

Managing 21st Century Networks A world of convergence

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RESEARCH NOTE:

The information presented in this report is based on a survey of 473 IT Directors and Managers, Communications Managers and Network Managers in Europe and the Middle East. It was completed in October 2006.

Those surveyed included small and large enterprises within a broad cross section of industries.

The Internet Protocol (IP) - used for transmitting data across networks everywhere - has moved beyond its origins. Once one of many, it has become a near standard for all types of computer communication. It is used pervasively, transmitting data to and from a multitude of devices ranging from those in our pockets to spacecraft circling distant planets. Arguably IP is the most successful open standard ever, but as network communications converge under a single standard used for an increasing number of applications, we need to understand how effectively these critical assets are being managed.

- **IP is the de facto commercial standard for computer communication in Europe and is fast becoming so for other types of communication**
100% of the IT and Communications Managers surveyed stated their main computer network was IP based, and the majority are using that network for internal and external telephony as well as video communication. This usage is widespread and not confined to niche areas.
- **Network availability, security and performance are the most important things to monitor for effective network management**
Monitoring availability, security and performance were rated ahead of accessibility issues. This is not surprising as good access to a poorly performing network is not much use.
- **Managing network level functions like multi-protocol label switching (MPLS), quality of service (QoS) and IP Multicast were considered more important than managing actual applications**
MPLS allows delivery of certain IP packets to be prioritised, thereby ensuring an acceptable QoS for users requiring high performance from specific applications, like voice. IP multicast conserves bandwidth and makes the network more efficient. If these functionalities are managed well, applications should take care of themselves.
- **Managers were generally satisfied with their ability to manage these key network technologies, however, other network management activities fell short of expectation**
In particular, managers felt that their current tools do not provide quick access to information about the cause or impact of problems. They felt they did not have the resources to proactively manage the network relative to the level of importance they placed on these activities. A similar gap exists in their ability to integrate network management with other management tools.
- **Many businesses are using managed services to help overcome these deficiencies**
Managed services are widely used for network security, and MPLS VPNs (Virtual Private Networks) in particular. Usage varies by country, uptake being greatest in France where the use of IP networking is at its most pervasive.
- **Smaller businesses (1000-5000 employees) are ahead of larger businesses (5000+ employees) in the adoption of IP networking**
Smaller businesses are less impacted by the politics of convergence. Their earlier adoption of IP networking has instilled confidence in their network management capabilities.
- **IT Directors are more bullish about the use of IP than the managers reporting to them**
Without the confidence of senior management it is unlikely that such key investments would have gone forward for board level approval.

CONCLUSION: Businesses are reliant on IP for the majority of their communications. Good management of IP based networks is one of the most critical tasks assigned to IT and Communications Departments

The main drivers behind the adoption of IP as the single protocol of choice by business are ease of management, robustness and fact that it is the basis for the global communications network – the Internet. However, network failure can now mean a total communications failure; and business is vulnerable to wrong doers honing their skills on a single technology. Selecting the right tools to manage IP networks is a key decision for IT managers if they are to ensure the network is available and secure, whilst delivering high performance and efficiency.



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Scope of this report and target audience

This report looks at where European companies stand today with regard to network convergence, the opportunities it opens up and the problems it introduces. The report examines how easy businesses are finding it to manage and monitor their networks and how this varies between countries and businesses of different sizes. It also looks at the contrasting views of Network Managers, IT Managers and IT Directors.

The report is aimed at end user organisations seeking peer review or insight into the current state of network convergence, and IT vendors and resellers wanting to understand the challenges faced by their customers.

Quocirca would like to thank the 473 senior European Technology Managers who took part in this survey. Without their help, monitoring the progress of business use of IT would not be possible.

Introduction – Converging Networks

Almost without exception, today's corporate IT networks are based on the Internet Protocol (IP). There is the odd anomaly in specialist areas - some cash-point networks for example, but even these are being switched to IP. This was not the case twenty years ago. What has happened to make IP arguably the most successful open technology standard ever and what are the consequences of its total adoption for the management of networks?

In the 70s, corporate IT networks were about accessing a single central mainframe from a dumb terminal, over low-speed cabling using technologies such as IBM's Systems Network Architecture (SNA). In the late 70s, with the development of mid-range computers, faster connectivity was required and cabling systems like Ethernet and ARCNET were developed.

Vendors developed their own networking protocols: DECnet, AppleTalk, NetBEUI, IBM's LAN Server – a plethora of incompatible interfaces and protocols that tied businesses to a single vendor or – for those who attempted – it making the integration of disparate equipment a nightmare.

Vendors emerged with their own proprietary solutions to solve this problem, the most successful being Novell with its NetWare operating system. But in the late 1980s a new operating system based on open standards – UNIX – was starting to be pushed by IT vendors led by Sun Microsystems. UNIX used an open standard – IP – for networking. IP had been developed by the US DoD (Department of Defense) to drive its Advanced Research Projects Agency Network (ARPANET); this was the predecessor of what is today called the Internet.

In 1995, Microsoft released a new version of its desktop operating system, Windows-95, and included for the first time, an IP based network stack along side NetWare, and NetBEUI. It was fortuitous that the company did this, because over the next few years, Microsoft's ascendancy on the desktop would be challenged by the rising use of the public Internet which was spawning a host of upstart IT vendors. If Microsoft lost control of the gateway to the Internet it would also lose control of its vision for an "Information super-highway" accessed from Windows.

The way to link to the Internet was IP.

The elimination of virtually every other network protocol by IP over the last 20 years is remarkable, but this was only act

one – IP was set to revolutionise what was still largely a separate industry. Telecommunications.

IT departments found managing a single network for IT communications made a lot of sense, especially when it was based on the same standard as the broader public wide area network – The Internet. But the IT industry had set its sights beyond the IT department; it was the very nature of the IP protocol that allowed it to do this.

IP networks are packet switch networks. They pass round packets of information with no need to understand their content. These packets are then interpreted on their arrival at a target device in much the same way as cargo is shipped around the world in containers. Containers can hold anything from cars to chocolate, or in some cases, contraband. Either way, the shipping company may know little about the content; it is dealt with on arrival at its destination.

In the case of IP networks, it was realised that although they had been developed for computer communications, the network could be used to ship information to any device providing the device could interpret the contents. It presented the IT industry with another massive opportunity: the telephony network used to transmit voice communications and some other data, for example facsimiles (fax).

The telecommunications industry is ancient compared to its IT counterpart, having originated in the 19th century. The public network developed over more than a 100 years, mostly on a national basis by government owned institutions based on a mishmash of networking technology. Unlike the packet based internet, voice telecoms is based on circuit switched networks – predictable with guaranteed point to point service levels – but much less flexible. Changing this was going to be a huge task, and it is to the credit of the IP visionaries that descendants of those publicly owned bodies are starting to do so. One of the most advanced is BT in the UK which has described its new IP based 21st Century Network (21CN) as a move from a "spaghetti based" to a "lasagne based" architecture.

Businesses were targeted with some fairly simple messaging: *you have two networks, a modern one run by IT and an older one run by the telecoms department. With enough investment the IT network could do both efficiently, less expensively and flexibly, thereby opening up new opportunities.* As this report will show, businesses have been largely persuaded by this argument and the second round of network convergence is well underway.

As businesses have invested in IP networks they have sought to use them for more and more applications beyond computer communication and telephony – video conferencing, surveillance and so on – as well as revolutionising the work place by opening up inter-company communications and remote working.

But relying on a single network leaves companies exposed. A network outage can mean total outage. Although a single network is easier to manage, it is also easier to attack as hackers hone their skills on a single technology.

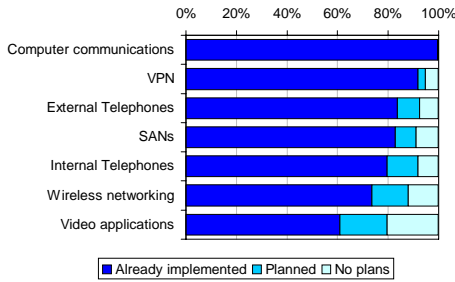
The ascendancy of IP is one of the most remarkable stories in the history of corporate and public computing and communications. It is not possible to understand 21st century information technology and communications (ITC), without an understanding of the network technology that has enabled it.

An IP world

One of the first things asked of the participants of this survey was “Is your primary IT network based on the IP protocol?” 100% said yes and unsurprisingly they were all using their network for computer communications. But the majority were using their network for a wide range of other applications too: enabling remote access via VPNs (Virtual Private Networks), internal and external telephony and video based applications (figure 1).

Figure - 1

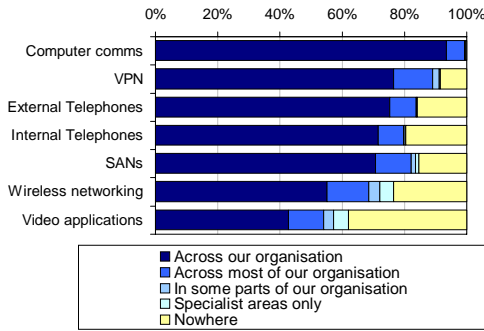
Which of the following applications are running over your IT network?



Those who said they were planning to use their network for these more advanced applications were mostly planning to do so sooner rather than later. It is not just in the odd specialist department where advanced IP applications are being deployed; more often than not it is across the whole organisation (figure 2).

Figure - 2

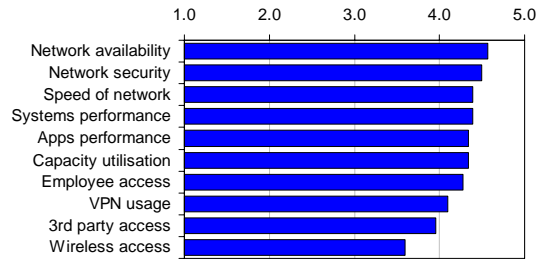
To what extent do you use your IT network for the following?



A number of factors have driven migration to IP based applications. In our survey, cost reduction, simplified management and enhanced communications capabilities were given similar weighting, i.e. the move to IP is driven by recognised benefits on a number of fronts. But the motivation to move to IP is one thing; the challenge it introduces is another. When it comes to managing their networks, monitoring availability, security and performance are rated more highly than monitoring access (figure 3). After all, good access to a poorly performing network is not much use.

Figure - 3

How important is it for you to be able to monitor the following?



Bars show average response on a scale of 1 to 5, Where 1 = “not important at all” and 5 = “very important”

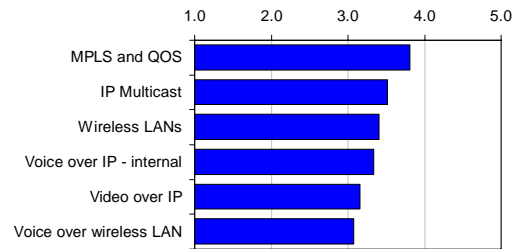
Generally speaking, organisations rate their capability to monitor any particular aspect of their network about the same as the importance they assign to it.

For the managers themselves, it is not high profile applications like VoIP or video that are rated the most important (figure 4), but network management capabilities like Multi-Protocol Label Switching (MPLS).

MPLS is an underlying technology that ensures quality of service (QoS). It allows traffic for certain applications like voice or video – where users will be noticeably impacted by delays or jitters – to be prioritised. It also allows service providers to offer different service levels based on different service plans. MPLS also allows traffic to be re-routed when parts of the network fail or get congested.

Figure - 4

Importance of network technologies and capability to manage

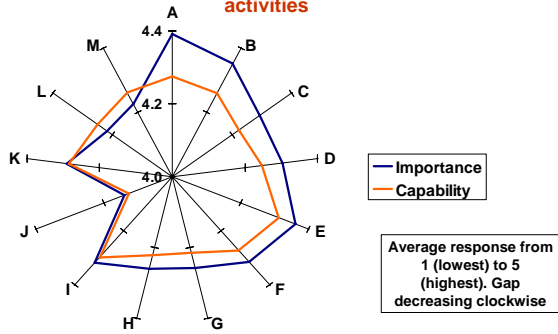


Bars show average response on a scale of 1 to 5, Where 1 = “not important at all” and 5 = “very important”

When it comes to carrying out network management activities, capability gaps start to open up. The largest separation between importance and capability to manage networks are, “getting quick access to information about problems, their causes and impact” and “having adequate resources to proactively manage the network” (figure 5).

Figure - 5

Importance versus capability of network management activities



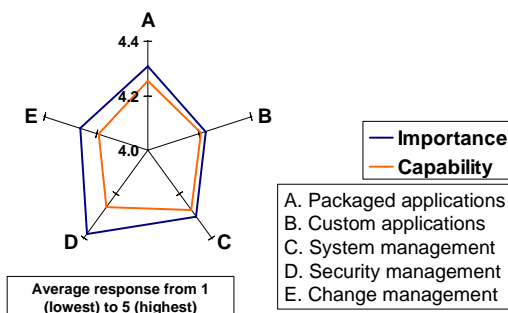
- A. Quick access to information about a problem - cause, impact and resolution
- B. Adequate resources to proactively manage and maintain network
- C. Provide adequate training to staff
- D. Easily maintain/update existing tools/solutions
- E. Maintain a well-defined and documented process for managing network
- F. Retain and recruit specialists with appropriate skills
- G. Easily implement new tools/solutions
- H. Use advanced tools to proactively manage infrastructure
- I. Justification of costs and benefits to senior management
- J. Use an open, standards-based architecture
- K. Simplify rather than increase the complexity of network
- L. Metrics to monitor and control operations
- M. Define and manage service level agreements

It is a huge task managing vast networks with thousands of end points, from large servers to telephones and cameras. On top of that, pressure from the business to provide more and more functionality across this single network means IT teams will increasingly feel under-resourced and under-skilled. Good tooling can help to prioritise and identify problems before they become serious and impact services. Good tools also allow mundane day-to-day tasks to be automated.

IP networks cannot be managed alone, given their ubiquity and the wide range of activities for which they are being used. They need to be tied in with the management of other IT activities. Again, there is a gap between organisational capability and the relative importance placed on these activities, in particular security and change management (figure 6).

Figure - 6

Importance versus capability of integrating network management with other activities



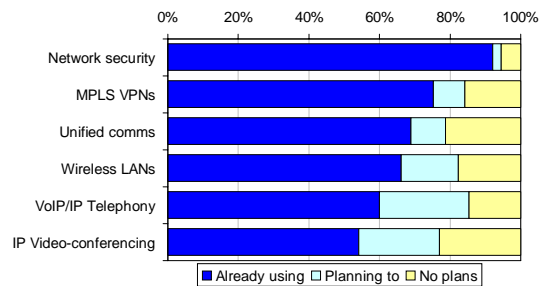
- A. Packaged applications
- B. Custom applications
- C. System management
- D. Security management
- E. Change management

With the size of corporate IP networks this is not surprising. Keeping track of changes to devices on networks and ensuring their security needs advanced capability.

Given the difficulties of managing such huge networks with their thousands of devices, it is not surprising that organisations are turning to managed service providers for help (figure 7).

Figure - 7

Does your organisation use or plan to use a managed service for any of the following?



The extent to which they do this varies widely, especially in the different countries covered by this survey.

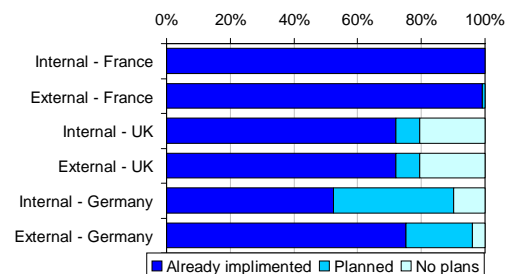
European dis-union?

The IP revolution has not moved forward on a single front and it has not only been driven by the IT industry. Huge IT companies, like Cisco, have grown up on the back of it, but as IT networking has converged with telephony, vendors who served the traditional voice market have fought back. Often these organisations have a more regional heritage, like Siemens in Germany and Ericsson in Sweden. But all seek to serve a global market, and this is leading to commercial convergence as these companies have undergone a series of mergers and acquisitions.

The Franco/US merger that created Alcatel-Lucent during 2006 challenged Cisco's position as the world's leading network equipment vendor (measured by revenue). Alcatel had been a dominant force in the French market and drove the IP agenda hard. Thus, for certain applications such as telephony, IP is more prevalent within French companies than for those in Germany and the UK (figure 8).

Figure - 8

Use of IT network for internal and external telephony in different countries



Given that IP telephony and other IP based applications are more widespread in France, it is not surprising French technology managers also give some of the highest importance ratings to MPLS, QoS and IP Multicast (a way of sending one-to-many, rather than one-to-one messages), and

have turned in greater numbers to managed service providers (figure 9).

Figure - 9

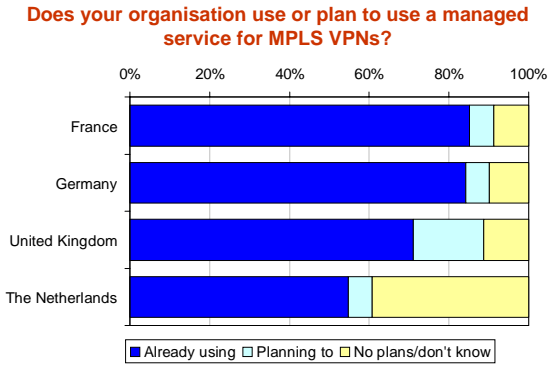


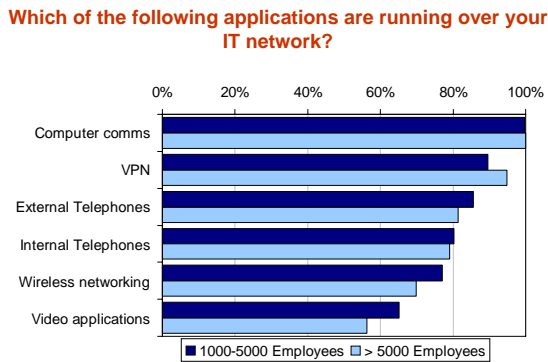
Figure 8. revealed a pattern in Germany that explains why IP telephony is marginally more widespread for external than internal calls in the overall sample. Many German companies have long term leasing agreements for local service providers on PBXs (corporate exchanges for traditional voice telephony). To get around this, networking vendors have been selling add-ons to German companies that allow them to keep their PBX for internal use but interface to the outside world using IP.

But the biggest difference between businesses and their use of IP is not the country in which they are based but the size of their business, in this case measured by number of employees.

Size matters

With the exception of VPNs, smaller businesses (1000-5000 employees) are making more use of advanced IP applications than big business (figure 10).

Figure - 10



Typically, small businesses are less encumbered by legacy investments and the politics of old guard versus new; one of the challenges of network convergence has been getting IT and Communications Managers to work together and in small businesses they are often one and the same.

This is reflected in the confidence of small business to manage their networks; in every area they reported a better capability to do this (Figure 11), and to carry out network management activities (Figure 12) than larger businesses.

Figure - 11

Capability to manage network technologies by organisation size

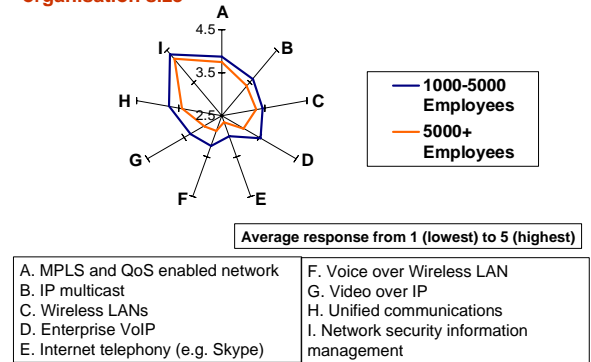
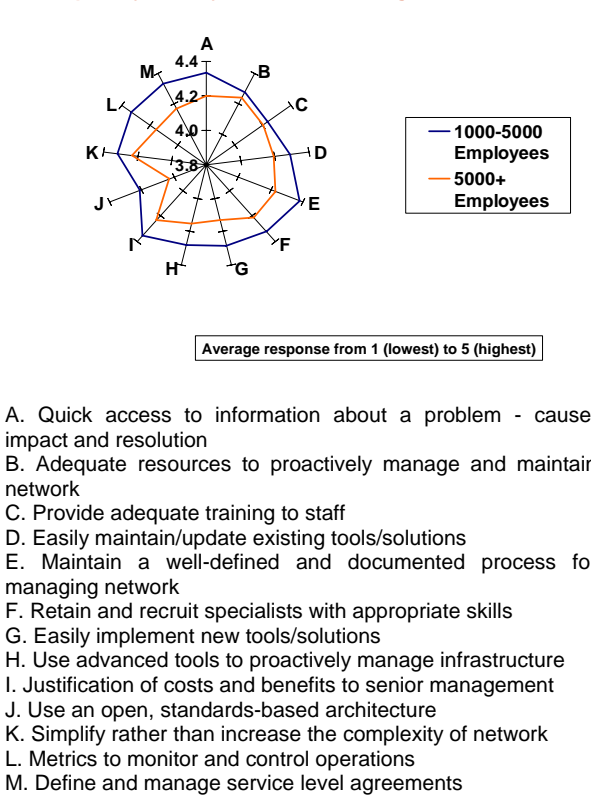


Figure - 12

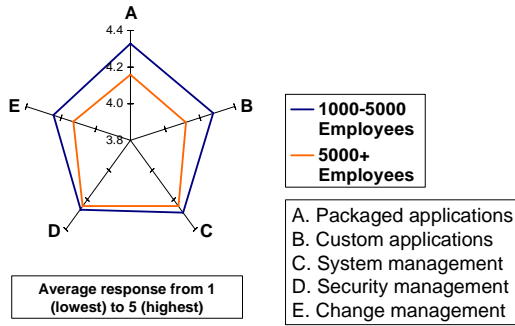
Capability to carry out network management activities



Smaller businesses felt more able to integrate their network management efforts with other activities (Figure 13). Interestingly, they reported a greater gap in the importance they assigned to these activities relative to their ability to execute them, than larger companies - suggesting the deeper an organisation gets into IP, the greater the challenges of managing a single pervasive network

Figure - 13

Capability to integrate network management with other management activities.



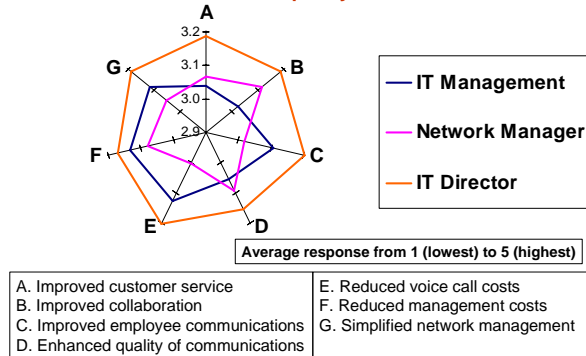
Such complexity might deter those tasked with pulling these converged networks together, but their bosses are more resolute.

Strategic vision

IT Directors constituted about one third of the respondents in this survey, the remainder being IT or Network Managers. The IT Directors universally rated the benefits of adopting IP telephony higher than the managers reporting to them (Figure 14).

Figure - 14

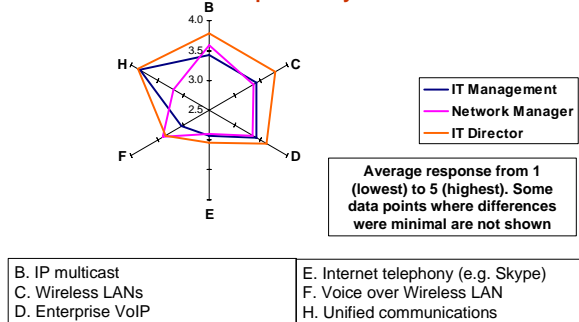
If you are using VoIP, rate the following benefits of IP telephony.



IT Directors were also bullish about their organisation’s capability to manage their networks, at least in certain areas (Figure 15). Again, they were generally more confident than those tasked with doing the job.

Figure - 15

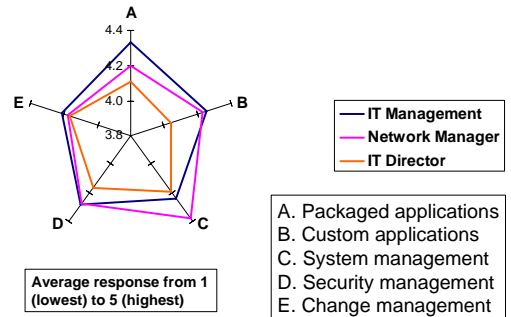
Capability to manage network technologies by responsibility



They were, however, less confident about their organisation’s ability to integrate network management with other tasks (Figure 16) - aware of the importance but less knowledgeable about the actual details.

Figure - 16

Capability to integrate network management with other management activities.



Their confidence is critical - without their buy in, moving to a single network for all corporate communications would be less likely to be put before the Board for consideration and financial sign off. And, without the buy in of business management, the corporate IP revolution would not have moved at the pace it has.

Conclusion - where next?

IP is the de-facto standard for computer communications and will soon become so for voice and most other network-based communications. Local area networks, wide area networks and the Internet all run over IP and are tightly integrated with IT networks. IP is replacing fibre channel as the preferred protocol for storage area networking (SANs).

For those linked to the Internet, IP has been bringing data into our homes for over a decade now and is becoming more pervasive as major voice providers switch to their new IP based networks. IP is now seen as a new way of delivering TV to homes and is already available from some service providers. IP is also used to deliver email and other data to mobile phones. It’s not just local communications. NASA is experimenting with IP to create an interplanetary network for communications with increasing numbers of research satellites orbiting Earth and other bodies in the solar system.

Millions – if not billions – of devices are connected using IP: single network protocol used all the way from our pockets to outer space. Whilst a single standard makes it easier to build the interfaces between devices and sub-networks, availability, performance and security become increasingly complex. The proliferation of IP needs to be supported by robust network management tools. Only this will ensure that the increasing importance of IP to humanity does not drift to far from our capability to manage it.

APPENDIX A

Interview Sample Distribution

The information presented in this report was derived from 473 interviews with senior IT influencers and decision makers during a survey completed in October 2006.

The sample distribution was split as follows (figures 17 to 20):

Figure - 17

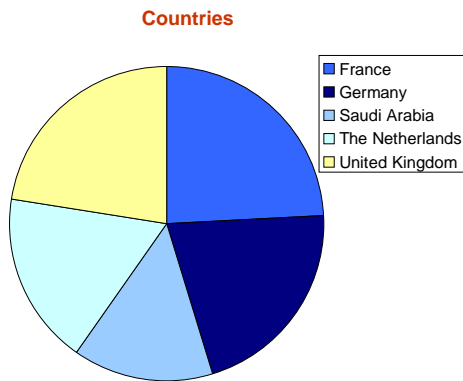


Figure - 18

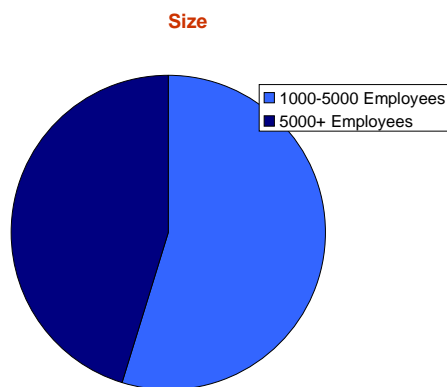


Figure - 19

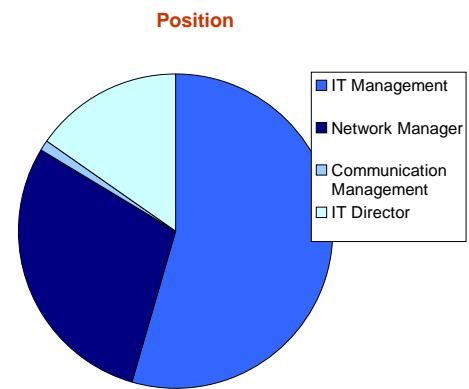
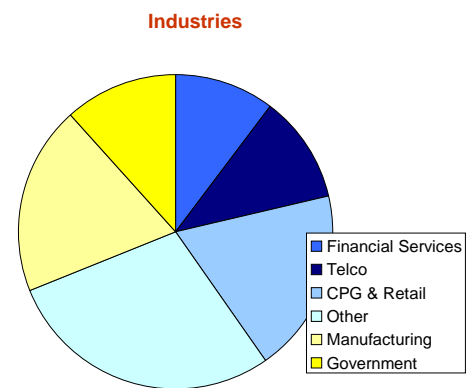


Figure - 20



About CA

CA (NYSE: CA), one of the world's largest information technology (IT) management software companies, unifies and simplifies the management of enterprise-wide IT for greater business results. Our vision, tools and expertise help customers manage risk, improve service, manage costs and align their IT investments with their business needs.

Enterprise IT Management, or EITM, is our vision for the future of IT. It's how customers can close the gap between the promise of IT and what it actually delivers. We make it possible for customers to more efficiently, easily and securely manage all of the people, the processes, the computers, the networks, and the range of technologies that make up their infrastructure — whether distributed or mainframe, and regardless of the hardware or software they are using. We build our solutions on the CA Integration Platform, our common architectural foundation that allows customers to integrate, share and automate the management of IT assets and resources.

Today, we serve 99 percent of the Fortune @1000 companies, as well as government organizations, educational institutions and thousands of other companies in diverse industries worldwide. To date:

- We own approximately 600 patents, with more than 1,900 pending worldwide.
- CA is active in or leading all major standards organization.
- We have achieved the exacting standards of the International Organization for Standardization (ISO) 9002:1994 Global Certification and 9001:2000, the ultimate ISO certification for global quality.

Founded in 1976, CA is a global company with headquarters in Islandia, NY, more than 150 offices in 45 countries and fiscal year 2005 revenues of \$3.53 billion.



About Quocirca

Quocirca is a primary research and analysis company specialising in the business impact of information technology and communications (ITC). With worldwide, native language reach, Quocirca provides in-depth insight into the views of buyers and influencers in large, mid-sized and small organisations. Its analyst team is made up of real-world practitioners with first hand experience of ITC delivery who continuously research and track the industry in the following key areas:

- Business process evolution and enablement
- Enterprise solutions and integration
- Business intelligence and reporting
- Communications, collaboration and mobility
- Infrastructure and IT systems management
- Systems security and end-point management
- Utility computing and delivery of IT as a service
- IT delivery channels and practices
- IT investment activity, behaviour and planning
- Public sector technology adoption and issues
- Integrated print management

Researching perceptions, Quocirca uncovers the real hurdles to technology adoption – the personal and political aspects of an organisation's environment and the pressures of the need for demonstrable business value in any implementation. This capacity to uncover and report on end-user perceptions in the market enables Quocirca to advise on the realities of technology adoption, not the promises.

Quocirca research is always pragmatic, business orientated and conducted in the context of the bigger picture. ITC has the ability to transform business and business process, but often fails to do so. Quocirca's mission is to help organisations improve their success rate in process enablement through better levels of understanding and the adoption of the correct technologies at the correct time.

Quocirca has a pro-active primary research programme, regularly surveying users, purchasers and resellers of ITC products and services on emerging, evolving and maturing technologies. Over time, Quocirca has built a picture of long-term investment trends, providing invaluable information for the whole of the ITC community.

Quocirca works with global and local providers of ITC products and services to help them deliver on the promise that ITC holds for business. Quocirca's clients include Oracle, Microsoft, IBM, Dell, T-Mobile, Vodafone, EMC, Symantec and Cisco, along with other large and medium sized vendors, service providers and more specialist firms.

Sponsorship of specific studies by such organisations allows much of Quocirca's research to be placed into the public domain at no cost. Quocirca's reach is great – through a network of media partners, Quocirca publishes its research to an audience possibly measured in millions.

Quocirca's independent culture and the real-world experience of Quocirca's analysts ensure that our research and analysis is always objective, accurate, actionable and challenging.

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