

### 5G: HOW HAVE WE GOT HERE AND WHAT IS IT?

Telecommunications technology has been rapidly advancing since the 1980s when '1G' (First Generation) telecommunications first emerged. With each succeeding generation, new functionalities have developed – '2G' brought us Short Messaging Services, '3G' introduced internet connectivity, and '4G' made us as widely and swiftly connected as we are today. '5G' is the next generation of this connectivity, and it promises URLLC connectivity – ultra reliable low latency communication – meaning that connections will not drop and the time between a user's action and the web's response will be 10% faster.

5G operates on a higher frequency than previous generations, in what is commonly known as the mmWave. This means that a 5G mast cannot send signals as far as with previous generations, so more masts will be needed to ensure that there is good 5G coverage. As a result, there have been new innovations in small cell technologies, to utilise common items including lamp posts, and bus stops to support the 5G network. Some of this necessary additional infrastructure has fed conspiracy theories about the intrusion and extension of networks. The UK is currently one of the most developed 5G markets in Europe, with the four main operators – EE, Vodafone, Three, and O2 – having already launched 5G services in over a hundred areas of the country.

### WHAT ARE THE APPLICATIONS OF 5G FOR BRITAIN?

To say that the opportunities of 5G are endless might sound like an overstatement, but it is in fact the reality. Although regular consumers may not notice the need for 5G – downloading a film may be faster but for general internet use the increased speed will not be noticeable – the real opportunity with 5G is in industry applications. Imagine a connected world where you can talk to the appliances in your home, drones can deliver your take-away food, autonomous vehicles 'man' the roads, and factories are fully automated. You are just touching on the opportunities 5G presents.

5G has the potential to engage with every industry. Analysts predicting that the 5G value chain will be worth \$3.6 trillion, the global sales opportunity will surpass \$13.2 trillion across multiple industries and that 5G will generate 22.3 million jobs by 2025 (IHS Markit, 2019). The UK must seize this opportunity to place British innovation and ingenuity at the heart of the next digital and technological revolution.

### 5G WILL ENABLE \$13.2 TRILLION IN GLOBAL SALES ACTIVITY IN 2035



**MANUFACTURING**  
4687 BILLION



**INFORMATION AND COMMUNICATION**  
1,569 BILLION



**WHOLESALE & RETAIL**  
1,198 BILLION



**PUBLIC SERVICE**  
985 BILLION



**CONSTRUCTION**  
731 BILLION



**TRANSPORT AND STORAGE**  
627 BILLION



**FINANCIAL AND INSURANCE**  
609 BILLION



**OTHER**  
2,746 BILLION

#### REFERENCE

IHS Markit (2019) The 5G Economy: How 5G Will Contribute to the Global Economy, November 2019

## WHAT SHOULD THE GOVERNMENT DO TO SUPPORT A 5G?

The UK government telecommunications regulator, Ofcom, has already done a lot to support 5G innovations. A second round of 5G spectrum frequencies is going to market auction this year in order to boost mobile internet capacity by a further 20%.

Additionally, the Department of Culture, Media and Sport has been working with partners including UK5G, to support trials around the potential use of 5G in numerous projects and initiatives including 5G CAL, 5G Logistics, Filming with 5G, Green Planet AR, Connected Cowes, Milton Keynes 5G, 5G Create, 5G Ports and more (UK5G, 2021). Throughout 2021 and beyond, the UK government should consider a 5-step investment plan in order to deliver on the 5G promise, to ensure the UK's position as a leader in R&D, and to stimulate more job opportunities across the country.

### INVEST IN ROLLOUT

The UK's four major telecommunications providers have already begun the rollout of 5G, but coverage is still low. The UK government should encourage telecommunication providers to deliver 5G coverage more widely, critically to close the connectivity gap between urban and rural areas so as to deliver equal services and network capacity across the country.

### INVEST IN EDUCATION

Several UK universities, including Surrey, Birmingham City, Bristol, Coventry, and Warwick are working closely with government, enterprises, solution providers, telecommunications and more in order to develop new 5G innovations. The government should incentivise educational institutions to create the 5G leaders of the next decade. This will be vital to ensure the UK is leading the technical innovations making 5G a reality – rather than just following the trends - and it will ensure new opportunities for British business.

### INVEST IN INNOVATION

The opportunities for 5G can be seen in virtually every industry, with manufacturing, ICT, wholesale and retail, public service, construction, and forestry and fishing just a few sectors which will see operations revolutionised over the next decade. The government should continue increasing investment in innovative trials of 5G technologies. 5G is a reality and the technology behind it is established. Real opportunity lies in demonstrating the potential applications of 5G in different industries so as to deliver next-generation services and ensure the UK is a leader in the next phase of the Fourth Industrial Revolution.

### INVEST IN ADOPTION

Once 5G is available, and its utility proven, the UK should incentivise industries to take up the 5G opportunity. Initial plans to boost enterprise connectivity via Private 5G have been launched by Ofcom, however the number of companies investing in 5G solutions is low. In order to boost productivity, create new jobs and support industries for the challenges of the 21st century, the government needs to incentivise technological adoption and ensure the sustainable growth of industries.

### INVEST IN TECHNOLOGIES

5G as a technology does not exist in isolation. There are a number of other innovations which will ensure the potential of 5G is met and will support the full digitisation for the Fourth Industrial Revolution. AI, IoT, quantum computing, and blockchain are just a few of the technologies that have the potential to completely reshape our future. As with 5G, which will elevate the opportunity for many of these innovations, the government should invest in these technologies and the people behind them, to ensure the UK plays a role in redefining the world as we will know it.

### REFERENCES

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UK5G (2021) 5G Projects, Testbeds and Trials in the UK, Current DCMS-funded projects, <https://uk5g.org/discover/testbeds-and-trials/>