

IP is Not for Everything and Everyone

One Size Does Not Fit All When it Comes to Network Convergence Over IP

By Ian Graham

ORIGINALLY, the compelling cost savings of consolidating voice, video and data transmission over a single network sparked interest in network convergence over Internet Protocol (IP), but today this network convergence is being driven by the promised cost savings of IP Telephony.

In fact, In-Stat/MDR predicts the number of IP lines shipped in PBX systems will grow from 5.5 million in 2003 to 15.9 million in 2008. In the same report, it predicts that while the PBX market is mature and slowing, between 2003 and 2008 shipments of converged PBX lines will grow at a 11.2 per cent CAGR, while pure IP PBX line shipments will grow at a 28.9 per cent CAGR.

With the proliferation of Internet access and content, usage of international bandwidth is expected to grow quickly, generating a huge demand for IP-based data services. Such rapid developments have changed the preference of many primary users of wholesale data services—carriers, tier two service providers, Internet service providers and content service providers, to name a few—whose purchasing decision is now heavily skewed toward buying IP transit services.

Overall, many organizations are feeling pressure to create infrastructures based entirely on IP. But is this the right solution?

CONVERGENCE DOES NOT MEAN PURE IP

Through aggressive marketing by IP vendors, general market perception is that convergence is synonymous with IP. In a recent article in *TMC Internet Telephony*, author Tony Rybczynski defines convergence as follows: “Network convergence is the act of bringing voice, data, and video onto an IP, Ethernet, or optical network. Enterprises striving for uniformity have focused on the IP protocol suite as the protocol of choice for networking and applications, spurred largely by the Internet and by the economics of having fewer protocols to manage.” This article and others like it suggest IP is the protocol of choice, and moreover, urge IT managers to believe IP is the *only* choice. In fact, for certain applications, it’s definitely not the best choice.

By taking a more business-driven approach to IP requirements, convergence should be defined a bit differently. Network convergence is the migration of technologies from legacy based voice and data to IP based technology. This will be a gradual transition characterized by consolidation and optimization of existing network infrastructure where users will need to support a mixture of technologies on a common platform.

CRITICAL INFORMATION REQUIRES MORE THAN BEST EFFORT

Critical infrastructure networks are those that require guaranteed, always on service and all have similar requirements. They have critical traffic requiring guaranteed connection and typically have a separate network that carries their critical data over fiber and microwave, using transport mechanisms such as SONET/SDH (TDM), ATM or Frame Relay.

Today, IP is known as a “best effort” network—it does not provide guaranteed delivery. While this may be more than adequate for most enterprise communications, the network must be “always on,” for critical infrastructures.

Some examples of critical infrastructure networks include:

- ▼ **Transactional information in financial networks such as banks and insurance companies.** In these environments, a network outage or traffic slowdown can translate into literally millions of dollars lost.
- ▼ **Monitoring information in industrial and transportation environments.** Imagine the problems if data packets from a train monitoring systems did not arrive properly—it could result in track problems, accidents and even death.
- ▼ **Voice communications in enterprise networks.** While best effort Voice over IP (VoIP) may be acceptable for many organizations, voice is sensitive to latency, which can cause

echoes, or even worse, a delay in hearing what the other person is saying. In fast-paced business environments where good communication is essential, this may not be good enough.

- ▼ **Monitoring systems in industrial applications such as oil and gas production and distribution.** Reliability is critical to ensuring that equipment in the field is operating properly. Imagine the environmental implications if a report of a damaged or blown wellhead can't reach the central monitoring site.

We believe these critical infrastructure networks such as utilities, oil and gas companies, financial institutions, government and transportation authorities need to take a hard look at a "hybrid" approach to convergence for several compelling reasons:

- ▼ They have guaranteed delivery requirements for critical monitoring data and voice that can't be answered with IP.
- ▼ They've already invested significant funds in their infrastructure, which can be extended for several years by using a hybrid approach.
- ▼ The infrastructure of leased lines and private fiber networks already exists and can be effectively leveraged.
- ▼ In some private network scenarios, the Internet may not even be available, which could negate the benefits of using IP as a transport mechanism.
- ▼ Their critical infrastructure can be vulnerable to Internet-based threats, which puts the entire organization at risk. For some organizations, this is not an acceptable risk.

If IP offers only best effort, then why use it for critical traffic that really requires guaranteed delivery? It makes more sense to create a converged infrastructure that utilizes the transport mechanisms that meet specific needs, particularly for critical applications such as industrial, transportation, utility and finance since much of the critical infrastructure is already in place. Organizations can prolong legacy investments while implementing solutions in a controlled manner that makes sense for their business.

BUILDING A HYBRID CONVERGED NETWORK

Organizations should seriously consider building a hybrid network rather than converging all network traffic onto IP. Existing network infrastructures should be evaluated, and either phased out or optimized into the hybrid network, potentially as part of a longer-term network evolution plan.

Any converged network—whether a hybrid of legacy and new technologies or exclusively IP—must satisfy several key business requirements:

- ▼ It should support legacy voice and data, so organizations can leverage these often-expensive investments for as long as possible, minimizing capital expenditures.
- ▼ It must support a multi-vendor environment to allow organizations to transport all traffic and use the solutions that best meet specific needs.
- ▼ It must provide the flexibility to support both bandwidth optimization (best effort) and guaranteed delivery.

- ▼ To ensure guaranteed delivery and equipment optimization, it should support mixed technologies including low latency TDM on SONET/SDH, legacy voice and data, ATM, Frame Relay, Multi-protocol Label Switching (MPLS), and of course, IP.

ENCOURAGE EVOLUTION, NOT REVOLUTION

While prevailing opinion suggests pure IP is the way to go, organizations should take what they have today and migrate deliberately and cost-effectively, creating a hybrid network.

Before throwing out existing network equipment in favor of an all-IP infrastructure, organizations should take a close look at their business needs, and ensure that they match them to appropriate network elements. The best network convergence solution for critical infrastructure networks is a hybrid approach: one that leverages the benefits of IP while leveraging other technologies to meet specific needs. 🌐

Ian Graham is product manager with Toronto-based Bayly Communications, a leading manufacturer of network access and transmission products for worldwide telecommunications and critical infrastructure markets. E-mail igraham@bayly.com