NETWORK EVOLUTION:
FINDING THE PATH TO THE NEXT GENERATION NETWORK

If you've been following the telecommunication press recently, you would be forgiven for thinking that IMS (IP Multimedia Subsystem) will revolutionize communications networks overnight and usher in a new era of ubiquitous multimedia services. In reality, standards and networks will evolve over a period of time to achieve this goal. Operators across Latin America are taking a pragmatic approach to the rollout of new infrastructure, ensuring that deployments today will evolve to meet the future demands of architectures such as IMS. In short, equipment purchased today must be IMS ready. Only if this approach is taken can an operator ensure that network investment is optimized.

IMS provides the ability to develop a service which is independent of access type allowing a common service to be delivered across a range of terminals. The long term benefits are clear. Services can be developed and delivered quicker and launched to a larger market. This reduces the financial risk to the operator, but more importantly it benefits end-users because they are presented with a greater range of services which are competitively priced. It sounds like a win-win situation, but exactly how do we get there from here? To answer that question we need to look at what an operator needs today, and what is driving the move towards Next Generation Networks. Today there is a need to deploy simple, competitive VoIP services that will generate a sustained revenue stream and ensure the operator's place in the competitive and evolving VoIP marketplace. At the same time standards are evolving to define the Next Generation Network (NGN), a huge undertaking in itself.

First, let's take a look what an operator needs today.

IMMEDIATE OPERATOR NEEDS

Today operators are addressing the immediate needs associated with deploying VoIP (Voice over IP) and MoIP (Multimedia over IP) services to business and residential customers. This means dealing with problems such as service reach, service reliability, security, and interconnection. Building an infrastructure that can deliver these capabilities is underway right now, with operators in Brazil and Mexico taking a slight lead with their IMS plans. The key to the long-term success of the new services will depend on the ability of the underlying infrastructure to adapt to the evolving IMS standards.

Effective session control is at the heart of solving these issues. This has led to the widespread adoption of Session Border Controllers (SBCs) to provide solutions to these problems. SBCs typically consist of two primary functional elements: a signaling element and a media element, hosted within a single device. They handle the relationship between the separate signaling and media paths that characterize VoIP and MoIP calls. This enables them to address issues in both the access networks and the interconnection between networks.

In an access network SBCs increase service reach by allowing access to customers behind NAT devices, thus increasing the potential subscriber base. SBCs can police the calls being admitted to the access network to prevent overbooking of resources and thus a loss of quality. Media can be policed to ensure it agrees with requested services to protect quality and prevent service theft.

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SBCs at network interconnect points help to secure the network by performing topology hiding, preventing both network and personal details from being propagated, and limiting the range of DoS attacks. They also provide valuable accounting data on the actual media being exchanged, permitting more accurate inter-operator settlements.

As VoIP services become subject to regional regulatory requirements, operators must comply by providing Emergency Call Handling and Lawful Interception facilities. Again, SBCs are ideally placed to deliver these functions.

Thus, the SBCs' ability to deliver effective call/session control makes it an essential tool in the creation of reliable, secure and compliant services in today's VoIP networks.

For operators to develop their networks in the future to embrace IMS, it is essential that they have the built in flexibility to evolve in step with the standards. The success of IMS as a globally accepted architecture relies on the process of standards development. Before looking at IMS itself, let's look at some of the key organizations involved in their development.

EVOLVING STANDARDS

The aim of any converged network is to allow rapid deployment of new services capable of being accessed from a variety of devices over a variety of access networks. The key to achieving this level of interoperability is the development of a set of standards covering access, i.e. what device is being connected, and service delivery, i.e. what services are available. The glue that sits between the devices and the service is the IMS – allowing any device to connect to any service.

Getting there is not a single step; bodies such as 3GPP (Third Generation Partnership Project) and ETSI (European Telecommunications Standards Institute) have phased releases of standards planned over the next few years. Each release promises to deliver a broader coverage than its predecessor.

IMS was first defined by 3GPP and was designed specifically for mobile networks in its initial release. However this was seen as unnecessarily restrictive and subsequent releases of IMS have been defined to be access independent. This step promoted inter-working between different access devices and thus has stimulated the drive towards further convergence.

In the fixed-line world ETSI's TISPAN body (Telecoms & Internet converged Services & Protocols for Advanced Networks) is also working to standardize converged networks using IMS as its core architecture. The ultimate objective is to have a common IMS architecture for both fixed and mobile services by 2008/2009.

Work is also being carried out by the 3GPP2 (Third Generation Partnership Project 2) group; their Multimedia Domain (MMD) solution will allow CDMA2000-based access networks to provide third generation mobile services.

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SESSION CONTROL IN THE IMS

At the heart of the IMS are three Call Session Control Functions (CSCFs), each of which has a distinct role to play in the delivery of ubiquitous services. We will look in more detail at the role of the Proxy-CSCF (P-CSCF).

The P-CSCF is the first point of contact within the IMS for a caller. It ensures that the user is registered with the correct network (if the user is roaming) and that messages are correctly routed to the service network once registration has occurred.

The P-CSCF is in the position to detect which services should be hosted by the visitor's network. This is important not only in terms of content services but also in the provision of Emergency Call Handling and Lawful Intercept. It can also provide defense against SIP signaling attack.

TISPAN also defines an Interconnect Border Control Function (IBCF) to formalize signaling interconnect between networks and Border Gateway Functions (BGF) to handle the media.

The IBCF formalizes the signaling interconnect between networks. Its functions include protecting and policing the signaling, topology hiding and conversion between IPv4 and IPv6 (where required). Whilst 3GPP networks are IPv6 only, 3GPP2 and wireline evolutions are likely to be a mixture of IPv4 and IPv6. The IBCF controls a BGF in the media path that protects media exchanged across the operator boundary.

DIVIDE AND EVOLVE

If we compare the session control functions being performed in networks today to the session control functions required in an IMS, several shared characteristics can be seen.

It is clear that the functions needed to build an IMS core require the physical separation of the signaling and media elements provided by SBCs today. This dictates the need for SBCs to be capable of migrating from single nodes handling both signaling and media to physically separated nodes handling just signaling or media.

It is also clear that functions within converged networks and IMS definitions currently have considerable overlap. It is therefore important to consider the functional requirements at any particular point in the network rather than defining products to meet a functional block.

The SBCs sitting in the access network today will be split to meet the signaling requirements of the P-CSCF and media requirements of the access BGF. The Interconnect SBCs will be similarly split to deliver topology hiding and IBCF for the signaling and an Interconnect BGF for the media.

CONCLUSION

Operators looking to ride the NGN wave must consider how to meet their immediate needs and protect their investment by implementing a flexible infrastructure capable of evolving with the standards. The standards are defining the capabilities and shape of next generation networks. This determines the evolution path for session control elements such as the SBCs - they must support the separation of media and signaling functions. This flexibility and independent scaling allows VoIP services to be introduced today to generate the sustaining revenue that will carry the network through to the next generation. Customers can reap the rewards of evolution through the introduction of an increasingly rich and accessible range of services. ■

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