

EXECUTIVE SUMMARY

IP communications is not coming to critical infrastructure (CI) industries: it is here, and growing fast. IP telephony (IPT) is poised to become the dominant voice technology in CI industry communications as legacy TDM-PBX systems and phones are being replaced by IP-PBXs. Moreover, a variety of non-voice applications, while not reflected in earliest case studies, is not far behind. This study examines the applicability of emerging Internet Protocol- (IP) enabled communications technology to CI communications networks essential to the secure operation of electric grids, natural gas pipelines, and water supplies, among others. This report, the product of an extensive study, measures possible financial drivers and assesses potential private, internal applications and features used to enhance the communications capabilities of critical infrastructure entities.

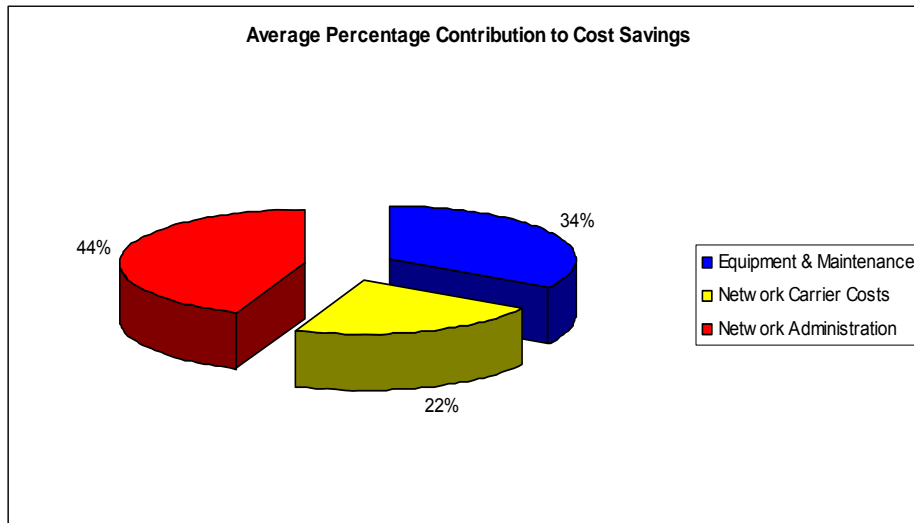
The study was initiated in April 2005 by the United Telecom Council's (UTC) Voice over IP Working Group, which includes core utility members of UTC as well as interested vendors and consultants.

Cost Savings is Number One

The major driver behind the accelerating deployment of IP communications (or IPC) is cost savings. By converging voice and data onto a single IP-based network, an enterprise can substantially reduce expenditures by minimizing or eliminating leased lines and long-distance costs for voice calling, and implementing TDM PBX maintenance. Phasing out dual maintenance of data and voice networks and reducing cabling costs leads to more savings. And still more cost and administrative efficiency is achieved by reducing the cost of moves, additions, and changes.

The increases in productivity from conversion to IP communications are substantial and are amply demonstrated in electric utilities, as shown in the Allegheny Case Study (see Section 12, below). A converged network not only enhances an organization's communications capabilities, but facilitates employee mobility and provides a foundation for deploying advanced, feature-rich services and solutions including video surveillance, multimedia collaboration, wireless media roaming, instant messaging and multi-channel contact center applications.

The advantages of IP communications for critical infrastructure applications are driving it to the status of a business requirement. Thus, it is both timely and appropriate for critical infrastructure entities to develop a strategy for implementing IP-based technologies.



Source: Cisco

Chart 1 Average Percentage Contribution to Cost Savings

IP Communications Deployment Shows Quick Payback

For an enterprise with an IPC system, the total cost of network ownership is calculated by combining voice and data departments, which shows considerable reductions in overall costs. Eliminating multiple sets of infrastructure, simplifying system administration and maintenance, and consolidating voice and data circuits reduces total network ownership costs. Contributions to the total cost savings are shown in Chart 1.

Return on Investment (ROI) analyses show that most IP communications deployments deliver a positive financial result quickly, with an average payback of 16-18 months. According to one deployment model, reductions in annual operating costs for voice communications between 35% and 41% may be expected. Depending on the financing mechanisms, after investing in network upgrades ROI calculations on actual deployments in the utility industry investigated as part of this study were between 78% and 110%, with a payback of only 1.29 years.

Reliability, Quality of Service and Security

Their positions within critical infrastructure entities give utility industry telecommunications engineers and managers special concerns with respect to reliability, Quality of Service (QoS), and security. These issues must be adequately addressed in order for IP communications to gain user confidence and wide acceptance. However, it must be noted that an enterprise network is a much more circumscribed environment than the public Internet. Hence, these issues can be managed with a far greater degree of control than the term "IP" may indicate.

The traditional Public Switched Telephone Network (PSTN) offers reliability and a high QoS. An IPT system can and should be similarly engineered for reliability. A number of techniques have been developed to provide QoS control, including traffic classification and prioritization that provide the same level of quality as the PSTN.

Security is a major concern for both voice and data communications. Compliance with NERC Cyber Security Standards is a high priority for utilities. Regardless of the technology in place, these networks must be protected. When introducing IP technology to the data network, a number of security measures are coordinated to provide protection for the network, including the servers, applications, traffic, endpoints, and system boundaries. Thus, the network gains additional cyber security protections while realizing the benefits of IP-based technology. Investments in IPT can be investments in cyber security as well.

Enterprise Now, Mission-Critical Next

Of the utilities surveyed as part of this study, most are considering IP-enabled systems. Those who have implemented IPT have done so at the enterprise level. One-half have not started IP communications deployment as yet. Utilities are delaying deployment in Operations (on the same data networks as SCADA) until experiences at the enterprise level prove out the technology and the migration process.

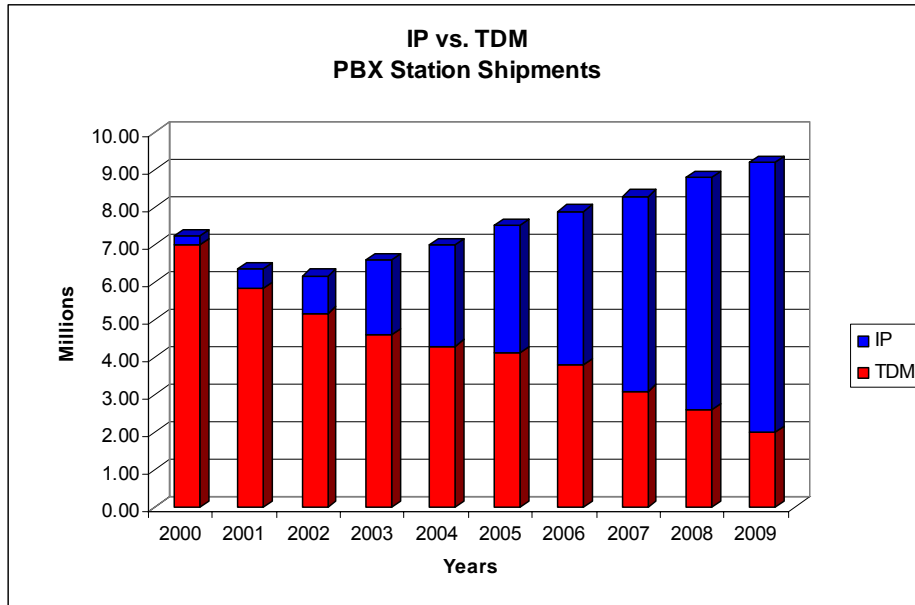
The successful deployment at Allegheny Energy offers guidance on the deployment of IPT in the electric utility industry. Confirmation of the acceptance of IP telephony is demonstrated by American Electric Power's (AEP) recent decision to begin a company-wide IP telephony deployment with Cisco. Many utilities are conducting major pilot projects and evaluating vendor solutions.

Modular Implementation

Migration from an existing voice communication system to an IP-based system can be implemented incrementally, at a limited number of sites. The transition to IP may be implemented internally by the enterprise or externally using managed services, depending on factors such as technical competency, availability of resources, and capital constraints.

Larger Industry and Market Observations

The Telecommunications Industry Association forecasts that in 2006, more than half of all the new PBXs being installed at U.S. enterprises will be IP-based. Chart 2 clearly illustrates the rapid progression towards IP telephony implementation:



Source: TEQConsult; Reilly Associates

Chart 2 IP vs. TDM PBX Station Shipments

The ascendancy of IP telephony is even more evident from its use for: long distance traffic by the major carriers (e.g. AT&T, MCI, and Sprint); links between military command centers; and enterprise networks in many Fortune 500 companies, especially financial services.

IP Is Ready Now

The message that this study brings to CI decision makers is that IPT is a proven technology, ready for deployment in critical infrastructure industries today. Equipment manufacturers are adapting IP as the primary platform for the coming generation of PBXs and call processors, and non-voice applications can be integrated easily through network expansion.

IP communications offers considerable reduction in operating costs and high return on investment, even after the capital expenditures, including the network. The network enhancements that are made to support IPC, such as QoS and network management tools, strengthen the communications backbone for all applications: data, voice, and video. These enhancements contribute to the security and reliability of the networks. For electric utilities, they can help to enable compliance with NERC Cyber Security Standards.

The deployment of IP technology opens the door to a wide range of IP communications possibilities that can improve productivity in the enterprise and provide leading-edge functionality and communications tools for mission-critical operations.