

Synopsis

One of the few predictions we can make with some confidence is that the global business climate will remain turbulent. Social, political and economic pressure will bring about new working practices in an endeavour to maximise the return on investment in people and working capital. Organisations will turn *network-centric* as computers and communications converge to play an increasingly critical role, and the information network will become a key enabler for many new applications.

We are experiencing significant innovation in network technology, with 10 Gigabit operation, Virtual LANs, Voice-over-IP, multimedia protocols, high-speed cabling and new developments in broadband cable and wireless. Bandwidth consumption is growing fast. The explosion of Internet services and the formation of Intranets and Extranets are having a dramatic affect on traffic, and bandwidth prediction can no longer be extrapolated from historical data.

While the business climate is expected to remain unpredictable, network infrastructure strategy is clear. Future designs must be multimedia-capable, highly scaleable, manageable, fail-safe and secure. The corporate network has become a pivotal component in business; poor performance and down-time can therefore have a devastating affect.

1. Business Challenges

Today's business environment is characterised by financial turbulence, greater competition from global organisations, increasing levels of congestion, conflict and terrorism and fewer skilled people. In order to succeed, business must increase its responsiveness to change and continue to minimise operating costs.



Managers recognise that the most appropriate response to the prevailing business climate is a *revolutionary*, rather than an *evolutionary* transformation in business practices. They know from experience that only radical change will bring about the necessary business advantage.

Successful businesses acknowledge the rapid evolution towards a *digital economy*, and view networked Information Technology as a key strategic weapon. These businesses are therefore elevating their spend in IT Infrastructure as they prepare to support non-stop e-commerce platforms and desktop multimedia applications. Bandwidth and quality of service are now key parameters for success.

In order to accomplish effective and coherent integration, the communications network is now performing a *central* role within the organisation, supplying the *right* information in the *right place* at the *right time*. This continuing change will impose new and demanding requirements on the infrastructure of corporate local and wide-area communications networks.

However, traffic patterns are changing due to the explosive growth in Internet access plus extensive use of Intranets and Extranets. All this means that we can no longer extrapolate from historical traffic trends and users will therefore need to develop a more flexible and responsive network strategy, selecting the right blend of technologies to meet the evolving needs of their organisations.

2. Some Facts

Let's take a moment to review some recent statistics to quantify the rate of change we are already experiencing.

Annual world-wide business spend on Information Technology exceeds \$US1,000 billion and, according to investment bank, J P Morgan, the spend on network hardware alone represents about 10% of this figure. Business spend on IT and telecommunications in the UK alone was approximately £80 billion in 2003, representing 8% GDP and slightly more than the nation's spend on healthcare services.

According to Intel, over 100 million PCs are sold each year, a figure that exceeds the number of TVs shipped. The Internet is changing the way we live and work. A new user is connected every 0.4 second, and a recent survey found that 30% to 40% of children in the US have modified their TV viewing in order to surf the Internet. 50% of the UK population have Internet access and/or a PC at home. The Internet user population grew to 400 million world-wide in 2003.

A new generation of businesses is riding on the back of this trend. Electronic commerce has exploded in recent years. IDC estimated the world-wide e-commerce market to be worth a staggering \$US1,300 billion in 2003, with business-to-business transactions accounting for at least \$US1,000 of this.

This dramatic change in the way we communicate is responsible for the increase in Internet access time to 45 minutes on average, while voice calls remain static at around 3 minutes.

London commuters spend an average of 15 hours each week in transit. They spend up to 30% of their income on travel and, not surprisingly, 2 million UK people now work from home. At least 2 million broadband links have been deployed in the UK to date, mostly to residences.

3. Key Trends in Information Networks

We are witnessing increased exploitation of Communications & Information Technology, as a tool to maximise limited resources and manage businesses more effectively within the turbulent business environments that lay ahead.

The following trends will influence the choice of future network technologies:

- pervasive, digital communication networks & services (e.g. Internet)
- cost/performance improvements in computing & communications
- mission-critical information access
- network-centric organisations (use in JIT processes, etc)
- travel avoidance due to congestion, terrorism, etc
- co-operative working within and between organisations
- teleworking (e.g. homeworking, mobile users)

There is a phenomenal increase in the number of PCs used for business applications, with an installed base of 250 million devices world-wide in 2003. The number of units doubled over a period of 6 years. Perhaps the most interesting statistic is the proportion of PC devices that are LAN-connected; an increase from a mere 50% in 1995 to 85% in 2003. Most of the remaining 40 million devices are remotely networked, many with dial-up facilities, an increasing number by broadband ADSL, mobile cellular services such as GPRS or 3G, and "hotspots" based on WLAN technology.

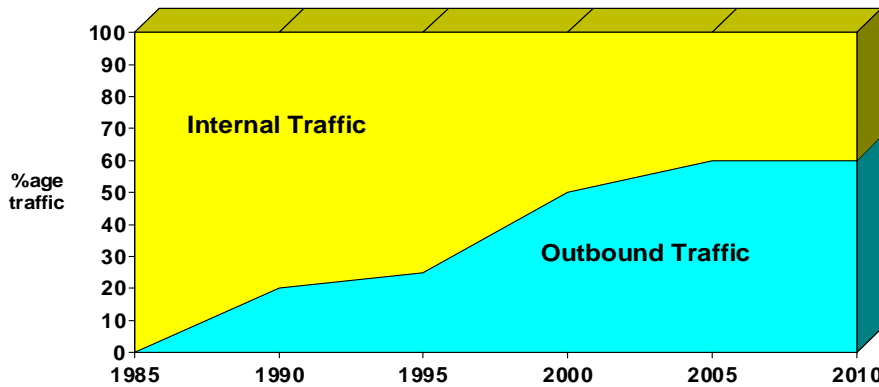
The pace of developments at the desktop is also frantic and unpredictable. Many new, bandwidth-hungry applications are being enabled by dramatic improvements in both cost and performance of IT equipment, and organisations are becoming more strategic in their use of IT and communications. Consequently, network traffic is increasing in volume and changing by nature.

There are many trends and applications that will *collectively* cause a dramatic increase in future network bandwidth requirements. The network industry responded by introducing 10 Gigabit backbones in 2002. Key bandwidth drivers will be:

- increased usage (more people using IT, more use per head)
- growth in computing power at all levels (especially in PCs)
- distributed processing (especially distributed databases)
- web browsing based on internet and intranet technology
- collaborative computing applications at the desktop
- image: document capture and distribution (e.g. medical imaging)
- video: broadcast TV, training services, video-conferencing
- multimedia and hypermedia applications

4. LAN Traffic Trends

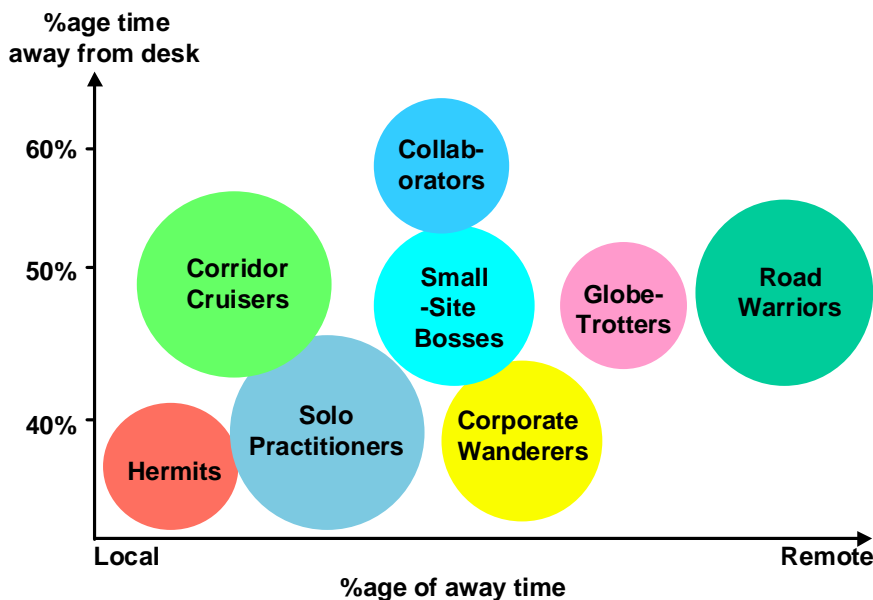
Data dominates voice in external traffic streams, and this survey by IDC shows that outbound traffic exceeds internal LAN traffic beyond the year 2000. Gone are the days when 80% of traffic remained internal to the LAN. This trend is having a significant impact on telecommunications strategy



5. Workforce Mobility

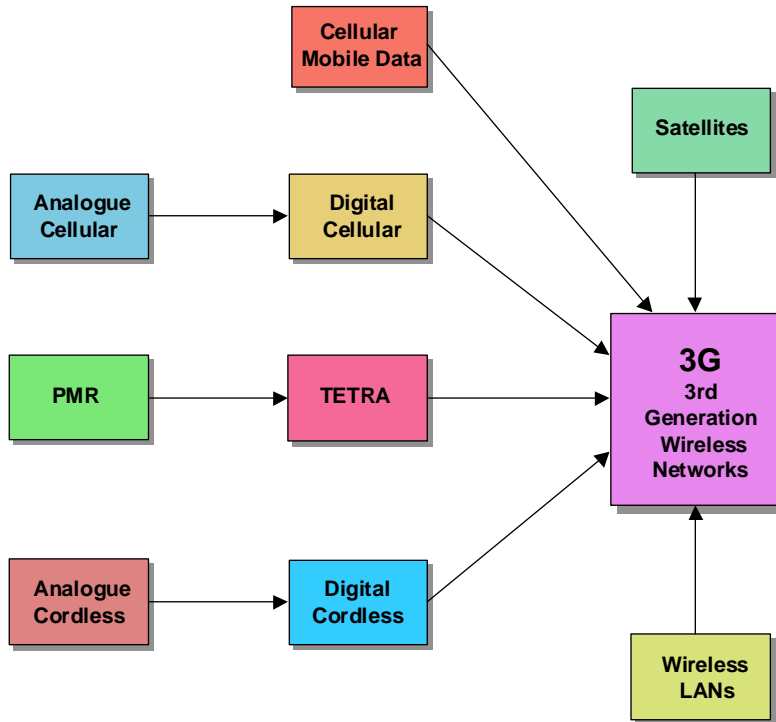
The growing need for mobility is highlighted by a study conducted by BIS Strategic Decisions. The survey illustrates time spent away from the desk, and the local site, by various types of worker (see below). This research has some hard-hitting messages to communications network and site planners.

Remote and mobile workers reinforce the need for enterprise-wide networks, and are also driving the deployment of high speed Wireless LANs and cellular networks. At the same time, many organisations are giving serious thought to *the need to travel*. Travel is both expensive and a poor utilisation of time. Video-conferencing is at last emerging as a powerful antidote to business travel.



6. Evolution of Wireless Networks

A variety of wireless communications technologies and services have been available for some time. The key candidates are featured in the chart below, which illustrates how these are evolving and converging into a major international strategic programme known as 3G, or *Third Generation*.



The main objective of 3G is to support world-wide roaming with low-cost pocket terminals running multimedia applications (i.e. voice, data, image, video). 3G was initially planned to support 2 Mbit/s indoors, 384 kbit/s to pedestrians and 144 kbit/s for vehicular use, however initial service offerings have been slower.

In order to bridge the huge bandwidth gap between the original 9.6 kbit/s GSM data service and 3G, a number of interim services were launched. These were dubbed 2.5G. HSCSD (High-Speed Circuit-Switched Data) increased the data rate to 14.4 kbit/s. GPRS (General Packet Radio Service) supporting a maximum burst rate of 171.2 kbit/s. GPRS has been very successful in Europe. And finally, EDGE (Enhanced data for GSM Evolution) uses more efficient modulation techniques to boost the maximum data rate to 384 kbit/s. Ovum predicts some 700 million subscribers to 2.5G and 3G services by 2007.

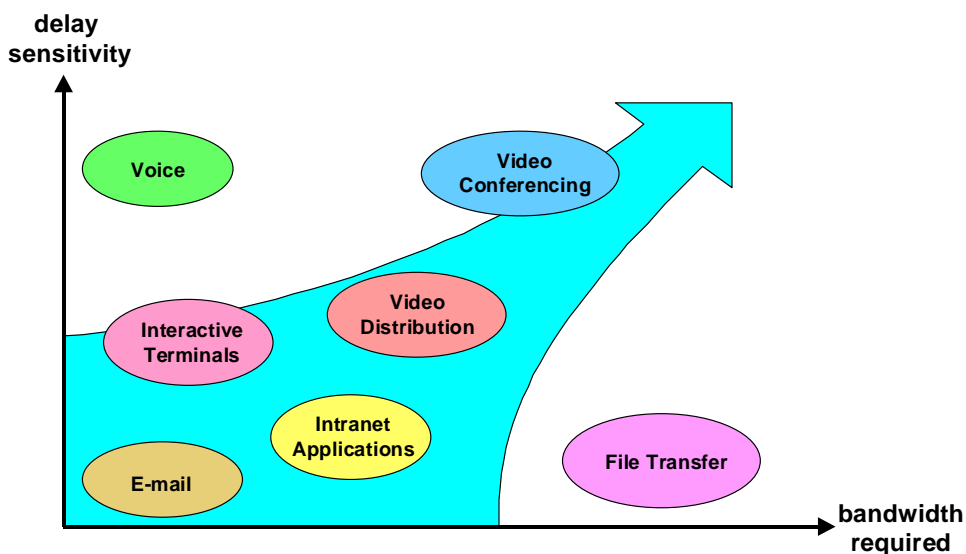
Wireless LAN technology has not stood still, with standards-based products from over 70 vendors operating in the 11-54 Mbit/s range. Market analysts, Cahners In-stat, Frost & Sullivan and IDC estimated the world-wide value of WLAN hardware at around \$US4 billion in 2004, with value growth of at least 20% per annum over the next few years. Gartner predicts that over two-thirds of all new laptops will be sold with bundled WLAN facilities by 2007 and that WLAN penetration in professional PCs will exceed 90% by this date.

The pervasiveness of Wireless LAN connectivity has created a new market in the public networking space, known as "hotspots". Wireless access points are being deployed at airports, conference centres, hotels, railway stations, motorway stations and coffee shops to provide a high-speed, industry standard portal for travelling professionals. The deployment of "hotspots" is very aggressive in many areas, especially within Europe.

7. Multimedia Convergence

Organisations are now converging telecommunications, IT and video, as an enabler of mass-market video-conferencing and networked multimedia. Datamonitor recently investigated this scenario and found that a number of major players in the desktop arena have yet to fully recognise the implications of migration towards intranet video-conferencing. High-end users have been reluctant to follow this route due to congestion and security issues, although attitudes are now changing.

Many emerging applications will have embedded voice and video. Real-time voice and video are very sensitive to variation in end-to-end delay (known as delay variance), even when compressed. Unlike video, voice is not bandwidth-hungry. Future applications will require high levels of bandwidth plus tighter control of delay as part of an increasing need to fulfil Quality of Service (QoS) requirements.



8. Video-Conferencing

A US survey by Sage Research found that 47% of organisations planned to introduce video-conferencing in 2000. The survey involved 270 organisations with fewer than 500 employees to more than 10,000.

According to independent research commissioned by Sony, 85% of Times Top 500 companies in Europe use video-conferencing, with an average of 29 terminals each.

The main drivers for video-conferencing are risks associated with terrorism and conflict, travel congestion, best use of scarce resources (demographics) and green issues. Enablers will be global digitisation and reducing costs of telecommunications, and improved compression techniques.

9. Investment Decisions

A recent survey of corporate organisations conducted by Business Communications Review highlighted the main issues pre-occupying network managers. The most significant issues according to this survey were minimising downtime, problem identification and resolution, security and backbone bandwidth.

Market analyst, Forrester Research, recently commented on infrastructure reliability with the advice, "Plan for network costs to more than double over the next three years, as competition pushes firms to move to non-stop e-commerce performance of 99.999%". Network infrastructure quality is now a crucial business success factor.

While the business climate is expected to remain unpredictable, network infrastructure strategy is clear. Future designs must be multimedia-capable, highly scalable, manageable, fail-safe and secure. **The corporate network has become a pivotal component in business. Poor performance and down-time can have a devastating affect.** Select suppliers and products with care.

About Brand-Rex

Brand-Rex is a designer and manufacturer of copper and fibre based cabling systems, headquartered in Glenrothes, Scotland with facilities across Europe. Brand-Rex has two primary businesses: Connectivity and Speciality. Its Connectivity division designs and manufactures cabling systems (both copper and fibre) for data communications and is the No.2 player in Europe. The Speciality division exclusively produces cables that are used for control, communications, power and instrumentation within hostile environments.