IP Multimedia Subsystem - IMS

Technical White Paper

IP Unity Carrier-Grade Technical White Paper

Contents

Figures

IP Multimedia Subsystem (IMS)

Introduction

With communications technology and competitive pressures expanding at a rapid pace, service providers need increasingly reliable, scalable, and extensible systems to deliver the applications that their markets demand. The range of services is expanding to include not only telephony, but also text, video, streaming data and mixed mode/media applications.

Service providers need network architecture and standardized solutions that can be developed and deployed rapidly and cost-effectively. They have embraced the IP Multimedia Subsystem (IMS) suite of standards in large numbers, to help them accomplish these goals. IP Unity recognizes providers' critical needs for faster services deployment, and has added a progressive set of IP Multimedia Subsystem (IMS) functionalities to its portfolio of IP services to address them.

This white paper is intended to detail the major goals and functions of the IMS architecture, and to relate how IP Unity, a leading provider of enhanced services delivery solutions, is implementing IMS within its Mereon Media Server and Application Server solutions to support carriers and their evolving needs.

Understanding IMS Functionality

IMS is a core network architecture that allows communication between servers and clients, using open standards that support IP network interfaces and fixed-mobile convergence. IMS is comprised of a layered and unified architecture that manages media as it moves through the network and provides the systems integration needed to provide any IP Multimedia services for and between any set of wireline and wireless end-users. The core network contains reusable functions that manage and route media to media and application servers for processing. Application servers host the services and IMS defines the service control, routing, protocols, and charging processes across the network, without regard to input device or data format.

The IMS development framework defines how services connect and communicate with the underlying telecommunications network. IMS also defines how services integrate with provider back-end systems. Using IP Unity applications within the core IMS network, providers can integrate legacy networks and systems with next-generation communications services and rapidly produce new services and applications without stranding embedded networks or services.

Throughout this white paper, we will make frequent reference to IP Unity's Mereon Media Server and Application Server in conjunction with the IMS architecture and network elements, to illustrate how these IMS-compliant network elements aid in the delivery of new services. For more detail on IP Unity's full solution set, please see Pages 16 – 23.

The IMS infrastructure integrates a range of protocols and media types and provides a generic architecture to streamline network processes.

IMS functionality includes:

- IP connectivity-based development
- Access-independent processing – CDMA2000, GPRS, WiFi, 3G
- QoS for IP multimedia
- Policy control for efficient use of media resources
- User and data security and authentication using SIP
- Charging capabilities

Roaming support
Services control across the network
Services development API support

The figure below shows a typical access-independent IMS network.
.

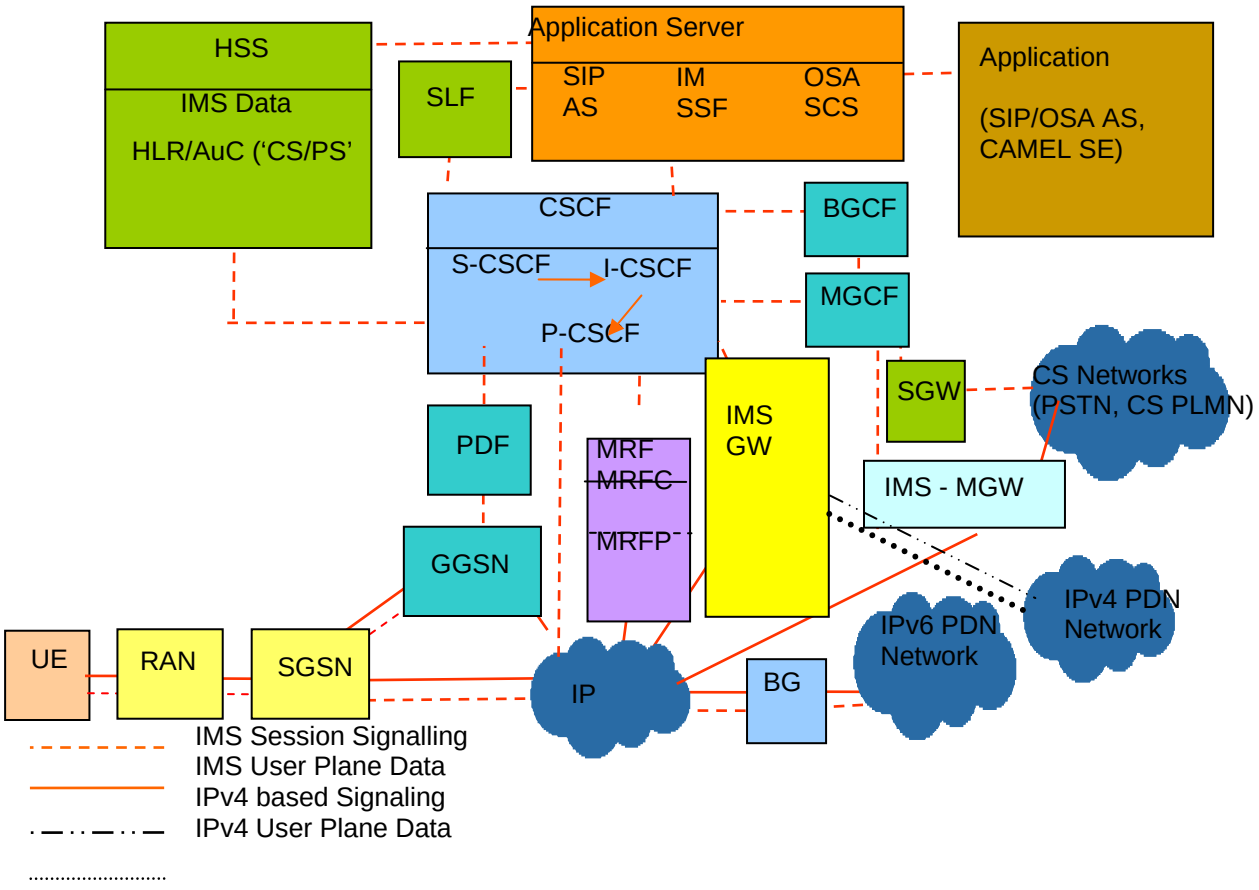


Figure 1. IMS Network Architecture

Layered Architecture

IMS uses a three-layered architecture comprised of the *connectivity* layer, the *control* layer, and the *application* layer.

The connectivity layer is the entry and exit point into the IMS network through routers and switches connected to the access network and the network backbone.
The control layer contains the CSCF (call session control function) and other control servers that manage call and session routing and file protocols. It performs support functions such as provisioning and charging. Gateways provide network communication to external networks.
The application layer includes the application and media servers which process and store data and generate services for the subscriber.

With an IMS-centric media server and IMS-compliant application server (such as IP Unity's system) in place, providers can generate a seamless flow of data from the initial access-independent entry point into

the IMS network, through the application servers and media servers where data is processed, and to the subscriber device. IMS defines the movement of the data stream, including the processing flow, but it does not process the data.

The IMS architecture allows providers to define which application services are to be activated, security parameters for services, and how data is to be routed inside the network.
IMS uses IP-based routing and session control. The core network has packet-switched (PTSN) and circuit-switched (Internet) components that enable adding, modifying, or deleting multimedia data during a session. Voice, multimedia, text, chat, and other media types can be blended within the IMS network.

Session Initiation Protocol (SIP) Support

The Session Initiation Protocol (SIP) is an IETF signaling protocol used by technology products for creating session-oriented connections between two or more endpoints in an IP network.

SIP is a critical open standard, well-supported throughout the carrier and vendor community, which is responsible for helping to enable general applications such as client location registration for mobile call forwarding, flexible message structuring, distribution of function between multiple devices, separation of signaling and media paths, and forking (which allows multiple devices to be associated with a single address). SIP also enables call flow for the following discrete functions:

Call Hold	Music on Hold
Unattended Transfer	Consultation Hold
Unconditional Call Forwarding	Attended Transfer
No Answer Call Forwarding	Busy Call Forwarding
Single-Line Extension	3-way Call
Incoming Call Screening	Find-Me
Call Pickup	Call Park
Outgoing Call Screening	Automatic Redial
Click to Dial	

For more information on SIP functionality, see www.sipforum.org and the associated IETF SIP working drafts, from which the above information was excerpted.

SIP implementation has grown rapidly among carriers, due to two major factors:
1. SIP compatibility with other standards, such as VoiceXML, which allows developers to focus on service logic and application services and thus develop services more efficiently.
2. The inherent SIP framework, which allows providers to extend the power of SIP to meet evolving network and service needs. For instance, IP Unity's SIP enhancements include IMS-required extensions in security, compression, and QoS negotiation.

Media Server SIP interface

IMS allows providers to link to users using a core network, from which the provider can control services and establish fixed connectivity to other networks or resources, such as databases.
To comply with these flexible IMS network deployment configurations, the Mereon Media Server and selected other industry media servers provide two interfaces:
A Media Resource (MR) interface between CSCF and MRFC via IMS compliant SIP support
The Mereon Media Server acts as the Media Resource Function, composed of MRFC and MRFP
A Media Processing (MP) interface between MRFC and MRFP via the H.248 (Megaco) protocol
The Mereon Media Server acts as MRFP

The Mereon Media Server complies with the mandate of H.248 for media server implementation, and also leverages key carrier-grade softswitch vendor support in both network deployment and planned deployment to address the diverse requirements of the carrier-grade service provider market. Although H.248 is not

considered to have the benchmark standard status of SIP, it is still used by many softswitch vendors to provide media processing and control.

Application Server SIP Interface

The Application Server provides an IMS-compliant SIP interface for service providers and system integrators to deploy vendor-developed applications and services, such as messaging and video conferencing, or to develop third-party applications on top of the Application Server.
The following figure illustrates an IMS network architecture configured to work with the Mereon Application Server component.

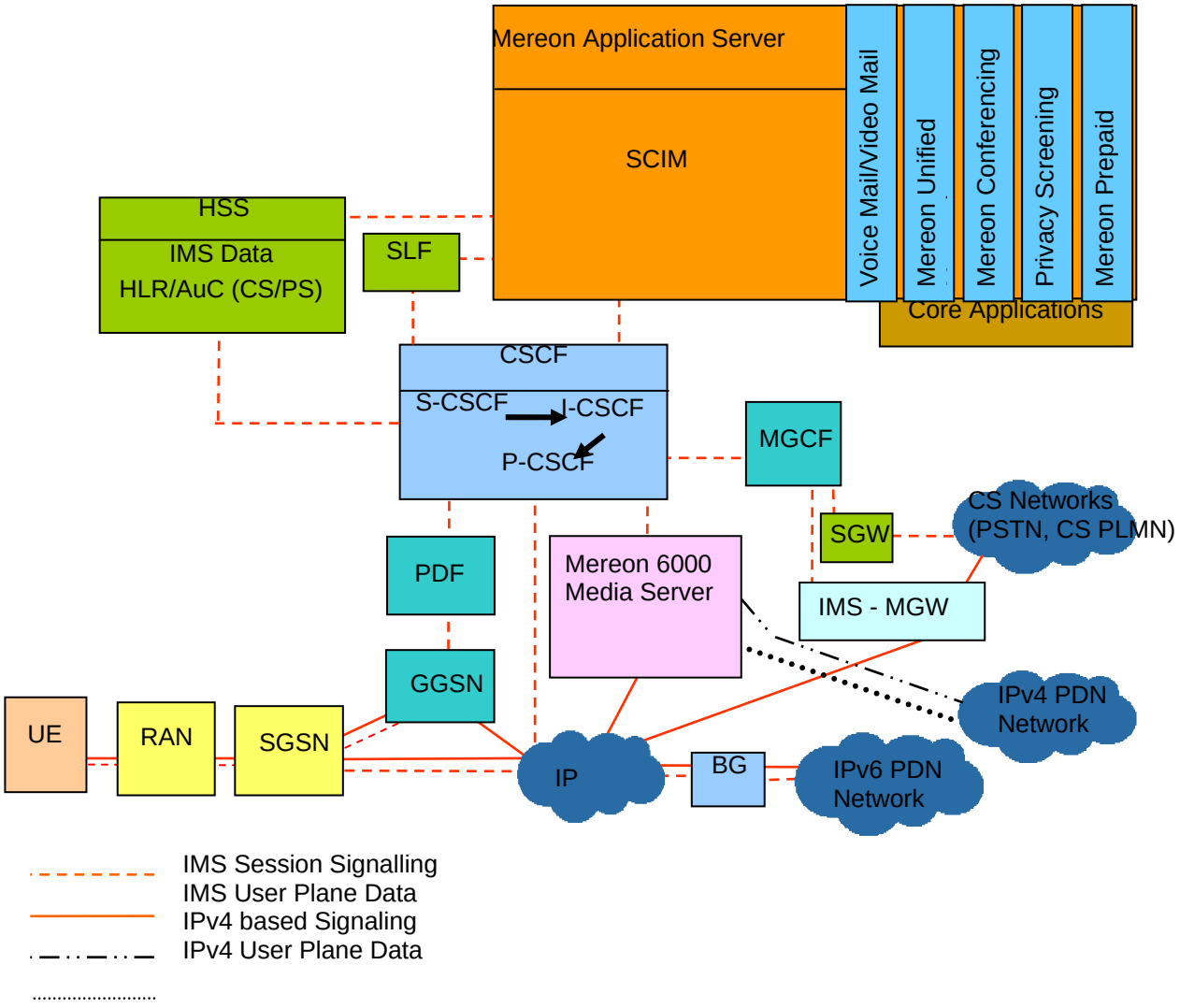


Figure 2. IMS with Mereon Application Server Component

IMS Components

IMS provides a core network architecture that facilitates standards-based communication to application services. Within that network, IMS specifies how media will be transported through the IMS network and relies on the endpoint or media gateway to manage media encoding. To transport media, IMS uses the following key components:

- Call Session Control Function (CSCF)
- Session Border Controller
- IP Service Control Interface (ISC)
- Media Gateway Control Function (MGCF)
- Media Resources Function (MRF)
- Media Resource Function Controller (MRFC)
- Home Subscriber Server (HSS)
- Charging Entities

Call Session Control Function (CSCF)

The Call Session Control Function (CSCF) is the session routing point in the IMS core network. It distributes incoming calls to the application services.

The CSCF handles initial subscriber authentication. Application services that receive a message from the CSCF are defined to permit the processing of that call, and to perform additional service-related checks.

The CSCF uses the SIP message itself to pass the call event to the service and adds additional header information to maintain control of the call. The application service then processes the message independently or returns the message to the CSCF. The CSCF then runs the ISC filters and passes the message on to the next service defined, or ends the data processing.

The CSCF supports the use of Parlay interfaces and allows the provider to use a Parlay gateway between CSCF and legacy application services to translate signaling when necessary.

Session Border Controller

For public or private IP networks, IMS uses a *Session Border Controller* component to route calls through the firewall to the Call Session Control Function (CSCF) component within the IMS network.

IMS Service Control (ISC)

The CSCF component uses the *IMS Service Control (ISC)* interface to intercept call signaling and pass it to application services for processing. The ISC interface implements filters for subscribers that it has stored in the Home Subscriber Server. It compares these filters with the incoming SIP message and determines which application services should be invoked and in which sequence.

Media Gateway Control Function (MGCF)

To manage calls from or to legacy platforms, such as SS7/TDM channels from PSTN/PLMN networks, calls are routed through the *Media Gateway Control Function (MGCF)* and passed to the core IMS network CSCF using SIP or RTP protocols. All calls routed through these media gateways enter the IMS core network as SIP/RTP media streams. RTP streams are routed directly between media servers, gateways, and endpoints.

To replace TDM, IMS emulates PSTN/ISDN service capabilities and interfaces by adapting the data stream to an IP infrastructure. To simulate the PTSN/ISDN data stream, IMS uses session control over IP interfaces and infrastructure.

Media Resource Function Controller (MRFC)

Application services fall into three categories:

- Rerouting with no data processing
- Media-streaming generators that are often dedicated servers
- Standard media servers that typically use VXML-based applications

The MRFC is a network component that communicates with an application service and directs a separate media server to handle the media stream. The MRFC can also be used to manage conference control and charging, as well as to control subscriber roaming.

Home Subscriber Server (HSS)

The Home Subscriber Server (HSS) provides a central repository for subscriber information. The HSS stores all subscriber information required to establish sessions between users and provide services to subscribers.

The HSS stores:

- Subscriber registration
- Subscriber preferences
- Subscriber location
- Services information, such as address books

The HSS stores many types of user information, including a mobile network's Home Location Repository. It provides an interface through which users can gather data. The HSS uses existing directories rather than replacing them, making it a useful tool for deploying next-generation services.

Charging Entities

Charging entities are used to control billing information for subscribers using network services. The definitions of the interfaces an application service must use for charging entities are maintained in the IMS network. IMS uses an offline charging entity (Rf) and an online charging entity (Ro) that are used in a Diameter message format.

IMS Network Architecture and Applications

Using IMS architecture and IMS-compliant applications such as those supported by IP Unity, providers can offer a range of services over a common network infrastructure. IMS-based applications can deliver the following real and non-real time services.

Real-time services:

- Fixed mobile convergence
- Multi-modal calls
- Audio/video streaming, messaging, and conferencing
- Mobile broadcast/multicast
- Voice portal
- Voice-activated dialing
- Mobile advertising
- Announcements

Non-real time services:

- SMS/MMS notification
- Web access to VM/UM
- Multi-party chat
- Push-to-talk
- Mobile gaming

Sample Application

IMS allows rapid development and deployment of enhanced services. The following sample scenario describes an example of how the provider will soon be able to use IP Unity's Mereon Media Server, Mereon Application Server and Mereon Applications to help subscribers realize the benefits of the IMS architecture.

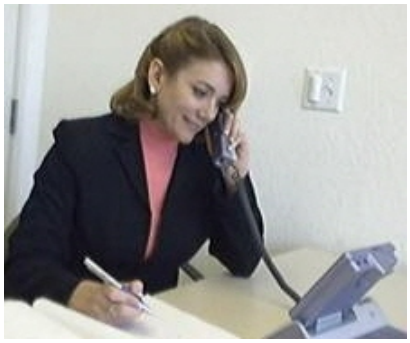
Usage Scenario -- Using Video Mail

In this hypothetical scenario, two participants are conducting a business transaction for the purchase of a house. The subscriber, Mary, has limited time to search for a house and has engaged a realtor, Diane, to find prospective properties that fit her criteria.

3. Using her cellular phone, Diane calls Mary to tell her of a potential prospective property.
4. Mary is unable to accept the call and Diane gets her recorded video greeting.

5. Diane then leaves a message for Mary, describing the house.
6. Hours later, Mary calls in to her Unified Messaging system and retrieves a new video message from Diane describing the house.
7. Mary returns the call to Diane and leaves a message that the listing sounds favorable and asks Diane to leave a video movie of the house.

8. Diane takes a short video of the house and leaves the resulting file as a message on Mary's unified messaging.
9. Mary views it and decides to schedule a walk-through prior to bidding on the property.



Throughout the entire process, IMS simplifies the transmission of voice and video data streaming across the network seamlessly, manages media as it moves through the network as well as bandwidth for video requirements, authenticates user and voicemail permissions, and performs access-independent media streaming functions using the fixed-mobile convergence that is possible with IMS and Mereon platform performance.

The IP Unity Mereon™ Platform

Summary

IP Unity is a leader in providing state-of-the-art solutions to develop, launch, and maintain rich-media applications and IP services over wireline, wireless, and broadband networks. IP Unity's carrier-grade Mereon™ Media Servers, Mereon Application Servers and IP applications provide a complete media processing solution. These solutions, along with our full suite of telecommunications applications, supply the tools and technology providers need to deploy feature-rich media services across a distributed network.

The Mereon suite of products includes:

- Mereon Application Server
- Mereon 6000 Media Server
- Mereon 3000 Media Server
- Mereon Unified Messaging
- Mereon Conferencing
- Mereon Auto Attendant
- Mereon Prepaid Services
- Privacy Screening

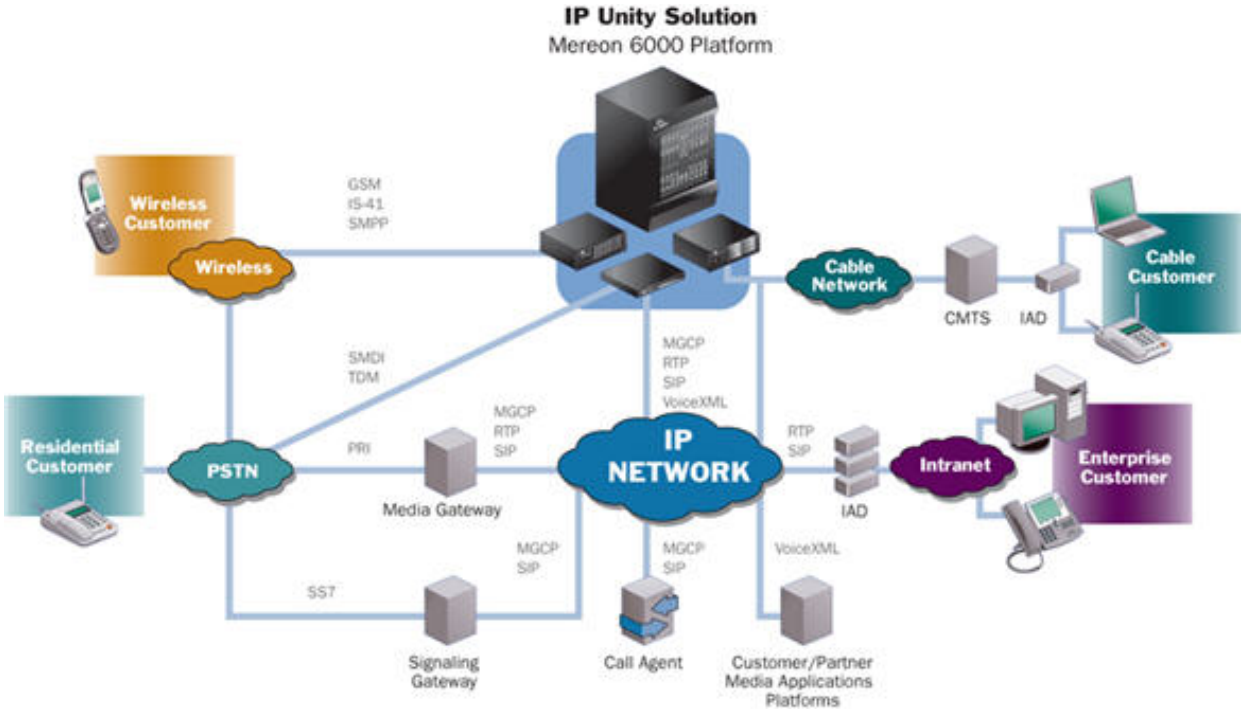


Figure 3. Overview of Mereon 6000 Platform Architecture

Mereon Platform Architecture

The Mereon Platform is composed of a Mereon Media Server, a Mereon Application Server, and Mereon applications and third party applications that process media in a multitude of ways. Installed in an IP-enabled, next-generation carrier network architecture, this platform provides the underlying engine for IMS service delivery. The Mereon Application Server and the applications running on it are installed across a cluster of server nodes for high availability. Figure 2 shows a typical Mereon Platform configuration.

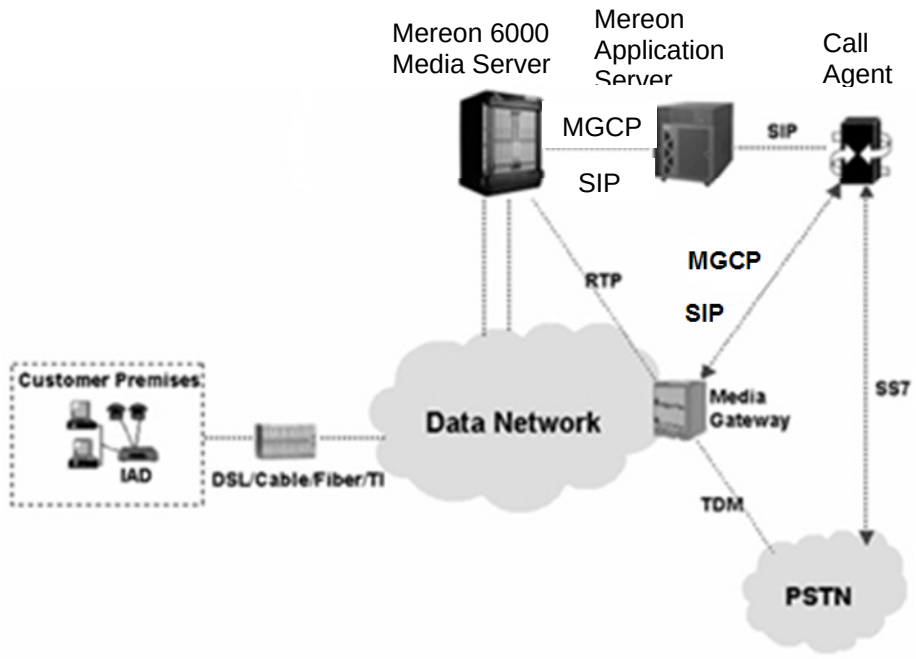


Figure 4. Typical Mereon Platform Configuration

Mereon Platform Components

The Mereon Platform offers carrier-grade high-speed, high-volume media processing to enable providers to deploy high-margin, enhanced services on standard PSTN and next-generation networks. Led by the requirements of new packet-switching technology and fixed/mobile network convergence (FMC) networks, Mereon offers the hardware and software support to create and deploy services such as unified messaging, voicemail, conferencing, interactive voice response, speech recognition and text-to-speech capabilities.

Mereon Application Server

The Mereon Application Server provides call control and media management capabilities for telephony and media-rich applications. It provides the runtime engine and various subsystems (including third-party components) such as a relational database, network attached storage and Web server. The runtime objects perform specific functions as directed by the applications that run on it.

Web Subsystem

The Mereon Application Server Web Subsystem includes a J2EE-compliant EJB server, Java servlet engine, and HTTP server components. These components provide the Web-facing interfaces for the Mereon Application Server and applications.

Mereon 6000 Media Server

The Mereon 6000 Media Server provides a carrier-grade hardware platform that delivers services such as Interactive Voice Response (IVR), conferencing, tones, announcements, recording, automated speech recognition, transcoding, text-to-speech, fax and other services on a single platform.

The Mereon 6000 is based on a modular design that allows the provider to add media or speech processing cards without interrupting the subscriber's service. The platform can be scaled from as few as 100 ports up to 16,000 ports in a single 14RU shelf.

The Mereon 6000 Media Server supports all open and standardized protocols, and can be controlled by any softswitch or application server. The open system allows development of third-party applications and promotes customization for enhanced services.

Mereon Applications

Mereon applications are designed to allow flexibility, scalability, customization and seamless integration of existing applications and networks.

Mereon Unified Messaging

Mereon Unified Messaging simplifies communication by allowing subscribers to manage all of their messages --regardless of media type -- such as voice, fax, PDA, and e-mail. The messages can then be retrieved using telephones, PCs, web devices and PDAs.
The Mereon Unified Messaging application integrates with existing voicemail and messaging infrastructures to provide a bridge to next-generation services.

Mereon Conferencing

Mereon Conferencing offers interactive audio-visual and audio-only conferencing via Voice over IP (VoIP) and PSTN networks. Online conferences can be synchronized over the telephone and Internet in real time, and users can control the media type, participant roles, offer voting sessions, recorded playbacks, and private communication options. Conferences can be scheduled, modified, or cancelled using an intuitive Web interface in combination with automated e-mail notification and reminders to all participants. Operator intervention is not required.

Features of Mereon Conferencing include:

- PSTN, wireless, or IP access
- Web interface for conference administration
- Automated e-mail notifications and reminders
- Web-based subscriber services, such as profiles, reservations, presentations and reports
- Web-based, real-time conferences
- Conference recording and playback options
- Web- and telephone-based participant controls, such as conference access, attendee management, volume controls, and recording
- Compatibility with legacy systems, such as IP, TDM, and converged communications infrastructures
- Multi-lingual conferencing features
- SSL and secure tunneling security features

Mereon Auto Attendant

Mereon Auto Attendant automatically answers and routes incoming calls to the correct destination. The caller is greeted with customized information and the caller is directed to dial the extension of the person being called, or speak the person's name to be connected. The system can be configured for customized features using a Web-based user interface. Interactive Voice Response (IVR) applications such as driving directions, weather, music, and hours of operation can be programmed to play automatically.

Mereon Prepaid Services

The Mereon Prepaid Services application provides a Web interface the provider can use to develop prepaid services such as prepaid dial tone, prepaid long distance, prepaid messaging and conferencing. The service platform also enables the provider to manage prepaid calls and feature activities. For example, using the Web interface, the provider can customize or enable subscribers to customize their experience, charge and recharge their calling card or account, and view their billing records.

Mereon Privacy Screening

Mereon Privacy Screening is a call screening service that works with Caller ID. When an anonymous or private call comes in for a subscriber, the call is redirected to the Privacy Screening service and the service prompts the caller to supply identification, such as a name or PIN. Upon notification, the subscriber can choose to accept or reject the call, or route the call to voicemail.

IMS and Mereon Applications – Delivering Next-Generation IP Services

IMS brings divergent technologies together. Rich media data is processed more readily because IMS defines common standards to move the data through the network of gateways and application services. Mereon applications are uniquely positioned to maximize the capabilities of IMS, because they are designed to use open source development, multiple platforms and file types, and customizable configurations.

Providers face two critical areas in application services: fast development and fast deployment of applications. Using IMS with the Mereon Platform, providers can realize improvement in the time-to-market cycle for rich-media and niche applications. Deployment of newly-developed applications and services is more efficient, less costly, and generates more revenue with one unified and powerful platform, because IMS and the Mereon Platform offer open standards and reusable functions such as subscriber profiles, group lists and charging, thus reducing the need for application-specific design and configuration.
IMS supports access independence, multiple network architectures, terminal and user mobility, and extensive IP-based services such as Push-to-talk over cellular (PoC) and video sharing. Mereon Applications, using the IMS network architecture, meet the requirements of both fixed and mobile convergence in delivering IP services.

The Future of IMS and Mereon Platform Functionality

IP Unity has made a commitment to fulfill the promise of IMS technology. Although the technology is in its early stages, IP Unity well into the implementation of a three-phase plan to deliver full IMS functionality across all Mereon Media Server and Application Server products.
Phase One has been implemented in June 2005 through Mereon Release 3.0. With that release, the Mereon Media Server was enabled to perform as a full Media Resource Function (MRF). This allowed existing IP Unity cable and fixed line customers to benefit from the rich media and fixed mobile convergence functions made possible with the IMS architecture, i.e., IP services available seamlessly across networks, geographies, and end-user devices, through RFC3261 and SIP extension compliance.
IMS, integrated with Mereon Application Services, supports:

- Multiple user identities
- Contact and group list management
- Dynamic and blended media sessions
- Personalized IMS sessions
- Profile management
- Call screening
- Call initiation/transfer/management
- IVR-based information service delivery
- IPTV
- Video sharing
- MMS

In addition, the initial implementation of IMS and the Mereon Platform allowed transparency with IP Unity's core applications: Mereon Unified Messaging and Mereon Conferencing.

Planned Enhancements

Phase Two, released in the third quarter of 2005, transformed the Mereon Platform into a complete Application Server within the IMS environment. It included a Software Development Kit (SDK) and an ISC interface that meets 3GPP-specified standards for SIP signaling and other SIP extensions. The Mereon Application Server improves service scalability and provides an infrastructure for the development of innovative applications. The IMS-enhanced Mereon Application Server now eases the transition to an IMS network architecture, especially for providers who build prepaid and other call control applications on the Mereon Platform.

Increased Security and Customization Options

Phase Three, scheduled for release in the first quarter of 2006, will add IPv6 to the existing IPv4 addressing protocol on the same platform, along with providing additional security enhancements. IMS will also provide fully IMS-compliant real-time and non real-time enhancements to applications such as Mereon Unified Messaging and Mereon Conferencing.
Plans for Phase Three include:

- Implementation of an ATCA architecture
- High-level APIs based on XML
- A powerful service execution engine
- Broad interoperability on the applications-layer HSS database and SCIM functions, as well as the switching-layer CSCF function.

When IMS is fully implemented, the provider will be able to develop and deploy new services such as sticky ‘click-to’ and ‘push-to’ applications for cable, wireless, and fixed networks, and make them accessible over handhelds, PCs, set-top boxes, PDAs, and other access devices. These technologies make it possible to deliver competitive video-sharing services and gaming applications.
IP Unity is driving IP technology to meet the needs of tomorrow’s market. IMS, when integrated with the Mereon Platform, provides the stable and flexible network architecture and development environment that will meet the requirements and fulfill the promise of next-generation telecommunications services and applications.

Conclusion

IMS offers a robust environment for developing and deploying multiple network services and data from a common network across different access networks. It uses advanced communications technology to provide standards-based procurement that supports rich media delivery in real-time, to reduce the cost of media delivery. It offers a unified architecture that can be used for both fixed and mobile access to support the market demand for multiple device types.

About IP Unity

IP Unity is a leader in carrier-grade media servers, application servers and real-time multimedia applications for IP, TDM and convergent networks. The company is the carrier's first choice for critical applications such as messaging, conferencing, video and integrated communications features.

The company's flagship products are its award-winning, internally developed Mereon™ Media Servers, Application Servers and applications software. These standards-compliant products deliver voicemail, unified messaging, audio/web conferencing, IVR, prepaid/debit services, web collaboration, presence service, privacy screening and announcements. In addition, the company bundles its Mereon™ Platform with the software and systems of other leading applications developers, softswitch, gateway and mobile communications systems providers to produce end-to-end solutions like IP Centrex, collaboration and mobile messaging/conferencing.

IP Unity was formed in 1999 and has deployed over 275 systems in 30+ countries. IP Unity's approach to delivering high value and coast savings for carriers is to enable many services via one powerful, carrier-class system – operators do not have to buy one specialized media server for messaging, another for conferencing, a third for IVR and announcements. For example, by running multiple services on the Mereon Media Server, carriers can quickly launch new packages, realize a dramatic decrease in delivery cost per subscriber (up to 50% with each subsequent feature activated), and greatly accelerate the system's payback period (reducing payback cycle by between 50% and 70%).

In addition, IP Unity generates operating cost savings through the use of one single OAM&P for all services on any network type. The Mereon Media Server processing power and communications ports is utilized to support many different applications simultaneously, driving down the incremental cost and complexity of adding feature sets. But while the Mereon system supports many applications, it has the versatility to address existing PSTN based networks, hybrid PSTN and IP networks and IP-only networks that require revenue-generating applications.

The Mereon Media Server and Mereon Application Server simplify and unify the user interface for carriers, presenting one customizable look and feel across all applications, all devices, on all networks. They integrate with traditional and IP wireline, cable, wireless and fixed/mobile convergence networks, and easily enable bundling and customization of features by market and by user group.

The systems' technical innovations are amply demonstrated in the functions of advanced session control, resource allocation, speech recognition for voice navigation, a single OAM&P system for all applications, shared transcoding and modular primitives for both the Mereon Media Server and applications access.
IP Unity's Mereon Media Servers and Mereon Application Servers are IP Multimedia Subsystem (IMS)-compliant and bridge wireline, cable and wireless networks, giving carriers the ability to deliver a single set of future-proofed features, user interfaces and services transparently, over any network or over multiple networks. The company recently announced an aggressive IMS implementation roadmap, which will enable carriers to achieve service and feature portability, rapid applications delivery and service personalization. The platform leverages its inherent media processing and session control functions as well as the IMS protocols to provide multiple user identities, contact and group list management, dynamic and blended media sessions, the ability to handle personalized IMS sessions, profile management, call screening, call initiation/transfer/management and IVR-based information service delivery.

These capabilities enable the creation of highly appealing and sticky 'click-to' and 'push-to' enhanced services and applications for cable, wireless and fixed networks, accessible over handhelds, PCs, set-top boxes, PDAs and other user devices.

IP Unity
475 Sycamore Drive,
Milpitas, CA 95035
USA

E-mail: info@ipunity.com
Toll-free telephone number: 866-IPUNITY (866.478.6489)
Local telephone number: 408.582.1100
E-mail: support@ip-unity.com
http://www.ipunity.com/

Appendix: IMS Standards

With the increased complexity of communications networks, applications, and services, the use of standards-based development has become a key factor for successful application services deployment and operation. IMS offers a standards-based development architecture that includes 3GPP (Release 5 issued in 2004) - GSM and 3GPP2 Multimedia Domain - CDMA.
IMS meets the standards of the following telecommunications associations:

Alliance for Telecom Industry Solutions (ATIS)
Association of Radio Industries & Business (ARIB)
China Communications Standards Association (CCSA)
European Telecommunications Standards Institute (ETSI)
Telecommunications Technology Association (TTA)
Telecommunications Technology Committee (TTC)

Interfaces and Standard Bodies

IMS offers a common network interface for the varied protocols in use for communication and interactivity. The IMS access network interface can communicate with SIP, MGCP, and MEGACO. It can also accept different QoS, SLA, resource management protocols, and schema.
The following table lists the access network, standard body, and interfaces that are supported using IMS.

Access network	Standard body	Interface between CA/AS/FS	Interface between CA and endpoint	Interface between CA and MS	Interface between endpoint and MS
Cable	PacketCable, EuroCable	SIP and NCS	MGCP and NCS	MGCP and BAU	RTP
T1/DSL	MSF	SIP and IA	SIP/MEGACO an IA	SIP and IA	RTP
Cellular	3GPP/3GPP2 IMS	SIP and ISC	SIP	SIP and MEGACO	SIP and XCON
T1/DSL	IPCC	SIP	SIP/MGCP	SIP/MGCP	RTP
T1/DSL/WiFi/WiMax	ETSI TISPAN, ITU-NGN	SIP	SIP/MEGACO	SIP/MEGACO	RTP

IMS Compliance

IMS offers standards compliance with the following features:
Compliancy

Transport
- IPv6
- QoS, SLA, resource management
- Media authorization
- SCTP

Signaling
- RFC3261 and extensions

Management
Billing
- P-headers

Security
- SSL, TLS, SIP security

Enhanced (real and non-real time) services to landline and mobile subscribers:

Audio/video conferencing and text chat
Audio/video streaming
Color ring-back tone

Mobile advertising
Multi-party chat
Prepaid
Push-to-talk
SMS/MMS notification
Unified messaging – voice, video, fax
Voice-activated dialing
Voice portal
Web/WAP access to applications

IMS Support

IMS support is outlined in the following categories:

Architecture
3GPP TS 23.218, TS 23.228, TS 23.229
Support QoS Signalling at Different Bearer Service Control Levels (3GPP TS 23.228-550*)
Management interface
Telecom Management: 3GPP 32.101, 32.102.
Performance Management: 3GPP 32.104
Accounting Management: 3GPP 32.105
Configuration Management: 3GPP 32.106
Fault Management: 3GPP 32.111
Application Server
ISC interface:

- RFC3261 compliant and extensions
- Registration events
- Charging parameters
- SIP compression*

Sh* interface
Dh* interface
Generate CDR with charging parameters
Support OSA/Parlay* 3GPP TS 22.127-540
Media Resource Function (MRF)
Mr:

- RFC3261 compliant and extensions
- Support draft-burger-sipping-netann-10, VoiceXML 2.0, CCXML 1.0*, and XCON*
- Charging parameters
- SIP compression*

Gi:

- RTP/RTCP
- IPv4, IPv6*

Support LAES*: interception of multi-party sessions (3GPP TS 33.107-530, ETSI 201 671 edition 2, TIA's J-STD-025B, T1-678*)
Country- and regional-specific tones and announcements
Interactive Voice Response (IVR)

- Announcement IVR (for wrong numbers, network congestion, service changes)
- Authorization IVR (for calling cards, ordering, billing, access, and security applications)
- Auto Attendant IVR
- Voice Mail IVR

Multi-lingual support
Generate CDR
Automatic Speech Recognition (ASR)
Text to Speech (TTS)