



**A STRAIGHTFORWARD GUIDE TO 5G:**

# HEALTH & SOCIAL CARE

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MAY 2022

# INTRODUCTION

Few sectors, if any, have been subject to as much sweeping change—and strain—as health and social care. In the wake of the Covid-19 pandemic, employees worked tirelessly on the frontlines, saving countless lives and embarking on an impressive accelerated digital transformation.

But despite significant progress, connectivity is still a major problem for the sector and far from the only challenge it faces. Currently, 70% of the NHS budget is used for long-term condition management due to the UK's ageing population and rise in complex comorbidities. In social care, too, demand for services is increasing, and there are significant concerns around recruitment and digital skills.

5G could play an important role in tackling these challenges. Digital technologies can support more people-centric care, a transition from a reactive to a preventative model, and move the delivery of care from clinics to communities. Unlocking the efficiency, resilience and flexibility required to meet the UK's ever-growing health and social care needs.

This guide has been designed to demystify 5G, helping organisations understand exactly what 5G is, what it does and why it's important. We've tried to keep it as jargon-free as possible but if you find yourself confused, we've included a handy glossary.

## What is 5G?

5G is the 5th generation of mobile technology, following on from 4G. In the same way that mobile phone technology develops with each new handset that is introduced, the technology and equipment that forms the telecoms network updates too.

5G is one of the fastest, most robust technologies the world has ever seen. That means quicker downloads, much lower lag and a significant impact on how we live, work and play.

The UK is one of the most technologically advanced countries in the world and 5G is the natural next step in progressing our society's digital journey. With increased connectivity and capacity it opens up the potential for new, innovative services for both individuals and industry. Already, through trials, we have seen the transformative benefits for all areas of health and social care including prevention, diagnosis, screening, medical treatment, independent living, logistics, operations and infrastructure.


## How is 5G different from other Gs?

5G is not just "4G but a bit quicker". Instead, it is a total remodelling of the mobile system: 5G is completely digital, bringing greater flexibility and new opportunities. The 5G's extra bandwidth also facilitates the capability to use larger amounts of data—reliably, with almost zero lag, at a rate that is up to 20 times faster than 4G.

Don't believe it can be *that* much better? Ultimately, 5G will be able to deliver:

- Handles up to 1,000 times higher data volumes than 4G
- Supports 10-100 times more connected devices per km<sup>2</sup> than 4G
- Enables data speeds 10-100 times higher than 4G
- Reduces latency by around 5x compared to 4G technology
- Enables up to 10 years of battery life for low power, machine-type devices

These numbers are based on an optimised stand-alone 5G network (basically, the all-singing, all-dancing 5G) and that isn't available for all instances and uses quite yet. We're at the start of



WHAT IS 5G?

the 5G journey but understanding what it's building to can help organisations understand exactly how it might be able to help them.

A better performance, however, is not all it offers: 5G networks' systems and power are also based on standard computer chips, which because of economies of scale makes it cheaper than custom equipment.

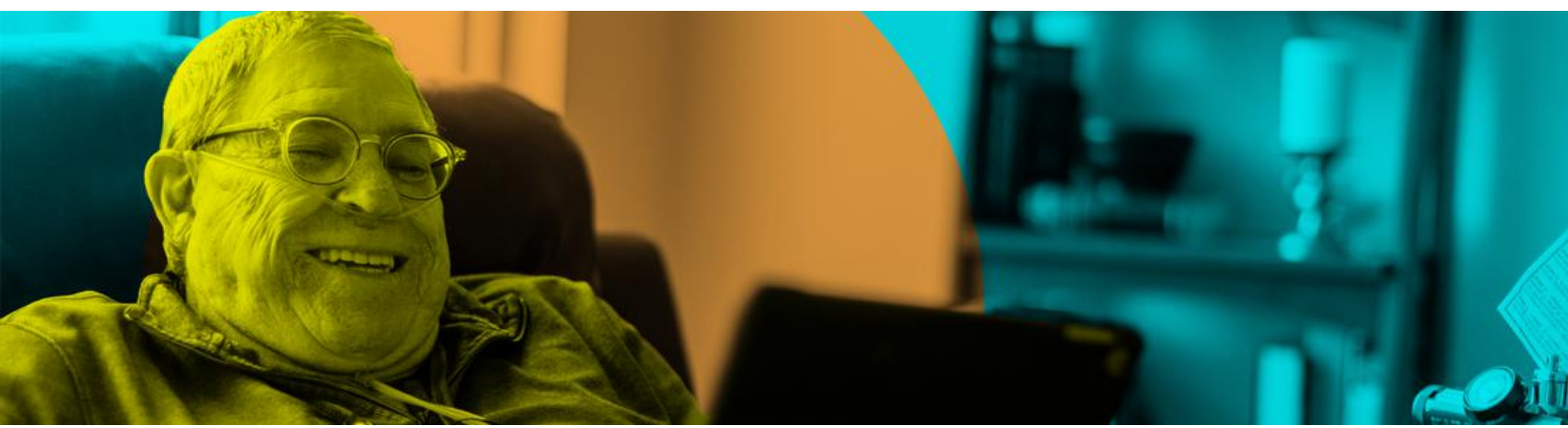
### **How is 5G different from Wi-Fi?**

5G and Wi-Fi complement each other but there are several advantages to 5G, some of which are listed below:

- 5G will be the designated choice for outdoor networks: the early business cases include connected vehicles, remote-operation of cranes and HGV, and drones.
- 5G can be deployed using the original 2/3/4G sites, making the deployment costs can be lower than Wi-Fi.

- 5G is optimised for coverage: since the licensed spectrum allows higher transmit power, the coverage of 5G Small Cells is usually 100 to 300 metres, which is larger than the coverage of indoor Wi-Fi (usually within 50 metres).
- 5G has more advantages in anti-jamming, reliability, low latency, and multiple connections. Ideal for CCTV security feeds on public transport, or anything relating to worker safety.

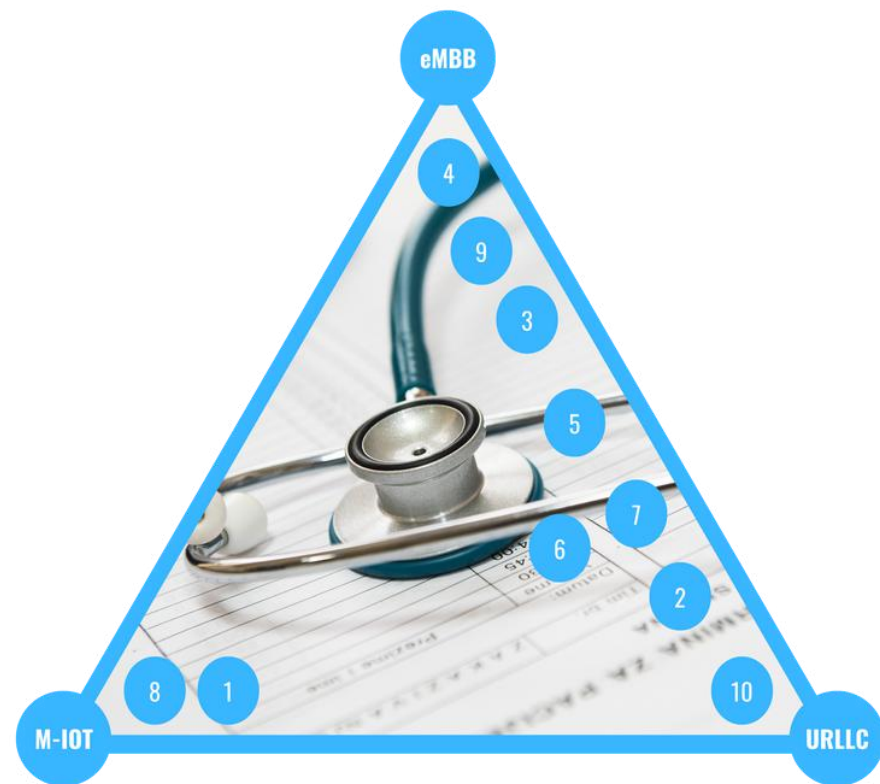
When thinking about 5G, there are three key pillars that people tend to speak about: Extended Mobile Broadband, Massive Internet of Things and Ultra-reliable, Low Latency Communications. Head to our glossary for definitions or read the diagram below, which explains by way of use cases.



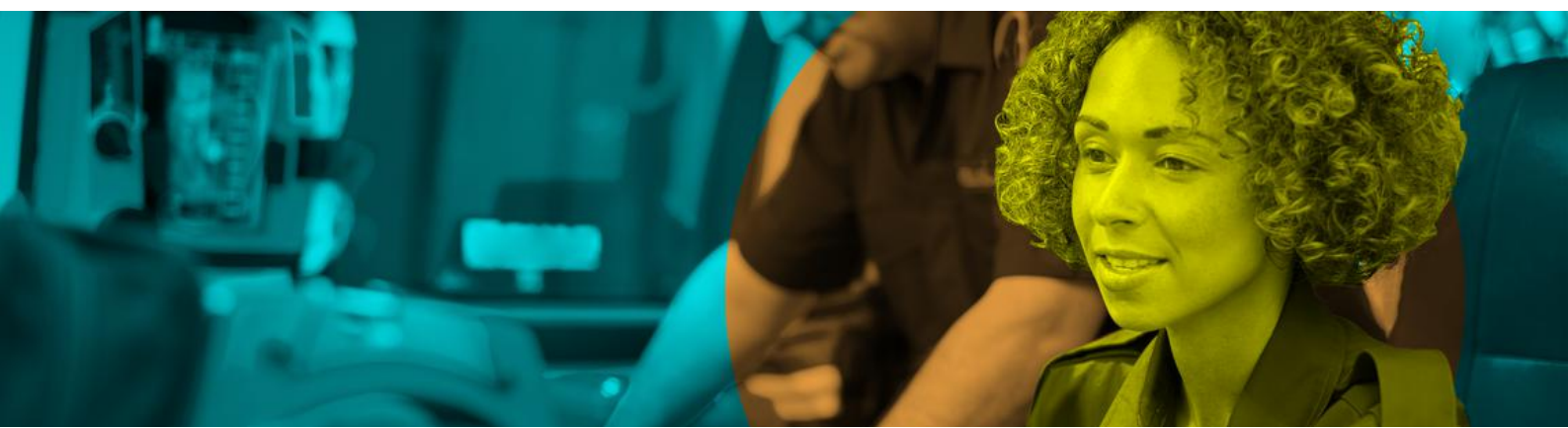
## What can you use 5G for?

Hopefully, now you know a little bit more about what makes 5G tick, but why is that important to health and social care? With its impressive capabilities, 5G provides an opportunity for the sector to access digital tools, skills and resources that will empower its staff to change how and where they deliver care, making the everyday less laborious and more rewarding.

**Enable more inclusive, accessible care for all:** 5G's increased bandwidth and reduced latency supports multiple technologies and services at the same time, over the same network. For the NHS, video-streaming and the sharing of medical imagery in real-time enables long-distance consultations, training, collaboration and support—driving efficiency, reducing costs and pollution associated with travel while ensuring patients are seen in a timely manner, in an environment that suits them.



1. Mass patient monitoring
2. Remote robotic surgery
3. Video consultations / supporting medication adherence
4. Rapid transfer / download of GB sized files
5. Digital solutions to tackle loneliness & social isolation
6. AR/VR - Training / remote assistance / patient treatment
7. Less invasive & resource intensive diagnostic techniques
8. Connected Hospitals - high density of sensors
9. Connected ambulances
10. Drone delivery of organs, blood & medical supplies



In social care, 5G supports many sensors that can be used by care workers to monitor welfare and health in the community for both patients and the vulnerable. This ensures essential services can not only continue as 2G, 3G and analogue connectivity is phased out, but also be expanded to support medication adherence, predictive monitoring and tools to tackle social isolation and loneliness.

5G enables the creation of private networks, either within hospital settings or communities, making services accessible to all, and offering a more affordable alternative to high bandwidth charges over commercial networks.

**Supporting emergency care to better outcomes:** In emergency scenarios, time is one of the most important factors in determining patient outcomes. 5G's high bandwidth and low latency allows paramedics to transfer huge amounts of data, including ultra high quality video, in real-time to experts at hospitals.

Experts can guide paramedics to deliver more complex care at the site of an emergency and hospitals in turn can prepare more effectively for a patient's arrival. This can help secure better patient outcomes and decrease the number of patients who need to be referred to the hospital for further treatment. This is significant because prolonged stays in hospitals have a negative impact on general wellbeing, particularly amongst older people - and cost the NHS £400 a night.

**Improved diagnosis and screening:** 5G's high bandwidth and availability promise quicker and more advanced diagnosis. Results (including huge image files) can be shared with healthcare professionals in real-time, 5G-powered augmented reality and artificial intelligence can facilitate more complex diagnoses, providing a level of insight to healthcare professionals not previously possible. Patients can even conduct less invasive procedures from the comfort of their own homes, helping to tackle long waiting lists and improve efficiency.



**Driving operational**

**efficiencies:** 5G can also help support the broader running of health and social care facilities, driving efficiencies and ultimately enabling workers to spend more time working with individuals. For instance, the high bandwidth of 5G enables the monitoring and tracking of buildings, people and the assets in them, decreasing time spent looking for items and wastage (the NHS spends £14m each year, for instance, replacing unreturned or lost crutches).

Operationally, this data can be used to inform predictive maintenance of telehealth equipment, sensors and more, ensuring care can be consistently delivered.





# LIVERPOOL 5G

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In 2016, Liverpool City Council became concerned that Liverpool's analogue telephone line system was going to be switched off. The city wanted to introduce digital technologies, allowing people to live and flourish independently at home but it soon became apparent that the added cost of digital was going to be almost prohibitive. A private 5G network allowed the council to take back control.

By providing free, reliable connectivity - a key barrier to the adoption of technology in public services - Liverpool 5G has demonstrated the benefits of affordable connectivity to those for whom data charges and current connectivity costs are prohibitive, whilst reducing costs and saving clinicians' time for stretched healthcare services like the NHS. The project's transformative use cases include a remote urine monitoring tool, a device to diagnose and monitor pressure ulcers, and telehealth services that improve services for users and reduce costly and unnecessary home visits from healthcare providers.

Ann Williams, Commissioning and Contracts manager for Adult Social Services at Liverpool City Council, said: "5G connectivity has also improved the quality of our services. New technologies—such as automation and augmented reality—allow us to monitor patients at home, which takes the pressure off the health and social care sector."

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## 5G CASE STUDY



"We first introduced a LoRaWAN Gateway but found that it was unable to support voice; this meant that if somebody had fallen over in their home and alerted for help, they were unable to then explain the issue, which was incredibly frustrating. Our private network offers far more flexibility."

## Looking for more?

Hopefully, this simple guide to 5G has been useful. For more information, please visit our UK5G hub, where you can find more examples of deployment and if you'd like to be connected to companies currently using 5G, feel free to get in touch at [hello@uk5g.org](mailto:hello@uk5g.org).



## Glossary of useful technical terms

Technical terms used in and around the world of 5G, listed alphabetically

### **Augmented Reality / Virtual Reality:**

Augmented reality is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities. Virtual Reality goes one step further, seemingly taking the viewer into a different world or environment in an immersive way. 5G networks will facilitate greater use of this through expanded network bandwidth and low latency, meaning more immersive experiences and no more feeling sick when you wear a headset.

**Cell tower:** A cell tower or cell site is a cellular-enabled mobile device site where antennae and electronic communications equipment are placed—typically on a radio mast, tower, or other raised structure—to create a cell in a cellular network.

**Cloud:** IT parlance, a data centre where applications are hosted.

**Devices and Sensors:** These are the next step in the data or signal journey, developed to handle the new loads required by faster and increased data signals.

**Enhanced Mobile Broadband:** eMBB is, in simple terms, an extension of services first enabled by 4G networks that allow for a high data rate across a wide coverage area. Basically, allowing more data to be transferred. eMBB provides the greater capacity necessary to support peak data rates both for large crowds and for end-users who are on the move.

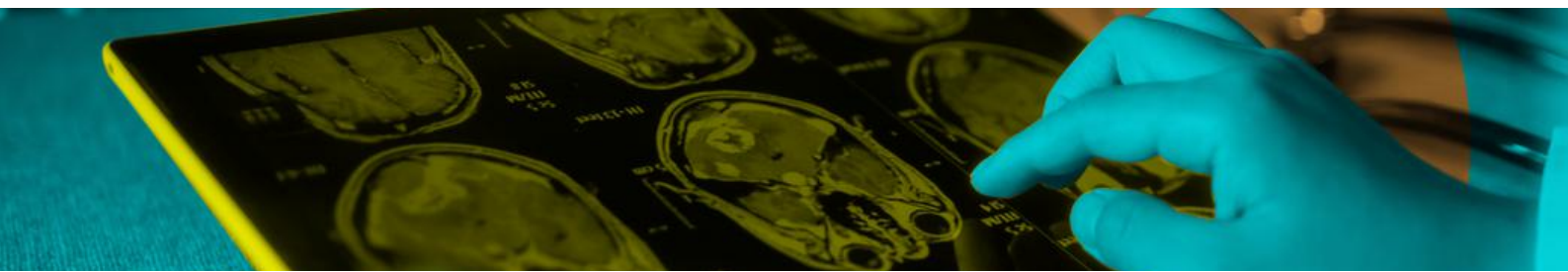
**IoT:** The Internet of Things describes physical objects that are embedded with sensors, processing ability, software, and other technologies, and that connect and exchange data with other devices and systems over the Internet or other communications networks. This could be anything from a smart fridge in your home to a monitor in a care home that alerts staff to the fact a resident is getting out of bed.

**Non-standalone network:** Non-Standalone (NSA) 5G is the model of deployment where 5G services are provided without an end-to-end 5G network. This means that the network will rely on some previous generation (4G LTE) infrastructure.

**Massive IoT:** communications between different machines, deployed at a large scale. This capability enables Internet of Things deployments and rollouts of sensors across sites, including large distributed sites. Sometimes also referred to as Massive Machine Type Communications.

**Network Latencies:** Used to indicate any kind of delay that happens in data communication over a network. The longer the latency, the more “laggy” an experience, such as Augmented Reality or mobile gaming will feel, and the more the user has a disconnect between taking an action and seeing the result of that action.

**Private Networks:** A private network is a restricted, personal network that can be deployed in a particular location or across multiple connected locations. This type of network can be configured in such a way that devices outside the network cannot access it, meaning you can set up the network exactly how you want it and can always guarantee bandwidth. Imagine, for instance, a local authority might want to set up a private network covering a particular community or area.



**Standalone network:** A network where the 5G radio connects directly to a 5G core providing full end-to-end 5G architecture with no reliance on 4G infrastructure. These networks will deliver the full 5G experience.

**User device:** A UE is a piece of end-user hardware such as a smartphone or modem that can connect to the cellular network.

**Ultra-Reliable Low Latency Communications:** URLLC is a set of features that provide low latency (high refresh rate) and ultra-high reliability for mission-critical applications such as industrial internet, smart grids, remote surgery and intelligent transportation systems.

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