Written Evidence Submitted by Vodafone UK (UKT0002)

House of Commons Science and Technology Committee inquiry - UK telecommunications infrastructure and the UK's domestic capability

Introduction

As a leading provider of digital services in the UK, Vodafone welcomes the opportunity to submit evidence to this inquiry. High quality, secure digital connectivity brings extensive societal and economic benefits. We believe that secure and resilient digital infrastructure and services are crucial to the UK's economic success - both now and in the future. This has been highlighted during the COVID-19 outbreak which has seen significant increases in voice and data traffic on our networks. Our networks have, in spite of the enormous pressure placed on them, remained resilient.

The current conversation regarding the diversity of telecoms networks has very wide implications for the telecommunications sector and for the future of the digital economy. We support the Government's ambition to increase the diversity of the UK's telecoms supply chains and are focused on expanding our supply chain options through engaging with 'Open Radio Access Networks' (OpenRAN) vendors and encouraging newer network providers, to ensure the optimal balance across suppliers.

Decisions regarding particular vendors need to be based on detailed analysis with carefully considered risk assessments. We welcome the evidence-based approach taken by the Government in conducting and developing the policy conclusions of its recent Supply Chain Review. The Government's proposed framework strikes a careful balance: ensuring the security of telecommunications networks while providing network operators with the necessary stability when investing in their networks, and sufficient choice of vendors to protect innovation and provide effective competition.

The security of our networks is our top priority and we subject all suppliers to high levels of assurance. We work closely with the National Cyber Security Centre (NCSC), Government security services and the wider industry to ensure our networks are secure. Diversity of suppliers is key to ensuring resilience and wider security of networks. We would welcome greater vendor choice and competition and support the Government's ambition to diversify the telecoms supply chain in the long-term. Vodafone is trialling new technology in the UK and globally to help support this.

OpenRAN trials in the UK are still in the early stages and vendor diversification is expected to take several years. There are currently only three vendors to provide telecoms equipment at scale in the UK – Ericsson, Nokia and Huawei. A further reduction in eligible network vendors would place significant strain on remaining providers, create a concentration risk - which would be damaging to network resilience - and affect future network roll-out and the UK's digital ambitions.

Security of Vodafone networks

Vodafone takes a multi-layered approach to delivering security, including selection and security testing of equipment, network design, vendor mix, security monitoring and cyber defence, and mature security functions within the company. It is about risk management and this combination of measures underpins the judgements that operators and government agencies make about what the risks are and where exactly they lie. All vendors' equipment is at potential risk of compromise, which is why we have stringent processes in place to limit that risk.

The UK Government decision to establish the Huawei Cyber Security Evaluation Centre (HCSEC) in 2010 introduced additional security evaluation for Huawei network products and was designed to provide greater assurance on the use of Huawei products in UK networks. The UK, via HCSEC, leads the world in its ability to understand, analyse and assure the quality and integrity of its hardware and software.

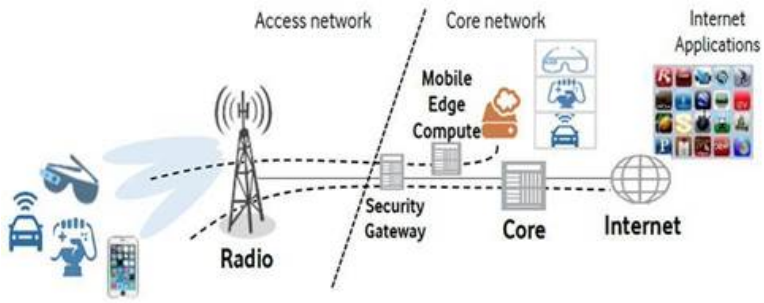
We consult closely with NCSC on supplier choices and seek advice on network architecture, processes and risk mitigation strategies. We believe the approach currently adopted in the UK provides a strong framework for managing the risks and Vodafone is committed to working with the Government to continuously improve network security and resilience – looking ahead to the new primary legislation due this summer and the introduction of the Telecoms Security Requirements.

We also work closely with government and industry partners to assess telecoms sector security and performance, and always comply with the latest regulations.

Layers of Vodafone network security

Our mobile network is formed of multiple layers of security, which process information in different ways. It is important to differentiate these layers – the Radio Access Network (RAN), Transmission and Core. In the UK our core network does not use Huawei and we have no plans to change that. We describe the core as "intelligent" as it is the "brain" of the network. It manages the network and this is where the concentration of customer information is controlled.

We use both Ericsson and Huawei for the radio access (antennas) – the RAN. The RAN cannot be targeted to intercept large amounts of information. A base station cannot "talk" to another base station. The RAN is controlled by the Core. All data between the base station and the security gateway, which goes into the Core, is encrypted. Today more than 50% of the Internet traffic is end-to-end encrypted making it practically impossible for anyone to understand it or try to hijack an ongoing conversation.



5G network security
5G security is an enhancement of 4G security. The split of functions between access and Core from 4G to 5G is unchanged. And as we continually build on our experience, we are adding new 5G security tools. 5G provides strong features to protect customers from interception, impersonation and location tracking.

These features offer a similar or better level of protection than the equivalent features in 4G. There is a separate encrypted connection between the base station and the security gateway at the edge of the core. This means that customer signalling traffic is encrypted end–to-end between the device and the core network.

5G networks will in all cases maintain a clear structural distinction between the access network and the Core network. Multi-access Edge Computing (MEC), a 5G technology, does not mean 5G networks are more vulnerable than 4G networks. MEC is, and always will be, explicitly part of Vodafone's core networks, wherever it is situated and will always be protected using stringent core security measures.

Government Supply Chain Review
We submitted significant volumes of data and evidence to the Government's Telecoms Supply Chain Review. We made strong arguments in favour of diversity of supply as being key to ensure resilience of networks and contributing to innovation and price competition, supporting lower prices for consumers.

The Government has taken sensible steps in its Telecoms Supply Chain Review and follow-up report on High Risk Vendors to improve the level of cyber security and resilience in our telecoms networks.
The Government's framework, based on a strong evidence base, strikes the correct balance between ensuring the security of our telecommunication networks and providing certainty to mobile network operators who are investing and building out these networks.

With a very limited choice of vendors, any significant limit on one supplier results in an over reliance on another, as has recently happened with another mobile network operator in the UK. If a country's mobile networks are all effectively dependent on one or two providers of network equipment and one supplier has an outage, the damage to network resilience and customer experience is much higher than if there are three or more suppliers of equipment available.

Diversification of telecoms supply chains and Vodafone OpenRAN development
We support the Government's ambition to increase the diversity of the UK's telecoms supply chains and are focused on expanding our supply chain options through engaging with OpenRAN vendors and encouraging newer network providers, to ensure the optimal balance across suppliers.

However, the reality is that the current choice in the UK is in effect restricted to Huawei, Nokia and Ericsson and diversification will take time.

We are currently developing and trialling OpenRAN which will enable Vodafone and the telecoms industry to introduce a wave of new 2G, 3G, 4G and 5G technology vendors – in addition to the existing market leaders – improving supply chain resilience. This supports Government's goal of better telecoms supply chain diversity as OpenRAN standardises the design and functionality of the hardware and software in the RAN – the infrastructure, masts and antennae that operators use to carry mobile traffic.

In a complex technical process, the RAN gets deconstructed and reassembled into a set of fully open and interoperable sub systems. In contrast, traditional network deployments are based on monolithic architectures, which means the full stack for all software and hardware elements is developed and supplied from the same vendor. OpenRAN is designed to increase the number of potential companies that can supply different components.

OpenRAN could also deliver benefits including faster innovation from new and smaller suppliers, faster network deployment, an improvement in coverage and lower the barriers to entry for new suppliers. OpenRAN trials in the UK are still in the early stages and vendor diversification is expected to take several years.

Vodafone Group has recently become a founder member of the Open RAN Policy Coalition, which will promote policies to advance the adoption of open and interoperable solutions in the RAN as a means to create innovation, spur competition and expand the supply chain for mobile technologies including 5G.

Vodafone Group has been a leading advocate for OpenRAN approaches as part of the industry association, the Telecom Infra Project, which it now chairs. While OpenRAN is still a maturing technology, where there is still a need to catch up with existing vendors from the point of view of performance, cost and industrialisation, Vodafone is actively trialling OpenRAN technology. In addition to our current trials in the UK, we are trialling the technology in Ireland, Turkey, Mozambique and the Democratic Republic of Congo.

It is also important to understand the impact of the current lack of interoperability between equipment from different vendors. To a large extent this has been designed in by current suppliers to protect IP and to tie operators in to the vendor. This means that the equipment of different vendors generally cannot be combined e.g. in upgrading 4G to 5G. As 5G in the UK will initially be built on existing 4G infrastructure, if restrictions were to be placed on the use of Huawei 5G equipment, we would have no choice but to rip out and replace all Huawei 4G equipment currently in our RAN. This would be time consuming, expensive and significantly disrupt our 5G roll out plans. Over time a significant adoption of OpenRAN would necessitate that existing vendors increase the scope for interoperability but this is not a short term solution to the current issues.

We encourage the Government to include OpenRAN deployments as part of its future digital strategies and provide support for R&D, piloting and deployment of OpenRAN as well as to start-ups in radio software.

Impact of further restrictions on particular vendors

According to an independent report from Assembly, commissioned by Mobile UK in 2019, a restriction placed on Huawei in the telecoms supply chain could have significant impacts in the UK:

- A partial to full restriction on Huawei in the telecoms supply chain could result in an 18 – 24 month delay to the widespread availability of 5G in the UK. This would result in the UK failing to be a world leader in 5G – something that has been central to the UK government's 5G strategy.
- Using the government's own estimates on the benefits of 5G, the cost to the UK economy of a delay in rollout is calculated at between £4.5bn and £6.8bn.
- As well as the measurable financial impact, the UK will also suffer in terms of lower inward investment and lost productivity gains through stagnation of digital infrastructure.

Setting arbitrary restrictions on a single vendor and near term deadlines for replacement will have a substantial negative impact on services and future network development. Any further restrictions on the use of Huawei in telecoms networks would require significant reengineering of Vodafone's 4G infrastructure and therefore has a much wider impact than just future 5G roll out. Any requirement to rip out and replace 4G Huawei kit would reduce the funds available for 5G investment and cause significant disruption to consumer services. It would effectively set back the UK's telecoms network several years. Given the security risk in the RAN is very low - even if Huawei were viewed as a security threat - this seems disproportionate.

A reduction in eligible network vendors would also place significant strain on remaining providers – further damaging future network roll-out both in urban and rural areas. Even if they could meet the increase in demand in a reasonable timescale there is a risk of higher costs and greater risk from increased concentration in the supply chain. Slowing down the roll out risks hampering the UK's level of competitiveness - given 5G is a critical enabler of digital transformation for companies and public services.

It is also important to recognise the particularly high costs of deploying digital infrastructure in the UK as well as the incremental pressure on the ability of many operators to derive profitable income and therefore reinvest in benefits for our customers. This is in addition to the significant demands that are being placed on the UK's telecoms sector as a result of the current COVID-19 situation. During this period, Vodafone's top priority is maintaining the quality of service across our networks to keep the UK connected, with significantly increased demand on the network every day, and to support all our customers and employees. This requires substantial resource in a logistically and financially challenging context.

Therefore any further costs, such as those required to make changes that go further than those currently planned by the Government, would have a significant negative impact in what is an already challenging investment environment. Return on capital employed in the UK is the lowest in the world. Any requirement to fund the replacement of existing network equipment before its planned end of service would not only affect network rollout and customer services, but would also reduce the amount available to invest in securing and protecting our mobile networks.

In addition, the nature of the current UK telecoms market means that reducing any vendor market share - regardless of their country of origin - below around one third of the technology ecosystem would ultimately likely result in price increases for consumers due to the effect such a move would have on confidence in sustainable long term operator-vendor partnerships.

This is because a vendor cap below around one third of the market effectively makes that vendor unsustainable due to lack of scale in the long-term. As a result, we would expect a vendor in this position to no longer be incentivised to invest in market innovation more generally, for example in handset development. They would also no longer be incentivised to engage in important international standards such as the GSMA standards. The ultimate outcome of this would likely be a return to a situation where different handsets were required in different continents, effectively setting telecoms development back several years, as well as increasing prices for consumers due to a lack of choice.

It is also worth highlighting that in other countries where stricter measures regarding certain suppliers are being imposed, the context is very different. For example in the US, Huawei is only used by a few US rural carriers and US operators (unlike UK and EU operators) are building 5G separate from their 4G networks. Therefore restrictive measures will have limited real impact for the US. Despite this significantly lesser challenge, last year the US Government announced a very significant subsidies package of approximately $20 billion for 5G deployment. The few US carriers impacted by the decision to remove Huawei network equipment will expect to be financially compensated for swapping it out

About Vodafone UK
Vodafone UK connects people, businesses and devices to help our customers benefit from digital innovation. Our services span mobile, fixed line connections, home and office broadband and the Internet of Things (IoT).

Having made the UK's first mobile phone call and sent the first text message, Vodafone has a history as a tech pioneer. In 2018 we made the UK's first live holographic call using 5G, and were first to start carrying live 5G traffic from a site in Salford, Greater Manchester. We now have 5G in more places than anyone else, with multiple locations now live across the UK and the rest of Europe. Today we serve more than 18 million mobile and fixed line customers in the UK, with 4G network coverage at 99%.

We are part of Vodafone Group, one of the world's leading technology communications providers, connecting people and organisations of all sizes to the digital society. We have extensive experience in connectivity, convergence and the Internet of Things, as well as championing mobile financial services and digital transformation in emerging markets.

Vodafone Group has mobile operations in 22 countries, partners with mobile networks in 42 more, and fixed broadband operations in 17 markets. As of 31 March 2020, Vodafone Group had 362 million customers, including 115 million mobile customers, 25 million broadband customers and 22 million TV customers in Europe and 168 million mobile customers in Africa.

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