Oracle® Communications Service Broker

Concepts Guide

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Glossary

Preface

This document provides an overview of Oracle Communications Service Broker and explains the product's key concepts and technologies. The document also describes Service Broker's components and how they interact with each other.

Audience

This document is intended for users who require a general understanding of Oracle Communications Service Broker architecture.

This document assumes that the reader is familiar with:

- Intelligent Network (IN) architecture, concepts and variant protocols
- Signaling System #7 (SS7): SIGTRAN and TDM
- Session Initiation Protocol (SIP)
- IP Multimedia Subsystem (IMS) architecture and interfaces
- Java Management eXtensions (JMX)

Terminology

This section describes the Service Broker-specific terms used in this document. For an explanation of general terms, see **Glossary**.

Term	Description
IM	Interworking Module. IM is a fundamental element in Service Broker architecture, allowing connectivity between Service Broker and the various service platforms and session control platforms in the network.
IM-ASF SIP	Interworking Module—Application Server Function for SIP. The module provides an ISC interface between Service Broker and a SIP AS.
IM-PSX	Interworking Module—Presence and Subscriber-status eXtensions. The module provides a MAP interface between Service Broker and entities in an SS7 network.
IM-SCF	Interworking Module—Service Control Function. The module implements the SCP part of the IN call state model and provides an IN interface between Service Broker and SSPs in the SS7 network. IM-SCF is also known as Reverse IM-SSF.
IM-SSF	Interworking Module—Service Switching Function. The module implements the SSP part of the IN call state model and provides an IN interface between Service Broker and SCPs in the SS7 network.

Term	Description
IM-OCF	Interworking Module—Online Charging Function. The module implements the Charging Trigger Function (CTF) and provides a Diameter Ro interface between Service Broker and Online Charging entities in the IMS domain.
OE	Orchestration Engine. OE is a core Service Broker function that enables application assembly. OE sequentially invokes various applications. The order in which applications are invoked is defined in an orchestration logic.
OLP	Orchestration Logic Processor. OLP is an OE component that executes the orchestration logic by invoking applications as defined in the orchestration logic.
OPR	Orchestration Profile Receiver. OPR is an OE component that selects and downloads orchestration profiles and logic for each session, based on session data. For more information, see OLP.
R-IM-ASF SIP	Reverse Interworking Module—Application Server Function for SIP. The module provides a SIP interface between Service Broker and call control entities in the IMS/IP network.
R-IM-OCF	Reverse Interworking Module—Online Charging Function. The module provides a Diameter Ro interface between Service Broker and the Charging Trigger Function (CTF) in the IMS domain.
R-IM-SSF	Reverse Interworking Module—Service Switching Function.The module is also known as IM-SCF. For more information, see IM-SCF.
SM	Supplementary Module. A module that facilitates and complements Service Broker functionality in certain deployments.
SM-LSS	Supplementary Module Local Subscribers Server. The server stores subscribers' profiles.
SM-PME	Supplementary Module Parameter Mapping Engine. The XML-based engine manipulates parameters in the header and body of internal Service Broker SAL messages.
SSU	Signaling Server Unit. The unit enables Service Brokerto connect to SS7-based and IMS-based signaling networks through a standard software interface.

Reference Documents

The following documents provide additional information about Service Broker and relevant standards.

Oracle Communications Service Broker User Manuals

- *Oracle Communications Service Broker Release 5.0 Installation Guide*
- *Oracle Communications Service Broker Release 5.0 Configuration Guide*
- *Oracle Communications Service Broker Release 5.0 System Administrator's Guide*
- *Oracle Communications Service Broker Release 5.0 Integration Guide*

Intelligent Network Standards

- ITU-T Q.1218, Interface Recommendation for Intelligent Network CS-1
- ETSI TS 101 046 V5.7.0, CAMEL Application Part (CAP) Phase 1
- ETSI TS 101 046 V7.1.0, CAMEL Application Part (CAP) Phase 2

- ETSI TS 123 078 (3GPP TS 23.078 version 7.9.0 Release 7) V7.9.0, Customized Applications for Mobile network, Enhanced Logic (CAMEL) Phase X; Stage 2
- ETSI TS 129 078 V4.8.0, CAMEL Application Part (CAP) Phase 3
- ETSI TS 129 078 V7.4.0, CAMEL Application Part (CAP) Phase 4
- ETSI TS 300 374, Intelligent Network (IN) - Intelligent Network Capability Set 1 (CS1); - Core Intelligent Network Application Protocol (INAP); - Part 1: Protocol specification
- TIA/EIA Wireless Intelligent Network (WIN) IS-771
- TIA/EIA Wireless Intelligent Network (WIN) IS-826
- TIA/EIA-41-D, Cellular Radio telecommunications Intersystem Operations, IS-41
- 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

SIP Standards

- IETF RFC 3261, Session Initiation Protocol

IMS Standards

- ETSI TS 129 228 V7.11.0, IP Multimedia (IM) Subsystem Cx and Dx Interfaces
- ETSI TS 123 218 V7.9.0, IP Multimedia (IM) Session Handling
- ETSI TS 132 260 V7.3.0, IP Multimedia Subsystem (IMS) Charging
- ETSI TS 132 299 V7.7.0, Diameter Charging Applications
- IETF RFC 3588, Diameter Base Protocol
- IETF RFC 4006, Diameter Credit-Control Application

MAP Standards

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

UMTS Standards

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

Encoding Standards

- IETF RFC 3863, Presence Information Data Format (PIDF)
- ITU-T X.693, ASN.1 Encoding Rules, XML Encoding Rules (XER)

1 Understanding Service Broker

The following sections describe Oracle Communications Service Broker components:

- Introduction
- Functional Architecture
- Signaling Server Units
- Tiered Deployment Architecture
- Service Broker Domains

Introduction

Service Broker offers control and orchestration of service delivery and realtime charging for each session, call, or event in the telecom network. It delivers solutions for telecom networks across multiple domains, covering SS7-based networks, SIP/IMS networks, Diameter-based charging platforms and interaction with web services. Service Broker provides two primary functions:

- Mediation between applications (service logic) and different networks.

  This function provides applications with access to switching and session control layers in different network domains (PSTN, PLMN, NGN,IMS), together with the required protocol.

  For example, IN triggers from an MSC can be converted to a SIP session initiated towards an IMS application, opening a channel between the MSC and the IMS application, and allowing the application to respond and control the call routing in the MSC.

- Orchestration of services.

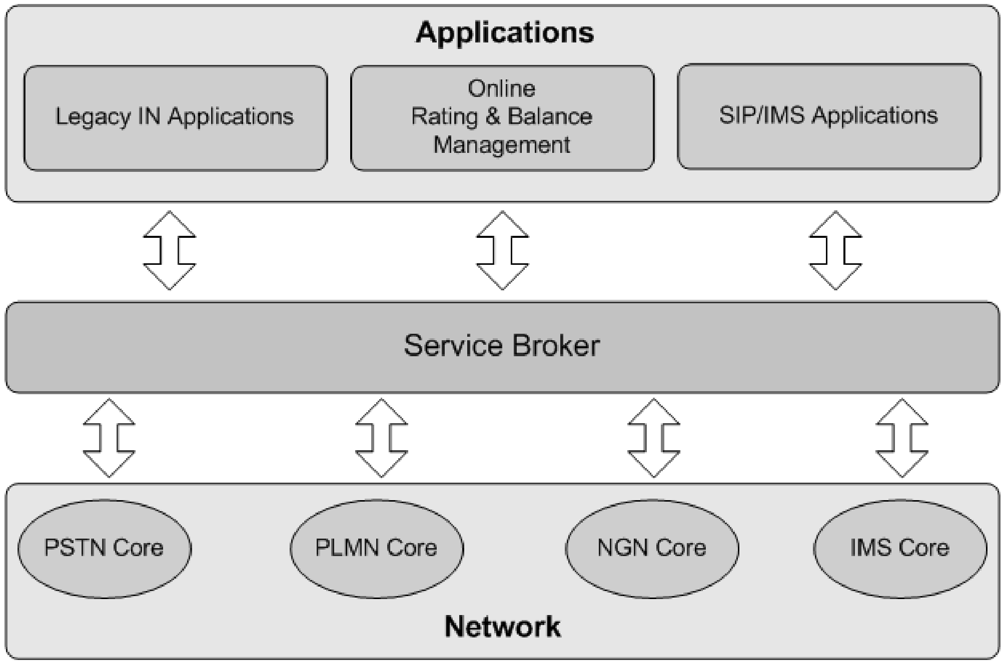
  This function enables the compilation of multiple applications for a single call or session. In addition, service orchestration enables IN applications to work together with SIP applications, enhancing service capabilities. In legacy networks, this function circumvents IN limitations that allow only one IN application to control a call or a session.

  For example, a legacy prepaid service implemented by an SCP can be combined with a Follow-Me or VPN SIP-based application.

Service Broker is fully compliant with IMS and NGN standard methodologies of service interaction, charging and orchestration, including support for IMS and IN interaction and integration with Diameter for online/offline charging.

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

Figure 1–1 Service Broker Mediation Across Domains and Delivering Service Orchestration



From a service delivery perspective, Service Broker enables the delivery of the following services:

- From legacy SCPs to new SIP/IMS clients
- From SIP/IMS application servers to legacy domain subscribers

From a charging perspective, Service Broker enables the use of:

- Diameter-based charging for legacy networks
- Legacy charging platforms, such as Prepaid SCPs, towards data networks enabling Diameter (for example, GGSN Ro).

Service Broker allows a gradual and seamless migration path from legacy networks to an IMS domain and IT-based services. During the migration, Service Broker fully supports the continuity of services already available in the network, leveraging existing legacy infrastructure and installed base. Service Broker focuses on new investments in the IMS domain while capping investments in legacy equipment, creating a new offering to operators who can now evolve their network to SIP, mostly throughout the application layer.

Functional Architecture

Service Broker is based on an architectural design that allows the system to adapt to and interact with service platforms and session control entities in both legacy SS7 and IMS/SIP domains. Service Broker architecture is composed of the following components:

- Orchestration Engine (OE)

  The OE resides at the core of the Service Broker architecture. The OE routes service and charging requests from the network to one or more service platforms. The OE also manages interactions between service platforms and session routing across applications.

- Interworking Modules (IMs)

  A set of configurable and interchangeable modules that enable the OE to communicate with application platforms and session control entities in various network. Each IM provides interaction with a specific network element through the element's native protocol.

  There are two types of IMs:

  - Network-facing IMs, which enable connectivity between Service Broker and session control entities, such as MSCs. Network-facing IMs provide a stateful front-end to session control entities so that they interact with Service Broker in the same manner they interact with application platforms, without the need to perform changes in configuration. IM-SCF, R-IM-ASF are examples of such modules.
  - Application-facing IMs, which enable connectivity between Service Broker and application platforms, such as IN SCPs, SIP ASs, IMS ASs, and Online charging servers. Application-facing IMs provide a stateful front-end to applications so that they interact with Service Broker in the same way they interact with the network, without the need to perform changes in configuration. IM-SSF, IM-OCF, IM-ASF are examples of such modules.

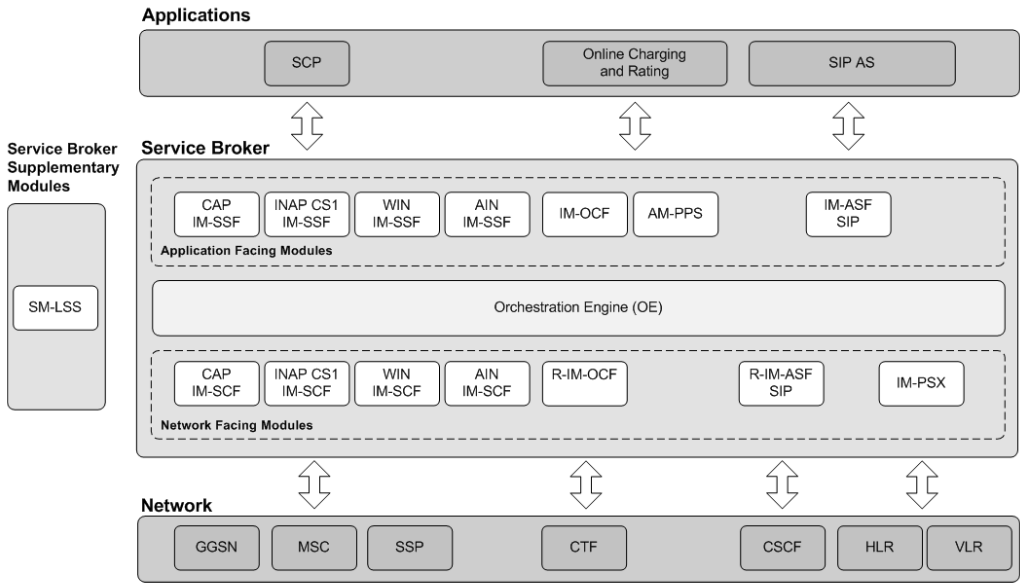
- Supplementary Modules

  SMs are configurable and interchangeable modules that facilitate and complement Service Broker solutions in certain deployments. SMs are provided with Service Broker and can optionally be used.

At the core of Service Broker, the interaction is normalized to a common session and event model. Each IM provides the conversion between the Service Broker internal representation of the session and the applicable external protocol. Through an extensive set of network and application-facing IMs, the OE extends service orchestration beyond IMS to pre-IMS, for example, IN, SS7 networks, and other non-IMS domains, such as SOA and IPTV. This enables orchestration and mediation between various application and charging platforms across different domains.

Figure 1–2 shows the full architecture of Service Broker with the Orchestration Engine at its core and with a complete set of Interworking Modules.

Figure 1–2 Service Broker Functional Architecture



Orchestration Engine

Service orchestration within the IMS domain is based on a concept of application assembly. This concept enables delivery of multiple services in a single session by routing the session through multiple applications. The chain of applications through which a session passes enables each application to accomplish its role in its turn.

The OE handles a session as follows:

1. The OE is triggered through Service Broker network-facing IMs by session control entities from both legacy and IMS domains.

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

2. The OE routes the session to multiple applications through Service Broker application-facing IMs.

   Interaction with applications is provided through the following:

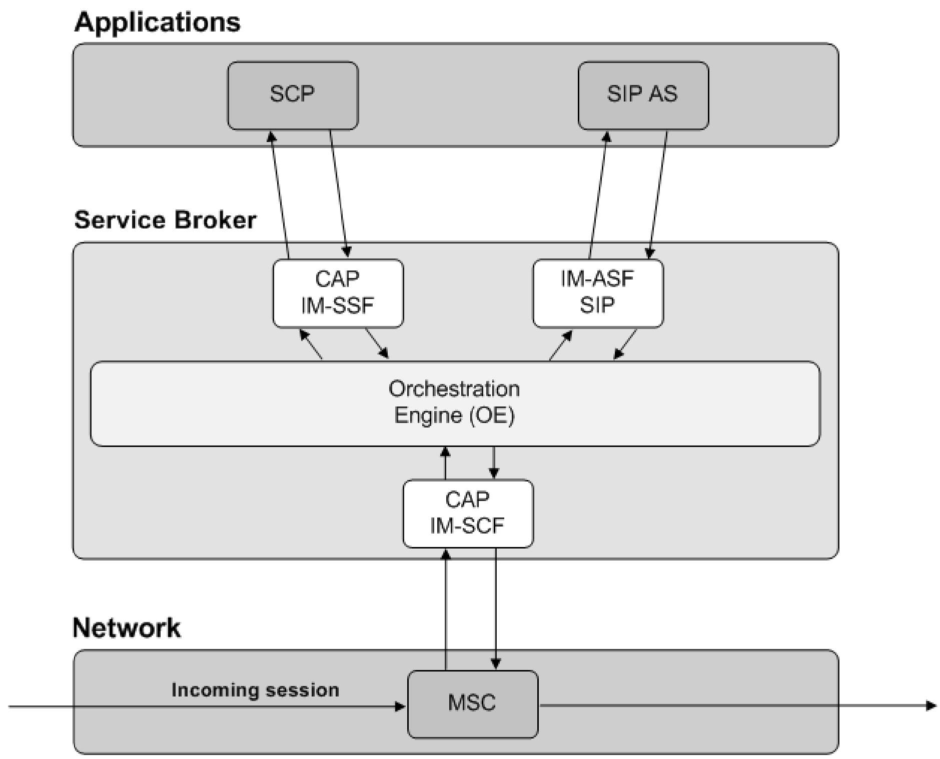
   - IM-SSF towards IN SCPs
   - IM-OCF towards online charging servers
   - IM-ASF towards application servers

   The route through multiple applications is not static, but is determined in real-time mode by 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 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



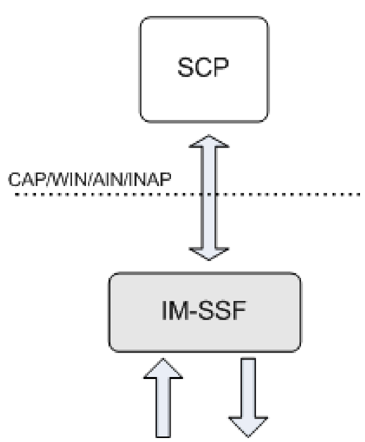
Interworking Modules

Interworking Modules (IMs) are fundamental elements in Service Broker architecture that allow connectivity between Service Broker and the various service platforms and session control platforms in the network.

IM-SSF

The IM-SSF implements the SSP part of the IN call state model and provides the interface between the IN SCP in the legacy network 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 IM-SSF



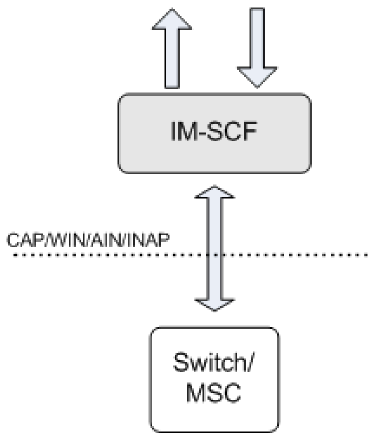
IM-SSF modules are available for a variety of IN protocols and protocol variants including CAP, AIN, INAP, and WIN.

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 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.

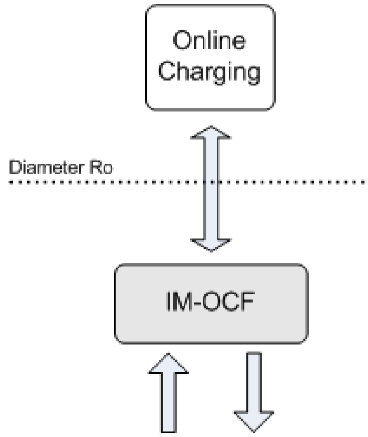
Acting as an SCP, it receives and arms IN triggers from an MSC/SSP and generates internal sessions to Service Broker, based on the trigger information.

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 Online Charging Server, acting as 3GPP-compliant Charging Trigger Function (CTF).

Figure 1–6 IM-OCF



Online Charging Server is a telecom platform providing online rating and charging, as well as subscriber balance management. IM-OCF is an application-facing module that interacts with online charging platforms using Diameter Ro, allowing real-time charging for any session, whether IN, SIP, or any other session or event that is mediated through Service Broker.

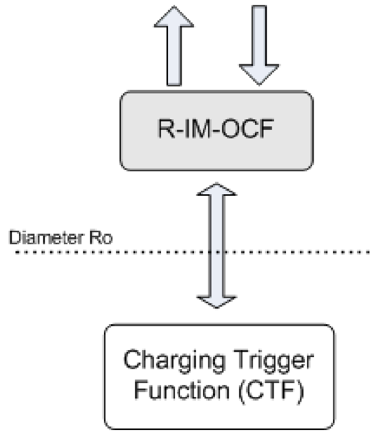
Deploying IM-OCF with Service Broker's IM-SCF provides a complete online charging solution for SS7-based networks using various IN protocols. Combining IM-OCF with Service Broker's R-IM-ASF provides a complete online charging solution for SIP-based networks, effectively acting as a 3GPP IMS Gateway Function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

The variety of protocols supported by Service Broker's IM-SCF allows IM-OCF to provide a real-time, online charging solution to CAP/INAP-based GSM/UMTS mobile networks, WIN/IS-826-based CDMA/1X/EVDO mobile networks and wireline AIN and INAP. It paves the way to a full prepaid/postpaid convergence for voice and data and the migration from legacy nodal Prepaid SCPs solutions to converged and unified charging.

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 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.

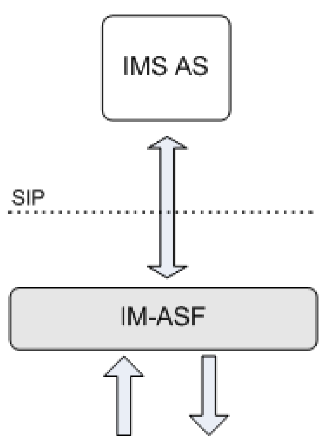
R-IM-OCF allows Service Broker's OE to orchestrate real-time charging requests.

IM-ASF

IM-ASF enables Service Broker to interact with IMS entities, that is applications and session control entities. It provides IMS entities with an IMS frontend to Service Broker. Typically, IM-ASF serves as an application-facing module that enables the delivery of a service to all session control entities. However, not all applications necessarily deliver services to all the entities.

IM-ASF is used in solutions where the application responds to sessions initiated by Service Broker. Applications that initiate new sessions interact through R-IM-ASF.

Figure 1–8 IM-ASF

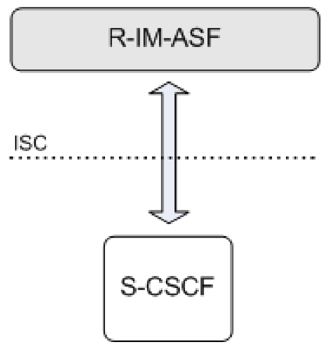


R-IM-ASF

Reverse IM-ASF (R-IM-ASF) enables Service Broker to interact with IMS entities, that is applications and session control entities. It provides IMS entities with an IMS frontend to Service Broker. Typically, R-IM-ASF serves as a network-facing module, enabling Service Broker to be invoked by core IMS elements, such as S-CSCF, as well as other pre-IMS elements, such as Soft switches and MGCs. This allows IMS core elements to trigger applications that are connected to Service Broker.

IMS applications or session control entities that initiate new sessions interact through R-IM-ASF. In solutions where the application responds to sessions initiated by Service Broker, IM-ASF is used.

Figure 1–9 R-IM-ASF



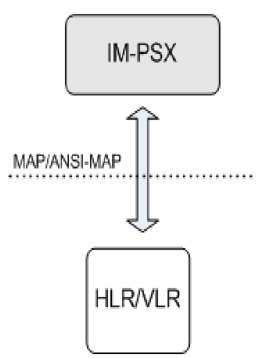
IM-PSX

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

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

- Query a legacy network on information about subscribers, such as a subscriber's state, location, and the services a subscriber receives
- Receive notifications from an HLR when a subscriber who was previously unaccessible 1254537 accessible again
- Modify information about subscribers in a legacy network (in GSM networks only)

Figure 1–10 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.

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.

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

Tiered Deployment Architecture

The Service Broker deployment architecture is based on a separation into the following logical tiers as shown in Figure 1–11:

- Signaling Tier

  The Signaling Tier consists of pairs of servers on which SSUs run. Depending on specific requirements, each SSU—that is, SS7, SIP, and Diameter—can be deployed on a different pair of servers so that each SSU pair provides access to a different network. Alternatively, different SSUs—for example, SIP SSU and Diameter SSU—can run on the same server pair as shown on Figure 1–11.

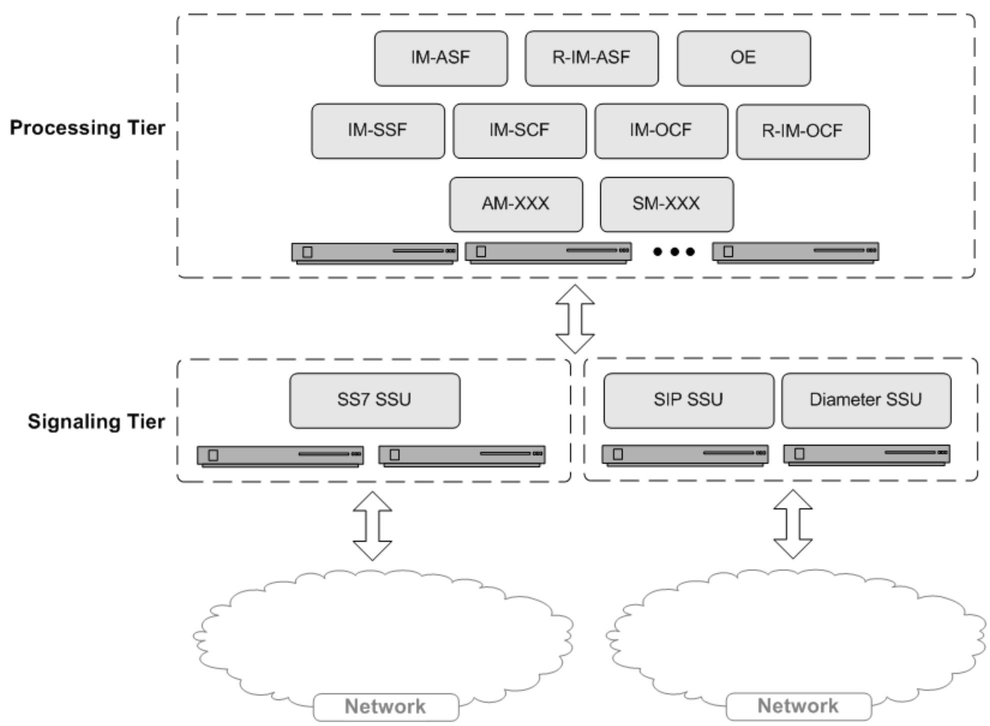
The set of SSU deployments and servers is considered the Service Broker Signaling Tier. You can scale the Signaling Tier by adding pairs of Signaling Servers as required

- Processing Tier

  The Processing Tier is a set of servers on which Service Broker functional components run. These components include IMs, OE and SMs. The modules that run on the Processing Servers are stateful, where the state information is maintained and distributed across the Processing Tier.

  The modules retrieve and store session state in an in-memory storage. On failure, functioning Processing Servers continue to retrieve and process all messages, including those stored in the in-memory state of the failed Processing Server. The Processing Tier of a Service Broker deployment includes two or more servers, employing an N+1 redundancy schema. Normally, at least two servers are deployed for redundancy purposes. Scaling the Processing Tier is possible by adding Processing Servers as required

Figure 1–11 Service Broker Deployment Architecture



Axia Platform

The Signaling and Processing Tiers of the Service Broker make use of a modular OSGi (Open Services Gateway initiative)-based platform called the *Axia platform*. The Axia platform provides platform-level server services and a processing environment that:

- Isolates individual processes and provides a container for managing those processes
- Supports concurrent processing
- Offers atomic and isolated execution of operations

- Enables services to be transparently distributed to all Signaling Servers and Processing Servers in their respective domains
- Provides redundancy and is scalable for high availability
- Deploys Service Broker processing modules, such as IMs, OE and SSU components, within the Signaling or Processing Tiers

Both Signaling Tier servers and Processing Tier servers host platform-level server services.

For the purpose of modularization, the Axia platform is based on Oracle WebLogic Server and Equinox OSGi 3.5. Equinox OSGi is an Eclipse project that implements the OSGi framework. Service Broker components are packaged and deployed as OSGi bundles.

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

http://www.osgi.org

About Server Services

Server services offer functionality that is provided at the platform level. You configure certain server service functionality using the Administration Console or management scripts.

Server services include:

- Deploying and managing the life cycle of Service Broker components. The deployment artifacts are OSGi bundles. You can perform a number of operations including installing, uninstalling, starting, stopping, and updating bundles.
- Collecting, storing, and updating configuration data and propagating configuration data to Service Broker components across the domains.
- Storing application-level data used by IMs and server services during runtime. This type of storage is provided as a memory store managed as an Oracle Coherence partitioned cache. The data in the cache is always replicated on at least two servers to ensure high availability.
- Generating logs for each server in the domains. Logging is based on Log4J.
- Generating notification messages for management and monitoring purposes, such as messages about the current state of a component or process, and warning and error messages.
- Collecting traffic usage statistics. A usage statistic is a count of the number of events or messages that are sent and received. Usage statistics are generated, collected and stored for each server in a Signaling Domain.
- Routing events to the appropriate Service Broker components.
- Managing processing threads. Service Broker uses a number of work managers that share a pool of threads. The system automatically adjusts the thread pool to the work being scheduled in order to maintain as high a throughput as possible.

Service Broker Domains

From a system administration perspective, Service Broker deployments are managed using domains. A Service Broker domain is a logically related group of servers. A Service Broker deployment includes two types of domains:

- Signaling Domain—Used to manage the servers of the Signaling Tier and the SSUs executed on these servers. Servers in the signaling domain are named Signaling Servers.
- Processing Domain—Used to manage the servers of the Processing Tier and the module instances (that is OE and IM instances) executed on these servers. Servers in the processing domain are named Processing Servers.

A Service Broker production deployment usually includes two domains, a processing domain and a signaling domain. Each domain is deployed as a set of at least two servers.

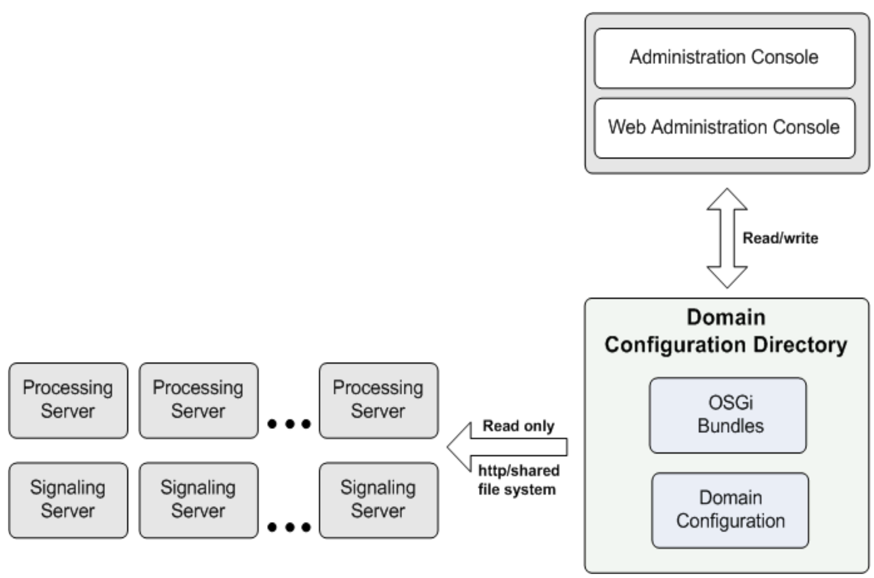
When the Signaling Tier provides connection to more than one network, as shown on Figure 1–11, different signaling domains manage each network connection. In this way, each signaling domain manages a pair of Signaling Servers and the SSUs running on these servers.

Note: For testing and evaluation purposes, it is possible to deploy Service Broker with both the Signaling Tier and Processing Tier co-located on a single machine.:

The Signaling Domain and Processing Domain interact, and propagate protocol events across the tier boundaries.

The following sub-sections describe domain-related concepts and terminology, which are also shown in Figure 1–12.

Figure 1–12 Service Broker Domain



About Signaling Servers and Processing Servers

Each server in the Processing and Signaling Tiers runs on its own Java Virtual Machine (JVM), and the term "server" reflects a JVM rather than a physical machine.

Servers can be added to and removed from the Processing Tier and Signaling Tier domains while the system is running, without service interruption.

Servers within a domain are symmetrical, which means that they all have the same Service Broker OSGi bundles installed and started.

Load balancers can be introduced between network nodes and Signaling Servers to distribute traffic between the network nodes and Service Broker.

Domain Configuration Directory

A domain has an associated domain configuration, which is stored in a domain configuration directory. All servers in the domain have read-only access to the domain configuration directory. Each time a Processing Server or a Signaling Server is started, it retrieves configuration data from the domain configuration directory and then stores a read-only copy of the data for use during runtime. The domain configuration directory is accessed using a shared file system or via the Domain Configuration Web server.

The domain configuration directory stores also the Service Broker OSGi bundles.

The domain configuration directory is also accessed by the Administration Console, see "Administration Console".

Administration Console

The Administration Console enables you to manage a domain. Through the GUI, you can view the data stored in the domain configuration directory, and have read / write access to the domain configuration directory.

The Administration Console can be installed and run from any machine that has access to the domain configuration directory.

The Administration Console can run in two ways:

- Standalone Administration Console
- Web Administration Console

The Administration Console manages a single domain. In a typical production deployment there are two instances of the Administration Console, one to manage the signaling domain and another to manage the processing domain.

Note: In a test environment, where one domain includes both Signaling Servers and Processing Servers, there is only one Administration Console instance. In this case, the Administration Console manages both the Signaling Tier and Processing Tier in one domain.

Scalability

Scalability is the ability of a system to provide throughput in proportion to, and limited only by, available hardware resources. A scalable system is one that can handle increasing numbers of requests without adversely affecting response time and throughput.

The growth of computational power within one operating environment is called vertical scaling. Horizontal scaling is leveraging multiple systems to work together on a common problem in parallel.

Service Broker scales both vertically and horizontally. Scaling options differ according to whether you are scaling the Processing Tier or the Signaling Tier.

Processing Tier Scaling

The Processing Tier of a Service Broker deployment includes two or more servers, employing an N+1 high availability schema, where several Processing Servers are grouped together to share a workload. The Service Broker Processing Tier can increase its throughput by adding a new Processing Server to the processing domain. You can add a new Processing Server on either of the following:

- A new physical machine (horizontal scaling)
- A machine that already executes another Processing Server (vertical scaling)

In either way, all servers are grouped under one processing domain and administered from one instance of the Administration Console and in the same Domain Configuration Directory.

Signaling Tier Scaling

The Signaling Tier of a Service Broker deployment consists of pairs of servers on which SSUs run. The Service Broker Signaling Tier can increase its throughput by adding pairs of Signaling Servers. You administer each pair of Signaling Servers in a separate signaling domain.

2

Service Broker Interworking Modules

Interworking Module (IM) is a fundamental element in the Oracle Communications Service Broker architecture. IMs allow connectivity between Service Broker and the various service platforms and session control platforms in the network. Relying on lower layer connectivity (that is, SIP, SS7 and Diameter) to the network provided by SSUs, IMs provide the application frontend to Service Broker. In addition, each IM implements functionality that allows Service Broker to act as a specific network entity towards service platforms and session control platforms.

For example, IM-SCF allows Service Broker to act as an SCP towards SSPs in the network. IMs normalize the external network interface to a common session and event model, which is used internally by Service Broker.

The following sections describe the various types of Service Broker IMs:

- IM-SCF
- IM-SSF
- IM-OCF
- R-IM-OCF
- IM-ASF
- R-IM-ASF
- IM-PSX

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.

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 -> MSC
Connect	Service Broker -> MSC
Continue	Service Broker -> MSC
EventReportBCSM	MSC -> Service Broker
InitialDP	MSC -> Service Broker
ReleaseCall	Service Broker -> MSC
RequestReportBCSMEvent	Service Broker -> 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 CallGap and ActivityTest. These operations enable applications to manage availability of the service to the network and perform other auxiliary functions.

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 -> MSC
ApplyCharging	Service Broker -> MSC
ApplyChargingReport	MSC -> Service Broker
AssistRequestInstructions	MSC/SRF -> Service Broker
CallInformationReport	MSC -> Service Broker
CallInformationRequest	Service Broker -> MSC
Cancel	Service Broker -> MSC/SRF
Connect	Service Broker -> MSC
ConnectToResource	Service Broker -> MSC
Continue	Service Broker -> MSC

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

Operation	Direction
DisconnectForwardConnection	Service Broker -> MSC
EstablishTemporaryConnection	Service Broker -> MSC
EventReportBCSM	MSC -> Service Broker
FurnishChargingInformation	Service Broker -> MSC
InitialDP	MSC -> Service Broker
PlayAnnouncement	Service Broker -> MSC/SRF
PromptAndCollectUserInformation	Service Broker -> MSC/SRF
ReleaseCall	Service Broker -> MSC
RequestReportBCSMEvent	Service Broker -> MSC
ResetTimer	Service Broker -> MSC
SendChargingInformation	Service Broker -> MSC
SpecializedResourceReport	SRF -> Service Broker

Supported BCSM Event Types

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

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)
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 CallGap and ActivityTest. These operations enable applications to manage availability of the service to the network and perform other auxiliary functions.

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 -> MSC
ApplyCharging	Service Broker -> MSC
ApplyChargingReport	MSC -> Service Broker
AssistRequestInstructions	MSC/SRF ->Service Broker
CallGap	Service Broker -> MSC
CallInformationReport	MSC -> Service Broker
CallInformationRequest	Service Broker -> MSC
Cancel	Service Broker -> MSC/SRF
Connect	Service Broker -> MSC
ConnectToResource	Service Broker -> MSC
Continue	Service Broker -> MSC
ContinueWithArgument	Service Broker -> MSC
DisconnectForwardConnection	Service Broker -> MSC
EstablishTemporaryConnection	Service Broker -> MSC
EventReportBCSM	MSC -> Service Broker
FurnishChargingInformation	Service Broker -> MSC
InitialDP	MSC -> Service Broker
PlayAnnouncement	Service Broker -> MSC/SRF
PromptAndCollectUserInformation	Service Broker -> MSC/SRF
ReleaseCall	Service Broker -> MSC
RequestReportBCSMEvent	Service Broker -> MSC
ResetTimer	Service Broker -> MSC
SendChargingInformation	Service Broker -> MSC
SpecializedResourceReport	SRF -> 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 -> MSC
ContinueSMS	Service Broker -> MSC
EventReportSMS	MSC -> Service Broker
FurnishChargingInformationSMS	Service Broker -> MSC
InitialDPSMS	MSC -> Service Broker
ReleaseSMS	Service Broker -> MSC
RequestReportSMSEvent	Service Broker -> MSC
ResetTimerSMS	Service Broker -> 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 -> MSC
ApplyChargingGPRS	Service Broker -> MSC
ApplyChargingReportGPRS	MSC -> Service Broker
CancelGPRS	Service Broker -> MSC
ConnectGPRS	Service Broker -> MSC
ContinueGPRS	Service Broker -> MSC
EntityReleasedGPRS	MSC -> Service Broker
EventReportGPRS	MSC -> Service Broker
FurnishChargingInformationGPRS	Service Broker -> MSC
InitialDPGPRS	MSC -> Service Broker
ReleaseGPRS	Service Broker -> MSC
RequestReportGPRSEvent	Service Broker -> MSC
ResetTimerGPRS	Service Broker -> MSC
SendChargingInformationGPRS	Service Broker -> 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)

Table 2–8 (Cont.) BCSM Event Types Supported by IM-SCF CAP Phase 3

BCSM Event Type	Detection Point
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 CallGap and ActivityTest. These operations enable applications to manage availability of the service to the network and perform other auxiliary functions.

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 -> MSC
ApplyCharging	Service Broker -> MSC
ApplyChargingReport	MSC -> Service Broker
AssistRequestInstructions	MSC/SRF -> Service Broker
CallGap	Service Broker -> MSC
CallInformationReport	MSC -> Service Broker
CallInformationRequest	Service Broker -> MSC
Cancel	Service Broker -> MSC/SRF
CollectInformation	Service Broker -> MSC
Connect	Service Broker -> MSC
ConnectToResource	Service Broker -> MSC
Continue	Service Broker -> MSC
ContinueWithArgument	Service Broker -> MSC
DisconnectForwardConnection	Service Broker -> MSC
DisconnectForwardConnectionWithArgument	Service Broker -> MSC
DisconnectLeg	Service Broker -> MSC
EntityReleased	MSC -> Service Broker
EstablishTemporaryConnection	Service Broker -> MSC
EventReportBCSM	MSC -> Service Broker
FurnishChargingInformation	Service Broker -> MSC
InitialDP	MSC -> Service Broker
InitiateCallAttempt	Service Broker -> MSC
MoveLeg	Service Broker -> MSC
PlayAnnouncement	Service Broker -> MSC/SRF
PlayTones	Service Broker -> MSC./SRF
PromptAndCollectUserInformation	Service Broker -> MSC/SRF
ReleaseCall	Service Broker -> MSC
RequestReportBCSMEvent	Service Broker -> MSC
ResetTime	Service Broker -> MSC
SendChargingInformation	Service Broker -> MSC
SpecializedResourceReport	SRF -> Service Broker

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

Operation	Direction
SplitLeg	Service Broker -> 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 -> MSC
ContinueSMS	Service Broker -> MSC
EventReportSMS	MSC -> Service Broker
FurnishChargingInformationSMS	Service Broker -> MSC
InitialDPSMS	MSC -> Service Broker
ReleaseSMS	Service Broker -> MSC
RequestReportSMSEvent	Service Broker -> MSC
ResetTimerSMS	Service Broker -> 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 -> MSC
ApplyChargingGPRS	Service Broker -> MSC
ApplyChargingReportGPRS	MSC -> Service Broker
CancelGPRS	Service Broker -> MSC
ConnectGPRS	Service Broker -> MSC
ContinueGPRS	Service Broker -> MSC
EntityReleasedGPRS	MSC -> Service Broker
EventReportGPRS	MSC -> Service Broker
FurnishChargingInformationGPRS	Service Broker -> MSC
InitialDPGPRS	MSC -> Service Broker
ReleaseGPRS	Service Broker -> MSC
RequestReportGPRSEvent	Service Broker -> MSC
ResetTimerGPRS	Service Broker -> MSC
SendChargingInformationGPRS	Service Broker -> 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)
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

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

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 -> SSP
ApplyCharging	Service Broker -> SSP
ApplyChargingReport	SSP->Service Broker
AssistRequestInstructions	SRF->Service Broker
CallGap	Service Broker->SSP
CallInformationReport	SSP->Service Broker
CallInformationRequest	Service Broker->SSP
Cancel	Service Broker->SSP/SRF
CollectInformation	Service Broker->SSP
Connect	Service Broker->SSP
ConnectToResource	Service Broker->SSP
EstablishTemporaryConnection	Service Broker->SSP
EventNotificationCharging	SSP->Service Broker
EventReportBCSM	SSP->Service Broker
FurnishChargingInformation	Service Broker->SSP
InitialDP	SSP->Service Broker
InitiateCallAttempt	Service Broker->SSP
PlayAnnouncement	Service Broker->SSP/SRF
PromptAndCollectUserInformation	Service Broker->SSP/SRF
ReleaseCall	Service Broker->SSP
RequestNotificationChargingEvent	Service Broker->SSP
RequestReportBCSMEvent	Service Broker->SSP
ResetTimer	Service Broker->SSP
SendChargingInformation	Service Broker->SSP
ServiceFilteringResponse	SSP->Service Broker
SpecializedResourceReport	SSP/SRF->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 -> Service Broker
OriginationRequest (Return-Result)	Service Broker -> MSC
AnalyzedInformation (Invoke)	MSC -> Service Broker
AnalyzedInformation (Return-Result)	Service Broker -> MSC
ConnectResource (Invoke)	Service Broker -> MSC
DisconnectResource (Invoke)	Service Broker -> MSC
FacilitySelectedAndAvailable (Invoke)	Service Broker -> MSC
FacilitySelectedAndAvailable (Return-Result)	MSC -> Service Broker
IntructionRequest (Invoke)	MSC -> Service Broker
InstructionRequest (Return-Result)	Service Broker -> MSC
ResetTimer (Invoke)	Service Broker -> MSC
SeizeResource (Invoke)	Service Broker -> MSC
SeizeResource (Return-Result)	MSC -> Service Broker
SRFDirective (Invoke)	Service Broker -> MSC
SRFDirective (Return-Result)	MSC -> Service Broker
TBusy (Invoke)	MSC -> Service Broker
TBusy (Return-Result)	Service Broker -> MSC
TNoAnswer (Invoke)	MSC -> Service Broker
TNoAnswer (Return-Result)	Service Broker -> 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 -> Service Broker
OriginationRequest (Return-Result)	Service Broker -> MSC
AnalyzedInformation (Invoke)	MSC -> Service Broker
AnalyzedInformation (Return-Result)	Service Broker -> MSC

Table 2–18 (Cont.) Operations Supported by IM-SCF WIN Phase 2

Operation	Direction
ConnectResource (Invoke)	Service Broker -> MSC
DisconnectResource (Invoke)	Service Broker -> MSC
FacilitySelectedAndAvailable (Invoke)	MSC -> Service Broker
FacilitySelectedAndAvailable (Return-Result)	Service Broker -> MSC
IntructionRequest (Invoke)	MSC -> Service Broker
InstructionRequest (Return-Result)	Service Broker -> MSC
ResetTimer (Invoke)	Service Broker -> MSC
SeizeResource (Invoke)	Service Broker -> MSC
SeizeResource (Return-Result)	MSC -> Service Broker
SRFDirective (Invoke)	Service Broker -> MSC
TBusy (Invoke)	MSC -> Service Broker
TBusy (Return-Result)	Service Broker -> MSC
TNoAnswer (Invoke)	MSC -> Service Broker
TNoAnswer (Return-Result)	Service Broker -> MSC
CallControlDirective (Invoke)	Service Broker -> MSC
CallControlDirective (Return-Result)	MSC -> Service Broker
OAnswer (Invoke)	MSC -> Service Broker
ODisconnect (Invoke)	MSC -> Service Broker
ODisconnect (Return-Result)	Service Broker -> MSC
TAnswer (Invoke)	MSC -> Service Broker
TDisconnect (Invoke)	MSC -> Service Broker
TDisconnect (Return-Result)	Service Broker -> 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 -> Service Broker
Info_Collected	SSP -> Service Broker
Network_Busy	SSP -> Service Broker
Origination_Attempt	SSP -> Service Broker
Resource_Clear	SSP -> Service Broker
Termination_Attempt	SSP -> 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 -> SSP
Authorize_Termination	Service Broker -> SSP
Cancel_Resource_Event	Service Broker -> SSP
Continue	Service Broker -> SSP
Disconnect	Service Broker -> SSP
Forward_Call	Service Broker -> SSP

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

Message	Direction
Send_To_Resource	Service Broker -> 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
ACG	Service Broker -> SSP
Monitor_For_Change	Service Broker -> SSP
Monitor_Success	SSP -> Service Broker
Send_Notification	Service Broker -> SSP
Status_Reported	SSP -> Service Broker
Termination_Notification	SSP -> Service Broker
Update_Data	SSP -> Service Broker
Update_Request	Service Broker -> SSP

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 -> Service Broker
Info_Collected	SSP -> Service Broker
Network_Busy	SSP -> Service Broker
Origination_Attempt	SSP -> Service Broker
Resource_Clear	SSP -> Service Broker
Termination_Attempt	SSP -> Service Broker

Supported SCP/Adjunct Call Related Operations

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

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

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

Supported Non-Call Related Operations

Table 2–24 lists the SCP/Adjuncted 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
ACG	Service Broker -> SSP
Monitor_For_Change	Service Broker -> SSP

Table 2–24 (Cont.) Non-Call Related Operations Supported by IM-SCF AIN 0.2

Message	Direction
Monitor_Success	SSP -> Service Broker
Send_Notification	Service Broker -> SSP
Status_Reported	SSP -> Service Broker
Termination_Notification	SSP -> Service Broker
Update_Data	SSP -> Service Broker
Update_Request	Service Broker -> SSP

IM-SSF

IM-SSF is an application-facing Interworking Module (IM) 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 CallGap and 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 -> Service Broker
Connect	SCP -> Service Broker
Continue	SCP -> Service Broker
EventReportBCSM	Service Broker -> SCP
InitialDP	Service Broker -> SCP
ReleaseCall	SCP -> Service Broker
RequestReportBCSMEvent	SCP -> 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 CallGap and 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 -> Service Broker
ApplyCharging	SCP -> Service Broker
ApplyChargingReport	Service Broker -> SCP
AssistRequestInstructions	Service Broker/SRF -> SCP
CallInformationReport	Service Broker -> SCP
CallInformationRequest	SCP -> Service Broker
Cancel	SCP -> Service Broker
Connect	SCP -> Service Broker
ConnectToResource	SCP -> Service Broker
Continue	SCP -> Service Broker
DisconnectForwardConnection	SCP -> Service Broker
EstablishTemporaryConnection	SCP -> Service Broker
EventReportBCSM	Service Broker -> SCP
FurnishChargingInformation	SCP -> Service Broker
InitialDP	Service Broker -> SCP
PlayAnnouncement	SCP -> Service Broker
PromptAndCollectUserInformation	SCP -> Service Broker
ReleaseCall	SCP -> Service Broker
RequestReportBCSMEvent	SCP -> Service Broker
ResetTimer	SCP -> Service Broker
SendChargingInformation	SCP -> Service Broker
SpecializedResourceReport	Service Broker/SRF -> 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)

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

BCSM Event Type	Detection Point
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)

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 CallGap and 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 -> Service Broker
ApplyCharging	SCP -> Service Broker
ApplyChargingReport	Service Broker -> SCP
AssistRequestInstructions	Service Broker - > SCP
CallGap	SCP -> Service Broker
CallInformationReport	Service Broker -> SCP
CallInformationRequest	SCP -> Service Broker
Cancel	SCP -> Service Broker/SRF

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

Operation	Direction
Connect	SCP -> Service Broker
ConnectToResource	SCP -> Service Broker
Continue	SCP -> Service Broker
ContinueWithArgument	SCP -> Service Broker
DisconnectForwardConnection	SCP -> Service Broker
EstablishTemporaryConnection	SCP -> Service Broker
EventReportBCSM	Service Broker -> SCP
FurnishChargingInformation	SCP -> Service Broker
InitialDP	Service Broker -> SCP
PlayAnnouncement	SCP -> Service Broker/SRF
PromptAndCollectUserInformation	SCP -> Service Broker/SRF
ReleaseCall	SCP -> Service Broker
RequestReportBCSMEvent	SCP -> Service Broker
ResetTimer	SCP -> Service Broker
SendChargingInformation	SCP -> Service Broker
SpecializedResourceReport	Service Broker/SRF -> 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 -> Service Broker
ContinueSMS	SCP -> Service Broker
EventReportSMS	Service Broker -> SCP
FurnishChargingInformationSMS	SCP -> Service Broker
InitialDPSMS	Service Broker -> SCP
ReleaseSMS	SCP -> Service Broker
RequestReportSMSEvent	SCP -> Service Broker
ResetTimerSMS	SCP -> 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 -> Service Broker
ApplyChargingGPRS	SCP -> Service Broker

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

Operation	Direction
ApplyChargingReportGPRS	Service Broker -> SCP
CancelGPRS	SCP -> Service Broker
ConnectGPRS	SCP -> Service Broker
ContinueGPRS	SCP -> Service Broker
EntityReleasedGPRS	Service Broker -> SCP
EventReportGPRS	Service Broker -> SCP
FurnishChargingInformationGPRS	SCP -> Service Broker
InitialDPGPRS	Service Broker -> SCP
ReleaseGPRS	SCP -> Service Broker
RequestReportGPRSEvent	SCP -> Service Broker
ResetTimerGPRS	SCP -> Service Broker
SendChargingInformationGPRS	SCP -> 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)

Table 2–33 (Cont.) SMS Event Types Support by IM-SSF CAP Phase 3

SMS Event Type	Detection Point
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 CallGap and 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->Service Broker
ApplyCharging	SCP->Service Broker
ApplyChargingReport	Service Broker->SCP
AssistRequestInstructions	Service Broker/SRF->SCP
CallGap	SCP->Service Broker
CallInformationReport	Service Broker->SCP
CallInformationRequest	SCP->Service Broker
Cancel	SCP->Service Broker/SRF
CollectInformation	SCP->Service Broker
Connect	SCP->Service Broker
ConnectToResource	SCP->Service Broker
EstablishTemporaryConnection	SCP->Service Broker
EventNotificationCharging	Service Broker->SCP
EventReportBCSM	Service Broker->SCP
FurnishChargingInformation	SCP->Service Broker
InitialDP	Service Broker->SCP
InitiateCallAttempt	SCP->Service Broker
PlayAnnouncement	SCP->Service Broker/SRF
PromptAndCollectUserInformation	SCP->Service Broker/SRF
ReleaseCall	SCP->Service Broker
RequestNotificationChargingEvent	SCP->Service Broker
RequestReportBCSMEvent	SCP->Service Broker

Table 2–34 (Cont.) Operations Supported by IM-SSF INAP CS-1

Operation	Direction
ResetTimer	SCP->Service Broker
SendChargingInformation	SCP->Service Broker
ServiceFilteringResponse	Service Broker->SCP
SpecializedResourceReport	Service Broker->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 -> SCP
OriginationRequest (Return-Result)	SCP -> Service Broker
AnalyzedInformation (Invoke)	Service Broker -> SCP
AnalyzedInformation (Return-Result)	SCP -> Service Broker
ConnectResource (Invoke)	SCP -> Service Broker
DisconnectResource (Invoke)	SCP -> Service Broker
FacilitySelectedAndAvailable (Invoke)	Service Broker -> SCP
FacilitySelectedAndAvailable (Return-Result)	SCP -> Service Broker
ResetTimer (Invoke)	SCP -> Service Broker
SeizeResource (Invoke)	SCP -> Service Broker
SeizeResource (Return-Result)	Service Broker -> SCP
SRFDirective (Invoke)	SCP -> Service Broker
SRFDirective (Return-Result)	Service Broker -> SCP
TBusy (Invoke)	Service Broker -> SCP
TBusy (Return-Result)	SCP -> Service Broker
TNoAnswer (Invoke)	Service Broker -> SCP
TNoAnswer (Return-Result)	SCP -> 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 CallGap and 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 -> SCP
OriginationRequest (Return-Result)	SCP -> Service Broker
AnalyzedInformation (Invoke)	Service Broker -> SCP
AnalyzedInformation (Return-Result)	SCP -> Service Broker
FacilitySelectedAndAvailable (Invoke)	Service Broker -> SCP
FacilitySelectedAndAvailable (Return-Result)	SCP -> Service Broker
SRFDirective (Invoke)	SCP -> Service Broker
TBusy (Invoke)	Service Broker -> SCP
TBusy (Return-Result)	SCP -> Service Broker
TNoAnswer (Invoke)	Service Broker -> SCP
TNoAnswer (Return-Result)	SCP -> Service Broker
CallControlDirective (Invoke)	SCP -> Service Broker
CallControlDirective (Return-Result)	Service Broker -> SCP
OAnswer (Invoke)	Service Broker -> SCP
ODisconnect (Invoke)	Service Broker -> SCP
ODisconnect (Return-Result)	SCP -> Service Broker
TAnswer (Invoke)	Service Broker -> SCP
TDisconnect (Invoke)	Service Broker -> SCP
TDisconnect (Return-Result)	SCP -> 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 -> SCP
Info_Collected	Service Broker -> SCP
Network_Busy	Service Broker -> SCP
Origination_Attempt	Service Broker -> SCP
Resource_Clear	Service Broker -> SCP
Termination_Attempt	Service Broker -> 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 -> Service Broker
Authorize_Termination	SCP -> Service Broker
Cancel_Resource_Event	SCP -> Service Broker
Continue	SCP -> Service Broker

Table 2–39 (Cont.) SCP Call Related Operations Supported by IM-SSF AIN 0.1

Message	Direction
Disconnect	SCP -> Service Broker
Forward_Call	SCP -> Service Broker
Send_To_Resource	SCP -> 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
ACG	SCP -> Service Broker
Monitor_For_Change	SCP -> Service Broker
Monitor_Success	Service Broker -> SCP
Send_Notification	SCP -> Service Broker
Status_Reported	Service Broker -> SCP
Termination_Notification	Service Broker -> SCP
Update_Data	Service Broker -> SCP
Update_Request	SCP -> Service Broker

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 -> SCP
Info_Collected	Service Broker -> SCP
Network_Busy	Service Broker -> SCP
Origination_Attempt	Service Broker -> SCP
Resource_Clear	Service Broker -> SCP
Termination_Attempt	Service Broker -> 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 -> Service Broker
Authorize_Termination	SCP -> Service Broker
Cancel_Resource_Event	SCP -> Service Broker
Continue	SCP -> Service Broker
Disconnect	SCP -> Service Broker
Forward_Call	SCP -> Service Broker
Send_To_Resource	SCP -> 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
ACG	SCP -> Service Broker
Monitor_For_Change	SCP -> Service Broker
Monitor_Success	Service Broker -> SCP
Send_Notification	SCP -> Service Broker
Status_Reported	Service Broker -> SCP
Termination_Notification	Service Broker -> SCP
Update_Data	Service Broker -> SCP
Update_Request	SCP -> Service Broker

IM-OCF

IM-OCF is an application-facing IM that provides an IMS Charging Trigger Function (CTF) frontend 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 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:

- Session-based Charging with Units Reservation (SCUR)

  This functionality is used for event charging in the IMS domain over ISC SIP sessions (for example, SIP INVITE and BYE) or legacy domain over IN triggers (for example, CAP call control) depending on southbound Unit Reservation enables credit updates during a session.

- 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 southboundUnits 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. Immediate charging updates the credit at the time when the event occurs.

Supported Ro Operations

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

Table 2–44 Supported Ro Operations

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
Abort-Session-Answer	Service Broker	OCF	ASA

R-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 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 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 Ro Operations

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

Table 2–45 Supported Ro Operations

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
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-ASF

IM-ASF is typically an application-facing module that provides an IMS session control entity (that is CSCF) frontend to an application, and allows interaction with Service Broker as if it were an IMS switch interacting through ISC (see "IM-ASF").

IM-ASF is used in solutions where the application responds to sessions initiated by Service Broker.

Service Broker provides the following implementations of IM-ASF: IM-ASF SIP

IM-ASF SIP

IM-ASF SIP is typically an application-facing module that provides an IMS session control entity (that is CSCF) frontend 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

Service Broker Reverse IM-ASF (R-IM-ASF) is typically a network-facing module that provides an IMS Application Server frontend to the network, and allows interaction with Service Broker as if it were an IMS Application Server interacting through ISC (see "R-IM-ASF").

R-IM-ASF is used in solutions where a SIP network entity, such as CSCF or Terminal Status application, initiates sessions towards Service Broker.

Service Broker provides the following implementation of R-IM-ASF: R-IM-ASF SIP

R-IM-ASF SIP

Reverse IM-ASF SIP (R-IM-ASF SIP) is typically a network-facing module that provides a SIP Application Server frontend to the network, and allows for interaction with Service Broker as if it were a SIP AS 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 —acting 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

Supported SIP Requests

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

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

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 2–46 describes the MAP operations supported by IM-PSX MAP:

Table 2–46 Supported MAP Operations

Message	Direction
MAP-ANY-TIME-INTERROGATION	Service Broker->HLR
MAP-ANY-TIME-SUBSCRIPTION-INTERROGATION	Service Broker->HLR
MAP-ANY-TIME-MODIFICATION	Service Broker->HLR
MAP-INSERT-SUBSCRIBER-DATA	Service Broker->VLR
MAP-SEND-IMSI	Service Broker->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 an 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 unaccessible becomes accessible again

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

Supported Operations

Table 2–47 describes the ANSI-41E operations supported by IM-PSX ANSI-MAP.

Table 2–47 Supported ANSI-41E Operations

Message	Direction
SMSRequest	Service Broker -> HLR
SMSNotification	HLR -> Service Broker
Search	Service Broker -> HLR

3 Service Broker Service Orchestration

The following sections describe the components and the mechanics of the Oracle Communications Service Broker Orchestration:

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

About Orchestration Engine

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

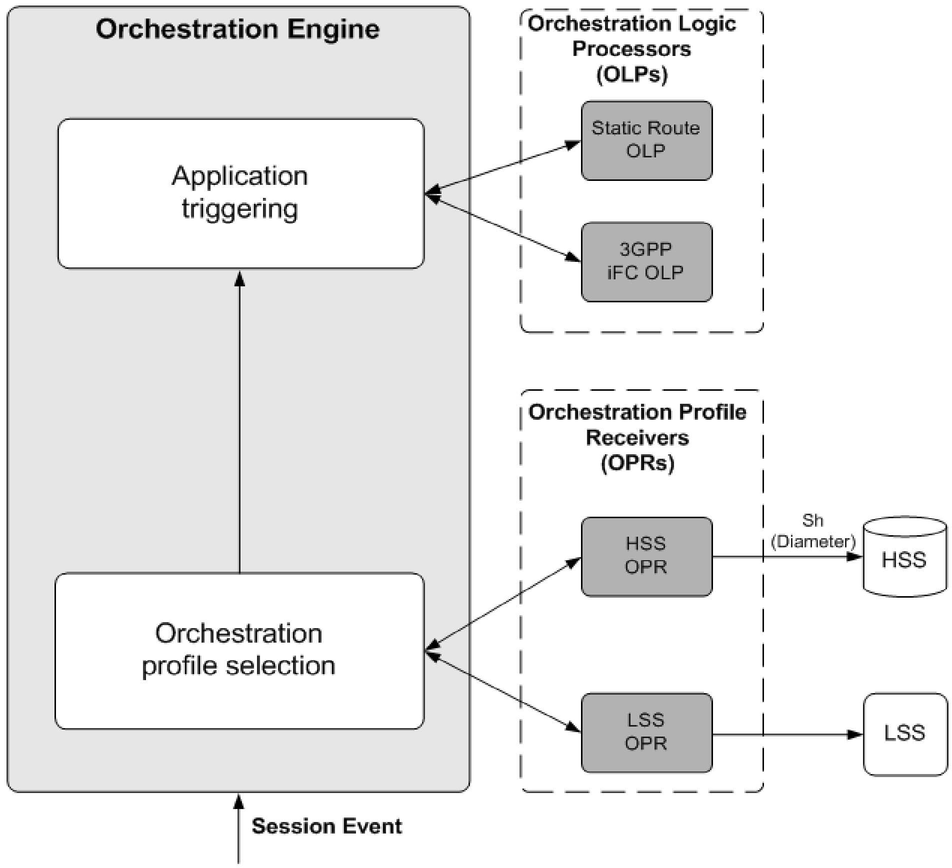
To perform service orchestration, the OE requires an orchestration logic. An orchestration logic defines applications through which the OE should pass a session and the order in which these applications must be invoked.

Service orchestration is performed using the following 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: OLRs and OLPs)



When triggered by the session control layer, the OE performs the following procedure for each call or session:

1. Orchestration profile selection: The OE uses an OPR to select and retrieve an orchestration profile. The orchestration profile includes information on the type of OLP to use next, and the specific parameters that type of OLP requires.

   The OE uses either HSS OPR, LSS OPR, or any other installed OPR as defined in the OE configuration settings.

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 preconfigured list of applications to determine which applications to invoke and in which order.

Supported SAL Requests

The Orchestration Engine supports the following SAL requests:

- INVITE
- REGISTER
- MESSAGE
- SUBSCRIBE
- NOTIFY

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. Service Broker includes the following SSUs:

- SS7 Signaling Server Units (TDM and SIGTRAN)
- SIP Signaling Server Unit
- Diameter Signaling Server Unit

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 frontend 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.

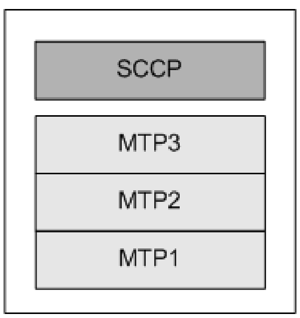
Key Functionality

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.
- 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 appropriate SCCP address that is used to route traffic in the SS7 network.
- Global Titling (GT)—Supports GT address format.

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

SS7 SSU - TDM



SS7 SSU for SIGTRAN MTP3 User Adaptation Layer (M3UA)

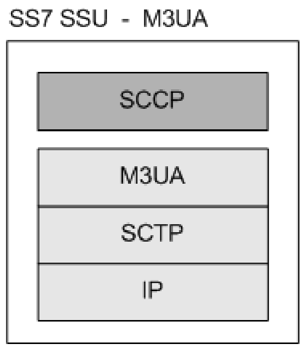
SS7 SSU over SIGTRAN M3UA provides Service Broker with connectivity to the legacy SS7 network over an IP-based physical infrastructure, using the MTP3 User Adaptation Layer (M3UA). SS7 SSUs are physically connected to an IP network through Signaling Gateways (SGs).

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 appropriate SCCP address that is used to route traffic in the SS7 network.
- Global Titling (GT) - Supports GT address format.

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



SIP Signaling Server Unit

The SIP Signaling Server Unit (SSU) is a SIP frontend 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 frontend for Service Broker, which provides access to remote Diameter entities (for example, OCS, HSS) in the IMS network. Every Service Broker IM that requires a Diameter interface (i.e 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:

- 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 is assigned more than one Diameter destination to enable alternative routing if one of the destinations is unreachable.
- Heartbeat—The Diameter SSU holds a list of established Diameter transport connections and updates their status periodically. The status of connections is used when routing Diameter traffic from Service Broker to the network.

5

Service Broker Solution Use Cases

This following sections describes typical use cases for implementing solutions based on Service Broker:

- IN Mediation
- Service Orchestration
- Service Delivery
- Converged Network with VCC
- Real-Time Charging - Prepaid Migration Solution
- IM-SSF for IMS

IN Mediation

Service Broker's interworking modules can mediate between the SCPs and SSPs or MSCs that use different protocols or different flavors of the same protocol.

Mediating between Different Protocols

Use Case

A combined CDMA/GSM network can be migrated to GSM, enabling operators to deliver CAP-based, Prepaid SCP services to CDMA subscribers and consolidate the service layers of both networks.

Solution

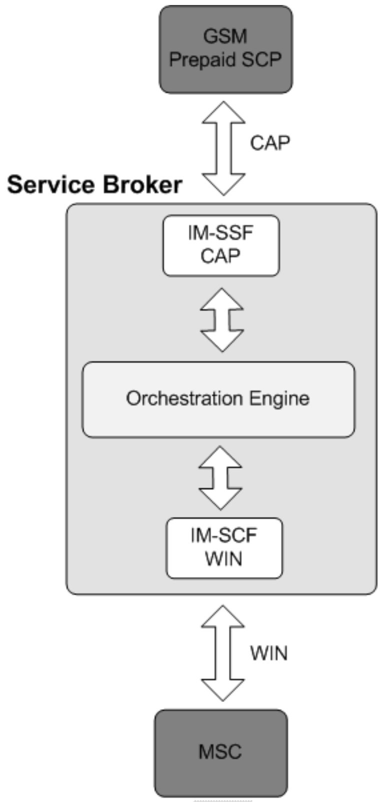
Service Broker interacts with the SCP and the MSC, using the following IMs:

- CAP IM-SSF to communicate with the GSM SCP through the CAP protocol.
- WIN IM-SCF to communicate with the WIN-based MSC.

Example

Figure 5–1 illustrates this example of Service Broker's IM mediation between different protocols.

Figure 5–1 Mediating between Different Protocols



Mediating between Protocol Flavors

Use Case

Operators can add equipment produced by different vendors to their existing, single-vendor environment and mediate between different flavors of the same protocols.

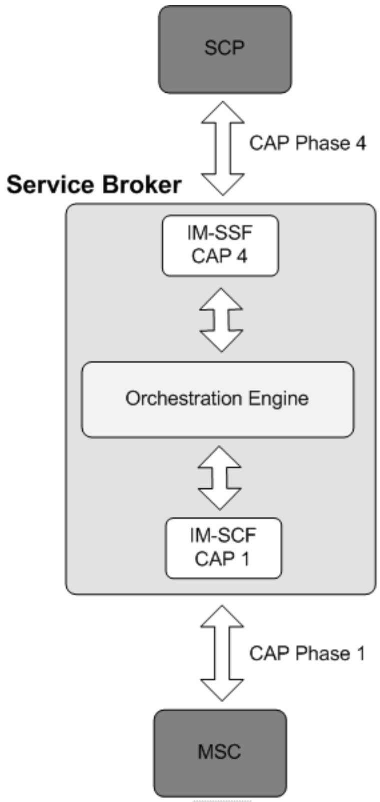
Solution

Service Broker can act as a mediator between, for example, an SCP, which uses CAP Phase 4, and an MSC, which uses CAP Phase 1.

Example

Figure 5–2 illustrates this example of Service Broker's capability to support different flavors of CAP to communicate with the MSC and SCP.

Figure 5–2 Mediation among Protocol Flavors



Service Orchestration

Service Broker's service orchestration capabilities enable the delivery of combined services that run in different networks.

IN Service Interaction

Use Case

Operators can deliver combined services running on different SCPs in a single session in IN and IMS networks.

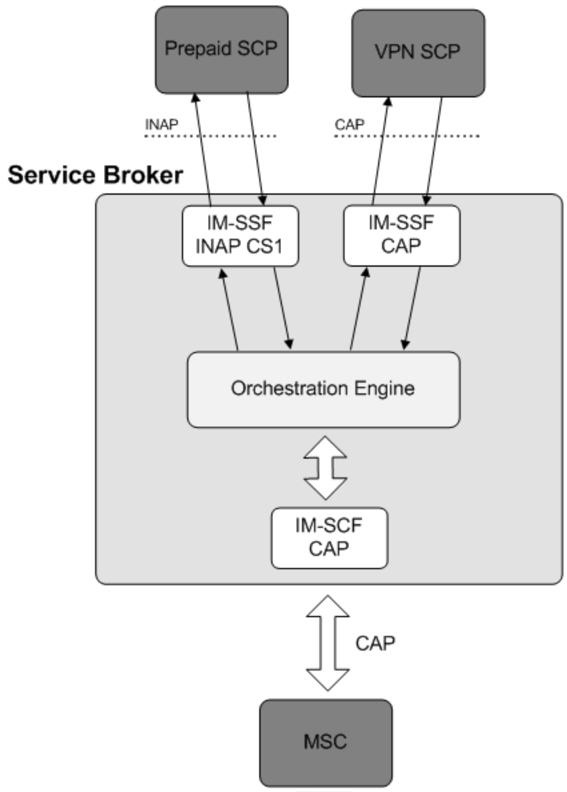
Solution

Service Broker communicates with each of the SCPs to orchestrate a number of services running in different networks, using IM-SSFs that support different protocols.

Example

Figure 5–3 shows an example deployment in which Service Broker first forwards a session to the Prepaid SCP to perform online charging operations and then to the VPN SCP.

Figure 5–3 IN Service Interaction Solution



IMS Service Interaction

Use Case

Operators can implement ISC, Cx/Sh, Ro/Rf protocols in an IMS network, based on filter criteria stored in the HSS.

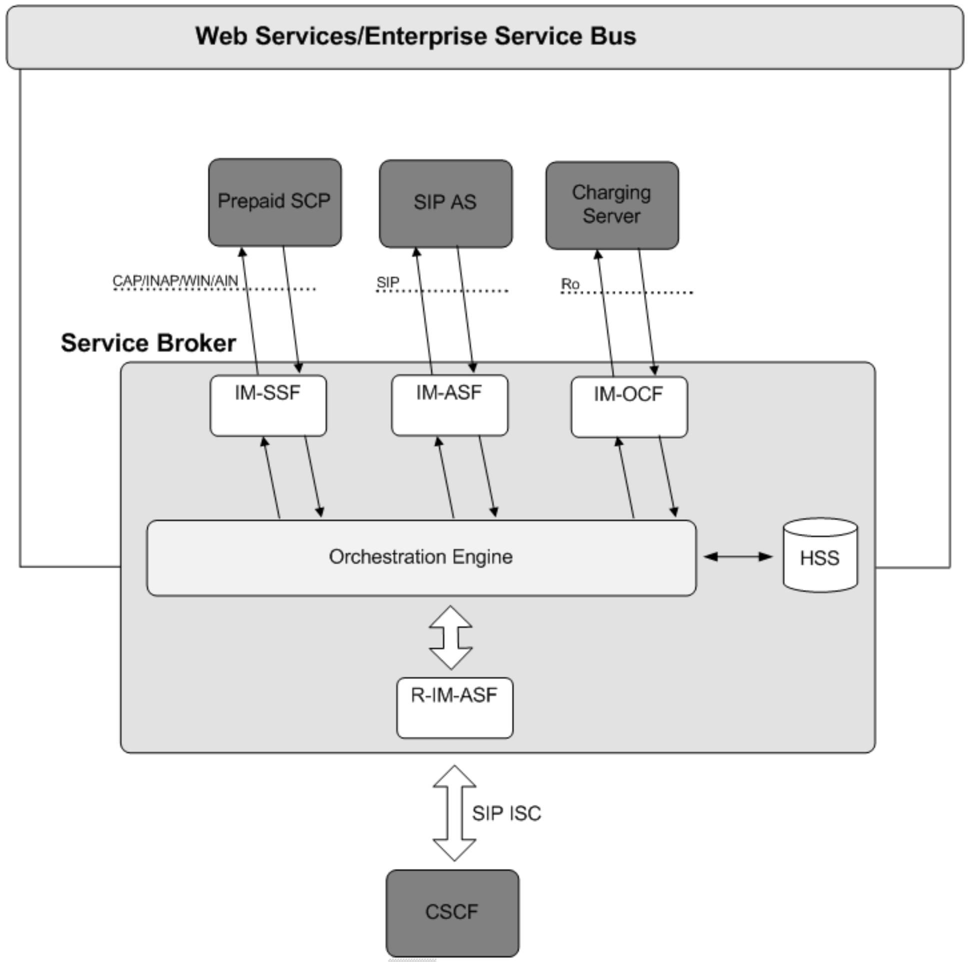
Solution

Service Broker interacts among various application servers in order to deliver services. Integrating with SOA Service Framework and Enterprise Services bus enables Service Broker to interact with Web Services and an external SOA Service bus.

Example

Figure 5–4 shows an example of a deployment in which Service Broker—integrated with Web Services—communicates with the IMS network and provides service interaction based on the logic retrieved from the HSS.

Figure 5–4 IMS and SOA Services Framework



Charging Mediation

Use Case

Operators can implement a Diameter-based online charging request from multiple sources, including different variants of Ro/Diameter and legacy voice calls, using different IN protocols in the IN domain?

Solution

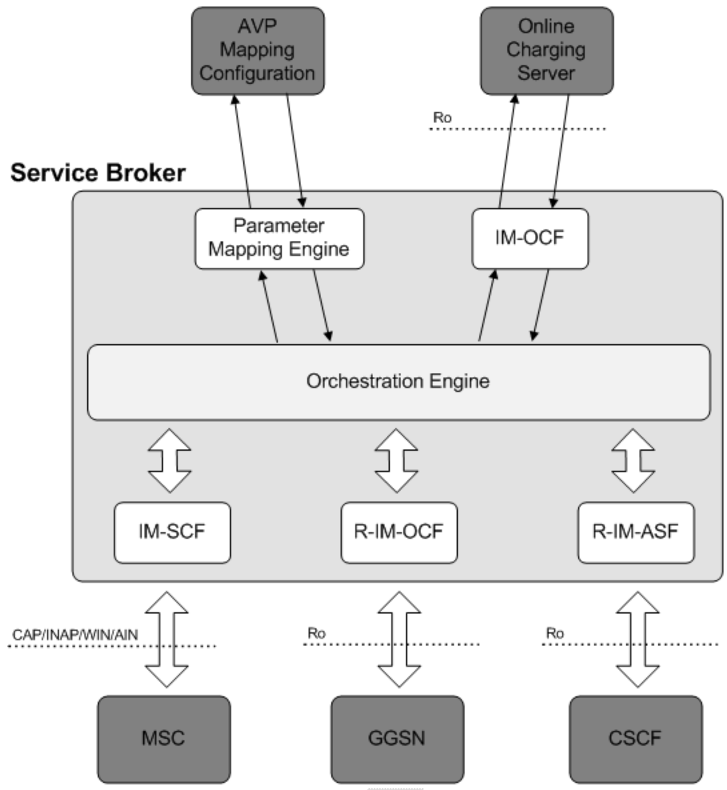
Service Broker processes charging requests for normalization and adaptation before sending these requests to an online charging server that analyzes and complies with each request.

Example

For example, a combined UMTS/IMS operator can use Service Broker to unify charging across different services and network elements that originate from different vendors using different variants of the Diameter or Radius protocols, into a common online charging server.

Figure 5–5 shows an example of a deployment in which Service Broker processes charging requests from a legacy MSC, GGSN and CSCF using SM-PME and then forwards the requests to the online charging server.

Figure 5–5 Service Broker Charging Mediation Solution



Service Delivery

Service Broker's service delivery capabilities enable the delivery of:

- Legacy services to SIP networks
- SIP services to legacy networks

Delivering Legacy Services for SIP Networks

Use Case

Operators can deliver existing IN-based, prepaid services to SIP-based subscribers.

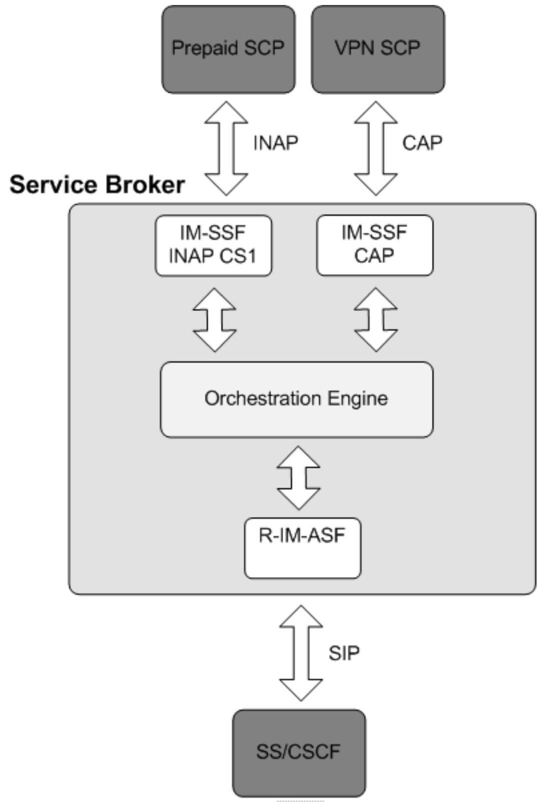
Solution

Service Broker mediation enables the delivery of legacy services running on IN SCP platforms to SIP Softswitches and CSCFs. This capability can also be implemented to enable wireline carriers to deliver their existing legacy service platforms, such as Number Portability or Toll-Free, to SIP-based subscribers.

Example

Figure 5–6 shows an example of a deployment in which Service Broker delivers legacy prepaid and VPN services to the Softswitch or CSCF.

Figure 5–6 Delivering Legacy Services to a SIP/IMS Network



Delivering SIP Services to IN/Legacy Networks

Use Case

Operators can deliver SIP/IMS-based services to a legacy domain, including 2G/2.5G/3G phones and to fixed POTS subscribers.

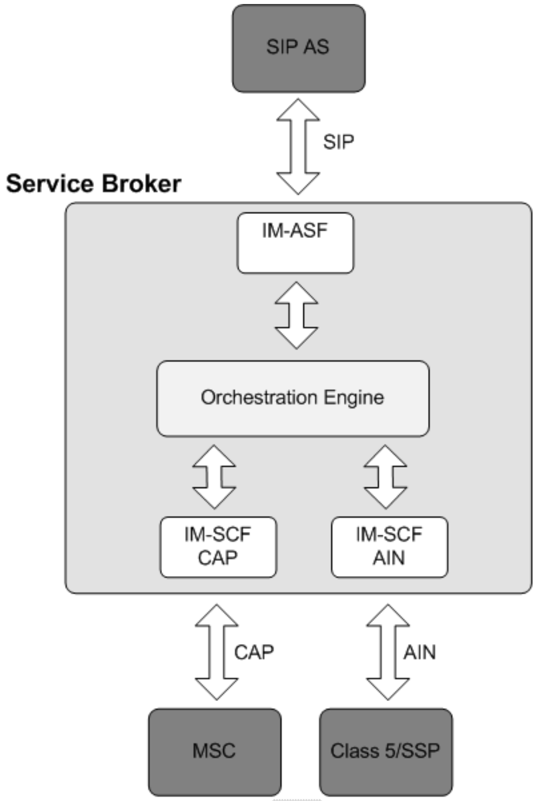
Solution

Service Broker mediation enables the deployment of SIP/IMS platforms that deliver services to mobile subscribers in legacy domains. Using this solution, mobile GSM operators can deploy a SIP implementation of the Voice VPN service over CAP to GSM mobiles as an alternative to their Voice VPN service platform.

Example

Figure 5–7 shows an example of a deployment in which Service Broker delivers SIP services to legacy networks.

Figure 5–7 Delivering NGN Services to IN/Legacy Networks



Converged Network with VCC

Service Broker enables service interaction between SIP/legacy domains and dual-mode handsets that support Voice Call Continuity (VCC).

Use Case

Operators can provide VCC services between WiFi and the 2G/3G mobile domains.

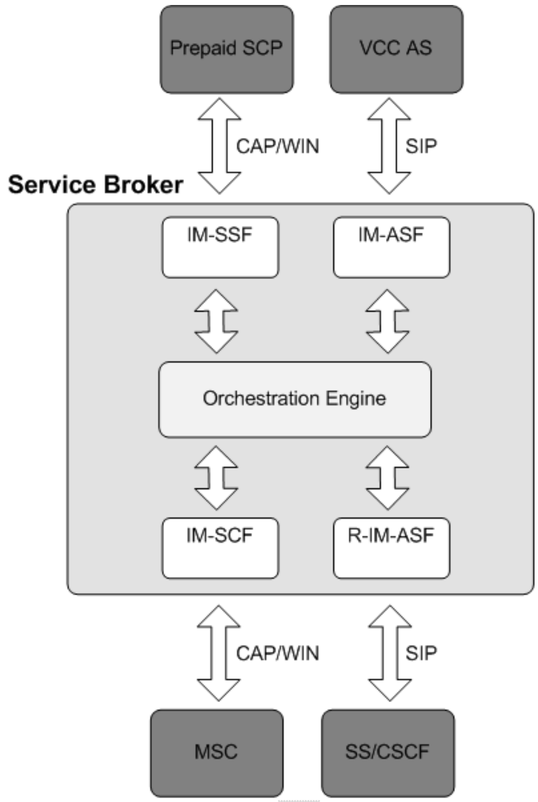
Solution

The VCC capability can be combined with any other SIP-based or IN-based service platform to create a dual-mode handset service combination.

Example

Figure 5–8 shows an example of a deployment in which Service Broker delivers services to both legacy and SIP-based networks.

Figure 5–8 Service Broker Voice Call Continuity for Converged Networks



Real-Time Charging - Prepaid Migration Solution

Service Broker enables migration of Prepaid SCP solutions to an online, unified charging service.

Use Case

Operators can regain their investment in a legacy Prepaid SCP and continue to provide a wide range of flexible prepaid services, combining call control and online charging capabilities.

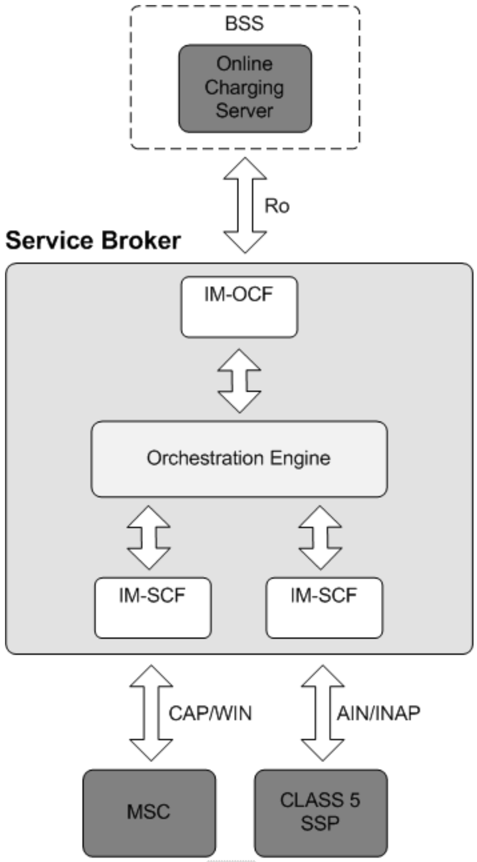
Solution

Service Broker can act as an SCP frontend to the network to provide the entire prepaid family of services, including prepaid, credit control, spending limit, and roaming control, to an online unified charging service.

Example

Figure 5–9 shows an example of a deployment in which Service Broker delivers online charging services.

Figure 5–9 Service Broker Used for Online Charging for Legacy Networks and Migration from Prepaid SCPs



IM-SSF for IMS

Service Broker enables existing, deployed, IN-based services to function within an IMS network.

Use Case

Operators can deliver existing, IN-based prepaid services to new IMS subscribers.

Solution

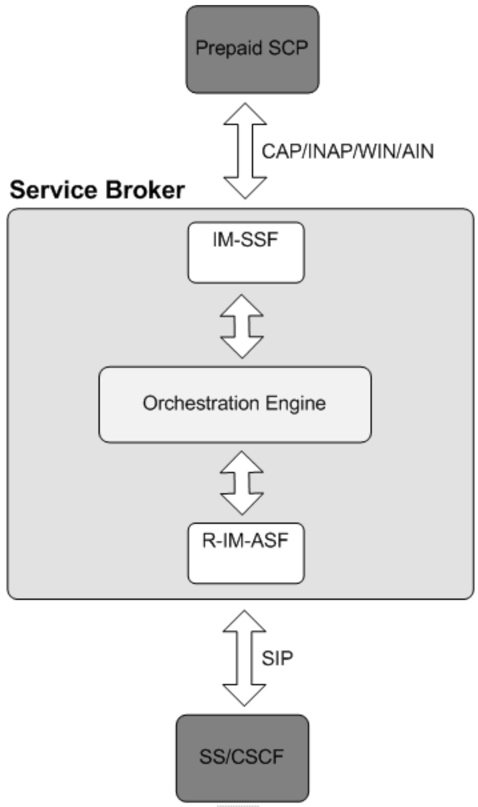
Service Broker's IM-SSF enables IMS CSCFs to interact with legacy services running on existing SCP IN platforms.

Alternatively, Service Broker interacts with the CSCF through ISC to implement legacy service platforms, such as Number Portability and Toll-Free, to new TISPAN/IMS subscribers in a TISPAN core network.

Example

Figure 5–10 shows an example of a deployment in which Service Broker delivers prepaid services.

Figure 5–10 Service Broker IM-SSF Solution



A

Supported Standards

The following sections list the telecommunication standards supported by Oracle Communications Service Broker:

- Supported GSM/UMTS Standards
- Supported GSM/IMS Standards
- Supported TDMA/CDMA Standards
- Supported Wireline Intelligent Network (IN) Standards
- Supported SIP Standards

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

CAMEL Phase 4

- ETSI TS 122 078 (3GPP 22.078) V7.6.0, CAMEL Application Part (CAP) Phase 4, Stage 1
- ETSI TS 123.078 (3GPP TS 23.078) 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
- ETSI TS 129.078 (3GPP TS 29.078) V7.5.0, CAMEL Application Part (CAP) Phase 4, Stage 3

Supported GSM/IMS Standards

CAMEL over IMS (IM-SSF)

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

IMS Architecture

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

IMS Charging

- ETSI TS 132 299 (3GPP TS 32.299) V7.5.0, Telecommunication management; Charging management; Diameter charging applications
- ETSI TS 132 296 (3GPP TS 32.296) V7.0.0, Telecommunication management; Charging management; Online Charging System (OCS): Applications and interfaces
- ETSI TS 132 240 (3GPP TS 32.240) V7.2.0, Telecommunication management; Charging management; Charging architecture and principles

- ETSI TS 132 260 (3GPP TS 32.260) V8.7.0, Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging
- ETSI TS 132 270 (3GPP TS 32.270) V8.0.0, Multimedia Messaging Service (MMS) charging
- ETSI TS 132 274 (3GPP TS 32.274) V8.5.0, Short Message Service (SMS) charging

Supported 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 (3GPP2 S.R0006), Wireless Features Description, IS-664
- TIA/EIA (3GPP2 N.S0012-0), Enhancement for Wireless Calling Name Feature Description, IS-764
- TIA/EIA (3GPP2 N.S0004-0), Enhanced Charging Services, IS-848
- TIA/EIA (3GPP2 X.S0009-0), Location Based Services, WIN Phase 3, IS-843

Supported Wireline Intelligent Network (IN) Standards

INAP 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

Supported SIP 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

Supported MAP Standards

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

Supported UMTS Standards

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

Supported 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 Signalling System #7 (SS7)—Signalling Connection Control Part (SCCP)
- ITU-T Q.771, Specifications of Signalling System No. 7 – Transaction Capabilities Cpplication Part
- ITU-T Q.772, Specifications of Signalling System No. 7 – Transaction Capabilities Cpplication Part
- ITU-T Q.773, Specifications of Signalling System No. 7 – Transaction Capabilities Cpplication Part
- ITU-T Q.774, Specifications of Signalling System No. 7 – Transaction Capabilities Cpplication Part
- ITU-T Q.775, Specifications of Signalling System No. 7 – Transaction Capabilities Cpplication Part

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

Glossary

3GPPs

3rd Generation Partnership Project. 3GPP provides collaboration between groups of telecom associations to make a globally applicable third generation mobile phone system specification.

API

Application Programming Interface. An API enables an application to interact with other applications by providing methods and properties that can be invoked by external programs.

AVP

Attribute-Value Pair. AVP is a data representation model in which each property (attribute) of an object has a certain value.

For more information, see **Diameter**.

B2BUA

Back-to-Back User Agent. A B2BUA is a logical Session Initiation Protocol (SIP) network element. B2BUA resides between end points of a SIP session and mediates SIP signaling between the ends of the session during the entire session.

For more information, see **SIP**.

BCSM

Basic Call State Model. In the IN architecture, the BCSM describes the phases through which a call goes for both the originating (O-BCSM) and terminating side (O-BCSM).

For more information, see **IN**.

BER

Basic Encoding Rules. In addition to XER, the BER is used to encode data structured according to ASN.1.

For more information, see **XER**.

CAMEL

Customized Applications for Mobile Networks Enhanced Logic. CAMEL is an ETSI standard that defines a set of standards designed to work on either a GSM core network or a UMTS network. CAMEL provides various mechanisms to support operators' services that are not covered by standard GSM services, even when roaming outside the HPLMN (Home Public Land Mobile Network).

For more information, see **CAP**.

CAP

CAMEL Application Part. CAP is an ETSI standard that defines the signaling protocol used in the Intelligent Network architecture in GSM mobile networks. CAP allows for the implementation of value added services, including prepaid services, SMS, and MMS in both the GSM voice and GPRS data networks.

For more information, see **CAMEL**.

CSCF

Call Server Control Function. In the IMS architecture, the CSCF is a collective name for servers or proxies that are used to process SIP signaling packets in the IMS.

For more information, see **IMS**.

Diameter

A protocol for authentication, authorization, and accounting. Diameter runs in the application layer and uses TCP or SCTP as a transport protocol. The Diameter protocol consists of a header followed by one or more AVPs.

For more information, see **AVP**.

DP

Detection Point. In the IN architecture, a DP indicates states in basic call and connection processing. An IN service can be invoked based on the state.

EDP

Event Detection Point. In the IN architecture, there are two types of EDPs:

- EDP-N: Event Detection Point - Notification. When triggered, the event is reported. Call processing is not suspended.
- EDP-R: Event Detection Point - Request. When triggered, the event is reported and call processing is suspended.

For more information, see **DP**.

GGSN

Gateway GPRS Support Node. GGSN provides transmission of IP packets between the GPRS network and external packet switched networks, such as the Internet and X.25 networks.

For more information, see **GPRS** and **IP**.

GPRS

General Packet Radio Service. GPRS is used by GSM mobile phones for transmitting IP packets.

For more information, see **GGSN** and **IP**.

GT

Global Title. A GT is an address used in the SCCP protocol for routing signaling messages on telecommunications networks.

GTT

Global Title Translation. GTT is a process of translating a GT into a point code.

HA

High Availability. HA is a system design protocol and associated implementation that ensures a certain degree of operational continuity during a given measurement period.

HSS

Home Subscriber Server. In the IMS architecture, HSS contains subscription-related information, performs authentication and authorization of the user, and can provide information about a subscriber's location and IP information.

iFC

Initial Filter Criteria. In the IMS architecture, the iFC is an XML-based format used for describing an orchestration logic.

IMS

IP Multimedia Subsystem. The IMS is an architectural framework for delivering multimedia services over the Internet Protocol (IP).

For more information, see **IP**.

IN

Intelligent Network. The IN architecture enables operators of both fixed and mobile networks to provide advanced services, including prepaid calling, toll free calls, and voice mail.

INAP

Intelligent Network Application Part. INAP is a signaling protocol in the IN architecture.

Intelligent Peripheral

In the IN architecture, an Intelligent Peripheral is responsible for playing announcements to, and collecting information from callers, as required by the service logic, and as directed by the service control point.

IP

Internet Protocol. IP is used for communicating data across a packet switched internet using TCP/IP.

ISC

Interface between the CSCF and Service Broker or between Service Broker and AS.

JDBC

Java Database Connectivity. JDBC provides database-independent methods for querying and updating data in a database.

JMX

Java Management Extensions. JMX provides tools for managing and monitoring applications, system objects, devices, and service oriented networks.

For more information, see **MBean**.

M3UA

MTP Level 3 User Adaptation Layer. M3UA enables the SS7 protocol User Parts to run over IP instead of telephony equipment, such as ISDN and PSTN.

For more information, see **SS7**.

MAP

Mobile Application Part. MAP is an SS7 protocol that provides an application layer for various nodes in GSM and UMTS mobile core networks and GPRS core networks. The MAP enables these networks to communicate with each other and provide services to mobile phone users.

For more information, see **SS7**.

MBean

Managed Bean. An MBean represents a resource that must be managed and runs in the Java virtual machine. Mbeans can be used for getting and setting application configuration, collecting statistics, and notifying events.

For more information, see **JMX**.

MRF

Media Resource Function. In the IMS architecture, the MRF provides media-related functions, such as media manipulation and playing tones and announcements.

MSC

Mobile Switching Center. An MSC connects the landline public switched telephone network (PSTN) system to the wireless communication system. An MSC is typically split into:

- MSC server
- Media gateway

An MSC incorporates the bearer-independent call control (BICC).

MTP

Message Transfer Part. The MTP is a part of the SS7. MTP provides reliable, unduplicated, and in-sequence transport of SS7 messages between communication partners.

NGN

Next Generation Network. An NGN describes key architectural evolutions in telecommunication core and access networks that will be deployed over the next five to ten years.

PC

Point Code. In SS7 architecture, a PC acts like an IP address in an IP network. A PC is a unique address for a signaling point. A PC is used in MTP layer 3 to identify the destination of a message signal unit (MSU).

PCM

Pulse Code Modulation. PCM is a digital representation of an analog signal. In this representation, signal magnitude is sampled regularly at uniform intervals and then quantized to a series of symbols in a binary code.

PLMN

Public Land Mobile Network.

PSTN

Public Switched Telephone Network.

SB

Service Broker. SB is a network element that efficiently manages service interaction and composition. SB resides between the service layer and the converging network. An SB is traditionally decoupled from the core switch and the service execution or service creation environment.

SCIM

Service Capability Interaction Manager. The SCIM orchestrates service delivery among application server platforms within the IP Multimedia Subsystem (IMS) architecture.

SCP

Service Control Point. An SCP is a component of an intelligent network telephone system that is used to control the service. An SCP queries the service data point (SDP) that holds the database and directory. Then the SCP identifies the geographical number to which the call is to be routed based in information SDP database.

SCCP

Signaling Connection Control Part. The SCCP is a network layer protocol that provides extended routing, flow control, segmentation, connection-orientation, and error correction facilities in Signaling System 7 (SS7) networks.

For more information, see **SS7**.

SCTP

Stream Control Transmission Protocol. SCTP is a transport layer protocol.

SDR

Service Detail Record. An SDR captures call-specific attributes.

SG

Signaling Gateway. The SG transfers signaling messages between Common Channel Signaling (CCS) nodes that communicate by using different protocols and transports.

Sh

Interface type in the IP Multimedia Subsystem. Sh used to exchange information between SIP AS/OSA SCS and HSS through the Diameter protocol.

For more information, see **IMS**, **HSS**, and **Diameter**.

SIGTRAN

A family of protocols that provide reliable datagram service and user layer adaptations for SS7 and ISDN communications protocols.

For more information, see **SS7**.

SIP

Session Initiation Protocol. SIP is a signaling protocol used for controlling multimedia communication sessions, such as voice and video calls, over Internet Protocol (IP).

For more information, see **IP** and **IMS**.

SIP AS

IP Multimedia Subsystem Application Server. In the IMS architecture, the SIP Application Server hosts and executes services, such as presence, voicemail, and toll free calls.

For more information, see **IMS**.

SMS

Short Message Service. SMS provides interchange of short text messages between mobile telephone devices.

SMSC

Short Message Service Center. SMSC is a network element in the mobile telephone network that delivers SMS messages.

SS7

Signaling System Number 7. SS7 is a set of telephony signaling protocols that handle setting up and disconnecting telephone calls and provide additional services, such as prepaid billing services, SMS, and number translation.

SSN

Subsystem Number. SSNs are used to identify applications within network entities that use SCCP signaling.

SSP

Service Switching Point. SSP is a component of an intelligent network telephone system, integrated into a telephony switch. The SSP implements the Basic Call State Machine (BCSM) which is a Finite state machine that represents an abstract view of a call from beginning to end. As each state is traversed, the switch may invoke a query to the SCP to wait for further instructions on how to proceed.

For more information, see **SCP**.

STP

Signal Transfer Point. An STP is a router that relays SS7 messages between signaling end-points (SEPs) and other signaling transfer points (STPs).

For more information, see **SS7**.

Switch

A device in the telephony network that routes telephone calls.

TDM

Time Division Multiplexing. TDM is a type of digital multiplexing in which two or more signals or bit streams are transferred simultaneously as subchannels in one communication channel.

TISPAN

Telecommunications and Internet converged Services and Protocols for Advanced Networking. TISPAN ETSI is the core competence center for fixed networks and their migration to Next Generation Networks.

UAC

User Agent Client. A UAC sends SIP requests.

For more information, see **SIP**.

UAS

User Agent Server. A UAS receives SIP requests, which are sent by a User Agent Client, and returns SIP responses.

For more information, see **SIP**.

URI

Unified Resource Identifier. An URI is used to identify or name a resource on the Internet.

XER

XML Encoding Rules. In addition to BER, XER is used to encode data structured described in ASN.1.

For more information, see **BER**.

XML

eXtensible Markup Language. XML provides a framework for creating structured languages for storing, exchanging, and publishing content.

For more information, see **XSD**.

XSD

XML Schema Definition. XSD is an XML-based format for describing structure and content of XML documents, including XML elements that the document contains, content model of these elements, and attributes.

For more information, see **XML**.