Will 1999 Be the Year of IP Telephony?

Neal Leavitt

After several years of talking the talk, service providers say 1999 will finally be the year that IP telephony begins walking the walk. Industry observers say this is the case because both the technology and the marketplace are about ready for large-scale user adoption.

One indication this may be true is the aggressive expansion and promotion of IP telephony services by such worldwide telecommunications giants as AT&T, British Telecommunications, Deutsche Telekom, and France Telecom. Many smaller companies are also throwing their hats into the ring.

While IP-telephony technology has advanced considerably (see the sidebar, "Focus on IP Telephony"), service providers still must work on remaining problems with transmission quality, latency, ease of use, and bandwidth. And despite the growing demand for IP telephony-because of its lower cost and its ability to efficiently use the same network that organizations already use for data transmission-providers still may face a major challenge in broadening the service's appeal to both consumers and companies.

Many companies believe they are already using private networks-including the traditional circuit-switched telephone network, leased lines, and virtual private networks-cost-effectively. The
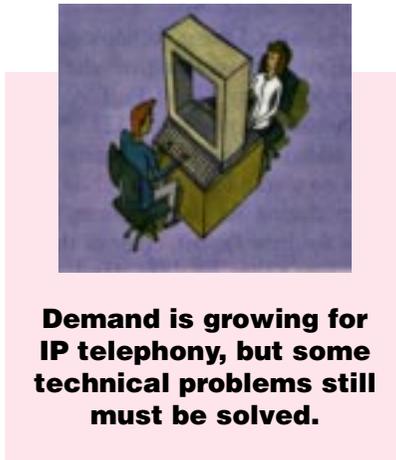
Demand is growing for IP telephony, but some technical problems still must be solved.

big hurdle thus may be convincing management to invest in a conversion to IP telephony.

Nonetheless, market analysts predict 1999 will be the beginning of a dramatic upswing in the IP-telephony market. International Data Corp. (IDC) expects the worldwide IP-telephony market to grow from $3.5 million in 1995 to $560 million this year. As the figure on the next page shows, Frost & Sullivan predicts Internet telephony will be an approximately $1.8 billion global market by 2001. Killen & Associates forecasts a $17 billion global market by 2002 for IP-telephony services, equipment, and software.

Forrester Research says Internet telephone calls will provide 4 percent of US telephone company revenues by 2004. And Analysys says that IP telephony traffic will overtake circuit-switched telephony traffic by 2000 and comprise more than a third of all international calls by 2003.

TECHNICAL CHALLENGES

IP telephony vendors and providers are currently trying to deal with a number of issues that have hampered the technology. For example, ease of use is a problem. Many IP telephony systems require users to dial long special-access numbers in addition to the receiver's phone number.

Providers are making some progress on transmission-quality problems, which are caused when packets get jumbled while traveling over IP networks. Despite the work already done, Philip Lakelin, an analyst for Analysys, said it will take another two years to equal the quality provided by traditional phone networks.

Such efforts will be important because, said analyst Peter Meade with Cahners In-Stat Group, a market research firm, "Most people really don't care if they are making an IP telephony call or a call over the (traditional phone network). Right now the average person simply wants to know what a call is going to cost and how good the quality is."

Latency

Congestion on IP networks, particularly on the Internet, can cause delays in packet delivery for telephony transmissions. Many providers have tried to deal with latency problems by using either ATM networks or, on frame relay and other networks, by using RSVP (Resource Reservation Protocol). ATM natively supports Quality of Service for high-priority traffic, such as phone transmissions. RSVP lets users reserve resources for high-priority transmissions along a route from sender to receiver. Enabled routers then schedule and prioritize packets.

Meanwhile, new voice-compression algorithms have slashed Internet voice delays during the past year from 600 to less than 300 milliseconds. Mark Winther, IDC's group vice president of telecommunications research, said this latency level is adequate. However, he said, vendors and service providers will have to continue reducing latency to make IP telephony service more similar to traditional telephone service.

Interconnection and interoperation

Two critical issues for IP telephony's future are interconnection with the traditional telephone network and
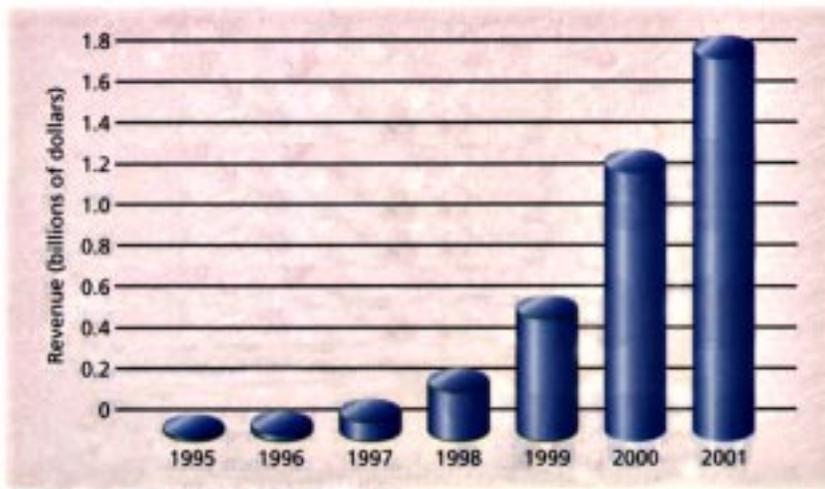
A study by Frost & Sullivan, a market research firm, found that worldwide Internet-telephony revenues began to increase substantially last year, will grow even more significantly this year, and will reach about $1.8 billion by 2001.

interoperability between different vendors' products.

Gateway devices connect the traditional phone network (frequently via a PBX) and an IP network. Gatekeepers provide the intelligence necessary to control the number and type of connections allowed across a gateway. They also limit the amount of bandwidth a connection can use and provide such services as address translation.

Currently, IP telephony is not interoperable across all vendors and can take place only between users with the same or compatible equipment. Cahners' Meade said that this has been a problem for the technology but that equipment vendors, service providers, and standards bodies are working toward the interoperability that will be necessary for IP telephony to take off.

The International Telecommunication Union (ITU) recently adopted H.323, which provides a foundation for audio, video, and data communications across IP networks, including the Internet. H.323 establishes standards for data-stream compression and decompression, ensuring that different vendors' equipment has some area of common support.

The specification also establishes common call-setup and -control protocols, runs on top of common network architecture, and is not tied to a particular hardware platform or operating system. Many vendors are already making their IP telephony products H.323-compatible.

To further interoperability between different vendors' IP-telephony gateways and gatekeepers, a number of leading technology firms-including Ascend, Cisco Systems, Lucent Technologies, and VocalTec-are working on the iNow (interoperability Now) Profile, which will be based in part on H.323.

In addition, the ITU recently began work on a standard that will be called H.gcp during its development phase. Pierre Andrew Probst, chair of the ITU study group that develops standards for multimedia systems, said the new standard permits control of gateway devices that pass voice, video, fax, and data traffic between traditional telephone networks and packet-based data networks. Connections through such gateways could let a standard-telephone user place a long-distance call via the Internet.

Bandwidth

Many consumers, particularly those with slow analog modems, have trouble efficiently using IP telephony, which demands considerable bandwidth. However, better data-compression algorithms have helped to address this problem.

In addition, H.323 provides bandwidth management, which lets network managers eliminate traffic disruptions by, for example, limiting either the number of simultaneous H.323 connections within their networks or the amount of bandwidth available to H.323 applications.

Meanwhile, ADSL (asymmetric digital subscriber line) and cable modems provide many users with more bandwidth at lower costs.

EXPANDED SERVICES AND THE KILLER APP

To make their services appealing, domestic and international IP-telephony carriers will have to roll out a constant stream of offerings, in addition to voice mail, call waiting, and high-speed ADSL service, which are already available in many US metropolitan areas.

However, IP telephony may require a killer app before it can really take off. Currently, though, said Bill Leighton, AT&T Labs' vice president of data-network technology, there is no killer app. He said widespread use of IP telephony will result from many smaller applications that cumulatively will provide more desirable services for businesses and consumers.

Video services

Cahners' Meade believes that one possible killer app will be improved video links with IP phone calls.

Already, products like NetSpeak's WebPhone 4.0 and VocalTec Communication's Internet Phone 5 can function as real-time videophones.

Video over IP is not new, but it requires considerable bandwidth. This has held back its use with IP telephony, whose home and small-business users often face bandwidth limitations.

IP-enabled phone

Meade said another killer app may be the IP-enabled phone. Aplio, for example, just rolled out its Aplio/Phone 2.0, a device that connects a standard telephone to the Internet. Earlier product versions permitted communications only between Aplio/Phone users, but Version 2.0 is slated to work with other H.323-compatible IP-telephony and -conferencing software (such as Microsoft's NetMeeting) over most ISPs.

InnoMedia has released a similar device, called InfoTalk, which sits between the phone and the jack, and routes calls over the Internet to other InfoTalk users.

Web-enabled call centers

Vendors, such as Essl Technologies and NetSpeak, are beginning to release IP telephony products that let customers make calls and access a Web site using the same phone line. The products also route on-line requests for customer service to representatives at call centers. Customers with one phone line can thus

Focus on IP Telephony

IP telephony has been around since 1995, when VocalTec Communications introduced the first software product. Initially, however, the technology produced poor sound quality and was complex to set up and use. Since then, providers have improved the technology.

The technology

The analog sound input for IP telephony is connected to an analog-to-digital converter. A codec highly compresses the resulting stream of data, which is then turned into IP packets, which can be sent over the Internet, a public IP network, or a private IP network. Compared to the Internet, which many Internet service providers (ISPs) will use, the other two types of networks are faster and less congested.

At the receiver's end, packets are decoded, decompressed, processed by a digital-to-analog converter, and sent to a telephone speaker or other sound output device.

IP telephony thus can represent a convergence of circuit-switched networks, such as the traditional phone network, with packet-switched networks, such as the Internet, intranets, LANs, and WANs.

The service is separated from the network by a spanning layer, TCP/IP, which lets carriers provide voice calls over different network technologies, such as ATM, Ethernet, traditional phone networks, and even the cable TV infrastructure. IP telephony can take place phone-to-phone, PC-to-PC, fax-to-fax, or among the different types of devices.

Using IP

Because it is packet switched and sends packets along any available channel on a transmission route. IP telephony uses network bandwidth more efficiently and thus is less expensive than traditional circuit-switched telephony, which uses an entire communications channel for each conversation.

In addition, in the US, the Federal Communications Commission (FCC) has not yet imposed fees on IP-telephony carriers, as it has on traditional telephony carriers, for connecting to long-distance carriers' networks. However, IP telephony won't keep this cost advantage for long, noted telecommunications analyst Peter Meade with Cahners In-Stat Group, a market research firm. The FCC is expected to initiate long-distance access charges for Internet calls by 2001, which will decrease, at least domestically, IP telephony's price advantage.

By 2001, however, estimates Phillips Tarifica, a market research firm, AT&T alone will lose between $620 million and $950 million in international calls to the Internet. Therefore, traditional telephone carriers are also jumping into the IP telephony marketplace.

Meanwhile, IP telephony could be used with the converged voice-and-data IP networks that several companies are promoting as a way to make an organization's network operations simpler and more efficient.

"We're pushing this technology very hard," said Mark Bakies, product-marketing manager for Cisco Systems' Telephony Internet Service unit. He said Cisco's converged network will be able to offer a variety of services, including those related to IP telephony.

obtain real-time voice access to representatives without disconnecting from the Internet.

Because of the central role customer service operations play in many companies, industry observers expect Web-enabled call centers to become popular.

Unified messaging

Elie Wurtman, president and CEO of Delta Three, which operates a large IP-telephony network, said unified messaging, while not prevalent now, will become very important during the next few years. IP-telephony vendors are already developing products that enable unified messaging, which lets a user access e-mail, voice mail, faxes, and pager messages via a phone or PC.

While standard telephony is expected to become IP telephony's most popular feature, analysts also expect IP fax to become very popular. Usage of AT&T's IP-based WorldNet Enhanced Fax Service has increased by more than 30 percent since its introduction last year.

According to Mark Bakies, product-marketing manager for Cisco Systems' Telephony Internet Service unit, "Studies have shown that a large portion of long-distance minutes is fax traffic. In fact, up to 60 percent of long-distance minutes to Japan are faxes."

For IP telephony to have a significant presence in the marketplace, Cahner's Meade said, equipment vendors and service providers will have to continue to invest in and improve the technology. As for now, said Olivier Zitoun, Aplio's president and founder, "IP telephony is like the dawn of TV. This is the beginning of the next-generation telephone industry." ❖

Neal Leavitt, president of Leavitt Communications, writes frequently on Internet and other technology-related issues. Contact him at leavcom@ix.netcom.com.