SUPERHIGHWAYS FOR EDUCATION

Consultation Paper on Broadband Communications

Department for Education

The Scottish Office

Department of Education Northern Ireland

Welsh Office

Department for Education
Sanctuary Buildings
Great Smith Street
London SW1P 3BT

0171 925 5000
0171 925 6000

ISBN 0 11 270898 6

CONTENTS

The Stationery Office's Internet preferences and navigational aids for this title

We suggest the use of Arial or a similar sans-serif typeface. This document has been prepared for the Netscape browser and is also viewable using the NCSA Mosaic browser.

Back to contents
Back to previous section
On to next section
Back to other Stationery Office pages
Back to DfEE home page

---

comments

Appendix B

Access to this consultation paper through the Internet

This consultation paper marks the launch of a DFE presence on the Internet. Further DFE materials in that medium will follow. Access to the DFE home pages can be made via the Internet using

http://www.open.gov.uk/dfe/dfehome.htm

HMSO (now The Stationey Office), made the necessary arrangements for the publication of this paper on the Internet and the document can also be accessed using the following

http://www.tsoinfo.gov.uk/document/supered/supered.html

Since the publication of this document the Department for Education (DFE) has become the Department for Education and Employment (DfEE)

Prepared for the Internet by HMSO
from Superhighways for Education - Consultation Paper on Broadband Communications
published by HMSO as ISBN 0 11 270898 6
at 4.95 sterling

and is available from the

- The Stationery Office Publications Centre
- Stationery Office Bookshops
- Statonery Office Accredited Agents

---

comments

Superhighways for Education

Consultation Paper on Broadband Communications

Foreword by the Secretaries of State for Education, Scotland, Northern Ireland, and Wales

This January the Government issued an invitation at the British Education Training Technology exhibition at Olympia. We invited the telecommunications, cable, broadcasting, information technology and multimedia industries to work with the education community to develop - through a programme of industry-funded pilot projects - commonly accessible national, and ultimately international, education superhighways. We undertook that these projects, and the way forward they represent, would be underpinned by a thorough process of consultation to bring together the worlds of education and commerce.

In terms of global communications, we now contemplate a leap into the future. This is likely to be as great as the changes brought about by the development of printing, the internal combustion engine, and powered flight. But it will take place over a much shorter timescale. We have a long way to go and a relatively short time to chart our path. Education will be a key spring-board in these developments because the pupils and students of today will be the workforce and consumers of the future. They - and we - will all need a new kind of literacy - network literacy.

We must now consider together how to enable our education services to reap the benefit from the opportunities offered by the world's information superhighways. The higher education sector in the UK is already a pioneer in the field. We must extend its achievements and build upon the values of the broad and balanced education demanded by the National Curriculum for England, and those for Wales, Scotland and Northern Ireland. Radical changes to teaching and learning styles will become possible in the years ahead as a result of the new communications and information technologies. In facing the challenges we must not forget that education is not just a preparation for working life but a matter of individual, cultural and social development, and of life-long learning. Quality of life depends on all these factors.

This consultation paper is the first, practical step towards extending to the whole of education the progress that is now being made in higher education. Schools, colleges of further education and other education institutions are now the main arbiters of how their financial resources are spent. They will take the decisions in the future about whether or not to connect to superhighways. They will want to know that the new opportunities will match their needs.

This consultation paper therefore offers the opportunity to contribute to the debate, and to take part in shaping developments. Through co-operation between schools, colleges, universities and industry, we can pilot new ways of teaching and learning using the new communications technologies. **We in Government shall be ready to fund the evaluation of innovative new proposals: this paper sets out the criteria by which we shall assess them.**

We now look forward to your responses to this paper which has been prepared by the four UK Education Departments, with advice from the National Council for Educational Technology. The responses we are asking you to make are of two kinds. First we seek your answers to the key questions raised under 'The Future, Questions for Consultation'. Second, we invite specific collaborative projects, relevant to the development of superhighways for education, which would benefit from independent evaluation with Government support. Project criteria against which to bid for such evaluation appear in Appendix A. **We shall weigh your responses carefully, and shall publish the outcomes of the consultation in the Autumn.**

The Rt Hon Gillian Shephard MP
Secretary of State for Education
[select thumbnail for larger picture, 54K bytes]

The Rt Hon Ian Lang MP
Secretary of State for Scotland

[select thumbnail for larger picture, 89K bytes]

The Rt Hon Sir Patrick Mayhew QC MP
Secretary of State for Northern Ireland
[select thumbnail for larger picture, 100K bytes]

The Rt Hon John Redwood MBE MP
Secretary of State for Wales
[select thumbnail for larger picture, 87K bytes]

---

comments

Section 1 - Superhighways: Concept and Development

Superhighways - why are they important?

1. Information superhighways offer the potential to deliver widely and cheaply a vast range of services, including education. They have become possible because telecommunications, broadcasting and information technologies are converging into a single 'digital' (see note 1) technology, and because fibre optic cable now provides the means of carrying information by light, enabling vastly greater data transmission rates than are practicable through copper wire. Most of the major developed countries, in particular the USA, other countries in the EU, and Japan have plans for information superhighways. In February, at the G7 Ministerial Conference on the Global Information Society, Ministers from the most advanced economic countries called for active co-operation in preparing for the advent of the superhighways.

What do we mean by a Superhighway?

2. The term 'superhighway' is usually taken to mean a *broadband* network capable of transferring very large amounts of information - including video, still images, audio and text - at high speed between users. *Narrowband* networks, for example those linking computers over ordinary telephone lines, are slower and less flexible in their functions. But the digitisation of information, including still and moving images, and the ability to 'compress' that digital information, now means that narrowband networks can carry an increasing range of functions.

3. For the purpose of this consultation paper, broadband is defined by *function* and *quality* (two way transfer of instantaneous video, still images, audio and text - to multi-channel television standard) rather than by transmission rate or the type of transmission medium. But as an indication, the range of service that the education community will probably need in the longer term to secure benefit from fully interactive applications is likely to resemble that made possible by the most advanced two-way communication technology. Such technology relies on **Mbit** data rates per second or more. Development of compression techniques progressively means that such applications can be delivered using technologies with narrower bandwidth. Figure 1 gives an indication of the current *comparative* capacity of telecommunications technologies.

Action across Europe and the rest of the world?

4. The concept of the information superhighway originated in the plans of the Clinton administration to develop a 'National Information Infrastructure' in the USA. In January 1994 the US Vice President, Al Gore, challenged industry to connect all the country's classrooms, libraries, hospitals and clinics by the year 2000. The US administration is currently seeking to put in place a regulatory structure that will encourage, through competition, the investment of some $150 billion needed to achieve that goal.

5. In Europe progress is also rapid. The European Union Summit in December 1993 approved proposals to begin planning for the 'European Information Society'. Recommendations about the major technical and regulatory preconditions for establishing European superhighways were drawn up early last year under a group led by European Commissioner Bangemann in its report '*Europe and the Global Information Society*'.

6. The Bangemann report urged European Union countries to work through market mechanisms to carry Europe into the information age. It sought the development of a common regulatory approach to enable a competitive, Europe-wide, market for information services. It argued *for* early review of policy towards telephone monopolies, intellectual property rights, tariffs for telecommunications, media ownership laws, and rules for standardising and linking networks. It argued *against* the use of substantial public financial assistance, dirigisme, or protectionism.

Progress in the UK?

7. **The UK is well placed to take a leading role in these developments.** While most EU countries still have telecommunications monopolies, the privatisation of British Telecom and the competition policy framework for

telecommunications laid down in the 1980s has encouraged significant investment by BT, Mercury and the cable companies. In November 1994 the Department of Trade and Industry's Command Paper '*Creating the Superhighways of the Future*' set the scene for the development of broadband networks in this country for the foreseeable future. The existing regulatory framework (see note 2) was upheld as the right framework for developing internationally competitive communications in the UK. Public telecommunications operators (PTOs) were encouraged to bid for new local delivery franchises to gain expertise in innovative new technologies.

8. Figure 2 shows the extent of cable television and local delivery service franchises. Investment by the cable industry is expected to increase to some 10 billion [sterling] in this decade. Very substantial investment in broadband technology is also being made by British Telecom and other PTOs, with fibre-optic connections already reaching as far as telephone exchanges and many large corporate users. **In terms of infrastructure, the UK is therefore well placed to enter the era of the information superhighway**. As the map shows however, particular issues arise as to how the broadband networking needs of rural areas of the country, not currently covered by franchises, will best be served. This is further discussed in paragraph 33.

Note 1: 'digital' - information composed of **0** or **1** signals, for example within a computer or compact disc. Back

Note 2: See 'Competition and Choice: Telecommunications Policy for the 1990s' (Cm 1461, March 1991). Back

---

---

comments

Section 2 - Superhighways in Education

9. Network competency is already becoming significant in business, and will be essential for working life in the next century. The rapid advance over the last decade of electronic mail, mobile telephones and fax suggests that commerce and industry will need no encouragement to adopt newer and more efficient generations of communications technologies. Indeed the pace of such developments is likely to be driven largely by commercial pressures.

SuperJANET - the first education superhighway

10. But commercial pressures do not invariably set the pace for the development of new technologies. **SuperJANET - the Super Joint Academic Network - provides the UK's first education superhighway, and is currently one of the largest high performance networks in the world**. Conceived strategically in 1989 as an optical-fibre network to support the networking requirements of the UK research and higher education community, it builds upon the earlier JANET academic network established in the 1980s. SuperJANET currently has two components. A 34 Mbit/s data network interconnects 60 sites across the UK and forms a high performance part of the global Internet (paragraph 31). Of these sites 14 are also connected via a 34 Mbit/s multi-service network which is currently being upgraded to 155 Mbit/s. A plan for the expansion of SuperJANET has been approved by the Higher Education Funding Councils and the connection of an additional 27 sites to the data network has recently been announced. Figure 3 shows the current distribution of SuperJANET sites.

11. Applications of SuperJANET to date have included group/co-operative working, advanced information services, remote consultation, and distance learning and teaching. The SuperJANET network is capable of handling high quality video, a capability not provided by low bandwidth networks. Hence it is possible, using SuperJANET, to retrieve large moving image files and view images from simulations in real time. Pilot projects using SuperJANET in *medicine* have permitted students at a remote site to view surgical operations from a video camera, to control the camera remotely, and to maintain two way audio contact with an instructor. The SuperJANET network has also enabled access to brain imaging scanners from a distance and to an extended database of cases for comparative studies.

12. In *other areas of higher education* pilot projects have focused on the ability of SuperJANET to transfer large datasets such as satellite images and electronic journals, and to permit researchers to have direct personal access to collections of rare and valuable documents and artefacts. New self-directed learning packages are being developed, which can contain text, still or moving images and audio, and which can be accessed in either a linear instructional or encyclopaedic manner.

13. With the expansion of the higher education sector and the removal of the binary divide between universities and polytechnics and colleges, the Higher Education Funding Councils have set two priorities:

- connecting all higher education institutions to JANET as soon as practicable; and
- extending SuperJANET to additional institutions, as and when such connections are technically and financially sensible, provided they are in keeping with the aims of the SuperJANET project.

14. The Higher Education Funding Councils will shortly be consulting higher education institutions on issues surrounding the exploitation of information systems as a basis for developing a strategy for higher education over the next decade.

Education superhighways - schools and further education: general considerations

15. Impressive though the power of broadband technology is, it is vital to consider carefully the uses to which it could be put in schools and further education. **Among the key issues are those of content and the design of on-line materials, the ease of computer interfaces between the content and the learner, and the cost of superhighway connections, services and applications.** Priority decisions will be needed on whether to use superhighway applications rather than longer established methods of pursuing key educational objectives such as improving basic literacy, numeracy and IT skills. **We must consider the 'added value' that superhighways may bring in their own right. A main purpose of this consultation paper is to open up that debate.**

16. In the school sector, 1995 will see the introduction of a revised National Curriculum in England and in Wales. In both countries the revision has reduced the amount of detailed prescription and allows more flexibility to schools particularly in respect of 14-16 year olds. But an essential element of the revisions is the requirement that, where appropriate, almost every subject should employ IT to enhance teaching and learning and to develop pupils' *IT capability*. **The National Curriculum framework for IT requires that pupils at all key stages should be taught the IT skills of handling and communicating information - skills which will be fundamental to the use of superhighways**. In Scotland IT targets have been defined at particular stages in the 5 - 14 curriculum, and skills in IT are required as core competencies in the proposed post-16 curriculum. The Northern Ireland Curriculum also includes provision for IT competence.

17. To promote the twin objectives of using IT to enhance learning and to develop IT capability itself, the Government has operated a grants programme since 1988 which has, in England, supported 187m [sterling] of expenditure on IT equipment and teacher training in the curriculum use of IT. Total expenditure on IT in schools has been 4-5 times this amount over the same period. Further stimulus to the development of the use of new technologies in schools has been provided by the DFE's initiatives on City Technology Colleges and Technology Colleges with their special emphasis on technology, science and mathematics. The Education Departments of Northern Ireland, Scotland and Wales have also made substantial investments in the development of IT capability. **This has made possible significant progress towards the Government's objective of ensuring that all pupils are well-versed in the use of new technologies in preparation for working life**.

18. There is however no room for complacency. Evidence from HMI, the Education and Training Inspectorate in Northern Ireland, and independent sources indicates that schools are not finding it easy to offer all pupils appropriate opportunities for using IT in the curriculum. Some of the IT skills they learn in primary and secondary schools are not applied as frequently as they might be to enhance performance in various subjects. **The use of education superhighways in schools, if appropriately planned and supported, could further enrich the curriculum in general and IT capability in particular**. Access, for example, through video-on-demand to the educational broadcasting material produced by the BBC, independent broadcasters and programme makers, could offer high quality underpinning for National Curriculum and other school purposes.

19. Potentially, education superhighways offer a range of significant benefits to the delivery and content of the curriculum. For instance:

- **English**. Already the main language of international IT, English is likely to be the main language used on the international broadband superhighways of the future. Both written English and oral presentation skills within video conferencing will be among the main currencies of superhighways. In terms of literature and drama, pupils and students could use superhighways to explore a wide range of multimedia sources to enhance their work, for example by comparing different interpretations through video of a particular play.
- **Mathematics**. Communications technologies can provide many opportunities for pupils in using and applying mathematics, particularly in establishing lines of enquiry in which pupils and students collect, analyse and interpret data from a worldwide variety of sources, and illustrate concepts and outcomes as visual models.
- **Science**. There is potential for on-line experimentation, shared between sites; access to banks of pre-recorded experiments; and interactive services simulating science activities which would normally be prohibited by cost. Person to person access to research scientists could also become possible.
- **History**. With the ability to exploit archive video footage, as well as providing immediate access to electronic archives world-wide, superhighways could offer a significant enhancement of resources.
- **Geography**. There is potential for the real-time relay of satellite images of the earth for weather data analysis, for the study of global warming, or for the study of patterns of settlement and transport networks.
- **Modern foreign languages**. Direct class to class, or pupil to pupil, video links as well as text-based interactions could substantially enhance the range and quality of teaching and learning.
- **Design and technology**. The power and flexibility of networked IT could be used to good effect in enabling video conferencing around design ideas displayed and modified during discussion on screen.
- **Art**. The ability to create and manipulate images on screen could be supplemented by the ability to access high definition images of works from art galleries around the world, and to compare pictures on a segmented screen.
- **Music**. Access for comparative purposes to different high quality interpretations could become possible, as well as scope for participation in distance masterclasses.
- **Welsh**. In Wales, where Welsh is a central part of the National Curriculum, superhighways could also offer significant benefits in the delivery of the subject as a first language, and as further means of immersing learners in Welsh as a second language. Superhighways could also be used to aid the development of the distinctive

Curriculum Cymreig.

20. It is readily possible to identify exciting educational possibilities for the superhighway. But an analogy can be drawn with real travel for educational purposes. There are many beguiling opportunities, but in each case decisions have to be taken about whether the value added justifies the cost in money and time involved.

The learner with special needs

21. There is particular potential for pupils and students with *special educational needs*, and those being educated in hospital or otherwise than at school. Very able children may also benefit and there are also potential applications for the education of ethnic and other minority groups. **The flexibility of broadband to enable direct and immediate interactive communication between student and tutor, or between school and other teaching services, may significantly improve the delivery of a particular support service, as well as the assessment and management of the student response**. In Scotland a distance learning certificate in Special Educational Needs is offered by the Northern College in Aberdeen using electronic mail and conferencing links. The potential of these opportunities is likely to be further enhanced by the extended use of synthetic speech outputs and by further development in the use of virtual reality technologies in educational contexts.

Superhighways in further education

22. Further education colleges already offer a very wide curriculum. Many of the same considerations as in schools apply. Colleges will need to keep pace with education superhighway developments if they are to continue to play their full part in vocational education and training to ensure that the nation remains competitive. In general terms FE colleges are likely to be interested in superhighway developments in order to:

- widen access to provision, including particular specialisms within any college;
- enrich curriculum content by improved access to resources;
- foster a more versatile approach to the development of core skills in both academic and vocational courses;
- promote collaborative ventures with the local community, including employers and schools; and between UK colleges and their counterparts in other countries;
- gain access to sources of information on vocational needs to improve responsiveness of colleges to changing vocational requirements, both in the UK and Europe;
- provide information, advice and guidance to prospective students, especially adults wishing to re-enter education.

23. Education superhighways could well prove relevant also to the **youth service** in promoting the development of personal and social education, and to **the provision of information to young people generally**. Broadband communications technologies will give the FE and adult education centres greater ability to meet lifelong learning needs in terms of vocational, leisure and social activities. There will be increasingly easier access to learning for home-based students and those with mobility problems. To help achieve this, staff in FE colleges and adult education centres will need further to develop their skill in the use of new technologies. Already developments such as the ACTOR project at Ulster University are enabling distance teaching by video-conferencing to minority groups in remote FE colleges. The 'Bytes for Belfast' project is exploring the use of the Internet in improving communication skills and providing information on training opportunities for unemployed school leavers.

Staff development needs

24. **Significant potential exists for developing the use of superhighways for staff training and development**. As schools develop their role as partners in the delivery of *initial teacher training* (ITT), broadband networks may help school and higher education providers to ensure that their different contributions are closely linked and that, together, they provide maximum support for trainees.

25. The Open University's PGCE (see note 3) is already developing around a network. **From the current year, some 1,100 students are linked through loaned computers and modems with each other, their tutors and OU staff**. Facilities already in place or being developed include e-mail, bulletin boards, electronic conferencing, electronic file transfer and other on-line services, as well as CD-ROM.

26. Similar potential benefits exist for *in-service teacher training* (INSET). Links between schools and training providers may establish particularly effective and efficient ways of developing teachers' knowledge and skills. There is considerable scope also for schools to collaborate through networks, perhaps working alongside each other or exchanging expertise. DFE is currently supporting, with the LEA and others, a pilot project in rural Northamptonshire using distant tutorial facilities to support INSET in science to a cluster of six primary schools, through use of electronic mail telephone links.

Management and administration

27. Significant benefits stand to be gained from the use of multimedia and superhighway applications in the management and administration of the education service. Projects based on multimedia applications in **school management training** and **teacher appraisal** techniques have shown teachers to be optimistic about their potential in the longer term, but that they require considerable time for familiarisation. There is significant potential for linking such applications with on-line tutorial support over the superhighways.

28. Pilot studies by DFE and other Departments have also considered the administrative implications of electronic communications with non-Departmental public bodies, with LEAs, with schools and with colleges of further education. The collection of statistical data is already taking place by electronic means. Great potential exists to develop such services, although the compatibility of different IT systems and electronic mail services remains a challenge, as does confidentiality and security. Applications and services must also be developed to address a wide range of different needs. The Department is looking further into the issue of disseminating information electronically, for example by CD-ROM, and over the Internet. **This consultation paper will be the first DFE publication to be made available on the Internet (see Appendix B). It will be followed by further publications as appropriate to that medium.**

Note 3: Post-Graduate Certificate of Education. Back

---

comments

Section 3 - Relevant Technologies

Multimedia and integrated learning technologies.

29. Pilot projects now being funded by the education departments and others will help determine how various new technologies can enhance the process of teaching and learning. The aim is to identify advantages or constraints in using these technologies in education. Several have a particular bearing on the potential of superhighways in education since their applications approximate, as nearly as is possible at this stage, to the kind of applications likely to become available on-line on superhighways.

CD-ROM - This technology has made a particular impact on educational institutions as an information source, accessible within libraries and in the classroom, capable of enhancing students' and pupils' data-handling skills. With the increasing interactivity of CD-ROM technology, its capacity to hold moving images, and the advent of CD-ROM discs suitable for use by younger children, the DFE has funded the provision of multimedia computers and a range of CD-ROM discs to primary schools. Most secondary schools in the UK and an increasing proportion of primary schools are now equipped with CD-ROM. Access to multimedia material on CD-ROM distributed through internal or external networks may well become an increasingly common phenomenon.

Interactive Video (IV) - Although it is not fully digital, this technology most closely resembles the distance learning and training applications that may become available over education superhighways. IV has the capacity to integrate full or partial screen moving pictures with text or graphics, enabling the user to control and interact with this material using a computer. Evaluation of this technology, with the television-based CDI (Compact Disc Interactive) technology, has been undertaken in the school curriculum. Benefits of IV in schools include a greater sense of pupil responsibility for their own learning, sustained hold on pupil attention spans, and developments in conceptual awareness. However considerable time is required for teacher familiarisation and for lesson planning: issues and material not requiring specific pupil decisions also tend to attract lesser attention.

Integrated Learning Systems (ILS) - Computer based, and generally networked within a school or other education institution, these manage the delivery of curriculum material to pupils and students so that they are presented with individual programmes of work. Some are able to adjust automatically to provide appropriate levels of difficulty according to students' responses, while others use teacher or student intervention to move to higher levels. All systems provide formative feedback and diagnostic records for both students and teachers. In the USA, systems have been in use for some time with both teachers and students reporting learning gains. Early outcomes from a pilot project currently supported by the UK Education Departments have indicated some learning gains and an increase in attention levels and personal learning responsibility. In terms of classroom management, teachers are benefiting from having smaller teaching groups and more personal contact (half classes use the ILS system alternately). All current integrated learning systems run on high bandwidth local area networks. **Broadband networks may open up the possibility of on-line classroom access to a very wide range of supplementary curriculum materials, provided line charges and other costs are low and that access is structured**. Work is needed to establish the proper relationship between networked in-school ILS and supplementary outside material accessed via broadband or other means.

Satellites: direct broadcasting and remote sensing

30. Services delivered by satellites have significant potential in education. Evaluation of the first year of a Welsh Office initiative to provide satellite receiving equipment for secondary schools identified greatest use in geography (remote sensing satellites which collect information about the Earth's surface and atmosphere), and in modern foreign languages (direct broadcasting systems which bring satellite television in a range of EC and non-EC languages into the classroom). There are signs that other subject departments are gradually exploring the potential that satellites have to offer. The evaluation found that both systems contributed to increased motivation, improved linguistic skills, and provided work with a greater sense of immediacy and relevance through access to live images. Direct broadcasting systems offer the possibility of eventual video conferencing between institutions in the UK and abroad. This would require education institutions to have access to transmitting equipment as well as receiving systems. Such facilities may become more widely available in the future, although the increasing encryption of satellite-transmitted data for commercial purposes may prove to be a disincentive to educational users as they would need to purchase decoding devices.

The Internet and World Wide Web

31. The Internet is a worldwide network linking some 30,000 smaller networks, with many millions of users, ranging from universities, research institutions and libraries to businesses, schools and individuals in their homes. At present, as far as users are concerned, it is a mainly narrowband network used for conveying electronic mail and messages and accessing remote sources of information, although it can also convey graphics, audio and video. The range and quality of the functions available on the Internet are dependent upon the capacity of the connection, the speed of the modem, and the power of the user's computer. Using a basic telephone line and modem link, for example, it could take about two hours to transfer one minute of video, assuming adequate disk space on the receiving computer. Recent developments such as the World Wide Web are now providing a more user-friendly means of accessing the Internet, and the number of connections is growing as a result. Higher education institutions have been connected to the Internet since 1991 through the JANET network. A relatively small - but growing - proportion of schools and colleges is at present connected. BT will this year provide Internet access through the Campus 2000 network, offering 3000 schools and colleges the chance to be connected. Specially tailored connections for schools and colleges are also available from other commercial providers.

32. At present the educational value of Internet connection is still being explored. Pilot projects are being mounted in schools in the UK to assess its possible value, for example the 'School Libraries of the Future' project, sponsored by DENI, the NCET and the British Library, and 'Schools On-line' sponsored by DTI and commercial organisations. Preliminary indications are that the value of Internet connectivity lies in the opportunities it provides to both teachers and learners to develop skills of information handling, experience of electronic communication at a distance, and general network literacy. Schools will need to consider the telephone costs of access to the Internet, and the need for safeguards over unsupervised pupil access to a medium which contains bulletin boards of a personal nature and which can be used to purvey undesirable material. (Some commercial providers are now developing ways of offering restricted access to the Internet, with monitoring devices to detect abuse of the system.) The NCET is publishing guidance, '*Highways for Learning*', on the use of the Internet in schools and colleges.

---

comments

Section 4 - Wider Issues

Rural areas - needs and prospects

33. Technological developments, including the use of the radio spectrum or satellites for the delivery of broadband services, could in the future make provision to rural areas more commercially attractive. A particular challenge will be the development of adequate two-way services, to enable rural users to obtain the same interactivity as other users. Progress towards defining the uses which rural communities can make of advanced communications technologies - including use for distance learning - is being made under the Kington Connected Community Project in Herefordshire, supported by a number of sponsors including BT and Apple Computers, and by the Government. In the Western Isles of Scotland a similar project is being supported by BT and Highlands and Islands Enterprise. The Northamptonshire Distance In-Service Training project (paragraph 26) is also exploring issues relating to teacher training in rural areas. These initiatives will lead to clearer understanding of the likely demand by rural users for such services, and put into focus the commercial viability of broadband infrastructures in rural areas.

Charges and tariffs

34. **The education service in the interests of pupils and students rightly looks for the availability of good quality educational materials at reasonable cost. The service as a whole represents a large marketplace, and one which has potential to open up an even larger market for new educational products - that of the home.** Schools and colleges are used to a high standard of book production and educational broadcasting tailored to their needs. Recent years have seen a phenomenal growth in the production of educational materials on CD-ROM and other multimedia formats, the prices of which are beginning to become widely affordable. Educational consumers will expect the same sort of services and charges from superhighways. They will compare different media and ask whether superhighways can deliver what they want more effectively and more cheaply.

35. They will be wary about open-ended costs, for example tariffs for on-line services, which are difficult to plan for. **One possibility might be the development of 'flat rate' tariffs for education for unlimited use over a year or per month, irrespective of bandwidth.** Ultimately it will be for the education institutions themselves, in the light of their budgetary priorities, to decide whether to provide on-line facilities for their pupils or students. These are all factors which providers of connectivity and on-line applications and services need to bear in mind as broadband technology is piloted in education.

Intellectual property rights

36. For real educational benefit to be gained, the material used for educational purposes must be of good quality. Such educational materials, whatever the format of distribution - on paper, CD-ROM, or via superhighways - are costly to produce. Investment in their production is dependent on the possibility of a fair return on investment. Copyright protection will therefore be as important in the era of superhighways as it has been in those of earlier technologies. Given the ease of reproduction of electronic works, careful consideration will need to be given to enabling superhighways to be used to their maximum effect, while at the same time protecting the interests of the creators and publishers of educational and other materials. Payment trends in the future will reflect the scale and pace of development in the new superhighway markets - as new products and services become available.

---

comments

The Future - Questions for Consultation

This paper has given a brief outline of a rapidly developing picture. There are areas of uncertainty: and different options for the way forward. **In planning for the future, the UK Education Departments would now like to seek the views of readers of this document both in education and in the worlds of commerce and industry.**

Responses to this consultation document are therefore now invited on the questions below. Respondents need address only those questions of concern to them. The Departments will also welcome views and comments on any related points which may not have been addressed in the paper.

All responses should be in writing and addressed to:

Andrew Partridge,
Superhighways and Multimedia Unit,
Room 4.44,
Department for Education,
Sanctuary Buildings,
Great Smith Street,
London SW1P 3BT

or on the Internet using the following:

superhighways@dfe.gov.uk.

All responses should be received by 7 July 1995.

Responses with implications for Scotland, Northern Ireland, and Wales will be passed on to the appropriate Departments.

In line with the Code of Practice on Access to Government Information, responses to this consultation may be made available on request unless you state in your response that you wish it to remain confidential.

EDUCATIONAL QUESTIONS

Schools

1. *Do schools (primary, secondary and special) see advantage in connection to broadband networks for:*

   a) curriculum purposes - and if so what areas of the curriculum would benefit, what specific new applications made possible by broadband would teachers welcome, and what approaches should be adopted for different groups of children at various stages of their education?

   b) in-service training and advice, for example through connection to LEA and other advisory centres and services?

   c) special educational needs (SEN), either by improved curricular opportunities for pupils with SEN or through specific technologies for those with particular impairments such as communication or sensory disorders?

   d) administrative purposes, for example for communication with Government agencies, LEAs or other schools?

2. *What sort of educational applications and services (for example video-on-demand, ILS, interactive packages, and curriculum focused materials) would schools most like to see available on broadband networks?*

3. *What are schools' particular concerns about broadband networks (for example unfriendly user-interfaces, on-line costs, and changes in teaching methodology)?*

Professional development

4. *What scope is there for using broadband networks with initial teacher training students, and to provide in-service training, advice and support for serving teachers and other school staff? What particular applications and services could usefully be developed for these groups? How best could teachers' competencies in new networked technologies be developed?*

Further education

5. *What applications and services should be developed on broadband networks to meet the needs of students in colleges of further education and other institutions serving the 16+ age group?*

6. *Are there particular features of broadband networks, for example video-conferencing and remote participation in lectures and workshops, which would lead to more efficient use of resources and/or increased participation through home access by students?*

Higher education

7. *How is SuperJANET affecting styles of teaching, learning and administration in higher education and research, and what are the likely issues for the future?*

8. *What services and applications have been in particular demand, and have there been problems of supply due to over-demand?*

9. *Do educational bodies take the view that the SuperJANET network should be expanded to include further education and schools, and if so what would be the particular advantages:*

a) to higher education; and

b) to further education and schools?

Adult education and education in the workplace

10. *What contribution could broadband networks make to the development of basic literacy and numeracy skills, and adult education more generally? How do colleges view the potential of broadband networks in aiding the development of lifelong learning?*

11. *How do companies and public sector institutions view the potential of broadband for workplace training, and are there particular features of broadband technology that should be developed for this area?*

QUESTIONS FOR SUPPLIERS

Infrastructure, applications and services

12. *How far have schools, further education and other educational institutions been connected as part of the networks of the various cable companies? What educational applications and services are companies and broadcasters:*

a) able to provide now; and

b) likely to provide in the future?

13. *What involvement have public telecommunications operators (PTOs) had to date in providing educational applications and services over broadband technology, and what plans do they (or broadcasting organisations) have to provide such applications and services in the future?*

14. *What prospects are PTOs and cable companies able to offer of discounted tariffs for educational customers?*

15. *What particular standards, protocols or technologies do network providers regard as offering the best solutions to the needs of the education service?*

16. *How would network providers propose to ensure compatibility between broadband educational networks, nationally and internationally?*

17. *How can network and service providers limit access by pupils to undesirable materials, and minimise the effects of malicious hacking? Is the technology yet available?*

OTHER ISSUES

18. *What means will best ensure the maximum use of educational materials over broadband networks, while at the same time protecting the intellectual property rights of authors and producers of multimedia and other products?*

19. *How will the needs of schools and other education consumers in rural areas best be provided for? What is the potential of radio and satellite technology to permit two-way broadband communications for such users?*

20. *Are there international opportunities, lessons or constraints that should be borne in mind?*

---

comments

Appendix A

Bids for Department sponsored evaluation of broadband pilot projects: guidance and criteria.

Educational purpose

1. Project proposals should have a clear educational purpose and employ software applications and services which are of direct and immediate educational relevance to the needs of the users. Proposals should state clearly which users and needs are being addressed. It should be apparent for instance whether a project is aimed principally at the training of staff, or developing the skills or knowledge of learners.

2. Whilst projects in schools and colleges should be firmly grounded in the National Curricula or the vocational qualifications framework, they may go beyond to provide an appreciation of learning practices which might be developed as broadband becomes more widely available. They might also address wider issues such as administration and teacher development.

Interactive broadband

3. Educational institutions are familiar with the value of high quality multimedia broadband programmes through the media of broadcast and video tape. Experience with Laserdisc and CD-ROM is already demonstrating in education the additional value of interactivity through the use of indexing, linking, editing, storing, rearranging and combining sections of audio-visual material with material created by learners through the word processor, microphone and still and moving video camera.

4. Proposals should clearly state the type of technological facilities to be used and indicate the added educational value which these would bring. Services and applications provided over the network should make appropriate use of interactivity.

5. Proposals should be based on broadband technology, as defined earlier in this paper in terms of its facilities. The Departments will be prepared to consider proposals based on hybrid technologies which will serve to develop the necessary skills, interfaces and partnerships.

User-machine interfaces and gateways

6. The user machine interfaces employed by the projects should be suitable for education and training. They should take account of reading age, pupils' and students' abilities, hand-eye co-ordination (particularly for the very young and learners with special needs), and should be informed by current practice with multimedia applications in education.

7. Where possible these interfaces should allow differentiated access, so that different facets can be tailored to suit different users' needs, without denying access to the more powerful facilities where these are required. Again this is particularly relevant to younger children and those with special needs. Where proposals provide for connection to the Internet and other comprehensive facilities, they should make clear how pupils and other users will be protected from exposure to undesirable applications such as pornography and adult bulletin boards.

Inter-operability

8. Proposals should set out provision for linking with other networks, both within and across different sectors of education.

Equipment and services

9. Proposals should set out the type of equipment and services to be made available to learners, teachers and anyone else to be involved. A full specification should be made available on request.

Costs to schools and other educational institutions

10. The costs of participating in a project should be minimal to educational institutions. Proposals should have due regard to the level of resourcing of the institutions and the way in which they operate. In particular they should not be required to make significant outlay of capital, or payment for maintenance, technical support, services or intellectual property rights.

11. Experience of earlier projects shows that a technical support helpline should be provided at the outset. Proposals should make clear the likely sustainability of the work at the end of the project, in terms of technology and the costs.

Staff development

12. Proposals should indicate how teachers, lectures and senior managers would be prepared for their role in the project.

Applicability of outcomes

13. The intended outcomes of projects should be of immediate relevance to decision makers or practitioners at the time the project is to report. Similarly the type of products and services employed during the course of the projects should be likely to be available and affordable to educational institutions in the future.

Variety of institutions

14. The pattern of projects accepted for evaluation will cover a variety of institutions, for example primary and secondary schools, further and higher education, and institutions in rural and urban areas. Projects which also aim to help learners in the home will be considered.

Variety of technologies

15. A range of proposals embracing various technologies and facilities would be welcome. The evaluations would seek to cover for example interactive audio linked to other media, video-on-demand, well-indexed audio-visual resources, video conferencing, hypermedia, and telepresence.

New partnerships

16. Just as the development of the transport system led to new forms of commerce, information superhighways are likely to give rise to new services and products - for education as for other areas. The invention and commercialisation of these may require new partnerships. Proposals from consortia which combine skills and capacities in education, electronic publishing, broadcasting, software applications, computer systems, communications carrying and communications software, would be welcome.

Evaluation

17. Documents submitted to the Education Departments or their agents in support of bids will be confidential. However the results of evaluation would be published under arrangements prescribed by the Departments.

Project Proposals

18. **Six copies of each project proposal should be addressed to:**

Andrew Partridge,
Superhighways and Multimedia Unit,
Rm 4.44,
DFE,
Sanctuary Buildings,
Great Smith Street,
London SW1P 3BT.

The closing date for projects to be evaluated from 1 January 1996 was 7 July 1995. The evaluation of further projects may be funded at a later date: information on this will be given in the Autumn response to the consultation exercise.

19. Enquiries concerning potential bids should be made to the Superhighways and Multimedia Unit on 0171-925 5490 (or fax 0171-925 6988).

---

comments

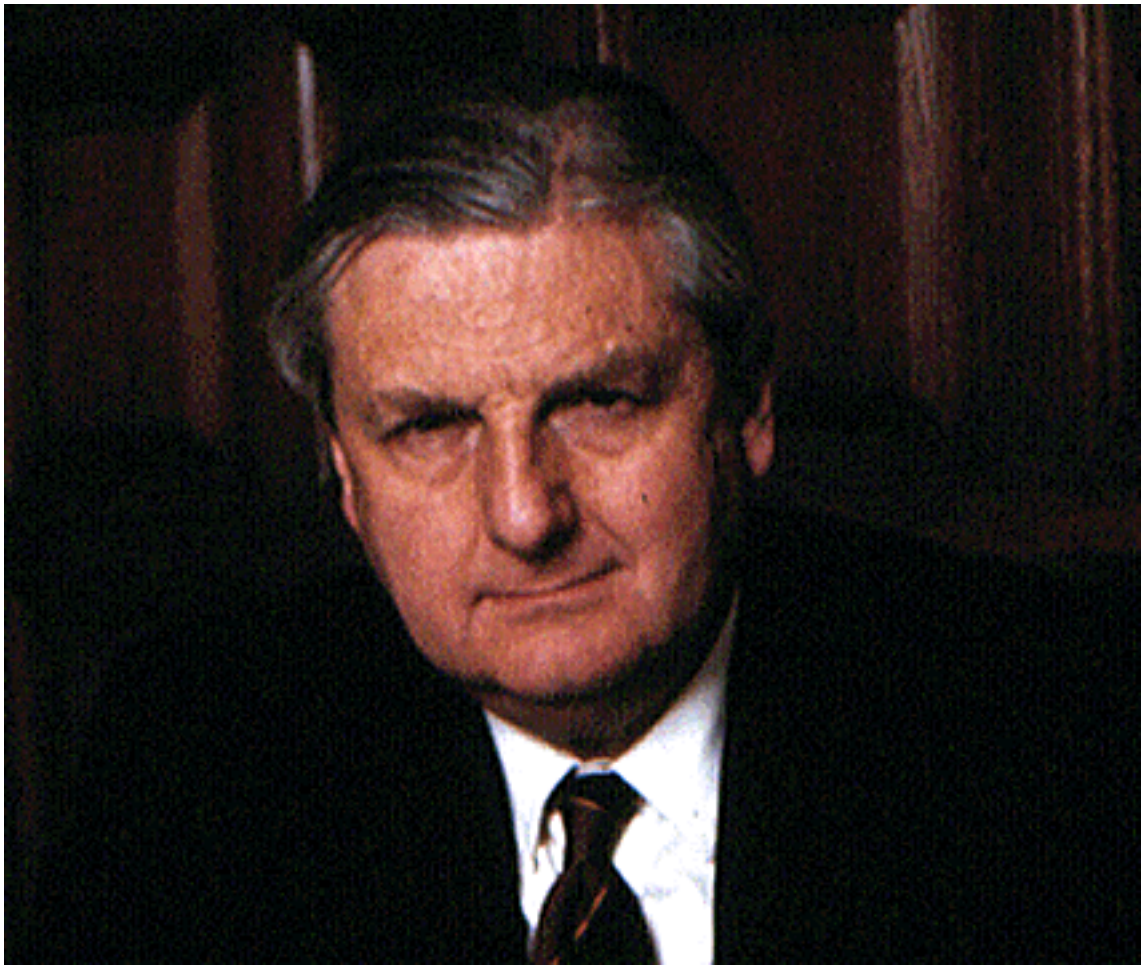
The Rt Hon Gillian Shephard MP
Secretary of State for Education

comments

The Rt Hon Ian Lang MP
Secretary of State for Scotland

comments

The Rt Hon Sir Patrick Mayhew QC MP
Secretary of State for Northern Ireland



---

comments

The Rt Hon John Redwood MBE MP
Secretary of State for Wales

---

comments

Figure 1 - An indication of the current *comparative capacity* of telecommunications technologies

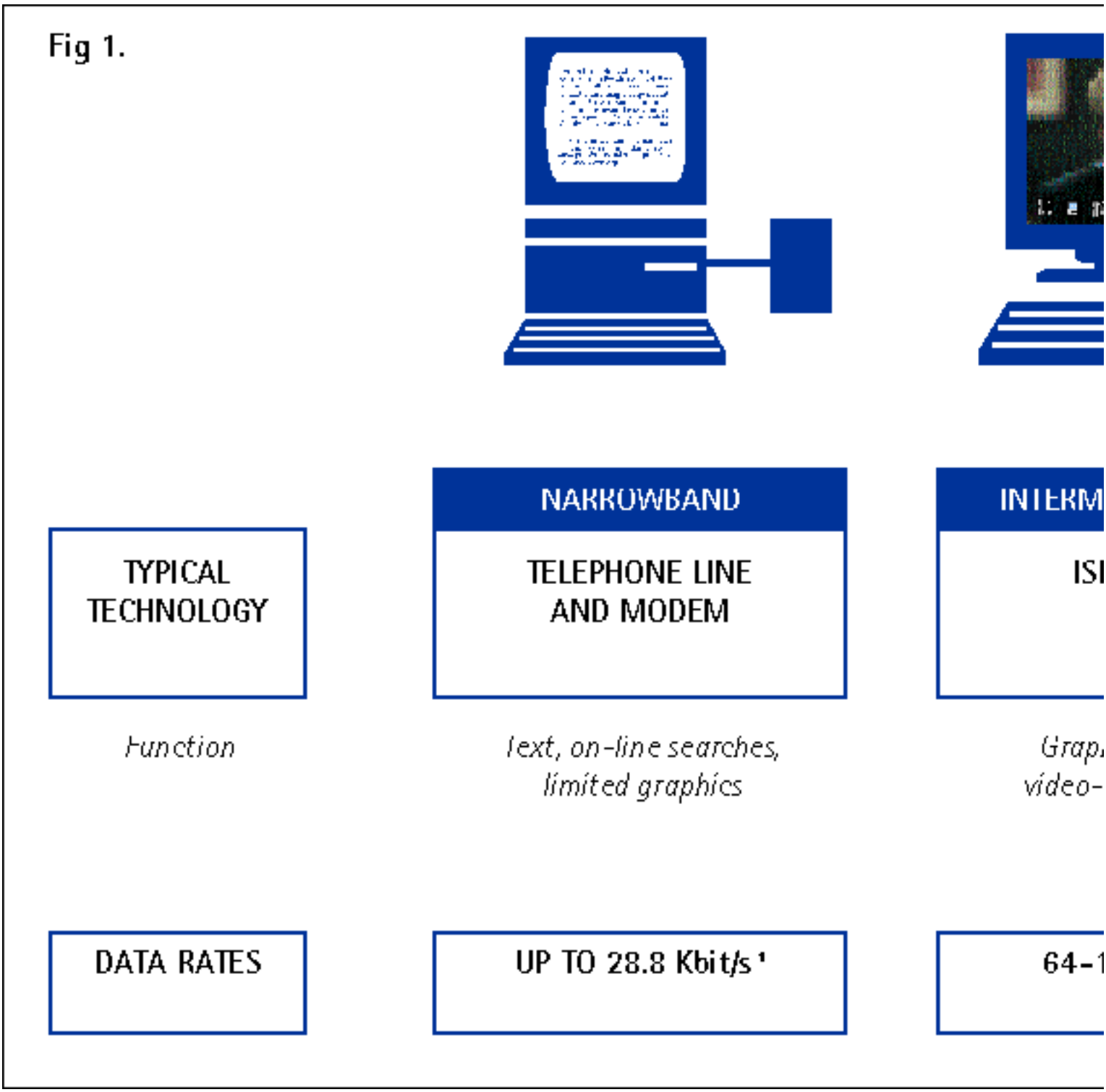


Figure 1 notes:

(**1**) Bit =The smallest element of digital data
Kbit/s = 1,000 bits per second
Mbit/s = 1,000,000 bits per second
(**2**) ISDN = Integrated Services Digital Network (a network providing end-to-end digital connectivity to support a wide range of services).
(**3**) Transmitting a typical full screen moving image requires data rates of the order of 50 Mbits per second. With compression this can be reduced to 2Mbit/s.

comments

Department of Trade and Industry (DTI)

Creating the Superhighways of the Future: Developing Broadband Communications in the UK

Presented to Parliament by the President of the Board of Trade
by Command of Her Majesty, November 1994

Prepared for the Internet by HMSO
from Cm. 2734
published by HMSO as ISBN 0 10 127342 8
6.75 sterling

Contents

The Stationery Office's Internet preferences and navigational aids for this title

We suggest the use of Arial or a similar sans-serif typeface. This document has been prepared for the Netscape browser and is also viewable using the NCSA Mosaic browser.

Back to contents
Back to previous section
On to next section
Back to other Stationery Office pages

comments

Figure 2 - Franchises in existence at the beginning of 1994

Source: Independent Television Commission

Dark blue represents the Franchised areas

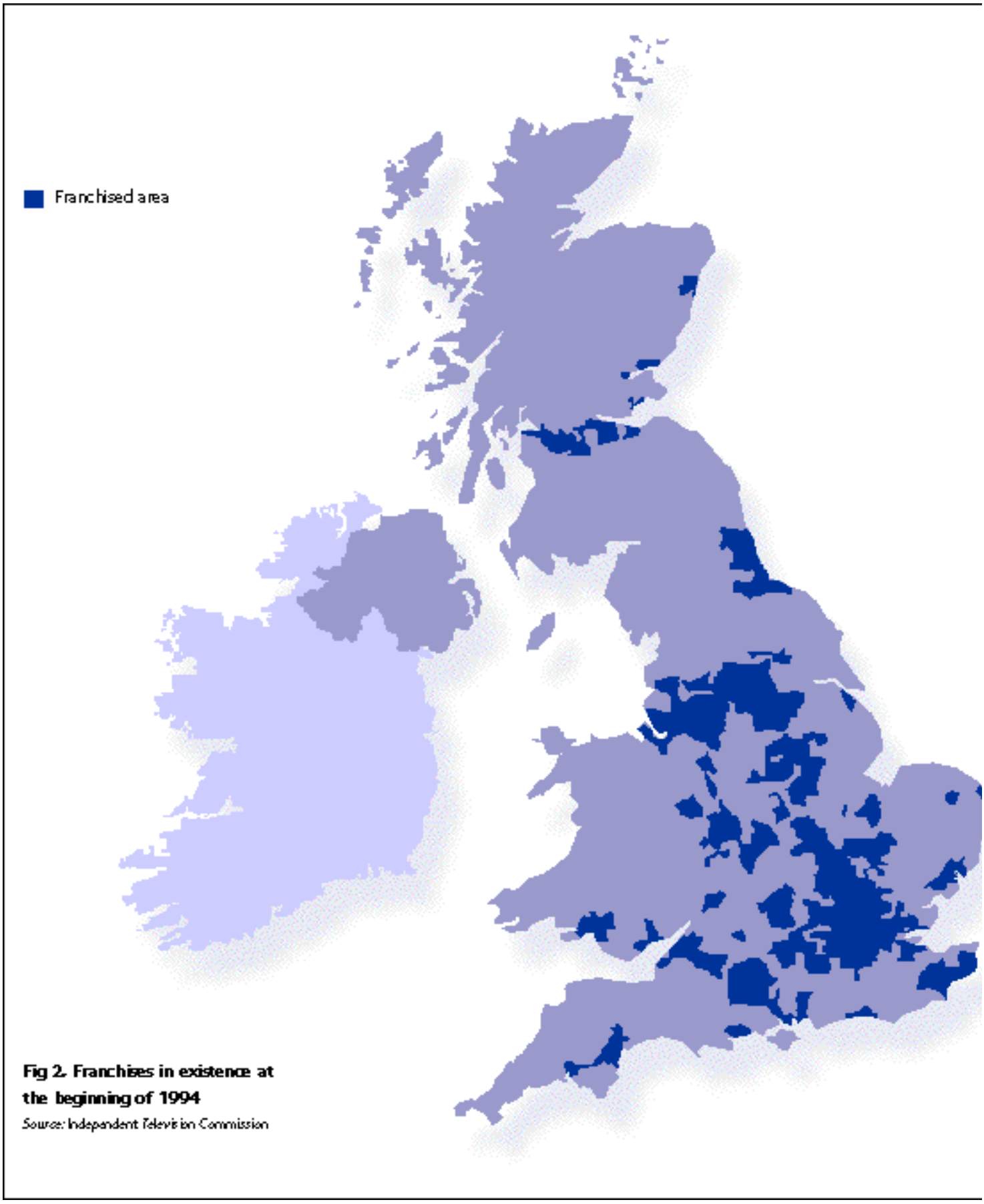


Fig 2. Franchises in existence at the beginning of 1994

Source: Independent Television Commission

comments

Figure 3 - Current distribution of SuperJANET sites

Source: UKERNA

Black represents Multi-Server Network
Dark blue represents Data Network

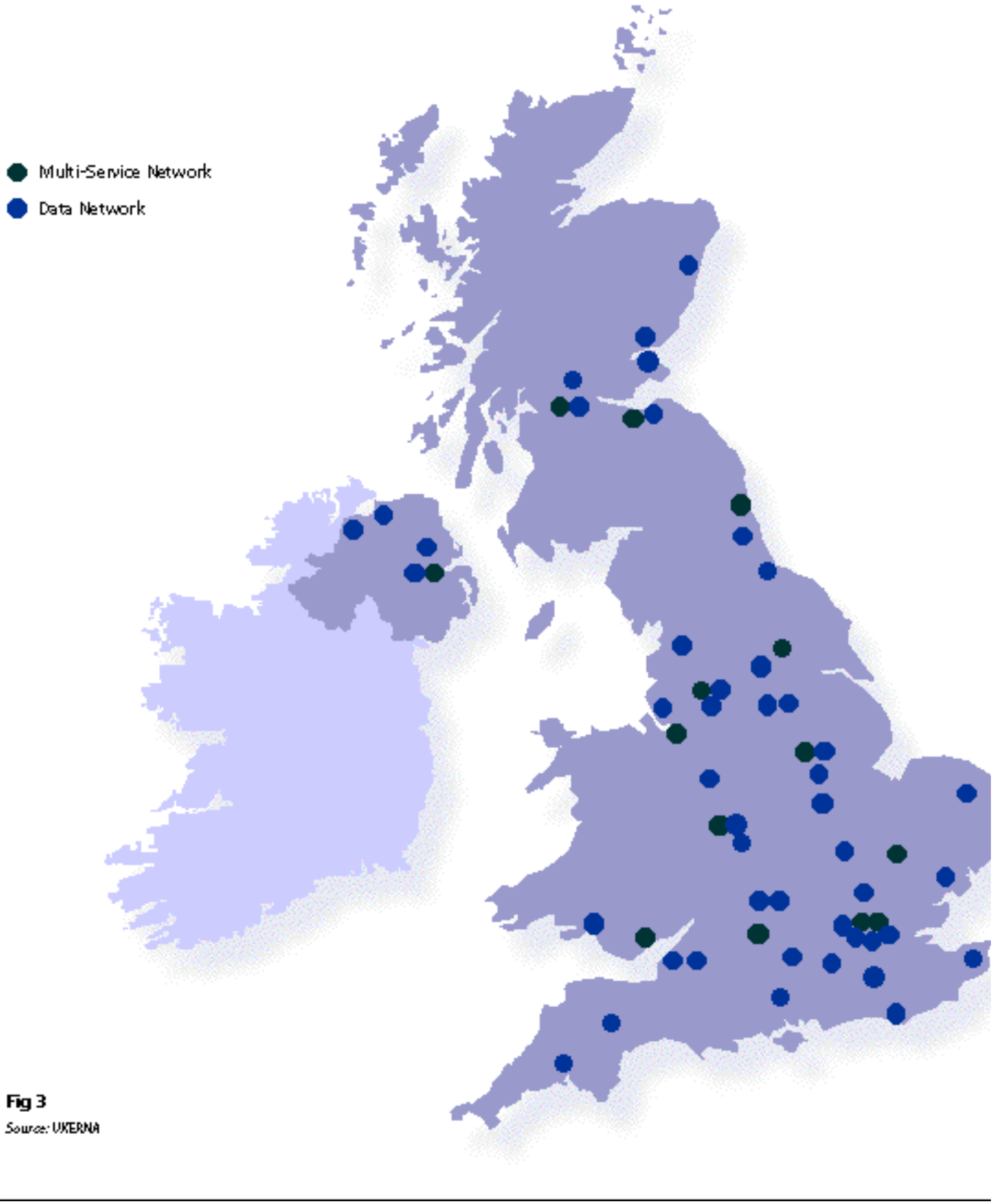


Fig 3

Source: UKERNA

comments

Chapter 1 - Introduction

1. Ideas about "information superhighways" and the "information society" rightly attract a good deal of interest. Every society in the world is confronted with opportunities and challenges arising from the convergence of communications, information technology, media technologies and services, and the development of multimedia. These, combined with cheaper telecommunications, provide the scope for many new applications, especially with high-capacity, two-way ("broadband") communications technologies.

2. This Paper considers these issues, particularly in relation to telecommunications policy. It also incorporates the Government's response to the recent Trade and Industry Select Committee report on optical fibre networks (see note 1), which has itself sparked a constructive public debate. Annex A responds to the Committee's detailed recommendations. In this context, the Paper should be read with the response to the Select Committee issued by the Office of Telecommunications (Oftel), dealing with those recommendations specifically directed to the Director General or of relevance to his statutory functions. The Government has seen, and agrees with, the content of the Director's response to the Committee.

3. Telecommunications policy is important because cheaper, more flexible and competitive high-capacity communications networks are needed to underpin the introduction of many of the advanced communications, information services and entertainment which would make an "information society" a reality. Reliable broadband telecommunications are necessary before serious investment in the full range of new information and entertainment services can be made.

4. Here the Government believes the UK enjoys a real advantage over its main international competitors: because of the regulatory and policy framework which was put in place when privatisation and then market liberalisation began in 1984, and was further developed in 1991 as a result of the review of the telecommunications duopoly, a process began of investment in new broadband networks, and of investment in the upgrading of existing networks. By the end of the decade, cable communications companies alone will have invested 10 billion [Sterling] in new networks. BT, Mercury and the other telecommunications operators are likely to have at least matched that investment. Satellite services such as those offered by BSkyB also require substantial continuing investment.

5. The success of this policy of progressive liberalisation and the encouragement of new entrants has been remarkable: prices have fallen as services have both improved and widened. The growth in communications has been marked, as has the growth in the number of people with access to telephones. The introduction of mobile communications and other technological changes have given a real spur to the whole telecommunications industry. At the same time, falling costs of computing power are leading to true multimedia-capable PCs becoming widely available at relatively low cost. The real price of communication is falling, at the same time as capacity is rising exponentially. All this points to a future where information will be more easily obtained, analysed and used, and where economic activity is more knowledge-based. Cheaper communications will ease some of the disadvantages of remote or rural locations, and easier, cheaper access to information may be of relatively greater benefit to smaller firms. The spur to all this progress was the original decision to liberalise infrastructures and services.

6. These factors, with all they mean for the way we live and work, are the starting point for this Paper. The Paper examines three related issues arising from this process:

(a) the potential public and private sector uses for emerging communication networks. Advances in information and communications technology (especially broadband) are leading to "multimedia" equipment and applications, combining two-way exchanges of data in the form of television-type images as well as more conventional electronic information. The possible applications of this technology offer competitive benefits for business as well as benefits for users of public services and households. The Bangemann report in May 1994 highlighted ten key areas for new applications (see note 2), which the Government is considering carefully;

(b) the role of the regulatory framework for the telecommunications industry in providing for the development of the underlying broadband networks. It is important to distinguish between the development of networks (the objective of telecommunications policy) and the development of services carried over new communications systems. The Government

considers existing policy is proving particularly successful in stimulating investment in modern broadband infrastructure. But debate over the way broadband services should be developed is only beginning;

(c) the role of Government: in regulation; in the promoting of competitive and successful companies in telecommunications; in the efficient delivery of services to the public; and in ensuring that the competitive position of the whole economy is enhanced. Also a factor for consideration is concern about prospects for rapid delivery of entertainment services to unfranchised parts of the UK - even with a substantial programme of new franchising likely over the next year.

7. The Paper also sets out the conclusions the Government has reached on these issues. In summary, these are:

(a) that the existing regulatory framework, based on the 1991 Telecommunications White Paper, continues to provide the best framework for developing internationally competitive communications in the UK. It does so by providing a stable, effective and evolutionary environment within which the necessary investment in new competitive networks, and in new services, can take place. The main task ahead is to build on the UK's current strength in telecommunications, especially in the new era of broadband communications;

(b) that new local delivery franchises for broadcasting services should continue to be awarded on an exclusive basis, subject to the wider policy framework already in place. However, given the Government's keenness that all broadband operators should have opportunities to develop the full range of new interactive services, it hopes that national PTOs such as BT and Mercury will bid for new local delivery franchises to gain such expertise in innovative new technologies. The Government would seek to license any such franchises in a way which allowed PTO franchisees to test new technologies alongside their existing services, using the same infrastructure where possible;

(c) that the Government will place more emphasis on coordinating and encouraging its own use and promotion of communications applications, building on existing work underway throughout the public sector; and

(d) that in order to focus the DTI's interests in multimedia services, Ian Taylor (Parliamentary Under Secretary of State for Trade and Technology) will have a new co-ordinating role, drawing on advice from a group of senior industrialists.

Note 1: Trade and Industry Committee Third Report, Session 1993-94: "Optical Fibre Networks" (1994, London, HMSO). Referred to hereafter as the "TISC Report". Back

Note 2: "Europe and the global information society": Recommendations to the European Council (Brussels, 26 May 1994). Back

---

comments

Chapter 2 - The Potential of Broadband Communications

8. The full scope of the opportunities offered by the convergence of telecommunications, broadcasting and information technology is only now becoming clear - some 20 years after the invention of the basic fibre optic technology (see note 3). This chapter looks at some of the opportunities for new (especially broadband) services in the UK, and describes some of the benefits and changes which might result.

9. Many of the services considered here have originated on traditional "narrowband" telecommunications networks, but have the potential to be enhanced using broadband networks. "Broadband" simply means a network capable of transferring large amounts of information quickly, usually in both directions (see note 4).

10. Other applications, such as broadcast TV, are normally regarded as requiring broadband capacity, but the greater availability of sophisticated compression technology means the distinction between services needing narrowband and broadband capacity is becoming eroded: more data can be sent down "narrow" wires. In this Command Paper the term "broadband" is used generally to include some applications which may be capable of being delivered over "narrowband" networks. What is significant is not the bandwidth being used for any particular application, but the growing economic and social significance for users in the UK of the transfer of very large amounts of information. The fact that the cable operators have recently changed the name of their trade body from the "Cable Television Association" to the "Cable Communications Association" reflects the growing awareness of these opportunities.

Interactivity

11. Many of the more sophisticated (and technically demanding) applications, such as videoconferencing, require a full two-way broadband infrastructure, capable of being "switched" like conventional telephone cables. Other applications, such as delivery of multi-channel broadcast television, require only a broadband one-way unswitched infrastructure, or at most limited two-way communication with sufficient capacity provided by a normal telephone line for any necessary interactive responses. This points to the range of infrastructure development which is likely to be needed to provide the full range of communications most cost-effectively. Infrastructure should evolve, making full use of existing networks. A combination of fibre-optic trunk delivery and coaxial local delivery is likely to be adequate for most residential uses.

12. The Government considers efficient infrastructure is best developed by competing providers, rather than by promoting a single all purpose switched two-way infrastructure. The point is that competing infrastructures are more likely to evolve quickly, as a result of competitive pressures, without dispensing unnecessarily with existing investment and installed equipment. The resulting high capacity networks may - as in the case of UK cable companies - initially offer little more than multichannel television. But the evidence is that they move quickly to experiment with new services, once their initial investment is in place. Other telecommunications companies are equally innovative. A competitive environment tends to reduce the gap between the development and the deployment of new technologies, products and services, thereby rapidly increasing the products and services available to customers.

13. It is worth noting that there is a good deal of debate - and disagreement - as to how highly developed communications networks will need to be, and how fast new, interactive services will be taken up. A key advantage of competition in infrastructure and services is that market pressures promote faster innovation, investment, and experimentation.

Broadband applications for business

14. For business and industry, the benefits of the application of modern technology to simple telecommunications are already evident: the use of mobile communications, fax machines and electronic mail is now widespread; 10 years ago it would have been worth considerable comment.

15. The impact of broadband communications is likely to be most quickly apparent in information technology. Business is familiar with local area networks linking personal computers. Increasingly so-called "metropolitan area networks" and "wide area networks" are being deployed as well, linking computers and office televisions in separate buildings, and even

separate towns. The development of "virtual private networks" supported by public telecommunications operators and specialist network services firms is becoming commonplace. The effect is to reduce the need for different parts of a business, or a business relationship, to be co-located if they are to work together effectively. It may also give a renewed advantage to lower-cost parts of the UK, by removing much of the disadvantage which arises from non-metropolitan location. Telecommunications companies may thus increasingly offer "solutions", combining IT, data and communications packages. Small firms may find access to valuable data becomes relatively cheaper - an important development, as access to and use of information is an increasingly important key to competitive success.

16. Videoconferences are becoming another new class of applications being used more widely, reducing the need to travel to attend meetings. Although interpersonal factors will continue to mean that meetings and travel will always be important, the signs are that the potential for further growth is significant. With the total business travel market in the UK according to BT exceeding 20 billion [Sterling] per year, only a small proportional shift to videoconferencing would be significant. So broadband communications should lead to some environmental benefits as well as having considerable potential to improve business efficiency.

17. Another area of application is the development of teleworking. Many larger UK firms already operate through remote locations (BT is itself a good example). But the development of new communication systems may make this a much more widespread option for many firms and their employees.

18. For business users, there are several other important trends. The first is the growing role of electronic data interchange (EDI) in industry and in commercial transactions. Broadband capabilities increase the speed at which large amounts of information are delivered, and improve the responsiveness of high-capacity EDI networks and applications considerably. EDI is already important in financial services operations, in international trade and in ordering and stock control in manufacturing and in retailing. In the future, its use will expand, further "levelling" the locational choices facing firms. The benefits will also spread to small companies as well as to large ones: large companies will have an interest in encouraging their suppliers to use EDI and the falling price of telecommunications will further encourage its take-up by small and medium-sized enterprises (SMEs). The emergence of electronic commerce is clearly well underway. Electronic tendering for public and private contracts looks likely to become important. As it becomes more established, companies will become disadvantaged if they are unable to transact business this way.

19. Another feature is the development of information services for commercial and business users, combining conventional "news" with screen-based information. Videotron (a large cable company) has launched such a service in London, in association with Reuters. ITN and IBM also have a similar service, while Reuters has long had its own news service. Such services are likely to be particularly useful in the financial services sector, where the UK has traditional strengths. Other companies are already taking advantage of the opportunity offered by local cable companies to advertise their services locally, at low cost. Increasingly, competitive advantage will be gained through the ability to obtain access to information rapidly, to analyse it and then to deploy it. New technologies will make this possible for any business, whatever its size. Teleworking, electronic tendering and the development and the full range of "telematic" services for SMEs (amounting to packaged versions of all the services discussed above) are all among the ten applications identified by the Bangemann Group. The European Commission and Member States are promoting pilot projects in these areas.

Broadband applications for individuals and households

20. The services made possible by broadband networks for households are likely to be as significant as the first introduction of television. The key point about broadband services is the enormous increase in the range of choice they are able to offer, as well as the ability to transfer large amounts of data. These choices will encompass not only entertainment but a wide variety of new services making passive consumers active demanders covering the whole range of household activities, including entertainment and education, work and shopping. Delivery of these services to homes is likely to be both through television screens and via personal computers, many of which are beginning to be configured for "multimedia" (capable of processing television images and audio signals, as well as conventional computing tasks). The increasing use of CD-ROM databases is an early, and significant, example of the sort of information resources which may become widely available.

21. However, in the short term the most popular new services to homes are expected to be various forms of video-on-demand and interactive games. Video-on-demand will provide access to a wide range of popular programming material at the request of individual consumers. These services are able to be carried on existing networks, and video-on-demand is likely to be widely available within five years. Home shopping, banking, education, travel and theatre/cinema booking, directories, classified advertising and bulletin board/exchange of information services are also all likely to develop over communication networks in the next few years. Disabled people, or those who have difficulty in using traditional telecoms

services, may find these especially valuable. Some of these require full broadband capabilities, particularly if their multimedia potential is to be developed, while others can be delivered over suitably adapted narrowband infrastructure. Continued expansion of satellite delivery - pioneered successfully in the UK by BSkyB - will extend the take up of many of these services.

22. The introduction of early forms of these interactive services is just beginning to feature in some cable television systems in the UK (especially Videotron). In future, services will become both more widespread and more sophisticated. They are also likely to become more useful, especially as a body of relevant software and information is developed and as consumers are encouraged to be more imaginative in their demands. Some interactive services might develop, for those who are interested, in much the sort of way that the Internet has been developed by its users, involving ad hoc interactions among groups within the community who share common interests. The Bangemann Report has identified so-called "city information highways" as a city-scale application of interactive data services. Although this is all broadly to be welcomed, at the same time the Government will seek to avoid interactive services being abused or used to support illegal activities, and consider how privacy can be protected.

23. Other trials of new services to homes are also currently underway. BT has undertaken a trial of a range of services with 60 of its employees since the spring, and plans a much larger trial next year. Nynex is working on interactive broadband applications with a group of potential users centred on Salford, including local authorities, universities, business, industry, hospitals and local police forces. This autumn hundreds of homes in Cambridge will be offered personalised news services, video-on-demand, games, education and home shopping through an interactive multimedia trial involving Cambridge Cable, News International, Anglia Television, On Line Media and Olivetti.

24. The availability of much wider choice of programming to ../broadband_commss may have a real impact on the market for broadcast material. At present, television programmes on the main networks generally involve the programme provider packaging material in a form which it is hoped will be of widespread interest. In the future, it is likely that not only will the number of possible channels increase sharply, especially as digital transmission replaces analogue, but household users will also be able to manage their own entertainment to a much greater extent than is presently possible; this will enable households to use video-on-demand technology to assemble their own viewing on a programme by programme basis, rather than a channel by channel basis. The pace at which video-on-demand services are taken up may also depend to some extent on the ability of those providing it to offer access to popular copyright material at attractive prices. How much difference to viewing habits this expansion of choice is likely to make is difficult to estimate. For some, better access to specialist programmes will be an attraction, whereas for many others the existing network channels may retain their appeal.

Broadband applications for public services

25. The implications for public services are also considerable. Broadband communications are already being used in the academic sector. SuperJANET - the Super Joint Academic Network - was conceived in 1989 as a strategic development which would provide an optical fibre network to support the networking requirements of the UK research and higher education community in the 1990s. Preparatory work led to BT being awarded an 18 million [Sterling] contract in November 1992 to provide a range of networking services for four years from March 1993. The Higher Education Funding Councils are funding the programme through their Joint Information Systems Committee (JISC), which overseas the management of the national academic network by a not-for-profit company - the Joint Network Team (JNT) Association, trading as UKERNA.

26. SuperJANET offers both a high speed configurable bandwidth network serving 14 sites and a high speed switch data service serving over 50 sites. Its aim is to demonstrate a wide range of new applications that can exploit high performance wide-area networking. The network can support high quality video, a capability not provided by low bandwidth networks. Projects running over SuperJANET include group/co-operative working, information services, remote access, remote consultation, supercomputer support, distance learning and teaching, and associated applications in many academic subjects.

27. In academic research and teaching, the capacity to share information in its "raw" state at low cost will be an asset in many disciplines. More communities of scholars are likely to emerge based on shared interests and complementary skills, without needing to be co-located. The entire concept of the "university" as a geographically concentrated pool of teaching and research skills may change in significant ways, broadening the concepts pioneered by the Open University.

28. SuperJANET links key university sites and teaching hospitals, and thus extends broadband communications into health care. There are already examples in the UK on the SuperJANET network of the transfer of high definition images

between hospitals to support diagnosis and treatment. Remote diagnosis is likely to become possible.

29. In education generally, widespread use of broadband networks should provide access to a variety of services. The application of long distance learning will enable specialist teaching to be more widely accessible, and greater use of visual display in teaching materials should open up the imagination of students. If schools are to be persuaded of the benefits of broadband networks, the development of applications and services must reflect a wide range of their needs. It is also important that the services should be delivered in an appropriate way, for example through common education user interfaces which take account of the different needs of school managers, teachers and pupils. These issues are under consideration by the Department for Education and the National Council for Educational Technology (NCET) against the background of the CCTA consultation on information superhighways and public services announced earlier this year. Pilot projects are under way to investigate the advantages to schools of curriculum and administrative applications using multimedia technology, EDI, electronic mail and bulletin boards.

30. The Bangemann Report suggests a European-level academic network. It also suggests the development of public service networks in administration, air traffic control and road traffic management.

31. In health care, to complement the activities on SuperJANET described above, the National Health Service is already implementing a long-term strategy to enable electronic communications between all NHS organisations. National Health Service-wide networking facilities will be based on international standards. This will allow work already in hand in image transfer, x-rays, CT scans and so on, and other aspects of telemedicine such as remote diagnosis, to be integrated with minimum disruption and cost. We may see the emergence of centres of medical excellence in unexpected ways, and perhaps in unexpected places. In addition, the National Health Service is benefiting from the same process of electronic data interchange which is revolutionising purchasing and stock control in business and manufacturing.

Pace of future developments

32. Much of this is already beginning to happen. Indeed, for many in the telecommunications and broadcasting industries this assessment of future applications is perhaps too conservative. But these are all benefits which it is realistic to expect will become widely available within the UK over the next decade or so. That is the same sort of period of time which saw the introduction and widespread use of the fax machine and the personal computer. It may happen much faster.

33. Looking ahead, the key conclusion which emerges from this review of possible new communications and media services is that there is great scope for more innovation and imagination. Communications networks (in the UK at least) are being built faster than applications are being developed to fill them. In the short term that will put further downward pressure on prices. In the longer term, if the UK is to establish itself at the leading edge of this second information revolution, UK businesses and the communications industry will need to experiment, and take commercial risks to do so. The public (in both the business and domestic markets) must be encouraged to embrace change and welcome experimentation. All that will only work with a regulatory framework liberal enough to allow it to happen, and resilient enough to cope with consolidation and even occasional failure.

Note 3: See TISC Report, paragraph 11 for a non-exhaustive list of examples. Back

Note 4: TISC Report, paragraph 6, contains a useful schematic table to illustrate the capabilities of narrowband and broadband networks. Back

---

comments

Chapter 3 - The Roles for Government

34. The Government remains committed to facilitating the continuing development of the full range of communications by:

- most importantly, establishing and maintaining a stable, effective and evolutionary *regulatory framework*;
- working with the private sector to *articulate a clear vision* of the place communications can play in the UK's national, economic and social life;
- *promoting the competitiveness* of UK operators, manufacturers and suppliers of the full range of networks and services;
- *setting an example* by being innovative in the Government's own purchase and use of telecommunications and services;
- giving due consideration to the *needs of rural areas* for new communication services, and continuing the commitment to universal service in telecommunications;
- obtaining *maximum benefit from UK Government and European research funds* available to support communications developments;
- keeping abreast, and taking account, of the *development of new technologies* in communications;
- giving due consideration to the *protection of personal and corporate data* on networks;
- providing *appropriate protection to intellectual property rights*.

35. Although these facets of the Government's role are dealt with separately in the following two chapters, it is important to see the various roles of Government as properly co-ordinated with each other, and evolving as the industry develops.

36. Unsurprisingly, the processes of privatisation and liberalisation of telecommunications in the UK since 1984 have concentrated attention in recent years (and in parts of the TISC Report) on the Government's regulatory role. Because some regulatory issues have been controversial (especially the policies on PTOs conveying and providing entertainment), these issues are dealt with in detail in the next chapter.

37. In the future, however, the relative importance of regulatory issues is likely to recede, as competition becomes even more established in communications services. The issues for the industry will then focus on applications and services, and consequently other roles of Government will become more important, such as being a consumer and purchaser of services and in facilitating research and experimentation.

---

comments

Chapter 4 - A Stable Regulatory Framework

Objective

38. The most important single role for Government is to develop and maintain a stable and effective regulatory framework. The objective is to provide the economic benefits of competition, and to allow maximum opportunity for rapidly developing technology to be deployed in emerging markets by a wide variety of competing players. Within this framework there is an evolutionary development of regulation, reflecting the timescale of increasing competition in these markets. New communications technology and services require very considerable sustained investment by companies involved in this market. Investors must have confidence that successful long-term investment will be rewarded appropriately, and maintaining this confidence is an important regulatory objective.

Background

39. The Government's regulatory policy towards telecommunications is most recently set out in the 1991 White Paper: "Competition and Choice: Telecommunications Policy for the 1990s". This White Paper set out the framework which has applied after the end of the telecommunications duopoly established at the time BT was privatised in 1984. It is important to place this in its wider context: since 1984, the Government has followed a policy of privatisation and then of progressive liberalisation in telecommunications, leading to substantial new market entry in the expectation that this would lead to more competition, with corresponding benefits for customers. This has indeed been the result.

40. The 1991 White Paper marked a significant step in the liberalisation process. As part of that policy, it allowed existing cable franchisees to offer voice telephony in their own right. The latter development reflected the Government's view that it was important, and in the interest of customers, to allow competing telecommunication infrastructures to be developed within the United Kingdom as a key feature of liberalisation. This is now providing an important competitive spur in the market for local telephone connections to final users, mirroring the effects of liberalisation and competition which had already become apparent on trunk routes where Mercury and BT have competed since the mid 1980s and where other companies are now starting to compete.

41. Given the rapid pace of technological development, and the variety of technologies which may prove cost-effective for customers with differing requirements and locations, the Government's approach to regulation of this sector will also continue to reflect the aim of technological neutrality, subject to the need to ensure that networks remain capable of interconnecting with each other over the full range of their services. Interconnection of broadband services will become a significant regulatory issue.

42. One of the Government's objectives since 1991 has been to encourage local cable operators to build their networks, to provide local competition in communications services. This is a capital-intensive exercise. In order to provide the necessary regulatory certainty for the cable industry to underpin this investment - expected to amount to 10 billion [Sterling] in this decade - the Government announced in the 1991 White Paper that it would not review the policy on PTOs not conveying entertainment services nationally to homes at least until 1998, and that the policy on provision would not be reviewed before 2001.

43. UK cable franchisees say that their confidence - and that of their financial backers who have over the past year provided a substantial amount of further debt and equity funding - has to a large extent been based on the commitment by the Government to the regulatory framework announced in 1991. The cable industry is estimated to be creating up to 30,000 new jobs in services and construction during this decade.

The Government's approach

44. It is important to be clear that there is no asymmetry in the regulatory framework for broadband communications. Any company, including BT or Mercury (through subsidiaries for franchises awarded before April 1994 and in their own right for franchises awarded thereafter), may convey and provide entertainment or information services to homes by holding the

relevant local franchise, and may provide these services to any non-residential premises including schools, universities and hospitals as well as businesses. The national PTOs are also able to provide networks offering a wide range of interactive services, including video-on-demand, to individual residential customers. BT and Mercury have had every opportunity in the past, as well as now, to own interests in cable franchisees.

45. BT has taken advantage of this policy in Westminster, where it owns the cable franchise through a wholly-owned subsidiary, but BT has also chosen to dispose of all the other cable franchises in which it once had an interest. Mercury's 80 per cent shareholder, Cable & Wireless PLC, holds an interest in no less than 28 local cable franchises. BT and Mercury may not provide broadcast entertainment services over their national networks, but no other PTO can provide entertainment services nationally either. However, BT and Mercury are able to act as agents for cable franchisees in conveying signals to or from homes, although so far no cable operator has chosen to request this.

46. It is also important to place the achievements of the cable industry in context: infrastructure competition in supplying individual homes is potentially important, but so far it is not well developed. BT retains some 96 per cent of local connections to homes. Over time the success of these new entrants (including specialist companies like MFS and COLT (see note 5), and new networks like Energis, as well as cable operators) by making the market more competitive, should create the opportunity to reduce the extent of regulation. Given the economic potential of radio based systems likely to begin to be introduced over the next year, the Government considers that the extent of local infrastructure competition will, in time, frequently be wider than the local duopoly (BT and cable franchisees) which the Select Committee envisaged developing for most customers.

47. The Government does not consider that the alternative to infrastructure competition (discussed in paragraphs 71-75 of the TISC Report), based on regulated access to an open network, would be as satisfactory: it would require permanent regulation, and would ultimately require delivery of services over networks which belonged to a monopoly supplier. That supplier would also be likely to be involved in the provision of services and could not be expected to be indifferent to the relative attractiveness of the services carried. BT may not wish to be restricted simply to offering a passive service, especially as the process of European and international liberalisation gathers pace. The provision of competing infrastructure, where possible, is a spur to service innovation and falling prices. For example, competition has led some cable companies to offer free local cable-to cable calls in off-peak periods. The general fall in communications prices since 1984 is well-documented. And further market entry and network construction by companies like Energis is keeping downward pressure on network prices.

48. Within these limits, the success of the package of policies announced in the 1991 White Paper has so far been considerable. The UK cable franchisees--formerly building very slowly--have sharply lifted the pace at which they are building out their networks. The provision of telephony services has added a new source of income. At the beginning of October 1994, a total of 571,000 telephone lines had been installed by cable companies. At the present rate of growth, several million such lines are likely to have been installed by the end of the decade.

49. Cable companies know that the increased rate at which they are going to be building their networks over the next few years will mean that they need to devote substantial management effort to ensuring that construction does not unnecessarily disrupt local residents and communities, and that the relevant streetworks legislation is followed.

50. It is now expected that over 1.2 billion will be spent by the cable communications industry during 1994 alone, and that more will be invested in each of the next three years, which will mark the peak rate of construction. The Government is clear that the billions of pounds of further investment needed by the UK cable franchisees if the Government's objectives are to be achieved would be put at risk if the 1991 White Paper framework were reviewed prematurely.

51. At the same time, cable companies are facing the challenge of marketing their services to larger numbers of potential customers (and the industry has found it hard so far to attract more than one-fifth of potential customers, especially for entertainment services). That will mean they need to devote more attention to customer service and to providing commercially-attractive programme content. Cable companies are now developing new customer service software to support telephony and cable entertainment service as part of the same package. And a good deal of effort is now being made by cable companies to develop new programming--for example, a number of London-based franchisees have combined to develop a new London channel. Similar developments are being considered elsewhere in the UK.

52. It is worth noting, too, that the policy on national PTOs conveying and providing entertainment is closely linked to the local delivery broadcasting regime, which is based on exclusive franchises, granted in return for obligations to build networks. This policy of exclusive franchising by the ITC, and its predecessor the Cable Authority, has also encouraged the investment needed to build residential networks past individual homes. The ITC has made it clear that it has no

intention of reviewing its exclusive franchising policy for the foreseeable future. The Government agrees that this policy continues to be appropriate in pursuit of its aim of providing competitive communications infrastructures in the UK. As the TISC report (paragraph 36) notes, the PA Consulting Group report concluded that UK infrastructures compare well internationally. Areas not yet franchised

53. The TISC Report highlights the needs of areas not yet franchised (paragraph 76). The Government shares this concern. The ITC has now embarked on a substantial programme of new franchising. The new franchises are being offered as Local Delivery Operator (LDO) licences, under the terms of the Broadcasting Act 1990.

54. Over the last year it has awarded new LDO franchises in West Kent and Blackpool & Fylde, providing coverage to 200,000 further homes. It has advertised a franchise for Southern East Anglia. In addition to the franchise for Northern Ireland announced on 19 October 1994 (potentially covering over 500,000 homes), the ITC expect to advertise franchises encompassing over one million new homes in Great Britain by the end of 1995.

55. LDO licences differ from established cable franchises in that they are technologically neutral; entertainment and telephone services may be delivered by radio means as well as by the development of a wired infrastructure. Through the Radiocommunications Agency, the Government has set aside sufficient spectrum to enable the LDO franchisees to deliver their present range of services by radio. This spectrum has been standardised throughout Europe to facilitate lower unit costs and to offer export opportunities to UK equipment suppliers. The Government expects that the ability to use radio technology will make it much more economic for LDO operators to offer cable-type services to less densely populated parts of the United Kingdom. Procedures for allocation of radio spectrum in future are currently being considered by the Government, following the recent public consultation on this subject.

56. The process of deciding the shape and conditions attaching to each franchise involves consultation with prospective bidders; the ITC will therefore only be able to announce details of each franchise once this process is reasonably well-advanced. Once the proposed franchises have been awarded in 1995, it is hoped that combined cable and LDO franchises will cover over 16 million of the UK's 22 million homes. The scope for awarding further franchises beyond this is covered in Annex A.

57. The Government wants all broadband operators to be able to develop and to gain market experience with the full range of new interactive services. From April 1994, national PTOs (including BT and Mercury) have been able to apply in their own right for new LDO franchises for local broadcasting services from the ITC. If these companies bid successfully for new LDO licences, the Government will also be prepared to issue these companies with Telecommunications Act licences which enable them to supply entertainment services within the franchise areas. It would seek to do this in a way which allowed them to test new technologies alongside their existing services, making use of the same infrastructure where possible. The intention is that national PTOs should be able to test and demonstrate new technologies without having to compete with themselves in the areas where they hold a new LDO franchise. This will provide them with an opportunity in the UK which should assist them in international markets. The Government recognises that such arrangements might limit competition. The Director General of Telecommunications is supportive of national PTOs taking such opportunities. He has, however, indicated that such a PTO may well be considered dominant for interconnection and related purposes, and would for example be subject to no undue discrimination provisions.

Conclusion

58. The Government remains of the view that the regulatory framework set out in the 1991 White Paper, which provides certainty for all participants in the market, with clear dates for reviews of the present regime, is valid. It is therefore not appropriate to review this policy prematurely. It is not a case of maintaining assurances despite changed circumstances. Nor is it the case (as paragraph 95 of the TISC Report argues) that the restrictions on BT post-date most cable franchises: in fact, the restrictions date from 1984. To change the framework abruptly would also undermine the confidence of companies in many other sectors of the UK economy, including important inward investors, in the reliability of Government statements of policy on which major investments are based.

59. Looking ahead, the Government considers that the present arrangements provide the most appropriate framework, within which an internationally competitive communications industry is developing. Many new entrants to the market are able to develop innovative infrastructures and services, and can compete in increasingly competitive markets which will not become dominated by any single player.

60. It follows from this that the Select Committee's proposals of a franchise by franchise relaxation of the 1991 White Paper commitments will not be pursued. The present policy already provides strong commercial incentives to encourage

cable franchisees to build their networks as early as possible, and then to offer on them as wide a range of services as is economic. Moreover, any adjustment of policy could markedly alter the current market value of existing cable franchises. This would be very hard to justify to the investors involved.

61. Ultimately, the policy for developing this industry will be judged by its results. Already consumers are benefitting from a growing choice of both operators and new services, at a competitive price. Existing infrastructure owned by BT, Mercury and other companies is being progressively upgraded. The introduction of increasing competition in trunk networks and in the local loop has also contributed to these companies improving the quality of service they offer, and widening the range of new services they make available to consumers.

Note 5: COLT is City of London Telecommunications, a specialist PTO providing services to large corporate customers in London. MFS competes in largely the same market. Back

---

comments

Chapter 5 - Further Government Responsibilities

62. The Government has other responsibilities, besides regulation. This chapter looks in more detail at these non-regulatory roles.

Promoting the competitiveness of UK operators, manufacturers and suppliers

63. To help take advantage of the new opportunities in communications, the Government is working in dialogue with all those involved in the UK, including network operators, content and service providers, manufacturers and suppliers, to define and shape the services which will be developed in the future. The competitiveness of these sectors will be promoted most effectively by the development of a pro-competitive regulatory framework, as explained in chapter four.

64. Efforts to support and develop the competitiveness of the UK's communication sector will take many forms. Studies like that undertaken on telecommunications infrastructure by PA Consulting for the DTI earlier this year may be an important tool. Two examples of current sponsorship work in this area give a good impression of what will be involved: the first is the Telecoms 2000 initiative, developed by DTI and the Federation of the Electronics Industry in collaboration with BT, Cable & Wireless, GPT, Ericsson, Motorola and Northern Telecom. Based around a series of seminars hosted by the large companies, it aims to use the supply chain to promote a message of continuous improvement to smaller suppliers. The second example is the study which the DTI is co-sponsoring with the Cable Communications Association into the future software requirements of the UK cable franchisees. This is designed to strengthen links between the vigorous UK software sector and the cable franchisees.

65. The Government will also work with the European Commission and other EU Member States to explore the practicality of implementation of the applications identified in the Bangemann Report, to ensure that the UK businesses and public services derive as much benefit as possible.

A platform for exports

66. Successful communications operators and service providers in the UK have been able to gain valuable experience, as a result of our policies of early liberalisation. They are now well placed to export products, services and expertise to developing world markets. The openness of the UK regime to inward investors has the important additional benefit of encouraging such investors to use the UK as a telecommunications hub to provide services throughout Europe as other European markets become more liberalised. In addition, the established reputation of many British programme makers, publishers and information providers is a valuable asset. International business is already exploring the value of multimedia applications, with UK companies at the forefront. For example, a wide range of multimedia business applications will be on show to a networked audience in Boston, London and Eindhoven at a conference in May 1995, "the Millenium". This event, and the broadband network to deliver it, are being organised by the British association for corporate telecommunications users, the Telecommunications Managers Association.

Multimedia in Government

67. To facilitate the task of promoting competitiveness, Michael Heseltine, President of the Board of Trade, has asked Ian Taylor, Parliamentary Under Secretary of State for Trade and Technology, to co-ordinate the DTI's interests in broadband communications and multimedia. Mr Taylor will shortly be appointing a panel of senior private sector industrialists to advise him in this task. The panel will comprise individuals from each of the main areas of interest - telecommunications companies, IT suppliers, users, manufacturers, broadcasters and publishers.

68. Within the DTI, a Multimedia Steering Group has been established to bring together the wide range of multimedia interests inside the Department. This is chaired by Alastair Macdonald, the Deputy Secretary in charge of the DTI's Industry Command. Mr Macdonald will be assisted by a new multimedia unit in Telecommunications Division of the DTI. This Unit will aim quickly to become well informed about multimedia developments both in the UK and overseas, including the variety of expertise already available within Government. It will also co-ordinate the implementation of the

DTI's policies on multimedia. At the same time, Telecommunications Division's existing dialogue and sponsorship work with infrastructure and service providers and manufacturers will be maintained and extended to reflect fully the emerging market opportunities. The wide range of contacts between other parts of the DTI and organisations involved in different aspects of multi-media - IT suppliers, publishers and research communities - will continue.

Opportunities for the Government as provider and user of broadband services

69. The Government's significant role as provider of services and information to individuals and businesses means that it has an opportunity to promote innovative uses of the full range of communications in its own right. Some of the most promising innovative uses in the fields of education and healthcare were referred to in chapter two. Some other opportunities do not necessarily require full broadband capacity, but do involve much wider access to interactive sources of information and delivery of services. Examples in time could involve interactive access to library and museum databases, and even on-line filing of income tax returns.

70. The Government is investigating these opportunities carefully and considering how its own functions can best take advantage of these new technologies, where appropriate in collaboration with commercial providers. In the short term, the involvement of the public sector in promoting greater use of electronic data interchange (EDI) may be particularly important if it can involve provision of more effective services to small and medium-sized businesses. Some of these services may be delivered over true high-speed broadband networks, but growth may initially come from low-cost services over existing networks or by taking advantage of developments in off-line technology. The type of service offered by Internet access providers and by other on-line services like Compuserve is likely to be the starting point for this market. On 10 November the CCTA Government Information Service was launched to provide information from a range of Government departments via the Internet. Interest in EDI in public services is already being developed through user associations focused on applications and services, organised under the auspices of the EDI Association. The Central Unit on Procurement and the DTI have supported this in connection with the PURSUIT initiative.

71. In June the CCTA published a consultative report on opportunities for public sector applications of information superhighways in the UK, which described a wide variety of ways in which central and local government could take a lead in developing useful applications for broadband networks. It gave particular emphasis to the need for departments to consider new ways of undertaking public business and providing services to consumers. A consultative meeting has been held on 21 November 1994 to bring together the private sector and senior managers responsible for public services to consider responses to the report. The main government publishers of information, for example, are interested in establishing electronic publishing services for an international market. The DTI is considering how the Business Links network, TECs and the range of services provided by the department can best promote the potential benefits of using broadband communications. The CCTA has facilitated the establishment of SIGMAPS (Special Interest Group for Multimedia Applications in Public Service).

72. As a demonstration of the Government's commitment to consider working in new ways, arrangements have been made to allow this document to be made available on the Internet. The procedure for doing this is explained in Annex B. This is the first UK Government Command Paper which has been made available electronically in this way.

Universal service

73. Universal service has always been a central regulatory objective of the Government's policy on telecommunications, both in providing telecommunications to those in rural areas and to those on low incomes. This will continue to be an important objective. Licences granted to BT and some other operators already impose universal service obligations in respect of voice telephony and certain other established telecommunications services, including leased lines. Cable operators have an obligation to provide entertainment and other telecommunications services (except voice telephony) to all customers in those areas built out under their construction obligations.

74. The success of the Government's policy of liberalising telecommunications, and the corresponding reductions in the price of telecommunications (by over 30 per cent overall in real terms since 1984), which have benefited consumers, have also contributed to increased take up of basic telephone services in the UK. When BT was privatised in 1984, some 79 per cent of households had a telephone. Now over 90 per cent have one - a result of falling prices and competitive services. A significant number of the telephone customers being recruited by the cable companies have not had a phone in their ../broadband_commss before, which is a further demonstration of how lower costs and greater choice is improving accessibility to the telephone.

75. OFTEL is currently assessing the costs to BT and other network operators of maintaining the current service obligation, and will be covering this issue as part of the wider consultation paper which it will be publishing in December. In the future increased use of radio technology may well reduce the costs of providing telecommunications services to remote rural areas, so reducing the cost of a universal service. Nevertheless, the Government will continue to pay close attention to the communications needs of those living and working in rural communities.

76. In looking at universal service generally, the Government recognises that many of the remaining households without a telephone live in urban areas, and the most cost-effective means of delivery may well differ between rural and urban areas. At present, with broadband services still at an early stage of development, it would be premature to try to assess the extent to which new services will become widely available on a commercial basis, and the economic and social consequences of such development.

Research and development in broadband

77. An important role for Government is to help shape the content of UK and EU funded research and development programmes on communications, so that these make the maximum contribution to the successful development of new communications services in the UK. A wide range of private sector organisations, including small and medium sized enterprises, as well as UK Government departments and agencies, are playing an active role in the European RACE (see note 6) and Telematics programmes. For example, a RACE project known as TRIBUNE, involving BT, has developed a broadband user/network interface test-bed, to help both equipment manufacturers and service providers to test new broadband terminals and services in realistic conditions.

78. In the Telematics Programme the DTI has sought to promote a coherent UK approach across the seven main areas of the Programme. The total funding available for RACE and Telematics has been 669 million [Sterling] under the Community's research Framework Programme III (1990-1995), with at least 1090 million [Sterling] proposed under Framework Programme IV (1994-1998). The communications R&D programme will be known as "Advanced Communications Technology and Services" (ACTS).

79. This work has received added impetus following the Bangemann Report, and further proposals are being made for European work in a wide variety of potential broadband applications, many under the auspices of the TENs (Trans European Networks) programme. The UK Government is following up these opportunities, particularly the ten applications identified by the Bangemann Group as the keys to the launch of the Information Society, in close co-operation with the UK private sector. The UK Government welcomes the stress in the Bangemann Report that investment in infrastructure and services should come from the private sector.

80. The importance of the SuperJANET network in providing broadband connections to a wide variety of UK academic and research organisations has already been mentioned. The Government would welcome SuperJANET being developed further. Increased collaboration with the European academic network is also likely.

81. BT has maintained a considerable commitment to research and development, spending some 265 million [Sterling] on this in 1993/94. Much of this activity is centred on the BT research facility at Martlesham Heath, which is one of the world's foremost telecommunications research facilities. BT's spending on R&D rose 14 per cent last year, reflecting the company's commitment to developing competitive products and services in many areas of technology, from optical fibre transmission and mobile communications to network architecture and management. Much of the work carried on by BT is aimed at the development of software for application in the communications networks of the future.

82. In discharging this role of maximising the opportunities provided by research and development programmes, the Government hopes that an important contribution will be provided by the Communications Technology Foresight panel, organised by the Office of Science and Technology.

83. There are other smaller research and development programmes involving government. An example is the pilot applications project known as the rural Connected Community scheme based at Kington in Herefordshire. Apple Computers, BT, the Rural Development Commission and the DTI have collaborated in this scheme to investigate how the provision of computers and broadband communications could improve business, community and educational activities in a rural location.

Television programme producers

84. The UK possesses a strong sector of television programme makers, who should benefit from greater opportunities as

broadband networks provide new outlets for their products. In some cases, cable and satellite will act as secondary markets for products originally provided to the main networks. Often these programme makers operate in small, independent companies, which in the past have had to negotiate with a small number of powerful network operators. At present there is active debate about the extent to which independent providers can gain the right to sell on their programmes to secondary markets. This issue will increase in importance as the secondary market for content develops. The Government is following this issue closely.

Data protection

85. The provision of services based on broadband infrastructure has the potential to raise a number of important wider issues where Government has a direct role. These include the protection of the integrity of information systems, the privacy of individuals, and protection of telecommunications users from abuses, such as malicious calls or fraudulent use of customer data. As communications systems become ever more sophisticated, they present new and more complex dimensions to these problems as well as new opportunities to deal with problems - such as the use of Calling Line Identification (CLI) to identify the number of an incoming call. At the same time, the prospect of EC law on data protection is a matter of widespread interest.

Intellectual property rights

86. The attraction of broadband services to the consumer will depend crucially on their content. But content providers will be reluctant to agree to the inclusion of entertainment or other programming in services unless they can be sure that their intellectual property rights (IPR) will be safe in this environment and can be used to obtain fair economic rewards. This requires an examination of the fundamental rights available under copyright laws as they apply to new multimedia products and new ways of exploiting copyright works generally. It is also important to consider how far legal backing is needed to support means of preventing or limiting unauthorised copying. New copyright licensing and accounting arrangements will need to evolve.

87. The Government is already active in these areas. They were addressed at national level in a major overhaul of UK copyright law carried out in 1988. Currently the DTI is closely involved in discussions on relevant initiatives and supporting new legal instruments to clarify arrangements at European level and in the World Intellectual Property Organisation. Follow up to the Bangemann Report in this area will be a priority.

88. Another IPR issue relates to standards. Standards are fundamental to telecommunications because without them there is no interoperability, as the Committee has noted. Standards are made to be open and available to all, but the rights of the IPR holder must still be respected where a standard contains an IPR. The European Telecommunications Standards Institute (ETSI) has been working for some time to agree a policy which reconciles the need for accessibility to the IPR contained in standards with the property rights of IPR holders. This balance is proving difficult to attain.

Note 6: RACE is "Research into Advanced Communications for Europe", involving collaborative research on true broadband communications. Back

---

comments

Chapter 6 - The Way Ahead - International Opportunities

89. The success of the Government's policies of liberalisation in the telecommunications sector since 1984 has been widely recognised as considerable. The benefits to domestic consumers and to business users in the UK - in terms of higher quality of service and lower prices - have already been substantial, and these will continue.

90. But a further real benefit of the Government's policy is only now starting to emerge. Having been the first in the European Union to privatise and liberalise telecommunications, it is now to our advantage to see these policies adopted across Europe.

91. There are two separate strands to this. First, the policy: as the first European country to privatise and liberalise telecommunications, the UK has been able to contribute significantly to the debate over removing existing monopolies in telecommunications in Europe. Issues with which the UK grappled at the outset are only now being addressed in Europe. The Commission and other Member States are looking to the UK's experience as they develop regulation in a liberalising European market. Some Member States have still to appreciate that universal service provision should be enhanced, not weakened, by pursuing liberalisation within a stable regulatory framework. Within the European Community, no other Member State has yet fully liberalised the key market of public voice telephony and the underlying infrastructure. However, the Community is committed to introducing competition in public voice telephony by 1 January 1998, with longer transitional periods for certain Member States. The issue of infrastructure liberalisation is currently being actively debated within the Council of Ministers on the basis of a Green Paper produced by the European Commission. The UK Government will work to ensure that agreement on liberalisation of infrastructure provision is reached in the near future, and that the date for such liberalisation is no later than that already agreed for public voice telephony.

92. The second strand is the effect that UK policies have had on companies competing in the British telecommunications market. They have had to work very hard to succeed. That process of competition has forged the competitive, analytical, financial, managerial and customer-oriented skills needed to win. By comparison, a good number of other European telecommunications companies only have experience as state controlled monopolies. As the process of European liberalisation continues, companies with experience in the UK are well placed to export a wide range of goods and services, including software and consultancy advice, to European markets. The Government will do everything it can to encourage them to do so. For example, following the recent Thery Report, France is to develop a number of pilot broadband applications projects. We hope UK companies will be able to contribute.

93. Other developments are also leading towards an increasingly global market in communications. The recent separate announcements by the United Kingdom and the United States of equivalence in respect of international simple resale are an example of how the old regulatory barriers to world communications are being broken down. The world's largest players, including BT (with its partner MCI) and Cable & Wireless, are already forming strategic alliances in order to compete at the global level.

94. The main task ahead is to build on the UK's current strengths in telecommunications as communications technologies develop and converge. Common to US Vice President Gore's plans for a Global Information Infrastructure, the Bangemann Group's report, and the vision of the use of broadband in Japan prepared by MITI and the Ministry of Posts and Telecommunications, is the urgent need for regulatory reform to encourage investment by the private sector. Here we are able to take advantage of the pro-competitive, liberalised framework which has clearly been established in the UK. By comparison, the US legislation to introduce greater competition into the local US telecommunications sector, similar in many respects to the UK's 1991 liberalisation, has recently been delayed. Elsewhere in the European Community the commitment is only to introduce competition in voice telephony services in 1998. Nevertheless the magnitude of the task facing the UK in establishing a leading position internationally in the full range of communications should not be under-estimated. This Command Paper has set out the wide ranging approach which the Government, working closely with the private sector, will be adopting.

95. There is no room for complacency. The report of Commissioner Bangemann's Group referred to mastering the risks inherent in developing the Information Society, and maximising the benefits. The risks, as well as the potential, need to be properly understood, particularly given the vast investments in new infrastructure and services which private companies

will make. The Government is determined that individuals and businesses in the UK armed with this understanding make the most of the substantial opportunities.

---

comments

Annex A

Specific Government responses to the individual recommendations of the Trade and Industry Select Committee's report on optical fibre networks (Third Report, Session 1993-94)

1. Government policy in respect of broadband development should be based on a recognition that the networks and services need to be developed together. (Para 20)

The Government agrees with the Select Committee that policy on telecommunications infrastructure and services in the UK should reflect a recognition that both networks and services need to be developed. This is consistent with the approach which the Government has adopted, within the wider context of its policy of progressive liberalisation and the establishment of competition. The initial focus of industry investment and of Government policy has been concentrated on providing a framework for infrastructure development and investment. The immediate result has been a sharp increase in construction: for example, cable construction has grown from 66,000 homes passed in 1986 to over 3.3 million in August 1994, with half that latter figure being added over the past two years. (Tables 3 and 4 of the TISC Report set out more detailed figures.) Construction by other new telecommunications companies has also developed rapidly.

But it is already apparent that the focus of the communications industry is moving towards the development of services and applications. Some of this shift is no more than qualitative improvement in existing telephony or data services, or the development of improved content for cable television networks, including more local programming. But other services are being developed which will involve a degree of interactivity, and eventually encompass true multimedia applications (see paragraphs 11-13). The key to the development of these services is access to a suitable range of flexible networks at reasonable prices. The Government's policy provides for the development of such networks. The challenge facing the industry now is to encompass the development of commercially attractive services and entertainment content.

2. The DTI should commission and publish comparative studies of telecommunications infrastructure and the prospects for further UK development on a regular basis. (Para 37)

The Government agrees with the Select Committee about the benefits of undertaking comparative studies of the UK's international competitiveness in this sector. A report was commissioned by the Government from PA Consulting Group and published in February 1994 which compared the UK's telecommunications infrastructure with those in the United States, France, Germany, Japan, the Netherlands and Sweden (referred to in the TISC Report, paragraph 36). It has been widely welcomed. The Government considers that this report has contributed to a more informed debate on the relative place of the United Kingdom's telecommunications sector in relation to our major economic partners. The Government agrees with the Select Committee that it would be desirable to repeat this comparative study, and proposes to commission a further study along similar lines in 1997, to enable developments over that period and future prospects to be assessed, and also to take account of European voice telephony liberalisation from 1 January 1998.

3. OFTEL should proceed with its review of interconnection as a matter of urgency. (Para 51)

The Government agrees with the Select Committee about the desirability of OFTEL pursuing its comprehensive work programme on improving the arrangements for interconnection. OFTEL is pressing ahead vigorously with this programme, as set out in its statement in March 1994 on Interconnection and Accounting Separation. The changes OFTEL targetted for January 1995 should now be in place early in 1995. There has been a slight delay as a result of the need to consult further with the industry on important details of the changes proposed. OFTEL is planning to issue a consultation document on longer term issues in this area in December.

4. The Government and OFTEL should actively seek to promote the highest technical standards and the greatest possible technical compatibility between networks. (Para 64)

It is in the interests of all participants in the industry to ensure that there are proper standards for interconnection and technical compatibility. This is particularly important given the Government's commitment to the promotion of infrastructure competition. Both the Government and OFTEL work with the industry, and with European and international

standards bodies, to ensure that technical standards are developed in a timely and appropriate manner to meet the industry's requirements. In the UK the Network Interfaces Co-ordination Committee (NICC) plays an important role in establishing technical compatibility between the various networks in this country. Its current work programme is addressing the specific issues of concern to the Select Committee.

But standards are not developed in a vacuum: the evolution of standards must reflect the need to continue to operate with existing investment and existing technology, as well as the commercial requirement to ensure that investment is proportionate to the return likely to be made. It is also necessary to deal with the potential tension for operators wishing to promote common standards on the one hand and wanting to develop and market innovative new products on a proprietary basis which might provide a competitive advantage on the other.

A UK contribution to establishing early and appropriate international standards, as for example with the mobile GSM technology, can give UK industry a competitive edge in developing new products and marketing them successfully in world markets.

5. As regards areas of the UK not yet franchised:

- all such areas should be divided into franchises and offered for franchising to any operator, including PTOs, by the end of 1995;

- areas where a franchise has not been awarded by the end of 1995 should be opened to any operator, including PTOs, to provide any service after that date;

- for new franchises awarded before the end of 1995, the normal period of exclusivity, subject to the ITC's discretion, should be seven years, or five years where adjacent to an existing franchise and awarded to the same franchisee; and such franchises should be opened up to competition thereafter (possibly through over-franchising). (Para 76)

  The Government shares the underlying objective that there should be substantial further franchising. Initially this will extend the benefits of local delivery of multichannel entertainment services and the provision of an alternative telecommunications infrastructure (see chapter four). Although the Government wishes this process to take place successfully and rapidly, it is necessary to operate the franchising process at a pace which takes account of the rate at which companies taking up franchises can invest. There can be no merit in granting further franchises which are not developed within a few years.

  For the same reason, the Government considers that it would be counterproductive to set an arbitrary date for the conclusion of the franchising process. Indeed, such a policy could cause potential franchisees to refrain from bidding until that date had expired, in the hope of obtaining more favorable access to unfranchised communities.

  Chapter four notes the ITC's plans for substantial further LDO franchising. LDO franchises have recently been awarded in West Kent and Blackpool & Fylde. The ITC has already advertised the franchise for Northern Ireland and bids have closed for Southern East Anglia. The ITC expects it will be able to offer new LDO franchises covering over one million homes by the end of 1995. With further franchising continuing as fast as practical thereafter, and with the developing use of radio technology, it should become economic to provide cable-type broadband coverage to around 80-85 per cent of the UK population. But this will not exclude the remainder of the population, many of whom can already receive satellite services, and in the years to come should benefit from a wider range of radio and satellite based services.

  The Government does not consider it appropriate at present to introduce any limitation on the present exclusivity of franchises. Existing franchises and those about to be awarded will remain exclusive for the foreseeable future, in line with the ITC's long-established policy. The Government considers that this is the right approach while franchisees are faced with licence obligations to establish coverage of their communities within defined periods. While this investment is required, an arbitrary period of seven years' exclusivity would not attract the necessary investment. The present regime facilitates the market entry of new companies and the establishment of new networks.

  While it is premature to consider ending the exclusivity arrangements now, the industry accepts that franchises will not be permanently exclusive. This would not be consistent with the Government's objective of promoting competition in infrastructure and the establishment of a liberalised, competitive market. But for the forseeable future, maintenance of the current policy on exclusivity is needed to sustain the cable franchisees commitment to

building out their networks.

The Government is keen that all broadband operators should have opportunities to develop, and gain experience in offering to customers, the full range of new interactive services. It was explained in chapter four above how BT and other national PTOs could pursue this by bidding successfully for new LDO franchises.

6. The Government and OFTEL should examine the possibility of encouraging PTOs and cable companies to co-operate in providing broadband infrastructure in areas where there is no likelihood of cable television franchises being awarded by the end of 1995. (Para 77)

There is nothing (beyond the normal requirements of competition law) to prevent national PTOs and cable companies co-operating at present in the provision of broadband infrastructure within cable franchise areas. Nor is there any impediment on their jointly approaching the ITC to promote the creation of new LDO franchises. Action along these lines will be pursued if the companies involved judge this to be in their commercial interest. If the provision of broadband infrastructure in remote or lightly populated parts of the United Kingdom is fundamentally uneconomic with present technology, then it is unlikely that companies will have any incentive to co-operate in a programme of investment in any event.

Unsurprisingly, companies entering the market have chosen to start with the most commercially attractive urban areas, and are only now beginning to consider taking up and developing less densely populated franchises. But technological developments including the use of radio for the delivery of broadband services mean that the provision of these services in remote parts of the United Kingdom is becoming increasingly attractive in commercial terms.

7. The Government should make explicit that its aim is "to enable any company to provide any service to any customer". (Para 93)

While the idea of enabling any company to provide any service to any customer initially appears attractive, it is capable of a number of interpretations and needs to be considered carefully. The underlying objective of the Government's policy is that consumers should be provided with the widest range of services at competitive prices. To achieve this the Government has adopted the policy of encouraging competition in the provision of infrastructure at the local level. The Government welcomes the Select Committee's endorsement of the benefits for consumers of competition in local networks (paragraph 75), and accepts the Committee's view that this might restrict choice now in certain areas in order to widen it later. Such an approach has been effective in promoting market entry and investment in a way that unrestricted access might not: a policy of immediate full liberalisation would give great power to incumbent network operators, who would be able to deter market entry by new companies facing high entry costs to develop their networks.

Those providing infrastructure already have a strong commercial incentive to contract for attractive content with a wide variety of providers, so that their networks are of maximum interest to customers. However, the exclusive basis of cable and LDO franchises means that programme providers cannot supply programmes directly to customers. But this is not surprising; all network operators want to retain control of programming on their networks to ensure commercial success. As explained above, the Government is not minded to change its current regulatory approach on exclusivity. But the provision of a wide range of services to customers by different companies via dominant networks may justify the development of particular rules on open access. This is a matter which is kept under review by the European Commission as well as within the UK. At the same time, OFTEL is working on a more effective policy on interconnection arrangements.

8. The Government should reduce the uncertainty concerning the restrictions on PTOs by directing OFTEL and the ITC to review the licences for current franchise areas, taking account of the build obligations contained in the licences, with a view to allowing competition into franchise areas by providing for the lifting of the restrictions on PTOs on a franchise by franchise basis at specified future dates, subject to the principle that all cable franchises should be exclusive for seven years from the granting of the original licences; and the Government should make clear that all restrictions on PTOs conveying or providing entertainment will be lifted by the end of 2002, provided that the PTOs permit fair and open access to their networks. (Para 108)

The Government does not accept that there is uncertainty about the restrictions on PTOs (as the TISC Report, paragraph 107, claims). The Government's settled policy in this regard is set out clearly in the 1991 White Paper.

The stable regulatory environment which has been created by the Government's policies has enabled substantial investments to be made. This investment of billions of pounds by the cable franchises is not free from risk, as the Select Committee acknowledged (paragraph 92). To seek to foreshadow later changes in the regulatory regime would not, in the

Government's view, assist the development of broadband communications in the UK as it would be likely to have a devastating impact on the plans for future investment of many of the major companies currently involved.

It is important to recognise the implications of the Select Committee's recommendation. If current cable franchises were to cease to be exclusive seven years after they were originally granted, some 20 franchises covering 2.2 million homes would immediately be affected. The vast majority of the remaining franchises currently granted, namely 103 franchises covering 12.2 million homes, would lose their exclusivity within the next two to three years. Such a change would represent an absolutely fundamental alteration to the regulatory and financial basis upon which these franchises are currently being developed.

As set out in detail in chapter four, the Government considers that the present regulatory framework continues to be the best way of providing a suitable climate for the development of communications technology, infrastructure and services. That regulatory environment will undoubtedly evolve as more infrastructure is established, as technology advances and as the market for broadband services and applications becomes more competitive. To move away now from the policies in the 1991 White Paper would adversely affect the value of existing or prospective franchises. Such a change could only have the effect of deterring investment and retarding the development of the communications industry. It would be immediately relevant to those companies planning to raise funds in London and overseas in the next few months. Indeed it would undermine confidence in business more generally, not least amongst important inward investors, about making future investments in the UK which were based on explicit statements of Government policy.

9. The Government should make clear that the Director General's views on the continuation or otherwise of the restrictions on PTOs will be treated as advisory only. (Para 109)

Any review undertaken (on the timescales set out in the 1991 White Paper) of the present policies on national PTOs conveying or providing entertainment would be conducted by the Government. In reaching any decision, the Government would of course consider the advice of the Director General of Telecommunications carefully. There would be nothing unusual in this: at present the Government consults the Director General of Telecommunications on a wide range of issues in which he has an interest.

10. Conditions should be imposed in return for any lifting of restrictions on PTOs, relating to:

- fair and open access to their networks;
- the extent and timing of the development of broadband infrastructure;
- the linking to the network of public facilities such as schools and hospitals. (Para 110)

The issue of fair and open access to networks has already been covered, and is also a matter currently being addressed by OFTEL in its work on interconnection. Government policy on the development of broadband networks and infrastructure, and the benefits which the Government sees flowing from that policy, have been set out in detail in chapter four. The linking of public facilities such as schools and hospitals to broadband infrastructure is discussed below.

11. The Government should adopt a more active and co-ordinated approach to the development of broadband applications for the public sector. (Para 113)

The Government agrees with the Select Committee that it would be desirable for it to adopt a more vigorous and co-ordinated approach to the development of broadband applications in the public sector. Its plans for doing so have been set out in chapter five.

12. The Government should examine how it could ensure that all public institutions such as hospitals and schools are connected to broadband networks as soon as possible, and should consider setting targets in this respect for the network operators. The Government and OFTEL, in association with the PTOs and cable companies, should seek to raise public awareness of the considerable public service benefits resulting from broadband networks. (Para 115)

The response to Recommendation 11 is also relevant. The Government agrees that greater public awareness of the benefits of broadband communications would be valuable. Publication of this Command Paper is designed to help raise the profile of this issue, by setting out the Government's vision of the importance for UK competitiveness of future developments in broadband. Greater public awareness should also help the companies involved be more responsive to consumer demand for a wide range of communications applications and services. Through dialogue and encouragement the Government will press all those involved to develop new and innovative services and to raise consumer awareness of the opportunities which are increasingly open to them.

The Government welcomes the fact that a number of cable companies and other PTOs are already working closely with public institutions such as schools, universities and hospitals by providing a full range of communications services and sharing the benefits of their investment. There is already a good range of innovative educational literature available on the benefits and opportunities of broadband, and a number of operators are trialling extensive new services with hospitals, schools, universities, police and emergency services, local authorities and libraries. It is clearly to the operators' advantage to do all this, as it helps to create a more aware, informed and effective base of consumer demand. As explained above, the Government is increasing its effort in exploring and publicising the potential applications of broadband in the public sector. The Joint Information Systems Committee of the Higher Education Funding Councils is also playing a leading role. But it is ultimately for budget holders in public bodies and institutions to judge whether the benefits of these services merit their participation, given the many competing priorities for effort and resources which these institutions face. It would not be appropriate for central Government to set targets in these areas, given that central Government has quite properly devolved decisions over spending and resource use to more local management. But the cost savings available on existing telephony services already mean that many public sector managers are well aware of the merits of alternative service provision. Wider consideration of how the greater use of broadband services can lead to improved delivery of public services and greater cost-effectiveness will be important in the future, and will be kept under review.

13. The Government and OFTEL should keep under review the adequacy of the telecommunications facilities available to less densely-populated areas and the potential ways of ensuring that these areas are not disadvantaged. (Para 119)

The Telecommunications Act already places a duty on the Government and the Director General of Telecommunications to secure the provision of telecommunications services as necessary to satisfy a reasonable demand. These are continuing responsibilities which the Government and the Director General take very seriously. They require consideration not only of the needs of rural areas but also of those in urban areas without easy access to telecommunications. BT has a universal service obligation contained in its license, as do some other PTOs, and OFTEL is considering the policy implications arising from this obligation in circumstances where telecommunications services are provided by a wider range of companies, and where BT is less dominant than has hitherto been the case (see chapter five).

It is worth noting that in the period since the privatisation of BT the number of United Kingdom households having a telephone has risen from 79 per cent to over 90 per cent. Many customers taking phones for the first time are doing so from cable providers, as a result of lower prices improving relative accessability. At the same time new developments in direct-to-homes satellite broadcasting and forthcoming developments in the radio delivery of broadband telecommunications and information services mean that less densely populated parts of the United Kingdom are likely to be able to receive broadband-based services within the foreseeable future, at reasonable cost.

14. The Government should take more account of the supply industry in its overall policy towards broadband networks. (Para 121)

The Government agrees with the Select Committee about the importance of taking into account the interests of manufacturers and suppliers in pursuing new opportunities in broadband. The DTI is engaged in detailed dialogue with manufacturers and suppliers on these issues, and has increased the resources devoted to this task.

One of the most important issues for UK suppliers is access to markets. In pursuing a policy of ensuring a competitive environment at home and securing liberalisation overseas, the Government bears the interests of suppliers very much in mind. Major inward investors such as Motorola and Northern Telecom have been attracted to the UK because of the opportunity to develop products and services in a liberalised market, and have enriched the UK supply base. For example, Northern Telecom has spent over 60 million [Sterling] in the UK developing new generation transmission systems which they are selling worldwide. Exports for the sector as a whole have grown strongly since the UK market was liberalised.

Competition has also spurred the modernisation of existing networks as well as the construction of new infrastructure. BT has spent some 16 billion [Sterling] on its networks since 1987 and the vast majority of the equipment has been supplied by UK based companies.

The success of broadband networks will depend heavily on the quality and diversity of the applications which the networks offer. This provides a significant opportunity in the software area where the UK industry has strengths, including a number of small niche companies. The DTI's Telecommunications Division has been working with a senior manager from BT on secondment to the DTI to analyse the strengths and weaknesses of the UK software industry, the aim being to form the basis of a dialogue with the industry on actions to help them take advantage of the opportunities broadband developments will bring. This work complements the study being undertaken with the Cable Communications Association described in chapter five.

15. The Government should make the promotion of broadband services central to its policies on broadband developments. (Para 122)

As explained in the response to the Select Committee's first recommendation, it is clear that the emphasis within the broadband communications sector is moving from the provision of infrastructure towards the provision of services. The Government is committed to ensuring that its present policies on the development of infrastructure are carried through to completion, while at the same time encouraging the industry to put an increased amount of effort and investment into the development of services and applications which will be of use to business, industry and residential consumers.

16. The Government should review the structure of telecommunications and broadcasting regulation in order to ensure consistent principles and clear responsibilities in all matters relevant to broadband regulation and development. (Para 127)

The Government is committed to a policy of regulatory stability combined with sensible regulatory evolution to provide the necessary environment to stimulate the continuing development of a competitive market and sustain a high level of investment in communications infrastructure and services. Any review of this regulatory system for telecommunications and broadcasting at this stage would create an unnecessary and unwelcome degree of uncertainty into a sector which is already called upon to make what the Committee notes is a great deal of high-risk investment. The Government is mindful that the growing convergence of telecommunications, broadcasting and information services may ultimately require a similar convergence in the regulatory structure. It would however be premature at present to promote change in the regulatory structures, in the absence of much more concrete information about how convergence will occur.

17. There should be an independent review of the powers of regulators and how they could be made more accountable. (Para 128)

In the present circumstances the Government does not believe that a general review of the powers of statutory regulators would be desirable.

Indeed, the system of statutory regulation used in the United Kingdom in respect of privatised and regulated utilities is based on an important principle of regulatory independence. Regulators' duties are set by Acts of Parliament and the regulator is then charged with discharging those duties as an independent person. To seek to reduce the independence of regulators might be expected to diminish confidence that they would make consistent decisions which took account of the full range of their statutory responsibilities. It would also risk conferring disproportionate influence on those companies and industries capable of wielding the largest lobbying power. That would disadvantage smaller companies, and the interests of particular regions or disadvantaged groups within the population. It would also introduce a degree of uncertainty into the broader regulatory process which would be unhelpful in sectors such as communications where the main players are called upon to make substantial investments.

The present regulatory framework requires the statutory regulators to be accountable in a number of ways. First, if operators do not accept licence modifications proposed by a regulator, there is in effect a right of appeal provided to the Monopolies and Mergers Commission. Second, all decisions of a regulator are subject to challenge in the courts under the procedures for judicial review. Third, the regulators are subject to the scrutiny of the National Audit Office and the Public Accounts Committee in respect of the resources for which they are responsible. Fourth, and highly relevant in this context, the regulators are regularly required to give evidence to Select Committees about the discharge of their responsibilities.

---

comments

ANNEX B - Availability of This Command Paper via the Internet

For the first time, the Government has made arrangements for this Command Paper to be available electronically via the Internet. The Internet is the world's largest network of computers. It was established by the US Department of Defense in 1969, and it developed as a flexible network for academic users. It now has millions of users. It provides an electronic mail and information service, as well as a means of very wide ranging access to databases and to information files.

This use of Internet is an excellent example of the innovative approach to the dissemination of information which the Government is seeking to promote, and also of the lead which the Government as an information provider is able to take. The Stationery Office, has made the necessary arrangements. This document can be accessed via the Internet using the following URL:http://www.tsoinfo.gov.uk/document/DTIcmd/DTIcmd.htm. This document is available via anonymous FTP from: ftp.open.gov.uk/pub/docs/dti/

---

comments

Annex C - Glossary of Terms

Asynchronous transfer mode (ATM) A technique for the rapid switching of messages generally used on networks built with fibre optic cable.

Bandwidth The quantity of spectrum required for a specific purpose: eg a television channel typically occupies a bandwidth of 8 Megahertz whereas a telephone conversation typically occupies only 4 kilohertz. Back

Broadband/narrowband *Broadband* - a service or connection allowing considerable information to be conveyed - such as for television pictures. Broadband networks have a capacity of at least 2Mbit/second. *Narrowband* - a service or connection only allowing limited information. Narrowband networks have a typical bandwidth of 64 kbit/second. Back

Cable Communications Association (CCA) The representative body set up by the broadband cable operators to promote their interests. Back

Calling line identification One of a range of advanced network services which are dependent on digital network signalling. It enables the person being contacted to identify the number from which the call is being made. BT are just beginning to make it available to most of their customers. Back

Capacity The maximum rate at which a telecommunication system is able to transmit information from one location to another. The capacity of a system is determined by the apparatus of which it consists - its switches and the cables, fibres or radio links. Back

Coaxial Cable Cable consisting of a central conductor surrounded by and insulated from another conductor. It is the standard cable used in present-day cable systems. Coaxial cables have a wider bandwidth than twisted pair but less than that available over fibre. Back

Conveyance The carrying, as opposed to the switching and delivery, of messages. Back

Electronic Data Interchange (EDI) The structured communication of information between computer terminals. Typical EDI applications include the electronic automation of business processes such as ordering and invoicing. Back

ETSI The European Telecommunications Standards Institute - a body recognised by the EC to generate European telecommunications standards, some of which support various EC Directives. Back

Franchise The right to install and operate a cable system in a specified geographic area awarded by the Independent Television Commission. Back

Interactivity The use of two-way communication in a system to enable a subscriber to enter into a dialogue with the programme source. Back

Interconnection agreements Agreements made by operators on the terms by which their networks may be connected to each other. Back

International Simple Resale (ISR) Resale over an international leased circuit involving conveyance of messages via the PSTN at both ends of that leased circuit. Back

ITC Independent Television Commission

Leased lines/private circuits Lines supplied by one operator to another for 'resale' purposes, or to companies for their own use. Back

Local Delivery Operator (LDO) New version of cable TV licence introduced by the Broadcasting Act 1990. LDOs can deliver entertainment using radio technology as well as cable.

Local loop The local telephone network as opposed to the long-distance trunk network.

OFTEL Office of Telecommunications. The licensing and monitoring body established under the Telecommunications Act 1984. Back

Programme Provider Company assembling programmes into a service to be provided through terrestrial, cable or satellite systems. Back

Public Switched Telecommunications Network (PSTN) The telecommunications networks of the major operators, on which calls made can be switched to all other subscribers.

Public Telecommunications Operator (PTO) Major operators who are so designated by the Secretary of State. Compared with non-PTO operators, PTOs have additional rights and responsibilities. Back

RACE Research for Advanced Communications in Europe. An EC R&D programme for the telecoms sector, which will be followed by the ACTS programme (Advanced Communications Technologies and Services). Back

Service providers Companies providing telecommunication services but not themselves running networks. Examples would be premium rate service providers, companies offering value added services, and retailers of airtime on the cellular networks. Back

Switching The movement of messages from one exchange line to another, and any associated services. Back

Telematics The EC Telematics programme is concerned with the exchange and processing of information, especially across national boundaries. The programme involves applications in such areas as the establishment of trans-European networks between administrations, transport services, healthcare, flexible and distance learning, libraries, linguistic research and engineering, and telematics systems for rural areas. Back

Trans European Network programme (TENs) Following the entry into force of the Maastricht Treaty, the EC has a formal role in the establishment and development of TENs in the areas of transport, telecoms and energy infrastructures. Back

Video-on-demand Programmes or films are sent independently to customers in response to individual requests. Back

Voice Telephony A telephone service. Back

This Command Paper (Cm 2734) was published by HMSO
as ISBN 0-10-127342-8 and is available from

- The Stationery Office Publications Centre,
- The Stationery Office Bookshops,
- The Stationery Office Accredited Agents

and through good booksellers at 6.75 sterling

---

comments