

Bridging the old and new with IPX

BICS and other carriers are adapting and aligning intra-operator and transport services with the new commercial and technological reality brought about by IP-centric applications and traffic. By **Dimitri Repinec** and **Piet De Maertelaere**, BICS.

The IP evolution is ushering in a new world for carrier's carriers. Consumers want new and improved services to be delivered in a converged and commercially integrated way, while many network operators are at an advanced stage in deploying IP in the core and broadband at the edge. As a result, transport networks are carrying rising volumes of IP traffic – and voice over IP (VoIP) in particular – driving wide-scale transformation in wholesale business models and creating additional cost and complexity for those running IP and traditional time division multiplex (TDM) in parallel.

The GSM Association's IP eXchange (IPX) was initially conceived as the mobile industry's answer to the complex question of how to bridge these islands of legacy TDM and the new wave of IP-based voice, video and real-time multimedia applications. But IPX is just as relevant for fixed operators because next-generation networks (NGNs) are powered by IP Multimedia Subsystem (IMS) and soft-switching architecture and many real-time applications cannot be delivered reliably over legacy networks or public 'best effort' internet. Those that demand guaranteed quality of service (QoS) require a managed and secure IP path with full transparency of technologies, routes and cascaded revenues end-to-end.

As a private IP cloud with guaranteed QoS and full transparency, IPX delivers on all of these requirements. Most importantly, it provides a technical and commercial framework governed by strict rules and recommendations (namely IR.34 and IR.77) to ensure a managed and secure environment in which all members of the value chain must respect service level agreements (SLAs) and cascaded revenue responsibility. This enables more flexibility than the traditional telco business model, allowing both established communications service providers (CSPs) and the new wave of over-the-top (OTT) players to innovate, collaborate and compete in an IP-centric future.

IPX gains momentum

Both understanding and adoption of IPX gained momentum in the last quarter of 2011, with BICS for example connecting its 40th service provider. The commercial roll-out of Long-Term Evolution (LTE) fourth-generation (4G) mobile networks has been the major driver, because IP interconnect is mandatory to

enable roaming. Almost 250 operators are investing in LTE according to The Global mobile Suppliers Association (GSA), with 35 LTE networks live and more than 100 expected to enter commercial service by the end of 2012. Trials are already engaging multiple operators in testing LTE data roaming based on IPX LTE Signalling, which employs the Diameter protocol for transport instead of the legacy protocols used today to communicate globally between operator networks (i.e. SS7/C7 for messaging and ISUP for voice). Diameter also plays a central role in IMS interconnect, as well as

authentication, charging, policy and mobility management.

Similarly, IP interconnect is mandatory for Rich Communications Suite (RCS), the industry initiative led by the GSM Association (GSMA) to support real-time services such as presence-enabled 'Enhanced Address Book', instant messaging (IM) and VoIP. RCS is powered by session

initiation protocol (SIP) signalling and, like many of the new multimedia collaboration tools that are emerging, requires new settlement arrangements and KPIs to be defined for interconnect. Carrier networks also need to be service aware – both in terms of technical realisation and settlement mechanisms.

Several mobile operator groups will be launching RCS commercially in 2012, with five major mobile players committed to an enhanced version (RCS-e), which builds on established interoperability principles. Discussions have also taken place regarding interoperable RCS services in Sweden, Italy and France, as well as Finland and Canada. In Asia, RCS-like services are already running commercially in Korea, while the four mobile operators and fixed operator NTT Corp. in Japan are participating in the GSMA's RCS Project.

IP drives wholesale shift

Carriers such as BICS see both LTE and RCS will remain the key drivers of IPX for mobile operators for now because although they have deployed IMS in the core, they currently lack the necessary network elements to monitor and guarantee QoS on voice (VoIP) end-to-end. As a result, the majority continue to use TDM for international voice interconnect and transit. However, the wholesale voice market is undergoing major transformation as VoIP begins to dominate and some

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industry commentators believe that mobile will actually preserve a role for wholesale carriers moving forward.

Analysts at Ovum predict that international wholesale traffic volumes will reach 349 billion minutes in 2016, with the vast majority being mobile-originated. At the same time, wholesale revenues (i.e. excluding termination) are expected to drop to \$2.9 billion due to the continued downward pressure on prices. Ovum warns that if internet VoIP grows to dominate the international retail voice market, then the international wholesale voice market could disappear altogether, as no-one will be prepared to pay for it.

As such, VoIP represents a 'double-edged sword' for international carriers because although they have realised considerable cost savings transporting voice and data on a single integrated network, they face increasing competition from OTT players such as Skype and GoogleTalk. OTT players use the public internet for transport under the 'bill and keep' (BAK) model and therefore don't need to pay for international transit and termination separately.

With the biggest share of international voice traffic expected to be VoIP by 2015, Ovum believes that wholesale players must act now through a combination of service differentiation (primarily based on quality and security) and the bundling of voice with other services. As such, it supports the view that service differentiation can be achieved by using IPX.

Evolution of international voice

Despite the significant shift in traffic patterns and the threat posed by OTT, BICS has found that the migration from TDM to VoIP for international intra-operator interconnects has been slow. Up until recently, the majority of voice transit solutions have mimicked TDM models by combining legacy approaches such as network assurance, quality management and least- or best-cost routing (LCR/BCR), with just a 'flavour' of VoIP interconnection.

The fact that TDM is a highly-standardised synchronous technology where only one codec (G7 11) is used, packet loss doesn't exist and delay has no impact on speech quality makes it possible for the business to cross multiple switches (i.e. of different parties) over long distances. This is the technological reality that has for so long sustained the LCR and arbitrage-driven voice business model, where billing is time (minute) based and cascades naturally across multiple carriers because all are paid using the 'termination model'.

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To realise a truly VoIP-compliant solution however, international carriers need QoS management systems based on SIP signalling rather than ISUP, systematic monitoring to assure in-band quality and new approaches to managing packet loss on what is often multi-service IP infrastructure. Delay and packet loss impede voice quality with VoIP, making direct and optimal routing via a regional, distributed switching infrastructure a necessity. This leaves no room for LCR and arbitrage-based routing and demands a new commercial framework supporting the VoIP transit business.



Several international carriers including BICS have fundamentally changed their network topology, routing principles and operational management to make the promises of VoIP a reality. IPX-compliant carriers are building VoIP interconnects with as many operators as possible to avoid SIP-ISUP conversion and are enforcing the use of a limited set of accepted codecs towards originating and terminating parties to lower the impact of transcoding and signalling interworking. Furthermore, to offer VoIP-based voice transit at the same quality as TDM, carriers are replacing the TDM-centric star-topology with full global distribution of session border controllers (SBCs), which control and manage real-time multimedia traffic flows between IP networks.

IPX therefore provides a set of new service features within a new commercial framework, to include:

- Routing transparency for each destination – i.e. whether it is reached via IPX compliant on-net (end-to-end private IP), off-net (routed to another IPX, but only ever two IPX providers in the chain), or a non-IPX compliant 'break-out' route (e.g. TDM direct route, or non-IPX IP route)
- Commercial transparency – a split of termination fee and the international transit service fee, whereby the service fee can be part of a multi-service bundled offer supported by strong SLAs
- Global coverage and distributed routing – deployment of interconnected SBCs worldwide to support optimal, low-latency direct routing
- Guarantees on end-to-end IP transport performance (delay, packet loss, jitter) covered by GSMA IPX compliant SLAs

Stepping into the IP cloud

With full commercial transparency under IPX, terminating parties have the option to step away from the minute-based model, while transit service fees can also migrate from minute-based to flat-fee session or volume-based models. Transparent end-to-end routing is also essential, since the calling and called party must both be capable of supporting the codec used.

There are also several codecs emerging for video, while several hundred codecs have been developed in total over the last 10 years. However, only a limited number will become de-facto industry standards. Nevertheless, IPX is essential for interconnecting VoIP and video over IP services because the majority of these codecs are latent-sensitive. Moreover, IPX incorporates a set of services designed specifically to

“IPX provides a way for mobile operators to work more closely with OTT players.”

interconnect any IP service between any pair of operators and allows the addition of end-to-end QoS, together with a variety of charging models over and above that of volume.

IPX transport is the foundation of the IPX portfolio, providing a closed and secure community of trusted mobile and fixed IP networks that is effectively a private IP cloud. Any type of operator or CSP (e.g. ASP, ISP, VNO, etc.) can connect to this private cloud, which supports next-generation IP-based hubbing (connect to one and send to many), roaming and interworking with other connected members.

Reflecting reality at the edge

Both IPX voice and LTE/RCS are examples of hubs built on top of current IPX carrier offerings, but any type of content or application-based service can be achieved under a bilateral model, in the same way mobile operators use a GPRS Roaming eXchange (GRX) currently. Of course, not all CSPs will want to use IPX as their interconnect solution and will continue to employ a combination of GRX, SMS hubbing and legacy TDM interconnects (typically E1) on a bilateral basis for international voice transit.

However, one interconnect per service per supplier can quickly result in 10-20 different access lines that all need to be managed and paid for. For example, one STM-1 for voice transit plus a 100Mbps link for GRX, five E1s for signalling and one E3 for a bilateral connection delivered by 3-4 different suppliers to enable LCR and redundancy. Replacing this with a single Gig-E line for IP interconnect enables significant savings.

In Asia, IPX is proving an effective solution for reducing the cost of interconnects and is also being employed as a way of exchanging any kind of traffic in a controlled and secured environment with QoS guaranteed. The majority of IPX users still connect on a bilateral basis because labour costs are lower than in other markets. However, the fact remains that where you have a multi-service environment and convergence between fixed and mobile operators, bilaterals can become unmanageable, while the business models of IPX more accurately reflect the reality at the edge.

This is the case in western Europe, where IPX is helping CSPs

to manage the cost of running TDM and IP in parallel (i.e. lower transport and management costs) and to deliver triple- and multi-play flat-fee services in a more efficient and scalable manner. IPX provides them with hubbing or transport solutions that enable per-session or per-volume billing. Either way, this translates to a reduction in cost of the interconnect and allows CFOs to better align edge and interconnect PNLs, although each CSP will have to make its own choice regarding the business model employed.

Challenges moving forward

There is growing acceptance within the industry that the shift to flat-fee and multi-play services at the edge, the threat to established telco business models posed by OTT players and the rising levels of mobile-originated and IP-based traffic in transport networks is driving significant change in the requirements for intra-operator connectivity and transit.

OTT players are an inevitable part of this new technological and commercial environment and IPX provides a way for established players to work with them more closely in a controlled environment. Mobile operators in particular are looking at how to integrate premium OTT services with QoS guaranteed and where the settling party pays. For example, if a premium social networking application is not working, the mobile subscriber could contact the mobile operator and IPX would provide the transparency needed to identify and fix the issue.

Discussions are still at an early stage in terms of fitting OTT players and content providers within the IPX environment but 2012 will see some major developments in this area. Likewise, international carriers concerned that IPX models could cannibalise legacy products must now accept that it is vital to adapt and align their offerings to benefit from the opportunities that will emerge. They are also wrestling with the huge commercial challenge posed by enabling IPX peering with guaranteed SLAs and CoS.

Today, a hybrid environment of IP and legacy TDM exists and the latter will certainly remain relevant in emerging and heavily-regulated markets. But in the majority of markets it is consumer demand driving industry development. It's therefore BICS's belief that wholesale business models will have to adapt to this new reality and support network operators, CSPs and the technology houses delivering OTT within a trusted environment of open business models. ☺



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