The 2001 Hinton Lecture

ROYAL ACADEMY of ENGINEERING

Connecting the country

- an engineering approach to creating broadband Britain

Sir Peter Bonfield CBE FREng
Chief Executive, BT plc

The Hinton Lecture

The Hinton Lecture, the premier annual lecture of The Royal Academy of Engineering, is named after the late Lord Hinton of Bankside OM KBE FRS FEng, the first President of The Academy which, on its formation in 1976, was known as The Fellowship of Engineering.

Lord Hinton was one of this century's most eminent engineers. Starting in engineering in 1917 as a sixteen-year old apprentice with the Great Western Railway at Swindon, Christopher Hinton gained first class honours at Cambridge in the Mechanical Sciences Tripos, then worked for Brunner Mond (later ICI), being seconded to the Ministry of Supply during the Second World War.

In 1946 he was appointed Deputy Controller of Production, Atomic Energy, and in 1954 Member for Engineering and Production when the United Kingdom Atomic Energy Authority was formed. His organisation was responsible for designing and building the factory at Springfields for extracting uranium, for building Windscale with its production piles and complex chemical plants, the diffusion plants at Capenhurst, the first industrial nuclear plant at Calder Hall and the fast breeder reactor at Dounreay.

In 1957 Christopher Hinton became the first chairman of the newly-created Central Electricity Generating Board. Following the conferment of a Life Peerage in 1965 he was an active member of the House of Lords and a highly successful first Chancellor of the University of Bath. His achievements throughout a long and distinguished career were recognised by honours and awards from the nation, from countries overseas, from the engineering and scientific establishments and from academia. He remained active in retirement until his death in 1983 at the age of 82.

During his retirement, as President of the Council of Engineering Institutions (CEI) from 1976, Lord Hinton was involved in the final stages of the creation of The Fellowship of Engineering in that year. Under the CEI Charter, its President was also the President of the newly-formed Fellowship. Lord Hinton assumed that post with enthusiasm and energy, and over the next five years was instrumental in developing The Fellowship's activities and administration. One of the activities was the introduction in 1977 of an annual Distinction Lecture which was given each year until 1981, when it was renamed the Hinton Lecture in his honour, following his retirement as President.

Sir Peter Bonfield CBE FREng
Chief Executive, BT

Sir Peter Bonfield was educated at Hitchin Boys Grammar School and graduated from Loughborough University of Technology in 1966 with an Honours Degree in Engineering.

He began his career with Texas Instruments Inc., establishing a wide experience base both in semiconductors and computers in Europe, the USA and the Far East, before becoming a Divisional Director in 1974 based in the USA. He joined the Board of ICL plc in 1981, became Managing Director in 1984, and was Chairman and Chief Executive from 1985 to 1996. He also joined the Board of STC PLC in 1985 and was Deputy Chief Executive, STC PLC from 1987 to 1990. On 1 January 1997 Sir Peter resigned as Chairman of ICL plc but remained on the Board as Non Executive Deputy Chairman until December 2000.

Sir Peter Bonfield became Chief Executive of British Telecommunications plc on 2 January 1996.

He is a non-executive Director of AstraZeneca Group Plc, and Vice President of the British Quality Foundation.

He is a Fellow of The Royal Academy of Engineering; the Institution of Electrical Engineers, the British Computer Society, the Chartered Institute of Marketing, The Marketing Society and the Royal Society of Arts. He is a past Member of the Civil Service College Advisory Board, the Trilateral Commission, and the CBI's President's Committee. He is a companion of the Institute of Management, an Advisory Member of The British Council, and a Member of the Company of Information Technologists, the European Round Table, the Salomon Smith Barney International Advisory Board, and the EU-Japan Business Dialogue Round Table. In 1994 he participated in the High Level Working Group established by the European Commission to consider the creation of the information society.

In 1995, he was made a Commander of the Order of the Lion of Finland. In the same year he also received the 1995 Mountbatten Medal from the National Electronics Council in the UK, awarded for his contributions to technology and the electronics industry. In 1996, he was awarded the Institute of Management Gold Medal. He is a Liveryman of the Worshipful Company of the Information Technologists, a Freeman of The City of London, and an Honorary Citizen of Dallas, Texas. In May 1998 Sir Peter received The Outstanding Executive Award from Texas Tech University. He has also received Honorary Doctorates from the Universities of Cranfield, Loughborough, Surrey, Mid Glamorgan, Nottingham & Trent, Brunel, the Open University, Northumbria at Newcastle, Royal Holloway University of London, and Kingston University. He is a member of the International Advisory Panel in support of scholarships for the University of London.

He was awarded the CBE in January 1989 and knighted in 1996.

The 2001 Hinton Lecture:
Connecting the country - an engineering approach to creating broadband Britain

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Connecting the country

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Thank you very much for inviting me to give this year's Hinton lecture. It is indeed a great honour. This lecture commemorates Christopher Hinton - Lord Hinton of Bankside. He was a brilliant engineer, with a particular talent for co-ordinating large and complicated projects. One of these was a huge expansion of the national grid - the electricity network. He supervised this when he was the first chairman of the Central Electricity Generating Board in the nineteen fifties and sixties.

Today, communications networks are the ones undergoing a step change as more and more individuals and businesses adopt broadband services. Like the national grid, this change will profoundly affect the way we live and work. It demands high levels of engineering skills and it poses continuing questions for policy makers and regulators. But the challenges are well worth meeting. The Secretary of State for Trade and Industry, The Rt Hon Patricia Hewitt MP, has said that high speed internet connections will be as important to our economy as roads and railways. One of our customers put it a different way, describing broadband as like being hot water - "not strictly essential, but highly inconvenient to live without".

Clearly, broadband communications can make a significant difference to people's everyday lives. So how we can make sure that the benefit is felt as widely as possible? This is a complex question, and I want to look at it in accordance with classic engineering principles. By this I mean analysing the process in terms of its intended output and the available inputs.

First of all this means defining the output – the objective. In simple terms, I would define this as enabling as many people as economically possible to enjoy the benefits of broadband, and I will explain why I believe this should be the objective. Then we need to examine the inputs, and I would categorise these under three headings: supply, demand, and policy. By 'policy' I mean the policy environment created by governments and regulators. Then, having analysed each element, we can identify the main challenges and ask what can be done to meet them.

BENEFITS

So to begin with the objective, why should we use broadband? In fact, what is broadband?

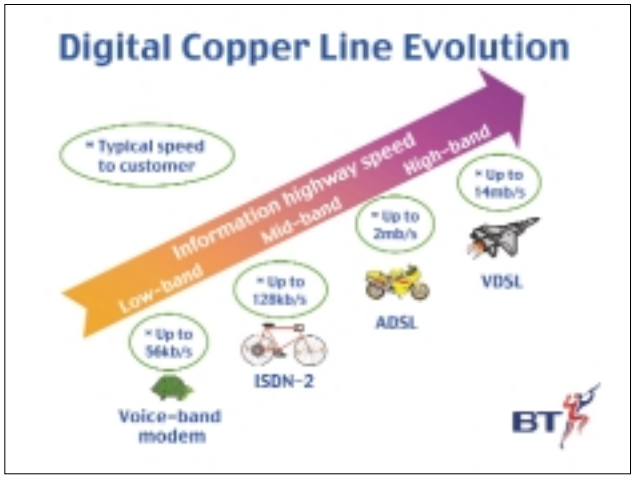
There is no precise definition. It is a term that has come to mean services with certain features - speed, a permanent network connection and interactivity.

Broadband tends to describe local connection speeds greater than 128 kilobits per second. This is the limit of the conventional telephone network's local connection when it is enhanced by the technology known as ISDN. Typically, a local connection via computer and modem runs at lower speed – up to 56 kilobits per second.

Broadband is also 'always-on', permanently connected to the network, and it is often, although not always, interactive. Signals can be sent upstream from the user as well as downstream to the user. I should add that broadband connections can be channelled to the computer or the television and in time they will reach all kinds of appliances, from the central heating to the fridge.

The applications can be passive such as watching videos; or extremely active, such as downloading business-critical applications or playing a game against an opponent in another continent.

None of the key elements - speed, permanent connection, or interactivity - is new in itself, so the term 'Broadband Britain' can be misleading. For many years, backbone networks have carried data at speeds measured in gigabits per second. High speed, permanent, connections are the norm among large corporations. As for interactivity, the phone has been an interactive device for more than a century. In other words broadband is not something you can box up separately from the rest of the system.



There is a continuum of network speeds all the way from mobile networks operating at 9.6 kilobits per second (kb/s) to backbone networks running at hundreds of gigabits per second (gb/s).

Communications networks carrying digital bits are similar to electricity or road networks. Different sections have different levels of capacity. Different people use the networks in different ways, consuming different amounts of bandwidth. The reason that 'broadband' is now in the spotlight is that fast, always-on, interactive, services are now there for the asking for millions of individuals and small businesses.

At broadband speeds, video images are smooth rather than jumpy. Downloading of large files takes seconds rather than minutes. Graphics-rich internet pages appear instantly.

But some may ask "What's the fuss about? Isn't this just a faster network?" Well, that question was answered in a report by McKinseys, which said:

"To those who still think we are making excessive claims for what is basically a faster way to do things we can already do, we would say that a car is just a faster version of a horse and carriage and a computer merely a faster mechanical calculator. If broadband applications have a fraction of the impact of either of these, they will indeed change everything."

So speed equals transformation, and when you factor in a permanent connection with interactivity, you create a new and powerful combination. This has a clear impact. For example, research in the United States has shown that once people have broadband they tend to move their computer from the study or bedroom to the kitchen or living room.

One customer said: "If I've got to turn my computer on to get a recipe and I'm on a 56 kilobit modem then the recipe book wins. Now, broadband wins." That sums it up. Broadband represents a turning point in the customer's experience. It means that digital information becomes more central to people's everyday lives.

- You can watch the film of your choice at the time of your choice.
- You can download software or music in seconds.
- You can set up a corporate intranet TV system to provide video briefings for employees.

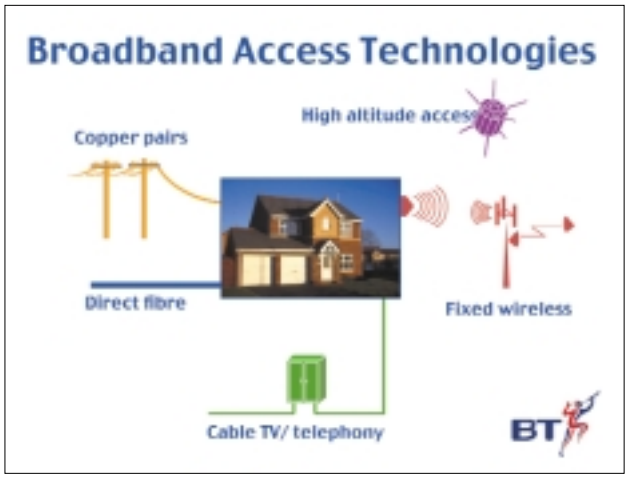
- You can remotely monitor heart patients with critical conditions via mobile implants.
- You can access multimedia education packages from anywhere in the world.

So the benefits are clear. No wonder broadband has been compared to the car or computer. However, while the benefits of the computer were clear, it took two decades to reach half of the population. The benefits of the car were clear, but it took nearly a century to reach half of the population. Early experience has shown that broadband will not be adopted overnight either.

Over half of UK households could have broadband services today, but fewer than one per cent have actually signed up, around 160,000 in total. So what is preventing faster, wider adoption of these services? To answer that question, we need to turn to look at what is going into the process in the UK at the moment in terms of supply, demand and policy.

SUPPLY

So let's look first at the supply of broadband services.



There are several methods of delivering interactive broadband services to customers' premises.

Optical fibre is one. Satellite and radio can also be used, but, for the home or small business, there are currently two main access routes - co-axial cables or phone lines converted by the technology known as DSL.

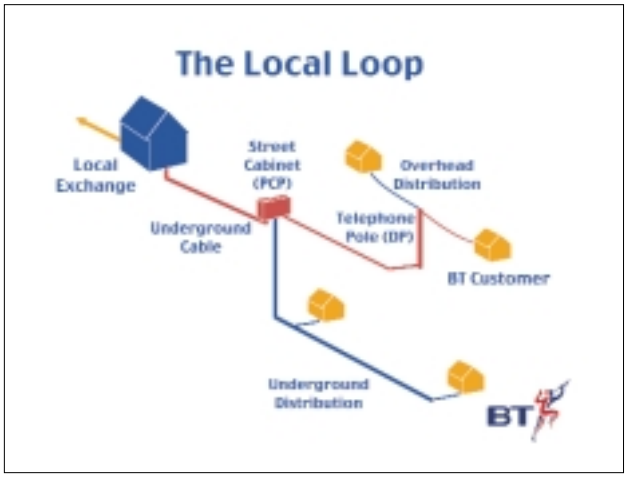
Over half of the homes in the UK are now passed by the cable companies, NTL and Telewest. Cable operators chose their franchise areas and not surprisingly they chose the most commercially attractive ones. They can offer a bundled service of television access, telephony and, in some areas, broadband.

The other main current technology route is DSL - or Digital Subscriber Loop. DSL converts an existing copper telephony line to offer speeds in a typical range of 500 kilobits per second to 2 megabits per second (mb/s) - 10 or 40 times faster than the standard phone network's local connection. The version of DSL currently widely used in many countries including the UK is asymmetric DSL – ADSL. This provides high speed downstream to the customer but with a slower return channel. It is very suitable for internet access where people want to download large amounts of information but generate less themselves.

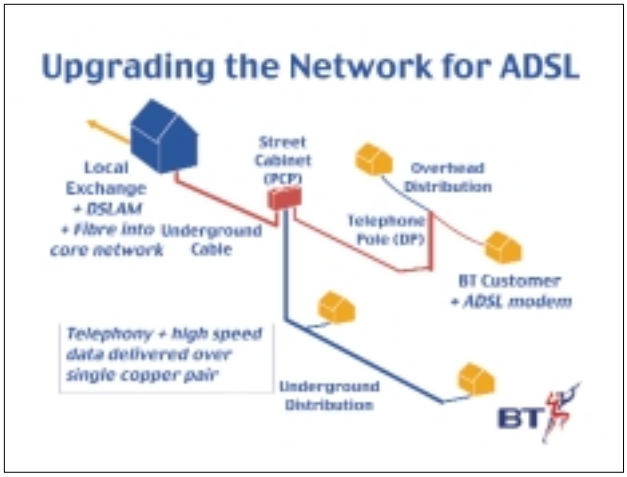
DSL requires special equipment at the exchange, called a DSLAM, and another box at the customer's premises. It is limited by distance, but now it can work up to around 5.5kms from the exchange with the help of our new rate adaptive technology.

Another variant of DSL which BT is exploring is VDSL - very high speed DSL. This involves running fibre from the exchange to the roadside cabinet and then installing DSLAM equipment to convert the last few hundred yards of the line. This enables the connection to run at a typical

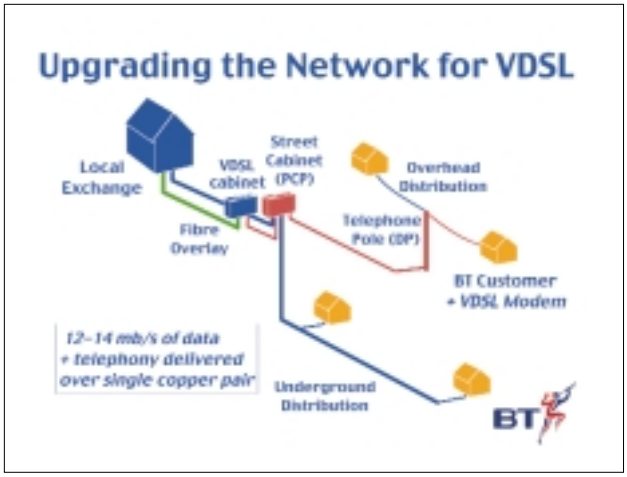
speed of 14 mb/s downstream and 3 mb/s upstream. This means that the single copper loop can simultaneously handle several channels of television, as well as fast internet and telephony.



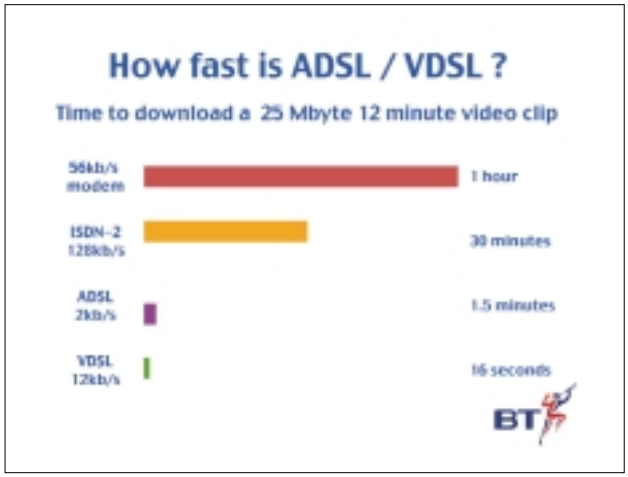
BT has been at the centre of the development of DSL in the UK. We carried out the early trials. We have enabled 1,000 exchanges with ADSL. We have played an active part in creating a competitive market. We are leading the drive to improve the technology and make DSL more affordable. We are investing in the search for new applications and new technical advances.



The 1,000 exchanges that we have enabled cover some 60% of the UK's local access lines. This is far ahead of current demand and we have the capacity to install four times as many connections as we are actually doing. However, some parts of the country are not technically viable for DSL because too great a proportion of customers live too far from the exchange to receive it. Other areas are not commercially viable. In these, the size of the exchange area means that forecast demand is so low that we cannot justify the rate of return to our shareholders. I do not believe that these areas will be permanently excluded from the broadband world, but operators have to follow commercial principles. This means that the burden of investment cannot be borne by a single company, unless there is a dramatic change in technology.



Turning to the competitive issues, there has been a great deal of debate over the process known as local loop unbundling. Under this system, BT's lines from local exchanges to customers are made available for use by other operators, to offer whatever services they wish, under EU terms interpreted by the regulator, Oftel. To judge by some of what has been claimed, you would think that broadband depended entirely on local loop unbundling and that BT was determined to stop it happening. But you would be wrong on both counts. In fact, out of 80,000 ADSL broadband connections, only 150 or so are running on unbundled loops. However, that is not because BT has been intransigent, but because operators have dropped out of the market.



A year ago there were 40 operators seeking to use lines in 2,000 exchanges. Now there are around 10 seeking to operate in around 300 exchanges. There are around 30 sites where other operators are actually running services over local loops. Last year competitors were clamouring to enter exchanges. We drew up plans to accommodate their equipment at 500 exchanges – and this was a complex task when operators had different needs in terms of power, space, security and other issues. We commissioned high tech building companies. There was even controversy over how space would be allocated to prevent congestion. But then the demand evaporated. The clamour subsided. Designers and surveyors had to be made redundant. BT transferred new recruits onto other work. There has been no congestion at any exchange.

Today, far from obstructing unbundling, BT is keen to make a successful business out of it. Indeed we have launched a new service whereby BT will install and manage DSLAMs for other operators, reducing their investment requirements and hence the risk. Meanwhile, competition is alive and well in the retail market. BT Wholesale sells a broadband product to around 180 retail service providers who channel their content to end-users over BT's network. This means that the majority of broadband customers are with non-BT providers.

We should also mention mobile services, as higher bandwidth is now available on the move. For example, BT Cellnet, soon to become O_2, is offering GPRS services that enables users to stay connected to a corporate network all day. Soon, there will be high bandwidth '3G' services as well. In BT, our vision is to provide users with a personalised portal which they can access at high speed via PC, mobile or even TV.

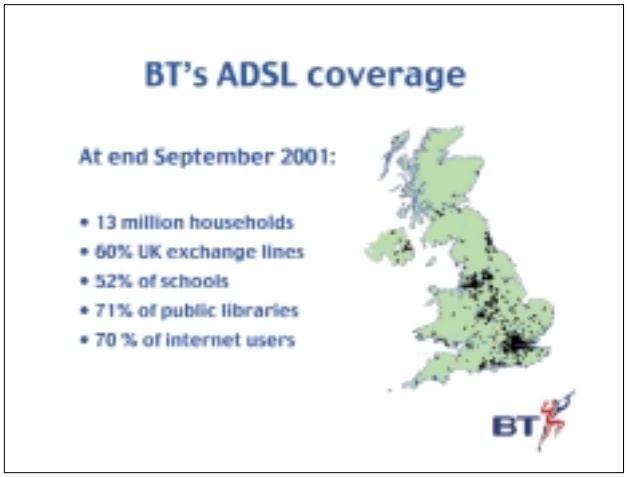
So this analysis demonstrates that if broadband is slow to take off, it is not because of blockages on the supply side. The focus of our attention therefore has to switch to demand.

DEMAND

In the movie 'Field of Dreams', the hero builds a baseball diamond at his remote farm after hearing voices telling him that if he builds it, the players and the people will come. So he builds it and sure enough, they come, in their thousands. Well, it may work for baseball, but in the UK broadband market, something more than pure faith seems to be needed to create demand.

Given that large organisations already use broadband, the focus today is on consumers and small and medium enterprises. For these customers, broadband has only recently become a realistic option. The question is whether they can see a tangible benefit from using a faster local connection.

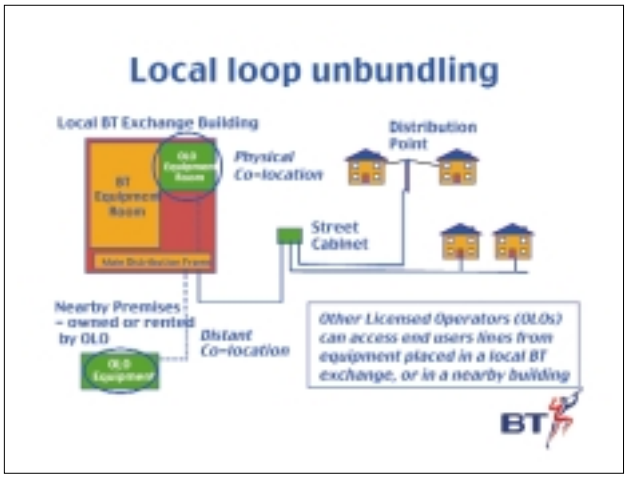
The small and medium business market contains many different types of customer. At one end are those who simply want email facilities. At the other are companies that have moved their entire customer relationship and supply chain operations online. In between are those using e-commerce facilities with professionally hosted web-sites.



Depending on the applications required, different access technologies are needed. At one end are those using the Public Switched Telephone Network for simple access. At the other are those using optical fibre and local area networks at very high speed.

We're already seeing increasing numbers of small and medium companies taking the step up from narrowband to broadband.

One music production company told us "ADSL has changed the way we work. We used to have to send CDs by post – now we send music as digital files in seconds." A design company is using broadband to exchange files with clients, and a car retailer is using ADSL to upload advertisements to web-site, in effect switching from hard copy to web-based advertising.



So the benefits are coming through, but those who are using broadband today are mainly using it to make existing applications work faster, rather than discovering completely new ones.

One of the new applications is video on demand, which is up and running in some areas with suppliers such as Home Choice. There has been some public sector uptake, for example a project linking local authorities in London. But it is early days here. Public sector usage is important because it creates access to many users, for example in schools or libraries, and also draws in suppliers and partners.

So let's turn the question around, why are people not using broadband?

Awareness is one obvious issue. Do people know what they are missing? For example, one survey showed that half of small businesses were not even aware of what the technology offered.
Another factor is the shortage of new applications. In my view we have only just begun to explore the potential of the technology and as we discover how to use the power of broadband in new ways, new customers will be attracted to the services.

Price is relevant as well. Consumer broadband access typically costs between £25 and £40 a month. Some businesses can clearly see that this is outweighed by the savings achieved, on couriers for example. But for others the price is currently more than they want to pay, because they have no feeling yet of the benefit to their business. Also there are some special factors at work in the UK. For example we have one of the cheapest rates of narrowband internet access in the world, and more important, we have flat-rate unmetered tariffs everywhere. In other European countries, broadband is the only way to get flat-rate services and so demand is driven by budgetary considerations. This means that selling broadband in the UK has to go one better –

promoting services and content that fully exploit speed, always-on access and interactivity, since there is no attraction in the flat-rate tariff alone.

POLICY

Turning to Government policy, the Government's target is to ensure that the UK has 'the most extensive and competitive broadband market in the G7 by 2005'. The E-Envoy, Andrew Pinder, has proposed that the Government's role should be to set targets, promote competition, stimulate demand and look at pump-priming the market in rural areas.

The Government has set up a Broadband Stakeholders Group to bring together providers, users and others involved. This is important in creating the partnerships that will be needed to maximise broadband take-up.

BT broadly supports the direction of UK Government policy, although there are one or two specifics on regulation that I will address in a minute.

CHALLENGES

So, having looked at these inputs to the process and the desired output, what assessment do we make?

One general observation is that the public debate over broadband has become disconnected from reality. Local loop unbundling has dominated the debate, when it is a relatively minor aspect of the process and one that BT wants to encourage, not discourage. Supply of broadband has been a preoccupation, when demand is the main issue, and finally, there has been a huge focus on BT and DSL, when broadband is bigger than any one supplier or any one technology.

Another misconception is that broadband is the answer to everything. Even with relatively low take-up of broadband, the UK is faring well in the so-called 'new economy'. For example, there are more people online in the UK than in many European countries. A recent report by the French Ministry of Finance, Economy and Industry expressed concern that France is falling behind countries such as the UK.

Since the introduction of unmetered access, the UK has pulled ahead of other European G7 countries in the number of secure servers per million inhabitants. Secure servers are the warehouses of the digital world and a good indication of the intensity of e-business. This does not mean that we should soft pedal broadband because it will mean a step change for many customers. But it does show that what the Government has called 'e-Britain' is competing well internationally, despite the challenges of creating 'broadband Britain'.

However, the Government's target for broadband is a stretching one. Our analysis has shown that there are several challenges to address if we are to meet it. These are chiefly:

- a lack of awareness
- a lack of applications
- a lack of public sector take-up
- technical limitations
- economic issues
- and regulatory issues.

So finally, let's look at these in turn and ask what action can be taken.

Action (1) Boost awareness

First, there is a need to boost awareness of what broadband can offer to businesses and individuals. This is an issue for everyone, Government, local government, operators and content providers. The need is for marketing programmes, education and opportunities for people to see broadband in action whether at a school, library, business or other location. Companies need to become aware of what broadband can offer their particular businesses.

The Broadband Stakeholders Group is well positioned to take a lead in promoting broadband awareness nationally.

Action (2) Build applications

The second issue to be addressed is the need for more compelling content and new applications. This is another case for partnership, in this case between service providers, content providers and applications designers. Projects are in progress around the country. For example, BT has set up a Broadband Applications Lab to evaluate and test broadband applications that designers hope to bring to market.

To give you one example of this work, we are conducting trials of a service entitled 'software-to-go'. This enables an individual to rent many kinds of software online, lifestyle, education or entertainment. You can hire software for an evening or a weekend, with titles ranging from French tutorials to action games.

There is also a great deal of scope for new applications for interactive TV or video streaming. Interactive TV offers a world of new possibilities with viewers participating by buying, voting or responding to questions. Instead of having a studio audience of a few hundred, *Question Time* could become a debate involving millions. The fate of *Big Brother* contestants could be decided in seconds rather than hours - although that might still be too long for some!

In the United States, a new management learning programme has been created by a company called Ninth House. It takes the form of an interactive soap opera set in a business. At various critical stages the action stops and the viewer is asked what they would do if they were a particular character. The way the plot develops in the next section depends on the answer given.

Meanwhile, the UK could become the seed-bed for Europe's broadband applications. Somewhere out there in Belfast, Bristol, Edinburgh or East Anglia, there may well be tomorrow's Bill Gates, Tim Berners-Lee, Bell or Brunel. So let's invest in that possibility and have faith in our young engineers.

Action (3) Build public sector adoption

Another driver for demand is the public sector. As the EU's eEurope action plan says, "the public sector must lead, not trail, in the take-up of new technologies."

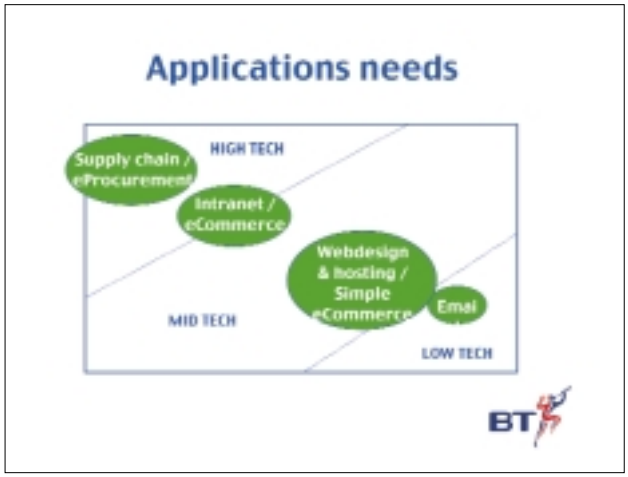
A lot could be achieved by the deployment of broadband to more schools, colleges, hospitals and public libraries. This would encourage adoption by other suppliers and stakeholders. There are models for this approach in countries such as Ireland and Sweden.

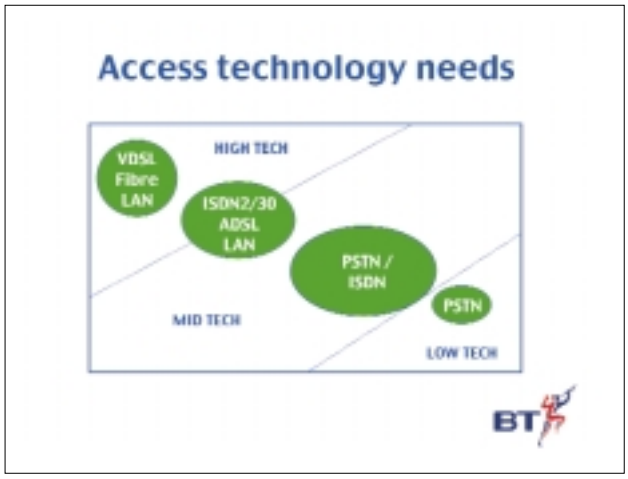
Action (4) Address technical limitations

Turning to the issue of technical hurdles, there is a lot of work going on to upgrade the technology. For example, this summer in BT, we began to deploy a DSL enhancement called 'rate adaption', developed by Fujitsu. Before this, DSL would only reach customers within 3.5km of exchanges - rate adaptive DSL extends the range to 5.5kms.

BT Wholesale is also staging trials of self-install DSL, or 'broadband in a box'. This is equipment which users can fix in their own premises, rather than having an engineer call on them.

There are many other emerging technologies around which will extend broadband services even further. For example, many offices now use very high speed gigabit ethernet services. These are now migrating to wide area networks as well as local area networks or LANs. The wireless LAN is also becoming more commonplace. In practice this means you can walk into the office, flip open your laptop and have immediate broadband access.





Action (5) Address economic issues

The key economic issues are the price of the service to the customer and the cost of the investment to the supplier.

BT is actively working to reduce prices where possible. For example, BT Wholesale dropped the prices of one of its most popular products by £5 a month to £30 this summer, and it has now halved the wholesale installation charge to £75 for a three month period. However, when it reduces prices, BT has to be careful that it is not judged by Oftel to be unfair to competitors. This aspect of regulation needs to be very carefully handled otherwise a no win situation could be created for BT and its customers, not to mention the Government's targets.

While price is an issue for customers, investment is the issue for operators. Currently there is much unused capacity, but in time, we will have to look at how to equip those areas where the roll out of ADSL is not commercially viable. I think the logical way forward here is to establish a partnership approach, embracing private and public sectors, suppliers, potential users and other stakeholders. This is not a pipedream. In fact in Wales and Scotland projects of this kind are already planned or underway and BT has proposed that a challenge fund should be set up for regional partnership schemes on similar lines.

Action (6) Reform regulation

Turning finally to regulation, the fact that there are 179 DSL providers, plus competition between DSL and cable, suggests that insufficient competition is not a major problem. I think the priority is to shift the focus from the concentration on unbundling the local loop towards promoting competition in a way that extends choice and encourages investment. Indeed, the better Regulation Task Force under Lord Haskins has produced a report which recognised that regulation can stifle investment if it restricts returns too severely.

Oftel will be wound up in 2003 and replaced with a new 'super-regulator', Ofcom, to oversee telecoms and broadcasting. This is a chance to take a fresh look at regulation across the digital industries.

CONCLUSION

I hope that I have given you a fresh perspective on the issue of broadband.

Once again, engineers find themselves at the heart of a transformation in society. Our task is to integrate engineering and commercial skills to create a sustainable broadband future. In order to achieve that, we need to get both the technical and economic models right and my analysis and proposals are intended as a contribution towards that task. There are major challenges, but the potential rewards are greater still.

It was said of Lord Hinton after his death that he had always shown "an unswerving faith in what he was doing." So whatever the frustrations, I would urge all those involved to maintain an unswerving faith in the potential of broadband communications to transform the way we live, work, learn and communicate. We will all want more personally relevant information, delivered any time, any place, by voice data and video.

That is the broadband opportunity, covering many different technologies and approaches. It won't happen overnight – but it will happen.

The future is broadband.

The Royal Academy of Engineering

The objectives of The Royal Academy of Engineering are to pursue, encourage and maintain excellence in the whole field of engineering in order to promote the advancement of the science, art and practice of engineering for the benefit of the public.

The Academy comprises the United Kingdom's most eminent engineers of all disciplines. It is able to take advantage of their wealth of knowledge and experience which, with the interdisciplinary character of the membership, provides a unique resource with which to meet the objectives.

Its activities include an extensive education programme, research chairs and fellowships, visiting professorships, industrial secondments and international travel grants. It provides expert advice on engineering matters to government and other bodies and administers the UK's premier annual prize for innovation in engineering, The Royal Academy of Engineering MacRobert Award.

Election to The Academy is by invitation only. Up to sixty Fellows may be elected annually, together with Honorary Fellows and Foreign Members who have made exceptional contributions to engineering. All are elected by their peers for personal achievement of exceptional merit and distinction. Fellows are distinguished by the title "Fellow of The Royal Academy of Engineering" and use the designatory letters "FREng".

The Academy was founded in 1976 as The Fellowship of Engineering on the initiative of HRH The Duke of Edinburgh and a group of distinguished engineers. It was granted its Royal Charter in 1983 and, with the consent of HM The Queen, adopted the present title in 1992.

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