The Changing Landscape of Business Communications

Summary

As recently as the 1980s, business communications could be summed up in two words: Ma Bell. The telephone monopoly supplied a single network that connected us to the world. At the very least, it was simple to manage: one connection handled all communications.

Needless to say, much has changed. Wireless phones, email, instant messaging, and audio/video conferencing have become standard. Many people still work from offices, but many others work from home or on the road. The single network has been replaced by multiple networks for voice, data and video. Managing business communications is much more complex, and the risk of technological obsolescence has increased significantly.

Observers agree that the future of business communications lies in *packet-based* technology, which allows voice, data and video to travel over a single connection. This approach — known as *convergence* — simplifies management, reduces costs, and provides a flexible platform that can evolve quickly and with less expense.

The Age of the Single Network

Until quite recently, business communications relied on *circuit switching* through what is known as the *Public Switched Telephone Network* (PSTN). Whether phones were analog or digital, the PSTN connection was supplied by a single provider — the telephone company.

Analog telephony held sway through the 1970s. Communication consisted of telephones connected by a twisted pair of wires to an organization's *key system* or *PBX*. These private systems were connected over *trunks* to a telephone company's *Central Office* (CO) switch and then to the larger PSTN. Although expensive, analog telephony made use of the best technology available at the time.

Digital phone systems appeared in the early 1980s. These systems enabled significant improvements in voice quality and telephone functionality, but did not change the fundamental structure of business communications. The single network — the PSTN — still dominated.

The Age of Multiple Networks

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Personal computers also began to appear on office desktops in the 1980s. The PC led to greater productivity, but it was a stand-alone device that could not communicate with other machines.

As PCs proliferated, the idea of connecting them together gained momentum, resulting in the *Ethernet*. By 1990, most PCs "sat" on a network that was completely different from the voice network: the *Local Area Network*, or LAN. Soon, *Wide Area Networks*, or WANs, connected the LANs to the outside world. The age of multiple networks had begun.

The Internet

Nothing has shaken the world of business communications like the Internet. Voicemail and paging came along, but it was not until 1996 that that the Internet brought such indispensable tools as email and instant messaging to the desktop. A new type of telecommunications provider — the *Internet Service Provider*, or ISP — soon developed.

Now companies had as many as four networks to manage:

- Circuit-switched (PSTN) network for voice
- LAN
- WAN
- Internet

The Beginning of Convergence

Installing and maintaining separate networks is not cost-effective. They involve a great deal of redundancy because they require:

- Two or more devices on the desktop – PC, telephone, fax, etc.
- Two infrastructures – one for voice and the other for data
- Two or more sets of hardware – PBX or key system for the telephones; router, switch, etc. for computers
- Two or more sets of lines to the outside world
- Two or more network service providers – for local calls, long-distance calls, and data/Internet access
- Two sets of staff – one for voice and the other for data

Multiple networks make managing business communications far more complicated than it should be.

In the late 1990s, in response to the problems created by multiple networks, the idea of routing voice and data over a single network began to gain momentum.

1997 – Voice over Internet Protocol (VoIP) Gateways

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VoIP[1] technology was introduced in 1997 and heralded the convergence of the separate worlds of voice and data.

The first business-ready VoIP solution was the *VoIP gateway*. VoIP gateways are computers or other devices that turn voice signals into *packets*, which are then sent over an *IP network*. Gateways have *T1* or *ISDN* interfaces to the PSTN (usually via the key system or PBX) and an Ethernet interface to the IP network.

Gateways enable companies and organizations to cut long-distance costs and even avoid long-distance tolls entirely. In a toll-bypass solution, calls between offices are routed as VoIP calls, completely eliminating the involvement of the regular telephone system.

VoIP gateways have an additional advantage in that they do not require the replacement of "legacy" key systems or PBX equipment. However, this is a double-edged sword: key systems and PBXs can be costly to maintain and upgrade, and they cannot provide the features that a complete IP voice solution can offer. This legacy approach still depends on the PSTN, if only for local calling.

1998-1999: The IP Telephone and IP-PBX

IP telephones began to appear in 1998 and take all of this a step further. *IP telephones* look and function exactly like digital telephones, except that the voice signals are turned into packets by the telephone (rather than the VoIP gateway) and sent to the LAN over a built-in Ethernet connection.

Beginning in 1999, several vendors introduced *IP-PBX* solutions. This solution further simplifies business communications and provides the platform necessary for a truly converged communications solution.

Now, companies and organizations no longer need multiple separate network infrastructures; one network with one set of equipment can handle it all. For the first time since the 1980s, the amount of equipment needed to provide business communications can actually be reduced.

An IP telephone/IP PBX solution brings other new benefits. This technology reduces the costs and hassles of moves, additions and changes; provides support for telecommuters; and enables seamless dialing between offices in a multiple-office environment. In addition to "hard phones," there are also *softphones* — software that emulates an IP phone and is installed on a PC.

PCs and telephones connect directly to a single infrastructure — the LAN — and the LAN connects to the local environment via a single packet connection (T1, DSL, wireless, CATV, etc.). The elements needed for convergence in business communications are now in place.

Barriers to Convergence

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What stands in the way of this simpler, cheaper, more effective new world of business communications?

Not technology. The technology required to make converged networks a reality exists and has been readily proven in production environments.

The most important barrier is the ubiquity of the PSTN. In theory, the traditional telephone system is obsolete; IP can perform all the functions of the PSTN, and indeed, many more. However, IP networks are not as universal as the PSTN. Until they are, there will continue to be a need to connect the IP voice system to the PSTN, at least for local calls.

Another barrier involves some lingering public doubts surrounding IP voice quality and reliability. For the most part, this concern is based on the fact that convergence has come to be equated with the *public Internet*. For all of its benefits, the public Internet is not quite ready. However, a great deal can be done today to make VoIP quality equal to the traditional phone system, especially for businesses.

The Future of Converged Networks

So where is all of this heading?

One day soon, all voice, video and data traffic will travel on IP networks and use one platform. No one knows exactly when this will occur, but it is an inevitability that is not disputed by even the most pessimistic detractors of converged networking. One day, the LAN will have devices that will enable all forms of communication, whether *wireless* or *wireline*. From a networking perspective, the line between voice and data will be blurred or even obliterated.

The idea of convergence is powerful, beautiful and elegant. It has captured the imagination of such visionaries as George Gilder, who speaks poetically about it in his best-selling book *Telecosm*: "When anyone can transmit any amount of information, any picture, any experience at any time, instantaneously without barriers of convenience or cost, the resulting transformation becomes a transfiguration."

[1] VoIP (voice over Internet Protocol) refers to making a call over the Internet. IP telephony refers to IP-based calls that have features such as those one finds in a PBS or key system – call waiting, call transfer, voicemail, etc. Finally, IP communications means the use of IP to bring voice, video and data communications together on a single network and platform.

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