CREATIVE INDUSTRIES:
A GUIDE TO TRIALLING OR DEPLOYING 5G

UK 5G | Innovation Network

INTRODUCTION

Amid rising expectations and ever-shrinking budgets, creative businesses are eager to explore new, innovative methods of creating and delivering content and experiences. This vital UK industry needs more immersive, personalised and accessible content: 5G can help to deliver.

But while benefits and use cases emerge daily, we know from speaking to the sector that 5G can seem complex and intimidating. Our work is looking to address that, helping the creative industries—of all types and sizes—find the right resources and connections to map a path to 5G: this guide aims to increase understanding, build confidence and facilitate commercial deployments.

Struggling with what 5G actually is?
Have a read of our <u>straightforward guide</u>.

We know from speaking to the sector that 5G can seem complex and intimidating.

From understanding the different deployment methods to top tips for establishing a 5G trial, we are here to help creative businesses of all types and sizes.

DEPLOYMENT MODELS: PUBLIC NETWORKS

Once you've decided you want to deploy 5G in your business, you need to consider how to do that. The key to clarifying the task ahead is to understand the range of deployment options available—and the first choice to make is between either a public or private 5G network.

How do you determine if a public or private 5G network is better suited to your needs? There are some important differences between the network options and understanding this can help you make more informed decisions and initiate meaningful discussions with potential suppliers.

This section is designed as a stepping stone, hopefully growing your understanding of private and public mobile networks and helping you to make the most suitable choice for your organisation.

a) Public networks

A public mobile network is an online network to which anyone can connect. If you have a 5G-ready device, and funds to pay for the bill, you can access information—which most consumers see as 'the internet'—through a public 5G network delivered by MNOs (mobile network operators, such as EE or Vodafone).

Access to a public 5G network is binary: it is either deployed in an area or not. Most people think of a public mobile network when they hear the term "5G". With these networks, security, service and management are the responsibility of the MNO.

- Currently available, 'off-the-shelf' 5G, supplied by mobile network operators
- Coverage is dependent on the infrastructure deployed by mobile network operators
- Optimised for maximum download speed
- All users have equal access

- May not offer the security and reliability required for critical operations/sensitive data such as live news broadcasts
- Provides the capability for mass market use cases

Currently, there is a very good urban rollout of public 5G and this can be thought of as 'consumer 5G', with the networks optimised for the things that consumers care about.

As a result, they focus on massive download speed. But the more people that use the devices, the more capacity becomes an issue—especially in scenarios where a large mass of people are congregated, such as at a music venue or sports stadium. This is known as a contended network—the more users or devices on a network, the more people may struggle for bandwidth at peak times.

In terms of the download vs upload, it's typically a 3:1 ratio for public 5G networks—roughly three amounts of download, to one upload. You can download a lot of information, but uploading vast amounts of information from your device is less straightforward.

If you're looking to create a scalable network across a range of physical locations and transfer large amounts of data from those sites, upload—or uplink—will be of greater importance.

DEPLOYMENT MODELS: PRIVATE NETWORKS

b) Private networks

A private 5G network is any network to which access is restricted, essentially operating as your own personal network. This could include a localised network, for instance, covering a tourist attraction such as a country estate or something smaller such as a stadium or concert hall.

- Customised to your specific needs
- Fully controllable: restricted for secure environments or operations
- Can be tailored to allow greater focus on uplink
- Guaranteed capacity
- Scalability options

Sometimes also referred to as a non-public network (NPN)*, a private 5G network is a secure, all-you-can-eat network that is exclusively yours—log on and go wild, as you require.

Security-wise, it comes with dedicated SIMs for whitelisted devices. While perhaps not as simple as clicking 'Join Wi-Fi', it provides the confidence that only devices you know and permit can connect to your network.

This is attractive to a number of different organisations. Gaming, production and broadcast companies, and other creative businesses don't want rogue connections into their network at the edge. Of course, a system is only as secure as its weakest link (managing the data securely on the cloud) but the 'front door' is effectively well guarded.

Furthermore, organisations dealing with operation-critical information—for example, a live broadcast event—can ensure a greater deal of security and reliability in crucial daily operations and transfers of data.

If you are running a private 5G network, and you are catering to the public, you would more than likely 'hand off' to Wi-Fi, via a Wi-Fi-5G bridge, which could happen at tourist attractions or entertainment venues. This means pushing consumer access to a universal frequency as not everyone has a 5G phone yet.

Scalability is the next big difference between public 5G networks. How big can private 5G networks go? It could be as small as a room, or as big as an art gallery, museum or even a neighbourhood. The critical point is that it's available exactly where you need it, rather than where it happens to be available.

Flexibility is the third main difference— being fully in charge of the network enables you (or an expert within your organisation) to tweak the upload and download speeds, as well as security options—whitelisting or removing devices as you see fit.

You can also guarantee capacity, ensuring you always have the connectivity you need, whenever you need it, and there is no ceiling for uploads.

If you don't have existing relationships with telecom vendors, there are multiple private network vendors who can manage the service for you (see the UK5G Supplier Directory).

*In 3GPP parlance, a Non-Public Network (NPN) enables the deployment of a 5G System for private use. An NPN may be deployed as:

A Stand-alone Non-Public Network (SNPN): Operated by an NPN operator and not relying on network functions provided by a PLMN, or
A Public network integrated NPN (PNI-NPN): A non-public network deployed with the support of a PLMN.

WHAT ARE SOME OF THE PRIVATE 5G NETWORK OPTIONS?

Permanent vs temporary: You can switch private networks on (and off) as your organisation sees fit. Temporary networks could service a music festival or filming in a challenging location. Permanent networks may be better suited to fixed locations such as museums or entertainment venues.

Carrier-grade vs lab-grade: Carrier-grade is the premium option, offering all the bells and whistles and performance guarantees (which comes at a cost).

Whereas lab grade is more experimental, rough and ready. While lab grade offers a more cost-effective option, the trade-off is you need to be comfortable—and have the engineering expertise internally—to be able to tinker and get your hands dirty. These can be a great option for a temporary network or a trial, but possibly not an effective long-term solution.

Hybrid Networks

Did you know that private networks can also be provided by public network operators (i.e. Mobile Network Operators)? A Hybrid public-private network is where a 'slice' of a public network is reserved for the sole use of a subset of users for additional services or service levels.

This means the service is deployed, integrated with, managed or otherwise enabled or supported by a mobile network operator. Such a hybrid network may well use nationally licenced operator spectrum but could use other types of spectrum licencing as an alternative.

An operator may choose to dedicate a network operations team to support its private network customers.

Standalone versus non-standalone

Once you've decided between using a public or private network you then need to consider the two deployment modes for 5G networks: Non-Standalone Architecture (NSA) and Standalone Architecture (SA).

With the deployment of widely available 5G still evolving, most 5G available today is Non-Standalone, meaning the network architecture requires support from its predecessor 4G in terms of billing and logging of activity. This route is quicker and easier to implement, and a more cost-effective option, but the trade-off is that you won't be able to realise the full promise of 5G.

By contrast, Standalone is based on a fully new end-to-end 5G network, with no reliance on 4G infrastructure. This is where you get the full 5G experience with all the bells and whistles and can start to unlock the ultra-reliable low latency communications.

While this offers a much richer set of features and a more flexible, future-proof network, in the short term it does mean more costly and complex deployment and integration.

It's worth noting that public 5G networks will also be either standalone or non-standalone. In this instance, you're dependent on what the mobile network operator has deployed, but it's helpful to understand this before you sign up so you can be sure a specific public 5G network can provide the capabilities you need.
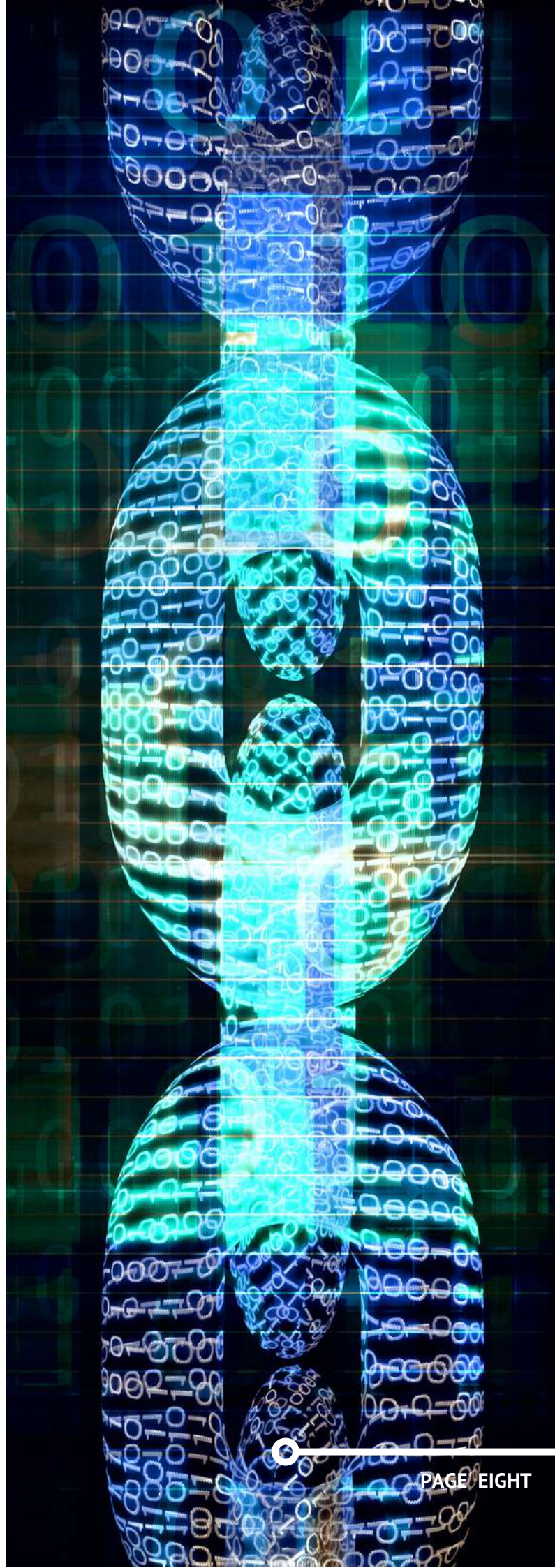
System Integrators

Knowing exactly what you need and how to put it all together can be tricky, especially if you don't have all the technical know-how in-house. A systems integrator is an individual or business that builds computing systems by combining hardware, software, networking and storage products from multiple vendors.

This can be particularly useful for facilitating communication between systems that do not usually communicate: for example, granting access to third parties in the case of remote maintenance, training or security.

For help meeting key business goals, head to our Supplier Directory.

HOW TO SET UP A 5G TRIAL

Whether you're running a limited 5G trial or have plans to deploy more widely, the following guidance—based on learnings from over 30 projects that took place in the UK's 5G Testbeds & Trials programme—should help steer you to success.
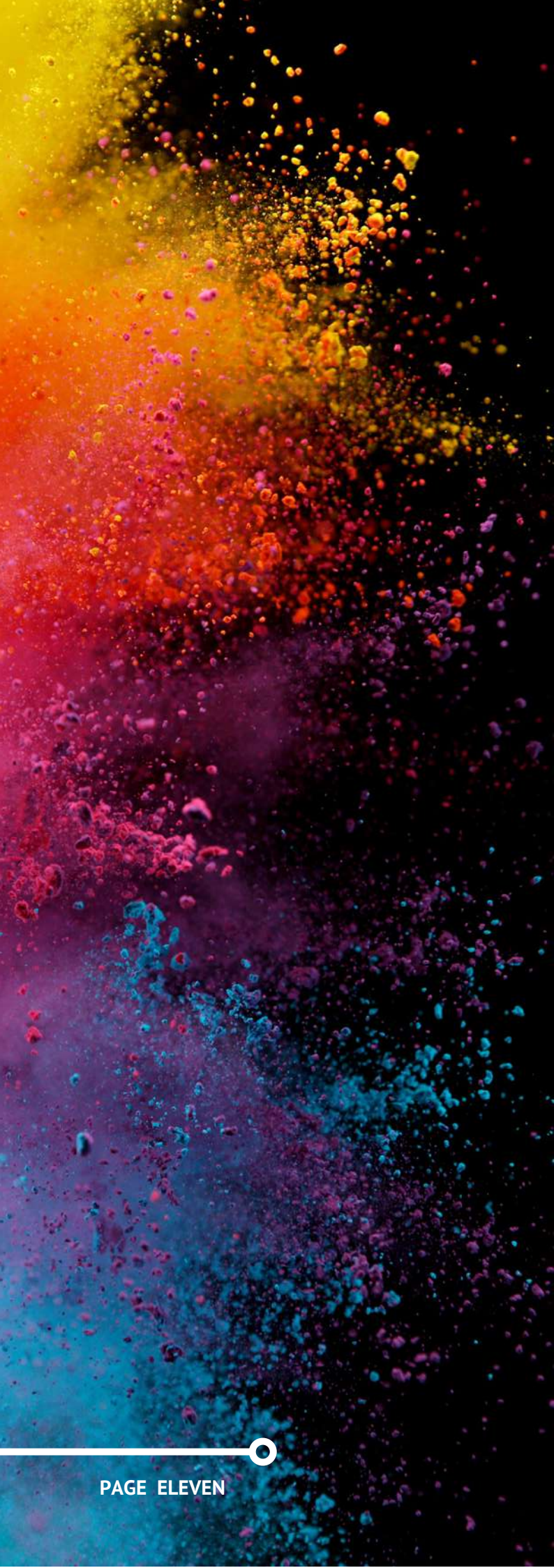
Define your need

Pushing technology to its limits can be tempting and rewarding—but it can also bring added complexity and a need for teams to learn new skills. Beware, therefore, of the temptation to do something with new technology just because you can. Be clear about why you are doing something and if you're not ultimately delivering an improvement to your operations or the experience of your end customer, it might not be worth the cost and time investment. Considering how exactly you allow end users to engage with your experience or content can also help to guarantee satisfaction.

Build a team with clear roles and responsibilities

Whether you are building a team internally or will be collaborating with partners, make sure you clearly define responsibilities and have all the skills you will need. This may mean looking externally to bring in certain skill sets that are new to your company. Open and regular communication is key to success.

Identify if you need to apply for a spectrum

Ofcom sees the Shared Access Licence as "opening up new options for users, such as small businesses and community groups which could support innovation and enable new uses. The licence could be useful for all sorts of different businesses and industries".

The offering of the Shared Access Licence model has been a catalyst for the private network market in the UK, creating opportunities for innovation in network deployment and usage, and providing an entry point for new SME vendors, seeking to serve this emerging market. Put simply, this means that if you are an organisation—perhaps a venue provider—and there isn't good public 5G service where you need it, or you want to control the performance of the network and who can access it, you can create your own private 5G network using spectrum applied for through the Shared Access Licence route and without necessarily having to go to a Mobile Network Operator.

Shared Access Licencing is seen as one of the key enablers for telecoms supplier diversification, and feedback from across the 5G Testbeds & Trials Programme has been that Shared Access Licencing is a welcome offering for industry and others to run new private 5G networks.

[Read this article for more information about how to apply for spectrum.](#)

Consider how end users will engage with your trial

If you're deploying a VR experience for visitors to engage with, will you provide devices or allow people to use their own? While the latter may at first glance appear easier, it could actually provide greater cost and complexity as you'll need to build a solution that works on multiple devices—and test it on every possible device. It also makes it much harder to guarantee the end-user experience.

Secure your supply chain

The 5G market is still fairly immature and this, coupled with macro factors such as the global chip shortage, means the availability of kits and devices can sometimes be limited, with long lead times. Take the time to research potential suppliers and agree on a schedule upfront; building SLAs into agreements might also be a good idea.

Additionally, if you are asking for adaptations or personalisations to be made to devices, ensure you are doing so from an informed decision. Don't assume that something is a "quick change", be sure to understand the implications before deciding if the impact on delivery time is worth it.

Engage your team

Employees need to be able to use any deployed technology. It's crucial you encourage them to embrace 5G, involving them in the process from the very beginning and perhaps even identifying a champion who can be your evangelist amongst teams. You need somebody who can explain the technology in simple terms and understands the challenges employees may face.

Consider scalability

Be fully prepared for scalability straight off the bat—operational and production challenges can come as trials step up in size, even when close to the original brief.

With the increase in scope, cameras, equipment or audience size comes funding challenges, but also practical issues around setup. For instance, scaling from an audience of 1,000 people to an audience of 10,000 requires serious consideration of booking systems, location, output and so forth.

The integration of specific workflows and the professional systems required also need to be tested at scale for larger productions, so do not assume this will be straightforward, and create contingency plans alongside your initial planned brief.

Make proactive considerations ahead of starting the project, and have an idea of how to tackle these challenges, or what is potentially possible, before they arise.

HOW TO BUILD A BUSINESS CASE FOR BROADER DEPLOYMENT

Introducing stackable use cases

There has been much talk when it comes to 5G about "killer applications"—yet such use cases are rarely found.

Instead, multiple innovation projects, testbeds and trials point to the need for stackable use cases, which incorporate multiple ways 5G technology can be used, capturing the broader business opportunity. Put simply, this concept involves layering multiple use cases and their combined ROI across the same 5G infrastructure investment.

Stackable use cases will often span multiple departments and jurisdictions. This can mean considering how different teams in your organisation could use 5G or even how multiple organisations could layer together the various potential applications of a 5G network.

Why are they needed?

As an enabler, 5G has the power to unlock more than just faster download speeds. But at this early stage in its lifecycle, deployments can be relatively costly. To develop compelling use cases in a time of increasing budgetary pressures, stackable use cases—when coordinated properly—can help to facilitate effective and commercially viable cases for investment by reducing the pressure on an individual use case to deliver outstanding results.

What's more, understanding and working towards stackable use cases can shift how we think about 5G and infrastructure investment as a whole. Grouping together overlapping benefits and use cases can encourage looking for additional value that could be extracted from a single deployment, and identifying other use cases and issues that could benefit from 5G connectivity.

Stacking multiple use cases truly unlocks the transformative power of digital operations, delivering benefits that go way beyond basic connectivity and make the most of 5G's capabilities and the technologies it enables. Most importantly, it can start to make real-world deployments at scale more commercially viable.

Potential stackable use cases

From gaming to sports broadcast, the potential for 5G across the creative industries is vast. But how does an organisation create a stack of use cases? Let's take a tourist or cultural venue as an example.

First and foremost, 5G connectivity through the venue can be used to improve the visitor experience: including ensuring there is sufficient capacity on the network for people to use their phones even when the venue is at capacity, as well as offering more engaging experiences. A variety of destinations such as Sherwood Forest, the Eden Project and the Cathedral of Malaga have deployed 5G-powered augmented and virtual reality experiences, offering a far richer, immersive and personalised experience to their visitors. Data from the 5G Connected Forest project found that on average visitors trying their AR experience stayed at the forest for two hours longer.

This alone, however, may not be sufficient to justify the investment.

5G connectivity can also be used to help manage the operations and logistics side of a venue. 5G enables the mass deployment of the Internet of Things, which allows sensors to be deployed around galleries, museums and other tourist attractions to deliver insights. These analytics can be used to measure crowds, ensure public safety and optimise the financial performance of exhibitions by understanding visitor flow and dwell patterns. In addition, the high bandwidth enables real-time ultra-high-definition CCTV streams to ensure exhibit and visitor safety and security. In outdoor settings, such as a vast country estate, woodland or festival site, 5G-connected drones can be flown beyond the line of sight, increasing the visibility you have across a broad area, enabling more efficient management, with less wasted time travelling around the grounds.

From Raglan Castle in Wales to the Natural History Museum in London, many cultural destinations are themselves sites of historical significance: 5G connected sensors can also be used to protect them. IoT and automated solutions can be deployed over 5G to monitor, analyse and facilitate early identification of problems (for example, the movement of stones). This can enable intervention before situations become critical, better-protecting sites of historical significance, delivering a faster resolution of issues and potentially saving costs.

Together curators, facilities and operational teams can layer up these different use cases into one business case with multiple benefits to offset the necessary investment.

CASE STUDY: GREEN PLANET

The Green Planet project discovered that putting 5G through its paces could create an engaging VR experience for its audience.

The big trial was at Piccadilly Circus, London, where a private standalone 5G network was deployed, delivering everything using mobile edge computing. The team were empowered to deliver higher fidelity graphics than had previously been possible over VR, delivering increased realism and immersion that maximised the audience experience. The experience quite simply would not have been possible with 4G or non-standalone 5G.

Critically, the project also made the decision to provide all visitors with a device to access the VR experience. This proved to be a sound decision, granting the partners far greater control, reducing the need to test on multiple devices and variations, and ensuring all users had the same great experience.

This resulted in the Green Planet Experience having a 96% audience approval rating, making it the number one ranked experience surveyed by immersive experts StoryFutures Research.

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