



**A STRAIGHTFORWARD GUIDE TO 5G:**

# TRANSPORT & LOGISTICS

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# INTRODUCTION

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Be it by rail, road, sea, inland waterways, pipe or air, the transport and logistics sector is the linchpin that keeps the UK moving. In fact, as an island nation, the movement of goods—or logistics—is critical to our very existence. The movement of people—or transport—racked up 873 billion passenger kilometres in 2019, according to the Department of Transport.

But the transit of people and goods in a post-Covid, post-Brexit world is more complex than ever before, with evolving consumer demands and behaviours, rising costs and shrinking margins.

To succeed and thrive, organisations need to become more resilient, agile and productive. 5G—and the digital technologies it powers—can be the key to unlocking a more efficient, sustainable future for transport and logistics.

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.

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TRANSPORT  
& LOGISTICS

## 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 sectors in the transport industries including the movement of people, movement of goods, infrastructure and operations.

## 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 network'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.





1. Autonomous vehicles
2. Vehicle platooning
3. Ultra Hi-Def Video: Traveller Security & Safety
4. Download a GB in a second: Traveller Experience
5. Smart City Cameras: Traffic Management
6. Travel Assistance: Realtime freight optimisation
7. AI & Machine Learning to intelligently analyse large volumes of data
8. V2X - intelligent transport systems
9. Drones flying behind the line of sight
10. Teleoperation - from vehicles to unloading cranes at ports
11. Optimisation of last mile delivery e.g. curbside parking availability
12. Asset track & trace / Condition Monitoring

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## 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 the transport industries? With its impressive capabilities, 5G networks can enable an efficient and sustainable transport and logistics sector amid the difficulties of trade post-Brexit and a pandemic.


**Unprecedented insights for smarter operations:** 5G provides a layer of insight not previously possible: enabling smarter, more productive operations. Its high bandwidth capability allows for a greater density of sensors that can be deployed on road networks, transport modes and goods, meaning more data—and with machine learning, greater and quicker insights and analysis. Monitoring occupancy levels on public transport can facilitate dynamic scheduling, improving passenger experiences and optimising costs while smart rerouting can minimise delays and optimise journeys.

While 5G can mean the difference between tracking a shipping container and tracking every item in the shipping container, taking the guesswork out of logistics.

In terms of infrastructure, 5G is capable of real-time collection of huge environmental data sets, powering digital twins that can simulate entire ports, airports, rail networks or potential changes to a transport network.

**Support safer and more efficient travel across land, sea and air:** 5G's increased bandwidth and reduced latency enable high-quality video monitoring, vehicle-to-everything (V2X) communications and real-time control of operations. Operators can better monitor vehicle and railway safety; in addition, intelligent control systems can redirect traffic in real-time away from traffic or hazards, advise on optimum speeds to reach green lights, and prioritise emergency services traffic and delivery vehicles.



A worker in a white hard hat and a high-visibility yellow safety vest is standing on a port or construction site. He is holding a mobile device in his right hand and pointing with his left hand. In the background, a large blue container is being lifted by a crane. The scene is set against a bright, clear sky.

V2X communications can help to protect all road users—especially the most vulnerable—with cyclist and pedestrian alerts, notifications of accidents ahead, junction assistance and ultimately, cooperative manoeuvres between autonomous vehicles.

Drones can also be deployed to conduct vital safety inspections and checks to ensure the safety of passengers and minimise dangers to workers—critically with 5G's low latency, drones can be safely operated beyond the line of sight. Increasing efficiency, reducing disruption and ensuring safer journeys for everyone, no matter your mode of transport.

**Reduce environmental impacts:** Like all sectors, transport and logistics has a duty to reduce its environmental impact. 5G can play an important role, with its ability to power sensors and connected IoT devices that can monitor, calibrate and adapt transport systems. Intelligently controlling traffic to ensure vehicles aren't held in queues and optimising freight routes can ease congestion and idling, helping to reduce CO2 produced by traffic jams. Similarly, predictive maintenance can ensure vehicles are kept in premium conditions, associated with less hydrocarbon, carbon monoxide and nitrogen oxide emissions. Remotely controlled drones for last-mile deliveries could further reduce road miles and subsequent carbon emissions.

**Futureproof transport & logistics:** In a digital-first world, with smart vehicles, cities and depots, 5G supports the volume of data that needs to be shared, at speed, between vehicles, rolling stock, ships, aircraft, infrastructure and people. In addition, while self-driving vehicles still require a human safety driver, the low latency and ultra-reliability of 5G allows for a single operator to manage multiple vehicles remotely, helping to tackle skills gaps and reduce costs. 5G also enables the experiences that passengers expect,

powering digital technologies and providing information in a highly personalised, real-time manner over a reliable connection—improving accessibility, increasing passenger numbers and boosting confidence across multi-modal journeys in the process.

**Improve connectivity with a single, scalable, dynamic network:** 5G enables organisations to create a universal, flexible network across physical locations, rather than assorted networks and inconsistency or patchy connectivity. This makes it easier to manage networks holistically and grants access to third parties in the case of remote maintenance, training or security. Compared to existing solutions, 5G also makes it easier to share data across multiple sites and organisations. This supports seamless collaboration and innovation, helping to close the skills gap in logistics management and level up the UK's transport and logistics sector as a whole.





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# 5G CASE STUDY



# WEST MIDLANDS 5G (WM5G)

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Working with West Midlands Metro and GoMedia, West Midlands 5G (WM5G) is exploring how 5G connected trams can create better passenger experiences aboard the region's public transport. Trams collect a variety of valuable information, including CCTV footage and tram performance and maintenance data. Currently, this information is accessed and downloaded manually, outside the hours of operation. To improve this process, the team equipped a tram with a 5G solution that, due to increased bandwidth, allows high-definition CCTV footage captured on the tram to be securely and remotely transferred to the Regional Traffic Control Centre while in operation.

Confidence in public transport took a hit amid Covid-19; there are also several other factors that can impact willingness to use services, such as broken air conditioning, damaged seats and anti-social behaviour. Traditionally, it has been difficult to report these issues which can discourage passengers from choosing public transport options. But the deployment of a 5G-enabled reporting process ensures passengers can feel safe and satisfied with their journeys. Issues can be shared in real-time, through urgent notifications sent to onboard staff and the Regional Transport Coordination Centre. The onboard connectivity can also be used by passengers to further improve and optimise their travelling experience.

WM5G is also using a 5G network to manage passenger numbers at stations and onboard transport, which can help improve passenger confidence and comfort. 5G-enabled video data learning is harnessed to boost traveller experience and ensure alignment with passenger health and safety measures, through enhanced accuracy of occupancy assessment to provide better information to travellers and operators.

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## 5G CASE STUDIES

While the project has initially been delivered on buses, there is the potential to extend it to other services, such as tram and rail.

In addition, WM5G has deployed a number of solutions to monitor and optimise traffic throughout the region, which is home to some of the UK's busiest and most congested roads. Firstly, vehicle counting sensors with 5G connectivity were installed on two roads in Solihull with a high variety and density of traffic, for live traffic monitoring. Thanks to 5G and its much faster upload and download speeds, one network can sustain higher-quality processing or process a greater number of feeds — creating more comprehensive datasets than those currently possible with 4G. The data gathered enables the development of state-of-the-art prediction models which can be used to more accurately forecast traffic flow and help to manage congestion.

## 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 temperature monitor on a tram.

**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 Internet of Things:** 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. Also sometimes 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 port or airport might want to set up a private network to cover the entirety of its site



**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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The logo consists of the text 'UK' stacked above '5G' in a bold, white, sans-serif font, contained within a white square. The background of the entire page is a photograph of a worker in a high-visibility vest using a tool, with a blue and purple color overlay.

**Innovation  
Network**