

BIS | Department for Business
Innovation & Skills

DIGITAL BRITAIN

**Consultation on proposals
for a Next Generation
Fund**

JANUARY 2010

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Consultation: Proposals to introduce a Next Generation Fund

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This consultation is relevant to: All stakeholders with an interest in Next Generation Access (NGA), including communications providers, network owners and consumers.

1. Executive Summary

1. The Digital Britain report set out an ambition to strengthen and modernise the country's communications infrastructure so that the UK could compete and lead in the global digital economy.
2. Throughout the world, countries are now wrestling with how best to develop Next Generation Access (NGA) Networks for both citizens and businesses. Whilst currently there is no evidence that the UK is being disadvantaged by the lack of NGA, it is likely in the future that there will be serious negative economic consequences for countries which continue to rely on current generation broadband and that those countries will be unable to take advantage of the economic and social benefits associated with NGA.

What is Next Generation Access?

3. Next Generation, or super-fast broadband, is difficult to define, but is generally accepted as offering connectivity at a considerably higher speed than available currently. This connectivity is currently delivered through a variety of fibre optic technologies, but in the future will also be delivered through wireless means, such as satellite, mobile and other technologies such as WiMax.

Why is it important?

4. Greater levels of connectivity enable economies to remain competitive. Many countries, including the UK, believe that NGA will deliver similar benefits to those enjoyed since the roll out of current generation – higher productivity, greater innovation, increased access to new markets and greater consumer choice. NGA will also enable more efficient and effective delivery of government services, including tele-health and tele-medicine services such as the real-time monitoring of long term health conditions.
5. NGA also has the capacity to change the delivery model for content and entertainment, with films, TV, music, computer games and other applications able to be either downloaded in a relatively short period of time, or streamed directly from a remote source. This should, in time, bring greater choice, innovation in services and cheaper product for consumers.

Why is Government intervention needed?

6. The market in the UK is delivering NGA, with Virgin Media's high speed broadband service available to nearly 50% of households. BT have stepped up their efforts to deliver NGA and aim to connect 1.5m homes to NGA in 2010, and aim to have NGA in 40% of all homes by 2012. There are also many smaller, local infrastructure projects that are delivering NGA to the marketplace. But due to the high cost of this infrastructure, it is estimated that the market alone will not deliver much beyond 60-70% of the country. Therefore, without intervention, many towns and communities will not be able to benefit from the advantages NGA can offer.

7. The Government recognised this and decided to create a Next Generation Fund funded through a small landline duty of 50p per month on all fixed lines. The draft legislation for this was published following the Pre-Budget Report. The Fund will help support the market to deliver beyond the commercially attractive areas to at least 90% of the UK by 2017.
8. The objectives of the Next Generation Fund are:
 - to support the roll out of NGA to at least 90% of households in the UK by 2017;
 - to promote the roll out of infrastructure that meets the needs of businesses and households in the UK, and supports economic growth;
 - to ensure value for money through minimising deadweight and ensuring competition in the procurement process;
 - to meet affordability constraints implied by the income stream from the new 50p per month landline duty imposed on all fixed lines.
 - to maximise synergies with the Government's Universal Service Commitment, a parallel infrastructure investment programme to ensure virtually every community has access to a broadband connection of at least 2Mbps.
9. This consultation is aimed at identifying all the issues and evidence required to inform the delivery of the Next Generation Fund. There are many factors that are still uncertain, in particular factors such as precisely how far and to where the market will deliver, and therefore where the Next Generation Fund can have best effect.
10. We also need to consider the options for intervention and delivery. A delivery team will be responsible for the procurement process and identifying which areas should benefit from the Fund first. But before these can be tackled, we need to consider a number of questions – should this be a National (UK-Wide) project, Regional or even sub-Regional? Which approach should be taken to the intervention? Which approach to deployment should be used – should Government intervene on the fringes of the market deployment and work out towards the areas that are virtually certain not to be served by the market in a reasonable period of time, or should deployment work inwards? We have also looked at how best to ensure there is competition within these newly built networks, helping to drive up consumer choice, and drive down consumer prices.
11. As announced at Pre budget report 2009 and in line with its wider objective to support the delivery of major Government projects, the newly formed Infrastructure UK will assist this project as part of its initial work programme.
12. The Digital Britain Report considered the Next Generation Fund as a solution to the likely limits of commercial deployment of the fixed network. We generally tend to take a technology neutral approach to any intervention. We need to consider whether that approach still applies in the context of NGA. Whilst other technologies might in due course match the expected performance, we believe that fixed-line solutions, based on fibre are likely initially to be the most appropriate. The funding for this intervention will

13. In order to inform these decisions, we need to look at the existing and planned market deployment in the UK, and where necessary across the rest of the world, in order to gain some insight into where the Fund might be needed and how it should be used. We are delighted with the NGA roll out that has taken place in the UK, and is planned for the coming few years, and demonstrates that the view taken by the Caio Review was right – that the market is delivering. But we have also recognised that in some areas the market will not deliver, at least in a short timeframe. The Government therefore believes that we need to act in order to ensure the UK continues to be a world leader in digital content, innovation and services, with a world class communications network that supports this. We believe the Next Generation Fund is the fairest and most effective method with which to support this.
14. We recognise that the Fund is a subsidy to commercial companies, which leaves the assets in the ownership of the private sector. In these circumstances we take the view that it is only right that we include a mechanism for a clawback scheme, should it be proved the market would have delivered without public subsidy. This is clearly a sensitive area that would require significant negotiation during the procurement process but we believe it is right that this is considered at this point. It is also a requirement under EU State Aid rules to implement this if public funds are used in areas where it is proven that the private sector would have addressed.
15. These are all issues that need to be addressed, and we hope that the responses to this consultation will provide a large amount of the evidence on which to base these policy decisions.
16. In addition to the consultation questions, we would welcome responses on any other aspect relevant to this consultation, not covered under the specific questions raised.

2. How to respond

17. When responding please state whether you are responding as an individual or representing the views of an organisation. If you are responding on behalf of an organisation, please make it clear who the organisation represents by selecting the appropriate interest group on the consultation response form and, where applicable, how the views of members were assembled.

18. Consultation responses can be submitted by letter, fax or email to:

Name: Peter McDougall

Team: CCI Broadband Team

Department of Business, Innovation and Skills

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19. A list of those organisations and individuals consulted is attached at Annex C. We would welcome suggestions of others who may wish to be involved in this consultation process.

3. Additional copies

20. You may make copies of this document without seeking permission. Further printed copies of the consultation document can be obtained from:

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www.bis.gov.uk/publications

21. An electronic version can be found at www.bis.gov.uk/consultations

22. Other versions of the document in Braille, other languages or audio-cassette are available on request.

4. Confidentiality & Data Protection

22. Information provided in response to this consultation, including personal information, may be subject to publication or release to other parties or to disclosure in accordance with the access to information regimes (these are primarily the Freedom of Information Act 2000 (FOIA), the Data Protection Act 1998 (DPA) and the Environmental Information Regulations 2004). If you

want information, including personal data that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, amongst other things, with obligations of confidence.

23. In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

5. Help with queries

24. Questions about the policy issues raised in the document can be addressed to:

Name: Peter McDougall

Team: CCI Broadband Team

Department of Business, Innovation and Skills

Postal address: UG 22- 30, 1 Victoria Street, London SW1H 0ET

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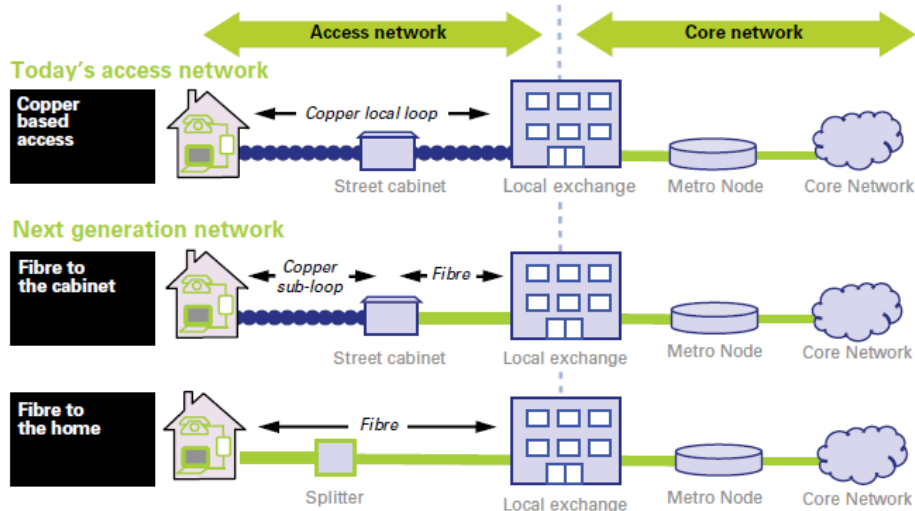
Email: peter.mcdougall@bis.gsi.gov.uk

A copy of the Code of Practice on Consultation is in Annex D.

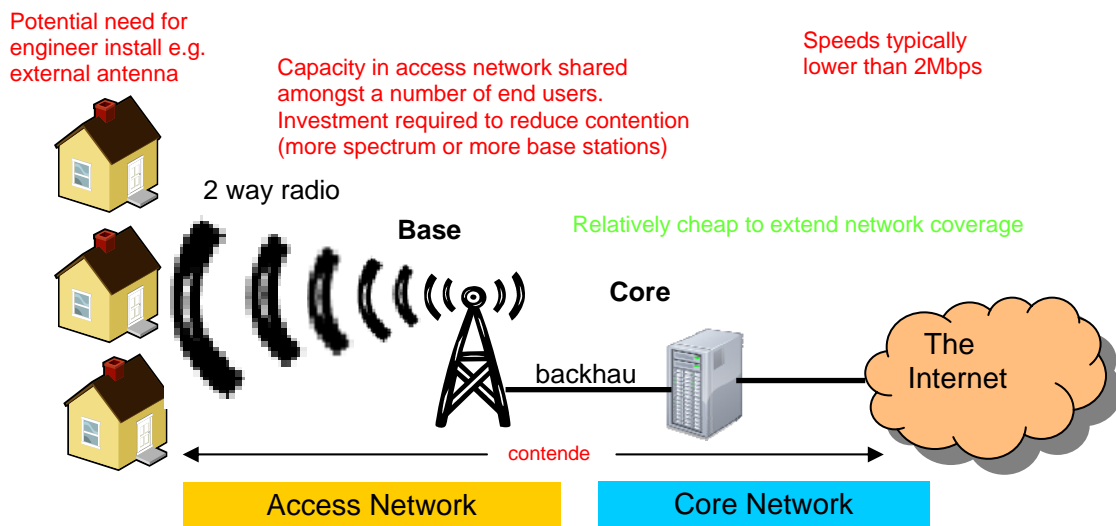
6. The proposals

Next Generation Access (NGA) – What is it?

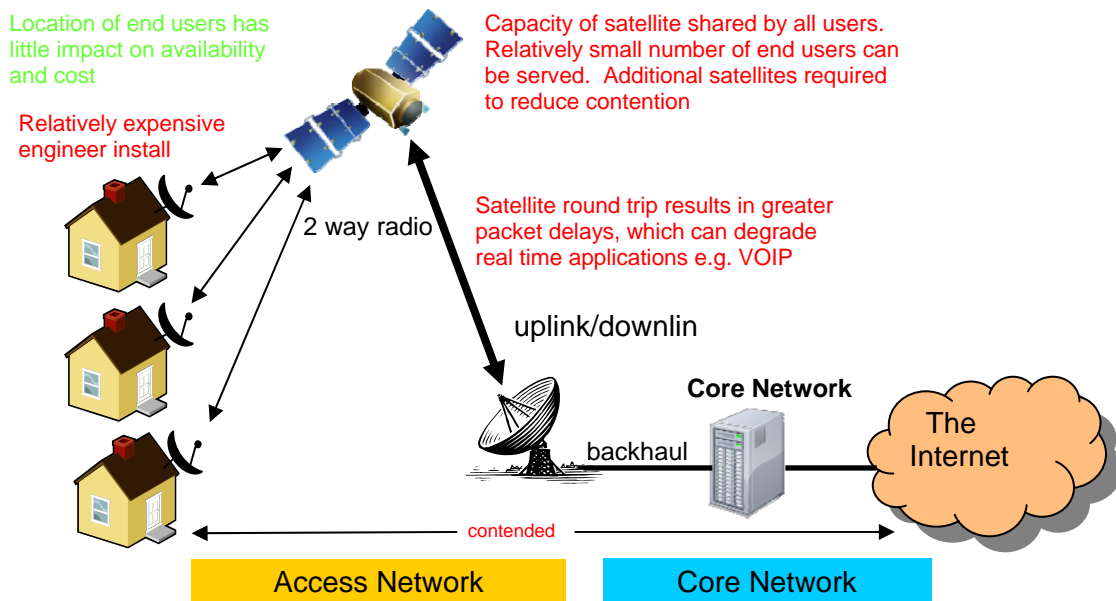
25. Next Generation Access is the term used to describe the infrastructure and set of technologies which provide super-fast broadband. Most homes in the UK currently receive broadband through the standard copper network but consumers already show signs of wanting increased bandwidth and speeds which are testing the technical limits of that network. Most expect that future new applications will require greater speed and more symmetrical download and upload speeds.
26. Next Generation Access technologies can include Fibre to the Cabinet (FTTC), Fibre to the Home (FTTH), satellite or mobile wireless technologies. Currently, there is no agreed definition of super-fast broadband but there have been two clear trends in the evolution of broadband services – one to ever increasing bandwidths for fixed line services, and increased mobility at more modest bandwidths. These are linked to some extent, and are likely to converge, particularly at lower bandwidths, but in general NGA connectivity:
- Will be faster;
 - Will offer more symmetrical download and upload speeds;
 - Will deliver greater reliability and consistency of service across users and over time
27. BT and Virgin Media have already announced their commitment to developing next generation broadband services. BT will be upgrading its network using FTTC technology to produce speeds of up to 40Mbps, they plan to roll out to with 1.5m homes by 2010 and up to 40% of UK homes by 2012. BT have recently announced that they are increasing the number of homes with access to FTTH to 2m by 2012. Virgin Media have completed their roll out of their super-fast broadband service, with their entire network, covering nearly 50% of all homes in the UK, now able to access up to 50Mbps.



28. The take up of current generation mobile broadband is also increasing rapidly, indicating that consumers are increasingly wanting access to the internet on the move. Sales of 3G dongles and the prevalence of smart phones with 3G internet access have increased steadily over the last 2 years. Research from Nielson estimates that at least 8m people accessed the internet on a mobile device in the first half of 2009, an increase of 40% on the previous year.
29. Recent announcements regarding the end of O2's exclusivity agreement for the Apple iPhone, and the arrival of new models from other suppliers such as Palm will continue this trend. As this usage rises, consumers will demand faster, more reliable connections, with applications and services that demand higher bandwidths. The spectrum modernisation programme, which is aimed at releasing additional spectrum to the market, will enable operators to begin rolling out next generation services, either WiMAX or Long Term Evolution (LTE). The first UK trials for LTE were recently announced by O2.



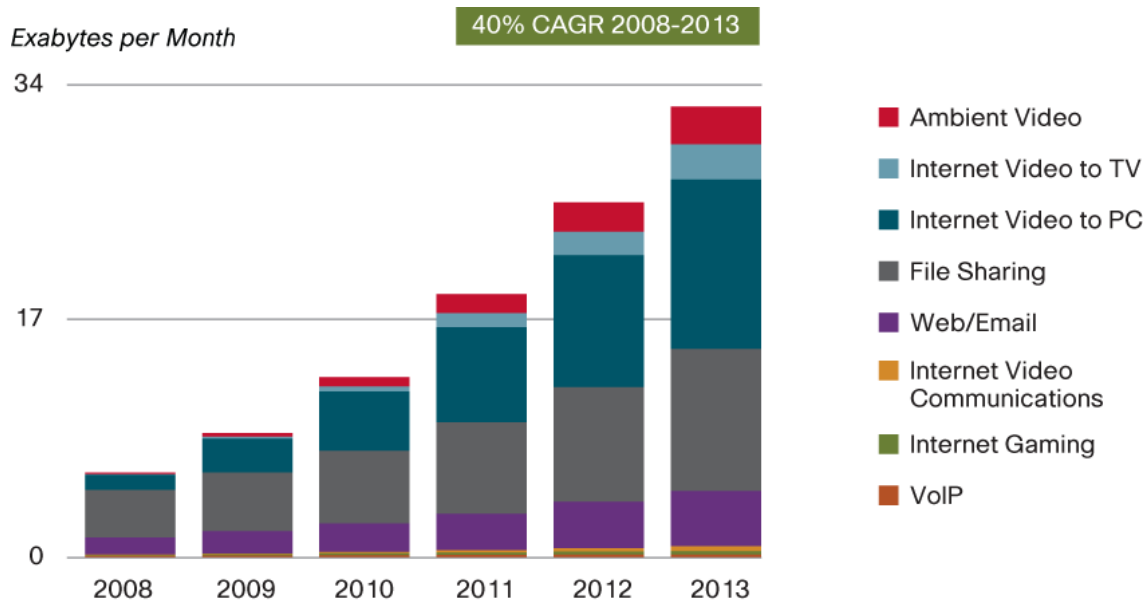
30. Satellite providers increasingly offer competitively priced broadband packages, offering coverage across the UK, including areas not well serviced by terrestrial services. Most are planning to deliver additional capacity that will result in the availability of higher bandwidths. These offerings are vital for those in not-spots offering connectivity to those that would otherwise suffer. Avanti, Astra and Eutelsat are all in advanced plans to offer next generation satellite broadband services from next year, once new satellites are in orbit.



31. Powerline Communications (PLC) technology through the electric power network can be used for the transmission of broadband. It is noted that in some case it may provide the most effective form of access for next generation broadband. Our expectation is that such circumstances are likely to be limited, and we are mindful of the possible effects on radio users in such cases
32. NGA will not only allow consumers and businesses to take advantage of new services and applications, but also to enjoy higher quality versions of the existing ones.

NGA – Why is it important?

33. Many countries, like the UK, consider Next Generation Access Networks to be vital to international competitiveness. It is believed that NGA will have positive effects on the economy in the UK but to take advantage of this opportunity the UK must be ready to invest in the future of its NGA networks. It is reasonable to assume that Next Generation Access will deliver similar benefits to current generation broadband: higher productivity, increased innovation, improved access to new markets and business opportunities created by e-commerce, greater consumer choice and easier and quicker access to e-government services.
34. It is still difficult to predict exactly what services and applications could become available. Just as services such as social networking, and real-time streaming were unimaginable 10 years ago, the innovative applications that super-fast broadband could support are only to be guessed at. But we do know that bandwidth demands are increasing year on year as consumers take advantage of the services offered over faster networks. This is only likely to increase. Whilst the following chart illustrates traffic in the core of the network, there are obvious conclusions to draw in relation to the access part of the network.



Source: Cisco VNI, 2009

35. NGA will also offer applications and services such as those described below.

Tele and home working – Increased bandwidth could support applications such as two-way video conferencing and encourage greater use of tele-working for employees and employers. This also gives businesses the advantages of two-way video conferencing allowing increased collaboration regardless of location. Tele-working can also reduce the barriers for less mobile groups, the disabled or single parents who need to work flexibly, and allow them to gain entrance into the labour market.

Improved delivery of public services – Higher quality video conferencing can allow for improvements in education, creating virtual classrooms, and can improve the quality of healthcare services over the internet. Some healthcare services can already be delivered over current generation broadband but increased bandwidth provides the potential for better quality imaging, smoother motion and sound which suggest tele-healthcare services can be significantly improved for those who need it.

Increasingly schools are using the internet not only as a tool for the children to work and learn but also as a tool for communicating with parents. As the trend inexorably increases, high capacity communication links between schools and families will become increasingly important.

One area for society which could prove exciting are the multi-media opportunities offered through NGA. Greater bandwidth and speeds allow TV services to be delivered in HD, large file size bursting of HD media allows the viewer to start viewing a film while it is still being downloaded. NGA can also support multiple HD media streams in different areas of a premise, whether for businesses or the individual citizen.

Economic benefits of NGA – While it is not possible to accurately assess the economic benefits of NGA in the UK, it is possible to say that NGA will have a significant economic impact on the UK. Assuming that applications and services

compatible with super-fast broadband will be developed by countries in which the infrastructure is already in place, the UK will miss a huge opportunity if it doesn't develop its NGA network.

NGA will also support indirect opportunities for the content and creative industries, which currently contribute around 7% to the UK's total economy and which have already benefited from current generation broadband.

Employment could be increased by the construction and maintenance of the broadband infrastructure. Work carried out by the London School of Economics (LSE) and the Information Technology and Innovation Foundation¹ has estimated the impact on employment of investment in broadband. They find that 280,000 jobs would be created with a £5 billion investment in next generation broadband.

SMEs are likely to be particular beneficiaries of NGA as it may offer them the opportunity to exploit new markets and business opportunities. They will also be able to take advantage of the potential viable cloud computing Infrastructure associated with NGA.

Next generation access will also bring significant benefit to businesses in the way they operate. Cloud Computing may achieve critical mass, giving greater architectural flexibility and cost savings. Software itself will be run as a service, particularly important for SMEs, with dumb terminals more prevalent, with virtually all the processing carried out behind secure firewalls. The benefit to SMEs is that it relieves them of the expensive and time consuming challenge of implementing fixes, patches, virus updates etc, and will also offer greater back-up arrangements for vital data.

Proposals / Options

The following options have been considered:

Option 1: Do nothing – Although the landline duty has been announced in the Digital Britain Report, this option serves as a useful baseline for comparison. If it did not go ahead, the market currently delivers Next Generation broadband to around 50% of the population, possibly increasing to up to 70% as demand increases

Option 2: Deploy the Next Generation Fund. This is the option that will be taken forward because it will incentivise the roll-out of next generation superfast broadband to at least 90% of UK homes and businesses by 2017 and hopefully accelerate the expansion of the boundary of market provision from 50% to two thirds of the UK population.

36. This option sets out key aspects that need to be considered in order to deploy the Fund effectively. These include when to intervene, procurement method, the level of deployment, and so on.

¹ The UK's Digital Road to Recovery, London School of Economics and The Information Technology and Innovation Foundation <http://www.itif.org/index.php?id=242>

Rationale for Intervention (Option 2)

37. Delivering a network to provide for the future essentially involves building a new network(s). It will take billions of pounds of investment for this to become a reality. The market, as shown by the recent announcements by BT and Virgin Media is already delivering for some. These plans suggest that around 50% of the UK population currently receive fixed NGA and as demand increases, it may be commercially viable for fixed NGA to be rolled out to up to 70% of the population. Wireless and satellite provision could boost availability still further. It also seems likely that those NGA networks being rolled out will tend to be deployed in the same areas, meaning that those lucky enough to be in areas served by NGA may well also have a choice of competing providers.
38. But the Government believes that unaided, it is unlikely that the market will deliver beyond this to the remainder of the population in a reasonable period of time, if at all. The network effects brought about by having widespread access to broadband and NGA are only truly compelling when take-up and access reach a certain point. The Impact Assessment for the Digital Britain Report outlined some of these effects, and includes jobs created in other parts of the economy as a result of the applications, services and opportunities which further investment in broadband generates (e.g. growth in the content and creative industries).
39. In order to allow for this and prevent a next generation divide and regional disparities, the Government believes it should act now to deliver at least 90% coverage of NGA by 2017. This will also underline the Government's commitment to investment in infrastructure and ensure the UK is an attractive place with which to do business.
40. Therefore the rationale for the creation of the Fund is twofold – to promote greater social equity and reduce the chance of a digital divide, and to ensure that the UK is in a position to take advantage of the economic benefits that arise from NGA across the whole of the UK.

Option 1 - Do nothing

41. Without intervention, coverage would be sub-optimal and the full benefits as outlined above would not be possible.

International Comparisons

42. The UK is not alone in trying to develop its NGA network. Other economies recognise that there needs to be investment in next generation broadband and are pursuing a range of strategies to achieve this and a summary of some of these strategies are set out below.
43. The UK's position is that the market will deliver up to around 70% of the country. We are pleased that the market in the UK has been very quick to respond to the challenge of developing super-fast broadband. Just 12 months ago, Virgin Media were still in trial developments and BT had not even begun trials. But some areas will require targeted interventions. The Next

Generation Project will deliver at least 90% coverage of Next Generation broadband by 2017.

44. Within Europe, other countries are addressing the issue with different strategies:
- i. **Finland:** The Government has committed to getting 99% of homes within 2km of a fibre connection by 2015. For 95% of homes, the market will deliver and the remaining 5% will be two thirds funded by public investment of €133m (£112m). What is unclear is how the final 2km between connection and homes will be provided as the subscriber is responsible for this last section. This will be provided at a cost of €55 (£47) per household, not including the additional investment to connect homes to the fibre.
 - ii. **Germany:** By 2014 it will deliver 50Mbps to 75% of households, with public sector involvement where the market will not deliver. €180m has been identified for this.
 - iii. **Greece:** €0.7bn (£0.6bn) of public investment will be spent with a further €1.4bn (£1.2bn) of private investment, to deliver FTTH to 2 million homes. This is at a cost of €192 (£160) per household.
 - iv. Outside Europe, the **Australian Government** has announced an A\$43bn (£21bn) FTTH project to provide FTTH at speeds of 100Mbps to 90% of homes over the next 8 years. Wireless technology will provide the final 10% with up to 12 Mbps. This project will be a joint venture with industry but the public will own a minimum of 51% of the project. The cost per household is a minimum of A\$2,750 (£1,350) depending on the size of the publicly owned share of the investment.

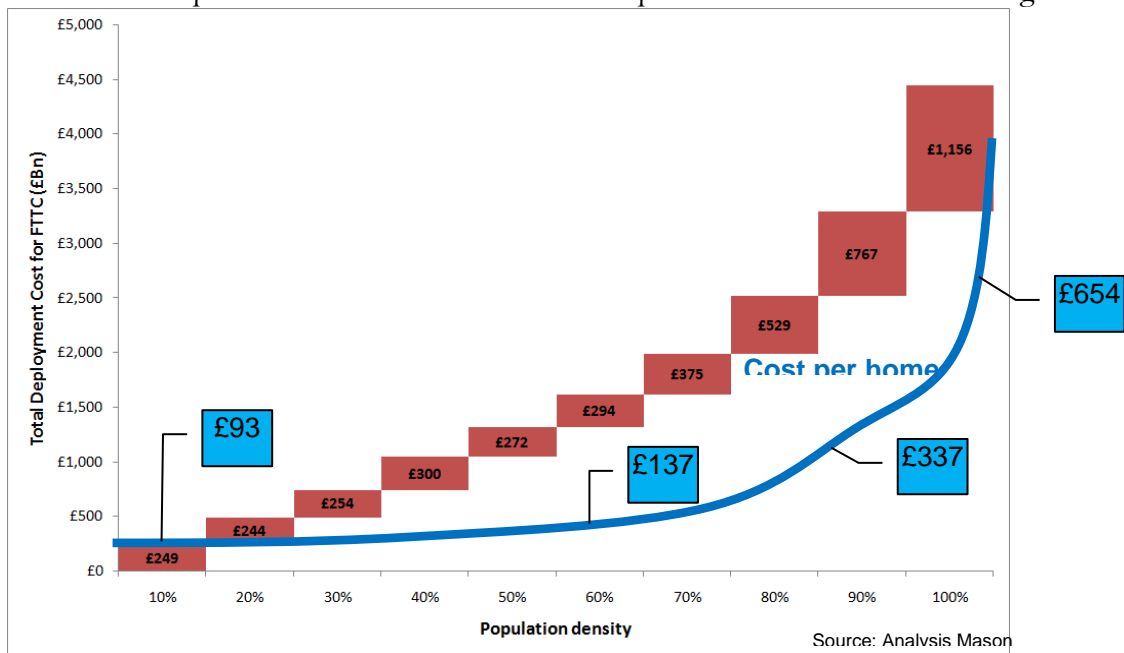
Technology Options

Fixed Line

45. Research carried out for the Broadband Stakeholder Group by Analysys Mason² as part of the Caio Review shows that the cost of rolling out fibre or a new cable infrastructure jumps significantly once deployment exceeds the 60-70 % level. They analysed the cost of deploying NGA using three different technological solutions:
- Fibre to the Cabinet – download speeds of around 20 – 40Mbps initially
 - Fibre to the Home (GPON) – download speeds of around 2.5Gbps but share bandwidth
 - Fibre to the Home (PTP) – symmetric download and upload speeds of Gbps and don't share bandwidth

² Analysys Mason (2008) The costs of deploying fibre-based next generation broadband infrastructure. http://www.broadbanduk.org/component/option.com_docman/task.doc_view/gid.1036/Itemid.63

46. Until the 60-70% point however, costs remain relatively stable, and therefore we suggest that as long as demand is proven, the market will deliver beyond the 50% of households and businesses within the footprint of existing investment plans.
47. In the light of recent developments, and in particular BT's announcement that they are to increase their Fibre-to-the-Home offering to 25% of its planned NGA footprint at no additional cost to the original estimate, it is perhaps worth considering whether the estimates made by Analysis Mason are still valid. It is possible that cost estimates are in practice lower than first thought.



Next generation mobile and satellite services

48. It is currently difficult to predict the impact of next generation services provided by satellite, mobile and WiMax. It is likely that mobile and WiMax in particular will be confronted by the same challenges as fixed line NGA deployments in that the business case is likely to be stronger in areas of greater population density. Whilst the “final drop” access is delivered wirelessly, significant capital investment is needed in upgrading base stations, masts and ensuring adequate backhaul in order to deliver a good quality of service. This is a significant challenge.
49. Next generation broadband delivered by satellite, once the satellites have been deployed, has the benefit of greater coverage, but still has the challenge of providing adequate bandwidth without impacting significantly on the service. The upfront customer equipment costs are also higher, although these are beginning to fall into line with terrestrial services. And of course, satellite will never be able to entirely remove the delay that makes real time interaction such as online gaming a challenge.
50. We believe that these challenges will prevent NGA being rolled-out to the last 30% - 40% or so of the UK population. The roll-out of NGA is associated with an inherent risk – Network operators may be reluctant to deploy further NGA

if there is no further development in the creation of new services and applications which require super-fast broadband. In turn, content service providers are unlikely to support the development of new services to be supported by NGA without a substantial roll-out of the new infrastructure on which they can be used. This could result in a co-ordination failure which means both network operators and service providers do not invest in infrastructure and services respectively, delaying the roll-out of NGA.

51. We expect there to be demand for NGA services in the areas that Virgin Media and BT are already deploying networks. What is more uncertain is the point at which demand levels fall below that which would make sense for commercial deployment, and therefore we begin to get a picture of where the areas for intervention begins.
52. Roll-out of NGA requires substantial capital expenditure to build the network. There are long payback periods and the size of revenue from subscriptions is unknown, because of demand uncertainty. This higher degree of risk than with first generation broadband, may mean that network operators are more unwilling to roll-out NGA networks much beyond areas where density of population means they are more certain to receive a return on their investment. In more rural or suburban areas, decreasing population density means it is unlikely that fixed line operators in particular will roll out network upgrades on a commercial basis.
53. Therefore, the Government believe that action is needed to incentivise the market to deliver to these areas, in the form of seedcorn funding, raised by the 50p per month landline duty on telephone lines announced in the Digital Britain Report. Whilst remaining a consumer landline duty, it is anticipated this will be applied and collected at the network owner level for ease of collection and enforcement. Further details are available in the corresponding consultation document on the raising of the landline duty, published jointly by BIS and HMT following the Pre Budget Report 2009.
54. It is possible that the cost of deployment may be brought down by introducing other regulatory or policy measures, such as the use of new or existing telegraph poles to allow for deployment of telecoms cables overhead, or mandating duct access. The Government's consultation on whether to relax the Electronics Communications Code to allow for deployment overhead closed recently, and the Government response will be published shortly.

Means of Intervention

55. There is a risk that Government intervening too early would distort the market, or chill planned investment and there is a possibility that the Fund could be used to subsidise roll-out in areas that the market would deliver to in a reasonable amount of time. Equally, the up to 70% estimate may or may not be accurate.
56. So, we need to establish firmer conclusions for where the areas for intervention starts, or to design an intervention that is flexible enough to be able to adapt as the market moves forward without itself chilling investment. We know that the market, through BT and Virgin Media's NGA roll out is delivering to

approximately 50% of the country currently, and this doesn't take into account further deployment over the next 5 years, or smaller networks such as Digital Region South Yorkshire, FibreCity's roll out in Bournemouth, Dundee and Sheffield, or the myriad of smaller local networks that are currently helping to provide next generation broadband to some of the more rural and remote areas of the UK.

57. We also need to consider the point at which the Next Generation Fund should cease intervention. The Digital Britain Report stated that the Fund be used to deliver Next Generation broadband to at least 90% of the country. As described earlier, once you move above this, the costs escalate considerably to the point where the business case for deployment becomes unsustainable, even with the seed-corn funding that the Next Generation Fund will provide.

Consultation Questions

- 1. We welcome responses to any aspect of this consultation.**
- 2. Do respondents feel that the cost analysis for fixed-line Next Generation Access is still valid, and if not, what are the latest estimates?**

Next Generation Access – What do we really mean, and what are the options for delivery of NGA using the Next Generation Fund?

58. It is likely that there will be a patchwork of networks across the UK, ranging from the predominantly fibre-to-the-cabinet deployments of BT and Virgin Media, local infrastructure projects such as Digital Region South Yorkshire and Alston Cybermoor, fibre-to-the-home as well as NGA by satellite or Long Term Evolution (LTE) and WiMax in time.
59. We recognise that significant investment is needed to upgrade the fixed telephone network, and that potentially the Next Generation Fund could be the incentive needed for this to happen in non-commercial areas.
60. Government's approach is, as far as possible, to remain technology neutral and focus more on the services, applications and content that we would expect to be delivered through an NGA network, through specifying service quality criteria rather than the underlying technology. The market is usually best placed to determine which technology will serve different areas best – what works for one area, might not work in another.
61. However, the Digital Britain Report framed its consideration of the Next Generation Fund very much in the context of the fixed network. Increasingly, the debate around NGA is framed around the deployment of fibre. Whilst one approach could be to define services that can be delivered over NGA, in the short term, we believe only fixed line will have the ability to deliver.
62. By 2017, this may well be very different, with the spectrum modernisation programme providing the basis for the roll out of next generation mobile services, and satellite providers already have clear work plans to deliver NGA, so this consultation asks whether it is right we focus resources on the deployment of fibre deeper into the network and address the inadequacies of the fixed network.
63. Whilst we accept that at present there is no agreed definition of next generation access or super-fast broadband, we would expect connections to have:
- Significantly faster and more symmetric download and upload speeds than most current services,
 - Higher quality of service, with increased bandwidth for greater consistency across users and over time, with less contention in the network resulting in consumers achieving the speeds promised, within a reasonable margin. We would also expect to see reduced or minimal latency
 - Improved reliability of service, with loss of connection a rarity.
64. This will provide the platform for the sorts of services you would expect to see delivered over an NGA network, such as multiple High Definition streaming and high quality web conferencing enabling greater tele and remote working.

65. We are already moving towards a Digital Government, with increased delivery of public services online and NGA will enable more advanced application of this. Education delivery has the capacity to be transformed, enabling remote and distance learning, completion of homework online and other innovative applications that are currently unable to operate over the existing network. The much vaunted tele-health and tele-care would become more feasible, with clinicians able to monitor and treat long term conditions more effectively and efficiently.
66. But in order to press forward with designing the procurement process, we would like feedback on whether this minimum criteria and service-based approach is the right approach. Whilst fibre-to-the-home (FTTH) throughout the UK would ensure the network is as future-proofed as possible, we need to strike a balance between value for money and equity.
67. If the Fund was to be used to provide solely FTTH, the likelihood is that there would be insufficient funds to reach at least 90% of the population with NGA that was outlined in the Digital Britain Report. Fibre-to-the-Cabinet (FTTC) solutions will, for most households, begin to provide the services we would expect as NGA at a lower cost. But it is likely that this would only be one part of the upgrade needed to the fixed network.
68. Whilst in time, next generation mobile and satellite broadband services may start to match the headline speeds of fibre-based connections, we do not believe the overall service levels will initially be of the same quality. Inherent problems with backhaul capacity, contention in the network and latency will mean an inferior service compared to a fibre-based connection.
69. Coupled with the fact that the Fund will be created by a landline duty on fixed lines, we believe it is right that solutions provided by the Fund should be fixed line, fibre connections only.
70. In addition, the European Commission State Aid Guidelines for intervention in NGA markets state that “NGA networks are mainly fibre-based or advanced upgraded cable networks that are intended to replace in whole or to a large extent the existing copper-based broadband networks or current cable networks.”
71. This consultation will provide the basis for Government to take policy decisions, which in conjunction with the procurement team, will provide a framework for delivery of the Next Generation Fund.

Consultation Questions

- 3. What do respondents feel is the minimum bandwidth requirements, both download and upload, in order to qualify as a Next Generation broadband service? Are the requirements above regarding quality of service, including latency and reliability sufficient? What figures should we set on the bandwidth requirements?**
- 4. Do respondents have views how the Next Generation Fund will be used and in particular the focus on fixed line solutions?**

5. What minimum criteria should we be looking at, bearing in mind the need for value for money, equity and flexibility?
6. What applications and services would not be able to be run over a network that has the criteria outlined as a minimum?

What are the options for the procurement and intervention process?

72. When considering the implementation and delivery of the project, a number of decisions need to be made regarding the procurement of service delivery, and the approaches that should be taken in order to maximise value for money, effectiveness and quality of service, and minimise the risk of deadweight investment. These centre around:
- Should delivery and therefore procurement of service providers be at a National (UK-wide), Regional (defined by the Regional Development Agencies) or even sub-Regional level? Engagement with the Devolved Administrations, Regional Development Agencies and Local Authorities will need to be considered and ensure any roll out is complementary to any on-going infrastructure work funded outside of the Next Generation Fund.
 - How best to employ the Next Generation Fund to deliver the objectives of the Digital Britain White Paper – that is delivery of NGA to the areas of the UK that the market will not reach. Options so far identified include a reverse auction process (as specified in Digital Britain), either Regional or National, that encourages competition between network operators and service providers, or other approaches such as flat or graded subsidies per house connected.

National vs Regional vs Local deployment

73. The roll out of any network is tremendously complex, expensive and time consuming. Such a widespread deployment of infrastructure in telecoms has not been seen in nearly a century.
74. A national, UK-wide, approach to the implementation of the Next Generation Fund has many pros and cons. The biggest advantage is probably scale, and the efficiency gains that this will bring, in terms of pricing, network management and the billing and operations efficiencies offered by a National network
75. However, a national deployment could be inflexible, and result in a “one size fits all” approach, which doesn’t suit the needs of a given local area.
76. A more regional approach could offer greater flexibility, allowing network operators to use market knowledge of individual areas, including the topography, prospective demand and ability to pay, as well as other local conditions. Depending on how the areas are defined, service providers would still be able to factor in more attractive areas to subsidise those where the business case is less compelling.
77. A regional approach will inevitably result in a number of different networks, and consideration should be given to ensure that these are all interoperable and do not become separate islands of connectivity. Should this be the approach taken, the network operator (s) will need to work closely with the Independent Networks Cooperative Association (INCA), and engage with or adhere to the

outcomes of the recent COTS project, currently being facilitated by the Broadband Stakeholder Group.

78. We would also need to be mindful of the potential need or demand for smaller scale, local projects, in areas where network operators still find the business case challenging, even with the proposed subsidy offered by the Next Generation Fund. This offers the possibility of the Next Generation Fund being used to subsidise roll out of NGA in these areas. This is likely to depend on the demand, and where the proposed deployments fall in relation to the areas that are likely to require intervention, but at this stage we remain open to the possibility.
79. A more regional approach would also have the benefit of being able to bring in expertise, and possibly even additional funding, from the Devolved Administrations, Regional Development Agencies and Local Authorities, all of whom have been involved in network developments over the last 8-10 years during the development of current generation broadband. It would be counter-productive to not harness this knowledge if it were suitable.

Options for intervention

80. The procurement model for the provision of NGA in the areas requiring intervention will be crucial in determining value for money for the public sector, and ultimately the landline duty payer.
81. The decision on which approach to use will be based on which approach has the potential for attracting the most bidders, and providing value for money for the landline duty payer, along with factors such as speed of deployment and the technology solutions posed in any bid.

Outside in, or inside out?

82. Having established where we think the intervention may start and end, the next consideration is the approach that should be taken to addressing these areas. There look to be two obvious options to achieve this – either the NGA Fund starts on the fringes of the where the market is expected to deliver to – an inside out approach. Or it starts on the far reaches of these areas, wherever that may be, and will work inwards towards the market roll out.
83. Both of these pose questions. If you take the “outside in” approach, you undoubtedly ensure that those that are served by the Fund are those that would not be reached by the market, which is key. The difficulty here is that on the fringes, even with a subsidy, the business case might still be difficult to make, depending on how the subsidy will work. This might mean that there is less interest from commercial companies to begin roll out.
84. This approach also raises the possibility of the Next Generation Fund subsidising provision of a service in sparsely populated areas over those more urban and suburban areas that the market has not yet reached, at least in the short term. However, we would expect this to be corrected in the medium term.

85. An “inside out” approach has the benefit of deploying infrastructure closer to where the market is delivering, and therefore it is likely that the business case will be stronger in these areas (primarily due to density of population and ease of deployment), with the subsidy provided by the Next Generation Fund. The economic impact of NGA roll out is also likely to be greater in these areas.
86. We also need to bear in mind the Universal Service Commitment project that will run concurrently to the Next Generation project. It is anticipated that many of the “not-spots” will be closed using next generation technologies, due to the high percentage of clustering, so there is potential for some overlap. The Digital Britain Report estimated that approximately 1.5m additional homes could benefit from NGA as a result of this intervention. It will be the job of the procurement team to manage this overlap to avoid unnecessary public investment and to ensure the greatest benefit.
87. Until the question of which approach to deployment is decided, we believe that it would not be appropriate at this stage to specify the areas that will receive intervention first. This prioritisation will be a matter for the procurement team to decide, subject to clear criteria from Government, once considerable scoping and synergies with the Universal Service Commitment have been undertaken. Furthermore, the chosen approach will need to be compatible with state Aid Rules but we believe it is appropriate to seek views on this, and we would welcome input in order to further inform opinion.
88. However, as uncertainty currently exists as to where the market deployment of NGA will reach, there is a danger that intervention using the Next Generation Fund may encroach on areas that the market would reach in a reasonable period of time, and cool the market investment. This is linked to how we define the areas for intervention, and careful consideration will need to be given to this.
89. In terms of prioritisation, we would expect this to be a matter for the procurement team to consider, once the approach to roll out has been decided. The procurement team will be in a position to look at the current market, and the synergies with the Universal Service Commitment, and decide on a roadmap for deployment which will inform the procurement process.

Consultation Questions

- 7. In your opinion, would a regional or National deployment be a more efficient and appropriate use of the Next Generation Fund, and why? What other options are open to HMG in creating competition in the procurement process?**
- 8. What do you consider to be the optimum procurement approach or commercial model that balances the public sector’s need to demonstrate value for money with private sector considerations?**
- 9. Would an “outside in” or an “inside out” approach to delivery be more effective and why? Are there other approaches that should be considered?**

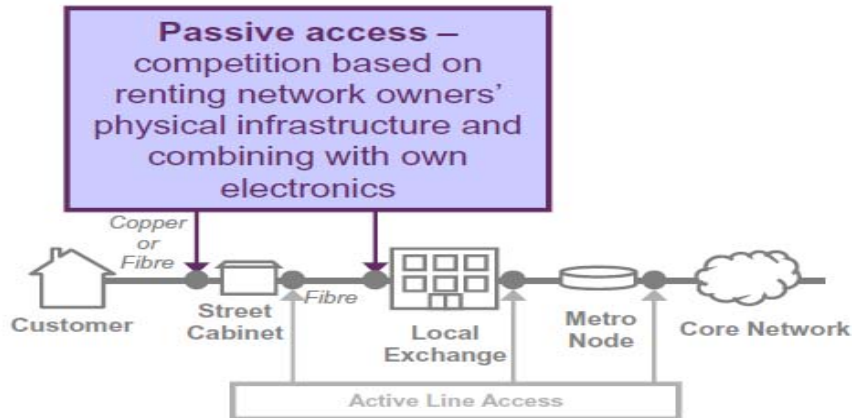
- 10. Where should the Next Generation Fund be used to intervene in the first instance, in terms of either location, or market deployment, in order to minimise the risk of distorting the market, and not chill planned investment?**
- 11. What do you see the risks to competition from providing public support for NGA roll-out and how can these be mitigated?**
- 12. At what stage in the deployment cycle, such as time or penetration, should the Next Generation Fund cease intervention, and why?**
- 13. Which areas of the UK should receive intervention from the Fund, and why?**

What should happen if the Fund supports networks in areas that in retrospect should have been served on purely commercial terms?

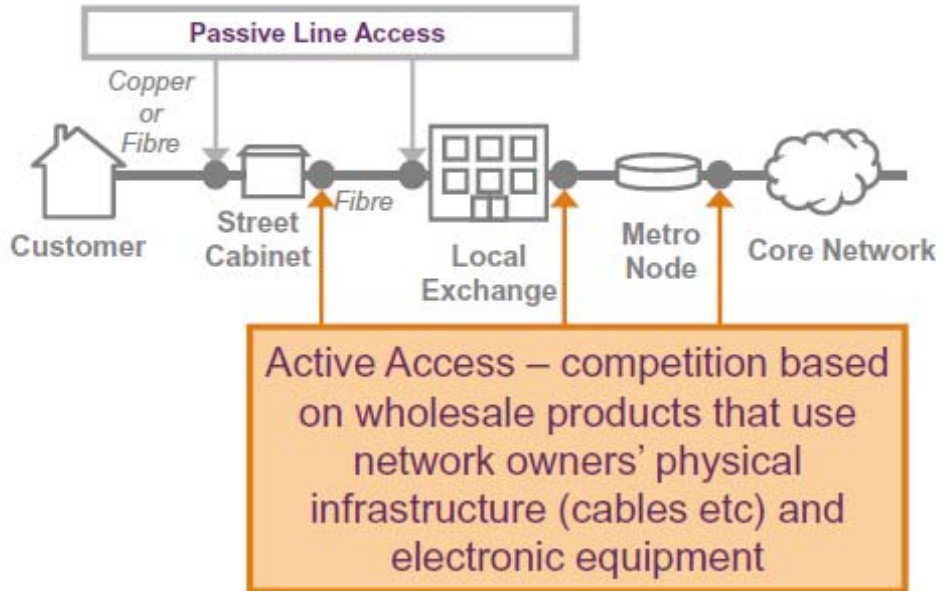
90. Whilst the Government believes that the Fund is necessary in order to incentivise the roll out of NGA beyond the areas that are commercially attractive, it is also possible that the Fund will be a success in terms of stimulating the take up of NGA, bringing significantly more subscribers than anticipated. This will therefore generate increases in revenue for the company or companies that are successful in the procurement process.
91. In order to avoid winning bidders being effectively granted a windfall, it may be appropriate to look at methods of “clawing back” a proportion or the entire amount awarded from the Fund, if there is a return on the investment greater than a certain level. Given that the Fund will only form part of the investment, determining where that level, and when any claw back might take place is will be crucial. If any scheme is implemented too early, it may damage a company’s ability to continue to invest in further upgrades.
92. This area will require consideration as part of the procurement process, which will be led by the procurement team, but the Government believes that this is something that should be considered, and indeed is required to do so if it is later proved that the market would have provided in areas which benefitted from public subsidy.
93. The Government recognises that State Aid clearance will be needed, and is in discussions with the European Commission regarding this.
94. Therefore, the Government would like responses on the following questions:
 - 14. Should the Government consider a claw back scheme, once the return on investment reaches a certain level?**
 - 15. If so, at what level of return on investment should this begin, and how should this be determined? For example, you could implement a sliding scale that increases as the return on investment increases.**
 - 16. Are there any other options HMG should consider to minimise deadweight?**

Wholesale Access and competition –

95. When considering the use of public funds in infrastructure, it is essential that effective competition remains in order to produce value for money and ultimately lower prices and better choice for the consumer.
96. In the current generation of broadband, competition was introduced by requiring BT Group to open up their network at a wholesale level and allow competitors to run services over this in exchange for fair regulated prices that reflect this imposition.
97. This was taken one step further through the introduction of Local Loop Unbundling (LLU) that allowed Communications Providers to install their own equipment and electronics in BT Exchanges and control the final part of the access network. Finally, by requiring Openreach to be functionally separate from the rest of BT Group.
98. This approach has led to the UK having one of the most competitive broadband networks in the world, with considerable choice and low prices for the consumer. Competition has also been provided, in approximately half of the country, by the cable infrastructure. The recent surge in mobile broadband has increased the choice available.
99. In a next generation world, there are challenges in promoting competition, particularly for fixed line next generation access. For next generation mobile, the Spectrum Modernisation Programme will help maximise adequate infrastructure competition. For next generation satellite, the challenge remains in ensuring enough capacity, as well as the cost of deploying the satellites.
100. The cost of deploying fixed line NGA makes it unlikely that there will be substantial infrastructure competition, outside of the most commercially attractive areas. It is likely that for 40-50% of the country, BT and Virgin Media will both have NGA networks.
101. However, once you move beyond this, into areas where currently only one, large network is present, it is unlikely that new entrants into the market will commit the significant investment costs in order to deploy a new network, covering significant areas. There may be smaller networks that will offer some level of competition, but it is more likely that these will be limited in scale.
102. There are two approaches to promoting competition in fixed line NGA – passive and active access. Passive access refers to competition based on renting network owners' physical infrastructure and combining it with service provider's own electronics – much like Local Loop Unbundling in today's market. This could include duct access and sub-loop unbundling.



103. Active access refers to competition based on wholesale products that network owners' physical infrastructure and electronic equipment – much like the current Bitstream product available today. This requires network owners to implement an Open Access model, with service providers able to offer products over their network in exchange for a suitable price for the renting of the network.



104. Infrastructure competition or passive access such as sub-loop unbundling and duct access, can maximise the potential for innovation. However, such approaches may not be as cost-effective as active access, especially in some parts of the UK. Therefore, it is right to consider whether some form of bitstream access can deliver the same kind of benefits as passive access.

105. Ofcom is currently reviewing competition for fixed line wholesale access, with proposals anticipated early in 2010. As part of this, it is considering which types of access should be required where competition concerns exist, and in what form.
106. Separate to Ofcom's considerations, Government believe that any network that is deployed as a result of the Next Generation Fund should be open access, in order provide the best choice and price, as a result of competition, for the consumer. However we also believe that it is right to ask whether this should be the case, and consider all the options.

Implementing active access

107. So far, the focus of industry attention has been on identifying how best to implement active access – whether as part of a regulatory decision from Ofcom or as a condition of public sector funding of NGA deployments.
108. Ofcom, along with NICC (a technical forum for the telecoms sector that develops interoperability standards), have outlined the active access approach that they believe would work best for next generation access networks – namely Ethernet Active Line Access, or ALA.
109. It is desirable that ALA has a number of key characteristics in order to maximise its benefits. It should:
 - Retain as much as possible of the innovation supported by passive access
 - Be neutral to the applications – voice, video, HDTV, data
 - Be implementation neutral to the underlying media – point-to-point fibre, GPON, copper, bonded copper, wireless
 - Help to overcome technology isolation – one wholesale access for all technologies.
110. There are also other interoperability issues to consider – the emergence of a number of local and community-led broadband networks means that it is likely that there will be a patchwork of networks that make up NGA across the UK.
111. In order to avoid these being developed in isolation, it is desirable that they are all interoperable, and don't result in a sub-optimal range of services offered at a retail level. In order to reduce this risk, a degree of standardisation and harmonisation is needed, particularly at the technical and process levels.
112. The Broadband Stakeholder's Group has taken a proactive step, and has established The Commercial, Operational and Technical Standards (COTS) project. The aim of the COTS project is to work with representatives of independent, local projects, national network operators and ISPs to develop a standardised approach. Work is currently on-going to reach this aim, and is intended to be fully ALA compliant.
113. Openreach have been working on an ALA-compatible solution, Generic Ethernet Access, that is aimed at allowing competitors to provide services over the Openreach network – whether FTTC or FTTH. There has been some

concern in the industry that this is inadequate, but government would like views on this.

114. We believe networks receiving money from the Fund should be open access, but are seeking responses to the following questions:

Consultation Questions

- 17. Do respondents feel that Government is right in insisting all networks built with the use of the Fund should be open access?**
- 18. Do respondents believe that active line access is the right approach to achieve fixed access competition?**
- 19. Do respondents feel that the proposed product, Generic Ethernet Access (GEA) is adequate, and if not, why not?**
- 20. Do respondents feel that the same active access remedies should be applied in the areas that receive subsidy from the Next Generation Fund, or are there good reasons for not doing this?**
- 21. How should compliance with any requirements to provide an active remedy be managed? For example, once you've imposed a supply obligation as part of a procurement process, what contractual provisions are necessary to ensure effective compliance, and how would these be enforced?**
- 22. How might active remedies vary with time? For example, wavelength unbundling appears impractical now, but we expect it to become a realistic (and possibly attractive) option in 3-5 years time. How might the terms of any remedy imposed as a result of the procurement process be varied?**
- 23. What other measures could be looked at by Government in terms of passive access, in order to introduce greater competition?**

7. Consultation questions

- 1. We welcome responses to any aspect of this consultation.**
- 2. Do respondents feel that the cost analysis for fixed-line Next Generation Access is still valid, and if not, what are the latest estimates?**
- 3. What do respondents feel is the minimum bandwidth requirements, both download and upload, in order to qualify as a Next Generation broadband service? Are the requirements above regarding quality of service, including latency and reliability sufficient? What figures should we set on the bandwidth requirements?**
- 4. Do respondents have views how the Next Generation Fund will be used and in particular the focus on fixed line solutions?**
- 5. What minimum criteria should we be looking at, bearing in mind the need for value for money, equity and flexibility?**
- 6. What applications and services would not be able to be run over a network that has the criteria outlined as a minimum?**
- 7. In your opinion, would a regional or National deployment be a more efficient and appropriate use of the Next Generation Fund, and why? What other options are open to HMG in creating competition in the procurement process?**
- 8. What do you consider to be the optimum procurement approach or commercial model that balances the public sector's need to demonstrate value for money with private sector considerations?**
- 9. Would an "outside in" or an "inside out" approach to delivery be more effective and why? Are there other approaches that should be considered?**
- 10. Where should the Next Generation Fund be used to intervene in the first instance, in terms of either location, or market deployment, in order to minimise the risk of distorting the market, and not chill planned investment?**
- 11. What do you see the risks to competition from providing public support for NGA roll-out and how can these be mitigated?**
- 12. At what stage in the deployment cycle, such as time or penetration, should the Next Generation Fund cease intervention, and why?**

13. Which areas of the UK should receive intervention from the Fund, and why?
14. Should the Government consider a claw back scheme, once the return on investment reaches a certain level?
15. If so, at what level of return on investment should this begin, and how should this be determined? For example, you could implement a sliding scale that increases as the return on investment increases.
16. Are there any other options HMG should consider to minimise deadweight?
17. Do respondents feel that Government is right in insisting all networks built with the use of the Fund should be open access?
18. Do respondents believe that active line access is the right approach to achieve fixed access competition?
19. Do respondents feel that the proposed product, Generic Ethernet Access (GEA) is adequate, and if not, why not?
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23. What other measures could be looked at by Government in terms of passive access, in order to introduce greater competition?

8 What happens next?

116. Government will consider the responses to the consultation and will publish a response within 12 weeks. The responses will help inform policy and provide a basis with which to move forward, particularly regarding next steps for the procurement group.

Annex A: Market deployment in the UK

Since the publication of the Digital Britain White Paper, the market roll out of NGA has continued rapidly. In particular:

BT:

BT announced on 9th July that it was launching super fast broadband cable to 1.5M homes by summer 2010. The plan is the first chapter in BT's longer-term programme to make super-fast fibre broadband available to 40 per cent of the UK – or some 10 million homes - by 2012. The company has pledged to spend £1.5 billion on this programme. BT will offer access to service providers on an open, wholesale basis thereby supporting a competitive market. Sixty nine locations across England, Scotland, Northern Ireland and Wales will benefit from this latest phase of BT's investment programme.

BT further announced on 9 October that they will be increasing the number of homes that will receive Fibre-to-the-Home (FTTH), as part of this network upgrade programme. Some 2.5m homes will be able to access FTTH by 2012.

Virgin Media:

Virgin's roll out of NGA continued with the completion of the DOCSIS 3.0 roll out across the entire network in mid-July. Subscriber numbers of the higher bandwidth packages has continued to increase with the number of customers on the 20Mbit/s and 50Mbit/s packages rising by 39,400, with the rate of addition 9,600 higher than in the first quarter of the year, although the share of gross additions remained at 12%.

H2O networks:

H2O Networks are continuing with their deployment of fibre through the waste water systems in Bournemouth, and recently announced the creation of Opencity, who will manage the relationship between Fibrecity and service providers.

Digital Region, South Yorkshire:

Following final approval of the project in the April 2009 budget, contracts were signed with the selected technology partner, Thales Security & Solutions Ltd, in early May, network build commenced in mid June (and continue on schedule) and the regional public launch took place on 17th July.

In parallel, as the project has come to an end, the focus has been on initiating the live business, Digital Region Ltd.

Alston Cybermoor:

There has been a great deal of work going on to lay the fibre and install wireless upgrade equipment

Community Broadband Network – CBN

Specific developments since June:

- 1) Alston 'Fibre-moor', (see above) Cumbria, have started digging fibre. Alston is one of the most sparsely populated parishes in England. Formerly a broadband 'notspot', then home to the successful Cybermoor wireless project, the local community has decided that they won't be in the next generation broadband slow lane.
- 2) Manchester 'The Corridor' - Oxford Road Corridor regeneration project. Aiming to cover an initial 500-1000 premises, the Corridor fibre to the premises project has gone to tender.
- 3) West Whitlawburn Housing Co-op in Cambuslang, Glasgow has completed 100 new homes all with fibre connections installed by the firm Fibre Options.

Annex B: Glossary

Term	Definition
Asymmetric Digital Subscriber Line (ADSL)	Technology that allows the use of a copper line to send a large quantity of data (e.g. a television picture) in one direction and a small quantity (e.g. a control channel and a telephone call) in the other. Also known as xDSL.
Bandwidth	Physical characteristic of a telecommunications system that indicates the speed at which information can be transferred. In analogue systems, it is measured in cycles per second (Hertz) and in digital systems in binary bits per second (Bit/s).
Bit-rates	The rate at which digital information is carried within a specified communication channel.
Broadband	A service or connection generally defined as being 'always on' and providing a bandwidth greater than narrowband.
Cloud Computing	Cloud Computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications.
Connection speed	The rate information can be transferred from the internet to computer. Dependent on the type of connection, i.e. modem, cable, DSL, etc.
Copper line	Main transmission medium used in telephony networks to connect a telephone or other apparatus to the local exchange. Copper lines have relatively narrow bandwidth and so have limited ability to carry broadband services such as video unless combined with an enabling technology such as ADSL.
Digital	Binary coded representation of a waveform, as opposed to analogue, which is the direct representation of a waveform.
DSL	Digital Subscriber Line. A family of technologies generally referred to as DSL, or xDSL, capable of transforming ordinary phone lines (also known as 'twisted copper pairs') into high-speed digital lines, capable of supporting advanced services such as fast internet access and video-on-demand. ADSL, HDSL (High data rate DSL) and VDSL (very high rate DSL) are all variants of xDSL.
Fibre-to-the-cabinet (FTTC)	Access network consisting of optical fibre extending from the access node to the street cabinet. The street cabinet is usually located only a few hundred metres from the subscriber premises. The remaining segment of the access network from the cabinet to the customer is usually by copper phone lines but could use another technology, such as wireless.
Fibre-to-the-home (FTTH)	A form of fibre optic communication delivery in which the optical signal reaches the end user's living or office space.
Fixed link telephony operators	Operators providing fixed as opposed to mobile telephony services.

FSS	Fixed Satellite Service.
Independent Service Provider (ISP)	Entities which provide telecommunications services over fixed or mobile networks, or services with a telecommunication service component, to the public at large but do not own or operate telecommunications networks. Some independent service providers may not use telecommunication networks e.g. they may be publishers of printed directories.
Internet service provider	Service provider who provides access to Internet services.
IP	Internet Protocol. The packet data protocol used for routing and carriage of messages across the internet and similar networks.
IPTV	Internet Protocol Television. The term used for television and/or video signals that are delivered to subscribers or viewers using Internet Protocol (IP), the technology that is also used to access the Internet. T
ISDN	Integrated Services Digital Network. A standard developed to cover a range of voice, data, and image services intended to provide end-to-end, simultaneous handling of voice and data on a single link and network.
ISP	Internet Service Provider. A company that provides access to the internet.
Local loop	The access network connection between the customers premises and the local PSTN exchange, usually a loop comprised by two copper wires.
Local Loop Unbundling (LLU)	LLU is the process where the incumbent operators (in the UK it is BT and Kingston Communications) make their local network (the lines that run from customers premises to the telephone exchange) available to other communications providers.
Modem (Modulator/Demodulator)	Device that converts a digital signal into analogue for transmission purposes. It also receives analogue transmissions and converts them back to digital. It effectively allows computers to use telephone networks for communication with other computers.
Narrowband	A service or connection providing data speeds up to 128kbits/s, such as via an analogue telephone line, or via ISD.
Optical Fibre	Cable made of glass fibres through which signals are transmitted as pulses of light. It is a broadband medium that can easily provide capacity for a large number of channels.
Router	A device, or in some cases software in a computer, that determines the next network point to which a data packet should be forwarded on its way to its destination. Typically, a packet will travel through a number of network points with routers before arriving at its destination.
SDSL	Symmetric Digital Subscriber Line. Unlike ADSL, it offers the same fast data rate speeds in both directions.
Sub-loop unbundling	A variant of LLU where a competitive operator takes control of only a portion of a customer's local loop, allowing them to install their equipment closer to the customer and potentially offer higher speed services.

Universal service provider	Provision in some Telecommunications Act licences requiring the licensee to provide certain services to all specified persons. For example, BT is currently required to provide basic voice telephony and certain other established telecommunications services to anyone who may reasonably request them.
USO	Universal Service Obligations. This is a series of requirements, currently upon BT and Kingston Communications, to provide every household in the UK with access to a landline telephone.
VDSL	Very high bit rate DSL. This is currently the fastest version of DSL and can transmit very high data rates on short reaches of the local loop.
Video-on-demand (VoD)	A service or technology that enables TV viewers to watch programmes or films whenever they choose, not restricted by a linear schedule. Near Video on Demand (NVoD) is a service based on a linear schedule that is regularly repeated on multiple channels, usually at 15-minute intervals, so that viewers are never more than 15 minutes away from the start of the next transmission.
VoIP	Voice over Internet Protocol. A technology that allows users to send calls using Internet Protocol, using either the public internet or private IP networks.
xDSL	see DSL

Annex C: List of companies consulted

<p>Action with Communities in Rural England Alcatel Lucent Arqiva BSkyB BSG BT BBC CBI CISCO Systems CLA Cable & Wireless Carphone Warehouse Centre for the Protection of National Infrastructure Cabinet Office Colt Community Broadband Network DCMS Ericsson Eurim Federation of Communications Services Freedom4 Google Huawei Technologies ISPA Inmarsat Intellect KCom Microsoft Motorola National Association Local Councils National Consumer Council National Consumer Federation Nortel Nokia Northern Ireland Office Nokia Siemens Networks Orange</p>	<p>Ofcom Consumer Panel Ofcom O2 OFT Pipex PCCW Qualcomm RDAs RIM RNIB RNID Regional Rural Affairs Forum Reuters Rural Services Network Scottish Government Skype SPARSE-Rural T Mobile Tiscali UKCTA UK Broadband Virgin Media Vodafone Verizon Business Welsh Assembly Wight Cable Yahoo 3</p>
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Annex D: The Consultation Code of Practice Criteria

The Consultation Code of Practice Criteria

1. Formal consultation should take place at a stage when there is scope to influence policy outcome.
2. Consultation should normally last for at least 12 weeks with consideration given to longer timescales where feasible and sensible.
3. Consultation documents should be clear about the consultation process, what is being proposed, the scope to influence and the expected costs and benefits of the proposals.
4. Consultation exercise should be designed to be accessible to, and clearly targeted at, those people the exercise is intended to reach.
5. Keeping the burden of consultation to a minimum is essential if consultations are to be effective and if consultees' buy-in to the process is to be obtained.
6. Consultation responses should be analysed carefully and clear feedback should be provided to participants following the consultation.
7. Officials running consultations should seek guidance in how to run an effective consultation exercise and share what they have learned from the experience.

Comments or complaints

If you wish to comment on the conduct of this consultation or make a complaint about the way this consultation has been conducted, please write to:

Tunde Idowu,
BERR Consultation Co-ordinator,
1 Victoria Street,
London
SW1H 0ET

Telephone Tunde on 020 7215 0412
or e-mail to: Babatunde.Idowu@berr.gsi.gov.uk

Summary: Intervention & Options

Department /Agency: Department for Business, Innovation	Title: Impact Assessment of proposals to introduce a Next Generation Fund	
Stage: Consultation	Version: Two	Date: 6 th November 2009
Related Publications: Impact assessment on NGA; Impact assessment on USC, Digital Britain Final Report, Impact Assessment on NGA Network Landline Duty		

Available to view or download at:

Contact for enquiries: Colette Beaupré

Telephone: 020 7215 1650

What is the problem under consideration? Why is government intervention necessary?

In the last year the rate of roll-out of next generation super-fast broadband has gathered pace in the UK. This has predominantly been driven by the two main network operators, BT and Virgin Media. This roll-out is taking place on a commercial basis, beginning with the areas where the business case is strongest. However, the market on its own is not expected to deliver Next Generation Broadband to approximately 30-40% of UK households and businesses because of the higher cost of service provision. The introduction of a 'Landline Duty' has been proposed to help incentivise the market and fund the roll-out of infrastructure to at least 90% of households in the UK by 2017. This will ensure the UK is a world leader with a world class telecommunications infrastructure, and will help prevent a divide in digital infrastructure provision. This situation provides a rationale for intervention on the grounds of horizontal equity and social inclusion as it will enable areas currently not covered by a reliable broadband service to receive the same level of service provision as other, better served areas, and it will overcome the affordability constraint that currently prevents the market doing this alone.

What are the policy objectives and the intended effects?

This Impact Assessment examines how the fund from the new duty will be most effectively deployed and what it will look like, as the 'Next Generation Fund', whilst minimising the costs to government and business. This helps take forward a Digital Britain Final Report recommendation to roll-out next generation super-fast broadband to at least 90% of UK homes and businesses by 2017 and hopefully accelerate the expansion of the boundary of market provision from 50% to two thirds of the UK population. A HMT/HMRC Impact Assessment on the introduction of a Landline Duty to help fund the roll-out of Next Generation Access, focuses on the duty itself. The duty proposes a small general supplement of 50p per month on all fixed lines, with the exception of those which are part of a social telephony system.

What policy options have been considered? Please justify any preferred option.

The following options have been considered:

Option 1: Do nothing – Although the duty has been announced in the Digital Britain Report, this option serves as a useful baseline for comparison. If it did not go ahead, the market will deliver Next Generation broadband to around 50% of the population by 2012, possibly increasing to up to 70% as demand increases.

Option 2: Deploy the Next Generation Fund. This is the option that will be taken forward because it would deploy the funds necessary to roll-out next generation superfast broadband to at least 90% of UK homes and businesses by 2017 and hopefully accelerate the expansion of the boundary of market provision from 50% to two thirds of the UK population.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects? This Impact Assessment will be finalised and published alongside the government response to the consultation. A Post Implementation Review will be carried out 3 – 5 years after implementation.

Ministerial Sign-off For Consultation stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister:

..... Date:

Summary: Analysis & Evidence

Policy Option: 2	Description: Introduce a Next Generation Fund supplement of 50p per month.
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COSTS	ANNUAL COSTS		Description and scale of key monetised costs by 'main affected groups' There will be a cost to those liable to pay the duty, via the Exchequer, of up to £175 million a year. There will be costs to both Government and business from the tendering process. For the administrative costs of collecting the duty please see the Duty Impact Assessment published separately.	
	One-off	Yrs		
	£			
	Average Annual Cost (excluding one-off)			
	Up to £ 175m	8	Total Cost (PV)	Up to £ 1245 million
Other key non-monetised costs by 'main affected groups' There will be a one off cost to business for familiarisation with the spend related to the new duty.				

BENEFITS	ANNUAL BENEFITS		Description and scale of key monetised benefits by 'main affected groups' It is difficult to assess the size of the potential benefits which may be generated by NGA.. Upto £1,245m of public money available for spending on NGA infrastructure. This would represent a transfer from the Exchequer to business, which enables additional public investment in the UK economy.	
	One-off	Yrs		
	£			
	Average Annual Benefit (excluding one-off)			
	Up to £ 175m	8	Total Benefit (PV)	Up to £ 1245 million
Other key non-monetised benefits by 'main affected groups' It is possible that the objectives of the Fund will be achieved without spending all of the revenue raised from the Duty. If this is the case the excess money will be spent efficiently elsewhere in the economy. It is expected that next generation super-fast broadband will deliver similar types of benefits and opportunities as current generation broadband, including higher productivity, increased innovation, improved access to new markets and new business opportunities. In addition it is believed that it will support a number of further benefits such as tele-working and improved delivery of public services.				

Key Assumptions/Sensitivities/Risks There is a risk that Government intervention too early would distort the market, or chill planned investment and there is a possibility that the Fund could subsidise roll-out in areas that the market would deliver to in a reasonable amount of time. The 65-70% point may or may not be accurate. The Consultation Document that this Impact Assessment accompanies looks at these risks. The benefits of NGA will only be realised if consumers are willing to pay for them. The time period used is 8 years to align this Impact Assessment with the Duty Impact Assessment.

Price Base Year 2005	Time Period Years 8	Net Benefit Range (NPV) £ Unquantifiable	NET BENEFIT (NPV Best estimate) £ 0 plus unquantifiable benefits
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What is the geographic coverage of the policy/option?	UK
On what date will the policy be implemented?	2011
Which organisation(s) will enforce the policy?	NDPC/BIS

What is the total annual cost of enforcement for these		£Unknown		
Does enforcement comply with Hampton principles?		Yes		
Will implementation go beyond minimum EU requirements?		No		
What is the value of the proposed offsetting measure per year?		£ 0		
What is the value of changes in greenhouse gas emissions?		£ Minimal –		
Will the proposal have a significant impact on competition?		No		
Annual cost (£-£) per organisation (excluding one-off)	Micro 0	Small 0	Medium 0	Large 0
Are any of these organisations exempt?	No	No	N/A	N/A
Impact on Admin Burdens Baseline (2005 Prices)		(Increase - Decrease)		
Increase £ 0	Decrease £ 0	Net	£ 0	

Key:

Annual costs and benefits: Constant Prices

(Net) Present Value

Evidence Base (for summary sheets)

Strategic Overview, The Issue

Objectives

The objectives of the Next Generation Fund are:

- To support the roll-out of Next Generation Access to at least 90% of households in the UK by 2017
- This will promote the roll-out of infrastructure that meets the needs of businesses and households in the UK, and supports economic growth
- Ensure value for money through minimising deadweight and ensuring competition in the procurement process
- Meet affordability constraints implied by the income stream from the new 50p per month landline duty imposed on all fixed lines

Scope for synergies with the Government's Universal Service Commitment, a parallel infrastructure investment programme to ensure virtually every community has access to a broadband connection of at least 2Mbps

This Impact Assessment, and the Consultation Document it accompanies, follows the publication by HMT of a joint Impact Assessment by BIS, HMT and HMRC, which looked at the impacts of the new Landline Duty. This Impact Assessment looks at the impacts of the provision of next generation broadband by the Next Generation Fund. The object of the policies proposed in these Impact Assessments is to take forward the Digital Britain recommendation to roll-out next generation super-fast broadband to at least 90% of UK homes and businesses by 2017 and hopefully accelerate the expansion of the boundary of market provision from 50% to two thirds of the UK population. This Impact Assessment follows on from the Next Generation Access Impact Assessment that accompanied the Digital Britain Final Report.

At present the majority of broadband provision in the UK is by copper wires. However, in the last year, the roll-out of next generation super-fast broadband has gathered pace in the UK. In the main, this is being driven by the two main network operators, BT and Virgin Media. Virgin Media for example has completed the roll-out of its X2 50Mbps service across its cable network and by July 2009 was available to just under half of UK households. The number of people subscribed to the higher bandwidth packages has continued to increase with the number of customers on the 20Mbps and 50Mbps packages rising by 39,400 with the rate of addition 9,600 higher than in the first quarter of 2009, however the share of the gross additions remained at 12%. BT, meanwhile, is expected to make its own fibre-based super-fast broadband service available to 1 million households by March 2010 and around 40% of the UK's homes and businesses by 2012 using a mixture of fibre to the cabinet (FTTC) and fibre to the home (FTTH) technology solutions. BT further announced on 9 October that they will be increasing the number of homes that will receive Fibre-to-the-Home (FTTH), as part of this network upgrade programme. Some 2.5million homes will be able to access FTTH by 2012.

Alongside these, there have been a number of smaller scale fibre trials and deployments that have been taking place in cities across the UK including Bournemouth, Dundee, Sheffield and Belfast. Details of these projects are set out in Table 1 below which is taken from Ofcom's latest Communications Market Report³.

Table 1: Selected UK super-fast broadband implementations and trials, July 2009

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

Source: Ofcom

As well as these fibre trials being carried out, there are also trials planned for next generation mobile broadband. The use of mobile broadband has increased with the use of 3G dongles and the prevalence of smart phones, which looks set to continue. As more people use this technology they will start to demand faster speeds

³ Ofcom (2009) *Communications Market Report 2009* <http://www.ofcom.org.uk/research/cm/cmr09/>

and more reliable connections. The release of additional spectrum, through the spectrum modernisation programme, will allow operators to begin rolling out next generation services, either WiMAX or Long Term Evolution (LTE). O2 recently announced the first UK trials for LTE, which are likely to take place before the summer of 2010.

Satellite providers are also looking to be able to provide next generation broadband services. In order to be able to provide the availability of higher bandwidths, many satellite providers are planning to deliver additional capacity. Avanti, Astra and Eutelsat are all planning to offer next generation broadband services from 2010, once new satellites are in orbit.

There is currently no agreed upon definition of superfast broadband or next generation access. It is expected that connections have:

- Faster and more symmetrical download and upload speeds, with a minimum of 20Mbps download speed and 10Mbps upload speed
- Higher quality of services, with increased bandwidth for greater consistency over time and space, with less contention in the network resulting in consumers achieving the speeds promised, within a reasonable margin.
- Improved reliability of service, with it being rare to lose connection.

Billions of pounds are needed to provide a network suitable for the future, as this essentially involves building a new network. For fixed line NGA, the largest cost comes from digging up the roads to run the fibre from the exchange to the street cabinets at least. For wireless broadband, the cost comes from base stations that would be needed at regular intervals, the cost of wireless base stations are comparable to those of fixed line deployment. In the same way as current generation broadband, network operators are rolling-out next generation super-fast broadband on a commercial basis, beginning first in those areas where the business case is strongest. This has tended to be more urban areas since the higher population density means that the financial return achievable – in terms of the amount of subscription revenue generated from new connections relative to the cost of upgrading the infrastructure – is potentially greater.

In more rural and remote areas of the UK, as well as some suburban areas, the commercial case for deployment is relatively weaker and in some cases may not exist at all. This is because in less densely populated areas the cost of rolling out super-fast broadband is disproportionately higher (since homes and businesses

are spread over larger areas and longer distances must be covered in order to connect them) and potential additional revenues are considerably lower (since the number of premises – and therefore new subscriptions – in a given area is smaller).

Analysys Mason (2008) for the Broadband Stakeholder Group⁴ have modelled the cost of deploying next generation access super-fast broadband on a national basis under three different fibre-based technology solutions:

- Solution 1: Fibre to the Cabinet (VDSL) – households receive download speeds of around 30-100Mb/s depending on the length of the copper line connecting the street cabinet to the home
- Solution 2: Fibre to the Home (GPON) – households receive download speeds of around 2.5Gb/s but share bandwidth with other customers
- Solution 3: Fibre to the Home (PTP) – households receive symmetric download and upload speeds of up to 1Gb/s and do not share bandwidth with other customers

Under their assumptions, they estimated that after two thirds of the population has been reached the costs of rolling-out NGA began to rise steadily and that it was particularly costly to cover the last few percentages of households in the UK. Figures 1 and 2 illustrate Analysys Mason's results under the three different technology solutions.

Figure 1: Total cost versus percentage population for Fibre to the Cabinet Solution

⁴ Analysys Mason (2008) *The costs of deploying fibre-based next generation broadband infrastructure*. Final report for the Broadband Stakeholder Group. This report can be accessed at: http://www.broadbanduk.org/component/option.com_docman/task.doc_view/gid.1036/Itemid.63/

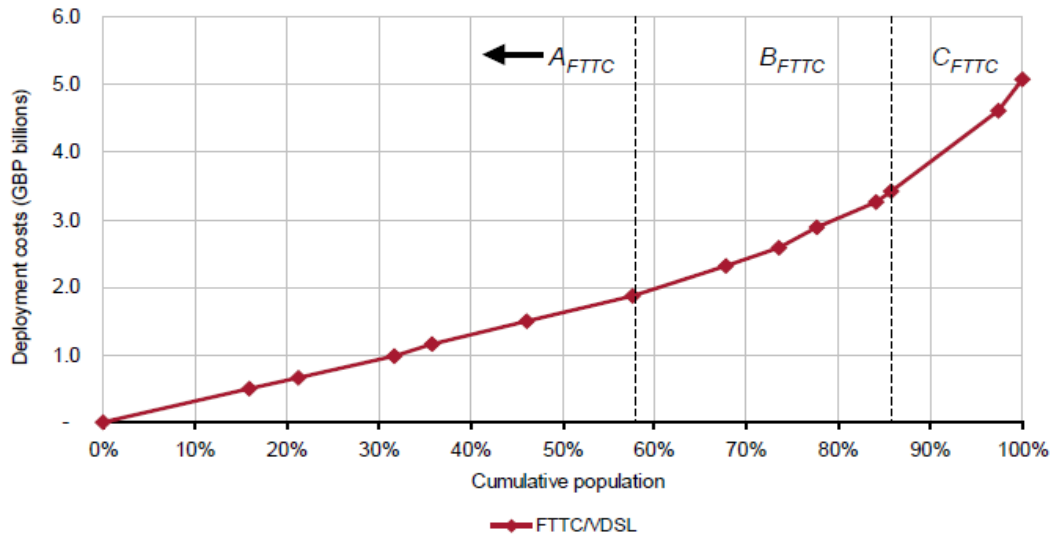
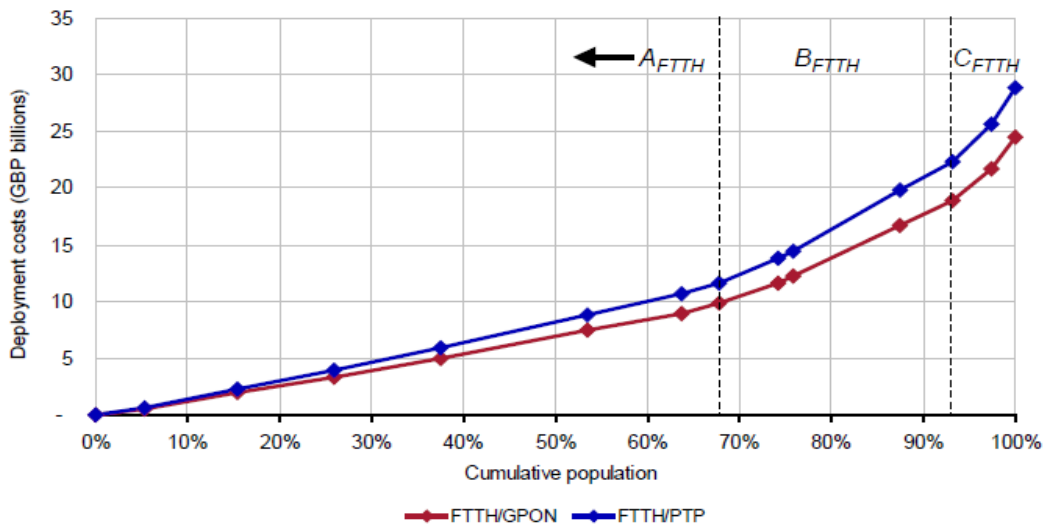


Figure 2: Total cost versus percentage population for Fibre to the Home Solutions



Source: Analysys Mason (2008)

The roll-out of NGA is associated with an inherent risk to the Network Operators. They may be reluctant to deploy further until there is further development in the creation of services and applications that require superfast broadband, and these are less likely to be developed without a reasonable number of consumers using superfast broadband. This may result in a coordination failure, leading to neither network operators nor service providers investing in infrastructure or services, delaying the roll-out of NGA.

There is also a higher degree of risk than with first generation broadband meaning Network Operators are more unwilling to roll-out NGA. This risk comes from the substantial capital expenditure needed to build the network and the long payback periods and the uncertainty over the demand and the size of the revenue from subscriptions.

Both of these reasons imply that the market will need to be incentivised to provide Next Generation Access to areas where the business case for deployment is not very strong. However, this on its own does not provide a justification for government intervention.

As noted above, it is projected that the market is likely to fail to deliver next generation super-fast broadband to approximately 30-40% of UK households. These areas will include rural and remote areas as well as potentially some suburban areas.

In these areas, households and businesses could continue to receive broadband services which are relatively slower, less reliable and of poorer quality than households or businesses in areas able to receive next generation super-fast broadband. Such a situation provides a rationale for government intervention on the following equity grounds:

- Horizontal equity – households (and businesses) in these areas will not be able to benefit from the same range of broadband applications, services and opportunities as those on next generation super-fast broadband as their current network is unable to support them
- Social inclusion – households and businesses in these un-served areas may not be able to take advantage of those broadband applications and services which promote greater interaction with the rest of society. For example, they may not be able to tele-work or take advantage of the improved education and health care services which can be supported by next generation super-fast broadband.

For the costs to Network Owners and Businesses from the introduction of the Landline Duty, please see the Impact Assessment published by the Treasury on the effects of the NGA Network Landline Duty. This Impact Assessment also covers the role HMRC will play in collecting the Duty and the potential benefits from the Duty.

Options Identification

The following options have been considered:

Option 1: Do nothing – Although the duty has been announced in the Digital Britain Report, this option serves as a useful baseline for comparison. If it did not go ahead, the market will deliver Next Generation broadband to around 50% of the population by 2012, possibly increasing to 70% as demand increases

Option 2: Deploy the Next Generation Fund. – This is the option that will be taken forward because it would deploy the funds necessary to roll-out next generation superfast broadband to at least 90% of UK homes and businesses by 2017 and hopefully accelerate the expansion of the boundary of market provision from 50% to two thirds of the UK population.

Options Analysis

Option 1: Do nothing

Without government intervention, it is envisaged that by 2012, the market will deliver next generation super-fast broadband to around 50% of the population. The deployment of NGA will be driven by the main network operators, BT and Virgin Media. Virgin Media has completed the roll-out of its XXX 50Mbps service across its cable network and in July 2009 this was available to just under half of UK households. BT have announced plans to roll-out super-fast broadband to up to 40% of UK homes by 2012.

As demand materialises for higher speed broadband services, it may be commercially viable to extend the roll-out NGA even further to around 60-70% of the population, however, this is likely to take place gradually over a considerable number of years. Unaided, there is no obvious means by which the market will deliver NGA beyond this. This, as explained above, is because compared to current generation broadband, investment in super-fast broadband involves higher costs, longer pay back periods and continuing demand uncertainty, all of which may serve to reduce the incentive and willingness of network operators to carry out further investment.

The areas of the UK which are unlikely to receive next generation super-fast broadband will not be confined to the more rural and remote areas of the country where the commercial case for roll-out is relatively weaker. It will also include households in some suburban areas which are situated long distances away from the main

exchange. Estimates by Analysis Mason⁵ show that the costs of rolling out to rural and remote areas, irrespective of the technology employed, increase dramatically at such levels of coverage.

This will mean that the potential benefits of NGA to households and businesses may be significantly delayed or even foregone, particularly if they are in areas of the UK lagging in technology take-up. This could have a significant impact on UK society and the economy. For example: consumers may not be able to benefit from the new more advanced education and healthcare services supported by NGA while UK businesses may be less able to exploit new market opportunities created by the global move to super-fast broadband.

Option 2: Deploy the Next Generation Fund

In the Digital Britain Final Report, the UK Government announced its intention to propose a Next Generation Fund. This would serve to deliver at least 90% coverage of Next Generation broadband for homes and businesses by 2017 and hopefully accelerate the expansion of the boundary of market provision from 50% to two thirds of the UK population.

To generate the substantial funds necessary, the UK Government announced in the Final Report its intention to propose a small landline duty on all fixed copper lines (that is, residential copper lines, the equivalent business analogue and ISDN2 lines and cable telephony lines). In addition, fibre lines will be subject to the landline duty.

Under this option, a landline duty of 50p per month would be placed on included line connections used by consumers and businesses. The landline duty would be applied to the owners of the network, with the expectation that it will be passed down the chain to the consumer. This would form the basis of a NGA Next Generation Fund which would be used to incentivise investment in NGA infrastructure in the areas of the UK that the market will not reach. Further details are available in the corresponding publication at the pre-budget report on the raising of the landline duty, published jointly by BIS, HMT and HMRC.

A procurement team, such as the proposed arms-length body, the Network Design and Procurement Company, will be responsible for the procurement process, and deciding exactly how the network will be rolled out. It is expected that spend on NGA will be up to £175 million a year from 2011. Many of the procurement process decisions that will need to be made are raised in the Consultation Document that this Impact Assessment

⁵ Analysys Mason (2008) *The costs of deploying fibre-based next generation broadband infrastructure*. Final report for the Broadband Stakeholder Group. This report can be accessed at: http://www.broadbanduk.org/component/option.com_docman/task.doc_view/gid.1036/Itemid.63/

accompanies. The Universal Service Commitment project will run concurrently to the Next Generation project. It is anticipated that many of the areas with no broadband at the moment will be covered using next generation technology, so there is some potential for overlap. It will be the job of the procurement team to manage this overlap to avoid unnecessary public investment and to ensure the greatest benefit.

The definition for what is expected from Next Generation Superfast Broadband given above provides a benchmark for the priorities of service that the Next Generation Fund should provide. The Consultation Document asks whether these are the correct priorities and whether they are sufficient.

How will the areas for intervention be defined?

The point where intervention is required is expected to be at roughly 65-70% of the UK population. There is a potential risk of the Government intervening too soon and using the fund to incentivise deployment in areas where this is not necessary and the market would have provided NGA by itself. The Consultation Document asks what is the most effective way of managing the roll-out to mitigate this risk, by asking whether an inside-out or an outside-in approach would deliver greater value for money. An inside-out approach would involve the NGA Fund starting on the fringes of the area where the market is expected to deliver to. This has the advantage of deploying infrastructure closer to where the market is delivering, and it is therefore likely that the business case will be stronger in these areas. An outside-in approach involves starting at the outside of the identified areas where intervention is needed and working towards the market roll-out. This has the advantage of ensuring that those that are served by the fund would not be reached by the market. The difficulty is that the business case for intervention at the edges of the identified area may be hard to make.

Where will the fund be deployed?

The Consultation Document asks whether National, Regional or Local deployment would provide the best value for money. National Deployment would provide a benefit because of its scale which would bring efficiency gains in terms of pricing, management and the billing and operations efficiencies offered by a National network. However, a national deployment could be inflexible, and may not suit each local area. A more regional deployment would offer greater flexibility, allowing network owners to make decisions based on their local knowledge. The regional network would however result in a number of different networks, and consideration should be given to the need for these to be interoperable.

Crucial for determining value for money will be the method of procurement chosen. The options listed in the Consultation Document are a reverse auction, a flat subsidy and a graded subsidy. The reverse auction has the benefit of introducing competition and innovation into the process. The flat subsidy and the graded subsidy approaches have the advantage of ensuring a level playing field and focusing the procurement decision on the ability to deliver the service, within the timescale.

What will be deployed?

The Government's approach is usually to remain technology neutral, as far as possible, and focus on the services, applications and content that would be expected to be delivered through a NGA network, through specifying the service quality criteria described above, rather than the underlying technology. The market is usually best placed to determine which technology will serve different areas best, what works well in one area might not work in another. The Consultation Document does however ask whether this approach is best considering that the debate around NGA is increasingly framed around the deployment of fibre. It is likely that in the short term, only fixed line will have the ability to deliver the defined services and therefore only fixed line, fibre solutions will be eligible for the Fund. It is possible that other technologies might in due course match the expected performance but these are not being considered currently. It is anticipated that the technology employed will be upgradable in order to future proof the infrastructure

Fibre-to-the-cabinet solutions will provide the services expected from NGA, for most households, but it is likely that this would only form part of the upgrade needed to the fixed network. Overtime next generation mobile and satellite broadband services may start to provide the same headline speeds as fibre-based connections, however it is not believed that the overall levels of service will be of the same quality. This difference in service quality will come from inherent problems with backhaul capacity, contention in the network and latency leading to an inferior service.

The Consultation Document that this Impact Assessment accompanies argues that it is right that the solutions funded by the Fund should be fixed line, fibre connections because the Fund will be created by a landline duty on fixed lines. This is supported by the European Commission State Aid Guidelines for intervention in NGA markets, which state that "NGA networks are mainly fibre-based or advanced upgraded cable networks that are intended to replace in whole or to a large extent the existing copper-based broadband networks or current cable networks."

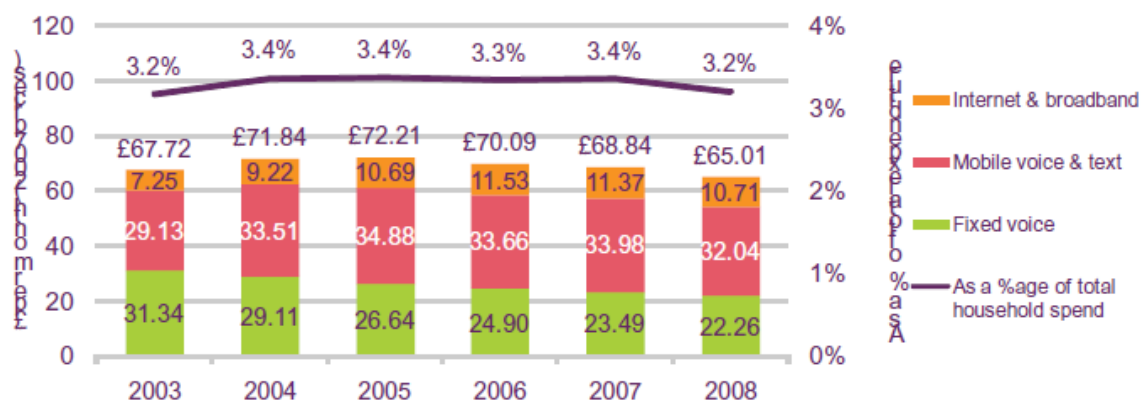
Costs

Consumers

The costs of financing the NGA fund will fall on network owners with the expectation that it will be passed on to residential and business users. According to the latest data from Ofcom, in the final quarter of 2008 there were approximately 33 million fixed lines of which some 23.5 million were residential fixed lines and some 9.5 million were business lines. On the basis of these figures residential users would contribute the largest share – equal to around 70% – to the Next Generation Fund.

Figure 3 shows that an estimated £65 is spent on average on telecommunication services by households every month. If total amount spent on internet and broadband (which could include mobile broadband) and fixed voice was some £32.97 a month on average in 2008, then a 50 p per month landline duty could increase total expenditure by around 1-2% a month.

Figure 3: Average household spend on telecommunication services.



Source: Ofcom / operators / ONS

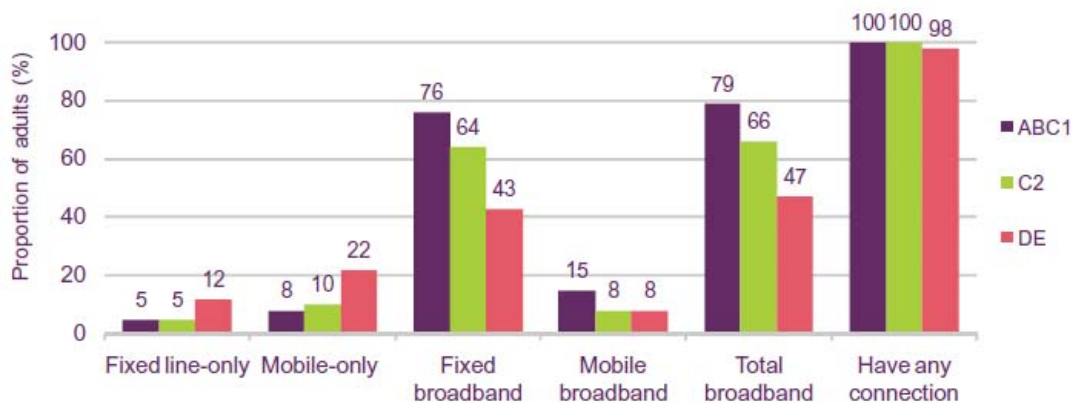
Notes: Includes estimates where Ofcom does not receive data from operators; adjusted to CPI; includes VAT

The financial impact of the landline duty is likely to be disproportionately greater on less affluent socio-economic groups including the elderly. HMRC estimate that the increase in the cost of living for the poorest percentile from the landline duty is estimated to be about 0.08%, assuming one included landline per household.

whilst it is estimated to be just over 0.01% for the richest percentile. The average increase in the cost of living from the landline duty is estimated to be 0.03%.⁶

Figure 4 shows that there is considerable variation in the use of telecommunications services across the different socio-economic groups. For example, the more affluent socio-economic group (AB) is more likely to have fixed broadband and less likely to be mobile-only than the less affluent socio-economic groups (C2 and DE)⁷.

Figure 4: Household telecoms connections, by socio-economic group



Source: Ofcom technology tracker, Q1 2009

Base: All UK adults aged 15+

Note: mobile-only and fixed only relate only to phones, i.e. mobile-only and fixed-only may also have an internet connection. Any connection refers to fixed, mobile or broadband.

At present there is evidence to suggest that fixed and mobile phones are not seen as being good substitutes and that the increase in price for a fixed line is unlikely to result in a large number of people switching to mobile phones.⁸ However, as the functionality and reliability of speed of mobile phones and mobile broadband increases, it is possible that fixed and mobile telephony and broadband will become closer substitutes. This may lead to some shift by consumers away from fixed-line telephony and broadband towards mobile⁹ in order to escape the landline duty. However, this effect is likely to be very small given that the landline duty equates to a 1% increase of monthly expenditure and it must also be noted that mobile telephony and broadband would need

⁶ Source: Calculations from 2007 Expenditure & Fodd Survey

⁷ Ofcom (2009) *Communications Market Report, 2009*. Available at: <http://www.ofcom.org.uk/research/cm/cmr09/>

⁸ Ofcom (2009) *Fixed Narrowband Retail Services Market: Consolation on the identification of markets and determination of market power*.

http://www.ofcom.org.uk/consult/condocs/retail_markets/fnrsm_condoc.pdf

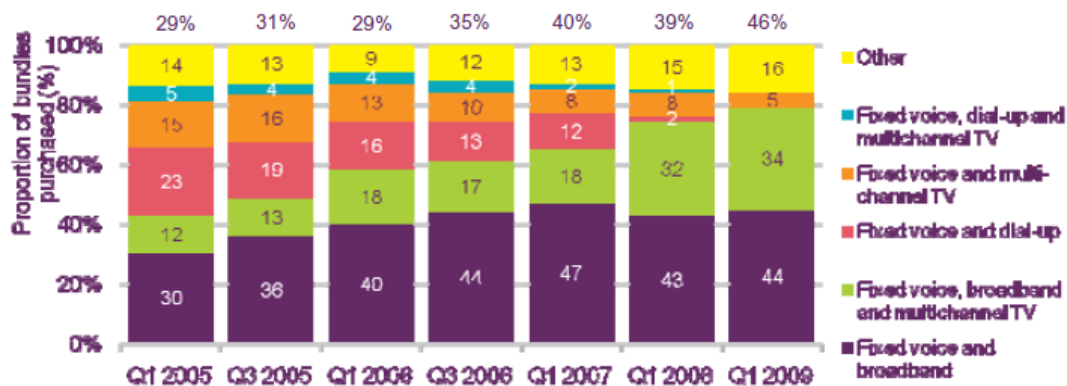
⁹ In the literature the shift away from fixed towards mobile telephony and broadband is known as *fixed-mobile substitution*.

to make substantial improvements for this to begin to happen and this is not expected to be seen over the next few years.

Evidence presented in the Communications Market Report 2009, for example, suggests that more people are making calls from home using their mobile rather than the fixed-line because mobile users are now able to make more calls for a fixed monthly price for a larger number of minutes¹⁰.

However, the extent to which residential users may be able to avoid the landline duty by switching away from fixed-line telephony and broadband to mobile may be limited if they have purchased bundled communication services (e.g. phone, broadband and TV). This is because the cost of purchasing communication services separately may be higher and represent poorer value for money in that they cannot take advantage of the various discounts that may be offered by suppliers if they purchase bundled services¹¹. Figure 5 shows that in Q1 2009, 46% of households in the UK purchased bundled communication services.

Figure 5: Bundled services by households, by type.



Source: Ofcom research, Q1 2009

Note: A bundled service is defined as two or more services taken from a single provider, with or without a price discount.

Businesses

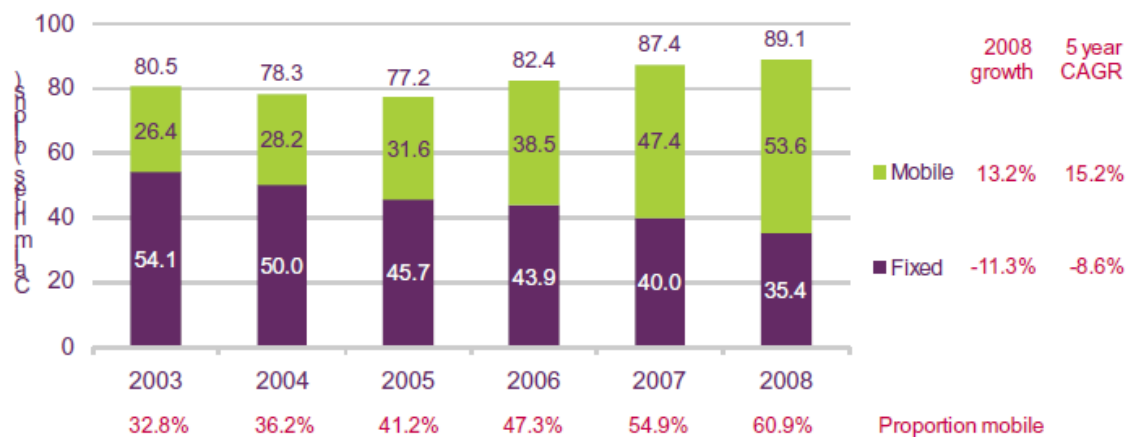
There is also an increasing tendency for businesses to switch away from fixed telephony and broadband services to mobile. This is illustrated in Figure 6 which shows that the volume of mobile calls as a percentage of

¹⁰ Ofcom (2008) *Mobile Citizens, Mobile Consumers: adapting regulation for a mobile, wireless world*. Available at: <http://www.ofcom.org.uk/consult/condocs/msa08/msa.pdf>

¹¹ In its Communication Market Report 2009, Ofcom gives the examples of TalkTalk which offers unlimited calls at set times with their fixed line and broadband package while BSkyB offers 'free' broadband if their exclusive free evenings and weekend calls package *Sky Talk* is purchased.

total calls has increased significantly since 2005. This has been driven by the increased functionality and speeds offered by mobile phones.

Figure 6: Business voice volume calls (billion minutes)



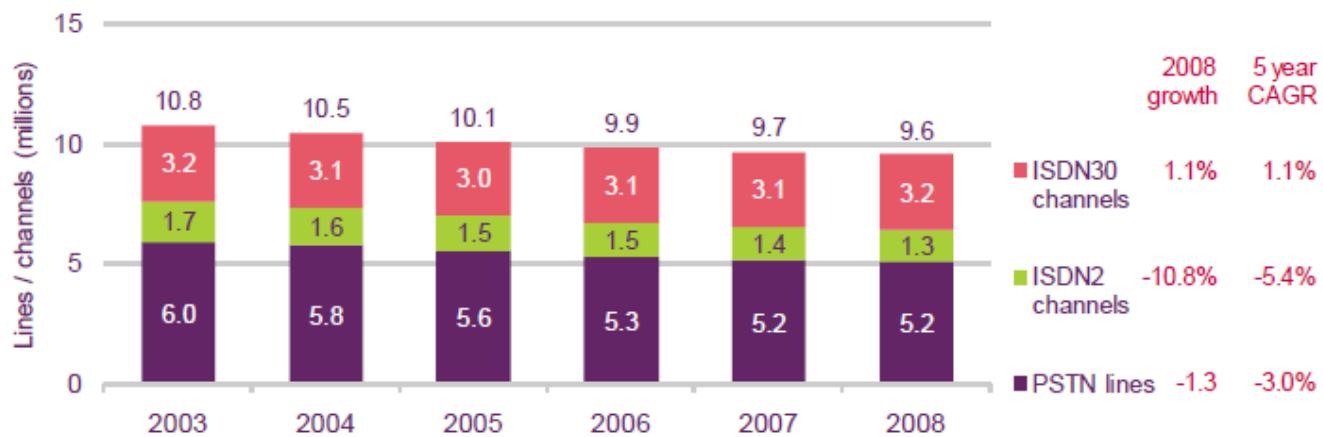
Source: Ofcom / operators

Note: Fixed data excludes non-geographic voice call volumes

The number of fixed business lines fell by only 1.8% in 2008, despite the more than 10% fall in fixed business voice call volumes during the same period. This is shown in Figure 7. This suggests that there is a reluctance to give up fixed lines, and suggests that few would be given up with the introduction of the landline duty. As Ofcom notes in its report, it is unlikely that there will be a complete shift by businesses away from fixed lines towards mobile. This is because many businesses consider fixed lines vital for keeping in contact with clients, suppliers and customers¹².

Figure 7: Business fixed lines, by type (millions)

¹² Ofcom (2009) Communications Market Report.



Source: Ofcom / operators

Note: Figures may be overstated due to an element of double-counting of WLR lines

In general, there is likely to be a positive relationship between the amount of landline duty paid and the size of the business in terms of number of employees. On the whole, a firm with a large number of employees would be expected to pay a larger landline duty given that it would probably require more local loops.

For the majority of firms, we would expect the financial impact of the landline duty to be fairly small in relative terms. For example, a firm with 250 employees would be expected to pay a landline duty in the region of £1500 a year assuming one line per employee.

However, it is possible that in a limited number of cases, the proposed landline duty may represent a significant financial impact. This would happen for example, if a firm were to have a relatively large number of lines and very low profit margins. In this instance, the landline duty could under certain circumstances, possibly result in the firm making a loss rather than a profit. The landline duty will be applied for each local loop which should reduce the exposure of business to the landline duty.

There is a risk that if the landline duty were to push firms with very narrow profit margins out of business there would be indirect costs to the economy through a reduction in output and increased unemployment.

High-level benefits of NGA

This section analyses the wider benefits of next generation broadband. The extent of these benefits being realised will be determined by the effectiveness of the fund.

The Landline Duty is expected to raise up to £175 million a year which would be made available to be spent on NGA infrastructure. Discounting this figure using HMT's Green Book recommended rate of 3.5%, over 8 years, upto £1,245m of public money would be made available for spending on NGA infrastructure. This would represent additional public investment in the UK economy.

In addition, it is reasonable to assume that next generation super-fast broadband will deliver similar types of benefits and opportunities to current generation broadband. These include higher productivity, increased innovation, improved access to new markets and business opportunities created by the growth in e-commerce, greater consumer choice and access to time-saving e-government services¹³.

In addition, Government believes that the types of applications and services which may be supported by next generation super-fast broadband – such as for example two-way video conferencing which requires faster and more symmetric upload and download speeds – may deliver a number of further benefits. For example:

Tele-working

NGA super-fast broadband supported services such as two-way video-conferencing may encourage more employees and employers to make greater use of tele-working, whereby some employees work from home where they can be more productive. This can deliver benefits both to the firm, the worker, as well as the wider economy, society and the environment. For example, tele-working can:

- Help reduce the barriers to entering the labour market for those groups which may be less mobile (e.g. disabled and single parents with child-care responsibilities who wish to work part-time)
- Potentially contribute to the reduction in traffic congestion as well as carbon emissions thereby improving environmental quality
- Improve work/life balance (e.g. by reducing the amount of time travelling to and from work)
- Allow for more flexible working patterns

Improved delivery of public services (education and health care)

¹³ These benefits are discussed in greater detail in the impact assessment on the universal commitment for 2Mb/s broadband which formed part of the overall impact assessment for the Digital Britain Final Report published in June 2009. Available at: http://www.culture.gov.uk/images/publications/digitalbritain_impactassessment.pdf

NGA can help improve the quality and delivery of education services to people in more rural and remote areas, helping them become more skilled, productive and earn a higher wage. Australia is an excellent illustrative example of where this is actually happening. According to DCITA¹⁴, higher speed broadband has led to the creation of virtual classrooms which help to deliver a better quality of service and enables teachers to engage with students as a group through video conferencing.

NGA can also play an important role in improving the quality and delivery of healthcare services. As Table 2 shows, NGA has the potential to deliver higher quality versions of existing health care technologies and services as well as new ones which cannot be supported using current generation broadband networks.

Table 2: Delivery of healthcare technologies and services at different broadband speeds

Domain/service	Technology	Individual	Small institution	Large institution
		10 Mbps	100 Mbps	1 Gbps
A. Care				
High quality non-real-time video-imaging for diagnosis	File transfer	High quality	High quality	High quality
Cardiology neurology and emergency room consultations	H.323 video	High quality	High quality	High quality
Cineo-angiography and echocardiograms	H.323 video	High quality	High quality	High quality
3D Interactive brain imaging	SGI Vizserver	Unsupportable	Medium quality	High quality
Clinical decision-support systems	Web browsing	High quality	High quality	High quality
Advanced decision support systems	Image transfer		High quality	High quality
Home monitoring	Telemetry	Medium quality		
		always on		
Home tele-visits	H.323 video	Medium quality		
Public health information	Web browsing	High quality		
C. Teaching/learning				
Professional tele-education	MPEG 1 video	High quality	High quality	High quality
Effective learning	Multimedia			
Browsing	High quality	High quality	High quality	
Comprehensive learning environment	H.323 video conferencing			
	T.120 applications			
	Sharing	Medium quality	High quality	High quality

Source: OECD Information Technology Outlook, 2004

According to the DCITA (2007) while some health care services can be delivered using small amounts of bandwidth (e-psychiatry, e-ultra-sound and e-radiology) the number of services using increased bandwidths is rising because it offers the prospect of clearer pictures, smoother motion and better synchronicity of sound with images through broadband. This suggests that the quality of healthcare service can be significantly improved for people who cannot easily access health care services such as the elderly or people living in remote areas.

¹⁴ DCITA (2007) *The economic effects of broadband: an Australian perspective*. This paper can be accessed at: <http://www.oecd.org/dataoecd/29/9/38698062.pdf>

Social and Environmental benefits

According to Plum (2008), NGA supported services may help deliver further progress towards the achievement of social objectives such as increased democratic participation, cultural understanding and social inclusion. Furthermore, NGA supported services may make a more powerful contribution to environmental objectives such as carbon abatement and reduced energy consumption¹⁵.

Business

Next Generation Broadband will bring significant benefits to businesses in the way they operate. Cloud Computing would become a reality for the majority. Cloud Computing has cost saving implications and provides architectural flexibility.

Potential Job Creation

There is the potential for employment to be increased through the construction and maintenance of the broadband infrastructure. Work carried out by the London School of Economics and the Information Technology Innovation Foundation¹⁶ has estimated that the impact on employment from investment in broadband is that 280,000 jobs would be created with a £5 billion investment in NGA.

As part of the UK Government's overall strategy to deliver universal broadband of 2Mb/s by 2012, from the Universal Service Commitment, in some localised areas where households and small businesses are experiencing very poor or no broadband service at all¹⁷, the appropriate technological solution may be a fibre to the cabinet upgrade. In these instances, it is possible that some consumers will be taking up broadband for the first time and experiencing the benefits and opportunities which it offers. There is potential for synergy with the Universal Service Commitment, this will be managed by the procurement team. The recent Champion for Digital

¹⁵ Climate Risk Pty Ltd (2007) *Towards a high bandwidth, low-carbon future*. This report can be accessed at: http://www.climaterisk.com.au/Climate%20Risk%20Telstra_report.pdf

¹⁶ The UK's Digital Road to Recovery, London School of Economics and The Information Technology and Innovation Foundation <http://www.itif.org/index.php?id=242>

¹⁷ These localised areas are often referred to as *not-spots*. These not-spots are not just limited to the more rural and remote areas of the UK but can also be found in some of the UK's largest towns and cities.

Inclusion report¹⁸ highlights the scale on the benefits of getting people who currently do not use the internet online.

It is extremely difficult to assess the size of the potential benefits which may be generated by NGA. Next generation access and super-fast broadband is still in the very early stages of being rolled-out across the country and its full effects are not going to appear for some considerable time. It is also still very much unknown as to what new and innovative applications and services super-fast broadband is likely to support, consumer demand for such services and the precise amount businesses and households would be willing to pay for them. Furthermore, the benefits may depend on the technology solution used to deliver NGA (e.g. FTTC, FTTH, upgrade of the copper-based network etc). As a result, there is considerable uncertainty as to the size of the potential benefits achievable from next generation broadband.

Risk

There is a risk that Government intervention too early would distort the market, or chill planned investment and there is a possibility that the Fund could subsidise roll-out in areas that the market would deliver to in a reasonable amount of time. The 65-70% point may or may not be accurate. The Consultation Document that this Impact Assessment accompanies looks at these risks. The benefits of NGA will only be realised if consumers are willing to pay for them.

Recommendation

The Government's preferred option is to deploy the Next Generation Fund. This is the option that will be taken forward because it would deploy the funds necessary to roll-out next generation superfast broadband to at least 90% of UK homes and businesses by 2017 and hopefully accelerate the expansion of the boundary of market provision from 50% to two thirds of the UK population. This takes forward a Digital Britain recommendation. This option would allow the benefits of Next Generation broadband to be realised by at least 90% of the country, would allow the UK's digital infrastructure to be future proofed and would reduced the potential divide in digital infrastructure between well connected areas and those areas that are currently less well served by broadband.

¹⁸ http://raceonline2012.org/sites/all/themes/raceonline/files/pwc_report.pdf

Monitoring, Enforcement, Evaluation

It is possible that, as well as incentivising the roll-out of Next Generation Broadband beyond the areas that are commercially attractive, the Fund will be a success in terms of stimulating the take up of NGA, bringing significantly more subscribers than anticipated. This would therefore generate larger revenues for the company or companies that are successful in the procurement process. The Consultation Document that this Impact Assessment accompanies asks whether a 'claw back' method should be considered.

The Consultation Document also considers at what point the Next Generation fund should cease intervention. Once Next Generation broadband has been delivered to 90% of the country, as stated in the Digital Britain Final Report, the costs escalate considerably to the point where deployment becomes unsustainable, even with funding provided by the Next Generation Fund.

A Post Implementation Review to look at the effectiveness of the policy will be carried out 3-5 years after implementation. 2017 will be a good time at which to consider whether to continue with further funding, or to wind the fund down.

Specific Impact Tests

Competition assessment

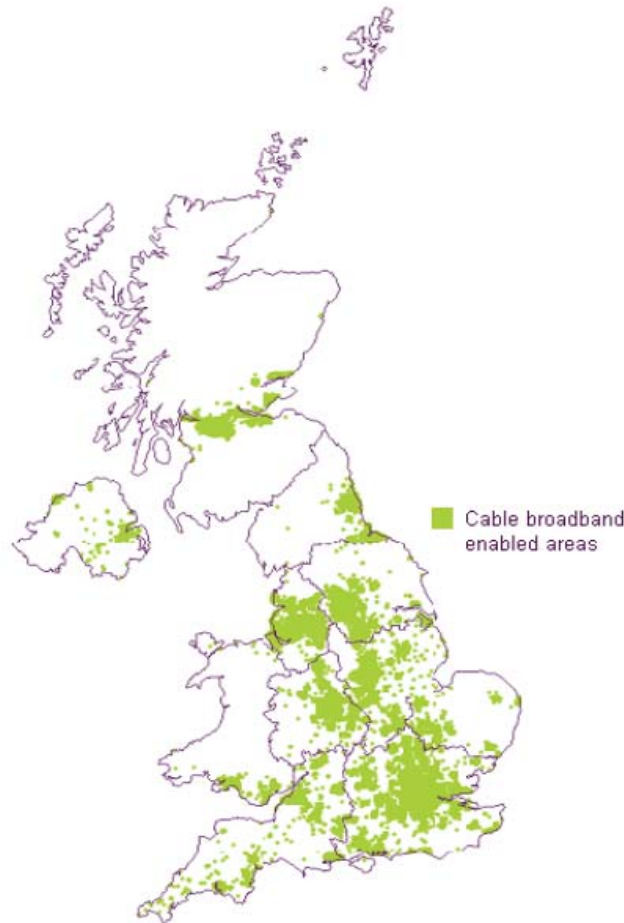
Competition at the infrastructure level varies across the UK. In more urban parts of the country where the business case for NGA investment is strongest, competition has already emerged between BT, the incumbent network operator, and Virgin Media which has begun to roll-out its own cable network capable of delivering next generation broadband services (see Map I overleaf).

In less densely populated areas of the country where the business case for NGA investment is significantly weaker, BT remains the only network operator¹⁹. It is possible that as a result of spending the Next Generation Fund, other operators will roll-out competing networks thereby providing increased competition at the infrastructure level in these areas. However, there is some uncertainty that this will actually happen, at least in the short-term. This is because BT, as the incumbent operator, has first mover advantage meaning that it is relatively cheaper for BT to upgrade its network to support next generation broadband services than other

¹⁹ Ofcom (2008) *Review of the wholesale broadband access markets 2006/07* Final explanatory statement and notification. Available at: <http://www.ofcom.org.uk/consult/condocs/wbamr07/statement/statement.pdf> and; Ofcom (2007) *Review of the wholesale broadband access markets 2006/07*, Explanatory statement. Available at: <http://www.ofcom.org.uk/consult/condocs/wbamr07/wbamr07.pdf>

operators to deploy completely new infrastructure. Anyone will be able to bid for the fund and each bidder will be looked at in terms of its individual merits relative to the priorities outlined in the procurement specifications.

Map 1: Coverage of Virgin Media cable broadband services



Source: Ofcom (2009)

In the long-term, it is possible that competition at the infrastructure level may increase. This may happen if, for example, as a result of proposed steps to release and liberalise radio spectrum suitable for next generation mobile and mobile broadband as part of the planned wireless radio spectrum modernisation programme²⁰, mobile network operators are able to roll-out their own networks capable of delivering next generation broadband services of similar quality, reliability and speed as those available through physical fixed-line telecommunication networks. However, this possible increase in competition is difficult to predict and is one of

²⁰ Consultation on a Direction to Ofcom to Implement the Wireless Radio Spectrum Modernisation Programme <http://www.berr.gov.uk/consultations/page53062.html>

many options. It is hard to say whether mobile services will catch up with fixed lines in the level of quality they provide, and without this occurring they are unlikely to become closer substitutes.

Even if there is relatively little increase in competition at the infrastructure level, it is possible that investment in NGA infrastructure may lead to an increase in competition at the retail level if it enables more internet service providers to offer broadband services in a particular area. In such circumstances, consumers would benefit in terms of access to a wider range of broadband providers and services which may now be offered at potentially lower prices than before.

The competitiveness of businesses in the areas where Next Generation Access is deployed, will be improved. This will especially be the case for businesses in areas where there is currently little or no broadband service. These businesses will be able to compete with businesses in currently better connected areas on a more level playing field.

There will be a level playing field when competing for tenders to provide Next Generation Access, meaning that there will be no competitive advantage for the providers successfully selected by the procurement team. The procurement team will be required to ensure this, and also ensure that there will be no significant allocation to one area of the UK to deploy spend, over another.

Small firms test

Over 99% of firms are small firms employing fewer than 50 people, most of which are sole proprietorships or partnerships with no employees. It can therefore be reasonably assumed that the financial impact of the proposed landline duty on these businesses is likely to be small given that they are unlikely to have many fixed lines. For example, a hypothetical firm employing five people with ten fixed lines would expect to pay around £60 a year. The landline duty will be applied for each local loop which should reduce the exposure of business to the landline duty. SMEs are likely to receive particular benefits from NGA as it may offer them the opportunity to exploit new markets and business opportunities. They will also be able to take advantage of new services and applications offered by Next Generation broadband such as cloud computing, which will help their business operations and have potential cost saving implications.

Rural Proofing

The impacts of rolling out NGA are likely to be greater in more rural areas compared with urban areas since it is often the case that copper-based broadband services in rural areas do not experience the same speed, quality, reliability of service and bandwidth as those in urban areas. With the roll-out of NGA people in rural areas will be able to experience the same choice and range of services as people in urban areas.

Other specific impact tests

Specific tests including Legal Aid, Sustainable Development and Carbon Assessment have been considered in this impact assessment. After initial screening, it has been deemed that no significant impact is anticipated in any case.

We have also considered the potential effects of these proposals on race, disability and gender equality. Again, after initial screening it has been deemed that no significant impact is anticipated in any case. These groups in the areas that Next Generation Broadband is rolled out to would gain improved services for businesses and access to public service facilities online as consumers.

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

Type of testing undertaken	<i>Results in Evidence Base?</i>	<i>Results annexed?</i>
Competition Assessment	Yes	No
Small Firms Impact Test	Yes	No
Legal Aid	No	No
Sustainable Development	No	No
Carbon Assessment	No	No
Other Environment	No	No
Health Impact Assessment	No	No
Race Equality	No	No
Disability Equality	No	No
Gender Equality	No	No
Human Rights	No	No
Rural Proofing	Yes	No

Glossary

3G	Third Generation Mobile services
Cloud Computing	Term used for delivering hosted services over the internet
Coverage	The extent to which broadband service is available should businesses and consumers wish to subscribe
FTTC	Fibre to the Cabinet – Fibre delivers broadband to the cabinet on the street and broadband is delivered to the home by copper wire
FTTH	Fibre to the Home – Fibre is delivered by fibre right to the home
GPON	Gigabit Passive Optical Network
ISDN	Integrated Services Digital Network – a data transfer technology using the copper phone network
LTE	Long Term Evolution – so-called 4G mobile services offering greater data rates
Next Generation Superfast Broadband	There is currently no agreed definition of next generation superfast broadband, but it is likely to be faster, have more symmetrical download and upload speeds and be more reliable and consistent across users and time compared with current generation broadband
Network Owners	Businesses that own all or part of a network such as BT Openreach or Virgin Media
NGA	Next generation access – also known as next generation broadband, or superfast broadband – The term used to describe the infrastructure and set of technologies which provide superfast broadband
PTP	Point-To-Point
Retailers	Businesses that sell services to the end consumer such as BT Retail, Virgin Media, Sky or TalkTalk
Take-up	The acceptance of broadband services where offered
VDSL	Very high bitrate digital subscriber line
Wimax	A wireless data transfer technology

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