

## Where is the All-IP Network?

By Jesse Cryderman

For many years now, telecom industry pundits have heralded the all-IP network of the future with messianic fervor. The one-network-to-rule-all-networks promises to flatten all competing transfer protocols and standards into a single, packet-based passageway that is separate from the access technology. Its foretold gifts will eviscerate expenses and create ubiquitous service experiences across all platforms.

There's only one problem: it's still not here. Are we waiting for a fairy tale, or is the Next-Generation Network (NGN) any closer today than it has been in the past? With the rapid rollout of LTE networks, the promise of VoLTE, and the move to DOCSIS 3.0 in cable, at first glance the answer seems to be yes, we're a lot closer than it might appear. However, there are still significant technical hurdles to be cleared before all networks are speaking the same language.

### What is All-IP?

An all-IP network is simply a packet-based network in which all data is transferred the same way and independent of the access or transport technology. Industry parlance these days trends toward next generation networks, or NGN to describe the all-IP network. Here's how the International Telecommunication Union (ITU) defines NGN:

"A Next Generation Network (NGN) is a packet-based network able to provide services, including telecommunication services, and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It offers unrestricted access by users to different service providers. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users."

From this definition, it becomes apparent that there are several differences that must be addressed, compared to the numerous disparate networks of today. In the core, transport technologies must be



condensed, meaning voice service must move from circuit-switched to VoIP, and legacy technologies such as frame relay (ISDN) must be migrated to all-IP. Similarly in the wired network, voice switching infrastructure (PTSN) must be eliminated and VoIP must be integrated into DSLAMs (digital subscriber line access multiplexers). And in the cable access network, a migration to PacketCable standards, which enable VoIP and SIP services, must occur.

### Does All-IP really rule all?

In a word, yes, and here's why: A single network implementation promotes scale, dramatically reduces complexity, erases

international communication barriers, and opens up an infinite number of logical service pairings and converged offerings that are freed from transport requirements and can originate from countless providers. In terms of expense, this will eventually translate into a profound reduction in costs.

Take, for example, AT&T, which has a massive footprint of legacy infrastructure, network equipment and real-estate that will be liberated when the transition to all-IP is complete. According to the Voice Communication Exchange Committee (VCXC) a DC-based nonprofit advocating for the acceleration of all-IP (and the death of PTSN by 2018), the transition to all-IP will shrink the network equipment by more than 90 percent. Companies like AT&T, that have accumulated telecom gear and real-estate for more than 100 years, will experience a massive (\$25 billion+) windfall as this legacy is divested.

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“AT&T’s portfolio goes back more than 100 years even as commercial real estate appreciated five-fold since the 1970’s,” writes the VCXC. “All-IP networks require both less equipment and far fewer points of interconnection between networks. The transition of the AT&T’s core network to all-IP already started emptying buildings, but most of the benefits await adoption of the IP-IP interconnects necessary to support HD voice.”

Any service provider who moves from PTSN to VoIP will realize a huge reduction in equipment. “Comcast’s all-IP network supports 10 million Digital Voice customers from five data centers,” writes Bell Labs VoIP pioneer Daniel Berninger, of VCXC. “Half a rack of VoIP network equipment replaces a room full of Class 4 and 5 of circuit switching equipment. Equipment sheds replace the contents of entire buildings.”

For wireless service providers without a wireline legacy, there are huge cost reductions in the wireless environment enabled by all-IP, namely the transition to LTE networks. However, wireless service providers, even those (except for SK Telecom) who have transitioned to LTE, still operate two different network architectures, circuit-switched for voice and packet-based for data. Once this redundancy can be converged, wireless networks will become much more consolidated, cheaper to operate, more fully featured, and interoperable.

And for all communications service providers (CSPs), the near-infinite new business cases that are possible once networking is standardized and separated from access and transport can be a huge windfall. CSPs can leverage their core network assets in exciting new ways, and monetize them through numerous new channels in the world of all-IP. For instance, Aepona offers the Network as a Service (NaaS) solution. Richard McConnell, CTO of Aepona, explains how NaaS and all-IP deliver unprecedented service layering and provider agility:

“NaaS is all about the exposure of “services” previously unavailable to 3rd parties that they can leverage to add contextual and intelligent applications into the offerings they deliver to customers. In the case of

**The global transition to all-IP networks shrinks the footprint of required network equipment by as much as 90 percent.**

all-IP networks, this includes the ability to set quality of service, determine the type of network the device is on, create anonymous subscriber information, add billing / payments capabilities, identify device type information, and many other new capabilities that are very difficult or impossible to access from pure over-the-top applications. Additionally, the network is agnostic to the device or device OS, so the services enabled by NaaS are able to reach the broadest set of subscribers possible.”

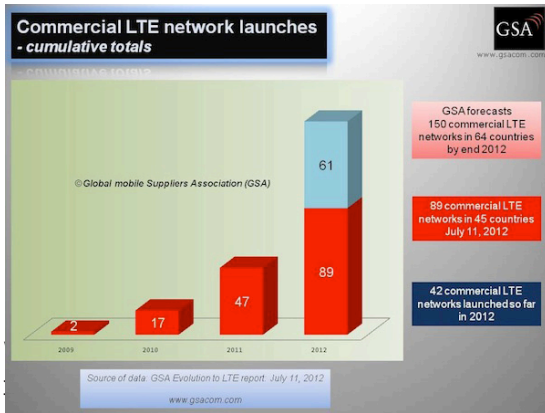
**CSPs: Investing heavily in All-IP**

CSPs aren’t standing idly by, but actively investing in the all-IP dream, and in particular, wireless service providers. According to the GSA, LTE is the fastest developing mobile technology in history. As you can see in Figure 1, the rapid deployment of LTE networks around the world is extraordinary.



Figure 1 - Commercial LTE Network Launches  
Source:GSA

“North American mobile cellular capital expenditure



is no longer investing in its 3G network, T-Mobile is spending \$4 billion on LTE, and AT&T spending on wireless is up 54 percent, year-on-year.

However, LTE is not yet a silver bullet. There are spectrum and interoperability challenges that must be addressed, and there's a pesky elephant in the room named VoLTE that isn't ready for showtime yet.

Paul Lambert, Informa Telecoms and Media, recently listed some of the challenges CSPs face in the transition to LTE: "While the outlook for LTE network-roll-outs is extremely positive, the industry, as a whole, needs to resolve key challenges that are barriers to uptake: these include fragmentation arising from the proliferation of spectrum bands used for LTE worldwide, the provision of voice over LTE, the availability of smartphones, and LTE roaming."

#### Path to the future

The truth is that all-IP is everything that it's cracked up to be, it is the path to the future, but it's still many years off. While the end seems imminent, the PTSN dial-tone will still ring for another decade or longer, and ISDN networks will continue to operate for another ten years as well. Collapsing legacy communication networks into a single ecosystem is

**An all IP network's technology tolerance means unimpeded innovation all around; the core [IP] network can evolve independently from the access network.**

a task that is encumbered by initial transition costs, fragmented standards, legacy lifecycle concerns, and competitive pressures. It is a migration that is compounded by the fact that VoLTE is proving harder to develop commercially than originally thought. (At press time, the only operator globally to launch VoLTE is SK Telecom, and only two operators--Verizon and MetroPCS--have announced VoLTE launches.) But this is definitely no reason to deem all-IP a dream--now is the time to strike service partnerships for the future, and approach network planning with the migration to all-IP in mind.