UK 5G Innovation Network

A STRAIGHTFORWARD GUIDE TO 5G:

CREATIVE INDUSTRIES

MAY 2022

Creative
INDUSTRIES

INTRODUCTION

In 2019, the creative industries contributed £115.9bn of value to the UK economy: that's greater than the automotive, aerospace, life sciences and oil and gas industries combined. But the sector is facing mounting pressure amid ever-shrinking budgets and an increase in expectations—audience demands have evolved and more sustainable ways of working are now required.

5G could play an important role in tackling these challenges. By 2025, 57% of global wireless media revenues will be generated using 5G networks, with Intel's 5G Economics of Entertainment report forecasting that 5G could bring $1.3trillion in new revenues for the media and entertainment industry by 2028.

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.

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 creative industries including broadcast and production, heritage sites, tourist destinations, as well as live sports and entertainment.

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 km² 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 the 5G journey but understanding what it's building to can help organisations understand exactly how it might be able to help them.

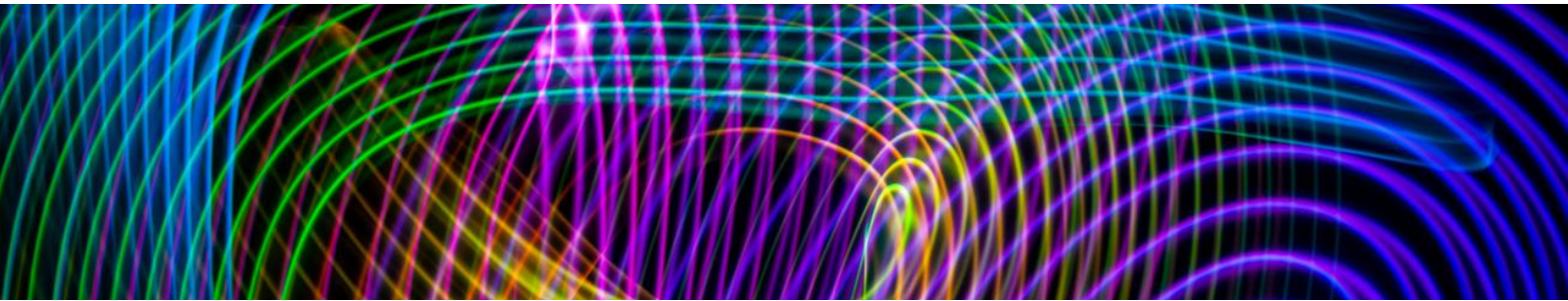
A better performance, however, is not all it offers: 5G networks' systems and power are also based on standard computer chips, which because of economies of scale makes it cheaper than custom equipment.

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 remote broadcast and production, and augmented and virtual reality experiences at outdoor tourist and heritage sites.
- 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 can be deployed using the original 2/3/4G sites, making the deployment costs can be lower than Wi-Fi.
- 5G has more advantages in anti-jamming, reliability, low latency, and multiple connections. Ideal for manufacturers needing optimised security and safety of workers around cobots.

When thinking about 5G, there are three key pillars that people tend to speak about: **Enhanced Mobile Broadband**, **Massive Internet of Things (MIoT)** and **Ultra-reliable, Low Latency Communications (URLLC).** Head to our glossary for definitions or read the diagram below, which explains by way of use cases. These three pillars tend to work on the basis of trade-offs between each other. For instance, to achieve the lowest possible latency, you may need to reduce the number of things you can connect, or reduce the data speed.



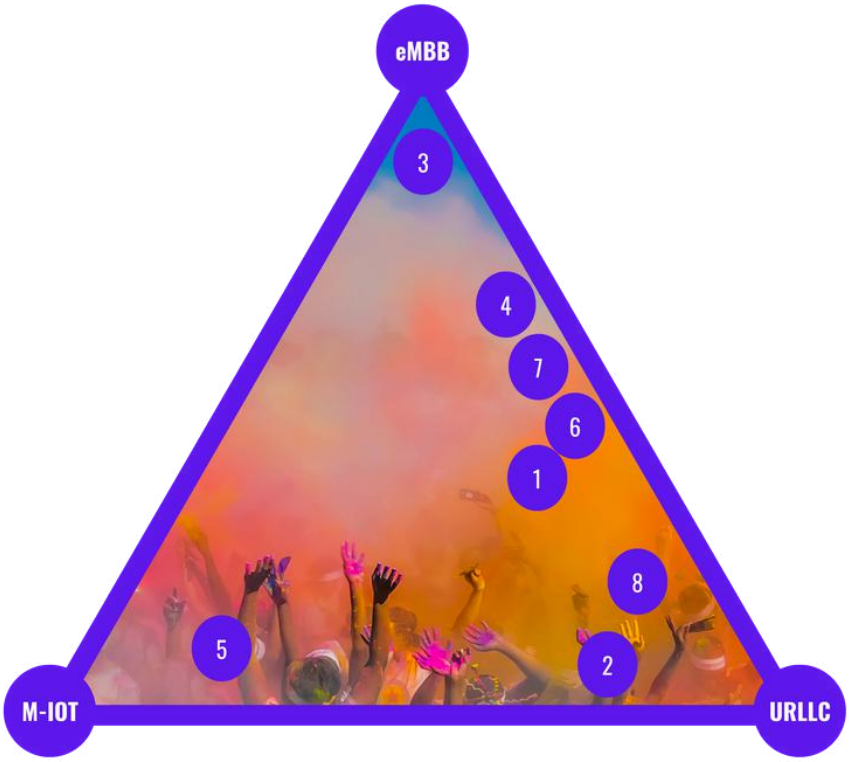
ON LOCATION WITH THE 5G LIVE+WILD PROJECT.

The speed & reliability of 5G making filming in remote & rugged locations possible.

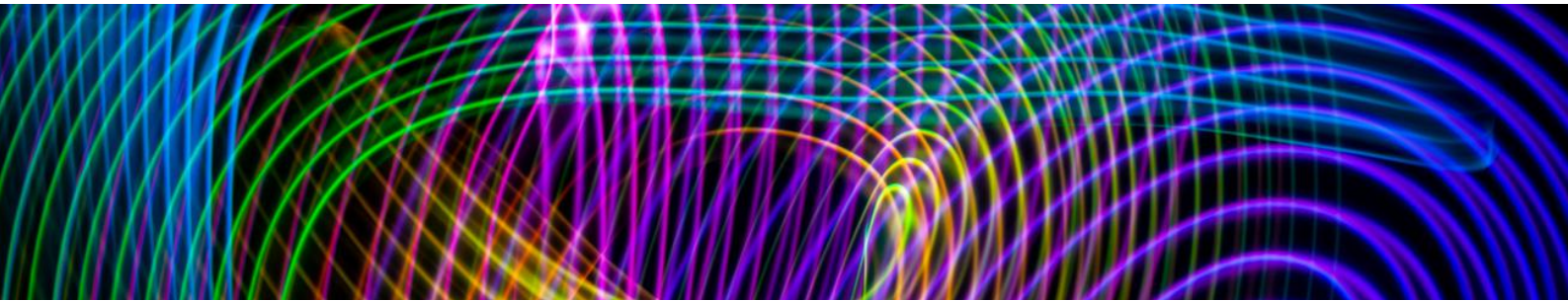
What can you use 5G for?

Hopefully, now you know a little bit more about what makes 5G tick, but why is that important to the creative industries? With its impressive capabilities, 5G provides an opportunity for the sector to explore innovative methods of delivering content and experiences while remaining competitive.

Create richer immersive content: 5G's bandwidth and latency improvements help power innovative, immersive experiences like personalised content, volumetric video, and virtual or augmented reality (VR and AR). Its higher bandwidth also allows for manipulating large data files remotely, enabling content producers to use cloud-based and even artificial intelligence-driven tools to improve output quality.



1. Augmented Reality/Virtual Reality
2. High reliability for mission critical e.g. live broadcast
3. Rapid download speeds (GBs in a second)
4. Streaming Ultra Hi-Definition Video
5. Sensors to monitor heritage sites
6. Low lag, fast downloads for immersive multiplayer gaming
7. Work & play in the cloud: tourist experience or gaming
8. Remote production & collaboration



Be more agile: Creatives—from theatre makers to game developers—need reassurance that their processes will deliver under pressure. 5G guarantees improved mobility (cut the wires!), flexibility, and reliability. In addition, this allows businesses to coordinate remotely and more sustainably.

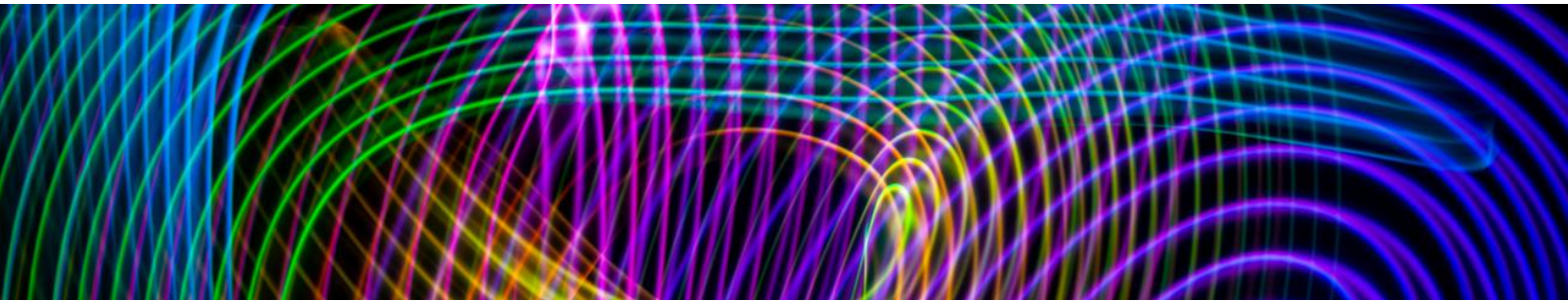
High-quality live experiences: With 5G, you can ring-fence a section of a mobile operator's network to guarantee the quality of output. This is a great option for live broadcasting, sports and events, where broadcasting delays are not an option.

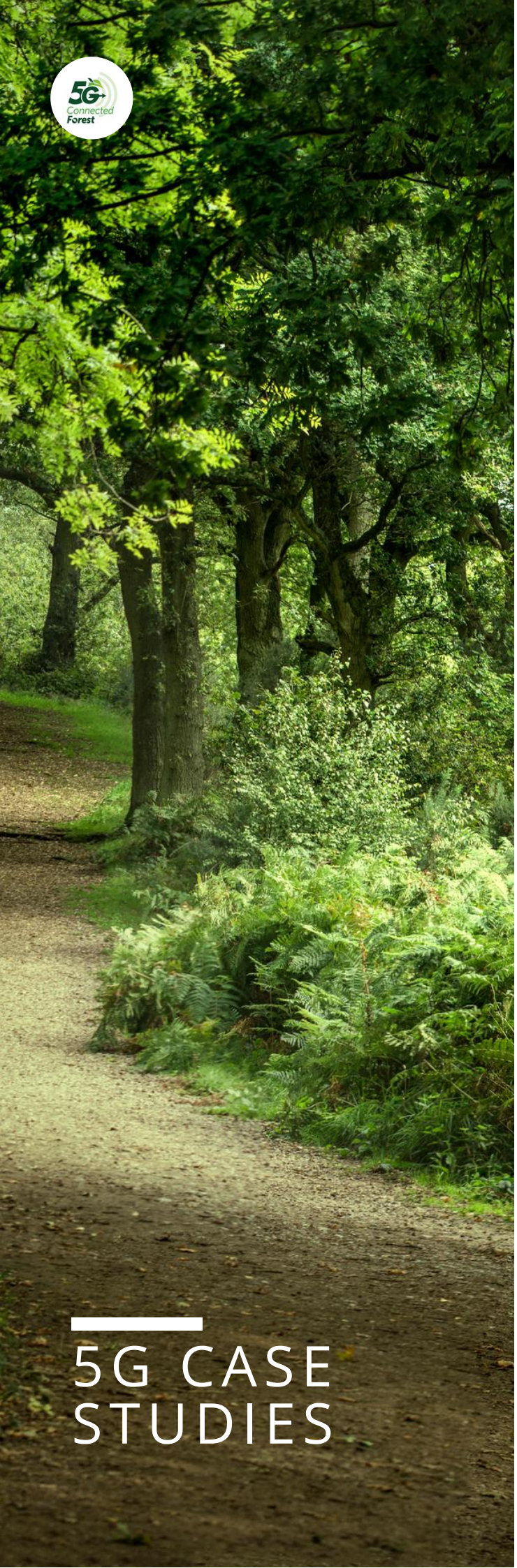
It also makes filming in more remote or challenging locations easier, whether that's on the side of a cliff or at a muddy festival. And don't forget the augmented live experiences 5G can deliver, reinventing the way we enjoy everything from opera and theatre productions, to major sporting events.

Tailor to your needs: With 5G, it is possible for organisations to set up their own private mobile network on either a permanent or temporary basis. For creative businesses, this could support the production and development of content by allowing creators to set up pop-up networks, for example, at a music festival.

Process data in a way that fits your business needs: The improved bandwidth and latency of 5G networks provide more data processing options, whether it's on the device, in the cloud or at a cell tower in the near future. This flexibility means content creators can choose the route that delivers the best experience and is most cost-efficient for their business.

By moving data processing off user devices, 5G helps content creators analyse and respond to data faster, which is critical when delivering personalised, immersive experiences. This also improves accessibility, ensuring consumers don't need the latest devices to access content, so you can reach bigger more diverse audiences.





5G CASE STUDIES

5G CONNECTED FOREST

Already, 5G is playing a crucial role in delivering visitor attractions for all ages at the historic site of Sherwood Forest. An Arrow Through Time is an interactive, augmented reality movie experience that tells the story of Robin Hood, featuring an exciting cast of actors, including Black Mirror's Dominic Le Moignan and a script co-written by BAFTA award-winning CBBC writer and producer Nick Hutchings. What's more, Rufford Ghost Walk—delivered via mixed-reality headsets—allows guests to come face-to-face with Nottinghamshire's holographic paranormal counterparts.

Their 5G network is also protecting the sensitive forest environment through robotic environmental management. Typically, monitoring the historic Sherwood Forest is labour-intensive, time-consuming and costly but now, the duties of first rangers are supported by way of a UK-first remote-controlled robot dog (named Gizmo) that collects data. This is complemented by drone and advanced sensing technologies that capture the aerial view of the forest —paving the way for understanding the health of the forest in real-time to ensure safe, sustainable interactions between humans and woodland.

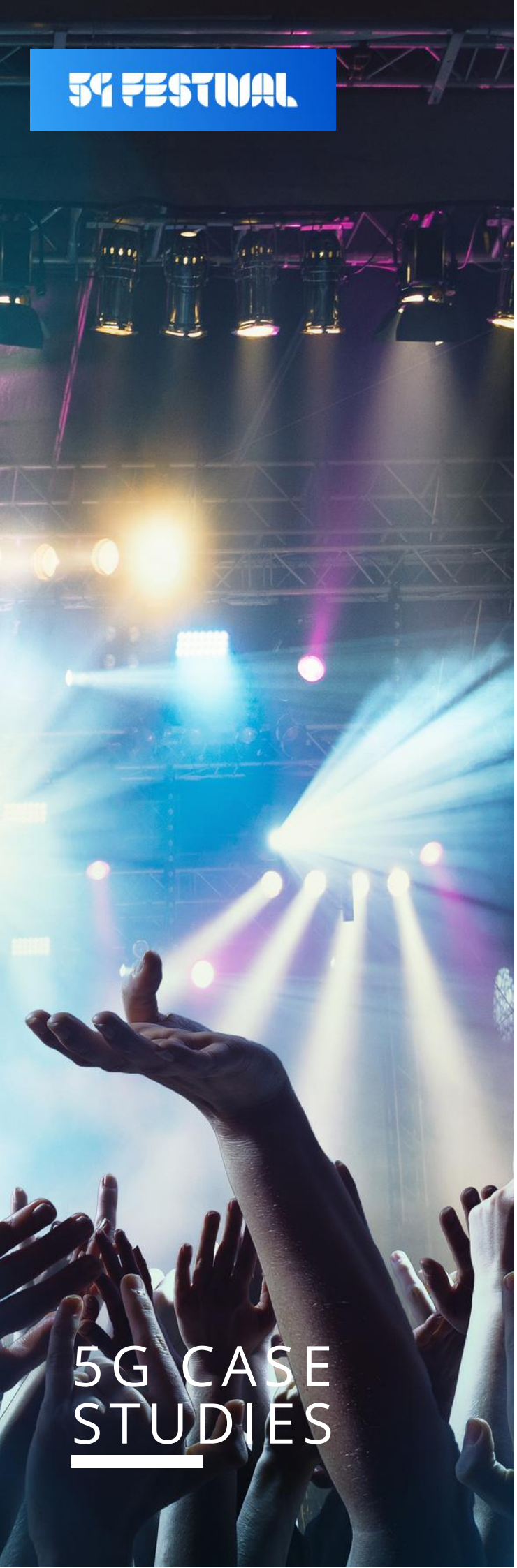
Ceren Clulow, a Digital Connectivity Manager at Nottinghamshire County Council who led 5G Connected Forest, said: "5G's capacity for massive data transfer and collection has allowed us to achieve this and in the process, stabilised our visitor economy." She added, "The fact that my children are no longer asking for a day out in Birmingham is indicative of our success. Families nationwide are flocking to us instead..."

5G FESTIVAL

The social and economic impact of the coronavirus pandemic on the live music industry has been severe. 5G Festival has, therefore, created an innovative platform for musicians and artists to write, rehearse and produce music despite geographical barriers, and deliver new, engaging ways for audiences to interact with live performances. This is anticipated to be a game-changer for the production of events across the music industry and venues, as well as the way in which audiences can experience them.

In March 2022, taking place simultaneously across the three venues, more than 20 musicians performed together in a unique concert. This demonstrated the technical milestones that have been achieved during the course of the project–in particular, solving the issue of latency (delay) between artists collaborating remotely with each other from different locations since it is not currently possible for artists to perform together remotely over an ordinary mobile network or Wi-Fi. The showcase also highlighted the potential future use cases for 5G in the music and live art sector, alongside the commercial benefits of using 5G as part of a range of connectivity solutions for this type of event.

Gavin Newman, Brand Director at Metropolis Studios, said: “Being able to drive audio and video latency low enough to enable members of a band to rehearse and perform seamlessly with each other, separated by 70 miles between venues, demonstrates the significance of the project and the capability of 5G technology. We also hit a world first by capturing and mixing their performance in 3D at the studio and distributing it back to an audience in Brighton, something we believe will have compelling commercial significance in the future.”



5G FESTIVAL

Jamie Gosney, Director & Owner, Sonosphere, said: "One of the things that excites me about all that we're doing and is very current, is the ability to allow artists to collaborate without travelling. Local venues will also be able to host immersive live streams of concerts, allowing fans to have as near to the live experience as possible, again without travelling to remote locations. Both of these are directly in line with current green issues and the latter has the added advantage of boosting local economies."

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.

UK 5G Innovation Network

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.

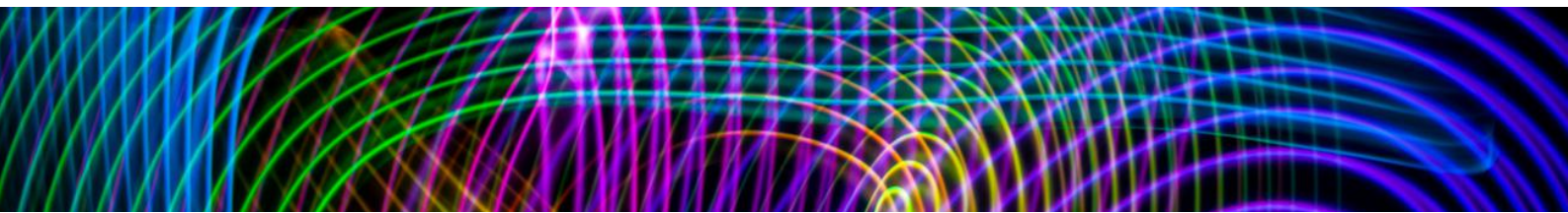
IoT: The Internet of Things describes physical objects that are embedded with sensors, processing ability, software, and other technologies, and that connect and exchange data with other devices and systems over the Internet or other communications networks. This could be anything from a smart fridge in your home to a temperature monitor in a museum.

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. 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, the BBC might want to set up a private network at Wembley Stadium.



Glossary of useful technical terms continued

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.