



# Transforming Enterprise Communications

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**An IDC White Paper**  
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## Key message

Today's challenging economic climate has forced most CEOs to take a long and hard look at their enterprise business strategy. As a result, many of them have put a halt to investing more time, money, and energy in growing top line revenue and instead are now concentrating on improving business continuity, employee productivity and reducing cost. As a consequence IT and communications managers witness a cut in budget while having to deliver infrastructure that improves application and service availability.

At the same time, global competition has forced companies to be increasingly spread out. Many companies also enjoy a growing mobile workforce, such as executives traveling around the world, salespeople operating in the field, and telecommuters working from home. In addition, a company's partners and customers are subject to the same trend. Business executives most likely do not realize that in such a distributed environment the concept of improving business continuity and application availability changes dramatically.

The above calls for a transformation of the enterprise communications infrastructure. The infrastructure of the new millennium will be able to supply high levels of network availability to distributed regional offices, mobile employees, remote workers, partners, and customers at reduced cost, resulting in heightened business competitiveness. The technology that makes such a network possible is based on IP convergence. Convergence is often mistaken to be an end in itself, but it is rather a means to break through communication barriers resulting in new applications that improve productivity and customer satisfaction. It can also help to reduce cost through combining separate voice and data networks into a single transformed network.

There is no single approach to transforming an enterprise communications infrastructure. Strategies depend on company size, vertical industry, business approach, risk-taking capability, innovative culture, and so on. It does not have to be an instant transformation either, in many cases such a network will gradually emerge, starting from greenfield installations.

Bottom line, transforming your enterprise communications is not just about technology but about maximizing employee productivity, increasing application availability, improving business continuity, and reducing cost. In short, real business benefits.

This white paper, written by IDC and commissioned by Nortel Networks, discusses the strategies available to enterprises for transforming their enterprise communications infrastructure to deliver improved business continuity and application availability at reduced costs.

## **Changing business, evolving networks**

Because of today's uncertain and challenging economic environment, many companies tend to be cautious and focused on short term profitability rather than long term growth. Despite this short term pressure, however, long term trends continue to influence the competitive business environment. Trends that also affect IT and communications infrastructure developments, as the role of IT is to support a company's business.

Over the last decades, companies have become more global in nature and employees have become more mobile. At the same time, companies have put an emphasis on their core competence and started to source a number of non-core activities through partners. Because of the build-out of this global, mobile, distributed network of sites, and hence employees, customers, and partners, the role of IT and communications has become increasingly important. In today's global economy the ability to distribute knowledge swiftly and intelligently is more critical than the capability to invest large amounts of capital.

As a result of these developments, modern enterprises must adjust their communications to fit their more distributed nature. The economic downturn, however, has put pressure on the bottom line. Companies are looking not only for improved productivity but also for concrete, measurable cost savings. In such a distributed environment business executives most likely do not realize that the concept of improving business continuity and application availability changes dramatically.

Despite companies becoming increasingly global and the rise in employee mobility, most of the IT budget remains focused on delivering services to the desktop. In reality, an increasing number of employees may be away from their desk for more than one-third of their working day. The result is that finance is paying for equipment that is not being used effectively. The way to reduce cost and increase productivity is to make sure that IT investments – even if budgets are tight - are being directed where they will have the most effect: supporting the increasingly distributed and mobile business environment.

The above calls for a transformation of the enterprise communications infrastructure. The infrastructure of the new millennium will be able to supply high levels of network availability to distributed regional offices, mobile employees, remote workers, partners, and customers at reduced cost, resulting in heightened business competitiveness.

## **What to look for when transforming your enterprise communications?**

Once the decision has been made that the above trends have a significant impact on your company and that business will benefit from improved applications and service availability the next step will be to decide on the implementation strategy of transforming the supporting infrastructure.

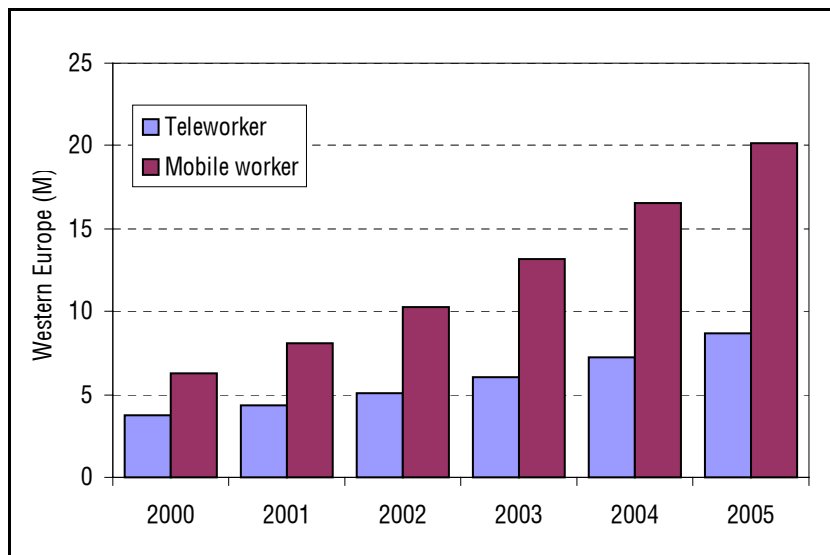
### ***The changing nature of work***

In the increasingly global economy, the lines between home and workplace, between occupation and recreation, between time zones and international borders, are fading. Your work is no longer where you are. Your work is what you do.

Work is being liberated from the workplace. The nine-to-five weekday is becoming less attractive. No longer is the office in the city the definition of the working environment. Now, your work is wherever you are. Your workplace is wherever you want to be.

As a result, there are more mobile workers today than ever and it is likely that the number of mobile workers will continue to grow at a rapid pace. Figure 1 depicts the development of the mobile workforce in Europe as predicted by IDC.

**Figure 1**  
**Expected Growth in Mobile and Remote Workers**  
**Accessing Corporate Networks**



Source: IDC, 2002

It makes sense to look at a communications infrastructure in terms of a three-layer structure, the relevant layers being applications, services, and connectivity. Applications are the most visible component; users of the communications infrastructure experience applications directly and the role of the other layers is to support the applications. A transformed network can deliver both voice, data and converged applications. The services layer provides services to the applications such as conferencing, queuing, or transfer in the case of voice. The connectivity layer provides the physical infrastructure that interconnects all the components. It involves the transport, switching, and routing of specific information types. Decisions that you make in one layer affect the others.

For example if you add voice to your data infrastructure your connectivity layer will need to be a switched environment rather than a shared one. In the words of Rob Aerts head of the telematics department, Máxima Medisch Centrum in Veldhoven: *“We have built redundancy into our network, making it available 7x24 hours. This offers our users a very stable voice application. We also included quality of service features, so every call that a patient makes is very steady throughout the entire network.”*

### **Applications drive transformation**

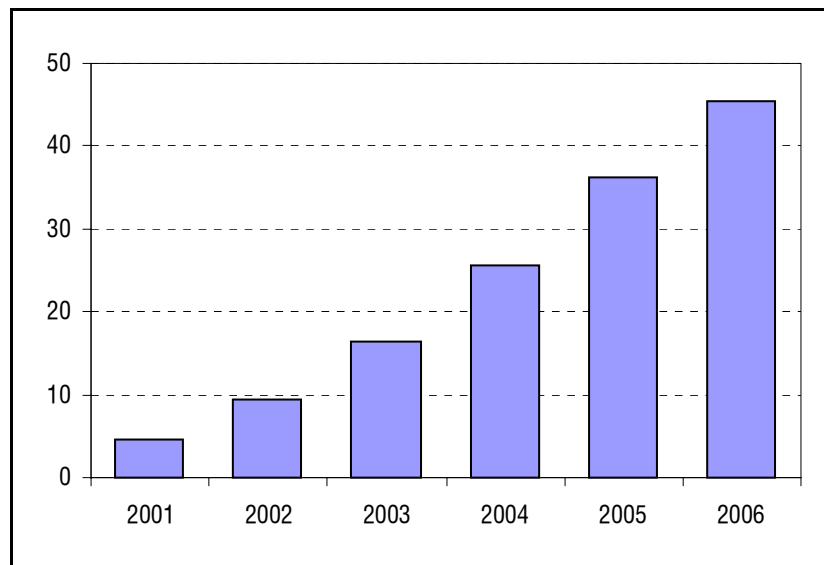
First and foremost it is the applications that will define a transformation strategy. Applications that will generate revenue and allow people and departments to communicate more efficiently. Employee productivity will increase because of integrating voice mail and e-mail, as well as better access to teleconferencing and eLearning applications. Applications that will bring companies closer to their customers, including: streaming video in call-centers, and databases with text from sales calls. Applications that will enable workers to take their telephones home. If they have a high-speed Internet attachment at home, they can attach their telephone to that and get all the features of their office phone (not having to make a long distance call on the home bill, not tying up the home phone with office work, etc.). The ability to transfer both data and voice features to home workers is particularly attractive in call center applications because the capability allows companies to recruit people with disabilities, mothers with small children, and others who may prefer to work at home.

Many of the above mentioned applications are grouped by IDC under the definition of unified communications. In this economy, the main goals of unified communication are to deliver faster response times, allow associates to be more productive, budget time more effectively, improve customer service, and break through barriers of communication to decrease communications friction and message loss, all of which results in a foreseeable, predictable return on investment. As Michael O’Connor, Chief Executive of CORKBIC puts it: *“A core goal that we’re seeking is to be able to establish collaborative development teams to form between individual companies or between companies and customers on developing new products or taking products on the route to market.”*

### **Consumer High-speed Internet Connections**

The penetration of broadband Internet is growing rapidly. By 2006, 45 million high-speed Internet connections will serve consumers in Western Europe. The availability of broadband enables enterprises to implement flexible working and teleworking strategies. DSL is the most widely used broadband technology.

**Figure 2**  
**Home Broadband Connections (Million)**  
**in Western Europe, 2001–2006**



Source: IDC, 2002

Web-based unified communication tools and collaborative applications can bring people and content together to solve problems, reduce costs, and shorten time needed to complete tasks, allowing employees to work in a remote/home/satellite office as though they were in the main office.

For some companies, the use of virtual workspaces and related functionality is no longer limited to individual teams. Companies have begun to expand access to employees across entire enterprises and, in some cases, to suppliers, partners, and customers. Aside from the reduction in office space, benefits include providing team members with the ability to collaborate on their own work schedule and from different time zones as well as enabling faster feedback in a live, real-time collaborative environment via applications that provide online conferencing, meetings, chat, file exchange, and shared bulletin boards. In addition, employees' increasing skill levels in using advanced technologies, as well as greater availability of broadband connections, are making telecommuting or working from remote offices even more efficient and effective. Moreover, using collaborative applications can cut costs and travel time and produce results more quickly. *"The positive impact from using this solution has been increased communication by people in the building. It is very easy for new people who are coming in and new staff to use the system and deploy it and also in particular it offers great flexibility if people want to scale up or down. They can take a handset and move it from one location in the building to another and all their messaging and numbers and everything else follow them."* commented Michael O'Connor, Chief Executive of CORKBIC.

There are several aspects that need attention when selecting unified communication services and solutions. First, look for

services that can easily fit into your existing business equipment and internal business operations. Second, make sure your solution is open and standards-based in order to allow interoperability with leading private branch exchange (PBX) and voicemail solutions. Additionally, you might require a customized solution that addresses a specific vertical application. A thriving development community for your solution vendor will give you a wider choice of custom applications.

### ***Getting Broadband Access on the Road***

Mobile workers will frequent several locations when travelling between offices, home, remote sites, and customer sites - hotels, airports, railway stations, convention centers, airplanes, and trains, to name just a few. At these locations, mobile workers increasingly demand services that will enable them to conduct business in the same way they are used to in the office.

The fact is that many of the services that are being taken for granted at the office, are very hard to acquire on the road. Email access, printing services, access to business databases, Internet access, all in a secure environment, are not readily available. Having access to these services would enhance both job satisfaction and productivity.

To support the increasingly mobile workforce in Europe, many location owners are offering services on-site to their visitors. Locations that offer these broadband type services are called hot-spots.

**Table 1**  
**Western European Hot-Spot Locations by Location Type, 2001–2006**

	2001	2002	2003	2004	2005	2006
Hotel	433	2,557	5,144	8,754	11,678	13,793
Airport	5	48	99	135	160	173
Airline lounge	21	99	217	315	374	413
Exhibition and convention center	11	33	88	155	199	232
Highway restaurant	1	56	166	385	714	1,098
Railway station	4	82	238	550	1,019	1,565
Total	475	2,875	5,952	10,294	14,144	17,274

Source: IDC, 2002



## Services create flexibility

The application layer is supported by the services layer. In a fully transformed network, creating a new application means nothing more than making use of the available enhanced services without changing the underlying connectivity infrastructure.

Today, most of the service options relate to voice applications. Examples are broadcast messaging, call forwarding, call return, caller ID, find-me service, message notification, find-me and follow-me services. In a transformed or converged network these services take on extended functionality. Broadcast messaging is a voice messaging service feature that allows subscribers to send one voice message simultaneously to multiple recipients and/or groups of recipients. In a transformed network this messaging future no longer applies to voice only, but might also include data and video. Conference calling is a connection between three or more people into one phone conversation. Typically, businesses can organize conference calls with most modern phone systems or a conference bridge. In a transformed network new collaboration services enable conference participants to write or draw on a blank slide (whiteboarding), to connect to a Web site or browse the Web together, and to engage in private text communication with the conferencing host or any other participant.

New enhanced services are emerging that are important for distributed enterprises. These services go beyond the core functions of unified messaging and unified communication, but they are increasingly important especially since a person's actual physical location can be increasingly hard to determine and is, in many cases, irrelevant.

## Connectivity provides reliability

The applications and services mentioned above can only come to full fruition if they are based on a single infrastructure that is able to support voice, data, and video either partly or in full. Aside from the business benefits mentioned in the previous section, another advantage of an IP-based converged infrastructure is that running voice over your wide area data infrastructure saves money previously spent on separate voice lines. On the campus or in the office it can also alleviate the time and money spent on moves, adds, and changes. *"The operating cost is significantly reduced because adds, moves and changes are far easier to do and can be done by a regular operative rather than a specialist. Most businesses have a need for constant change and this can be done on a single console with very low cost"* said Michael O'Connor, Chief Executive of CORKBIC.

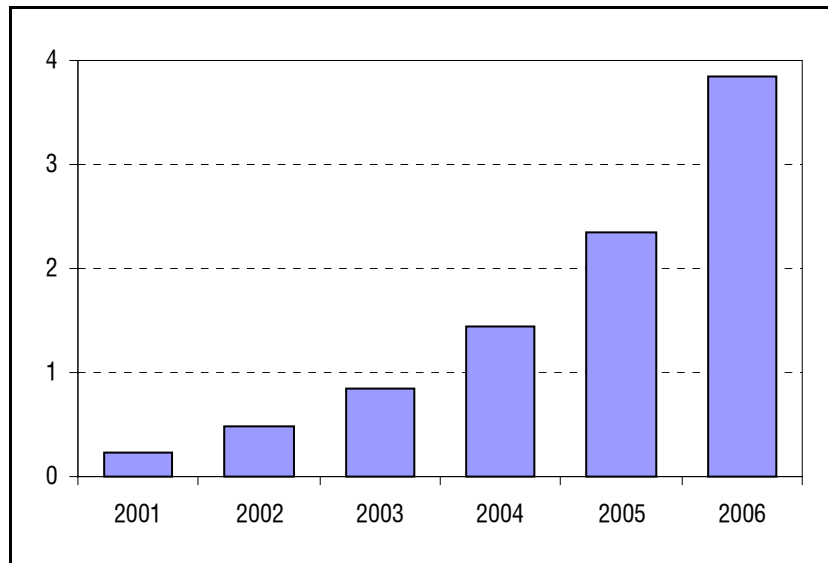
Merging voice and data systems, telephones (or the equivalent of telephones, telephone software running in PCs) must be attached to the LAN. This cannot be any LAN; it must be an ethernet. Another requirement is that the ethernet LAN is based on a switched configuration, using LAN switches instead of shared hubs. Many LANs are switched these days, but this is not enough. The LAN switches must have the ability to prioritize

packets so that they can send voice packets immediately. This involves buffering packets, determining their content and releasing voice packets from the buffer before data packets.

### ***IP Phone Market Developments***

Sales of IP telephones in Europe grew 159% from 2000 to 2001 to just over 220,000 units. IP telephone unit shipments and revenue will realize a compound annual growth rate (CAGR) of 77% and 60%, respectively, over the 2001 through 2006 forecast period. By 2006 close to 4 million IP Phones will be shipped in Western Europe. IP Phones have an ethernet interface to the LAN. It digitizes and packetizes the user's speech and also generates the appropriate IP telephony signaling messages. The physical appearance of an IP telephone is quite similar to that of a traditional telephone. However, IP phones enable office workers, home workers and travelers to make all their calls through the enterprise telephone system so that they are not tied to a single location and do not have to use hotel telephones, calling cards, or the home telephone.

**Figure 3**  
**IP Phone Shipments (Million) in Western Europe, 2001–2006**



Source: IDC, 2002

Although this process introduces complexity into the system, it saves the milliseconds needed to make voice quality acceptable. IDC believes that voice quality is as good as it is in a traditional system, if the LAN-based system is installed on a switched LAN that has the ability to give voice packets priority over data packets. In the words of Paul Rieter head of the medical technology department, Máxima Medisch Centrum in Veldhoven: *“The vision of the hospital was to integrate the communication systems, like paging, voice, and data. Therefore we needed to*

*upgrade our networks to one robust network, integrating all these systems.”*

A switched and prioritized architecture, however, is not enough to ensure real reliability. The architecture creates a highly reliable telephone system; however, it is meaningless if it is installed on a less-than-robust LAN configuration. And virtually all LANs have their vulnerabilities. For example, when LAN switches fail, the part of the LAN-based telephone system that they handle also fails. To achieve end-to-end reliability, one may have to upgrade LANs to add robust characteristics to switches. One example is the ability of the LAN to recover in sub-second time in case of failure. In such a case, voice applications will not notice the broken link and will continue to serve employee and customer communications. *“My advice to organisations looking into IP telephony is to ask yourself, what is the quality of my physical network, how reliable is the network, what will be worst case when IP fails?”* says Rolf Hunziker, teamleader teleservices at ETH.

Although servers rarely have the extreme reliability of large PBXs, that does not matter. The system does not have to be just one server. If one server is not reliable enough, then many can be used. The cumulative result is that the LAN-based telephone system itself can be more reliable than a traditional telephone system. This is because gateways and applications can be programmed to back each other up. Most products also use selected hardware and a slimmed-down version of Windows NT or Windows 2000 with increased reliability or other specialized operating systems like WindRivers Vx Works. Beyond this, it is important to know how the LAN telephone system would work if the electricity fails. Some products allow a few telephones to work, but to have all telephones work it may be necessary to install backup power in all wiring closets. This would mean installing either battery-powered units in each closet or backup power for the entire site, which could be an expensive proposition.

Potential buyers should look closely at the security considerations of adding telephone systems to their LANs. For instance, when VOIP calls between offices pass over leased private networks, they are not vulnerable to eavesdropping. However, they often pass through the same routers that connect organizations to the Internet. This then becomes a potential point of attack by an outsider pretending to send a VOIP call but actually sending malicious data or penetrating the data network. Also, if the same router is used for data connection to the Internet and VOIP connections to leased lines, then a denial of service attack on that router will bring down not merely the organization's Internet and Web capabilities but possibly also telephone calls between offices. While there are solutions to these problems one should not make these choices lightly, or without fully understanding the steps needed to eliminate vulnerability.

IP-based telephone systems have another advantage over circuit-switched PBXs: They scale better. Traditional PBXs come in many size ranges: key systems for six or fewer users, tiny PBXs for up to 20 lines, small PBXs for 50 users, and so on. The

circuit-switched approach may force companies to periodically scrap installed PBXs and buy new models when they outgrow their current system. Although it is possible to configure IP PBXs to scale from five to 500,000 users, generally these new products have scaling ranges, too. The difference is that these ranges are broader than traditional products, so it may take longer before companies need to upgrade their systems. Also, in an IP environment it becomes much easier to expand or contract your voice network. There is no need for installing new wiring and line cards, you plug the phone in the data network and you are ready to go, provided your ethernet LAN can take the additional traffic load. Rob Aerts, head of the telematics department, Máxima Medisch Centrum in Veldhoven explains: *“At the moment we have installed 500 IP phones and about 700 analogue phones. The solution we chose scales to over a thousand IP phones, so there is enough room to install another 500 IP phones.”*

### **At your own pace**

The last question you need to answer is which approach will be the best: a complete transformation of the network or preserving the existing communications infrastructure and delivering new innovative features? The answer to this question will be different depending on which applications you plan to deliver on the network, whether you are a small/medium or a large enterprise, or a call-center company, whether you are more forward looking or more conservative in your approach.

There are no hard and fast rules that will tell you which approach to take but in general most companies are likely to preserve their existing infrastructure and start delivering new features gradually while reserving the complete transformation strategy for greenfield sites. The reasoning behind this is simple. Companies have invested a huge amount of money in their existing voice communications infrastructure.

Moving to a new infrastructure means throwing away investments, not only in equipment but also people, because employees need to be trained in using new technology. If a company has recently upgraded its LAN but the infrastructure is not ready for IP voice it is also unlikely to immediately invest again in upgrading the network. In these cases a gradual approach, for instance through IP-enabling an existing PBX, might be beneficial. Some PBX's can even be upgraded to support all these innovation applications and services. *“Our goal is not to be completely IP and that is why we needed to test the interoperability and we have achieved that now”* adds Rolf Hunziker, teamleader teleservices at ETH.

New installations in new buildings and locations, however, are much more likely to be completely transformed. Obviously there is no legacy infrastructure in a greenfield location and the arguments mentioned above do not apply here. *“One of the advantages of IP Telephony is that it significantly reduces capital investment in start up environments, particularly with the infrastructure that you're deploying. For example the wiring contract is significantly reduced because for a particular*

*work station there needs only to be one Category 5 or Category 6 wire on which the whole data and telephony traffic is carried.”* said Michael O’Connor, Chief Executive of CORKBIC.

Last but not least, you need to carefully examine the financial implications of installing a transformed infrastructure. If the projected returns are not good enough you can not make a case for change. Today’s economic realities are based on cost reduction and new solutions will have to show their worth in measurable financial terms.

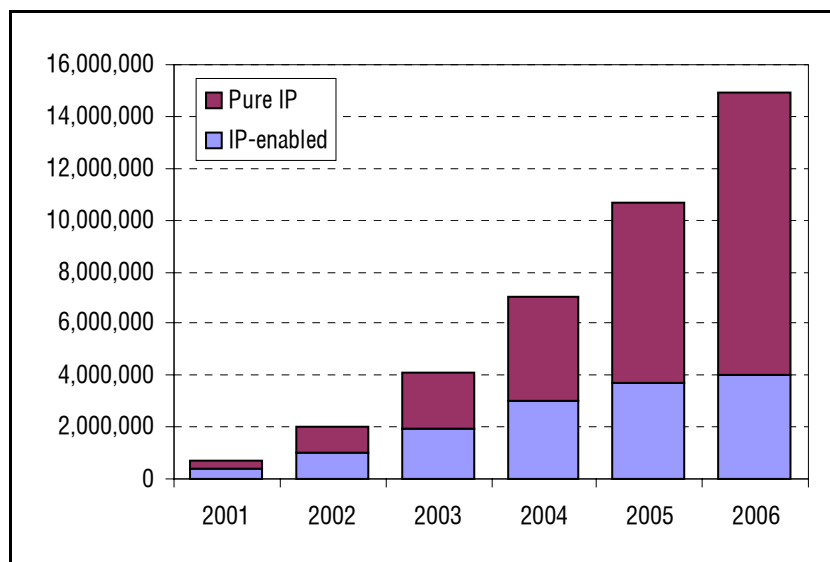
### **New Market for Converged Systems**

The emergence of voice over IP (VoIP) has created the potential for an industrywide transition from traditional circuit-switched PBXs to server-based systems over an IP infrastructure. Many users have slowed investments in their existing PBX networks as they evaluate the advantages of buying VoIP systems.

The enterprise telephone market is being transformed by the arrival of CBX (converged branch exchange) telephone systems, which can be constructed less expensively than proprietary systems because they are based on standard hardware. They also offer the opportunity for strategic business benefits because they can work with data networks and computer applications.

Enterprises in Europe are increasingly turning to IP based communications solutions. In 2006, IDC expects that close to 15 million phone lines will be either pure IP or IP-enabled.

**Figure 4**  
**Installed Base of IP Phone Lines**



Source: IDC, 2002

## Conclusion

Transforming enterprise communications is not just about technology but about maximizing employee productivity, increasing application availability, improving business continuity, and reducing cost. IP convergence is likely to be a large contributor to this but it is a means to an end and not the end itself. There is no single magic formula or recipe for transforming an infrastructure. Enterprises will tackle the issue in different ways and at different speeds.

## Methodology

This white paper is based on published IDC data. The case studies and quotes were developed through in-depth interviews conducted by IDC and Nortel with organizations that were provided by Nortel Networks. All primary case study data was checked by IDC before publishing.

## Additional Information

If you require any additional information on this IDC White Paper or the issue of transforming enterprise communications please refer to any of the following:

IDC on the web ([www.idc.com](http://www.idc.com))

Nortel Networks Website ([www.nortelnetworks.com](http://www.nortelnetworks.com))

Nortel Networks EMEA freephone number (00800-8008-9009)

## Organisations interviewed for this White Paper

### ***National Software Centre (NSC), Cork, Ireland***

The NSC fosters the development of innovative, knowledge-intensive companies, providing access to a range of business expertise, business development programs and flexible, turn-key business operations at its newly built a multi-tenanted Innovation Centre in Cork. They are providing managed voice and data services as part of the monthly lease to help fill a need for suitable office space and infrastructure for small start-up companies.

The NSC voice communications solution is a VoIP system based on a layer-3 switching infrastructure. There are no analogue phones installed.

This white paper includes quotes from Mike O'Connor, CEO, CORKBIC at the NSC.

***Máxima Medisch Centrum (MMC), Veldhoven, Netherlands***

Máxima Medisch Centrum is a state of the art medical centre, employing 3500 people, amongst which 170 medical specialists. Besides offering 865 beds for patients, it specialises in medical training and education. Máxima Medisch Centrum philosophy is built on innovation and team spirit, openness and reliability, and respect for the individual.

The Máxima Medisch Centrum has installed 500 IP Phones in addition to 700 analogue phones. The underlying infrastructure features redundancy and QoS.

This white paper includes quotes from Paul Rieter, head of the medical technology department and Rob Aerts, head of the telematics department, at Máxima Medisch Centrum in Veldhoven.

***Eidgenössische Technische Hochschule (ETH), Zürich, Switzerland***

The ETH is an institution of the Swiss Confederation dedicated to higher learning and research. It imparts to its students the highest state of knowledge and practical skills. It seeks to enable young people to find their orientation in a complex and rapidly changing world, and to stimulate an understanding of ethical and cultural values so that, upon completing their studies, they will be not only highly qualified professional people but also responsible members of society. ETH is also a leading research organization.

The ETH has been field-testing VoIP solutions since 2000 and are currently conducting a trial with 40 VoIP users. The university's voice system involves 18 nodes providing communications to over 20,000 users at 272 locations.

This white paper includes quotes from Rolf Hunziker, teamleader teleservices at the ETH.





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