Assembly

A report for Mobile UK

The Impact on the UK of a Restriction on Huawei in the Telecoms Supply Chain

5 April 2019

Contents

Executive Summary

The upgrade of the mobile network to 5G is seen as a significant milestone for the nation and further enabler of economic growth and will directly enable new industries. All four mobile operators have advanced plans to launch 5G services during the second half of 2019, becoming more widespread as handset availability increases during 2020.

The UK Government has on various occasions set out its ambition for the UK to be a leader in 5G to help create a world-leading digital economy and has committed significant funding to help make this happen. As well as improved mobile coverage, the Government's aims for 5G include increased productivity, efficiency gains, new opportunities for UK business and higher inward investment. 5G is widely expected to bring about significant opportunities and benefits, delivering not only a step-change in mobile connectivity but opening up much wider opportunities and creating new business models across the economy.

As plans for 5G have advanced, and roll-out becomes imminent, there have been calls from various governments around the world to restrict the use of Chinese equipment (particularly that of Huawei), in the mobile network over security concerns. Some countries have indeed already taken action to restrict the use of Huawei. The UK is currently conducting a review of the telecoms supply chain. As that review concludes, all mobile operators want to ensure that decisions made on vendors that can be used in their networks are proportionate, risk and evidence based.

Assembly has carried out an assessment of what a restriction on Huawei in the telecoms supply chain could have on operators' 5G roll-out plans and subsequently the UK economy. Based on discussions with three of the four operators, it is our estimate that a partial, or full restriction on the use of Huawei could result in a delay to 5G roll-out of between 18 and 24 months. The effects would be felt differently by each operator and across the country, but would be long lasting and impact not only consumers (through disruption to 4G services and delay in 5G benefit), but whole industries. A full restriction would also see operators face additional and significant unforeseen spend on replacing equipment and leave the resilience of the supply chain effectively dependent on only two vendors with a loss in competition that has driven technological progress.

There are various estimates of the impact 5G will have on the UK economy, however the Government assumes that if the UK is leading technology development and deployment of 5G, at the current trajectory, the benefit is estimated to be around £164bn by 2030. Taking the Government's own estimates as a starting point, we calculate the cost to the UK economy of delay in 5G roll-out at between £4.5bn and £6.8bn depending on the severity of any restriction placed on Huawei. This is a loss across the mobile sector, related industries, and the economy at large.

Background

Context and wider current debate

In recent months there has been widespread press and media coverage over countries such as the US, Australia and New Zealand urging caution over relying on telecommunications equipment made by Chinese companies (specifically Huawei), based on security concerns. The US has appeared to be particularly active in exerting pressure on allies to follow its stance. In parallel, the UK Government has been conducting a Telecoms Supply Chain Review. The current conversation about the use of Huawei equipment in telecoms networks therefore has very wide implications for the whole mobile sector and for the future of the UK's economy.

The Government's Telecoms Supply Chain Review

In November 2018, the Government published the terms of reference for its Telecoms Supply Chain Review. The review aims to ensure the security and resilience of UK telecoms networks, quality, availability, and long-term costs of the relevant equipment. The review is considering both market incentives and security risks, likely future scenarios, and any appropriate regulatory and policy action. It is structured around four streams:

1. Economic analysis, to understand the supply chain and the incentives of buyers and vendors;
2. Technical analysis, to identify network security risks, and future requirements;
3. Sector intelligence, to understand the approaches to network security taken by operators and vendors; and
4. International engagement, to take stock of other countries' approaches, as the Government recognises the "global nature" of telecoms supply chain arrangements.

The focus of the review is on the parts of the supply chain relevant to fixed and mobile network security, with particular regard to arrangements and procurement drivers related to terrestrial infrastructure and suppliers for access and core networks. The review was ongoing at the time of writing. Its outcome will inform future Government policy.

The UK's 5G ambitions

The UK Government has on various occasions set out its ambition for the UK to be a world leader in 5G. This was first set out during the 2016 budget, which carried the intention to devise a 5G strategy. This was laid down in detail in 2017: the Government published it in March, and updated it in December of that year. In 2018, the ambitious objectives of the 5G strategy were restated in the Future Telecoms Infrastructure Review; this provided the

roadmap through which the Government aims to foster public and private investment in networks to get 5G off to a good start and ultimately thrive.

The UK has positioned itself to be a global leader in 5G

The Government's 5G strategy of 2017 states that the Government has a clear ambition that the UK should be a global leader in 5G so that it can take early advantage of its potential and help to create a world-leading digital economy. The success of the strategy should ultimately result in three main outcomes:

1. Accelerating the deployment of 5G networks;
2. Maximising the productivity and efficiency benefits to the UK from 5G; and
3. Creating new opportunities for UK businesses at home and abroad, and encouraging inward investment.

The strategy set out a course of actions across several pillars. There are three broader objectives, one of which relates to commercial availability of 5G, and two about coverage. With regard to the former, the Government does not set a strict target; however, in its update to the strategy, it notes there is broad consensus that UK operators should make 5G commercially available by 2020 – something all mobile operators' have announced they will do. In terms of coverage, the Government set two deadlines – one for 'high-quality coverage' where people live, work, and travel to be achieved by 2025; and one for the majority of the population to have access to 5G by 2027.

To make this happen, the Government has made available £740m between 2017–18 and 2020–21, to help bring better broadband (fixed and mobile) for homes and businesses across the UK, boost the next generation of mobile connectivity, and keep the UK at the forefront of the development of the internet of things (IoT). Part of the funding is allocated to a coordinated programme of integrated fibre and 5G trials, to ensure the UK leads the global 5G revolution. The Government also aims to facilitate the roll-out of the necessary infrastructure along railways and motorways by 2025, having recognised that early development and adoption of 5G will initially rely on adequate coverage and availability of 4G networks.

This all demonstrates the Government's awareness of how important it is to foster a quick 5G deployment, and the need to act on the elements which underpin such deployment. All these objectives were restated in the Future Telecoms Infrastructure Review of July 2018, which also highlighted the paramount importance of security and resilience for the telecoms networks of the UK. In the review, the Government noted it expects operators to invest in the security and resilience of the new networks, and build effective supply chain relationships that support this.

Operator’s 5G launch plans

EE

EE has announced that it is switching on 5G sites in 16 UK cities in 2019. The first launch cities will be the UK’s four capital cities – London, Cardiff, Edinburgh and Belfast – and Birmingham and Manchester. As well as the six launch cities, through 2019 EE will also be introducing 5G across the busiest parts of ten more UK cities: Glasgow, Newcastle, Liverpool, Leeds, Hull, Sheffield, Nottingham, Leicester, Coventry and Bristol. The first 1,500 sites that EE is upgrading to 5G in 2019 carry 25% of all data across the whole network, covering 15% of the UK population. EE will launch with multiple smartphone partners, as well as an EE 5G home router with external antenna, to showcase the power of 5G for broadband.

O2

According to official statements, O2 will begin the roll-out of its 5G network in 2019 in the four corners of the UK. Belfast, Cardiff, Edinburgh and London being the first to benefit. Other areas of the UK will see roll-out from 2020 to coincide with the wider availability of 5G handsets.

Three

Three will launch 5G in H2 2019 with a data-only Fixed Wireless Access (FWA) product as part of a £2bn network investment. The initial launch will be in London and other major cities where they see value to be greatest. This forms part of Three’s tiering strategy – to upgrade the busiest sites on its network.

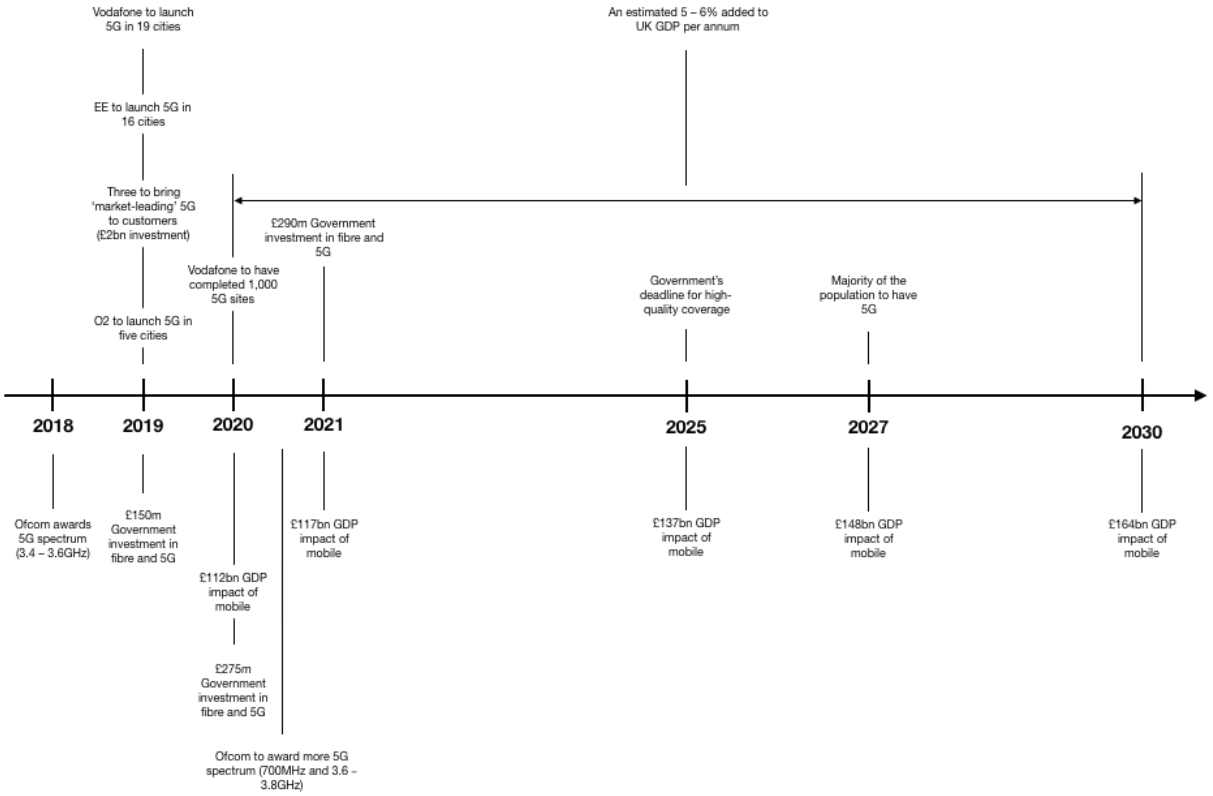
Vodafone

Vodafone’s 5G roll-out is an evolutionary upgrade of 4G infrastructure to deliver 5G. They are already trialling 5G in Birmingham, Bristol, Cardiff, Glasgow, Liverpool, London and Manchester and will be delivering 5G to Birkenhead, Blackpool, Bournemouth, Guildford, Newbury, Portsmouth, Plymouth, Reading, Southampton, Stoke-on-Trent, Warrington and Wolverhampton later in 2019.

Timeline of events as currently anticipated

The figure below shows the timeline of events and expected benefits as currently anticipated.

Figure 1 – Timeline of events as currently anticipated



Source: Assembly

Qualitative Assessment

Impact of a restriction on 5G launch plans

Overview

Within the two main pillars on which the Telecoms Supply Chain Review is based (market incentives and security risks), the Government has set out a broad range of possible outcomes with regard to restrictions on the use of Chinese network equipment (Huawei in particular).

The review's intention is to understand the market to ensure better cybersecurity is achieved, while a diverse and vibrant vendor base in telecoms equipment supply continues to exist. One possibility is that the review finds no concerns that cannot be managed; on the other hand, the Government could opt for either a total ban, or for a partial ban which would require operators to diversify their supply.

UK mobile operators are currently using Huawei in a significant percentage of their networks, however all have committed to only using this particular vendor in the access, rather than the core which is considered to be more sensitive. A restriction or ban of Huawei would be problematic for two reasons. Firstly, the initial wave of 5G technology will largely be an upgrade of 4G; and secondly, there is little interoperability between vendors, which means it is difficult to deploy non-Huawei 5G equipment alongside existing Huawei 4G equipment. A ban would require operators to replace such equipment before they could deploy 5G technology. Therefore restrictions on Huawei for 5G end up becoming restrictions on the operator's 4G technology too, including what operators have already deployed.

A partial or full restriction would have four main consequences:

1. Additional investment required by operators to replace their current equipment;
2. The time required to carry out the above;
3. A reduction in competition in the supply chain which has up until now been good for technological progress; and
4. A significant loss in benefit for consumers and industries reliant on both 4G and 5G connectivity.

Equipment vendors are at different stages of advancement in their 5G development. Excluding Huawei from the market would mean excluding a supplier that is considered to be a leader in terms of 5G equipment. It's estimated that competitors of Huawei would need between nine and 18 months to bridge the technological gap, with inevitable knock-on effects on the advance of 5G for the operators affected. Such a gap would be

unrelated to the severity of a restriction on Huawei. A partial or a full restriction would still mean operators have to wait for Huawei's competitors to catch-up.

Excluding any vendor would also reduce the resilience of the supply chain and erode the competitive aspect among vendors which has so far resulted in a high degree of technological progress.

We estimate this to have an impact on operators' launch plans in terms of timing and costs. As such, we estimate that 5G would arrive in the UK market at least 18 months later than expected, possibly up to 24 months, while operators comply with restrictions imposed.

No restriction

Should the Telecoms Supply Chain Review find there are no concerns that cannot be managed, this would likely lead to the Government leaving the status quo unaltered, thereby leaving operators free to make their choices of equipment in the access network based on existing conditions and arrangements. In practice, this would mean operators will be able to continue to use Huawei equipment for 5G, and will not be required to replace Huawei 4G equipment where in use. This outcome of the review would therefore ensure operators' deployment and launch plans for 5G are unaltered, and in turn that the deadlines set by the Government for its 5G-related objectives do not suffer any delays. This would maximise the chances of the UK meeting its ambition of leadership in 5G and the full range of future economic benefit would be available.

A partial restriction

There have been suggestions a partial restriction is being considered – a cap that would restrict mobile operators from using Huawei's equipment in a certain proportion of their networks. It is currently unclear along which lines the Government could require operators to diversify (e.g. diversification across regions, or within each mobile site). If the restriction were set in terms of population coverage, operators would be likely to prioritise high-density areas, which are also the most commercially attractive. This means that non-urban areas would be left behind, and feel the consequences of a restriction most.

Interoperability issues could also arise under this scenario, if the partial restriction was set out in such a way as to require operators to diversify equipment in their sites. There are difficulties in achieving a joined-up solution by using multiple vendors, not only within a given site but also in the connectivity between sites. This would likely result in operators looking to use one single vendor for each geographical region, to minimise disruption – the consequence of which would mean an uneven 5G roll-out.

We consider a partial restriction on Huawei equipment implemented immediately is likely to delay widespread 5G deployment by around 18 months, taking into account the time needed to replace Huawei equipment and the current gap in technology advancement between Huawei and other vendors.

A full restriction

In the event of Huawei being entirely excluded from mobile operators' radio access networks, operators would have to proceed to replace equipment on all mobile sites where Huawei is used. Our conversations with operators has suggested that this process would likely take at least two years, which means the launch of 5G would be pushed back from the second half of 2019 to 2021 (possibly even longer for one operator).

To deal with this, operators would face additional and significant unforeseen spend. There is also the risk of possible increases in equipment prices due to reduced choice in the market for vendors (possibly as much as 20 – 25% higher than current prices). The additional costs would delay the investments operators have planned for the immediate future.

Aside from the impact on the economy and the industries expected to take advantage of improved connectivity that 5G brings, there could also be a material impact on the 4G network. Given interoperability issues and the upgrade path taken by some operators, a ban on Huawei would entail an extensive 4G replacement which would directly affect the experience of existing users of the network while that replacement programme was carried out.

Impact on growth, competitiveness and investment in the UK relative to other economies

The ambitious plans set out by the Government to make the UK a leader in 5G bring about significant opportunities, with positive downstream effects not only on the telecoms industry (the mobile sector in particular), but also on related, technologically-sensitive verticals which will enjoy the direct benefits of 5G. Should the Government's ambition materialise, these sectors of the UK economy would also benefit from leadership in development and innovation, attracting the first wave of investment and research which could flow to other countries if the UK fails to be the first mover.

Our interviews with mobile operators highlighted that the UK is currently well placed to possibly be the first country to launch 5G at scale in the western world, with any delays resulting in the UK missing the opportunity to be the host of pioneering experimentation. In particular, R&D in the car manufacturing industry would be lost, to the advantage of countries such as Germany and Korea.

Competitiveness

5G is a critical enabler of digital transformation for companies and public services. A slowing down in the roll-out of 5G therefore risks hampering the country's level of competitiveness. In January 2017, the DCMS notes that mobile, IoT and 5G are a "fundamental competitive differentiator", and can provide significant economic gains

through productivity improvements, efficiency of critical infrastructure, enhanced services and new business opportunities.

DCMS highlights the paramount importance of 5G in the creation of new skills, critical for future UK competitiveness and security. In its quantitative assessment, the DCMS considers a position ‘global leadership’, ranked first, that has an assumed impact to the model of +10%. Under the current trajectory, this would fall by 1.23%; further delays to 5G deployment are likely to impact competitiveness even more significantly.

Impact on industries expected to take advantage of the 5G opportunity

Overview

The mobile industry has been working with leading UK businesses – across the construction, retail, heathcare, transport and utility sectors – to partner with them to explore innovative 5G use cases. The use cases are anticipated to bring substantial business benefits by delivering efficiency savings while also having the potential to unlock new 5G enabled revenue streams. While some of these use cases are still in their infancy, and will probably not be widespread in their availability and use during the next 18 – 24 months, decisions are being taken today in terms of investment, tests and trials. Any delay to the availability of 5G will have knock on consequences here and on where leading technology companies decide to locate.

The mobile sector

While 5G will be a considerable enabler of economic benefit across a range of industries, and for the economy as a whole, the importance of 5G for the mobile industry itself should not be underestimated. A report published by DCMS estimates that faster mobile speeds delivered by 4G resulted in an annual increase in GDP by 0.7%, whereas an increase in mobile penetration has a positive impact varying between 0.6% and 2.8% on GDP.

The high-speed, low-latency nature of 5G, combined with the efforts of Government and industry to improve mobile coverage where people live, work, and travel, are likely to have an even higher impact compared to that of 4G. Delays to the adoption of 5G will therefore result in missed opportunities to secure higher speeds and expand the use cases for mobile services, thereby denying a huge opportunity for growth.

Home broadband

5G has the potential to enable mobile broadband to reach fibre-like speeds at lower deployment costs than fibre, which makes it an attractive option for non-urban areas – so called Fixed Wireless Access. Here, 5G-FWA could address the issue of high-speed connectivity in a very effective way. Three have suggested that 5G-FWA will support speeds in the range of 80 – 100Mbps and has the potential to serve about 85% of the

existing fixed-line market in the UK, both in urban and rural areas. It is estimated that deploying 5G-FWA could be cheaper than fibre due to lower civil engineering costs; and crucially, it could also be economical for customers, both financially and practically so.

5G-FWA is likely to be one of the earliest use cases of commercial 5G in the UK; this means that any delay in 5G deployment over the next 18 – 24 months will directly result in missing the opportunity to launch 5G-FWA services later this year. This will have a negative impact on the Government's plans to improve high-speed broadband coverage, especially in the under-served areas; and will inevitably have a downstream negative effect on the businesses and regions of the country that need better broadband to grow and thrive.

Connected and autonomous vehicles

Connected cars are expected to be heavily dependent on the improvements to connectivity brought about by 5G. Without 5G, connected and autonomous vehicles are unlikely to unleash their full potential. The Connected Future report, published by the National Infrastructure Commission (NIC) in December 2016, estimates that connected and autonomous vehicles can bring benefits of about £51bn to the UK economy by 2030, expected to come through improved efficiency, mobility, productivity, and environmental performance. A joint report of the Royal Academy of Engineering and of the Institute of Engineering and Technology issued in November 2015 notes that connected cars will contribute to improved road safety and more effective vehicle maintenance, and ensure drivers plan their journeys better. They also have the potential to provide better transport opportunities for an ageing population or for individuals with disabilities. This would result in combined benefits for sectors such as transport, built environment, insurance, and digital communications, facilitated by effective sharing of data.

Delays to 5G would not only result in these benefits being pushed back, but there is a risk that the UK could lose the leading role it can play in the early experimentation in connected and autonomous vehicles, as the country is well placed to combine potential leadership in 5G with a well-developed car manufacturing industry.

Healthcare

The Five Year Forward Review published by the National Information Board (NIB) in 2015 indicates that technology could contribute to potential savings opportunities of between £8.3bn and £13.7bn a year by 2020 to 2021. This estimate refers to technology enhancements as a whole, which means 5G cannot be singled out; however, industry stakeholders have pointed out 5G is likely to be a major enabler of such savings due to its use-case-centric approach, together with the anticipated coverage and capacity characteristics.

Research published by the mobile operator O2 in March 2018 found that 5G-enabled technology could replace physical GP consultations with telehealth. If there were a reduction by 5%, this would reduce GP visits by 4 million in a year; waiting times would fall and free up about 1 million hours of GP time. O2 estimates a productivity gain of £1.3bn as a result, taking into account reduced absence of employees in a working day. Delaying the

launch and large-scale adoption of 5G by 18 – 24 months would result in the UK missing out on a large portion of such benefits.

Smart cities

The success of smart cities is strongly tied to 5G development. In March 2018, research published by O2 found that the enhanced connectivity of 5G has the potential to unlock productivity savings of about £6bn per year. Households would save about £450 per year in energy, food bills, and council taxes; councils themselves would regain £2.8bn per year due to the introduction of systems such as smart lighting and smart refuse collections, and improved social care. Smart grids would also help reduce road congestion and rail delays; O2 estimates road management systems would translate into a reduction by 10% of the time spent in traffic by vehicle commuters, and £440m reclaimed in lost productivity due to 5G sensors on railway lines. These benefits will all be delayed if 5G is not implemented according to the timescales currently envisaged.

Impact on consumers

Overview

Reduced choice for operators in the market for equipment could have downstream effects for consumers in several respects. 5G's enormous potential to increase capacity means that its delayed arrival on the market could make the UK fall behind other countries in terms of quality of experience of mobile services – consumers would miss out on the benefits that come from the ability to use extra capacity especially in highly congested areas, such as stadiums or stations.

Reputational damage and inward investment

Position in global league tables

The position of the UK in global league tables and rankings was a considerable talking point during the early stages of 4G deployment which have continued to this day and are regularly the subject of media attention. The importance of the UK being part of the early movers is of paramount importance to maintain a strong position in league tables when it comes to 5G deployment.

Inward investment

The Government's own 5G strategy outlines the importance of 5G for encouraging inward investment, having made it one of the three key pillars. The 5G expertise team within DCMS also have within their remit to 'develop a strong UK 5G brand - the 5G Innovation Network - that supports and promotes the development of the 5G sector in the UK and helps to attract inward investment'. The strategy goes on to outline how being at the forefront of the

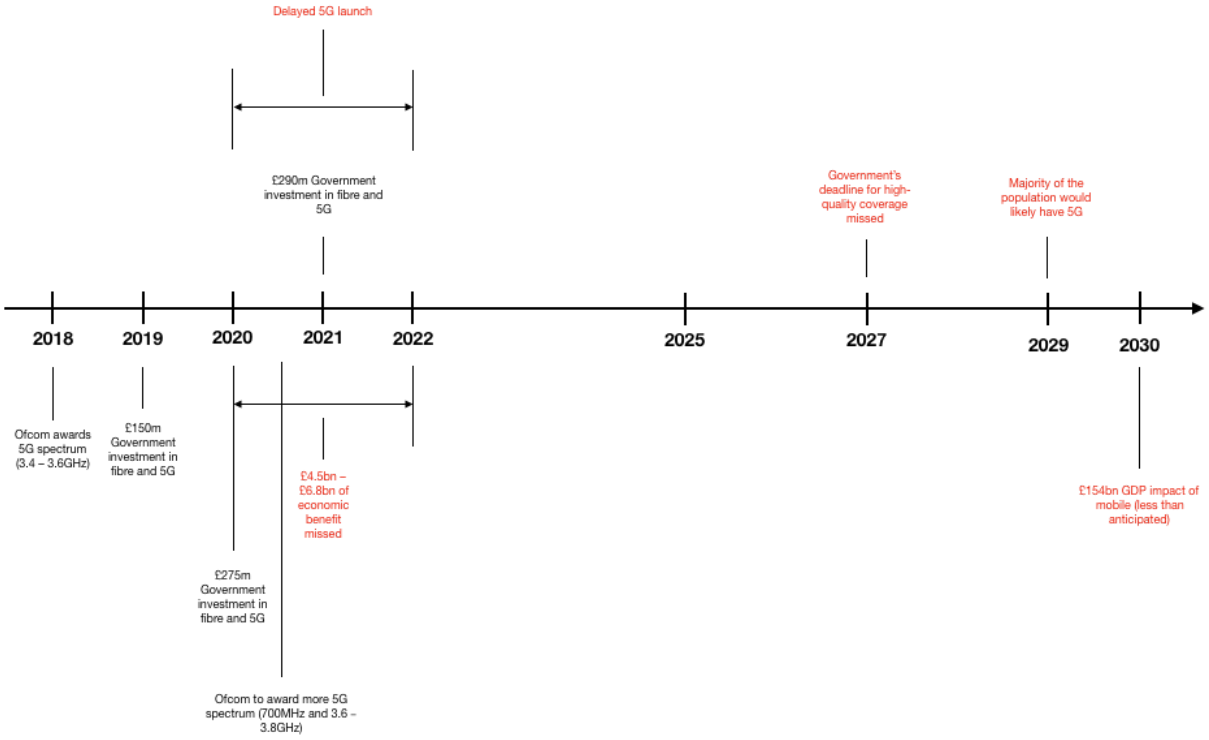
development and deployment of 5G networks will help the UK digital sector compete in global markets for a range of products and services; enhance UK capabilities at home and overseas, and help attract inward investment.

Any delay in the UK operator's ability to launch 5G will undoubtedly have an impact on the attractiveness of the UK from an investment perspective.

Revised timeline in the event of a restriction

The figure below shows what will happen to various milestones if a restriction is imposed on Huawei.

Figure 2 – Timeline of events in the event of a restriction



Source: Assembly

Quantitative Assessment

Anticipated economic benefit of 5G in the UK

Overview

Assessments of the impact 5G will have on the UK economy vary from one estimate to another, particularly given the early stage of 5G development. However, the UK Government has provided indications of just how much it expects the UK to benefit from 5G in several reports and studies.

In the report prepared by the Future Communications Challenge Group (FCCG) on the "UK strategy and plan for 5G & Digitisation", issued by the DCMS in January 2017, it is estimated that the UK GDP impact of the mobile sector would be £112bn in 2020, growing to £198bn in 2030 which would then be 5.7% of the UK GDP. The figure assumes that the UK is leading technology development and deployment of 5G; at the current trajectory, the benefit is estimated to be around £112bn in 2020, growing to £164bn in 2030.

The DCMS concludes that should the UK not maintain leadership in 5G, this would result in missing the opportunity to create £173bn of incremental GDP over 10 years between 2020 and 2030. The Government's 5G strategy confirms this estimate, and concludes that securing the mobile networks necessary for the UK to be at the forefront of 5G will be critical to the growth of the UK economy.

Solely for the mobile sector, the estimated benefit of 5G amounts to £29bn by 2020, expected to go up to £51bn by 2030. Related industries (i.e. the verticals benefitting more directly from 5G) would gain £11bn in 2020, up to £24bn in 2030; and the general economy would see a positive impact of £9bn in 2020, growing to £20bn by 2030. The largest part of the benefit is in productivity improvements, where 5G is expected to help achieve a £63bn benefit in 2020, up to £103bn by 2030.

The economic impact of a restriction

A partial restriction

Should 5G deployment in the UK face a partial restriction in the form we have assumed above, this would reflect in delay, or entire loss of, the economic benefits of 5G for 18 months between 2020 and 2022. Overall, we estimate the size of such loss to be £4.5bn across the mobile industry, the related industries, the economy at large, and productivity improvements.

In particular, £2.5bn of productivity benefits would be lost entirely. The mobile sector would miss out on the opportunity, under a scenario where the UK is a global 5G leader, to generate about £1.2bn; related industries would lose about £478m. The economy at large would miss benefits estimated in the region of £366m. The figures above come from

estimates of the impact on GDP of each industry/variable, with or without 5G. The difference between each of the two scenarios represents the economic benefit of 5G, and the damage coming from failure to secure global leadership.

A full restriction

In the event of a full restriction imposed on Huawei, and 5G deployment in the UK facing a delay of 24 months as estimated above, this would reflect in delay, or entire loss of, the economic benefits of 5G between 2020 and 2022. Overall, we estimate the size of such loss to be of £6.8bn across the mobile industry, the related industries, the economy at large, and productivity improvements.

In particular, about £3.8bn of productivity benefits would be lost entirely. The mobile sector would miss out on the opportunity, under a scenario where the UK is a global 5G leader, to generate about £1.8bn; related industries would lose about £726m. The economy at large would miss benefits estimated around £556m.

Calculations

Table 1 – Economic benefit of 5G

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total (£m)	0	2,190	4,625	7,309	10,262	13,745	17,915	23,883	28,442	30,456	34,392
Monthly		*183*	*385*	*609*	*855*	*1,145*	*1,493*	*1,990*	*2,370*	*2,538*	*2,866*

Source: Assembly, DCMS

Table 2 – Loss of economic benefit of 5G from a restriction and subsequent delay

1 year	2020	2021	2022		
Loss of benefit	0	2,190		**2,190**	**£m**
1.5 years	2020	2021	2022		
Loss of benefit	0	2,190	2313	**4,503**	**£m**
2 years	2020	2021	2022		
Loss of Benefit	0	2,190	4,625	**6,815**	**£m**

Source: Assembly, DCMS

Methodology

Qualitative assessment

- In determining the likely delay to a 5G launch and reliance on Huawei we have had extensive discussions with EE, Three and Vodafone
- We have made use of a number of reports and studies prepared and published by Government

Quantitative assessment

- UK GDP impact change to global leadership - incremental versus current trajectory
- The calculation estimates the global impact with and without 5G and the difference represents the economic benefit of 5G
- If 5G is delayed, the original value (without 5G) is used; the full value of 5G calculated is applied after. This is a conservative assumption and may be a larger impact based on time to implement and a loss of competitiveness
- Values are prorated when a monthly value is required

Confidentiality

- No detailed or disaggregated information has been shared directly between operators that we spoke to as part of this report
- information provided to Assembly was on a confidential basis and only the aggregated outputs have been shared with the operators

General assumptions

- Our assessment is focused on the use of Huawei in the access network, and not the core. It is also only focused on use in the mobile network, and not in the fixed network

Sources

- Huawei Cyber Security Evaluation Centre Oversight Board, Annual Report 2019
- UK Government Telecoms Supply Chain Review Terms of Reference, November 2018

- 5G Wireless Home Broadband: A Credible Alternative to Fixed Broadband, November 2018
- Next Generation Mobile Technologies: A 5G Strategy for the UK, March 2017
- Next Generation Mobile Technologies: An update to the 5G Strategy for the UK, December 2017
- UK Government, Autumn Budget 2016
- UK strategy and plan for 5G & Digitisation - driving economic growth and productivity, January 2017
- National Infrastructure Commission, Connected Future report, December 2016
- Identification and quantification of key socio-economic data to support strategic planning for the introduction of 5G in Europe, European Commission, September 2016

Assembly

If you have general enquiries about Assembly and its work, contact:

Assembly
WeWork
41 Corsham Street
London N1 6DR
United Kingdom

+44(0) 7786 625 456
info@assemblyresearch.com