



Whitepaper

IMS architecture for 3G Mobile --- and PC audio/video convergence

How to extend the broadband mobile audio/video network to the internet users

Abstract

One of the most discussed challenges that worldwide carriers are facing today is the telecommunication networks convergence.

Third generation mobile networks and broadband access to the Internet are spreading together with new challenges and opportunities. The *IP Multimedia Subsystem (IMS)* is the acclaimed architectural model that is guiding the transition to the next generation of IP based telecommunication services.

This whitepaper focuses on the design of IMS architecture for the extension of 2G/3G mobile networks to the Internet Video and VoIP users.

Scenario

During the past few years telecom networks have been highly fast shaping environments; technology evolves very quickly and the highly competitive scenario demands for the continuous offering of new services.

Only few of such new services become killer applications but these killer applications change very quickly the spending habits of the end user. The recent advent of network convergence is starting to bridge three segments that were traditionally isolated: fixed voice, mobile voice and IP services.

Nowadays end users rely on their Internet connection to place phone calls and on their mobile phone to connect to the Internet; moreover voice services revenues are declining faster than expected and the ARPU is being driven by value added services.

This scenario is both a challenge and an opportunity for carriers and service providers; success is about being able to offer the forthcoming killer application and follow the

user base spending habits regardless of the medium they are using to consume these services.

Extending their services to the Internet is a way for mobile carriers to start building an Internet user base, keep control of their customer and match their communication needs even when using their PC.

This whitepaper introduces an architecture that powers a business model where a softphone is distributed to Internet users which are enabled to interoperate using voice and video calls with carrier's mobile network. In the following paragraphs different flavours of services and billing strategies will be described together with the description of a best-practice implementation.

Benefits

- ➔ New revenue streams coming from video calls, both from 3G mobiles and video-enabled PCs.
- ➔ Both Pc and mobile users get accustomed to 3G services
- ➔ New internet customer base
- ➔ 2G users get motivated to leverage their service plan to the feature-rich 3G world
- ➔ Reduce churn, remaining closer to the customer with new and exciting services.

Step 1 - Planning

How are customers billed?

There are three ways an operator can offer the 3G-to-PC convergence service:

- ➔ *Inbound only*: PC users can receive video calls, but are not allowed to place calls. This way, 3G mobile calls are charged as usual. This model is often used when the ability to connect to the service is offered also outside the operator's customer base.

- ➔ *Inbound/outbound*: both mobile and PC users can place video calls. Outbound calls originated by PCs generate CDR in the 3G gateway, connection is allowed only between operator's customers or extended to non-subscribers via prepaid credits
- ➔ *Inbound/outbound with number mobility*: the same number is assigned to 3G and PC terminal, and calls can be routed accordingly to user's preferences.
- ➔ Easy installation
- ➔ Zero configuration for the user
- ➔ Security with authentication, authorization and classes of service management
- ➔ Privacy through media encryption
- ➔ Audio and Video quality
- ➔ Administrative feature to control the user base and avoid abuses
- ➔ Brand recognition through customizable user interface
- ➔ Automatic provisioning and integration with legacy backend systems
- ➔ Automatic network recognition and NAT-firewall traversal solution

The service provider, when designing the service can choose between these possibilities or decide to mix the three of them and use different classes of service. For example, the service provider can choose to provide inbound only capabilities to non-subscribers while allowing both Inbound and Outbound calls to subscribers.

How are phone numbers assigned?

Each registered PC user has a personal number assigned from a predefined numbering range. Operators can choose to reserve a dedicated range of their public numbering plan to video-enabled PC, rather than assign network private addressing; moreover, dedicated numbering plans are already available in most countries for Video and VoIP terminals.

An advanced option is to allow actual subscribers to share the same number between mobile handset and PC softphone (number mobility).

What software is required?

In order to enable the Internet users to place audio and video calls the installation of a specific software (softphone) is required; this software makes use of PC multimedia resources (audio card, webcam, and microphone) and act as a terminal to interact with 3G mobiles and other PCs.

When choosing the softphone software a number of features should be taken into account, including:

How to protect privacy and meet regulations?

To be comparable with standard mobile and fixed phone services VOIP communications must prove to be compliant with the security and privacy standards required by massively deployed end user services:

- ➔ Users must be authenticated in order to be tracked and billed
- ➔ Transported media must be encrypted in order to protect privacy even when using the open and insecure Internet network
- ➔ Regulatory requirements (such as lawful interception) must be implemented

How to avoid network configuration problems?

Difficult configuration is probably the main reason that prevents mass adoption of IP-based telephony. Most commercial and non commercial solutions require the end user to edit complex configurations and provide cryptic feedback to configuration problems. This issue can be addressed with more advanced solutions which provide automatic network configuration and require the end user to simply log-in using his credential.

Moreover, the wide spread of appliances for connecting and protecting domestic networks (routers/access points/firewalls) block standard

IP-multimedia applications. To overcome this problem, automatic network discovery and Firewall/NAT traversal solutions should be used.

Step 2 - Architecture engineering

IMS Standards and architectures

The IP Multimedia Subsystem (IMS) standardization process is an effort toward a common usage of protocols and architectures for the next generation of convergent IP networks.

The adoption of IMS compliant architectures provides a number of benefits including:

- ➔ Interoperability, both cross-carrier and cross-vendor
- ➔ Proven scalable architecture
- ➔ Support for advanced services such as presence management, flexible billing, authentication, multi access channels, privacy and security
- ➔ Architecture reuse and faster time-to-market

Figure 1 shows the diagram of the proposed architecture including:

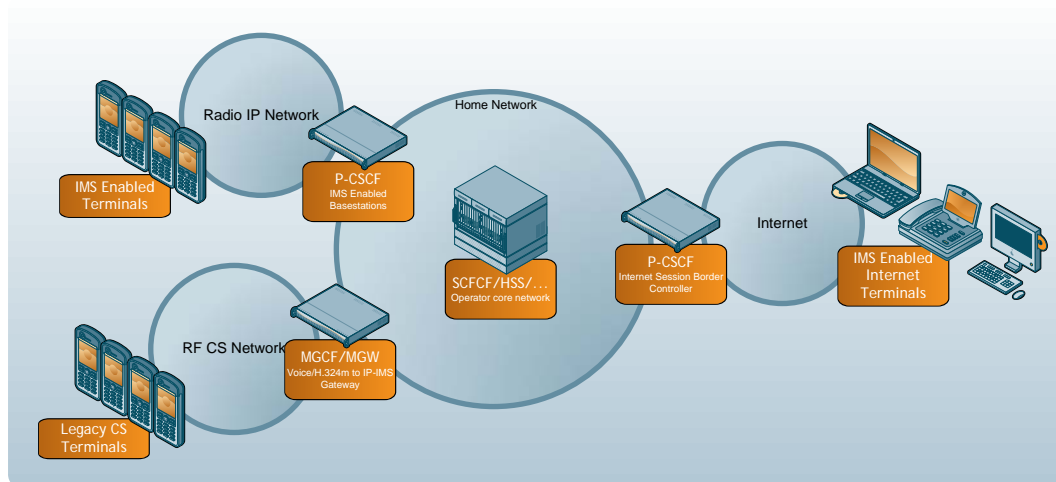


Figure 1

IMS Terminals

In the proposed solution there are two different set of IMS Terminals; the first set is made up of the Software Endpoints distributed to the internet user base in order to gain access to the service provider's network.

The second set of terminals are the IMS enabled mobile phones; these terminals are not required for the architecture to be complete, but are very likely to become part of any IMS powered network in the near future.

P-CSCF: Session Border Controller

The P-CSCF is the first point of contact for the IMS terminals. In this specific scenario, the first P-CSCF acts as a Session Border Controller (SBC) in order to link the internet (the visited network) with the service provider IMS network (the home network).

The SBC provides the following functionalities:

- ➔ Network isolation
- ➔ NAT and firewall traversal handling
- ➔ Authentication and authorization

The second P-CSCF is the IMS enabled base station; once again this network element is not required in current network but is very likely to have it deployed in the next future.

MGCF/MGW: 3G Gateway

The 3G Gateway is the network element bridging the gap between legacy Circuit Switched UMTS telephone systems and Packet Switched IP IMS networks.

The most important features of such gateways are:

- ➔ Circuit switched interfaces (ISDN PRI and/or SS7 ISUP)
- ➔ 3GPP-324m / H.324m compliance
- ➔ Audio transcoding (AMR to internet-friendly codecs)
- ➔ Advanced call routing functionalities
- ➔ Fault tolerance and scalability
- ➔ 3GPP IMS Signalling compliance (SIP)

only client for real time communication specifically designed to be deployed by service providers in order to offer Audio and Video services over private and public networks.

Mirial Softphone supports both audio and video conversations at bitrates ranging from 20kbps to 1280kbps and is compatible and field proven with almost every audio/video terminal supporting H.323, SIP or H.324m.

Mirial Softphone includes a number of features specifically designed for service providers such as:

- ➔ Automated provisioning and distribution
- ➔ Single click installation (no configuration required)
- ➔ Provisioning API for easy integration with customer's users database
- ➔ High quality audio with wideband codecs, automatic gain control and advanced Acoustic Echo Cancellation
- ➔ High quality video with support for H.261, H263+, H.264, up to 30fps and 4CIF resolutions (704x576 pixel)

Step 3 - Implementation

This paragraph introduces a best-practice implementation for the proposed architecture based on Mirial equipment.

Mirial Softphone

Mirial Softphone is the most advanced software

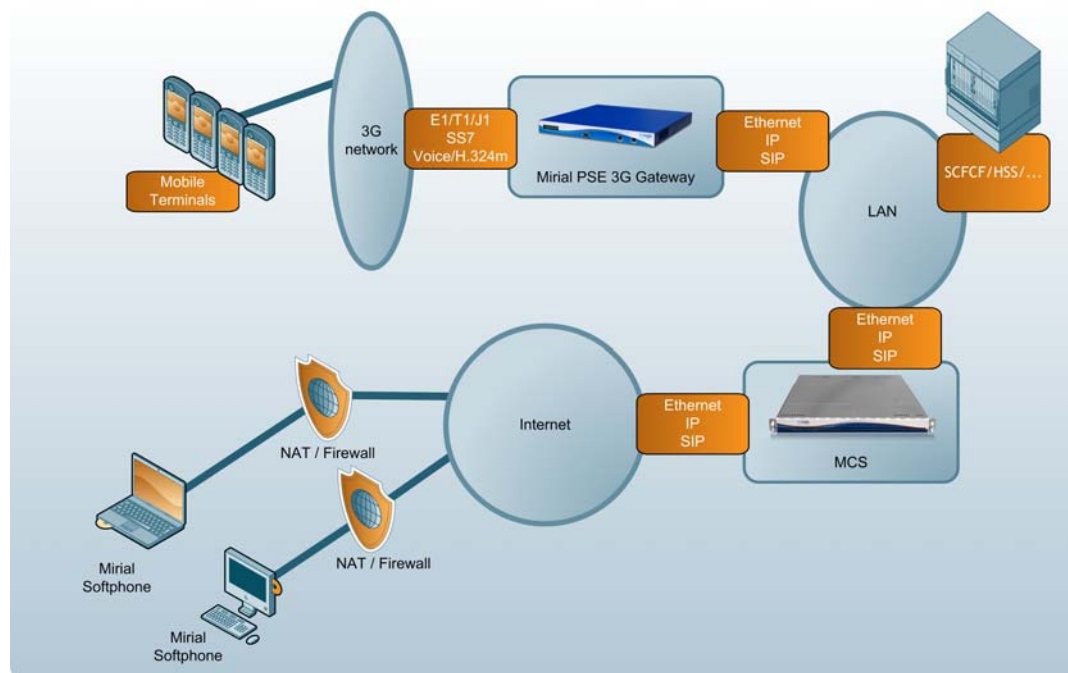


Figure 2

- ➔ Integration with network elements like Voice and Video Mail, Multi Conference Units and centralized address book

MCS

MCS is a network element specifically designed to manage and control wide installations of Mirial soft phones.



MCS is targeted to Video and Voice over IP service providers willing to offer their subscribers the smoothest visual communication experience in the simplest and most effective way.

MCS provides the following functionalities:

- ➔ Automatic Mirial Softphone configuration (no need for the user to enter confusing network parameters and address)
- ➔ Authentication management both with internal or external user database
- ➔ SIP Proxy and optionally registrar for streamlined deployments
- ➔ Firewall/NAT traversal and automatic network discovery
- ➔ Mirial automatic update management

Mirial PSE 3G Gateway

PSE 3G Gateway is a network element enabling the connectivity between 3G and IP networks. It supports industry standard protocols including ISUP or PRI interfaces, and interoperates with all 3G handsets and terminals. The PSE 3G Gateway connects Voice and 3GPP-324m networks to SIP/IMS/H.323 networks. PSE 3G Gateway is perfectly suited for mission critical deployments and implements fault-tolerance, cluster configurations, service monitoring via SNMP and comprehensive CDR generation.



PSE 3G Gateway provides the following functionalities:

- ➔ Embedded Video IVR (Address Book / Dial Extension)
- ➔ Enables PC to 3G handsets videocalls and viceversa
- ➔ Enables 3G users to participate in IP multiconferences
- ➔ Enables different 3G video services such as
 - 3G video portal
 - 3G video mail
 - 3G video contact center
 - 3G video streaming
 - 3G video blog
 - 3G video chat / dating
- ➔ Support for H.323 and SIP on IP networks
- ➔ Embedded gatekeeper
- ➔ Vertical and horizontal scalability
- ➔ Compact appliance (1RU), small footprint

Need more information?

You can find more information on Mirial products and other solutions whitepaper on our website:

<http://www.mirial.com>

If you have any question or want to be contacted by one of our sales representatives, please send an email to:

sales@mirial.com



www.mirial.com

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