

WHITE PAPER

VoIP in the Enterprise: Ready for the Mainstream

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IDC OPINION

Voice over IP (VoIP) is a maturing technology ready for mainstream adoption. It is true that there have been obstacles in the way of widespread take-up. These barriers are all but won over, as VoIP service providers have focused on high quality of service, carrier-grade resilience and a plethora of attractive features.

At the core of the VoIP proposition is the promise of lower cost of calls. This can now be regarded as fact — IDC research shows that enterprises that adopt VoIP are three times as likely to exceed their cost saving expectations as undershoot expectations.

Perhaps the biggest stumbling block for VoIP has been the belief that there is no reason to fix something that isn't broken. Companies with investments in legacy equipment that continues to provide a sufficient level of functionality have essentially proven that they are unwilling to switch without reason.

However, IDC research shows that a steady stream of enterprises will replace their PBX systems as they reach end-of-life. This, and the expiration of VPN service contracts, will break the inertia of legacy voice services. Enterprises considering PBX upgrade or replacement, or planning a VPN upgrade, are likely to consider deploying an IP VPN. VoIP is then an obvious choice, especially if voice traffic uses spare capacity on data networks.

The business case for VoIP has a strong cost saving focus, based on lower call and line costs, but also in reduced administration and increased flexibility of the service. But there are other considerations for enterprises considering VoIP, such as the size and distribution of their offices. It is important for enterprises to focus on the wider picture, looking beyond the headline cost savings, in deciding whether or not to migrate to VoIP.

This White Paper is designed to be a management guide to VoIP, and is based primarily on the results of a large-scale survey of end-user enterprises in the UK across a range of business sectors and sizes.

THE CONVERGENCE OF VOICE AND DATA

IP Enters the Mainstream

The core principle of IP (Internet Protocol) networks is that traffic is broken up into packets which are sent across the network over a variety of paths, and reassembled at a destination. IP is very suited to data transmission, because data can be broken up easily into packets.

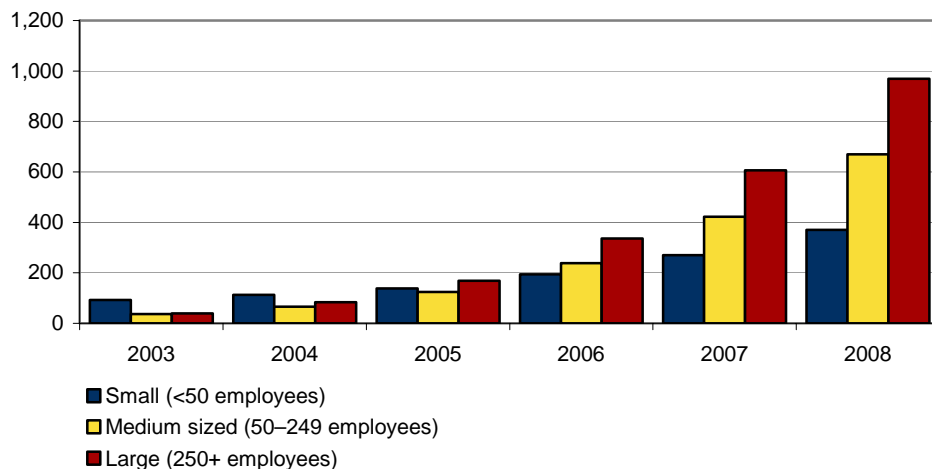
Voice, on the other hand, traditionally uses a circuit-switched network, which requires a dedicated circuit to connect the callers at each end. Voice is a very unforgiving network application; anything more than a half-second delay can make a voice connection unusable.

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IP technology is now shifting position. Network operators and communications providers are replacing their separate voice and data networks with a single converged architecture; IP has become a mainstream proposition. The adoption of IP has grown steadily, and is forecast to expand even further (see Figure 1).

FIGURE 1

Western Europe IP Telephony Spending by Size of Enterprise, 2003–2008 (\$M)



Source: Western European IP Voice Services 2005–2008 Forecast, Doc #32900, IDC, 2005

Operators and communications providers are upgrading existing networks and building out IP based networks in order to offer a range of advanced and enhanced IP services to residential, corporate and multinational enterprises. The rationale for this investment is that IP delivers better quality of both data and voice, while allowing the rationalisation of network infrastructures. This rationalisation means that converged IP-based networks are cheaper to operate, which drives down operating costs.

Enterprise customers too are attracted by IP technology. It has shown itself to be both affordable and dependable. IP now underpins the Internet as a service delivery platform for business applications.

The Convergence of Voice and Data in the Enterprise

Given that enterprises have already invested substantial sums in their existing networks, why would an enterprise deploy an IP-based converged network? The research carried out by IDC suggests four key drivers for convergence of voice and data in the enterprise:

- ☒ Using VPNs to carry voice: Many enterprises have deployed, or are considering deploying, an IP-based virtual private network (VPN) for their corporate enterprise network requirements. IDC's research indicates that many enterprises were attracted by the possibility of running voice through existing VPN lines between sites, to reduce cost of calls between those sites by using spare capacity on the VPN.
- ☒ Planned network upgrade: IDC research suggests that a considerable number of enterprises migrate to converged networks because they need to upgrade the PBX. Many enterprises that are nearing the end of their WAN service contract also consider IP.
- ☒ Network rationalisation: Many enterprises find themselves with multiple network types, due to merger/acquisition or organic growth. Network rationalisation to a single, IP-based architecture, reduces costs of administration and support.
- ☒ Improved workforce productivity: Many of the enterprises researched by IDC envisaged improvements in their workforce productivity, through the introduction of enhanced services such as audioconferencing and unified messaging.

IDC Research Methodology

IDC conducted a total of 350 interviews with IT managers/directors, across large medium and small enterprises.

Interviews were conducted in the major sectors: finance; manufacturing; retail and wholesale; government; business services; and TTMU (transport, telecoms, media and utilities). The enterprises interviewed include 300 medium to large companies as well as a further 50 smaller enterprises, defined as having less than 50 telephone extensions.

The aims of the research study were to:

- ☒ Establish whether enterprises have addressed the issue of VoIP, what stage they have reached in dealing with the issue, their level of awareness and the nature of their plans for implementation.
- ☒ Identify what job titles and functions will have an influence on the decision to move to VoIP and who the final decision-maker will be.
- ☒ Understand the perceived benefits of VoIP as well as the perceived barriers for UK enterprises.
- ☒ Establish the relative popularity of full or hybrid IP implementations as well as the potential for hosted VoIP offerings.

- ☒ Identify the types of enterprises that will be early adopters, mainstream adopters and laggards, by industry sector, enterprise size, or other identifying characteristics.
- ☒ Identify which vendors enterprises will choose as preferred suppliers for VoIP implementations by name and by type of enterprise.

A major consideration in the research was the differing views of those enterprises that had adopted VoIP, those that were considering deployment, and those that had considered VoIP but rejected it.

This management guide also draws upon IDC's extensive research programmes in IP networks. A list of research sources is given in the Related Research section of this paper.

What is VoIP?

Overview of VoIP Technologies and Features

In its simplest form, VoIP is intended to allow a phone call to be converted from an analog format into a packetised digital format that can be routed over a data network.

In practice, however, when enterprises begin looking at VoIP, they are generally looking for a way to tie together a conventional circuit-switched telephone network and a packet-switched data network that is capable of carrying both data and voice. Using a single network for both voice and data eliminates the need for an independent network dedicated to voice while extending the utility of the existing data network. It simplifies network administration by homogenising equipment and centralising control, thereby consolidating support staff.

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VoIP also simplifies the rollout of new services, while making new integrated applications possible. Businesses may need to aggregate calls from a variety of places or communicate with remote offices and telecommuters. For such requirements, the ability to extend features/functionality, bypass expensive long-distance circuits, and make use of an already paid-for data connection can generate significant return on investment (see Table 1).

In addition to these sorts of hard savings, there are a variety of soft savings associated with VoIP that should be taken into consideration. The value of being able to find remote or floating workers, regardless of their location, just by using their phone number is difficult to quantify, but self evident. Presence awareness, the ability to detect whether other users are online and whether they are available, offers a similar soft saving in that it can ensure that employees use the most effective and efficient means of communication to complete a task, while benefiting from improved information flow.

TABLE 1

Benefits of VoIP Features

Feature	Benefit
Voice mail	Basic answer machine functionality.
Audioconferencing	Provides audioconference capability while avoiding high per-minute service provider charges, as an enterprise can put all of its internal audioconferencing onto its IP WAN.
Unified messaging (voice mail, email and fax)	Provides access to voice mail via a text interface, and vice versa, either pulling voice mail into a client, or integrating into email applications. It allows users to be more efficient, listening to email while roaming or otherwise away from a computer. Users can scan, prioritise, forward and otherwise deal with voice mails via a PC interface that may be handier and quicker for these purposes.
Directory services	Allows numbers to be located and accessed quickly by staff. Integrates well with click-to-dial.
Contact centre-based directory	Provides VoIP directory features to the contact centre, allowing rapid dialing, predictive dialing and other call centre functions.
Presence	Based on the model for Instant Messenger, allows users to see not just whether a colleague is logged on, but their reachability status via various media (telephone, email, etc). Can be integrated with "find me/follow me" call routing to determine where individual calls should be delivered.
Videoconferencing	Similar to audioconferencing, but enables deeper levels of collaboration through features such as document sharing, whiteboarding, and Web co-browsing.
Click-to-dial	Automatically dials any telephone number that is saved in call logs or address book. Saves time in looking up numbers, and ensures accuracy in dialing.
Dial plans	Dial plans map telephone numbers to destination IP addresses. Allows use of shortened telephone numbers between VoIP users, enabling faster and more efficient routing of calls.
Soft client	A PC-based application, which enables IP calls via that PC. Allows value-add services such as videoconferencing. Also provides mobile telephony capability via laptops and (typically) WiFi connectivity.
One-way video	Allows transmission of video Web casts and other streamed content, in conjunction with voice calls.

Source: IDC, 2005

The Minimum Standard for VoIP

The public switched telephone network (PSTN) is a robust, mature platform characterised by its legendary "five nines" reliability (99.999% availability). It is the standard against which all things are measured in telephony.

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PSTN sets the fundamentals required of VoIP if it is to become adopted as an acceptable technology. The core elements that VoIP must offer at a minimum are:

- ☒ Quality of service (QoS): VoIP's voice quality on early systems was plagued by echo and jitter. However, the voice quality issues have largely been solved for VoIP, with improved network designs, the implementation of QoS guarantees, and the use of performance management tools. Voice quality over a well-implemented VoIP network is now equal to, and sometimes exceeds, that of the PSTN.

- ☒ Reliability: Because VoIP systems rely on computer technologies that are more unstable than the technologies used in the PSTN, they are inherently more prone to downtime. However, more resilient system architectures that leverage the server-side strengths of VoIP, particularly in a distributed environment, have closed the gap significantly, and it is now possible to build an impressively reliable VoIP network.
- ☒ Features: Speed dial, call forwarding, call holding, voicemail, and directory services are just a few of the many services offered with even the most ageing legacy systems. While VoIP is far more capable of enabling new services than legacy systems, it must incorporate as *standard* the basic features provided by traditional voice.
- ☒ Privacy and security: With VoIP, voice is just another application sitting on top of the networking stack, and once calls hit the Internet or someone gets on the local network, it is just a data stream that anyone can listen in on or save to disk. The frequency with which intruders are able to penetrate the corporate firewall makes even in-house VoIP deployments seem risky compared to traditional systems. VPNs address these issues, but the threat remains.

VoIP Services

Traditional enterprise telephony systems are implemented using one of two core systems:

- ☒ **Public branch exchange (PBX) systems** provide the foundation for most enterprise telephony systems today. PBXs provide in-house telephone switching and manage connections to the outside world.
- ☒ **Centrex systems** allow service providers to offer enterprises voice services comparable to PBXs that are hosted offsite.

Similarly, there are several types of VoIP implementations available. Unlike traditional enterprise telephony solutions, which are typically purchased and installed as complete systems, the rollout of VoIP systems can vary widely from enterprise to enterprise. Enterprises looking at VoIP should be sure to consider the full range of options available, particularly since VoIP allows so many pieces to be put together in so many ways.

The two main types of VoIP service are those that are based on the customer's premises (customer premises equipment, or CPE) and hosted solutions, which are located at a service provider's premises. Both alternatives can utilise IP VPN networks in a configuration known as voice IP VPN.

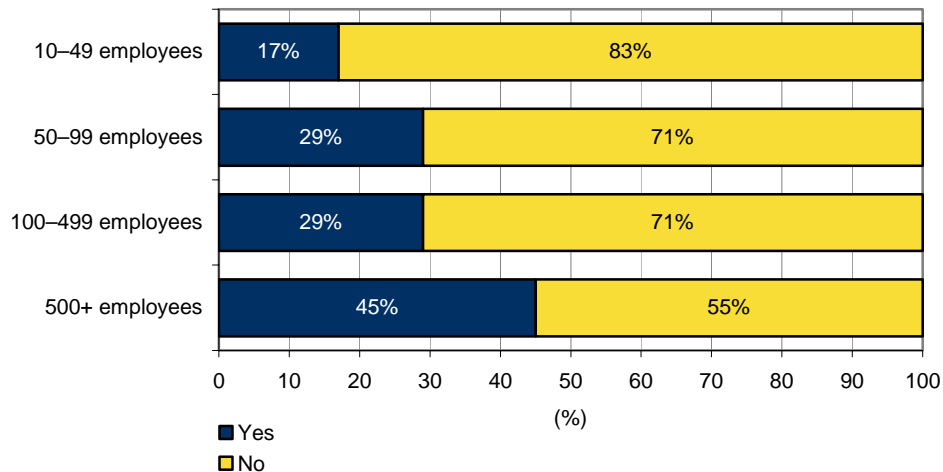
In IDC's survey most respondents are familiar with CPE as a concept (see Figure 2). There is less awareness among respondents of hosted solutions. This difference in awareness is reflected in IDC's market adoption predictions, which show that CPE equipment dominates the market.

All of the VoIP service configurations reduce line rental and call charges compared with calls carried exclusively over PSTN.

FIGURE 2

Position on Installed IP PBX Versus Hosted Continuum

Q. Are you familiar with the term "hosted VoIP"?



Source: IDC, 2005

CPE-Based Services

IP PBX systems represent the VoIP world's replacement for the traditional CPE — the PBX. In addition to offering the features found in a traditional PBX, the IP PBX is typically far more scalable. While enterprise systems have relied on PBXs in the main branch and key systems in remote offices, an IP PBX can create a single PBX system for the entire enterprise using distributed server clusters, thereby developing a more efficient and resilient system.

IP PBX services may involve replacement of the existing PBX with new equipment, or an IP gateway may be installed. This gateway sits between the PBX and the new IP PBX, and allows a gradual migration of the network to support VoIP. A gateway may extend the life of the PBX, but may be more expensive in the long run as the ageing PBX needs maintenance.

Hosted VoIP (IP Centrex)

Hosted VoIP services, sometimes referred to as IP Centrex, are like traditional Centrex systems in that they typically require a smaller capital outlay at the start, but it is essentially a case of renting versus buying.

Hosted VoIP offers the same range of features as CPE solutions, but the capability is based on, and managed via, the network. Its main advantage is that the initial cost outlay is lower than CPE. Ongoing costs are predictable, and there is minimal in-house management and administration overhead.

Hosted VoIP services are most suited to small and medium businesses that have a single site, or those that want to add an extra site at low cost.

Voice IP VPN

Voice IP VPN services utilise an enterprise's secure VPN network, and run both data and voice over it. This is an attractive configuration, since they can reduce the cost of calls between VPN-connected sites, assuming that spare capacity exists on the VPN to carry voice.

IP VPNs work with a range of network types, from DSL to leased lines and Ethernet. The VPN can also accommodate both traditional PBX systems and hosted VoIP, allows equipment at existing sites to co-exist with expansion to new sites using hosted services.

IP VPNs are also useful if remote or mobile workers need to connect securely to the enterprise's network.

Both IP PBX and Voice IP VPN must accommodate existing trunks (direct connections between sites, typically over PSTN) either by connecting trunks directly into the new IP infrastructure, or by the use of gateways.

The VoIP Proposition

VoIP can offer the enterprise a far greater range of services than a legacy system and do it all more flexibly. Data networks have a place in every enterprise, and it makes sense to extend the capabilities of the network to fully leverage that investment.

The core VoIP proposition rests on three principles:

- VoIP is cheaper than PSTN
- VoIP is easier to maintain and manage than traditional PBX systems
- VoIP is more flexible and extensible than PSTN and other non-IP network types

VoIP is cheaper, easier to manage and more flexible than PSTN and traditional PBX systems.

VoIP is Cheaper

VoIP reduces inter-office and long-distance charges dramatically by transmitting voice calls through data lines instead of traditional networks. Some use of the PSTN is still likely, since most enterprises need to call other parties on the PSTN. But these are typically local calls. Long distance and international call charges are avoided as calls are carried as far as possible on the enterprise network, breaking out only for the last leg of the call.

VoIP can also result in savings from using spare capacity on the existing data network. Enterprises with a WAN rarely use all of their available bandwidth for data transmissions, so the extra capacity can be used to carry voice. Many enterprise are using VoIP over their existing data networks to add redundancy and/or overflow capacity to their existing PSTN voice networks at low cost.

VoIP is Easier

Administration of a VoIP service is easier than a traditional PBX system. In general, adds, moves, and changes to users can be done more efficiently in a VoIP system, which also helps lower operating costs.

The recent availability of inexpensive Web-based interfaces for legacy PBX systems has made them more efficient, but VoIP's advanced mobility functions, such as find me/follow me, go far beyond what is possible with traditional systems.

VoIP is More Flexible

VoIP enables the addition of capacity to existing voice capability in a flexible and cost-effective manner. The use of hosted IP voice, for example, allows any employee with a data connection (cable, DSL, etc.) to connect to the corporate IP voice network and have PBX-like features available. The growth of a business, therefore, can be supported on an as-needs basis.

This flexibility allows enterprises to provision new offices quickly with full telephony features. It also enables home workers and other remote workers to connect seamlessly to the voice network.

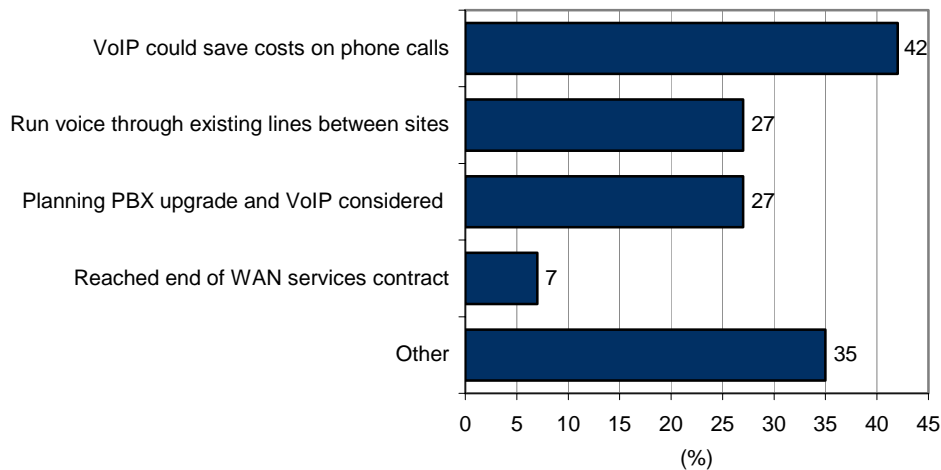
The Business Case for VoIP

There are several dimensions to building a business case for VoIP. The most obvious factor is the potential cost savings from implementing VoIP, and indeed cost reduction is the key perceived benefit of VoIP based on our survey results (Figure 3).

Cost reduction is the key perceived benefit of VoIP.

FIGURE 3

Reasons for Initial Interest in VoIP



Source: IDC, 2005

But there are other non-financial considerations to be made in evaluating existing voice provision against VoIP. Based on IDC's survey and its ongoing research programmes, the following areas should be examined by any enterprise considering VoIP:

Cost Considerations

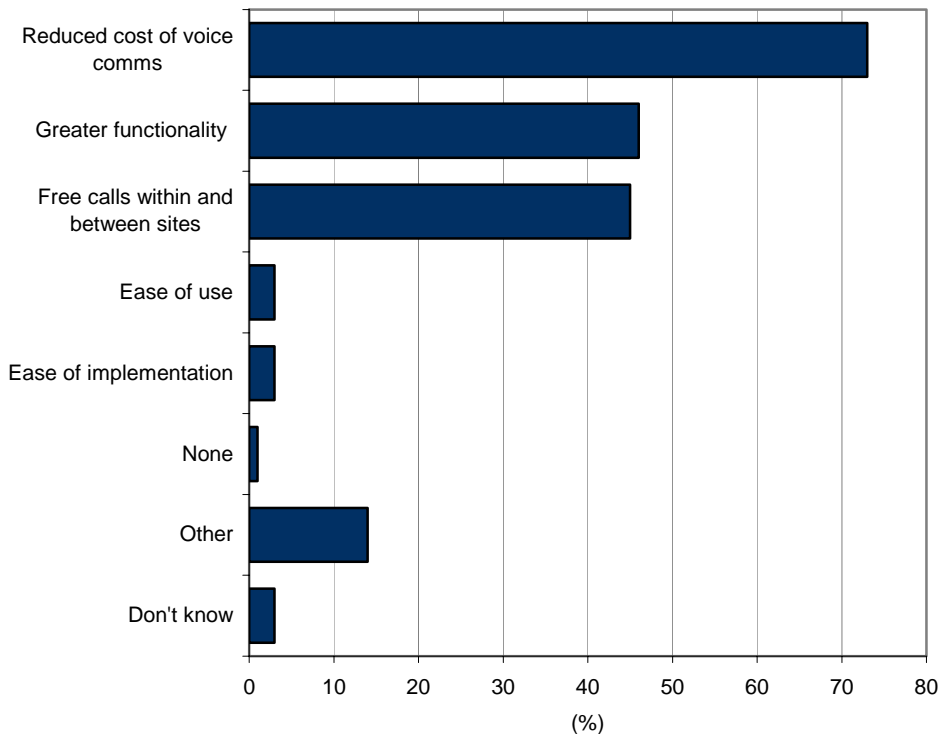
Much of the headlines regarding VoIP concern reduced costs of voice calls. But where are the cost considerations to be made?

- ☒ Lower cost of voice calls. VoIP calls across an enterprise's IP network are, effectively, free. There are therefore significant savings to be had for enterprises with remote branch offices by avoiding long distance and leased line charges.
- ☒ Intelligent routing. Intelligent routing can ensure that calls are made in the most effective manner. Calls can be dynamically switched between available interconnects, packet switched or circuit switched, to ensure that the relationship between cost and quality is optimised.
- ☒ Improved mobility. When combined with wireless LAN (WLAN, WiFi, etc.), VoIP opens new possibilities across an enterprise campus. VoIP and WLAN can provide "anywhere and anytime" contact.
- ☒ Predictability of costs. A hosted IP voice service allows a business to plan and predict its voice call charges, giving it control over a predictable cost structure that fits with changing business needs.

Of the cost advantages outlined above, the lower cost of voice calls is the greatest perceived benefit of VoIP (Figure 4).

FIGURE 4

Most Important Benefits Achieved With VoIP



Source: IDC, 2005

It is important to note that the costs of implementing a VoIP solution must also be considered. The two primary sources of cost, over and above the technology acquisition costs, are the retraining of system management personnel and the retraining of users. Although the long-term benefits of VoIP are compelling, enterprises should consider in their business case the short-term training costs. Otherwise, long-term savings may not be realised as productivity-enhancing features are unused.

Geography

The geographic distribution of an enterprise's offices plays a key role in deciding how to migrate to VoIP.

Enterprises that are based in one location can benefit from the low call charges and extra features offered by an IP PBX solution. If an enterprise has multiple sites and makes a high number of calls between those sites, then an IP VPN-based VoIP service may be attractive. Voice IP VPN enables free calls to be made over the VPN.

Enterprises that have one central office but smaller satellite offices, or perhaps remote or mobile workers, may want to extend PBX functionality to those employees not in the main office location. A voice IP VPN solution may be appropriate, but smaller companies may prefer a hosted VoIP service. If an enterprise needs to open new offices, hosted and voice IP VPN services can be extended to the new sites without incurring high infrastructure costs.

Larger enterprises will operate multiple offices each with its own PBX. As requirements change and the enterprise expands, it may want to decide on the VoIP service on a site-by-site basis. An IP VPN-based service supports the option of keeping the existing PBX or moving to a hosted telephony solution.

Number of Calls

Enterprises need to consider their current and predicted use of their existing voice services. If call volumes are high and growing, an IP PBX or IP VPN solution will provide additional call capacity to supplement the current capacity. You may be able to use under-utilised Internet bandwidth for additional voice traffic. This solution saves the expense of adding extra lines into the enterprise's PBX system.

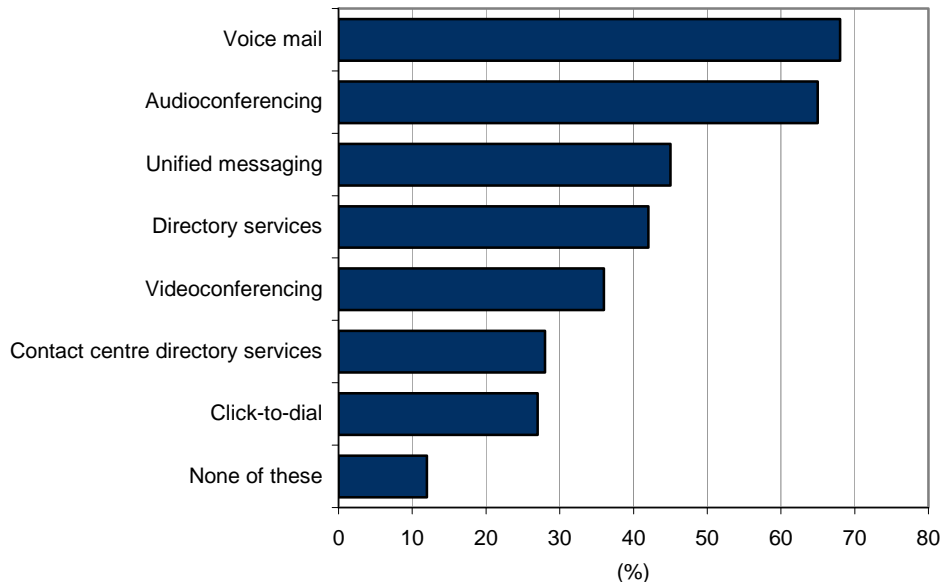
Small to medium-sized businesses with average call volumes are most likely to find a hosted services solution appropriate for their VoIP needs, especially if they have just one location (see Geography, above).

Features

Many enterprises will want to realise the benefits of VoIP through the additional features it offers. The enterprises surveyed in IDC's recent end-user research rated how useful VoIP features are to their enterprise. Voicemail is seen as very important by the vast majority of enterprises. Audioconferencing is highly valued by 40% of respondents. Other services considered as beneficial include unified messaging, directory services, contact centre-based directory, videoconferencing, click-to-dial and one-way video (Figure 5).

FIGURE 5

Enhanced Services Used Due to VoIP



Source: IDC, 2005

Voice mail is the most common feature by VoIP users but many of the less obvious ones are also being used by the enterprises in IDC's research. Unified messaging is being used by 45% of VoIP users surveyed; click-to-dial by 27%.

Ageing Infrastructure

Perhaps the biggest stumbling block for VoIP has been the belief that there is no reason to fix something that isn't broken. Companies with investments in legacy equipment that continues to provide a sufficient level of functionality have essentially proven that they are unwilling to switch without reason.

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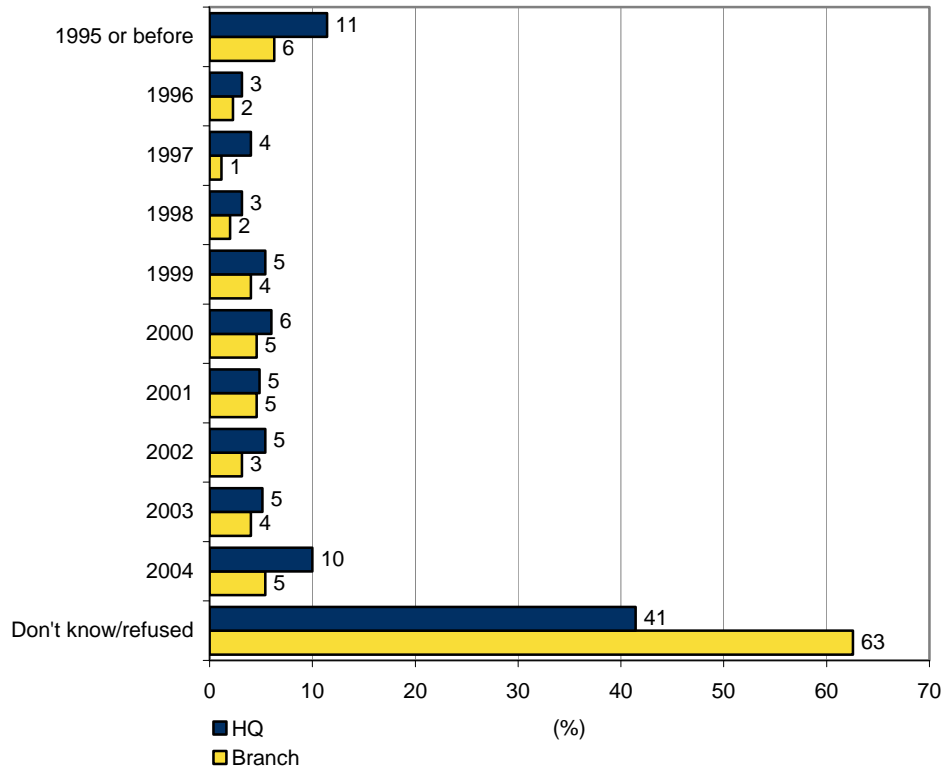
One of the key drivers to adopt converged networks, therefore, is the approaching end-of-life of existing PBX-based voice systems and/or VPN service contract. Many enterprises take the opportunity to re-evaluate their needs and consider migration to IP-based voice services. As the management of telephony migrates from office management to IT management, as is the trend, more enterprises will replace their ageing PBXs with both converged and integrated voice and data networks.

Interestingly, many enterprises do not know precisely when their PBX was installed. We asked enterprises to say when the PBX equipment had been installed (Figure 6). The spread is fairly even year on year, with quite a few more than 10 years old. This suggests that there was no "blip" in any year so there should be a fairly even level of demand for upgrades in the coming years. However, in many cases, respondents did not know the installation date of their PBX, which suggests that in many cases they were installed before the IT department came to be involved with voice communications.

FIGURE 6

Date of Installation of PBX

Q. When was your HQ PBX installed?



Source: IDC, 2005

Management

Managing a PBX is a non-trivial task. As well as the tangible costs of the hardware itself and staff costs in managing user information, PBX overheads include keeping the system operational at five-nines availability and ensuring that, as demand increases, capacity is increased in line.

An IP network that carries both voice and data allows an increase in data capacity without adding new voice lines. If further bandwidth is required new lines can be added but these increase both voice and data capacity.

A single IP-based converged network is also easier to administer and support than parallel voice and data networks. Many telephony features exist as software in a softswitch, rather than hardwired into the PBX. It is easier to reconfigure a softswitch than reprogramme and reconfigure a traditional PBX.

Many enterprises will consider outsourcing entirely the management of its telephony provision to a hosted service provider. This reduces the hidden costs of system management, and ensures that expertise is on tap only when it is needed.

A CALL TO ACTION

VoIP is no longer an emerging technology. It is maturing and suitable for consideration by all types of enterprise.

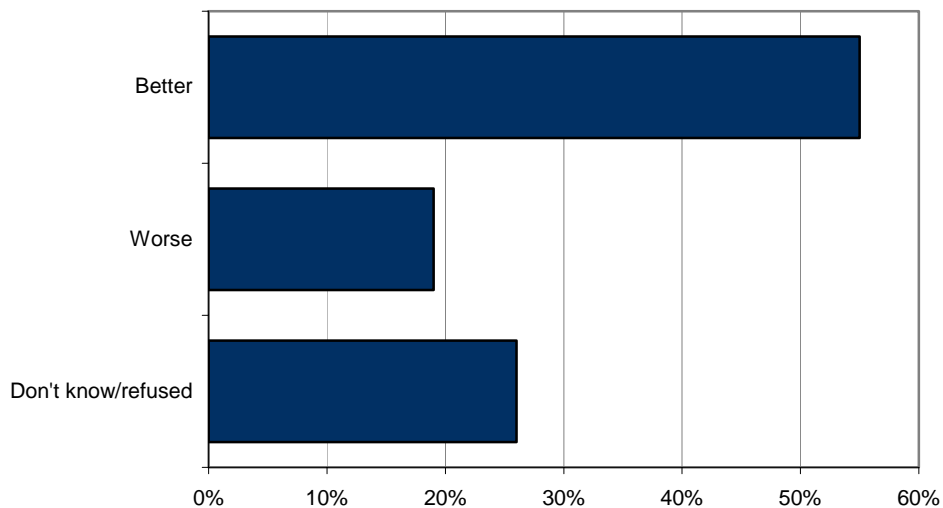
Importantly, the barriers to adoption are being eroded, to the point where objections are being outweighed by the positive business case:

- ☒ The quality of service issues are disappearing. Initial concerns over VoIP have been addressed, and early impressions of VoIP's poor quality should be reevaluated.
- ☒ Service reliability remains paramount to enterprises. VoIP can offer industrial-strength reliability, but enterprises must ensure that they are covered by a service level agreement.
- ☒ Inertia that slows adoption of VoIP is beginning to loosen, as ageing PBX infrastructure comes up for renewal, and VPN contracts run out. As enterprises consider migration to IP networks, voice is an obvious application, even if other voice-related features are slower to be adopted.
- ☒ Scepticism about the business case for VoIP is weakening. There are plenty of examples where real cost savings and feature benefits are being realised. IDC research shows that enterprises that adopt VoIP are three times as likely to exceed their cost saving expectations as undershoot expectations (Figure 7).

Enterprises that adopt VoIP are three times as likely to exceed their cost saving expectations.

FIGURE 7

Experience of VoIP Compared to Expectations



Source: IDC, 2005

Related Research

- ☒ *The Potential for VoIP in UK Enterprises — From Hype to Reality* (Doc #SR02M, February 2005)
- ☒ *Western European IP Voice Services 2005–2008 Forecast* (Doc #32900, February 2005)
- ☒ *Western European IP Telephony Equipment 2004–2008 Forecast Update: 2004–2005 Outlook* (Doc #32852, February 2005)
- ☒ *Western European IP PBX 2004–2008 Forecast Update: 2H04* (Doc #32681, December 2004)
- ☒ *Western Europe IP User Survey, 2004* (Doc #HP07L, December 2004)
- ☒ *European IP Telephone Tracker Summary, 3Q04* (Doc #32523, December 2004)
- ☒ *European Broadband Access Market, Preliminary Assessment and Predictions, 2004–2005* (Doc #BT60L, December 2004)
- ☒ *VoIP Trends Within Western European WANs, 2004* (Doc #32338, November 2004)
- ☒ *Western European IP PBX 2004–2008 Forecast and Analysis* (Doc #31639, July 2004)

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