Response to UK Government consultation on Digital Communications Infrastructure Strategy

1. Google Inc is a US company, providing a wide range of largely free services including Google Search, YouTube and Android, serving one billion people in hundreds of countries across the world. Google welcomes the opportunity to respond to this consultation on the UK Government's strategy for digital communications infrastructure.

2. Over the last three years Internet players have invested $100bn in the physical network of the Internet, according to Analysys Mason. Google is a major partner in the funding, design, and laying of undersea cables: Google is a participant in the UNITY cable (since 2008), South-East Asia Japan Cable (2011) and most recently the FASTER cable system (2014). We have also built many data-centres around the world, including most recently the $1bn data-centre in Hamina, Finland (opened 2011; expanded 2013) and $773m data-centre in Netherlands (announced September 2014).

3. Google also invests and drives innovation in in the so-called "last mile" infrastructure that connects users to the Internet. For example, Google has worked to promote dynamic spectrum sharing, particularly in TV white spaces.

- In the U.S., we have built a database that allows devices to determine, for a given location, what frequencies can be used while protecting licensed entities and wireless microphone signals from harmful interference; this database has been certified by the Federal Communications Commission (FCC) and is available to wireless devices that are approved by the FCC for the TV white space bands.
- Last year, we also ran a trial with ten schools in the Cape Town area of South Africa, helping them receive wireless broadband over a white space network.
- In the UK, we are working together with Ofcom, many different players in the Wi-Fi eco-system (device/chip manufacturers, database providers, trial partners) and even London Zoo to make it possible to test and use TVWS technology in order to power wireless connectivity and innovation.

4. In the United States, Google also offers Google Fiber: a gigabit fiber connection to the home, with speeds that are up to 100 times faster than today's average speeds, at competitive prices. Google Fiber is available currently deploying its services in three cities, and is exploring coming to nine additional metro areas.

5. In addition to enhancing user connections with gigabit speeds, Google is also developing new and innovative ways of connecting the currently unserved users. Project Loon is one such project, making progress on developing balloons that fly around the globe on stratospheric winds and provide Internet access to the earth. Project Loon began with a pilot test in June 2013, when thirty balloons were launched from New Zealand's South Island and beamed Internet to a small group of pilot testers. The pilot test has since expanded to include a greater number of people

over a wider area. Looking ahead, Project Loon will continue to expand the pilot through 2014, with the goal of establishing a ring of uninterrupted connectivity around the 40th southern parallel, so that pilot testers at this latitude can receive continuous service via balloon-powered Internet.

6. In 2014, Google also acquired Titan Aerospace and while it is still very early days, we believe there is the potential for atmospheric satellites to help bring internet access to millions of people around the world.

7. In view of the rapid growth of these types of investment from non-traditional sources in the user-facing physical broadband networks, we would encourage policymakers to look well beyond the traditional models as they consider how best to encourage the evolution of telecommunications infrastructure. Innovation should be nurtured and regulatory obstacles avoided. Investment from new areas and into novel technologies should be recognised and encouraged.

8. In this context, we would recommend that policymakers consider not only the removal of regulatory blockages within the existing frameworks - around spectrum or fixed line networks - but in those connected areas for new technologies, such as overflight or use of airspace. For example, air traffic control services can enable experimentation without compromising safety; greater harmonisation between countries in Europe would ensure that restrictive practices in one country do not stop new innovations from getting off the ground in many others.

Household requirements

9. The UK Government estimates that average household requirements will range from 19Mbps to 52Mbps by 2018. Currently average broadband usage per household over a 24 hour period remains significantly below that level. However Google delivers 1000Mbps symmetrical networks via Google Fiber in a number of US cities. Demand for Google Fiber is high.

10. It is hard to anticipate what the future holds but it appears likely that while consumers may require more capacity so will an increasing range of devices in the home. As more household items, from thermostats to smoke alarms, connect to the web, they will need capacity to upload, not merely download. For certain services, latency will also be as important as speed.

11. A recent US study concluded that the provision of 1000Mbps to 14 cities in the US added $1.4bn in additional GDP (FTTH Council, September 2014). In this context, policymakers should also consider whether short-term revenues, such as the ‘fibre tax’ levied by the Valuation Office Agency, are in the public interest if they deter bigger, longer term growth that comes from high speed connectivity.

Meeting demand

12. Existing technologies are in theory capable of meeting the demand outlined by the Government (52 Mbps by 2018) but in practice they may not be deployed.

13. There are regulatory steps policymakers can take to facilitate the more efficient roll-out of technologies in ways that will lower costs and thereby increase the viability of reaching more homes with better access:

- spectrum policy should continue to open up more spectrum for wireless broadband use. In particular, access to spectrum for license-exempt use should be expanded in high, medium and low frequency bands. In addition, policies should enable dynamic sharing of spectrum -- that is, allowing secondary users to access spectrum when and where it is not being used by incumbents;

- streamline regulations that effect constructions of new networks, including access to 'rights of way' and utility poles; as the European Commission recognized last year, a number of measures can help reduce the costs of deployment by as much as 30% (http://ec.europa.eu/information_society/newsroom/cf/dae/itemdetail.cfm?item_id=10052);

- even if the regulatory barriers to construction are low, the cost of building a network is still quite substantial. These costs can be lowered further if multiple entities coordinate and share the expense of certain components. For instance, rather than an electrical utility and a broadband provider separately digging their own trenches to install infrastructure, policymakers could incentivize them to coordinate their build, lowering the cost for each of them as well as reducing disruption within a community. Similarly, policymakers can implement 'dig once' policies, requiring that fibre conduit be installed whenever someone digs up the 'public rights of way'; that way, if a new provider wishes to deploy fiber, they need not dig up the street again. 'Dig once' approaches have reduced network installation costs by 25–33% in urban areas and roughly 16% in rural areas (US GAO).

14. As policymakers consider options to stimulate investment, they should consider unintended consequences, such as those outlined in the report by Plum on copper versus fibre, where attempts to reduce the cost of copper could hamper the growth of fibre. For those reasons, a more technology-neutral approach may be preferable, where policymakers seek to incentivise outcomes (as recommended, for example, by the House of Commons Communications Committee) rather than the highly difficult task of trying to pick a winner from among competing alternative technologies.

15. UK Government strategy has accordingly focused on outcomes in four areas: speed, choice, price and coverage.

- Speed: the Government put the emphasis on download speeds. Google Fibre in the US not only offers 1000Mbps download speeds but symmetrical upload speeds. Changes in

patterns of consumption, with independent devices - not just consumers - requiring access to the web, will make upload capacity more important. Latency will also become a key measurement. It may not matter if a user cannot upload their cat picture to social media immediately, but the speed with which a connected smoke alarm responds might be critical to saving lives.

- Choice: a competitive market is key to a healthy infrastructure.

- Price: affordable consumer access is important but there should be healthy competition around quality too. While we do not wish to see consumer prices rise in ways that make it harder for more people to get online, we also recognise that a focus in a market on price, to the exclusion of all other factors, can have adverse effects. A race to the bottom on price can be counterproductive for both competition and quality of experience.

- Coverage: coverage is important and universal coverage is required if policymakers want to realise the full potential of a connected society. In harder to reach areas, traditional fixed and mobile technologies are coming up against the limit of what is commercially viable. This is where new technologies and new innovations could be particularly valuable, and where policymakers and regulators should also be prepared to experiment and reform. Delivery via air, for example, can reduce the financial costs in remote areas significantly but more can be done to alleviate the regulatory burden.