Critical Telecom Infrastructure Convergence

Through aggressive marketing by IP (Internet Protocal) 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 that IP is the protocol of choice: we believe that many I.T. professionals take this to mean that IP is the *only* choice. In fact, for certain applications, it's definitely not the best choice.

We define convergence 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."*

Why Convergence?
Convergence makes good sense, from both a business and technical perspective. The primary goal of convergence is to simplify the critical telecom infrastructure, in order to create a network that is more efficient and less expensive to maintain.

There are a number of factors that could influence a Utility's decision to converge their critical telecom infrastructure: perhaps the most compelling reason is equipment obsolescence. Obsolete equipment must be replaced when support is discontinued, or the Utility will be at risk when the equipment fails. Regulatory policy can have a significant effect on updating and converging networks, as Utilities are required to adhere to standards and ensure consistent service quality. Finally there is the ongoing updating of critical telecom infrastructure to improve business and network efficiencies and realize operational cost savings.

Business Challenges
There are a number of business challenges companies need to overcome to realize a fully converged network. The first and most significant hurdle is the huge investment in legacy equipment. In North America, it is estimated that annual spending on Telecom equipment by Utilities is 2B to 3B dollars. If you consider just the past 10 years, this means there is roughly 20 – 30B dollars in Telecom assets deployed, which doesn't include long-lived assets over 10 years old. This huge installed base of diverse assets must be taken into consideration in any network convergence plan, and provisions must be made to maximize the investment in these assets.

Another significant factor to consider is the preference to spend telecom budget dollars on projects with high calculated ROI. Essentially, investments in existing infrastructure are competing with BPL and UTelco initiatives for scarce dollars. The ROI on critical telecom infrastructure is somewhat more nebulous and less exciting than these BPL and UTelco initiatives, however, the costs savings are very real and a strong business case for ROI can be built for a converged critical telecom infrastructure.

As mentioned above, the business challenges that need to be addressed in any network convergence plan are provisions for the large and diverse existing network and limited budget and resources. Another key issue is the disruption to business operations — and subsequently costs and profits — that inherently accompanies any wholesale changes in technology. All of these issues mean that it is prudent for Utilities to extend the life of existing infrastructure as long as reasonably and economically possible, and proceed in a phased manner.

Technical Challenges

There are a number of technological changes that are influencing network convergence at Utilities:

- Many SCADA and AMR devices are becoming IP enabled, and these devices are gaining wide acceptance.
- There is a shift from legacy analog circuits to digital circuits.
- Proprietary interfaces are being replaced by standards based interfaces.
- There is a preference for private telecom over private and leased line technology. There is a requirement in Utility networks to support Internet Protocol to keep current with technology developments.

Utility networks also have a significant existing infrastructure. These networks have evolved over time and support a diverse set of equipment. The existing infrastructure includes analog SCADA, AMR, Teleprotection and a host of other legacy devices. Because of the significant existing infrastructure and associated replacement costs there will be a requirement to support legacy infrastructure for many years to come.

The Utility telecom infrastructure for the foreseeable future will need to support a mixture of legacy and Internet enabled equipment. The question then is how you get from a legacy based infrastructure to an all IP infrastructure?

Migrating to an IP Infrastructure

The notion of an all IP infrastructure seems in the near term somewhat unrealistic when you consider the installed base and replacement costs of legacy equipment. Therefore the primary challenge in converting to an Internet Protocol based solution is the huge existing installed base of legacy equipment. This is further complicated when you consider the spending priorities within organizations that are geared toward high ROI investments rather than critical infrastructure capital expenditures and what capital dollars there are often

allocated to replacing existing equipment rather than improving network efficiencies.

A sound migration strategy will take into account the existing infrastructure and make provisions for maintaining this equipment as long as is reasonably and economically possible. The migration strategy must accommodate both legacy and Internet Protocol services together for the foreseeable future.

We believe that Utilities should seriously consider integrating existing legacy assets and new equipment into a **hybrid network.** The hybrid network provides guaranteed delivery mechanisms for critical data circuits such as Teleprotection, and Internet Protocol capabilities to enable technology advances.

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 requirements:

- It should support legacy equipment, so that Utilities can leverage these often-expensive investments for as long as possible, minimizing capital expenditures.
- It must support a multi-vendor environment, to allow Utilities 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 QoS.
- To ensure QoS and equipment optimization, it should support mixed technologies including low latency TDM on SONET/SDH, legacy voice and data, ATM, Frame Relay, Multiprotocol Label Switching (MPLS), and of course, IP.

In summary, the Utility critical telecom infrastructure will need to evolve from legacy equipment to Internet Protocol over a period of many years as resources, technology and budget permit. A hybrid network approach gives Utilities this ability to extend their investment in legacy equipment, while providing a platform for introducing new technologies that meet the needs of the business — ultimately culminating in a phased approach to network convergence that makes both business and technical sense.

We would appreciate the opportunity to talk to you about how the Bayly OMNI-Optix can help you create a Hybrid Network that provides an evolution to IP while allowing you the ability to maintain legacy equipment.

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