

## **International telecommunications**

*D.W.F. Medcraft*

*Director, Products and Services, British Telecom  
National Networks, UK*

This presentation reviews the major forces shaping telecommunications services today, focuses upon those services of particular interest to Aslib members and gives some indication of the future direction of those services.

Telecommunications, especially in an international context, is too large a field to cover comprehensively here, so it is necessary to concentrate on services for data, and especially text, communication. The forces which shape these services and the services themselves are broadly similar in major trading nations around the world and in international services between countries, although there are variations, especially in pricing and regulation of services between countries.

### **THE THREE FORCES**

Text and data communications services as they exist today represent a marriage of three major forces which will be examined individually in turn. These forces are:

- developing technology
- standards and protocols
- changing user needs and requirements.

#### Developing technology

In the last few years the impact of microprocessors on computing has been revolutionary. It is now possible to have a computer on your office desk more powerful than any

that existed in the world twenty years ago and it is possible to carry a very powerful device weighing no more than two or three kilos around with you wherever you travel in the world.

The major trends here have been:

- the ability to concentrate electronic complexity into smaller physical units
- the rapidly reducing costs of such units
- the growing importance of software to operate the resulting systems.

All of these trends have affected telecommunications as much as computing. Telephones and other communications terminals as well as exchange equipment are now just types of computer. They may be special purpose computers but the world market for telecommunications equipment ensures that the same principles of large-scale production and low cost apply to communications equipment as to computing in general.

Telecommunications also benefits from the growth of other technologies. Two are of particular relevance: satellite transmission and fibre optic transmission.

In less than twenty years we have built a complex web of relay stations in the sky encircling the globe and providing ever-greater communications capacity to virtually every country in the world. Satellites are individually expensive, but their large capacity to carry telephone traffic can be shared between thousands of simultaneous users, and the resulting links made more cost-effective.

Optical fibres represent another way of channelling more communications traffic through a single link. In fifteen years fibre optics has come out of the laboratories and into widespread commercial operation. British Telecom already has long-distance fibre optic systems in use carrying up to 1,900 telephone calls on a single link. We are now proceeding in conjunction with international partners to lay the world's first under-sea fibre optic cable to the European continent in 1985 and a transatlantic fibre optic cable for completion in 1988.

The key to delivering the new power and cost-effectiveness of this new technology to customers is the digital mode of operation. Traditionally telephone signals have been sent using a direct representation of the human voice transmitted electrically, as in a domestic hi-fi system. This has real limitations and suffers from degraded quality over longer links. Also, it is not easily capable of carrying signals other than straightforward voice telephony. By digitally encoding all information into a very fast stream of binary digits of information it is possible to carry any form

of telecommunication traffic in a single stream capable of easy switching and transmission by the latest technologies.

The technical jargon associated with computer and communications is formidable. You will hear much talk of kilobits and megabits and soon gigabits, and of digital voice encoding and other exciting technical concepts. In detail the technology should not concern you. It is the ever falling real cost of national and of international communications that matters. An example of the relative costs of international links to North America from 1920 to the present day shows a reduction from £263.54 to £1.39 for 3 minutes at 1984 equivalent prices (1945 = £35, early 1970s = around £7). It is clear that technology has enabled us to make great advances in the last dozen or so years and we see no signs of this rate of progress slowing. Indeed, the reverse is true. Through the efforts of research labs around the world, the investment of computer and communication companies, and the growing liberalisation and resulting competition in communications, we see an acceleration of technological advance. This is all to the good, since it means proliferation of a variety of highways to carry customers' messages.

## STANDARDS

The proliferation of highways can cause problems, however. If one looks across the world at the variety of standards for domestic electricity supply, there are differences in voltage, in type of current and, critically, in type of socket through which the supply is delivered. Telecommunications is an international market and its growth would have been much impaired unless the problems of the electricity industry were substantially overcome in the individual networks. Happily, this has happened. Through the combined efforts of CCITT (the International Consultative Committee for Telephony and Telegraphy), CEPT (the European Council for Posts and Telecommunications) and ISO (International Standards Organization), literally hundreds of standards have been agreed for international telecommunications. These cover all aspects of the operation of telephone networks whilst more recent standards cover the evolving field of data and text transmission.

The standards that I want to focus on are those that define the operation of data networks, those that define the linking of public message services, and those that define standards for the format and content of messages.

Substantially the best way to transmit data around the world is through a network that shares its resources

between many users. Technically the most effective way of doing this is with a mode of operation known as packet switching. In packet switching the message is broken up into short blocks of data, each of which is given a wrapping of address and control data and sent independently through the network, CCITT has a number of standards for packet switching. The critical one is known as X25 and has become the common currency for computer and terminal manufacturers around the world wanting to connect to public data networks. Saying that a terminal or a computer 'conforms to X25' means that it can connect to any one of dozens of public data networks around the world and communicate directly with the tens of thousands of terminals connected to those networks.

X25 only covers the transmission of information at network level 1. Building this into internationally intelligible messages requires more. It requires procedures agreed between systems in different countries. There are two approaches here which I would like to describe separately.

The first is where a single vendor's message service system is installed in many countries. This may be through the international spread of a single network (as with GEISCO Qwickcomm) or through the franchising of a system to separate operators in many countries (as with the ITT Dialcom system operated in Britain by Telecom Gold). There are in fact around half a dozen such systems operating internationally, each incompatible with the others.

The other approach is to adopt an international standard for messaging. You are familiar with telex, a traditional crude but effective form of messaging. In the same vein of development we now have Teletex, an international standard for message formatting and transfer. Teletex is now accepted by manufacturers across the world as the basis of an open public international message service, and has much to recommend it. It will deliver high-quality text as quickly as the user wishes - immediately, or overnight at lower rates. It does this at almost fifty times the speed of telex, and more economically.

To tie the variety of message services together more standards are necessary and CCITT has been active in this field, by developing X400, a standard for linking electronic mailboxes and other systems for communicating text messages.

Whilst each standard is of great significance, what is really important is the way that the standards fit together as pieces of a larger jigsaw. These pieces of the jigsaw together build the reference model for Open Systems Interconnection, the Holy Grail and final goal of all international standards work in this area. OSI brings to reality the open world of networking - to the benefit of users worldwide.

## USER NEEDS

A major part of the rationale for the continued development of communications is the ever-increasing perceived value of information. As the world becomes smaller and the international net of business transactions more densely spun, so there is a greater need for transfer of information, both between and within companies. The way is being led by international organisations in the information-intensive service sectors such as finance and banking. Prime examples are American Express and Citicorp, who have seen the scope for using information technology as a tool to expand their business through increased efficiency and competitiveness. They want immediate worldwide message transfer on demand, tight but economical control of information about the distributed operations of their company, and an ability to overcome the barriers of time, national frontiers and language.

Worldwide the demand for data communication is increasing at around 20 per cent per annum and we see no limit to this growth.

## AVAILABLE SERVICES

Traditionally two forms of telecommunication service have been available to builders of national and international data and text network facilities: the public switched telephone network and private circuits. Neither of these has been optimised for this purpose and private circuits on an international basis have been more expensive than most organisations have been able to justify.

Increasingly the answer is seen as packet switching. In Britain we have British Telecom's Packet SwitchStream service. This has grown into a mature and very successful service and BT has recently committed a further £80 million to the expansion of the network and an increase of the facilities available. Packet SwitchStream supports terminals from teletypes or simple portable terminals through to the most sophisticated mainframe computer. There is a wealth of facilities available with the service and in many cases the service is tailored through selection of these facilities to the needs of a particular customer.

Packet SwitchStream serves Britain and is also a gateway to the world of international packet switching, our IPSS service. IPSS links networks in all of the major industrial countries of the western world, from the United States to Singapore, from Brazil to Japan. Therefore a worldwide homogeneous infrastructure dedicated and optimised for transmission of data and text has evolved rapidly in the last few years.

## THE FUTURE

Planning, building and developing telecommunications facilities is inevitably a long-term activity. The investment is huge, the pay-back extended; it is not an activity for the faint-hearted. This does not mean that we can see quite clearly the shape of the growth of telecommunications networks over, say, the next five years. There will be increasing choice of facilities and services and there will be a steady reduction in the real cost of services.

The key activity will be the development of services which add value to the basic networks. Here British Telecom has taken a lead in Europe through the establishment of mailbox services such as Telecom Gold and in stimulating the further extension of the use of networks, particularly for the field of translation. We are very pleased to have had a role in the establishment of the Textnet service, which is the subject of another paper at this conference.

British Telecom is determined to combine an entrepreneurial approach to market development with a commitment to quality and service which will ensure the full satisfaction of our customers.

## AUTHOR

D.W.F. Medcraft, Director of Products and Services,  
British Telecom National Networks, 2-12 Gresham Street,  
London EC2V 7AG