

## **Approach to government intervention in the deployment of next generation broadband**

### **Incorporating its response to the previous government's Next Generation Fund consultation**

**24 May 2010**

#### **Preface**

Next generation broadband featured in the political manifestos of all of the major political parties in the run up to the 2010 general election. Indeed there appears to be a remarkable level of political consensus that the evolution of next generation broadband is likely to be of real economic and social significance in the decade ahead. All of the major parties are agreed about the desirability of ensuring the widest possible availability of next generation broadband services and all recognise that to achieve this, some form of public subsidy might be required at some stage, although views do differ about the timing of any potential public intervention.

Given this consensus about the possible need to intervene at some stage to extend next generation broadband availability, the BSG has developed this position paper which sets out the BSG's view on how policy makers should approach this complex issue. We do not comment here on the case for intervention<sup>1</sup>, but our overall approach has been governed out of a concern to ensure that any potential intervention is designed to be as efficient and effective as possible.

The previous government undertook a consultation to gather views on how to design its proposed intervention, the Next Generation Fund. Attached at Annex A is BSG's response to that consultation, which provides useful further information and analysis on a number of the key issues that government would need to address when designing an intervention.

It is not clear to us that there is a compelling case for intervention to start immediately. However, given the level of political consensus set out in the election manifestos, there is a market expectation that intervention will occur at some stage. In order to avoid uncertainty about the government's intentions distorting market decisions, we believe it would be appropriate for government to provide further clarity to the market in the short term about their likely approach to intervention in the longer term.

If public funds are to be used for extending the reach of next generation broadband then we believe that the objective should be to achieve the widest possible coverage as can be justified on a cost-benefit approach. In some areas wireless and satellite services could provide a more affordable alternative or better value for money than fibre based solutions. However, we need further evidence on the costs and capabilities of alternative wireless and satellite technologies to undertake an informed

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<sup>1</sup> The BSG will return to the issue of the case for intervention in a future report.

cost-benefit analysis of the full range of potential technology solutions.<sup>2</sup> Furthermore, it will be necessary to ensure that any funds are spent in the most efficient and effective way possible. The government's first priority therefore should be to minimise any barriers to investment. As well as ensuring the greatest 'bang for the buck' from public subsidy it will also maximise the extent of market led deployment as doing so will mean that the available public funds can be targeted at the areas that are most in need.

Whatever proposal is developed by the new government and however it is funded, we believe it is essential that government has the information and evidence it needs to design and deliver the most efficient and effective intervention. Currently we only know a limited amount about how the market is likely to develop over the next months and years. Answering many of the important questions regarding intervention today would require making some quite significant and untested assumptions. In our view, these assumptions could be much better informed if more time is taken to gather vital evidence on key demand and supply side factors. By further developing the evidence base government will be in a much stronger position to ensure that any intervention is targeted and spent in the most efficient and effective way for the maximum benefit of UK citizens.

**We should stress that this does not mean that the BSG is advocating a delay or deferment in policy- or decision-making on the UK's next generation broadband infrastructure. Rather, we are recommending specific actions that need to be taken in the short term to ensure the most effective outcomes in the long term.**

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<sup>2</sup> BSG is currently undertaking a study into the costs and capabilities and wireless and satellite technologies, which should be published in September.

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## **Executive Summary**

This position paper sets out the BSG's view on how government should approach structuring any intervention into the deployment of next generation broadband. It does not address specifically the case for intervention, but instead reflects a political consensus that intervention will be necessary at some stage to ensure a widespread deployment of next generation broadband.

The costs of deploying next generation broadband are of an order of magnitude more expensive than the rollout of first generation broadband: where current broadband required an upgrade to equipment in the exchange, next generation broadband requires extensive civil works to replace some or all of an end user's copper line with fibre. These high costs mean that more densely populated areas provide a more attractive opportunity for commercial deployments, with less dense areas more costly per customer, and more challenging to justify for commercial operators. It is this unequal distribution that an intervention would seek to address.

### **Rationale for intervention**

BSG provides no view here on the rationale for intervention, although we consider that there is no need to begin an intervention immediately as the market is still in the early stages of its deployment and there is still much that remains unknown. However, government should utilise a cost-benefit approach to determining whether, and when, to intervene.

Adopting this approach would then help to define the scope of any intervention. At this stage, BSG does not consider that a policy of universal access to fibre-based next generation broadband can be justified as it is unlikely (and certainly is not proven) that the benefits would outweigh the costs. Therefore, the scope for any intervention should be to address all unserved homes that can be justified on a cost-benefit basis.

### **Understanding the challenge**

There are a number of risks with undertaking an intervention. It can chill private investment, leading to significant wasted investment from the public sector, and if structured poorly could lead to stranded assets and inefficient investment, ultimately not achieving the desired objective. However, there is also a risk that failing to intervene, or intervening too late, results in an opportunity cost of lost benefits and adversely impacts on the UK's national competitiveness.

To mitigate these risks, government needs to ensure that it has enabled the private sector to deploy as far as possible by removing remaining public and regulatory policy barriers. It also needs to ensure that any intervention avoids investing in areas where it is likely the market will deliver next generation broadband, and to make a judgment about the timing of any intervention. Government needs further evidence in order to make informed decisions on these issues.

At this point in the debate, a significant amount is known about the issues surrounding next generation broadband, particularly regarding the costs and likely extent of deployment, and how to assess the value of next generation broadband.

There remain considerable unknowns, however, such as likely revenues from next generation broadband, the investment case for commercial deployment, the costs and capabilities of alternative wireless and satellite technologies, and even what

actual costs for fibre deployment would be, as at present this is based on a theoretical model.

Government needs to gather more evidence on each of these issues. Creating a more complete picture will enable better decisions to be made about where, when and how to intervene including testing the conclusion that it is a final third that will be left unserved, a view based largely on an analysis of the costs of deployment only.

### **What should government do?**

BSG is not advocating a 'wait and see' approach, and there should be no delay in policy- and decision-making on the UK's next generation broadband infrastructure. Rather, there are specific actions that need to be taken in the short term to ensure the most effective outcomes in the long term.

Set out below are a number of recommendations for government action. They cover:

- improving the evidence base for policymaking on the approach to intervention;
- removing barriers to market-led deployment of next generation broadband;
- and considering how to design an intervention, including the funding mechanisms used and the trigger for its launch.

**Work on all of these issues can and should start sooner rather than later.**

### **Recommendations to government**

1. Reiterate its position on intervention, and set a target to deliver next generation broadband to as many homes as can be justified on a cost-benefit basis.
2. Develop a better, more informed evidence base for designing the intervention based on:
  - i. further information regarding the actual costs of scale deployments
  - ii. understanding the investment case and decision making process for operators
  - iii. identifying how the market-led rollout looks geographically
  - iv. studying the revenue impact of next generation broadband networks
  - v. understanding what the consumer experience is of next generation broadband, and what characteristics are the most valuable
  - vi. studying the impact of the market-led deployment of next generation broadband on consumers, businesses and communities, with a particular focus on identifying externalities
  - vii. examining the costs and capabilities of alternative wireless and satellite technologies.
3. Remove potential obstacles to market-led deployment:
  - i. explore opportunities for passive infrastructure sharing with alternative providers of infrastructure
  - ii. better coordination of streetworks

- iii. greater clarity on the application of non-domestic rates to fibre in the access network
  - iv. examine the impact and implications of copper shutdown
  - v. facilitate the release of 800MHz and 2.6GHz spectrum to support next generation mobile broadband development
  - vi. support the development of independent local open access networks as a sustainable part of the industry.
  - vii. review the costs and impacts of planning constraints on the deployment of communications infrastructure, including restraints on small satellite dishes in rural areas, including National Parks and on listed buildings, and the deployment of phone masts and base stations.
  - viii. evaluate the use of additional spectrum at Ka-band to support the development of next generation satellite systems
4. Consider what role government could play in stimulating demand for next generation broadband.
5. Develop a trigger for the launch of the intervention.
6. Begin designing the procurement approach:
  - i. consider the costs and benefits of regional versus national procurements
  - ii. understand from industry what procurements would need to look like to be commercially attractive and sustainable
  - iii. be clear about the role of other national, regional and local authorities in the intervention.
  - iv. define the government's objective, and understand what factors should be considered as part of the value for money assessment of possible solutions.
7. Consider the different funding options for the intervention that are open to government.

## **Introduction**

Within BSG, and the stakeholder community at large, views are divided about the case for intervention to extend the reach of next generation broadband networks at this time. Some consider that it is too soon to intervene as market-led deployment is still in its early stages and we do not know how far it will reach, or whether next generation broadband is an essential utility that justifies public expenditure. Others consider that waiting for the market to deploy will leave significant parts of the country un-served and disadvantaged, exacerbating the digital divide.

However, if there is a compelling case for intervention, then the BSG believes the objective should be to achieve the widest possible coverage of next generation broadband as can be justified through a cost-benefit approach, rather than setting an arbitrary coverage target of xx% of homes. BSG notes that the principle of universal coverage of broadband has been established by the 2Mbps universal service commitment (USC); we agree with the approach of universality in this instance as the cost-benefit assessment is likely to be positive for such a limited expenditure. However, fibre-based next generation broadband is of an order of magnitude more costly. At this time, given our current understanding of the costs and benefits, it is difficult to justify a policy of universal availability of fibre-based next generation broadband; and until more is known about the costs and capabilities of wireless and satellite technologies it will also be difficult to justify universal delivery of next generation broadband using alternatives to fixed-line technologies.

The challenge will be delivering the widest possible coverage that can be justified within the real financial constraints that public finances currently face. Whatever funding option is chosen the challenge for government will be to use the limited funds as efficiently and effectively as possible, in order to secure the best connectivity possible for the widest coverage of households that can be justified. To achieve this it will be necessary to think very carefully about the design and timing of any intervention.

The purpose of this paper, therefore, is to guide thinking about the design, implementation and timing of any intervention, to ensure its efficiency and effectiveness in achieving the widest possible justifiable coverage of next generation broadband.

## **A: Background**

### **1. Rationale for intervention**

Since its initial deployment in the UK ten years ago, broadband has had a significant positive economic and social impact. Similar positive economic effects have been seen in markets around the world. Broadband, along with other developments in ICT, has enabled innovation, which in turn has driven productivity growth. Next generation broadband will continue to enable new ways of doing things and open up further opportunities for innovation.

Based on our analysis of the costs of fibre based next generation broadband (FTTC, FTTH-GPON and FTTH-P2P) it is highly likely that the market will not deliver fibre to all parts of the UK and that some areas will remain un-served for a significant period of time, if not indefinitely. The costs of fixed-line fibre-based next generation broadband networks depend mainly on scale and density, meaning that smaller and less-dense areas are significantly more expensive to deploy to, and therefore

commercially more challenging (as well as more difficult to justify for public intervention). This is a conclusion replicated in most major economies around the world with similar geographies.

Un-even distribution of next generation broadband could have a negative effect, as un-served communities, households and small businesses become increasingly disadvantaged over time. It is also likely that the full potential positive externalities related to next generation broadband will also not be realised unless next generation broadband is universally available and adopted.<sup>3</sup>

## 2. The cost-benefit analysis for intervention

Current thinking regarding the scale of the required intervention is that as much as a third of homes in the UK could go un-served, based on the initial analysis of the costs of deploying fibre. Based on this assumption, an intervention to provide next generation broadband (FTTC) to 90% would require a subsidy of about £1bn; this could bring the cost per home down to the level seen in the first two-thirds of homes. The cost of an intervention achieving 100% coverage for FTTC would be around £1.5bn, although cost estimates for the last 10% of homes are more speculative and the costs may be higher in these areas.

In a recent study for Vodafone,<sup>4</sup> Ingenious Consulting estimated that to justify this level of public subsidy, it is necessary to believe that positive externalities worth €7 per subsidised connected household per month would be generated – externalities are society-wide benefits that are over and above the benefit that is experienced (and paid for) by the customer. Ingenious also highlighted that services of different capabilities may be justified in different geotypes based on the costs and expected benefits. For example, in more dense areas with lower costs per home it may be that a subsidy to deliver FTTH could be justified; in less dense areas the higher costs could mean that FTTC or wireless technologies could be justified, but not FTTH. Government may wish to consider whether the intervention it develops should be designed to deliver the widest possible coverage of the best capability broadband that can be justified.<sup>5</sup>

For the purpose of this paper, however, BSG is not taking a view as to whether or not intervention can be justified. Instead, our focus is on how an intervention should be structured and timed to ensure the most efficient and effective outcome should the decision be taken to intervene. Government should, however, develop a view on the levels of benefit that it considers will accrue as it develops its approach to extending the coverage of next generation broadband. The market-led deployment provides a significant opportunity to understand the impact that next generation broadband will

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<sup>3</sup> An example of this could be copper switch-off, which could bring significant benefits but could only be achieved with 100% coverage of next generation broadband. For more information see pp50-51, Plum Consulting for BSG, *A Framework for Evaluating the Value of Next Generation Broadband*, June 2008.

<sup>4</sup> Ingenious Consulting, *Optimal Investment in Broadband: The Trade-Off Between Coverage and Network Capability*, commissioned by Vodafone Group and published in Vodafone, 'Developing Government objectives for broadband', March 2010

<sup>5</sup> BSG notes that the Australian government has promised to deliver 100Mbps broadband to 90% of homes, with up to 12Mbps solutions being provided for the most rural 10% of households. It has now also announced that this last 10% will be provided by satellite and wireless means and that NBN will procure a A\$1bn satellite system directly  
[http://www.dbcde.gov.au/broadband/national\\_broadband\\_network](http://www.dbcde.gov.au/broadband/national_broadband_network)  
<http://www.theaustralian.com.au/business/media/conroy-backs-push-for-regions-to-get-two-high-speed-satellites/story-e6frg996-1225858131107>

have on consumers, businesses and communities. Government should consider a programme of evidence gathering that would shed light on the benefits of next generation broadband, including the value of potential externalities.

### 3. Our view on the scope of intervention

If there is a compelling case to intervene at all, then we cannot see why that case would not extend to as many households as is justified; in some areas this could mean utilising wireless and satellite services that could provide a more affordable alternative or better value for money than fibre based solutions.

However, we believe this could and should be achieved while keeping the costs of any intervention to a minimum, recognising the constraints on the public finances. In order to do this it will be necessary for government to do three things.

1. Ensure that any potential policy or regulatory barriers to investment are minimised.
2. Ensure that the subsidy only applies to homes where it is possible to be confident that the market would not otherwise serve.
3. Use alternative lower cost fixed-line, wireless and satellite technologies where mainstream fixed line next generation broadband technologies would not be affordable or where lower cost technologies may offer better value for money. This may mean accepting a lower level of service provision than the implied FTTC benchmark, but would still represent a significant improvement on the 2Mbps USC and would, we believe, be sufficient to support significant positive benefits to households, communities and businesses in these areas.

## **B: Understanding the challenge**

### 1. The risks of getting intervention wrong

The nature of this intervention means that government will need to get this right first time. The levels of funding required, the importance of the investment, and the nature of long-term infrastructure investment are likely to mean that government will only have one opportunity to intervene in the market to increase coverage of next generation broadband.

If poorly implemented a subsidy can pre-empt or chill market led-investment, cause significant dead weight effects and prove ineffective in achieving its objective. These are significant risks, and suggest that government needs to ensure that it makes the intervention as efficient and effective as possible.

However, there is also the risk that failing to intervene or intervening too late would result in an opportunity cost of failing to realise the private benefits (producer and consumer surplus) and positive externalities resulting from the universal availability of next generation broadband. This opportunity cost is likely to be relatively small in the short term, but could be larger in the long term as lower productivity growth starts to impact national competitiveness. This suggests that government needs to ensure that the timing of any intervention is optimal.

### 2. How to mitigate these risks

Government intervention through direct subsidy is only one policy route open to government to try to increase the coverage of next generation broadband. Other

measures it could take involve changes to the statutory and regulatory environment that remove barriers and further incentivise market-led deployment, with the aim of increasing the reach of market-led rollout. The most efficient and cost-effective method for government to increase coverage is to enable the private sector to deploy further by removing any policy and regulatory barriers that remain obstacles to investment.

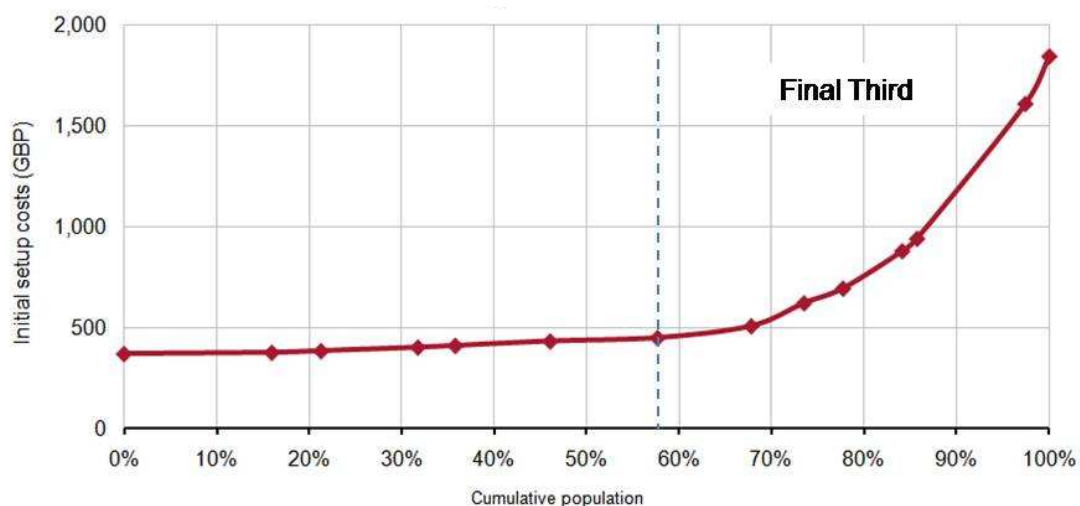
Government also needs to avoid investing in areas where it is likely the market will deliver next generation broadband. This is clearly an inefficient use of available funds and goes against the intended objective – importantly, the more efficiently the funds are used, the more funds that would be available to increase the level of coverage that can be achieved. In order to develop an approach that avoids investing in areas likely to receive market-led investment, it is necessary to develop a much deeper understanding of the potential market reach.

Government also needs to make a prudent judgement about the timing of the intervention. There are many factors that will influence the costs and benefits of earlier versus later deployment, and thus the correct timing of any intervention. We discuss these below.

### 3. What do we know today?

Work done so far has demonstrated the costs for national rollout of either FTTC or FTTH (whether GPON or P2P). Analysis based on this work has suggested that, where a commercial case exists for investment, it should apply for the first 58% of homes for FTTC, and the first 68% for FTTH, given the similar costs per home in these areas. After this, the costs per home increase more quickly and significantly, making the commercial case for investment much more uncertain.

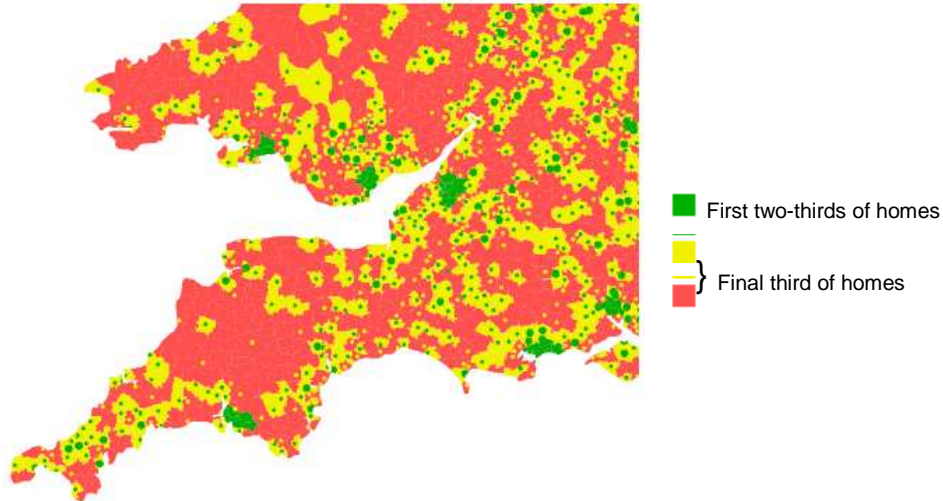
**Figure 1: FTTC - cost per home connected**



Source: BSG based on Analysys Mason data

Based on this work, we also have an idea of where deployment based on this cost model might look like. Below is a map of the southwest; those areas in green would be in the first two-thirds of homes, while areas in yellow and red would be in the final third.

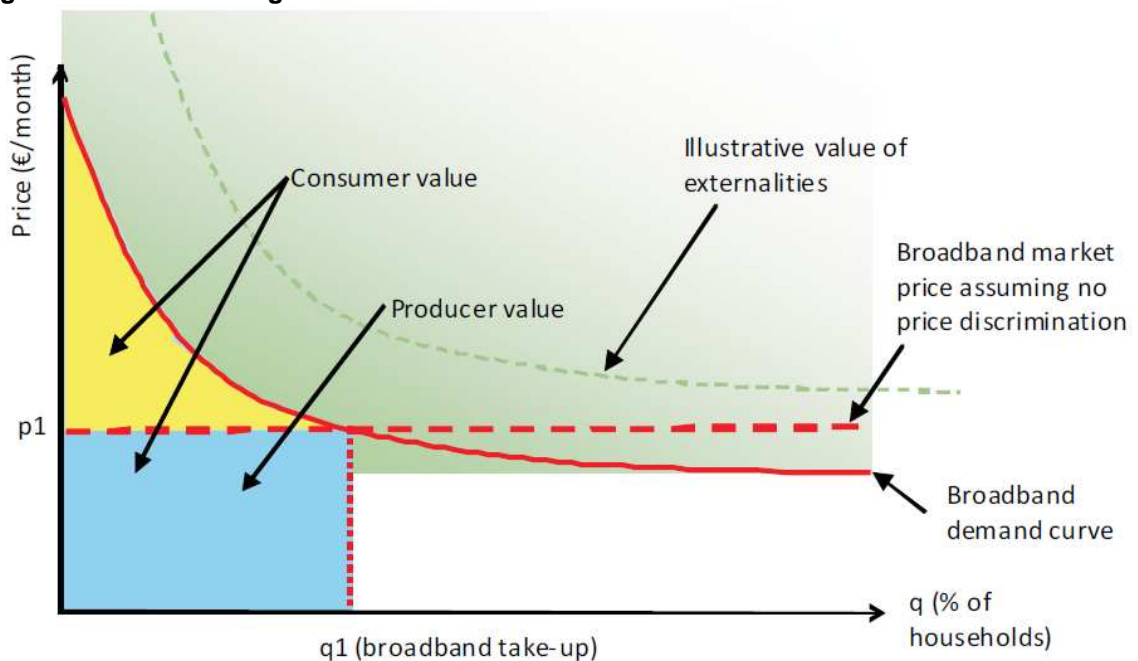
**Figure 2: Map of the South-West showing final third**



Source: Analysys Mason for BSG

We also have an understanding of how to assess the value of broadband, considered against the classic economic concepts of consumer value, producer value and externalities, as discussed in Vodafone’s policy paper ‘Developing Government objectives for broadband’.<sup>6</sup> Consumer and producer value are the most direct measures of economic benefit, while externalities can include societal value, productivity improvements and increased efficiencies.

**Figure 3: Understanding the value of broadband**



Source: Ingenious Consulting for Vodafone

Assessments on this basis are useful as they allow us to understand the types and levels of benefit that government need to believe will exist to justify any intervention. However, at present there is relatively little reliable data on which hard estimates of the scale of these values can be based, as evidence is only beginning to emerge

<sup>6</sup> Ingenious Consulting for Vodafone Group, *Optimal Investment in Broadband*, March 2010

regarding the impact of first generation broadband and from early-adopters of next generation broadband. What this approach does demonstrate, however, is the level of externalities that government need to believe will accrue in order to justify intervention at a particular level in any given area.

#### 4. What don't we know today?

##### *Capex assumptions*

The current analysis of the capex costs of fibre-based deployment are based on a number of assumptions regarding the cost of civil works; the cost of equipment required; and the levels of penetration the network would achieve. With such a large number of variables, it is likely that the costs of deployment might change over time. Lower penetration would see the cost per home connected rise, while new digging techniques, such as innovative slot trenching techniques, could reduce the costs of deployment. Alternatively, the assumptions on availability of duct and other passive infrastructure for re-use may be too optimistic, increasing the need for new duct and therefore the costs of civil works. Similarly, due to the length of time the deployment might take the active equipment on the network could go through two or three development cycles, each bringing with it the possibility for greater capability and/or lower cost.

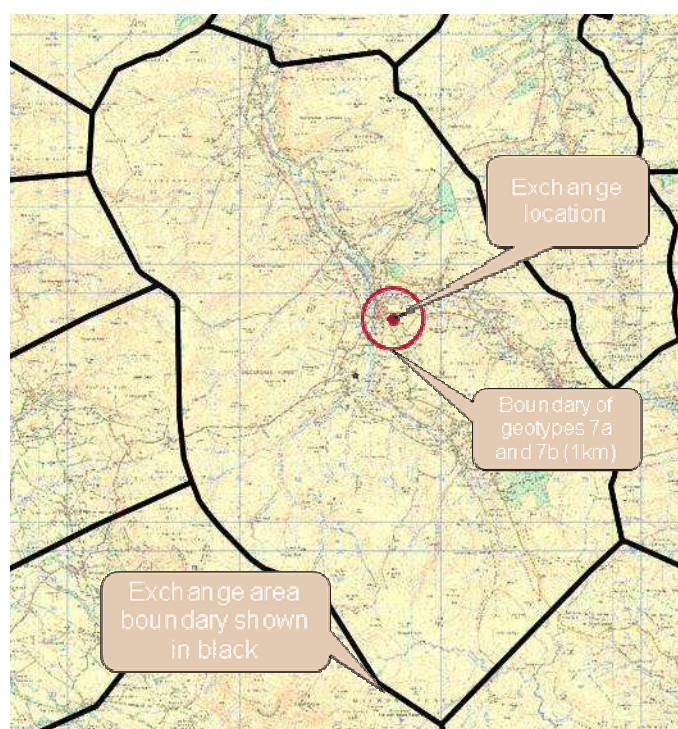
BSG has recently undertaken a review of its fibre-base next generation broadband cost model, and found that some costs could be slightly lower than originally thought, although there is insufficient robust evidence at this time to revise the base case in our work. However, the costs at this point in time are theoretical only – although the model is based on cost data from industry, until actual large scale deployments take place it is difficult to assess how accurate to real deployments these costs are.

##### *Investment considerations*

As well as the uncertainty over the capex costs, it is also important to understand that capex costs form only one part of the decision-making criteria for investment by a commercial operator. The opex costs of fibre versus existing copper, as well as alongside copper, and other key criteria that would underpin a commercial business case, such as network competition, are currently unknown.

To highlight the difficulties involved in making judgments based purely on the capex analysis, it is useful to consider what a deployment based on this analysis might look like. The analysis undertaken was on a geotype by geotype approach. This resulted in splitting exchange areas outside of major cities into two: lines within a certain distance from the exchange were in one geotype (labelled (a)); and lines longer than this distance were in a separate geotype (labelled (b)). The figure below shows what this would look like for the Alston exchange in Cumbria.

**Figure 4: Alston exchange area geotypes**



Source: Analysys Mason for BSG

As a result of the higher costs of deploying to homes with longer lines further from exchanges, all *b* geotypes were in the final third of homes. Therefore, we would not expect to see deployment to areas classified as a *b* geo type. However, BT's current deployment plans suggest they will be deploying FTTx to all homes within a coverage area. Our analysis, based on data from Point Topic and the classification of geotypes within our cost model report, suggest that BT's initial deployment of next generation broadband to 10m homes will capture around 1.5m homes in *b* geotypes, or homes in the final third (we are as yet unable to provide this analysis for its recent announcement that BT will extend investment to reach 66% of all homes).

Similarly, the geotype approach suggests that many small exchanges would be within the first two-thirds of homes on a capex basis: exchanges such as Alston, with over 1000 lines, would be viable for those homes closest to the exchange based on a capex analysis. However, current deployment plans from BT include deployment to only a handful of exchanges with less than 10,000 lines.

The rationale for this approach to deployment is therefore not purely based on upfront capex, but reflective of other commercial considerations. Furthermore, until actual deployment begins it is impossible to know the exact geographic nature of the market-led deployment. We currently have only a limited understanding of how these other factors play into the commercial investment decisions.

#### *Revenue assumptions*

The analysis so far has assumed that there is a point at which any commercial investment moves from a net-positive for the investor to a net-loss, based on an expected level of return – it is at this point that any intervention would step in to

subsidise deployment. However, little is known about the revenue model for fibre-based services in the UK and what the break-even point for investment would be.

The current analysis is based on investment already being committed in the first two-thirds, and the expectation that this should mean that the investment will eventually reach all homes in the first two-thirds based on the capex profile. However, as we have discussed above this does not reflect the many factors that will go in to investment decisions. Furthermore, if revenues do not reach planned-for levels then further investment beyond that which is already committed may be delayed, or not delivered at all.

#### *Public and regulatory policy*

There are still a number of uncertainties regarding the regulatory and public policy environment for investment. As we discuss below, there are a number of areas of activity that still require resolution on a policy front, which could have material impacts on the levels of investment in next generation broadband. Resolving these should be a priority for government.

#### *Costs and capabilities of alternative wireless and satellite technologies*

The role for wireless technologies needs to be better understood. While we expect that the majority of next generation broadband services supported by an intervention will be delivered by fibre-based fixed line solutions, in some areas (such as, but not limited to, the final 10% of homes) wireless and satellite services could provide a more affordable alternative or better value for money than fibre based solutions. Further work is required in order to assess the role for these technology platforms.<sup>7</sup>

### 5. Why does this matter?

Without more information regarding the issues above, we have insufficient information to make an informed prediction of the likely market reach of fibre based next generation broadband. Small changes to the costs and revenues will shift the break-even point at which a subsidy would be required, and moving the assumed break-even point can have a significant impact on the scale of funds required to subsidise deployment. Meanwhile, understanding the factors that weigh on an investment decision will enable a more refined model of likely deployment to be developed that reflects more than a capex analysis, as well as assisting with the development of a procurement approach that delivers a commercially attractive and sustainable outcome.

This is important for two reasons. First, there is a need to avoid chilling private investment and wasting public money. Although it is arguable that there is a chilling effect simply through a government commitment to intervene, having a clearer understanding of how the market-led deployment will develop, and developing an approach based on this expectation, would limit the chilling impact of the intervention. In doing so it would limit wasted spending that duplicates investment the market would likely make.

Secondly, this would permit government to concentrate resources where they are needed most. Money not spent at the margins of commercial viability is money that can be targeted at the harder-to-reach areas in the final few per cent; this is likely to be important when any intervention will need to maximise the use of limited resources, given the pressures on public finances.

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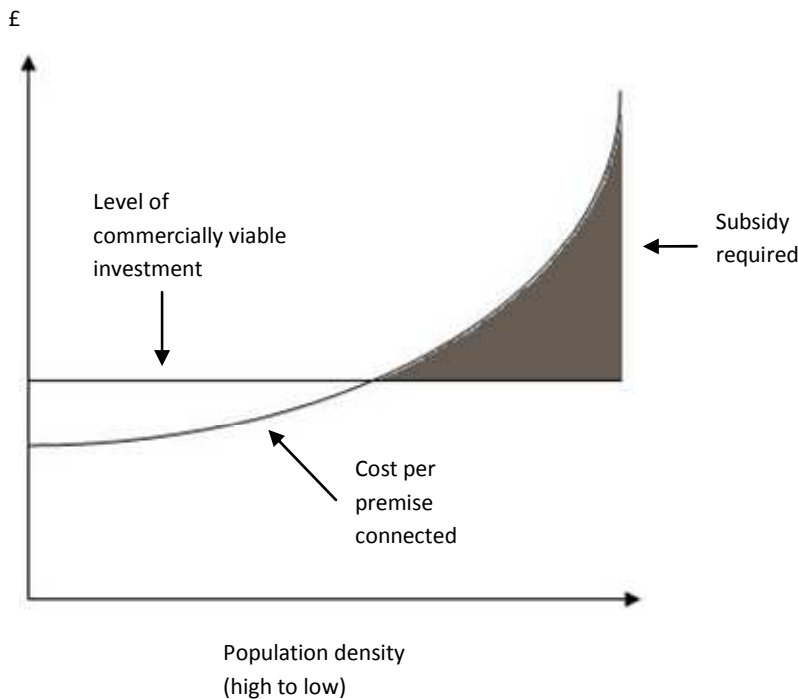
<sup>7</sup> BSG is currently undertaking a study into the costs and capabilities and wireless and satellite technologies, which should be published in September.

## C: How would a subsidy work?

### 1. Final Third base case

The base case for the Final Third distinction is drawn from the results from the BSG's 2008 fibre cost model, where the costs remain relatively constant through the least expensive first 58% of households (based on the costs for FTTC). Based on this, the base case assumes that if there is a business case for the market to deploy to 40% of households, then that business case should extend to at least 58% of homes. This then became the basis for the assumption that a subsidy would be required for approximately one third of premises.

**Figure 5: Final Third base case**



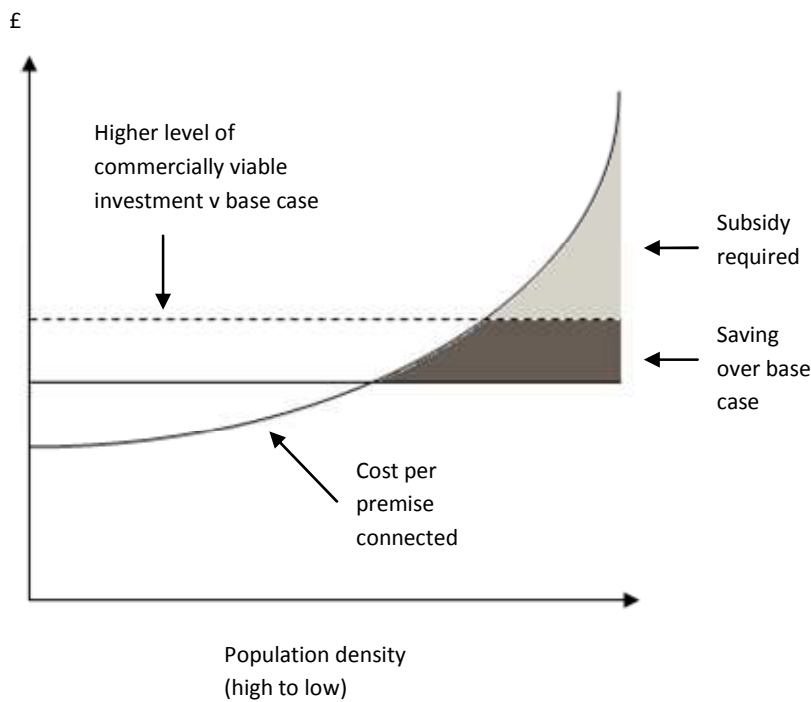
Source: BSG

However, as discussed above the assumption that the business case works up to 58% is unproven (even with BT's recent announcement that it will increase its deployment to 66% by 2015, this is only a commitment to deploy and is not yet an actual deployment), and there is currently insufficient evidence on revenues and other issues that underpin the decision to invest for this to be regarded as a definitive analysis. Below we consider how different scenarios could impact on this view.

### 2. Impact of higher revenue

If the business case for next generation broadband deployment proves more attractive than assumed in the base case then the break-even point would move further up the cost curve, reducing the number of homes that would require a subsidy and the total amount of subsidy required.

**Figure 6: Impact of higher revenue**

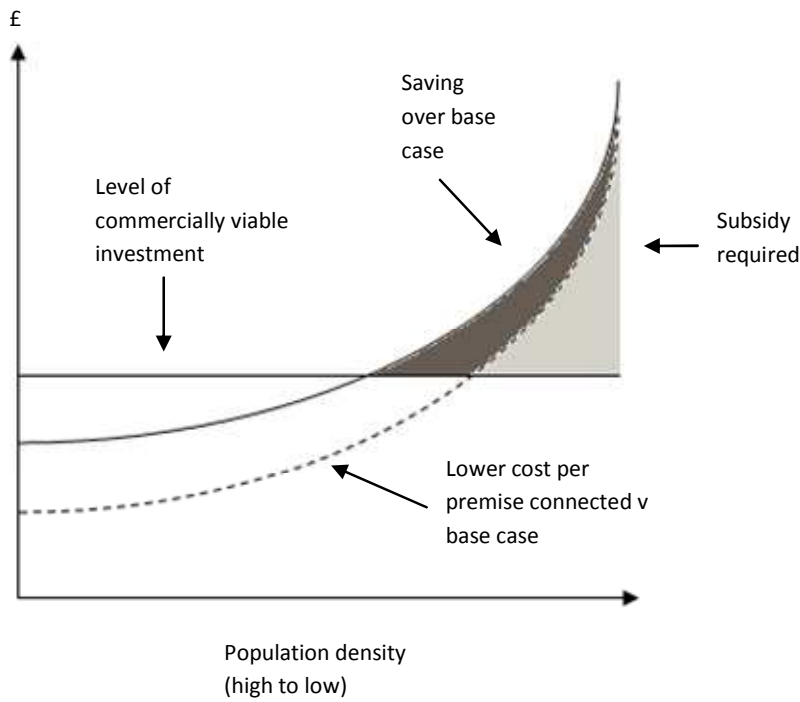


Source: BSG

### 3. Impact of lower costs

If the costs of next generation broadband deployment prove to be lower than was assumed in the base case then the break-even point again moves to the right, reducing the total level of subsidy required. Lower costs per premise connected would occur for example if the level of take-up were to be higher than was assumed in the final third base case, as this allows the high levels of fixed costs to be shared between more homes taking a service.

**Figure 7: Impact of lower cost of deployment**

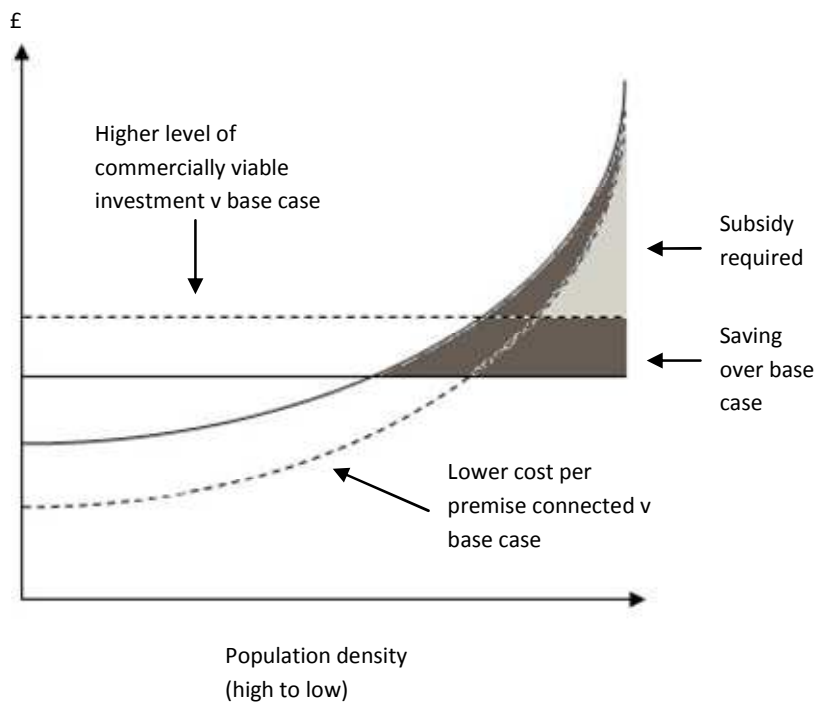


Source: BSG

4. Impact of higher revenue and lower costs

In the case that both the actual deployment costs prove to be lower and the business case proves more attractive then the scale of the required subsidy would be significantly smaller.

**Figure 8: Impact of higher revenue and lower cost**



Source: BSG

This demonstrates the risk of intervening without sufficient information. If the subsidy were to be based on the initial final third base case, but it then subsequently proved that the costs of deployment were lower and the business case stronger then a significant amount of public money will have been wasted. Alternatively, revenues could be lower and costs higher than the modelling suggests, increasing the amount of subsidy required and the number of homes requiring subsidy

To avoid this situation decisions about where to intervene should not be taken until there is more market information about the business case for deployment based on actual market data. In our view this data should begin to identify trends in the next 12-18 months as services are deployed.

#### 5. Getting the timing right

Getting the timing of any intervention right should be a key concern for government. While there are costs associated with intervening too early, there may also be costs associated with intervening too late. These costs would be the foregone consumer surplus through next generation broadband not being available to some homes; and the foregone positive externalities through non-universal availability.

The 2008 BSG report 'A Framework for Evaluating the Value of Next Generation Broadband'<sup>8</sup> (hereafter *Value Framework*) suggested that while these costs (forgone benefits) are likely to be small in the short term, they could be significant in the long term. This suggests that a short delay in implementing the planned intervention would not risk incurring costs in the short-term. Sufficient market information to make a more informed decision about where and when to intervene should become available in the near to medium term

### **D: So what should government do next?**

We should stress that this does not mean that the BSG is advocating a delay or deferment in policy- or decision-making on the UK's next generation broadband infrastructure. Rather, we are recommending specific actions that need to be taken in the short term to ensure the most effective outcomes in the long term.

#### 1. Remove potential obstacles to market led deployment

There are a number of issues where ongoing policy activity is required, both to provide greater clarity and certainty for investors, and to investigate further policy activities that could incentivise and assist market-led deployment of next generation broadband.

##### *Passive infrastructure sharing*

One such area is the potential of access to existing ducts and poles, or passive infrastructure. Ofcom's recent WLA market consultation proposed a passive infrastructure sharing remedy, which would permit access to BT's infrastructure. However, more should be done to assess whether access to alternative infrastructure providers, such as utility companies, could be achieved, and whether a market for passive infrastructure access could be created in the UK.

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<sup>8</sup> Plum Consulting for BSG, 'A Framework for Evaluating the Value of Next Generation Broadband', June 2008

The Caio Review identified a number of barriers to enabling this access; however, industry commitment to the BSG's Passive Infrastructure Standards Working Group has shown that there is a demand for activity in this space.

Aligned to this is the need for further cooperation over streetworks, again an issue identified in Caio. This remains an area where further benefit could be achieved, and should be explored as part of a wider examination of passive infrastructure sharing.<sup>9</sup>

#### *Planning rules*

Alongside passive infrastructure sharing, government should also review planning rules governing the deployment of telecommunications infrastructure. This will be important in relation to the liberalisation of infrastructure that could be utilised for overhead deployment of fibre, but would also be relevant to mobile mast deployments and rules governing satellite dish installations. The existing rules should be considered in a trade off alongside government's priorities in the telecommunications sector and its competing priorities in other policy areas.

#### *Business rates*

There remains continuing uncertainty for operators regarding the treatment of fibre in the access network by the non-domestic rating regime. Although recent work between BSG and the Valuation Office Agency has produced a greater level of clarity, uncertainty still exists and more definitive advice from government would be beneficial.

#### *Copper shutdown*

Identified as an area that should be given policy consideration in *Value Framework*, Ofcom highlighted copper shutdown as an area of potential activity at some point in the future in their superfast broadband regulatory statement.<sup>10</sup> However, copper shutdown is a much broader policy issue than simply being a regulatory concern about how best achieved once industry has indicated it would wish to pursue it; government should explore this issue further.

#### *Spectrum*

Wireless services are an important competitive driver to first generation broadband services, and the evolution of these services through 4G/LTE and other similar technologies will continue to provide competition against first-generation services, while being a complement to fibre-based next generation broadband services. Government should continue to facilitate the release of spectrum, tied to coverage targets and in an open and competitive manner, to enable the development of higher speed and capacity wireless services.

#### *Independent local open access networks*

In the UK and other markets, new entrants have begun to deliver next generation broadband infrastructure to consumers. These new entrants often have small-scale, local networks, and due to their scale struggle to attract service providers. This impacts on the levels of take-up on these networks, as consumer choice is limited. If these networks are able to become a sustainable feature of the market, however,

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<sup>9</sup> BSG, through the Passive Infrastructure Standards Working Group, is working through a number of these issues in partnership with industry stakeholders

<sup>10</sup> pp 62-65, Ofcom, 'Delivering super-fast broadband in the UK: Promoting investment and competition', March 2009

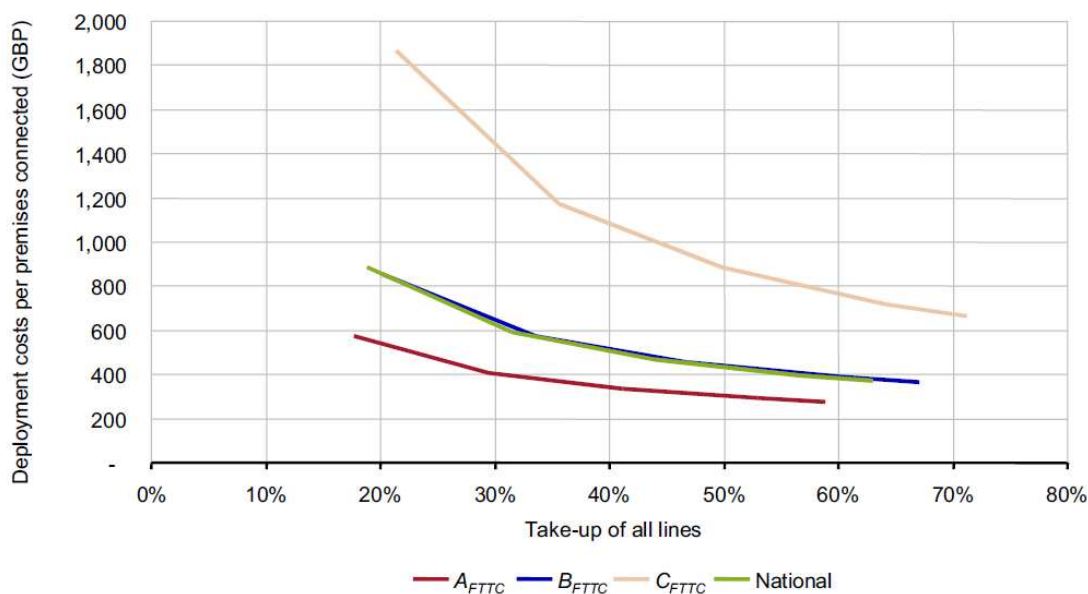
they may provide opportunities for this programme to achieve its objectives in innovative ways.

Enabling these networks to become a sustainable feature in the industry has been at the heart of the BSG-led Commercial, Operational and Technical Standards Project (the COTS Project), which is working to ensure that consumers benefits from a choice of service providers regardless of who operates the underlying network. Government should continue to engage in this work, and consider any other activity it could undertake to resolve this issue.

## 2. Consider demand side intervention

In the case of a fixed network deployment there is a high proportion of fixed cost and a lower variable cost per home connected. There is therefore a strong correlation between take-up rates and the cost per connection, as shown in figure 9 below ( $A_{FTTC}$  represents the first two-thirds of homes;  $B_{FTTC}$  and  $C_{FTTC}$  the final two thirds). The higher the take-up rate, the lower the cost per connection as the high proportion of fixed costs are defrayed across more customers, and the better the business case for deployment. Strong demand is therefore likely to lead to more extensive deployment. It is therefore worth considering whether any actions at national, regional or local level could be taken to help drive the level of demand as and when new networks are deployed.

**Figure 9: Impact of different levels of take-up on cost per home connected (FTTC)**



Source: Analysys Mason for BSG

## 3. Understand costs and capabilities of wireless

Current next generation broadband policy is predicated on the use of fibre based technologies, however, as wireless and satellite technologies continue to evolve it is likely that they will play a role in the market, either as complementary services or in some cases as a substitute for fixed as discussed above.

Given their different cost profiles, satellite and wireless could prove to be effective substitutes in areas where the costs of fibre based provision are likely to be

excessively high or would not provide value for money. This would become particularly relevant if the goal became to increase coverage as far as possible to near-universal levels, as discussed above. It will therefore be important to have a detailed understanding of the comparative costs and capabilities of wireless and satellite networks, alongside existing studies on the costs and capabilities of fibre.<sup>11</sup>

#### 4. Understand commercial case for investment

Commercial operators are still in the early stages of understanding the commercial models that could underpin successful next generation broadband deployment. As discussed above, the full commercial case will be based upon considerations of capex, opex, potential revenues, competitive threats and other commercial and technical issues.

Current analysis underpinning the final third project is largely based on our understanding of the fixed deployment costs of fibre. To develop a more accurate prediction of where the market might deploy it will therefore be necessary to develop a much deeper understanding of the business case for deployment than is currently held.

#### 5. Develop trigger mechanism for intervention

To avoid intervening either too early or too late a trigger mechanism for intervention should be developed, perhaps based on the extent of actual market deployment and consumer adoption. Such a trigger could be utilised in a number of ways, such as regionally or nationally, or based on different/additional factors reflecting government's rationale for intervention. However, it should be developed with the improved evidence base that government would establish through addressing the earlier steps, which would provide a more accurate prediction about likely market reach.

It should be noted that predicting market reach will always be an inexact science as any prediction must inevitably be based on major assumptions. Nevertheless, it is our view that these assumptions can and should be more informed than they are today. Even a year from now, we are likely to know more than we do today, enabling us to make better decisions.<sup>12</sup>

#### 6. Begin to design a model for intervention

The need to wait before making a final decision about where and when to make the subsidy available does not mean that important progress on other key elements of the procurement design cannot be made. Indeed we would argue that there are a number of critical issues that need to be addressed now, for example, it will be necessary to:

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<sup>11</sup> BSG is currently undertaking a study into the costs and capabilities and wireless and satellite technologies, which should be published in September.

<sup>12</sup> With the trigger mechanism, BSG is intending to highlight that it is important for government to develop an approach to knowing when to launch an intervention to deliver next generation broadband. However, we recognise that next generation broadband solutions are likely to play a role in delivering the USC. In these cases, next generation broadband deployment should take place – it is not the intention here to suggest a delay in the delivery of next generation solutions that are specifically designed to deliver the USC.

- consider the relative costs and benefits for national, regional and local approaches
- understand which technology solutions might constitute best value for money in different locations
- understand what the un-served areas are likely to look like geographically and understand the economic implications for the procurement process – to be efficient the procurement must be presented to the market in a way that makes commercial sense.

**Work on these issues can and should start sooner rather than later.**

## Recommendations for government

1. Reiterate its position on intervention, and set a target to deliver next generation broadband to as many homes as can be justified on a cost-benefit basis.
2. Develop a better, more informed evidence base for designing the intervention based on:
  - i. further information regarding the actual costs of scale deployments
  - ii. understanding the investment case and decision making process for operators
  - iii. identifying how the market-led rollout looks geographically
  - iv. studying the revenue impact of next generation broadband networks
  - v. understanding what the consumer experience is of next generation broadband, and what characteristics are the most valuable
  - vi. studying the impact of the market-led deployment of next generation broadband on consumers, businesses and communities, with a particular focus on identifying externalities
  - vii. examining the costs and capabilities of alternative wireless and satellite technologies.
3. Remove potential obstacles to market-led deployment:
  - i. explore opportunities for passive infrastructure sharing with alternative providers of infrastructure
  - ii. better coordination of streetworks
  - iii. greater clarity on the application of non-domestic rates to fibre in the access network
  - iv. examine the impact and implications of copper shutdown
  - v. facilitate the release of 800MHz and 2.6GHz spectrum to support next generation mobile broadband development
  - vi. support the development of independent local open access networks as a sustainable part of the industry.
  - vii. review the costs and impacts of planning constraints on the deployment of communications infrastructure, including restraints on small satellite dishes in rural areas, including National Parks and on listed buildings, and the deployment of phone masts and base stations.
  - viii. evaluate the use of additional spectrum at Ka-band to support the development of next generation satellite systems
4. Consider what role government could play in stimulating demand for next generation broadband.
5. Develop a trigger for the launch of the intervention.
6. Begin designing the procurement approach:
  - i. consider the costs and benefits of regional versus national procurements
  - ii. understand from industry what procurements would need to look like to be commercially attractive and sustainable

- iii. be clear about the role of other national, regional and local authorities in the intervention.
  - iv. define the government's objective, and understand what factors should be considered as part of the value for money assessment of possible solutions.
7. Consider the different funding options for the intervention that are open to government.

### BSG response to the Next Generation Fund consultation

BSG welcomes the opportunity to provide feedback to the government's Next Generation Fund proposals.

#### Consultation questions

#### 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?

##### Summary

Much of the debate about the costs of next generation broadband and the likely extent of market deployment has been based upon the fibre deployment cost model developed by the BSG with Analysys Mason in 2008.

The BSG has recently conducted a review of this cost model to determine whether, on the basis of new evidence either the model itself or some of the underlying assumptions and cost inputs should be revised.

Overall, we have concluded that while some new evidence is starting to emerge, there is not as yet sufficient reliable evidence to cause us to revise the initial findings of the 2008 report. As is explained below, most of the new data points that we have identified fall within the range of cost estimates included in the 2008 report. In other words they fall within the existing margin of error. We therefore believe that the original report and the original base case estimate remains the best guide to the likely costs of fibre deployment at this stage.

We do expect however, that better data will emerge quite soon as more actual deployments get underway. We will therefore continue to keep the model under review on a quarterly basis and will revise the cost model as and when more robust cost data emerges.

##### BSG cost model

The BSG's fibre cost model generated base case headline results for national deployments of £5.1bn for FTTC, £24.4bn for FTTH-GPON and £28.8bn for FTTH-P2P.

The model, however, is necessarily built upon a large number of assumptions that, although verified as best estimates by the industry, need to be treated with some caution in the absence of real data related to actual scale deployments in the UK. To account for this uncertainty around these key assumptions a number of critical sensitivities were also modelled which resulted in a range of cost outcomes that were set out in detail in the final report.

For example when the full set of sensitivities were taken into account the costs for national FTTC deployment were found to be in a range between £3bn and £9bn; the costs for FTTH-GPON were found to be in a range between £16bn – £35bn; and the costs for FTTH-P2P were in a range between £20bn – £40bn. These sensitivities include higher and lower duct re-use assumptions and use of alternative infrastructure; higher and lower levels of take-up; different equipment choices and migration scenarios; and additional home visits for installation.

### Cost model revision

Over recent months the BSG has undertaken a review of the 2008 study which has considered both the structure of the underlying model and the key assumptions about cost inputs used in the model. The BSG issued a call for evidence and received a number of submissions.

The BSG did not receive any submissions suggesting that the underlying structure of the model needed to be revised. However we did receive a number of new data inputs which we reviewed. These data inputs related to five key areas of the cost model:

- Duct re-use assumptions, for which new evidence had emerged from the results of the duct surveys carried out by Analysys Mason for Ofcom.
- The cost of fibre installation in an existing duct
- The costs and likely utilisation of micro-trenching deployment techniques
- The cost to deploy fibre in a grass verge
- The cost of households taking a DIY approach to deployment (self-build/community build)

These new inputs could all have an impact on the overall cost, and are discussed below.

### Duct re-use

In the 2008 cost model, BSG recognised that assumptions on duct re-use had a major impact on the projected cost of deployment. However, without any available data it was determined that the most sensible approach would be to set out a base case, with higher and lower re-use sensitivities modelled. These re-use levels were verified by industry as being reasonable and appropriate bounds for the modelling, and are set out in the table below.

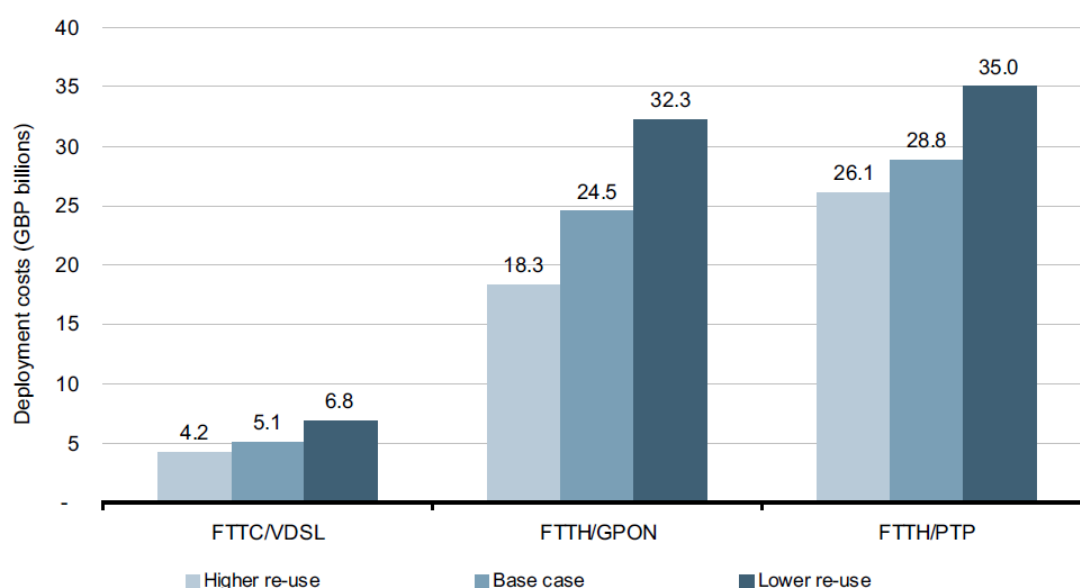
**Table 1: Duct re-use assumptions**

<i>Re-use</i>	<i>Exchange to street cabinet</i>	<i>Exchange to street cabinet for P2P</i>	<i>Street cabinet to DP</i>	<i>Street cabinet to DP for P2P</i>	<i>DP to end-user premise</i>	<i>DP to end-user premise for P2P</i>
Low	50%	40%	25%	20%	15%	15%
Mid-range (base case)	80%	70%	50%	40%	30%	30%
High	95%	80%	70%	50%	60%	60%

*Source: Analysys Mason for BSG*

As demonstrated in the chart below, the lower and higher re-use assumptions provided a range for FTTC costs of £4.2bn – £6.8bn. For FTTH-GPON, the range was £18.3bn – £32.3bn; for FTTH-P2P the range was £26.1bn – £35bn, reflecting the fact that more duct space is required for this technology.

**Figure 10: National deployment costs for duct re-use scenarios**



Source: Analysys Mason for BSG

The duct access surveys conducted by Analysys Mason for Ofcom in 2009 and 2010 now provide a useful data point with which to re-assess the duct reuse assumptions used in the model. Following consideration of the results, Analysys Mason re-ran the model with the revised re-use assumptions set out in Table 2 below.

**Table 2: Duct re-use assumptions based on Ofcom duct surveys**

Re-use	Exchange to street cabinet	Street cabinet to DP	DP to end-user premise
Base case	80%	50%	30%
Duct survey results	64%	70%	29%

Source: Analysys Mason for BSG

Under these re-use assumptions, the projected costs for FTTC would actually increase, to around £6bn, while the cost of FTTH-GPON and FTTH-P2P would come down to £21bn and £26bn respectively. This is clearly significant and we therefore considered whether the base case should be revised on the back of this new data. We decided this would not be appropriate for two reasons. Firstly, while interesting, these outcomes actually fall well within the range of projected costs set out in the original 2008 report. Secondly, it should be stressed that the duct survey sample size was extremely small, representing just 0.02% of Openreach's duct network. In effect this is too small to be statistically significant making it impossible to predict that these costs would be replicated more widely across the network. At best, until more data emerges about duct space, we may take these results as being indicative that our initial assumptions provide a correct range.

#### The cost of fibre installation in an existing duct

In the initial model the cost to install fibre in a duct was estimated to be £8 per metre, based on industry best estimates. In the call for evidence, we received one input that suggested that fibre install costs could fall in a range between £10 and £4, potentially providing a blended average of £6 per metre and another that it could be £4 per metre.

Given the significance of fibre install costs, using a £4 per metre input cost would have a considerable impact on the overall projected costs, producing a saving of perhaps as much as £3bn for a national FTTH-GPON deployment. However, these lower install cost numbers were either based on deployments in other national markets (where conditions could be significantly different to the UK) or on relatively small network deployments. Moreover we received a number of other submissions that supported the validity of the original costs in the 2008 report. As a result we do not believe it would be appropriate to change the base case assumptions at this stage. However, it is clear that lower install costs would have a significant impact on projected total costs and we will therefore keep this issue under review. As more actual cost data emerges it should be possible to more accurately model this input.

#### The costs and application of the microtrenching deployment technique

Micro-trenching is a technique that was not modelled in the original study, but has been utilised by H2O in its early FTTH deployments in Bournemouth. Costs are around £40 per metre, which would be significantly cheaper than other deployment techniques in roads (originally modelled at £100 per metre) and footpaths (modelled at £60 per metre).

However, there are doubts about how widely micro-trenching technology could be used. It can only be utilised on certain terrain types, and cannot be used on paving stones. There have also been concerns raised by local authorities about the visual amenity impact on roads and pavements. It is therefore difficult to predict at this time what impact this approach could have. Modelling 50% of road and footpath deployments as micro-trenching could save upwards of £1bn for a national FTTH-GPON rollout, but it is unclear whether 50% is a realistic figure given the concerns set out above. We also note that BT has no plans to utilise this technique in its deployment of next generation broadband at this stage.

#### The cost to deploy fibre in a grass verge

The original cost estimate for grass verge deployment was £40 per metre. There is some consensus across the industry that this figure could be reduced down to £30 per metre. The impact of this would be to take about £0.7bn off the cost of the base case for GPON-FTTH. The costs saving for FTTC would be much less as there is less verge fibre deployment in the case of FTTC.

#### The cost of households taking a DIY approach to deployment

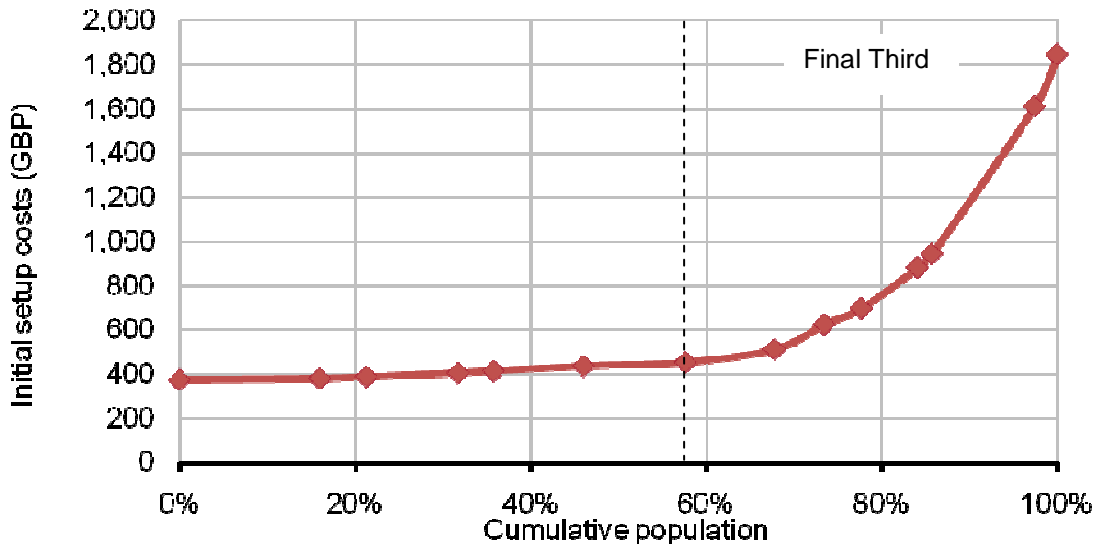
There are a number of small community fibre projects in the UK where local communities have taken a DIY approach to fibre deployment. Unfortunately there is little published information about actual costs of these deployments; however, the BSG did receive one submission that suggested a cost from the distribution point to the premise of £3 per meter.

If a self provision/ community provision approach was taken in all rural areas (those in (b) areas in the original 2008 report) then this could lead to a total saving of £1bn (FTTH-GPON). However, that would assume that 800,000 premises took a self build/ community build approach (i.e. digging their own trenches). While it is clearly possible that some communities will take a self build approach it is difficult to assume at this stage that this will be a wide scale phenomenon. It is therefore again too soon to build such an assumption into the overall model. However, if more verifiable evidence does emerge either about actual costs of community deployments (and we look to INCA in this regard) or the likely extent of community/ self build initiatives then these can be built into the model.

### Final Third

It is worth noting that, even taking account of the cost variations highlighted above it is likely that the 'per connection' cost curve will continue to exhibit the same shape. In other words it will tend to be relatively flat across urban areas then climb more steeply in rural areas. This essentially reflects the fundamental significance of geography in deployment costs. We therefore believe that the shape of the cost curve will remain as shown in the graph below, even though the line itself could be higher or lower.

**Figure 11: Cost per home connected, FTTC**



### Conclusion

The new evidence that has come to light is neither sufficiently robust nor statistically significant to enable the BSG to revise the base case it set out in the original fibre costs report. New data points were either unverifiable or reflected deployments in other markets, which face very different conditions and are therefore difficult to extrapolate into a UK model. Furthermore, all revisions suggested by this data fall within the lower and higher bounds that the first report established, suggesting that where revisions could be made these would not fundamentally alter the estimations of the costs, although they would suggest that the costs are likely to be towards the lower end of the range.

The best source of new evidence, however, will be deployments by the market. As information begins to emerge from these it should be possible to develop a better understanding of the costs of deployment in the UK. BSG therefore intends to continue to collect new evidence on a quarterly basis, and will re-run the model when significant, verifiable new evidence emerges.

- 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?**

It will be extremely difficult to achieve an industry consensus on a precise technical definition of a next generation broadband service. Not only do different technologies

have different characteristics, but the capabilities of those technologies will change over time.

It is worth noting that attempts to define first generation broadband 10 years ago led to service definitions based on download speeds between 256 and 512Kbps - somewhat below what most would consider an acceptable first generation broadband service today. Moreover, the most transformative aspect of those early services for consumers was that they were 'always on' and didn't require the user to repeatedly dial-up to get access, yet this was something that was missed in much of the early discussion about broadband definitions. Previous experience therefore suggests that precise technical service definitions probably have limited value in informing broadband policy.

Rather than focus on a precise technical definition, a more useful approach may be to consider the characteristics that are important for improved service delivery for consumers (i.e. a service level beyond the capability of existing first generation ADSL services). For example, in *Value Framework* BSG set out the following regarding the characteristics of next generation broadband:

“The incremental benefits of next generation broadband over current generation broadband services ultimately flow from the enhanced user experience and services it can support. These in turn depend on the attributes of next generation broadband:

- Much greater consistency of bandwidth across users and over time
- Higher download and particularly upload speeds
- Greater reliability of service (i.e. a reduction in faults)
- Other improvements in quality of service including lower latency (lags in responding), lower error rates (which can disrupt streamed video) and freedom from radiofrequency interference (which raises the quality of video applications).”

The various fixed and wireless technologies will all perform differently against these criteria. However, they also have very different cost profiles and it is highly unlikely that one single technology will be deployed universally, with or without public subsidy, in any but the smallest high density economies such as Hong Kong or Singapore. In deciding which technology to deploy commercial investors and public procurement bodies will therefore have to make a trade off between the costs and the capabilities of the technologies. In order to make the right procurement choices it is probably more important at this stage to have a clear understanding of current costs and capabilities of the various technologies than to set some minimal threshold definition.

#### **4. Do respondents have views on how the next generation fund will be used and in particular the focus on fixed line solutions?**

BSG agrees with the government's view that the majority of homes in the UK will have access to next generation broadband through fibre-based access networks. The level of funding available suggests that fibre-based next generation broadband could be delivered in some form to most homes, although it is not yet clear whether this would be justified for every home, and it could be that other lower-cost fixed line, wireless and satellite technologies are the most efficient and effective options for many homes. Within the fixed line options, however, there are a range of different

technologies, including VDSL, GPON and point-to-point fibre; each has different costs and capabilities. Even with a focus on fixed-line solutions, government would need to consider the trade-offs involved between these different fibre-based technology options.

Furthermore, should government move from its 90% target to one that subsidises every home where intervention can be justified there is likely to be a role for wireless (both terrestrial and satellite). Ultimately, government will need to address value for money based on the costs, capabilities and reach of all technology options. At this stage further evidence is required regarding the costs and capabilities of wireless technologies to better understand what this role could be.

**5. What minimum criteria should we be looking at, bearing in mind the need for value for money, equity and flexibility?**

The primary objective for this programme should be maximising coverage as far as can be justified, given the limited funds available. All other requirements should flow from this.

**6. What applications and services would not be able to run over a network that has the criteria outlined as a minimum?**

As discussed in response to question 3, there currently are few services available designed specifically for next generation broadband speeds in the UK given that the market is still deploying the infrastructure and superfast services have only been available to consumers for a short time. A recent white paper, produced by BSG and Value Partners,<sup>13</sup> demonstrated that content and services providers are likely to develop services for superfast broadband once the infrastructure is in place and consumers are able to utilise them. It is therefore not possible to answer this question at this time, just as it is difficult to set a well-informed minimum set of criteria for a next generation broadband service.

**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 government in creating competition in the procurement process?**

It is difficult to conclusively state at this time whether a national or regional approach to procurement would be the most effective and appropriate approach. At a high level, there are costs and benefits to either approach.

A national approach benefits from the reduced cost of only undertaking one procurement exercise and ensures that a coherent national solution is delivered. A regional approach, however, has the benefit of utilising local solutions that may allow for greater innovation in delivery, and would enable lessons learned from earlier procurements to feed in to the processes for later procurements.

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<sup>13</sup> Value Partners and BSG, 'Broadband Infrastructure: The Service and Application Providers' View', March 2010

It will be important that government consults widely with industry in order to understand their views about how they would need or want any procurement to be structured. Intellect's Concept Viability service is a useful tool available to policymakers for this purpose, and has already been used to assist with the delivery of the Universal Service Commitment.

However, along side these considerations there are a number of unknowns that government should develop a clearer picture of if it is to develop the most effective procurement approach. These reflect issues that should influence government's thinking on whether a national, regional, or even local approach to procurement should be developed.

#### The sustainability of independent local access networks

In the UK market today, there are a number of sub-national network operators who have begun to deploy fibre-based networks: local developers such as Redstone, Quintain, and IFNL; innovative new entrants such as H2O; publicly-funded networks such as Digital Region and Cornwall; and community-based projects such as Alston Fibremoor.

These networks are at different stages of development and commercial maturity. However, the challenge of ensuring a competitive service environment on these networks is common to all, and is an issue that industry is still working to resolve through the BSG-facilitated COTS Project. Providing consumers with a choice of service providers has created the most competitive broadband market in Europe; ensuring this choice is therefore available regardless of who operates the underlying infrastructure is important for consumer interests. However, this is also important for the commercial sustainability of local networks as it enables operators to maximise take-up and wholesale revenues, while ensuring the largest addressable market for service providers.

What is clear is that if the development of these networks proves unsustainable, there is a real risk of technology islands and, at worst, stranded network assets that are of little value to the industry and cause significant consumer harm. However, should these networks prove sustainable and become part of the UK communications market they would bring the potential for more innovation in network deployment methods and techniques.

Utilising this potential innovation should play an important role in the government's approach to ensuring value for money, and ultimately for delivering next generation broadband solutions to as many homes as possible. At this stage, however, there is uncertainty regarding the outcome for these initiatives. Government should continue to monitor developments in this space in order to inform its thinking on this issue.

#### The likelihood of leveraging additional local support

In the UK we have already seen a desire on the part of many local authorities and regional development agencies to bring next generation broadband to their areas. Examples such as Digital Region in South Yorkshire, the project in Cornwall, and the Manchester North Corridor trial are just three examples of public organisations considering next generation broadband in the UK.

These organisations have already demonstrated a willingness to invest in next generation broadband, and others are undertaking analysis and determining whether this type of investment would be right for their area.

In order to ensure the best value for money for government, there may be a role of sub-national public organisations. There is an opportunity for central government to leverage the support of local organisations, in terms of funding, administration, and local political support. A national procurement could risk losing this support or could help to coordinate it, while a regional procurement may be able to capture it or could risk creating uncoordinated solutions. However, a further risk for government could be consistency of outcome through this approach. For example, some areas may benefit from a superior solution or suffer from a sub-optimal solution due to the involvement of a regional body.

Government should develop a clear view on the role for sub-national public organisations in this process.

#### The costs and capabilities of wireless technologies, including spectrum requirements and scale considerations

The role for wireless technologies needs to be better understood. While we expect that the majority of next generation broadband services supported by the fund will be delivered by fibre-based fixed line solutions, in some areas wireless and satellite services could provide a more affordable alternative or better value for money than fibre based solutions.

The viability of wireless technologies, however, may be impacted by the scale of the solution required. For example, satellite services would benefit from the scale of being a national solution for the hardest to reach homes. Other wireless technologies may have different requirements of scale. The capabilities of wireless solutions are also dependent upon the spectrum available: this will be contingent on the release of further spectrum by Ofcom.

Considering the role that wireless could be expected to play, government should seek to understand this issue further as it develops its views on whether a national or sub-national approach to procurement would be most appropriate.

### **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?**

At this stage it is difficult to respond to this question, as we do not yet know what the geographic coverage of market-led next generation broadband will look like. As discussed above, according to the cost model market deployment should create divides within exchange areas, such that for exchanges not in major cities those homes closest to the exchange will see deployment, while those furthest away would not. This would hold for all but the smallest exchanges, with less than 1,000 lines. However, actual deployment is likely to be quite different, with BT, Virgin and regional players planning to upgrade entire coverage areas.

Without understanding what the market-led areas look like geographically, it will be difficult to establish the optimum procurement approach. Government should look to learn from commercial deployments, to understand what areas will remain un-served and then to assess how best to procure against these.

### **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?**

The consideration of an outside-in versus inside-out approach is based on a view that the fund would address the issue geotype by geotype, in the same way that BSG's cost model was developed.

However, it is difficult to envisage how this would be operated as a procurement. Government would need to devise the geotypes to be assessed. BSG's fibre cost model proposed one way to view geotypes, based on exchange size and line lengths, but other methods could be equally valid.

A further challenge is that in each region, and even locality, a range of geotypes would exist. It would require multiple procurements to address each of the particular geotypes, which would result in multiple procurements within the same region, or multiple national procurements. This would likely result in a very expensive, and complicated, procurement that in practice would be difficult and time-consuming to operate, and may not reflect a commercially sustainable outcome for industry.

However, it has been argued that it would make most sense to intervene first in areas that the market is least likely to reach, often referred to as an 'outside-in' approach. This implicitly means investing in the most costly areas, which could limit the extent of the coverage. Whether this is possible will depend upon the granularity of the intervention approach i.e. whether it is developed at a national, regional, or local level, and the trigger mechanism it adopts. What is important, though, is that whatever approach is adopted, it should be designed in a technology-neutral way that makes commercial sense to the industry. Government should ensure that it consults with industry as it designs its approach to the procurement.

**10. Where should the next generation fund be used to intervene in the first instance, in terms of either locations, or market deployment, in order to minimise the risk of distorting the market, and not chill planned investment?**

In the view of the BSG, the question that government needs to consider at this time is how to determine at what point the intervention should begin. The location of the first intervention is less important than ensuring that the intervention begins at the most appropriate point in time.

As discussed above, committing to intervene in a market at the beginning of an investment cycle will always carry the risk that commercial investment will be chilled, as organisations wait to see what the government will fund. The timing of the commitment means that there is a risk of this whether the intervention occurs alongside industry investment, or occurs after the market-led investment has completed.

However, it is in the interest of government and taxpayers to ensure that this risk is mitigated as far as possible. Ultimately, government should be seeking to gain the maximum coverage of next generation broadband as its funds will allow. Money saved through ensuring that private investment goes as far as possible will mean that more funds are available to address the more expensive and commercially challenging areas, particularly those in the final 10%.

In order to provide certainty to the market to try to mitigate the risk of chilling investment, BSG proposes that government consider establishing a trigger, which when met would stimulate the launch of the intervention. This trigger could be based

on the coverage of market-led network deployment or a level of take-up by consumers; this could be considered regionally or nationally, depending on the procurement approach adopted. However the trigger is devised, it should reflect the rationale for government's intervention and need to demonstrate and deliver public value.

Should a trigger be developed, we would consider it unlikely that it would be met before 2012.<sup>14</sup> This is not to say that it shouldn't be met before this point, or that there is no possibility that the market would achieve the trigger levels in this time. However, based on current planned market-led deployment, evidence from other markets of the growth of take-up of next generation broadband services, and the time it is likely to take government to design the procurement we consider 2012 to be the earliest point at which any intervention would begin.

This would provide significant opportunity, however, for government to refine its approach. During this period it will be delivering the USC, which faces many similar challenges to the next generation fund: government should utilise the USC as a trial run for the procurements to come, and ensure that as much learning as possible occurs through the process. It will also provide opportunities for government to learn from the experience of governments in other markets who are attempting to deliver similar policy objectives. In a procurement that is likely to be as complex as this, there may be significant benefits to being a second-mover. It may better for the UK in the long term to get this right, rather than to act immediately.

Some may argue that it is worth government spending more, and investing where otherwise the market may have, in order to ensure maximum coverage sooner. This is a legitimate view, and largely depends on your view of the benefits that next generation broadband will deliver. In the view of the BSG, a delay of a year or two in launching the intervention is unlikely to create a significant dis-benefit on an investment that pays back over thirty years. However, there would be benefits in utilising the funds saved through the delay to ensure that government can provide next generation broadband to as many homes as can be justified, including those within the final 10%.

#### **11. What do you see as the risks to competition from providing public support for NGA roll-out and how can these be mitigated?**

As discussed above, there is current uncertainty regarding whether independent local access networks have a sustainable role to play in the UK's next generation broadband market. Should government determine to adopt a local or regional approach, they should ensure that they are satisfied that this uncertainty has been sufficiently resolved in order to enable consumers access to a choice of service providers on these networks, and that the risk of stranded assets is mitigated.

BSG's work on the COTS Project, which seeks to address these issues, is ongoing; a successful resolution would go a long way to mitigating this risk, and ensuring open access is a reality on all independent local access networks.<sup>15</sup>

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<sup>14</sup> Indeed, the government's own risk analysis on NGA modelled government intervention taking place no earlier than 2012. p38, "An assessment and practical guidance on next generation access (NGA) risk in the UK", HM Government, March 2010.

<sup>15</sup> BSG notes that the Business, Innovation and Skills Select Committee has highlighted the role that these local initiatives could play, and the importance of COTS in enabling these networks to be

**12. At what stage in the deployment cycle, such as time or penetration, should the next generation fund cease intervention and why?**

At some point, next generation broadband services may be considered sufficiently essential that they may become part of a revised USO. At this point, intervention would need to take a different course, with consideration given as to how best to fund the USO. In this case the fund, if still active, should cease. However, there is no way to accurately know when this scenario would come to pass.

A further consideration on this issue for government, however, is whether the fund is purely to subsidise capex, or whether it may also support ongoing opex.

BSG expects that subsidising opex for fixed networks would be unnecessary, given that the majority of the cost profile is in the upfront deployment costs. However, where any solution uses wireless technologies, either in part or wholly, the cost profile would change considerably. Wireless technologies are less capex intensive than fixed networks, but have higher operating costs that would need to be considered. This may necessitate some form of ongoing support for any wireless networks supported by the next generation fund, with consideration needing to be given as to how such an ongoing commitment could be funded. In order to inform their views on this, government needs to develop a better understanding of the costs and capabilities of wireless technologies.

**13. Which areas of the UK should receive intervention from the fund, and why?**

BSG considers that this project should deliver next generation broadband to all areas of the UK that are not served by commercial deployments, and that can be justified on a cost-benefit basis.

**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.**

Claw back schemes would be most important if government intervention occurred concurrent to market-led deployment, as this would be a further tool to mitigate unnecessary public expenditure. It may also be important regardless of the timing, in order to mitigate the impact of chilled investment caused by the intervention.

However, government must be careful with introducing such an approach into this programme. The nature of investments in next generation broadband means that the

return takes a number of years to materialise, with increasing levels of revenue generation compensating for heavy investment in earlier years.<sup>16</sup>

Any claw back scheme should reflect this and the commercial risk that an operator would incur as a result of the network investment, regardless of the level of subsidy provided by government. Government should only intend to support the capex investment in a next generation broadband network; the commercial sustainability will likely be down to the operator's business model (with the caveat for wireless networks as discussed in question 12).

The procurement has to be developed in a way that allows industry to operate a commercially viable service once the network has been deployed; any overly-punitive claw back scheme could mean that operators bid for higher levels of funding upfront to insure against the risk, or ultimately may mean that the procurement does not provide the opportunity for a sufficient return to investors to make it attractive enough for operators to bid for.

#### **16. Are there any other options government should consider to minimise deadweight?**

In order to minimise the deadweight impact of this procurement, government should consider the various points set out above in order to ensure that policy is developed based on the best available evidence; this should lead to the most efficient and effective procurement approach being developed within the constraints on the programme:

- Gather further information regarding commercial deployments and investment cases
- Understand the costs and capabilities of all technology options
- Consider the costs and benefits of regional versus national procurements
- Develop a trigger mechanism to launch the intervention

Furthermore, it may be that changing the funding mechanism would impact on the deadweight loss. Specifically, the government should assess the impact of a new tax versus utilising general taxation, and against other funding options such as infrastructure bonds or use of the licence fee.

Finally, government should continue to focus on addressing barriers to deployment of market-led next generation broadband that could further increase the coverage of private investment. Enabling the market to increase planned coverage would provide the best value for money solution for government, and would minimise the deadweight loss of the planned intervention.

#### **17. Do respondents feel that government is right in insisting all networks built with the use of the Fund should be open access?**

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<sup>16</sup> KPN, the Dutch incumbent, has stated that its FTTC investment would take 4-5 years to pay back, while its FTTH investment would pay back over 8 years. P24, "Update on KPN's fibre rollout", KPN, 15 December 2009. Available at <http://www.kpn.com/web/file?uuid=5cbf20b4-7a7e-4c04-ba1c-e558388f2e1e&owner=f8d4923e-0e96-4bbc-ba57-b2dba1d52e3b>

- 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?**

As any network deployed with the assistance of the next generation fund would be financed in part by public funds, BSG considers that they would need to be open access in order to ensure compliance with State Aid regulations.

How these networks will meet this open access requirement, however, is up to the network operator. ALA is an industry standard, and so BSG would expect that any active products developed by a network are compliant with that standard, but this is for the operator to decide. Government should seek clarity from those submitting bids as to how they would ensure that their networks would be open access (and, more importantly, how they will enable a multiple service provider environment on the network), but has no need to stipulate particular active (or passive) product standards. Furthermore, any bids should be assessed on the likely effectiveness of the approach to delivering open access. If there are issues with these standards, these should be dealt with in other places, such as Ofcom, OTA and NICC.

**About the Broadband Stakeholder Group (BSG)**

The BSG is the UK government's advisory group on broadband. It provides a neutral forum for organisations across the converging broadband value-chain to discuss and resolve key policy, regulatory and commercial issues, with the ultimate aim of helping to create a strong and competitive UK knowledge economy. Further information about the BSG can be found at: <http://www.broadbanduk.org/>