

IMS SIP Toolkit

An advanced tool for developing
IMS SIP-compliant applications and devices



Developing IMS SIP Applications

Softil's IMS SIP Toolkit is a powerful and highly versatile set of tools to facilitate the development of IMS SIP applications while reducing development time and cost. The Toolkit includes all the required components, including an extensive set of quick start sample applications, a GUI test application, and detailed documentation. The IMS SIP Toolkit is fully compliant with IETF, 3GPP, TISPAN, and PacketCable 3.0 specifications.

As part of Softil's standard-compliant SIP Developer Suite, the IMS SIP Toolkit is comprised of Softil's award-winning SIP Toolkit, IMS Add-on, and SigComp Add-on components. The IMS SIP Toolkit is designed to dramatically accelerate the development of IMS SIP applications.

Products developed with the IMS SIP Toolkit:

- S-CSCF – Serving Call Session Control Function
- I-CSCF – Interrogating Call Session Control Function
- P-CSCF – Proxy Call Session Control Function
- AS – Application Servers
- UE/UA – User Equipment: 4G/LTE mobile phones and devices, wireless LAN and wireline endpoints
- MRFC – Media Resource Function Controller
- MGCF – Media Gateway Control Function
- SGW – Signaling Gateway
- BGCF – Breaking Gateway Control Function
- Fixed to Mobile Convergence (FMC) Systems

Examples of devices, services and applications that can be developed with the IMS SIP Toolkit:

- Dual-mode handsets
- Push-to-talk over Cellular (PoC)
- Presence and Instant Messaging
- Advanced conferencing systems
- Video sharing
- Click-to-talk

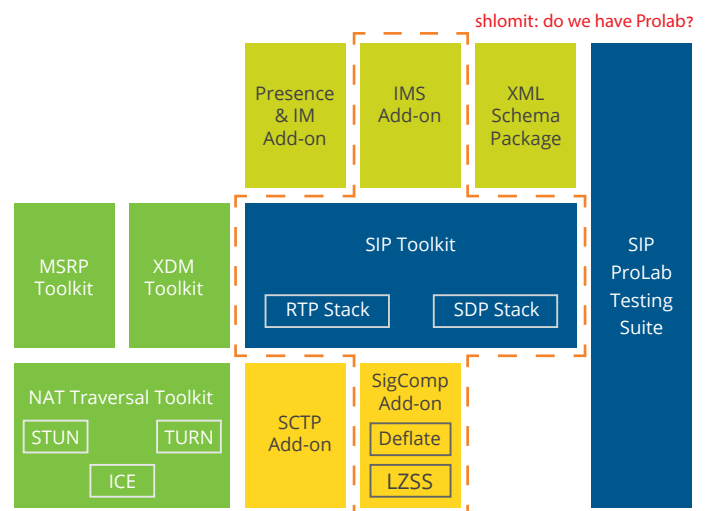
IMS Overview

The IP Multimedia Subsystem (IMS) is a SIP-based network that serves as the infrastructure for services, call or session control in advanced networks. In 4G/LTE networks, IMS is located above the packet switch (PS) layer, but it can interact with circuit switch (CS) networks and other packet-switched networks like the Internet.

IMS distinguishes between the access plane and the user plane. The access plane can be a radio access network (RAN) or any other access layer. In IMS, the user plane is in fact a packet-switching network. This level is the transportation plane for all media and signaling within and outside the IMS network.

Above the user plane is the control plane. Entities in this layer control the media streams and signaling links between other entities; for example, call control and media control. The application level, above the user level, handles delivery of advanced services that require service logic beyond session setup/teardown.

IMS separates between entities that provide different network services, as opposed to earlier architectures that lacked this separation. IMS defines unique network entities for call control, service control, resource control, media control and packet switch control.

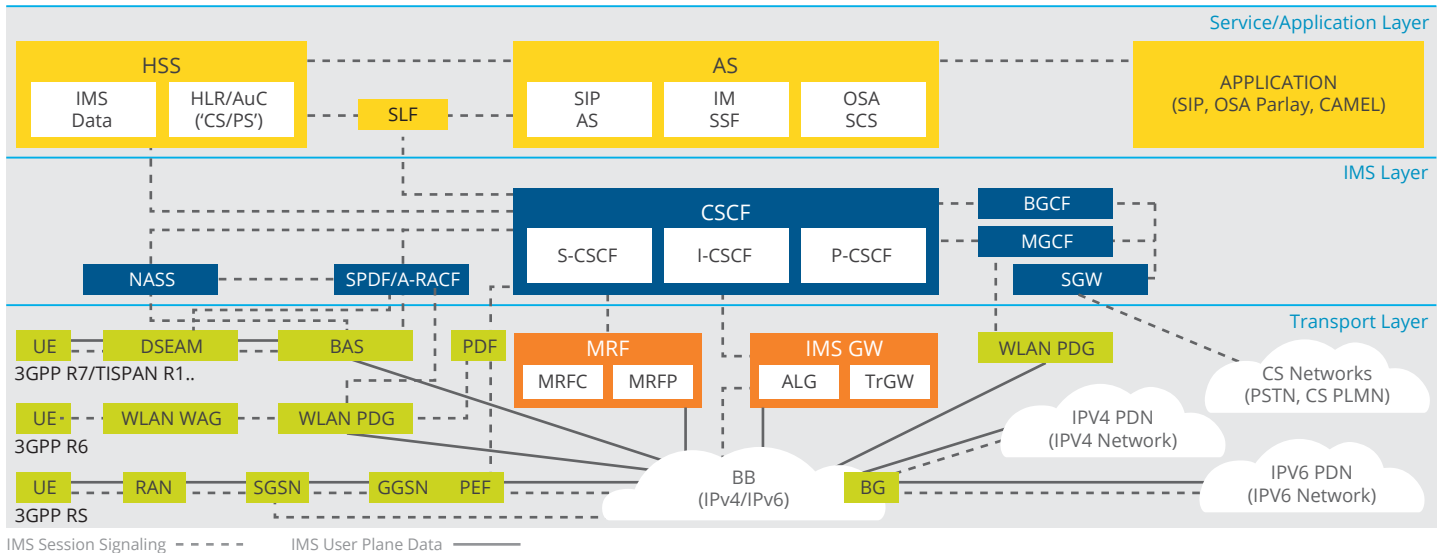


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IMS Architecture - Layered Approach



IMS SIP Toolkit Specifications

The IMS SIP Toolkit provides all necessary SIP, SDP and RTP services, such as encoding, sending, receiving, and parsing SIP messages. The SIP messages can be transferred over several transportation layers, such as UDP, TCP, and SCTP over IPv4 or IPv6, using several security schemes, such as TLS and IPsec. The Softil SIP Toolkit implements and supports many extensions and layers above the SIP message.

IMS Special Features

- SigComp: signaling compression between UE and PCSCF as defined in RFC 3320, 3321, 4896, 5049, 4077 and related standards
- All IMS specific P-Headers, including RFC 3325, RFC 3455, RFC 3313
- Preconditions (RFC 4032) and IMS Resource reservation (RFC 3312)
- Globally Routable UA URI (GRUU)
- SIP Outbound
- IPv6 support
- Support for event packages, useful for presence and reg-event
- Parsing more URI schemas, such as PRES URI, TEL URI, and IM URI
- ENUM: translation of telephone numbers to SIP URI
- Flexibility to support new headers with new syntax as needed

Call Control

- Support for Mobile Registration with Path/Service-Route headers
- Support for preloaded SIP routes
- Dynamic local address
- Support for IMS SDP extensions
- Session timers

Security

- Support for MD5-AKA and IKE
- Security Agreement (RFC 3329)
- Support for all access network flavors, including 3GPP/LTE, TISPAN and Packet Cable 2.0
- Comes with a special quick start application with sample code for each access network flavor
- IPsec with ESP transport mode and manual keying as well as tunnel mode
- TLS
- HTTP digest with MD5 and "auth-int" extension

Presence and Events Packages

- Support for general event package with subscribe-notify mechanism as defined in RFC 3265

General Support for SIP Extensions

- Supports dozens of SIP protocol extensions for IMS/non-IMS applications

The IMS SIP Toolkit is delivered with:

- Source code
- Sample programs
- GUI test application with full signaling capabilities
- Complete documentation

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Major features required for IMS SIP signaling:

- P-headers: private SIP headers for IMS
- IPv6 support: mandatory IMS transportation level
- Signaling compression: mandatory IMS requirement for signaling between UE and P-CSCF
- Support for IM URI, PRES URI, and TEL URI
- ENUM: translation between phone numbers or TEL URI to SIP URI
- Support for Instant Messaging (IM)
- HTTP DIGEST using 3GPP AKA Authentication: "AKAv1-MD5"
- IPsec: IP security
- Security agreement negotiation as defined in RFC 3329
- Support for mobile registration using Service-route and Path headers
- Preconditions and IMS resource reservation, mechanisms for Quality of Service

IMS SIP Toolkit Design Principles

Coded in ANSI C and cross-platform compatible, the IMS SIP Toolkit is available for all common operating systems. Its open, object-oriented architecture makes it programmer friendly and highly flexible. The Toolkit provides multiple layers of APIs, including:

- High-level APIs that hide the complexity of the protocol and enable rapid development of applications
- Mid- and low-level APIs that expose the protocol's internal mechanisms and allow for more power and customization based on application requirements

The Toolkit is inherently designed to offer both extensive functionality and complete flexibility.

IMS SIP Toolkit Architecture

SIP Stack

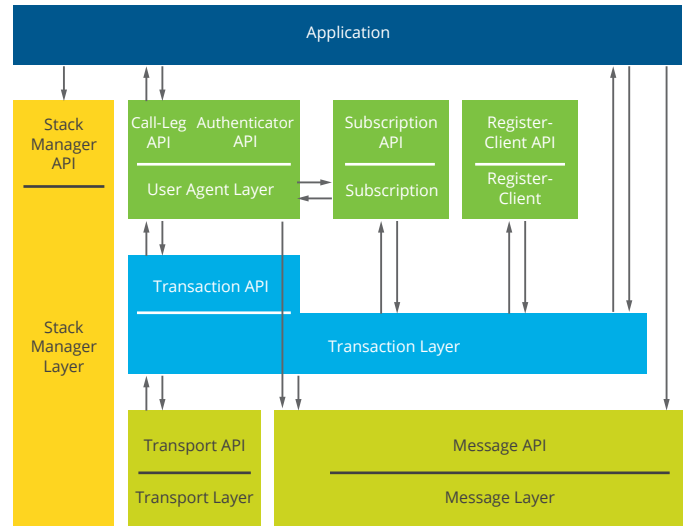
The SIP Stack is an internally multi-threaded (configurable) library containing all SIP-specific Toolkit functionality, including message encoding and decoding, transaction and call management, and SIP extensions.

Session Description Protocol (SDP) Stack

The SDP Stack is a library for SDP message processing. It complies with RFC 2327 and enables parsing/encoding of any SDP message field. The SDP Stack provides an SDP Message Layer for creating, browsing, and editing SDP message parts.

RTP/RTCP Stack*

The RTP/RTCP Stack is a library for sending and receiving RTP and RTCP packets.



IMS SIP Toolkit APIs

The SIP Toolkit is standards-based and enhanced with intuitive, object-oriented APIs to provide optimal control over SIP Stack activities:

- SIP Message Layer for creating, browsing, editing, and comparing SIP messages and message parts
- Dialog Control Engine for rapid SIP application development
- Subscription Control Engine
- Transaction Control Engine
- Connection Management
- SIP Stack Manager Layer for setting system configuration, memory allocation, logging, and other resources

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Standards Supported

The IMS SIP Toolkit supports more than 150 IETF standards, including:

- 3GPP TS.24.229 IMS SIP extensions
- TISPAN ES 283 003 IMS extensions
- SigComp-related RFCs and drafts
- IETF RFC 3266 support for IPv6 in SDP
- IETF RFC 3261 (Session Initiation Protocol – SIP)
- IETF RFC 3262 (Reliability of Provisional Responses in SIP)
- IETF RFC 3263 (Locating SIP Servers)
- IETF RFC 2327 (Session Description Protocol – SDP)
- IETF RFC 3264 (An Offer/Answer Model with SDP)
- IETF RFC 3265 (SIP Specific Event Notification)
- IETF RFC 3266 (Support for IPv6 in SDP)
- IETF RFC 1889 and 1890 (RTP/RTCP)
- IETF RFC 3329 SIP security agreement
- IETF RFC 3455 Private headers
- Support for general SIP headers: ease of implementing any IMS SIP header-based standard
- Globally Routable User Agent URIs (GRUU) support
- IETF RFC 4032 - Preconditions
- IETF RFC 3312 - IMS Resource reservation
- SIP Outbound
- Numerous Internet drafts for various SIP extensions.

For a complete list, contact Softil.

Operating Systems*

The IMS SIP Toolkit supports a wide range of operating systems and can easily be ported to other operating systems. Supported operating systems include:

- Windows
- Android
- iOS
- Linux
- Embedded Linux
- vxWorks
- Solaris
- Green Hills Integrity
- 64-bit operating systems

**Inquire about additional available operating systems*

The Softil SIP family also includes:

- **SIP Developer Suite** – the IMS SIP Toolkit is part of the SIP Developer Suite, a powerful and highly versatile set of tools, add-ons, and testing tools that enables developers to combine the necessary components for building an ideal development environment for their application.
- **SIP Server Platform** – a comprehensive SIP server development solution with complete standards-based functionality of Proxy, B2BUA, Events, Redirect, and Registrar servers.
- **Multimedia Terminal Framework** – a complete set of building blocks for developing SIP-based IP Phone applications in RTOS or embedded environments.
- **Advanced RTP/RTCP Toolkit** – a standalone RTP/RTCP Stack that provides IPv4/IPv6, security, and advanced functionality.
- **Professional Services** – a full range of design, integration, and deployment consulting services.

For more information, contact Softil at info@softil.com

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