Ofcom
OFFICE OF COMMUNICATIONS

National Assembly Enterprise and Learning Committee

Inquiry into the Contribution of Higher Education to Economic Development in Wales

Broadband Access in Wales

Contents

Section 1

Introduction

Broadband Availability and Take-Up in Wales

1.1 Wales faces significant broadband infrastructure access issues and rural areas in particular risk isolation through an increasing digital divide. Consumer and citizen expectations, for example, of the delivery of audio visual content via broadband, may well exceed what is available technically in rural areas, where consumers and citizens could continue to experience multiple deprivation of communications services, for example, a lack of mobile coverage, slow or unavailable broadband connections and a lack of digital television and digital radio coverage.

1.2 The information in this submission is based on evidence given earlier in the year to the Parliamentary Welsh Affairs Committee's inquiry into Globalisation and more recently, to the National Assembly Broadcasting Committee. However, this document also includes a summary of data and findings published in our third review of the Communications Market Report for Wales, published on 22 May this year. The full report is available at: http://www.ofcom.org.uk/research/cm/cmrnr08/wales/ and includes additional data charts and tables, not included in the printed version of the report. Ofcom continues to seek, within the resources available, to deepen the geographical detail of its research, as well as to reflect on new themes and patterns of consumer behaviour, brought about by the convergence between fixed and wireless communications technologies. However it should be noted that the granularity of data involved in this research has grown and care needs to be taken in drawing excessively far-reaching conclusions from data based upon small sample sizes.

1.3 Ofcom's work on its second review of public service broadcasting (PSB) will also have to take account of the communications market in Wales along with its other strategic work on the radio spectrum, a vital economic resource, including the Digital Dividend Review (DDR).

1.4 DDR spectrum could be used for a wide range of new services, including wireless broadband access, mobile phone services, mobile multimedia services, additional digital television channels/ additional high definition television services and other new services. The DDR process will in essence be driven by market mechanisms and market demand. It is not for Ofcom to mandate the best use for this highly valuable resource but it is through market mechanisms that the most efficient use of the released spectrum will be achieved. However, realising the benefits from this process for consumers and citizens in Wales, where economies of scale are less evident than in the UK generally, could be a challenge. However, Ofcom aims to ensure that the design of the spectrum auctions will prevent 'spectrum hoarding' and other anti-competitive behaviours.

1.5 As a converged regulator, Ofcom has been able to supply a quality of data and evidence about the communications sector in Wales, through for example, its annual communications market reports; we therefore welcome the Committee's deliberations on this very important subject area.

Section 2

Key themes

Take-up of digital TV and broadband has slowed in Wales

2.1 Since the end of 2006, take-up of digital television in Wales has risen by 2 percentage points, to 84%. This modest rise contrasts with England and Scotland where relatively large increases of 11 and 9 percentage points respectively were recorded over the same period.

2.2 Historically, take-up of digital TV in Wales has been higher than the UK average, related to poor analogue television reception in some parts of the country and the availability of the full Channel 4 service on digital television platforms. However large increases in 2007 mean that England (86%) and Scotland (85%) now have similar levels of take-up to Wales, while Northern Ireland stands at 79%.

2.3 During the same period, broadband take-up in Wales has increased by 3 percentage points to 45%. Wales now has the lowest broadband penetration of the UK nations. This contrasts with significant growth in other parts of the UK; in England take-up rose from 44% to 57%; in Scotland from 46% to 57% and in Northern Ireland from 42% to 52%.

Communications service take-up is highest in Cardiff, Swansea and Newport

2.4 New survey data this year allows us to see how take-up and use of communications services varies across different parts of Wales.

2.5 Take-up of digital TV is highest in Cardiff (95%), Swansea (88%) and Newport (88%), compared to the Wales average of 84%. Similarly, take-up of broadband is highest in Cardiff (58%), Swansea (56%) and Newport (62%), and lowest in smaller urban areas in the south (34%) and Wrexham and the urban north (44%).

2.6 Use of converged communications services is highest in Cardiff, and in some cases Swansea. For example, use of VoIP (voice over Internet protocol) stands at 17% in Cardiff and 18% in Swansea compared to the average of 11% across Wales. Over a third (36%) of adults in Cardiff have watched video content online, compared to 24% across Wales. Adults in Cardiff are also more likely to have listened to radio online 14% compared to the Wales national average of 9%. Other highlights include;

- A quarter of adults in Wales have watched video content online
- Broadcasters operating in Wales are repackaging regional content for distribution over the internet; the BBC, S4C and ITV all offer online Wales-focused programmes. Around a quarter (24%) of adults in Wales have used the internet to watch TV or video content, rising to 36% in Cardiff. This compares with 30% across the UK as a whole. Use appears to correlate with broadband penetration.
- One in ten adults in Wales have listened to radio online
- Many radio stations offer listen-live functionality over the internet. One in ten (9%) in Wales have used the internet to listen to the radio; lower than the UK average (13%). Use is higher in England, with similar levels in Wales, Scotland and Northern Ireland.

- One in ten adults in Wales have made VoIP telephone calls

- Eleven per cent of adults have used the internet to make VoIP telephone calls in Wales, very similar to the UK figure (12%), and up from around 7% in 2006. Use appears higher in Cardiff and Swansea, and lower in rural areas. Unsurprisingly, use of VoIP also correlates with broadband penetration.

- 17% of adults in Wales have accessed mobile internet

- Accessing the internet using a mobile phone is less common in Wales (at 17%) than the UK average (20%).

- 16% of adults in Wales have listened to audio on a mobile handset…

- One in six adults (16%) in Wales have used their mobile handset to listen to audio content – a similar level to the UK overall. There is a big difference between urban and rural areas, where use stands at 17% and 11% respectively.

- …although very few have watched video on a mobile handset

- Across Wales, only a very small proportion have used their mobile to watch television or video clips – 4%, the same as the UK as a whole.

- 15% of adults in Wales have used a social networking site

- Fewer people in Wales use social networking sites than the UK average – 15% compared to 20%. Again this is related to the lower take-up of broadband in Wales.

- 16,000 Wikipedia articles are available in Welsh

- More Wikipedia articles are written in Welsh than any other UK indigenous language other than English. As of January 2008, there were around 16,000 Wikipedia articles written in Welsh, two and half times as many as were written in Irish.

- Take up of telecoms services lower in Wales than the rest of the UK

- Take-up of telecoms services is generally lower in Wales than in the rest of the UK: 79% of households in Wales have a fixed-line (compared to 87% across the UK), 82% have a mobile phone (84% across the UK) and 55% have internet access at home (65% across the UK). Take-up of fixed and mobile telephony in rural areas of Wales (74%) is lower than average in rural areas of the UK (84%).

- Broadband take-up is highest in Cardiff and Swansea.

- Internet access in Wales has not grown significantly since 2006 although broadband take-up rose from 43% to 45% over the period.

- Broadband penetration is higher across the larger southern urban areas (58% in Cardiff and 56% in Swansea), and lower in the smaller southern towns (34%). Broadband take-up in rural areas of Wales is similar to that in rural areas of Northern Ireland, but lower than in England and Scotland.

- 3G take-up in Wales highest in the UK
- Reported take-up of 3G mobile services in Wales (20%) is higher than in England (18%), Scotland (14%), or Northern Ireland (17%).
- 82% of broadband customers in Wales are satisfied with connection speed
- Ninety per cent say they are satisfied with their broadband service in Wales, similar to the level across the UK as a whole (89%). A slightly lower proportion of broadband customers (82%) are satisfied with the speed of their broadband connection, consistent with the UK average (83%).
- 89% of mobile customers in Wales satisfied with reception
- Eighty-nine per cent of people in Wales are satisfied with their mobile phone reception, slightly higher than the UK average (87%). Satisfaction levels are lower in rural areas (84%) than in urban areas (90%), with people in Mid Wales the least satisfied (77%).

Section 3

The Broadband and Telecommunications Infrastructure in Wales

3.1 Broadband has offers a very different user experience to a dial-up connection which was the initial way most consumers and many small businesses began to access the Internet during the mid to late 90s. Broadband offers always–on connection and tariffs based on fixed contract rates rather than charges per minute as is the case with dial up narrowband Internet services. The most popular form of broadband delivery for consumers is via DSL, (digital subscriber line), a service which is provided over the existing telephone line access network. Copper telephone lines, running underground or on poles, carry a conventional telephone service along with an additional higher frequency signal which carries the broadband service to homes and business premises. Unlike dial-up internet, DSL broadband does not tie-up the telephone line so that voice calls on a line can be made at the same time as accessing Internet data. Unlike telephony, however, the availability of broadband DSL depends upon distance from an exchange. Premises situated further away than 5km are generally unable to receive a service.

3.2 Internet delivered via broadband can be also be regarded as an alternative digital broadcasting platform, capable of carrying streamed audio and video content, including broadcast television and video on demand services. However, access at sufficient data speeds to carry near standard definition television is limited in practice to premises situated around 2km or nearer to an exchange (in the case of DSL broadband).

3.3 Virgin media operates a cable network in Wales, which represents an alternative method of receiving a broadband service but access to this network is only available in the urban areas of south east Wales, Cardiff, Newport, Swansea and parts of the vale of Glamorgan.

3.4 Internet delivered programming is currently provided by the BBC, via its iPlayer and Channel 4 (via 4OD) and through the use of Windows Media Player/proprietary software from S4C and ITV Local Wales on their web sites. In addition, BT has launched BT Vision, a video on demand service, delivered via broadband and Inuk Networks, based near Newport, provide their broadband based ‘Freewire’ Internet television service to a number of university campuses across the UK.

BT’s Core Network: 21CN

3.5 In 2004, BT announced that the roll-out of its £10bn UK 21st Century (21CN) next-generation network would start in South Wales. This investment is essentially in the core networks operated by BT that eventually feed local exchanges. As such it does not directly impact on the future upgrading of lines from the exchanges to premises and end users (known as the access network or ‘last mile’). Currently significant problems still remain in some isolated communities in Wales, for example where, historically, limited line connections (via line concentrators) have been installed to compensate for infrastructure limitations. Such communities may have grown in size but the number of simultaneous calls that can be made remains limited and provision of Digital Subscriber Line DSL broadband is not possible.

3.6 On 28 November 2006, BT customers in the village of Wick in South Wales became the first in the UK to be migrated to the 21CN network, in what will be a five-year, 20 million line, UK-wide migration programme. BT originally stated that it would aim to migrate 350,000 domestic lines in South Wales to the new core IP-based network by the end of summer 2007, but following software problems at Wick, relating to the migration of legacy telephone systems from the old PSTN network, the roll out schedule has been delayed. In all, 1.23 million customer lines will eventually be migrated in Wales (4.8% of the total lines in the UK), involving a capital investment of £460m.

3.7 BT estimates that it has already laid more than 2,300 kilometres of fibre optic cable in South Wales as part of the upgrade process. 21CN is capable of delivering high-bandwidth services to the exchanges that can be accessed by households and businesses in Wales. In the future, ADSL2+ technology will offer maximum download rates of up to 24Mbit/s for premises located within 2 km of an exchange. BT launched a Cardiff based trial of ADSL2+ towards the end of 2006. Working with BBC Wales, BT demonstrated the transmission of high-definition television pictures over the new network using, as an example, the Wales-produced BBC Drama, Torchwood.

Broadband enabled exchanges

3.8 DSL broadband can now be provided at most exchanges in Wales, providing broadband services to users based up to 5km from the exchange. (Generally the service level reduces the further a customer is from an exchange). According to Ofcom research, commissioned in 2006, 16% of premises in Wales are situated further than 5 km from an exchange (compared to the UK average of 13%, while 19% of premises in Wales are within 2km of an exchange (allowing users to take advantage in the future of significantly higher broadband speeds) compared with a UK average of 17%.

3.9 Significant progress was made during 2006 towards ensuring DSL broadband is available to all Welsh homes, thanks to the EU-approved Regional Innovative Broadband Support Scheme (RIBS). Following the Welsh Assembly Government's announcement in March 2006 that BT had been awarded the contract to upgrade a final tranche of 35 exchanges in Wales, 33 of these exchanges were broadband-enabled by October, extending broadband access to a further 9,259 premises. All exchanges upgraded under the RIBS scheme will deliver ADSL Max services, offering bandwidths up to 8 Mbit/s with the result that 433 exchanges in Wales are now capable of supporting ADSL Max. The enabled exchanges will also be able to support future upgrade programmes, for example to ADSL2+, when these are rolled out. The RIBS project (now known as RIBS 2) has now shifted its focus to addressing 'not-spot' areas in Wales which, due to localised technical issues such as the presence of line concentrators or aluminium rather than copper cable, are not able to receive ADSL services, or can only access broadband services at very low bandwidths.

3.10 The first part of the RIBS contract was completed when the last two exchanges, Rhos and Llawhaden, were upgraded in summer 2007, allowing an additional 7,500 premises to be served by broadband enabled exchanges. However there are still a number of 'not-spot' areas in Wales which (due to localised technical issues such as the presence of line concentrators or aluminium rather than copper cable) are not able to receive ADSL services, or can access broadband services only at very low bandwidths.

3.11 In November 2007, the Deputy First Minister asked officials to consult the wider telecommunications industry to seek affordable and economically viable solutions to enable households in the 'not spot' areas to access broadband . A wide cross-section of broadband providers and equipment manufacturers were consulted and following this assessment of the market, the Deputy First Minister announced, in April 2008, that the Welsh Assembly Government would undertake a Wales-wide procurement to seek a telecommunications provider or consortium to enable access in broadband not-spots across Wales. In addition, the Welsh Assembly Government continues to work with BT to explore options for addressing a number of significant not-spot areas (which were not therefore included in the above procurement) and details of these areas will be published at a later date.

3.12 In the meantime, people in Wales who are unable to receive a broadband service are encouraged to register their details with the Welsh Assembly Government using the not-spot form at www.bnrw.org.uk (or in the Welsh language at www.cadbec.org.uk. So far around 1200 registrations have been received.

Local Loop Unbundling (LLU)

3.13 Local Loop Unbundling (LLU) is the process by which an alternative operator can take over the BT line connecting an exchange to a residential property or business premises. The operator places its own equipment in the exchange and connects it to the trunk network, thereby enabling a third party to provide services such as DSL broadband to end users. However, operators do not have to use LLU to provide services; wholesale products such as IP stream also provide a way in which third parties can compete with BT in the provision of, for example, DSL broadband services. However, due to the level investment involved, LLU is only likely to develop in exchanges that serve significant populations.

3.14 By November 2006, 48% of premises in Wales had lines connected to either LLU exchanges or were in areas where it is possible to access cable services and this figure increased significantly to 62.5% of premises by November 2007 (compared to a UK average of around 70%). Most of the remaining exchanges that have not been unbundled are in more rural locations which serve fewer premises. Due to the economics of LLU provision, further roll-out to these exchanges appears to be unlikely. To date however, there are no significant price differentials in broadband services available in LLU and non-LLU areas. However, in cable areas, domestic consumers can already access broadband speeds of up to 20Mbit/s for £20 per month and if Virgin Media rolls out a new 50Mbits/s service later this year, the differences in terms of broadband service access between cable and non-cable areas could become significant.

SDSL

3.15 BT has halted its Symmetrical Digital Subscriber Line (SDSL) roll-out in Wales and there has been no change in the availability of this service since November 2005. Given recent developments in DSL technology, further SDSL roll-out is not likely. SDSL has been marketed primarily as a business technology and the high cost of this service and its products reflect its superior features. The roll-out of ADSL2+ services, offering even greater bandwidths, could further reduce the demand for SDSL. Bulldog's current ADSL2+ business service allows download rates of up to 16Mbit/s and upload rates of 1Mbit/s. However, quality of service is often more critical for business applications than upload/download speeds alone and so these high contention services may not be ideal for many businesses. For businesses situated outside SDSL areas that require high quality of service levels and low

contention, an expensive 1:1 leased line is often the only alternative. Historically, in Wales, leased lines have always been a particularly unattractive option in rural areas. Due to their remote locations, rural businesses often face far higher tariffs than those in inner-city or urban locations. The relatively competitive costs of these services compared to SDSL provides further evidence that low SDSL availability is not a major issue for Welsh businesses.

FibreSpeed

3.16 FibreSpeed - Open Access Networks for Wales is a key initiative within the Welsh Assembly Government's Broadband Wales Strategy 2005-2007. As well as addressing the objective of providing affordable 'fibre speed' broadband connectivity (a minimum of 10Mbit/s symmetric broadband service with multi-Gbit/s capability, and greater as technology develops in the future) to business parks/locations in Wales, it will also meet the objective of ensuring that Wales has extensive access to a competitive wholesale infrastructure. The network will be 'open access', comprising local access networks along with a backbone network interconnecting these locations to other telecoms networks and points of presence distributed across the network. A range of wholesale products and services will be made available to service providers on an open and equal basis. The project will initially deliver connectivity to 14 business parks in north Wales. Subsequent phases are being developed to cover other parts of Wales, with an estimated 50 strategic sites in total throughout Wales. However, in the future, FibreSpeed has the potential to support other public sector broadband initiatives. On 14th November 2007, the Deputy First Minister and Minister for the Economy and Transport, Ieuan Wyn Jones AM, announced the award of the FibreSpeed contract to Geo - Hutchison Network Services UK Limited.

3.17 The FibreSpeed Project will provide an 'Open Access' telecommunications infrastructure network offering a range of advanced wholesale products to service providers on an equitable, non-discriminatory and fully transparent basis. This investment is the first Government-supported network of its kind to be delivered anywhere in the UK. FibreSpeed will meet the demands of high-bandwidth users (supporting a minimum of symmetrical 10 Mbit/s services with Gigabit capability) and enable the setting of retail prices on a par with London and the South East of England. The project's initial focus is on serving 14 key strategic business parks as this is where the benefits will be delivered most rapidly, but it is also envisaged to benefit those outside of business parks, including other businesses communities, citizens and the public sector across the whole of the north Wales region.

WiFi Hotspots

3.18 WiFi 'hotspots' provide convenient mobile broadband access for both business and personal use. However, in Wales hotspots often duplicate broadband coverage in urban areas that are already well served, for example via DSL. Because WiFi hotspots are rare in rural areas, they are not generally considered as a practical way of extending broadband coverage. In December 2006 there were 539 WiFi hotspots operated by BT Openzone and its partner providers in Wales, out of a total of 9,833 in the UK. BT Openzone and partner networks provide 95% of all UK hotspots. The number of WiFi hotspots in Wales decreased marginally between July and December 2006. This decrease may signify saturation in the high density conurbations and it is possible that under-utilised hotspots have been closed down.

Mobile broadband

3.19 Several 3G providers, including 3, T-Mobile and Vodafone have introduced mobile broadband services for use with laptop computers and other portable devices, offering speeds over their 3G networks of up to 2.8 Mbit/s, with contract prices starting from £10 per month. In Wales, the full benefit of these services is limited to areas, primarily on the north and South Wales coastal areas, where 3G reception is currently possible. In other areas of Wales, where 2G mobile coverage is available, speeds are limited to 'up to 48 Kbit/s'.

2008 Communications Market Report Data: Availability and Take-up

Fixed-lines

3.20 Fixed telephony services over the public switched telephone network (PSTN) are available to all of the UK population as a result of the universal service obligation (USO) which is provided by British Telecom (BT) and Kingston Communications in Kingston-upon-Hull.

3.21 Under the USO all UK households have access to a landline at a standard charge, although additional charges for connection apply where the cost of installation is in excess of £3,400. The USO mandates BT and Kingston to provide affordable telephone services for less advantaged members of the community in the form of special pricing schemes. As a result of the USO, there are no significant issues relating to the availability of fixed voice telephony services in Wales or anywhere else in the UK, although a small number of single dwellings in remote locations may have difficulty in connecting to the network.

Narrowband internet

3.22 The availability of narrowband internet services (defined as an internet connection achieved by means of dial-up over a twisted copper pair or coaxial cable at speeds of less than 128kbit/s) is the same as that of fixed-line voice services, as the only equipment required to access narrowband services (apart from a standard fixed-line) is a suitably equipped personal computer.

3.23 Over recent years the use of narrowband internet services has declined rapidly as the availability of broadband internet services has increased and as prices for these faster services has fallen. According to the Office for National Statistics, at the end of 2007 less than 10% of UK internet connections were narrowband, compared to 56% three years earlier.

Broadband internet

3.24 The two main technologies used to supply broadband services in the UK are digital subscriber line (DSL) supplied over a standard copper twisted pair connected to a local telephone exchange, and cable modem technology over a cable operator's hybrid fibre-coaxial network.

3.25 Ofcom's figures show that at the end of 2007 DSL connections, including those provided using Local Loop Unbundling (LLU), accounted for 78% of non-corporate broadband connections across the UK, compared to 76% a year previously. Cable modem broadband connections made up 22% of total connections at the end of 2007. Despite growth in the availability of wireless and satellite broadband services, such connections accounted for less than 1% of the total at the end of 2007. Data are

not currently available on take-up of cellular wireless broadband connections, and these are excluded from our connection figures.

DSL broadband availability

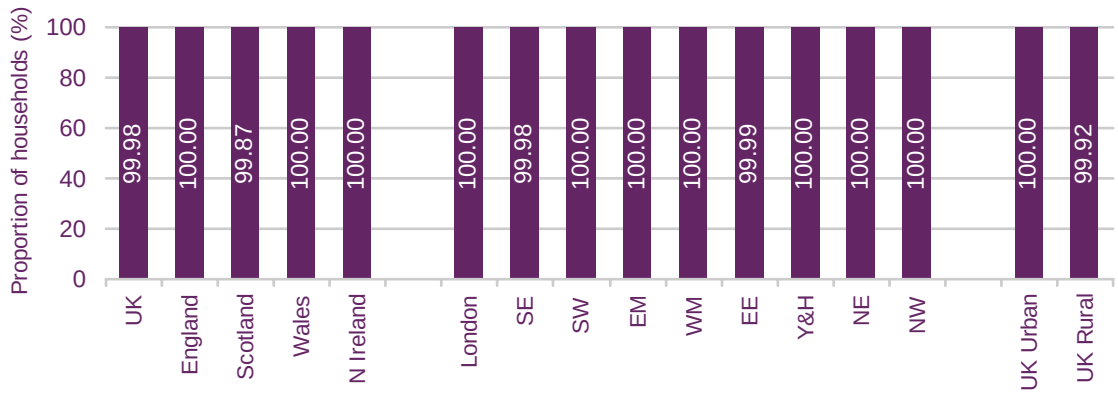
3.26 Almost all UK households (over 99.9%) were connected to a DSL-enabled BT local exchange at the end of December 2007, although not all of these will be able to obtain broadband services (see the box on 'not-spots' below). DSL availability is higher than that of cable modem services in all areas of the UK, therefore the availability of DSL can be used as a model for overall UK broadband availability.

Broadband 'not-spots'

3.27 Not all delivery points in an area served by a DSL-enabled area exchange will be able to obtain broadband services, for a variety of reasons including distance from the exchange and network quality. BT estimates that 99.6% of its network is able to support broadband speeds of 512kbit/s and above. However, even with this level of availability there will still be a significant number of households in 'not-spots' (areas unable to receive DSL broadband services), although the exact scale of the problem is difficult to quantify.

3.28 Households in 'not-spots' will not be able to access or obtain the full experience of using services which require higher or consistent bandwidth, such as VoIP and video streaming. As such, these consumers suffer a substantial detriment, and as both broadband take-up and the use of higher-bandwidth services increase, the scale of the problem is becoming more apparent. The proportion of households connected to a DSL-enabled exchange was over 99.99% in both rural and urban areas of Wales at the end of 2007, in line with levels across the UK.

Proportion of households connected to a DSL-enabled exchange

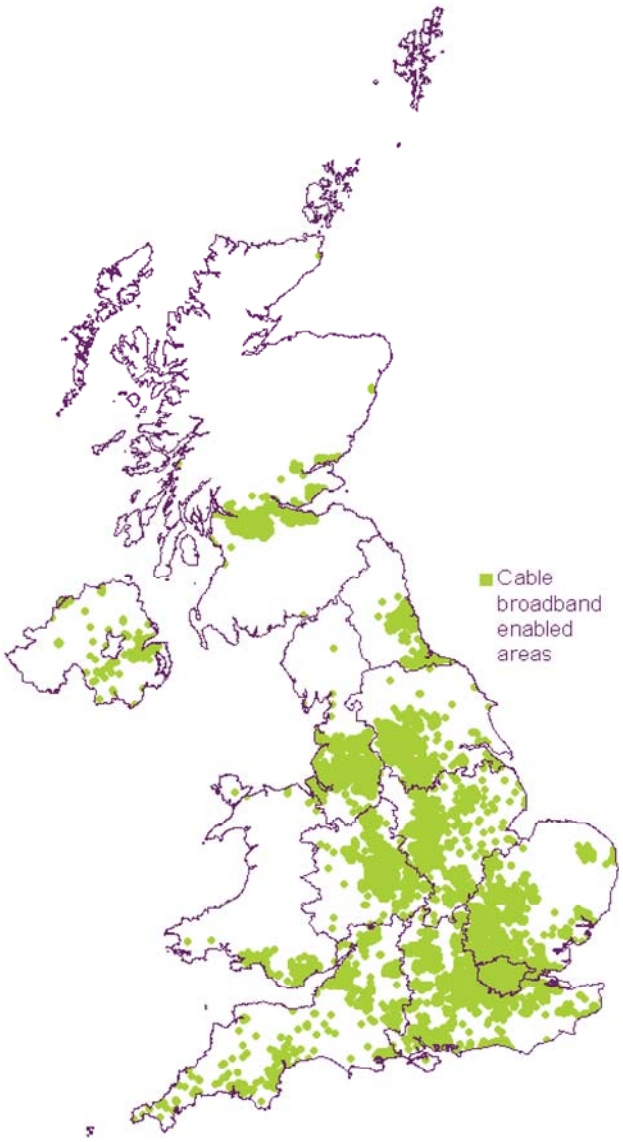


Source: Ofcom/BT, December 2007 data

Cable modem broadband availability

3.29 Data from Virgin Media show that at the end of 2007 almost half of all UK households (49%) were passed by its broadband-enabled cable network; although a small proportion of these will not be able to receive cable broadband services. The proportion of households passed by Virgin Media's broadband-enabled cable network was lowest in Wales, at 24% of households, and highest in England, at 52%.

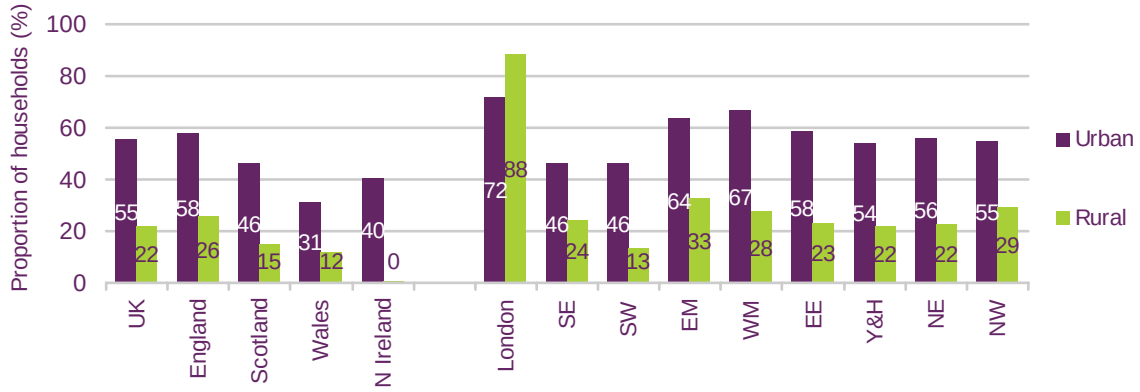
Proportion of households passed by Virgin Media broadband



Source: Ofcom/Virgin Media, Q4 2007 data

3.30 Households located in urban areas were more than twice as likely to be able to receive cable broadband services as those in rural areas. This was evident in Wales, where Virgin Media broadband was available to 31% of households in urban areas, compared to 12% in rural ones.

Coverage of urban and rural areas by Virgin Media broadband



Source: Ofcom/Virgin Media, December 2007 data

Note: The basis on which these figures have been calculated is different to that in the 2007 Nations and Regions report; the urban rural split for Northern Ireland is based on the location of the local exchange rather than the area which it covers (as is used for the other nations). As such, the rural figure is likely to be understated and data are not directly comparable to those for the other nations

Local loop unbundling broadband availability

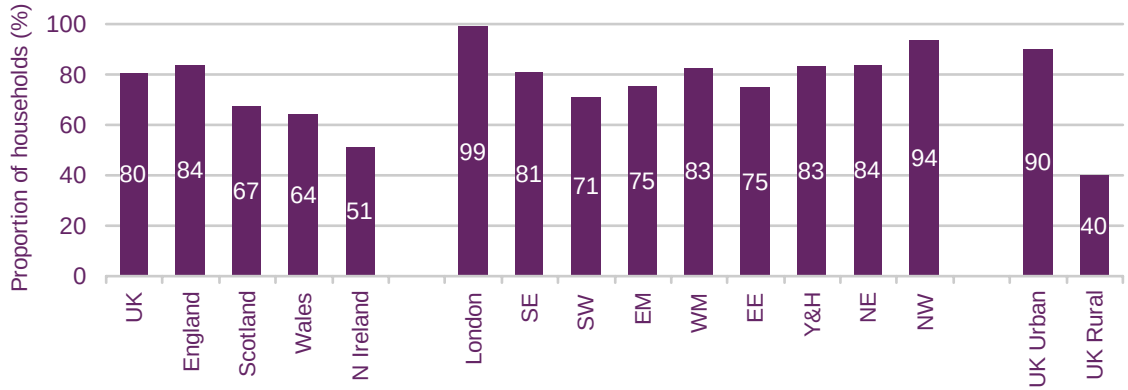
3.31 Local loop unbundling (LLU) involves an alternative operator leasing the twisted copper pair between the BT or Kingston Communications local exchange and a customer's premises, and placing its own equipment in the exchange. This allows the LLU operator to connect the end-user to its own network and to provide voice and DSL services without investing in an expensive access network over the 'last mile'.

3.32 Unbundling an exchange allows operators to offer services without being tied to BT or Kingston's wholesale products, enabling greater differentiation in services and tariffs. It can also give operators economies of scale which are not available to them when purchasing wholesale products on a per-unit basis.

3.33 Consumers living in an unbundled exchange area are likely to have access to a wider range of suppliers and retail propositions than those living in an area which has not been unbundled, and in the last quarter of 2007 LLU services were responsible for over 85% of the growth in the total number of non-corporate UK broadband connections.

3.34 At the end of 2007 80% of UK households were connected to an unbundled local exchange, up from 67% at the end of 2006. The proportion of households connected to an unbundled exchange was highest in England among the nations at 84%, and lowest in Northern Ireland at 51%. In Wales almost two-thirds (64%) of households were connected to an unbundled local exchange at the end of 2007, the third highest among the nations.

Proportion of households connected to an unbundled exchange



Source: Ofcom/BT, December 2007 data

3.35 The high fixed costs associated with unbundling a local exchange (installing the equipment in the local exchange, the equipment itself and providing connectivity to the LLU provider's network) and the low rental cost per line (currently £1.30 a month for DSL services and £6.67 per month for DSL and voice services) mean that in order for an exchange to generate per-unit cost savings over the use of BT's wholesale products it must have a certain number of unbundled customers.

3.36 LLU operators have therefore tended to unbundle exchanges serving a large number of delivery points, and typically these are found in urban areas. As a result, 90% of households in urban areas across the UK are connected to an unbundled local exchange, compared to just 40% in rural areas. This was also the case in Wales where households in urban areas (77% availability) were almost twice as likely as those in rural areas (41% availability) to be able to receive LLU-based services.

Proportion of households in urban and rural areas connected to an unbundled exchange

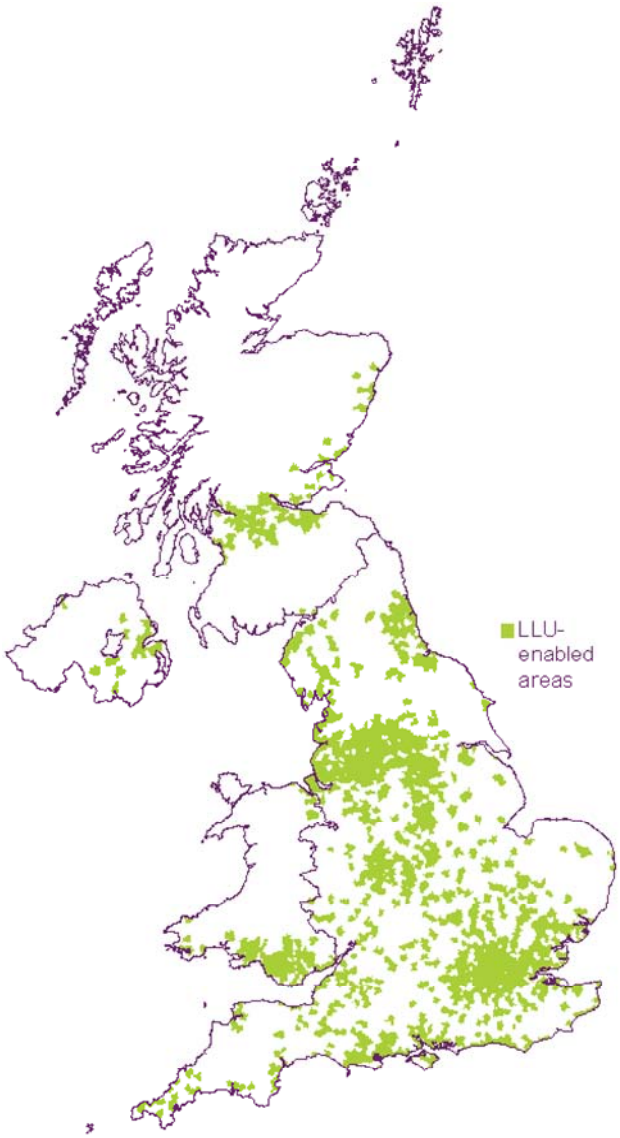
Source: Ofcom/BT, December 2007 data

Note: The urban/rural split for Northern Ireland is based on the location of the local exchange rather than the area which it covers (as is used for the other nations). As such, the rural figure is likely to be understated and data are not directly comparable to those for the other nations

3.37 The above chart shows the UK distribution of areas able to receive LLU-based voice and broadband services and the concentration of unbundled exchange areas in

urban locations. In Wales these are concentrated in the south of the country (Cardiff, Swansea and Newport) and the north-east (Wrexham).

Areas served by unbundled exchanges



Source: Ofcom/BT, Q4 2007 data

Mobile availability

3.38 The availability of mobile telephony services across the UK of mobile networks with second generation (2G) and third generation (3G) coverage has been evaluated in each postcode district. For an operator to be counted as having coverage its network footprint has to cover at least 75% of the postcode district, and by using this data conjunction with population figures we are able to calculate the proportion of people living in such postcode districts.

3.39 The 75% threshold is different to those used in the 2007 report (when we used 95% for 2G services and 50% for 3G) for the following reasons:

- to allow direct a comparison of 2G and 3G coverage levels;
- to reflect that the availability of 3G services is now widespread; and
- analysis of the data at a 95% area threshold revealed that small changes in the way in which the 2008 coverage figures had been compiled by the mobile network operators led to marked differences in the output figures.

3.40 It is important to note that just because a postcode district does not have 75% mobile coverage it does not necessarily follow that mobile services are not available there.

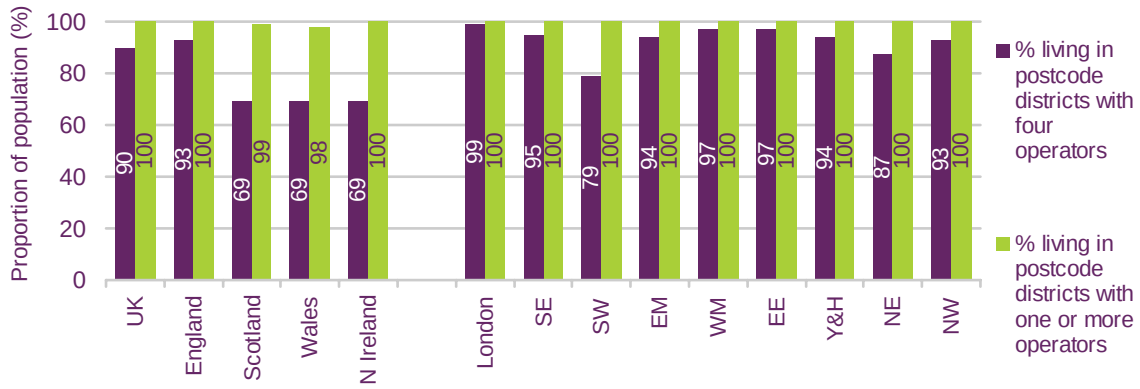
2G availability high across most of the UK

3.41 For 2G services we identified postcode districts where a) at least one and b) all four of the 2G networks had area coverage over the 75% threshold. It is important to note that the figures for Q1 2008 are not directly comparable with those published in the 2007 report as a result of the changes to the area coverage threshold outlined above.

3.42 The data show that across the UK almost all of the population (over 99%) lived in a postcode district where there was at least 75% 2G area coverage from one or more of the mobile networks in Q1 2008. The data shows that in Wales the proportion living in an area with 2G coverage from at least one operator was, at 98%, slightly lower than those in the other nations.

3.43 There was greater variation in the proportion of people living in a postcode district with at least 75% coverage from all four 2G mobile networks. Across the whole of the UK 90% of people lived in such an area, while in Wales more than two-thirds (69%) did. This was identical to levels in Scotland and Northern Ireland but lower than in England (93%).

2G mobile phone population coverage



Source: GSM Association / Europa Technologies; Q1 2008

Note: Figures show the percentage of population within postcode districts where at least one or four operators had at least 75% 2G area coverage; data not directly comparable to that published in the 2007 report.

2G geographic coverage high in Wales

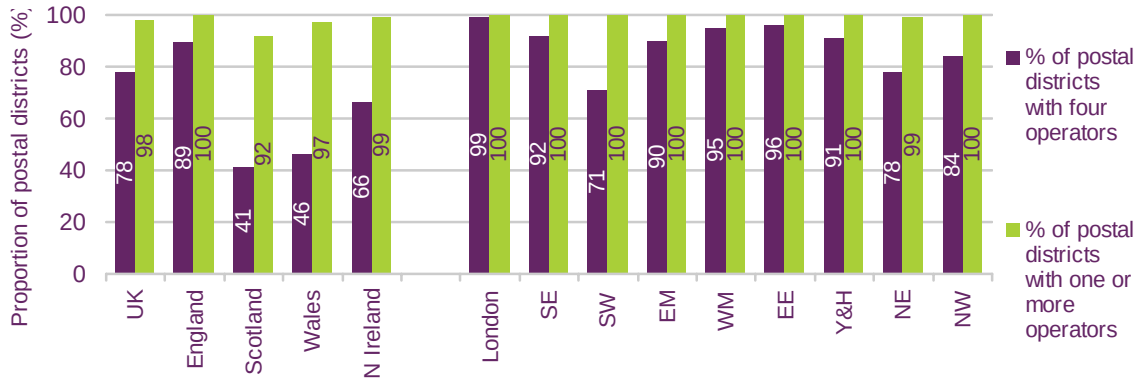
3.44 In addition to population coverage we also calculated geographic 2G coverage (using the same 75% area coverage threshold) in order to understand where there were gaps in coverage. The figure below shows that, although 2G mobile geographic

coverage was high across most of the UK in Q1 2008, it was not as high as population coverage. This is a result of the networks concentrating network build in areas of higher population density.

3.45 The majority of postcode districts in the UK (98%) had 2G area coverage from one or more mobile networks. Geographic 2G coverage in Wales was the second lowest among the UK nations at 97%, while it was highest in England (over 99%). The lower geographic coverage in Scotland (92%) reflects the fact that large areas of the sparsely populated Highlands and Islands are without coverage.

3.46 The proportion of postcode districts with 75% area coverage from all four 2G networks varied across the UK nations and English regions. In all of the nations except England (89%) less than two-thirds of postcode districts had 2G coverage at a 75% area threshold from all four 2G networks. Wales had the second lowest level of geographic 2G coverage from all four providers at 46% of postcode districts.

2G mobile phone geographic coverage

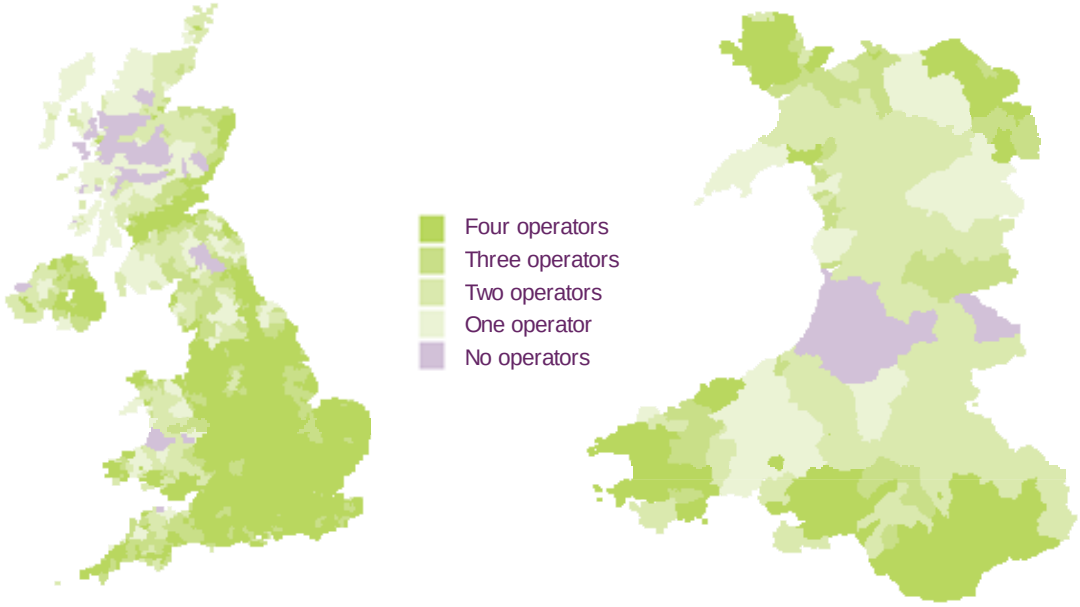


Source: GSM Association / Europa Technologies; Q1 2008

Note: Figures show the percentage postcode districts where at least one or four operators had at least 75% 2G area coverage; data not directly comparable to that published in the 2007 report.

3.47 The figure above shows that although most of the UK was covered by 2G services there were still sizeable areas where coverage was less than 75% or where 2G services were only available from one or two mobile networks. These regions included the Scottish Highlands and Islands, areas of mid-Wales and the west of Northern Ireland, many of which have poor coverage as a result of topographies that limit the range of cellular masts. The areas affected by lower levels of network 2G coverage in Wales include mid-Wales and parts of the border with England.

Map of 2G mobile phone geographic coverage by number of operators



Source: Ofcom / GSM Association / Europa Technologies; Q1 2008

Note: Maps show the number of 2G operators with at least 75% area coverage; not directly comparable to those published in the 2007 report.

3G availability concentrated around urban areas

3.48 The 75% postcode district network footprint threshold was also used when analysing 3G mobile availability. In the 2007 report a 50% area threshold was used for 3G services to reflect ongoing network rollout ahead of the end 2007 deadline for achieving 80% population coverage as stipulated in the five 3G licences. This means that that the data in this year's report are not comparable to those published last year.

3.49 Similarly, it should be noted that the methodology used to derive the coverage data in this report is different to that which was used to ascertain whether the 3G networks had met the coverage obligations outlined in their 3G licences earlier this year. The data in this report are based on postcode district coverage estimates provided to the GSM Association by the mobile networks, while the methodology used to establish whether the 3G licence coverage obligations had been met can be found at: http://www.ofcom.org.uk/consult/condocs/3g_rollout/3GRolloutobligation/

3.50 In the case of 3G services there are five network operators (rather than four as there are for 2G) and we identified postcode districts where a) at least one and b) at least four of the 3G networks had area coverage above the 75% threshold.

90% of the UK population lives in an area where 3G services are available

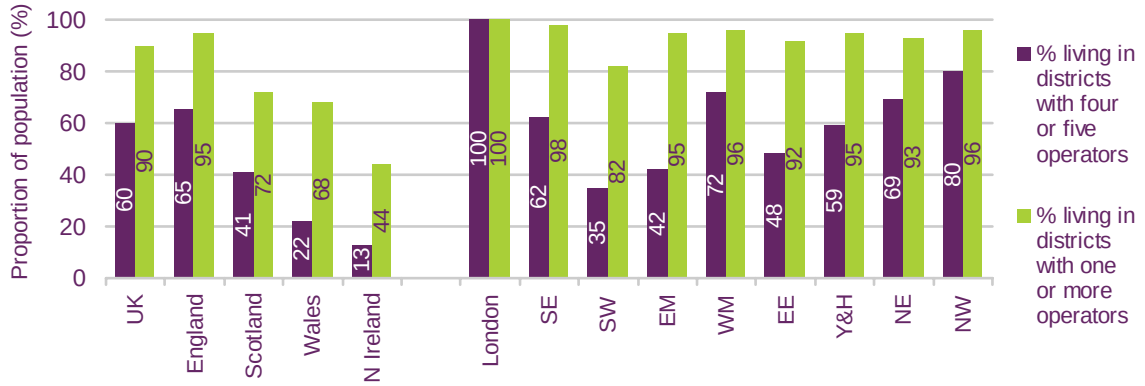
3.51 Across the UK, 3G coverage figures were lower than those for 2G services, the only exception being in London where the proportion of postcode areas with 2G and 3G coverage from at least one network at the 75% threshold was the same (over 99%) and the proportion with 3G coverage from four or more networks at the same threshold was higher than for 2G.

3.52 The data show that 90% of the UK population lived in a postcode district with at least 75% area coverage from one or more 3G networks, and the proportion among the UK nations varied from 44% in Northern Ireland to 95% in England. Wales had the second lowest 3G coverage at 68% of the population.

60% have a choice of four or more 3G networks

3.53 Across the UK, 60% of people lived in postcode districts with 75% 3G area coverage from at least four mobile networks. The proportion living in these areas was highest in England (65%) and lowest in Northern Ireland (13%). In Wales 22% of people lived in an area with 3G coverage from four or more networks, again the second lowest among the nations.

3G mobile phone population coverage



Source: GSM Association / Europa Technologies; Q1 2008

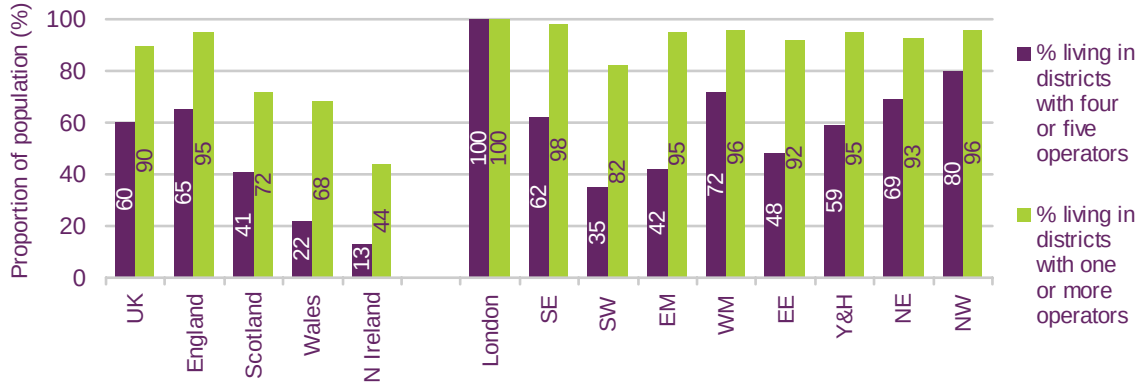
3.54 Note: Figures show the percentage of population within postcode districts where at least one or four or five operators had at least 75% 3G area coverage; data not directly comparable to that published in the 2007 report.

Geographic 3G coverage varies widely across the UK

3.55 Analysis of geographic 3G coverage showed that in Q1 2008 over three-quarters (77%) of UK postcode districts had 75% 3G area coverage from one or more of the mobile networks. Among the UK nations the geographic 3G coverage was highest in England at 89%, while it was lowest in Wales at 39%.

3.56 Across the UK, just under half of postcode districts (47%) had 75% 3G area coverage from at least four of the UK 3G networks. The proportion in England (57%) was, again, much greater than in the other nations, where it was highest in Scotland (22%) and lowest in Wales (12%).

3G mobile phone geographic coverage



Source: GSM Association / Europa Technologies; Q1 2008

Note: Figures show the percentage of population within postcode districts where at least one or four or five operators had at least 75% 3G area coverage; data not directly comparable to that published in the 2007 report.

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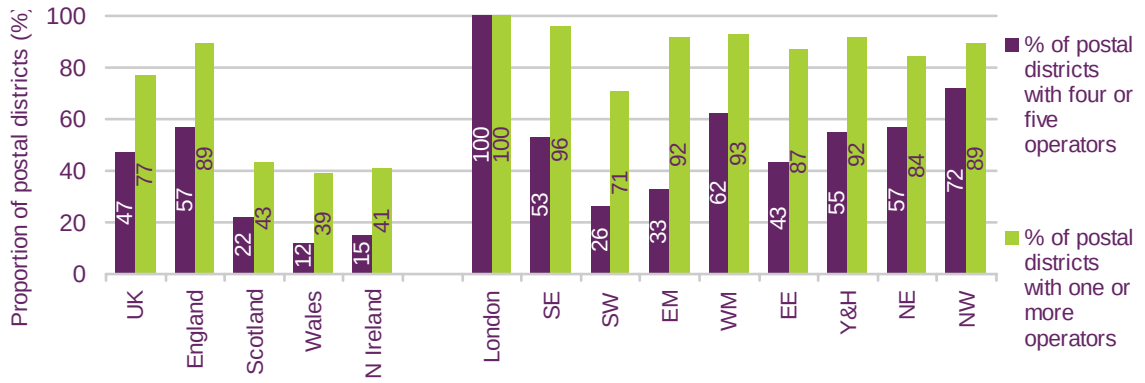
3G mobile phone geographic coverage



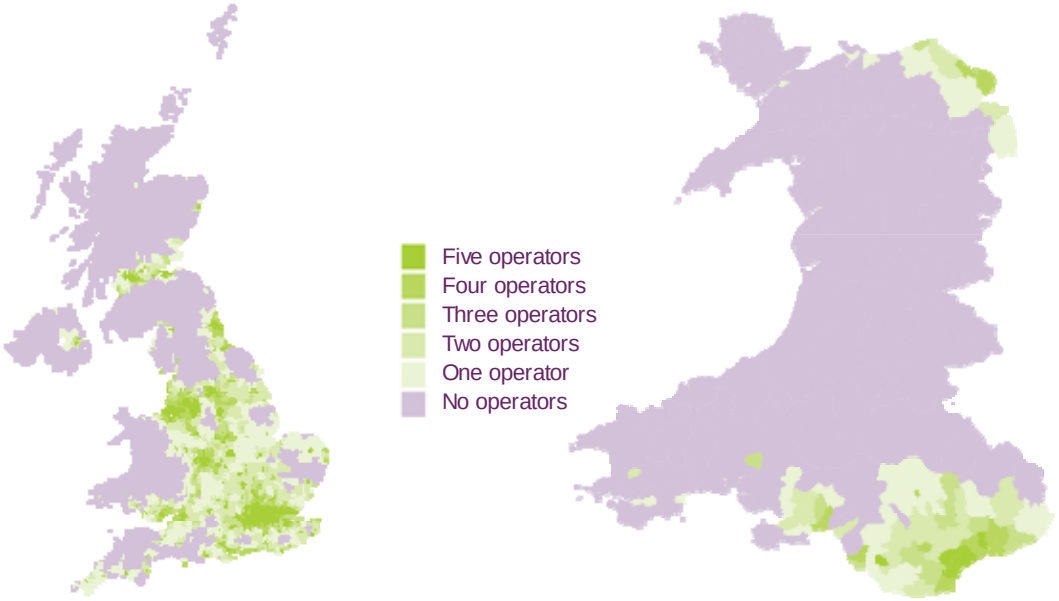
Source: GSM Association / Europa Technologies; Q1 2008

Note: Figures show the percentage postcode districts where at least one or four or five operators had at least 75% 2G area coverage; data not directly comparable to that published in the 2007 report.

3.59 The figure above shows where the mobile operators have implemented their 3G networks. Across the UK 3G network rollout has been concentrated in urban areas to enable the networks to meet the population coverage obligations outlined in the 3G spectrum licences. The result of this is that there are still large areas with a low

population density where 3G services are not available. 3G coverage in Wales is concentrated around Cardiff, Swansea, Newport and the Cheshire border area.

Map of 3G mobile phone geographic coverage by number of operators



Source: Ofcom / GSM Association / Europa Technologies; Q1 2008

Note: Map shows the number of 3G operators with at least 75% area coverage; not directly comparable to that published in the 2007 report.

Service take-up

3.60 Take-up of telecommunication services was generally lower in Wales than in the rest of the UK, although the majority of respondents had fixed-line telephony (79%), mobile telephony (82%) and internet access (55%) at home.

3.61 Take-up of telephony services (both fixed-line and mobile) in rural Wales was lower than take-up in rural areas in the other three nations. Take-up of broadband (and the internet) in rural Wales was similar to rural areas in Northern Ireland, but was significantly lower than in rural areas in England and Scotland.

3.62 Take-up of mobile phones in urban Wales was at a similar level to urban areas in the other three nations. In comparison, take-up of fixed-line telephony, the internet and broadband in urban Wales was significantly lower than in urban areas in England, Scotland and Northern Ireland.

3.63 Internet access showed no significant growth over the figure reported in 2006, although broadband access grew from 43% to 45% over the period. Both figures are subject to error margins of +/-3-4%.

Take-up of communications services

		UK	England	Scotland	Wales	N. Ireland	UK Urban	UK Rural
Individual								
Voice telephony	Fixed Line	**87%**	87%	87%	79%	88%	86%	93%
	Mobile	**84%**	85%	81%	82%	85%	84%	84%
Internet	PC	**69%**	70%	64%	60%	65%	68%	73%
	Total Internet	**65%**	66%	60%	55%	61%	64%	69%
	Broadband	**57%**	58%	53%	45%	52%	57%	59%

Source: Ofcom

3.64 Analysis of broadband take-up across Wales showed that penetration was relatively high across the larger southern towns. However, overall urban penetration was confined to 43% by low take-up (34%) among the smaller southern towns.

Take-up of communications services in Wales

		Wales	Cardiff	Nport	Sw'sea	Wxam	Other Urban Sth	Mid Wales*	Coastal North*	Rural Nth	Rural Sth	Wales Urban	Wales Rral
Individual													
Voice telephony	Fixed Line	79%	81%	80%	84%	77%	74%	85%	78%	88%	86%	77%	88%
	Mobile	82%	89%	85%	85%	84%	82%	74%	77%	74%	76%	84%	74%
Internet	PC	60%	72%	67%	66%	71%	43%	69%	64%	67%	65%	59%	67%
	Total Internet	55%	69%	62%	64%	58%	40%	65%	56%	62%	57%	53%	61%
	Broadband	45%	58%	62%	56%	44%	34%	46%	49%	52%	49%	43%	51%

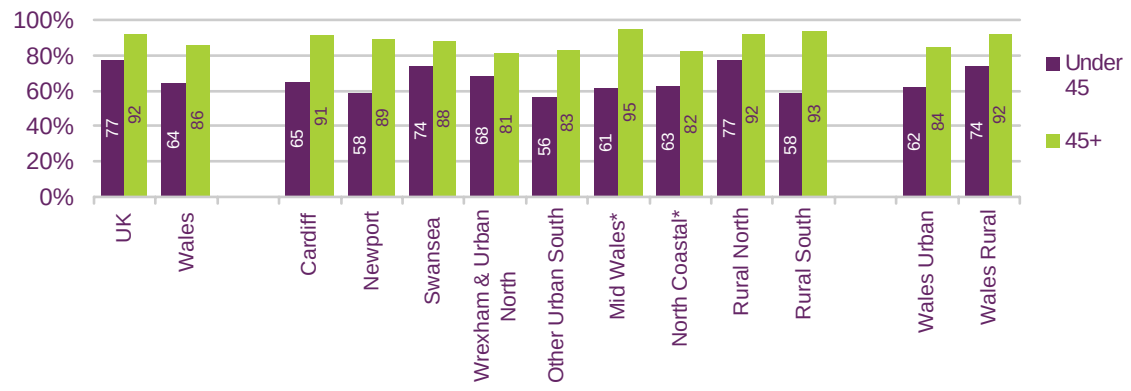
Source: Ofcom

* Sample size less than 100. Apply caution and treat as indicative only.

3.65 At 79%, fixed-line penetration was also significantly lower in Wales than in the rest of the UK, and fell by 10 percentage points from 2006 (compared to a UK average fall of around 3%). While survey error margins of 3-4% on both the 2006 and 2008 surveys mean that this figure should be treated with some caution, it is clear that there have been significant decreases in the use of fixed-lines across urban areas in Wales, all of which reported household levels under 85%. Rural penetration remained relatively high, at 88%.

3.66 The figure below illustrates that this trend was particularly marked amongst 15-44 year olds in urban areas, where 38% did not have a fixed-line.

Fixed-line take-up

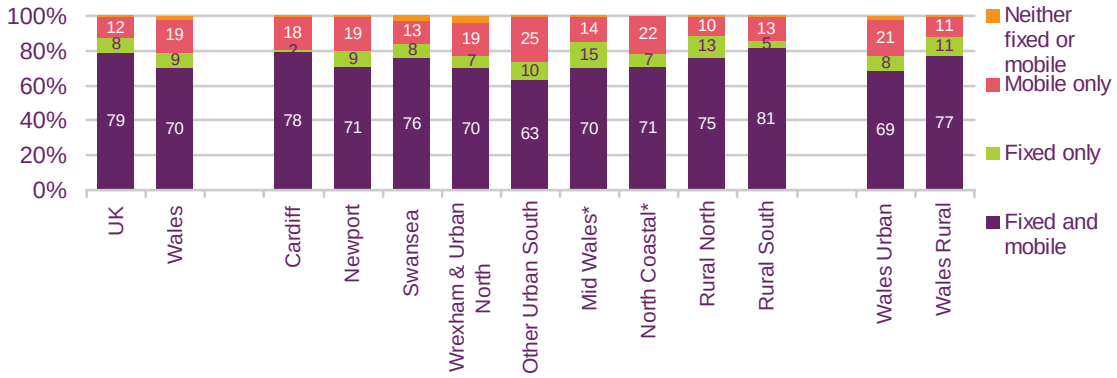


Source: Ofcom

* Sample size less than 100. Apply caution and treat as indicative only.

3.67 This lower penetration of fixed-lines in Wales does not necessarily indicate lower access to telephony overall, but rather reflects a much higher proportion of consumers using a mobile phone only. Nineteen per cent of respondents reported that they lived in a household with a mobile phone, but no fixed-line, compared to the UK average of 12%. The proportion of people living in mobile-only households was high across all the urban areas in Wales that we surveyed.

Cross-ownership of household telephony services



Source: Ofcom

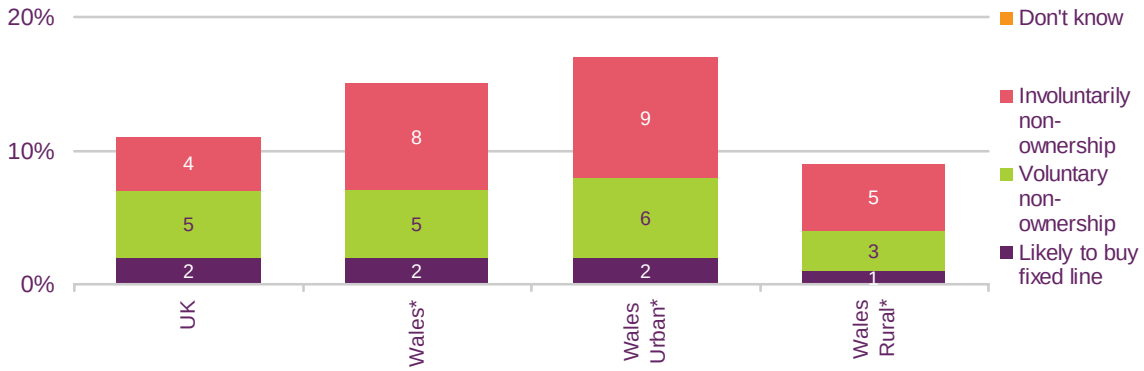
* Sample size less than 100. Apply caution and treat as indicative only.

Non-ownership of telecommunications services

3.68 There are many possible reasons for not owning a particular communications service, and these generally fall into one of two categories; voluntary and involuntary. Voluntary non- ownership is where potential consumers do without services because they perceive they do not need them, or because they are satisfied with alternative services. Involuntary non-ownership is where potential consumers do without services, but not through choice; this is mainly due to affordability. In the following analysis where consumers gave multiple responses which fall into both categories these have been reported as 'involuntary'.

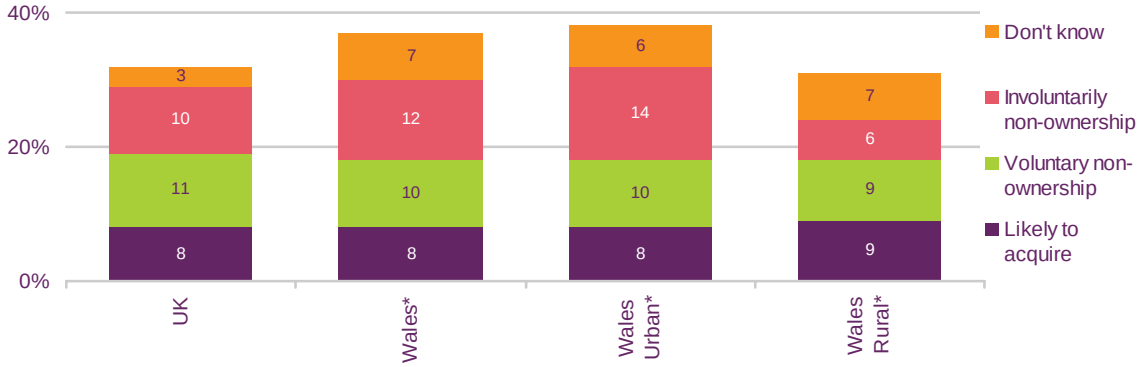
3.69 The survey suggested that involuntary exclusion from fixed telephony was more common in Wales (8%) than across the whole of the UK (4%), particularly in urban areas. It also showed that involuntary exclusion was most likely to relate to the cost or affordability of the service.

Non-ownership of fixed-line services



3.70 A majority (55%) of people in Wales lived in a household without a broadband connection, compared to the UK average of 43%. There was no clear pattern regarding involuntary non-ownership of broadband in Wales, which at 12% was only slightly higher than the UK average of 10%, although it was higher in the smaller southern towns (21%).

Non-ownership of broadband services

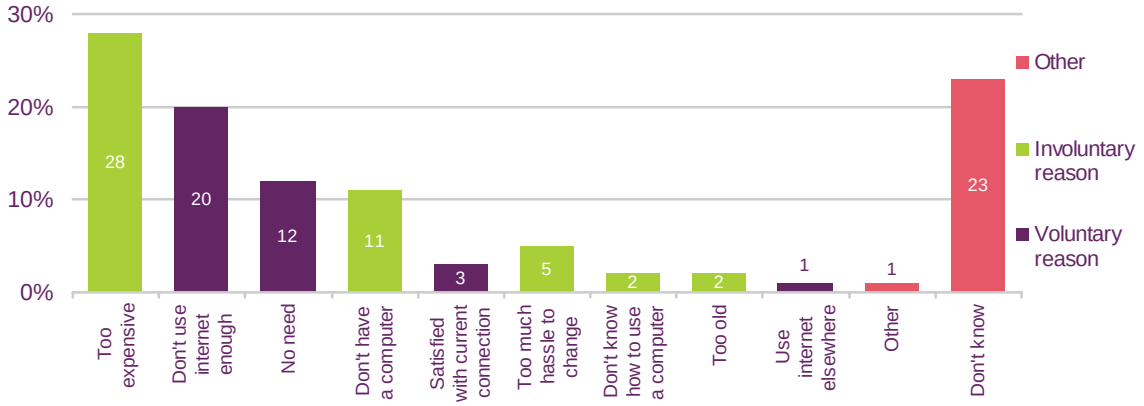


Source: Ofcom

* Sample size less than 100. Apply caution and treat as indicative only.

3.71 The figure below shows that the two most commonly cited reasons for not having broadband among respondents in Wales were the perceived cost (28%), and people's belief that their levels of internet use were too low to justify having broadband (20%). Lack of availability was not a frequently cited reason for not having broadband at home.

Reasons for not having broadband

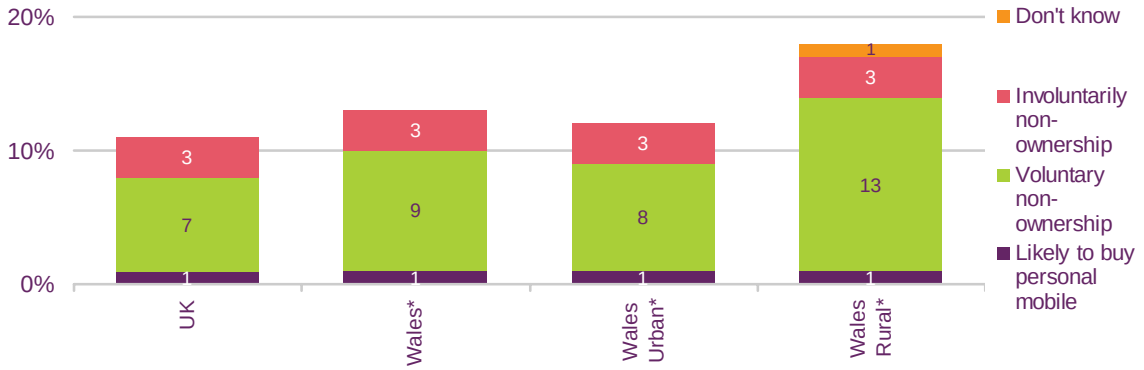


Source: Ofcom

* Sample size less than 100. Apply caution and treat as indicative only.

3.72 The reasons given for not having broadband by people in Wales were similar to those across the UK as a whole, although cost was slightly more of a factor, and 'no need' was mentioned less. Involuntary ownership of a mobile phone was low in Wales at 3%, the same level as the UK overall.

Reasons for not having mobile services



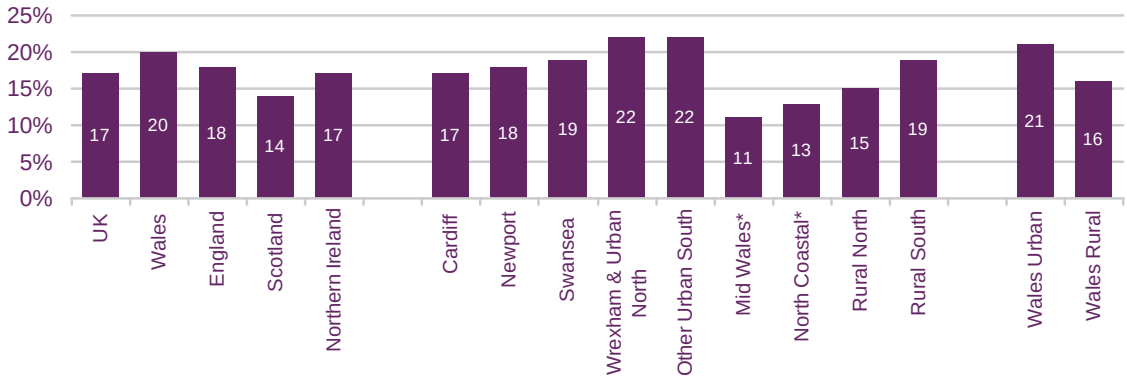
Source: Ofcom

* Sample size less than 100. Apply caution and treat as indicative only.

3G take-up

3.73 Take-up of 3G mobile services in Wales (20%) was higher than the 17% average across the UK, and was higher than in England, Scotland or Northern Ireland.

Take-up of 3G services



Source: Ofcom

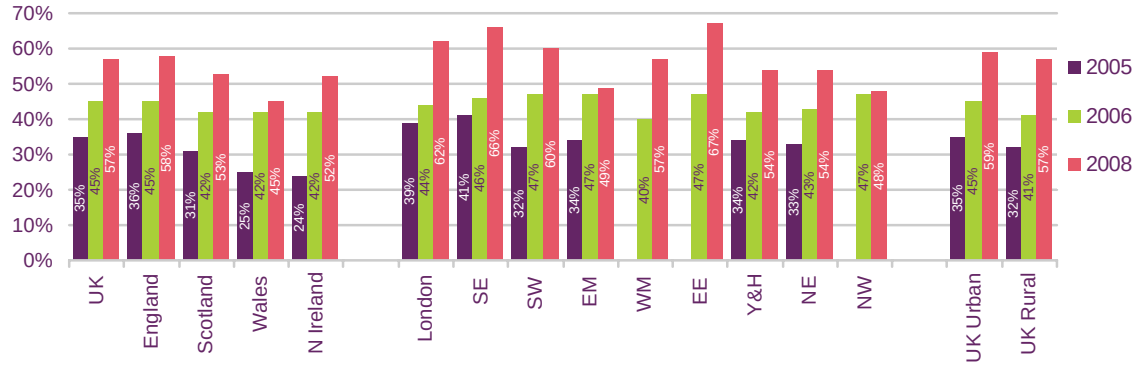
* Sample size less than 100. Apply caution and treat as indicative only.

3.74 In line with the rest of the UK, the biggest difference in 3G mobile take-up in Wales was between urban (21%) and rural areas (16%), perhaps reflecting higher 3G availability in urban areas. None of the other regional variations were statistically significant.

Broadband

3.75 Broadband growth in Wales has slowed since 2006, with an increase of 3 percentage points. This contrasts with significant growth in broadband in the UK in general, with take-up increases of 10 percentage points or more observed in England, Scotland and Northern Ireland.

Broadband take-up trend

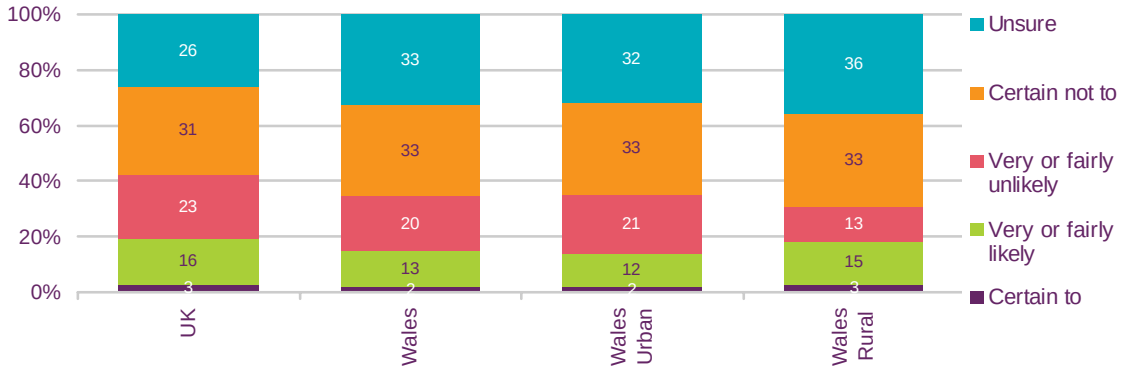


Source: Ofcom

3.76 Consumer responses suggest that the gap in broadband take-up between Wales and the rest of the UK will not close significantly during 2008. Only 15% of those without broadband in Wales said that they were likely to get it in the following year; 53% were unlikely to and 33% were unsure. Within Wales, interest in getting broadband was lower in urban than in rural areas.

3.77 Take-up of broadband was highest in the main population centres with little difference between Cardiff (58%), Swansea (56%) and Newport (62%). In Mid-Wales take-up was comparable (at 65%), but it is lowest in smaller urban areas in the south (34%) and Wrexham and other urban areas in the north (44%).

Intention to get broadband in next year

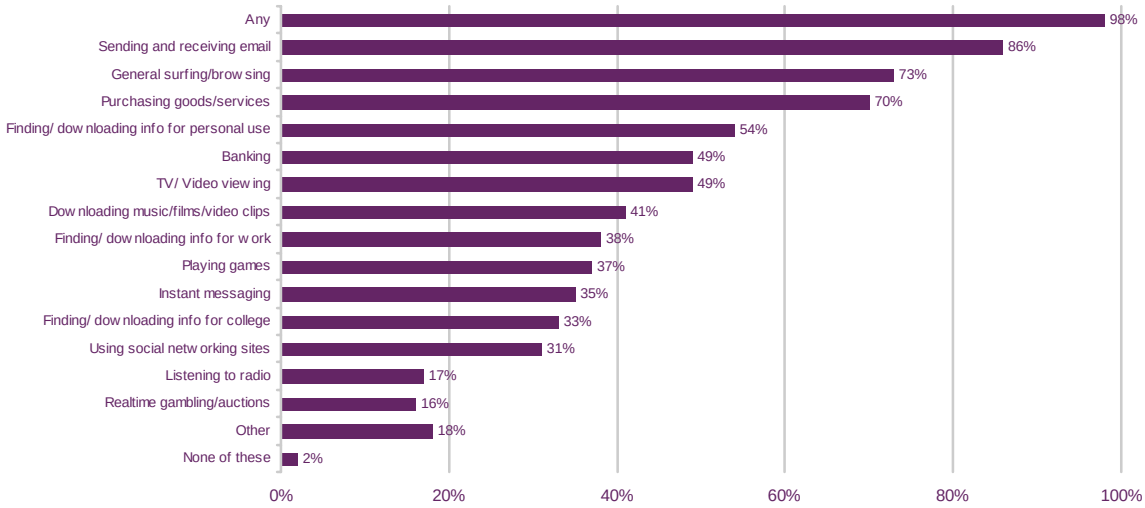


Source: Ofcom

* Sample size less than 100. Apply caution and treat as indicative only.

3.78 The most common online activities among broadband owners in Wales were sending and receiving email (86%), general surfing/browsing (73%), purchasing goods/ services (70%) and finding/downloading information for personal use (54%). Around half said that they used the internet for banking, and for watching TV/video clips (49%).

Use of online applications among Wales broadband users



Source: Ofcom

Base: Adults aged 15+ with a broadband connection at home

3.79 Overall, there was little difference in use of online applications between consumers in Wales and the UK average.

Suppliers

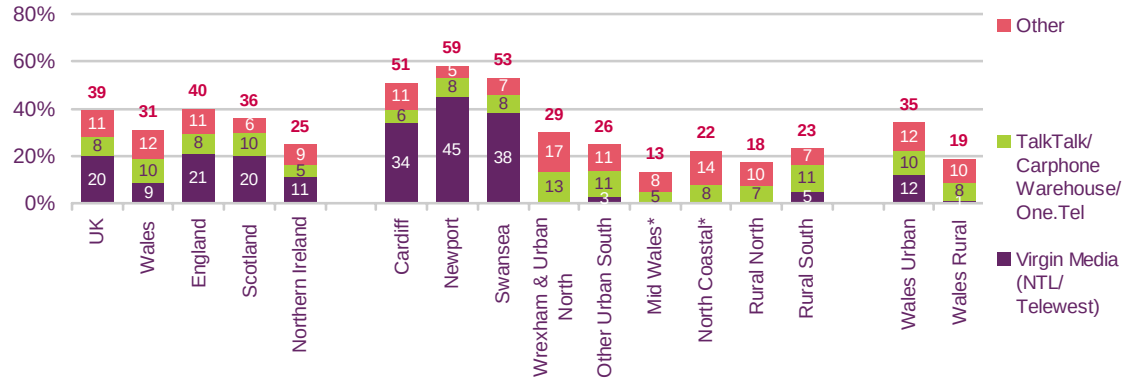
Fixed-line suppliers

3.80 Use of fixed-line suppliers other than BT was slightly lower in Wales (31%) than the UK average of 39% although it is also important to note that some BT customers may also take call services from another operator using carrier pre-selection (CPS) or indirect access. However, use of providers other than BT was higher than in Northern Ireland (25%), with wide gaps between rural and urban areas in all parts of the UK. This reflects the lower availability of cable and unbundled exchanges (LLU) in rural areas across the UK.

3.81 Within Wales, 35% of urban consumers used alternatives to BT, compared to 19% in rural areas. This difference can be partly explained by the level of Virgin Media cable penetration, which was 12% in urban areas, and just 1% in rural areas. Virgin Media's overall penetration of 9% in Wales, compared with 20% across the UK, reflects the fact that cable availability in Wales is the lowest among the UK nations.

3.82 Other differences were apparent across Wales. Penetration of non-BT suppliers was much higher in the three key urban areas of Wales (Cardiff, Swansea and Newport). This was again due to take-up of Virgin Media cable services, which was between 34% and 45% of the total fixed-line customer base in these areas. Use of suppliers other than Virgin Media or BT was similar across all areas.

Fixed-line supplier use



Source: Ofcom. Base: Adults aged 15+ with a fixed line at home.

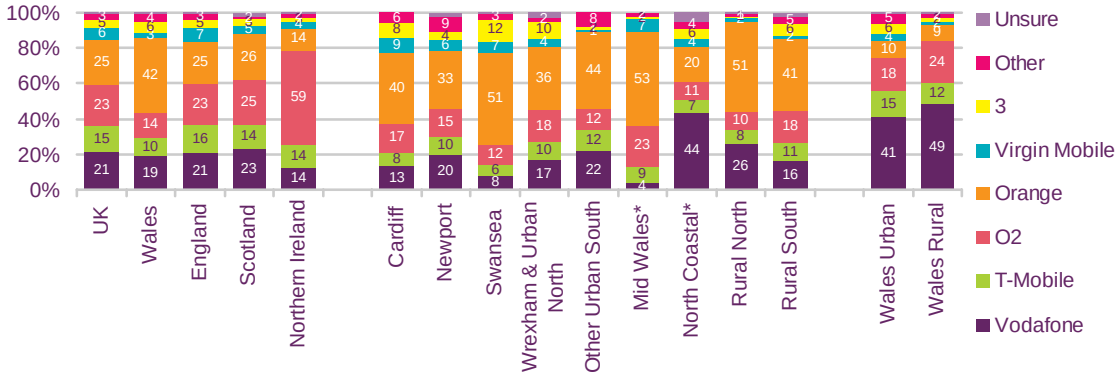
* Sample size less than 100. Apply caution and treat as indicative only.

Mobile networks

3.83 Mobile users differ in their choice of mobile network in Wales compared to the other UK nations: Orange was the most-used mobile network (42% compared to the UK average of 25%), and O2 at 14% was some way behind its national share of 23%. 3.77).

3.84 Across Wales, Orange was the most-used network in all areas except North Coastal, where Vodafone had the largest share. Vodafone and Orange had higher shares in rural areas, where 3 and other network operators had a lower share.

Mobile network operator used



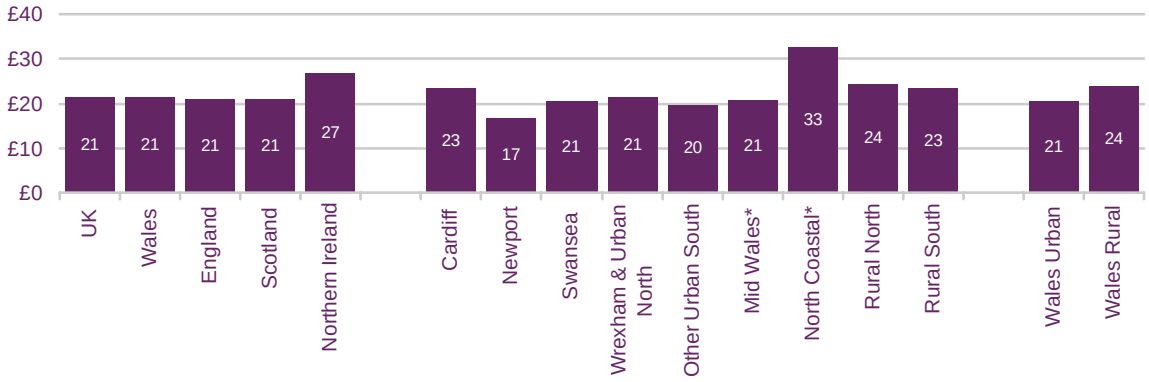
Source: Ofcom. Base: Adults aged 15+ with a mobile phone

* Sample size less than 100. Apply caution and treat as indicative only.

Telecoms spend

3.85 Average claimed monthly fixed telephony spend in Wales was £21, identical to the UK average. Spend was similar across most areas of Wales, but was lower in Newport at £17 a month and higher in North Coastal areas at £33 a month. It was also slightly higher in rural areas (£24 a month) than in urban areas (£21 a month), perhaps a reflection of the fact that those in rural areas are more dependant on fixed telephony to keep in contact than those in urban areas, where mobile use is higher.

Average monthly household spend on fixed-line telephony

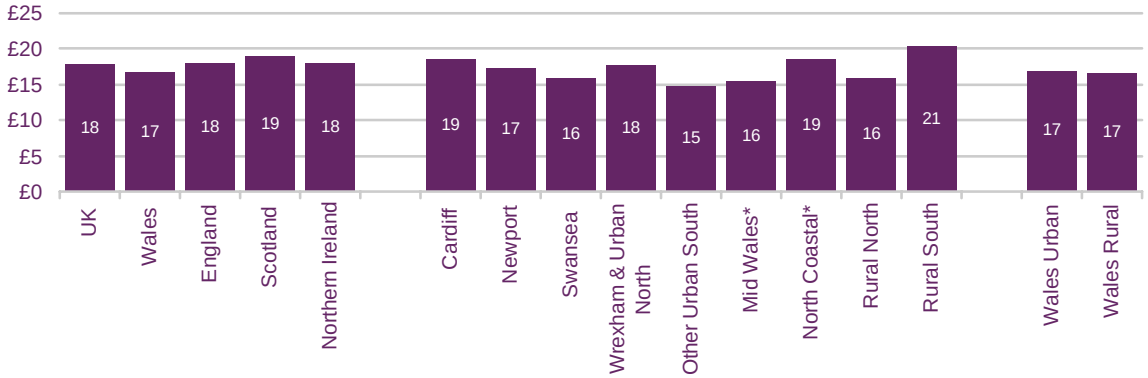


Source: Ofcom. Base: Adults aged 15+ with a fixed line at home

* Sample size less than 100. Apply caution and treat as indicative only.

3.86 Average monthly internet spend in Wales (£17) was similar to the UK average of £18. Claimed spend did not vary significantly across areas of Wales, and there was no difference between urban and rural areas. Spend in smaller southern towns, where broadband penetration was lowest and the range of internet applications used was narrow (as shown in the convergence section), was marginally lower than in other areas of Wales.

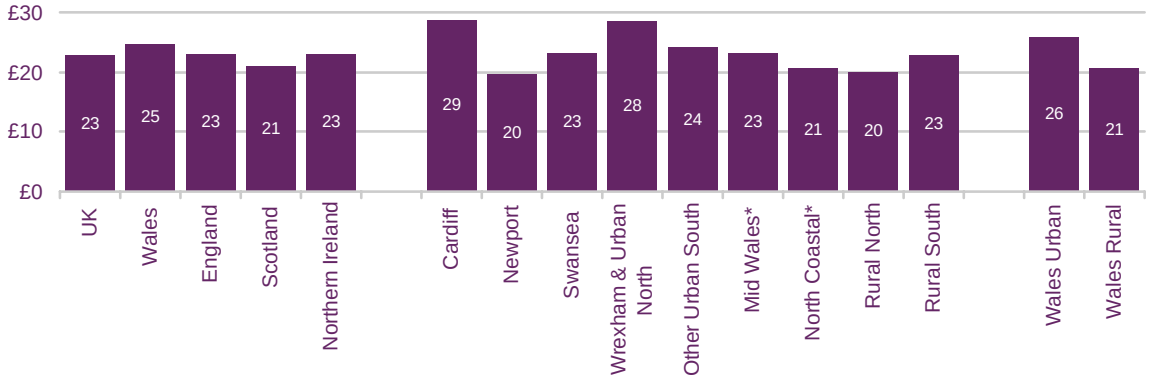
Average monthly household spend on internet service



Source: Ofcom. Base: Adults aged 15+ with a fixed line at home * Sample size less than 100. Apply caution and treat as indicative only

3.87 Claimed mobile phone spend was a little higher in Wales than the UK average, and was also higher in urban areas than in rural areas. Pre-pay use in Wales was most common in Welsh rural areas (74%) where spend tended to be lower. Mobile spend was highest in Cardiff and the urban north, and higher 3G use in urban areas of Wales may also be a factor.

Average monthly individual spend on mobile phone



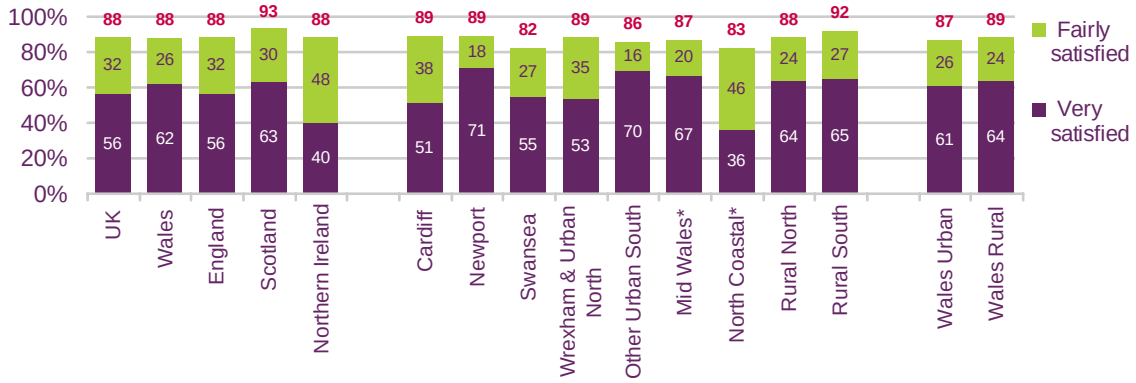
Source: Ofcom. Base: Adults aged 15+ with a fixed line at home

* Sample size less than 100. Apply caution and treat as indicative only

Satisfaction

3.88 The level of satisfaction with fixed-line services in Wales was high at 88%, the same as the UK average. Satisfaction levels may be related to spend, as the area which had the lowest satisfaction (North Coastal Wales) also had the highest overall claimed mobile spend.

Overall satisfaction with fixed-line service

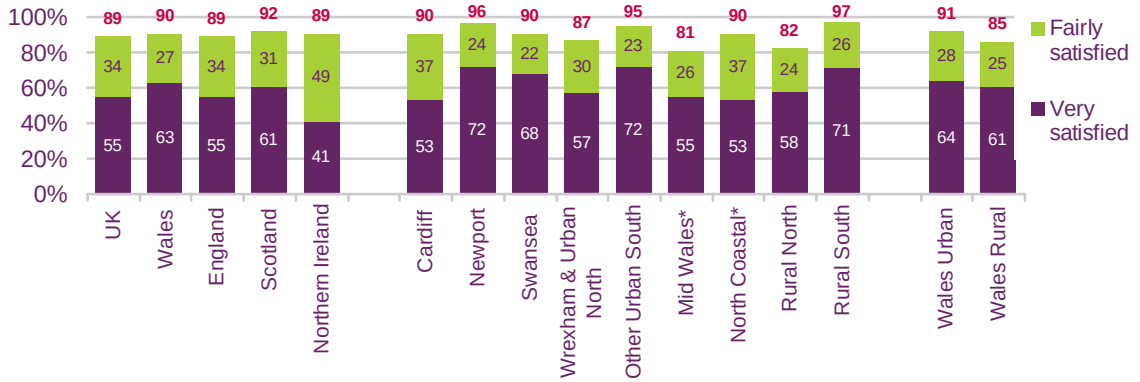


Source: Ofcom. Base: Adults aged 15+ with a fixed line at home

* Sample size less than 100. Apply caution and treat as indicative only

3.89 The figure below shows that there were marginally higher levels of satisfaction with broadband services in Wales (90%) than across the UK as a whole (89%). There was some indication that satisfaction levels were lower in rural areas than in towns, and they were lowest in Cardiff.

Overall satisfaction with broadband service

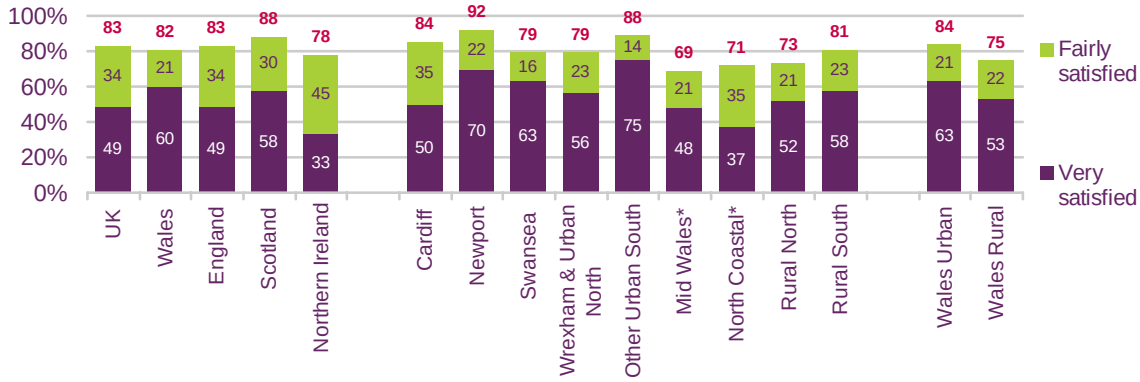


Source: Ofcom. Base: Adults aged 15+ with a fixed line at home.Sample size less than 100 in all areas within Wales. Apply caution and treat as indicative only.

3.90 The lower overall broadband satisfaction levels in rural areas of Wales may be driven by low satisfaction with connection speed (in rural areas distances from exchange to premises tend to be further, so speeds tend to be slower). Only 75% of broadband users in rural areas of Wales were satisfied with the speed of their broadband connection, compared to 84% in urban areas.

3.91 Overall, more than four in five consumers in Wales (82%) were satisfied with the speed of their broadband connection. This was on a par with the UK average (83%), although the proportion of 'very satisfied' customers was higher than average in Wales. Consumers in Cardiff gave the lowest satisfaction rating among those living in towns.

Satisfaction with speed of broadband connection



Source: Ofcom. Base: Adults aged 15+ with a broadband connection at home

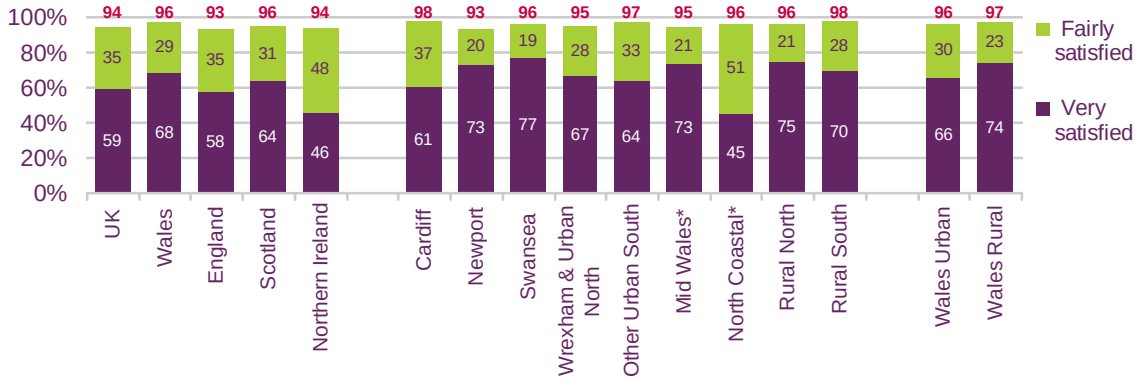
Sample size less than 100 in all areas within Wales. Apply caution and treat as indicative only.

3.92 The proportion of consumers in Wales who were satisfied with their mobile service (96%) was higher than that for both fixed-line and broadband services (88% and 90% respectively) as shown in figure below. Satisfaction in Wales was similar to the UK average, but a greater proportion of consumers in Wales (68%) were 'very satisfied' than the UK average (59%).

3.93 Satisfaction with mobile service was similar in rural areas (97%) and urban areas (96%), and among the latter Cardiff had the lowest proportion of users who were very

satisfied, at 61% compared to the average of 66% in urban areas. Spend may have been a contributory factor, as average claimed monthly mobile spend in Cardiff was around 15% above the average for Wales. North Coastal areas had the lowest proportion of mobile users who were very satisfied with their service (45%), possibly due to coverage issues and lack of choice of suppliers in the area.

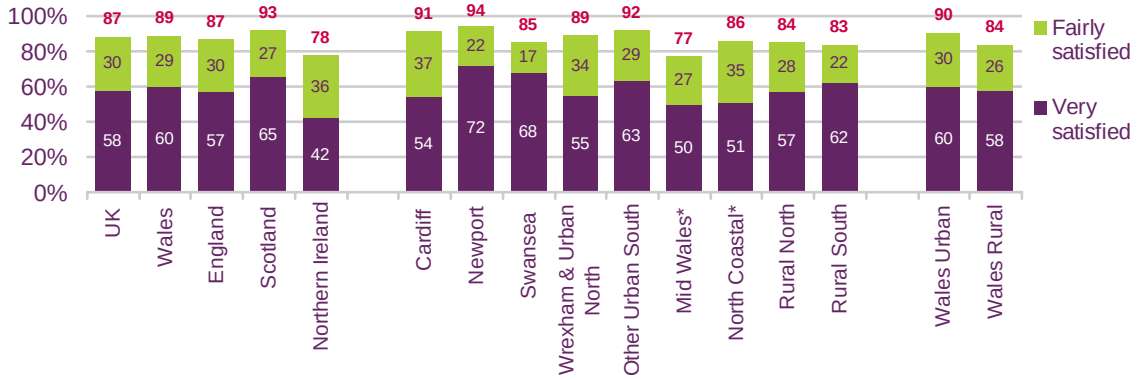
Overall satisfaction with mobile service



3.94 Source: Ofcom. Base: Adults aged 15+ with a mobile phoneSample size less than 100. Apply caution and treat as indicative only.

3.95 The figure below shows that the proportion of people satisfied with their mobile reception in Wales (89%) was slightly higher than the UK average (87%). Satisfaction levels were lower in rural areas (84%) than in urban areas (90%), with Mid Wales returning the lowest satisfaction (77%). It is likely that coverage issues were a factor here.

Satisfaction with reception of mobile service



Source: Ofcom. Base: Adults aged 15+ with a mobile phone

* Sample size less than 100. Apply caution and treat as indicative only.

Mobile

A470 case study

3.96 Following discussions with the Ofcom Wales Advisory Committee, a drive-by survey of the A470 was commissioned as a case study of mobile availability. The A470 is one of Wales' main trunk routes, connecting North and South Wales, but is not currently surveyed by the mobile phone providers. The results are set out below and

show that there are some locations on the route where mobile reception is significantly less than in population centres. The research data will be used in the cost benefit analysis work relating to telecommunications service provision to be carried out as part of Ofcom's Access and Inclusion project.

A470 Mobile coverage survey

3.97 In January 2008 Ofcom commissioned a survey of mobile telephony coverage on the A470 in Wales to provide an insight into the level of service availability on this main road which runs the full length of Wales, from Llandudno in the North to Cardiff in the South.

3.98 Using an automated test rig, calls were made from mobile handsets mounted in a car which was driven the entire length of the route. Call attempts were made every 2 minutes and successful calls lasted 90 seconds; where there was no coverage calls were re-attempted every 10 seconds . Handsets from each of the four mobile network operators were used for the GSM (2G) test and all five operators for 3G.

3.99 Of the calls made with GSM handsets, 32% of call attempts failed because there was insufficient signal quality. Where there was a good signal, 89% of calls made were completed successfully, with the majority of failures due to calls dropping after being established successfully. Sections of the road north and south of Dolgellau, including the Coed Y Benin forest park, and over the Brecon Beacons proved particularly problematic for some operators.

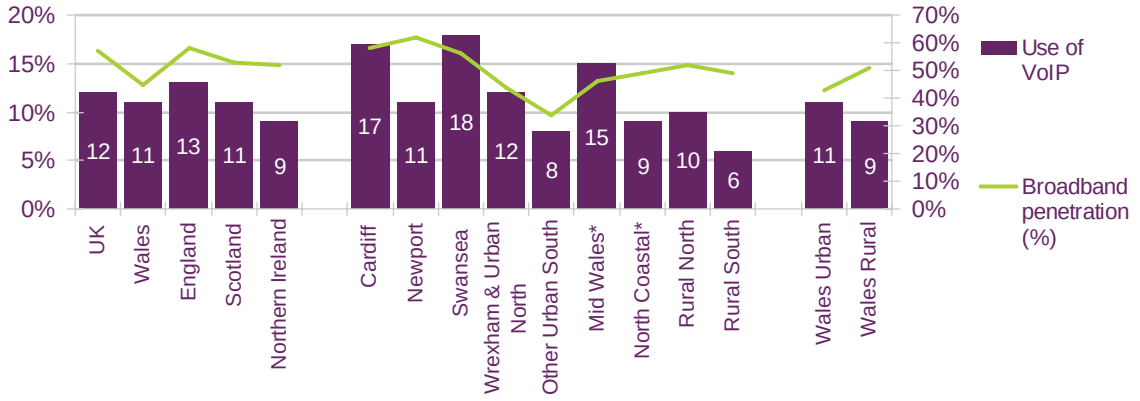
3.100 With calls made with dual mode 3G/GSM handsets, 39% of call attempts failed because there was insufficient GSM or 3G signal quality. Where calls could be made, only 17% were made using the 3G network, with the majority of phones falling back to the more widely available GSM networks. Once a call was established, 81% of calls completed successfully.

3.101 Whilst the methodology used was not suitable for drawing direct comparison between different mobile operators, the results provide a good overview of service availability on this route and highlight that coverage in these less populated routes is significantly less than in population centres.

Use of internet to make phone calls (VoIP)

3.102 Eleven per cent of adults in Wales use the internet to make telephone calls, similar to the UK average (12%). This has risen from around 7% in 2006. There are indications that use is higher in Cardiff and Swansea, and lower in rural areas – age is probably a factor, as urban dwellers tend to be younger. Unsurprisingly, use of VoIP correlates with broadband penetration.

Proportion of adults living in a household that has used Voice over IP



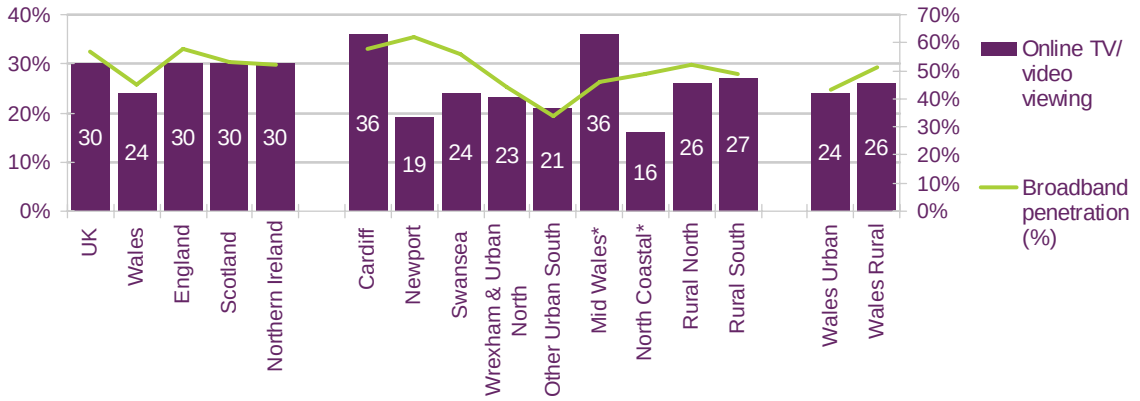
Source: Ofcom. Base: Adults aged 15+

* Sample size less than 100. Apply caution and treat as indicative only.

Use of internet to watch television and video content

3.103 Around a quarter (24%) had used the internet to watch TV or video content in Wales, compared with 30% in the UK (and each of the other three nations). Higher use was apparent in Cardiff, and possibly also in Mid Wales (though note the small sample size). Use appears to correlate with broadband penetration.

Proportion of adults living in a household that has used the internet to watch TV or video content



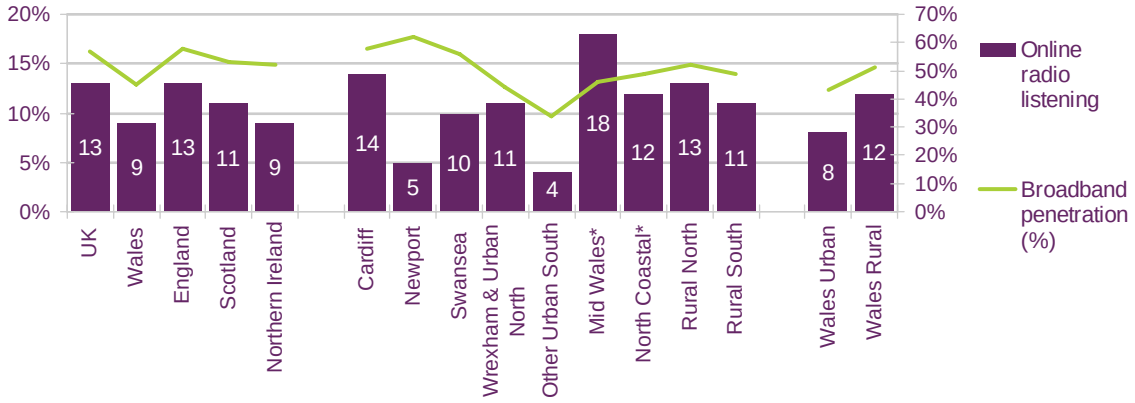
Source: Ofcom. Base: Adults aged 15+

* Sample size less than 100. Apply caution and treat as indicative only.

Use of internet to listen to the radio

3.104 Under one in ten (9%) adults in Wales have used the internet to listen to the radio, lower again than the UK average (13%). Use was higher in England, with similar levels in Wales, Scotland and Northern Ireland.

Proportion of adults living in a household that has used the internet to listen to radio



Source: Ofcom. Base: Adults aged 15+

* Sample size less than 100. Apply caution and treat as indicative only.

3.105 Use was higher in rural areas, despite the older age profile. It was also high in Cardiff and Mid Wales (although caution should be applied to the latter finding, due to a small sample size).

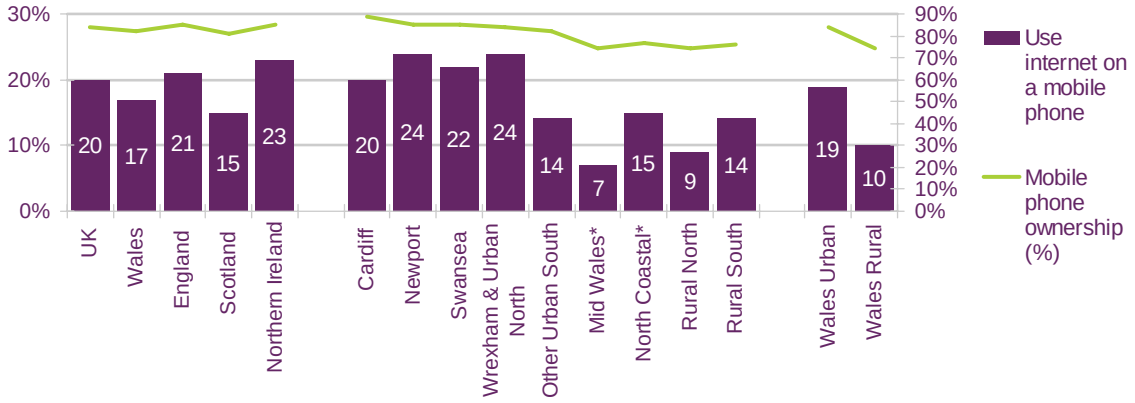
Mobile phone

3.106 The core 2G and 3G mobile phone technologies are able to carry voice, data and audiovisual content. In addition, the mobile handset can incorporate many more functions such as the ability to play music and games, and technologies such as Wifi, Bluetooth and GPS. This section looks at the proportion of adults who use their mobile phone to access the internet, watch video and listen to audio content.

Use of a mobile phone to access the internet

3.107 The proportion of adults who have accessed the internet using a mobile phone was lower in Wales (17%) than in the rest of the UK (20%). Use was highest in Northern Ireland. Use was strongly differentiated by area, with all urban areas (except the smaller southern towns) showing high levels of use, with the lowest being in Mid Wales (7%) and the rural north (9%).

Proportion of adults who have used a mobile phone to access the internet



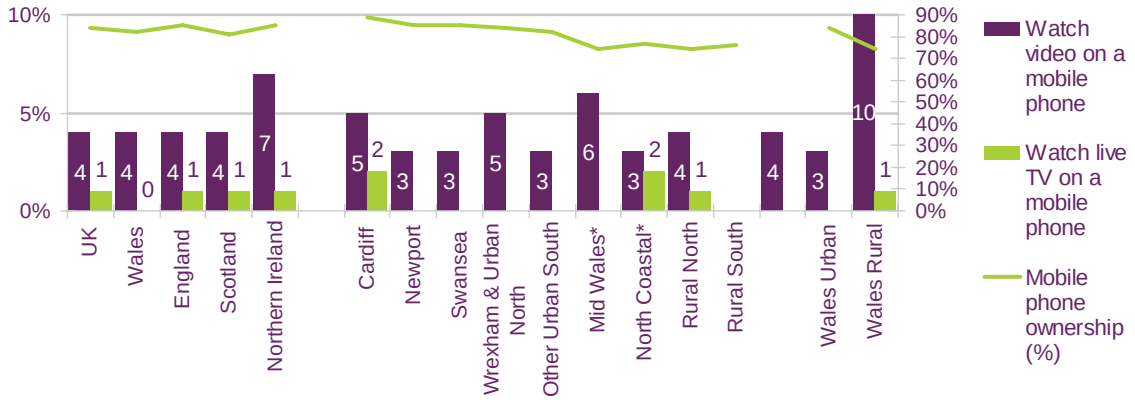
Source: Ofcom. Base: Adults aged 15+

* Sample size less than 100. Apply caution and treat as indicative only.

Use of a mobile phone to watch audiovisual content

3.108 Across Wales, only a very small proportion had used their mobile for watching audiovisual content – 4%, the same as the UK as a whole. There appear to be no significant differences between the Welsh areas.

Proportion of adults that have used a mobile phone to watch audiovisual content



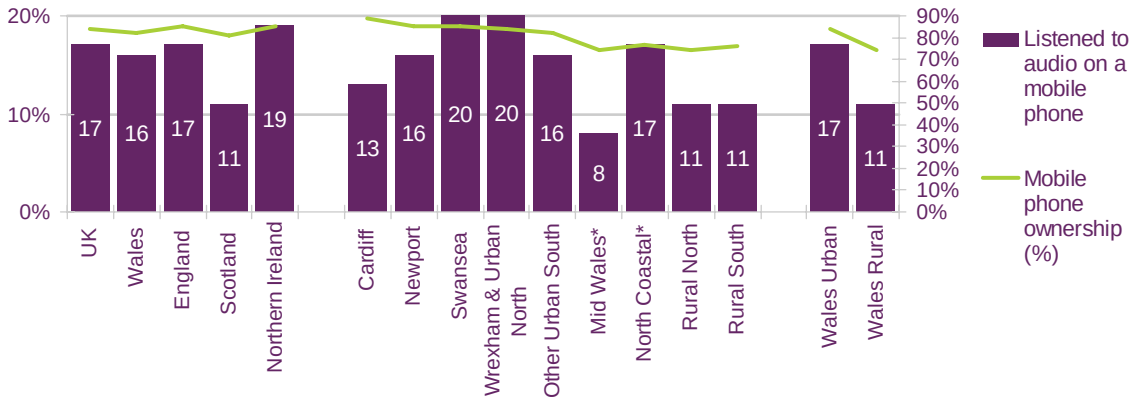
Source: Ofcom. Base: Adults aged 15+

* Sample size less than 100. Apply caution and treat as indicative only.

Use of a mobile phone to listen to audio

3.109 One in six adults (16%) in Wales said that they had used their mobile phone handset to listen to audio content, such as radio, pre-recorded digitally stored music and podcasts – approximately the same incidence as the UK overall. There is a big difference between urban and rural areas, at 17% and 11% respectively.

Proportion of adults who have used a mobile phone to listen to audio content



Source: Ofcom research, 2008. Base: Adults aged 15+

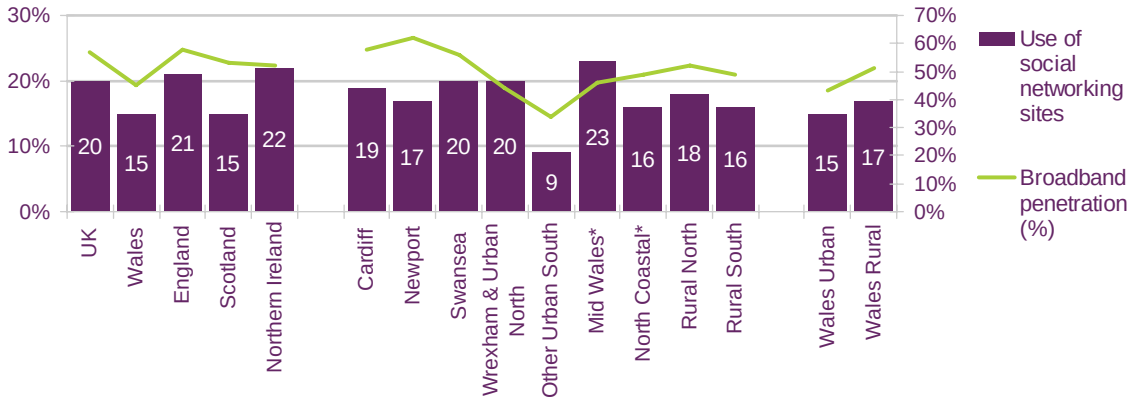
* Sample size less than 100. Apply caution and treat as indicative only.

Social networking sites

3.110 'Social networking sites' are websites on which users can create their own profiles using text, graphics and photos, join groups of people with common interests and send messages to other site members. Despite the media coverage that these sites attract, this remains for now a minority activity among adults. Levels of use are lower

in Wales than in the rest of the UK – 15% and 20% respectively, which broadly matches the difference in broadband take-up. Across Wales, levels of use of social networking sites were fairly consistent, the exception being the smaller southern towns, where use was lowest, at 9%.

Proportion of adults in a household that has used social networking sites

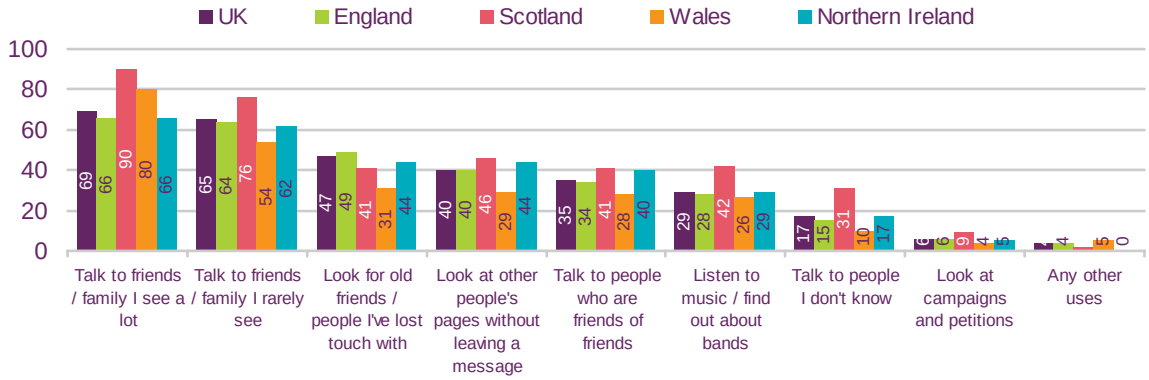


Source: Ofcom. Base: Adults aged 15+

* Sample size less than 100. Apply caution and treat as indicative only.

3.111 Adults in Wales with a page or profile on a social networking site were most likely to use the sites to talk to friends and family that they see a lot. Only 10% of profile owners in Wales used social networking sites to talk to people they don't know.

What social networking websites are used for



Source: Ofcom

Section 4

Next Generation Access: An Introduction

4.1 There are unprecedented changes occurring in the telecoms industry right across the globe. The current networks and technologies, on which most telecoms operators rely, have used the same fundamental elements for decades. These fundamentals are now changing with a move to completely new, “next generation” networks. The results of these changes and the impact they have on consumers will be with us for many years. Ofcom’s approach to these changes sets out to balance the need to remove any unnecessary barriers to investment in the new networks with the need to ensure they deliver positive outcomes, where appropriate by ensuring the continued presence of strong competition.

4.2 When considering next generation networks, they are often logically divided into two separate components, because these have very different implications for operators, regulators and consumers. The first is the backbone or core networks, often simply known as next generation networks (NGNs). There is considerable industry debate already underway on how NGNs will affect telecoms markets in the UK. The second component, next generation access networks (NGA), are formed from the section of the operator’s network which links end customers into the operators’ backbone networks. Last year, Ofcom published a discussion document about next generation access, which set out our view of the most important regulatory issues they raise. We feel the time is now right to present our proposed policy approach to these issues and in doing so, seek to stimulate a broader public debate about next generation access networks.

4.3 The current generation of consumer broadband services were launched in earnest in the UK around the turn of the millennium by BT and the cable operators. These had a slow start, with the services having limited geographic coverage and with the absence of sufficiently strong competition between providers. The regulatory approach to broadband has had an important role in shaping how the market developed. This approach is based on principles which Ofcom established in our Strategic Review of Telecommunications. The most relevant aspects for the broadband market have been:

- contestability: making the opportunity for entering the market accessible to a wide range of companies;
- innovation: allowing the maximum scope for innovation by the promotion of competition at the deepest level at which it will be effective and sustainable; and
- equivalence: the requirement for operators with market power to make the inputs used by their downstream businesses available to their competitors on the same basis.

4.4 Partly as a result of this approach, since its slow start, the market has developed rapidly in terms of competition, coverage and customer take up. Today, over 52% of households in the UK have broadband, up from 16% three years ago[(-1-)], and over 99% can access at least one access network. The average headline speed[(-2-)] of the products delivered to consumers increased three fold in the past 18 months to 4.6Mbps by June 2007. There is a very wide range of products available, covering many different price points, speeds, customer service and bundling options.

4.5 The development of the broadband market is far from complete. In particular, the desire for operators to offer ever faster speeds, and for customers to purchase them, shows no sign of slowing. New high speed services, such as high definition video will place increasing demands on current networks. We are already seeing some upgrades to current cable networks, and they continue to offer the opportunity to deliver very high bandwidths to end customers. At the same time, there is also no doubt that upgrades to copper based broadband networks will continue. However, there is likely to be a point beyond which the today's access networks will no longer be able to address increasing speed and coverage requirements. Next generation access networks are designed to overcome these limitations and, as with current broadband networks, their deployment will accelerate the development of exciting new services that can take advantage of them.

4.6 Ofcom believes that the deployment of next generation access networks has the potential to be very positive for consumers. We are keen to see investment take place at the right time and in an efficient manner. This will involve removing any unnecessary regulatory barriers which might delay this investment. One important factor to achieve this is sharing our policy framework and clearly setting out the practical options for the regulation of these new networks where ex ante regulation may be appropriate at the earliest opportunity possible. This is a key objective of this consultation.

4.7 Next generation access networks may take many forms. They may be based on upgrades to BT's existing copper access network or Virgin Media's cable network, or a completely new deployment of wired or wireless infrastructure, each of which has different advantages and disadvantages. BT has direct copper connections between the exchange and almost every customer premise in the UK. In contrast Virgin's network covers around half of all households, and offers a shared access network using very high capacity fibre and coaxial copper cables. Wireless networks have obvious advantages for delivering mobile services but new technologies may also have a role in delivering very high speed access over large areas in the future. The organisations that deploy next generation access networks may also vary, and could include: communications providers; utilities; building developers; community broadband projects; other new entrants; and, in some instances, the public sector.

4.8 In the UK, we are seeing the first signs of next generation access deployment, for example the Digital Region project in South Yorkshire and a new housing development in Ebbsfleet Valley, part of the Thames Gateway project in Kent. In some countries, next generation access networks are already being deployed more widely. This has required operators to make risky investments, often relying on the predicted success of the new, untried, products that the networks will support. In each case however, there are commercial, geographical or political factors which are not features of the UK context that have led operators to deploy new access networks. These include:

- current generation broadband services which appear less able to meet most customer's needs at the moment compared to the UK;
- greater scope to generate additional revenues from services such as pay TV, whereas the market is already relatively mature in the UK; and
- relatively lower deployment costs of next generation access than in the UK, in part due to more densely populated urban areas.

4.9 It may therefore be that the efficient deployment of next generation access is simply earlier in some other countries than in the UK. We do not yet see evidence that the UK will be significantly disadvantaged economically or socially as a result. It is important that we continue to monitor the situation closely for any new evidence that would change this view. However, we continue to think that promoting investment which is timely and efficient in the context of the UK market is the correct approach.

4.10 We are proposing to achieve the conditions for this investment by adapting the existing principles of contestability, innovation and equivalence that we have used for the regulation of current generation broadband. In addition we think that two further principles will be necessary as we move to next generation access, to reflect the commercial risks and different characteristics of these investments compared to existing access networks, which are largely sunk cost investments. The five principles underlying our proposed approach are:

4.11 contestability: we think that timely and efficient investment will best be achieved by making the investment contestable, allowing any operator who considers that there is a business case for deploying next generation access infrastructure to invest, as soon as they wish;

- maximising potential for innovation: as we recognised in the Telecoms Review for current networks, we believe that the scope for innovation and differentiation is essential for competition in next generation access, and that infrastructure investment is helpful in achieving this. We are consulting on an approach which maximises the potential for innovation, while allowing for the current economic and technical uncertainty around next generation access;

- equivalence: strong competition in current generation broadband has been helped by ensuring that all operators are able to buy exactly the same wholesale products, with the same processes and at the same price, as operators with market power. We propose to apply this principle to next generation access, supported by approaches such as functional separation, essential to reduce incentives for anti-competitive behaviour while retaining incentives for efficient investment;

- reflecting risk in returns: we recognise that anyone who makes investments in next generation access is likely to face significant commercial risks. Regulation should reflect these risks in order to provide appropriate incentives for investment in the first place. We are consulting on a range of approaches to reflect such risk such as anchor product regulation, and risk-adjusted returns; and

- regulatory certainty: It is also important that the regulatory regime we adopt is clear and in place for a reasonable period of time, to allow investors the clarity that they need to invest with confidence. We are publishing this consultation and establishing a program of seminars and meetings supporting it to provide this clarity.

4.12 The consideration of these principles leads us to several specific remedies that may be appropriate to deal with concerns raised by any future next generation access networks that give their owners significant market power (SMP) in the relevant markets. The most appropriate remedies will vary with the technology used to build the network, but those most likely to be relevant are:

4.13 Sub-loop unbundling – this passive line access[(-3-)] remedy already applies to BT's copper access network but is not yet used by any competitors. We believe it will

become increasingly important if we see next generation access networks that still rely on this copper infrastructure. Like LLU today, making the passive bottleneck asset directly available to third parties best supports our principle of allowing innovation by competitive network investment. However, there are practical and cost issues that may mean unbundling is not a viable remedy for all next generation access technologies, or for all parts of the UK; and

4.14 Active line access – Due to the practical concerns about future passive unbundling remedies, a wholesale product, giving competitors access to active bottleneck assets, may be required as well[(-4-)]. It is essential that such a remedy gives those relying on it the maximum possible control over the underlying network's innovation potential. Technology developments suggest that the difference in innovation potential between a carefully conceived and implemented future active line access product and an unbundling remedy may be less than today. However, delivering on this potential will require a step change improvement in the effectiveness of the development processes used for similar bitstream products today.

4.15 In order for these remedies to be effective, it is imperative that they are supported by appropriate backhaul products to transit traffic from the access network to competitors' own core networks. These may take a number of forms and apply at a number of locations within the network depending on the extent to which communications providers own their own infrastructure for the transit of services.

4.16 In addition, as demonstrated by today's broadband market, all access remedies need to be supported by appropriate and robust processes, for example in provisioning, fault management, maintenance and product enhancement. Effective processes are necessary to ensure that any access remedies are viable for practical use by alternative operators to deliver an effective and sustainable competitive environment.

4.17 Alongside possible future remedies, we have also set out our approach to the evolution of current regulation and potential implications on the deployment of next generation access. Any change to existing regulatory products following a move to next generation access will affect operators who currently rely on them. We will consider factors such as the location and timing of existing and potential future investments in current generation broadband before undertaking any changes.

4.18 Although we are keen to ensure regulation is not a barrier to companies investing in next generation access when it makes sense for them, this investment should not be achieved at any cost. In particular, it should not be detrimental for consumers, for example in having to pay higher prices for today's services, nor by sacrificing competition.

4.19 Specifically: we do not currently see evidence of a market failure that would warrant direct intervention by Ofcom in commercial investment decisions. Therefore, we do not propose incentivising operators to deploy next generation access in ways which would result in all consumers paying higher prices for today's products; and neither do we think there is a case for withdrawing all regulation from next generation access networks, bearing in mind that they are likely to be bottlenecks, and the presence of competition has greatly benefited today's broadband consumers.

4.20 The principles we have set out are designed to further citizen and consumer interests and the wider benefits for the economy that flow from these, but there are other specific issues that that may result from next generation access deployment and must be addressed. One is the availability of the appropriate information to allow consumers to make informed purchasing decisions about next generation products

and services. Current concerns that the headline “up to” speeds of broadband products may not reflect the actual speeds a customer will achieve demonstrate the importance of this issue. Another important concern is that next generation networks may be more likely to be deployed in densely populated areas, hence widening the geographic differences in access to high speed services. The significant uncertainty around next generation access deployment suggests it would be premature to attempt to address this potential problem now, but that we must work with the appropriate agencies and be ready to respond quickly at the appropriate time. Our aim is to secure the wide availability of high speed networks across the UK.

4.21 The first, small scale, commercial deployments of next generation access will occur quite soon as part of planned large housing developments, such as the development project in Ebbsfleet. The new networks deployed to these developments raise very specific policy challenges for Ofcom, especially where these networks and the operators deploying them are covered by existing market definitions and regulatory remedies. We explore the principles we will use to consider these shorter term issues here, and we will address them in detail in a future consultation.

4.22 We believe the deployment of next generation access networks offers important potential benefits for consumers and will represent both a significant investment, and a fundamental change, for the whole telecoms industry. The new networks and the competitive landscape they bring will be with us for many years. We must ensure there is a full and open debate around the many complex issues they raise, and that the policy approaches we have proposed here are appropriate and widely understood by all interested parties.

Annex

Ofcom

Background Information

Ofcom was charged with the promotion of Media Literacy as set out in Section 11 of the Communications Act 2003. When Ofcom assumed its responsibilities in 2003, there was no agreed definition of 'media literacy'. Following an extensive consultation in the summer of 2004, Ofcom set out its definition as follows:-

'Media Literacy is the ability to access, understand and create communications in a variety of context.'

In November 2004 Ofcom published its **Media Literacy Strategy** which promised the following:

- A wide ranging **research** programme to assess the extent of media literacy in the UK;
- The development of a **common labelling system** to support greater consistency in presenting information related to possible harm and offence and to protect young and vulnerable people from inappropriate material.
- The establishment of a **cross-platform working group** – including the BBC , ITV, Channel 4, five, BSkyB, British Board of Film Classification (BBFC), major ISPs, mobile phone operators and others - to investigate how viewers prefer to receive information about challenging content, particularly in homes with digital television.
- **Support for related and relevant work undertaken by other organisations** across the UK.

Ofcom's statement of strategy and priorities for the promotion of media literacy can be found at
http://www.ofcom.org.uk/consult/condocs/strategymedialit/ml_statement/

Since then, Ofcom has commissioned and published a wide range of Audits on media literacy activity which again can be found on the website at
http://www.ofcom.org.uk/advice/media_literacy/medlitpub/medlitpubrss/

Where we are now

Ofcom's Annual Plan for 2008/9 sets the following criteria for promoting media literacy going forward:

6.32. We have now built a substantial evidence base to guide our work to promote media literacy and have gained significant support from a wide range of stakeholders for the need to promote the media literacy of all sections of society. Throughout 2007 we have been in discussion with both internal and external

stakeholders in a review of our priorities for the next three years. In response to this review we intend to increase our investment in media literacy over the next three years, with a particular emphasis on empowering consumers.
6.33. For people to be able to benefit from new communications technologies they must be able to make informed choices and have the tools available to manage their relationship to content. We will encourage all content providers to promote and make available information about potentially harmful or offensive content in a form that is easy to use and understand. We are encouraged by the important work of the Broadband Stakeholders Group which has been seeking to agree common principles for the provision of information about potentially harmful and offensive commercially produced and acquired content on all platforms. We hope this work leads to an industry-agreed good practice code which will empower users to make informed choices and better manage their family's relationship to commercially produced and acquired audiovisual content.

6.34. At the same time as these initiatives, we will also encourage the promotion and development of technological tools, such as internet filters, firewalls and PIN access to television services that are easy to use and are effective in helping people manage their access to media. The continuing work of industry to develop a technical standard and kitemark scheme will lead to internet filters that are more effective in blocking inappropriate content and offer greater support to parents in their use.

6.35. In 2008/09 we will work with a range of partners including adult education providers, UK Online centres, libraries and other support networks to ensure that information is made available to those sections of society who are not yet online and who may be hard to reach.

6.36. We will continue to undertake research into people's attitudes and preferences when using digital communications technologies. In the coming year we will publish the findings from a second wave of our Media Literacy Audit (first published in 2006). This will help Ofcom and other stakeholders to identify trends and changes in people's behaviour and highlight new emerging issues which need to be addressed.

6.37. Finally, many of the challenges people face online arise from outside the UK. In response to this, we will establish a forum to enable researchers into media literacy to share their findings and best practice to enable us all to address the global nature of many of the common issues we face.

The Wales Media Literacy Network

Why and when did Ofcom establish the Wales Media Literacy Network?
Ofcom held a public meeting in October 2006 and in response to demand from broadcasters and learning providers at that meeting, decided to establish the Wales Media Literacy Network. The Network (which was officially launched in March 2007) was created primarily to provide a central point of coordination for media literacy activity in Wales and to allow stakeholders the opportunity to share information.

Who makes up the Wales Media Literacy Network?
There are many organisations that have a key role to play in the promotion of media literacy skills, knowledge and understanding - amongst both adults and children. These include content producers, broadcasters, platform and network providers, learning providers, academics, Government, parents, the voluntary sector and others.

Ofcom currently funds Network activity, and NIACE Dysgu Cymru oversees the administration.

A Committee (made up of Network representatives from the various stakeholder groups) was formed to govern the Network, which meets quarterly. In 2007-08 the Wales Media Literacy Network Committee met on the following dates: 10th May 2007, 8th October 2007, 31st January and 24th April 2008. The Committee is chaired by Karen Roberts who is responsible for rolling out Ofcom's Media Literacy remit in Wales.

Membership of the Network is free and any interested parties from the above groups are encouraged to sign up. This can be done by e-mailing Karen at karen.roberts@ofcom.org.uk

What does the Wales Media Literacy Network do?
Ultimately (and perhaps somewhat idealistically) the Network's goal is to increase levels of media literacy in Wales – particularly amongst vulnerable and disadvantaged groups. However in order to achieve this people have to

a) realise that they are 'illiterate' in the first place
b) recognise the benefits of becoming more literate

it is the collective responsibility of those organisations signed up to the Network to encourage a media literate society, and it is imperative that the Network acts as an umbrella organisation to try to facilitate this. The Network will therefore:

- Bring together stakeholders from across Wales on a regular basis to share good practice, information, ideas and **work in partnership** on all matters relating to media literacy.
- Coordinate events aimed at bringing about a better public understanding of media literacy and generally **raise the profile** of its benefits.
- Identify the current issues relating to media literacy and respond to Government (and other) consultations where they have a bearing on media literacy.
- Provide a **'match-making' service** between learners, learning providers and media professionals. For example: If a broadcaster wishes to undertake specific work in relation to media literacy, the Network could help find an appropriate outlet for that project (e.g. local authority, private training provider or community development group).
- Develop and maintain a **Media Literacy Wales website** to provide an online network for media literacy issues; publish details of events and Network meetings etc. All the activities of the Network would be linked through the website and this would act as a focal point for activity *
- **Collate and distribute information**
- In the long term the Network will establish a **Wales Media Literacy Strategy** to promote a clear vision for the way forward for media literacy in Wales. The Network would seek to encourage the Welsh Assembly Government to take on board the recommendations within the strategy.

*The terms of reference for the Network was established at the first meeting, and this document, plus agendas and minutes of these meetings are currently available on the Niace Dysgu Cymru (NDC) website at www.niacedc.org.uk .
However, the Network is currently in the process of creating its own designated website which in future will hold such information.

Network events and activity

A number of high profile Network events have already been held in Wales to

- increase membership of the Network, and;
- to promote the work of Network members as they relate to media literacy.

National Eisteddfod, Mold (August 2007)

The National Eisteddfod is one of Europe's oldest and largest cultural events. It attracts thousands of people and hundreds of organisations from across Wales. The Wales Media Literacy Network, in conjunction with S4C and the Royal Television Society Wales Centre, (RTS) held an evening event showcasing media literacy activity from across Wales.

The event was an opportunity for members of the network to explain a little about their work in media literacy through video and digital storytelling. Presentations were given by:

- Ofcom
- NIACE Dysgu Cymru- Media Literacy in Adult Learners' Week
- BBC Wales, digital stories
- Canllaw Online- digilabs
- ITV Wales

All contributions to this event were made through the medium of Welsh.

University of Glamorgan – Atrium Building (October 2007)

Following the success of the National Eisteddfod event, it was felt that it would be beneficial to hold a similar event in South Wales. This coincided with the opening of the University of Glamorgan's Cardiff School of Creative and Cultural Industries http://cci.glam.ac.uk/ which agreed to host the event - and was again supported by the Royal Television Society. In addition to the above, presentations were also given by:

- Merthyr Media Projects
- Wise Kids

E- Democracy – Pierhead Building, National Assembly for Wales (14th January 2008)

The Network felt it was particularly important to engage with policy makers in the media literacy agenda. A major conference was held in the Pierhead Building, Cardiff Bay, on Monday January 14. The conference encouraged debate about the development of an e-democracy strategy in the Welsh context and was an opportunity for stakeholders to voice their opinions and concerns for processes going forward. Speakers included e-democracy experts Anne Mackintosh and Andy Williamson; AMs Leighton Andrews, John Griffiths, Peter Black, Alun Cairns, Alun Davies and Bethan Jenkins; as well as representatives from Ofcom, NIACE Dysgu Cymru, the Welsh broadcast media, Communities@One and the Wales Council for Voluntary Organisations.

Pupils from Greenhill and Thomas Picton Schools in Pembrokeshire also attended the conference to record the day's proceeding for their own internet radio station and they also produced a digital story which was subsequently published online. As a result, a video of the event was posted on the National Assembly for Wales' website.

Digital Literacy in a Web 2.0 World, Aberystwyth University (4th June 2008)

The Network, in partnership with the Department of Theatre, Film & Television Studies at Aberystwyth University hosted a workshop on digital literacy for adults with an interest in education on June 4th 2008 in room A14, Hugh Owen Building, Penglais Campus, Aberystwyth.

Developments in Internet, mobile technologies and services mean that these days there are unprecedented opportunities for people to interact, socialise and access knowledge online. The Internet and digital devices offer affordable access to media and innovative, online tools and virtual spaces to support content creation; education; collaboration; accessing specialised knowledge; research and more. This event explored the development of these technologies, and looked at the digital literacy skills that are needed to help us get the most from them, whilst ensuring our personal safety.

Forthcoming events

National Eisteddfod, Cardiff (August 2008)

Following the success of last year's event, it is envisaged that a similar presentation (hosted by S4C and the RTS) will take place on Wednesday 4th August at the National Eisteddfod for Wales in Cardiff.