



*Concepts Meet Reality...*

## **Enterprise IPT – an end-to-end solution**



## Introduction

IP Telephony (IPT) has the potential to provide enhanced telecommunications features at a lower cost than traditional digital or analog service. The shift from Public Branch Exchange (PBX) technology to IPT represents a change in the way voice is managed within an enterprise as voice and network teams come together to support the new communications environment. That is why it's important to develop a long term convergence strategy for voice and data and determine an approach that balances benefits against cost and potential risk. Typically, a pilot is performed to gauge the overall fit of a vendor solution with your technical requirements and expected benefits.

As part of any IPT deployment, it is necessary to evaluate the current data network to determine what upgrades are necessary to support voice. Substantial investments may be required in the Local Area Network (LAN) and Wide Area Network (WAN) infrastructure in order to meet the demands for real-time voice communication.

Because ongoing support will be a key success factor for any IPT deployment, it is critical to determine how to align existing voice and network teams within your organization to support IPT. This may require substantial effort to develop cross functional skills among team members and clearly define support roles. The result should be an integrated team capable of supporting both voice and data.

## **Background**

IPT involves digitizing voice signals and transmitting them over LAN/WAN infrastructure using IP standards. Previously, data communication platforms were not ideal for handling the demands of real-time voice communications, due to the low bandwidth and sensitivity to changes in network traffic flow. Early applications of IPT were centered around end users with voice hardware and software installed locally on their PCs. In 1998, companies such as Cisco and Lucent developed hardware that was capable of switching, which made IPT less computer dependent. Eventually, as networks evolved, this enabled convergence of voice, data and video over common network architecture.

For organizations with large investments in PBX technology, IP enabled PBX represents an evolutionary step towards IPT. It leverages the existing PBX and data network infrastructures by transporting voice over the WAN/MAN (metropolitan area network) circuits and converting from time division multiplexing (TDM) to IP, then back to TDM at the destination site, which is commonly referred to as "IP trunking." This is achieved with media gateway cards, which act as a converter between TDM and TCP/IP standards. Data network routers provide connectivity between sites, which can terminate locally into the traditional voice network for line-side communication. IP trunking supports multiple standardized IPT signaling protocols such as SIP and H.323. By essentially creating a toll-bypass, IP enabled PBX can result in significant savings on long distance communications for large multi-site and international organizations.

Pure IP represents a complete departure from the proprietary PBX model and utilizes the client-server architecture of the IP network. Both the physical components as well as most of the inherent features of the PBX, including call waiting, call conferencing, message alerts and voice recognition, are paralleled in the IP-based system. All these components exist as individual hosts on the network and communicate directly with one another. A centralized call server provides call processing capabilities and establishes the signaling path between IP endpoints, but does not maintain the voice link like a traditional PBX.

Because an IPT implementation may require a significant investment to upgrade the current infrastructure at individual sites to meet Quality of Service (QoS) needs, a convergence strategy should be developed that weighs potential benefits against the cost of ongoing support.

## **Analysis**

Despite some compelling industry drivers, few large organizations have completely converted to IPT. This is due in part to the ubiquity and reliability of the PBX model. As a mission critical application, voice has proven to be very stable over the years. But many organizations either installed or updated their PBX systems in 1999 in anticipation of Y2K, and as these systems reach end of life, IPT has proven to be an attractive alternative, especially considering most traditional vendors are no longer investing in PBX technology. With this transition comes a new dynamic: as voice moves beyond its traditional boundaries and becomes an embedded component of existing IT applications the focus will ultimately shift towards how end users interface with the new technology. This can be through traditional messaging applications such as Exchange and IBM Notes as well as hand held wireless devices. In this sense, IPT commoditizes voice, treating it as another application on the network.

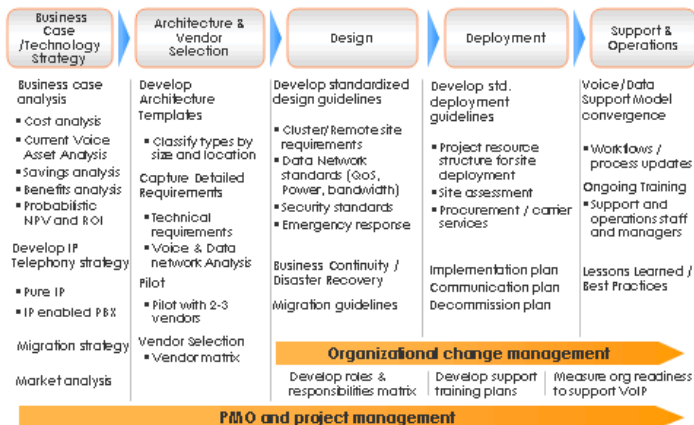
Some of the early adopters of IPT experienced problems regarding performance as a result of limited bandwidth, especially over the WAN. Lower reliability compared to the PBX model, especially when weighed against the cost of upgrading the LAN/WAN infrastructures and security risks associated with Denials of Service (DOS), viruses and hackers meant slower than expected rates of adoption for IPT. But many vendors have since addressed these issues and the adoption rate has steadily increased. The market place for IPT includes traditional PBX vendors such as Avaya and Nortel as well as data networking vendors such as Cisco and Microsoft. With each company offering their own proprietary solutions, there is little opportunity to mix and match capabilities to best meet an organization's needs.

As a result of these factors, organizations are beginning the transition to IPT with pilots at smaller sites. These smaller initial deployments allow for easier resolution of organizational and technical issues as well as a means of evaluating the benefits of converging voice and data on a smaller scale.

### Business Case and Vendor Selection

The best way to approach a large multi-site IPT deployment is to break it down into a phased implementation that begins with building the business case and convergence strategy. It is critical to evaluate current voice assets, including depreciation costs, long term maintenance contracts and ongoing support. This will allow your organization to estimate the potential cost savings for IPT that result from:

- Reduced capital expenditures compared to upgrading PBX infrastructure
- Reduced maintenance and support costs as a result of centralized infrastructure
- Reduced toll charges
- Increased worker productivity



Phased methodology for Enterprise IPT

For large scale distributed IPT implementations, one of the key business drivers will be to centralize as much infrastructure as possible at larger sites, while providing robust features at smaller remote sites. This results in lowered maintenance and support costs due to reduced equipment at remote sites. Instead, a centralized call processing server provides the voice capabilities for these sites.

Productivity enhancements resulting from IPT deployments, such as simplified move/add/changes and click-to-dial directories can be difficult to quantify. Initial pilots with small sites should help to determine the overall impact of these factors. In addition, it is important to determine the total cost of ownership for an IPT deployment by considering such factors as:

- Disaster recovery capabilities
- Additional power and cooling for wiring closet
- Redevelopment of PBX-based applications for IPT

After defining the business case, a thorough evaluation of LAN and WAN assets should be performed throughout the enterprise, including the gathering of network topologies and inventories and determining the necessary bandwidth for optimal performance. A detailed list of technical requirements should be developed to gauge the success of your implementation.

Once an IPT strategy has been defined, the next step is to perform a pilot with two or three vendors, one of which could be the incumbent voice provider. A vendor selection criteria matrix will help to provide a framework for choosing a solution. Specific decision criteria should be defined and weighted before beginning the pilot, including:

- Success of pilot: meeting pre-defined requirements
- Cost
- Support issues
- Global availability
- Training centers/skillsets
- Fit with convergence strategy
- Realized benefits stated in the business case

### **Design**

When beginning the design phase, there are numerous factors to consider. Some of the top design points are hub and remote site requirements, standardized architecture templates, integration into the data infrastructure, Quality of Service (QoS), global dial plans, security standards, emergency response architecture, business continuity/disaster recovery, and migration strategy.

One of the first steps in creating a design is to collect the requirements that the IPT architecture must support. Creating standard architectural templates for the various types of sites and locations will allow classification of the requirements for each template.

One of the business case drivers for migrating to IPT is to leverage a centralized voice processing architecture, similar to the

approach in the existing data infrastructure. The IPT architecture should be closely aligned with the architecture of the WAN/LAN/MAN, Enterprise Directories Structures, email, DHCP, and other networking components. It is important to have a clear understanding of the dependencies between IPT and the numerous networking components that are leveraged.

With voice beginning to traverse the network, the architecture should include a QoS strategy to ensure voice quality. With the other various types of traffic on the network, some of it high priority, a thorough evaluation is needed to determine how voice can be integrated. Classifying and marking voice to ensure it gets the priority required and when and where this takes place in the network will be critical.

With a centralized voice processing architecture, a global dial plan strategy is important. When designing the dial plan the existing dial plan the existing dial plan and what adjustments may be required.

It is also important to involve the Network Security team early in the design phase to assist in identifying the vulnerabilities in the network that may impact the voice application, such as unauthorized access, toll fraud, phone hardening, switch and voice gateway security, secure remote access, and identity spoofing.

With the ability to move IPT devices easily around the network, the Emergency Response Architecture is a critical factor. Numerous vendors offer solutions to assist in this effort. The key is the ability to track where the emergency call originated from and deliver the appropriate information to the emergency response officials. In addition, emergency response plans should examine the available up time (in case of a power outage) for voice in the network and determine if there is a need to add additional emergency phones in the design. These lines could be maintained independently from the IPT architecture and strategically placed for access in common areas.

The IPT architecture should be leveraged to follow Business Continuity/Disaster Recovery Plans. The architecture should reflect the appropriate redundancy and failover required to

support the business during a disaster. Some of the design decision points include hardware failover for call processing and voice applications, multiple connectivity paths into the network, redundant gateways to the PSTN, and backup power. In addition, the existing network infrastructure should be evaluated to ensure that the appropriate amount of redundancy and failover are included to support voice.

A migration strategy from the existing voice network should be included when developing the IPT architecture. If there will be a transition period for a site, it is necessary to understand how the two infrastructures can be connected to handling calling patterns, voice mail, and access to PSTN connections.

### **Supporting IPT**

From an organizational standpoint, the convergence of voice and data represents a shift in how the current network infrastructure is managed. It will require voice, network and security teams to work together to ensure consistency across applications and network devices. When planning an IPT deployment, team members should be brought together early on in the process so they can plan, design and deploy together.

The goal is to develop cross-functional skills by partnering resources to exchange knowledge. One effective method is to assign individuals to temporary assignments on other teams. Team members should not be expected to be experts in all areas, but it is important they develop sufficient general knowledge to facilitate communication. Voice resources should have clearly defined roles within clearly defined skill sets as they are transitioned into the data world. A 'roles and responsibility' matrix should be developed during the design phase so the necessary personnel can be in place once deployment begins. During deployment, minor changes will most likely be applied to the matrix as well as to existing processes for network management, such as monitoring and notifications for changes to the network.

Assessing skills prior to implementation will help to determine the team's overall readiness to support IPT. The end goal of the support migration should be a single team capable of supporting both voice and data.

### **Conclusion**

The transition from traditional PBX voice technology to IPT represents change from a technological and an organizational standpoint. Early definition of the expected benefits of an IPT deployment and developing a convergence strategy with detailed technical requirements will help to gauge the success of the overall deployment. A pilot with two or three vendors is recommended to determine the best fit for your organization. Bringing voice, network and security together early in the development phase will help smooth transition as individuals develop the necessary skill sets. The result can be significant savings for large organizations and a new role for voice as an embedded component of your IT infrastructure.



**Enaxis Consulting, LP**  
24 Greenway Plaza, Suite 1505  
Houston, TX 77046  
713.881.9494  
[www.enaxisconsulting.com](http://www.enaxisconsulting.com)