Memorandum submitted by OFCOM

Broadband Speed

Contents

Section		Page

Ofcom's relevant statutory duties

1.1 Ofcom welcomes this opportunity to submit evidence to the House of Commons Business and Enterprise Committee's inquiry into broadband speeds in the UK.

1.2 As the United Kingdom's independent regulator for the communications sector, Ofcom's principal duty, set out in section 3(1) of the Communications Act 2003 is:

a) to further the interests of citizens in relation to communications matters; and

b) to further the interests of consumers in relevant markets, where appropriate by promoting competition.

1.3 Our main statutory duties in the area of the Committee's inquiry are sections 3(2)(b) and 3(4)(b of the Act, specifically:

a) *to secure the availability throughout the UK of a wide range of electronic communications services[1]; and*

b) *must have regard to:*

- *the desirability of promoting competition in relevant markets;*
- *the desirability of encouraging investment and innovation in relevant markets;*
- *the desirability of encouraging the availability and use of high speed*
- *data transfer services throughout the United Kingdom[2]*

1.4 The relevant statutory duties under the Communications Act are in part drawn from the EU Regulatory Framework for Electronic Communications, specifically under Chapter III of the Framework Directive, *Tasks of National Regulatory Authorities*, it is stated that National Regulatory Authorities:

"shall promote competition in the provision of electronic communications networks, electronic communications services and associated facilities and services by inter alia: …

(b) ensuring that there is no distortion or restriction of competition in the electronic communications sector;

(c) encouraging efficient investment in infrastructure, and promoting innovation;"[3]

1.5 We are active in a number of areas that touch upon the Committee's inquiry with respect to the above duties, as well as seeking to secure competition at the deepest level that is effective and sustainable, particularly in the longer term. This ongoing work builds on the strategy outlined in our Super-fast Broadband statement and our Next Generation New Build statement.[4]

---

[1] Section 3(2)(b)
[2] Section 3(4) (b), (d) and (e)
[3] Article 8 (2), Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002.
[4] See Delivering super-fast broadband in the UK, policy statement, 3 March 2009,
(http://www.ofcom.org.uk/consult/condocs/nga_future_broadband/statement/statement.pdf) and

Is the target for universal access to broadband at a speed of 2Mb/s by 2012 ambitious enough?

2.1   We note that the government's proposal for a Universal Service Commitment of 2 Mbit/s is not intended as a target for the generality of consumers, but as a threshold which should be available to all. Most premises in the UK are already capable of receiving bandwidths in excess of 2 Mbit/s.

2.2   The question of whether this minimum threshold is sufficient, and is likely to be for a reasonable enough duration to justify policy intervention depends, we would suggest, on three critical factors:

- **Current and future consumer expectations**: what level of bandwidth is likely to be delivered without the proposed government intervention, and how is this likely to evolve?

- **The extent of any market failure**: how many consumers are unable to obtain a specific level of bandwidth commercially, and what impact will this have?

- **The cost of remedying this market failure**. What would it cost to fill any such gap, at least partially, and is such expenditure justified by the benefits that will accrue?

2.3   The current position, according to research recently published by Ofcom,[5] is that consumers on the most widely used 'up to 8Mbit/s' DSL-based[6] packages receive a mean maximum bandwidth of 4.8Mb/s, and a median of 5.6 Mb/s. Other available DSL-packages offer greater bandwidths, and the entry-level cable package offered by Virgin Media provides a mean maximum speed of 9.5Mb/s.

2.4   Setting the proposed Universal Service Commitment at any of these levels would involve intervention to subsidise the provision of broadband to roughly half of UK households, an obligation that would likely be very costly, and which could undermine the delivery of services by commercial players. Instead, and as set out in the government's *Digital Britain* report, the aim should be to set a target below these levels, but which does not exclude consumers from the benefits which can be provided by broadband internet. The government has set out the rationale by which it has arrived at the proposed 2Mb/s threshold in that report. We note that this proposed threshold is more than sufficient to provide basic internet access to transactional websites, makes allowance for the fact that in many households there may be multiple simultaneous users of such services, and is sufficient to support new services based on video content, which are likely to become increasingly important.[7] Judgements about whether the ability to access this range of services

---

Next Generation New Build, Policy statement, 23 September 2008, *New build statement*, (http://www.ofcom.org.uk/consult/condocs/newbuild/statement/new_build_statement.pdf)
[5] *UK Broadband Speeds 2009*
[6] Digital subscriber line
[7] The BBC, for example, recommends a minimum speed of 500kbit/s to use its *iPlayer*

fulfils the policy objection are necessarily difficult to reach, and may change over time.

Future demand

2.5   If demand for higher connection speeds emerges, it is most likely to be as a result of the increasing use of live streamed video, either for TV viewing or as part of video-based communication services. Such services are already a part of many consumers' internet activity: Ofcom research indicated that one in four internet-connected households accesses a catch-up TV service, such as by the BBC *iPlayer* or *4oD*. *YouTube*, providing access to user-generated video content, has a UK audience of 16 million.

2.6   At present, these services can be delivered using less than the recommended 2Mbit/s; however expectations of the quality, and hence bandwidth of internet-delivered TV are rising at the same time as usage of these services. The BBC recently increased the standard *iPlayer* video stream to 0.8Mbit/s from 0.5Mbit/s; it has also introduced a high quality stream at 1.5Mbit/s and a "high definition" stream which runs at 3.2Mbit/s.

2.7   Increasing demand for high speed services may also lead to contention within the home: a 2Mbit/s line would come under pressure when multiple users are accessing higher quality video simultaneously.

2.8   We can expect that the average bandwidths delivered by commercial providers will continue to increase over the next few years without additional intervention – and as noted above, the majority of UK homes are already in a position to access higher speed services. Furthermore, the 2Mbit/s recommendation does provide for access to much of the live video currently available to internet users.

2.9   Nonetheless, the 2Mb/s Universal Service Commitment is perhaps best viewed as an important milestone in the evolution from a narrowband communications infrastructure to a world in which the norm is super-fast, or next generation, broadband. In this context, the key challenge is to ensure that whatever technical solution is delivered for 2012 is capable of further evolution.

Is the Government right to propose a levy on copper lines to fund next generation access?

3.1   In examining the government proposals to introduce a general supplementary charge on all fixed copper lines to create a Next Generation Fund, we suggest there are three key questions to consider, many of which draw on our previously published and ongoing work[8] in relation to super-fast, or next generation, broadband access:

- is next generation access, and the super-fast broadband services that it promises, of **significant potential value** to UK consumers and citizens?

- if so, is the deployment of these networks by commercial interests alone likely to be **extensive and timely** enough to maximise the potential benefits for the UK?

- to the extent that there may be shortfalls in commercial deployment, what are the **best mechanisms for addressing these**?

3.2   It remains difficult to quantify the potential benefits of super-fast broadband over and above those delivered via existing infrastructure. Given the early stage of its development both here and abroad, there is limited direct historic evidence on which to draw, so any conclusions are inevitably speculative in nature. Nevertheless, the limited emerging evidence from current generation broadband and early next generation deployments suggests that there is the prospect of real consumer benefits emerging.[9] Included among these is the ability to receive high bandwidth speeds regardless of distance from the telephone exchange.

3.3   Consumers, citizens and businesses are likely to realise private, social and economic benefits following the rollout of super-fast broadband. Many of these will build on the already strong progress made with today's broadband services. The new super-fast broadband services supported will provide a range of different characteristics, such as higher downstream and upstream speeds, that will enable innovative new applications.

3.4   For residential customers, super-fast broadband may provide a better or more reliable way to do things they already do today – for example, faster and more reliable connections for web-browsing, file sharing and e-commerce. In the longer term though, consumers are likely to benefit from new products and services that can only be delivered over super-fast broadband connections, including bandwidth hungry content and audio-visual services.

3.5   For citizens these new services and applications may offer more intuitive and engaging ways to relate to each other and to physical and virtual communities more broadly. They will enable citizens to participate in new ways with society and

---

[8] http://www.ofcom.org.uk/consult/condocs/nga_future_broadband/
[9] http://digitalbritainforum.org.uk/report/category/being-digital/

democratic processes, and will influence how citizens access and benefit from future public services.

3.6   Business customers are more concerned with availability, resilience and quality of service – particularly given that loss of connections can mean loss of business. There is also scope for businesses to use super-fast broadband services to improve their productivity, for example making greater use of online sales and purchasing systems, or more widely adopting cost-saving strategies such as teleworking. Super-fast broadband may also underpin an online economy where consumers and online businesses can trade, develop new applications and services and drive the UK's creative industries.

3.7   To ensure that super-fast broadband really delivers these potential consumer, citizen and business benefits, it is imperative that there is:

- wide availability of super-fast broadband in the home, in the office and, potentially, on the move, at affordable prices and available to many;

- effective choice of super-fast broadband services and the applications offered over the new networks;

- high take-up of super-fast broadband by a broad range of different consumer groups, citizens and businesses;

- service innovation – a range of new services available that improves the lives of consumers.

And that there are:

- competitive prices - consumers must benefit from competitive prices and efficient delivery of services, but with prices at levels that give incentives to investment;

- empowered consumers – who understand what these new services offer them compared to today's broadband. They must also be able to easily migrate between services and competing suppliers, while being protected against potential abuse.

3.8   Ofcom believes that there are significant potential benefits in the deployment of next generation access and that these are likely to be maximised if it is deployed as widely as possible while still maintaining affordability and effective competition.

3.9   The costs of deploying next generation access are important in considering the second question – how far and how fast will commercially led deployment progress? Because of the need to upgrade more of the physical infrastructure comprising the access network for next generation broadband than was the case for current generation access, the deployment costs are significantly higher. As discussed elsewhere in this document in relation to universal access to broadband, there are areas of the UK in which even an upgrade to current generation broadband is not commercially viable. Unless the revenues generated by next generation services are much higher than currently achieved, it seems certain that areas beyond commercial deployment will be more extensive for next generation access than for today's broadband.

3.10   The accuracy of any assessment of the areas likely to remain "unserved" will
        improve over time as currently uncertain aspects of the commercial case become
        clearer, for example:

- How much will consumers be willing to pay for the new higher speed
  access?

- How many consumers will be interested in upgrading from their current
  broadband products?

- What new services will emerge to take advantage of the higher speed
  access and what revenue will they attract?

- What are the real world deployment costs of next generation access in the
  UK?

- How quickly will deployment in the UK and abroad lead to reduced
  equipment and operational costs?

3.11   Super-fast broadband is already available to around 50% of UK premises via Virgin
        Media's network, and BT intend to deploy next generation access in its network to
        around the same proportion of households and businesses. Private sector
        investment to deliver super-fast broadband is therefore very much a reality for large
        parts of the UK, and infrastructure-based competition will develop in these areas in
        the coming months and years. It is possible that as the market develops we will see
        deployment costs fall and/or revenues increase to the point that these and other
        companies significantly increase the proportion of the UK that is served. At the same
        time, there may be cases where the expected costs rise above current expectations,
        for example as a result of practical difficulties, or as a result of using more expensive
        technologies to deliver higher quality services.

3.12   However, most cost estimates[10] suggest that per customer deployment costs
        increase very rapidly as coverage progresses beyond around two thirds of the
        country. Scenarios in which the entire country is served solely on the basis of
        commercial deployment therefore seem unlikely. While market developments may
        see next generation coverage being extended over time, there also remains the
        question of whether this will happen quickly enough to maximise the potential
        benefits to the UK.

3.13   It is likely therefore that super-fast broadband will deliver significant benefits to the
        UK, but may not be commercially available to up to a third of premises. Ofcom has
        considered the role regulation plays in detail in its previous consultations and most
        recently our statement on super-fast broadband[11]. The principles we have outlined in
        those publications are designed to ensure that our regulation does nothing to
        artificially limit commercial investment in, and therefore coverage of, next generation
        access, while at the same time ensuring the full range of consumer interests are
        protected.

3.14   While inappropriate regulation can harm otherwise viable deployment business
        cases, it is not as clear that regulation can or should be used to underpin
        investments that are not efficient or commercially viable. Regardless of the
        regulatory approach, the challenging underlying economics of next generation

---

[10] For example, http://www.broadbanduk.org/index.php?option=com_content&task=view&id=303&Itemid=7
[11] http://www.ofcom.org.uk/consult/condocs/nga_future_broadband/statement/

access in the less densely populated areas of the UK are likely to remain. Therefore opportunities to accelerate super-fast broadband deployment, and/or see it deployed more widely using other forms of intervention such as the proposed levy will remain a matter for public policy.

3.15 To the extent that any form of public intervention is used to address the remaining unserved areas, it will be important to ensure this is done as effectively as possible. Issues that will need to be considered include:

- minimising the overlap of publicly funded deployment areas with those which would otherwise have been served via efficient commercial investment. This will involve careful and ongoing assessment of market development and commercial deployment plans;

- ensuring that access to funds is subject to a competitive process, and open all entities capable of delivering an efficient solution;

- ensuring that the assessment criteria for those contesting the fund are appropriately specified. These should cover issues such as required coverage, timescales, service specifications, pricing, competitive access, use of standards, future network upgrades; and

- ensuring that there are opportunities for effective competition to emerge. In the areas which require public intervention, this is more likely to be based on products that make greater use of existing infrastructure (so-called "active" products) than seek to duplication cabling and other equipment already installed (so-called "passive" products).

Will the Government's plans for next generation access work?

4.1   In our super-fast broadband statement published in March 2009, we stated that investment in next generation access networks will improve users' broadband experiences through higher bandwidths, a better balance between downloading and uploading speeds and more reliable, higher quality services. These improvements have the potential to support innovative new broadband services and applications, bringing real social and economic benefits for consumers and citizens.

4.2   However, given the nature and scale of the investment associated with next generation access networks, it is widely accepted that universal coverage is unlikely to be achieved without public intervention. We recognise that government has a responsibility not only to address issues around social inclusion but also to create the right conditions for business to succeed in highly competitive global markets.

4.3   A publicly-funded scheme has the potential to deliver the benefits of super-fast broadband to areas which would otherwise be disadvantaged, increase business competitiveness and improve consumers' access to new online services.

4.4   The Government announced in its *Digital Britain* report that it will seek to support investment in less commercially attractive parts of the country. The Government proposed to do this by introducing a levy of 50p/month on all fixed telephone lines. The money generated, estimated to be £150m to £175m per annum, will be collected over a number of years and used to fund super-fast broadband roll-out in the 'final third' of the country.

4.5   The experience to date of broadband delivery and adoption appears to demonstrate that the competitive provision of services delivers wider choice, greater innovation in services and keener prices to businesses and individual consumers alike. So while the precise details of these high-level plans have yet to be finalised, we consider that it is important that the government's final scheme should be designed to increase competition among communications providers as far as possible and encourage privately-funded provision to the greatest extent possible.

4.6   This will require the final scheme to be well targeted and well structured to avoid distorting competition or expending avoidable use of public funds. Specifically there are two particular areas that we would like to draw the Committee's and government's attention to:

- targeting will require careful analysis of market failure to identify where the costs of supplying network coverage would not be economically efficient and/or would be such to make private sector investment highly unlikely.

- those companies receiving funding should ensure that third party access is required to ensure the greatest choice to business and individual consumers.

4.7   In terms of successful plans for super-fast broadband, it is very easy to place too much emphasis on the importance of activities to increase availability of these

networks to end-users. The government's plans for a levy (see section 3) are one example of such activities. However, for super-fast broadband to be truly successful and make a difference to consumers, businesses and the UK more generally, the services these new networks offer will need to be taken up and used. Without high levels of take-up, these new networks will not deliver material benefits.

4.8   So while it is right to consider the question of availability now, issues of demand and take-up are likely to emerge just as they have for current generation broadband. This is especially true where consumers' willingness to pay and demand for very high bandwidth services remains unclear, both in the UK and in other countries. It is probably too early to consider actions to help drive take-up: the private sector is considering this now, and is well placed to develop new applications and services that can drive take-up. But it could well be a future issue for consideration.

Are companies providing the speed of access which they promise to consumers?

5.1 Broadband speeds are clearly a vital component of the consumer experience of broadband services, and for the market to operate efficiently, consumers must have accurate information about the comparative speed of broadband services in order to inform their purchase decisions. The absence of such information has the potential to lead to market failure and consumer detriment as consumers make sub-optimal choices and operators have reduced incentives to invest in delivering higher actual speeds.

5.2 However, broadband speeds are not straightforward to define or communicate as they vary by location and by time of day. For example, the maximum speeds available to customers of DSL broadband (the most common type of broadband, delivered via the copper telephone line, which accounts for around 75% of UK fixed-line broadband connections) are defined by the length of the wire from their local exchange to their home; and speeds will typically slow down below these 'maximum' speeds during peak times due to contention (shared bandwidth by multiple users) in both their provider's network and in the broader internet. Therefore although DSL packages will have a 'headline' or 'advertised "up to" speed, most customers will not, in practice, be able to achieve this speed.

5.3 Ofcom has been active in ensuring that consumers have the information they require in order to make informed choices about their broadband service. We have sought to ensure that:

- **advertised speeds enable consumers to identify the differences between different types of services**. It is important that providers differentiate between packages offering different speeds. For example, current mobile broadband deployment in the UK can either deliver maximum speeds of 3.6Mbit/s or 7.2Mbit/s, services delivered via ADSL1 can deliver maximum speeds of 8Mbit/s, those delivered via ADSL2+ can deliver maximum speeds of 24Mbit/s and fibre-based services can deliver higher maximum speeds. These advertised speeds are always referred to as 'up to' as speeds will vary between consumers and by time of day, and it is important that it is always clear to consumers that the actual speeds they receive will vary and will typically be lower than the 'up to' speed. The Advertising Standards Authority (ASA) is responsible for advertising and Ofcom has discussed how broadband is advertised with the ASA.

- **consumers are given accurate information at point of purchase on the speeds their line is capable of delivering (the estimated access line speed), and a clear explanation that actual throughput speeds are likely to typically be less than the access line speed**. In order to increase consumer understanding of broadband speeds and to ensure that consumers are advised in advance of purchase of the speeds available to their specific location, Ofcom introduced in June 2008 a voluntary Code of Practice for broadband speeds[12] ('the Code'), which 50 broadband suppliers have signed up to (representing over 95% of UK broadband connections).

---

[12] http://www.ofcom.org.uk/telecoms/ioi/copbb/copbb/

The Code came into force in December 2008 and requires ISPs to tell consumers the maximum speed they can expect and to explain why actual speeds vary. Ofcom is working both to increase consumer understanding of the Code and to monitor that ISPs are complying with the code.

- **consumers have access to reliable data which compares the performance of ISPs**. Information about the actual speeds that consumers receive should be in the public domain to help consumers understand more about the factors which determine broadband performance. In turn, if consumers have access to this information, operators will have greater incentive to compete on actual performance and invest in newer technologies. Ofcom's research into actual broadband speeds (published in July 2009[13]) was a major step towards this, although it only looked at 'up to 8Mbit/s' and 'up to 10Mbit/s' packages from the largest nine providers. We are currently reviewing how we will repeat the research and discussing with stakeholders (ISPs, consumer groups and industry monitoring experts) how to ensure that this information is available to consumers on an ongoing basis.

Different measures of broadband speed

5.4   There are a number of different definitions, or types, of broadband speed:

- **Headline** or **advertised speed**. This is the speed that ISPs use to describe the packages that they offer to consumers. They are typically described as 'up to' speeds, and refer to the maximum speed at which any customer's line will synchronise to the Digital Subscriber Line Access Multiplexer (DSLAM) at the exchange.

- **Modem synchronisation speed** or **access line speed**. This refers to the maximum speed of the data connection between the broadband modem and the local exchange or cable head end. It constitutes the maximum speed that an individual line is capable of receiving.

- **Download throughput speed.** This is the rate of data transmission from a network operator's access node to a customer. This figure is often dependent on factors such as the ISP's network, its traffic shaping and management policy[14] and the number of subscribers sharing the network at the same time. Because speeds typically vary throughout the day, **average download throughput speed** is a more useful measure.

- **Upload speeds**. Broadband connections do of course work both ways – they have an upstream as well as a downstream. Virtually all broadband connections in the UK are asynchronous, with upload speeds typically much slower than download speeds.

5.5   There are other speed-related measures which also impact on the consumer experience of broadband. These include:

- **Latency**. The time it takes a single packet of data to travel from a user's PC to a third-party server and back again. Connection with low latency will feel

---

[13] http://www.ofcom.org.uk/research/telecoms/reports/broadband_speeds/
[14] Traffic shaping is used by ISPs to manage bandwidth according to different policies. For example to optimise bandwidth so that more users can get higher speeds or reduce heavy use during peak hours.

more responsive for simple tasks like web browsing and latency is particularly important for some applications such as online gaming (these are also known as Ping times)

- **Jitter.** A measure of the stability of a connection (it can also be defined as the rate of change of latency). The lower the measure of jitter, the more stable a connection is. Jitter is a major contributor to the quality of a VoIP (Voice over IP) phone call and is also valued by online gamers.

- **DNS resolution time**. The DNS (domain name service) protocol translates domain names (such as google.com) into the IP addresses that are actually used to route traffic. Every ISP maintains its own DNS servers through which customers' computers issue queries to translate names into IP addresses. When these servers fail or operate slowly, web browsing and other online activities suffer. A slow DNS time does not affect download speed, but can severely affect the responsiveness of the internet while browsing.

How broadband speed is advertised

5.6 Broadband services are typically advertised as offering speeds of 'up to XMbit/s', where this speed represents the maximum possible modem synchronisation speed in the downlink.

5.7 This is in accordance with Advertising Standards Agency (ASA) guidelines which recognise that it is important for providers to be able to differentiate between different products, and the variation in actual speeds means it is not practical for providers to advertise on the basis of actual speeds.

5.8 This 'up to' speed is important in enabling providers to differentiate between different types of services. Figure 1 details the distribution of these packages by headline speed based on data provided by the nine largest ISPs in the UK by retail market share (who have a combined market share of over 90%). It indicates some shift in the market towards higher headline speeds between November 2008 and April 2009, with much of the change attributable to Virgin Media upgrading all its 4Mbit/s cable customers and many of its 2Mbit/s cable customers to an 'up to' 10Mbit/s package.

Figure 1: UK residential broadband connections by headline speed
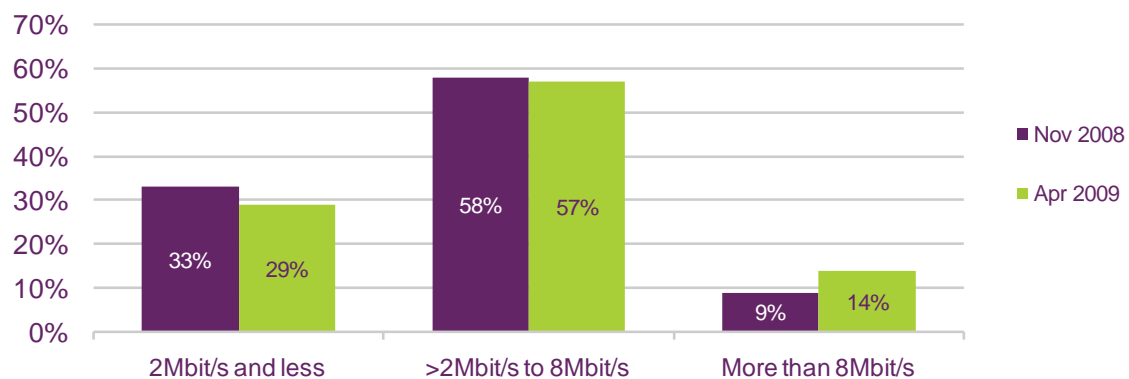
Source: Ofcom, based on data provided by the UK's nine largest ISPs by retail market share (representing over

Why broadband speeds differ from the advertised speeds

5.9   However, these 'up to' speeds do not represent the actual speeds which consumers receive. The following constraints all mean that the actual speeds delivered to consumers are typically considerably less than the advertised 'up to' speeds.

- Advertised 'up to' speeds typically detail the maximum speed at which a line can synchronise to the Digital Subscriber Line Access Multiplexer (DSLAM) at the exchange. However, the actual speeds available to the end user are typically less than this because some of the available capacity is used by critical communications protocols which are required for the connection to operate. ISPs typically limit the bandwidth available for end users' data in order that there is sufficient capacity for this other 'overhead' data.

- For DSL broadband, the maximum line speed available is constrained by the length of the copper wire connection between the premises and the local telephone exchange, with speeds slowing down as the length of the line increases.

- For all broadband connections, speeds are constrained by contention in the ISP's own network; this is a particular problem during peak periods as multiple users put demand on backhaul networks.

- Poor wiring and interference within the home can severely impact performance. In June 2009, BT launched an initiative to address this by offering the *BT Broadband Accelerator* (a filter which consumers install into their phone socket in order to reduce electrical interference from telephone-extension wiring) free of charge (save postage and packing) to all customers where BT believes performance can be improved.

- Congestion on the wider internet causes individual web sites and applications to slow down.

- Consumer equipment performance, in particular computers and routers, can affect speeds received.

5.10   As DSL broadband is currently the only broadband technology which is available nationwide, the maximum speeds available to many consumers are defined by the length of the copper wire between their home and the local telephone exchange. Figure 2 depicts the theoretical degradation of the maximum speeds achievable by DSL broadband as the length of line from local telephone exchange to premises increases. It shows that although second-generation DSL services (ADSL2+) offer significantly faster speeds than first-generation ADSL speeds to customers with a short line length, beyond a distance of 3km from the exchange there is little difference between the two technologies.

Figure 2: Theoretical maximum DSL speeds by length of line from exchange to premises

Source: http://www.tpg.com.au/dslam/faq.php
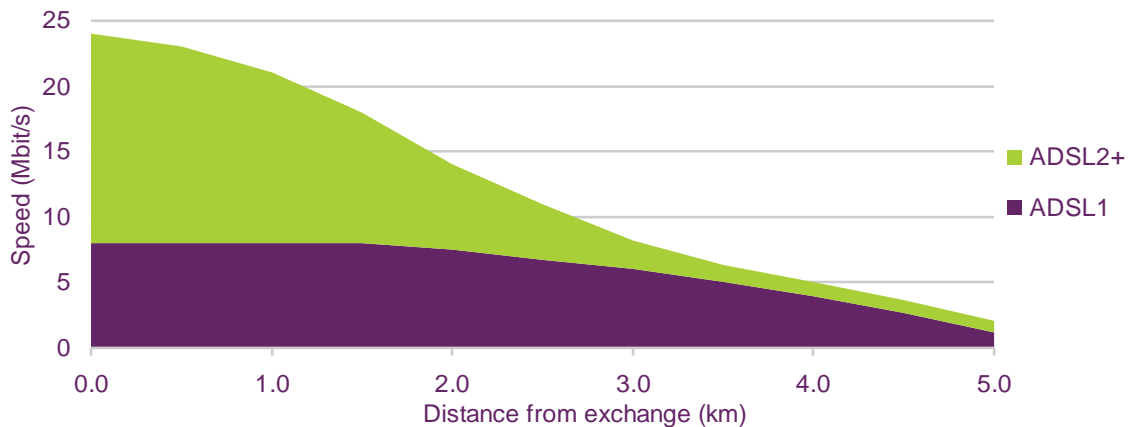
Ofcom's voluntary code of practice on broadband speeds

5.11   In order to address potential consumer confusion caused by the variance between advertised 'up to' broadband speeds and the actual speeds delivered, and to ensure that consumers are better informed about the choices of broadband products available to them, Ofcom introduced the Voluntary Code of Practice on Broadband Speeds[15] on 5 June 2008. This came into force on 5 December 2008 at which point 50 internet service providers, collectively representing over 95% of UK broadband subscriptions, had committed to adhering to the Code.

Signatories to the Code also agree to comply with the following:

- Provide all consumers within the sales process, with information on their estimated access line speed (regardless of whether the sale is conducted over the phone, in a retail shop or through the ISP's website).

- Provide a facility on their website so that consumers can find out, in a clear and easily accessible manner, what their estimated access line speed is, i.e. the maximum speed that the customer is going to receive as opposed to the advertised headline speed.

- Provide the customer with a durable record of the estimated access line speed given at point of sale.

- Explain to the consumer in a clear and meaningful way that the actual throughput speed that a consumer receives is likely to be lower than the estimated access line speed and headline speed. ISPs should explain that the actual throughput speed experienced by a consumer will be influenced by a number of factors including the ISP's network capacity, the ISP's traffic shaping and management policy, the number of subscribers online at any one time, by time of day etc. ISPs should also indicate to consumers the times of day when the network is likely to be most congested.

[15] http://www.ofcom.org.uk/telecoms/ioi/copbb/copbb/

- Use their best endeavours to set out clearly, and in a prominent place on their websites (e.g. within help or FAQs sections), information relating to their respective policies on fair usage; traffic management and traffic shaping to cover, at a minimum, the matters set out below.

Therefore, if ISPs are compliant, the Code will ensure that broadband is sold on the basis of the access line speed rather than just the advertised headline speed so that customers have a better expectation of what they will receive. The Code also includes measures that should be taken if, after appropriate diagnostics, the customer continues to receive an access line speed significantly lower than the estimate provided at point of sale.

Consumer perceptions of broadband speeds

5.12   In Q1 2009, more than eight out of ten consumers were satisfied with the speed of their fixed-line broadband connection. However this was significantly lower than satisfaction with the overall service (90%), or with value for money (84%) (see Figure 3). Satisfaction with the speed of the service has also fallen from 90% in Q1 2006. However, this is likely to be due to changing expectations – in 2006 many consumers may have been comparing broadband services against narrowband (dial up) access, while in 2009 broadband has become widespread as have online applications which require faster downstream speeds, such as the BBC *iPlayer*.

Figure 3: Residential customer satisfaction with aspects of broadband service
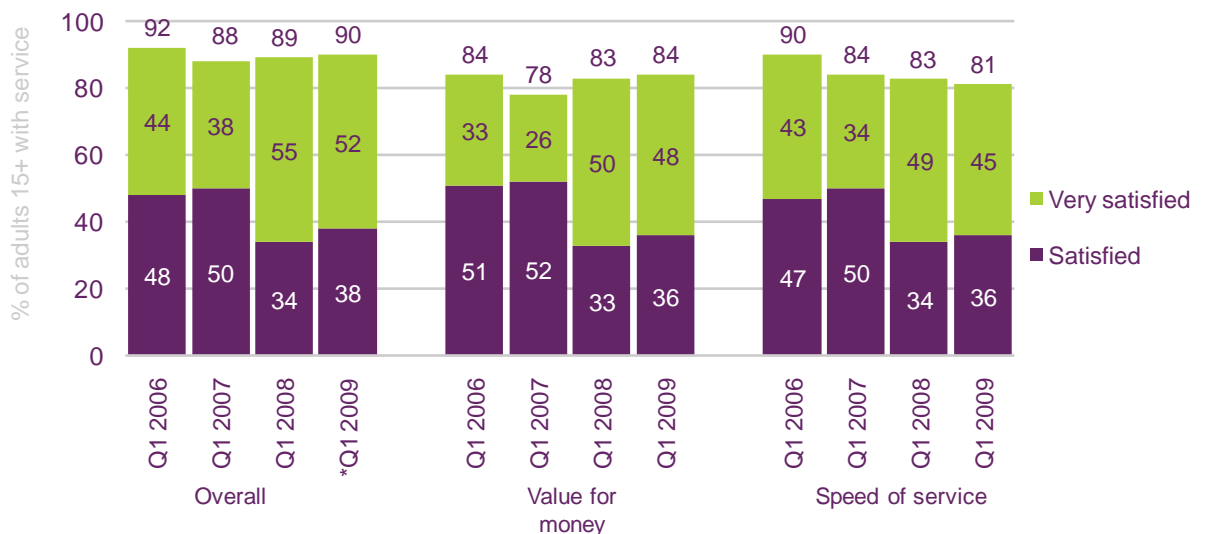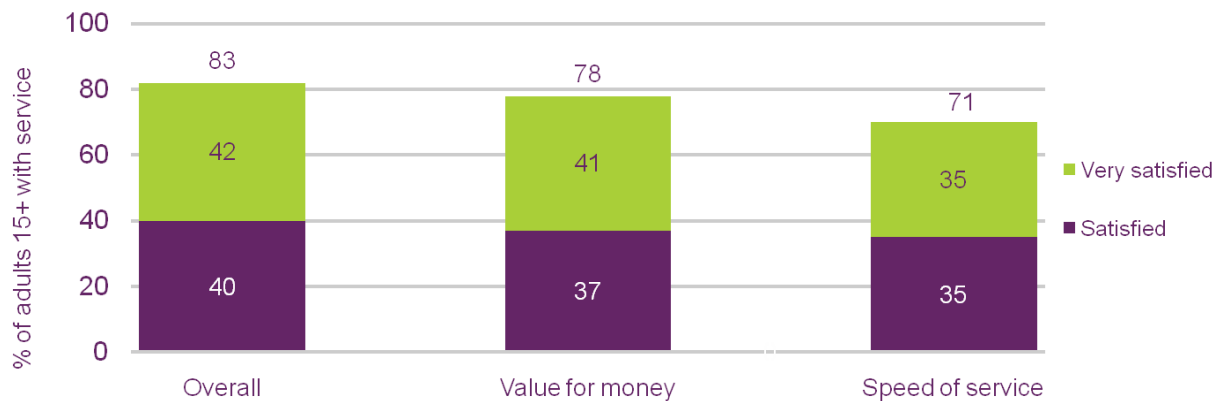

Source: Ofcom research
Base: All adults with broadband (fixed broadband only from 2009)
Note: Includes only those who expressed an opinion. *Q1 2009 figures based on fixed broadband service

5.13   Satisfaction levels with mobile broadband services were lower than for fixed-line broadband services (Figure 4). This is likely to be a reflection of greater variation in mobile broadband performance than in fixed-line broadband performance as well as much lower actual average speeds.

Figure 4: Residential customer satisfaction with aspects of mobile broadband service

Source: Ofcom research, Q1 2009. Base: All adult s with mobile broadband
Note: Includes only those who expressed an opinion

5.14   After price, speed of connection was the second most commonly cited service aspect, which consumers said they compared when selecting their broadband supplier, with 45% comparing speeds (Figure 5).

**Figure 5: Broadband features compared by consumers**
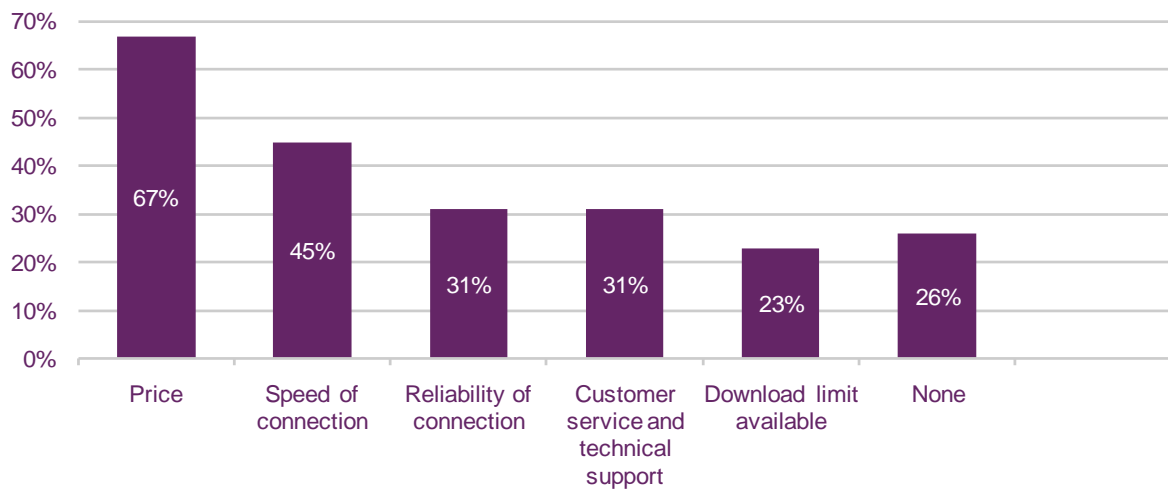
Q15. Which if any of the following internet service features have you tried to compare from different broadband suppliers?
Base: All respondents (2,128)
Source: GfK broadband speeds survey among 2,128 online panel respondents who are broadband decision makers, September-October 2008

5.15   Among those who sought to compare speeds, 32% found it 'extremely easy' or 'very easy', with a further 30% finding it 'fairly easy'. A quarter (25%) of consumers found it difficult to compare speeds with 10% finding it 'very difficult' or 'extremely difficult'. Note, however, that this research was undertaken in September and October 2008, before the Code came into force.

**Figure 6: Ease of comparing broadband features**
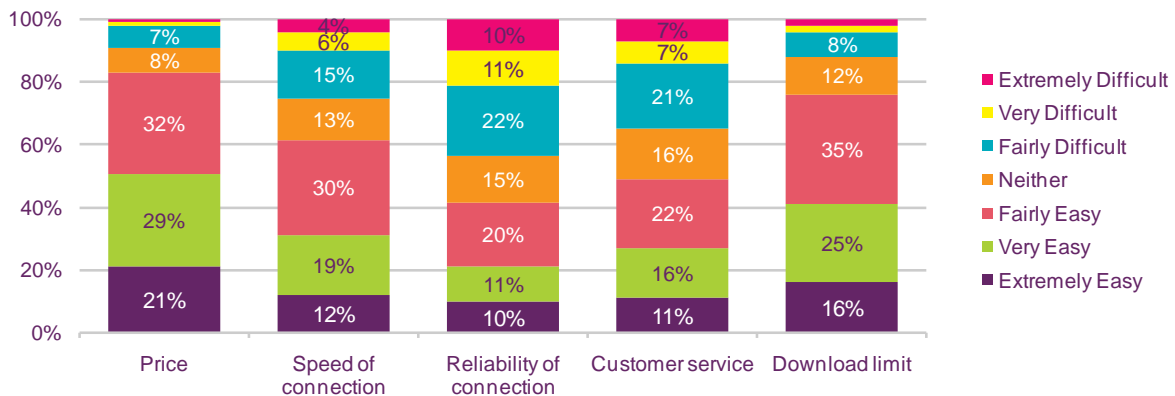
Q16. How easy was it to compare the following internet service features from different broadband suppliers?
Base: Those who have compared service features (1417)
Source: GfK broadband speeds survey among 2,128 online panel respondents who are broadband decision makers, September-October 2008

5.16   More than a quarter (26%) of consumers thought that their actual connection speed was not what they expected when they signed up. This compares with 17% whose expectations on reliability were not met, and 9% who thought they would receive a higher download limit.

Figure 7: Agreement that service matches initial expectations
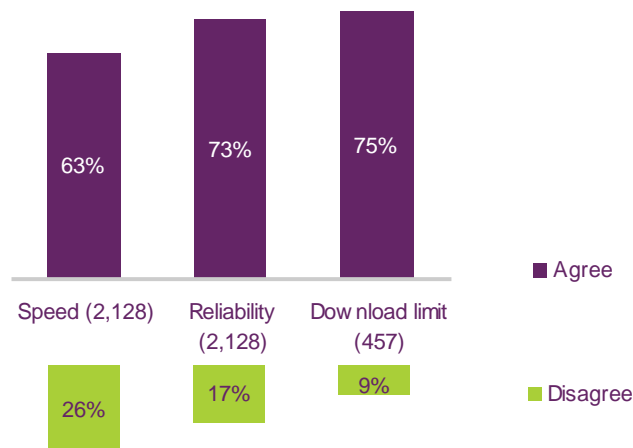
Q12A/B/C: To what extent do you agree or disagree that your [speed / reliability / download limit] is as you expected it to be at the time of signing up?
Base: All UK broadband decision makers (2,128) / All with a download limit (457)
Source: GfK broadband speeds survey among 2,128 online panel respondents who are broadband decision makers, September-October 2008

Ofcom research into actual broadband speeds

5.17   Ofcom undertook a major research project between November 2008 and April 2009 into the actual broadband speeds received by consumers. The research involved assembling a representative panel of over 1,500 UK broadband users and

monitoring the broadband performance delivered via a hardware unit connected to panellists' routers. The final research report was published on 28th July 2009.[16]

5.18   Overall, we found that average actual download throughput broadband speeds delivered were 4.1Mbit/s. This represented 57% of the average advertised 'up to' speed (7.1Mbit/s), and 83% of the average maximum speed delivered (7.1Mbit/s). (Note that as we were not able to run specific access line tests for our panellists, we use the highest download throughput speed test recorded during the month as the maximum line speed). (Figure 8)

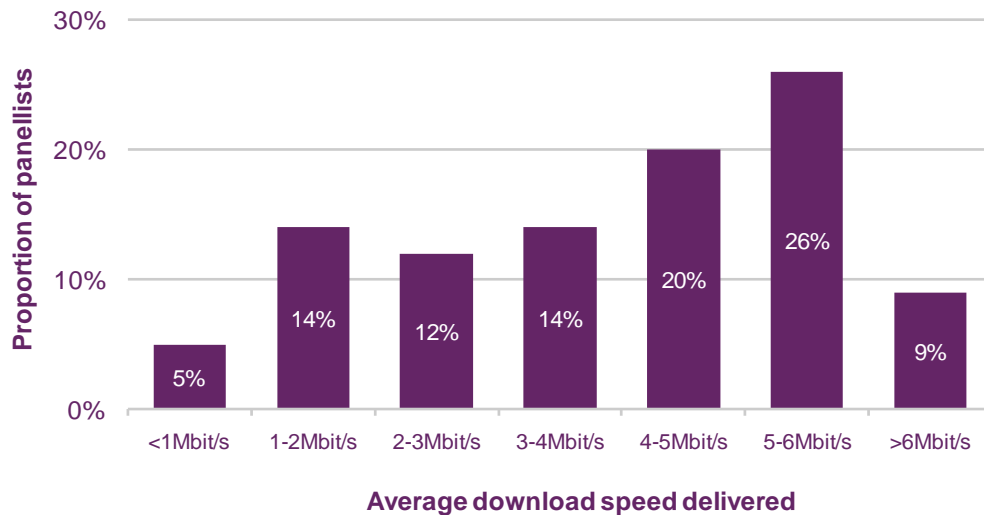**Figure 8: Average UK broadband speeds, April 2009**
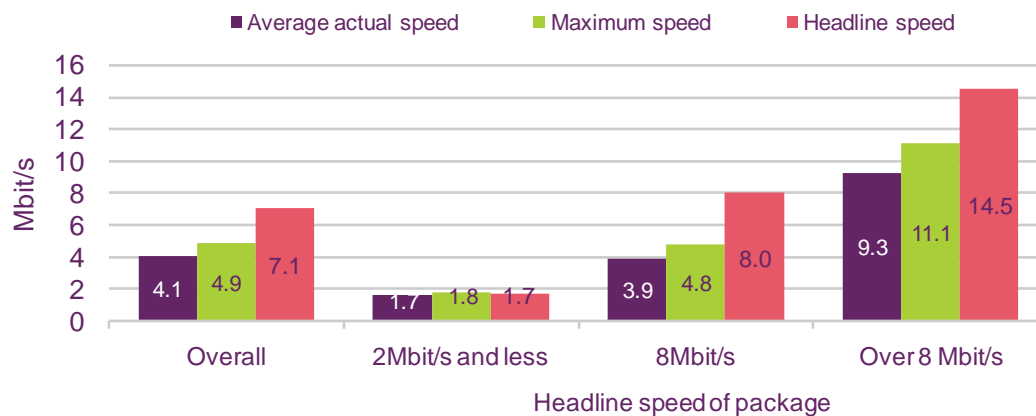
Source: SamKnows measurement data for all panel members with a connection in April 2009
Notes: (1) Data have been weighted by demographics, ISP and headline speed in order to ensure that they are representative of UK broadband consumers as a whole; (2) Data are not comparable to that published in the January 2009 broadband speeds report as one operator has re-stated its package split (while the average headline speed of connections over 8Mbit/s has fallen significantly as a result of Virgin Media upgrading many of its 2Mbit/s and 4Mbit/s connections to 10Mbit/s)

5.19   Focusing in particular on the 'up to' 8Mbit/s packages (which in April 2009 accounted for 57% of residential UK broadband connections), we found that fewer than one in ten of our sample on 8Mbit/s headline packages received actual speeds of over 6Mbit/s and one in five received less than 2Mbit/s (Figure 9).

[16] http://www.ofcom.org.uk/research/telecoms/reports/broadband_speeds/

Figure 9: Average download speeds for panellists on 'up to' 8Mbit/s packages

Source: SamKnows measurement data for all panel members with a connection in April 2009
Note: Data have been weighted by demographics, ISP and headline speed in order to ensure that they are representative of UK broadband consumers as a whole

5.20   As detailed above, the length of the line from premises to exchange constrains the speeds that are available via DSL broadband (all 'up to' 8 Mbit/s packages in the UK are delivered via DSL). Figure 10 indicates that there is a strong relationship between the average speeds delivered and the distance from the exchange. (Note that the distance is the straight-line distance calculated from the six-digit postcodes of premises and exchanges).

Figure 10: Distance from exchange and average download speeds achieved by panellists on packages of 'up to'
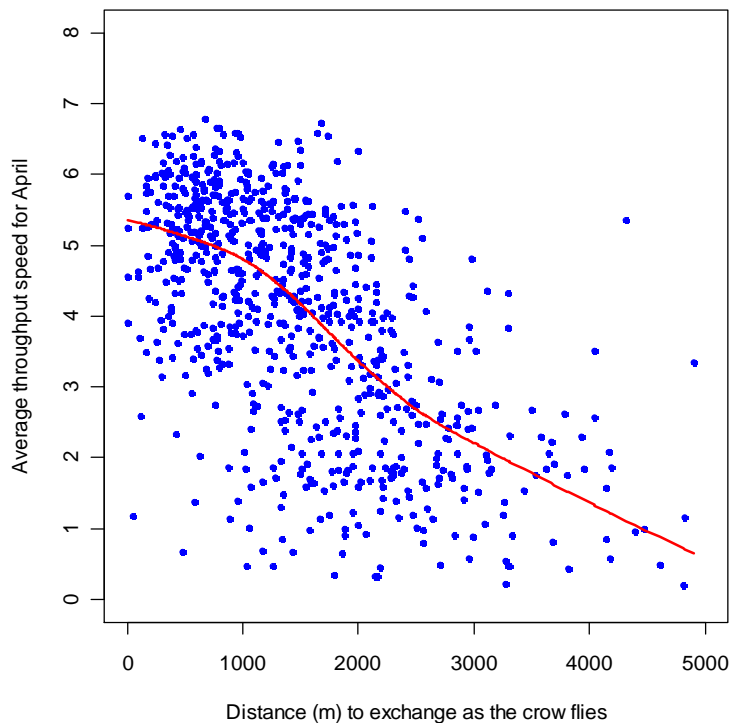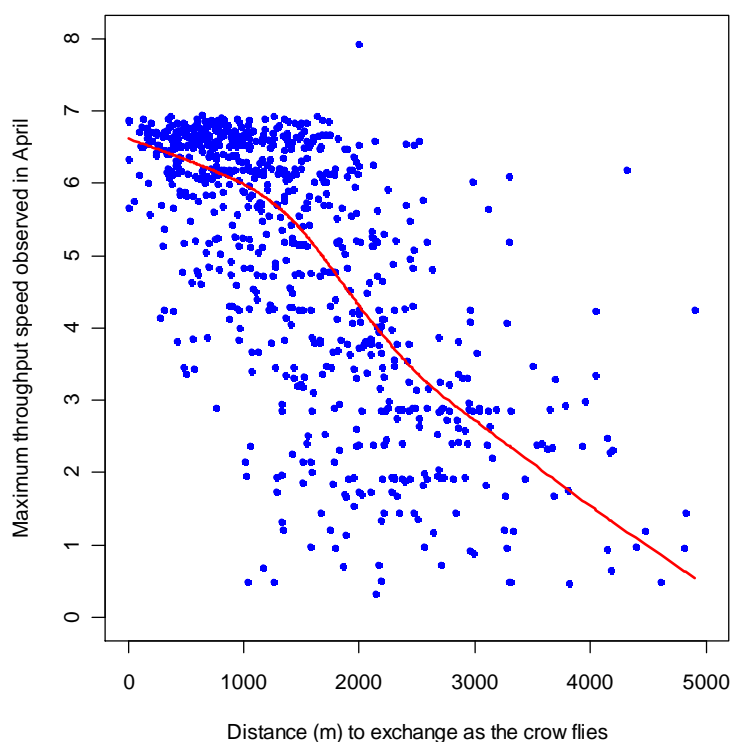

8Mbit/s

Source: SamKnows measurement data for all panel members with a connection in April 2009.

5.21   The relationship is a little stronger when the maximum speeds received are plotted against distance from exchange (Figure 11). This chart also highlights that hardly any customers on packages of 'up to' 8Mbit/s ever receive speeds higher than 7Mbit/s, indicating that even those customers living very close to an exchange do not experience the headline speed when downloading files. This is because the advertised speed refers to the modem synchronisation speeds (see 5.1), but some of the available capacity is reserved by ISPs for use by critical communications protocols which are required for the connection to operate. ISPs typically limit the bandwidth available for end users data in order that there is sufficient capacity for this other 'overhead' data. For example, if a line synchronises (connects to the DSLAM at the exchange) at 8128kbit/s (~8Mbit/s), systems such as the BT broadband Remote Access Server (BRAS) system limit user traffic to 7.15Mbit/s.

Figure 11: Distance from exchange and maximum download speeds achieved by panellists on packages of 'up to' 8Mbit/s
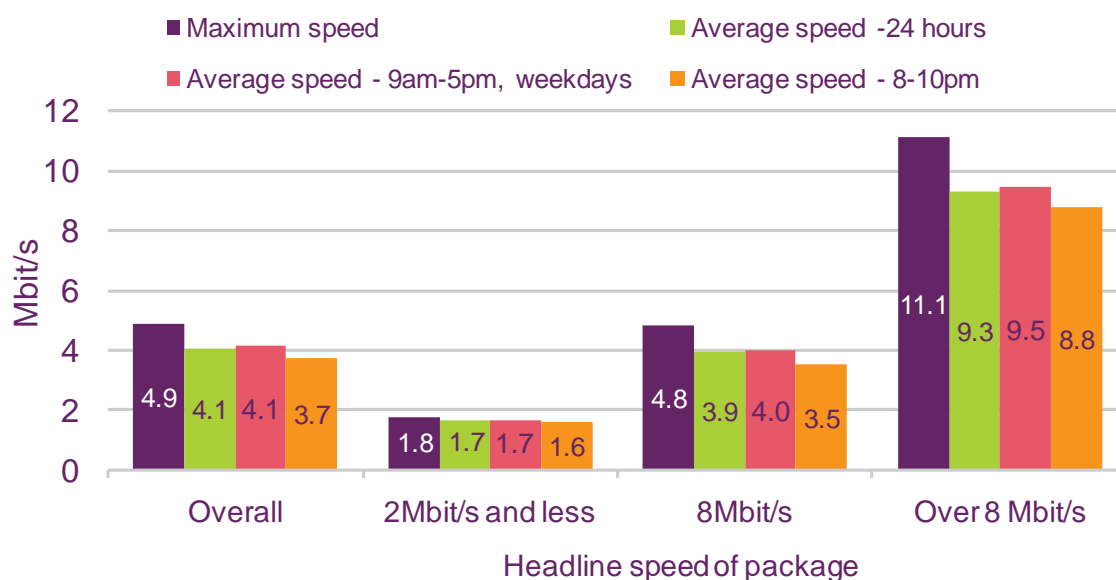

Source: SamKnows measurement data for all panel members with a connection in April 2009.

5.22   Overall, we found that average actual download throughput broadband speeds delivered were 4.1Mbit/s. This represented 57% of the average advertised 'up to' speed (7.1Mbit/s), and 83% of the average maximum speed delivered (7.1Mbit/s). (Note that as we were not able to run specific access line tests for our panellists, we use the highest download throughput speed test recorded during the month as the maximum line speed). (Figure 12)

5.23   Broadband speeds are also constrained by contention in the network, which affects all types of broadband (including DSL, cable and mobile broadband). Figure 12 shows how speeds during the peak evening period of 8-10pm are on average across all panellists only around 77% of the maximum speed ever recorded (typically during an off-peak hour when there is very little contention in the network).

Average speeds in this peak evening period are around 90% of the average speeds recorded throughout the day. Speeds in the 'working' hours of 9am-5pm Monday to Friday are marginally faster than overall average speeds.

Figure 12: Variations in download throughput speeds by time of day

Source: SamKnows measurement data for all panel members with a connection in April 2009
Note: Data have been weighted by demographics, ISP and headline speed in order to ensure that they are representative of UK broadband consumers as a whole

5.24   We had sufficient sample sizes to be able to compare the speeds delivered to consumers on 'up to' 8Mbit/s DSL services with those delivered to customers of Virgin Media's 'up to' 10Mbit/s cable service. Figure 13 summarises the speeds achieved by ISPs in different time periods to a 95% confidence interval around the mean.

5.25   Our research found that the average actual speeds received by Virgin Media cable customers on 'up to' 10Mbit/s (8.1 to 8.7Mbit/s) are significantly higher than those delivered by any of the largest eight DSL operators' 'up to' 8Mbit/s packages. Among the DSL operators, average download throughput speeds sit in a range of 3.2 – 5.1Mbit/s, with significantly faster average speeds delivered by O2[17], Orange, Plusnet, Sky and TalkTalk than by AOL Broadband and Tiscali.

---

[17] We have considered O2 and Be customers together

Figure 13: Average download speeds, April 2009

|	Average download throughput speed during period (Mbit/s)			
	24 hours	8-10pm	3-11pm	9am-5pm Mon-Fri
AOL 'up to' 8Mbit/s	3.3 - 3.9	2.8 - 3.4	3.1 - 3.6	3.4 - 4.0
BT 'up to' 8Mbit/s	3.8 - 4.2	3.1 - 3.5	3.4 - 3.8	3.8 - 4.3
O2 'up to' 8Mbit/s*	4.1 - 5.1	4.1 - 5.1	4.1 - 5.1	4.2 - 5.2
Orange 'up to' 8Mbit/s	3.8 - 4.5	3.3 - 3.9	3.6 - 4.2	3.9 - 4.6
Plusnet 'up to' 8Mbit/s*	3.8 – 4.9	3.7 - 4.7	3.7 - 4.7	3.9 - 5.0
Sky 'up to' 8Mbit/s	4.0 – 4.7	3.7 - 4.4	3.8 - 4.5	4.1 - 4.8
TalkTalk 'up to' 8Mbit/s	3.8 – 4.6	3.7 - 4.5	3.8 - 4.5	3.8 - 4.5
Tiscali 'up to' 8Mbit/s	3.2 – 3.7	2.5 - 3.0	2.8 - 3.3	3.4 - 4.0
Virgin Media 'up to' 10Mbit/s	8.1 – 8.7	7.5 - 8.2	7.8 - 8.5	8.4 - 9.0
Other 'up to' 8Mbit/s*	3.3 – 4.6	3.2 - 4.5	3.1 - 4.4	3.2 - 4.5

Source: SamKnows measurement data for all panel members with a connection in April 2009
*Caution: small sample size (<50)
Note: The range shown represents a 95% confidence interval around the mean.

5.26　The access technology used is a significant driver of variation in broadband speeds delivered. Services delivered via cable offer higher speeds on average than comparable DSL services because, unlike DSL broadband, there is no significant degradation of performance over the length of the line to a consumer's premises. Second generation DSL broadband (ADSL2+) can deliver faster speeds than first generation DSL broadband (ADSL1).

Figure 14: Average download throughput speeds by technology and headline package, April 2009
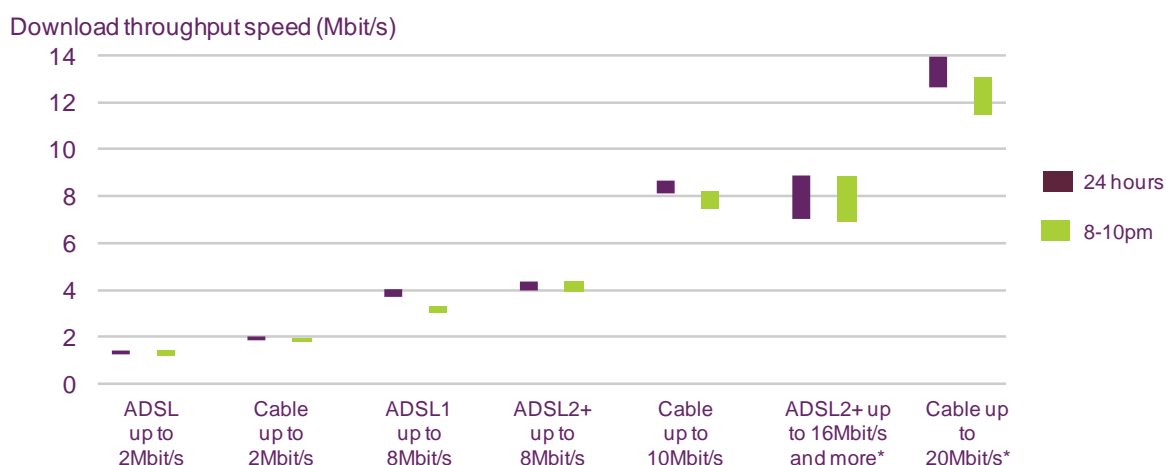
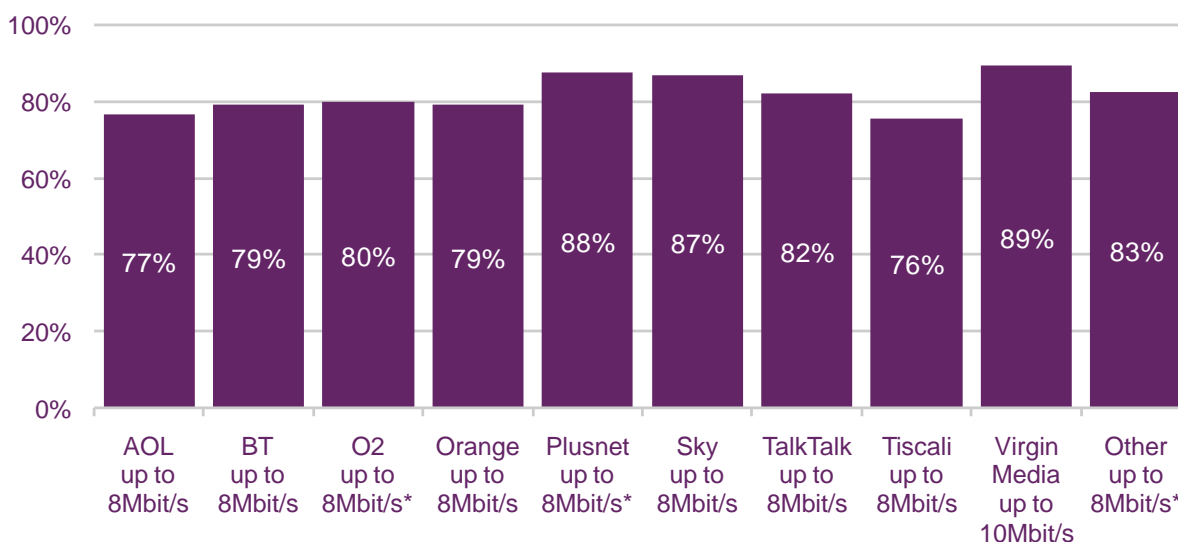*Source: SamKnows measurement data for all panel members with a connection in April 2009*
*Caution: small sample size (<50)
Notes: (1) Data for ADSL1 up to 2Mbit/s and ADSL1 and ADSL2+ up to 8Mbit/s have been weighted by distance from exchange; data for ADSL2+ services up to 16Mbit/s and all cable services have been weighted by region and rural/urban; (2) The 'error margin; shown represents a 95% confidence interval

5.27   Mobile broadband (i.e. broadband services delivered via cellular networks typically to a USB modem or 'dongle') was outside the scope of our own research. Data published by Eptiro in June 2009 suggest that mobile broadband at headline speeds of 'up to' 3.6Mbit/s or 'up to' 7.2Mbit/s typically deliver average actual speeds of less than 1Mbit/s, significantly slower than any DSL or cable packages.[18]

5.28   Another driver of variation between ISP performance is the backhaul capacity available (which determines the level of contention in the network. Figure XX below shows the impact of contention in the network by examining the average speeds delivered against the maximum line speeds (defined as the maximum speed a customer ever received) for DSL and cable services of 'up to' 8Mbit/s or 10Mbit/s.

5.29   This is useful because it highlights the areas over which the ISP theoretically has control (as maximum speed is defined by the physical constraints of the connection into a home, the average speed as a proportion of the maximum speed reflects performance within these constraints). The maximum line speed is also important to the way in which broadband is sold, since under Ofcom's Code of Practice for Broadband Speeds, suppliers who have signed the Code have committed to advise customers of the maximum line speed (also known as the access line speed) at the time of purchase.

5.30   The analysis shows that there are some differences between operators, indicating that contention in the network is a bigger issue for some ISPs than for others. Average speeds delivered by Plusnet, Sky and Virgin Media are significantly closer to maximum line speeds than for any other operator, meaning it is likely that their customers will typically receive more consistent speeds throughout the day.

Figure 15: Average speeds (24 hours) as a proportion of maximum speeds, April 2009

Source: SamKnows measurement data for all panel members with a connection in April 2009
*Caution: small sample size (<50)
Notes: (1) Includes combined LLU and non-LLU customers, data have been weighted to splits provided by ISPs; (2) Data have not been normalised by distance from exchange as it indicates average speed as a proportion of maximum speed and should not therefore be affected by differences in line length caused by differences in customer profile.

---

[18] www.epitiro.com/news/epitiro-publishes-uk-mobile-broadband-research.html

Ofcom's next steps

5.31 Broadband speeds vary as a result of a number of factors and ensuring that consumers are informed of the speeds available in a way which is accurate and easily understandable is not straightforward. Considerable progress has been made within the last year in improving the information which consumers have to inform their purchase decision. Specifically, Ofcom has taken a number of measures to ensure that consumers are properly informed about broadband speeds:

- **Access line speeds and variations in broadband speed**. All providers who have signed up to Ofcom's voluntary code of practice on broadband speeds are required to advise of the access line speed and how actual speeds may be lower.

- **Comparative actual speed data.** Given the complex factors which combine to determine the actual speeds delivered, it is unrealistic for broadband to be sold by the average actual download speed which consumers will receive. Nevertheless, it is important that consumers have access to comparable data on actual speeds delivered by ISPs. Ofcom's recent research into actual broadband speeds has identified that there is significant variation in performance between operators offering services at the same advertised speed, and that there is also variation between maximum speeds and average speeds.

- **Consumer information.** Ofcom has also published consumer guides[19] on broadband speeds and choosing a broadband provider which have helped to inform and empower consumers.

- **Advertised speeds.** Broadband packages are advertised as delivering 'up to' speeds. This is in accordance with Advertising Standards Authority (ASA) guidelines which recognise that it is important for providers to be able to differentiate between different products, and the variation in actual speeds means it is not practical for providers to advertise on the basis of actual speeds.

5.32 However, consumer research and research into actual speeds has identified that ISPs need to do more to ensure that they are giving their customers enough information about the services they provide and the types of factors that may impact on the actual speed they receive.

- Consumer research in September 2008 (before the Code came into force) found that speed of connection was a key cause of dissatisfaction with broadband services and that over a quarter of consumers (26%) thought that their actual connection speed was not what they expected when they signed up.

- Research into actual speeds finds that on average actual speeds are only 83% of maximum speeds and are slower still in the peak evening periods. There is also variation between operators.

---

[19] http://www.ofcom.org.uk/advice/guides/bbchoice.pdf
http://www.ofcom.org.uk/advice/guides/bbspeeds.pdf

5.33   Ofcom is committed to monitoring the market and intervening as appropriate to ensure that the broadband market operates efficiently and that consumers have access to the information they need to make optimal choices of broadband supplier. Our work within the next six months will include the following:

- Ongoing research to assess consumer satisfaction with aspects of broadband services, including speed of connection.

- Working with industry and consumer stakeholders to determine how best to ensure that consumers have access to accurate and comparable actual speed data on an ongoing basis.

- Mystery shopping research to assess compliance with the voluntary code of practice on broadband speeds and remedial action if required.

- Defining scope and timing of future research into actual broadband speeds

- Ongoing monitoring of consumer complaints regarding broadband speeds and the miss-selling of broadband.

- Continuing engagement with the ASA on the guidelines for the advertising of broadband

- Considering revisions to the Code of practice in the light of the above, including whether it should be made mandatory and whether a requirement to advise of actual speeds should be incorporated.

Section 6

To what extent does current regulation strike the right balance between ensuring fair competition and encouraging investment in next generation networks?

6.1 As part of its recommendations in the *Digital Britain* Report, the government proposed to amend the Communications Act 2003 to make the promotion of investment in communications infrastructure one of Ofcom's principal duties alongside the promotion of competition, to meet our overarching duties of securing the interests of citizens and consumers in the provision of communications services.

6.2 It is worth noting that our duties already attach a great deal of importance to incentivising investment, particularly in relation to electronic communications networks. Specifically, under Article 8 of the Access and Interconnection Directive, 2002, and transposed under Section 3 of the Communications Act 2003, Ofcom is already duty bound to promote competition in the provision of electronic communications networks and services by, *inter alia*, "encouraging efficient investment in infrastructure, and promoting innovation."

6.3 Ofcom does not consider that competition and investment are necessarily mutually exclusive. Our duties to consumers and citizens can be best met through both securing competition and promoting investment. Our regulatory framework promotes investment by ensuring contestability, recognising risk and giving certainty. We have given specific consideration to investment in new build next generation networks in our guidance notes published in May, which draw on our previous statements, aiming to provide further assurance by setting out expectations in advance of the market developing .

6.4 Moreover, Ofcom adheres to defined procedures in regulating markets to ensure that we act proportionately and effectively,[20] in line with our regulatory principles. These are outlined below.

Regulation and investment – the UK experience

6.5 Shortly after Ofcom came into being, we initiated a Strategic Review of Telecommunications in 2004. This recognised the need for investment in emerging technology and new platforms by competing scale operators alongside BT in order for the UK economy to remain competitive and to therefore promote competition at the deepest, economically viable, level possible.

6.6 Our Review's conclusions led to elements of BT's assets identified as economic bottlenecks being placed into a separate business unit, Openreach, which in combination with agreed price reductions in provision of essential wholesale services and the improvement of ordering and fault processes under the auspices

---

[20] The European Competitive Telecommunications Association (ECTA), commissions a regulatory scorecard that compares the regulatory environment in 18 EU Member States, as well as Norway and Turkey, in the electronic communications sector and its effectiveness in promoting the objectives of the EU Regulatory Framework. In the latest scorecard for 2008, as in previous years the UK came as the overall leader.

of the Office of the Telecommunications Adjudicator; this facilitated BT's competitors to offer retail broadband services over BT's copper wires via local loop unbundling. This has created greater certainty for BT's competitors, allowing them to make significant investment in new infrastructure. And we have seen a wave of new investment by well-resourced competitors like Sky, O2, and Carphone Warehouse to deliver LLU-based services. In fact, the number of operators investing **increasing threefold** between 2005 and 2008.

6.7   By the end of August 2009, there were **6.06 million** unbundled lines, compared to just **200,000** when Ofcom published its Statement accepting BT's undertakings in September 2005. There was a twofold increase in the number of LLU enabled exchanges between the end of 2005 and September 2008, at which point some 1,902 exchanges had been LLU enabled. Over the same period the percentage of households with access to at least one LLU operator increased from 40% to 83%. Ofcom's initiatives to promote competition have also resulted in greater scope to deregulate the associated wholesale broadband access market in almost 70% of country where competitive investment in LLU has taken place with four or more operators present.

Figure 16: Unbundled local loops
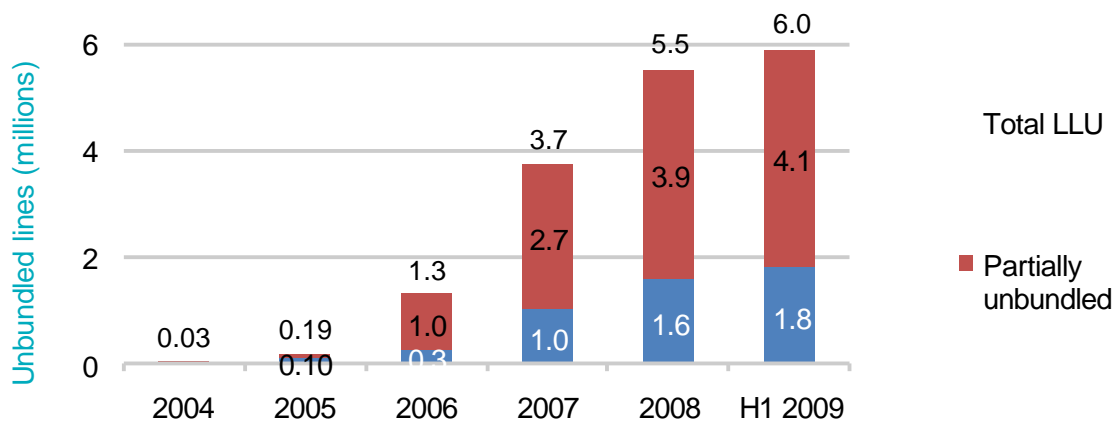
6.8   At the same time, BT has been investing in its next generation core network **21CN**. The focus of this investment programme has recently shifted away from moving its legacy voice telephony customers onto a new platform, but BT continues to invest in its next generation network, or NGN. BTs NGN-based broadband services were launched in mid 2008 and are currently available in 548 exchanges which equates to coverage of approximately 40% of the population. By April 2010 BT expects these services to reach 55% of the population.

6.9   These new networks have the potential to deliver significant benefits to consumers, competitive communication providers and BT. Equally, Ofcom is sensitive to the fact that the investment climate for NGNs will be affected by regulatory risks, including uncertainty about the level and nature of future regulation. The areas where we are seeking to reduce this risk are set out below.

6.10   A **holistic approach to next generation voice interconnect.** Clarity and predictability about the regulation of narrowband voice interconnection charges is particularly important for all communication providers making NGN investments. Our

proposed approach for next generation narrowband voice interconnect is that where Significant Market Power (SMP) – i.e. market dominance - is found, reasonable charges should take account of the need to avoid creating artificial arbitrage opportunities by taking a holistic approach to cost recovery that avoids distorting incentives, and the need to allow an appropriate return on BT's investment in NGNs. We believe that this can be implemented using our existing powers.

6.11 **The cost of capital**. Ofcom acknowledges that there may be specific demand and technology risks associated with BT's 21CN investment. Ofcom's consultations on risk and the cost of capital consider how Ofcom could take into account such risks in setting an appropriate investment return[21].

6.12 **Reducing uncertainty for alternative providers**. A key purpose of our approach to NGN is to help reduce uncertainty for alternative providers about the impact that NGN migration, specifically 21CN, will have on the current SMP access and interconnect arrangements.

6.13 However, the issues raised by the migration to next generation access networks, i.e. the migration from copper to fibre-based access, are distinct from the issues raised by the migration to NGNs outlined above and we have taken extensive steps in this separate area as well.

6.14 BT also announced in July 2008 that it intended to invest £1.5 billion deploying next generation super-fast broadband services which will deliver up to 40Mbit/s to 40% of UK homes by the end of 2012, and in May 2009 BT announced that it was examining doubling the pace of this deployment. In the interim, BT also announced that it will increase the number of homes that can receive its ADSL2+ network, which offers speeds of up to 24Mbps, to cover 75 percent of Britain by spring 2011 and 55 percent by spring 2010.

6.15 Virgin Media has also launched a 50Mbit/s product, now available across its network and the company has also announced it is planning to invest in extending its network beyond the 45 per cent of the country it covers today.

6.16 There are also a wide range of other smaller scale investments in NGA, including H2Os use of sewers to build high performance new access networks in Bournemouth and Dundee. A selection of super-fast broadband implementations and trials are highlighted in Figure 18 below.

Figure 17: Selected UK super-fast broadband implementations and trials

---

[21] see www.ofcom.org.uk/consult/condocs/cost_capital2/

Company	Deployment type	Maximum download speed	Technology	Where	Scale	When
Virgin Media	Commercial	50Mbit/s	DOCSIS 3.0 cable	Virgin Media cable footprint	12.6m homes by summer 2009	Rollout started Q4 2008
Fibrecity (H2O Networks)	Commercial	100Mbit/s	FTTH	Bournemouth and Dundee	c88,000 homes on completion	Rollout started Q1 2009
Titanic Quarter (Redstone plc)	Commercial	100Mbit/s	FTTH	Belfast	5,000+ premises on completion	First tenants in H2 2009
BT	Commercial	Burst to 100Mbit/s	FTTH	Ebbsfleet Valley	10,000 homes on completion	Currently serving <100 homes
Virgin Media	Trial	200Mbit/s	DOCSIS 3.0 cable	Ashford, Kent	c100 homes	May 2009 for six months+
BT	Pilot	40Mbit/s	FTTC	Muswell Hill and Whitchurch	c.15,000 homes	Deployed in July 2009

6.17 We recognise that building such networks involves very substantial investment, and potentially long payback periods. Prospective investors therefore seek certainty over the regulatory landscape, particularly with respect to regulation of charges. Ofcom is keen to ensure that prospective investors are not inhibited from investing in super-fast broadband because of the regulatory regime and consumers gain maximum benefit from the delivery of new high-speed services now and in the longer-term.

6.18 On this basis, we have published statements with a view of setting out the regulatory principles in relation to next generation access deployments, in order to provide regulatory certainty. These principles have already been published in a number of documents.[22]

6.19 As indicated above, we believe that our duties with respect to consumers and citizens can be best met by both promoting investment to support early deployment and widespread availability of super-fast broadband and by securing competition at the deepest level that is effective and sustainable, particularly in the longer term.

6.20 In practice these translate into five principles. These are based on the original regulatory principles outlined in our 2005 Strategic Review of Telecommunications but are expanded to reflect the differing characteristics of next generation fibre based networks compared to current generation copper networks, specifically:

- **Contestability**: creating conditions that allow any player who sees a case for deploying next generation access infrastructure to invest, as soon as they wish;

- **Maximising potential for innovation**: scope for innovation and differentiation is essential for competition in next generation access;

- **Equivalence:** in order to deliver effective competition, we must ensure all players have equal opportunities to access wholesale services at the levels where competition can be effective and sustainable;

---

[22] *Delivering super-fast broadband in the UK*, Policy statement, March 2009; and *New Build Guidance*, May 2009

- **Reflecting risk in returns:** investors in next generation access must have the opportunity to earn returns on investment that reflect the level of risk incurred; and

- **Regulatory certainty:** the regulatory regime must be clear and in place for a reasonable period of time. This will give investors the clarity that they need to invest with confidence.

Each one of these five principles are important to promote competitive investment and it is worth considering how each principle is being addressed practically by Ofcom at the present time.

6.21 **Contestability.** The principle of contestability seeks to secure effective and sustainable competition for consumers in the future. In practice Ofcom must consider the appropriateness of options for new regulatory remedies which are based both on physical access to ducts and well as electronic-based wholesale services. This also means ensuring the retaining of options for future competition that make future market entry possible on the most cost-effective basis possible and that Ofcom will promote inter-platform competition e.g. through spectrum release.

6.22 **Maximising the scope for innovation and differentiation.** We expect that electronic-based products will develop further in the future and offer scope for competitive differentiation and innovation that are not possible with existing wholesale 'bitstream' products. To support this objective, we have been working closely with industry to develop a good understanding of the technical requirements for active products. We believe it is important for active products to reflect many of these requirements. The feedback from our stakeholders suggested that this can be best delivered through industry's existing approaches to new product development and we have made significant progress in standardisation of such products with standards bodies in the UK and internationally including, the Broadband Forum, MEF, ITU, and NICC.

6.23 **Equivalence.** In practice this means a requirement to meet reasonable demand for deployment of next generation access at the same time as BT. This may include the provision of inputs using the same components, processes and systems BT uses itself where reasonably practicable, or otherwise to the same specifications, functionality and performance. This work has already been taken forward in relation to variations to the BT undertakings covering fibre-based services.

6.24 **Reflecting risk in returns.** We believe that pricing flexibility on wholesale electronic-based services is appropriate and that for physically-based products - such as duct access - cost-based pricing that reflects the level of risk incurred is appropriate and will support investment and competition. In either case, the pricing of products must allow opportunities to recover costs and earn **a reasonable rate of return on investments**. However, while companies may have freedom to set specific price levels, we will continue to monitor pricing for behaviour that suggests anti-competitive motives or effects. This will include the relative levels of prices or other activities that may be undertaken to undermine fair competition.

6.25 In summary, Ofcom believes that its duties to consumers and citizens can be best met through both promoting investment and securing competition. Our regulatory

framework promotes investment by ensuring contestability, recognising and allowing reward for risk and providing longer-term regulatory certainty wherever possible. We have given specific consideration to investment in recent statements and guidance, setting out expectations in advance of the market developing to provide further assurance. Finally, Ofcom adheres to defined procedures in regulating the market to ensure that we act proportionately and effectively, in line with our regulatory principles.

25 September 2009