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The Rt. Hon. Jeremy Hunt,
Secretary of State
Department for Culture Media and Sport

The Rt. Hon. David Willetts,
Minister of State for Universities and Science
Department for Business, Innovation and Skills

25 November

2010

Dear Ministers

DIGITAL INFRASTRUCTURE

We are writing to you to share emerging conclusions from our project on the Digital infrastructure.

Summary

It is essential that Government continues to prioritise broadband alongside other major infrastructure projects. Good progress is being made but we are concerned that the current infrastructure may not be adequate in terms of both speed and penetration; greater ambition is needed.

We believe delivery of broadband to the final third of the population is best achieved by a *patchwork approach*. Technology neutrality will be an essential criterion as we believe a mix of technologies will be needed.

It will be important that the money Government has available should be used to best effect, in particular to leverage in other sources of funding from commercial investors, as well as EU money.

A key element in stimulating take-up of superfast broadband will be Government - both central and local - sending clear signals that they will be delivering more of their services electronically. A joined-up strategy is needed.

Ofcom and other regulators urgently need to address issues of co-ordination and access, in particular network sharing. Digital systems need to be secure, resilient and robust if future applications in areas such as telemedicine and tele-care are to be realised, and more services delivered on-line; personal data, financial information, and personal privacy must be protected at all times.

A better understanding of the 'people dimension' is vital. Full use of existing research evidence and new research to fill the gaps, together with more public engagement, are needed.

Detail

The Digital Economy¹, underpinned by high capacity information and communication networks (ICT), is an essential component of the UK's strategic infrastructure. Our report *A national infrastructure for the 21st century* put ICT right at the centre of the network of networks which forms the national infrastructure². It is a technology that pervades multiple sectors: investment in the network will yield economic and social benefits across a wide range of applications which cannot be easily predicted, but for which a core high speed digital backbone is essential to maximise the opportunities for leading-edge entrepreneurial and business developments.

Government has rightly been making clear just how vital the ICT infrastructure is to the UK³. It has been estimated that it contributes £102 billions in gross value-added, employs over 2.5 million people and is central to the UK's cultural brand⁴ (see Annex 1).

Digital technologies have a vital role in helping to re-profile the economy, driven by innovation and wealth creation in both the businesses that develop the technologies and those that use them. These technologies will also enable and facilitate the delivery of many services by both the private sector and Government. They will underpin the capability of manufacturing and service sectors to raise their productivity and competitiveness.

Government therefore needs to articulate a clear broadband strategy and how it will implement it.

The *Digital Britain* report had a lack of overall vision and was a missed opportunity. It had too much of a focus on technical issues; and on broadcast at the expense of broadband. It also lacked a people dimension⁵.

A world-class Broadband infrastructure requires:

- high capacity and resilient networks to deliver not just the universal service commitment but also super-fast broadband;

¹ Defined here as the novel design or use of information and communication technologies to help transform the lives of individuals, societies or business

<http://www.rcukdigiteconomy.org.uk/home/what-is-digital-economy.html>

² This CST report is available at www.bis.gov.uk

³ National Infrastructure Plan October 2010 (see www.hm-treasury.gov.uk)

⁴ *The Fuse: igniting high growth for creative, digital and information technology industries in the UK*, CIHE report September 2010

⁵ In other words, understanding the ways in which people may make use of digital access in the future, and how markets and public provision will develop in relation to that use to help shape policies for creating facilities and access

- ubiquitous, seamless connectivity to households and businesses

The benchmarks, against which the UK is measured, are penetration, bandwidth (speed) and cost (see Annex 2).

The Coalition Government has made clear that it recognises the importance of digital as part of the economic infrastructure. Your ambition is that: *'by the end of this Parliament, this country should have the best super-fast broadband in Europe and be up there with the very best in the world'*⁶. We welcome reiteration of this aim in the recent National Infrastructure Plan⁷.

We are concerned that, while good progress is being made, the current infrastructure may not be adequate in terms of both speed and penetration. There is a strong view⁸ that the UK's network will have to extend quite considerably, with more capacity and more points of contact needed - for example street cabinets, wireless base stations etc. We also ask whether the commitment to 2Mbps during the lifetime of this Parliament is sufficiently challenging.

There are two reasons for our concern. First, many households are using broadband for several complex applications simultaneously, including streaming multi-media to their computers, and increasingly moving to high-definition equivalents; speeds of 2Mbps risks either long delays or things grinding to a halt. Increasing use of computers has raised expectations and reduced tolerance of electronic delays. Second, and more fundamentally, we question whether 2Mbps will be adequate to deliver the ambitions that Government has for delivering more services on-line and to underpin the transformational role that ICT will need to play where speeds will change through a combination of technical and commercial drivers and the UK must keep pace - an increase of possibly an order of magnitude may be needed. We recognise the real challenges of delivering superfast broadband to the whole of the UK, but believe that universal service standards should not stand in the way of Government's overall ambitions on broadband.

The private sector is best placed to develop the UK's broadband network. But Government has a key enabling role in creating the conditions which stimulate the delivery of broadband to those areas where the market by itself will not deliver, for example to rural areas; to those areas where there is poor take-up or where the costs would otherwise be prohibitive. We welcome the creation by Government of the Broadband Delivery Unit within BIS to deliver its objectives and its engagement with a wide range of stakeholders.

Government also has an important role in setting the framework for regulation, and in ensuring the network is secure and resilient.

The immediate challenges are:

- getting superfast broadband⁹ to the third of the population that the market may otherwise struggle to reach
- delivering in a time of fiscal austerity

⁶ Speech by Jeremy Hunt 15 July 2010

⁷ National Infrastructure Plan October 2010 (see www.hm-treasury.gov.uk)

⁸ Broadband Britain - what people want and how to deliver it; Digital communications knowledge transfer network; report from their next generation access working group August 2010

⁹ Some define super-fast broadband as 100Mbps

- driving private sector investment by making the regulatory changes that will bring down the cost of roll-out¹⁰
- driving demand by using delivery of Government services as a vehicle to speed take up
- addressing the people dimension, specifically to understand more clearly what people want and expect from digital 'universe' and the extent to which people understand and can take advantage of the digital delivery of public and other services

We will address each of these challenges in turn. We also include a short section on Technology Futures where we highlight some of the most exciting technology developments.

Roll-out of super-fast broadband to the final third of the population

The UK digital market is dynamic and competitive, but the geographic overlap between the two major superfast broadband suppliers - BT and Virgin - is almost total¹¹.

Government must push forward its plans to establish a series of Rural Market Testing Projects to discover exactly what needs to be done to make super-fast broadband commercially viable in rural communities¹² as well as urban areas, and to understand what kind of Government support will be necessary. This is a particularly important point - superfast broadband deployment is inevitably focused on urban areas where the biggest returns on investment will accrue¹³. This will have a knock-on effect on where people choose to live and work, and hence on the demands made on other parts of the infrastructure, for example transport.

We believe delivery of broadband to the final third of the population is best achieved by a *patchwork approach*.

This will involve putting in place a core national backbone with a patchwork of local provision connected to it via digital hubs, as has been explored in depth in the Digital Scotland Report¹⁴. A process of co-operative planning will be needed for the core digital backbone to achieve broad coverage across the UK. Then individual organisations - companies, local authorities or community groups - can innovate and compete to provide local access via the 'patches'. Ofcom will have a key role in ensuring the necessary balance between co-operation and competition and is currently reviewing the wholesale broadband access markets¹⁵.

The keys to success will therefore be:

- ensuring that the core backbone is in place

¹⁰ Virgin Media has announced that they will start to roll out a 100Mbps service by the end of the year – available to about half of homes in the UK. BT is investing £2.5 billions in the fibre upgrade of its network

¹¹ From conversations with Ofcom

¹² Caroline Spelman MP 3 Jun 2010, 1:37PM @RuralUK - digital divide: "I certainly am aware of the disadvantage of those in rural areas with a lack of good broadband provision and that is why the new government has prioritised super-fast broadband, and DEFRA in particular will focus on its provision in rural areas. We will use DCMS legislation announced in the Queen's Speech as the vehicle for this and engage the utilities in making it happen".

¹³ For example, BT has 67% coverage in the UK and Virgin 43%; and the overlap between the two is almost complete, according to Ofcom

¹⁴ Digital Scotland; Royal Society of Edinburgh, October 2010

¹⁵ Second consultation on market definition, market power determinations and remedies; Ofcom 20 August 2010

- encouraging innovative approaches to solutions at the local level (see Annex 3)

Government should not underestimate the scale of what will be needed, and having a clear implementation plan will be vital, as well as the availability of funds. Initiatives will be needed to make it easier for the major players to build the backbone - the base stations - and for communities then to build the networks they need. The issue then becomes one of having the necessary 'backhaul' ie getting internet traffic to and from base-station nodes to local or remote areas. The *patchwork approach* will be hard to make economically viable without lower access costs to the core backbone.

Technology neutrality will be an essential criterion, as we believe a mix of technologies will be needed. It will be important that Government maintains its commitment to technology-neutral solutions for broadband, and that in specifying performance standards particular technologies (for example satellite - see below) are not disadvantaged.

Fibre optic cabling will be central to the network, including backhaul¹⁶. It is as cheap to install and cheaper to maintain, and lasts much longer than the copper wires being used now¹⁷. There are remote rural locations, however, for which the provision of fibre optic cabling is unlikely to be economically viable.

It has been argued that satellite technology can deliver broadband to almost any location in the UK, potentially offering a way to 'fill in' the numerous small 'notspots' in terrestrial systems as well as supporting rural and remote areas. At present satellite has real limitations, because of latency effects - essentially it is viewed as a 'fill-in' technology in rural areas where there are no alternatives and people are willing to put up with longer latencies or lower bandwidth - but a recent report¹⁸ suggests that these effects can be overcome and that satellites could provide a service of over 2Mbps to between 225,000 and 300,000 homes by 2014. We have not had time to consider in detail the realities of satellite provision. It is important that there is an assessment of the potential for this technology.

Delivering in a time of fiscal austerity

While some argue strongly that upgrading to superfast broadband can add billions to the UK's GDP¹⁹, the costs of upgrading will be substantial. The Broadband Stakeholders Group has estimated the cost of street-level, super-fast broadband coverage (50-100 Mbps) at £5 billions and providing fibre optic cabling to individual households at £25 billions²⁰.

¹⁶ A single fibre can carry up to 30,000 times the capacity of copper and can deliver hundreds of mbps over tens of kilometres

¹⁷ Conversation with Professor Michael Fourman, School of Informatics, Edinburgh University

¹⁸ Private information from a Satellite Broadband Steering Group position paper

¹⁹ Based on the South Korean superfast upgrade; some commentators believe that 600,000 new ICT-enabled jobs can be created in four years, adding £18 billions to GD - based on South Korean Ministry of Information and Communication figures cited in LeeH, Oh S, and Shim Y (2005) *Do we need broadband? Impacts of broadband in Korea*. Cited in the report: *Getting up to speed: making super-fast broadband a reality*; NESTA policy briefing January 2009

²⁰ See Analysys Mason (2008): *The cost of deploying fibre-based next generation broadband infrastructure*; final report for the Broadband Stakeholders group

Government has decided against taxing households with a telephone landline to fund improved broadband provision across the UK. There is therefore an urgent need to establish alternative incentives to enable funding in the current economic climate.

Rolling out superfast broadband represents real challenges. It is essential that Government continues to prioritise broadband alongside other major infrastructure projects. It will also represent a major engineering challenge and involve considerable upheaval. We therefore welcome the recent launch of the National Infrastructure Plan and the announcement of £530 millions of investment over the Spending Review period to support private sector investment.

Major players such as BT and Virgin have pivotal roles to play in both delivering superfast broadband and rolling out to the final third of the population - but there are concerns that some areas will be too small. Local Councils (see example in Annex 4) will themselves be under pressures from the Spending Review. The answer will therefore lie in getting smaller businesses engaged, as well as with the major players, and there must be incentives - not necessarily just fiscal ones - to stimulate demand once the networks are in place. It will be important that the money Government has available should be used to best effect, in particular to leverage in other sources of funding from commercial investors, as well as EU money.

A key element here will be Government - both central and local - sending clear signals that they will be delivering more of their services electronically, not only as a means of making savings, but also to provide incentives to the private sector to invest in the digital network and for potential service providers to invest in complementary assets to exploit the new market possibilities which will arise. However, development of some parts of the network, and the necessary access, may never be economically viable without some kind of subsidy.

Consequently, we welcome the announcement to trial superfast broadband in Cumbria, Herefordshire, the Highlands and Islands, and North Yorkshire.

Regulatory changes

Regulation of the digital infrastructure is needed because we do not believe that market forces alone will provide all of the essential features required, for example the appropriate level of competition, security, resilience, interconnectivity and co-ordination, and investment in innovation and R&D.

Regulation needs to be flexible and responsive, recognising that technology is changing rapidly and that local solutions - for example in poorly-connected areas or in other particular circumstances - will be needed if parts of the UK population are not to be digitally excluded²¹.

Broadband provision in urban and rural areas raises different issues and the regulatory approaches need to be different. Ofcom has a pivotal role in helping to stimulate broadband roll-out - particularly into rural and other potential 'notspots' - by ensuring the necessary collaboration between the core infrastructure owners and local or other organisations, so that both access and the necessary 'backhaul' are available at competitive pricing. Lack of backhaul, or where the cost is prohibitive, will seriously limit the provision of local access, the delivery of next-generation

²¹ In the Digital Britain report Government said it believed that Ofcom should have an explicit general duty to encourage investment as a means of furthering the interests of consumers, alongside its duty to promote competition where appropriate. Such a provision was not included in the Digital economy Act 2010. Ofcom still has a duty to have regard to the desirability of promoting investment under the Communications Act 2003

bandwidth to homes and businesses and ultimately the roll-out to the final third of the population.

More generally, collaboration right across the infrastructure landscape, and between the different regulators, is needed. For example, infrastructure sharing so that:

- internet cabling can be installed through the sewerage and/or electricity systems;
- other companies have access to BT's ducts and poles

We recognise there may be issues around shared access once the multiple infrastructures are in place - both in terms of information-sharing and trench-sharing. For example: electricity companies have no conflict of interest but fibre installation is not a priority for them. But we believe these are essentially practical issues which can be overcome by better dialogue and co-ordination. We welcome the announcement from Ofcom allowing competitors to have access to a dedicated virtual link over new fibres laid by BT, and requiring BT to offer access to its underground ducts and telegraph poles.

Therefore Ofcom and other regulators urgently need to address issues of co-ordination and access. Government has recognised these arguments²² and has announced that BIS will co-ordinate across Government departments to ensure competition and consumer outcomes are delivered effectively. This should include issues such as fibre provision for new build homes, and to multi-owner buildings. Infrastructure UK should play a role in oversight of this co-ordination activity, which is a generic issue that Government has recognised in respect of all national infrastructure.

There are, however, a number of instances where we believe Ofcom may need to intervene to maintain trust in the system:

- *network management* policies, whereby the speed of the service can be reduced by internet service providers (ISPs), for example to deal with network congestion. But there are suspicions that where speeds may be being manipulated deliberately most users would not know whether it was a problem with the equipment or the ISP. Ofcom should consider ways of ensuring that such traffic-management techniques are transparent
- *contention management* where a number of users share the same line. This helps to keep costs down, but download speeds can vary significantly. Again, Ofcom should consider ways of ensuring that such techniques are applied transparently
- the *growing gap* between the actual speeds delivered and the speeds that some ISPs use to advertise their services (the UK average broadband speed of 5.2Mbit/s is less than half the average 'up to' speed which ISPs advertise)

We have not considered whether further regulation of the content on the World Wide Web is needed. This goes beyond the scope of our current project.

Delivering Government services

²² National Infrastructure Plan October 2010 (from www.hm-treasury.gov.uk)

In our report *A vision for UK research* we highlighted the need for Government to create the right environment for business investment. A major driver to stimulate both the roll-out of the digital infrastructure and its take-up by users (both business and individuals), is for Government to signal clearly that it intends to deliver more of its policies and services through the digital network.

There are three issues:

- ensuring robust and resilient systems; and that privacy is protected
- ensuring that Government is consistent and joined-up in delivering services through the digital network in secure and simple ways
- deciding where the focus should be in terms of what is delivered

Having secure and resilient systems will be paramount - where financial transactions are being made, or personal data such as national insurance numbers or bank details are required, security is vital. For applications such as telemedicine and tele-care, confidentiality and dependability must be absolute. If the public is to have confidence in these systems then we cannot have repeats of earlier incidents where individuals' personal data was lost; digital systems must also be fireproof against external hackers. Robustness is also vital - people will become increasingly frustrated and turned off on-line engagement with the public sector if the systems continually malfunction²³.

Therefore ISPs, the regulators and Government need to work together to make the digital systems more robust and resilient to attack.

There is also an important systems' architecture point - there needs to be a clear relationship between those using the software and the software designers, with a greater focus on the design and content of those services that are being delivered online. If the system design is complex, what is being delivered is fragmented, not well-signposted and counter-intuitive, people will not use it. Government needs to think very carefully about these aspects when delivering its services on-line.

We should also be careful not to build our infrastructure using key components which are purchased from a single supplier. This exposes the infrastructure to a single point of failure. Product faults as well as more sinister undocumented features of such products, in particular switches at the core of the network can be disastrous for the network. A plurality of suppliers would help with the resilience of the network.

Key sectors emerging for delivering services by broadband include: smart electricity metering, health, transportation and education. Annex 4 has illustrative case studies.

Addressing the 'people dimension'

We believe that if we are to create a practical vision for a better digital UK, understanding the 'people dimension' is just as important as the technological possibilities. Analysis of the ways in which people will make use of digital access in the future and how markets and public provision will develop in relation to that use should shape policies for creating facilities and access. In an environment where technology is moving fast and in unpredictable directions, Government should avoid

²³ *Better use of personal information: opportunities and risks; CST report available at www.bis.gov.uk*

making untested assumptions about how people behave and what they will want to use, which could be mistaken and could lead to wasteful investment. It is also important to ensure that elderly, disabled and other vulnerable sections of our society are fully included, and possibilities to enhance their lives through the application of digital technologies are sought (see Annex 5). A particular challenge will be to ensure that the elderly and those with disabilities can access the online services and other technologies that are used by the wider population, and that technical backup is available.

There are two particular activities that need support in order to ensure that the people dimension is fully captured: these are research and public engagement.

In relation to research, there is already a social research base for understanding how people relate to digital environments, though undoubtedly this will need to be expanded and updated as technologies develop. Also highly relevant is a wide range of social and economic research on life styles, which can inform judgements about the expansion of digital technologies; for example, what parameters may influence the expansion of home-based working, or how far people will substitute visits to friends or relatives by regular virtual contacts, or whether healthcare delivered on line is an acceptable substitute for face to face contacts with professionals.

We believe that Government should:

- ensure that all public investment in the Digital Infrastructure is fully informed by existing research on the people dimension, and if necessary commission new research to inform policy decisions
- encourage regulators and commercial providers to take decisions which are informed by relevant research

Public engagement is an approach which we have advocated consistently in a number of our reports. We believe that it is highly relevant to the development of a Digital Economy which is sensitive to the people dimension. We believe that Government should consult with the business sector and regulators to design and put in place mechanisms for public engagement and dialogue on key issues such as:

- the value placed on the digital infrastructure where this entails significant investments and costs, and how people balance cost and benefit in terms of broadband take-up
- levels of investment in the digital infrastructure; and how tolerant society is to risks resulting from network failure
- exploring the public's hopes and concerns on digital matters; the future challenges and the role customers can play in helping to solve them to create better services; and access, including issues of digital exclusion
- privacy, security and trust
- regulation, including issues of 'network management' and 'net neutrality'
- how Government can be a more intelligent customer

We believe there is a role for public service bodies such as the BBC in raising awareness and educating people about the opportunities offered by digital technologies.

Technology Futures

Digital technologies will:

- deliver existing services, for example e-commerce, buying on-line or Government services on-line, plus new options being developed
- drive communications, for example through social networking services
- deliver things that have not yet been invented or we do not know we want

The World Wide Web continues to have a profound effect on how we live. Recent technology changes have been revolutionary - the growth of social networking through applications such as FaceBook and Twitter means we can now interact in ways not envisaged a few years ago. Cloud computing offers the opportunity for delivering services and facilities in a distributed fashion -via the internet.

Videoconferencing has been around a long time and new developments, for example 3D holograms, have the potential for major economic and social impact: less travel, more sustainable business operations and lifestyles etc.

The on-line games industry, not least the 'serious' games component is also a huge driver for superfast broadband as well as a major industry for the UK, from simulating disaster sites for emergency service training purposes to simulating development paths, for example in urban planning. Throughout, the need to ensure resilience against cyber-crime will be vital.

We believe the next great change will be the evolution to the Semantic Web. The vision involves an opening up of non-personal public data by the creation of a web of linked data which will enable querying, integration and sharing of data from distributed sources in heterogeneous formats. An earlier CST report looks at a related area²⁴. It has led to data.gov.uk - a single point of access for non-personal Government datasets and part of the Open Data initiative. This is pioneering the use of open standards to publish, retrieve and link the data together. Much of this innovation is UK led. The Web of Linked Data that is emerging has the potential to be a powerful new information infrastructure.


We would be very happy to discuss the contents of this letter further with you, and how we might link together in the future in this strategically important area. We will be putting this letter on the website.

Yours sincerely,

²⁴ See the CST report *Better use of personal information: opportunities and risks* at www.bis.gov.uk/cst

Handwritten signature of Professor Sir John Beddington in black ink.

Professor Sir John Beddington
co-Chair CST

Handwritten signature of Professor Dame Janet Finch in black ink.

Professor Dame Janet Finch
co-Chair CST

Economic and social value of the Digital Economy

Economic and social value of the digital economy²⁵

In 2009, the digital economy was identified as accounting for around 8% of UK GDP²⁶

By 2012 it is predicted that £1 in every £5 of all new commerce in the UK will be spent online²⁷

Digital companies already generate 10% of the UK's Gross Value Added – around £130 billion

Digital companies employ 6% of the UK's workforce – more than 1.7 million people

They have kept growing through the downturn, and that will continue to grow rapidly in the years ahead – by an estimated 4% each year

The Information, Technology and Innovation Foundation has calculated that a government investment of £5 billion in next generation access would create nearly 300,000 jobs

A NESTA report argues that universal super-fast broadband would create double that number, and add £18 billion to the UK's GDP²⁸

Some estimates say that in California – an economy roughly the size of the UK – next generation access will generate 2 million new jobs²⁹

On average, each person has three or four interactions with the Government each month. Government estimates that getting just one of these done online – rather than by phone, on paper, or face-to-face – savings of at least £1 billion every year can be made³⁰

Today, there are around 40 million internet users in this country, including 30 million who use it every day

People with broadband at home now value it more highly than their land line, mobile phone or digital TV. Most say that they could not do without it

²⁵ Including from a speech by Jeremy Hunt 15 July 2010

²⁶ Digital Britain – interim report

²⁷ Digital Britain – interim report

²⁸ based on South Korean Ministry of Information and Communication figures cited in LeeH, Oh S, and Shim Y (2005) Do we need broadband? Impacts of broadband in Korea. Cited in the report: Getting up to speed: making superfast broadband a reality; NESTA policy briefing January 2009

²⁹ Stamford, CT; Gartner Inc (2003) One gigabit or bust initiative: a broadband vision for California

³⁰ Speech by Jeremy Hunt 15 July 2010

Annex 2

Comparisons between countries on broadband roll-out

Most countries employ a dual-track approach: first, achieving access to first-generation broadband for the entire population; and then achieving access to next-generation capability for large proportions of their population in the near-to-medium term.

Country	Population Density (/km ²)	UN e-Government Survey Rank ³¹	Broadband penetration per 100 inhabitants ³²	Major messages
UK	254.676 ³³	4	29.81	Relies extensively on private investment and market forces.
Australia	2.92 ³⁴	8	25.36	High levels of stimulus funding - National Broadband Network, projected to cost up to AUD 43 billion - providing 100 Mbps to 90% of the population. Some questions initially about the degree of competition. Lessons for UK on connecting remote areas.
Singapore	7022.81 ³⁵	11	23.71	Excellent digital infrastructure -delivered through government intervention. Strong economic focus but risk of neglecting social impact
South Korea	486.813 ³⁶	1	33.82	Strong infrastructure - less than 1% of the population not connected. Investment in deployment through expenditure - public/private partnerships ³⁷ - tax breaks and low-cost loans. Effective competition regulation. Experiencing similar problems to UK in 'final third' roll-out (mainly in rural areas)
USA	31.577 ³⁸	2	27.10	High levels of stimulus funding - American Recovery and Reinvestment Act of 2009 appropriated \$7.2 billion for the development of broadband through the National Broadband Plan. Seen as a middle-of-the-pack performer on most first-generation broadband measures, but a weak performer on prices for high and next-generation speeds

Market status for broadband in the UK³⁹

³¹ For e-Government participation and e-participation: United Nations E-Government Survey 2010

<http://unpan1.un.org/intradoc/groups/public/documents/UN-DPADM/UNPAN038853.pdf>

³² ITU Fixed broadband subscribers per 100 population, 2009 [http://www.itu.int/ITU-](http://www.itu.int/ITU-D/ict/e/Indicators/Indicators.aspx)

[D/ict/e/Indicators/Indicators.aspx](http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&language=en&pcode=tps00001&tableSelection=1&footnot es=yes&labeling=labels&plugin=1)

³³ <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&language=en&pcode=tps00001&tableSelection=1&footnot es=yes&labeling=labels&plugin=1>

³⁴ <http://www.abs.gov.au/ausstats/abs@.nsf/94713ad445ff1425ca25682000192af2/1647509ef7e25faaca2568a900154b63?OpenDocument>

³⁵ <http://www.singstat.gov.sg/stats/keyind.html#popnarea>

³⁶ http://www.un.org/esa/population/publications/wpp2008/wpp2008_text_tables.pdf

³⁷ Reference: Byung-Sam Kang, *Bridging the Digital Divide between Urban and Rural Areas: Experience of the Republic of Korea, 2009*

³⁸ <http://www.census.gov/population/www/popclockus.html>

³⁹ Communications Market Report, Ofcom 19 August 2010, plus

There are 18.6 million residential broadband connections in the UK⁴⁰

71% of people have access to a broadband connection at home (73% in England, 70% in Northern Ireland, 64% in Wales and 61% in Scotland). Fixed broadband is flat at 65% and mobile broadband - which is driving take-up - is at 15%

Cable broadband (offering bandwidths up to 50mbps) is available in up to 48% of UK homes - 51% in England but only 23% in Wales

Take-up of superfast broadband has been slow. Nearly half the population could have had access to super-fast broadband but fewer than 0.5% of households did so by the end of 2009⁴¹. Reasons may include the price differential between current superfast and lower-speed services, and the perception that current speeds are sufficient for most internet applications

Consumer satisfaction with mobile telephony and broadband remained stable at 94% and 90% respectively

On bandwidth, the average broadband speed in the UK is now 5.2 Mbps up from 4.1 Mbps in 2009⁴².

⁴⁰ *National Infrastructure Plan October 2010 (from www.hm-treasury.gov.uk)*

⁴¹ *There were only 74,000 'up to 50Mbit/s' Virgin Media cable connections at the end of June 2010. BT has announced its fibre roll-out had reached over 1.5 million households by July 2010 although Point Topic estimates there were around 12,000 live BT fibre connections at the end of July 2010 (see reference 3 above pp 8, 289 and 290).*

⁴² *Ofcom Research July 27 2010; Over 18 million separate service performance tests were carried out in over 1,500 homes during May 2010.*

Examples of Innovative Local Broadband Provision

Local Government delivering super-fast broadband⁴³

North Yorkshire County Council, supported by Yorkshire Forward and GO-Yorkshire and Humber has invested £2.2 millions in a *NYnet* initiative to deploy fibre-optic broadband connecting schools, hospitals and other public sector buildings across Yorkshire. This sustainable, open-access network can then be extended by private sector operators to connect up households and businesses.

Fibrecity networks⁴⁴

Using patented technology, a fibre network is deployed through the wastewater infrastructure and then brought to homes and businesses using micro trenching systems, making the premises fibre ready with 100 Mbps bandwidth. This technique reduces cost and minimises environmental impact. The fibre connection operates on an open access technology platform, allowing simultaneous link up with multiple providers and has the potential to deliver many next generation services such as film on demand, video conferencing and telemedicine.

Bournemouth is to become the first Fibrecity network in the UK, with the aim of providing all 88,000 homes and businesses with ultra high bandwidth by mid-2011.⁴⁵ The project is funded entirely by the i3 Group at a cost of around £30 million. After a pilot scheme, in August 2010 Wessex Water decided not to continue citing financial and technical reasons.⁴⁶ The project is still proceeding but more traditional methods are now being used.

Rutland Telecom

Rutland Telecom offers the residents of Lyddington speeds of up to 40mbps. It was a joint approach between the villagers and a local company that was reselling BT's broadband.

The community raised £37000 to provide 200 homes with superfast broadband after established telecoms firms had said it was not economical to deliver high-speed broadband to the village

The process took two years and required the intervention of Ofcom but it is now up and running

⁴³ From the NYnet website, posted 4 June 2010

⁴⁴ <http://www.i3-group.co.uk/companies/fibrecity-holdings.aspx>

⁴⁵ <http://www.i3-group.co.uk/companies/fibrecity-holdings/fibrecity-bournemouth.aspx>

⁴⁶ http://www.bournemouthcho.co.uk/news/8332491.Fibrecity_chaos_for_Bournemouth_residents/

Case studies illustrating service delivery through broadband

Electricity use

Smart meters

The interconnection between technological and social systems can be illustrated by considering the roll-out of smart energy distribution networks. These networks would allow the UK power transmission system to employ digital technologies to optimise energy usage and better incorporate intermittent “green” energy sources.

As we set out in our earlier reports⁴⁷, smart metering is key to the overall development of these networks and allows grid optimization. It will also facilitate supply companies offering a wider range of *time of use* tariffs which in turn can incentivize demand-shift. By signalling and monitoring individuals’ energy use, smart meters might encourage energy demand reductions through behavioural change. It is important to emphasise that smart meters do not require super-fast broadband.

Irrespective of how accurate, technologically advanced, or well designed smart meters are, their potential benefits will only be fully realised if they are relevant and accessible to, and adopted by, the population. The Government has confirmed that it plans to mandate the roll-out of smart meters by energy supply companies across Britain. The National Infrastructure Plan emphasises the key importance of smart meters and a smart Grid.

Health

Remote monitoring

The Rural Digital Economy Research Hub is based at the University of Aberdeen: *remote monitoring for rural healthcare*. For emergency healthcare, the speed with which a patient’s condition can be initially treated is vital to helping them; a particular issue in rural areas.

A remote monitoring system being developed by the university that is harnessing sensing, mobile phone and GPS technologies, could help people with chronic health problems by gathering and transmitting data such as heart rate, breathing rate and body temperature.

The patient is fitted with the wireless system which will notify the emergency services automatically should the patient require treatment. The transmitted data, including the patient’s precise location, will also provide an opportunity for treatment options to be considered prior to arrival on the scene.

Education

⁴⁷ *Strategic decision-making for technology policy; A national infrastructure for the 21st century*

ICT in schools⁴⁸

At present schools are essentially left to decide on what emphasis they place on ICT against other competing priorities⁴⁹.

Increasingly ICT is breaking down the barriers between home and school: some schools have 'e portfolio' areas to enable parents to comment on how their children are learning.

There is still a real issue about the creation of an 'ICT underclass' among pupils and their parents⁵⁰. Two million pupils still cannot go on-line outside school. ICT clubs can help but can only do so much.

Successful schemes such as 'home access' which provides grants for parents to purchase ICT equipment but these only cover certain time periods eg Key Stages 2 + 3

The private sector (ICT producers and service companies) need to get engaged in a bigger way: the supply side for schools ICT is very fragmented - mainly small companies - and the tendency is for schools to make their own individual arrangements for procuring ICT. This 25,000 individual ICT purchases by the schools sector

Technology is moving very quickly and this causes difficulties both in terms of equipment is expensive and inefficient, but it is difficult to persuade schools to club together to secure better value for money deals. Suppliers have real difficulties dealing with and training. Resilience of equipment is essential but systems are fallible. Every £1 invested in equipment needs around £8 investment in back-up, training etc.

It is important to extend ICT learning to parents as well as pupils. There are examples of primary schools opening their doors to parents during schools hours for them to develop ICT skills alongside pupils; and schools allowing pupils to take home laptops/netbooks once a week so that pupils and parents can both learn together

There is increasing use of computer games to help learning, for example in developing pupils' analytical, strategic and planning capabilities. But the Gaming sector needs to do more - there is very little evidence that educational games are being developed

⁴⁸ Notes from the Westminster Education Forum Keynote Seminar: ICT at school and in the home: efficiency, inclusion and digital skills; 25 March 2010; at www.westminstereducationforum.co.uk

⁴⁹ The most ICT-literate schools can spend up to 20% of their discretionary budgets on ICT. Heads have great discretion so they will have deliberately chosen to invest in this way, rather than in other areas.

⁵⁰ There are problems not just for those families on social benefits but for those slightly above that level for whom the financial outlay can be prohibitive.

Social inclusion

There are two types of digital exclusion - geographic and demographic. It is vital that technological and infrastructure developments do not exclude vulnerable or remote populations from the digital marketplace. Inclusiveness arguments are now generally accepted - security and ease of access are the growing issues which need to be addressed if more people are to connect to the internet.

Digital exclusion⁵¹

There are still 10 million people in this country who have never used the internet ie one adult in every five. The *Digital Britain* report set a target of getting 7.5 million new people on-line by March 2014⁵²

Of these, four million are not only digitally excluded, but socially or economically excluded too. These are the people hardest hit by Britain's digital divide. The people who, every day, are missing out on the massive advantages that the rest of us take for granted, for example:

- the consumer savings of more than £550 that we make each year, thanks to online offers and the cheapest deals on everything from energy to home insurance
- the rapid, timely public information we receive on issues such as transport services and the swine flu outbreak

We believe that where exclusion derives from low incomes or low educational standards then it is best addressed through social policies.

⁵¹ From a speech by Jeremy Hunt 15 July 2010

⁵² Europe's digital competitiveness report: ICT country profiles; Commission staff working document May 2010