



# Voice over LTE / IP Multimedia Subsystem (VoLTE/IMS)



As Mobile Network Operators plan for 5G and consider shuttering their legacy 2G and 3G RANs to free up the spectrum for 5G, they have to address the impact of their decisions and the effect those decisions have for their subscribers and on their roaming partners. One of those impacts will be how to support voice service for 4G and 5G RANs. A key answer is the need for an IMS Core to support VoLTE and eventually VoNR. IP Multimedia Subsystem (IMS) is an industry-standard architecture for delivering this seamless communications experience to fixed and mobile subscribers alike.

Ribbon is a global leader in providing real time communications solutions for mobile, fixed and cable network operators. Ribbon's Containerised and virtualised VoLTE IMS Core combines carrier grade reliability, scale, and innovation with best-in-class functionality and global professional services to enable best-in-class IMS deployments.

## Overview

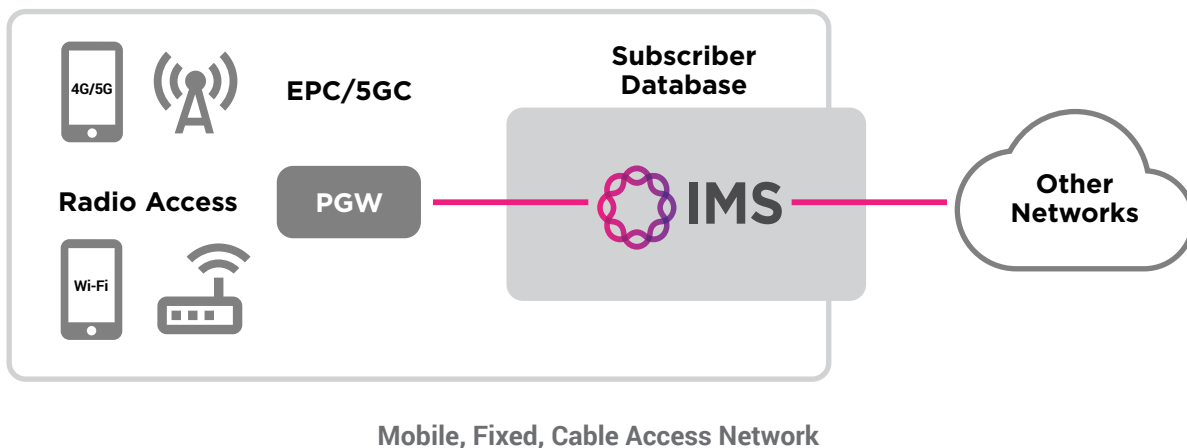
IMS defines standardized functions structured with an application layer separated from the underlying network by a common IMS core. Ribbon's IMS Core enables Mobile Network Operators to readily introduce a new Voice Core, supporting both VoLTE for 4G and VoNR for 5G services, thereby removing the reliance on Circuit Switched FallBack to 2G and 3G.

Ribbon enables Mobile Network Operators to leverage existing network infrastructure and introduce an IMS Core without jeopardizing support for existing 4G and 5G data services. IMS was created to ensure that operators could avoid vendor lock and gain market advantage by choosing best-in-class solutions from a variety of vendors. As an industry pioneer in voice and multimedia solutions, Ribbon provides operators with a containerised or virtualised IMS Core leveraging the industry leading components.

## IMS Solution

A Mobile Network Operator who has deployed 4G and is relying on 2G/3G for voice services in their own network and to support roaming partner subscribers, will encounter loss of service as other networks shutter their legacy networks to enable spectrum re-farming for 5G. This makes the need for an IMS VoLTE Core a business imperative.

To minimize the cost and impact of deploying VoLTE, the Ribbon IMS is fully standards compliant and can be seamlessly deployed, interfacing with an existing Packet Core and Subscriber Database.



## Ribbon's IMS Core Solution Elements

### IP Access and Interconnect – P-CSCF / IBCF / TrGW elements

Ribbon's IMS Core supports a Proxy CSCF (P-CSCF) which is a SIP proxy that provides the first point of contact for IMS user equipment. This user-network interface function securely protects the IMS Core, the VoLTE user, and provides subscriber authentication.

The P-CSCF manages the registration between SIP clients and a SIP registrar and can route incoming and outgoing calls between these clients and other networks or services over SIP trunks.

Ribbon IMS Core provides the Interconnect Border Control Function (IBCF), Interworking Function (IWF) and Transition Gateway (TrGW) functions, supporting all required interfaces to the other IMS components. This includes support for the Transit and Roaming Function (TRF) and Optimal Media Routing (OMR) required to support the Roaming Architecture for Voice over IMS with Local Breakout (RAVEL).

### Interrogating and Serving Call Control

The Interrogating and Serving Call Session Control Functions, (I-CSCF & S-CSCF) form the central components of the IMS Core. The I-CSCF is responsible for routing SIP messages to the appropriate S-CSCF based on information returned to it by the Subscriber Database (HSS). The Serving Call Session Control Function manages authentication, registration and session control for a subscriber's device, updating the subscriber database with location information and using returned information to allow or deny service. The S-CSCF processes all the SIP signalling and decides how to route a call, either to an Application Server or other S-CSCF using Initial Filter Criteria (iFC).

### Service Continuity - ATCF / ATGW / E-CSCF / EATF

In conjunction with the P-CSCF, Ribbon supports service continuity during IMS call transfers by being configured as an Access Transfer Control Function (ATCF) and an Access Transfer Gateway Function (ATGW). For IMS emergency calls, the solution supports the Emergency - Call Session Control Function (E-CSCF), Emergency Access Transfer Function (EATF).

### Call Routing - BGCF

In a VoLTE IMS, the Breakout Gateway Control Functions (BGCF) is a SIP proxy which processes requests for routing from an S-CSCF when the S-CSCF has determined that the session cannot be routed using DNS or ENUM/DNS. It includes routing functionality based on telephone numbers. Ribbon provides the BGCF function with a full suite of routing options and capabilities.

### ENUM/DNS

The Ribbon IMS Core provides the function of the ENUM/DNS server. The ENUM provides the Network functions such as the S-CSCF and I-CSCF with the SIP URI of an equivalent E.164 number that is assigned to the callee. At the same time, the DNS can resolve the IP address of the following hop address.

The ENUM/DNS provides the following query services:

- Address Querying
- Service Record Query
- Name Server Query

### Media Services – MRFC / MRFP Transcoding

The VoLTE IMS Core Multimedia Resource Function (MRF) provides real time media stream format conversions (transcoding) between two otherwise incompatible user terminals such as a wireless handset and a legacy landline device. The MRF element is divided into a Media Resource Function Controller (MRFC) and a Media Resource Function Processor (MRFP). Both functions are supported in the Ribbon IMS Core solution.

### Diameter Signaling – DRA / IWF

IMS networks use the Diameter protocol to access HSS data and PCRF policy and charging information in order to control subscriber sessions. The number of Diameter signaling messages being sent within IMS networks can be very large, putting pressure on many network elements and inhibiting network performance. Ribbon manages this messaging pressure by providing Diameter Routing Agent (DRA).

### IP Short Message Service (SMS) - IP-SM-GW / SMSC

Ribbon IMS Core supports IP short messages for interworking between the IP Short Message Gateway (IP-SM-GW) and the Short Message Service Center (SMSC) in which the IP-SM-GW converts the IP Short message to a CS short message (and vice versa) and sends/receives the short message to/from the SMSC.

### **MMTEL - Telephony Application Server**

Ribbon's IMS MMTEL Application Server is the heart of the IMS Core, providing real-time voice and supplementary services over any IMS-enabled IP access network and directly interworking with the legacy network, resulting in consistent service to the end-user irrespective of the access network. In the Ribbon solution it provides support for multi-SIM access over VoLTE, VoNR and VoWiFi.

### **Call continuity - SCC-AS (Service Centralization and Continuity Application)**

The SCC-AS is a key component in VoLTE IMS architecture. It plays a central role in ensuring service continuity and centralized control of the communication services in VoLTE network. The SCC-AS is responsible for managing the session initiation, session management and resource allocation for voice calls, as well as for providing handover and fall-back solutions to ensure IMS centralized services and service continuity. In case of a lack of 4G coverage, network failure or congestion, the SCC-AS can redirect the call to a different network, such as 2G or 3G, to maintain the call.

### **Conference Calling - Conference Application Server**

The Conference Application server plays a crucial role in enabling multiple users to participate in a single voice call, allowing them to communicate with each other simultaneously. The Conference Application server is responsible for managing the setup and control of conference calls, as well as for coordinating the communication between the participating users.

### **Supplementary Services - XCAP (XML Configuration Access Protocol) Server**

The XCAP server provides a centralized repository for configuration data. It is used to manage the configuration of services such as call forwarding, call waiting, and call barring. It provides a centralized location for the storage and retrieval of this data, allowing VoLTE end users to easily manage and update their service configurations.

## **Why Ribbon?**

Ribbon's Containerised or Virtualised IMS Core is designed to flexibly meet the unique needs of each network operator, providing unmatched benefits for mobile and fixed service providers:

- VoLTE services for mobile subscribers
- Flexibility to seamlessly integrate with multivendor EPC and HSS elements
- Ability to manage network access by mobile device "make and model" to ensure excellent customer experience
- Best in-class session border control, routing and transcoding capabilities
- Choice of either containerised or virtualised instantiation of IMS functions
- Secure user and control plane interfaces to ensure subscriber and network data is protected
- Highly experienced global professional services team

**Contact Us** Find out how Ribbon can help you transform your Mobile Network and realize the benefits of VoLTE/IMS