

Written Evidence Submitted by the Institute of Engineering and Technology (UKT0036)

The IET is pleased to offer its input to the Science and Technology committee inquiry on the UK's domestic telecoms capability. The Institution of Engineering and Technology (IET) has over 168,000 members worldwide in 150 countries and a registered charity. With over 100 local networks and 22 technical and professional networks, the IET provides thought leadership, professional standards and world-class knowledge and products.

We offer answers to the Science and Technology committee questions posed below and an appendix as an international market background for broader context and understanding.

Q1 What led to the current lack of market competition among telecommunications equipment suppliers and the absence of a domestic supplier in the UK

What led to limited choice was the international consolidation of the network equipment vendors, due in part to the scale and competitiveness of the market. This in turn spurred restructuring of the industry, consolidation of research and development and the concentration on larger global markets

There are too few 5G network vendors for the size of the market globally, with Ericsson / Huawei / Nokia as the primary vendors to approximately 800 plus network operators worldwide. New scale contenders are also international: Cisco / Microsoft / NEC / Samsung but all are working from a much smaller or national market base. New initiatives around software and cloud computing are emerging, but these are not yet at scale. These are often referred to as Open or Cloud Radio vendors and trials have started with companies such as Altiostar, Mavenir, Parallel Wireless.

The UK 5G trials and testbeds programme, and other operator trials and initiatives (e.g. ORAN alliance) are seeking to add new capability and new vendors.

It should also be stressed that defining the telecoms market as 5G alone will restrict the vendor choice for consideration. There are other high-speed networks to include such as 4G, Wifi, Fibre, Cable TV when considering customer choice, resilience and broader convergence.

Q2 What are the major barriers to entry into the UK telecommunications market and how these could be overcome

The major barriers to entry to the UK market relate to:

- operator buying power and scale are relatively low or small (UK is not one of the largest or fastest growth markets)
 - transition from 4G / 5G with costs, ease of implementation and systems quality to the customer
 - costs are affected by the choice of vendor, long term vendor finance, and energy efficiency
- These factors make it hard for a new entrant in a competitive market such as the UK
- established software, services and support mechanisms from major vendors
 - procurement may be multi-country from the bigger operator groups

Some of the ways of overcoming these barriers are through trials and testbeds, looking at evolution including Open RAN and steps towards software, and longer-term research and development approaches.

DCMS could also look at the Public networks for wider resilience; Ofcom already are stepping up checks associated with cybersecurity and broader resilience.

New opportunities may also emerge with dedicated investment projects such as Transport for London or HS2, as they may use more private network solutions and new vendors.

Q3 The feasibility of the Government supporting the establishment and growth of a UK-based vendor of 5G equipment

For the above reasons (such as association with scale, research and development and interoperability of 4G/5G) it is less likely that the UK Government action will lead to new “national champion” with global impact.

However, there are signs that the move towards software, security and services will lead to new specialists where the UK has real strengths, in areas such as network management and orchestration, private networks and systems integrators, services development.

DCMS already have supported some 5G trials that have illustrated innovation, improved understanding and investment roll out. However, longer term R+D and centres of excellence will need to be supported to ensure the UK retains a strong position in Digital technologies development and adoption.

Q4 How the UK can work with international partners (such as the ‘Five Eyes’ countries) to build a domestic capacity

Mobile telecommunications is built on international standards for systems reliability, quality, effective unit costs, and security. As network technology moves on to higher speed lower latency networks these standards need to be maintained. Spectrum harmonisation also remains a key enabler for futureproofing capacity and capability of 21st century wireless networks, requiring a longer-term vision for the future

For the immediate issues of 5G Network vendor choice the better opportunities are in Open RAN and software in the near term (2-3 years) and these will require ongoing support to standards and trials. The results of such trials are likely to be shared within larger vendor and operator groups internationally.

UK telecommunication operators are more used to working in the European standards framework known as ETSI 3GPP, and this needs ongoing support to attract more vendor interest. Working with the USA or others should be encouraged but not mandated, as operators will follow what they are doing through existing 3GPP, Open RAN and GSM Association mechanisms

Research and Development

For the longer term we need to recognize the importance of Horizon 2020 and in future Horizon Europe mechanisms, that bring together scientists and engineers for future networks. Software within networks will offer new choices and a new cost base, and this will be a key area for research and new opportunities

Recent examples include the Microsoft acquisition of UK company Metaswitch and the US-led Open RAN coalition initiative.

Spectrum

Ongoing spectrum coordination is needed to assure UK is not out of step with our neighbours and can learn from other benchmarks. Ofcom lead on this piece of work for the UK.

Q5 Measures the UK Government could take to encourage additional, established vendors to enter the UK market

These are described above in more detail but include UK trials and testbeds, focus on areas for change such as softwarisation, IoT, Applications for the Digital economy, and shared networks. These need to be coupled with a longer UK Research and Development strategy for public telecoms networks and their resilience.

Q6 In what timeframe the Government should look to build domestic capacity and remove all “high risk” vendors

There are control measures for all network vendors today which are also being strengthened through the new Ofcom processes. The guidelines published by [DCMS](#) and advice by [NCSC](#) are quite clear and are a balanced compromise in support of 5G investment and security. As new technologies emerge the guidelines will need to be adapted and adopted.

However, revisiting the DCMS trials programme and longer-term research and development could deliver some early results, coupled with an examination of public licensees for wider resilience measures.

The HMG work to date has focused on 5G and not on the wider range of Licensed Public High-Speed networks which offer wider resilience and choice. Covid-19 has shown our reliance on the Broadband and high-speed networks over the last few months. UK government now needs a collaborative longer-term development strategy to 2030 for public high-speed networks and their collective resilience.

Appendix:

Summary of the international telecommunications market (for background and context)

1) Market background

Any inquiry that looks into telecommunications would do well to consider both the UK and global market context. The size of the UK market is well covered by CMR 2019 [report](#) published by Ofcom in July 2019 with another update expected in July 2020

It should be noted that this report covers Broadband networks including Copper, Fibre and Cable TV and wireless networks including cellular, Wifi and Broadcast networks. Taking this forward the UK is likely to see new services that sit on individual networks and also across or through combinations or converged networks. Within wireless it is also important to look at the different generations of Mobile from 2G to 5G as most devices work with several generations. Transition to 5G also requires significant interplay between generations of networks

2) Global market

The global market for Mobile is best covered by the GSM Association Mobile Economy <https://www.gsma.com/mobileeconomy/report> 2020 released in Feb 2020. This concentrates on the cellular mobile world (generations from GSM – 2G to 5G) but excludes wifi networks. The number of cellular customers and expected growth can be seen rising from 8 billion (end 2019) to 8.8 billion estimated by the end of 2025, with a growing forecast share of 5G (20%).

Most demand for growth and transition to 5G is being driven by the larger markets of Asia Pacific / China and North America. It is also notable that there has been a major consolidation to three leading global network vendors over the last 30 years due to needed economies of scale and consolidated Research and Development at scale.

3) Global Mobile - Devices choice

At the end of Q1 2020 counterpoint research offer the following global market share picture of the following top 6 market leaders: Samsung, Huawei, Apple, Xiaomi, BBK Electronics (Oppo, Vivo, Realme, Oneplus) , Lenovo

Global Smartphone market	SHIPMENT (MILLION)		SHARE (%)	
	Q1 2019	Q1 2020	Q1 2019	Q1 2020
SAMSUNG	72.0	59.0	21%	20%
HUAWEI	59.1	49.0	17%	17%
APPLE	42.0	40.0	12%	14%
XIAOMI	27.8	29.7	8%	10%
OPPO	25.7	22.3	8%	8%
VIVO	23.9	21.6	7%	7%
REALME	2.8	7.2	1%	2%
LENOVO GROUP	9.5	6.0	3%	2%
LG	6.9	5.0	2%	2%
TECNO	4.7	4.6	1%	2%
OTHERS	66.6	50.7	20%	17%
TOTAL	341.0	295.0	100%	100%

Source: Counterpoint Research: Quarterly Market Monitor Q1 2020

4) Network vendor resilience

When looking at supplier resilience DCMS focused purely on 5G, and considerations related to resilience and speeding up the 5G roll out as well as a balancing prosperity and security. The wider UK telecommunications networks resilience was not closely studied, but in practice customers choose from a wider range of broadband networks, whether home based (e.g. Wifi, Fibre or Cable TV) or worked based.

The trends towards convergence of wireless and wireline were not a primary consideration but may lead to new resilience options and some new questions about the resilience of all public networks. Resilience and security have not been primary drivers of market choice in what is a very competitive market for broadband services.

Network vendor choice in 5G is also related heavily to cost, systems quality, 4G / 5G systems interoperability and ease of upgrade. The USA has a different network landscape, regulation and competitor dynamics. For Mobile very little use of Chinese vendors exists today and a lot of

early deployment relates to fixed wireless access via 5G radio. The USA has shown less interest in 4G / 5G interoperability in their initial deployment.

With respect to International Scale and partnerships these also remain important for Research and Development, Technical standards, economies of scale to lower unit costs and regulation of quality.

For cellular vendors there are only 3 primary vendors globally, even if there are local variations: Ericsson / Huawei / Nokia for approximately 800 licensed mobile operators globally.

5) International spectrum, vendors, Research and Development, and standards

International spectrum assignments are also critical to the wireless industry and there is strong harmonisation in this area, even if some continental differences do apply.

The globalisation of the network vendor supply chain has been in line with major network vendor consolidation over the last 15 years or so. Companies such as Marconi, Nortel, Siemens, Motorola, Alcatel and Lucent have all left a very competitive networks market. The scale of the Chinese market has also helped Huawei and ZTE grow largely from a 4G base.

Longer term planning and research and development to 2030 is now under way to add further resilience in areas associated with Open and Cloud based Radio network equipment; virtualization of networks and convergence / integration of networks and related services. This is no longer just a matter for 5G or public networks as broadband, wireline and security will require more choice and integration.

The recent acquisition by Microsoft of UK company Metaswitch is one commercial illustration of this trend. On a longer-term basis, it is expected that 5G will evolve towards a 6th generation of Mobile provisionally called 6G and evolutionary research and development work has started towards this.

This work will also be associated with Horizon 2020 and possible association with Horizon Europe. Whilst there are different needs and technologies this is following a similar long-term path to the original 2G /GSM R+D in the 1980's and similar developments in 3G and 4G subsequently.

There are also trends associated with the Digital economy where vendors are specialising in Industry 4.0. Future Internet and e-commerce; private network and IoT Solutions; Connected and driverless car initiatives; some smart city and digital health programmes.

Many of these will rely on international programmes of research, trials and standards, as the supply chains are highly globalised. However, it will open up a wider range of vendors interested with sector or systems integration knowledge beyond the operator – network vendor supply chain for 5G only.

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