

Digital Communications Infrastructure Strategy

This is a personal submission by Philip Virgo, based on participating in debate on UK communications strategy since the studies which led to the end of the Post Office monopoly after the 1979 Election. It does not necessarily reflect the collective views of the organisations with which I am associated.

Introduction and General Points

1) The DCMS “vision” has shrunk over the past four years.

On Thursday 15 July 2010¹ the Secretary of State, Jeremy Hunt, said he agreed with the CEO of Google, Eric Schmidt *“that it is now vital that businesses and government build their strategies around the internet”*. The Secretary of State reminded his audience that *“in his very first speech as Chancellor, George Osborne spoke about the urgent need to address Britain’s creaking broadband network”* and that *“in his very first speech as Prime Minister, David Cameron spoke about laying the cables of superfast broadband within the next five years as a central Government commitment.”*

Jeremy Hunt went on to say *“All of us realise that our broadband network is as fundamental to Britain’s success in the digital era as the railway network was in the industrial age. All of us share the ambition that, **by the end of this Parliament, this country should have the best superfast broadband in Europe and be up there with the very best in the world.**”* In his blog entry that day² he also talked of using infrastructure sharing to help cut the cost and the drive to put more government services on-line to help pull through the demand.

“... the best broadband network in Europe by 2015 and ... fairer access across the country” was one of the original the six key reform priorities in the Department’s 2010 Business Plan³. In the consultation document issued on 6 August 2014 this ambition had shrunk to ***“the UK should have a communications infrastructure that is comparable with other leading nations.”*** We also have “digital by default” services that cannot be used by over 20% of the population because of slow and unreliable connections.

Comparable is not good enough, unless leading nations means best in the world, not just in Europe. 2 Mbs is not good enough unless is “at least 2Mbs at the normal daily peak” – roughly equivalent to an average of 10 Mbs.

But the rest of the world has moved on. Within a Jeremy Hunt’s comments Korea was already ahead of where the UK is today. We have to bring our communications networks into the internet age, not just extend the life of that which is obsolete. We will destroy our economic recovery and cripple aspirations for a return to global competitiveness if we attempt to do so by delaying investment in both fibre and high speed mobile on the scale necessary to meet current, let alone future demand.

We should use the opportunity of apparent cross part agreement on the importance of broadband, (see the Launch of the Labour Digital Manifesto⁴), to bring action to stimulate investment forward to *before* the 2015 election purdah and not to waste another year.

2) Meanwhile the rest of the world has moved on.

We need to move from reliance on “a handful of semi-incompatible, pre-internet, national networks, to a world class, high resilience, secure and ubiquitous, any-to-any mesh”⁵. We need a communications infrastructure that is fit for purpose as a critical utility, on which lives and businesses depend. It should be no more subject to outages or traffic rationing at times of peak load than the power supply.

¹ <https://www.gov.uk/government/speeches/broadband-industry-event>

² <http://dcmsblog.uk/2010/07/call-to-tech-industry-to-join-broadband-consultation/>

³ http://old.culture.gov.uk/news/news_stories/7547.aspx

⁴ <http://www.labourdigital.org/number-one-in-digital>

⁵ <http://www.computerweekly.com/blogs/when-it-meets-politics/2014/08/how-does-the-uk-move-from-a-ha.html>

That entails funding hot standby routings and local digital exchanges (akin to cut down versions of the new regional peering centres) when primary routings or centrally co-ordinated services are overloaded or fail. We also need to make it worthwhile (whether motivated by fear or greed) for operators and investors to address the many choke points in on-line supply chains that have: “*more bottlenecks than a brewery*” rather than exploit their current monopoly and rationing opportunities.

Above all, we need to expedite an incremental transition from “best efforts IPV4 services, with no performance guarantees” towards a “mesh” of IPV6 networks with the services levels necessary for a society which is critically dependent on them.

That implies far greater changes to target setting, performance measurement, regulation and investment than envisaged in this consultation. It entails allowing market forces to handle changes that central regulation and planning cannot. It need not entail additional public sector funding but it will entail using what is available to draw in funding from business and consumers who want better service and from long term investors who want political and regulatory certainty.

3) We need accurate and meaningful information on current capacity and performance

We need to candidly assess the current state of the UK communications infrastructure. For example we have major players complaining about lack of take-up in parallel with users complaining that services go down during peak periods because of overload and contention. There is also said to be a serious and growing shortage of backhaul facilities to handle the traffic generated by the growing number of local fibre to the premises projects. This was said to have caused one local network provider to have turned down 70% of recent proposals. Meanwhile there are said to be many unused and under-used networks, such as those acquired by BT with the transfer of the MoD networks for £1. These included high capacity, high resilience fibre to disused airfields and army bases now being developed as business parks and housing estates without pre-installed broadband.

The Government's targets must include the provision of universal access that is fit for purpose for business as well as consumers, including inner cities, commercial centres and business parks as well as rural. This may well entail underpinning services to those who might otherwise be excluded from purely commercial operations with the targeted use of public procurement to ensure the universal delivery of on-line public services that are fit for use by those most dependent on them.

The targets for performance should not be based speeds, latency, contention etc. or semi-fictional comparisons with other nations using meaningless terms (such as “superfast broadband”) but on the capability of local (as well as regional and national) services to handle expected workloads – e.g. daily evening peaks, weekly peaks (e.g. Saturday mornings many in rural areas) and annual peaks (e.g. taxpayers filing on-line towards year end).

“Fitness for purpose” needs to be defined and linked to the many factors that affect the actual experience of business and consumer users with on-line services, including those of government. We should not under-estimate the cost to public finances and the economy of creating an information underclass, including small and medium sized firms as well as individuals of all social classes, not just in rural areas, unable to download government forms and advice, let alone use inter-active services.

The strategy needs to better reflect the way the Internet and the communications networks over which it runs currently works in practice and are evolving. The strategy needs to better consider the capability to handle peak loads (as with gas or electricity). That will entail major change to Government and regulatory planning and practice as well as the marketing strategies of major broadband players – that may well require looking at how business network operators handle the problem of getting those who want premium services to meet the cost of providing them.

There is a need for an independent agency (perhaps the National Physical Laboratory) to develop and maintain benchmarks representative of customer and business workloads (for use in measuring delivered performance) and comprehensive maps of service cover at postcode level, (beginning with those where public sector funding is sought to under-write provision). Both should be linked to those needed to help ensure that the critical national infrastructure is adequately secure and resilient.

4) The Universal Service Commitment should be based on “guaranteeing” access that is “fit for purpose” to the target audiences for all “Digital by Default” services.

Delivered Performance should be measured using benchmarks that relate to common usage and applications. Thus performance against the Universal Service “Commitment” should be measured by the ability to use the full range of Government’s Digital by Default on-line services for individuals and business. If a service cannot be used by at least 98% of the target audience then the either access is not fit for purpose or the services should not be digital by default.

5) Action on Planning practice

Confusion over what is good local planning practice is a major inhibitor to the sharing of infrastructure investment, whether new or old. It adds significantly to cost and delay. *We need to greatly improve the availability of guidance on good current practice rather than press for further legislative or regulatory change, let alone central government co-ordination. This should include building on past work done by the Royal Town Planning Institute and the Institute of Economic Development, including wide regard to Cod Powers and the Social Value Act.*⁶

This, plus guidance on what is good practice in combining public sector infrastructures, wayleaves and budgets (including use of the Social Value Act for all procurements over £101,000) with those of private sector players wishing to upgrade their existing network or build new ones, may be the most important single factor in helping bring forward investment in world class local infrastructure, almost regardless of the actions of central government – provided the latter does not get in the way.

6) The need for Government to support and mandate open Inter-operability

We need open inter-operability to international standards to avoid lock in to obsolete or temporary solutions. But many types and levels of inter-operability need to be covered. Major business users require seamless global roaming across networks (as with the Internet world) while different levels of service (reliability and availability as well as speed) have different cost implications for the providers.

Major players are running down support for UK standards activities as overseas technology suppliers tend to participate in international standards activities via their home markets. Government therefore needs to review how it ensures that UK-based research and development communities, business customers and innovative SMEs (including network operators) can have affordable access to the necessary information, advice and guidance as well as participate in standards.

Given the large number of relevant standards and the rate of change there is a need for an independent agency, perhaps the National Physical Laboratory, to map these, record which equipment and/or services support which and make the relevant information available in usable form, including to small suppliers and networks and to business customers. Given that such a service is likely to be a unique global resource and could give significant competitive advantage to UK business, the access charges should be linked to the proportion of global revenues paid in UK taxes.

7) The need to provide political and regulatory certainty

Political and Regulatory risk are the main inhibitor to investment in new infrastructure and innovative methods of services provision. Government is loath to intervene with “new” money but there is plenty of funding available from private sector investors seeking long term utility investments, from major customers (both public and private sector) seeking better service and value for their communications spend and from property owners seeking better rents and valuations. *Government needs to remove the obstacles to the new funding models being used elsewhere, including across the European Union. It also needs to provide continuity and consistency of policy across departmental boundaries.*

8) The main role of Government is to be an intelligent pro-active customer and robust anti-trust regulator

⁶ <http://www.legislation.gov.uk/ukpga/2012/3/enacted>

The Victorians rejected Prince Albert's plans to centrally plan the railways but used Admiralty and Post Office contracts to achieve more, faster, at less public cost, by underpinning investment in the services that market forces alone would not provide. Brunel would never have been able to raise the funds to extend his high speed, broad gauge line into Devon and Cornwall without the Admiralty contracts for carrying dispatches from Falmouth to Plymouth to Portsmouth and Whitehall. *MoD's current need to move its communications to IPV6 in order to remain in the mainstream of NATO's command and control and supply chain networks should similarly be used to help pull through the necessary investment in upgrading facilities that can be similarly shared with the civilian world.*

Similarly, without the landmark judgement of the United States versus the Terminal Railroad Association of St Louis⁷ the nascent North American road haulage industry would have been strangled at birth. The Internet has been described as a tangle of cartels masquerading as anarchy. BT is by no means the only dominant player whose behaviour requires robust regulation. *We need robust action against market abuse at all stages of the on-line supply chain, including those who have local or regional monopolies.*

The track record of UK Government in predicting winners is poor, except when supporting R&D to meet its own needs (e.g. the development of Radar). *The work and writings of Thomas Love Peacock⁸ (who organised the East India Company steamship and telegraph services without which the Indian Mutiny would have succeeded, but is far better known for satirising late Georgian and early Victorian debate over economic and social progress) and Anthony Trollope⁹ (whose Post Office surveys, producing evidence for the mail contracts that help underpin otherwise uneconomic railways as well as informing novels that similarly gave an alternative look at contemporary issues) illustrate the need to combine vision and caution when looking at the role of Government. It should confine itself to trying to become a well-informed, intelligent and pro-active lead customer and to preventing market abuse, not attempting to predict and plan the future, basing decisions on submissions from the "experts" of the day.*

Answers to the Questions asked

Q1 Views are sought on:

a) The appropriate role for Government?

The Internet and the local, regional and global communications networks over which it runs are undergoing fundamental changes as the world transitions into an age of ubiquitous IPV6-enabled connectivity. The pace, nature and direction of those changes are, as yet, unpredictable. The driving forces, including those leading to a re-assertion of user control linked to decentralisation and those reinforcing the current domination by a small number of national and global players, are more balanced than at first appears. The aspirations of government and regulators around the world to predict or dictate the process of change add to the uncertainty.

The probability is that the Internet will escape the clutches of US IPR lawyers and revert to its founding principles, as a network of networks, with debates over net neutrality replaced by negotiations over routines for paying for the inter-connection of services which have paid premium prices for priority, resilience and/or availability: akin to those which take place in the International Telecommunications Union. I would also venture to predict that the IETF and the ITU will have merged by 2030, albeit probably not by 2025. This could go some way towards simplifying the sometimes heated standards debates of recent years.

The UK focus on extending late 20th century network architectures means we are no longer a global leader. We need to turn that situation to advantage, leapfrog our competitors and facilitate market-led investment in IPV6 enabled 21st century fibre to the premises and high speed, ubiquitous radio networks, using the latest international inter-operability standards so that what we build today is better able to inter-work with whatever the future brings.

⁷ <https://supreme.justia.com/cases/federal/us/224/383/case.html>

⁸ http://en.wikipedia.org/wiki/Thomas_Love_Peacock

⁹ http://en.wikipedia.org/wiki/Anthony_Trollope

The prime role of government is therefore to act as an intelligent and pro-active customer, helping underpin those infrastructure investments which help meet its own needs and using the Social Value Act¹⁰ to pull through additional benefits with regard to social inclusion, skills and training.

The needs of Government include:

- i) The need of MOD for networks that comply with current and expected NATO standards including along procurement and support supply chains.
- ii) Digital by default services to the entire population and to all businesses.
- iii) Enabling central and local government operations to take 30% and more out of their cost bases by merging overhead operations and transitioning to networks that can be shared with their public service delivery partners (including local small firms and the third sector) as well as with each other.

That means focussing on inter-operability standards and procurement advice, bearing in mind that the need for compulsion usually means that the proposal is sub-optimal.

b) What other high level principles might the Government adopt?

It should stop trying to predict the future and instead improve its ability to respond to the present and to the unforeseen, when it happens.

It should require its regulators to take robust action against dominant players, whether international (acting in co-operation with others), national, regional or even local, who abuse their positions.

It should actively seek to map the current state of our communications networks, requiring all who wish to bid for government funding or public contracts to provide information to those responsible for monitoring the state of the critical national infrastructure. It should actively explore ways of making such information available to those seeking to share costs who will make similar information available in return. (see 3) above).

c) What resources do you consider the Government should aim to deploy to effectively manage its role?

It needs to fund and support UK expertise in the relevant areas of international standards, including measuring the performance of complex systems. This might be included in the role of the National Physical Laboratory when the extended contract with SERCO comes to an end (see 6) above)..

Section 1 – Existing and planned communications infrastructure and the current infrastructure market

Q2 What potential opportunities are there for Government to leverage its combined buying power to support policy objectives?

The mandatory central pooling of procurement via Treasury or Cabinet Office, using outside consultants has yet to demonstrate anything more than delay, cost and waste, except with regard to ending duplication of effort among smaller Whitehall Departments. This is largely because of the common 30% overhead cost, on both sides, of bidding and procurement for large contracts.

Some departmental procurements (such as N3 for the Health Service), Local authorities and public sector “co-operatives” (such as the surviving REIPs, JANET and some of the National Educational Networks) appear to be able to procure complex networks to common standards at considerably lower cost (including subsequent operations and changes over time) and to share these with local science parks and other community users. Others, such as Airwave and NIRTS, have not.

The savings made when local authorities make available the infrastructures for their local traffic control networks, in return for fibre upgrades, low cost mobile connectivity for front- line service staff,

¹⁰ <http://www.legislation.gov.uk/ukpga/2012/3/enacted>

shopping centre wifi and other community benefits also show what could be achieved by local initiatives organised by those with public sector procurement experience, including with the state aid rules (as applied in other EU states as well as in the UK) and the Social Value Act¹¹.

Government should therefore focus on publicising existing good practice and improving guidance on the use of, for example, the PSN and G-Cloud frameworks so that these can address the problems that the use of such guidance reveals.

Q3 If migration to IPV6 is required, are there any barriers to that migration and if so how might these be addressed?

This is a ticking time bomb. The main national networks may be able to support IPV6 (JANET has required this for years from its suppliers) but most services currently promoted and sold to business and consumers do not.

It is not just that the addresses have now run out and RIPE is having to buy back blocks of addresses which have been bought but not used. The routines for re-using addresses lie at the heart of many of the security vulnerabilities currently being abused on a growing scale. This problem will become very much worse with the transition to the Internet of Things and Smart devices, buildings, infrastructures and cities and may result in the UK becoming a backwater as the rest of the world, led by those in the Far East who originally needed the extra addresses, transition.

The main problem is that the costs are not born by those who will benefit most and they increase with each year of delay. Thus MoD faces serious costs with maintaining NATO compliance but its bidders apparently expect it to carry the full cost of enabling their services to be compliant for the contract.

IPV6 compliance should be mandated as part of all PSN procurements and for all networks in receipt of public funding.

Section 2 - What might future demand look like?

Q4 Is an ongoing disparity of provision of broadband services inevitable? If so should this be addressed and how might this be done most effectively?

The consultation document uses predictions of 40 -50% traffic growth per annum. The experience of the National Education Networks is that demand from schools is now doubling every 18 months. There is much evidence that demand across much of the UK is now capacity limited. Gigaclear, (reported to be about to float on the stock exchange), is said to be turning down 70% of opportunities to bid to install local fibre to home networks because it cannot get the local backhaul capacity at affordable cost. It is unclear whether the excess demand can be satisfied at acceptable cost, given the risk premium expected by investors in the face of regulatory business models that disallow term contracts which would enable the capital cost of connection to be treated as a leasing deal.

It is therefore likely that many communities will be served only if shared infrastructures are underpinned by contracts to provide public services, akin to the way contracts to support rural postal services were used to underpin the funding of otherwise uneconomic rail services in Victorian times.

Q5 How symmetrical will digital communications networks have to be in the future? Will this differ across user types? What implications does this have for fixed and wireless broadband provision?

Many, perhaps most businesses increasingly require symmetric services, not just those who themselves handle or distribute video material, but for marketing purposes - e.g. a country house hotel with a webcam of changing views and current weather conditions. Meanwhile social media, particularly among the younger generations, increasingly involves self-produced images and video material. Much of the latter is, however, being exchanged locally and should not need to travel up and down national networks for storage around the world. The current fixation with download speed is determined largely by the business models of those seeking to sign up customers with cheap subscriptions for broadcast or time-shifted material and services which are part or wholly advertising

¹¹ <http://www.legislation.gov.uk/ukpga/2012/3/enacted>

funded. It is unclear how long such models will last and basing policy on the assumption that current business models will survive the next decade is higher risk than the business models of players like Gigaclear, based on increased property values.

Q6 Which countries should be our benchmarks on communications infrastructure to ensure that businesses remain in the UK and continue to invest?

Benchmarking against any but those technology clusters to which leading edge innovators are moving their development and support centres condemn those who do the benchmarking to playing catch up. The pressure to play numbers games and pick figures to set “targets” and/or show the UK in a good light are understandable but the exercise is a waste of time, even if the targets were meaningful and the performance measures used were both meaningful and accurate, which they usually are not.

The only benchmarks which are relevant to determining whether businesses which have a choice of location remain in the UK and continue to invest are those used by the businesses themselves. These are commonly location specific – beginning with

- political, regulatory and fiscal certainty, followed by
- ease of handling planning, regulatory and fiscal issues, followed by
- current and planned communications (including physical) facilities and costs,
- the local skills/education/training base,
- the after-tax lifestyle for key (management, development and technical) staff and
- the availability of visa for those who cannot be recruited locally.

Q7 What metrics do you think should or will become relevant in comparing network performance in different countries?

See the answer to Question 7 above. When it comes to current and planned communications infrastructure the metric is the availability of facilities that are not only world class **but will remain so** as products, services, technologies and the demands of business and consumers evolve.

Section 3 - Scenarios of future demand

Scenario 1 Digital divide defined by skills rather than access, take-up of IPTV modest, wifi used in preference to mobile, current and planned networks capable of meeting consumer, business and SME needs.

Q8 Do you agree with this scenario or elements within it?

This scenario is already out of date

Demand among many communities (inner city, commercial centres and business parks, as well as rural is limited by both access and ease of use (“the device/service is as user friendly as a cornered rat”). Meanwhile major players complain about the poor take-up of the services they make available because users are loath to change because of past experiences when they do so. Meanwhile 16 – 24 years old spend barely half their time watching live TV as opposed to on-line downloads, compared to 80% of 55 – 64 year olds. If mobile operators did not have policies of offloading data traffic onto wifi hotspots wherever practical, their city centres services would have collapsed already.

Q9 What are your views on the technology commentary underpinning this scenario? To what extent might the infrastructure/technology discussed evolve irrespective of demand and how far will it be a direct consequence of the level of demand?

The quality of content delivery defines the experience for many users (3.18) and the vested interests of incumbent operators is delaying action to remove the many network bottlenecks (not just local access, but within regional and national backhaul and interconnection) which degrade this. The local service contract is only one element of inflexibility among many which needs to be addressed to enable users to control the level of service they receive.

Q10 Are there technologies not identified here that you think will have a major impact on the performance of existing infrastructure or the deployment of additional infrastructure in the next 10-15 years?

The technologies to change the situation are already available but not deployed because the regulatory structures are geared to protecting past investment by the incumbents, not encourage new investment that might create the need for the accelerated write-off of that which is already obsolete (even if only recently installed) in global terms.

Q11 Are there wider environmental issues not reflected in the scenario e.g. the price or availability of energy that will affect any of the scenarios and in what way?

The rapidly falling cost and rising capacity of communications hardware and the ongoing squeeze on consumer, business and public sector budgets should provide good incentives for new players to provide better service at lower cost than incumbents using obsolescent technology. But the new players will only attract investors if they can reduce the risk of incumbent retaliation by using innovative mixes of demand aggregation, installation charges and term contracts and access to the necessary backhaul and interchange facilities for global connectivity. The importance of interchange is the reason why the members of LINX¹² (the London Internet Exchange) has resisted any idea of running it as anything other than a not-for-profit mutual, ploughing all revenues into improved services. *There is a critical need to make it more attractive (whether increased revenues or fear of regulatory action) for those providing commercial backhaul and interconnection services to invest in bottleneck removal rather than reap short term rewards from rationing.*

Q12 How likely is any unforeseen disruption to this scenario and what area might it occur?

Provided neither government nor regulator creates additional political uncertainty it is probably that within a year the local independent networks (fibre and wireless) will reach the critical mass necessary for additional back haul networks and interchange facilities to become attractive to institutional infrastructure investors. At that point the incumbents (and others with national network facilities) will face the choice of upgrading their own facilities to compete for the business, treating the independents as partners, or facing competition from new national networks

Scenario 2: A slow transition towards demand for ubiquitous, seamless usage, with easier to use devices reducing the digital divide, SMEs demanding more symmetry and security and Cloud take-off limited by questions of data ownership.

Q13 Do you agree with this scenario or elements within it? Where do you agree/disagree? If you disagree what alternative scenario do you envisage?

This scenario is a fair description of the current situation save that the technology roll-out to support current demand is behind the curve across most of the country

Q14 What are your views on the technology commentary underpinning this scenario? To what extent might the infrastructure/technology discussed evolve irrespective of demand and how far will it be a direct consequence of the level of demand?

See answer to Question 9 above: The quality of content delivery defines the experience for many users (3.18) and the vested interests of incumbent operators is delaying action to remove the many network bottlenecks (not just local access, but within regional and national backhaul and interconnection) which degrade this. The local service contract is only one element of inflexibility among many which needs to be addressed to enable users to control the level of service they receive.

Q15 Are there technologies not identified here that you think will have a major impact on the performance of existing infrastructure or the deployment of additional infrastructure in the next 10-15 years?

¹² <https://www.linx.net/about/index.html>

See answer to Question 10 above: The technologies to change the situation are already available but not deployed because the regulatory structures are geared to protecting past investment by the incumbents, not encourage new investment that might create the need for the accelerated write-off of that which is already obsolete (even if only recently installed) in global terms.

Q16 Are there wider environmental issues not reflected in the scenario e.g. the price or availability of energy that will affect any of the scenarios and in what way?

See answer to question 11 above.

The rapidly falling cost and rising capacity of communications hardware and the ongoing squeeze on consumer, business and public sector budgets should provide good incentives for new players to provide better service at lower cost than incumbents using obsolescent technology. But the new players will only attract investors if they can reduce the risk of incumbent retaliation by using innovative mixes of demand aggregation, installation charges and term contracts and access to the necessary backhaul and interchange facilities for global connectivity.

The importance of interchange is the reason why the members of LINX¹³ (the London Internet Exchange) has resisted any idea of running it as anything other than a not-for-profit mutual, ploughing all revenues into improved services. *There is a critical need to make it more attractive (whether increased revenues or fear of regulatory action) for those providing commercial backhaul and interconnection services to invest in bottleneck removal rather than reap short term rewards from rationing.*

Q17 How likely is any unforeseen disruption to this scenario and what area might it occur?

The failure to agree inter-operability standards and cross-charging routines, including via "local digital exchanges" to avoid overloading national network with local traffic, gets in the way of providing the progress towards seamless roaming across services that customers already want. The difficulty of agreeing security processes between public sector networks security processes, such as those of PSN and N3, illustrates both the risk and the need for government to take a lead with regard to its own requirements before telling others what they should do.

Scenario 3: Customers take cover and connectivity for granted and is user rather than location specific, cloud will be the norm and the availability of gigabit links will lead to sharp rises in data volumes with pricing to encourage rather than discourage this.

Q18 Do you agree with this scenario or elements within it?

Most elements of this scenario are likely to be commonplace within 5 years, not 10 to 15, provided investors are given the confidence to fund the transition on an incremental basis. We are, however, likely to see the rise of local, not just national and regional Internet peering, including to avoid the need for traffic to unnecessarily cross regulatory and jurisdictional boundaries. We are also likely to see multiple gradations of quality/availability service.

Q19 What are your views on the technology commentary underpinning this scenario? To what extent might the infrastructure/technology discussed evolve irrespective of demand and how far will it be a direct consequence of the level of demand?

Much will depend on how far governments and regulators allow demand to evolve naturally without being distorted by incumbent players seeking to defend current business models against the customer mistrust of On Line Retailers, let alone Telcos and Internet Service Providers when it comes to looking after their data - only 6% having a high level trust compared to 54% having a low level, according to recent research by the Royal Statistical Society and IPSOS Mori.¹⁴

¹³ <https://www.linx.net/about/index.html>

¹⁴ http://www.statslife.org.uk/files/RSS_Data_trust_and_data_sharing_attitudes_research_note%281%29.pdf

Q20 Are there technologies not identified here that you think will have a major impact on the performance of existing infrastructure or the deployment of additional infrastructure in the next 10-15 years?

The bigger changes are likely to be in business models and industry structures or as a result of government interventions around the world, not just in the UK, rather than the result of new technologies. They include:

- The deployment of local (not just national or regional) internet exchanges reduces dependency on national networks and centralised services and leads to changes in industry structures as a whole, not just to the business models for local access services.
- The large scale use of privacy enhancing technologies in ways that destroy the advertising-funded business models of major players leads to changes in charging models and industry structure..

Q21 Are there wider environmental issues not reflected in the scenario e.g. the price or availability of energy that will affect any of the scenarios and in what way?

Removal of the fear of political and regulatory risk that is currently deterring long term investment could greatly expedite the pace of change.

Q22 How likely is any unforeseen disruption to this scenario and what area might it occur?

Failure to agree inter-operability standards and cross-charging routines, (including via “local digital exchanges” to avoid overloading national networks with local traffic), gets in the way of providing the progress towards seamless roaming across services that customers already expect and is essential for the high resilience “mesh” networks needed for when society becomes critically dependent on ubiquitous systems.

Q23 Are there factors, for example technical or unrelated to the regulatory framework, that could create bottlenecks and delay future infrastructure deployment in the UK in this timeframe, that would result in demand not being met or the UK not being seen as a leading digital nation?

Failure to reform “investor protection” regulation to facilitate long term infrastructure investment. A particular need is to make it much easier to raise early stage convertible loan finance. This is particularly valuable when revenues and therefore profits are uncertain. The biggest risk is, however, political and regulatory uncertainty including, for example the impact of business rates.

Q24 Do you expect commercial providers to deliver future infrastructure and meet demand on a purely commercial basis, or is some form of public intervention likely? If public intervention is likely how might that work with the commercial provision of infrastructure? What form might that intervention take?

The future direction of the evolution of communication services and of the Internet is uncertain. A breakup of the current dominant business models and players, under pressure from new entrants, is more than likely. The timescale will, however, depend on how the incumbents respond individually and collectively to change. Some will ride the tide of change, exploiting opportunities to work more profitably with new partners. Others will resist. Basing government and regulatory policy on their current public collective wisdom (as opposed to the strategic plans they are making in private) will almost certainly serve to ensure that the UK is behind the curve as new entrants begin to render their current business models obsolete and current incumbents invest in other business opportunities (including outside the UK).

The UK public sector accounts for approximately 50% of overall UK spend. It is believed to account for a smaller proportion of communications spend but its influence on infrastructure investment as a “commercial customer, whether intelligent or not, is considerably greater than would result from any “intervention”. It should therefore focus on ensuring its procurement frameworks mandate the use of forward looking inter-operability standards and help pull through investment in infrastructures that are fit for the socially inclusive delivery of public

services. The cost of not doing so and consequently incurring the cost of “assisted digital” support for over 20% of the target audience¹⁵ (as the relevant DEFRA minister has recently admitted will be necessary with regard to those of the Rural Payments Agency¹⁶), could more than wipe any the putative “digital by default” savings being claimed by Cabinet Office.

Local Authorities are making increasing use of the Social Value Act¹⁷ to pull through additional benefits (e.g. free access and/of wifi for community centres and skills training at all levels, including to development, maintain and use fixed and mobile networked services) when procuring communications services. Central Government should do likewise.

Q25 Which current or draft legislation might prevent or facilitate the emergence of any of the scenarios?

Most of the obstacles to investment can be addressed by identifying, publicising and replicating good practice by local authorities in handling planning applications (including ensuring the inclusion of shared infrastructure facility in both renovation and new build projects) and in procuring shared network services. The exception is the impact of business rates on new build networks not underpinned by advance service contracts.

Q26 Do you have views on which scenario (or combination of scenarios) is most likely and should influence the development of future strategy?

Government strategy should not be based on trying to predict the unpredictable. All three scenarios may happen in parallel as some players seek to defend current business models while others drive hard for change and some cities seek to move forward into the “smart” world and attract new industries and job while others resist change (for a variety of reasons).

We also face the risk of a backlash against big data, big systems and the loss of personal privacy and control that goes with them.

Section 4 Competition and regulation

Questions:

Q27 How might efficient investment in communications infrastructure be supported, for example by changes in the regulatory framework?

Robust action against predatory action by dominant players against new entrants who are undercutting or bypassing their services and business models would help bring forward investment in new networks and innovative products and services.

The robust enforcement of open inter-operability standards at all levels would similarly help.

Review the distinctions made between fixed and mobile networks which are becoming increasingly meaningless as deep fibre spreads to support local “5G” radio tails, with both supporting “white space” wifi. The current distinctions lead mainly to regulatory games for short term commercial advantage.

Review the concept of spectrum pricing. Does it achieve what was intended?

Review business rates on ducts, poles, masts and other facilities that are available for sharing. They may already be subject to legal review when they serve links with to EU partners.

¹⁵ http://www.countryside-alliance.org/ca/file/Importance_of_Investment_to_Rural_Economy_030714_Final.pdf

¹⁶ <http://www.thepoultrysite.com/poultrynews/32846/government-commits-to-online-cap-application-assistance-for-farmers>

¹⁷ <http://www.legislation.gov.uk/ukpga/2012/3/enacted>

Consult CEDR¹⁸ on the creation of cost efficient mediation and arbitration schemes for disputes on regulatory issues, including those between players, large and small, with each other and with Ofcom. Its processes are much cheaper than Judicial review but have, in practice is much the same impact but internationally and not just within the UK.

Q28 Are there any further measures necessary to incentivise the rollout of future mobile infrastructure in currently underserved areas?

There is a need to ensure that current commitments are met in practice. One obvious “carrot” is to make public sector procurements for mobile services dependent on “universal cover” and set up embedded for those using such services (e.g. community nurses and care workers), to automatically report failed connections (including GPS location) when they next obtain a signal.

One obvious stick is to open up spectrum to local operators where Mobile Operators fail to provide cover within a reasonable period, beginning with those areas where they have had 2G and 3G Spectrum for some decades but there are still not spots within 60 miles of Whitehall.

Q29 Is there a role for a revised USO or USC to ensure that minimum consumer demand requirements are met and to reduce the potential for a new digital divide? What might this look like?

Yes. It should be based on the quality of service (not just bandwidth, but contention, resilience, security and availability) needed to use digital by default public services and to support telecare monitoring, remote metering and other low bandwidth but essential services.

Performance should be measured by the use of benchmarks based on, for example, doing a tax return or benefit claim on line or looking for advice and guidance on a Government Direct website. See section 3) above.

Q30 In terms of supporting future innovation and long-term investment in infrastructure, what areas of broadcasting regulation may have served its purpose by 2025 -2030 (or indeed earlier). What future technical developments may also have longer term implications for regulation and wider public policy?

The concept of a single public service broadcaster funded by a compulsory poll tax, as opposed to voluntary subscription appears untenable in the Internet Age. A “watershed” time for protected viewing needs to be replaced by more effective age verification of those accessing material over a wide variety of media. “More effective” entails services that are easier for parents to understand and use and education for children as to why they should take care over their access and behaviour online because the technology “fixes” available and in prospect are of limited value. There is a need to look at the work done by the UK Adult Entertainment and Gaming industries done in response to demands from ATVOD and the Gambling Commission and pressures from UKCCIS before accepting claims that action is impossible – made mainly because the techniques used for effective age recognition get in the way of the pay-per-click advertising funding models used by some major players.

Q31 Are there changes to the EU Framework that the UK might seek to encourage more competition in UK markets?

The robust enforcement of existing competition law should take priority of spending effort on changes.

Harmonised spectrum strategy could bring considerable benefit, even if limited to the simultaneous launch of bands across member states.

Q32 Should Government seek changes to the European Framework which put more reliance on competition law and how might this be done?

¹⁸ http://en.wikipedia.org/wiki/Centre_for_Effective_Dispute_Resolution

We need to enforce existing competition law first.

Q33 In what ways can you see competition driving technological change in the UK in the future?

See section 7) above. We can already see a growing number of network providers entering the market to install fibre and wireless networks to connect those not well-served by current dominant players, provided they have confidence that the latter will not engage in predatory behaviour as soon as they do. This will continue provided they have a level and predictable playing field and incumbent players are incentivised to remove bottlenecks rather than milk monopoly positions (whether national, regional or local). This, plus mandatory inter-operability and the provision of IPV6 compliant network services will do more than anything else to drive technological change and help the UK begin to catch up with and, hopefully, eventually, overtake its overseas competitors.

Q34 How can the regulatory framework keep up to date with new business models and changes in technology?

It cannot and should not try, other than to address genuine problems as soon as they are identified. Predictive behaviour tends either to be wasted or to block off more opportunities than it prevents problems.

Q35 Are there any changes to legislation other than the Communications Act that would incentivise the provision of communications infrastructure?

- The reform of “investor protection” regulation to facilitate long term infrastructure investment. A particular need is to make it much easier to raise early stage convertible loan finance. This is particularly valuable when revenues and therefore profits are uncertain.
- The avoidance of new legislation and regulation that would create political and regulatory uncertainty.
- The reform of business rates so that they relate only to the actual revenues earned.

Q36 Would there be benefits to investment from a focus on broadband only services? Are there any barriers to the emergence and adoption of broadband only services, whilst still providing necessary access to emergency services?

There is a good case for asking the Advertising Standards Authority for taking a good look at current advertising which confuses viewers with adverts for cheap or free broadband and content, provided the customer also takes an expensive telephone line. It is unclear how far the packages on offer fit with regulatory undertakings and whether the latter are enforced. They certainly get in the way of rational investment decisions.

It may now be more useful to ensure that the emergency services have the GPS co-ordinates of the smart phone or tablet used to contact them

Section 5 – Facilitating and Encouraging Investment

Q37 How might copper access networks evolve over time alongside other access technologies? Is there a role for policymakers in helping manage any transition from copper to other access networks?

- Policy should be to encourage the removal and recycling of copper as soon as practical, including to discourage theft, now a significant cause of network failure.
- Pricing which allows for the extra cost of maintaining copper networks should be reduced accordingly.
- Progress with the replacement of copper networks in accordance with past regulatory undertakings should be monitored.

Q38 Views are sought on whether there are any additional actions the Government should consider to ensure:

a) That the provision of all areas of the UK's digital communications infrastructure remains competitive in order to ensure that the UK can take full advantage of growth opportunities in the Digital Age;

As above - government should focus on enabling market forces to pull through investment in "future compatible" (i.e. inter-operable and IPV6 compliant) networks and bottleneck removal without the fear of predatory action by incumbents or future policy change.

b) Aside from legislation and adapting the regulatory framework in the broad sense which other actions should the Government take to encourage investment in communications infrastructure?

Removal of the UK/EU regulatory requirements which discourage long term investment (as above)

c) That potential investment in the provision of digital communications infrastructure offers a suitable risk and reward profile to ensure that they can be financed by the private sector

Make it very much easier for landlords and tenants to co-fund infrastructure investment or take out term contracts to enable network builders to use leasing finance and thus cut the cost/risk and link reward (as in increased property values) to both.

Q39 Views are sought on:

a) The case for the UK to invest to gain 'early mover advantage';

We are still playing catch up and a long way from getting prime-mover advantage, Unless and until we do so the economic and fiscal consequences because the UK, save for financial services, will remain a sink rather than a source for on-line content and services and taxable revenues will continue to drain off-shore.

b) What areas in particular the UK should aim to see investment;

High capacity fibre to the premises, particularly business parks and commercial centres, including all those small firms in City of London and West End unable to get fibre at competitive cost.

Back haul capacity to those areas where local fibre is being provided to homes, business parks and commercial centres.

c) Are there any actions not covered elsewhere in this report that the government should consider to ensure digital communications infrastructure is in place before it is needed and such that it helps generate need.

We need geographic network mapping and sizing exercises to ensure that the target audiences can indeed access digital by default services before these are launched.

There is a need for an independent agency (perhaps the National Physical Laboratory) to maintain comprehensive maps of service cover at postcode level, beginning with those where public sector funding is sought to under-write provision. These should also be linked to those needed to help ensure that the critical national infrastructure is adequately secure and resilient.

Q40 How can we maximise the current R&D and innovation UK landscape to help take advantage of the opportunities provided by future technologies? What needs to be done by Government and its agencies, and industry to tackle any gaps?

Q41 In which future communications technologies do you consider the UK has, or could achieve, an international leadership position?

Any or all of those currently in University Research labs but only if government addresses the cost of securing and protecting patents, including against US trolls¹⁹ and focuses attention on helping those seeking to cover the cost of developing pre-production prototypes and growing the business to scale as opposed to selling out to overseas competitors.

Q42 What more might government and industry do to exploit future technologies, associated new applications and emerging business models?

Look at how healthy risk investment markets work (including in the UK in the past before over-regulation and over-taxation removed the incentive for those seeking to grow a business as opposed to selling out and have an easier life style).

Q43 What role might local bodies have in facilitating the future delivery of digital communications infrastructure?

The main driving force is likely to be local authorities taking their economic development and social inclusion responsibilities seriously and pooling their own budgets with those of local businesses large (from social housing operations, through retailers, hoteliers and manufacturers to property developers) and small (including home-workers, guesthouses, pubs etc.).

Q44 How can councils maximise the digital communications infrastructure in their local area to support their work on economic regeneration

- Pool budgets as above
- Work with their peers via the Royal Town Planning Institute and the Institute of Economic Development, CIPFA and SOCTIM to share best practice in planning and procurement guidance, including use of the Social Value Act²⁰ to get better value from suppliers.

¹⁹ http://en.wikipedia.org/wiki/Patent_troll

²⁰ <http://www.legislation.gov.uk/ukpga/2012/3/enacted>