## Digital Communications Infrastructure

Response to DCMS consultation.  From the Federation of Communication Services.

The Federation of Communication Services represents companies who provide professional communications solutions to professional users.  Our members deliver telecommunications via fixed line telephony networks, broadband, mobile networks and business radio.  Our members' customers range from SMEs, home-workers and micro-businesses up the very largest national and international private enterprises and public sector users.  FCS is the largest trade organisation in the professional communications arena, representing the interests of nearly 400 businesses with a combined annual turnover in excess of £44bn.

FCS is pleased to have this opportunity to respond to this timely consultation from DCMS, and looks forward to helping inform the development of this work in the coming months.

## General introduction

**Definition of terms**

The use of the expression 'digital communications infrastructure' is itself a hugely encouraging recognition that government understands the big picture.  What matters to businesses and consumers is connectivity – the ability to access and use digital comms infrastructure.  Precisely what platform might be used to deliver that connectivity is of no more than academic interest to the user.

So this is not about "superfast broadband" (a term which has itself become widely discredited).  This is about 'fit for purpose capability to access the internet with levels of speed, cost and resilience which are appropriate for my needs'.  That capability might be delivered via fixed line networks, or via wi-fi or satellite signals.

Members of FCS provide communications solutions predominantly to business users – in particular, to SME business users.  So this response focuses mostly on the needs of the business community.

**The needs of business users**

"Digital communications are an essential part of everyday life for consumers, citizens and business," begins the Introduction. It concerns us to see 'business' placed third in that list. There is a mis-match among policy-makers between calling for an SME-led, technically-literate economic revival on the one hand and facilitating the resilient connectivity of the business community on the other. Business parks and industrial areas have been cynically bypassed in the roll-out of BT Fibre To The Cabinet (FTTC) solutions, even in areas where this roll-out has carried a significant subsidy from the taxpayer.

It seems to business that the twin drivers of the policy to date have been to the detriment of the business community. The political objective has revolved around delivering sheer numbers of connected premises (ignoring the fact that in the chase for volume, homes are always going to win out over business addresses). And the commercial objective has been around enabling households to receive value-added bundled services of broadband, telephony and premium TV – a solution which accommodates both the demands for current year revenue and the technological shortcomings of delivery via the legacy copper network.

For business users, successful deployment of web-based communications solutions depends upon low contention rates, high resilience and often high upload speeds. Businesses can improve their operating efficiency, empower home-based and periphetetic staff, reduce their capex and avail themselves of scaleable state of the art software solutions only if they can rely upon their web connection to remain strong and stable throughout the working day.

Loss of the ability to record TV programmes or stream music videos might be a nuisance to consumers. But loss of telephone capability and order processing capacity is catastrophic for a call centre.

**What does business need?**

Business needs choice. Choice of products, choice of suppliers, choice of tariffs and contract structures, choice of functionality.

Business needs to be able to make the kind of informed and mature purchasing decisions about its communications infrastructure that it makes about its IT and data infrastructure, its marketing spend, its motor fleet policy or its gas and electricity contract. Some business people will be perfectly content with the levels of functionality available to members of the public, just as some business people are happy with a domestic-style electricity supply contract and a personal car-leasing plan. What matters is that they have a choice. For too many businesses at the moment, even domestic levels of broadband access are beyond their reach.

Business also needs consistency and reliability. In a normal competitive market place, business customers would expect to contract with suppliers who will meet or exceed their service delivery promises, in the knowledge that the customer can always go elsewhere. In the comms market place,

infrastructure access is largely down to a single monopoly provider -- BT Openreach. The consistent failings of Openreach, particularly in provisioning and fault-fixing for the business community, contributes to business's low regard for the comms sector and low motivation in learning more about what modern comms solutions could do to improve internal productivity.

Business also needs to be able to be world-class. DCMS describes its objectives as "an ambition of the UK having communications infrastructure that is comparable with other leading nations… we want to continue to compare favourably in the future". Can we really set our sights no higher than that?

**What is to be done?**

There is an ongoing conflict between the needs of the UK for a reliable, best in class infrastructure, the capability of BT Openreach to deliver it, invest in it and improve it, and the demands of BT plc to make a profit from it. Given that we are where we are, the best solution is to take Openreach (the utility provider) completely out of BT group (the retail/wholesale/value-add provider). Government can make an immediate impact by encouraging the creation of Openreach as a pure, stand-alone infrastructure supplier with an industry mutual ownership model and access to the same kind of funding (and constrained by the regulator with the same kind of KPIs) as other pure utility operators.

It is impossible and futile for Government to try and second-guess how the market will develop even in the lifetime of the next Parliament. Not even the industry can do that. Government's role is to ensure the conditions exist to allow the market to respond with minimum delay to whatever the future demands of business and consumer users might be. This involves a fundamental commitment to enabling multiple providers (and possibly multiple technologies) to compete in open markets, and mandating the necessary inter-operability standards as a condition of trade.

New comms infrastructure models, such as those being adopted by York, Peterborough, Liverpool and Aberdeen should be encouraged elsewhere in the country. The active participation of local government in facilitating these schemes should be encouraged, and 'connectivity' included in all future structure plans. Particular emphasis should be given to the needs of business parks and industrial areas.

We suggest Government should encourage the development of further innovations (such as the comms/power company partnership currently being developed in Ireland) on the understanding that these are commercial ventures, not state-funded interventions. The way to future-proof the nation's comms infrastructure is to ensure as many players as possible are able to take commercial decisions about entering the market, and create a truly competitive and dynamic supply-side market place.

To encourage this approach, passive ducting infrastructure should be incorporated in to all new roadway verges, housing developments, utility pipelines and business parks/commercial areas as a condition of planning. It is not necessary to fill this ducting on day one: simply to create as cost-efficiently as possible a future-proofed infrastructure which can yield rental revenue from a variety of future users as commercial drivers vary in the future.

# Answers to questions

**Q1      Appropriate role for Government**

We see twin roles for Government.

Firstly, Government must recognise the utility nature of the UK's communications infrastructure.

Britain's electricity cables, railway tracks and water pipelines are all characterised by an understanding that they are a common good, over which multiple operators may pass services of differering natures for differing customers with differing price/quality/punctuality considerations and possibly via differing routes.  This same understanding needs to be applied to the nation's digital communications infrastructure.  Not only the legacy fixed-line copper network, but the fibre-enabled infrastructure used by BT, Virgin, KCom and the 'alt-net' fibre providers and the radio-wave-enabled infrastructure used by mobile telephone and satellite networks.

To ensure the nation's ability to respond to changing technological innovations or demand-side developments, a clear line should be drawn in government approach between the products and services which are delivered and the infrastructure over which those services are carried.  The presumption should be in favour of open access, transparent wholesale pricing and common standards, written to ensure customer switching can take place without any technical or administrative barriers.  Government, through the regulator, has a primary role in ensuring these principles are enshrined in legislation at the highest level.  Operating a utility infrastructure is a long-term, long-payback business: to obtain optimal investment for UK plc, potential investors must have confidence the fundamental rules of the game are common for all players.

Separating (tier 1) infrastructure from (tier 2) wholesale/retail products means the cost of entry for new players at the tier 2 level is not restrained by the need to first invest in building a network.  This encourages innovation and technological development, which would be of particular value in the consumer-facing mobile telephony arena.

Secondly, Government should seek by all means to encourage fair and equivalent competition in the provision of communication services.  Firstly, by ensuring (via the regulator) that access to passive infrastructure is freely available and consistently priced.  Secondly, by requiring the installation of passive infrastructure ducting (whether or not this ducting actually has anything inside it on day one) as a condition of planning on all new way-leaves.  There are a number of economic models which can be devised to defray the tiny incremental on-cost of installing ducting to the installer, ranging from a pure commercial decision based on deferred future rental income or the creation of a 'passive infrastructure

futures' market.  In practice, once Government has mandated the ground rules, one would expect the market to create such mechanisms without any need for Government intervention

Beyond this, the role of Government is to maintain an environment in which the market can flourish.  And to resist any temptation to intervene on behalf of specific technologies or specific organisations.

**Q2      Government buying power**

Government has already set a powerful benchmark in its approach to public procurement, based on buying the best the market can provide, rather than creating bespoke solutions which risk swiftly becoming stranded assets.  This approach has already delivered such benefits, and stimulated businesses to create so many new solutions, that it is hard to anticipate any future Government returning to the old centralist approach.

The current Home Office ESMCP procurement represents a powerful opportunity for UK Government to create a world exemplar of communications best practice and future-proofing for the emergency services and wider public sector users.  The lessons and principles learned in this process should be fully captured to drive future public sector best practice.

**Q3  IPV6**

Migration to IPV6 is not an option:  it is a necessity in order to facilitate future developments.  Government should encourage early migration and resist special pleading.  Development costs like this are a cost of being in business.

**Q4      Disparity in broadband**

Nothing is inevitable.  At the moment there is only one infrastructure player in town for most users.  All BT customers have been paying part of their bills every month towards the ongoing costs of maintaining and improving their network.  But it is by no means clear any mechanisms exist to allow customers to determine whether this maintenance effort has been delivered in a proportionate manner.

A useful starting point would be to re-examine the Universal Service Obligation.  There is less need these days for a USO based on voice, and much more for one based on connectivity.  In most parts of the country, voice can be provided by one or other of the mobile operators.  And the 'utility versus resale' model noted in Q1 above, together with the improvements required to satisfy ESMCP connectivity requirements for the emergency services would swiftly deliver universal roaming across mobile networks.

There have been many examples of local and community initiatives to improve local connectivity by collectively funding running of fibre bearers or wireless links.  Many of these have subsequently been frustrated by BT then promising to over-build with state-funded connectivity, thus demolishing the business case to invest in third-party infrastructure.

We are already in a situation where BDUK have provided state subsidy to provide FTTC in rural areas, but where the clients' distance from the nearest cabinet means consumers paradoxically have both Next Generation Access, and poor broadband speeds.  BDUK now concede these areas, at the end of long copper runs from the nearest fibre-enabled cabinet, should be mapped white (ie- qualifying for further subsidy) in planning for roll-out to the final 10%.

As we move into the final phases of the roll-out, we are inevitably talking about hard-to-get-to areas.  So one-size-fits-all solutions will become increasingly inappropriate and increasingly cost-inefficient.  One easy way to break the deadlock and re-engage local communities would be to extend the principles of the Connection Voucher scheme trialled in BDUK's urban programme for the superconnected cities.  The first noteworthy principle is that while the scheme is administered via the local authority, it puts the subsidy into the hands of the individual user:  the one person who is best placed to determine what is best for him or her.  The second important principle is the opportunity to pool multiple users' vouchers to create a single aggregated pot.  Taken together, these have the potential to drive real, local initiatives and encourage competition between providers (and sometimes between technologies) to deliver the connectivity local people and businesses need.

This might, in some cases, result in multiple suppliers to a single geographic locality.  As far as FCS is concerned, that would be a perfect result.  Most of our current problems arise as a result of a single monopoly supplier peddling the single technical solution (FTTC) which happens to best suit that supplier's business model.  While this situation is allowed to persist, yes, disparity of broadband services will remain inevitable.

## Q5      Future symmetry of digital communications

Every digital communications platform is innately symmetrical.  With one exception.  Digital connectivity delivered over the copper network is asymmetrical due to legacy issues arising from the design of DSL.  The more we roll out fibre and radio-based communications platforms, the less issues of symmetry will come into play.  This is a most urgent requirement from the business community, for whom fast upload speeds and the stability and resilience of the connection are far more important than for consumers streaming movies.

## Q6      Which countries should be our benchmark

Britain's legacy inclination to trust the development of our communications infrastructure to a single former state-owned monopoly gives us much in common with our EU neighbours.  But it means we already trail well behind the most visionary countries like Sweden or Singapore.  But benchmarking ourselves against the past is not helpful for the future.  We should seek out countries who have a clear game-plan in mind and are engaged in empowering their citizens to receive connectivity, rather than 'broadband'.  New Zealand, Finland and the Netherlands might be useful places to start.  But our aspiration for the future of the UK should be to be better than the present of any of the above countries.

**Q7      Metrics to benchmark performance**

Given that the demands of business users are more exacting than those of consumers, the most useful metric would be the degree to which businesses are happy with their connectivity levels and aware of the benefits of hosted office applications.  Some of the work BDUK has already undertaken about the Superconnected voucher scheme would provide a useful foundation for this.  As would the Institute of Directors' January 2013 Member Broadband Survey and the rather more anecdotal Federation of Small Businesses July 2014 Digital Connectivity for Small Businesses.  The only metric that really matters is user satisfaction.

**Q8 - 22 Usefulness of scenario-playing**

The technology commentary pieces provide a useful snapshot of current conventional wisdom.  To suppose they can be regarded as anything more than that is innately flawed.  Firstly, technology has a habit of developing in previously unexpected ways.  Secondly, there is an innate underlying assumption about continuing to sweat the nation's current legacy infrastructure rather than looking at a 'best case' alternative.  This naturally circumscribes the points of reference.  Thirdly, the major driver will be the use to which businesses and consumers put the connectivity and functionality with which they are provided.  Look back 10 years and map the migration of the uses to which what we still call 'mobile phones' are put.  Look also at the counter-intuitive evidence that consumers who have dependable high speed connectivity are actually using their devices for two or three times as long as would otherwise have been the case.

Moving to an open-access fibre infrastructure would improve back-haul options for mobile network operators, underpinning a significant improvement in coverage and reliability.

On the other hand, there are still only 60 minutes in an hour.  A lot of the current growth in the market, particularly from the consumer end, is driven by novelty.  We will require even greater volume of bandwidth to handle ever more intense saturations of images and ever more complicated animations, but there is a strong argument the steepest part of the adoption curve is already behind us.  Sooner or later, demand curves stabilise.  They always do.

On the environmental question, fibre is innately more stable and requires less energy to operate the network and less maintenance than copper.  But data centres are major consumers of air-conditioning plant.  There is no technical reason for data centres to be located in close geographical proximity to their users.  There is a very strong case that they should be located near the Arctic circle, where clean, cold fresh air and low population densities provide the perfect environment.

Ultimately, this scenario-planning is a redundant function.  The role of government has to be to create the environment in which markets can fully, swiftly and cost-efficiently respond to changing realities.  Business people are the best positioned to play best-guess intellectual what-if scenarios, because ultimately they will be the ones who put their money where their hunches are.  Ensure business has

access to the tools, that the tools can not be bought only from a single monopoly provider, and that there are plenty of tools to go round. Everything beyond this can be left to the realities of the market.

## Q23    General factors, bottlenecks etc

The question of energy stability is vital. If the electrical power supply goes off for an extended period, both data and voice will cease to be available. First to consumers, but then to emergency services and utilities. This is not a function of individual device battery life, but of network resilience. There is a whole major public awareness piece to be considered here: businesses and consumers are relying upon systems which are ultimately only as stable as the long-term resilience of the energy supply infrastructure.

## Q24    Delivering future infrastructure demand

As noted above, there is a case for selective intervention by Government. The current Universal Service Obligation, which was developed for voice over the copper network, should be replaced with a new Universal Connectivity Obligation. It is not beyond the realms of possibility that competing suppliers might bid for the UCO for certain premises or blocks of premises (rather like the current model for trading carbon), in return for certain economic, planning or marketing concessions. In practice, such a scheme would be best administered at local (or even Parish) authority level.

The legacy copper network may continue to be the default in many areas for the foreseeable future. Subscribers already pay towards the cost of planned maintenance and improvement as part of the price-control regulations applying to the BT wholesale pricing. So we suggest the process of creating a connectivity-driven USO should include setting a framework of gradually escalating connectivity KPIs. Thus managing expectations and giving clarity both to the customer and to the network provider. Setting a migration pathway towards a mandatory minimum connectivity benchmark (say 20MB synchronous) over a period of XX months will enable providers to make the commercial decisions whether to upgrade, replace or over-build the existing infrastructure.

## Q25    Possible results of current or draft legislation

The current Home Office ESMCP procurement will be a game-changing use of public mobile networks to facilitate mission-critical voice and data for the emergency services. Issues about resilience, fibre back-haul and network capacity automatically fall out of this – underlining the case for the structural separation of the tier 1 mobile networks utility functionality from the tier 2 resale activities of the operators. The EU Data Reform Regulation as originally drafted risks destroying the call centre industry in the UK and in other EU member states. This will have a major impact on call volumes (and hence commercial value of infrastructure investment) in major centres like Peterborough and Glasgow and risks driving these jobs into countries with lower standards of data and employee protection.

The most important consideration should be to have a clear direction of travel and a clear set of goals for policy (a mandatory minimum 20MB synchronous Universal Connectivity Obligation by 2020, for example). Industry needs a consistent, stable and achievable set of objectives against which to plan.

This is as true for the business users of connectivity as it is for the infrastructure providers and the resellers.

**Q26     Pick the most likely scenario**

If policy planning has to refer to a scenario, then Scenario 3 is the only one that makes sense. Plan early for the extreme, and create mechanisms which will allow the market to deliver migration at the pace which makes commercial sense according to the social, economic and technological capabilities of the industry and its customer base at that time.

**Q27     Possible changes in the regulatory framework**

Both within Ofcom in the UK and BEREC across Europe, regulation is carried out on the presumption that legacy markets are still the norm. The voice over copper market is regulated separately from the voice over fibre market or the mobile communications market. This is nonsense in today's increasingly flexible and ever-converging market.

The very title of this consultation recognises that connectivity – ie what the customer actually gets – is what's important, not the platform via which that connectivity is delivered. The Data Centre Alliance has a voluntary code of international best practice which recognises different data centres may offer different levels of resilience and security. This kind of model, which maps capability to customer attitudes to risk, price and availability, is a far more promising template for the future regulation of the market place. It is not and should not be the role of the regulator to supress the mechanisms of free markets and the laws of contract. Customers must be both empowered to make appropriate buying decisions and made aware of their own responsibility in the event of that decision subsequently proving the wrong one for their business or family.

**Q28     Encouraging further mobile roll-out**

Structurally separating mobile infrastructure operation from the re-sale of minutes and applications would both lower the cost of entry for new resellers (thus encouraging innovation and increasing consumer choice) and future-proof the mobile infrastructure.

**Q29     Universal Service Obligation**

As mentioned above (see especially Q4 and Q24), the current Universal Service Obligation is redundant. Placing a mandated duty on the incumbent monopoly to deliver voice services to any address in the country in a process subject to strict price controls is anachronistic in a world of almost universal mobile voice connectivity. But there are some strong arguments for re-visiting the principle, and creating a new benchmark Universal Connectivity Obligation.

Firstly, the existing Universal Service Obligation should be passed to Telefonica UK, as an attachment to the universal coverage condition in the spectrum block they purchased in the 2012 'digital dividend'

spectrum auction.  The spirit of the USO – that affordable voice services should be available at every UK address – can be fulfilled by this simple acknowledgement of the current market place.

Looking forward there is a strong case for the creation of a new Universal Connectivity Obligation framework.  But on a very different footing.

The principles used for carbon trading could usefully be applied to the dynamics of providing connectivity.  Each property in the country would come with the connectivity equivalent of a carbon note, owned by the incumbent provider and set against the incumbent level of connectivity.  Low connectivity = costly note;  high connectivity = zero cost  note.  The price bandings are announced, and the tax is paid in a year's time on the levels of connectivity which pertain at those premises at that point.  Like carbon legislation, a glide path towards minimum universal connectivity benchmarks is set by Government, and each note becomes progressively more expensive as time goes by.  Each incumbent supplier can then see a clear commercial incentive to either upgrade existing customer services or sell the note to an alternative provider, who may be better able to offset the cost of improving that customer's connectivity against credits earned elsewhere in their network for delivering 100MB-plus connectivity.

Some mechanism must be found to set a more market-based price/incentive mechanism against the heavily-regulated legacy copper network and the comparatively unregulated fibre alternative.  The above is a high-level attempt to begin some discussion about this crucial issue.

Attaching state subsidy to this scheme via 'connection vouchers' would ensure the engagement of customers and automatically manage customer expectations.  It is especially important business subscribers should be engaged in this process, and the subsidy voucher model should be skewed to favour build-out to business addresses.

## Q30    Broadcasting

TV viewing has already crossed the Rubicon, where viewing on demand exceeds linear viewing.  The case for continuing to reserve radio spectrum for television broadcasting only stands up until universal connectivity with download speeds of above 10MB is the norm.  Government should begin planning now towards the eventual switch off of terrestrial television broadcasting and re-assignment of the spectrum.

## Q31    EU Regulatory Framework

Both within Ofcom in the UK and BEREC across Europe, regulation is carried out on the presumption that legacy markets are still the norm.  The voice over copper market is regulated separately from the voice over fibre market or the mobile communications market.  This is nonsense in today's increasingly flexible and ever-converging market.

UK Government must understand that for all its faults, Britain already has the most open, transparent and best regulated communications market in Europe;  arguably in the world.  Our engagement with

BEREC and the institutions of the EU should be on the basis of a world-class operator demonstrating what current best practice looks like, not as just one voice among 26 equals.

One specific change to the EU regulatory framework, arising from the experience of the business-to-business communications sector, would make a big difference to business users. The requirement that a small business employing fewer than 10 people should be treated as though it is an individual consumer should be repealed. Firstly, this disadvantages small business customers who might otherwise wish to negotiate long-term contracts in which prices can be guaranteed or once-off capital expenditure items (like handsets or groundworks) can be amortised as part of the monthly rental agreement or rebated against future call volumes. Secondly, it creates costs and administrative burdens for operators who have to provide compliant consumer codes of practice and access to Alternative Dispute Resolution services, even though these protections are in practice only used by individual consumers.

This provision is anomalous and does not appear elsewhere in the contractual relationships between SME customers and their suppliers from any other industry or utility.

Elsewhere, regulation should focus on delivering choice of connectivity for users and ensuring open access to networks by separating the infrastructure layer from the delivery layer on all technology platforms.

**Q33     Competition driving technological change**

What drives competition is customer need. Where sufficient customers need high speed connectivity, competition will seek to deliver a bundle of features, benefits and price points which satisfies that need. So long as access to those customers and the passive infrastructure which serves them is not artificially constrained. And so long as existing supply contracts contain suitable break clauses in the event of incumbent suppliers' failure to deliver what the customers need.

It follows that creating an environment where free and open competition can flourish will necessarily result in competition driving technological change. Change will be more dynamic if it is allowed to develop in anticipation of customer needs in a competitive market than if it is grudgingly and belatedly bestowed as a result of regulatory compulsion upon a monopoly provider.

**Q34     How can the regulatory framework keep up with changing market dynamics**

The regulatory framework has to be re-written from the ground-up on the basis of empowering competition and guaranteeing equivalence of wholesale pricing and access to infrastructure. It has to anticipate the reality that different delivery platforms will be of different value to different clients in different parts of the country and at different stages of the economic and product development cycles. Tinkering with a regulatory framework which started with the 'regulator as a proxy for competition' model necessary when British Telecommunications was first created will not deliver optimal results in an environment where voice over mobile networks exceeds voice over copper. And where data is far outpacing voice of any kind.

An immediate step in this direction would be to create a regulatory presumption in favour of 'fat pipe' network infrastructure: dark fibre available on a universal access basis to anyone who wishes to lease capacity to run services on it. Be they consumer voice and data, premium rate television packages or local authority CCTV.

**Q35 Changes to legislation to incentivise infrastructure provision**

The inclusion of ductwork runs alongside all new highways, rail, utilities and housing schemes can be made a condition of planning or way-leaves. It is not necessary that this ducting should actually have anything in it on day one. What matters is that the UK has a future-proofed ducting infrastructure which can be rapidly deployed at low cost as and when market conditions make this desirable. See Q1 for a discussion of possible market mechanisms to mitigate costs for the contractor.

**Q36 Broadband only services**

Where there are technology failures, markets have a habit of inventing solutions which match customers' preferences for risk and cost. The emphasis should always be on ensuring consumers are fully aware of the possible limits to their service, and are offered alternatives which might better suit their needs. There is a legitimate case for marketing legacy copper networks as a high resilience option. And for some customers, this might well justify a significant price premium.

**Q37 Copper networks and government transition planning**

The thrust of this paper is to promote competition at the infrastructure level. This means competition between different delivery platforms, as well as competition between different providers of the same technical solution. It is always bad practice to have all one's eggs in a single technological basket. The price mechanism is only one of a number of issues to be considered. It may not be sustainable to continue to offer copper-based connectivity with the degree of ubiquity and low level of cost that UK consumers currently enjoy. But it is perfectly possible that certain of the unique characteristics of copper-based networks might be sufficiently attractive for a different balance of price and availability to emerge in the future. Government should begin now to plan for an eventual switch-off of the copper network. Having announced that you are doing so, you may confidently expect the compelling commercial reasons why copper still has a place will rapidly be advanced. At which point, a more informed and useful discussion can begin.

**Q38 – 42 'First mover advantage'**

Several other countries have already gained significant 'first mover advantage' over the UK in terms of resilient high-bandwidth connectivity deployments. Some of them have undoubtedly been helped by the fact that their previous copper networks were so poorly resourced and maintained that ground-up fibre networks made far more economic sense than upgrading a woefully inadequate legacy system.

Looking forward, the undergirding principles must be to develop a market which offers business users and consumers a wide choice of products to reflect their informed purchasing preferences for price, reliability, latency, bandwidth and resilience.  None of these requires that any particular technology becomes the default.  Indeed, several competing technologies might deliver the optimal mix of connectivity for different customers in the same geographic area.

Concentrating on the empowering capability of connectivity puts the consumer in the driving seat.  This would be a genuine and lasting first mover advantage – making technology the servant of the entrepreneur, rather than the constraint around which he must work.

**Q43 – 44        Role of local authorities**

As noted above (see particularly Q24), local authorities have the potential both to aggregate local demands and concerns, and to disburse state aid in innovative ways to the individuals who will have to live with the results of their decisions.  In some instances, this role might be more efficiently undertaken by, or in partnership with, Local Enterprise Partnerships.

Connectivity for business users should be a major priority:  apart from their obvious role in employing local people, businesses can also move elsewhere in the event that connectivity issues become a major problem locally.  This will become an increasing risk to local sustainability in future, as companies become increasingly reliant on cloud-hosted operating solutions and workforces become more mobile.  Connectivity considerations should be a requirement in all future local structure plans.

DOCUMENT ENDS