CGI

Making 5G connectivity ubiquitous: is the answer in space?

Don't wait for a universal public 5G network to take advantage of 5G's transformative applications.

Increasingly, enterprises are choosing to set up their own private 5G networks so that they can leverage the benefits of 5G within their own 'four walls'. They're using real-time connectivity to unlock the latest generation of internet of things (IoT) technologies, intelligent video analytics, augmented reality experiences, autonomous and remote operations, interaction with mission-critical machine and industrial processes and so much more.

However, these private networks don't operate in isolation, and need connectivity that spreads beyond the 'bubble' of their immediate surroundings. The smart factory needs to send data to its HQ. The oil rig worker using a live video feed to show an issue to experts based on the mainland, needs real-time direction to fix the fault. The IoT sensors on a remote electricity substation need constant central monitoring.

But how do you provide connectivity in areas where existing mobile networks don't reach? This is where satellite technology comes in, bridging the gaps where terrestrial connectivity has yet to go or just can't go, or delivering a resilient second strand of connectivity.

How satellites complement 5G

The rise of 5G is being accompanied by broader availability of non-terrestrial networks. More and more, the answer to supporting innovative business transformation will lie in a hybrid 5G-satellite network.

Satellites are an ideal way to serve areas with a population density too low to justify a cellular service because the constellation coverage is available immediately without the need to deploy terrestrial infrastructure. The infrastructure for hybrid 5G networks already exists.

The next step is to visualise the possibilities, so here are four core benefits a hybrid network could have for your business.

Connecting the remote to the core

Satellites can connect even the most remote 5G private network to the internet or to the business's core functionality. Edge computing, programmed and monitored centrally over satellite, can be deployed to facilitate sending key data via the same connectivity path. Alternatively, a range of edge processing and decision functions can be controlled centrally to facilitate low-latency mission critical operations.

Imagine a military base in the middle of the desert that has sophisticated perimeter defences. Its private 5G network takes high-quality video from its CCTV cameras and uses edge processing to run image recognition software locally when it spots someone approaching the fence. But there's no one on the base qualified to grant the visitor access, so an image is sent via satellite back to HQ for authentication. This is equally applicable to any remote critical national infrastructure installation that needs a high-speed network locally and low-latent connectivity back to an operations centre.

Efficient, seamless mobile connectivity

A hybrid 5G network can enable seamless connectivity, where the user won't notice their device switching between terrestrial and non-terrestrial networks. Combining the two sounds simple, but it requires complex calculations to make sure the moving antenna is pointed at the right satellite at the right moment.

At CGI, we're developing this technology to create a hybrid 5G network for use on trains. Working with the Department for Digital, Culture, Media and Sport (DCMS), the UK Space Agency (UKSA) and the European Space Agency (ESA), our Satellites fOr Digitalisation Of Railways (SODOR) project will go live next year, aggregating 3G, 4G and 5G networks. With SODOR, trains will be able to flag up issues to central managers immediately – from life critical information, like derailments to more mundane matters, like notifications of track conditions and their impact on the train's maintenance requirements. Plus, passengers won't experience coverage black spots.

A connectivity extender without restrictions

A hybrid 5G network has the power to extend 5G connectivity reliably beyond the boundaries of terrestrial infrastructure to anywhere in the world – including the middle of the ocean, which could transform the IoT-enabled global supply chain. Although there are currently some solutions that use satellite to track valuable cargos outside the range of terrestrial networks, they're limited. Increasingly, supply chains will need the greater capability that a 5G network will bring. 5G Massive Machine Type Communications can support up to one million devices per square kilometre, compared to 4,000 for 4G. So a hybrid 5G network will be able to monitor every sensitive container wherever it is in the world, checking, for example, their temperature, whether anyone has opened them, or whether anything has been removed or added. Ports will be able to have up-to-date logistical information that can help them prepare to receive a cargo and minimise the amount of valuable time it has to spend waiting to unload or move on aboard an HGV.

A resilient second strand

In many industries real-time monitoring is essential to delivering always-on services. If there's an issue, the decision-making core needs to know about it almost instantly and there's no room for connectivity to fail. The satellite connectivity of a hybrid 5G network can be a valuable resilient back-up to terrestrial communications and the network can switch seamlessly to satellite at the first sign of difficulty. We're already seeing utilities companies, for example, using satellites in combination with other connectivity sources to maintain a constant flow of information about the state of their infrastructure in rural locations. Plus, in areas that are subject to volatile governance and political instability that can threaten access, having a satellite link that's far harder to disrupt than terrestrial connectivity, can be a smart resilience choice.

See the future for yourself

We're at the heart of 5G development, pushing the boundaries forward. We bring together the best minds in the business to do complex things well, knowing that building a successful future for 5G hybrid networks is so much more than just accessing the satellite technology. Effective 5G hybrid networks need expert integration and intelligent use of the technology available.

At our 5G Private Network facilities in London and Leatherhead, we demonstrate complete 5G business scenarios, so you can see how they could benefit your organisation and can explore how efficient usage of satellite technology works, as a part of the connectivity chain.

We're also channelling our expertise at leveraging hybrid 5G networks to drive industry development as a technology partner of the European Space Agency. We've built a 5G hybrid network demonstration and engineering facility at the ESA Harwell Campus in Oxfordshire to test out innovations with the potential to evolve the industry.

It's all part of our commitment to using technology to build solutions that are fit for purpose, rather than creating technology and then looking for ways to use it.

Start exploring what hybrid 5G networks can bring to your business today.

Get in touch to find out more.

Visit: **cgi.com/uk/communications/5g** or email: **enquiry.UK@cgi.com** and quote: **'5G hybrid networks'**