

## Cover sheet for consultation response

### BASIC DETAILS

Consultation title: "Digital Communications Infrastructure Strategy" (Treasury and DCMS)

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Representing (self or organisation/s): Program Planning Professionals Ltd

Address (if not received by email):

### CONFIDENTIALITY

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing

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Whole response

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Organisation

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Part of the response

☐

If there is no separate annex, which parts?

### DECLARATION

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Name David Allen Rogers (Director)

Signed (if hard copy)

## **DCIS - Digital Communications Infrastructure Strategy**

This submission is made on behalf of Program Planning Professionals Ltd. Much of our client base is in the financial services sector. They are the people who are being asked to fund any strategy – and so far funding on the scale required has not been invested on the scale needed. We therefore decided to seek to better understand why this was.

### **Summary**

This is an extremely important consultation. It is also a product of its time. The UK Government's strategic options are constrained by the austerity caused by the financial crash. Massive funding, estimated in excess of £50 billion is needed to deploy a state of the art nationwide infrastructure fit for the 21<sup>st</sup> Century, including to areas uneconomic for business to be served adequately – so it should be no surprise that many are far from being adequately served.

There is no money left and public spending cuts will certainly continue into (and probably beyond) the lifetime of the next Parliament. The clearly stated Government position in the document is that the market is expected to deliver. On that basis alone, and without a truly innovative Digital Communications Infrastructure Strategy which will require radical change, the prospects are bleak. Korea achieved in 2011 what the UK is still years away from delivering, and our global competitive position is already being eroded.

There is much talk about how Governments can catalyse the market, but the evidence from IT projects suggests that project management and control, most recently with the NHS and the Emergency Services Communications Programme (“ESMP”), could be a serious problem. Increased outsourcing to the private sector of such programmes based on better understanding of the wider strategy, firm contract discipline to prevent cost and time overruns and a joined-up approach across departments could represent a realistic hope for the future – along with a wider acceptance (and understanding) that change is the new “normal” in the sector. We are in the middle of an infrastructure revolution every bit as important as the industrial and agrarian revolutions before it. The consequences of failure for the economy would be grave, and the financial services sector, where we still do much of our business, would be threatened without an infrastructure that was “fit for purpose.”

The kinds of things that will have to be addressed are explored in our response. What has been done to date has not delivered what was needed. Time is not on our side and squabbles about just what was promised by whom for the UK by the end of 2015 do not yet demonstrate the close degree of cooperation that will be needed to deliver what the nation needs. However, it is precisely in such adversity that working together we have the best chance to galvanise attitudes, marshal the resources that we do have, and deploy them to best effect. We have reached that crossroads and have to decide how much we *really* want this – now.

The Nation responsible for the invention of the World Wide Web clearly has a huge appetite for a highly advanced Digital Communications Infrastructure and it is too early just yet to set us off as an information backwater. It is time to “dig in for *“we must become the change we wish to see,”*” and times are tough. Having a strategy upon which all Parties agree would send the right signals to the market – and that of itself would be a huge step in the right direction – and we need to act fast.

## Answers to the Questions posed in the Consultation

### Q1 Views are sought on:

#### a) The appropriate role for Government?

The core problem is that the current infrastructure simply wasn't designed to do what we now try to make it do – and it is only possible to upgrade the old copper plant so far – a bit like trying to shoehorn a Porsche engine into a Reliant Robin. This approach kept costs down but meant that sooner or later a capacity crunch would come when it was no longer possible to improve performance beyond a certain speed. We have hit that buffer. Wireless was touted as a solution, but the evidence already is that even in some rural Yorkshire communities that have taken it out and gone for fibre because radio is capacity limited – and fibre is almost limitless and has a lower long term opex cost to boot. The inconvenient truth is that we now have a creaking infrastructure which has patches of fibre which cannot deliver their full potential. To pursue the roads analogy, there is no point in building a superhighway if it suddenly gets reduced to a country lane. The resulting jams cause lost productivity, frustration, and voter anger.

The appropriate role for Government is to pay particular attention to what the technologists are saying and doing, understand what drives the various schools of thought that exist, then make up its own mind on the merits of each argument, and set out a clear vision of what it would like to see and how it intends to use its own purchasing power intelligently to help deliver this vision. The markets would latch onto this very positively, especially if the vision was a cross party one.

We would suggest that the *first* part of the vision should be to promote the construction of a “deep fibre network” (meaning not deep holes but rather as far out into the Countryside as possible to prevent bottlenecks). This could have wireless “tails” at higher frequencies (which enable higher bandwidths to be transmitted). Because of the laws of physics, transmitting higher frequencies means this can only be done over shorter distances – but deep fibre makes this less of a problem – and spectrum congestion is reduced at the same time.

The *second* part of the vision should be to ensure appropriate levels of data and cyber security, to protect both citizen and state.

The *third* must be to ensure that the global interoperability that makes the Internet so attractive doesn't stop. This is a real danger as we are running out of IP addresses (the telephone numbers of the Internet age), and unless all devices can recognise all other devices the system will no longer work. We need to move to something called IPv6 that solves the problem and will enable the so-called Internet of Things to actually work.

The *fourth* would be to better pool its resources and spend them more wisely. Unless this is urgently addressed the UK will no longer be able to bid for NATO contracts, and savings that could be delivered by better public service purchasing coordination with the vision of all Government services provided to everybody online – everywhere. This would also stimulate industry.

The *fifth* and final role would be to better understand that industry always has its own “angle.” The logical conclusion of the current slow roll out of fibre is that eventually we will get to a deep fibre network, but significantly after our Global competitors. As the terms “fixed network” and “mobile network” converge, then the regulatory environment will need to reflect this. Fixed versus mobile relationships will change forever, and the debate needed is how Regulators will manage the new converged network players of 2030... or if ex-ante regulation will even be necessary to the same extent. In this context interoperability and standards will become more important, as fights over which are the optimal ones will intensify.

Without such an agreed vision of what we want to see in 2030, we simply will not get there. A cross-party settled vision would be the ideal solution, since this is a project which will take several Parliaments to deliver. In Korea the vision was set out by the President. For GSM it was set out in Europe. In the UK we ought to be capable of doing something similar.

**a) What other high level principles might the Government adopt?**

*"Can the Secretary of State assure the House that those concerns are wrong and that she is on track to meet the Government's target of 90 per cent of premises getting superfast broadband by 2015?"*  
Harriet Harman MP in a Parliamentary Question (April 2013)

*"Part of our ambition to have the best superfast broadband network in Europe by 2015, is to ensure that rural, as well as urban areas, are provided with good online access with a minimum of 2Mbps."* DCMS in response to "The Register" expanding on comments made by Maria Miller (April 2013)

Culture Secretary Jeremy Hunt - May 2010, Hunt declared that it was the Government's *"ambition to have Europe's best superfast broadband by 2015."*

Cross party debate and discussion is vital on this important issue, but in a sector where looking 30 minutes ahead is tough – looking 30 years is even tougher. We may nevertheless be able to formulate some long term principles with some degree of certainty – but the precise route by which we will arrive there is as uncertain as the packets traversing the Internet itself. The lesson for Government in this is that predicting the future is still worth attempting, but the ability to respond to the unpredictable and unforeseen is far more important.

We also need a map of just what infrastructure is where and who owns it. Without this we will not find all the bottlenecks.

Finally it remains vital to maintain a close oversight over operators with significant market power – especially as we continue to move to a world in which the so called "last mile" of the infrastructure may well be shared because for technical reasons it is difficult to share out a managed fibre service from a street cabinet. Since the Regulator will have less resources than some of its potential "customers" this might well require close Government oversight to uphold competition law principles. There is a further danger that the regulator could ignore "smaller" but perfectly valid complaints on the grounds of administrative efficiency and thereby fail to adequately defend the needs of all citizens and consumers – which would be in breach of its current statutory duties.

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

Firstly, those required to better co-ordinate purchasing decisions by Government itself, so as to help achieve the longer term policy goal for digital infrastructure. It is also essential that more time and energy is devoted to data and cyber security as well as to continually striving to improve the protection of minors online. Typically problems extend beyond any one jurisdiction, so International engagement by Government is essential. Similarly, standards and interoperability are vital, and there is a major advantage to having those favoured by the UK adopted elsewhere. This function could be outsourced – as we proposed in our response to Ofcom's 700MHz consultation recently.

Finally, the split between DCMS and BIS should be ended. We need one joined up department, and the creation of DCIS is a positive step in that direction. Whilst considering Government resources, it would also be entirely appropriate to have a dedicated Standing Committee of the House to review progress annually. This project merits – even demands – such attention, and those of us who start it may not even be around when it concludes. People will need to be reminded down the track why this work matters.

## **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?**

This obviously depends on what the agreed policy objectives for Digital Communications Infrastructure finally are – so it is difficult to answer without pre-judging the outcome. It is clear however that the Government has two very different needs from Digital Communications Infrastructure.

The first is for a highly resilient highly reliable and very secure network for use in emergencies. Such networks do not easily lend themselves to being migrated on to a commercial platform. Attempts by the Home Office under the ESMCP programme were unfortunately based on the assumption that technology would evolve and network investments be made in a certain timescale that would make possible migration on to an existing mobile operator infrastructure. However there were always serious security concerns about putting traffic through sites not designed to military grade standards, as well as the obvious problem of a single point of failure and no independent alternative. In today's uncertain world one can understand why this is a risk.

As a consequence, and despite good intentions, the inevitable outcome will be that the existing contracts with current incumbent supplier Airwave will have to be extended, and there will be costs associated with this. We could be 7-10 years away from the kind of fully functional ESMCP network that the Home Office sought originally.

Ironically it was because the Infrastructure which was previously Government owned was sold off that this problem has become so acute. However the Government owns many thousands of buildings as well as having ultimate control over Network Rail, and it would be possible to contemplate the construction of a dedicated new broadband network. The characteristics of a secure network are so fundamentally different that although it is fully understood why a plan to migrate to a commercial infrastructure was attempted it is no great surprise at this time that it will not materialise. The question comes back to Government vision and the difficulties of trying to predict the future. Had the tender specified the services that were required and left the technology solutions to industry (as in the USA) then a whole myriad of alternative solutions could have emerged.

Perhaps in today's uncertain world we might be better investing now in a dedicated infrastructure for emergency use that was physically and logically separate. What would happen in the event of another 7/7 or worse if cells were taken down by the network operator for the perfectly legitimate purpose of preventing them being used to remotely detonate a bomb? Would this not also cripple the emergency services response?

If one accepts the importance of this "hard shoulder on the motorway" argument, then one way of saving money would be to include the MoD in the creation of such a dedicated network, which would be under their ultimate command and control with a single command structure in which all emergency services were involved. The duplication of command and control centres for each of the services alone reduced the level of coordination possible in the event of a large scale national emergency, and significant savings and better security could still be delivered by less ambitious sharing. There is no reason why mobile networks could not be involved in such a plan, but it would not run over their sites nor be ultimately controlled by them.

The second kind of network may more easily be shared – and elements of it already exist though they are not "joined up." The evidence is that some departmental procurements including N3 for the Health Service, Local authorities and public sector "co-operatives" (such as the surviving REIPs, JANET and the National Educational Networks) can procure complex networks to common standards at considerably lower cost (including subsequent operations and changes over time). Closer coordination of all this knowledge and its publicising by Government so that all are aware of what is where and what they themselves might be able to "piggyback" can only help. Also where a local authority has any infrastructure assets (e.g. for local traffic control) then where it is not part of the ESMCP infrastructure then they should be given full flexibility to use this as they so wish.

The focus of Government should therefore be on the promotion of best practice and the sharing of knowledge between public sector bodies. PSN and G-Cloud guidance on use would be a good starting point for such activity.

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

The issue of IPv6 is of *paramount* importance.

Plainly put the position is that we have run out of IPv4 addresses (the so called telephone numbers of the Internet), and it might be believed by DCIS that industry will therefore be forced to sort out the problem. However they will come up with a myriad of different and apparently compatible solutions – which when plugged together actually aren't. Sadly, this is already the position in the UK. The principal network infrastructure typically supports IPV6 (including JANET) but most *services* currently promoted and sold to business and consumers don't.

Interoperability, IPv4 v IPv6 – What does this all mean?

The current legacy infrastructure (known as the "PSTN") was designed to reliably deliver voice calls Internationally over what was called a circuit switched network infrastructure,. It was also designed to be a totally robust system with reasonably predictable traffic running over it. Expensive International links where capacity was rationed, cost more, reflecting the economics of deployment, the state of available technology, and a national monopolistic market. Wherever you were, it functioned to extremely an extremely high standard.

It is often assumed that the Internet works on the same basis. It doesn't. Not only that but as a "best efforts" service it was never even designed to. As a packet switched network it also works on a totally different basis. However at this early stage in its evolution it is having to run on an infrastructure that by-and-large was not designed to deal with what we ask of it. This fact of itself causes enough problems, as at the engineering level we have to ensure equipment and services can be both backwards and forwards compatible.

IPv4, put simply is about addresses ("telephone numbers") for the Internet age. In the Orkney islands for example for many years calls over the PSTN only needed 3 digits. As the requirement to connect more devices grew, so areas got their own area codes to differentiate them in a unique way. When more numbers were needed in a given area, additional digits were added to the area codes. IPv4 is just a string of numbers that enable things to identify each other – and therefore to work. As the Internet has grown we have simply run out of these numbers... This means we must have more, and IPv6 is just a longer string of numbers.

IPv6 and Interoperability – Why this matters

The problem we have is that the International governance structure of the Internet is different to that for the PSTN. Furthermore, the PSTN never had to deal with the Internet of Things ("IoT") revolution. Suddenly your fridge can tell you when it is empty, sensors can stop your car crashing, earthquakes can be anticipated, utility services meters read remotely – even your toaster could theoretically tell you when the toast was done. BUT... every individual device needs its own address or you can't call it and/or it can't call you.

It is widely believed that simply because IPv6 equipment is already available on the market in UK that all will be fine. Wrong. Even if today one purchased a house full of IPv6 compatible devices they would not work over a BT router in your home. Why isn't it working then and why does this matter? The problem is that somewhere in the infrastructure something either isn't working, or isn't allowing things to work. There could be many reasons for this, but one then has to look at the infrastructure and seek to find out what isn't working and why. This we call an *interoperability problem*. Next we need to get everybody to agree to standardise on equipment that will work and to deploy it – or eventually the Internet will just stop working properly due to a lack of numbers!

How the Internet is governed is a matter of extreme sensitivity. Its structure and dynamism, even its success, stems in part from the fact that it was organised and managed differently, and largely separately from the PSTN. However there is real concern that the very dynamism has been so successful that the governance structure is now under strain. Where the UK can help is to play an active role in the interoperability and standardisation process, and most importantly to encourage and actively promote the use of common terminology. This should help to ensure that a smoother transition to IPv6 – one that actually works, will happen.

Without investing Government focus, and money, on this area, any potential first mover advantage could be lost – and more worryingly we could even end up investing in a network which is in place and could work a bit, but only to the mass exclusion of IoT devices, which the Government already recognises as hugely important! Unless we wish to invest in a country lane rather than a superhighway, this matter demands our urgent attention.

#### IPv6 and Security

Another factor to be considered here is security and resilience. How can any network administrator cope in a world where *every device* has the potential to talk to *every other device* as IPv6 makes possible? Though this is a concern it is believed that there are methods and procedures for addressing this concern. Security issues on tomorrow's Internet infrastructure (and today's already) cannot simply be addressed via a Firewall. However nowhere in the consultation is trust and security mentioned. Without it the economic benefits will not accrue as trust in using the technology is undermined.

The routines for re-using addresses lie at the heart of many of the security vulnerabilities, and the scale of such abuse is rising rapidly. This problem will be exacerbated the speed of evolution to move to an Internet of Things and Smart devices, buildings, infrastructures and cities accelerates, and may result in the UK becoming an "Internet island." The pressure for IPv6 came from the Far East, where it is far less of a problem than in UK – they have by-and-large, made the transition already.

The main problem is that the costs are not born by those who will benefit most and they increase with time. The MoD already faces serious costs to maintaining NATO compliance but its bidders apparently expect it to carry the full cost of enabling their services to be compliant for contracts. Meanwhile on the business side there is no immediate pressure to upgrade unless something does stop working. On the equipment side they may already believe they are IPv6 compatible.

Government needs to mandate IPv6 compliance in all infrastructure contracts where it is relevant.

## 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?

Yes, if things continue as they are.

However the social, economic - and electoral - consequences of “disconnecting the shires” could be catastrophic. This is *not* a more traditional urban/rural debate. Rural does not mean Cornwall or the Orkney Islands so much as 5km away from a copper served local exchange – so uneven pockets of “not spots” exist. There is a danger of excessive focus on predictions in a business where 30 minutes is an eternity. The need is for flexible and rapid response to problems as they emerge, for the one thing that is agreed by everybody is that the speed of growth in demand is rapid. We are unfamiliar with any study that would dispute this fundamental principle.

This in turn validates the “deep fibre” model as the most prudent strategic digital infrastructure policy goal, with the key variable being timing – *when* not *if* – you build they will come. In fact they want answers right now, and are increasingly turning to politicians to vent their anger.

Therefore the bottleneck problem is becoming more serious because there is pent up demand that is not being satisfied. In a competitive market the market would be expected to address this – but it will not when the costs to do so exceed likely revenues. Wireless based operators can take up some of the slack for some of the time... but with congested spectrum, higher long term opex costs for wireless, the need for unpopular additional masts due to range constraints, and fibre inexorably spreading, however slowly, then Government could make clear its commitment to deep fibre and send a signal to the market that this was its vision for the future – uncertainty surrounding investment decisions would thus be reduced. It is not so much a demand question as a supply one.

By way of example a Secondary school in Hampshire was one of the first State school to implement a laptop for every student (parent funded) policy. Resulting demand for bandwidth has sharply increased. Overall in the UK demand from schools alone is growing at approaching 100% per year – and even faster in the Higher education sector. However backhaul capacity remains a serious problem, and many children remain unable to upload their homework...

Given that deployment and operational costs are too high then there are two likely outcomes. Either:

- 1 The costs of network deployment and operation must fall
- 2 Revenues must rise, during a prolonged period of austerity (unlikely)

Failure to address this will see disparities getting greater. It is not sufficient to say that 90% of households will have access to a 2Mbps service when already the consultation itself notes (p 27 – 2.9) that median household requirements are in the range of 19Mbps to 35Mbps... Public sector contracts for rural areas have a role to play in addressing the disparity.

## 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?

There is a real example of a rural dog kennel business that wanted to provide capacity into every single one of its dog pens to enable owners via the Internet to remotely check up on the wellbeing of their pet. They went to BT, but they were around 4kms from the local exchange – too far for BT to serve at what it felt was an economic investment level as infrastructure locally would have had to be moved from copper based to fibre based. Two other businesses in the same village have already closed, citing the inability to access the Internet reliably and at adequate capacity levels as the key problem.

People initially believed that asymmetric capacity would be sufficient because the principal need would be for the end user to interrogate the Web and then to pull down quantities of data as they wished. Those days are already long gone. Content is increasingly locally produced but globally demanded, and the explosion of social media is underpinning this continued trend. Online gaming and



other business to business uses are all growing to the point where we are already clear that symmetric services is the way to go. Some of the traffic being generated will stay local, but overall the need to have a digital communication infrastructure capable of supporting symmetric services is a “no brainer.”

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

We should be willing to learn from all Countries. Benchmarking has been misleading until now – what is the point of looking good in a league table if the way this was done was to “sweat” 20<sup>th</sup> century infrastructure harder if competitor nations go straight for a fibre based strategy? Their initial benchmarking metrics might not have looked impressive, but in the medium term they could continue to meet demand more easily and cheaply on a new infrastructure, whilst the UK cannot!

It is very obvious that the key concerns that really matter, and where benchmarking matters most, have to do with ability to get speeds only fibre can deliver at competitive prices – everywhere – now. In turn this requires a clear and unchanging long term infrastructure strategy, with cross-party support to guarantee regulatory stability, and workforce skilled enough to deliver what is required of them. On the network side actions to reduce costs of infrastructure ownership and opex costs would help to offset the continual downward pricing pressure which makes the markets hesitant to provide funding. This will impact Treasury’s “take” in the short term, but for people to continue to invest they simply won’t bother with the UK unless it is more attractive than alternatives. It is becoming relatively less attractive over time.

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

We need a future proofed infrastructure that has low on-going opex and fully symmetric ultra high speed connectivity everywhere where today there is an old fashioned telephone, plus a few places where these have already been replaced by mobiles. The key consideration is actually that the evolution of new and innovative services over the infrastructure is possible both now and into the future. Metrics are meaningless and actively misleading if they ignore this inconvenient truth.

### **Section 3 - Scenarios of future demand**

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

Questions:

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

No, it is outdated and we were surprised to even see such a scenario. There is already a huge mountain of compelling evidence that confirms this. Massive pent-up demand for more broadband capacity exists, TV viewing is moving from terrestrial and satellite to on-line and on demand, which is one of the demand drivers. There is a generational shift too. 16 – 24 year olds spend only around 50% of their time watching live TV as opposed to on-line downloads, compared to 80% of 55 – 64 year olds. As the Internet “infants” who grew up with social media and I-player get older, a second demand driver can be identified as they seek to consume more – and know what is available to them. Meanwhile mobile networks struggle to convey the volumes of data on them now – and with every passing year the pressures on the infrastructure are accelerating. Wi-Fi offloading simply provides further evidence of this self-evident truth. All this before we ever get to any discussion of the Internet of Things...

#### **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 infrastructure has *already* not evolved in the optimal way from a long term Government perspective – since not enough fibre was deployed at the start. Why?

The markets don't lend to undertakings that cannot convince them of an adequate return on capital. To have invested earlier in expensive new fibre which offered future-proofing but over which it was not yet clear *how* undertakings could fully monetise their assets represented a greater risk. Add to this regulatory uncertainty and “regulatory-lag” (regulators accept that they can never hope to keep pace with the market), and this all added up to higher risk. It made more sense to try to piggyback someone else's infrastructure to deliver a service then to build one's own... hence the strong demand for local loop unbundling.

Undertakings have to show investors that their plans can work with revenues they believe they *can* make, not ones that as yet haven't been invented. The pressure therefore is to avoid adding cost to the business plan if a cheaper short-term solution exists – and it did. It's all about payback time.

Government actions that make it cheaper and easier to deploy future proofed infrastructure as against upgrading the old legacy copper therefore have immediate merit. People do want more and better quality services, but bottlenecks are preventing this pent up demand from exploding – with direct economic costs to the Treasury. The problem was that such a policy would have resulted in higher end user prices, which would have depressed demand. Now we have plenty of demand, but not the infrastructure capable of satisfying it.

#### **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 key infrastructure components needed already exist, and a fibre network is easier to “upscale” – copper cannot even cope with today's traffic volumes adequately. In the world of a deep fibre digital infrastructure, very high capacity local tails could well be over 5G radio – mobile backhaul itself would principally be over fibre, and in the timeframes envisioned the distinction

between fixed and mobile will be far more blurred than today. In the UK we have yet to fully deploy 4G, but in Korea a trial 5G network will be operational by the time they host the 2018 Winter Olympics. Meanwhile by 2020 when Japan hosts the Olympics themselves, they are aiming to have a deployed 5G network.

**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?**

Power is likely to become an increasingly serious issue. In China, China Mobile reportedly already need 800Mw of power to serve their customers. Without robust power supplies there would be little point in bothering to deploy anything and investment will rapidly start flooding out of the UK. Expensive power represents an obvious and immediate block on the rate of service take up as it has to be priced into the eventual service offerings to customers.

Not building a ubiquitous network also causes avoidable environmental damage, as people and businesses are forced to migrate to areas where infrastructure exists in order to conduct their business. In one rural hamlet of only 90 people we know of, two businesses have already closed – and only one is left. Depopulation, more congestion, more pressure on the road infrastructure, and bigger bills for companies who would otherwise have allowed teleworking and thereby saved on their building rental or purchase costs – evidence damage already happening.

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

5G requires large blocks of spectrum to work as envisioned for its International success – which will come. Meanwhile spectrum pricing under the guise of efficiency of spectrum use actually proves an inefficient way to proceed because it fragments the market if the UK chooses a different band to other nations (who will be deploying before us for certain).

International standardised and inter-operable digital infrastructure development (that elsewhere in this response we argue in favour of) would be hampered in such conditions. Rows over spectrum assignment already occur, and just one successful legal challenge could upset a carefully nurtured image of political and regulatory stability and send investors flying.

**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 appears cautious, but it already cannot be delivered anyway because the infrastructure is not up to the job.

**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?**

This scenario appears cautious, but it already cannot be delivered anyway because the infrastructure is not up to the job.

**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?**

See Q12 response. Existing copper legacy equipment will probably have to be written off faster than planned by BT – but there is no way the Government has the power to force this in a deregulated market.

**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?**

Yes. See response to Question 11.

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

See response to Question 12

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.

**Questions:**

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

We estimate that scenario 3 will be the reality within 5 years, and probably sooner. The faster and more successfully joined-up the Government and Regulator's actions are then the faster the markets will fund and improvements will occur. We also expect to see a growth in local Internet peering where end-to-end control of the infrastructure is easier to deliver, thereby improving service quality guarantees. Quality of Service will become a key market differentiator – people need it but it is not simple or cheap to provide. The Government's own actions could prove the catalyst for this scenario as it is the "anchor tenant."

**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?**

Nowhere in the consultation is the single biggest threat to a Digital Communications Infrastructure mentioned – cyber-attack and data loss or other abuse. Attacks – and loss of Government data – are becoming alarmingly common, and far higher priority must be given to ensuring network robustness. This is a matter on which the Security and Intelligence Committee of the House have previously commented.

Most important is the provision by successive Governments of *stability and a consistent approach* over the long term – or the risk premium prices up projects and this delays deployments.

**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 deployment of local internet exchanges. The current centralised service increases risk.

Technologies which protect or enhance privacy so as to undermine advertising-funded business models is of concern, but there is an appropriate balance which Government must seek to find – the Courts will otherwise as happened in the Phorm case.

**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 of all kinds stimulates investment...

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

Of concern would be any failure to agree inter-operability standards and cross-charging routines, especially via “local digital exchanges” (so as to avoid overloading national networks with local traffic). This could disrupt progress towards seamless roaming across services that customers demand.

**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?**

Improved investor protection from current levels of political and regulatory uncertainty to stimulate long term infrastructure investment is essential. 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. Valuation Office duct rating, and the attempts to extend this to mobile masts, is quite bizarre in this context and flies directly in the face of even current policy for the sector. Business rates too are a concern

**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?**

No. In rural areas there is no business case so it won't be built.

Yes – inevitable and necessary for social inclusion. It is becoming an election issue

Not the current form where BT get all the business. This does not stimulate alternative infrastructure in bottleneck areas. The problem was that BT won the tender fairly. Was the right form of tender issued though?

The most effective intervention is to provide stability and certainty and do everything possible to stimulate alternative infrastructure provision – as was so successful in Korea. This includes using its huge purchasing power intelligently to promote its desired long term strategy, since the public sector accounts for 50% of all spend but it is the private sector who are paying for the bulk of the required infrastructure needed.

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

1 The Valuation office plan to charge rates on masts and towers

2 The business rates charged on duct

3 Spectrum auctions not “in synch” with other EU States or unilateral uses of bands that do not match a wider EU plan and prevent us leveraging economies of scale (and for ESMCP, inter-operability too, which would hinder ongoing investigations)

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

We fear that the scenarios are overly simplistic for such a complex market with such a high level of unpredictability. There is every possibility that elements of each scenario could happen in parallel whilst other completely unconsidered factors become critically important (e.g. cyber and data security).

Based on common-sense we would recommend however that the faster growth scenario is the most likely path if Government can act as the catalyst in the ways set out earlier in the response.

## Section 4 Competition and regulation

### Questions:

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

It is commonly accepted that the regulatory environment always lags the market and its needs. Action is necessary in a variety of areas to seek to reduce that lag which is holding back investment.

1. Get Ofcom to publish on their website a guide for rural communities on how to set up a community interest Company and manage the deployment of their own local fibre networks – including limited code powers to facilitate connection to the nearest existing exchanges.
2. “Help 1000 fibres bloom” Abolish rates on ducts poles, duct and masts. (They may already be illegal when undersea cable links to EU partners are considered...). Treasury will benefit more taxing the services generated over a Digital Communications Infrastructure rather than making it harder for the shoots to grow when at their most vulnerable. Engage Treasury and explain why.
3. Licence unused and unwanted 2 and 3G spectrum to rural Communities that want radio networks but still have no coverage provided by the commercial sector, and let them interconnect at wholesale rates to use the revenues from their calls and Internet use to fund their infrastructure. Amend current mobile licences to promote the duty of ensuring efficient use of the spectrum.
4. Review the out-of-date distinction and licensing regime split between fixed and mobile networks which is increasingly irrelevant and leads to pointless clashes as both seek regulatory advantage when the reality is that all will become converged infrastructures over time as deep fibre spreads slowly out and high capacity 5G radio tails to access it begin to be deployed. Regulatory “lag” is a brake on the market.
5. Review the concept of spectrum pricing – has it been a blessing or a curse? Does it really do what it was intended to do or does it have a significant opportunity cost by fragmenting bands across the EU-28 and thereby prevent cross border interoperability (including for blue light and other activities)? Is fragmentation why there has not been “another GSM” led by Europe? Does spectrum pricing cause fragmentation and hold back innovation? To what extent has it increased consumer pricing and slowed adoption of new services by forcing prices up? Spectrum pricing promotes competition but 5G will need huge blocks of spectrum – what is the best way forwards? Is it yesterday’s answer to tomorrow’s problems or the saviour of competition in the wireless world?
6. Ensure Ofcom cannot devise a band strategy yet ignore requirements like ESMCP because of “remit issues.” Specifically set aside some spectrum for ESMCP. Some additional services can eventually be conveyed over public networks, but not having a backup logically and physically separate highly secure network could have catastrophic consequences. Give MoD the lead role for this network management and invest in it as a “Keynesian” style public works project. Save on the need for multiple network management control centres across police, fire, ambulance, and RNLI services and use existing Government assets for masts.
7. Use this as the test bed to learn how to best procure all other Government services over commercial networks.
8. Continue to monitor closely the actions of the incumbents (note the use of the plural) to prevent them crushing new competitors. Devise a cost efficient arbitration scheme to enable small players to review Ofcom decisions – only big companies in practice could afford a typical Judicial Review.

9. Enforce open inter-operability standards, and ensure they form a part of all Government contracts with immediate effect. Get directly involved more in regional standardisation activity directly or via “neutral” organisations like our own.

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

Make available on a free licence 2G and 3G spectrum in areas where after 25 years the MNo's have failed to provide coverage in order to stimulate efficient use of spectrum and empower local communities to get connectivity. Some areas even 60 miles from London remain totally *unserved* not just underserved! See also answer to Q27.

Make public sector procurement of commercial mobile services dependent on “universal coverage,” embedded in Service Level Agreements within contracts, and set up routines for those using such services (e.g. community nurses and care workers), to report when they cannot obtain a signal. Contractually oblige the service provider to enhance coverage up to a predetermined investment level annually.

**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 needs to include:
- Ubiquity
- Quality of Service
- Ability to fully “e-interact” with Government
- Ability to access a basic suite of broadband medical transmissions from ambulances

Current measures are not adequate in this regard, and we note that there would be no need for such an obligation anyway if a ubiquitous deep fibre strategy was successful.

**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 one public service broadcaster funded by a taxation, as opposed to voluntary subscription appears untenable in the Internet Age. This is not to say that the BBC doesn't do a super job, but that it is delivered at a price that people may resent paying if they already have subscription TV. BskyB might argue that the licence fee should be replaced on this basis. The BBC will argue the opposite. The Government have ultimately to decide, as both services have their merits.

Because of the new flexibility of viewing patterns, 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. Work done by UKCCIS and ATVOD in this domain provides a sound basis for on-going work. Parents need clear and simple setup tools to protect their children, whilst children from primary age upwards need to be trained on Internet use as a core part of the National curriculum. This is all essential – for the tools available technically to protect users are never going to be perfect, nor free.

Most fundamental of all, is that by asking this question the consultation recognises that forms of “sectoral” regulation may be breaking down. We say that they are.

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

Harmonised spectrum strategy would ultimately bring more economic benefits. This need only entail simultaneous launches of bands across member states. Implicit is some loss of sovereignty over spectrum – if we ever really really had it in the first place anyway. Devices are increasingly going to be made in the Far East, so to a degree we will now be following their band plans if we wish to secure cheap terminal devices – unless our region has a comprehensive pan-European approach. On the evidence in the run-up to WRC 2015, this is simply not going to happen now, but over time it probably will. By 2019 there will be at least 1 5G network operational in Asia, and we would be wise to monitor closely what band this might be to keep deployment costs down for ourselves.

Regarding Data Protection the Digital Policy Alliance response tended to favour a regulation and consistent application, without explicitly stating this. On balance, provided application was uniform then a Regulation would make sense, provided the UK Government's perfectly valid concerns were reflected in any final EU text

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

Existing competition law in the UK works well, and in key sectors our law have for many years already based on EU law anyway and must be interpreted in accordance with it.

In general a move towards less ex-ante regulation would reduce “regulatory lag” but will be tough to deliver in the absence of competing networks for many would argue that until this happens real competitive conditions do not exist.

In order to maximise our influence in Brussels it is essential that we remain adequately resourced at UKREP and in Council meetings. Even if the UK were to leave the EU we would still have to engage on trade matters, standardisation, spectrum, and interoperability discussions, anyway, so this would make such a long term strategy even more important. We do more trade with just one EU Member State, the Republic of Ireland, than we do with all the BRIC nations combined...

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

This could just as easily be asked the other way about, and any answer would be guesswork. Real competition and less ex-ante regulation would we believe require much more alternative network infrastructure to be built first.

The key task is to provide stable conditions and to intelligently use Government purchasing power whilst tracking standards development and interoperability issues closely.

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

Fact - it can't. The aim should rather be to minimise the “lag” to keep regulation as relevant and consistent as possible. Otherwise regulation will create as many problems as it tries to fix – and it is a straight cost to business and consumers for as long as it is needed.

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

Yes. This question already covered by earlier answers.



It may be necessary to address spectrum pricing (if continued), duct and pole rating and improved data and cyber protection by specific new legislation. Stability and consistency should be the watchwords as uncertainty for investors must be avoided.

**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?**

Broadband is already the predominant service consumed and key source of revenue anyway. The problem being alluded to in the question is probably one of line power to fixed line telephones that enable 999/112 access even in the event of power cuts... but if there was ubiquitous mobile coverage and battery life of devices improved further, then this risk would be reduced. The old PSTN is slowly dying – and will continue to. No amount of Government intervention will stop this process.

There has also been huge debate over years concerning the merits of cell broadcast. It could be time to revisit this matter to improve citizen safety in times of national emergency.

## **Section 5 – Facilitating and Encouraging Investment**

### **Questions:**

**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 all copper. It helps to cause the network bottlenecks. Pricing which allows for the extra cost of maintaining copper networks should be reduced accordingly, including to discourage theft. We have tried to “push” our copper to do far more than it was ever designed to do, and it can no longer be pushed further. This is causing huge problems as it means that faster broadband speeds simply can no longer easily be attained by sweating an existing asset harder.

It is also being stolen, resulting in network outages...

**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;
- 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?
- 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

This Question has been dealt with at length in the preceding answers. One problem is the sheer volume and complexity of consultations themselves. In parallel with this consultation Ofcom has one on the IoT and The Mayor of London’s office sought comment too. This should be the subject of a wider discussion initiated by this consultation or “consultation fatigue” will reduce the number and quality of responses.

There has been significant energy expended by many undertakings and individuals to improve on the eighteen responses received in the preceding consultation, but so many consultations across so many areas (and broadband touches most of them) is not assisting Government to get the best out of those it or its agents consult.

**Q39 Views are sought on:**

- a) **The case for the UK to invest to gain ‘early mover advantage’;**
- b) **What areas in particular the UK should aim to see investment;**

Ubiquitous “deep fibre” and 5G (including revisiting spectrum strategy generally) and world leading Innovative ESMCP broadband backup network for times when the commercial network will not be there

- 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.**

A dedicated ESMCP for reasons of national security

**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?**

Tax breaks, as a way for Government to attract industry. The principal function of industry is to generate a return on capital, not to tackle the UK's R&D gaps.

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

5G – but only if we go for the deep fibre needed to support it.

Cyber and data security – the “trust” without which this whole endeavour will fail...

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

Industry will exploit future technologies and applications based on, amongst other things, availability of qualified staff, intensity of competition, and potential revenues. It can do such work almost anywhere. One effect of higher University tuition fees will be to reduce the number of expert undergraduate and post graduate students from around the world who previously would have come to the UK... Government therefore has to consider many diverse and apparently unconnected policy issues – of which this is just one example.

The key point to underline is that no exploitation will occur at all if there is not an advanced Digital Communications Infrastructure in place.

**Q43 What role might local bodies have in facilitating the future delivery of Digital Communications Infrastructure?**

This depends entirely on what local bodies. There are so many that the breadth of this question makes it almost impossible to answer satisfactorily. From Councils to charities to farmers cooperatives to parishes to churches and clubs – they are all likely to varying degrees to want the infrastructure. They are also unlikely to know what form would be best or how to go about deploying something. It needs to be made far easier for them to do so where problems are known to exist. This is not just about rural areas. In towns and cities problems can still exist because the key problem is the distance from the local exchange. Local organisations will best know what

**Q44 How can councils maximise the Digital Communications Infrastructure in their local area to support their work on economic regeneration**

One would hope that they have already been doing this, and for some years. It depends entirely on what they have, where it is, what condition it is in and if there is a demand for it in the location it happens to be.

END