



Section 2

Digital Networks

Britain's current network assets are the result of a series of legacy decisions:

- the public asset transfer of the switched fixed network when BT was privatised
- the exclusive geographical franchises of the 1990s for cable investment
- 2G mobile licences issued without charge; auctioned 3G mobile licences; but in both cases, a commercial surplus that was not price-regulated for a number of years, allowing substantial investment to create and roll out those networks
- a regulatory framework that incentivised competitive investment in first generation broadband
- a competitive set of fibre core networks funded mainly by high capacity Business-to-Business voice and data traffic
- broadcasting transmission networks (beyond the BBC) funded through the gifting of additional wireless radio spectrum, and, in the case of Satellite transmission, initial regulatory forbearance, but subsequently wholly- commercially based risk investment.

Unlike much other national infrastructure, Britain's communications networks have been created, in the main, without direct public funding.

The key question now is whether, as a nation, we can improve the capability and quality of our digital networks to meet growing consumer and business expectations, deliver what we need as a society and keep pace with international competitors.

Broadband digital communications are today what electricity was a century ago to our Edwardian forebears. And they are at about the same relative state of development: applications for business and industry are relatively well advanced. Use in the workplace increasingly common; basic uses in a significant and growing number of homes. The far sighted Edwardians knew that electricity in the home would



soon go beyond just domestic lighting to be a major power source for new devices, applications and services.

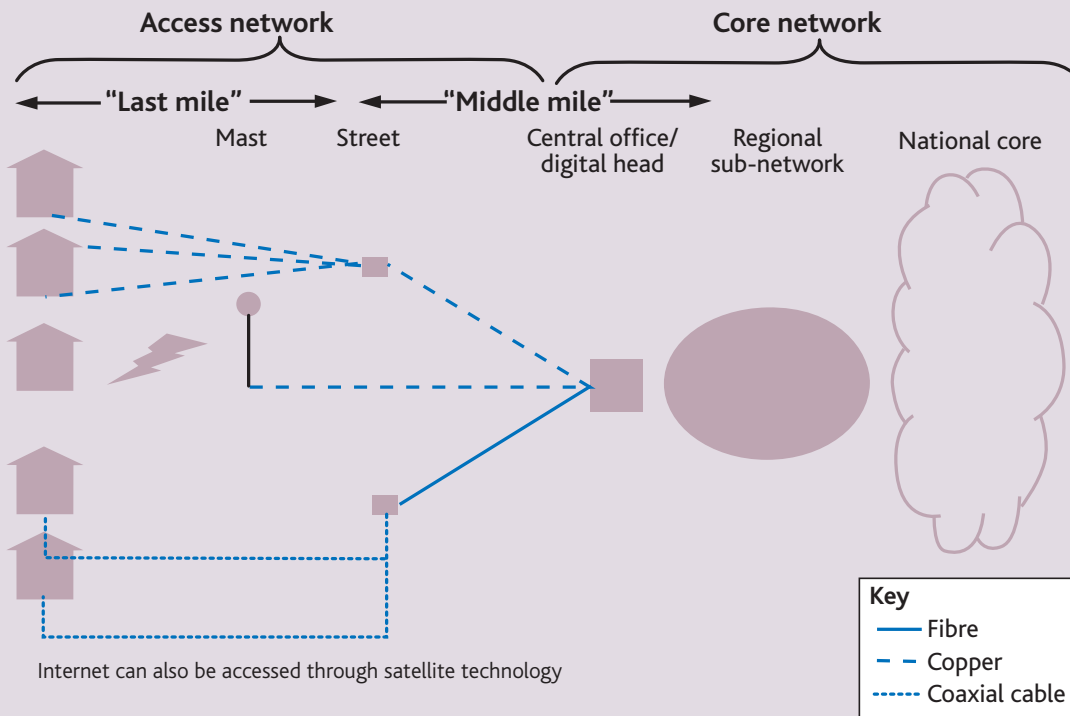
Even so, the extent to which electricity would be ubiquitous today and the revolutionary impact it has had on all aspects of our lives (including of course powering the communications and information revolution) was unimagined. But even within a few years, those countries that had adopted early and built national core and access networks led in innovation. They pioneered the new growth sectors that became the motors of economic prosperity.

Broadband digital networks, carrying very high capacity data and video information, at work, in the home and on the move, will be a major spur to innovation in the economies that adopt it. Available evidence shows that innovation accounts for one third of labour productivity improvements.



How does a broadband network operate?

A broadband network is made up of a number of layers. The capability and performance of each of these layers can affect the service experienced by the consumer.



The access layer of the network is generally the line between the exchange and the premises. Next generation fixed networks tend to replace part or all of the copper connection between those two points. Typically, NGA networks (Next Generation Access – high speed broadband access to the home, usually using fibre optic technology) tend to be 'fibre to the cabinet' (with a copper connection from the cabinet to the premises); or 'fibre to the home'.

Virgin's Media's NGA network is analogous to a 'fibre-to-the-cabinet' solution in that the cable network is typically made up of fibre deployed to street cabinets within 500m of customers' homes, with co-axial cable making the final connection. BT's plans for NGA are for a combination of the two rollout models.

We are already beginning to see the development of new services, such as tele-presence, network computing, iTunes film and distance health and education. An important feature of next-generation networks is that they are substantially better at two-way services, with significant uploading capabilities as well as high download speeds. Two-way video services could transform the delivery of those public services which require true, information-rich interaction between the citizen and the provider—health and education are good examples.



The development and success of first generation broadband in the UK owes much to a vigorous competitive market and investment by new broadband providers such as Carphone Warehouse, Tiscali and BSkyB, as well as BT Group plc and Virgin Media, the companies who have invested in end to end infrastructure as well as a retail offer. We recognise that as important as the development of Next Generation Networks themselves, will be the issue of transition for such competitive providers between first generation and Next Generation Broadband.

2.1 Next Generation Access Networks

Some other countries (notably the developed economies in the Far East, the US metropolitan centres, urban France and the Netherlands) have taken an early lead in the deployment of next generation fibre-based or co-axial cable fixed networks. (Wireless technologies such as Long Term Evolution/ 4G and WiMax are also promising, but, within the constraints of available spectrum and devices are unlikely to be able to provide mass, very-high bandwidth services in the short term).

A number of other governments are including next generation networks in their infrastructure development plans. The further development of next generation digital networks is part of the new US Administration's growth package; Germany has sought to combine a measure of regulatory and fiscal incentives to encourage its main telco to upgrade to fibre. Other governments are adopting innovative financial approaches to bring forward such upgrade investment. The Australian A\$5 Billion public broadband development tender includes a public capital instrument with an unspecified interest coupon: bidders for the tender offer their own values for that coupon. The Portuguese government is offering a public line of credit – albeit at commercial rates – to accelerate investment in fibre.

In the UK last year the Government commissioned the Caio Review to consider the UK's relative position and make recommendations.



The Caio Review

In February 2008 the Government commissioned Francesco Caio (Vice-Chairman of Nomura International, and subsequently adviser to the Italian Government) to examine the barriers to investment in NGA in the UK. His six month review was based around discussions with stakeholders and review of existing evidence and analysis, and focussed on three main questions:

- 1) Is the delay in the development of NGA translating to a competitive disadvantage for UK businesses and UK citizens?
- 2) Will the market deliver an investment in NGA on its own, or should the Government intervene now through subsidies or a structural change in regulation to get the roll-out of NGA started?
- 3) Is there a role for the Government to play in the development of NGA infrastructure and, if so, what type of initiatives ought it to pursue?

In summary, the principal finding of the Caio review were that the short term case for a major government intervention was limited. First, drivers for investment in other countries were quite different in that the UK already enjoys high availability of current generation broadband, with good levels of take-up and a highly developed internet economy. Second, there were strong indications that the market was delivering investment in NGA, with Virgin Media and BT announcing plans for fibre roll-out. Third, despite the growth in internet traffic, there was little evidence that UK customers would suffer a short term detriment.

Caio did though warn against complacency, stressing that broadband was important to quality of life and the competitiveness of the country, and that investment was not assured, being vulnerable to economic conditions and other developments. The Government and Ofcom should therefore play an active leadership role in determining the effective deployment of NGA. Caio recommended four sets of actions:

- 1) Set out a framework for delivery of NGA, by defining the country's ambition and vision of the future.
- 2) Launch a set of initiatives that do not distort the market but provide further momentum to the deployment of NGA. These included accelerating spectrum release, lowering build-out costs through better streetwork coordination and allowing overhead deployment, and supporting local open access network developments.
- 3) Establish a structured permanent benchmarking process to monitor the development of NGA in the UK and in relation to other countries.
- 4) Invest time and resources to identify remedies to adopt in case the market fails to deliver.



During the Caio review and since its publication, consumer and market developments have continued apace. Virgin Media is rolling out its new 50MB/s cable broadband service to 95% of its base during this year (Virgin Media's network passes slightly more than 50% of UK homes). This service is offered to customers at £35 per month plus line rental. In July 2008, the Virgin Media CTO announced the intention to provide 200Mb/s by 2012.

BT Group plc announced in July 2008 its plans to invest £1.5bn in Next Generation Access networks over five years, of which £1bn was incremental to planned investment. (BT is already engaged in a major upgrade of its core network as part of the '21CN' programme). Their announcement promised delivery of download speeds up to 40Mb/s to 10m homes by 2010. BT has stated that the deployment will involve a mix of fibre-to-the-home and fibre-to-the-cabinet solutions. This investment was identified as contingent on certain regulatory decisions, such as the rate of return on capital and rules on network access for BT's competitors.

BT announced in October 2008 that Muswell Hill in north London and Whitchurch in South Glamorgan would be first sites for deployment of fibre-to-the-cabinet, with the trials involving up to 15,000 customers in each exchange. Work in Ebbsfleet, where new-build properties are being equipped with fibre-to-the-home, is ongoing.

In addition there is a new breed of small, entrepreneurial companies offering Next Generation Broadband using a variety of different technology and innovation approaches. They sometimes using primary infrastructure that has not traditionally been used for communications networks (in the same way that Energis, now part of Cable & Wireless, used electricity and railway infrastructure for their core Business-to-Business network).

Competing NGA infrastructures can drive down prices. But they can also drive availability, particularly as mobile operators seeks to offer users the additional benefits of mobility at increasingly higher speeds, and make available national offers which fixed line players have to counter.

If these investments are carried to completion, we can reasonably expect at least half of the UK population to have access to NGA services and possibly a periphery around that- perhaps as much as 60 per cent or even more.

The Government welcomes these initial investments and will continue to look, in turn, at what more can be done with industry to provide a framework that is supportive of those willing to engage their capital to establish enduring networks for the future.

In some countries, regulators and governments have developed NGA strategies based on 'regulatory forbearance'. This means encouraging investment by allowing operators to construct monopoly access networks, with no regulation to allow their competitors access to that network. While we are not persuaded by the case for such absolute regulatory forbearance, the Government firmly believes that, where returns must be regulated, higher risk infrastructure investment justifies higher rates of return. It is welcome that Ofcom recognises that its regulatory framework needs to reflect that principle.



Unlike the current generation of broadband which flows off an already ubiquitous, sunk network (both physically and in cost terms), every additional home or business connected to Next Generation fixed networks represents new network build. This traditionally has a long (7-10 year) payback period, even allowing for uncertainties in the market, competitor decisions, and consumer take-up.

We cannot now know the exact percentage of homes to which the market, with current incentives, will roll out Next Generation broadband. But as a nation the UK will need widespread Next Generation Access networks by the middle of the next decade, even if they do not become universal for some time after that. We should start to plan now and therefore return to this challenge later in this section.

Growing consumer demand requires at least the current level of investment which the market is currently promising to spend on new network capability in core, backhaul and access networks. That demand has accelerated over the past year. The UK's current network infrastructure is beginning to be tested by consumer demand for real-time, streamed access rather than downloads, as shown by the higher than expected use of video sites such as the iPlayer, which went from nothing to 41m programme requests per month within a year¹.

The UK has enjoyed a sustained period of development of its first generation broadband network, with low prices and investment in the copper network to deliver good levels of service. But the UK might soon reach a stress-point at which the ability of that network to deliver further sustained improvements is strained.

Much of the debate around next generation networks confuses two separate issues. On the one hand, there are apparently exciting maximum speeds of 50 Mbps, 100 Mbps or more, that serve as national or corporate headline symbols in the broadband world. On the other hand, most users experience average speeds that do not match the broadband headline claims. To use an analogy with transport infrastructure, it is akin to the difference between a car's theoretical top speed and the length of time a journey actually takes and whether you encounter any traffic jams on route.

At this stage, demand for services requiring maximum speeds of 100Mbps is very uncertain. But between now and 2012 demand for average speeds of 20Mbps is likely.

There are already the early signs of congestion in first generation broadband, particularly for video use in peak times. This is most noticeable in the shared parts of the fixed networks (in access and backhaul). BT's 21st Century Network programme will play a part in upgrading the network, but it is still reasonable to expect that congestion will become more acute as more people make increasing use of high-bandwidth applications. It will also be particularly acute in small town and rural areas, not served by cable and who already have much lower average speeds than dense urban areas.

These factors have an important bearing on how the market evolves next generation networks. A very high proportion of the costs involved arise from primary

1 BBC figures for December 2008



infrastructure, i.e. digging up the streets to install fibre in existing ducts or creating new ducts where the current network is inadequate.

In some other countries, the emphasis has been on fibre-to-the-home (ftth). In new building developments, this is evidently sensible: essentially the same costs would be incurred whether fibre or copper were installed. But for the majority of existing urban households and small/medium-sized businesses upgrading the network to fibre from the digital exchange to the street cabinet may well be the sensible step for many years to come. It could involve less disruption and substantially lower cost. The Broadband Stakeholders' Group's research shows that this could achieve national coverage of next generation networks that would provide the desired 20Mbps average speeds for about one fifth of national fibre to the home coverage (£5Bn versus £25Bn).

Against this market and consumer backdrop, the Government remains of the view that its key role is in helping the market in the timely delivery of upgraded network capability.

But this should not lead to a sterile debate about intervention versus *laissez faire*. The Government and public policy already intervenes in many ways: through the sectoral regulatory framework, as a purchaser of goods and services, as the ultimate guarantor of the financial and credit system, as a significant deliverer of goods and services to Britain's citizens, and through the incentives or disincentive signals that the tax, rating and wider framework send out.

The developments, both in the domestic UK market and internationally, over the past year since the Caio Review started have tilted the balance between the two strands within the Review's conclusions- watching and leading- towards the latter. The existing network will meet many users' needs for some time to come. But if a substantive planning cycle for material network upgrade is not launched soon, then the UK will not have the necessary infrastructure in place when it needs it.

ACTION 1

We will establish a Government-led strategy group to assess the necessary demand side, supply-side and regulatory measures to underpin existing market-led investment plans, and to remove barriers to the timely rollout, beyond those declared plans, to maximise market-led coverage of Next Generation broadband. This Strategy Group will, by the time of the final Digital Britain Report, assess the case for how far market-led investment by Virgin Media, BT Group plc and new network enterprises will take the UK in terms of roll-out and likely take-up; and whether any contingency measures, as recommended by the Caio review, are necessary.

Secondly, the Government recognises the importance of a regulatory framework that provides predictability and is supportive of investment. Assessment of the right regulatory approach is for Ofcom as independent regulator, but the Government needs to ensure that Ofcom has the appropriate powers and duties to deliver the right balance between investment and competition.



Ofcom has set out clear regulatory principles, consistent with market-led development. Ofcom is also consulting on options for ensuring next generation network competition. Options range from a wholesale product provided by BT to competitors to direct access to the electronic equipment in BT's physical infrastructure or indeed to the ducts themselves. Wholesale Ethernet products allow a much greater degree of product differentiation, and hence competition, than first generation broadband wholesale products.

Ofcom's competitive remedies are focused, in fixed line, on BT in those parts of the network where BT has Significant Market Power. The Government notes that there is a range of other providers who also have ducts and other primary infrastructure.

ACTION 2

Between now and the full Digital Britain Report, the Government will, while recognising existing investments in infrastructure, work with the main operators and others to remove barriers to the development of a wider wholesale market in access to ducts and other primary infrastructure.

Internet Service Providers can take action to manage the flow of data – the traffic – on their networks to retain levels of service to users or for other reasons. The concept of so-called 'net neutrality', requires those managing a network to refrain from taking action to manage traffic on that network. It also prevents giving to the delivery of any one service preference over the delivery of others. Net neutrality is sometimes cited by various parties in defence of internet freedom, innovation and consumer choice. The debate over possible legislation in pursuit of this goal has been stronger in the US than in the UK. Ofcom has in the past acknowledged the claims in the debate but have also acknowledged that ISPs might in future wish to offer guaranteed service levels to content providers in exchange for increased fees. In turn this could lead to differentiation of offers and promote investment in higher-speed access networks. Net neutrality regulation might prevent this sort of innovation.

Ofcom has stated that provided consumers are properly informed, such new business models could be an important part of the investment case for Next Generation Access, provided consumers are properly informed.

On the same basis, the Government has yet to see a case for legislation in favour of net neutrality. In consequence, unless Ofcom find network operators or ISPs to have Significant Market Power and justify intervention on competition grounds, traffic management will not be prevented.

In terms of the wider regulatory framework, the Government accepts the detailed recommendations of the Caio Review.

There is a range of supply side measures recommended by Caio now underway, including:

- Development of a consultation on relaxing constraints on the deployment of overhead lines;



- Ofcom has set out the framework for the deployment of Next Generation Access in new building developments; and
- The Government is working to develop a publicly available specification to facilitate installation of NGA in new build properties as standard.

Caio also noted that Non-Domestic Rates add to the costs of development, but recognised that this would be true of any property tax. He said that lack of clarity about the potential business rates liability could add to uncertainty for new investors. He recommended that the Valuation Office Agency should provide updated and detailed guidance on the application of business rates to fibre. The Government is pleased that this has now been done. The guidance confirms that the pioneering allowance which has been applied for Cable TV networks will be similarly applied to investment in NGA and remain so for the period of the next valuation list (i.e. until 2015).

ACTION 3

The Valuation Office Agency has provided new, clear guidance which addresses the problem identified by Francesco Caio in his report, and will ensure that they respond to any queries from existing and new investors and maintain clear, helpful guidance. For its part, the Government will ensure that the guidance is widely understood by potential investors.

The Government is not persuaded that there is a case now for widespread UK-wide public subsidy for Next Generation Network deployment, since such widespread subsidy could simply duplicate existing private sector investment plans or indeed chill such plans. However, as suggested above, a significant proportion of households will fall into the group between current market-led planned deployment and the 'last few percent' of households. This gap reflects the difference between a widespread next generation broadband network, desirable for national innovation, efficiency and productivity gains, as opposed to, in the very long-term, universal access to the next generation network for reasons of fairness and equity.

ACTION 4

We will, by the time of the final Digital Britain Report, have considered the value for money case for whether public incentives have a part to play in enabling further next generation broadband deployment, beyond current market-led initiatives.

The Caio Report also recognised that localised open-access models of broadband deployment had a potentially important role to play in Next Generation roll-out.



This is particularly true when a defined and relatively stable local community can be engaged in committing to demand for such roll-out. In the Netherlands, the OnsNet project in Neunen has direct commitment from a high proportion of residents in a local community to next generation broadband. This significantly alters the economics by removing uncertainties over take-up. The issue then becomes long-term, stable finance.

A soft version of this model was successfully deployed by BT in the later stages of the roll out of first generation broadband to more rural communities. It has also been successfully deployed by organisations like the Community Broadband Network.

Local Government and Regional Development Agencies too are working on broader roll-out of next generation networks as a central part of local regeneration and economic development strategies.

COMMUNITY BROADBAND

The Community Broadband Network is working with a range of groups across the UK, with a varying degree of regional development agency and local government support. Together, they can provide evidence of useful models for development of broadband beyond the plans of major telcos.

Alston Fibremoor

Alston Cybermoor is a localised community project in Cumbria which aims to provide a fibre-to-the-home network in the most sparsely-populated parish in England. A local project to obtain first-generation broadband led to the creation of *Cybermoor*, among the first community-run broadband projects in the UK. Cybermoor is now looking to maintain their pioneering position by investigating the opportunities for fibre-optic technologies. By taking an intelligent approach to network design, financing and harnessing the power of the local community to drive take-up, Cybermoor can become Fibremoor at a cost well below usual estimates for such rural locations.

Digging started in January 2009.

West Whitlawburn Housing Co-operative

West Whitlawburn Housing Co-operative (WWHC) is a progressive social housing provider on the outskirts of Glasgow. It is embarking on a project to build a further 100 new homes alongside their existing flats, and is keen to offer their tenants the kinds of services being enjoyed by their counterparts in mainland Europe.

WWHC has appointed the Community Broadband Network to design and deliver a solution for new homes with the aim of fitting it to the existing homes soon after the building work is complete. WWHC set up a new co-op, Whitcomm, to organise the services. The fibre installation is a comparatively small percentage of the overall new build costs, funded by a mix of public and private financing.

The first fibre connections go live in February 2009.



The Caio Report rightly pointed out the key risk of such local developments: that we could see the emergence of unrelated and incompatible 'islands of connectivity'. If local developments are to form the nuclei of a connected Britain beyond the point that the market will serve, they need interoperability and common standards.

An established set of standards could also provide ready-made template solutions of best practice, which local communities could adopt off-the-shelf rather than each having to start from scratch. This could, in turn, provide further momentum to local self-help schemes, in which the public sector needs play only a small part.

The Government is committed to working with community and local groups to develop interoperability and best practice standards to unite localised NGA projects.

ACTION 5

The Government will help implement the Community Broadband Network's proposals for an umbrella body to bring together all the local and community networks and provide them with technical and advisory support.

2.2 Mobile Wireless Networks

Britain needs to match the development in its fixed infrastructure with its mobile infrastructure: Nationally, our consumer and content demands are increasingly for data, pictures and information as well as conversation, on the move. The mobile phone has become the one device no digital citizen wants to leave home without.

For consumers, what matters is the service they receive from their phone. Development of user-friendly mass market services such as the text message has done a great deal to help mobiles become the ubiquitous phenomenon they are today. But only a small subset of users – the tech-literate and enthusiasts – recognise or care about the technology that lies behind these services. In order for the innovation and service development to happen we must have in place the right elements, invisible to the user.



The growth of mobile

The growth in use of the mobile phone has been one of the most dramatic of all technologies. Licences were first granted to Vodafone and Cellnet (now O2) in 1983 with One 2 One (T-Mobile) launching in 1993 and Orange in 1994. A fifth operator, 3, began operation in early 2003.

The first UK mobile phone call was made by comedian Ernie Wise. Today 40% of all call minutes are accounted for by mobile. The first SMS message was sent in December 1992, we now send on average 6.5 billion text messages a month and 1.5 million picture and video messages a day. At the end of 2007 there were 73.5 million active mobile subscriptions, around 1.25 connections per head of the population.

New services continue to emerge, the latest being mobile broadband with some half million connections being sold in the period between February and June 2008. There is continued interest in the development of mobile television services, payment services and location based services among others.

The essential element for any wireless service, from the first radio sets to the Apple iPhone, is the ability of the network operator to access and use radio spectrum. Licensed use of frequencies in the radio spectrum is vital for the provision of mobile voice and data services, including increasing levels of mobile broadband. We need to ensure that we have the right framework for accessing and using spectrum.

The prize is significant. The market is approaching an unprecedented technology transition. The industry is only part way through the transition from GSM (the first real mass market mobile phones) to 3G technology (which allows new services such as video calling and internet access). We are about to begin a transition to a 4th generation of mobile radio technology, the so-called Long-Term Evolution (LTE) technology, beginning in earnest as early as 2011. Over an extended period the UK mobile operators are likely to find themselves running three generations of networks in parallel and there will be significant complications for the mobile handset industry. The end game will be well worth the effort. The next generation of broadband mobile networks offer headline data rates of up to 100Mbps.

This change will be hugely important for Digital Britain because:

- Mobility is now vital to consumers and business alike. This much prized flexibility will apply equally to mobile broadband.
- Already 20% or more of consumers in some socio-economic groups have “cut the wire”, especially in often younger and/or lower income groups in urban areas. They are connected to Digital Britain via their mobile devices. This number is likely to grow as devices improve in terms of easy connection to the Internet and the price of these more advanced devices fall.
- Mobile broadband has an important role to play in stretching the universal coverage of broadband to the extremities of the UK.



It is vital for the UK to be at the leading edge of this change so that people in this country enjoy cutting edge services on the move. Beyond that we must play a leading part in developing a global network of networks, so that the usability today of the mobile for calls around the world can be replicated in allowing users to access high speed data wherever they travel. The long term goal is any content... over any network...on any handset... anywhere. This requires aligned spectrum for mobile broadband across the EU and beyond and a wide industry consensus on the technology road map.

Mobile spectrum allocations in the UK

Licensed use of frequencies in the radio spectrum is vital for the provision of mobile voice and data services, including increasing levels of mobile broadband.

Such licences were until 2003 administered by Government ministers through the RadioCommunications Agency of the DTI; since then, Ofcom has had responsibility for ensuring optimal use of the spectrum. Ofcom has pursued a strategy of spectrum liberalisation:

- release of spectrum for use, primarily by auction;
- liberalisation, meaning that as a general principle the use to which a piece of spectrum is put is determined by the licence holder;
- administrative incentive pricing, which plays the part of an annual rent on the spectrum to promote efficient use by some licence holders;
- trading of licences so that the market can determine the most efficient use and user of the spectrum; and
- a general move to indefinite licences to promote certainty and investment.

Ofcom's policies also necessarily take into account the legacy licences attached to different spectrum bands.

Mobile spectrum licences in the UK were released in three chunks. In 1985, the first licences were granted in the 900MHz band to the companies which are today Vodafone and O2. In 1991, further licences in the 1800 MHz band were granted, and after some industry changes these were re-licensed in 1995 to Orange and One-2-One (now T-Mobile), with the two original operators also receiving some spectrum in that band. These four licences are generally referred to as GSM or 2G licences. All of these licences were granted for free on a comparative selection basis, on an indefinite basis, with annual pricing applied on the spectrum holdings to incentivise use, currently set at over £15m per annum per operator. (There was also a rollout obligation imposed on all the GSM operators, which was met some time ago).

In 2000 the Government auctioned spectrum in the 2100 MHz band for 3G use. All four incumbent operators were awarded a licence along with new entrant '3'. These licences were paid for at the auction on a 20 year licence running to 2021. The total paid at auction was £22.48Bn.



A summary of the operators’ spectrum holdings is as follows:

	Licence length	Vodafone (Vodafone plc)	O2 (Telefonica Group)	T-Mobile (Deutsche Telekom Group)	Orange (France Telecom Group)	H3G (Hutchison Whampoa Group)
900 MHz paired	Indefinite	2 x 17.2	2 x 17.2	0	0	0
1800 MHz paired	Indefinite	2 x 5.8	2 x 5.8	2 x 30.0	2 x 30.0	0
2100 MHz paired	Until 2021	2 x 14.8	2 x 10.0	2 x 10.0	2 x 10.0	2 x 14.6
Total paired		2 x 37.8	2 x 33.0	2 x 40.0	2 x 40.0	2 x 14.6
2100 MHz unpaired	Until 2021	0	5.0	5.0	5.0	5.1
Total unpaired		0	5.0	5.0	5.0	5.1

All three of these bands are suitable for delivery of mobile broadband services, using a set of standards which build on the GSM (2G) and UMTS (3G) technologies. They do though have different characteristics which would necessitate different network planning.

In broad terms, the lower the frequency, the further distance they are able to travel and the better the penetration of buildings. This can mean that fewer base stations are needed to provide 3G coverage in lower frequencies. Modelling work done by Ofcom suggested the savings to an operator of being able to provide 3G over 900MHz spectrum rather than 2100MHz could be £1.7bn.

At present, the 900 and 1800 MHz bands are reserved for 2G use, meaning that only the 2100 MHz band is in use for mobile broadband. Ofcom’s strategy of spectrum liberalisation has not applied to these bands to date, mainly due to the European legislation, but in part because of the disputes between the various mobile operators and between the operators and the regulator.

A fuller history is contained in the Ofcom document 'Application of spectrum liberalisation and trading to the mobile sector', available at: <http://www.ofcom.org.uk/consult/condocs/liberalisation/liberalisation.pdf>



In so far as public policy can help to unlock this exciting mobile broadband future the keys are, firstly the re-farming and liberalisation of GSM spectrum, allowing it to be used for 3G or LTE use; and, secondly, the early phased release of spectrum either side of the current GSM/3G spectrum blocks so that manufacturers can rapidly deploy devices that will allow the existing network operators and any new entrants to extend their offering to consumers seamlessly into higher speed mobile broadband with national coverage approaching universal levels. That means putting into use the digital dividend spectrum at 800 MHz (for coverage) and the 3G extension bands at 2.6 GHz (for capacity).

Unfortunately the UK has hit a temporary road block that is not allowing the release of the spectrum needed to keep us on track towards this important broadband mobile future. It is in the public interest for this impasse to be resolved speedily – either through a voluntary industry wide consensus with Ofcom that respects the principle of an equitable competitive start (the preferred option as it will be the fastest solution) or the Government would support an imposed process. The government believes that time is of the essence.

ACTION 6

We are specifying a Wireless Radio Spectrum Modernisation Programme consisting of five elements:

- a. It should resolve the future of existing 2G radio spectrum through a structured framework, allowing existing operators to re-align their existing holdings, re-use the spectrum and start the move to next generation mobile services. This must be achieved whilst maintaining a competitive market. If this can be done, the economic value of the spectrum would be enhanced. Existing administered incentive pricing (AIP) levels would be adjusted to reflect that enhancement. The Government believes that an industry-agreed set of radio spectrum trades could represent a better and quicker solution than an imposed realignment. There is an opportunity for industry to agree a way forward by the end of April 2009. In the absence of an industry-agreed trading solution by then, Government will support an imposed solution.
- b. Making available more radio spectrum suitable for next generation mobile services. Ofcom has proposed the release of the so-called 3G expansion band at 2.6GHz. The Government will support proposals from Ofcom to play a key role in a pan-European alignment of the Digital Dividend Review Spectrum (the so-called Channel 61-69 band), being released by the progressive switchover from analogue to digital broadcasting, pioneered by the UK. This will free up radio spectrum particularly valuable for next generation mobile services.



- c. **Greater investment certainty for existing 3G operators:** The Government wishes to encourage the maximum commercially-sensible investment in network capacity and coverage. But the further into a fixed term licence one goes the greater the disincentive to invest. We want to resolve this issue now as part of the structured framework. As part of the structured trading framework existing time-limited licences could be made indefinite and subject instead to AIP beyond the end of the current term. If this were achieved the Government would look to ensure that the AIP then set reflected the spectrum's full economic value and hence would capture over time the return equivalent to the proceeds that would have been realised in the market from an auction for a licence of the same period.
- d. **Greater network sharing:** the Government and Ofcom will consider further network sharing, spectrum or carrier-sharing proposals from the operators, particularly where these can lead to greater coverage and are part of the mobile operator's contribution to a broadband universal service commitment.
- e. **Commitments by the mobile operators to push out the coverage of mobile broadband eventually to replicate 2G coverage and mark their significant contribution to the broadband universal service commitment.**

2.3 Digital Broadcasting Networks: Television

The UK needs to continue to upgrade our Broadcasting Networks.

The digital television switchover programme in the UK is already underway and will be completed in 2012. It provides a number of transferable lessons: firstly the importance of a strategic direction from Government and regulator, setting clear timetables, planning the radio spectrum and ensuring that the vulnerable are helped through the transition. Secondly, the role of the market in providing innovation and new services, in this case digital satellite, digital cable and IPTV: what were high-end consumer electronics at the start of the programme are now simply inbuilt to television receivers or available as very low cost digital converters. Choice, diversity and range now characterise this market, including devices with storage and more broadband capability. Thirdly, recognising the important role played by Digital UK, the independent, not for profit organisation leading the process of switchover in the UK.



THE DIGITAL TELEVISION MARKET

The growth of digital television in the UK is a good example of the successful interplay between clear strategic direction-setting from government and the dynamism of a competitive market. It has provided a rich, mixed ecology of provision in digital television which has driven take-up well beyond the levels that most expected, at the start of the process, would have been reached without any direct public subsidy. Today, as we enter the first full year of the switchover process, almost 90% of the population have at least one digital television in their homes. There may be transferable lessons here for the migration to similar mass-penetration broadband.

From the launch of digital television services by BSkyB in 1998, consumers have responded with increasing enthusiasm to the increased choice of content and services. Competition between the satellite services from BSkyB, cable services from ntl and Telewest (now Virgin Media), and terrestrial services drove take-up to 50% of UK households in five years – easily more successful than any other country. ITV Digital may have folded in early 2002, removing for a while pay TV services from terrestrial television, but the launch of an expanded range of free-to-view services on the terrestrial platform in October 2002 from Freeview made digital television attractive to a new segment of households.

The Government had set out in 1999 the two criteria – availability and affordability – that had to be met before the full switch to digital television could be completed. In September 2003 it was clear that the market was driving the availability of affordable equipment – consumers were voting with their wallets for the programmes and services that only digital television could offer. With a developing plan for how to ensure that everyone would be able to share in those services, and an understanding that for around a quarter of homes this could only happen by switching off the analogue transmissions, the Government said that switchover was not a question of whether, but when and how. Two years later, in September, we were able to confirm the timetable together with the help that would be available to those likely to face most difficulty with the switch.

Since then BSkyB, Virgin Media, Top-UpTV and other pay TV service providers have continued to compete in innovative services. Sky HD was the first High Definition service in the UK, but services are now available from Virgin Media and Freesat, with plans in place for services on the terrestrial platform from late 2009/early 2010. Virgin Media offers on demand services including making the BBC's iPlayer service available over its cable network. Sky Player provides Sky TV online. The drive for innovation is constantly delivering more benefits for consumers from the digital revolution, and increasingly blurring the distinctions between different technologies.

Today nearly 90% of homes has digital television and around half have chosen pay TV services, often combined in a bundled offering with broadband and telephony. The Government's objectives for switchover may have set the overall direction of travel, but it is the market's response by providing innovative services and products that has made the overwhelming majority of consumers so ready for the end of analogue television.



It is right that people should have the option to take advantage of these market developments and use digital switchover as a means of joining the digital world in broadband as well as in broadcast. The government will also draw on the experience of the digital television switchover, particularly the experience of Digital UK and the Help Scheme in promoting, educating and assisting the public in relation to a major technological change.

ACTION 7

We will consider at what point and at what cost the standard offer provided by the Digital Television Switchover Help Scheme could have a return path capability, and we will ensure that such capability is available as an option.

ACTION 8

We will examine how the marketing and communications activity around Digital Switchover could be enhanced to use the region-by-region programme of publicly funded information and advice on one form of digital transition to provide impartial information on wider opportunities of digital beyond digital broadcast television.

2.4 Digital Broadcast Networks: Radio

In the development and take-up of Digital Radio the UK is a world leader. UK radio stations are already available on satellite and terrestrial TV platforms and around the world via the internet. It is DAB which has led the way in our digitisation of radio. Since the Radio Authority licensed the first DAB multiplex in 1998, DAB has become the platform of choice for digital radio listening. Over this time, while digital radio in other countries has faltered, the UK companies have positioned themselves as market leaders in technological developments and receiver manufacturing. As a result the UK has a significant advantage, one which we must exploit as other countries begin to develop their own digital radio markets.

Radio is an important part of the national discourse and, particularly, an important voice in local democracy. The Government accepts the argument advanced in the Digital Radio Working Group (DRWG) report that radio needs and should continue to have its own dedicated digital platform. The public benefits from having a dedicated medium which offers high quality news, intelligent speech services and local information, as well as music which caters to a variety of tastes, are substantial.

Dedicated analogue radio sets are no longer part of the retail mainstream: analogue continues to be used in bundled products (e.g. radio alarms). But in dedicated radio DAB has become the medium of consumer choice. The Government is prepared to make a commitment to DAB as a primary distribution mechanism for radio.

The rationale for “switchover” from analogue to digital cannot simply be transferred from television to radio. Analogue and digital radio transmissions can co-exist without the mutual interference which limited digital terrestrial television roll-out prior to switchover. The replacement cycle for cars, and the costs and difficulties associated



with retro-fitting existing vehicles with digital radio equipment also points to a more gradual transition process for digital radio. These are all issues which the digital migration plan must address.

The Government and Ofcom will have key roles to play in providing for a digital future for radio, but this in itself will not be enough. The radio industry, manufacturers, car manufacturers, mobile phone providers, transmission providers and retailers have a part to play in the development and implementation of a coherent drive to expand DAB. We will expect the radio industry to strengthen its consumer proposition both in terms of new and innovative content and to take advantage of the technological developments that DAB can offer. We would encourage radio manufacturers to integrate DAB into future devices, such as mobile phones and cars, as standard and to work with industry on their network and content plans.

Interoperability of radio across europe

In September last year, following calls from media regulators and broadcasters in the UK, France and Germany, World DMB published the European 'Digital Radio Receivers Profiles'. These profiles detailed for the first time a set of minimum requirements and features which will ensure the interoperability of all new digital radio receivers across Europe; effectively creating a single digital radio market across Europe. Features and functions for the in-car market are defined including automatic retuning between digital and analogue services and advanced travel and traffic services for real time satellite navigation systems.

The Government will, in line with the DRWG's recommendations, now set out a bold Digital Migration Plan that involves all the parties to take the majority of listening from FM to DAB as soon as possible.

In exchange for a clear plan from industry to drive the migration to digital the Government will:

- Develop a digital migration plan for radio which will migrate to DAB all national radio services and local services, carried on a local multiplex. This plan will include criteria which will need to be satisfied before migration can begin. These should be: that 50% of radio listening is to digital platforms; when national DAB coverage is comparable to FM coverage and local DAB reaches 90% of the population, and all major roads.
- Work with the industry to satisfy the migration criteria by 2015 and where possible identify initiatives which could bring forward the migration timetable.
- Take an early legislative opportunity to address some of the underlying structural problems of the DAB multiplex system, in order to facilitate greater sustainability, and encourage the establishment of more digital radio services. For the time being we reject the proposal for a further extension of the analogue and multiplex licences but will keep this under review if it can be presented as part of a compelling and agreed 'drive to digital' plan by the radio industry.



- Work with the BBC on how they can extend their digital radio coverage at least to replicate current FM analogue coverage.
- Undertake a cost-benefit analysis of digital migration.
- Engage with manufacturers and other European countries to implement the European digital radio profiles agreed by World DMB.
- Explore further, with Ofcom, which of the recommended incentives and investments it would be appropriate to pursue.

BBC NETWORK RADIO COVERAGE (% of population)

Population coverage – %

	Current (May 2008)	Planned
Stereo FM		97.1
Mobile DAB	92.2	97.6
Indoor DAB	82.2	91.7

Road coverage – %

	Current	Planned	Planned
Motorways	98.9	97.1	98.8
Primary Roads	91.4	80.5	90.1
A Roads	88.9	76.2	87.1

Source: Digital Radio Working Group report – Dec 2008

N.B. Comparing analogue FM to DAB coverage is not straightforward due to the individual characteristics of each platform and it is necessary to measure the performance in different ways. Coverage of Digital One (the national commercial multiplex) is similar to that of BBC network radio DAB. The current coverage of DAB on local commercial multiplexes varies considerably.

The DRWG also recommended that the commercial radio sector, Ofcom and Government should look closely at the most effective way to deliver local services in a digital age. The Government believes that radio’s ability to deliver localness is a key part of the medium’s attractiveness. We need to ensure it continues to meet the interests of listeners, both as citizens and consumers. To that end, we are commissioning an independent expert examination of the economic viability, continuing social contribution of, and most effective delivery methods for local radio services and the relevance of the existing localness legislation.

We also welcome the impact that community radio has had on both the radio sector and the communities they serve. Last year, following on from Ofcom’s review of the sector in late 2007, the Government consulted on future funding models, including potential legislative changes in relation to the length of community radio licences. Our conclusion on this issue is set out below.



ACTION 9

We will take action to support DAB digital radio in seven areas:

- a. **We are making a clear statement of Government and policy commitment to enabling DAB to be a primary distribution network for radio;**
- b. **We will create a plan for digital migration of radio, which the Government intends to put in place once the following criteria have been met:**
 - **When 50% of radio listening is digital;**
 - **When national DAB coverage is comparable to FM coverage, and local DAB reaches 90% of population and all major roads.**
- c. **We will create a Digital Radio Delivery Group which includes the retailers, the Transmission Networks, the BBC, the Commercial Radio Companies, the Car Manufacturers, consumer representatives and the device manufacturers whose role would be to increase the attractiveness, availability and affordability of DAB and to advise on the Digital Migration Plan.**
- d. **We will work with the BBC to explore how they could extend their digital radio coverage to replicate at least current FM analogue coverage.**
- e. **As recommended by the Digital Radio Working Group, we will conduct a cost-benefit analysis of digital migration.**
- f. **We will consult on new legislation to allow a one-off five-year extension of existing community radio licences, to bring them in line with other radio licences and recognise the important role they have in delivering social gain. We also intend to re-consider the rationale for the current restriction of 50% of funding from any one source.**
- g. **We will commission an independent expert examination of the economic viability, continuing social contribution of, and most effective delivery methods for, local radio services and existing localness legislation.**

