications to apply additional logic at various call stages. In addition, IM-SCF can deliver services that influence the entire life cycle of the call.

- Originating and terminating full BCSM implementation

  IM-SCF includes a complete standard implementation of the AIN 0.1 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN applications to interact with SSPs and act as if they were standard SCPs. IM-SCF forwards the call type (originating/terminating) to the application, enabling the application logic to differentiate between originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF interactions

  IM-SCF interacts with an internal switch-based media resources (internal SRF). IM-SCF enables applications to use these resources for announcements and user interactions (for example, to collect subscriber input) based on application instructions.

- Configurable IN messages/parameters tunnelling

  IM-SCF provides support for IN information tunnelling models. The tunnelling model enables applications to use specific IN parameters and operations. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from any application logic that requires such exposure.

Supported Switch Call Related Operations

Table 2–19 lists the switch call related operations supported by IM-SCF AIN 0.1.

Table 2–19 Switch Call Related Operations Supported by IM-SCF AIN 0.1

Message	Direction
Info_Analyzed	SSP to Service Broker
Info_Collected	SSP to Service Broker
Network_Busy	SSP to Service Broker
Origination_Attempt	SSP to Service Broker
Resource_Clear	SSP to Service Broker
Termination_Attempt	SSP to Service Broker

Supported SCP Call Related Operations

Table 2–20 lists the SCP call related operations supported by IM-SCF AIN 0.1.

Table 2–20 SCP Call Related Operations Supported by IM-SCF AIN 0.1

Message	Direction
Analyze_Route	Service Broker to SSP
Authorize_Termination	Service Broker to SSP

Table 2–20 (Cont.) SCP Call Related Operations Supported by IM-SCF AIN 0.1

Message	Direction
Cancel_Resource_Event	Service Broker to SSP
Continue	Service Broker to SSP
Disconnect	Service Broker to SSP
Forward_Call	Service Broker to SSP
Send_To_Resource	Service Broker to SSP

Supported Non-Call Related Operations

Table 2–21 lists the non-call related operations supported by IM-SCF AIN 0.1.

Table 2–21 Non-Call Related Operations Supported by IM-SCF AIN 0.1

Message	Direction
Send_Notification	Service Broker to SSP
Termination_Notification	SSP to Service Broker

IM-SCF AIN 0.2

This section describes the IM-SCF that supports the AIN 0.2 protocol (*Telcordia GR-1298-CORE Advanced Intelligent Network (AIN) 0.2* and *Telcordia GR-1299-CORE Advanced Intelligent Network (AIN) 0.2*).

Key Functionality

This section describes the key functionality supported by IM-SCF AIN 0.2:

- Basic call control for initial and full call treatment

  IM-SCF enables applications to interact with SSPs in one of the following modes:

  - Initial call control mode: Service Broker invokes the application based on the IN trigger received by the IM-SCF. According to the application's response, the IM-SCF instructs the SSP to route the call by responding to the trigger without requesting the loading of additional triggers.
  - Full call control mode: IM-SCF manages the arming of IN Detection Points (DPs) in the SSP and maintains an updated session view of the underlying call.

  In this way, IM-SCF enables applications to apply additional logic at various call stages. In addition, IM-SCF can deliver services that influence the entire life cycle of the call.

- Originating and terminating full BCSM implementation

  IM-SCF includes a complete standard implementation of the AIN 0.2 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN applications to interact with SSPs and act as if they were standard SCPs. IM-SCF forwards the call type (originating/terminating) to the application, enabling the application logic to differentiate between originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP interactions

  IM-SCF interacts with internal switch-based media resources (internal SRF) and external Intelligent Peripherals (IP). This enables applications to use these

resources for announcements and user interactions (for example, to collect subscriber input) based on application instructions.

- Configurable IN messages/parameters tunnelling

  The IM-SCF provides support for IN information tunnelling models. The tunnelling model enables applications to use specific IN parameters and operations. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from any application logic that requires such exposure.

Supported Switch Call Related Operations

Table 2–22 lists the switch call related operations supported by IM-SCF AIN 0.2.

Table 2–22 Switch Call Related Operations Supported by the IM-SCF AIN 0.2

Message	Direction
Info_Analyzed	SSP to Service Broker
Info_Collected	SSP to Service Broker
Network_Busy	SSP to Service Broker
Origination_Attempt	SSP to Service Broker
Resource_Clear	SSP to Service Broker
Termination_Attempt	SSP to Service Broker

Supported SCP Related Operations

Table 2–23 lists the SCP related operations supported by IM-SCF AIN 0.2.

Table 2–23 SCP Related Messages Operations by IM-SCF AIN 0.2

Message	Direction
Analyze_Route	Service Broker to SSP
Authorize_Termination	Service Broker to SSP
Cancel_Resource_Event	Service Broker to SSP
Continue	Service Broker to SSP
Disconnect	Service Broker to SSP
Forward_Call	Service Broker to SSP
Send_To_Resource	Service Broker to SSP

Supported Non-Call Related Operations

Table 2–24 lists the non-call related operations supported by IM-SCF AIN 0.2.

Table 2–24 Non-Call Related Operations Supported by IM-SCF AIN 0.2

Message	Direction
Send_Notification	Service Broker to SSP
Termination_Notification	SSP to Service Broker

IM-SSF

IM-SSF is an application-facing interworking module, acting as a standard SSP towards legacy SCP, providing the SCP with an IN interface to Service Broker (see "IM-SSF").

Service Broker IM-SSF supports the following protocols:

- IM-SSF CAP Phase-1
- IM-SSF CAP Phase-2
- IM-SSF CAP Phase-3
- IM-SSF INAP CS-1
- IM-SSF WIN Phase 1
- IM-SSF WIN Phase 2
- IM-SSF AIN 0.1
- IM-SSF AIN 0.2

IM-SSF CAP Phase-1

This section describes the IM-SSF that supports CAP phase 1 protocol (*ETSI TS 101 046 V5.7.0, CAMEL Application Part (CAP) Phase 1*).

Key Functionality

This section describes the key functionality of IM-SSF CAP phase 1:

- Basic call control for initial and full call treatment

  IM-SSF enables southbound switching entities to interact with SCPs for the delivery of legacy IN applications. An SCP can interact with the switching entity in either the legacy circuit switched network or the IMS packet switched domain in one of the following modes:

  - Initial call control mode—IM-SSF invokes the SCP at every new session. According to the SCP's response, IM-SSF uses the internal Service Broker abstract session to route the session without requesting the reporting of additional session events.
  - Full call control mode—IM-SSF provides an updated view of the underlying network session along the entire session by arming dynamic Detection Points (DPs): EDP-Ns and EDP-Rs.

  In this way, IM-SSF enables the delivery of SCP service logic to any switching entity, at various stages of the call. Note that IM-SSF can deliver a service logic that influences the session life cycle.

- Originating and terminating full BCSM implementation

  IM-SSF includes a complete standard implementation of the CAP phase 1 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables switching entities to invoke an SCP service logic for both originating-side and terminating-side calls, providing each call with corresponding treatment.

- Configurable IN messages/parameters tunnelling

  The IM-SSF provides support for IN information tunnelling models. Using this model, the IM-SSF can forward specific IN operations and parameters from the SCP, through the IM-SCF, to the southbound MSC. This capability is achieved by

tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from the SCP.

- SCP management procedures

  IM-SSF fully supports CAP phase 3 management operations, such as ActivityTest. These operations enable an SCP to manage availability of the service to the network and perform other auxiliary functions.

Supported Operations

Table 2–25 lists the operations supported by IM-SSF CAP phase 1.

Table 2–25 Operations Supported by IM-SSF CAP Phase 1

Operation	Direction
ActivityTest	SCP to Service Broker
Connect	SCP to Service Broker
Continue	SCP to Service Broker
EventReportBCSM	Service Broker to SCP
InitialDP	Service Broker to SCP
ReleaseCall	SCP to Service Broker
RequestReportBCSMEvent	SCP to Service Broker

Supported Events

Table 2–26 lists the event types supported by IM-SSF CAP phase 1.

Table 2–26 BCSM Event Types Supported by IM-SSF CAP Phase 1

BCSM Event Type	Detection Point
collectedInfo	DP(2)
oAnswer	DP(7)
oDisconnect	DP(9)
termAttemptAuthorized	DP(12)
tAnswer	DP(15)
tDisconnect	DP(17)

IM-SSF CAP Phase-2

This section describes the IM-SSF that supports the CAP Phase-2 protocol (*ETSI TS 101 046 V7.1.0, CAMEL Application Part (CAP) Phase 2*).

Key Functionality

This section describes the key functionality of IM-SSF CAP phase 2:

- Basic call control for initial and full call treatment

  IM-SSF enables southbound switching entities (for example, MGCs) to interact with SCPs for the delivery of legacy IN applications. An SCP can interact with the switching entity in either the legacy circuit switched network or the IMS packet switched domain in one of the following modes:

- Initial call control mode: IM-SSF invokes the SCP at every new session. According to the SCP's response, IM-SSF uses the internal Service Broker abstract session to route the session without requesting the reporting of additional session events.
- Full call control mode: IM-SSF provides an updated view of the underlying network session along the entire session by arming dynamic Detection Points (DPs): EDP-Ns and EDP-Rs.

In this way, IM-SSF enables the delivery of SCP service logic to any switching entity, at various stages of the call. Note that IM-SSF can deliver a service logic that influences the session life cycle.

- Originating and terminating full BCSM implementation

  IM-SSF includes a complete standard implementation of the CAP phase 2 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN switching entities (for example, S-CSCF) to invoke an SCP service logic for both originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP/MRF interactions

  IM-SSF fully supports CAP phase 2 media operations, such as ConnectToResource(CTR) and EstablishTemporaryConnection(ETC). This capability enables an SCP to control both switch-based media resources (internal SRFs) and external Intelligent Peripherals (IPs). The ability to control these resources enables the SCP service logic to use these resources for announcements and user interaction (for example, to collect subscriber input).

- Configurable IN messages/parameters tunnelling

  IM-SSF provides support for IN information tunnelling model. Using this model, IM-SSF can forward specific IN operations and parameters from the SCP, through IM-SCF, to the southbound MSC. This capability is achieved by tunnelling a XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from the SCP.

- Switch-based charging timers and CDRs

  IM-SSF implements all SSF charging related timers. This capability enables an SCP to instruct IM-SSF to monitor call duration for online charging services, including prepaid services, and to insert charging information generated by IM-SSF into CDRs. IM-SSF can be configured to perform the charging procedure by itself (for example, to monitor call duration). Alternatively, IM-SSF can be coupled with IM-SCF. In this case, IM-SSF instructs IM-SCF to transfer charging operations towards the southbound MSC/SSF and use the switch charging capabilities.

- SCP management procedures

  IM-SSF fully supports CAP phase 2 management operations, such as ActivityTest. These operations enable an SCP to manage availability of the service to the network and perform other auxiliary functions.

Supported Operations

Table 2–27 lists the operations supported by the IM-SSF CAP phase 2.

Table 2–27 Operations Supported by IM-SSF CAP Phase 2

Operation	Direction
ActivityTest	SCP to Service Broker

Table 2–27 (Cont.) Operations Supported by IM-SSF CAP Phase 2

Operation	Direction
ApplyCharging	SCP to Service Broker
ApplyChargingReport	Service Broker to SCP
AssistRequestInstructions	Service Broker/SRF to SCP
CallInformationReport	Service Broker to SCP
CallInformationRequest	SCP to Service Broker
Cancel	SCP to Service Broker
Connect	SCP to Service Broker
ConnectToResource	SCP to Service Broker
Continue	SCP to Service Broker
DisconnectForwardConnection	SCP to Service Broker
EstablishTemporaryConnection	SCP to Service Broker
EventReportBCSM	Service Broker to SCP
FurnishChargingInformation	SCP to Service Broker
InitialDP	Service Broker to SCP
PlayAnnouncement	SCP to Service Broker
PromptAndCollectUserInformation	SCP to Service Broker
ReleaseCall	SCP to Service Broker
RequestReportBCSMEvent	SCP to Service Broker
ResetTimer	SCP to Service Broker
SendChargingInformation	SCP to Service Broker
SpecializedResourceReport	Service Broker/SRF to SCP

Supported BCSM Event Types

Table 2–28 lists the event types supported by IM-SSF CAP phase 2.

Table 2–28 BCSM Event Types Supported by the IM-SSF CAP Phase 2

BCSM Event Type	Detection Point
collectedInfo	DP(2)
routeSelectFailure	DP(4)
oCalledPartyBusy	DP(5)
oNoAnswer	DP(6)
oAnswer	DP(7)
oDisconnect	DP(9)
oAbandon	DP(10)
termAttemptAuthorized	DP(12)
tBusy	DP(13)
tNoAnswer	DP(14)
tAnswer	DP(15)

Table 2–28 (Cont.) BCSM Event Types Supported by the IM-SSF CAP Phase 2

BCSM Event Type	Detection Point
tDisconnect	DP(17)
tAbandon	DP(18)

IM-SSF CAP Phase-3

This section describes the IM-SSF that supports the CAP phase 3 protocol (*ETSI TS 129 078 V4.8.0, CAMEL Application Part (CAP) Phase 3*).

Key Functionality

This section describes the key functionality of IM-SSF CAP phase 3:

- Basic call control for initial and full call treatment

  IM-SSF enables southbound switching entities to interact with SCPs for the delivery of legacy IN applications. An SCP can interact with the switching entity in either the legacy circuit switched network or the IMS packet switched domain in one of the following modes:

  - Initial call control mode: IM-SSF invokes the SCP at every new session. According to the SCP's response, IM-SSF uses the internal Service Broker abstract session to route the session without requesting the reporting of additional session events.
  - Full call control mode: IM-SSF provides an updated view of the underlying network session along the entire session by arming dynamic Detection Points (DPs): EDP-Ns and EDP-Rs.

  In this way, IM-SSF enables the delivery of SCP service logic to any switching entity, at various stages of the call. Note that IM-SSF can deliver a service logic that influences the session life cycle.

- Originating and terminating full BCSM implementation

  IM-SSF includes a complete standard implementation of the CAP phase 3 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables switching entities to invoke an SCP service logic for both originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP/MRF interactions

  IM-SSF fully supports CAP phase 3 media operations, such as ConnectToResource(CTR) and EstablishTemporaryConnection(ETC). This capability enables an SCP to control both switch-based media resources (internal SRFs) and external Intelligent Peripherals (IPs). The ability to control these resources enables the SCP service logic to use these resources for announcements and user interaction (for example, to collect subscriber input).

- GGSN Data triggers

  IM-SSF fully supports GPRS control operations. This support enables southbound network switching entities to trigger IN SCP service logic for data session control. This includes support for session authorization and continuous monitoring of ongoing data sessions as supported in CAP phase 3.

- Originating-side SMS triggers

  IM-SSF fully supports originating side SMS control operations. This support enables a southbound network switching entity to trigger an IN SCP for SMS

session control. This includes support for originating message approval/authorizations and originating SMS routing by SCP as supported by CAP phase 3.

- Configurable IN messages/parameters tunnelling

  IM-SSF provides support for IN information tunnelling models. Using this model, the IM-SSF can forward specific IN operations and parameters from the SCP, through IM-SCF, to the southbound MSC. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from the SCP.

- Switch-based charging timers and CDRs

  IM-SSF implements all SSF charging related timers. This capability enables an SCP to instruct IM-SSF to monitor call duration for online charging services, including prepaid services, and to insert charging information generated by IM-SSF into CDRs.

  IM-SSF can be configured to perform the charging procedure by itself (for example, to monitor call duration). Alternatively, IM-SSF can be coupled with the IM-SCF. In this case, IM-SSF instructs IM-SCF to transfer charging operations towards the southbound MSC/SSF and use the switch charging capabilities.

- SCP management procedures

  IM-SSF fully supports CAP phase 3 management operations, such as ActivityTest. These operations enable an SCP to manage availability of the service to the network and perform other auxiliary functions.

Supported Operations for Circuit Switched Call Control

Table 2–29 lists the operations supported by IM-SSF CAP phase 3 for circuit switched call control.

Table 2–29 Operations Supported by IM-SSF CAP Phase 3 for Circuit Switched Call Control

Operation	Direction
ActivityTest	SCP to Service Broker
ApplyCharging	SCP to Service Broker
ApplyChargingReport	Service Broker to SCP
AssistRequestInstructions	Service Broker to SCP
CallInformationReport	Service Broker to SCP
CallInformationRequest	SCP to Service Broker
Cancel	SCP to Service Broker/SRF
Connect	SCP to Service Broker
ConnectToResource	SCP to Service Broker
Continue	SCP to Service Broker
ContinueWithArgument	SCP to Service Broker
DisconnectForwardConnection	SCP to Service Broker
EstablishTemporaryConnection	SCP to Service Broker
EventReportBCSM	Service Broker to SCP

Table 2–29 (Cont.) Operations Supported by IM-SSF CAP Phase 3 for Circuit Switched Call Control

Operation	Direction
FurnishChargingInformation	SCP to Service Broker
InitialDP	Service Broker to SCP
PlayAnnouncement	SCP to Service Broker/SRF
PromptAndCollectUserInformation	SCP to Service Broker/SRF
ReleaseCall	SCP to Service Broker
RequestReportBCSMEvent	SCP to Service Broker
ResetTimer	SCP to Service Broker
SendChargingInformation	SCP to Service Broker
SpecializedResourceReport	Service Broker/SRF to SCP

Supported Operations for SMS Control

Table 2–30 lists the operations supported by IM-SSF CAP phase 3 for SMS control.

Table 2–30 Operations Supported by the IM-SSF CAP Phase 3 for SMS Control

Operation	Direction
ConnectSMS	SCP to Service Broker
ContinueSMS	SCP to Service Broker
EventReportSMS	Service Broker to SCP
FurnishChargingInformationSMS	SCP to Service Broker
InitialDPSMS	Service Broker to SCP
ReleaseSMS	SCP to Service Broker
RequestReportSMSEvent	SCP to Service Broker
ResetTimerSMS	SCP to Service Broker

Supported Operations for GPRS Control

Table 2–31 lists the operations supported by IM-SSF CAP phase 3 for GPRS control.

Table 2–31 Operations Supported by IM-SSF CAP Phase 3 for GPRS Control

Operation	Direction
ActivityTestGPRS	SCP to Service Broker
ApplyChargingGPRS	SCP to Service Broker
ApplyChargingReportGPRS	Service Broker to SCP
CancelGPRS	SCP to Service Broker
ConnectGPRS	SCP to Service Broker
ContinueGPRS	SCP to Service Broker
EntityReleasedGPRS	Service Broker to SCP
EventReportGPRS	Service Broker to SCP
FurnishChargingInformationGPRS	SCP to Service Broker

Table 2–31 (Cont.) Operations Supported by IM-SSF CAP Phase 3 for GPRS Control

Operation	Direction
InitialDPGPRS	Service Broker to SCP
ReleaseGPRS	SCP to Service Broker
RequestReportGPRSEvent	SCP to Service Broker
ResetTimerGPRS	SCP to Service Broker
SendChargingInformationGPRS	SCP to Service Broker

Supported BCSM Event Types

Table 2–32 lists the BCSM event types supported by IM-SSF CAP phase 3.

Table 2–32 BCSM Event Types Supported by IM-SSF CAP Phase 3

BCSM Event Type	Detection Point
collectedInfo	DP(2)
analyzedInformation	DP(3)
routeSelectFailure	DP(4)
oCalledPartyBusy	DP(5)
oNoAnswer	DP(6)
oAnswer	DP(7)
oDisconnect	DP(9)
oAbandon	DP(10)
termAttemptAuthorized	DP(12)
tBusy	DP(13)
tNoAnswer	DP(14)
tAnswer	DP(15)
tDisconnect	DP(17)
tAbandon	DP(18)

Supported SMS Event Types

Table 2–33 lists the SMS event types supported by IM-SSF CAP phase 3.

Table 2–33 SMS Event Types Support by IM-SSF CAP Phase 3

SMS Event Type	Detection Point
sms-CollectedInfo	DP(1)
o-smsFailure	DP(2)
o-smsSubmitted	DP(3)

IM-SSF INAP CS-1

This section describes the IM-SSF that supports the INAP CS-1 protocol (*ITU-T Q.1218, Interface Recommendation for Intelligent Network CS-1*).

Key Functionality

This section describes the key functionality of IM-SSF INAP CS-1:

- Basic call control for initial and full call treatment

  IM-SSF enables southbound switching entities to interact with SCPs for the delivery of legacy IN applications. An SCP can interact with the switching entity in either the legacy circuit switched network or the IMS packet switched domain in one of the following modes:

  - Initial call control mode: IM-SSF invokes the SCP at every new session. According to the SCP's response, IM-SSF uses the internal Service Broker abstract session to route the session without requesting the reporting of additional session events.
  - Full call control mode: IM-SSF provides an updated view of the underlying network session along the entire session by arming dynamic Detection Points (DPs): EDP-Ns and EDP-Rs.

  In this way, IM-SSF enables the delivery of SCP service logic to any switching entity, at various stages of the call. Note that the IM-SSF can deliver a service logic that influences the session life cycle.

- Originating and terminating full BCSM implementation

  IM-SSF includes a complete standard implementation of the INAP CS-1 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables switching entities to invoke an SCP service logic for both originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP/MRF interactions

  IM-SSF fully supports INAP CS-1 media operations, such as ConnectToResource(CTR) and EstablishTemporaryConnection(ETC). This capability enables an SCP to control both switch-based media resources (internal SRFs) and external Intelligent Peripherals (IPs). The ability to control these resources enables the SCP service logic to use these resources for announcements and user interaction (for example, to collect subscriber input).

- Service initiated calls

  IM-SSF enables an SCP to initiate a new call (for example, a wake-up call service). In this case, IM-SSF receives the INAP CS-1 InitiateCallAttempt operation from the SCP and uses the operation information to create a new call in the underlying switching network.

- Configurable IN messages/parameters tunnelling

  IM-SSF provides support for IN information tunnelling model. Using this model, the IM-SSF can forward specific IN operations and parameters from the SCP, through IM-SCF, to the southbound SSP. This capability is achieved by tunnelling a XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from the SCP.

- Switch based charging timers and CDRs

  IM-SSF implements all SSF charging related timers. This capability enables an SCP to instruct IM-SSF to monitor call duration for online charging services, including prepaid services, and to insert charging information generated by IM-SSF into CDRs. IM-SSF can be configured to perform the charging procedure by itself (for example, to monitor call duration). Alternatively, IM-SSF can be coupled with

IM-SCF. In this case, IM-SSF instructs IM-SCF to transfer charging operations towards the southbound SSP and use the switch charging capabilities.

- SCP management procedures

  IM-SSF fully supports INAP CS1 management operations, such as ActivityTest. These operations enable an SCP to manage availability of the service to the network and perform other auxiliary functions.

Supported Operations

Table 2–34 lists the operations supported by IM-SSF INAP CS-1.

Table 2–34 Operations Supported by IM-SSF INAP CS-1

Operation	Direction
ActivateServiceFiltering	SCP to Service Broker
ApplyCharging	SCP to Service Broker
ApplyChargingReport	Service Broker to SCP
AssistRequestInstructions	Service Broker/SRF to SCP
CallInformationReport	Service Broker to SCP
CallInformationRequest	SCP to Service Broker
Cancel	SCP to Service Broker/SRF
CollectInformation	SCP to Service Broker
Connect	SCP to Service Broker
ConnectToResource	SCP to Service Broker
EstablishTemporaryConnection	SCP to Service Broker
EventNotificationCharging	Service Broker to SCP
EventReportBCSM	Service Broker to SCP
FurnishChargingInformation	SCP to Service Broker
InitialDP	Service Broker to SCP
InitiateCallAttempt	SCP to Service Broker
PlayAnnouncement	SCP to Service Broker/SRF
PromptAndCollectUserInformation	SCP to Service Broker/SRF
ReleaseCall	SCP to Service Broker
RequestNotificationChargingEvent	SCP to Service Broker
RequestReportBCSMEvent	SCP to Service Broker
ResetTimer	SCP to Service Broker
SendChargingInformation	SCP to Service Broker
ServiceFilteringResponse	Service Broker to SCP
SpecializedResourceReport	Service Broker to SCP

Supported Events

Table 2–35 lists the event types supported by IM-SSF INAP CS-1.

Table 2–35 BCSM Event Types Supported by IM-SSF INAP CS1

BCSM Event Type	Detection Point
origAttemptAuthorized	DP(1)
collectedInfo	DP(2)
analysedInformation	DP(3)
routeSelectFailure	DP(4)
oCalledPartyBusy	DP(5)
oNoAnswer	DP(6)
oAnswer	DP(7)
oMidCall	DP(8)
oDisconnect	DP(9)
oAbandon	DP(10)
termAttemptAuthorized	DP(12)
tBusy	DP(13)
tNoAnswer	DP(14)
tAnswer	DP(15)
tMidCall	DP(16)
tDisconnect	DP(17)
tAbandon	DP(18)

IM-SSF WIN Phase 1

This section describes the IM-SSF that supports WIN phase 1 protocol (*TIA/EIA Wireless Intelligent Network (WIN) IS-771*).

Key Functionality

This section describes the key functionality of IM-SSF WIN phase 1:

- Basic call control

  IM-SSF enables southbound switching entities (for example, MGCs) to interact with an SCP for the delivery of legacy IN services. A WIN phase 1 SCP interacts with a switching entity in either the legacy circuit switched network or the IMS packet switched domain, in an initial call control mode. In initial call control mode, IM-SSF invokes the SCP at every new session. According to the SCP's response, IM-SSF uses the internal Service Broker abstract session to route the session without requesting the reporting of additional session events. In this way, IM-SSF enables the delivery of SCP service logic to any switching entity only during call setup.

- Originating and terminating full BCSM implementation

  IM-SSF includes a complete standard implementation of the WIN phase 1 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables switching entities to invoke an SCP service logic for both originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP/MRF interactions

IM-SSF fully supports WIN phase 1 media operations (for example, SeizeResource). This capability enables an SCP to control a switch-based media resource and external SRF. It also enables the service to use these resources for announcements and user interaction (for example, to collect subscriber input).

- Configurable IN messages/parameters tunnelling

  IM-SSF provides support for IN information tunnelling models. Using this model, the IM-SSF can forward specific IN operations and parameters from the SCP, through IM-SCF, to the southbound MSC. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from the SCP.

Supported Operations

Table 2–36 lists the operations supported by IM-SSF WIN phase 1.

Table 2–36 Operations Supported by IM-SSF WIN Phase 1

Operation	Direction
OriginationRequest (Invoke)	Service Broker to SCP
OriginationRequest (Return-Result)	SCP to Service Broker
AnalyzedInformation (Invoke)	Service Broker to SCP
AnalyzedInformation (Return-Result)	SCP to Service Broker
ConnectResource (Invoke)	SCP to Service Broker
DisconnectResource (Invoke)	SCP to Service Broker
FacilitySelectedAndAvailable (Invoke)	Service Broker to SCP
FacilitySelectedAndAvailable (Return-Result)	SCP to Service Broker
ResetTimer (Invoke)	SCP to Service Broker
SeizeResource (Invoke)	SCP to Service Broker
SeizeResource (Return-Result)	Service Broker to SCP
SRFDirective (Invoke)	SCP to Service Broker
SRFDirective (Return-Result)	Service Broker to SCP
TBusy (Invoke)	Service Broker to SCP
TBusy (Return-Result)	SCP to Service Broker
TNoAnswer (Invoke)	Service Broker to SCP
TNoAnswer (Return-Result)	SCP to Service Broker

IM-SSF WIN Phase 2

This section describes the IM-SSF that supports the WIN Phase 2 protocol (*TIA/EIA Wireless Intelligent Network (WIN) IS-826*).

Key Functionality

This section describes the key functionality of IM-SSF WIN phase 2:

- Basic call control for initial and full call treatment

  IM-SSF enables southbound switching entities (for example, MGCs) to interact with SCPs for the delivery of legacy IN applications. An SCP can interact with the

switching entity in either the legacy circuit switched network or the IMS packet switched domain in one of the following modes:

- Initial call control mode: IM-SSF invokes the SCP at every new session. According to the SCP's response, IM-SSF uses the internal Service Broker abstract session to route the session without requesting the reporting of additional session events.
- Full call control mode: IM-SSF provides an updated view of the underlying network session along the entire session by arming dynamic Detection Points (DPs): EDP-Ns and EDP-Rs.

In this way, IM-SSF enables the delivery of SCP service logic to any switching entity, at various stages of the call. Note that IM-SSF can deliver a service logic that influences the session life cycle.

- Originating and terminating full BCSM implementation

  IM-SSF includes a complete standard implementation of the WIN phase 2 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables non-IN switching entities (for example, S-CSCF) to invoke an SCP service logic for both originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/IP/MRF interactions

  IM-SSF fully supports WIN phase 2 media operations (for example, SeizeResource). This capability enables an SCP to control a switch-based media resource and external SRF. It also enables the service to use these resources for announcements and user interaction (for example, to collect subscriber input).

- Configurable IN messages/parameters tunnelling

  IM-SSF provides support for IN information tunnelling models. Using this model, the IM-SSF can forward specific IN operations and parameters from the SCP, through IM-SCF, to the southbound MSC. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from the SCP.

- SCP management procedures

  IM-SSF fully supports CAP phase 2 management operations, such as ActivityTest. These operations enable an SCP to manage availability of the service to the network and perform other auxiliary functions.

Supported Operations

Table 2–37 lists the operations supported by IM-SSF WIN phase 2.

Table 2–37 Operations Supported by IM-SSF WIN Phase 2

Operation	Direction
OriginationRequest (Invoke)	Service Broker to SCP
OriginationRequest (Return-Result)	SCP to Service Broker
AnalyzedInformation (Invoke)	Service Broker to SCP
AnalyzedInformation (Return-Result)	SCP to Service Broker
FacilitySelectedAndAvailable (Invoke)	Service Broker to SCP
FacilitySelectedAndAvailable (Return-Result)	SCP to Service Broker
SRFDirective (Invoke)	SCP to Service Broker

Table 2–37 (Cont.) Operations Supported by IM-SSF WIN Phase 2

Operation	Direction
TBusy (Invoke)	Service Broker to SCP
TBusy (Return-Result)	SCP to Service Broker
TNoAnswer (Invoke)	Service Broker to SCP
TNoAnswer (Return-Result)	SCP to Service Broker
CallControlDirective (Invoke)	SCP to Service Broker
CallControlDirective (Return-Result)	Service Broker to SCP
OAnswer (Invoke)	Service Broker to SCP
ODisconnect (Invoke)	Service Broker to SCP
ODisconnect (Return-Result)	SCP to Service Broker
TAnswer (Invoke)	Service Broker to SCP
TDisconnect (Invoke)	Service Broker to SCP
TDisconnect (Return-Result)	SCP to Service Broker

IM-SSF AIN 0.1

This section describes the IM-SSF that supports the AIN 0.1 protocol (*Bellcore, TR-NWT-1284, Advanced Intelligent Network (AIN) 0.1* and *Bellcore, TR-NWT-1285, Advanced Intelligent Network (AIN) 0.1*).

Key Functionality

This section describes the key functionality of IM-SSF AIN 0.1:

- Basic call control for initial and full call treatment

  IM-SSF enables network-facing switching entities to interact with SCPs for the delivery of legacy IN applications. An SCP can interact with the switching entity in either the legacy circuit switched network or the IMS packet switched domain in one of the following modes:

  - Initial call control mode—IM-SSF invokes the SCP at every new session. According to the SCP's response, IM-SSF uses the internal Service Broker abstract session to route the session without requesting the reporting of additional session events.
  - Full call control mode—IM-SSF provides an updated view of the underlying network session along the entire session by arming dynamic Detection Points (DPs): EDP-Ns and EDP-Rs.

  In this way, IM-SSF enables the delivery of SCP service logic to any switching entity, at various stages of the call. Note that IM-SSF can deliver a service logic that influences the session life cycle.

- Originating and terminating full BCSM implementation

  IM-SSF includes a complete standard implementation of the AIN 0.1 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables switching entities to invoke an SCP service logic for both originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/MRF interactions

IM-SSF fully supports AIN 0.1 media operations. This capability enables an SCP to control both switch-based media resources (internal SRFs) and external Intelligent Peripherals (IPs). The ability to control these resources enables the SCP service logic to use these resources for announcements and user interaction (for example, to collect subscriber input).

- Configurable IN messages/parameters tunnelling

  The IM-SSF provides support for IN information tunnelling models. Using this model, IM-SSF can forward specific IN operations and parameters from the SCP, through the IM-SCF, to the network-facing SSP. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from the SCP.

Supported Switch Call Related Operations

Table 2–38 lists the switch call related operations supported by IM-SSF AIN 0.1.

Table 2–38 Switch Call Related Operations Supported by IM-SSF AIN 0.1

Message	Direction
Info_Analyzed	Service Broker to SCP
Info_Collected	Service Broker to SCP
Network_Busy	Service Broker to SCP
Origination_Attempt	Service Broker to SCP
Resource_Clear	Service Broker to SCP
Termination_Attempt	Service Broker to SCP

Supported SCP Call Related Operations

Table 2–39 lists the SCP call related operations supported by IM-SSF AIN 0.1.

Table 2–39 SCP Call Related Operations Supported by IM-SSF AIN 0.1

Message	Direction
Analyze_Route	SCP to Service Broker
Authorize_Termination	SCP to Service Broker
Cancel_Resource_Event	SCP to Service Broker
Continue	SCP to Service Broker
Disconnect	SCP to Service Broker
Forward_Call	SCP to Service Broker
Send_To_Resource	SCP to Service Broker

Supported Non-Call Related Operations

Table 2–40 lists the non-call related operations supported by IM-SSF AIN 0.1.

Table 2–40 Non-Call Related Operations Supported by IM-SSF AIN 0.1

Message	Direction
Send_Notification	SCP to Service Broker
Termination_Notification	Service Broker to SCP

IM-SSF AIN 0.2

This section describes the IM-SSF that supports the AIN 0.2 protocol (*Telcordia GR-1298-CORE, Advanced Intelligent Network (AIN) 0.2* and *Telcordia GR-1299-CORE, Advanced Intelligent Network (AIN) 0.2*).

Key Functionality

This section describes the key functionality of IM-SSF AIN 0.2:

- Basic call control for initial and full call treatment

  IM-SSF enables southbound switching entities to interact with SCPs for the delivery of legacy IN applications. An SCP can interact with the switching entity in either the legacy circuit switched network or the IMS packet switched domain in one of the following modes:

  - Initial call control mode—IM-SSF invokes the SCP at every new session. According to the SCP's response, IM-SSF uses the internal Service Broker abstract session to route the session without requesting the reporting of additional session events.
  - Full call control mode—IM-SSF provides an updated view of the underlying network session along the entire session by arming dynamic Detection Points (DPs): EDP-Ns and EDP-Rs.

  In this way, IM-SSF enables the delivery of SCP service logic to any switching entity, at various stages of the call. Note that IM-SSF can deliver a service logic that influences the session life cycle.

- Originating and terminating full BCSM implementation

  IM-SSF includes a complete standard implementation of the AIN 0.2 Basic Call State Model (BCSM) for both originating and terminating calls. This capability enables switching entities to invoke an SCP service logic for both originating-side and terminating-side calls, providing each call with corresponding treatment.

- SRF/MRF interactions

  The IM-SSF fully supports AIN 0.2 media operations. This capability enables an SCP to control both switch-based media resources (internal SRFs) and external Intelligent Peripherals (IPs). The ability to control these resources enables the SCP service logic to use these resources for announcements and user interaction (for example, to collect subscriber input).

- Configurable IN messages/parameters tunnelling

  The IM-SSF provides support for IN information tunnelling models. Using this model, the IM-SSF can forward specific IN operations and parameters from the SCP, through the IM-SCF, to the southbound SSP. This capability is achieved by tunnelling an XER (XML representation of ASN.1) or a BER (binary representation of ASN.1) representation of IN operations to and from the SCP.

Supported Switch Call Related Operations

Table 2–41 lists the switch call related operations supported by IM-SSF AIN 0.2.

Table 2–41 Switch Call Related Operations Supported by IM-SSF AIN 0.2

Message	Direction
Info_Analyzed	Service Broker to SCP
Info_Collected	Service Broker to SCP

Table 2–41 (Cont.) Switch Call Related Operations Supported by IM-SSF AIN 0.2

Message	Direction
Network_Busy	Service Broker to SCP
Origination_Attempt	Service Broker to SCP
Resource_Clear	Service Broker to SCP
Termination_Attempt	Service Broker to SCP

Supported SCP Call Related Operations

Table 2–42 lists the SCP call related operations supported by IM-SSF AIN 0.2.

Table 2–42 SCP Call Related Operations Supported by IM-SSF AIN 0.2

Message	Direction
Analyze_Route	SCP to Service Broker
Authorize_Termination	SCP to Service Broker
Cancel_Resource_Event	SCP to Service Broker
Continue	SCP to Service Broker
Disconnect	SCP to Service Broker
Forward_Call	SCP to Service Broker
Send_To_Resource	SCP to Service Broker

Supported Non-Call Related Operations

Table 2–43 lists the non-call related operations supported by IM-SSF AIN 0.2.

Table 2–43 Non-Call Related Operations Supported by IM-SSF AIN 0.2

Message	Direction
Send_Notification	SCP to Service Broker
Termination_Notification	Service Broker to SCP

IM-OCF Ro

IM-OCF is an application-facing IM that provides an IMS Charging Trigger Function (CTF) front-end to any external Diameter-based Online Charging Server, acting as a 3GPP-compliant, IMS-Gateway Function (IMS-GWF). IM-OCF connects to the Orchestration Engine on the southbound, and interacts with online charging platforms using Diameter Ro or PCP in the northbound, allowing realtime charging for any session, whether IN, SIP, or any other session or event that is mediated through Service Broker.

In general, IM-OCF requests service units (usually time) from the charging server and controls the session duration accordingly.

Key Functionality

IM-OCF supports all types of charging models defined by 3GPP standards as described in the following sections:

- Event-based Charging with Unit Reservation (ECUR)

This functionality is used for event charging in the IMS domain over ISC SIP events (for example, MESSAGE) or legacy domain over IN triggers (for example, InitialDPSMS) depending on southbound interworking modules. Unit Reservation enables credit updates only at the end of the event.

- Immediate Event Charging (IEC)

  This feature is used for session charging in the IMS domain over ISC SIP events (for example, MESSAGE) or legacy domain over IN triggers (for example, InitialDPSMS) depending on southbound interworking modules. Immediate charging updates the credit at the time when the event occurs.

- Degraded mode

  In the online charging solution, Service Broker forwards charging request to an external online charging server (OCS). When the OCS is unreachable or not responding, Service Broker can assume proxy functions for the OCS. In this mode, called degraded mode, Service Broker provides service continuity by authorizing or denying charging requests for sessions based on pre-defined criteria. During the degraded mode, IM-OCF gathers charging information about the session by writing Charging Data Records (CDRs). When the OCS becomes available, IM-OCF Broker replays these CDRs to the OCS. Then the OCS actually charges the mobile subscriber.

- Announcement Manager

  You can set up IM-OCF Ro to trigger a Media Resource Function (MRF) to play announcements. You can specify the MRF that plays announcements, as well as set up the rules that define the announcement to be played based on various conditions. For example, you can define that the MRF plays an announcement to a calling party when the time granted for the call is over, and the mobile subscriber is located in the home network.

Supported Operations

Table 2–44 shows the operations supported by IM-OCF:

Table 2–44 Operations Supported by IM-OCF

Command-Name	Source	Destination	Abbreviation
Credit-Control-Request	Service Broker	OCF	CCR
Credit-Control-Answer	OCF	Service Broker	CCA
Re-Auth-Request	OCF	Service Broker	RAR
Re-Auth-Answer	Service Broker	OCF	RAA
Capabilities-Exchange-Request	Service Broker	OCF	CER
Capabilities-Exchange-Answer	OCF	Service Broker	CEA
Device-Watchdog-Request	Service Broker/OCF	OCF/Service Broker	DWR
Device-Watchdog-Answer	OCF/Service Broker	Service Broker/OCF	DWA
Disconnect-Peer-Request	OCF/Service Broker	Service Broker/OCF	DPR
Disconnect-Peer-Answer	Service Broker/OCF	OCF/Service Broker	DPA
Abort-Session-Request	OCF	Service Broker	ASR

Table 2–44 (Cont.) Operations Supported by IM-OCF

Command-Name	Source	Destination	Abbreviation
Abort-Session-Answer	Service Broker	OCF	ASA

R-IM-OCF Ro

R-IM-OCF Ro is a network-facing IM. It provides an IMS Online Charging Function (OCF) front-end to the network. R-IM-OCF Ro connects to the Orchestration Engine in the northbound, and interacts with Charging Trigger Function (CTF) using Diameter Ro in the southbound, allowing real-time charging for IMS-based sessions using any charging function, whether IN or IMS.

In general, R-IM-OCF receives service-unit requests and mediates them to relevant protocols, depending on the Online Charging Function (OCF) that is used.

Key Functionality

R-IM-OCF Ro supports all types of charging models defined by 3GPP standards as described in the following sections:

- Session-based Charging with Units Reservation (SCUR)

  This functionality is used for session charging in the IMS domain over ISC SIP sessions (for example, SIP INVITE and BYE). It supports Unit Reservation and credit updates during a session.

- Event-based Charging with Unit Reservation (ECUR)-

  This functionality is used for session charging in the IMS domain over ISC SIP events (for example, MESSAGE). It supports Units Reservation and credit updates only at the end of the event.

- Immediate Event Charging (IEC)

  This feature is used for session charging in the IMS domain over ISC SIP events (for example, MESSAGE). Immediate charging updates the credit at the time when the event occurs.

Supported Operations

Table 2–45 shows the operations supported by R-IM-OCF Ro.

Table 2–45 Operations Supported by R-IM-OCF Ro

Command-Name	Source	Destination	Abbreviation
Credit-Control-Request	CTF	Service Broker	CCR
Credit-Control-Answer	Service Broker	CTF	CCA
Re-Auth-Request	Service Broker	CTF	RAR
Re-Auth-Answer	CTF	Service Broker	RAA
Capabilities-Exchange-Request	CTF	Service Broker	CER
Capabilities-Exchange-Answer	Service Broker	CTF	CEA
Device-Watchdog-Request	Service Broker/CTF	CTF/Service Broker	DWR

Table 2–45 (Cont.) Operations Supported by R-IM-OCF Ro

Command-Name	Source	Destination	Abbreviation
Device-Watchdog-Answer	CTF/Service Broker	Service Broker/CTF	DWA
Disconnect-Peer-Request	CTF/Service Broker	Service Broker/CTF	DPR
Disconnect-Peer-Answer	Service Broker/CTF	CTF/Service Broker	DPA
Abort-Session-Request	Service Broker	CTF	ASR
Abort-Session-Answer	CTF	Service Broker	ASA

IM-OFCF PCP

IM-OFCF PCP is an application-facing IM. IM-OFCF PCP communicates with the Oracle BRM application through PCP.

IM-OFCF PCP deployed together with R-IM-OFCF RADIUS enables Service Broker to provide communication between network entities and the BRM application as follows:

1. R-IM-OFCF RADIUS receives a RADIUS accounting request from entities in the network. R-IM-OFCF RADIUS forwards this request to IM-OFCF PCP.
2. IM-OFCF PCP translates the accounting request to PCP and sends the request to the BRM application.
3. The BRM application sends an accounting answer to IM-OFCF PCP. IM-OFCF PCP forwards the answer to R-IM-OFCF RADIUS.
4. IM-OFCF RADIUS translates the accounting answer to RADIUS and sends the answer back to the network entity.

Key Functionality

IM-OFCF PCP supports the following key functionality:

- Mediation between RADIUS and PCP (in conjunction with R-IM-OFCF PCP)
- Sending accounting requests to the BRM application based on accounting requests received from R-IM-OFCF RADIUS
- Receiving accounting answers from the BRM application and forwarding them to R-IM-OFCF RADIUS

Supported Operations

Table 2–46 shows the PCP operation codes supported by IM-OFCF PCP.

Table 2–46 PCP Operation Codes Supported by IM-OFCF PCP

Message	Direction
PCM_OP_TCF_AAA_ACCOUNTING_ON	Service Broker to BRM
PCM_OP_TCF_AAA_ACCOUNTING_OFF	Service Broker to BRM
PCM_OP_TCF_AAA_START_ACCOUNTING	Service Broker to BRM
PCM_OP_TCF_AAA_STOP_ACCOUNTING	Service Broker to BRM

Table 2–46 (Cont.) PCP Operation Codes Supported by IM-OFCF PCP

Message	Direction
PCM_OP_TCF_AAA_UPDATE_ ACCOUNTING	Service Broker to BRM

R-IM-OFCF RADIUS

R-IM-OFCF RADIUS is a network-facing IM. R-IM-OFCF RADIUS communicates with network entities through the RADIUS protocol.

R-IM-OFCF RADIUS deployed together with IM-OFCF PCP enables Service Broker to provide communication between network entities and the Oracle BRM application as follows:

1. R-IM-OFCF RADIUS receives a RADIUS accounting request from entities in the network. R-IM-OFCF RADIUS forwards this request to IM-OFCF PCP.
2. IM-OFCF PCP translates the accounting request to PCP and sends the request to the BRM application.
3. The BRM application sends an accounting answer to IM-OFCF PCP. IM-OFCF PCP forwards the answer to R-IM-OFCF RADIUS.
4. R-IM-OFCF RADIUS translates the accounting answer to RADIUS and sends the answer back to the network entity.

Key Functionality

R-IM-OFCF RADIUS supports the following key functionality:

- Receiving accounting requests from network entities and forwarding them to IM-OFCF PCP
- Receiving accounting answers from IM-OFCF PCP and forwarding them to network entities

Supported Operations

Table 2–47 shows the RADIUS operations supported by R-IM-OFCF RADIUS.

Table 2–47 RADIUS Operations Supported by R-IM-OFCF RADIUS

Message	Direction
Accounting-Request	CTF to Service Broker
Accounting-Response	Service Broker to CTF

IM-ASF SIP

IM-ASF SIP is an application-facing module that provides an IMS session control entity (that is CSCF) front-end to a SIP Application Server, and allows interaction with Service Broker as if it were an IMS switch interacting through SIP. IM-ASF SIP enables Service Broker to invoke services running on SIP Application Servers (ASs). Every instance of IM-ASF SIP interacts with one SIP AS and holds at least two SIP UAs: a UAC for the session toward the SIP AS and a UAS for the session from the SIP AS.

Key Functionality

IM-ASF SIP supports the following key functionality:

- SIP UAC and UAS—acting as a standard SIP User Agent Client and SIP User Agent Server towards a SIP B2BUA AS. It supports all SIP states, timers and retransmissions, according to SIP standards.
- SIP header/token manipulation and mediation.

Supported SIP Requests

IM-ASF SIP supports the following SIP requests:

- INVITE
- BYE
- INFO
- CANCEL
- OPTIONS
- UPDATE
- REGISTER
- MESSAGE
- SUBSCRIBE
- NOTIFY
- REFER
- PRACK

R-IM-ASF SIP

Service Broker Reverse IM-ASF (R-IM-ASF) is a network-facing module that provides an IMS Application Server front-end to the network, and allows interaction with Service Broker as if it were an IMS Application Server interacting through SIP. R-IM-ASF SIP is therefore the Service Broker interface connecting to IMS core elements, such as the S-CSCF, and for other pre-IMS elements, such as Soft switches and MGCs. Every instance of R-IM-ASF SIP interacts with one S-CSCF, providing the S-CSCF with access to Service Broker.

Key Functionality

R-IM-ASF SIP supports the following key functionality:

- SIP UAC and UAS: Acts as a Back-to-Back User Agent or SIP RDS, supporting all SIP states, timers and retransmission, according to SIP standards.
- SIP header/token manipulation and mediation.
- Charging services

  R-IM-ASF SIP provides the following charging services:

  - Credit reservation requests generation

R-IM-ASF SIP sends these requests to IM-OCF through the OE. IM-OCF translates credit reservation requests to Diameter CCR and sends these CCRs to a billing application.

- Session monitoring and charging

  R-IM-ASF SIP monitors and charges a session on its own.

- Quota reauthorization

  You can specify whether R-IM-ASF SIP reauthorizes a quota upon receiving various triggers from a CSCF.

Supported SIP Requests

R-IM-ASF SIP supports the following SIP requests:

- INVITE
- BYE
- INFO
- CANCEL
- OPTIONS
- UPDATE
- REGISTER
- MESSAGE
- SUBSCRIBE
- NOTIFY
- REFER
- PRACK

IM-ASF SAL

IM-ASF SAL is an application-facing module that connects Service Broker with Service Broker applications, that is either out-of-the-box Service Broker applications, such as VPN and SVC, or complementary applications that you implement using the SAL extension framework. You deploy an instance of IM-ASF SAL, allowing Service Broker to communicate with a Service Broker application, when you want to add the application to the orchestration sequence and have the OE route sessions to that application. Each instance of IM-ASF SAL provides an interface to one application.

IM-ASF SAL communicates with Service Broker applications through a proprietary SAL protocol. SAL is closely related to the SIP protocol and contains many of the same parameters, such as the SIP timers. IM-ASF SAL provides states, timers and retransmission services to the application similar to those defined in the SIP standards.

IM-PSX

IM-PSX enables a SIP application to communicate with entities (such as an HLR and a VLR) in GSM and CDMA networks.

Service Broker IM-PSX supports the following protocols:

- IM-PSX MAP for GSM

- IM-PSX ANSI-MAP for CDMA

IM-PSX MAP for GSM

This section describes IM-PSX, which supports the MAP protocol used in GSM networks.

Key Functionality

IM-PSX MAP supports the following key functionality:

- Retrieving a mobile subscriber's IMSI
- Requesting information about a mobile subscriber, such as the subscriber's state and location, from an HLR or VLR
- Modifying information about a mobile subscriber, such as activating or deactivating event reporting from an HLR or VLR
- Requesting mobile subscription information, such as call forwarding supplementary service data, from an HLR or VLR
- Updating a VLR with a subscriber's data, such as changing the subscription or supplementary services

Supported Operations

Table 2–48 describes the MAP operations supported by IM-PSX MAP:

Table 2–48 Supported MAP Operations

Message	Direction
MAP-ANY-TIME-INTERROGATION	Service Broker to HLR
MAP-ANY-TIME-SUBSCRIPTION-INTERROGATION	Service Broker to HLR
MAP-ANY-TIME-MODIFICATION	Service Broker to HLR
MAP-INSERT-SUBSCRIBER-DATA	Service Broker to VLR
MAP-SEND-IMSI	Service Broker to HLR

IM-PSX ANSI-MAP for CDMA

This section describes the IM-PSX ANSI-MAP, which supports the ANSI-41E protocol used in CDMA networks.

Key Functionality

IM-PSX ANSI-MAP supports the following key functionality:

- Requesting information about a mobile subscriber, such as the subscriber's state and location, from an HLR

  A SIP application can initiate a session with IM-PSX ANSI-MAP when the application needs to obtain information about a mobile subscriber. The application can send a request to IM-PSX and specify required information (for example, the subscriber's location). IM-PSX then translates this request to the ANSI-MAP protocol and forwards the request to an HLR.

  After the HLR responds to the IM-PSX's request, IM-PSX forwards the HLR's response to the SIP application that initiated the session.

- Receiving notifications from an HLR when a subscriber who was previously inaccessible becomes accessible again

  If a SIP application requests information about a subscriber who is currently inaccessible, you can configure IM-PSX to receive a notification from an HLR when this subscriber becomes accessible again. In this case, the HLR initiates the session with IM-PSX. In the notification, the HLR provides subscriber's identification information, including MIN and ESN, and information about the subscriber's location.

Supported Operations

Table 2–49 describes the ANSI-41E operations supported by IM-PSX ANSI-MAP.

Table 2–49 Supported ANSI-41E Operations

Message	Direction
SMSRequest	Service Broker to HLR
SMSNotification	HLR to Service Broker
Search	Service Broker to HLR

IM-PSX Plugin

IM-PSX Plugin is a network-facing module that enables Service Broker to handle messages which existing IMs do not support. Unlike other network-facing IMs that communicate with TCAP users (such as CAP, INAP, WIN, or MAP), IM-PSX Plugin communicates with TCAP directly.

IM-PSX Plugin supports both ANSI and ETSI networks, as described in the following sections:

- IM-PSX ANSI Plugin
- IM-PSX ETSI Plugin

IM-PSX ANSI Plugin

This section describes IM-PSX Plugin that provides a TCAP interface for communicating with network entities in ANSI networks.

Key Functionality

IM-PSX ANSI Plugin supports the following key functionality:

- Generating a SIP message based on the information that IM-PSX ANSI Plugin received from the network
- Generating a TCAP message based on the information that IM-PSX ANSI Plugin received from a SIP application
- Support for PAbort and UAbort

Supported Operations

Table 2–50 describes the ANSI operations supported by IM-PSX ANSI Plugin.

Table 2–50 Supported IM-PSX ANSI Plugin Operations

Message	Direction
Query With Permission	Both directions
Query Without Permission	Both directions
Conversation With Permission	Both directions
Conversation Without Permission	Both directions
Response	Both directions
Unidirectional	Both directions

IM-PSX ETSI Plugin

This section describes IM-PSX Plugin that provides a TCAP interface for communicating with network entities in ETSI networks.

Key Functionality

IM-PSX ETSI Plugin supports the following key functionality:

- Generating a SIP message based on the information that IM-PSX ETSI Plugin received from the network
- Generating a TCAP message based on the information that IM-PSX ETSI Plugin received from a SIP application
- Support for PAbort and UAbort

Supported Operations

Table 2–51 describes the ETSI operations supported by IM-PSX ETSI Plugin.

Table 2–51 Supported IM-PSX Plugin ETSI Operations

Message	Direction
Begin	Both directions
Continue	Both directions
End	Both directions
Unidirectional	Both directions
Abort	Both directions

IM-UIX-SMS

IM-UIX-SMS is a network-facing module that enables Service Broker to receive messages from, and send them to, Short Message Service Centers (SMSCs) through the Short Message Peer-to-Peer Protocol (SMPP).

In conjunction with application-facing IMs (for example, IM-ASF), IM-UIX-SMS provides a solution for routing messages between SMSCs and applications.

IM-UIX-SMS communicates with SMSCs as follows:

- Sending messages from an SMSC to IM-UIX-SMS:

IM-UIX-SMS receives a **deliver_sm** request sent by an SMSC through the SMPP SSU. IM-UIX-SMS translates the request to a SAL message and sends it to the OE. The OE routes the message to an appropriate IM based on the orchestration logic.

- Sending messages from IM-UIX-SMS to an SMSC:

  IM-UIX-SMS receives a message sent by an application through an application-facing IM that supports the appropriate protocol (for example, through IM-ASF when a message is sent over SIP). Based on the received message, IM-UIX-SMS generates a **submit_sm** message and sends it to an SMSC through the SMPP SSU.

Key Functionality

IM-UIX-SMS supports the following key functionality:

- Routing messages from an application to a single destination through the SMSC
- Scheduling the date and time of message delivery
- Specifying the message modes
- Setting the delivery priority of a message
- Defining the data coding type of a message
- Setting the validity period of a message
- Associating a service type with each message
- Sending a registered short message that triggers the SMSC to send a delivery receipt to the originator of the message

Supported Functionality

Table 2–52 describes SMPP operations supported by IM-UIX-SMS.

Table 2–52 Supported SMPP Operations

Message	Direction
submit_sm	Service Broker to SMSC
submit_sm_resp	SMSC to Service Broker
deliver_sm	SMSC to Service Broker
deliver_sm_resp	Service Broker to SMSC

IM-WS

IM-WS is a network-facing module that enables Service Broker to receive messages from, and send messages to, web services using Simple Object Access Protocol (SOAP) or Representative State Transfer (REST) protocol.

IM-WS communicates with web services as follows:

- Sending messages from IM-WS to a web service:

  IM-WS receives an event notification submitted by an application in the SAL format. IM-WS translates this message into a SOAP or REST message and send it to a web service through the Web Services SSU.

- Sending messages from a web service to IM-WS:

IM-WS receives a SOAP message sent by a web service through the Web Services SSU. IM-WS translates this message from SOAP or REST to a SAL message and sends it to the OE. The OE routes the message to an appropriate IM based on the orchestration logic.

Key Functionality

IM-WS supports the following key functionality:

- Translating SAL messages into SOAP or REST messages
- Translating SOAP or REST messages into SAL messages

3

Service Broker Service Orchestration

This chapter describes the components and the mechanics of the Oracle Communications Service Broker Orchestration.

About Orchestration Engine

The Orchestration Engine (OE) is core to Service Broker functionality and is responsible for delivering multiple services per session (see "Orchestration Engine").

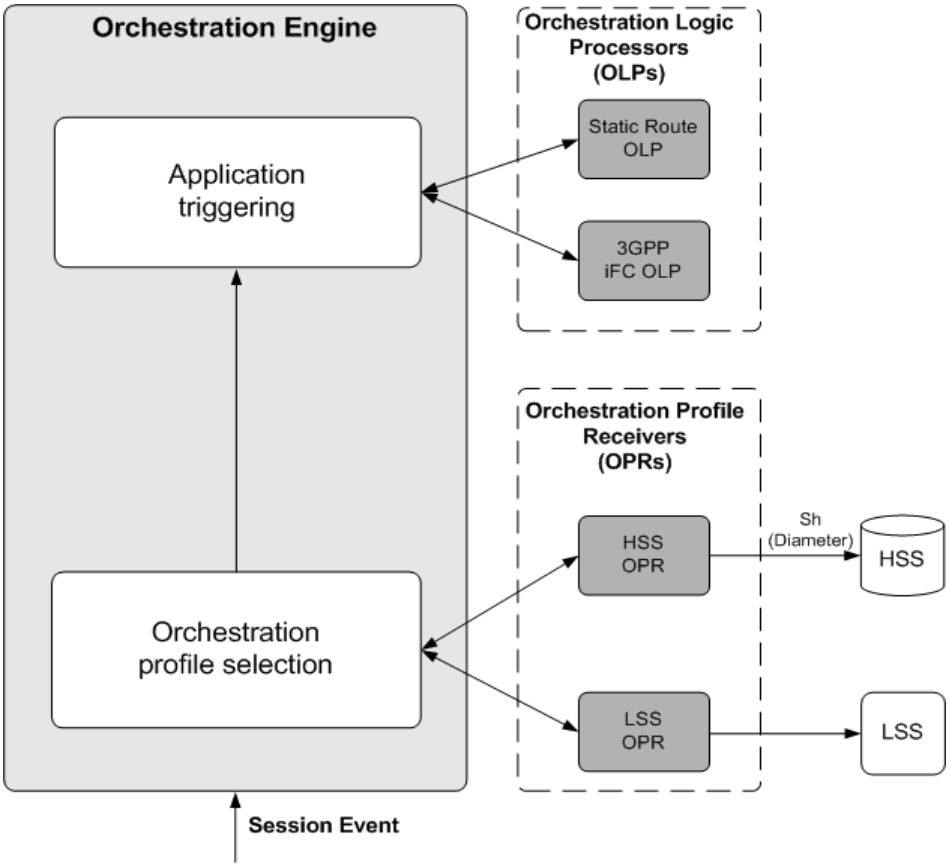
To perform service orchestration, the OE uses orchestration logic. Orchestration logic defines a chain of applications to invoke, and the order by which the applications are invoked. The orchestration logic is different for each session.

The OE uses two types of components:

- Orchestration Profile Receivers (OPRs)
- Orchestration Logic Processors (OLPs)

Figure 3–1 shows how OPRs and OLPs are used by the OE to select and download orchestration logic.

Figure 3–1 Orchestration Engine Components (Core Engine: OPRs and OLPs)



When triggered by a session, the OE performs the following procedure:

1. Orchestration profile selection. To select and retrieve an orchestration profile, the OE uses the OPR that you specified when configuring the OE. You can specify one of the following OPRs:

   - Default OPR

     The OE uses this OPR to route a session based on the the static route OLP.

   - HSS OPR

     The OE uses this OPE to retrieve subscriber profiles from an HSS.

   - LSS OPR

     The OE uses this OPR to retrieve subscriber profiles from an SM-LSS.

   - Custom OPR

     This option is relevant for the Online Mediation Controller only. The OE uses this OPR to retrieve subscriber profiles from the Subscriber Store. If the subscriber profile is missing, the OPR returns the error, and the OE terminates the session.

   See the "Configuring General Parameters" section in the "Configuring the Orchestration Engine" chapter in the *Oracle Communications Service Broker Processing Domain Configuration Guide* for more information.

   The orchestration profile includes information on the type of OLP to use, and the specific parameters that this type of the OLP requires.

2. Application triggering. The OE interacts with an OLP component. The type of the OLP is specified by the OPR that was used in the previous step. Using the information included in the profile, the OLP obtains orchestration logic, processes the orchestration logic, and determines which application to trigger next. Once an application is selected by the OLP, the OE routes the session towards that application and waits for the application to return.
3. When the session returns, the OE continues processing the orchestration logic, looking for the next application to trigger. This process repeats until orchestration is completed. At this stage the OE routes the session back to the session control entity.

About Orchestration Profile Receivers (OPRs)

When OE triggers an OPR, the OPR responds with an orchestration profile. The OPR performs the following steps in order to obtain an orchestration profile:

1. Connecting to a profile server that holds subscriber data and orchestration profiles:

   OPR connects to a Home Subscriber Server (HSS) or to an on-board profile server (called Local Subscriber Server).

2. Selecting an orchestration profile:

   OPR uses session information (for example, session origination, session destination and IN Service Key) to select an orchestration profile.

3. Obtaining the orchestration profile:

   OPR obtains the selected orchestration profile and forwards it to the OE.

Different OPRs connect different sources of subscriber data and orchestration profiles. Service Broker installation includes the following OPRs:

- HSS Orchestration Profile Receiver

  The Home Subscriber Server (HSS) is the primary user database in the IMS domain. It contains subscription-related information including subscriber applications and orchestration profiles. The HSS OPR uses the Diameter protocol over the standard Sh interface to connect the HSS and select orchestration profile.

- LSS Orchestration Profile Receiver

  Service Broker offers an on-board implementation of a profile server, called Local Subscriber Server (LSS). The LSS is capable of storing subscriber profiles, including orchestration logic given in the Initial Filter Criteria (iFC) format. The LSS OPR connects the LSS to look up subscriber profiles with orchestration logic.

- Default Orchestration Profile Receiver

  When this OPR is used, the OE does not retrieve an orchestration profile from an external server. Instead, the OE triggers the Static Route OLP with its pre-configured orchestration logic.

It is possible to add new OPRs to Service Broker, to connect to other profile sources that exist in the operator's network. Service Broker can apply orchestration logic defined in HSS or any other profile source to the legacy domain.

About Orchestration Logic Processors (OLPs)

Orchestration Logic Processors (OLPs) obtain orchestration logic and process it in order to determine which applications to invoke and in which order. The OLP is triggered by the OE. It requires profile data and provides the address of the application that needs to be invoked in return. When the application finishes its processing and returns to the OE, the OE triggers the OLP again to receive the address of the next application to invoke.

Different OLPs are used to process different formats of profiles and orchestration logic rules. Service Broker installation includes the following OLPs listed. By default, the OE is installed with an OLP that executes initial Filter Criteria (iFC). It is possible to add new OLPs to Service Broker to support additional formats of orchestration logics.

- Initial Filter Criteria (iFC) OLP

  Initial Filter Criteria (iFC) is a standard format for specifying orchestration logic, specified in ETSI TS 129 228 V7.11.0, IP Multimedia (IM) Subsystem Cx and Dx Interfaces. iFC is a set of rules in XML format, composed of conditions (Trigger Points) and application servers that will be invoked if a condition is met. The conditions are given in logic expressions and can be applied on the content fields within the session.

- Static Route OLP

  The Static Route OLP uses a pre configured list of applications to determine which applications to invoke and in which order.

Supported iFC Trigger Point Methods

An iFC definition contains conditions that the OE uses to determine which applications to invoke for a given session. In effect, the iFC defines the application chain through which the messages in a session are processed.

The filtering elements in an iFC include the trigger point method. This value provides a filtering condition based on the message type of the incoming request.

As conventionally defined, the iFC trigger point method represents a SIP request type, such as INVITE or REGISTER. However, note that as a mediation layer, Service Broker transforms messages received from diverse networks into a common internal representation of the messages. As a result, the method types available for use as trigger method values in Service Broker OE comprise a subset of those defined by the iFC specification.

Specifically, the Orchestration Engine supports the following trigger point method types in its iFCs:

- INVITE
- REGISTER
- MESSAGE
- SUBSCRIBE
- NOTIFY

These method types directly correspond to their SIP method equivalents. For other networks, Service Broker performs a logical mapping between message types.

4

Service Broker Signaling Server Units

Oracle Communications Service Broker Signaling Server Units (SSUs) manage Service Broker connectivity to external networks. For each network domain, a specific implementation of SSU handles the network connectivity functions.

This chapter describes the purpose and functionality of each of the SSUs.

SS7 Signaling Server Units (TDM and SIGTRAN)

The Signaling System #7 (SS7) Signaling Server Unit (SSU) enables Service Broker to access legacy SS7 network entities (for example, MSC and SCP).

The SS7 SSU is the Service Broker connectivity point to the network Signaling Gateways (SGs) or Signaling Transfer Points (STPs). Serving as the Service Broker front-end o the SS7 network, the SS7 SSU provides Service Broker with a point code, presenting it to the network as an SS7 signaling entity. Service Broker IMs that require an interface to the SS7 network (for example, IM-SCF and IM-SSF), use the SS7 SSU to send and receive SS7 messages to and from the SS7 network.

While the SS7 SSU supports the SS7 SCCP and lower protocol layers, the Service Broker IMs that interact with the SS7 SSU handle TCAP and higher SS7 protocol layers (for example, CAP and INAP).

Towards the SS7 network, the SS7 SSU presents a possibly redundant logical interface (one or more point codes) that has redundant physical interfaces. Redundancy is accomplished by deploying the SSUs in pairs (1+1 architecture). The redundancy model for the SSU is Active/Active with no single point of failure.

The SSU's role is to process low SS7 stack layers (up to SCCP) and distribute the traffic to the Service Broker IMs for processing.

To facilitate access to an underlying SS7 stack, Service Broker wraps the SS7 stack in an SS7 process, which is available to the SSU through a TCP connection.

SS7 SSU is available for two types of SS7 network connectivity, described in the following sections:

- SS7 SSU for Time-Division Multiplexing (TDM)
- SS7 SSU for SIGTRAN MTP3 User Adaptation Layer (M3UA)

SS7 SSU for Time-Division Multiplexing (TDM)

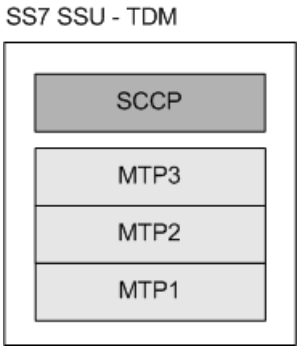
SS7 SSU over TDM provides Service Broker with connectivity to the legacy SS7 network over Time Division Multiplexing (TDM) physical infrastructure (i.e. PCMs) through the use of dedicated TDM signaling boards. Usually, SS7 SSUs are physically connected to STPs, but they can also be directly connected to MSCs, HLRs, etc.

Key Functionality

SS7 SSU over TDM supports the following key functionality:

- Support for MTP1, MTP2, MTP3 and SCCP SS7 protocol layers, as shown in Figure 4–1.

Figure 4–1 SS7 Protocol Stack Supported by SS7 SSU over TDM



- Alias-based addressing: An alias is assigned to every SS7 network entity. Applications use Service Broker to interact with legacy SS7 network entities by specifying the alias of the destination entities. The SS7 SSU converts the alias to an SCCP address, that is used to route traffic in the SS7 network.
- Global Titling (GT): Supports GT address format.

SS7 SSU for SIGTRAN MTP3 User Adaptation Layer (M3UA)

SS7 SSU over SIGTRAN M3UA provides Service Broker with connectivity to the legacy SS7 network over an IP-based physical infrastructure, using the MTP3 User Adaptation Layer (M3UA). SS7 SSUs are physically connected to an IP network through Signaling Gateways (SGs).

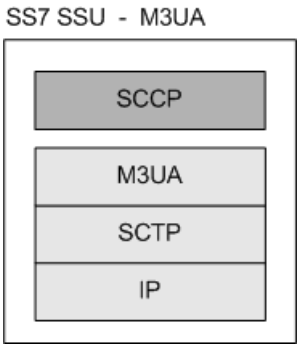
Key Functionality

SS7 SSU over SIGTRAN M3UA supports the following key functionality:

- Support for IP, SCTP, M3UA and SCCP SS7 protocol layers.
- Alias-based addressing: An alias is assigned to every SS7 network entity. Applications use Service Broker to interact with legacy SS7 network entities by specifying the alias of the destination entities. The SS7 SSU converts the alias to an SCCP address, that is used to route traffic in the SS7 network.
- Global Titling (GT): Supports GT address format.

  Figure 4–2 shows an SS7 protocol stack supported by SSU over M3UA.

Figure 4–2 SS7 Protocol Stack Supported by SSU over M3UA



SIP Signaling Server Unit

The SIP Signaling Server Unit (SSU) is a SIP front-end for Service Broker that provides access to SIP-based networks (for example, IMS) and the various SIP/IMS network elements (for example, CSCF, AS). Every Service Broker IM that requires a SIP interface (i.e. IM-ASF SIP, R-IM-ASF SIP) uses the SIP SSU as a sole route to send/receive SIP messages.

Redundancy of the SIP SSU is accomplished by deploying the SSUs in pairs (1+1 architecture).

Key Functionality

The SIP SSU supports the following key functionality:

- Alias-based addressing: An alias is assigned to every SIP network entity. Applications use Service Broker to interact with SIP network entities by specifying the alias of the destination entities. The SIP SSU converts the alias to an appropriate destination address that is used to route traffic in the SIP network. The same alias can be assigned to one or more SIP addresses, enabling alternative routing if one of the destinations is unreachable.
- Heartbeat: The SIP SSU is actively checking SIP entities in the network using the SIP OPTIONS request to check their availability status. The status information is used when routing SIP traffic from Service Broker to the network.
- Load balancing: When SIP traffic is designated to a certain address alias, the SIP SSU can divide traffic between more than one SIP address, providing load balancing between several SIP entities. Traffic is load balanced only between SIP entities that are known to be available, based on the heartbeat functionality.

Diameter Signaling Server Unit

The Diameter Signaling Server Unit (SSU) is a Diameter front-end for Service Broker, which provides access to remote Diameter entities (for example, OCS or HSS) in the IMS network. Every Service Broker IM that requires a Diameter interface, such as IM-OCF, uses the Diameter SSU as a sole route to send and receive Diameter messages.

Redundancy of the Diameter SSU is accomplished by deploying the SSUs in pairs (1+1 architecture).

Key Functionality

The Diameter SSU supports the following key functionality:

- Diameter connectivity: The Diameter SSU communicates with peer Diameter entities, supporting incoming and outgoing traffic.
- Alias-based addressing: An alias can be assigned to every Diameter network entity. Applications use Service Broker to interact with Diameter network entities by specifying the alias of the destination entities. The Diameter SSU converts the alias to an appropriate destination address that is used to route traffic in the network. The same alias can be assigned to multiple Diameter destinations to enable load sharing and alternative routing if a destination is unavailable.
- Alias-based routing: You can assign one alias to different Diameter destinations. The Diameter SSU would distribute requests among all destinations, using a round robin routing mechanism. You can assign different aliases to destinations supporting different functionality, providing a way to route Diameter requests to a particular Diameter function.
- Availability: The Diameter SSU holds a list of established Diameter transport connections and monitors their availability status when routing Diameter traffic from Service Broker to the network.

RADIUS Signaling Server Unit

The RADIUS Signaling Server Unit (SSU) is the RADIUS front-end for Service Broker that handles incoming RADIUS messages. Network entities transfer accounting messages to the RADIUS SSU, which then routes the messages to the appropriate IM, based on criteria defined for incoming messages. The RADIUS SSU is the sole route for transferring RADIUS accounting messages to the IM.

The RADIUS SSU also receives access messages containing subscriber authentication and authorization information. Access messages are then transferred to an appropriate Service Broker component.

Key Functionality

The RADIUS SSU supports the following key functionality:

Inbound routing: Messages are despatched to their destinations according to the local realm value of the User-Name AVP of the incoming message.

PCP Signaling Server Unit

The PCP Signaling Server Unit (PCP SSU) is a Portal Communications Protocol (PCP) front-end for Service Broker, providing communication with Oracle Communications Billing and Revenue Management (BRM) applications through PCP.

The PCP SSU receives charging requests from IMs, such as IM-OFCF PCP or IM-OCF PCP, and route the requests to BRM applications through the PCP.

Key Functionality

The PCP SSU supports the following key functionality:

- PCP connectivity with Oracle Communications BRM applications: The PCP SSU routes PCP requests to BRM applications using connection pools that maintain secured connections with the Oracle Communications BRM Connection Managers (CMs).
- A heartbeat mechanism: The PCP SSU implements a heartbeat mechanism, regularly sending requests to instances of BRM applications to check their

availability. The PCP SSU stop sending requests to unavailable instance, but continues checking their availability every few seconds.

- Alias-based routing: You can assign one alias to different instances of the same BRM application. The PCP SSU would distribute PCP requests among all instances, using a round robin routing mechanism. You can assign different aliases to instances of different BRM applications, providing a way to route PCP requests to a particular BRM application.

SMPP Signaling Server Unit

The SMPP SSU is a Signaling Server Unit (SSU) that enables Service Broker to communicate with Short Message System Centers (SMSC) through the Short Message Peer-to-Peer Protocol (SMPP).

In conjunction with IM-UIX-SMS and various network-facing IMs (for example, R-IM-ASF), the SMPP SSU enables Service Broker to act as an External Short Messaging Entity (ESME). As an ESME, Service Broker can send **submit_sm** messages to, and receive **deliver_sm** messages from, SMSCs.

Key Functionality

The SMPP SSU supports the following key functionality:

- Routing a **submit_sm** message generated by IM-UIX-SMS to an SMSC. You can set up rules that define the SMSC to which the SMPP SSU sends the message.
- Checking whether the SMSC is active using the heartbeat mechanism. Using this mechanism, the SMPP SSU sends regular requests to the SMSC and waits for a response. If the SMPP SSU does not receive a response within the specified period of time, the SMPP SSU considers the SMSC is inactive and does not send any further requests to this SMSC.
- Routing a **deliver_sm** message that Service Broker receives from an SMSC to IM-UIX-SMS. You can set up rules that define the IM-UIX-SMS instance to which the SMPP SSU sends the message.

Web Services Signaling Server Unit

The Web Services SSU is an SSU that enables Service Broker to communicate with external entities using SOAP-based or REST-based communications.

Service Broker applications and other components (such as IM-WS) interact with external entities through the Web Services SSU.

The Service Broker applications that use the Web Services SSU include the IM-WS and the Top Up and Subscriber Store services, which expose SOAP APIs.

Key Functionality

The Web Services SSU supports the following key functionality:

- Routing incoming requests to internal applications or IMs. A routing rule maps a requested resource (by URL) to an internal service or IM destination.
- Acting as a client for external Web service providers used by Service Broker applications.

- Applying authentication requirements to incoming requests. Service Broker can validate credentials in the form of HTTP Basic Authentication or WSSE UsernameToken credentials.

A

Supported Standards

This appendix lists the telecommunication standards supported by Oracle Communications Service Broker.

GSM/UMTS Standards

Service Broker supports the following GSM/UMTS standards:

CAMEL Phase 1

- ETSI TS 101 046 V5.7.0, CAMEL Application Part (CAP) Phase 1 (3GPP TS 09.78)

CAMEL Phase 2

- ETSI TS 101 285 V7.2.0, CAMEL Application Part (CAP) Phase 2, Stage 1 (3GPP TS 02.78)
- ETSI TS 101 441 V7.8.1, CAMEL Application Part (CAP) Phase 2, Stage 2 (3GPP TS 03.78)
- ETSI TS 101 046 V7.1.0, CAMEL Application Part (CAP) Phase 2, Stage 3 (3GPP TS 09.78)

CAMEL Phase 3

- ETSI TS 122 078 V4.5.0, CAMEL Application Part (CAP) Phase 3, Stage 1 (3GPP TS 22.078)
- ETSI TS 123 078 V4.11.0, CAMEL Application Part (CAP) Phase 3, Stage 2 (3GPP TS 23.078)
- ETSI TS 129 078 V4.8.0, CAMEL Application Part (CAP) Phase 3, Stage 3 (3GPP TS 29.078)

CAMEL Phase 4

- ETSI TS 122 078 V7.6.0, CAMEL Application Part (CAP) Phase 4, Stage 1 (3GPP 22.078)
- ETSI TS 123.078 V7.9.0, CAMEL Application Part (CAP) Phase 4, Stage 2

- ETSI TS 129.078 (3GPP TS 29.078) V6.5.0, CAMEL Application Part (CAP) Phase 4, Stage 3 (3GPP TS 23.078)
- ETSI TS 129.078 V7.5.0, CAMEL Application Part (CAP) Phase 4, Stage 3

  (3GPP TS 29.078)

GSM/IMS Standards

Service Broker supports the following GSM/IMS standards:

CAMEL over IMS

- V7.1.0, Customised Applications for Mobile Network Enhanced Logic (CAMEL) IM CN networking, Phase 4, Stage 2 (3GPP TS 23.278)
- V7.0.0, CAMEL Application Part (CAP) for IP Multimedia Subsystems (IMS) (3GPP TS 29.278)

IMS Architecture

- ETSI TS 123 218 V7.9.0, IP Multimedia (IM) Session Handling; IM call model, Stage 2 (3GPP TS 23.218)
- ETSI TS 122 228 V7.5.0, Service requirements for the Internet Protocol (IP) multimedia core network subsystem (IMS), Stage 1 (3GPP TS 22.228)
- ETSI TS 123 228 V7.7.0, IP Multimedia Subsystem (IMS), Stage 2 (3GPP TS 23.228)
- ETSI TS 129 228 V7.3.0, IP Multimedia (IM) Subsystem Cx and Dx Interfaces (3GPP TS 29.228)
- ETSI TS 129 229 V6.6.0, Cx and Dx interfaces based on Diameter protocol; Protocol details (3GPP TS 29.229)
- ETSI TS 124 229 V8.0.0, Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP), Stage 3 (3GPP TS 24.229)
- ETSI TS 129 329 V7.4.0, Sh Interface based on the Diameter protocol (3GPP 29.329)
- ETSI TS 129 328 V7.9.0, IP Multimedia (IM) Subsystem Sh Interface; Signaling flows and message contents (3GPP 23.328)

IMS Charging

- ETSI TS 132 299 V7.5.0, Telecommunication management; Charging management; Diameter charging applications (3GPP TS 32.299)
- ETSI TS 132 296 V7.0.0, Telecommunication management; Charging management; Online Charging System (OCS): Applications and interfaces (3GPP TS 32.296)
- ETSI TS 132 240 V7.2.0, Telecommunication management; Charging management; Charging architecture and principles (3GPP TS 32.240)
- ETSI TS 132 260 V8.7.0, Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging (3GPP TS 32.260)
- ETSI TS 132 270 V8.0.0, Multimedia Messaging Service (MMS) charging

  (3GPP TS 32.270)
- ETSI TS 132 274 V8.5.0, Short Message Service (SMS) charging (3GPP TS 32.274)

TDMA/CDMA Standards

- TIA/EIA-41-D, Cellular Radiotelecommunications Intersystem Operations, IS-41
- TIA/EIA Wireless Intelligent Network (WIN) Phase 1, IS-771
- TIA/EIA Wireless Intelligent Network (WIN) Phase 2, IS-826
- TIA/EIA, Wireless Features Description, IS-664 (3GPP2 S.R0006)
- TIA/EIA, Enhancement for Wireless Calling Name Feature Description, IS-764 (3GPP2 N.S0012-0)
- TIA/EIA, Enhanced Charging Services, IS-848 (3GPP2 N.S0004-0)
- TIA/EIA, Location Based Services, WIN Phase 3, IS-843 (3GPP2 X.S0009-0)

Wireline Intelligent Network (IN) Standards

Service Broker supports the following wireline Intelligent Network standards:

Intelligent Network Application Part (INAP) Capability Set 1 (CS-1)

- ITU-T Q.1218, Interface Recommendation for Intelligent Network CS-1
- ETSI ETS 300 374, Intelligent Network (IN); Intelligent Network Capability Set 1 (CS-1); Core Intelligent Network Application Protocol (INAP); Protocol specification

Advanced Intelligent Network (AIN)

- Bellcore, TR-NWT-1284, Advanced Intelligent Network (AIN) 0.1
- Bellcore, TR-NWT-1285, Advanced Intelligent Network (AIN) 0.1
- Telcordia GR-1298-CORE Advanced Intelligent Network (AIN) 0.2
- Telcordia GR-1299-CORE Advanced Intelligent Network (AIN) 0.2

IETF Standards

- IETF RFC 3261, Session Initiation Protocol
- IETF RFC 3428, Session Initiation Protocol Extension for Instant Messaging
- IETF RFC 2976, Session Initiation Protocol INFO Method
- IETF RFC 3325, Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Network
- IETF RFC 3455, Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3rd-Generation Partnership Project (3GPP)
- IETF RFC 3262, Reliability of Provisional Responses in the Session Initiation Protocol
- IETF RFC 3323, A Privacy Mechanism for the Session Initiation Protocol
- IETF RFC 3588, Diameter Base Protocol
- IETF RFC 3326, The Reason Header Field for the Session Initiation Protocol (SIP)
- IETF RFC 4240, Basic Network Media Services with SIP
- IETF RFC 4006, Diameter Credit-Control Application

- IETF RFC 2865, RADIUS Base Protocol
- IETF RFC 3579, RADIUS Support For Extensible Authentication Protocol (EAP)
- IETF RFC 2866, RADIUS Accounting Application
- IETF RFC 2869 (part of), RADIUS Radius Accounting Interim Update

MAP Standards

ETSI TS 129 002 V7.10.0, Mobile Application Part (MAP) specification (3GPP TS 29.002 version 7.10.0 Release 7)

UMTS Standards

- ETSI TS 123 018 V7.6.0, Universal Mobile Telecommunications System (UMTS); Basic call handling; Technical realization (3GPP TS 23.018 version 7.6.0 Release 7)
- ETSI TS 123 032 V7.0.0; Technical Specification Group Services and System Aspect; Universal Geographical Area Description (3GPP TS 23.032 version 7.0.0 Release 7)

SS7 Standards

- IETF RFC 4960, Stream Control Transmission Protocol
- IETF RFC 4666, Signaling System #7 (SS7) Message Transfer Part 3 (MTP3) - User Adaptation Layer (M3UA)
- ITU-T Q.713, Specifications of Signaling System #7 (SS7)—Signaling Connection Control Part (SCCP)
- ITU-T Q.771, Specifications of Signaling System No. 7 – Transaction Capabilities Application Part (TCAP)
- ITU-T Q.772, Specifications of Signaling System No. 7 – Transaction Capabilities Application Part (TCAP)
- ITU-T Q.773, Specifications of Signaling System No. 7 – Transaction Capabilities Application Part (TCAP)
- ITU-T Q.774, Specifications of Signaling System No. 7 – Transaction Capabilities Application Part (TCAP)
- ITU-T Q.775, Specifications of Signaling System No. 7 – Transaction Capabilities Application Part (TCAP)

> **Note:** Lower layer TDM protocols, MTP2 and MTP3, specified in ITU-T Q.701-Q.705, are supported by an external SS7 stack.

- Short Message Peer to Peer Protocol (SMPP) Specification v3.4, 12-Oct-1999 Issue 1.2

Web Services Standards

- JSR 311: JAX-RS, the Java API for RESTful Web Services
- JSR 224: Java API for XML-Based Web Services (JAX-WS) 2.0

- SOAP Version 1.2 Part 1: Messaging Framework (Second Edition) W3C Recommendation 27 April 2007

Policy Standards

- ETSI TS 123 203 V9.6.0, Universal Mobile Telecommunications System (UMTS); LTE; Policy and charging control architecture (3GPP TS 23.203 version 9.6.0 Release 9)
- ETSI TS 129 212 V9.4.0, Universal Mobile Telecommunications System (UMTS); LTE; Policy and charging control over Gx reference point (3GPP TS 29.212 version 9.4.0 Release 9)
- ETSI TS 129 213 V9.4.1, Universal Mobile Telecommunications System (UMTS); LTE; Policy and charging control signalling flows and Quality of Service (QoS) parameter mapping (3GPP TS 29.213 version 9.4.1 Release 9)
- ETSI TS 129 214 V9.4.1, Universal Mobile Telecommunications System (UMTS); LTE; Policy and charging control over Rx reference point (3GPP TS 29.214 version 9.4.1 Release 9)
- ETSI TS 129 215 V9.4.0, Universal Mobile Telecommunications System (UMTS); LTE; Policy and Charging Control (PCC) over S9 reference point; Stage 3 (3GPP TS 29.215 version 9.4.0 Release 9)