How IoT and 5G are enabling the fourth Industrial Revolution

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After what seems like years of waiting, it appears that the benefits and promises of 5G will soon be delivered. Far from being simply the next generation of mobile networking, 5G will be 100 times faster than its predecessor and will offer 25 times lower latency, providing unimaginably faster response times. Indeed, controlled tests have seen response rates of between 1 and 2 milliseconds, a vast improvement on 4G's average of 50 ms.

Such low latency is set to open up a whole new world of applications, forever transforming the way in which products are manufactured and how they're delivered, not to mention the way in which we move and how we communicate.

Until now, though, the focus of mobile networks has been on connecting people — initially through voice and SMS, and most recently through over-the-top messaging platforms and social media. The fifth generation, however,

promises to connect “things” too, unlocking the full potential of IoT, the expanding network of connected devices, software and sensors, continuously collecting and exchanging data. In doing so, 5G will serve as an enabler for the fourth Industrial Revolution.

Connecting everything

A term originally coined by Professor Klaus Schwab, founder and executive chairman of the World Economic Forum, the *fourth Industrial Revolution*describes the emerging technology breakthroughs disrupting every area of business and society today.

Consider, for example, a world in which drones deliver groceries directly from the warehouse to your doorstep. Not only will this mean faster product deliveries, but it will cut down on the number of vehicles on the road, thereby reducing congestion and carbon emissions. Autonomous vehicles, guiding themselves without the need for human intervention, will further improve traffic flow and reduce the number of traffic accidents.

Industries connected with various downstream systems will have access to real-time data on market supply and demand, and will be able to adjust their processes accordingly for greater efficiencies and personalization. And augmented reality will enhance retail experiences, improve learning and provide recreational opportunities never previously thought of.

All of these possibilities, and more, require connectivity of things at the very high speeds and ultra-low latencies that 5G can deliver. Latencies of 5G will be in the region of between 15 and 20 ms to begin with, however, and while this will be adequate for most human interactions, some of the examples above will require even lower latency. A shift in the network architecture is needed if we are to see latencies of 1 or 2 milliseconds in the wild.

Closer to the edge

A network's compute and storage requirements currently tend to be handled on remote servers, located far from the end user. Mobile edge computing or multi-access edge computing (MEC), however, brings these processes closer to the network edge; in many cases they'll actually be integrated into the radio towers from which 5G services will be delivered. As latency is affected by the number of hops from a device to a server, decreasing the distance and reducing the number of hops between the two by moving the server to the network edge will therefore significantly improve latency — ideally to the desired 1 or 2 milliseconds.

It's also worth considering that, largely based on virtualization and reliant on technologies such as network functions virtualization and software-defined networking, 5G makes use of stateless cloud services which, rather than storing data from one session to the next, rely instead on common external data management. Operators must therefore put in place a carrier-class data layer capable of bridging these stateless clouds and storing diverse data such as fast-changing session data, as well as the policy, subscription and long-lasting subscription data required by a range of different applications. Doing so, will result in an efficient MEC deployment, delivering data at the edge for ultra-low latency applications.

Monetization opportunity

MEC is clearly integral to 5G and IoT deployments. Indeed, the European Telecommunications Standards Institute described it as "a key technology and architectural concept to enable the evolution to 5G." For operators, though, it represents more than just a means of offering the necessary connectivity; MEC is also an opportunity to monetize 5G and the burgeoning IoT.

By providing an environment in which specialized latency-sensitive server applications can be hosted, operators will be able to charge more per connected device. Operators' central offices are set to become more valuable assets too; after all, enabling server applications on the edge will require facilities to host the edge computing. Indeed, many operators are already employing Central Office Re-architected as a Datacenter (CORD) and M-CORD for just this reason. Many others

are also implementing subscriber-aware edge technology to prioritize traffic and maximize their edge server deployments.

These examples alone give some idea of the extent to which change is afoot. OEMs and operators are talking up 5G like never before, and 2019 is likely to see the technology rolled out across a number of different regions. Businesses across all industries are set to change forever as a result of the high speed and ultra-low latency it promises. By providing the connectivity and the environment needed to unlock the potential of IoT and reap the benefits of the fourth Industrial Revolution, operators now have a huge opportunity to monetize the latest generation of mobile networking, and share in its success. 5G is almost upon us. It's time to step up to the edge and unleash the fourth Industrial Revolution.