

ENABLING 5G TO THRIVE

AS THE IMPORTANCE OF FAST AND RELIABLE CONNECTIVITY BECOMES INCREASINGLY MORE EVIDENT, **SHOBHIT JAIN** EXPLAINS HOW THE PROMISE OF 5G RELIES ON LOCATION INTELLIGENCE TO TRULY REACH ITS FULL CAPACITY

The importance of fast and reliable connectivity has never been more evident than in recent months. With people confined to their homes, communications networks have helped them stay connected and, in many cases, employed, while giving countless businesses continued access to the digital infrastructure they have required to weather the crisis.

At the same time, modern network technologies also hold the key to a global recovery. In the post-pandemic era, nearly all industries will seek to accelerate their efforts to automate, digitise and enhance their capability to operate remotely. For this, the continued advance of 5G, presently still in the early stages of a multiyear build-out, is critical.

But there are other pieces to the puzzle too. In particular, multi-access edge computing (MEC) technology, which brings cloud computing to the edge of the mobile network, is gaining recognition as a vital component of the networks needed in the future. Today, several commercial and pilot deployments are in

operation globally. When combined with 5G, MEC promises unprecedented levels of compute and network performance, with high bandwidth data transfers and ultra-low-latency connections – the kind of connectivity that can power the autonomous services of the future.

However, commercial success is far from assured. 5G MEC requires high upfront investment and comes with significant risks. Cloud processing and storage capabilities will need to be deployed closer to where the consumers, workers, cars, robots and industries of tomorrow will be. The question is: where will they be? Getting the most out of these promising technologies will require the help of another: location intelligence.

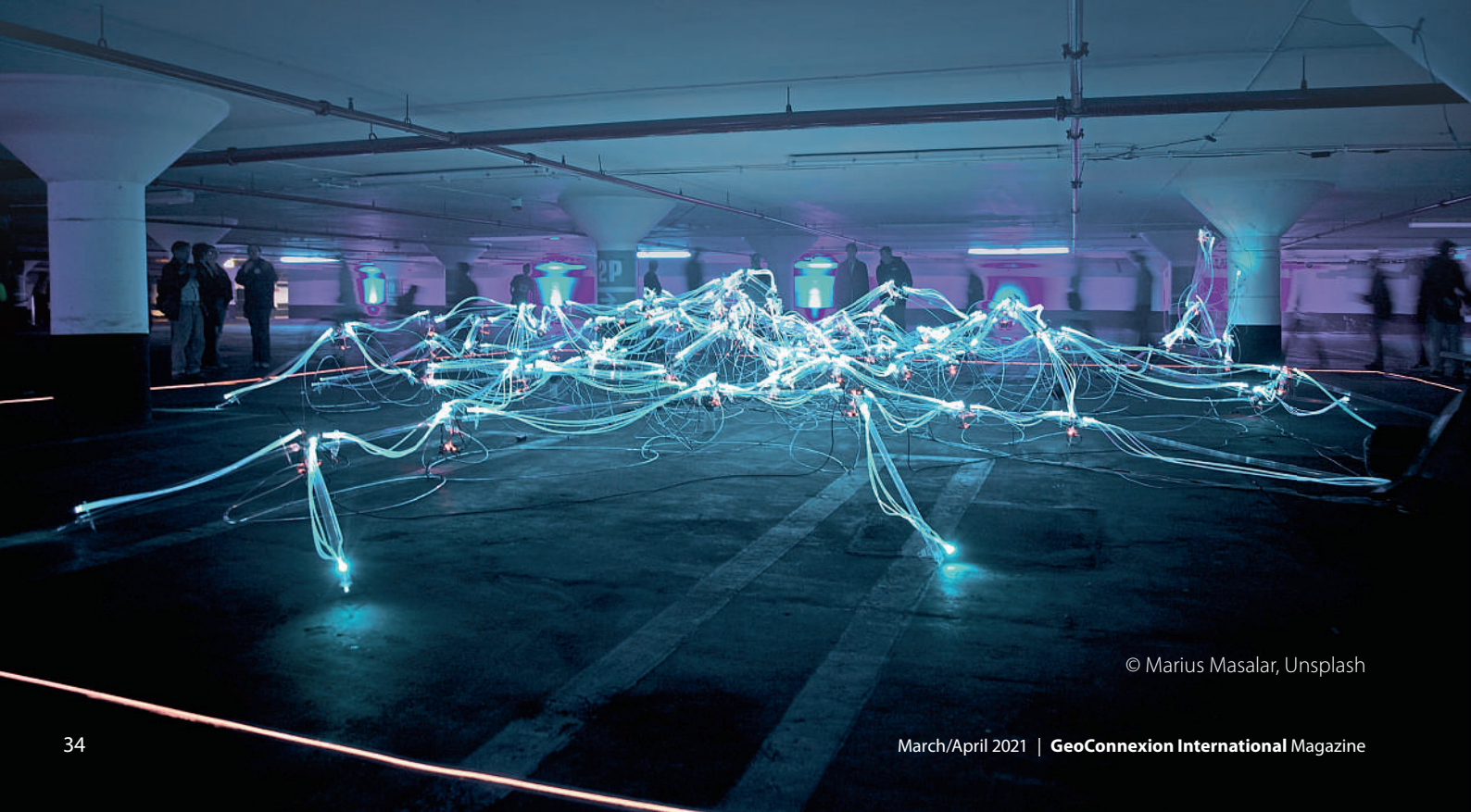
Navigating 5G MEC with location intelligence

For a long time, location intelligence has played a mostly peripheral role in enterprise decision-making and application development. In recent years, however, it has exploded with context richness, considering

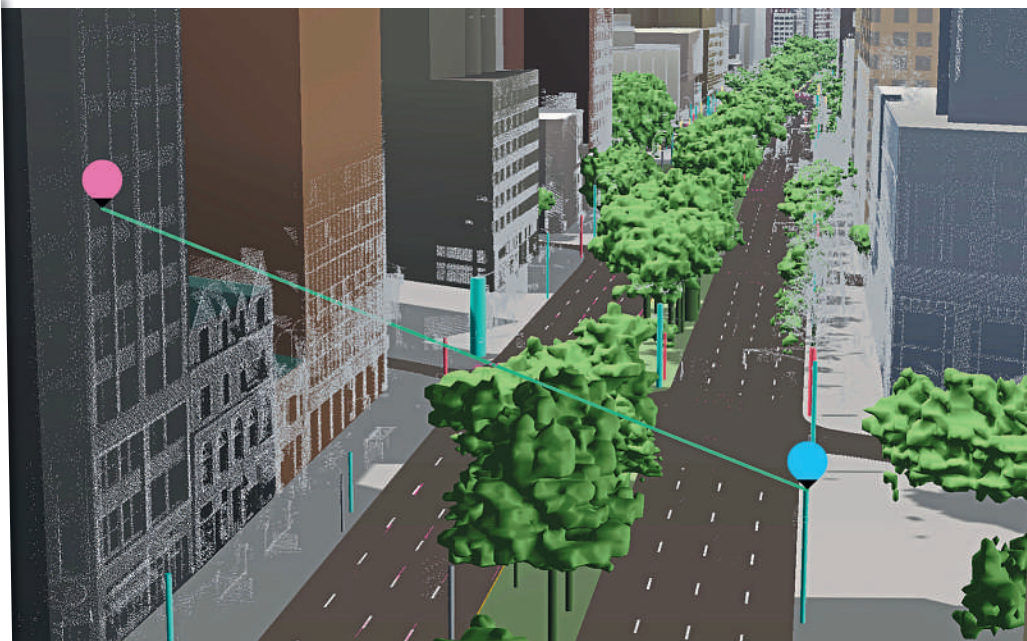
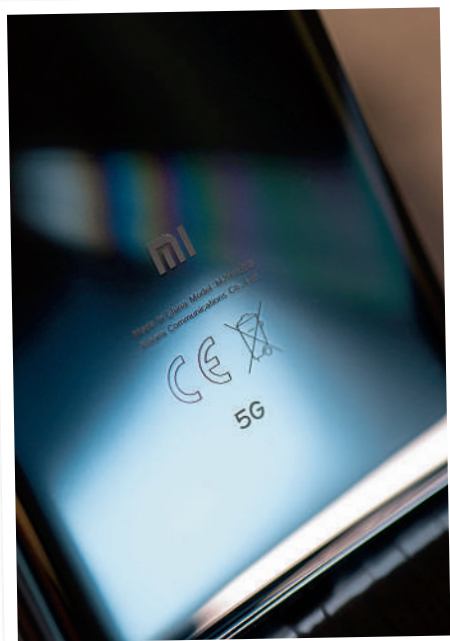
surrounding circumstances as a part of the technology, fuelled by affordable, low-powered sensors, big data analytics and artificial intelligence. This new generation of location intelligence is now at the core of the next wave of digital transformation and helping drive better real-world outcomes.

Its emergence is also perfectly timed to meet the needs of 5G MEC deployment. The physics of millimetre wave spectrum and beamforming technologies require the infrastructure to be different from earlier generations of mobile networks. Instead of today's spaced-out cell towers, 5G MEC will leverage a dense and complex network of small cells along with optimally placed edge servers. Fortunately, rich layers of visual and informational geospatial context can now be folded into the process of network planning and optimisation.

There are numerous ways that mobile network operators and others involved in the deployment of 5G MEC can benefit from location intelligence. With 3D geometry and rich mobility data, 5G MEC topology



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will be correct from the offset, keeping costs down to enable efficient network planning and deployment. High-definition location data hosted at the edge will also support accurate 'always on' positioning in real-world mobility and virtual control in remote environments, providing hyper-precise positioning for machines on the move. Edge-computed location context places every consumer at the centre of the universe, fuelling innovation and offering developers new paths to monetisation, while location will become key in managing privacy preferences as data transfers become instant.

In fact, once 5G MEC is rolled out, it will in turn benefit location intelligence and services. While location intelligence will act as a catalyst for enabling 5G MEC, the subsequent advancements in MEC will help fuel location intelligence in the future. Both industries and consumers alike will gain advantages from wider network coverage, lower latency, reduced transfer costs and the ability to better handle surges in data traffic, as the technology is increasingly adopted and developed.

A leap in positioning accuracy and latency

Organisations across numerous industry sectors invariably need to locate something to implement their business model successfully. In some cases, they will need to do so quickly, precisely and continuously. New network technologies make this possible, working in tandem with precise mapping to deliver unprecedented levels of positioning accuracy and enabling a multitude of new use cases.

Positioning technology has been something of an 'add-on' feature in previous generations of mobile networks. The 4G standard, for example, has primarily been deployed to serve smartphones and fairly modest positioning requirements. With 5G,

HERE Geodata Models, using location intelligence to display 3D representations of building geometry for 5G network planning

however, positioning technology has been baked into the development of this newest generation standard from the beginning. This is no accident – the authors of the 5G standard have sought to ensure that future networks will be able to serve the demanding positioning requirements of a wide range of vertical industry use cases across outdoor and indoor environments.

Additionally, they have resolved that future solutions must be able to seamlessly harness multiple positioning technologies to deliver the best possible performance in terms of accuracy, power consumption, cost and scale. After all, not every application will have the same requirements. The 5G standard integrates a broad spectrum of positioning technologies, including 4G, GNSS, WiFi, and Bluetooth LE.

5G NR (New Radio) itself is a welcome addition to the positioning toolset, with the ability to provide greater positioning accuracy and availability than 4G can. Much depends on how dense those formations of millimetre wave small cells will be. Industry estimates suggest that building out sufficient coverage of 5G signals could result in between four to 10 times as many cell sites per square kilometre compared to 4G networks. This kind of density significantly increases a device's visibility to multiple beacons, while wider bandwidths at high frequencies, together with enhanced antenna solutions, can theoretically enable more accurate location estimations.

Most location services today are enabled through a combination of on-device processing of positioning data and the transfer of some data for processing by a server in a remote central cloud. Calculating a position this way tends

to involve multiple hops and takes time. While 5G devices can perform calculations to work out their own location, doing so can quickly drain the battery.

5G MEC networks allow for the computing effort involved to be offloaded from the device to nearby edge servers. This enables devices to be continuously positioned in real-time by the edge network. By having the network do the processing work, more computationally intensive positioning techniques and algorithms can also be used to support novel use cases.

5G MEC and location intelligence: a happy coexistence

Location intelligence will be crucial to the deployment of 5G MEC networks, at a time when they are needed more so than ever before. Once 5G is rolled out, networks will continue to benefit from location services as they enable a new generation of use cases across both enterprise and consumer industries.

So, a cycle has effectively begun, whereby existing location intelligence will allow for the 5G MEC deployment, while the low edge compute of MEC will allow for everything to be tracked far more easily, in turn strengthening location intelligence. It is a prime example of how innovation and technology has advanced to improve itself, with both location intelligence and MEC enhancing the other as their use increases. And what new benefits might develop as 5G hits the mainstream over the course of the next few years? Only time will tell.

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