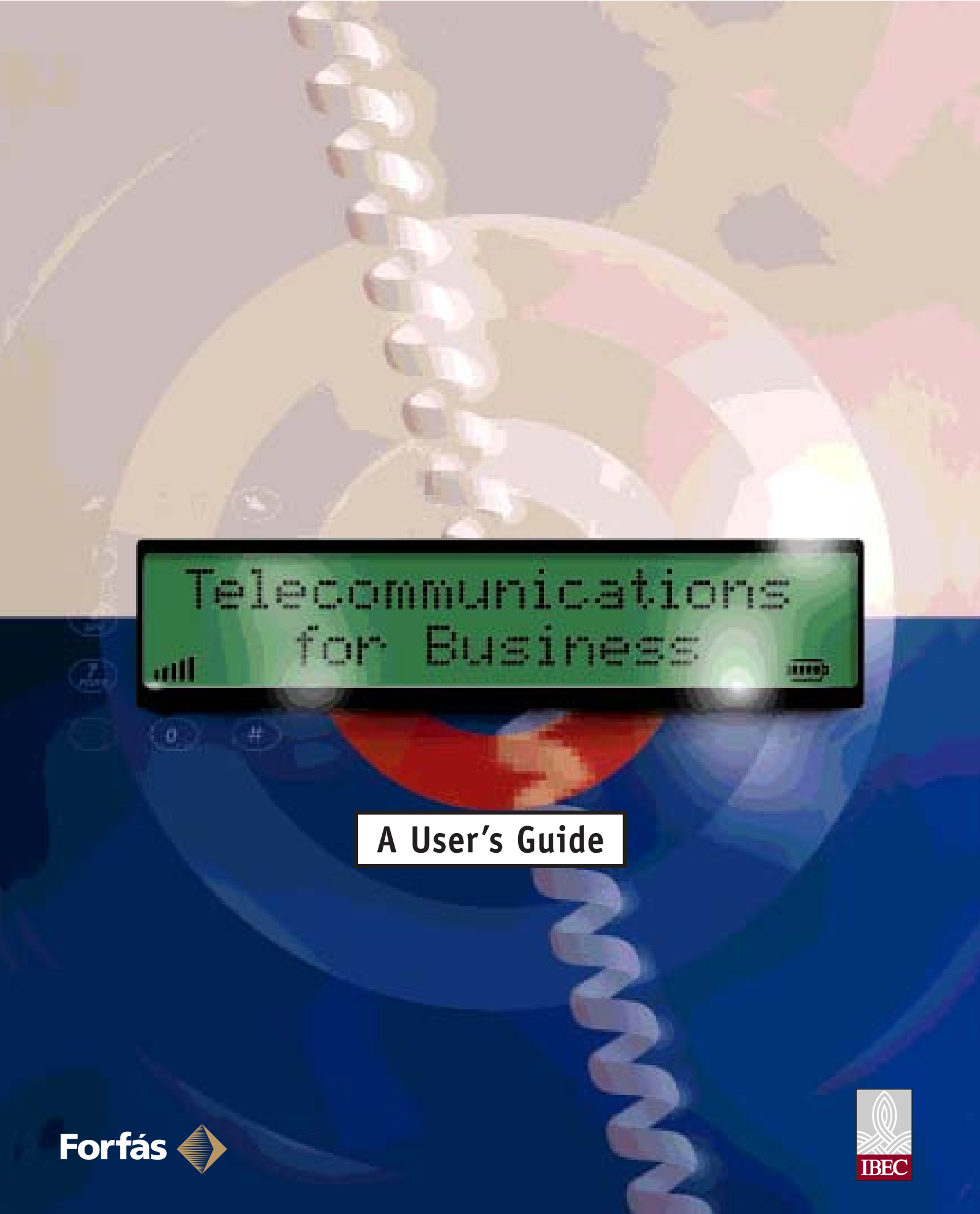

A User's Guide

Forfás

IBEC

Forfás is the state policy advisory and co-ordination board for industrial development and science & technology in Ireland. It is the body through which powers are delegated to Enterprise Ireland for the promotion of indigenous development and to IDA Ireland for the promotion of inward investment. Among its functions are advising the Minister for Enterprise, Trade and Employment on matters relating to the development of industry in the State and the promotion of science and technology for economic and social development.

Forfás works closely with bodies established by Government to consider specific issues critical to economic performance and job creation. These include the National Competitiveness Council, the Irish Council for Science, Technology and Innovation and its Technology Foresight Taskforce and the Expert Group on Future Skills Needs. Forfás provides secretariat and research support for these bodies.

Because of the increasing importance of telecommunications for the development of the enterprise sector, Forfás has in recent years undertaken work in the area in consultation with Government departments, the development agencies, telecommunications operators and businesses. Advanced investment in broadband was identified as critical to future economic growth in Forfás' long term strategy 'Shaping Our Future – A Strategy for Enterprise in Ireland in the 21st Century'. Forfás has published three allied reports: 'Telecommunications in Ireland' (1994), 'Telecommunications and Enterprise: Building and Investing for the Future' (1996) and 'Broadband Telecommunications Investment in Ireland' (1998). Forfás also worked with the National Competitiveness Council in the production of the document 'Statement on Telecommunications: A Key Factor in Electronic Commerce and Competitiveness' published in November 1998.

IBEC (The Irish Business and Employers Confederation) represents the interests of businesses of all sizes from all sectors of the economy. It provides economic, commercial, employee relations and social affairs services. IBEC works to shape policies and influence decision-making in a way that contributes to the development and maintenance of an economy that promotes enterprise and productive employment. It represents its members' interests to Government, State agencies, the trade unions, other national interest groups and the general public. Through its Brussels office, the Irish Business Bureau, IBEC works on behalf of businesses and employers at European level to ensure that European policy is compatible with IBEC's own objectives for the development of the economy.

The Telecommunications Policy Committee of IBEC promotes the development of policies for telecommunications services as a key factor in determining the current and future competitiveness of the Irish economy and the consequent maintenance and generation of employment. The Telecommunications Policy Committee was formed in 1994 and its membership comprises telecommunications service providers, users and independent telecommunications experts. Key telecommunications policy issues for the business community are promoted by the committee through the publication of regular reports and the annual IBEC Telecommunications Conference which provides a wider forum for these issues. These reports include in February 1998, 'Telecommunications Priorities - An Agenda for Government and Regulation' and in December 1998, its report 'Telecommunications after Liberalisation - Policies for Ireland'.

A User's Guide

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Foreword

IBEC and Forfás are very pleased to present *Telecommunications for Business: A User's Guide*. With the approach of the 21st Century comes a new era heralded by advanced telecommunications services - the so called 'digital revolution'. This brings new challenges which the Irish business community must be ready to meet. One of the most dramatic changes is the rapid introduction of electronic commerce as a whole new way of doing business.

Many people in business are not clear about what services are available to them, whether the new developments are relevant to their business or how they can exploit the new technologies. Both IBEC and Forfás feel that this publication answers many of the questions that business people today in Ireland are rightfully asking.

Development of awareness of the new era with its opportunities and challenges is the main aim of this guide. To accomplish this, the guide:

- describes clearly and simply the changes taking place in the telecommunications market in Ireland;
- summarises the range of advanced networks and services available to customers; and
- describes the strategic and operational implications of these changes for business operations, as well as new opportunities and threats arising.

There are many ways in which this guide can be utilised. For some, the glossary will be helpful in dealing with the plethora of new jargon that has sprung up with new information and communications technologies. For others, the directory at the back of the booklet will give easy access to key players in the Irish market. But for most people, this guide will, simply and in plain English, explain what is happening in this so called digital revolution and what their businesses should be doing to capitalise on these changes.

On a day-to-day basis, every business has always had to adapt to changes in how they operate. The difference now is the speed at which these changes are taking place. All sectors will be affected. The new challenges of this dynamic environment must be met by companies to ensure their long-term viability and prosperity in the next millennium.

We would like to thank the companies who contributed to our commercial section for their financial support. We would also like to commend the members of the Forfás/IBEC Joint Editorial Committee, together with the external consultants, for the excellent work they have done in preparing this document.

Chief Executive
Forfás

Director General
IBEC

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1 Digital Revolution

1.1 The Digital Revolution and Business

1.1.1 A leap forward

'The digital revolution has arrived! Ireland must be an advanced user of telecommunications services!'

The digital revolution has arrived!

This is the call of those involved in technology but few really understand what it means and how relevant it is for their own business. It is now vital that business leaders become aware of and understand the changes occurring as a result of digital technology and the new opportunities and threats these changes will present to them.

It is widely understood that computers have become essential to every sector of economic activity today as companies discover the advantages of systems that process and store information. So important have these become that all companies now require expertise in the use of computers and in the ways they can improve business practice.

A leap forward in telecommunications systems

However, less well-known is the fact that telecommunications systems, both fixed and mobile, have taken a similar leap forward and that the potential impact on businesses and business practice is as profound. Just as the typewriter has been superseded by the computer, so basic telephony and fax is being superseded by advanced telecommunications networks that transmit information (data, pictures and sound) at high speeds, hundreds of times faster than over the ordinary telephone line.

1.1.2 What does the phrase 'digital revolution' mean?

Falling costs...

Change in the business world is being driven by the dramatically falling cost of telecommunications and computing power and the ability of computers, linked into telecommunications networks[1], to transmit this information anywhere in the world.

...and ability to communicate

Information and Communications Technology (or ICT) opens up enormous possibilities for interactions - social, cultural and business - between people, companies, communities and markets all over the world. The implications for businesses are immense. The important aspect is not the technology, but new services and new ways of doing business that result from it. This is what is called the 'digital revolution'.

1 *The term* ***telecommunications*** *networks includes many systems from ordinary copper-based telephone lines to optical fibre networks capable of high-speed global transmission of large volumes of information, including voice, video and data. It also includes TV cable and wireless systems such as satellite and high-capacity mobile telephone systems.*

Implications for businesses...

...opportunities and threats

An example is the low cost of establishing a presence on the Internet and World-Wide Web[2], making it possible for companies of all sizes to sell their products and carry out their business on a regional and global basis. Customers can thus benefit from the wider choice of goods and services on offer.

This is both an opportunity and a threat. An *opportunity* because the market then becomes global; a *threat* because at the same time competition becomes global. Competitiveness and know-how are essential in this situation, as well as knowledge of and response to changes occurring in the way businesses are organised.

1.1.3 How are businesses changing?

New concepts are required...

No enterprise, no matter how well-established or how small, can afford to ignore recent developments in ICT and the extraordinary effects they are having on how industries are structured, how firms are organised and how customers behave. New mindsets are required, new measurements and new concepts.

...as interactive activities become more important...

One of these concepts is the growing importance of **interactions**. Interactions occur within firms, between firms and all the way through markets to the end consumer, enabling the exchange of goods, services or ideas. Formerly requiring physical meetings and transactions, interactions can now be carried out using the new digital technologies that allow voice, data, sound and pictures to be provided over many different networks. In addition, the increasing penetration of mobile services in the business sector is enhancing the ability of businesses to interact with customers (and vice versa) without any need to rely on geographic location.

Interactions now account for over one third of economic activity in developed economies. As the proportion of information workers increases in the labour market (in the US from 30 per cent in 1930 to 62 per cent in 1994) and through technological progress, interactive activities become still more important. The growing use of networks, together with vast improvements in speeds of performance and communication, are creating an explosion in the ability to interact.

Profound changes in the way business is carried out...

The result is that **new ways to configure businesses, serve customers and organise companies are emerging**. Examples include:

- It is becoming far easier for companies, regardless of size, to reach new customers anywhere in the world. Direct sales and distribution will become common business practice. Suppliers will ship products straight to the customer's door, dispensing with traditional warehousing, geographic distribution and retailing infrastructure.
- Workers in some industries, in particular those dealing with information, will use new ways of working and many will be able to do their jobs in less than half of the time they currently take. At the same time, there will be a net increase in employment, generated by the creation of new products and services essential to this new scenario.

2 *The Internet is the global network linking millions of computers that store and provide information for users. World-Wide Web (WWW) is the system that links topics on the Internet, making it easy for users to find what they want.*

...requiring new skills and new mindsets

- Outsourcing (sourcing materials or services outside the main company) will increase, allowing companies to benefit from the superior efficiency and economics of specialised suppliers. The use of external markets (where other companies co-ordinate the marketing and distribution of a variety of products and services) will also increase. Both will be fuelled by the falling costs of interactions.

- Consequently, integrated business systems will give way to more specialised ones. For example, in the clothing industry, electronic data interchange (EDI) allows players to separate procurement, spinning, weaving, finishing, logistics and retailing and contract them out to specialists along the industry chain.

- Co-operation, where companies carry out a set of activities jointly rather than separately, will become more economically attractive as falling interaction costs result in lower costs and higher returns.

co-operation and networking will become more attractive...

- Through new business arrangements providing networks between customers and companies, customers will be able to have a direct input into a product or service from design to delivery. This has already resulted in more personalised services in establishments experimenting with such networks.

  Examples include companies such as Dell Computers and Gateway, direct sellers of PCs. Messages are sent to their supplier warehouses over the Internet; the suppliers also get an inside view of the company's inventories and production plans and constant feedback on how well they are meeting shipping criteria. Their speed in customising and delivering products is now unmatched.

- During the next decade, corporations that are currently tightly knit will form disparate divisions and disperse geographically. Firms will get smaller, with one-person companies and partnerships proliferating. Teleworking (working at a distance from the company office using ICT) will become commonplace and people will be able to choose when and where they work.

...and 'intellectual capital' will become more valuable

- Expertise will become an increasingly valuable asset. People with expertise will have customers all over the world as the transfer of skills across borders and distance will become much easier. Intellectual capability will become more valuable and individuals who possess critical know-how will attract disproportionate returns.

Doing business in a world of plentiful and cheap interactions will clearly require new skills and a new mindset. No firm or sector will be left unaffected.

1.1.4 What businesses will be most affected?

Most businesses will be affected

Among the businesses likely to be most deeply transformed are:

- Interaction-intensive industries such as banking and communications, where transactions will increasingly take place directly over the Internet.
- Intermediary industries such as broking, wholesaling and the travel and tourism industry, which will also be affected by direct contact via the Internet between buyer and seller.
- Manufacturing, where corporate networking will become more important and computer-aided design systems can be interconnected.
- Entertainment and software where, increasingly, delivery will be over telecommunications networks rather than physically. For example, the latest Boyzone album will be ordered and paid for over the Internet, downloaded on to your computer and from there on to disk. Software will similarly be downloaded directly on to computers. The savings in distribution costs will be major.
- Education and training establishments, who will use file transfer to support joint research, networked library and archiving services and remote teaching.
- Healthcare, where secure access to databases of patient records and support of custom managerial, administrative and financial functions will be supported.

Those who anticipate and respond to the changes ahead...

...will be best placed to exploit the opportunities

Those who anticipate and understand the fundamental nature of the changes ahead and actively reshape their business models will be best placed to exploit the opportunities.

1.1.5 What does my business have to do?

Develop awareness...

As previously stated, it is no longer possible in this age of the digital revolution to ignore the new technologies, with the new opportunities and threats that come with them. Global trends indicate that all companies must develop an awareness of the implications of these technologies and of the challenges facing their business in the future.

...invest in and effectively use ICT...

Firms must invest in ICT to protect their existing markets, improve trading efficiency and exploit new opportunities in the global market. Among Irish-owned enterprises, there is a significant proportion of firms for which the effective use of ICT will be critical if they are to remain competitive and efficiently market and distribute their goods and services.

...and implement appropriate strategies

It is clear that each company must examine the implications of these developments for new services and new ways of doing business and that appropriate strategies be formulated and implemented to fully exploit the new fixed and mobile technologies and services, including broadband services.

1.1.6 What are broadband services?

Computer power is increasing...

Every day we see newspaper advertisements for faster computers with greater storage capacities. Even as we watch, computing power is increasing and comparing the average computer bought today with one bought five years ago gives one a shock. As computing power rises, the cost of processing falls - it is estimated that over the next decade, price/performance will fall by 98 per cent! [3]

...bringing demands for faster communications networks

With these increases in power come new demands. A growing proportion of businesses are increasingly dependent on the availability of high-capacity, competitively-priced telecommunications services capable of transferring commercially valuable data, voice and pictures at very high speeds and of providing high-speed links between companies and offices globally. Such services are called **broadband services**.

1.2 Communications and Applications

An example of a communications transformation in Ireland

The change in the face of telecommunications is quite astonishing at present. One visible sign of the transformation occurring is the explosion in the use of mobile phones among the Irish population and, in particular, among business users. Three years ago, their use was rare. Today, over 20 per cent of the population own mobile phones, among business users and young people their use is considerably higher, and in the next three years the target penetration is one million users! Not only will mobile networks carry voice calls, they will also carry mobile fax and data services.

What drives such rapid change? Over the entire field of telecommunications, three trends can be perceived:

1. Rapid **lowering of costs** in telecommunications and computing power with higher capacity networks;
2. Expansion in the use of the **Internet**;
3. **Advances in technology** bringing easy access to more efficient ways of doing business.

1.2.1 Lowering of costs

Sending information over the telephone line is slow...

In the last few years, there has been a dramatic lowering of telephone charges to business customers. This trend is set to continue, with access to the Internet made even cheaper.

Together with easy and cheap access, the speed of the communications network is very important. Up to now, the ordinary telephone network has placed limitations on the speed of transmission of signals. We are all familiar with the slow pace at which fax messages are received, especially if the document is long; similar frustration can be felt when complex files are sent via e-mail over the telephone line.

3 *The McKinsey Quarterly 1997 Number 1.*

...but broadband makes a huge difference

Now, high-speed or broadband networks are changing this scenario with complex data, including video, being accessed or sent at high speeds. (A document that takes up to ten minutes to transfer across an ordinary telephone line might take only two seconds over broadband!) Access to high-speed networks will also be cheaper with the advent of deregulation of telecommunications and new competition.

In tandem, the cost of computing power is taking a nose-dive. These two trends, together with new technologies that combine computing and communications, herald the new age of global access and interactions - the 'digital age'.

1.2.2 The Internet - a new dimension to market access

The implications of these developments are immense. An example is the use of the **Internet** - for the cost of a local call, any business can access the Internet. After that, access to the World-Wide Web to carry out any business is free! This gives a complete new dimension to the concept of market access.

Video as well as text can be transmitted at 'real-time' speed

The World-Wide Web is becoming increasingly important as a business tool, giving the opportunity to all businesses to operate in the global marketplace. Tens of millions of people globally have already been introduced to the idea of receiving services over a telephone line. Using broadband, the Internet can be used to communicate through voice and video as well as via documents, thus providing even more scope for bringing together customer and supplier.

...and changing the way we do business

Without a doubt, the Internet is ushering in an era of sweeping change that will leave no business or industry untouched. In just three years, the Internet has gone from a playground for 'nerds' into a vast communications and trading centre where some 90 million people swap information or do deals around the world.

Using new technologies

However, the real importance of the Internet is that businesses are adopting it to get serious work done. By using the Internet to link directly to suppliers, factories, distributors and customers, these companies are speeding up usually time-consuming and tedious tasks. Time and space are collapsing between partners. With the help of the World-Wide Web, businesses are saving time spent in product design, speeding up the order and delivery of components, tracking sales by the hour and getting instant feedback from customers - all the while keeping inventories to a bare minimum.

Incredible efficiency and creation of new wealth...

This is business process re-engineering all over again, but this time with the promise of incredible efficiency. And together with increased efficiency comes the potential creation of new wealth. As the Internet tears down the walls of geography, companies are creating entirely new businesses and tapping markets they never could have reached before. It is forecast that in the year 2002, 60 per cent of the world's commerce will be carried out over the Internet![4]

4 *The McKinsey Quarterly 1997 Number 1.*

...but many people's jobs will be turned upside down

The downside of the new era is upheaval across nearly every industry. In coming years, many employees could find their jobs turned upside down as human tasks such as selling airline tickets or tending to customer complaints over the telephone, are taken over by the one-to-one, buyer-to-seller, nature of the Internet. There are huge challenges to be faced and, in general, companies that prosper will be those that are aware of the implications of the new era and adapt appropriately.

The speed of change will be difficult to take in

The speed of the changes and the new opportunities they offer for global marketing are so immense that they are difficult to take in. Progress is being made on global agreements to ensure that:

- buyer and seller are able to come together freely and do business with minimal Government regulation;
- the Internet will be a seamless global marketplace;
- there will be tremendous competition but all entrants into the marketplace will have equal global access.

At the moment there are no customs duties on business carried out on the Internet, no discriminatory taxation, no Internet access taxes, no Internet telephony taxes. Discussions are on-going in international authorities such as the EU and OECD to create a framework for the taxation of e-commerce that respects these principles.

And these are just some of the revolutionary consequences of the coming of the digital age!

1.2.3 New business applications and media

New technologies and applications are coming in...

In tandem with the Internet, new technologies include:

- Electronic mail (e-mail)
- Electronic document interchange (EDI)
- Corporate networks
- Mobile communications
- Video services
- File transfer
- Database access
- Digital television
- VPN (Virtual Private Networks)

Business applications based on these technologies proliferate.

improving efficiency...

E-mail provides the means to connect people, whether they are down the street or on the other side of the world, within minutes. Messages in the form of text or computer files can be sent to a single recipient or to a list of many thousands. Complex files can be attached to messages and sent to recipients exactly as they were created. The recipients receive them directly on their computers and can then work on them. E-mail is fast replacing the fax machine as transmission speeds increase and the technology becomes ubiquitous.

EDI allows automatic exchange of orders and invoices, removing the requirement for manual duplication of documents. This has important implications for efficiency in the distribution and retail sale of tangible goods. This is particularly important in the food sector, increasingly under pressure to shorten lead times for filling orders and reduce inventory.

...linking across countries...

Corporate networks allow companies to link internally across countries or internationally, allowing offices and departments to work together as if they shared the same building.

...ready for business no matter where we are...

Mobile services have been extended to include data transmission (e.g. fax, e-mail, short message service) as well as voice calls. This means that the office of the future will be portable and personal and all communications services will be available over mobile networks. We will be able to travel anywhere, yet be ready for business when needed.

Video services (videotelephony/videoconferencing/videoclips) allow visual communication regardless of the location of the participants, giving considerable scope for saving both time and travelling costs. Desktop videoconferencing and business TV services are becoming increasingly widespread.

An important future application for this technology will be in call centres providing software support, where the customer and the service provider (no matter where they are) can simultaneously work on a problem.

File transfer of large files (e.g. cat scans or other medical results, video games or software, all of which take up a lot of storage space on computers) is of particular importance to some sectors at present.

A new range of business opportunities and services...

Database access is becoming more important as the ability to source information becomes essential to the success of a company. Global information on markets, products and services are held in commercial databases. These are essential for sourcing new markets, finding new ways to win market share and preparing business for foreign competition.

Digital Television is an important broadband service that will result in a dramatic increase in the number of available TV channels. The technology will not just increase the choice, quality and control of television content for consumers, but will also open up a whole range of new business opportunities and telecommunications services for the enterprise sector. For example, information can be sold, banking transactions carried out and mall shopping done with the aid of pictures and video.

...and a gateway to the Internet in every home

It is likely that access by digital television, rather than by personal computer (PC), will be the way to the mass market for business. Digital TV will be interactive and will effectively be a gateway to the Internet in every home, including those that do not have a PC. This will provide new opportunities for Irish companies to sell their products direct to the consumers. (The downside of this is, of course, that it will simultaneously increase the number of competitors). New businesses will also be created using this new medium.

VPN - a broadband application that provides advanced communications services to corporate customers

VPN (Virtual Private Networks) is an intelligent network service that uses the vast capacity of broadband networks. It is provided to corporate customers that are multi-site (both nationally and internationally) in nature and have large inter-site communication requirements. Such customers include multinational companies, banks, building societies and Government departments.

VPN uses the public network, but in such a way that the customer appears to use a private network. Calls between sites therefore use short-code dialling (private dialling), while public numbers (local, national and international) can be dialled by adding the prefix '0' to them. VPN is in the realm of broadband multimedia networks, with all traffic types (including video) being handled. Companies in Ireland can also extend their VPN to their mobile fleet, providing ease of use and considerable savings for mobile-to-office calls.

All of the above applications are potential sources of competitive advantage and are only a sample of the applications possible on broadband networks.

1.3 Opportunities and Threats

New ways for doing business...

...and creation of new businesses

Two broad approaches can be taken in considering of the implications of the new technologies for businesses:

1. Existing enterprises can consider new ways of carrying out and expanding their existing businesses and use digital technology to its maximum;
2. Entrepreneurs can look at opportunities for the creation of new businesses arising from the implementation of the new technologies.

1.3.1 Opportunities for existing enterprises

Electronic commerce - trading goods and services over a telecommunications network

In broad terms, the development of the Internet as a business tool is the most significant telecommunications issue facing companies in Ireland. It means that goods can be sold directly to consumers and paid for electronically. Such business is called **Digital Business** and the way it is carried out is called Electronic Commerce. **Electronic commerce** (e-commerce) is an exciting new opportunity for all enterprises, from the local corner store to large software companies.

In Ireland, consumers are starting to purchase information, goods, holidays and other services through their own personal computers. In the future, products in the entertainment, banking, software and learning sectors will increasingly be delivered over telecommunications networks to personal computers and digital televisions throughout the world. In fact, **all** sectors of industry will in the future make use of e-commerce.

Four different kinds of business activities are included in e-commerce.

Productivity improvements...

1. **Business-to-business e-commerce.** In the US, companies are putting their purchasing, supply chain management, inventory management, customer relations and logistics up on the Internet. The companies that have begun to do this are already realising dramatic productivity improvements.

...goods and services sold and delivered over the Internet...

2. **Digital sale and delivery of services and products** on the Internet. Everything from games and music to insurance policies, airline tickets, banking services, educational services and consulting services will be sold and delivered across the Internet to consumers. At present, such business is driven by children in the home (buying and downloading video games and music) and by the banking sector, but such activity will soon become global.

...even tangible goods...

3. **Retailing of physical goods.** Products as diverse as books, cars, flowers and clothing are being sold digitally (on the Internet) and delivered physically. It is estimated that 20 per cent of all the books and 10 per cent of all the cars sold in the US in 1999 will be sold on the Internet.

...with more effective marketing

4. **Direct marketing and advertising.** Marketers can be far more efficient in marketing to 'affinity groups'[5] on the Internet than they can be marketing or advertising to the population in general. Such groups will become more and more important, as advertisers and distributors become able to tailor products or services more specifically to the customers' needs.

The opportunities in digital business are immense. All manufacturing and services industries in Ireland should examine the potential for them in the area of e-commerce (as well as other forms of digital business) and implement appropriate actions.

1.3.2 Opportunities for new industries

We can become a leader...

In the US, e-commerce began three years ago; in Europe, the awakening began about a year ago. Ireland has a tremendous opportunity here. Already we are the European leader in telecommunications-based sectors such as telemarketing and call centres. Ireland can also become a leader in the field of e-commerce as we have a number of natural advantages:

- A strong base of overseas companies are based in Ireland, including a number of leading US companies in this field;

5 *Groups that share a common interest or environment. An example is 'Parent Soup', an affinity group of parents with young children, now estimated to number over 300,000 globally.*

...by being adaptive and creative

- a number of indigenous Irish companies have moved into the world of e-commerce (e.g. banks and other financial institutions);
- Ireland has significant software capability;
- we have the English language (the language of the Internet) and a facility for foreign languages;
- we are the only English-speaking country using the euro;
- we have a young population - more easily adapting to the Information Age; and
- we have an excellent education and training system.

To become the European centre for e-commerce, all business and Government organisations will have to adopt e-commerce as a way of doing business. It will also involve attracting new overseas companies and developing Irish-owned businesses based on e-commerce. Although ambitious, it is a real opportunity, one that can be achieved and would establish Ireland as one of the European leaders in e-commerce.

Enormous potential exists in the digital age for:

- the diversification of existing enterprises into new areas;
- the delivery of products and services in new and innovative ways; and
- the exploitation of new markets.

The multimedia content industry - combining video, sound and text

One growth sector deserving particular attention is that of the **content industry**, supplying material for inclusion in entertainment, educational or cultural products. Already over 30,000 people are employed in this industry (film, music, radio, publishing and advertising), producing output worth more than IR£1 billion annually.

Many opportunities exist to build and attract **multimedia** businesses that combine video, sound and text to create and electronically distribute education and training, entertainment and corporate communications products. Ireland is well positioned to exploit emerging opportunities in this area due to our strong position in software, media and the creative arts.

Digital support services are needed by an increasing number or companies

Another sector with potential is that of **digital support services**. An increasing number of companies in Ireland (indigenous or overseas) send products out over the Internet, giving rise to a demand for the following specialised support services:

- Computer animation and graphics, modelling and simulation;
- Development of software tools and systems. These include items such as voice recognition systems and World-Wide Web constructors for non-specialist companies;
- Post-production of film and video (writing, editing, addition of sound, music, etc.).

Opportunities will emerge for companies to supply developing industries in products or services

International digital or telecommunications industries locating in Ireland require infrastructural and network services such as fibre, routers, switches and specialised software. Demand for such items and provision of associated services will increase dramatically with the increase in the use of broadband applications. The software industry will also need specialised localisation services such as automatic translation tools for the international software market. There is an opportunity to attract such companies to Ireland and to develop Irish-owned companies in relevant areas.

1.3.3 Threats

If the digital revolution is ignored and out-moded business practices and models are maintained, businesses will lose competitive advantage to rival companies who will inevitably increase market share and improve trading efficiency. Only by becoming aware of the opportunities and threats inherent in the new technologies and formulating appropriate strategies, will businesses thrive.

Irish companies will come under pressure

Specific threats include the following:

- Companies that currently enjoy market leadership in Ireland will come under pressure from overseas competitors and need to have competitive strategies in place before this occurs.
- The lack of sustained investment in ICTs and in the required training in their use by Irish-based firms. This could lead to a growing disparity between Irish firms and international competitors. Such disparities could lead to losses in market share on both home and international markets. For example, with international retail chain-stores, having compatible technologies is a prerequisite for supplying into their international supply chains.
- Accelerated trends in efficiency will put pressure on Irish companies who do not have new strategies in place. In particular, the movement to out-sourcing of specialist products and services will challenge Irish industries.

New strategies are vital in a less regulated market...

- The marginal cost of entry to a market using e-commerce is low and relevant information is readily available. However, regulatory control is difficult to apply and cross-border trading in electronic goods and services hard to monitor. Companies operating in highly-regulated markets will come into competition with rivals operating in markets that are not so regulated. This could have the effect of entry to the marketplace of non-regulated goods, with subsequent loss of competitiveness for the regulated product.

...as is the availability of the required skills

- The availability of the required skills is an essential pre-requisite for the development of digital age companies and upon which, more than any other single factor, their success is critically dependent. Companies must ensure that people with the required expertise are retained and that a broad range of creative and technical skills is available to support the target markets.

2 Need for Preparation by Businesses

2.1 Developing Plans

2.1.1 Evaluating the business

Evaluating all aspects of each business

Among the implications of the digital revolution is that every business, small or large, trading domestically or internationally, needs to plan and prepare for e-commerce. Each enterprise is encouraged to evaluate all aspects of their business in the light of changes occurring and the opportunities and threats that they present.

Asking the right questions is important

Important questions include:

- What exactly do we need to do?
- Who will be responsible for the development of our e-commerce process?
- When will the planning process begin and how long will it take?

Whether you employ two or 2,000 people; whether you operate in a manufacturing or service industry; and whether you are a local, national or multinational organisation, a similar planning process can be followed to ensure that your business is fully prepared for doing business in the digital age.

A number of key activities are central to this planning:

a) **Assign responsibility**

The owner of the business or a key employee can take responsibility for planning

As a starting point, responsibility for planning for e-commerce and other use of ICTs should be assigned to one or more individuals. In SMEs, this is likely to be the owner or a key senior employee. Some initial information gathering from business and trade associations and the development agencies will ensure a broad level of understanding of the issues. Telecom operators can also describe the services they offer and how they can benefit your business.

b) **Investigation of in-house knowledge**

An in-house knowledge 'audit' will pinpoint who knows what inside the company. Through such an audit, the company's top intellectual assets can be determined. An important aspect of this is the convincing of employees to share what they know rather than horde knowledge to protect their standing in the organisation. As well as being a resource to management, that knowledge can be spread throughout the organisation, perhaps through the creation of an online directory available to all employees.

Just as companies are now familiar with the concept of in-house computing skills, in the future they will also need to develop expertise in telecommunications systems.

What networks are available and how can they be used?

c) **A knowledge of new technologies becoming available to that enterprise.**

Under the heading 'new technologies', investigations can include:

- Faster and more efficient telecommunications networks:
  - plans for implementation in the area of the business;
  - what is currently available, including fixed and mobile integrated services;
  - how it could be used;
  - group services; and
  - pricing.
- Applications using these networks. An overview has been given on applications currently available using faster communications networks (section 1.2.3). Emerging best practice indicates that each business should investigate how these could be used to carry out that business and improve its efficiency.

What does e-commerce mean for my business?

- In particular, the potential of e-commerce for the business should be investigated. As previously stated (section 1.3.2), for Ireland to become the European leader in this field, **all** businesses must consider adopting e-commerce as a way of doing business. Even the smallest local retailer or service provider can use the Internet to buy and sell, deliver services and market their products. An example of this is a craft worker in County Waterford who is planning to use the Internet to market his hand-cut crystal products in the US, thus overcoming the problems caused by the short tourist season.

d) **Business impact - an investigation of the ways in which using the technology will change business practice.**

How will this change the way I do business?

Changes in business practice resulting from the use of new technologies can be investigated. Suppliers and customers should be involved in this process to determine their future needs and technology capabilities. Questions asked can include:

- What are the opportunities for and threats to my business in the digital age?
- How can I give new or better service to my customers using the new technologies?
- How can I attract new customers?

How can I give and get better service?

- If the Internet is used as a marketing tool, what does this mean for my marketing department?
- What are the implications for each functional area?

What is best practice in the digital age?

- What are the implications for how I do business with my suppliers?
- What does it mean for my distribution network?
- If distance is no bar to getting supplies, do I have to locate all my business in a busy city with all the inherent problems (traffic, cost, etc.)?
- Could I network with other companies to share marketing or distribution platforms?
- Where will I source the expertise necessary to set up a new system based on my new ideas?
- What is best international practice for my business in the digital age?

2.1.2 The potential for new enterprises

The potential for setting up new enterprises using these new technologies can also be investigated. Examples of questions that can be asked include:

Could I or my company start a new business?

- Could my company offer products or services to other companies, regardless of location?
- Have I creative skills that can be used for the content industry? Writing, a knowledge of local history, art?
- Can my experiences in sound engineering/drama (for example) be put to use in a multimedia project?

Or exploit new markets?

- Could my company's experience in critical path analysis/advertising/graphics be used in the design of web sites?
- I have been working for a software company for years. Can I offer support services to companies doing new and really interesting things?
- Could I help someone else to adapt to Digital Business? Start up a consultancy? Offer services?

2.1.3 Formulating the strategy

The implications of e-commerce on key areas of the business

Your company should not wait too long to dive in. The people responsible for carrying out these investigations should report back to the company directors with a minimum of delay. At this stage, you should have a good understanding how e-commerce will affect your business, the markets you are in, who your competitors will be and what your ICT requirements will be in order to deal effectively and efficiently with your customers and suppliers.

You should also have detailed assessments of the implications of e-commerce on the following key areas:

- Marketing, sales and distribution;
- Production, product development and purchasing;
- Accounting and finance;
- Information technology;
- Human resources;
- Legal.

The strategy is drawn up...

Following such a report, a working group should be set up to consider the company's strategy in the light of the findings.

The strategy should include:

- An overall aim for business practice.
- Specific objectives.
- Goals
  - technology to be implemented;
  - changes in organisation;
  - changes in customer services;
  - time-scales.
- Methodology and supports needed.

...in light of the findings

2.1.4 Get started!

Companies with expertise can be contacted

Having done the necessary research, it is time to take the plunge and get started in the world of e-commerce. If in-house expertise is not available, contact can be made with companies that offer advice on how to put your core business processes on-line and how to sell your merchandise or services over the Web most efficiently, while protecting your vital systems. Information can be obtained from state agencies or IBEC on companies and organisations with the expertise you require. The commercial section and directory in this guide describes e-commerce services provided by such companies. Telecommunications network and service providers can give guidance as to the options available.

2.2 Support

2.2.1 Agency support

Encouraging the development of e-commerce

Offering a wide range of supports to firms in the software and international services sector

One of the priorities of Enterprise Ireland and IDA Ireland is to encourage the development of e-commerce activities and the take-up of Information and Communication Technology. Financial assistance for upgrading existing telecommunications links and implementing new technologies may be considered as part of a business development plan.

Enterprise Ireland and Shannon Development are targeting Irish companies and encouraging them to define their strategy for becoming digital businesses. As part of the establishment of Enterprise Ireland in July 1998, the Tánaiste and Minister for Enterprise, Trade and Employment expanded the range of international services activities eligible for state agency assistance to include electronic commerce activities. Enterprise Ireland offers a wide range of supports to firms in the software and international services sectors. Firms involved primarily in e-commerce based activities will be eligible to receive full financial and soft supports. Financial supports will include employment grants, preferential equity, R&D grants, training grants, feasibility study grants, technology transfer grants and management consultancy grants. Additional supports will include expert advice on business strategy, marketing, human resources, finance and R&D.

However, there will be a heavy emphasis on encouraging all clients to develop websites and e-mail addresses which will then be hyperlinked to the sectoral directory of more than 3,000 companies on the main Enterprise Ireland website (www.enterprise-ireland.com). Seminars and advice will be available to all companies on using the internet for competitive advantage. Financial assistance may also be made available for the creation of websites subject to state-aid constraints.

Emphasis on developing websites and on using the Internet

Enterprise Ireland also financially supports the placement of information technology and systems graduates in SMEs with the objective of enhancing the internal and external IT and systems of those companies. There is a major emphasis on increasing the use of e-commerce as part of this enhancement.

The Science and Innovation Directorate within Enterprise Ireland will support industry and universities in Ireland in relation to the European Union 5th Framework R&D programme. In this Programme there is a specific key action in 'New Methods of Work and Electronic Commerce'. Within the Information Society and Technologies (IST) as a whole there are also opportunities to help industry in awareness, best business practices and demonstrations of e-commerce use.

IDA Ireland is proactively targeting overseas e-commerce, multimedia and other related sectors with a view to attracting suitable companies and establishing digital projects in Ireland.

Developments in the ICT sector at a national level abroad are being monitored by IDA Ireland. This is central in the move towards establishing Ireland as a leading European location for digital business.

A Digital Park is being established

A feasibility study on the establishment of a Digital Park in Ireland was carried out by Forfás and a decision was made to establish such a Park in Dublin City Docklands and Citywest Business Park. This is now being implemented by IDA Ireland and will require the installation of advanced telecommunications support on the site with links to the transnational telecommunications operators. The Digital Park will support enterprises with high ICT needs and stimulate the take-up of advanced services and the infrastructure required to support the new digital businesses.

Enterprises to be targeted include specialised advertising; sound and video recording and editing; film and television studios; animation; software programming; and production and business management. The promotion of the Digital Park will make a significant contribution to establishing an Irish Centre of Excellence in the emerging content industry of the Digital Age.

Electronic Government will be here within three years

The **Government** has published a decision to introduce Electronic Government in Ireland within a three-year period and work is underway in Government departments to determine their needs. The Internet and electronic communications will allow most public services to be available on-line. Citizens will be able to access public services from their homes and from community locations such as public libraries, encouraging the use of ICT and familiarising people with it.

Under the auspices of the Information Society Commission and IBEC, an **Awareness Campaign** targeted at business is under way (see below). 'Best practice' case studies demonstrating the benefits that can accrue to business through the use of new technology are being collected and disseminated.

Demonstration projects and centres of excellence are being encouraged in universities, trade organisations and others.

2.2.2 IBEC support

- **E-Commerce Business Awareness Campaign**

  The ways in which firms operate in an electronic environment are constantly changing and vary from industry to industry. Many industries are now in their second or third generation of e-commerce, while others have not yet entered the arena.

Seminars on how to access e-commerce market

  With this in mind, IBEC and the Information Society Commission, with assistance from the European Commission, are running a series of seminars, nationwide, on how to access the ever-growing e-commerce market. The campaign will target SMEs, particularly those in the services sector, which depend heavily on telecommunications. The e-commerce market world-wide is predicted to grow from $10 billion today to $350 - $500 billion by 2002[6] .

6 *"Your choice. How E-Commerce could impact Europe's future" - Andersen Consulting.*

Each seminar will consist of a number of expert speakers from relevant companies that have succeeded in this expanding market, as well as expert service providers. There will also be opportunities for participants to meet vendors and state agency experts.

For further information contact Michael Moore at IBEC head office.
Tel: (01) 605 1659 Fax: 638 1659 e-mail: michael.moore@ibec.ie

- **IBEC Telecommunications Policy Committee**

Ensuring that quality and up to date services are provided

The Telecommunications Policy Committee promotes the development of policies for telecommunications services as a key factor in determining the current and future competitiveness of the Irish economy and the consequent maintenance and generation of employment. It seeks the development of competition in the provision of telecommunications services to ensure that quality and up-to-date services are provided at competitive prices. The Committee recently published *"Telecommunications After Liberalisation, Policies for Ireland".* (Internet: www.ibec.ie/telecoms).

2.2.3 Telecommunications Users' Group (TUG)

An independent voice

The Telecommunications Users' Group (TUG) has been set up as a response to the rapid changes in the whole area of telecommunications, to give an independent voice to the end-user community. The membership of the group is made up of representatives of companies, large and small, who are dependent on a quality advanced telecommunications infrastructure at the right price. (Internet: www.tug.ie).

2.3 A Partnership Approach

The Information Society is here...

At the turn of the century, the Irish enterprise sector can no longer ignore the implications of the advances in telecommunications for business practice and markets. The Information Society is here and now, bringing with it huge new opportunities and, accompanying them, new threats. Action is happening on many fronts:

Action on the part of Government - establishment of a business environment that encourages on-going investment in the telecommunications infrastructure, including investment in remote areas. The key issue is to ensure that the regulatory environment promotes a competitive liberalised market, encouraging operators to make the required investment. A programme to implement Electronic Government and to establish a Digital Park has been announced.

...service providers...

Action on the part of the Telecommunications Industry - making the required investment in infrastructure and services so that new technologies and business applications will be accessible to all enterprises - rural as well as urban, small as well as large, services as well as manufacturing.

...and businesses

A call to business leaders to get involved

Action on the part of Business - this is the most crucial aspect of all. The challenge is there for all enterprises to take part in the new era and to take full advantage of the opportunities arising. In the modern, more prosperous Ireland, confidence in our ability to exploit our native advantages is growing and we now have a unique opportunity to become a European leader in new ways of doing business arising from the implementation of advanced telecommunications services.

In summary, what can business leaders do?

- Become aware. Awareness of the new technologies and their implications for business practice is essential at a time when international best practice for each business is rapidly changing.
- Evaluate all aspects of your business in the light of the changes occurring and the opportunities and threats that they present.
- Explore the potential for the set-up of new enterprises in the new environment or diversification of existing ones.
- Formulate strategies for the company to take advantage of new opportunities and overcome potential threats.
- Look for supports from the agencies involved - state or business representative associations.

A partnership approach between Government, service providers and business will ensure that the progress of Ireland into the Information Age will bring with it increased prosperity and improved quality of life for all its people.

3 Broadband Services in Ireland

3.1 The Network

3.1.1 Why is it important to have a broadband network?

New applications and services are coming on stream...

Up to now, broadband was something that was important mainly to multinational companies requiring high-speed links to parent companies abroad; to research institutions such as universities; and to telecommunications operators who provided services nationally and therefore had to have high-capacity internal networks.

However, the situation is changing dramatically, with so many new applications and services coming on stream, all requiring advanced networks. As already described:

- Ireland is at present the Call Centre capital of Europe and services will soon include web-video links;
- the top US computer and software companies are locating in Ireland, bringing with them demands for advanced services such as video editing and software distribution;

...bringing demands for faster networks

- Government has declared its decision to provide Electronic Government within three years. This will include video consultations and access to huge databases;
- the opportunity exists for all companies to use e-commerce and for Ireland to become the leader in Europe in this field. This will require high-capacity service provision and international links;
- advanced technology, including products that carry voice, data and video on one network gives the opportunity for businesses to interact and communicate with other businesses and customers across the world at the same quality and speed as if they were in the same building.

All of the above means that a universally accessible broadband network is now required, together with very high capacity international links for new users.

3.1.2 How is broadband provided?

Broadband is a high-speed telecommunications link

Broadband is essentially a high-speed telecommunications link. It can be provided:

- via optical fibre networks where light is used to transmit signals;
- via satellites and high-speed radio technology (wireless broadband);

- via TV cable systems, using cable modem connectors;
- via the ordinary copper telephone line, using advanced technologies called ISDN, HDSL and ADSL (Table 1).

The capacity of broadband networks is described by rate of transmission (or bandwidth) and measured in Mbit/s.[7] The minimum capacity for broadband connections, and that most commonly provided, is 2 Mbit/s. Although this capacity is adequate for most of today's applications, as we move forward into the Information Society many customers are now demanding increased bandwidth of 34 Mbit/s, 155 Mbit/s or higher.

3.1.3 Broadband networks in Ireland

In general terms, the broadband networks in Ireland are organised as follows:

'Backbone' networks are in place...

'Backbone' networks - very high capacity fibre optical networks (telecommunications 'highways'), used to transport large quantities of information between the towns and cities connected to the network. These are managed by telecommunications operators.

...and local access networks are being rolled out...

There is ongoing development of Ireland's backbone network in order to meet anticipated requirements. A new technology called SDH[8] is increasingly being used in the Irish backbone network, as it is well suited to the administration of higher transmission rates and provision of broadband services. Public ATM[9] switches are being installed and, together with the extensive trunk fibre network, a national broadband network is being rolled out.

Local access networks to business parks, enterprises or homes - optical fibre, wireless, TV cable or upgraded telephone wires. The predominant way of accessing broadband will be copper cables and wireless with optical fibre being deployed to high volume business users and business parks. ATM switches are used to connect local networks to the backbone system. Major investment will be required for local access networks, which require immediate up-grading.

The demand is growing for access to national and international broadband links...

International links using high capacity optical fibre. At present, there are several international links to the UK and one to the US (Map 5). Major investment will also be required for international links, adequate for present requirements but requiring upgrading in the medium term.

A summary of telecommunications services being offered at present or planned in the near future is shown in Table 1. Services range from ordinary telephony to high-speed services allowing voice, data and video to be carried at the same time. Video-conferencing is an example of a service that uses such high-speed services.

7 *Megabits per second. A 'bit' is a unit of information. 1 Mbit/s is a million bits per second.*

8 *Synchronous Digital Hierarchy - a standard for high capacity transmission.*

9 *Asynchronous Transfer Mode - allowing, voice, data, audio, video and other kinds of telecoms traffic to be carried on the same network.*

Table 1 - Telecommunications Services

Service	Examples of Use	Speed	Typical Network
PSTN	Telephony and modem, e.g. internet access, e-mail	64 kbit/s (voice) 56 kbit/s (data)	Copper pair (ordinary telephone network)
Basic rate ISDN	Telephony, data, PC to PC conferencing	144 kbit/s	Copper pair
Primary rate ISDN	Telephony, PABX, video-conferencing, data	2 Mbit/s	Copper pair
HDSL - High Speed Digital Subscriber Line	Access to broadband services for business customers	2 Mbit/s	Copper pair
ADSL - Asymmetric Digital Subscriber Line	Fast downloading of large files and video	8 Mbit/s towards the customer, 640 kbit/s away	Copper pair
ATM - Asynchronous Transfer Mode	Broadband, e.g. large data transfers, video, multimedia	2 Mbit/s to 622 Mbit/s	Optical fibre
SDH - Synchronous Digital Hierarchy	Operators' backbone network	Up to 10 Gbit/s	Optical fibre
WLL - Wireless Local Loop (planned)	Access to internet services	32 kbit/s to 8 Mbit/s	Radio signals
TV Cable Systems	Fast internet access and interactive services	-	TV cable networks
Managed IP (Internet Protocol)	Data transfer, e-mail, video, multimedia and internet access	64kbit/s to 155 Mbit/s	Optical Fibre
GPRS (available in 2000)	Access to Internet, interactive and multi-media services	Up to 110 kbit/s	GSM
EDGE (available in 2002)	Access to Internet, interactive and multi-media services	Up to 384 kbit/s	GSM/UMTS
LAN interconnect	Voice and data connection between corporate sites	155 Mbit/s	Optical Fibre

3.2 Availability of Services

3.2.1 Broadband network providers

Competition has arrived

A wide range of broadband services (as described in Table 1) are, or will be, provided by operators in the Irish market:

- ATM to 155 Mbit/s
- LAN interconnect to 155 Mbit/s
- Managed IP services
- On-campus connection to 620 Mbit/s
- Faster internet access using cable modems
- Mobile data services

These include:

Rolling out ATM and fibre...

Telecom Eireann has over 70,000 fibre kilometres in place on its backbone. Two separate submarine fibre cables (SOLAS, CELTIC) to the UK with capacities of 2.5 and 5 Gbit/s provide international linkages. Telecom Eireann is now making broadband infrastructure available in response to customer demand. It is undertaking an accelerated deployment of ATM switches and is offering commercial ATM services. Fibre access has already been provided to business parks and commercial areas in all cities and is being deployed to towns around the country with over 1,000 existing telephone lines.

A new submarine cable between Ireland and UK

Esat Telecom completed the construction of a national 2.5 Gbit/s fibre backbone cable at the end of 1998 that reaches 30 cities and towns. It is presently constructing a fully privately owned submarine cable between Ireland and the UK with a 2,500 Mbit/s (2.5 Gbit/s[11]) capacity, with a second cable due to be completed mid-1999.

MCI WorldCom is a global provider of voice, data and internet services. In Ireland, MCI WorldCom is continuing to expand the existing fibre cabling, targeting business parks in Dublin, Cork, Galway and Limerick.

Using electricity power lines to carry fibre

OCEAN is currently laying a national fibre backbone. Efficient roll-out of this network is facilitated by the use of existing power lines and ducting possessed by the ESB. The consortium is planning to invest up to IR£120 million over the next four years.

11 *Gigabits per second - One gigabit = 1,000 megabits.*

NTL, also operating in Northern Ireland through a subsidiary Cabletel, has laid an undersea fibre cable between Ireland and UK. IR£30 million was invested in 1998. The cable has a link to Northern Ireland and onwards to Scotland and offers services to Irish and international telecommunications providers.

Fast Internet access via TV cable

Members of the Cable Communications Association of Ireland, for example, **Cable Management Ireland (CMI)**, are currently offering fast internet access services in the Dublin area. This service makes use of cable modems and CMI's existing cable infrastructure.

Stentor provides full e-commerce and internet solutions to business. It also provides turnkey solutions to call centres, as well as carrier's carrier services to other telecommunications operators.

GTS Ireland is part of Global Telesystems Group, Inc. a leading provider of telecommunications services worldwide. In Ireland, the range of services offered includes voice, data, internet, and mobile communications.

Cable and Wireless have extensive broadband infrastructure worldwide and are actively serving the Irish business consumer with a range of telecommunications services.

Eircell and Esat Digifone are currently planning deployment of GPRS and EDGE, which will enable high-speed data exchange over its GSM networks.

3.3 Planned Investment in Broadband

3.3.1 National backbone network

Map 1 shows the state of the Irish backbone network as of March 1999 and Map 2 illustrates the planned development of that infrastructure up to March 2000. Significant investment in the backbone network is expected over the coming years and operators such as Telecom Eireann, Esat Telecom, OCEAN, MCI WorldCom and NTL have revealed plans to roll out additional fibre. Telecom Eireann alone has intentions to roll out an additional 40,000 fibre kilometers by March 2000. Although not shown in the maps, a number of operators also use high-capacity radio links in the backbone network.

At present, between main population centres the maximum available capacity is up to 2.5 Gbit/s using SDH technology. The period March 1999 to March 2000 will see 'fill-in' of the existing SDH network as well as extension to Sligo, Ballina, Castlebar and north as far as Letterkenny. By March 2000 it is planned that links with 40 Gbit/s maximum capacity will be in operation linking Dublin, Galway, Limerick, Cork and Waterford.

Map 1

National Backbone Network - March 1999

Capacity

2.5 Gbit/s Fibre (SDH)

565 Mbit/s Fibre (PDH)

≤ 140 Mbit/s Fibre (PDH)

NOTE: PDH copper or radio infrastructure is not shown

INFORMATION SOURCES

Esat Telecom
Global One
NTL
Stentor
Telecom Eireann
MCI WorldCom

National Backbone Network - March 2000

Capacity

40 Gbit/s Fibre (DWDM)

2.5 Gbit/s Fibre (STM-16)

≤ 140 Mbit/s Fibre (PDH)

NOTE: PDH copper or radio infrastructure is not shown

INFORMATION SOURCES

Dept. of Public Enterprise
Esat Telecom
Global One
NTL
Stentor
Telecom Eireann
MCI WorldCom

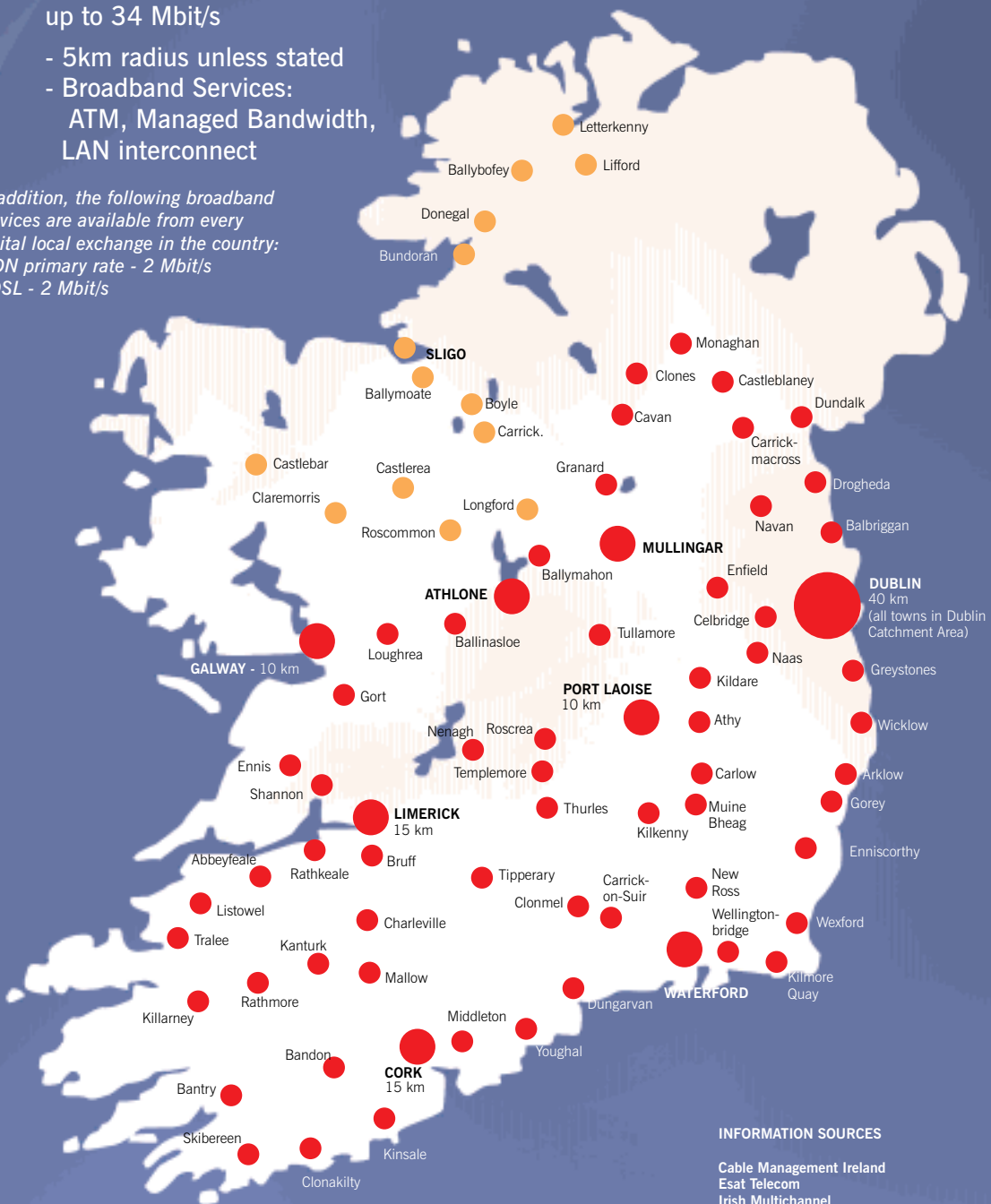
Map 3

National Broadband Access Network - March 1999

Access Capacity

- up to 155 Mbit/s
- up to 34 Mbit/s
- 5km radius unless stated
- Broadband Services: ATM, Managed Bandwidth, LAN interconnect

In addition, the following broadband services are available from every digital local exchange in the country:
ISDN primary rate - 2 Mbit/s
HDSL - 2 Mbit/s



INFORMATION SOURCES

Cable Management Ireland
Esat Telecom
Irish Multichannel
NTL
Telecom Eireann
MCI WorldCom

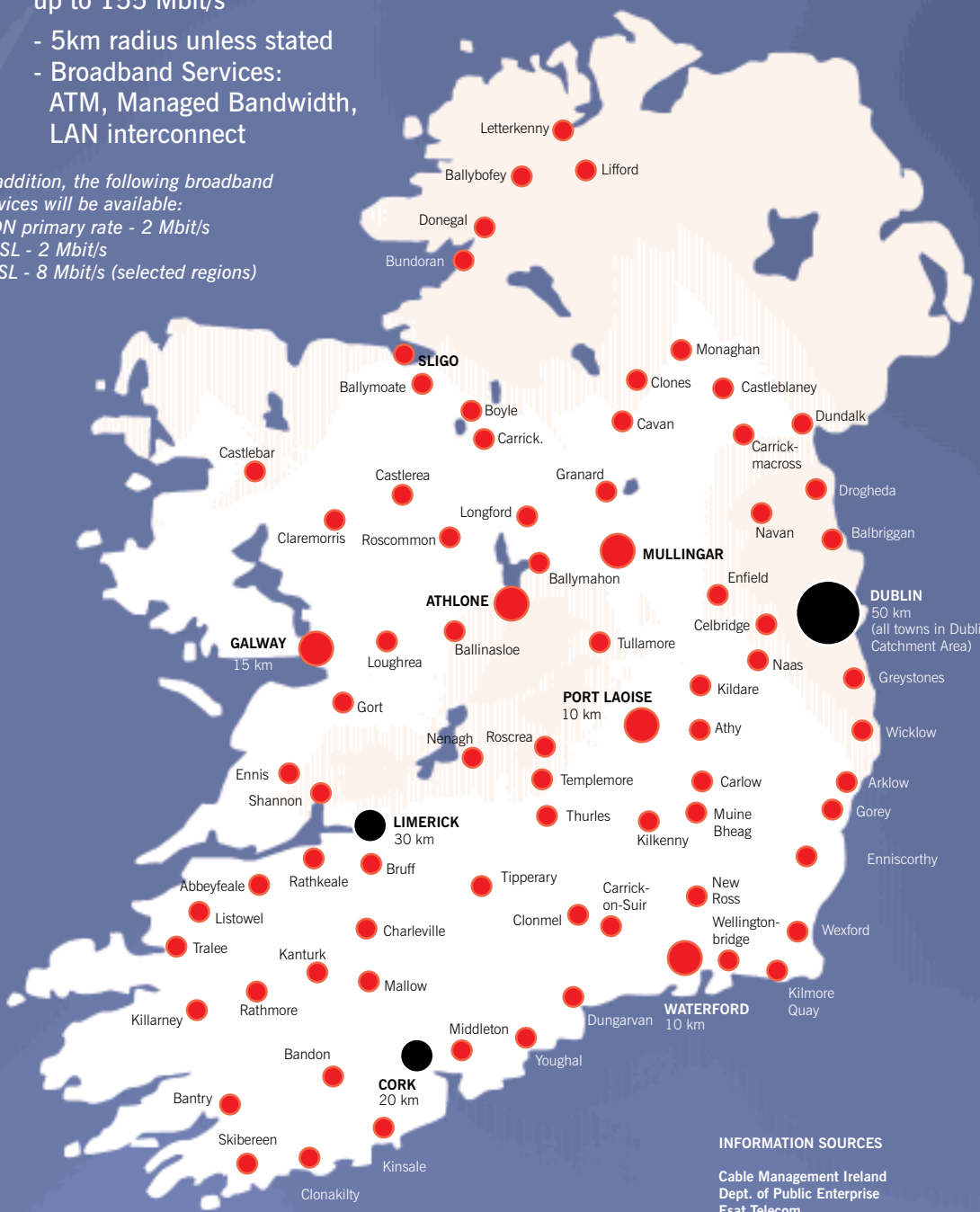
Map 4

National Broadband Access Network - March 2000

Access Capacity

- up to 620 Mbit/s
- up to 155 Mbit/s
  - 5km radius unless stated
  - Broadband Services: ATM, Managed Bandwidth, LAN interconnect

In addition, the following broadband services will be available:
ISDN primary rate - 2 Mbit/s
HDSL - 2 Mbit/s
ADSL - 8 Mbit/s (selected regions)



INFORMATION SOURCES

Cable Management Ireland
Dept. of Public Enterprise
Esat Telecom
Irish Multichannel
NTL
Telecom Eireann
MCI WorldCom

Map 5

International/Northern Ireland Links - March 1999

Map 6

International/Northern Ireland Links - March 2000

3.3.2 Local Access Network

Enhancement of the existing network and extension to the North-west

In parallel with the roll-out of nation-wide backbone fibre networks, development of the local access infrastructure is taking place (Map 3). Existing services (e.g. ISDN and HDSL) have recently been augmented by the roll-out of broadband ATM services to more than 40 towns and cities throughout the country and coverage is expected to increase over the coming year. In addition, substantial local fibre networks are planned for main centres such as Dublin, Cork, Limerick, Galway, Athlone, Drogheda, Port Laoise, Waterford, and Sligo. Service providers for ATM access include Telecom Eireann, Esat Telecom, MCI WorldCom and OCEAN. By March 2000, service up to 622 Mbit/s will be available in the main cities for high capacity users (Map 4).

Broadband links are targeted at towns with over 1,000 lines

Some operators have plans to launch Asymmetric Digital Subscriber Line (ADSL) access in 1999. ADSL allows access rates from the network to the user up to 8 Mbit/s and is ideal for broadband services such as LAN access, fast Internet access and video-on-demand.

Radio and TV cable services

Licences for Wireless Local Loop (WLL) are expected to be issued in 1999 with a minimum of narrowband (144 kbit/s) and broadband (2 Mbit/s) services to be provided. WLL access is seen as an efficient means of providing universal access to 'Information Society' services throughout the State, and should complement the wireline-based infrastructure. It is expected that a number of operators in Ireland will be interested in applying for these licences.

Using TV cable networks, Cable Management Ireland (CMI) have launched a fast internet access service for residential users in North County Dublin and Cablelink have similar plans for their franchise area. Suir Nore Relays have also recently secured EU funding to develop a cable TV network in Clonmel and Kilkenny. Irish Multichannel also plan to upgrade their cable networks and to provide a full telecommunications services using WLL.

Government action to address regional deficit

To address the problem of regional deficit, the Department of Public Enterprise recently announced IR£11.5 million funding towards the development of broadband infrastructure in locations such as Galway, Thurles, Clonmel, Tralee, Castlebar and Tallaght.

3.3.3 International/Northern Ireland Telecommunications Links

International links to UK and US

Map 5 shows international links from Ireland in March 1999. NTL has laid down a fibre link between Dublin and Belfast (2.5 Gbit/s) and Dublin to Preston (2.5 Gbit/s). Esat Telecom has also laid a 2.5 Gbit/s fibre link from Wexford to Lands End. The remaining links are provided by Telecom Eireann, including Dublin-Holyhead (radio and submarine fibre), SOLAS to Oxwich Bay, and CELTIC to the Tier 1 internet access point at Lands End. Esat Telecom has also laid a fibre cable from Wexford to Lands End.

Earth stations in Cork and Limerick provide access to the Intelsat and Eutelsat communications satellites and Telecom Eireann also provides access to the Private Transatlantic Telecommunications Cable (PTAT). However, the PTAT cable has limited bandwidth (45 Mbit/s to the US) and is not suitable for the transmission of broadband data.

More planned

Map 6 shows the number of additional international links currently under development. Esat Telecom are installing a second 10 Gbit/s link from Dublin to Southport and MCI WorldCom are planning links to the UK that will connect to their Ulysses (Pan-European) and Gemini (Transatlantic) networks.

As can be seen (Maps 5, 6), all international traffic from Ireland (except for low capacity PTAT and satellite links) currently passes through the UK. From there it is further routed on international cables such as TAT-12 and TAT-13 to the US, ODIN to Scandinavia and RIOJA to Spain. According to current plans, this will remain the case at least until March 2000, although there are plans for a direct cable from the US to Ireland and the Department of Public Enterprise is seeking to develop a public-private partnership project in this area.

Table 2 International/Northern Ireland links from Ireland

MARCH 1999

Link	Operator	Type	Capacity
Dublin (Portmarnock) - Holyhead	Telecom Eireann	Submarine fibre (PDH)	2x140 Mbit/s 1x565 Mbit/s
Dublin (Three Rock) - Holyhead	Telecom Eireann	Digital microwave (PDH)	7x34 Mbit/s
Dublin - Belfast	Telecom Eireann	Fibre (PDH)	2x140 Mbit/s 1x565 Mbit/s
Dublin - Belfast	Telecom Eireann	Fibre (SDH)	2.5 Gbit/s
Dublin - Belfast	Telecom Eireann	Digital microwave (PDH)	2x140 Mbit/s
Cork - UK (PTAT-1 East)	Telecom Eireann	Fibre (PDH)	2x45 Mbit/s
Cork - USA (PTAT-1 West)	Telecom Eireann	Fibre (PDH)	45 Mbit/s
Wexford - Lands End (CELTIC)	Telecom Eireann	Fibre (SDH)	2.5 Gbit/s
Wexford - Oxwich Bay (SOLAS)	Telecom Eireann	Fibre (SDH)	5 Gbit/s
Northern Ireland (SOLAS)	Telecom Eireann	Fibre (SDH)	5 Gbit/s
Eutelsat (Europe)	Telecom Eireann	Satellite	14x2 Mbit/s
Intelsat (North America)	Telecom Eireann	Satellite	7x2 Mbit/s
Dublin - Belfast	NTL	Fibre (SDH)	2.5 Gbit/s
Dublin-Preston	NTL	Fibre (SDH)	2.5 Gbit/s
Dublin - Belfast	OCEAN	Fibre (SDH)	2.5 Gbit/s
Wexford - Lands End	Esat Telecom	Submarine fibre (SDH)	2.5 Gbit/s

MARCH 2000 (ADDITIONAL LINKS)

Dublin-Southport	Esat Telecom	Submarine fibre (SDH)	10 Gbit/s
Dublin - UK	MCI WorldCom	Submarine fibre (SDH)	2.5 Gbit/s

3.4 Investment Requirements

3.4.1 Local Network Investment

The local access network remains a major bottleneck

Digital business requires high-speed telecommunications networks and easy access by companies to those networks. Although the optical fibre backbone network in Ireland is being developed to provide adequate capacity, the local access network (entering the customers' premises) does not, in general, provide broadband services.

As businesses adapt to the new scenario and the use of e-commerce increases, there will be a corresponding increase in demand for broadband access. It is important to establish a fast roll-out of fibre and ATM switches at local level to meet this demand. Broadband services need to be made available widely at the right price to small, as well as large, businesses and technologies in order to stimulate demand and the creation of digital businesses in Ireland.

Major investment is needed

Investment in local access networks ahead of demand would enable new services and stimulate the move to broadband through the enterprise sector. Addressing the short to medium term broadband requirements has been estimated to require approximately IR£200 million investment. This would provide high-speed ATM switches and fibre from the switches to customer premises in selected areas of high demand.[12]

The problem of such a funding requirement is being addressed. It is estimated that telecommunications operators are planning investment of IR£140 million in local access projects over the next year. A re-allocation of IR£18 million of Structural Funds has already been made to the provision of broadband infrastructure and awareness campaigns.

3.4.2 International Network Investment

High-speed international connections are required to the Internet backbone...

Internationally, high-capacity connections from Ireland to the Internet backbone and to the networks of major international carriers controlling this backbone, are essential if Ireland is to develop as a European centre for e-commerce activities. Already, data traffic is overtaking voice traffic on our telecommunications networks and the requirement for high-capacity international links is rapidly increasing.

...and 'peering arrangements' with major Internet service providers

In addition, Ireland, although a small country, can itself become part of the global Internet backbone. This can be done by establishing 'peering arrangements' with the large Internet backbone or internet service providers (ISPs). Peering arrangements are 'no fee' pricing arrangements between such service providers who handle traffic for each other to ensure maximum speed and effectiveness. A start has been made with a peering arrangement that has been established internally between ISPs currently operating in Ireland (including Indigo, Telecom Internet and Ireland OnLine).

12 *Broadband Telecommunications Investment in Ireland. Report prepared for Forfás by Analysys Limited.*

A Tier 1 connection to the main worldwide Internet backbone is now available to Irish business and to ISPs. This means that internet traffic from Ireland is no longer required to link to the UK or US, thus providing benefits in terms of both connection speed and costs.

Internet traffic is generally handled in dedicated peering facilities or 'telehouses', which have already been established in London, Amsterdam and Stockholm. They provide a competitive advantage for their host countries over countries without such facilities, including Ireland. Discussions are underway to promote the establishment of an Irish peering facility with high capacity links to the US and the major European hubs.

Challenge for Ireland:

National investment and a competitive market...

...international connections and an Irish 'telehouse'

In summary the challenge for Ireland is, therefore:

- To create a fully competitive and effectively regulated market in Ireland to help ensure that the required investment in broadband takes place and that prices are reduced to the level of our international competitors.
- To achieve a level of investment required to upgrade the existing local access network and make broadband services available to most Irish businesses.
- To increase investment by global telecommunications operators in high capacity international connectivity and ensure a peering facility or telehouse in Ireland with high-speed international links, exchanging and inter-connecting global Internet traffic.

3.5 Regulation

3.5.1 Background

Since 1st January 1998, the telecommunications markets in most of the European Union have been fully liberalised. Ireland has had a number of derogations from the timetable for liberalisation of European telecoms, including the provision of basic voice telephony until 1 January 2000. However, this deadline has been brought forward and Ireland is now completely liberalised. Competition in the provision of voice telephony has been allowed from 1 December 1998, with the consequent involvement of over 20 telecommunications operators.

The regulatory framework controls liberalisation of telecommunications

Essentially, liberalisation involves ending local monopolies by opening markets to competition. To protect the customers' interests, a regulatory framework is established that ensures a competent, efficient and effective service, while encouraging investment and providing market opportunities. The number of new operators is partly influenced by the regulatory framework, which covers such issues as the licensing process, the level of licence fee, the terms of interconnection and so on.

In Ireland, the first Director of Telecommunications Regulation took up office on 1st July 1997 (www.odtr.ie). Her key role is to instil confidence in the fundamental fairness and stability of the Irish regulatory framework. The telecommunications regulatory powers of the Minister for Public Enterprise has been transferred to the Director, who has access to the Department's budget and staff to carry out her duties within the normal constraints of financial prudence.

3.5.2 Present approach

A fair and proper development of the telecommunications market

The Office of the Director of Telecommunications Regulation was established by the Telecommunications (Miscellaneous Provisions) Act, 1996.

It regulates the telecommunications sector, including radio communications and broadcasting transmission and re-transmission. This involves:

- The development of operational policies for licensing and managing the radio frequency spectrum;
- Licensing/setting standards and specifications for operators, frequencies and equipment;
- Regulating in accordance with the licence terms/standards and specifications.

The Irish telecommunications market is fully liberalised as of 1 December 1998. The Office has set up the main licensing framework and there are now 24 general telecommunications licencees able to provide all services and nine basic telecommunications licencees providing more specialised services only.

The Office has established a policy of consultation, where possible, on key issues.

The Irish Government is committed to implementing the EU Directives pertaining to liberalisation. Implementing a pro-competition regulatory framework is essential for securing the conditions that will encourage operators to make the required investment and fully develop the market opportunities in broadband services. A recent survey carried out by BT indicated that Ireland has jumped from joint 9th place to joint 4th place in effective European regulation in the six month period to January 1999.

4 Commercial Features

At the launch of a series of seminars to heighten awareness among SMEs of the benefits of embracing electronic commerce. (from left): Mike Neary, Director, Information Society Commission. Tommy McCabe, Assistant Director, IBEC and the Minister for Public Enterprise, Mary O'Rourke, T.D.

4.1 E-Commerce Business Awareness Campaign

When your customers and suppliers want you to do business with them electronically, will you be ready?

Electronic Commerce is about carrying out many traditional business activities electronically. These include business-to-business linkages; digital sale and delivery of services and products; retailing of physical goods; and direct marketing and advertising.

E-commerce is the business growth engine of the future. It is estimated that the e-commerce market is expected to grow from US$10 billion today to $350 - $500 billion by 2002. In any environment, the success of a business is dictated by its ability to change and adapt. The main challenge now is the breakneck speed at which the business environment is changing.

It is imperative that businesses, large and small, be equipped to avail of the new opportunities to:

- improve business efficiencies;
- open up new markets; and
- increase profits.

That is why IBEC and the Information Society Commission are organising a nationwide series of seminars on e-commerce. The campaign is being part funded from European Union Structural Funds through the Department of Public Enterprise. This initiative will contribute towards IBEC's Telecommunications Policy Committee's recommendation that Ireland be an international e-commerce hub with multiple mirror web sites of leading international companies and assorted world class support services, such as added-value warehousing, order fulfilment, and international logistics.

Each Seminar will target SMEs, particularly those in the services sector who depend heavily on telecommunications.

E-Commerce Awareness Seminars

The half-day seminars will be driven by key case studies from companies large and small that are using e-commerce to improve their business. These companies consequently have improved efficiencies, opened up new markets and increased profits. The case studies will be followed by presentations by the leading service providers on how to implement action plans to enter this market. These seminars will aim to answer many of the questions that business people today in Ireland are rightfully asking.

The seminars are geared towards Chief Executives, IT professionals or executives involved in business strategy.

Organised by:

IRISH BUSINESS
AND EMPLOYERS
CONFEDERATION

Supported by:

THE EUROPEAN UNION

Schedule of Seminars

Venue	Date
Cork	5/3/99
Galway	29/4/99
Limerick	17/6/99
Dublin	3/9/99
Dundalk	24/9/99
Waterford	21/10/99*
Ennis	18/11/99*
Dublin	27/1/00*
Ballina	24/2/00*
Tralee	30/3/00*

* *Dates to be confirmed.*

For further information contact:

Michael Moore,
Project Executive,
E-Commerce Business Awareness Campaign
Tel: **01 605 1659 (direct)**
Fax: **01 638 1659**
Email: **michael.moore@ibec.ie**

Stephen Brewer
Eircell

4.2 Eircell

At Eircell we believe new technology must offer tangible benefits. That's why we don't just implement new technology; instead we harness it and make it work in the most productive way for your business.

So while we offer innovative mobile solutions, it's only through consultation with your company that they reach their true potential. Our Virtual Private Network and m-Commerce services are two such mobile business solutions that we can tailor to meet your real communications needs.

Increasing the efficiency and flexibility of your business, our VPN and m-Commerce services are designed for the way your business does business.

Eircell m-Commerce

The resounding success of mobile communications in Ireland has been based on a simple premise - the convenient connecting of people. The mobile phone is fast becoming a standard personal item, sharing the same space and status as a wallet or purse.

Mobile electronic commerce (m-Commerce) will continue to mirror this fundamental premise by linking businesses and people through a mobile phone/terminal. It's our belief that by developing innovative mobile applications the mobile phone will be central to the initiation, bearing and completion of business transactions in a secure and real-time manner.

Furthermore, we believe that the development of m-Commerce to its fullest potential in Ireland will be partnership-led and based. Partnerships between the Irish Government, the financial institutions, social partners and Eircell will ensure that m-Commerce becomes a viable reality in the not too distant future.

Eircell VPN (Virtual Private Network)

Specifically designed for business customers, VPN is our innovative new service that will improve your team's contactability and your company's cost effectiveness. Integrating your company's mobile and fixed networks, VPN offers three principal benefits:

choice: tailor your company's communication solution;

convenience: reach your team, either on their mobile or fixed lines with short code dialling via a private numbering plan;

control: reduce your company's costs by availing of the On-Net calling plan.

By developing a technology partnership with your company, our VPN package will deliver:

Private Numbering Plan

- Create your own communications solution by linking your mobile and fixed networks.

On-net calling plan

- All calls between your fixed or mobile lines are charged at the same rate.
- Direct link between your PABX and the Eircell IN Network.

Call management services

- Control your costs by tailoring how each individual can use their phone on your premises, locally, nationally or internationally.

For further information call us on **1800 22 55 88.**

Barry Maloney
Esat Digifone

4.3 Esat Digifone – Making it Work for You

Launched nearly two years ago, Esat Digifone is now Ireland's second largest telecommunications company. It is the fastest growing second mobile phone operator in Europe and with over 239,000 customers, holds 23 per cent of Ireland's pre-paid GSM market and 41 per cent of the total GSM market.

Esat Digifone prides itself in offering customers real value for money, while providing a state-of-the art GSM service. Digifone's range of products are considered to be advanced, while being easy to understand and simple to use. The following is an overview of the range of tariff options, products and business focused services offered by Digifone.

DigiPlans

Esat Digifone offers a range of tariffs, called DigiPlans, which are tailor-made to suit particular customers needs and usage levels. They include:

- **DigiLite** for the low user (typically a personal user) who needs their phone in the evening and weekends;
- **DigiFlex** for those who need the flexibility to use their phone for business and social use, during the working day as well as in the evening and at weekends;
- **DigiMax** for the heavy user (typically a business user) who needs to use their phone at all times during the day.

Digifone also offers a unique pre-paid offering - SpeakEasy - a unique pre-paid option where a user can choose between two tariff options, Early Bird or Night Owl, tailored to suit the user's lifestyle at low rates of 20p per minute.

Digifone Products

Digifone offers customers real value for money, for example customers can avail of the following, **free of charge:**

- Digifone Dropped Call Compensation Scheme;
- Nearest second billing, itemised bills, call barring, call waiting, call hold, Digifone Directory Assistance.

Also available **free of charge** but do incur usage charges are Message Minder, DigiText, DigiFax, DigiData, Call Divert and International Roaming.

Esat Digifone™
Making it work for you

Digifone has also introduced a unique new messaging initiative which is of particular benefit to the small business user - Digifone Secretary. This service costs IR£10 per month (plus VAT) plus a 10p charge (plus VAT) for calls answered by Digifone Secretary. Your messages are taken by a personal secretary when the phone is switched off, engaged, not answered or out of coverage.

This is part of a series of initiatives introduced by Esat Digifone which cater directly for the needs for the business customer. Digifone also work closely with our software solutions partners to bring other services to the business market.

For further information regarding the range of services offered by Esat Digifone please contact:

- **Lisa Delaney, Area Sales Manager - Eastern Region, Esat Digifone on 086-814 5146**
- **John Lenihan, Sales Manager - Munster Region, Esat Digifone on 086-8145132**
- **Jim Glynn, Sales Manager - Western Region, Esat Digifone on 086-8145214**

Sean Corkery
Chief Operations Manager
Esat Telecom

4.4 Esat Telecom

Esat Telecom is Ireland's second carrier and leading independent provider of telecommunications services to the corporate market. We provide our customers with a complete communications solution for today's ever-changing business environment. With over 5,700 corporate customers, Esat Telecom is changing the face of telecommunications in Ireland.

Network

At Esat Telecom we are committed to enhancing the business performance of customers through our tailored telecommunications solutions. The construction of our local, national and international Fibre Optic Network marks a turning point for the future of telecommunications in Ireland.

To date, Esat Telecom has laid over 125,000 fibre kilometres network in the construction of its state-of-the-art, wholly independent, broadband fibre optic network.

Portfolio of Services

Esat Telecom's network offers a full range of broadband services, some of which have never been commercially available to the corporate market in Ireland before. These include integrated voice, data, Internet and internal network solutions:

1. Voice

Esat Telecom's extensive voice portfolio includes:

- **Business Voice** - Our premium voice service provides customers with per second billing through direct connectivity to our fibre optic network.
- **Virtual Private Network** - Businesses can centralise services and enjoy all the benefits of a private voice network with low cost on-net calls between different sites though our VPN service.
- **Telenumbers** - Esat Telecom can also provide Businesses with premium rate, cost shared and free phone numbers.
- **Conference Connect** - an advanced Audio Conferencing service which facilities more than three participants communicating at any one time by telephone.
- **Card Services** - which include Esat Home, our prepaid international calling service at very competitive rates, Esat in Touch, our prepaid calling card and EasyCard, our post-paid global calling card.

2. Data

We can provide a range of data products tailored to suit your needs. The speed required and the technology employed is dependent on your specific requirements. Our data applications include:

- **Managed Bandwidth** - managed metropolitan national or international point-to-point connection over the core Esat Telecom network.

Esat TELECOM
Ireland's Business Telecommunications Company

- **Broadband LAN Interconnect** - enables customers to connect geographically dispersed local area networks at full native speeds.
- **Business Continuity** - a dynamic Business Continuity service over the core Esat Telecom network.
- **National Frame Xpress** - an advanced data network designed to carry all current and future data, video, Internet and multimedia applications.
- **International Frame Xpress** - Through our network interconnection with Global One, Esat Telecom can provide International Frame Relay connectivity to more than 80 countries worldwide.
- **National ATM** - enables simultaneous transmission of integrated voice, data and video on one platform, while providing an increased level of capacity, resilience and management.
- **Enterprise Management** - Full responsibility is assumed for a customer's dedicated computing operation 24 hours a day, seven days a week from secure, state-of-the-art facilities.

3. Internet

As Ireland's first, and largest, corporate Internet Services Provider (ISP), Esat Net provides complete eBusiness solutions to organisations of all sizes, including:

- High-speed Internet access
- Email; web hosting services, security products, individually tailored eBusiness solutions and consultancy
- Resilient, diverse routing bandwidth capacity with four separate carriers (two via Europe and two via the USA)

4. Systems Integration

BridgeCom Group was established in January 1994 and is becoming the largest independent networking systems integrator in Ireland. Acquired by Esat Telecom Group in 1998, BridgeCom is uniquely positioned to offer totally integrated, managed and secure desktop-to-desktop solutions.

Esat Telecom

Esat Telecom is part of Esat Telecom Group plc, which also comprises corporate Internet Services Provider, Esat Net; networking systems Integration Company, BridgeCom Group as well as 49.5% of GSM mobile phone operator, Esat Digifone. Esat Clear, a separate residential division that offers home phone and Internet service, and an Esat Access (payphone) division have also been established.

To find out more about Esat Telecom, call us on **1 800 799 799** or check out our website at **www.esat.ie**

Michael O'Hara
Chief Executive
GTS Ireland

4.4 GTS Ireland

How one Irish telecommunications company has succeeded by placing its emphasis on developing products and services of real value to the end user.

"Our business has demonstrated the value of looking beyond domestic markets and finding out what our customers really need. GTS Ireland has a unique combination of services and products with a strong global presence"

Michael O'Hara, Chief Executive GTS Ireland.

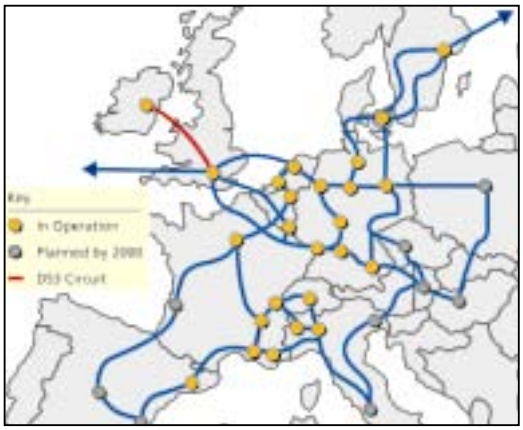
GTS Ireland is part of the Global TeleSystems Group (GTS) Inc, which is one of the world's leading telecommunications companies. With a market capitalisation of more than $4 billion, the group has made a number of significant acquisitions over the last 12 months - most noticeably Irish telecommunications service provider ITL, now GTS Ireland.

ITL was the second largest competitor to Telecom Eireann with more than 2,000 corporate customers. The company was built on the development and provision of services rather than investment in infrastructure.

As part of the global group, GTS Ireland will have access to several high-speed international networks. GTS is constructing (in partnership with FLAG Telecom) the world's first trans-oceanic dual cable system which will move information up to 25 times more quickly than current systems. The network will be operational in the Year 2000 and will link New York City, London and Paris at speeds up to 1.28 terabits per second with seamless connections to other cities around the world.

GTS also owns and operates the Hermes network, an advanced fibre optic network that connects 24 cities across Europe. When completed, Hermes will stretch for more than 18,000 kilometres and will provide end-to-end telecommunications services to customers in 24 cites in 16 countries.

The Hermes network is the most extensive in Europe with connections to all major cities and business areas.



Hermes is the leading pan-European carriers' carrier and provides centrally managed cross-border voice, data and Internet services to every major segment of the industry, including public telephony operators, Internet service providers and new market entrants.

Customers can avail of local connectivity via fibre optic connections and a full range of business services including international private networks (managed, leased and virtual), dedicated Internet access, intranets and broadcast services. With the completion of the transatlantic link to the US, the company will offer end-to-end services utilising IP (Internet protocol) transmission.

The company has invested more than $1.5 million in their new purpose-built International Switching Centre in GTS House in Dublin. This Centre has been equipped with a state-of-the-art Nortel DMS 100E switching platform which has multiple interconnects to the national telephone network. Over $1 million has also been invested in a DS3 high speed optical fibre network connecting GTS Ireland directly to a Digital Fibre Ring in London from where GTS Ireland have full interconnection with over 20 international carrier networks. For the corporate customer this means seamless high quality digital connections with over 200 countries worldwide. GTS Ireland will retain a fully functional secondary switching facility in Dun Laoghaire to ensure complete resilience.

GTS Ireland recently announced details of its e-commerce package for small business. The company - in conjunction with an established Internet service provider - provides a full range of internet based services for the small business.

The SME sector is the backbone of the Irish business community but has in most instances been the last sector of this community to enjoy the benefits of competition for telecommunciations services in the shape of greater choice, more services and lower costs. The service will enable small to medium sized businesses to take full advantage of the opportunities available through the Internet.

GTS Ireland is committed to servicing all parts of the telecommunications market and was the first company to offer competition on long distance calls, calls to and from mobile phones and local calls.

As part of its strategic network development plans, the GTS Group is also evaluating the feasibility of connecting Ireland directly to its high capacity Hermes fibre optic network. They will provide Irish Internet users with high speed access to international markets and further enhance Ireland's suitability as a hub for European e-commerce.

For further information contact:

John Hartigan
Business Development Manger
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Ballsbridge, Dublin 4
Tel: **01 280 9172**
Fax: **01 280 2194**
E-mail: **info@gtsireland.com**

Paul Toner
Head of Electronic Commerce
KPMG

4.5 KPMG Consulting

KPMG Consulting is a division of KPMG, one of the largest professional services firms globally. In Ireland we employ 1,100 staff, with over 140 highly qualified professionals in our consulting organisation. The origins of KPMG in Ireland date from 1876. The development and growth of the firm since then has been based on responsiveness to client needs and commitment to providing quality professional services. Engagements span a broad spectrum in both the private and public sectors for clients of all sizes.

KPMG Consulting is focused on assisting clients to implement IT solutions that transform the way they do business and serve customers. KPMG brings thought leadership, implementation experience, as well as strong business and technical skills to bear on these projects. This, combined with our partnership approach, results in reduced risk for the client, ensures that the solution meets the full needs of the business and is implemented on time and within budget.

KPMG are recognised as global leaders in the area of Electronic Commerce. In Ireland, KPMG formed a dedicated Electronic Commerce practice over two years ago when Electronic Commerce was emerging throughout Europe. Since then we have assisted some of the leading organisations in Ireland to devise business and technical strategies to implement solutions that take advantage of this electronic model for doing business.

We view Electronic Commerce as the application of Internet technology to facilitate electronic exchanges between Business-to-Business, Business-within-Business and Business-to-Consumer.

Business-to-Business solutions focus on enabling organisations to more effectively communicate electronically with suppliers and business partners that help to improve efficiencies within the supply chain.

Business-within-Business solutions facilitate greater process automation, improved information dissemination and greater collaboration within the enterprise. Once set up internally, similar services can be provided to business partners thereby improving communications, increasing loyalty and, as a result, increasing business volumes.

Business-to-Consumer solutions enable organisations to supply and serve their customers in a simple, convenient and most cost effective way.

The Internet and its associated technology is a key enabler for Electronic Commerce. Internet uptake by business is growing at a rapid rate and KPMG globally is at the forefront in providing services that enable our clients to take advantage of the opportunities that it presents.

Among the services we offer clients are:

- assistance in arriving at the correct business and technical strategy to take advantage of internet technologies;
- services to technically architect solutions to fit with, and integrate with, existing legacy systems;
- design and build services where KPMG will assume responsibility for designing, developing and delivering solutions for our clients.

Some of the projects our clients have asked us to perform can be complex, involving leading edge technologies combined with process change. Other times our clients do not have the available resources to deliver the project. In these situations KPMG can assume full responsibility for delivering the project and for transferring skills to the client's staff, enabling them to support and maintain the solution in the future.

Through our partnership approach, proven project management capability combined with our strong business and technology skills, we help to ensure that clients are successful in integrating Electronic Commerce with their business strategy.

For further information contact:

Paul Toner,
Head of Electronic Commerce,
KPMG Consulting.
Tel: **01 410 1277**
Fax: **01 412 1277**
Email: **paul.toner@kpmg.ie**

Seán Melly
MCI WorldCom Ireland

4.6 MCI WorldCom - a different kind of telecommunications company

MCI WorldCom is a global telecommunications company, with revenues of more than $30 billion and established operations encompassing the Americas, Europe and the Asia-Pacific region. Formed on 14th September 1998 with the merger of MCI Communications Corporation and WorldCom Inc., the company is the premier provider of fully integrated Voice, Data and Internet services to customers in 65 countries around the world.

This service portfolio has been extensively tried and endorsed in the real business world through 22 million customers worldwide. As a result, MCI WorldCom can offer customers in Ireland a proven suite of services for all of their Voice, Data and Internet requirements. MCI WorldCom's involvement in the Irish marketplace dates back to 1994, when it bought into the progressive Irish telecommunications company TCL Telecom.

MCI WorldCom's end-to-end wholly owned and managed global fibre-optic network links Europe to the Americas and the Asia-Pacific region. This network is the first telecommunications network to provide fully integrated service within and between the major European commercial centres of London, Paris, Frankfurt, Brussels, Amsterdam, Rotterdam, Stockholm and Zurich, with planned expansion for other European cities over the coming months. The pan-European Ulysses fibre and the Gemini transatlantic cable system make MCI WorldCom the first company in history to operate a single facilities based network spanning Europe and the USA.

12,600 kilometres of submarine cable diversely routed between London and New York, enable MCI WorldCom to seamlessly interconnect 31,000 buildings in the USA with 7,000 buildings in Europe. Voice, Data and Internet Services are effectively delivered over a single seamless network. With this capacity in place MCI WorldCom is ready to handle the exploding demand for new high bandwidth applications – including the Internet, which has been generating a highly significant increase in demand year on year.

MCI WorldCom's Internet services are provided via UUNET, a wholly owned subsidiary. The UUNET Internet backbone is the most reliable, rigorously engineered and widely deployed network in the world. This high capacity powerful backbone supports speeds from 28.8 kbit/s to OC-12 (STM –4, 622 Mbit/s) providing access to more than 1,000 locations worldwide. MCI WorldCom launched UUNET Internet services in the fourth quarter of 1998 in Ireland, marking not only a landmark for MCI WorldCom's business, but also for the development of the e-commerce sector.

Ownership of the network structure gives MCI WorldCom the crucial ability to control costs, quality and service management and to offer customers Service Level Agreements. MCI WorldCom has assembled a unique set of assets to pursue its strategy of serving the industry's fastest growing markets in successful competition with established national carriers.

MCI WORLDCOM

In Ireland MCI WorldCom has invested heavily in rolling out a broad range of Voice, Data and Internet services to its Irish customer base. This accelerated investment underscores MCI WorldCom's continued commitment to being the premier telecommunications carrier in the corporate marketplace. With offices in Dublin, Limerick, Cork and Galway MCI WorldCom's sales operations fall into distinct categories tailored to address the needs of multinationals, SMEs and the wholesale sector.

MCI WorldCom - offering you one network, one partner and one contract.

For further information please contact:

The Marketing Department at MCI WorldCom
Tel: **01 679 0404**
Fax: **01 607 8222**

George McGrath
CEO
OCEAN

4.7 The OCEAN Story

OCEAN is the joint venture communications company of BT and ESB which was launched in June 1998 to meet the growing demand for communications services in the deregulated market in Ireland. Coinciding with the deregulation of the Irish telecommunications market, OCEAN unveiled its initial range of products and services on 1st December 1998 as a first step towards providing a full portfolio of services for the Irish business and residential markets. Since then, OCEAN has followed a precise business plan to continuously develop a broad portfolio of products and services for the Irish market.

BT is one of the world's largest and most successful telecommunications companies and has formed a number of global partnerships – the 'Family of Alliances' - which include partnerships in Germany, Holland, Italy, Spain, Sweden, Switzerland as well as in Asia-Pacific and North America.

ESB is Ireland's premier energy and semi-state company. It is a vertically integrated organisation, dealing with all aspects of power generation, transmission and distribution. ESB's expertise has long been recognised internationally and it is currently contracted to provide engineering and management services in over 40 countries worldwide

Partnerships and Subsidiaries

Concert is an international subsidiary of BT and offers a world-class international communications portfolio of voice, data and Internet services. Concert provides connectivity to more than 800 cities in over 50 countries. OCEAN is the exclusive distributor of Concert products in Ireland.

The Concert portfolio of industry-leading services will continue to evolve to meet the new application needs of growing businesses and changing markets. Concert's portfolio is managed on a worldwide basis. Services can be implemented quickly and relied upon to meet the toughest demands of multinational companies. Whether you require a virtual voice network, want to transmit data across continents or set up an international Intranet, OCEAN – through Concert – will deliver the service.

Lucent Technologies designs, builds and delivers a wide range of public and private networks, communications systems and software, data networking systems, business telephone systems and microelectronic components. Lucent has been selected by OCEAN as its primary solutions partner.

One Stop Shop

When you deal with OCEAN, you will have one point of contact in setting up your international communications network. You save time and reduce the complexity of setting up communications services in different countries and obviate all the language and cultural difficulties which that can entail.

OCEAN

Ocean Link is a routing device attached to residential and small business customers existing phone line. Ocean Link will enable customers to make savings on international and national calls plus calls to mobiles by connecting to the state-of-the-art OCEAN network.

Ocean Quantum is the service that opens up a digital platform for the development of a series of 21st century products. Starting with support for both basic and primary rate ISDN, as well as offering voice service, it will develop into the future as more sophisticated voice and data services are launched. OCEAN is committed to helping both the Irish consumer and Irish business to keep up with the rapidly changing world of e-commerce – this product will allow them to do so.

With **Ocean Link** and **Ocean Quantum**, OCEAN is offering modern products that provide customers with competitive pricing and outstanding customer service.

OCEAN has a clear and simple pricing structure, developed to avoid confusion and offering both residential and business customers free itemised billing so they can see exactly what they are paying for. All calls will be charged by the second so customers will only pay for what they use and not a second longer.

OCEAN is also proud to announce its discount schemes. In the residential market, customers will make savings by joining, free of charge, OCEAN's *Small World* scheme. Small World is a discount scheme offering customers a saving of up to 15% on one number and 10% on a further two other numbers. OCEAN is also offering a discount package for its business customers called Business Partners – which operates on the same principle as *Small World*.

Unrivalled Customer Service

Personal account and service management is delivered by dedicated OCEAN customer teams to ensure greater ease of doing business. At OCEAN, customer service is not merely a departmental function, it is our way of doing business. The people on the OCEAN team are selected and trained to make doing business with us as easy as possible. We are responsive, professional and always try to see things from the customer's point of view. While some companies see technology as an end in itself, OCEAN sees technology as a means to an end, enhancing the effective performance of businesses we deal with. In many cases we work in close partnership with customers to engineer the optimum methods to achieve these ends.

OCEAN answers the challenges of the Global Information Age – an age which is challenging the way in which we think, live and work. Our strength lies in our ability to provide customers with innovative local solutions and global connectivity.

For further information contact:

E-mail: **answers@ocean.ie**
Website: **www.ocean.ie**
Contact: **Marketing Department**
Tel: **01 242 4000**
Fax: **01 242 4001**

Alfie Kane
Chief Executive
Telecom Eireann

4.8 Telecom Eireann

Established in January 1984, Telecom Eireann is the leading provider of local, long distance and international telecommunications services, including mobile and datacommunications services, in Ireland.

Total revenues for Telecom Eireann in 1997/98 reached IR£1.35 billion, with operating profits of IR£241 million and after-tax profits of IR£155 million.

Since it was established, Telecom Eireann has invested over IR£3 billion in its infrastructure, giving the company one of the most advanced networks in Europe. Telecom Eireann continues to invest in the development of new products and services and to broaden its portfolio of services through increasing both the range and sophistication of the services we offer.

In December 1996, the Dutch and Swedish telecommunications companies, KPN and Telia, entered into a strategic alliance with Telecom Eireann, acquiring a 20 per cent interest in the company, with the option to purchase an additional 15 per cent stake after three years.

The strategic alliance is the most important development for Telecom Eireann since the company was established in 1984. It represents a new era of growth and opportunity and will facilitate the company's transformation to become totally focussed on the needs of its customers.

Real Issues - Real Solutions

To inform our thinking, we have conducted detailed research to identify and prioritise the key issues our customer's face over the next three years. Our research highlighted the following priorities:

- Customer Service and Satisfaction
- Managing Growth
- Reducing Costs
- Competition
- Improving Marketing Effectiveness

As part on our ongoing commitment to our Corporate Customers, we are holding Business Forum events around the country. Our aim is to demonstrate our understanding of your business needs and to indicate how communication solutions can be used to address them.

Products and Services

Telecom Eireann has an unrivalled understanding of specific industry issues and is working to continuously develop innovative value-adding solutions in a partnership environment. However,

TELECOM EIREANN

all this would not be possible without having the premier communications products and services portfolio. The depth and width of our portfolio is unmatched - yet we don't rest on our laurels. We are constantly researching, developing and investing in our products and services.
For example, over the last few months we have completed a state-of-the-art disaster recovery site in Portmarnock (SureTel Plus) and have also added SymphonyATM to our broadband portfolio.

With Telecom Eireann's SureTel Plus, losing your telephony system need not mean losing your business. Designed specifically for call centres and mission critical telephony operations, SureTel Plus is the complete business recovery package. It provides immediate, emergency back-up for companies whose telecommunications sites have been rendered suddenly unusable, and for whom continued telephony services are critical.

SymphonyATM from Telecom Eireann delivers a universal connection for all communications - voice, video and data. In addition, SymphonyATM simplifies the management and configuration of networks and reduces costs by providing one common protocol.

Our products and services ensure that we as a communications company, you as our partner and Ireland as a nation, stays at the forefront of the Information Age.

Customer Care

Our commitment to customer focus sets us apart from other companies. We understand the real business issues you face every day. We have put in place the support to help you find the best solutions to these issues.

Telecom Eireann's goal is to develop a partnership that gives you, the business customer, direct access to the expertise and technology that will shape the future of your company.

We believe in giving our corporate customers the highest quality in service. And the best way to do this is through our account management teams.

Whether you belong to a major multinational or a small corporate enterprise, Telecom Eireann has an account management team to look after your distinct needs.

Our account managers will work with you to understand your business and maximise the benefits communications can deliver.

Contact Us

To find out more about Telecom Eireann's commitment to customer care and how an account manager can benefit your business you may contact us at

FreeFone: **1800 35 36 35**
Email: **Corporate.Solutions@telecom.ie**
Web Site: **www.telecom.ie.**

5 Directory of Consultants and Network & Service Providers

Telecommunications Consultants

AT&T Ireland

Provider of international voice and data communications services.

Contact	Jean Mc Keon	AT&T Ireland
Tel	1850 747474	Clonshaugh Industrial Estate
		Dublin 17

Cost Reduction Analysts

Independent consultants specialising in analysis and rationalisation of telecom charges.

Contact	John Flaherty,	Cost Reduction Analysts
	Michael Sandys	56 Tritonville Road
Tel	01 667 2800	Sandymount
Fax	01 667 2793	Dublin 4
E-mail	john.flaherty@cra.ie	
	michael.sandys@cra.ie	

Datanet

Independent consultancy providing voice & data, systems analysis, project management and support services.

Contact	David Campbell	Datanet
Tel	01 661 6611	11 - 12 Warrington Place
Fax	01 676 6611	Dublin 2
E-mail	dcampbell@datanet.ie	

Ericsson

Business communications, network integration, software development.

Contact	Jim Cullen	Eircsson Business Communications Ltd
Tel	01 207 2300	Beech Hill
Fax	01 269 3030	Clonskeagh
		Dublin 4

Paul Foley Solicitor

Consultant in telecommunications, broadcasting, electronics and information technology.

Contact	Paul Foley	Paul Foley, Solicitor
Tel	+44 0171 628 3250	118 Andrewes House
Fax	+44 0171 256 8870	Barbican
E-mail	paul.foley@btinternet.com	London EC2 Y 8AY

Glenwood Research

Independent consultancy supporting the writing of strategy documents, proposals and public reports.

Contact	Aedín McLoughlin	Glenwood Research
Tel	01 286 1877	Valclusa
Fax	01 286 1877	Enniskerry
E-mail	aedinmcl@tinet.ie	Co. Wicklow

Global One

Provider of telecommunications services to Irish business.

Contact	Tom Ryan	Global One
Tel	01 475 7711	Harcourt Centre
Fax	01 475 7715	Dublin 2

Inenco Group

Independent advice on the most appropriate provider for local, national and international telephone calls.

Contact	Chris Abson BSc	Inencogroup
Tel	+44 01253 785 000	Petros House
Fax	+44 01253 785 001	St. Andrews Road North
E-mail	chris.abson@inencogroup.com	Lytham St. Annes
		Lancs FY8 1ZZ

KPMG Consulting

Contact	Paul Toner	KPMG
Tel	01 410 1277	1 Stokes Place
Fax	01 412 1277	St. Stephens Green
E-mail	paul.toner@kpmg.ie	Dublin 2

Mason Communications

Independent telecommunications consultancy to vendors, service providers, end-users and policy organisations.

Contact	Harry McDermott	Mason Communications Ltd
Tel	01 668 8610	60 Northumberland Road
Fax	01 668 8379	Ballsbridge
E-mail	harry.mcdermott@masoncom.com	Dublin 4

Minerva Managed Networks

Managed router services, network management, managed internet and intranet services.

Contact	Fran O'Reilly	Minerva Managed Networks
Tel	01 602 0490	Palmerstown House
Fax	01 602 0433	Fenian Street
E-mail	fran.oreilly@minerva.ie	Dublin 2

David G. Nolan

Independent advice on telephone system specification, evaluation, selection and implementation.

Contact	David G. Nolan	David G. Nolan
Tel	01 280 9155	3 Park Road
Fax	01 280 9397	Dun Laoghaire
		Co. Dublin

Norcontel

Independent telecommunications consultancy providing strategy, policy, technical consultancy and support services.

Contact	Patrick E. Daly	Norcontel (Ireland) Ltd
Tel	01 670 8888	4 Westland Square
Fax	01 670 6650	Dublin 2
E-mail	pdaly@norcontel.ie	

Northwest Labs

An information communications and technology company providing solutions and advice to domestic and international clients.

Contact	John O'Neill	Northwest Labs
Tel	01 283 3789	10 Merville Road
Fax	01 283 4376	Stillorgan
E-mail	johnnwn@tinet.ie	Co. Dublin

Teltec Ireland

Teltec Ireland provides a national capability in research and development for the telecommunications community.

Contact	Joe Curtis	Teltec Ireland
Tel	01 808 2012	Technology House
Fax	01 837 7648	Enterprise Ireland
E-mail	curtisj@teltec.ie	Glasnevin
		Dublin 9

Telecommunications Network and Service Providers

Budget Telecommunications Ltd

Contact	Taigh O'Toole	Budget Telecommunications Ltd
Tel	01 278 1885	Unit 1, Courtyard Business Park
Fax	01 278 1887	Orchard Lane
E-mail	totoole@ivtech.ie	Blackrock
		Co. Dublin

Cable & Wireless Services Ltd

Telecommunications networks and services provider.

Contact	James Crowe	Cable & Wireless Services Ltd
Tel	01 404 0400	Airton Road
Fax	01 404 0337	Tallaght
E-mail	james.crowe@cwe.cwplc.com	Dublin 24

Cablelink

Provides a full suite of telephony and high speed Internet services.

Contact	Brian Moore	Cablelink
Tel	01 799 8400	10 Pembroke Place
Fax	01 799 8534	Ballsbridge
E-mail	bmoore@cablelink.ie	Dublin 4

Cable Management Ireland Ltd

Cable and MMDS Operator.

Contact	John Niland	Cable Management Ireland Limited
Tel	01 872 9900	70 Chapel Street
Fax	01 872 2747	Dublin 1
E-mail	market@cmi.ie	

Casey Cablevision Ltd

Contact	Pat Casey	Casey Cablevision Ltd
Tel	058 41845	Youghal Rd
Fax	058 45243	Dungarvan
E-mail	pat@cablesurf.com	Co. Waterford

Cignal Global Telecommunications Ireland Ltd

Telecommunications networks and services provider.

Contact	Margret Charles	Cignal Global Telecommunications
Tel	01 661 1788	Ireland Ltd
Fax	01 661 1431	C/o Mason Hayes & Curran
E-mail	mcharles@cignal.com	6 Fitzwilliam Square
		Dublin 2

EGN B.V.

Part of the Equant Group, providing data and voice services for multinational companies.

Contact	c/o Deloitte and Touche	EGN B.V.
Tel	01 402 5903	c/o Deloitte and Touche
Fax	01 402 5920	29 Earlsfort Terrace
		Dublin 2

Eircell Ltd

Eircell is a major provider of mobile telecommunications services in Ireland.

Contact	Claude Kinsella	Eircell Ltd
Tel	01 203 7773	Unit 9
Fax	01 203 7901	Richview Office Park
		Clonskeagh
		Dublin 14

Esat Digifone

Provider of mobile telecommunications services.

Contact	Lisa Delaney	Esat Digifone
Tel	086 814 5146	Digifone House
Fax	01 609 5010	76 Lower Baggot Street
		Dublin 2

Esat Telecommunications Ltd

Esat Telecom provides a full range of voice and fax services.

Contact	Eoin Pearson	Esat Telecommunications Ltd
Tel	01 602 6111	The Malt House
Fax	01 670 4608	Grand Canal Quay
E-mail	epearson@esat.ie	Dublin 2

GTS Ireland

Provider of telecommunications and e-commerce services to business users.

Contact	John Hartigan	GTS Ireland
Tel	01 280 9172	GTS House
Fax	01 280 2194	Ballsbridge
E-mail	info@gtsireland.com	Dublin 4

HiberNet Ltd

HiberNet operates in Ireland, UK and USA, providing a range of e-commerce and Internet services.

Contact	Denis McGauran	HiberNet Ltd
Tel	01 284 3388	Dun Laoghaire
Fax	01 284 3464	Co. Dublin
E-mail	dmcgauran@hibernet.ie	

International Telecommunications Ltd

Telecommunications networks and services provider.

Tel	01 280 9172	International Telecommunications Ltd
Fax	01 280 2194	Communications House
		94 Upper Georges Street
		Dun Laoghaire
		Co Dublin

Interoute Ireland Ltd

Interoute Ireland is a telecommunications networks and services provider.

Contact	David Ryan	Interoute Ireland Ltd
Tel	01 661 7360	3rd Floor, Hambledon House
Fax	01 661 7361	Lower Pembroke St
		Dublin 2

Iridium Communications Germany

Tel	+49 211 497 3235	Iridium Communications Germany GmbH
Fax	+49 211 4973223	Jagerhofstrasse 19-20
		Dusseldorf 40479
		Germany

IXC Communications Services

Telecommunications networks and services provider.

Contact	Chris Selby	IXC Communications Services
Tel	+44 171 629 9293	Europe Ltd
Fax	+44 171 629 9294	26/28 Mount Row
E-mail	cselby@ixc-comm.com	4th Floor
		London, WIY 5DA

LCN Inc

Telecommunications networks and services provider.

Tel	00 1 703 7097902	LCN Inc
Fax	00 1 703 7094136	105 Executive Drive
		Suite100A
		Sterling,
		Virginia 20166-9558
		USA

Mastercall International Ltd

Telecommunications networks and services provider.

Contact	Dan Healy	Mastercall International Ltd
Tel	021 961126	4a South Cork Industrial estate
Fax	021 317978	Pouladuff
		Co. Cork

MCI WorldCom

Global provider of voice, data and Internet solutions to businesses.

Contact	Sales Dept	MCI WorldCom
Tel	01 679 0404	Embassy House
Fax	01 670 8222	Ballsbridge
E-mail	info@wcom.ie	Dublin 4

National Telecommunications Ltd

Telecommunications networks and services provider.

Contact	Owen Lamont	National Telecommunications Ltd
Tel	+44 232 206112	Bristol House
Fax	+44 1252 402170	1 Lakeside Road
		Farnborough
		Hampshire
		England

Next Telecom

Mobile communications and phonecard services.

Contact	Patricia Hegarty	Next Telecom
Tel	086 8138770	85-89 Hanover St
Fax	021 272378	Cork
E-mail	nextgroup@tinet.ie	

OCEAN Communications Ltd

Ocean is a partnership of BT and ESB providing innovative local solutions and global connectivity.

Contact	Customer Care Team	OCEAN Communications Ltd
Tel	1800 26 23 26	158 Shelbourne Road
		Dublin 4

Primus Telecommunications Ltd

Telecommunications networks and services provider.

Contact	Kisher Patel	Primus Telecommunications Ltd
Tel	+44 171 6696000	Nioc House
Fax	+44 171 6696116	4 Victoria Street
E-mail	kpatel@primustel.co.uk	London, SW1H OGT

Princes Holdings Ltd

Provider of communications, television and entertainment services.

Contact	Customer Services	Princes Holdings Ltd
Tel	061 410 400	T/a Irish Multichannel
Fax	061 416 160	Corporate House
		Mungret Street
		Limerick

Reuters Connect Services

Reuters Connect Services provide dedicated voice and data circuits within the main financial centres of Europe and the US.

Contact	Don Overton	Reuters Connect Services
Tel	+44 171 5425100	85 Fleet St
Fax	+44 171 5425768	London, EC4P 4AJ
E-mail	don.overton@reuters.com	

RSL Communications (Ireland) Ltd

Provider of telecommunications services.

Tel	+44 148 3457300	RSL Communications (Ireland) Ltd
Fax	+44 148 3457733	Grange House
		60 Beaumont Avenue
		Churchtown
		Dublin 14

SM Communications Ltd

Providers of international telephony services.

Tel	01 855 2560	SM Communications Ltd
Fax	01 836 6082	Gardiner House
		64 Lower Gardiner Street
		Dublin 1

Startec Global Communications UK Ltd

Telecommunications networks and services provider.

Tel	+44 171 887 6090	Startec Global Communications UK Ltd
Fax	+44 171 887 6091	York House
		Empire Way
		Wembley, HA9 0PA

Stentor Communications Ltd

Stentor Communications Ltd specialises in the provision of e-commerce and business solutions.

Contact	Malachy Harkin	Stentor Communications Ltd
Tel	01 608 7300	Hogan Place
Fax	01 608 7301	Grand Canal Place
E-mail	solutions@stentor.ie	Dublin 2

Switchcom

Phonecard Services.

Contact	Susan Cleland
Tel	1850 663366
Fax	01 296 2228
E-mail	easytel@tinet.ie

Tele2 Telecommunications Services Ltd

Provides telecoms solutions to private customers and small to medium sized businesses across Europe.

Contact	Rob Corbet	Tele2 Telecommunications Services Ltd
Tel	01 661 1788	C/o Mason Hayes & Curran Solrs
Fax	01 661 1431	6 Fitzwilliam Square
E-mail	rcorbet@mhc.ie	Dublin 2

Telecom Eireann

Telecom Eireann offers a full range of national and international voice, data and multimedia services.

Tel	01 671 4444	Telecom Eireann
Fax	01 475 0953	St Stephens Green West
E-mail	corporate.solutions@telecom.ie	Dublin 2

Telecommunications and Computer Services Ireland Ltd

Provides a range of business telecoms services - including telephony, call cards, and premium call services.

Contact	Pat Clarke	Telecommunications and Computer
Tel	01 284 7202	Services Ireland Ltd
Fax	01 284 8408	31 Vale Avenue
E-mail	tcsiltd@indigo.ie	The Park
		Cabinteely
		Dublin 18

Teleglobe Ireland Ltd

Telecommunications networks and services provider.

Tel	+44 190 854 4300	Teleglobe Ireland limited
Fax	+44 190 854 4301	Suite 9
		Silbury Ct., 3rd Floor
		418 Silbury Blvd
		Milton Keynes, MK9 2AF.

Torc Telecom

Torc Telecom specialises in value added international prepaid calling cards and services.

Contact	Edel Mc Carthy	Torc Telecom
Tel	01 667 1600	St Martins House
Fax	01 667 1601	Waterloo Rd
E-mail	emccarthy@torc.ie	Dublin 4

Transaction Network Services Ltd

Transaction Network Services Ltd is an international company specialising in transaction orientated data services.

Contact	Paul Monnelly	Transaction Network Services Ltd
Tel	01 855 0809	Dunluce House
Fax	01 855 0812	Block F3, East Point
E-mail	pmonnelly@tnsi.com	Dublin 3

Vianvi Ltd

Telecommunications networks and services provider.

Tel	+1 313 8735500	Vianvi Ltd
Fax	+1 313 5567017	8801 Conant Street
		Hamtramck
		Michigan 48211 USA

Valutel Ltd

Contact	Celine Dalrymple	Valutel Ltd
Tel	01 825 3333	The Centre
Fax	01 825 3340	Clonee
E-mail	celine@valutel.ie	Co Meath

Web Services

Fully managed, low cost, Internet sales (e-commerce) services for small and medium sized businesses.

Contact	Brian Rossiter	Web Services Ltd
Tel	01 286 2485	2, Woodstock Link
E-mail	WebServices@ispo.ie	Belfast BT6 8DD

World Link SM Communications Ltd

Offers a cut rate voice and fax service to the business community.

Contact	Danny Murray	World Link SM Communications Ltd
Tel	01 855 2560	Gardiner House
Fax	01 836 6082	64 Lower Gardiner Street
E-mail	danny@nci.ie	Dublin 1

Miscellaneous Telecommuncations Services

Baxter

Installation of telephone systems, including PABX and conferencing facilities.

Contact	Kevin and Geraldine Baxter	Baxter Communications Ltd.
Tel	01 836 6888	42a Fairview Strand
Fax	01 836 6792	Dublin 3

Brightpoint (Ireland) Ltd

Distributors of Esat Digipack products.

Contact	Gretta Hayes	Brightpoint Ireland ltd
Tel	01 460 3300	Unit 6, Oak Court
Fax	01 460 3330	Western Business park
E-mail	gretta@brightpoint.ie	Dublin 12

Biacom

Communications systems for small and home offices.

Contact	Bill Lloyd	Diacom Computer Telephony
Tel	01 405 7888	Coral House
Fax	01 459 7022	Airton Road
E-mail	enquiries@diacom.com	Tallaght
		Dublin 24

Instant Communications Ltd

Supply, installation and management of cable network, fibre optics and data networking products.

Contact	Vincent O'Neill	Instant Communications Ltd
Tel	01 830 4077	61 Phibsborough Road
Fax	01 830 5304	Dublin 7
E-mail	instant@indigo.ie	

Jupiter

Telecommunications services offering full Fixed Line and Mobile services.

Contact	Jim Storan	Jupiter Communications
Tel	0902 73073	Golden Island
Fax	0902 75626	Athlone
E-mail	sales@jupiter.ie	Co. Westmeath

Livingston

Telecommunications rental equipment and network services.

Contact	Vincent Dillon	Livingston
Tel	1800 425 000	Unit 42
E-mail	vincent.dillon@livingston.co.uk	Airways Industrial Estate
		Dublin 17

Network Splicing

Provision of cabling and jointing services to the telecoms industry.

Contact	Chris Tallon, Alan Stout	Corporate Development Initiatives Ltd.
Tel	01 490 1438	1 Wainsfort Drive
Fax	01 490 1453	Terenure
E-mail	cdi@iol.ie	Dublin 6W

Telecommunications Equipment Vendors

Alcatel Ireland Limited

Tel	023 41060	Alcatel Ireland Limited
Fax	023 42256	IDA Industrial Estate
		Laragh
		Bandon
		Co. Cork

Bridgecom Limited

Contact	Garry Connolly	Bridgecom Limited
Tel	01 670 4433	The Malt House
Fax	01 670 4979	Grand Canal Quay
E-mail	garryc@bridgecom.ie	Dublin 2

Lake Communications Limited

Contact	Michael O'Dwyer	Lake Communications Limited
Tel	01 451 5422	Beech House
Fax	01 452 0826	Greenhills Road
E-mail	michaelod@lake.ie	Tallaght
		Dublin 24

Logica Aldiscon Limited

Contact	Brian McDonagh	Logica Aldiscon Limited
Tel	01 819 3400	Custom House Plaza 5
Fax	01 819 3401	Harbourmaster Place
E-mail	brianm@aldiscon.ie	Dublin 1

Lucent Technologies Ireland Ltd

Tel	1850 747 474	Lucent Technologies Ireland Ltd
Fax	01 478 5645	Corke Abbey
		Bray
		Co Wicklow

MDS Telephone Systems

Contact	Seamus Doran	MDS Telephone Systems
Tel	01 836 6288	Clonshaugh Ind. Estate
Fax	01 836 6492	Clonshaugh
E-mail	seamus.doran@mds.ie	Dublin 17

Nortel Ireland Limited

Tel	091 757 671	Nortel Ireland Limited
Fax	091 755 431	Mervue Industrial Estate
E-mail	www.nortelnetworks.com	Galway

Off Air Electronics Ltd

Contact	Fergal Keys
Tel	01 294 0893
Fax	01 294 0895
E-mail	keys@offair.ie

Siemens Ltd

Contact	Aoife O'Farrell	Siemens Ltd
Tel	01 216 2266	Fitzwilliam Court
Fax	01 216 2233	Leeson Close
Website	www.siemens.ie	Dublin 2

Sigma Wireless Technologies

Contact	Alan Feenan	Sigma Wireless Technologies
Tel	01 864 0888	McKee Avenue
Fax	01 864 0133	Finglas
E-mail	afeenan@sigma.ie	Dublin 11

Tecnomen

Tel	061 702 200	Tecnomen
Fax	061 702 201	Shannon Industrial Estate
E-mail	info@tecnomen.ie	Shannon
Website	www.tecnomen.ie	Co Clare

Tellabs Limited

Tel	061 703 000	Tellabs Limited
Fax	061 703 333	Bay 57-59
		Shannon Industrial Estate
		Shannon
		Co. Clare

Stockbrokers

ABN AMRO (Ireland)

Telecoms Analyst

Contact	Jemma Houlihan	ABN AMRO Stockbrokers Ireland Ltd.
Tel	01 609 3700	IFSC
Fax	01 829 1146	Dublin 1
E-mail	jemma.houlihan@abnamro.ie	

Davy Stockbrokers

Tel	01 679 7788	Davy Stockbrokers
Fax	01 671 2764	49 Dawson Street
		Dublin 2

Goodbody Stockbrokers

Contact	David Lowe	Goodbody Stockbrokers
Tel	01 667 0400	122 Pembroke Road
Fax	01 667 0410	Dublin 4

NCB Stockbrokers

Tel	01 611 5611	NCB Stockbrokers
Fax	01 611 5766	George's Dock 3
		IFSC
		Dublin 1

Telecommunications Regulator

Office of the Director of Telecommunications Regulation

Tel	01 804 9600	Office of the Director of
Fax	01 804 9680	Telecommunications Regulation
Website	www.odtr.ie	Block DEF
		Abbey Court
		Irish Life Centre
		Abbey Street Dublin 1

6 Glossary of Telecommunications Terms

ADSL Asymmetric Digital Subscriber Line. Access technology over the ordinary telephone copper cables that allows a maximum of 8 Mbit/s downstream towards the user and 640 kbit/s upstream.

Analogue An electrical signal in which the voltage continuously varies. Easily susceptible to interference and degrades in quality as the signal is boosted and re-amplified.

Asychronous A method of transmitting data where each character is sent separately.

ATM Asynchronous Transfer Mode - allowing voice, data, audio, video and other kinds of telecommunications traffic to be carried on the same network.

Backbone A high-capacity network that links together other networks of lower capacity, usually local area networks.

Bandwidth (Also known as 'capacity') In simple terms, how much information or traffic can be carried on the telecoms infrastructure in a given amount of time. The simple rule is that the greater the bandwidth, the greater the opportunities for commerce. As a specific example; with low bandwidth, transferring the contents of a music CD via the internet is not feasible; with higher bandwidth, it is entirely feasible.

Bits per second A 'bit' is a unit of information. The speed of a communications link is often represented as bits per second. 1 Mbit/s is a million bits per second.

BRA Basic Rate Access: ISDN Line consisting of two channels and a slow-speed data channel 2B+D.

Broadband A high-speed telecommunications link, allowing transmission at 2 Mbit/s or higher.

Browser A program used to access the World Wide Web.

CAD Computer Aided Design: using computers to aid the design and drafting process.

CAD/CAM Computer Aided Design/Computer Aided Manufacture: integrating CAD information in the manufacturing process.

CATV Community Antenna TV: a type of cable TV system; shorthand for all cable systems.

CD-ROM Compact Disc with Read Only Memory; compatible with computers, compact discs are inexpensive, high-capacity storage devices for data, text and video.

Collocation	The sharing between communications operators of the use of physical infrastructures, e.g. local exchange buildings and ducts, for the purposes of providing communications services.**Connectivity** A term for the quality and quantity of connections between communications networks.
Convergence	The 'coming together' of formerly distinct technologies, industries or activities; the most common usage refers to the convergence of computing, communications and broadcasting technologies.
CLI	Calling Line Identity. A facility that allows the telephone number of the calling party to be displayed on the recipient's phone equipment before the call is answered.
CPE	Customer Premises Equipment. Anything that the telephone subscriber attaches to their telephone line. Fax, Answering machine and such like.
CTI	Computer Telephone Integration. Used to describe the marriage of any telephone function with computer control: Voice Response, Predictive Dialling, Call Centre scripting and such like.
DECT	Digital Enhanced Cordless Telephony. Provides good call security to cordless phones.
Digital	Information expressed in binary patterns of ones and zeros.
DTMF	Dual Tone Multi-Frequency. More simply described as 'tone dialling'. Each button generate a combination to two tones (high and low) and allows access to advanced network features such as Voicemail and call diversion services.
DTT	Digital Terrestrial Television: digital television broadcast from ground-based antennae.
DWDM	Dense Wavelength Division Multiplexing. A relatively new technology that allows a significant increase in the capacity of a single fibre pair.
EDGE	Stands for Enhanced Data rates for GSM Evolution. This will allow GSM operators to use existing GSM radio band to offer wireless multimedia IP-based services and applications at speeds of 384kbit/s.packet switching. Voice services using FR are under development.
EDI	Electronic Data Interchange: allows information in agreed formats to be exchanged between organisations.
Electronic Commerce	Consumer and business transactions conducted over a network, using computers and telecommunications.

Fibre Optic	A modern transmission technology using lasers to produce a beam of light that can be modulated to carry large amounts of information through fine glass or acrylic fibres.
Frame Relay	Originally developed from ISDN, it is a variation of the X.25 interface offering fast **Local Loop**. The physical wires, usually copper, that run from a subscriber's site to their telecommunications company's local switch or exchange.
GPRS	General Packet Radio Service.Mobile networks are rushing to adopt GPRS, which will offer a fast (144Mb/s) connection for the transmission of data. (GSM subscribers are currently limited to 9600Kb/s). Will open the door for internet access on hand portable phones.
GSM	System for Mobile. A digital two-way cellular system developed in Europe and launched in 1991.
HDSL	High-Speed Digital Subscriber Line, access technology that allows two-way transport up to 2 Mbit/s over 2 or 3 twisted pair copper cables.
ICT	Information and Communication Technology.
IN	Intelligent Network. A network offering high levels of sophistication, and capable of identifying the profile of its users or subscribers. IN will allow for seamless integration of the different technologies.
Interconnection	The physical and logical linking of telecommunications networks in order to allow the users of one network to communicate with users of another network. Interconnection costs refer to the payments made by a telecommunications network operator to another operator to carry traffic to and from customers on their behalf.
Internet	The interactive global network linking millions of computers, transmitting, storing and providing information for users.
Internet Service Providers (ISPs)	Organisations which provide individuals and businesses with access to the Internet, (including commercial web sites). ISPs may be wholesalers or retailers or both. A wholesaler normally resells bandwidth and certain other services to smaller ISPs who act as retailers. The most significant component of the sale price is the amount of bandwidth purchased.
IP	Internet Protocol. IP forms the basis for a connectionless packet delivery service. New cellular services like GPRS will make use of IP to provide an always-on Internet and email connection.
ISDN	Integrated Services Digital Network. Usually offered in two forms - Basic ISDN and the faster Primary ISDN.

ISDN-PRA	ISDN Primary-Rate Access: ISDN where 30 64kbit/s channels are accommodated on a 2Mbit/s link.
Local Loop	The physical wires, usually copper, that run from a customer's site to their telecommunications company's local switch or exchange.
LAN	Local Area Network: a network which allows the sharing of computer information within a building or business site.
Long-Run Incremental Costs	These are the additional costs (per unit) that a telecommunications operator incurs in carrying out a particular activity on a long term basis.
MAN	Metropolitan Area Network: a high-speed digital network which allows the sharing of voice and data communications over a relatively large area, within a city.
MMDS	Multi-channel Microwave Distribution System: an analogue broadcasting medium which allows distribution of a number of analogue television channels (typically ten). Used to provide 'cable television' in areas where cable-laying is not viable.
Modem	A contraction of 'mo(dulator)' and 'dem(odulator)', an accessory that allows computers and terminal equipment to communicate through telephone lines or cable.
Multiplexer	A device that can combine and reformat different signal streams over a single line. A similar device at the receiving end unscrambles the stream back to its component parts.
ONP	Open Network Provision: a European Commission policy initiative to provide open access to the networks of dominant telecommunications operators.
Peering	Arrangements made between Internet Service Providers and Internet Exchange Administrators for the exchange of data traffic at Internet exchanges.
PDH	Plesiochronous Digital Hierarchy. Legacy technology used in the backbone network. Traditionally used to link every local exchange in the country for voice, but not well suited for the provision of broadband services.
PoP	Point of Presence: a point at which one network operator can hand traffic onto the network of another.
POTS	Plain Old/Post Office Telephone Service.
Protocol	A standard procedure for regulating data transmission between computers.
PSTN	Public Switched Telephone Network. Traditional telephone system over a copper pair, carrying voice at 64 kbit/s and data at up to 56 kbit/s.

SDH	Synchronous Digital Hierarchy - a standard for high capacity transmission. Now being used for all major investment in the backbone network.
SMDS	Switched Multimegabit Data Service: high-speed switched data service, used in broadband backbone networks.
Third Generation Mobile Services	The third generation of mobile telephony (known as Universal Mobile Telecommunications Systems in Europe) is designed to be a worldwide broadband, digital system. It will offer wireless Internet access, moving video images, two-way text communication and on-line transactions. Analogue and digital (eg GSM) systems were the first and second generations of mobile, respectively.
TO	Telecommunications Operator: term used to describe both a national dominant supplier of public telecoms services and infrastructure and a private company operating public telecoms services and infrastructure, nationally or locally, either as a concessionary monopoly or in competition with others.
UMTS	Universal Mobile Telephone Service. The next generation of mobile telephones.
Unbundling	Local loop unbundling means the provision to competing operators of access to individual subscriber lines so that the costs to that operator are solely the basic costs of the subscriber line and do not include any other access network or overhead costs. Local loop unbundling thus gives a competing operator dedicated access to customers via the local loop.
USO	Universal Service Obligation: the obligation placed on one or more telecoms companies to provide telecommunications services to customers in areas where providing service is not economic or to customers which are not economic.
VSAT	Very Small Aperature Terminals: Suitable for point-to-multipoint applications such as transmission of voice and data from head office to branch office providing bandwidth from 9.6Kbit/s up to 35 Mbit/s.
WLL	WLL - Wireless Local Loop. Radio signals transmitting at 164 kbit/s and 2 Mbit/s between points.
WWW	World-Wide Web - the system that links topics on the Internet, making it easy for users to find what they want.
xDSL	An umbrella term for the next generation of dedicated subscriber line technologies which allows high speed broadband communications over existing copper wires.

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