

# HEALTH & SOCIAL CARE: HOW DATA PRIVACY CAN BE EFFECTIVELY MANAGED VIA 5G NETWORKS



**UK  
5G**

**Innovation  
Network**

# INTRODUCTION

**5G enables a layer of insight not previously possible, for a smarter delivery of care. The increased bandwidth and reduced latency of 5G networks allow for the support of multiple technologies and services at the same time, over the same network, and at lower latency speeds than ever before. This can facilitate a shift in the provision of care from the clinic to the community, changing how and where health and social care services are delivered.**

Enhanced layers of analytics facilitate the capture and analysis of metadata, which can be used to drive efficiency and help prevent bottlenecks in health and social care systems. In addition, this data can provide insight into large-scale medical emergencies or emerging trends, helping to tackle national incidents such as the COVID-19 pandemic.

But a core part of the duty of care—and a vital concern for the sector as it embraces digital transformation—is that the protection of personal data is fair, lawful and transparent, with policies on confidential data seeking to strike a balance between safeguarding patient information and the use and sharing of records to improve care, for instance for research purposes.

With new security standards built into 5G, the sector can confidently deploy networks to power more intelligent, secure and privacy-compliant data management processes.

Of course, patients also need to be reassured that their data will be treated with sensitivity and caution. Frontline workers may find it helpful therefore to understand both the benefits of 5G and how data privacy can be effectively managed via 5G networks, so they can address any concerns that may arise at the point of care. Our work is looking to support this need, helping the health and social care sector to understand the power of 5G while building confidence and facilitating deployments.



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## THE POTENTIAL ROLE OF 5G IN HEALTH & SOCIAL CARE

This section explores the significance of data privacy through use cases, showcasing that 5G's greater bandwidth and reduced latency can enable the transfer of personal data required.

### a/ Connected Ambulances

In health and social care, reliable, consistent connectivity can very easily become a matter of life or death—and at the very least, it can affect a patient's healthcare outcomes. And when it comes to emergency care, timeliness in the delivery of care is clear. Connected ambulances have been successfully trialed in the UK and further afield, where 5G connectivity and the latest medical technologies enable staff to share a patient's vitals and symptoms with the hospital as well as access patient medical records, all in real-time. High-resolution video calling between the ambulance and hospital gives doctors a better understanding of the situation.

Working with the University Hospitals Birmingham NHS Foundation Trust, the [West Midlands 5G programme](#) conducted the UK's first demonstration of a remote-controlled ultrasound scan over a public 5G network.

The demonstration simulated a paramedic performing an ultrasound scan on a patient, under the remote guidance of a clinician who was able to interpret the ultrasound image in real-time. The ultrasound sensor was manipulated locally by the paramedic under the remote direction of the clinician, who used a joystick to send control signals over the live 5G network to a robotic or 'haptic' glove. This created small vibrations to direct the paramedic's hand, allowing the clinician to remotely control the sensor position and see the ultrasound images in real-time.

Enabling ultrasound scans to be performed by paramedics with a remote live diagnosis can bring several advantages to both patients and the NHS. In addition to speeding up diagnosis, the technology could reduce the number of ambulance journeys and hospital visits, freeing up resources. Crucially, scans performed in the field can enable faster diagnoses, ensuring more effective outcomes for the patient and increasing overall efficiency for the hospital.

The benefits of being able to monitor a patient's condition remotely and potentially start their treatment immediately, are clear to understand. With potentially large amounts of patient data being transferred from the field to a hospital, NHS and Ambulance Trusts need to have confidence that their connectivity is not only reliable but secure.

## b/ Telemedicine

5G's high bandwidth and low latency can also facilitate continuous real-time monitoring of people in their own homes through sensors, contactless sensing (using ambient wireless signal around users) and wearables, enabling potential issues to be identified and resolved before they become emergencies. This data can be accessed by all those providing care, including family, and reduce unnecessary GP appointments, district nurses and hospital visits—while providing greater data and insight than would be possible through a daily visit or weekly appointment.

With increased quality and timeliness of care, remote monitoring can have a positive impact on individuals' lives, offering them greater independence and confidence in their own homes, increased flexibility in their daily lives through not having to wait in for care visits, and a reduced need to explain their care and support needs, outcomes, and experiences multiple times.

But, of course, this is very personal information: if it were to get in the wrong hands, this would not only open up care providers to legal action but bad actors gaining access to the data could jeopardise an individual's wellbeing and access to care. Security of any connectivity solution is therefore paramount.





## 5G'S SECURITY CREDENTIALS

5G offers advanced security compared to previous cellular generations, providing confidence to health and social care providers. Cellular connectivity solutions also offer an element of certification on both the network and device side, offering additional assurance compared to Wi-Fi.

3GPP—the body which sets the standards for cellular connectivity—has built additional security credentials into the standards for 5G, which significantly enhances the protection of subscriber privacy and makes it harder for attackers to correlate protocol messages and identify a single subscriber.

It is important to note that the data is collected and stays with the creator of the data (for example, the person monitoring the patient). This means that, if the machine learning process identifies an anomaly, it will first be shared with the creator. Then, based on the permissions the creator has provided, the information can be shared elsewhere (for example, with the NHS or their care network such as a family member).

This privacy preservation technology is deployed by distributed ledger technology, which offers an immutable, transparent, secure and auditable ledger to verify the integrity and traceability of information/assets during their life cycle.

Through this technology, the data is only accessible to authorised users; anyone can see what transactions are taking place but not the data itself. 5G can also facilitate the distributed ledger technology, which in essence is built on a network that relies on frequent message exchanges between agents.

“The mechanism is untouchable. It cannot be broken,” said Muhammad Imran, Professor in Communication Systems at the University of Glasgow.

Another emerging concept is the development of federated learning solutions: a lot of learning happens locally with live data but the models are shared globally. In this scenario the data is not being transferred but rather, the knowledge is (essentially, the data is the personal property of the individual but learning from the data can be converted into a model).

Reassuring patients is essential; if people do not trust new solutions, the benefits 5G promises cannot be realised. As with any technology, there are risks but they are very small—significantly less so than with previous cellular generations—and outweighed by the benefits. In the same way that millions of people trust online banking, individuals can feel confident that their data is secure, only visible to those who are authorised to access it, and their privacy will therefore be protected.

## Using 5G to Creatively Tackle Data Privacy Concerns

The sector—and patients—can feel confident in 5G's ability to safely handle sensitive and confidential data.

Building on this, 5G networks in the future could be used in other, innovative ways to monitor people's activity, providing an alternative approach to data privacy.

A 5G-enabled sensor can detect both macro and micro activity: for example, an older person's at-home movements, without placing a visual camera in the room, which people may feel is an invasion of their privacy. The subtle changes in the wireless channel can even pick up a change in a breathing rate or heartbeat, providing a strong indicator of a patient's health.

The [5G New Thinking](#) project recently successfully demonstrated this with people who live independently but need additional support.





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