Agile IMS Network Infrastructure for Session Delivery

Implementing Agile and Web-Like Consumer VoIP, RCS, and VoLTE Solutions from Oracle Communications
IMS promised to revolutionize communications services by providing a universal session layer to bridge applications and networks.

IMS offers a common session layer to converge fixed and mobile networks and interfaces for guaranteeing service quality. Today, IMS is the de facto network architecture for evolving the PSTN—with nearly 200 million users across fixed VoIP and mobile networks. The leading IMS services for consumers are residential VoIP, RCS, and VoLTE.

Consumer VoIP is a critical first step toward truly comprehensive IP-based interactive communications—presence-enabled audio and videoconferencing, chat/instant messaging (IM), multimedia collaboration, and communications-enabled business applications. Despite growing competition and shifts in user behavior, voice and messaging services remain essential.

The GSM Association (GSMA) defines Rich Communication Services (RCS) as a suite of IP interactive communication and messaging services that can be offered over 3G, LTE, and WiFi networks. RCS aims to seamlessly unify the communications experience by integrating traditional mobile telephony with new interactive services such as presence, IM, and content sharing enabled by the enhanced address book of the mobile phone.

Long Term Evolution (LTE) is the next evolutionary step for mobile broadband, and voice over LTE (VoLTE) is the standard for maintaining and improving existing voice and multimedia services in LTE. It empowers 4G LTE network operators to deliver rich voice, video, and messaging services as core services. Upgrading voice-centric, circuit-switched networks to data-oriented, all-IP 4G LTE networks allows network operators to realize cost advantages and recover inefficient spectrum for additional data capacity. VoLTE allows LTE operators to leverage service ubiquity, mobile access, and interoperability to profitably monetize voice and messaging services and remain essential in markets where consumers are bombarded with communications choices.

Despite its progress, IMS has had numerous issues that have prevented its broader use, including capital requirements, total cost of ownership, and complexity. Security and interoperability within the cores and between the IMS core and other components have also constrained deployments.

Fixed and mobile service providers need to increase agility to capitalize on the opportunities enabled by IMS so they can accelerate time to market, successfully scale IMS deployments, and consistently deliver reliable, high-quality subscriber experiences.
Challenges in Delivering IMS Services

IMS has not kept pace with the demand for robust communications services. Challenges will always exist, but the reality is that IMS service adoption, although significant, has faired poorly to date compared to over-the-top (OTT) communications services. The cost and complexity of traditional IMS deployments have hindered service innovation.

IMS was designed for the largest service providers, limiting deployments by small and mid-size service providers. CAPEX has been too high because IMS has required too many separate components for deployment in the network. OPEX has been prohibitive because of the costs of integration, provisioning, and management.

It is time for a new approach—an agile IMS solution. IMS networks need to be more like web-based networks, both in their architectural design philosophies and in their deployment principles. Service providers will not be successful hanging onto the two year-plus deployment lifecycles of yesteryear. To be successful, new services need to be implemented rapidly, continually iterated, and improved and scaled seamlessly.

Solution Components

An agile network session delivery and control infrastructure is critical for the successful delivery of IMS-based services now and in the future. These components are typically located within the service provider’s network and provide essential session management, user control, application interface, and network border functions as envisioned by IMS but are delivered in a pragmatic, economical fashion. The following components are included in the Oracle Communications IMS session delivery solution for Consumer VoIP, RCS, and VoLTE:

- **Access Session Border Control (A-SBC)**
  Oracle Communications Session Border Controller is an SBC for fixed line, mobile, and OTT service providers that can be configured for both access and interconnect borders. It operates on a range of purpose-built hardware platforms or general-purpose servers to deliver a unique combination of performance, capacity, high-availability, and manageability that has made it the most widely deployed SBC in the world.

At service provider access borders facing enterprises and consumers, such as the Internet, 3G/4G mobile, or fixed line networks, Oracle Communications Session Border Controller enables new service build-out and consolidation of legacy service infrastructure. It protects the core network from malicious and non-malicious threats while maximizing service reach, reliability, and quality.
START THE EVOLUTION TO NETWORK FUNCTION VIRTUALIZATION TODAY
Oracle Communications Core Session Manager was designed to run in a fully virtualized environment and fully supports NFV’s goals to:

- Reduce equipment costs
- Increase the speed of innovation
- Share resources across services
- Finely tune service introductions
- Encourage a diverse, open ecosystem

IMS SESSION CORE FOR AUGMENTING EXISTING SBC DEPLOYMENTS
Oracle Communications Core Session Manager is complimentary to existing Oracle Communications Session Border Controller deployments and it:

- Adds S/I-CSCF & BGCF support to existing P/E-CSCF
- Is designed for rapid integration
- Allows scale by functional specialization
- Economically leverages existing assets

Figure 1. Conceptual IMS session delivery architecture for Consumer VoIP, RCS and VoLTE CSCF.

Call Session Control Functions (CSCF)
Oracle Communications Core Session Manager increases IMS agility by providing core session control functions in a virtualized environment. It was designed from the start to run in a fully virtualized environment and is in full alignment with in-progress Network Function Virtualization (NFV) standards. It is fully compliant with 3GPP core session and breakout gateway functions and interfaces.

Oracle Communications Core Session Manager offers field-programmable signaling and routing control, flexible database options, and multiple authentication options. It is built on a nimble signaling core for maximum interoperability and service flexibility without sacrificing reliability.

Built around agile principles, Oracle Communication Core Session Manager allows service providers to easily adjust, adapt, and leverage core session management for the dynamic needs of today and tomorrow.

It complements Oracle Communications SBCs and other Oracle Communications network session delivery and control infrastructure elements by leveraging installed infrastructure and providing a complete set of core session management functions. It provides a comprehensive signaling platform based on the field-proven Acme Packet OS, which provides enables interoperability in real time with its granular real-time SIP manipulation abilities.
Integrate Session Management

For service providers looking for an integrated SBC and core session management solution, Oracle Communications Unified Session Manager combines core session delivery functionality with the leading session border controller to reduce the complexity and cost of delivering high-value, revenue-generating SIP multimedia services. It can be used to deliver a broad range of IMS services, including Consumer VoIP, RCS, and VoLTE. It offers a web-like architecture for cost-effectively scaling from thousand to millions of subscribers, providing an alternative model that is fully 3GPP IMS standards compliant.

Oracle Communications Unified Session Manager consolidates many functional IMS elements into a single, scalable solution, including:

- **Access SBC** with comprehensive security, reliability, interoperability, and regulatory compliance capabilities
- **SIP Registrar** for authenticating and managing subscribers
- **IMS Session Management Functions**, including P-CSCF, ICSCF, S-CSCF, E-CSCF, and BGCF with all requisite interfaces

Oracle Communications Unified Session Manager is based on a proven, industry-leading SBC used in more than 120 IMS networks and streamlines agility and delivers the same IMS functionality with CAPEX requirements 55-75% less than traditional IMS core solutions. It offers longer-term savings in maintenance and operations with a nimbler approach for delivering SIP-based services. Operators benefit from having fewer systems to provision, monitor, and maintain. With fewer distinct functional elements, physical systems, and points of signaling interaction, operations staff can more efficiently manage and grow the network.

**Subscriber Load Balancing**

Oracle Communications Subscriber-Aware Load Balancer enables linear, non-disruptive SBC capacity, scaling to millions of subscribers from a single SIP IP address. It supports the delivery of any Consumer VoIP, RCS, or VoLTE service or any IMS application—voice, video, presence, messaging, or multimedia—over any fixed-line or mobile access network, and it is a high-performance, layer 5-7 aware load balancer.

Oracle Communications Subscriber-Aware Load Balancer can be deployed with a cluster of Oracle Communications Session Border Controllers to create a single logical node, and it provides dynamic, adaptive load balancing of IMS subscribers based on SBC availability and health score along with subscriber capacity, load, and session state. Oracle Communications Subscriber-Aware Load Balancer enables the creation of an Oracle Communications Session Border Controller cluster that supports up to two million subscribers from a single IP address appearance for scalable SIP signaling.
Breakout Gateway Control Function (BGCF)

Oracle Communications Session Router is a session routing proxy that overcomes the challenges inherent in routing SIP-based voice, messaging, and multimedia sessions in service provider networks. It helps service providers build a scalable next-generation signaling core. Oracle Communications Session Router provides high-performance SIP routing with scalable routing policies that increase overall network capacity and reduce costs. In IMS networks, it fulfills the requirements of the BGCF function. Oracle Communications Session Router is supported on multiple hardware platforms and third-party servers.

Interconnect Session Border Control (I-SBC)

Oracle Communications Session Border Controller can be deployed as an Interconnect SBC (I-SBC) to accelerate time-to-market or expansion of IMS or IP services. It delivers key functions for service provider interconnects, such as security and highly scalable and flexible routing and transcoding. It integrates three IMS functions—the Interconnect Border Control Function (I-BCF) to control the admission and set-up of sessions traversing between the networks, the Inter-Working Function (IWF) to provide signaling protocol interworking between the SIP-based IMS network and other service provider networks using H.323 or different SIP profiles, and the Interconnect Border Gateway Function (I-BGF) to control the quality of session transport.

IMS interconnect functions implemented by Oracle Communications Session Border Controller include I-BCF, IWF, and I-BGF/TrGW. It offers full IMS functionality at interconnect borders to fully control the SIP and RTP traffic flows that comprise IMS sessions, and it supports topology hiding and SIP IPv6-IPv4 interworking.

Enhanced Firewall Traversal

Oracle’s solution for extending IMS services to Internet-based users includes Enhanced Firewall Traversal Function (EFTF), an emerging standard under development within the 3GPP. The solution employs a client/server architecture powered by Oracle Communications Tunneled Session Controller, Oracle’s Acme Packet network session delivery platforms, and client applications provided by partners or developed via a freely available software developer’s kit (SDK). The solution enables any service provider to offer secure, first-class OTT services on or off its network. Service providers can tunnel real-time communications sessions through firewalls by making the tunnel appear like web traffic.

Oracle Communications Tunneled Session Controller can be implemented on the Oracle Communications Session Border Controller. By creating secure tunnels for audio, video, and data that looks like permissible web traffic, Oracle Communications Tunneled Session Controller delivers secure connectivity—even through firewalls—for example, enabling transparent handoffs between WiFi and IMS sessions.
WEBRTC SESSION CONTROL FOR IMS
Oracle Communications WebRTC Session Controller enables the extension of IMS-based services over the web. Much more than a gateway, Oracle Communications WebRTC Session Controller provides:

- Application control and synchronization during network changes and browser page reloads
- Rapid application integration with existing systems
- Identity management between multiple devices and across web and telephony domains
- Border and application security to prevent attacks and service abuse
- High-capacity media handling for NAT traversal, encryption, and transcoding
- Robust and dynamic interworking with existing infrastructure

WebRTC Gateway

WebRTC is an emerging Internet standard that equips any device with a supported web browser with real-time communications (RTC) capabilities—such as voice calling, video, chat, or file sharing—via simple application programming interfaces (APIs) without requiring users to download plug-ins. Oracle Communications WebRTC Session Controller enables reliable, interoperable, and secure service provider WebRTC deployments with a powerful signaling platform, scalable media engine, and client SDK for rapid development. It brings carrier-grade network capabilities into the web domain, enabling communication service providers to meet user expectations to communicate anytime and anywhere using any application, device, or network.

WebRTC increases agility for service providers by enabling them to offer new web-based communication services or extend existing services with web-based clients. The distinctive advantage of Oracle Communications WebRTC Session Controller is enhanced reliability of web communications by removing the complexity of delivering a premium subscriber experience. It incorporates web-based security standards providing network security, authentication, and authorization. Oracle Communications WebRTC Session Controller is also built to enable interoperability by providing signaling, media, and identity interworking to support large scale, reliable, and universal communications.

Element Manager

Oracle Communications Session Delivery Manager product family delivers highly scalable configuration and fault, performance, and security management for IMS deployments. Its flexible, high-availability architecture accommodates small to very large networks and provides extensibility for hosting advanced management applications and services. Oracle Communications Session Element Manager facilitates flow-through provisioning, capacity planning, and comprehensive performance and fault monitoring with “at-a-glance” status indicators that simplify real-time network-wide management with multiple dashboard and configuration views. Standard OSS/BSS ecosystem interfaces for fulfillment, assurance, billing, and mediation include SNMP, SFTP, XML, and SOAP. Oracle Communications Route Manager application centralizes and automates the management and distribution of local route tables to the BGCF function of the Oracle Communications Core Session Manager, and the Secure File Transfer Protocol is supported for the updating of local route tables via XML.

Service Monitoring

The Oracle Communications Session Monitor product family is a real-time, end-to-end service monitoring, troubleshooting, and analytics solution that provides unprecedented insight into IMS networks. The suite is comprised of network probes linked to a client dashboard through an unrivaled correlation engine. It comes with full support for a range of standard protocols, including SIP, RTP, MCGP, H.248/MEGACO, ENUM, Diameter, and SIGTRAN. Oracle Communications Session Monitor products are vendor agnostic and analyzes traffic from all major IMS interfaces and functions.

ORACLE COMMUNICATIONS SESSION MONITOR PRODUCT FAMILY

- Oracle Communications Operations Monitor captures and analyzes all signaling messages and media from the network, providing full, end-to-end correlation and quality metrics of all calls in real time.

- Oracle Communications Fraud Monitor is a self-learning, scalable solution to help network operators detect phone fraud and prevent it before damage is done.
Benefits

Oracle Communications allows service providers to deploy a network session delivery and control infrastructure as the core of a successful and agile IMS solution for delivering Consumer VoIP, RCS, and VoLTE services.

Agile, Web-Like Approach

Service providers can dramatically increase IMS agility and move to more web-like architectures by streamlining core session management functions, building in-field programmability for rapid adjustments without affecting users, and providing nimble scalability through clusters and virtualization.

Reduced Complexity

The IMS session delivery solution from Oracle Communications features a streamlined IMS core design for providing optimal performance and operations efficiency. By leveraging the robust signaling and media capabilities of the Acme Packet OS, communications service providers can diversify and adapt their networks without requiring massive operational changes. CSCF, session routing, access, and interconnect functions can be flexibly integrated or separated as needed while leveraging the same underlying streamlined architecture and systems management.

Field Programmability

In today’s competitive market, service requirements are constantly changing. The IMS session delivery infrastructure from Oracle Communications is based on the field-programmable Acme Packet OS. Acme Packet OS allows rapid, software-based service adjustments for incorporating new infrastructure devices, adding different subscriber end-points, connecting to new networks and modifying service call-flows without impacting subscribers.

Scalability

Load balancing, the ability to cost-effectively increase node capacity, and the use of virtualization technologies to abstract the software from the underlying hardware allows service providers to efficiently manage capacity, control spikes in service demands, and cost-effectively scale IMS infrastructure to drive the profitability of IMS services.

Proven Session Delivery Infrastructure

Oracle Communications is a long-time leader in IMS session delivery solutions with thousands of deployments, and provides the highest levels of security, reliability, and interoperability. Oracle Communications Session Border Controllers have been deployed in over a 150 IMS projects, interoperating with all major IMS vendors. Oracle Communications also has a deep history in IMS services, including IMS-based business services, RCS deployments, and VoLTE. With SBCs deployed in nearly every Top 100 service provider, Oracle Communications has experience and expertise in providing critical IMS session delivery infrastructure.