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## Paving the Way for a Fully Connected World

By: [Ludovico Fassati](#)

After the volatility of the last year, many businesses are exploring different ways to improve their organization. By putting the rollercoaster of 2020 in the rearview mirror, companies can start rethinking their existing business models and revenue streams and focus on what will drive their businesses forward. An important place to start in rebuilding for the future is by looking at how technology is infused across the business.



In fact, in a [recent study](#) 71 percent of organizations reported they have made at least one new technology investment in direct response to COVID-19 over the last year. While many of these purchases or upgrades were in response to supporting employees in working flexibly and remotely—either through new software or hardware—these types of investments in technology show a trend to building a technology foundation for growth.

The combination of IoT, 5G and multi-edge computing (MEC) makes up the infrastructure businesses need to both improve what they do now and help them build new connected business models.

Together they amount to an entirely new way of working, but first let's break down the individual value.

### IoT agility

Eighty-four percent of businesses surveyed for Vodafone's [IoT Spotlight 2020](#) report said IoT helped them quickly adapt in 2020. Even more, 87 percent indicated that it's critical for their

ongoing success. Of all the advantages IoT brings, like lowering costs or increasing revenue, this shows the biggest is in its power to provide digital readiness.

If this fitness is the foundation for both agile and innovative operations, data is the ground floor. Smart decisions are data-driven, and IoT gives businesses access to the most immediate datasets they need to inform strategy, enabling them to adapt, react and respond more quickly and effectively to changes in customer and market demands—moves that create competitive advantage.

IoT's vast impact is already seen in the most connected global industries such as automotive, logistics, utilities, manufacturing and healthcare. For example, tracking company [TrackTec](#) uses connected cameras and other devices to not only track the location of a given asset but also monitor habits, performance or even preempt problems before they occur for customers across public transport, transportation, private transport and machine management. Predictive maintenance has reduced costs by approximately twenty percent over a five-year period.

The technology is also emerging in some of the least connected industries. For example, Erüst's [family farm](#) uses an IoT solution that provides real-time information and data for more sustainable farming. The IoT solution helps the farm stay updated on weather conditions and receive notifications that help prevent diseases from spreading across their crops. It also helps to lower overall production costs and decrease water usage as well as fertilizers and pesticides as the solution tracks when crops actually need these resources.

This brings us to 5G, which will make new IoT applications, like in agriculture, possible. The next-generation network is designed for connecting things more than people, so its influence will be felt primarily in business and industry.

## 5G means more IoT

With 5G-compatible network solutions like NB-IoT, IoT will enable billions of more objects to be connected quickly and easily, paving the way for a fully connected world. As 5G becomes a reality, new use cases will be based on control services.

Every IoT deployment leverages two core capabilities: location-based services and remote monitoring. With LPWA, 2G and 4G data can be transferred between devices, so businesses can track, trace and monitor the status of their assets and goods.

But with 5G, these devices can also be controlled in real-time and remotely. This enables augmented and virtual reality applications, as well as those that power autonomous vehicles—all of which need an extremely quick response time to be possible.

It's not all about speed, though. Capacity also plays a big role, and 5G networks allow control of many more devices than ever before. A critical element of the transition to 5G for IoT is made possible by mobile private networks (MPN), which give businesses the chance to leverage the

latency, bandwidth and quality of service benefits 5G brings to critical application environments, even before national deployments.

A 5G MPN is like a mobile network dedicated to one piece of an operation that has specific network performance requirements as they control multiple complex systems in real-time. These might be things like automated guided vehicles, robotics, flexible manufacturing lines, and AR/VR on the factory floor, which are transferring large amounts of manufacturing and quality data through the process.

## Bringing it all together at the edge

A technology often associated with 5G MPNs is multi-access edge computing (MEC). The ability to process close to the device is a requirement for many critical applications, and MEC further enhances the ability for a 5G MPN to deliver higher levels of quality of service and deterministic performance.

As devices become more and more intelligent and generate increasingly larger amounts of high-value data, edge computing makes it possible to rapidly process and analyze it, bringing decision-making closer to the source.

Thanks to an edge gateway that can distinguish which data needs to go to the cloud and which needs to be processed instantly on site, overall system responsiveness can be minimized. This capability will play an increasingly important role as more factory machines become self-operating and more autonomous vehicles enter roadways around the world. By instantly processing information at the edge, safety-critical events can be actioned immediately without latency, such as stopping an automated forklift in a factory when there is a risk of collision.

Edge also helps reduce connectivity costs by sending only the information that matters instead of a constant stream of data from IoT sensors to the cloud.

Combining 5G MPN and edge computing creates an infrastructure that can be located where the data is generated and where the action needs to happen. This is hugely important when we are talking about critical operations but also for tactile or haptic applications like remote surgery.

What is normally bundled with MPN is a dedicated edge. In the case of “hybrid” MPNs, there are also solutions to send data to ‘edge cloud’ services running from strategic locations in telecommunications’ networks, keeping processing close to the device.

For example, we are working with [Digital Barriers](#), an edge intelligence provider, to deploy an MEC solution to help first responders have access to real-time video feeds that enable time-critical decision-making and help keep mobile workers safe and secure. This technology is helping to deal with critical, often life-saving events in milliseconds, reducing the time it takes emergency services to access incidents as well as combining live video streams from multiple cameras and sensors from various locations to gather a multi-dimensional view of a situation. This means

hospital staff can prepare better for a patient's arrival and make faster care decisions once someone arrives at the hospital. Information can also be shared at local, regional, or national levels to ensure staff and officers are present in areas of a crisis that are needed most. All of this can make an incredible difference in the time it takes to respond to a disaster.

## The device revolution

[Analysts](#) predict the number of connected IoT devices will grow to 24.1 billion by 2030. Along with this growth, 5G and edge computing will also expand to enable these increasingly intelligent devices and allow huge amounts of high-value data to be streamed and processed intelligently and flexibly.

The processing power of edge, along with the bandwidth and low latency capabilities of the next-generation network, will offer real-time control, greater data analytics and deeper insight into critical operational processes, which will lead to the creation of innovative products and services to generate new revenue streams.

Overall, the ability to connect devices wirelessly and distribute computing power according to system performance will be a game-changer for many sectors over the next few years.