



# The Transition from Traditional to IP Telephony

A White Paper by Vertical Networks  
October 2001

---

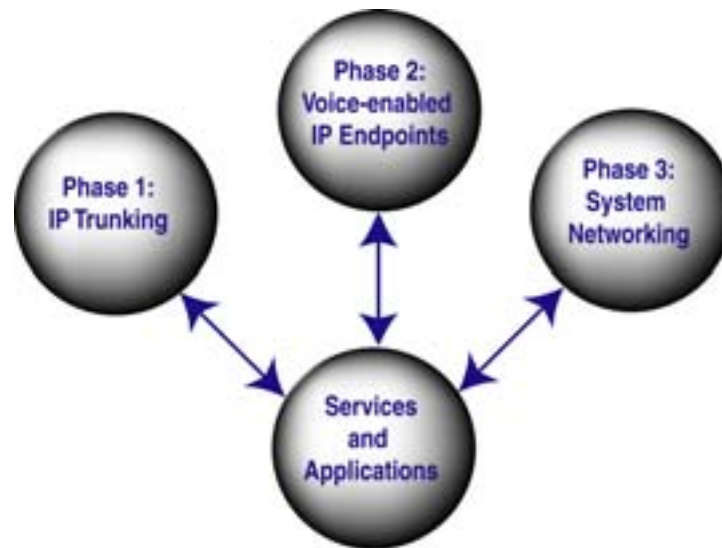
## Contents

Migrating to IP Telephony	2
Phase One: IP Trunking	2
Phase Two: Voice-Enabled IP Endpoints	4
Phase Three: System Networking	5
End-to-End IP Services and Applications	7
Deploying IP Telephony in the Real World	7
About Vertical Networks, Inc.	7

The Internet Protocol (IP)—the network standard for voice, data, and applications—is driving a significant shift in the public and private network infrastructure market, as well as in the telecommunications equipment market. An important element of this migration to everything-over-IP is IP telephony. This paper outlines a three-phase approach to implementing IP telephony.

## Migrating to IP Telephony

IP telephony will offer real-world business benefits; already some enterprises use it to improve employee efficiency and reduce costs. However, the public switched telephone network (PSTN), because of the capital invested in it, its large installed base, and its solid reliability, will continue in use for many years. And carrier-based IP telephony services will not be universally available for some time. It thus appears the PSTN and IP networks will coexist for the foreseeable future. Few if any businesses will make an abrupt switch to IP telephony; instead, businesses will look for flexible, practical migration strategies for deploying IP telephony. Most will take a phased approach to the converged voice and data communications services that IP telephony enables, evolving to voice over IP (VoIP) without a forklift upgrade of their existing voice and data infrastructure and without abandoning the PSTN. This paper shows how businesses can use an Integrated Communications Platform (ICP) to implement an IP telephony strategy in three phases: IP trunking, voice-enabled IP endpoints, and system networking. Using these phases, enterprises can take advantage of business-enhancing applications in each stage and throughout the network.



### Phase One: IP Trunking

IP trunking is the logical first step in implementing IP telephony. It is implemented using an ICP that includes an integrated VoIP gateway and PBX that connects to a WAN data trunk for both voice and data traffic. IP trunking results in measurable cost savings—some enterprises have reduced their long distance charges by as much as 75 percent.

Enterprises can use their existing data infrastructure for voice services, starting with basic voice over IP trunking today and later adopting more sophisticated services such as unified messaging and remote teleworker support. IP trunking allows businesses to create virtual tie lines that carry voice traffic over the data network between offices. These virtual tie lines improve bandwidth efficiency and reduce the cost of voice communications transported off the local premise—to other enterprise offices or to corporate headquarters—by bypassing the toll network. IP trunking also

enables the use of intelligent call routing and a uniform dialing plan (for example, five-digit dialing to any office, regardless of location).

## **Supporting IP Trunking**

To enable IP trunking, an ICP needs to support the following features:

- The platform must be able to convert all types of traffic to IP packets, enabling users to employ a single WAN for reliable and cost-effective connectivity between offices.
- The ICP must be able to intelligently route calls to the PSTN or IP network, based on criteria such as the number dialed and network status.
- IP trunking should offer the quality and reliability of traditional telephony systems. Any ICP thus must support quality of service (QoS) standards, such as differentiated services (diff-serv) and weighted fair queuing, that work in conjunction with carrier-based multiprotocol label switching (MPLS) deployments.
- In the event of a WAN failure, an IP trunking solution should continue to provide full phone services using local call control, automatic route selection, and alternative WAN connections.
- Any ICP should support multiple VoIP signaling protocols and multiple codecs, as well as common trunk connections from any carrier, regardless of protocol.
- VoIP features should mirror those of today's PBX systems, including sophisticated dialing plans, call detail recording, and voice conferencing.

## **Business Benefits of IP Trunking**

IP trunking can yield significant business benefits:

- Combining voice and data traffic on one trunk makes more efficient use of WAN bandwidth.
- IP trunking can save costs by eliminating traditional time division multiplexing (TDM) circuits and bypassing the PSTN.
- An ICP that supports multiple types of access connections allows enterprises to obtain services from one or more providers.
- Enterprises will not need multiple different connections to voice and data networks, since IP trunking requires only one connection.
- An ICP with integrated management will enable enterprises to handle IP telephony trunks like every other trunk on the system.

## Phase Two: Voice-Enabled IP Endpoints

During Phase One, enterprises still use their analog and digital phones. Phase Two introduces the use of voice-enabled IP endpoints such as IP phones, softphones, wireless phones, personal digital assistants (PDAs), and other IP appliances. The use of IP phones will improve the efficiency and reduce the cost of voice communications transported within the enterprise premises and to remote workers. However, the ICP should not dictate to the enterprise what phones it should use; instead, it must be able to support all types of phones— analog, digital, and IP.

IP phones will enable self-service moves, adds, and changes; more flexible deployments; and ultimately, new features and capabilities. For on-premise calls, IP transports voice traffic over the LAN as IP data packets. For off-premise calls, IP enables voice to be carried over the data network end-to-end, regardless of location.

Several factors currently prevent the full-scale deployment of IP phones, the most important of which are the lack of standards, QoS, functionality, and reliability. Thus initially, IP phones will likely be used in applications that are more difficult and expensive to implement with the TDM technology, such as for remote workers or remote call center agents. As issues are resolved, IP phones will become the preferred end-point for all calls, regardless of origination or destination. This transition will take place over several years and during that time IP phones will coexist with traditional digital and analog phones. The type of phone deployed will depend on the application and the return on investment.

### IP Phone Characteristics

IP phones should provide the following characteristics:

- They should deliver all the features and functionality supported by digital phones today and work seamlessly with existing analog and digital phones, while improving the overall user experience.
- IP phones should use standards-based signaling protocols. Today, most IP phone implementations are proprietary. Stimulus response protocols—such as the media gateway control protocol (MGCP) and MEGACO/H248—are the only open protocols that allow implementation of the business-class IP phone features that are expected in today's business environments. Therefore, companies should look for phones that support these standards.
- IP phones must offer the same end-to-end QoS and reliability as traditional PBX systems via standards such as 802.1p/Q and diff-serv.
- IP phones should be as easy to deploy as digital phones in matters of provisioning, powering, and ongoing maintenance. IP phones will be powered over Ethernet, enabling the use of a centralized uninterruptible power supply (UPS) system to provide power to the phones in the event of a power failure.

### Benefits of IP Phones

Implementation of IP phones will offer many benefits:

- They will enable greater flexibility and scalability. An IP phone can be located anywhere in the world where there is IP transport. Physical port capacity will no longer limit system size, enabling the deployment of a large, scalable voice infrastructure.
- A single wire to the desktop will unify IP transport for management, signaling, and bearer channels for data, voice, and IP phone power.
- Plug-and-play IP phones will simplify moves, adds, and changes. Integration with corporate databases will make it easier to access information and automate updates.
- Voice-enabled IP endpoints will enable new applications such as distributed call centers, greater mobility, instant messaging, and support for XML-based services.

## **Phase Three: System Networking**

The third and final phase of an enterprise IP telephony deployment—system networking—will leverage the capabilities achieved in the first two phases to provide a virtual communications system distributed over IP. Instead of being implemented individually in independent, disconnected offices, applications such as multimedia contact center, PBX, voice mail and unified messaging will now be integrated into a single system that provides network-wide services to multiple sites. A user will be able to dial by name or leave a voice mail for another user at another site as easily as he or she communicates with someone at the same site. Similarly, from a management perspective, the administrator will be able to perform moves, adds, and changes, or other configuration operations across multiple sites as easily as at a single site.

In today's global business environment, networking among systems will enable a seamless user experience and better access to information when and where it is needed. This phase will provide more intelligent networking among remote offices—as well as tighter integration with the communication system at headquarters—to improve and enhance interoffice communications.

ICPs with system networking will allow voice networks to become more like router networks, complete with local control, distributed intelligence, and centralized management. The ICP will be able to automatically discover the network topology and will dynamically configure itself to participate in the network. Even though a networked system will contain many geographically dispersed devices, it will behave as a single, cohesive system. In the event of a node failure, the system will be able to adjust, adapt, and self-heal. Network managers will be able to control failure modes to mitigate their impact on end users. Furthermore, when network managers add and remove capacity, the system will be able to self-organize and utilize the available resources.

The goal is to have information and control when and where they are needed. As with router networks, this means hosting information and call control locally to ensure performance and reliability. Otherwise, businesses will not be able to guarantee control of call flows or leverage the availability of multiple trunk connections and alternative carrier services. For example, if a company has a networked environment with a centralized call manager architecture, it will suffer a major service interruption if a WAN failure prevents connection to the centralized call manager. This failure could be especially critical in a distributed or small call center environment. Therefore, on-premise equipment must provide full call control capabilities.

Unlike the critical call control functions, network management and information storage and dissemination are best centralized. IP lets system administrators centrally manage all aspects of a large, distributed voice communications network. IP also allows integration with centralized directory services, enabling tighter integration with a company's internal resources and business processes.

## **System Networking Capabilities**

System networking will enable the following capabilities in an IP telephony deployment:

- Intelligent networking will enable the delivery of advanced voice networking features such as networked transfer between systems; network look-ahead to determine resource or user availability; a unified directory; and presence management, which lets users notify the voice network of their locations and contact preferences.
- When a new system comes online, it will notify the network of its resources, capabilities, and dialing plan information. It will also receive the same information from the other systems in the network, creating an intelligent network that is able to organize, share resources, and distribute load.
- Users will be able to move between locations and still access services without any administrative burden.
- Networking of features and capabilities across systems will let enterprises build large, scalable, and redundant voice communications networks.
- The key to system networking is utilizing standards-based mechanisms that address business networking needs. Products from multiple vendors will work seamlessly together, just like today's router networks.

## **Benefits of System Networking**

Following are some of the benefits associated with system networking:

- No matter where a person is attached to the network, he or she will have seamless access to all available features and capabilities.
- Information on moves, adds, and changes will be automatically distributed throughout the network, reducing administrative overhead.
- Better access to—and more efficient use of—corporate information will increase corporate competitiveness.
- IP systems at remote locations will be able to integrate with IP systems at the headquarters site through standards-based mechanisms.

## **End-to-End IP Services and Applications**

IP trunking, IP phones, and system networking are all critical to deploying end-to-end IP applications and services. With the mature IP infrastructure these elements provide, customers will be able to design, develop, and deploy other innovative applications that take full advantage of this new standards-based network.

Unlike the PSTN, which was originally created as a single, proprietary network with closed architectures and protocols, the emerging IP telephony network will mature in a deregulated, fast-paced environment. The central office (CO) will be augmented by the distributed intelligent office, which places the functionality of CO switches on standard commercial platforms networked together using open interfaces and standard protocols. This approach will enable innovators to add to the capabilities of the network or to specialize in specific functions.

The applications and services delivered by IP-based networks will surpass what the PSTN can do, realizing the promise of unified messaging, intelligent agents, information services, and advanced multimedia applications such as multimedia conferencing. Applications such as virtual and networked call centers, auto-provisioning, unified messaging, virtual office, online directory, and more, will likely employ a variety of different media and application servers such as voice XML (VXML), content, and hosting servers. Above all, IP services will enhance the advantages of a single, converged network to advance global business. The benefits derived from these applications will be greater than most businesses realize, although they may take somewhat longer than hoped to materialize.

## **Deploying IP Telephony in the Real World**

To best leverage new IP telephony capabilities, businesses must anticipate the gradual evolution of applications and services when building an IP convergence strategy. Because the transition from traditional to IP telephony will take place over several years, it is most practical to take a phased approach to conversion, starting with IP trunking, that lets businesses realize immediate benefits while still enjoying the stability and reliability of traditional voice services.

## **About Vertical Networks, Inc.**

Vertical Networks is the leading provider of Integrated Communications Platforms (ICPs), the first systems that combine voice, data, and applications support into one remotely manageable platform. With a unique focus on the needs of enterprise branch offices and small to medium-sized businesses worldwide, Vertical Networks delivers business solutions to a wide range of industries, including financial services, medical, publishing, and retail. To ensure total customer satisfaction, Vertical Networks' strategic network service provider, reseller, and systems integration partners offer comprehensive support services, including 7x24 on-site support.

For more information about Vertical Networks or its products, visit the company's Web site at [www.vertical.com](http://www.vertical.com) or call 408-523-9700.

© 2001 Vertical Networks, Inc. All rights reserved. Vertical Networks and the Vertical Networks logo are trademarks of Vertical Networks, Inc. Other trademarks, service marks, and trade names belong to their respective companies. Information and specifications may change without notice.