DCMS Consultation: Digital Communications Infrastructure Strategy

Vodafone UK response

As a leading provider of digital communications in the UK, and a committed investor in UK digital infrastructure we believe it is absolutely right that the Government should be setting out a strategic approach to the country's future communications infrastructure needs and we welcome the opportunity to give our views.

Vodafone is committed to improving voice and mobile internet coverage across the UK, both indoors and outdoors. We will deliver good quality mobile voice and mobile internet coverage to 98% of the population but will also dramatically improve geographical coverage. To deliver these improvements we are investing heavily. In the UK, Vodafone is investing £1 billion this year into its fixed and mobile networks. In particular, Vodafone has a track record of investment in infrastructure for mobile access and backhaul and services for enterprise customers.

1) Key principles and policy priorities

We have set out below our response to some of the specific questions asked in the consultation paper but it is important to set out first what we believe the main ingredients of any strategy should be from a Vodafone perspective. In line with these, there are basic, key things that Government can and must do now to allow us to build the network we need to meet current needs whichwill provide us with the platform to meet future demand. It is by pursuing these policies that the Government can put in place the foundations for world-class digital infrastructure.

Technology neutrality: Maximising the potential of wireless for the UK's Digital Communications Infrastructure Strategy

- In many areas of the country, wireless networks will be significantly less costly to build than fixed-line. Depending on the provision of fixed infrastructure in any given area, wireless networks may also be significantly quicker to deploy.

- Government should adopt a technology-neutral approach to policy which does not favour a particular technology in financing or facilitating deployment. This will enable operators to select the most appropriate technology to serve particular areas and communities. The recognition that mobile has a prominent role to play should be a fundamental tenet of any strategy with no preferential treatment given to fixed-line technologies. A shift to this approach has become critical given the high-risk bet that the Government has placed so far on a sole provider, BT, for the future of the digital economy in a large proportion of the country, especially in rural areas

- Timely assignment of new spectrum in sufficient quantities will assist the roll-out of mobile broadband and assure robust and reliable services provided that the Government takes a pro-investment stance to the mobile sector. In our view, the existing approach of taking the vast proceeds from spectrum auctions while investing in fixed-line infrastructure in non-urban areas is ineffective, inefficient, distortionary, and hugely damaging to a mobile industry that has the potential to deliver on the Government's digital agenda through LTE. Ultimately this is to the detriment of consumers who could otherwise be served with a wider choice of services across a greater area of the country. This becomes even more damaging as the policy debate shifts from the historical focus of coverage targets linked to where people live to ambitions for greater geographical coverage which would mean more investment in infrastructure in areas of minimal return on invest. We demonstrate in this response the lesser market outcomes that consumers

are experiencing compared to their European counter-parts. LTE technology brings the advantages of a long-term upgrade path, meaning that investment today would have even greater potential to provide world-class communications services in the future.

The final element of maximising the benefits of wireless technology is fit-for-purpose access to backhaul from BT at the right price. Mobile operators often have no choice but to use BT's network to connect masts to their core network, especially in rural areas. If mobile operators had better access to this network at appropriate regulated rates and access to BT's dark fibre we could roll out mobile internet coverage to suburban and rural Britain more quickly. Vodafone would welcome policy direction from the Government that encourages Ofcom towards a regulatory solution to speed up delivery and reduce the cost of mobile backhaul.

We acknowledge that the introduction of passive remedies will have an impact on BT's revenues but believe that the outcome would be positive rather than negative with appropriate levels of cost recovery being maintained and it would help eliminate areas where returns for BT are excessive, better replicating the outcome of a competitive market. Over recent years BT has, in the absence of sufficient competition, been able to overcharge for PPC services, overcharge for Ethernet services and has been found in a report by Frontier Economics[1] to have recovered £4.8bn above WACC across regulated markets. Even while being charge-controlled, BT's RFS show that BT's over recovery for AISBO services continues unabated. During this time, service provisioning has been at an all-time low. To us it is clear that a new approach is needed and the option of introducing competition at passive access levels is without doubt justified.

Attracting, sustaining and leveraging private sector investment in digital communications infrastructure

- There should be proportionate and targeted regulatory and policy intervention to maximise the scope for the private sector to invest and enable efficient use of public funds. We need a stable and certain regulatory regime that will allow a return on investment in the mobile sector. While the UK is seeking to compete on a global stage, we demonstrate in this submission that return on investment in the mobile sector in the UK is very low and significantly lower than in other EU countries.. In the UK, the mobile operators' rate of return on capital is significantly below the rate needed to cover costs (estimated by Ofcom to be 9%). Pro-investment policies can help encourage better investment outcomes in digital infrastructure for the UK businesses and citizens.

- Government investment should be targeted to avoid crowding out the private sector and distorting competition and various initiatives should be co-ordinated to avoid undue duplication and wastage. In areas where investment from commercial entities is unlikely to materialise, priority should be given to passive infrastructure that is future-proof, while in some truly underserved areas, funding for electronic elements of the network may also be required. Where the Government invests, investment should be awarded through a contestable process that delivers value for money for UK tax payers and the supplier should provide wholesale open access. UK Government needs to be get better at ensuring that programmes work better with EU state aid rules to ensure that mobile wireless technology can be used more effectively in particular ensuring that the vast majority of expenditure is capital not operating costs.

[1] Passive Access in the Business Connectivity Market, Frontier Economics, June 2014

- Government should continue to be open to the potential for commercially negotiated arrangements between industry participants for co-investment in new broadband infrastructure, as is the case today for tower-sharing.

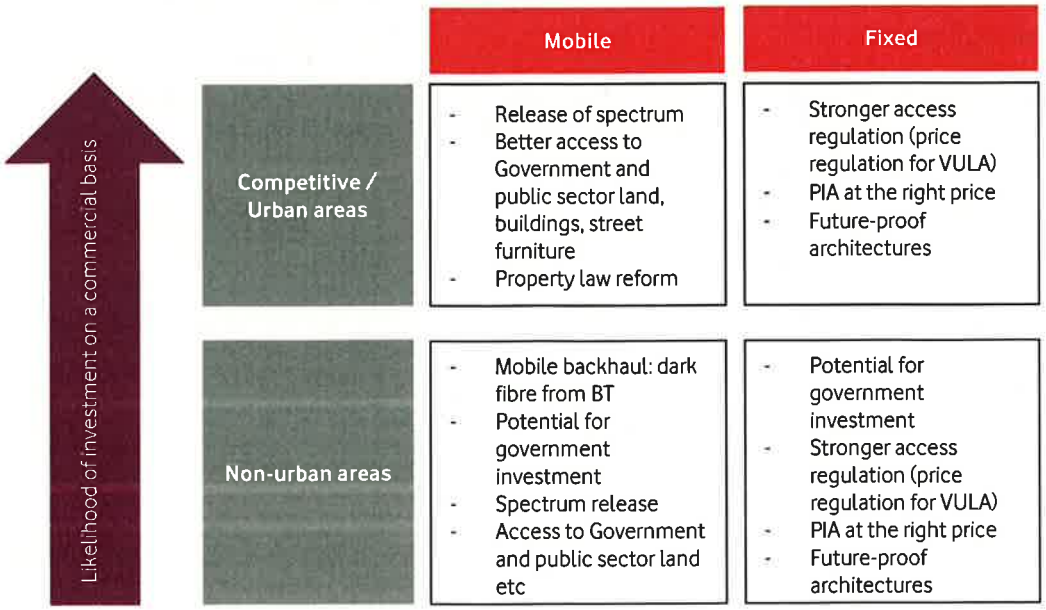
- There should be openness to the use of government infrastructure (e.g. roads, utilities and public land) where suitable for use by operators. We need better access to public land whether that be at national, devolved or local government level. Access to land at a low rent will reduce the operating cost of network rollout and improve the case for investment and there is a role for Government in facilitating a more strategic approach to this.

- Government should implement policies that decrease the costs of roll-out. The most urgent priority in this respect is property law reform. We need a clear legislative timetable for introducing a reformed Electronic Communications Code:
    - The property costs we incur are many times higher than other UK infrastructure providers. For example, the electricity industry pays on average £150 a year per pylon; we pay thousands of pounds. .
    - Any reform to the Code must ensure that we have clearer rights to immediately access sites for repairs and maintenance as well as consolidate, maintain and upgrade our infrastructure at no extra cost. Code reform must also bring down the overall cost of rent in line with other infrastructure providers
    - Code reform will help facilitate the site sharing arrangements we are proposing and ensure that this can be done with no added premium.

- Further, we need a planning system that allows us to build the infrastructure needed for that local area, including taller masts where necessary. Taller masts mean that we can deliver more coverage with less infrastructure among communities.

- We would summarise the role for private investment and public intervention as follows:

Vodafone's view of the policy responses required to secure first-class digital infrastructure for the UK



Principles for public investment in areas where investment from the private sector is unlikely to materialise:

- Public investment to be directed for areas where investment from commercial entities is unlikely to materialise.
- Public investment to be directed in priority to passive future proof infrastructure, i.e. with long term payback, while recognising that funding of active equipment may be required in some (very) remote areas. This includes for instance fibre backhaul + tower, and if fixed broadband is required on top FTTH).
- Public investment to support competition-proof architecture
- Awarded through a contestable and technology neutral process that deliver value for money
- Must deliver price reflecting subsidies and true open access and appropriate governance and structural arrangements

Striking a balance between strategic vision and investment certainty

Whether in setting out the Digital Communications Infrastructure Strategy, the Government takes an aspirational approach via the setting of long term targets (e.g. % coverage or Mbps speeds) or sets out concrete targets in phases over the short, medium and long term, the aim should be to strike a balance between setting a strategic path and providing sufficient detail around implementation to provide sufficient certainty to encourage investment.

3) Responses to specific questions:

We have not answered all of the questions in the document but have provided responses where we believe our input is most relevant.

We have not responded to the specific three scenarios as drafted in the document as we believe the general principles we have set out are applicable across a range of future scenarios and that the most effective role for Government is to provide a policy and regulatory framework within which industry can respond effectively to future demands and technological developments rather than attempting to predict those things now.

Q1 Views are sought on:
a) Is this an appropriate role for Government?
b) What other high level principles the Government might adopt?
c) What resources do you consider the Government should aim to deploy to effectively manage its role?

We agree that Government has a key role to play in setting expectations for future communications aims and in providing the right policy and regulatory environment in which industry can innovate to provide the infrastructure and services needed to deliver on those aims.

We believe that the Government needs to focus on ensuring the regulatory, policy and market conditions are supportive of the mobile and fixed industry being able to continue to invest in the network infrastructure, technology and services that will drive economic growth and positive societal change. We currently don't believe this is the case. The current focus is too often on short term consumer initiatives that can make good press releases but can ultimately result in worse coverage.

If the UK wants to have the internet infrastructure it needs, we firmly believe that Government, the public sector, local communities and the industry need to develop a new approach, where decisions that impact

network roll out and ultimately the coverage local people and businesses receive are taken strategically and not in isolation.

It is always dangerous to try to predict the future especially when it comes to technology. The Government needs to be careful that it doesn't focus on any particular technology over another or get fixated upon a particular demand forecast many years out.

There are, however, a few principles which we believe should be kept in mind when seeking to identify the digital infrastructure the UK needs over the next decade and beyond. It is an infrastructure which promotes:

- **Ubiquity of connectivity:** the benefits of an internet economy, whether to public or private sector or to the economy more generally through increased productivity, as well as the gains available by withdrawing or at least significantly reducing more costly, manual processes can only be achieved if (nearly) all citizens can access these new internet-enabled platforms; For instance, we note that all businesses must now file VAT returns online.
- **Scalability:** rather than pinning all expectations upon a particular (uncertain) demand forecast it is more important to make sure that infrastructure choices enable industry players to rapidly react to increasing demand, keeping their networks 'one step ahead' of the demand curve. It has been a mistake to focus on high bandwidth speed alone when access and reliability are more important;
- **Innovation and Competition:** the infrastructure choices must continue to enable differentiation, competition and consumer choice between providers.

While the UK today has much about its communications infrastructure of which it can be rightly proud, application of these principles means searching questions must be asked. Current planning, property costs and other rules are making it too difficult and too costly for operators to provide the ubiquitous and stable high-speed data networks consumers increasingly demand.

Digital infrastructure hasn't had the same political and policy support that more traditional infrastructure has got. Most evident has been the political support in the face of opposition the Government has given to HS2. The Government is clear that digital infrastructure is critical to the UK success but it hasn't yet found a way to properly support a policy framework that helps the building of this infrastructure. This needs to change and change quickly if the UK is going to get the digital infrastructure it needs.

Probably the biggest challenge facing Government is how to effectively ensure that BT's increasingly dominant position doesn't hold back the deployment of the connectivity the country needs. Fixed superfast broadband (outside major cities with a cable footprint) is exclusively based upon the technology and roll out choices of a single dominant player in BT. Other communications providers are unquestionably being pushed further down the 'ladder of investment' becoming more increasingly dependent upon BT product development and lifecycle than in earlier phases of development such as local loop unbundling.

We suggest that all these trends should be deeply worrying to a Government seeking a 'fit for purpose' digital infrastructure for the next 10-20 years..

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

As part of this strategy, and as mobile networks deliver near universal coverage across the UK, the Government should ensure it is supporting the market conditions that encourage private investment in mobile network infrastructure.

Government shouldn't be funding, procuring, subsidising or building alternative networks that compete directly with networks funded solely by private investment. Where there isn't already a good choice of good quality privately funded communications networks available, big infrastructure projects should include communications infrastructure with open access for those commercial networks wishing to use it. If there is already a choice of good quality privately funded communications networks available, then Government should encourage use of these networks and not build state funded competing infrastructure. Big procurement projects like smart metering or Airwave should ensure that they are using commercially available networks.

Public sector procurement in harder to serve and less economically viable areas should be required to act as a catalyst for promoting better connectivity, with the outcome being that the public sector gets the connectivity that it needs and that in so doing surrounding communities also benefit as public assets are made available on cost effective terms, on an open access basis, to serve wider demand.
The public sector is a large purchaser of connectivity and one of the objectives of public sector procurement should be around encouraging alternative infrastructure wherever possible. Attention needs to be paid to the underlying connectivity source to ensure that alternatives to Openreach infrastructure are in play and positively encouraged, regardless of the winning supplier.

To this end Government must ensure BDUK investment or any future state aid better supports mobile internet roll out and that 4G and future LTE developments can provide a real alternative. However, the Government must take action to address the problems with the current model to ensure that BDUK delivers full value for money, including identification of where coverage will improve and open access to BDUK infrastructure for mobile backhaul. As identified by the Public Accounts Committee, the current procurement model has failed to deliver meaningful competition[2].

4G could clearly play a role in future BDUK type projects but only if the Government can ensure that the state aid rules don't disqualify it due to the fact that operating costs can't be as easily covered by state aid and are way beyond any possible return on investment in revenue for a mobile network operator because of the relatively low population density and likely take up of services in the affected areas. A new approach would be needed to be developed. The operating costs would have to be drastically reduced to ensure 4G technology can be a viable solution. It is not a technological problem, it is a policy one.

The good news is the vast majority of these operating costs are controlled by Government either directly as the decision maker or indirectly through regulation. For example compulsory purchase of land for sites would remove rental costs, provision of fibre or access to dark fibre would remove backhaul costs and planning permission for taller masts would increase coverage and mean fewer structures are needed.

The same is true for any new Mobile Infrastructure Project (MIP) to fill total mobile 'not spots'. Currently the mobile operators pay the operating costs of the MIP sites which means that the vast majority when built will be loss making for the MNOs. This isn't a sustainable model capable of dealing with the challenge of providing near universal geographical coverage to areas where there is very limited return on investment even if the tax payer pays for the physical equipment (mast, radio equipment antennas etc.).

Section 2 - What might future demand look like?

[2] Public Accounts Committee, Fiftieth Report, *The Rural Broadband Programme*, March 2014

We have attached a report on domestic demand for bandwidth produced for the Broadband Stakeholder Group for context along with a demand forecast from CISCO.

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?

As is the case today, premises that are hard to serve either due to their geographic location or the sparsity of population that surrounds them give rise to both physical and economic challenges in delivering broadband services.

As technology has evolved and continues to evolve, the level of services provided to customers in these locations has improved, however the speed gap remains or has even widened as a result of faster services being rolled out in urban centres. For a minority, no improvements may have been seen for many years.

There is unlikely to be one solution to addressing this problem, and a centralised focus on one network (BT's) has not proved particularly effective at addressing the hardest to serve areas. While extending the rollout of fibre to the cabinet services to areas unlikely to be served by a commercial roll out provides benefit to the consumers it reaches, it stokes up competition concerns in the longer term (unless there are more robust remedies introduced to promote competition) and leaves those consumers that are outside either the commercial or subsidised roll out at an even greater disadvantage. The use of alternative technologies and alternative networks in a more localised way may provide the best solution, however to enable this to happen we would need to see changes in the way the backhaul solutions are regulated, including access to regulated dark fibre on the BT network to provide cost effective backhaul in harder to serve locations. The public sector is often the major purchaser of communication services as well as the owner of assets that could assist in broadband deployment and more thought needs to go into how to leverage that physical proximity and purchasing scale to act as a catalyst to help serve areas that have fallen behind. Ultimately the nature of the technology deployed will largely dictate the speed on offer, but there needs to be a focus on ensuring that public resources are identified and offered to help facilitate broadband in the hardest to serve communities.

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?

Undoubtedly consumer behaviour is changing and there is far more emphasis on pushing out content than simply receiving it. Enterprise users are well served by symmetrical service currently, however as a result these are priced significantly differently from consumer offerings. The need for consumers to upload from broadband and mobile devices has increased significantly and is regarded as mainstream. The services available today have been slow to recognise this with far more emphasis placed on the download speed. However we see no reason why the market will not respond to this evolving need for uploading by introducing products that are more suited to this change in behaviour. Increasingly we are all using the cloud to store our key data (music, photos films, contacts etc.) and this will only continue to increase. This requires good up and download speeds. It is however our belief that downloading will continue to be by far the main focus for consumers when selecting their broadband service.

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

We have outlined above our overview of the key elements of any national strategy in terms of attracting investment for mobile and fixed connectivity.

It is correct and important to understand the relative positioning and network capabilities of countries around the world.

The metrics to measure comparative positions are likely to need to be fluid. What will be important is that the UK keeps apace and that the networks developed are used and valued by UK and multinational businesses and consumers.

The majority of communications providers today are global and therefore the global markets compete for their investment resources. We know this from our own Project Spring infrastructure investment programme, which is resulting in countries with access to fixed-line passive infrastructure (such as ducts and poles) and dark fibre options being more attractive for investment.

Q7 What metrics do you think should or will become relevant in comparing network performance in different countries? What metrics should most appropriately be used as the basis to set objectives for government policy?

It is good for Government to have a list of aspirations in this area. Along with the usual measures on service features, we should include:

- Competition
- Price
- Quality of Service
- Security

We should also measure the following:

- Bandwidth
- Availability of service across the geography
- Reliability
- Penetration
- Differentiate between fixed and mobile
- Latency, jitter, packets
- Down load
- Symmetricality
- Support for multicast
- High availability

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?

The chief factors that would create bottlenecks are the policy areas we have highlighted in response to earlier questions.

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

The UK's mobile networks have been built using private sector investment. Market realities mean that in order to go further and faster than our current investment plans, which in the past have produced a relatively low return on capital employed, we will need support from Government. This could take the shape of a number of policy reforms from a streamlined planning system, reform of the Electronic Communications Code, fairer access to BT's infrastructure, to reductions in spectrum fees.

The Government could also look at an extension of the existing Mobile Infrastructure Project with the proviso that the current model, in which the MNOs make a loss, would need to be restructured as highlighted above. The crucial factor in delivering any "MIP II" would be whether or not operating costs could be driven down. The key factors involved, several of which we have highlighted above would be:

- Planning permission
- Property costs
- Providing better access to Government and other public sector land, buildings and street furniture
- Ensuring adequate backhaul broadband connectivity to sites
- Spectrum management and fees
- Ensuring energy suppliers provide timely and cost-effective power supply to sites

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

1) Network infrastructure:

As we have outlined above, there are a number of key legislative and regulatory challenges which stand in the way of the delivery of the network infrastructure needed to support any of the scenarios:

Property law reform

- We need a clear legislative timetable for introducing a reformed Electronic Communications Code:
- The property costs we incur are many times higher than other UK infrastructure providers. For example, the electricity industry pays on average £150 a year per pylon; we pay thousands of pounds.
- Any reform to the Code must ensure that we have clearer rights to immediately access sites for repairs and maintenance as well as consolidate, maintain and upgrade our infrastructure at no extra cost. Code reform must also bring down the overall cost of rent in line with other infrastructure providers

- Code reform will help facilitate the site sharing arrangements we are proposing and ensure that this can be done with no added premium.

Access to BT network for better backhaul in rural areas

- Mobile operators often have no choice but to use BT's network to connect masts to their core network, especially outside of major towns and cities.
- If mobile operators had better access to this network at appropriate regulated rates and access to BT's dark fibre we could roll out mobile internet coverage to suburban and rural Britain more quickly.
- Ofcom should introduce a regulatory solution to speed up the provision and reduce the cost of providing mobile backhaul.

Further planning reform

- We need a planning system that allows us to build the infrastructure needed for that local area, including taller masts where necessary.
- Taller masts result in more coverage and less infrastructure.

Access to land

- We need better access to public land whether that be at national, devolved or local government level
- Access to land at a low rent will reduce the operating cost of network rollout and improve the case for investment
- Government could facilitate a more strategic approach to this

2) Spectrum:

The strategy identifies a series of consumption scenarios. Which scenario comes to fruition will be a function of both supply and demand, as these are inherently intertwined. As 4G networks are currently being rolled out, we are seeing changes to consumer behaviour driven by greater coverage of data networks meaning that consumers can be more certain that they can get connectivity, and increased data allowances meaning they no longer fear using that connectivity. Supply is reinforcing demand. Vodafone is currently experiencing growth in data consump[redacted]

Sustaining supply is contingent upon availability of additional wireless spectrum, and if supply is constrained then demand will become suppressed – without a reliably performing network, consumers won't be looking for that "next great app". We would move from a positive cycle of increased supply driving demand, to a negative one of constrained supply suppressing demand.

In this context, both Government legislation and Ofcom policy has a clear role in allowing commercial providers like Vodafone to have the spectrum resources we need to both fulfil and drive customer demand.

We are supportive of the Spectrum Strategy published by Government, and will work both directly with DCMS and via the UK Spectrum Policy Forum to make this strategy a reality. Vodafone understands the

difficulty in assessing the best user of spectrum, where the outcome is a combination of quantifiable benefits such as commercial value, and less quantifiable benefits such as public well-being. We welcome DCMS's efforts to establish an analytical framework which could assist in determining the best use for spectrum, hence facilitating the Public Sector Spectrum Release (PSSR) programme. In our response to Question 27 below, we elaborate on the need for additional spectrum.

Although a key element, availability of spectrum is not, however, sufficient to ensure the ubiquitous availability of networks demanded by consumers. We cannot build masts unless it is economically feasible to do so. As we have outlined above, Government has a role to play in this context, because landlords are currently able to demand very high unsustainable rents, and the more extensive, denser networks demanded by the majority of growth scenarios will only exacerbate this issue. Legislation to put the communications industry on a similar footing to to other infrastructure providers is needed. Masts also require connectivity to core networks. Current regulation of, for example, passive communications infrastructure sharing is myopic in focussing on landline consumer broadband. A regime is needed whereby regulation of fibre access is service agnostic.

Without legislation and associated regulation which facilitates deployment of infrastructure, UK networks could become congested. This will stifle demand leading to the lower of the consultation's growth scenarios, hence harming the economy.

In addition, the current regime governing spectrum fees is unsustainable in the context of demands on industry to invest more in network infrastructure to improve population and geographical coverage. We believe fees should be significantly reduced

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

In our response to Question 25, we highlighted that Government needs to engage to allow companies such as Vodafone to provide the communications infrastructure which will drive demand.

We need reform to property law through a revised Electronic Communications Code, we need better, fairer access to BT's infrastructure and we need a planning system which supports the roll out of the network infrastructure we need in the places we need it.

Additional spectrum will also be required to support both 4G and 5G services, both for access and backhaul (where fibre is uneconomic). This will need to be across the full breadth of spectrum:

- *Sub-1GHz (UHF)*
  This spectrum is best for covering wide areas and providing in-building coverage, but it is also the most desired spectrum and there are inevitable tensions between users such as mobile and Digital Terrestrial Television (DTT). We welcome Ofcom's recent cost-benefit analysis on repurposing the 700MHz band, although with the unstoppable impetus to use this band for mobile, Vodafone considers the case could have been expressed far more easily by asking the alternative question of whether there was any reason it should *not* be repurposed to mobile.

Within the timeframe of the infrastructure strategy, there are real questions as to whether the 700MHz band will be sufficient, or whether it'll be necessary to expand into the 470-694MHz band currently used by DTT. At this stage, Vodafone considers it is too early to tell and a position of maximum flexibility should be adopted. For example it could well be that viewing habits for television mean that online consumption comes more to the fore, meaning that in the 2025-2030 timeframe although some level of DTT support is needed, the current channel line-up can't be justified. Conversely the growth in mobile data consumption could level off in that timeframe.

Vodafone participated in the European Commission High Level Group (HLG) examining the UHF band. Although we support the proposition that DTT be given some security of tenure on the 470-694MHz band as a consequence of losing access to the 700MHz band, it is premature to declare that DTT usage continues at its current level until 2030, and we believe that reviewing the state of the market only at 2025 is leaving matters too late. Government has a role to play in monitoring the market and facilitating industry agreement on the best balance of DTT and mobile usage. Vodafone believes that a status of co-primary for this band as an outcome of WRC-15 would allow maximum flexibility while not jeopardising current DTT usage. However, without this we consider that a secondary allocation for mobile broadband would at least signal that the issue needs to remain on the agenda.

- *1GHz – 6GHz*

This spectrum is best for providing enhanced data rates in particular locations. The PSSR initiative will provide various tranches of such spectrum. Vodafone understands that releasing such public sector usage takes time: this provides the opportunity to determine the optimal release mechanism, and not flood the market with spectrum such that supply significantly outstrips demand hence harming the commercial value of existing assets.

Whenever spectrum is made available, Government will face competing demands that this be on an exclusively auctioned basis, licensed shared access, or licence exempt. Vodafone sees the merit in sharing spectrum (either on a licensed or exempt basis) – for example WiFi offload is an essential element to our strategy for meeting customer demand – but ultimately for commercial services to be viable, assured access to spectrum is needed. Therefore, where appropriate, for example where given spectrum bands are internationally harmonised for LTE usage, we will continue to press for the spectrum to be auctioned on an exclusive access basis.

Our principal "ask" of Government in this area is that maximum visibility is provided of forthcoming releases, in order that stakeholders can plan accordingly.

- *Higher frequencies*

Higher frequency spectrum already forms an integral part of our network, being used to provide backhaul capability where fibre deployment isn't feasible. The advent of 5G will increasingly bring >6GHz spectrum to the fore for access, too. Standardisation of 5G will most likely focus on bringing together heterogeneous networks to provide "sufficient" bandwidth – i.e. giving the user the illusion of unlimited bandwidth. We do not consider that headline grabbing assertions of high data rates are helpful: consumers wish to have their applications work with no perception of the network acting as a bottleneck, and what particular bitrate achieves this is of little import to them. As DCMS will know, Vodafone has co-ordinated efforts via the UK Spectrum Policy Forum to

develop a series of use cases and determine the requirements of each of these, in order to scope 5G standards at an international level.

Government has a role to play in ensuring that the UK's vision for 5G is not overtaken by other stakeholders who wish to frame the technology in headline grabbing data rate terms. UK industry can work together to take this vision into international fora, but Government engagement, and funding where appropriate, would assist in securing better outcomes for the UK economy.

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

We have highlighted above the key measures which, taken together, could significantly incentivise the rollout of future mobile infrastructure in currently underserved areas. One critical element is worth expanding upon here is the need for a fit-for-purpose mobile backhaul product from BT. The Government can take a truly positive role in supporting high-speed, high-capacity broadband in underserved areas by facilitating the introduction of access to dark fibre for mobile backhaul that will serve the current and future needs of UK business and citizens. Dark fibre (fibre that is not yet "lit" by electronics) would enable mobile and fixed line operators to take control of and manage fibre backhaul that is currently managed by BT. The great benefits of this are to enable operators to rollout faster as they are no longer dependent on the incumbent for delivery of the electronics; there is much greater ability for operators to innovate than with a managed product; and it creates an opportunity for operators to provide their own wholesale services. Dark fibre is in fact very close in purpose to the PIA product mentioned in the consultation document but provides the additional benefit of avoiding congestion within ducts as operators can divide pairs of lines within large fibre optic cables between them.

We consider that passive access, in particular dark fibre, can enable the marketplace that our customers desire. Competing operators will be able to control and develop service features. Greater competition will improve the pricing of services. None of this will happen overnight, and we do not doubt it will be difficult yet we consider the effort will be worthwhile and is essential in order to achieve the ubiquity of coverage, scalability of network and competition, innovation and choice. In addition, we would welcome Government support for projects such as Vodafone's Rural Open Sure Signal approach which, through a combination of community leadership and Vodafone's technology, is bringing 3G voice and mobile internet coverage to rural communities across the UK for the first time.

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?

While a more ambitious USO may have the objective of providing a greater level of certainty around the minimum service levels to all consumers, it may do little good in practice if the cap on connecting individual customers with a 2Mbit or higher broadband service was set a level that still excluded many from receiving the minimum USO standard (there is currently a cap of £3400 for connecting standard telephone lines, where consumers are expected to pay any costs above this). The cost to serve the hardest to reach customers is likely to be considerable and there needs to be a clear understanding of the technologies to be used & the likely costs involved. The funding of such an obligation would also have to be carefully considered as any USO model may rely upon one set of consumers subsidising another, or requiring ongoing support from the tax payer and a full review would need to be undertaken before such a move was contemplated.

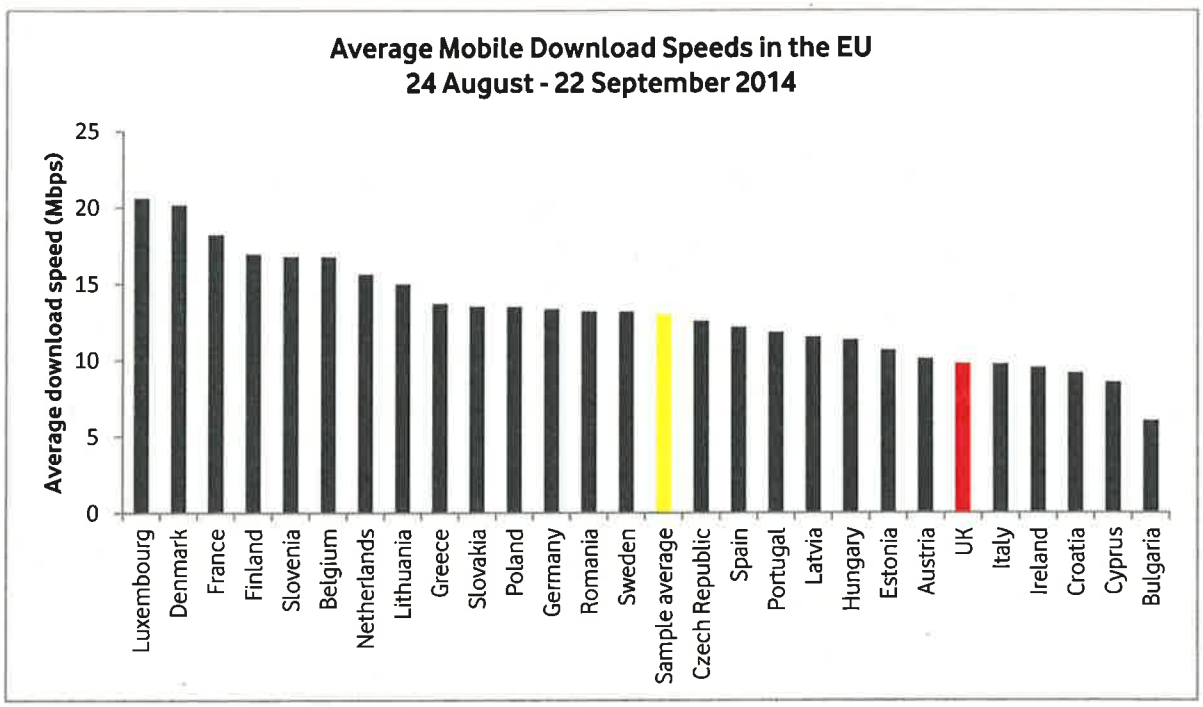
Q31 Are there changes to the EU Framework that the UK might seek to encourage more competition in UK markets?

The communications industry is the bedrock for wider growth and innovation, now and in the future. Modern communications are a fundamental part of how every company in Europe, small or large, does business. The Government's first priority with regard to Europe should be to ensure we have a policy and regulatory environment that puts the UK on a level playing field with the rest of Europe. The relatively restrictive environment we face in the UK means it is harder to build the infrastructure we need. For example, due to the more restrictive planning regime, we often have to resort to shorter masts in the UK than we are able to use in other European jurisdictions in which we operate.

For the UK and Europe to be competitive on the global stage requires companies acting at scale. The communications sector requires a dynamic approach to competition which understands that customers will benefit from investment and quality, and that society will benefit from consequent growth. Convergence and consolidation, across borders but particularly in-country, is needed to make this happen. This should be supported by a forward-looking, incentive-based approach to investment, allowing a reasonable return on capital and abandoning policies that seek to create a false basis for competition that is not based on investment. A regulatory environment which incentivises investment in infrastructure can enable operators to provide UK and European citizens with quality and cutting-edge services and businesses with the support needed to innovate and grow.

It is for these reasons that Vodafone that the Government needs to remain open to the potential benefits of in-market consolidation. On certain indicators, the UK appears to be comparatively unfavourable for investors in mobile and outcomes across the sector are weaker than in Europe in [redacted]

Market outcomes also suggest that the UK mobile communications industry is in need of a boost relative to its peers. Based on data collected between 24 August – 22 September 2014 on average mobile download speeds across 27 EU countries, the UK ranked in 22nd place.



Source: Ookla Net Index[3]

Europe needs harmonised regulation which is fit for purpose for the digital age. A fundamental tenet of communications services is their interoperability. An approach which breaks down silos across industry sectors, and treats all digital services in the same way, regardless of who is providing them, will be to the benefit of all Europeans.

Pan-European communications services for UK multinationals

An important reform that would enable UK operators to excel in pan-European services for multinational enterprises is an improvement in the quality of regulated fixed-line access products across Europe, particularly virtual unbundling, IP bitstream and terminating segments of leased lines. There are significant inconsistencies in the provision of fixed-line access products by the various SMP providers in the different member states. It is of paramount importance to multinational enterprises from or based in the UK that fit-for-purpose products with a harmonised set of features are made available across Europe. While in parallel, in order to ensure that remedies are tailored to national characteristics, national regulatory authorities should maintain the ability to impose other access remedies on SMP operators as required.

Based on Vodafone's experience of significant differences in timescales for delivery and service levels from SMP operators across the EU, it is critical that there are fit-for-purpose functional specifications for these products. For example, definitions of what constitutes acceptable migration procedures and reasonable repair times. Further, an important step that the EU could take towards a single market for enterprise communications is service standards that cover each and every step of delivery from ordering

[3] http://www.netindex.com/mdownload/1,7/EU/

to repairing faults with associated financial incentives for SMP operators to provide the standard of service required.

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

Vodafone would welcome competition authorities taking a more prominent and agile role in the sector across Europe. Significant investment from the private sector will be required to make the UK a world class digital economy, which in turn requires a return on capital. This can be facilitated by allowing investing companies to achieve the benefits of scale and scope that come from consolidation.

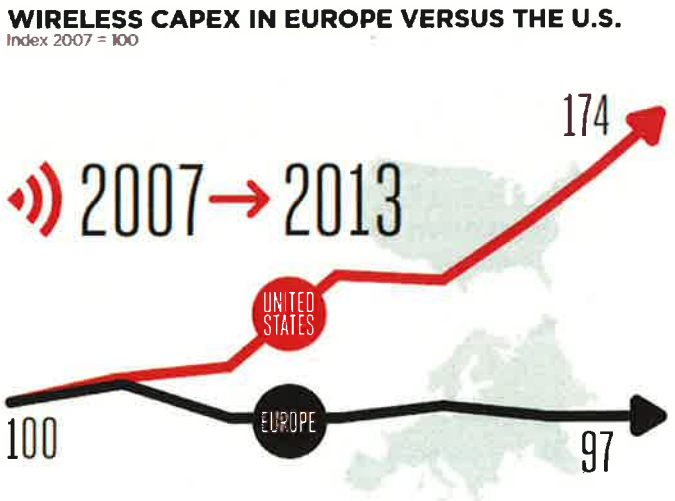
Investment, from that at the level of network infrastructure to that at the level of company mergers and acquisitions, should be welcomed. Where investment comes in the form of consolidation, there is an important role for competition authorities to ensure fair competition at every level of the communications value chain, from network to "over-the-top".

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

See our response to Q25.

Section 5 – Facilitating and Encouraging Investment

The UK, in co-operation with other EU member states, needs to take bold steps to encourage investment and help prevent a decline in Europe's position in the global digital economy. The extent of the delta that already exists was highlighted in a comparative study of the mobile industries in the EU and the US for the GSM Association.[4] Deployment of new communications infrastructure depends fundamentally on investment levels, where evidence shows the US to be far ahead of the EU:



Source: Goldman Sachs Global Investment

[4] 'Mobile Wireless Performance in the EU and the US', Navigant Economics for the GSM Association

The study found that the US market is outperforming the EU: US consumers use five times more voice minutes and twice as much data; growth in investment in the US is translating into data connection speeds, which are now 75% faster than the EU average; the US is deploying LTE at a much faster pace than the EU and by the end of 2013 19% of US mobile connections were on LTE networks compared to less than 2% in the EU.

Over the period to 2030, the world class digital economy that is needed for the UK and its citizens can only be achieved under an improved investment environment for mobile operators. This requires a shift in policy focus at a European level from a short-term preoccupation with consumer price cuts to a longer term vision of sustainable competition and innovation.

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?

While we believe that a policy that focuses on one technology or even one network (in most cases the BT network) is short sighted we believe that any transition away from a dependence on copper will be an evolutionarily one rather than a revolution. The cost of rolling out new access infrastructure, be it wireless or fixed, is considerable and time consuming so any wholesale transition away from copper looks some way off. We are however keen to ensure that the regulatory environment doesn't discriminate against new forms of access should they prove to be effective and nothing should be done to preclude them. In the intervening time the regulatory environment has to recognise the access bottleneck of BT's copper network, imposing appropriate remedies to ensure the competitive market outcomes can be mimicked as far as is possible.

When transition to FTTP occurs, and the provider continues to have SMP at that time in access provision, there is a clear need for policy makers to be involved in the network design to ensure open and equal access to the network and similarly for the migration of customers on legacy services.

The protection and improvement of competition in services should be at the heart of the FTTP network design. The SMP access provider must not have sole power to decide the look and feel of the access product or the access points.

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

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

The Internet of Things (IoT, also known as Machine to Machine (M2M)) connects machines, devices and appliances wirelessly to the internet, turning them into intelligent communicators of data that can help businesses and the public sector run more efficient organisations and deliver better services to customers and citizens.

We believe that demand for M2M applications will grow exponentially. M2M enables organisations to save time and money by optimising business processes, creating more efficient organisation which ultimately should be more successful leading to economic growth. There is a great opportunity for the public sector

to be an early adopter with M2M technology making, for example, refuse collection or transport systems more efficient or improving other municipal services in local government or improving health care provision.

Potential barriers:

The UK can't be a leader in M2M technology without having leading digital networks to deliver the data. The challenge is to ensure that the UK remains a good place to invest in digital network infrastructure to build the network that M2M technology needs. The Government must support the private sector as its rolls out this infrastructure in terms of modernising those areas of policy it controls which form barriers to build. M2M solutions need ubiquitous and stable coverage across the whole of the UK. This means that the barriers faced when rolling out a network suitable for the demands of the mobile internet for businesses and consumers are equally faced when ensuring we have a network with the ubiquity needed for M2M. Government must act quickly to ensure these barriers are removed.

To achieve the above, we need the Government's support in three areas:

1. The ability to invest, build and run a network delivering UK wide coverage at a cost that is sustainable long term.
2. The ability to use existing and new spectrum holdings for M2M with sensible spectrum fees that encourage investment in new technologies and are on a level playing field with other spectrum using sectors, like the broadcasters.
3. Public sector should be an earlier M2M adopter with public sector procurement policies designed to support and enable the development and rollout of M2M technology. Appropriate targets for adoption should be set.

As with other technologies, privacy and security are paramount issues; users of M2M technology need to have confidence that data collected from any source is secure. Controls must also be built in to ensure the broader security of M2M technology; if devices which enable or disable are functioning in, say, your home or car it is an absolute imperative that consumers and consumer data are safe and secure.

Network

- If the UK is to have successful IoT/M2M solutions both for the public and private sector, we need an effective network through which to deliver them. Whilst the key demand for M2M will likely be smaller sites, we still need a pro-infrastructure approach from central and local government to ensure timely delivery of the necessary networks.

- In practice this means Government facilitating access to public sector land, buildings and street furniture. In harder to reach areas this may also mean offering such sites at low rent to incentivise investment where the existing cost-benefit case doesn't make business sense.

- We also need a more strategic, pro-growth approach to planning at a local level, in which the development control policies of local authorities keep pace with their wider economic aspirations. There should be a presumption to approve reasonable telecommunications infrastructure applications.

- When using any land, public or private, we need to be able to acquire, access and maintain sites in an efficient manner. The current legislation governing this area (the Electronic Communications Code) is significantly out of date and requires urgent reform to ensure network improvements are not held up unnecessarily.

Spectrum policy

- Government spectrum policy should be focused on putting this finite resource to use where it creates most value for the UK economy. Vodafone and the mobile industry accepts the need to pay for the spectrum that we utilise, but if this resource is to be used efficiently, then it is important that users of spectrum that possesses similar characteristics are charged on a similar basis: we are unconvinced that this is currently the case especially when the fees proposed for mobile operators and broadcasters are compared.

- Within this, and most importantly for the development of M2M technologies, is that current spectrum is utilised. Only licenced spectrum can deliver the guaranteed quality of service that M2M demands. The Government should allow providers to use licenced spectrum to enable deployment of optimised M2M radio access technologies over existing cellular bands using existing sites, transceivers and antennas.

- Because of the nature of the devices, and with consumer services increasingly using 3G and 4G, 2G spectrum will be vital for M2M technology. Any Government policies which tie network operators into using 2G for general consumer offerings are therefore exceedingly counterproductive to the future, necessary, optimisation of spectrum for M2M.

Public sector procurement

- The public sector could and should be a key benefactor of the IoT and should be encouraged to procure IoT/M2M solutions. The Government should allocate a percentage of total procurement to M2M with a particular focus on how to build a British based skills base.

- There are numerous examples of where M2M technology can improve the quality of service while reducing the cost. Vodafone has been working in the Netherlands on using the technology to improve major public services from rubbish collection to street lighting. In particular, smart cities are necessary to adapt to the demand of urban growth. M2M technology lies at the heart of a smart city, improving the lives of the citizens within it. Imaginative and collaborative partnerships between local authorities, utilities, universities and the private sector – whether it is bus companies or software providers – are critical to make smart cities a reality.

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

Q44 How can council's maximise the digital communications infrastructure in their local area to support their work on economic regeneration?

Local authorities have a crucial role to play both as consumers and facilitators of digital services. Local government can use its considerable purchasing power to drive the digital provision of public services and the notable efficiencies it brings, for example through use of the Internet of Things. However, in order for there to be a reliable digital network through which to provide these services, we need a strategic partnership with local councils to enable us to build the infrastructure we need.

The mobile network is a piece of critical national infrastructure but it is built in partnership with every planning authority in the UK. Too often we see the provision of services held back by the refusal of planning authorities to grant permission for the necessary infrastructure, sometimes against planning

officer recommendation and often in opposition to the local authority's policies on economic development and digital services.

We believe there is an opportunity for a Charter for Coverage between local government and industry, brokered by government to ensure local authorities are actively supporting roll out, including planning consent and access to public sector land and street furniture for sites. There is also a potential role for Local Enterprise Partnerships in bringing together partners to deliver connectivity for their area.

We are already piloting a more strategic approach with a number of local authorities and other local bodies. With the facilitation of Government we could expand this approach across the UK.

For further information:

Graham Dunn, Senior Government Affairs Manager
graham.dunn@vodafone.com
07795044045