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Architects of Change

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Private 5G as a pioneer for the digital transformation

Advantages of 5G and use cases for companies

Content

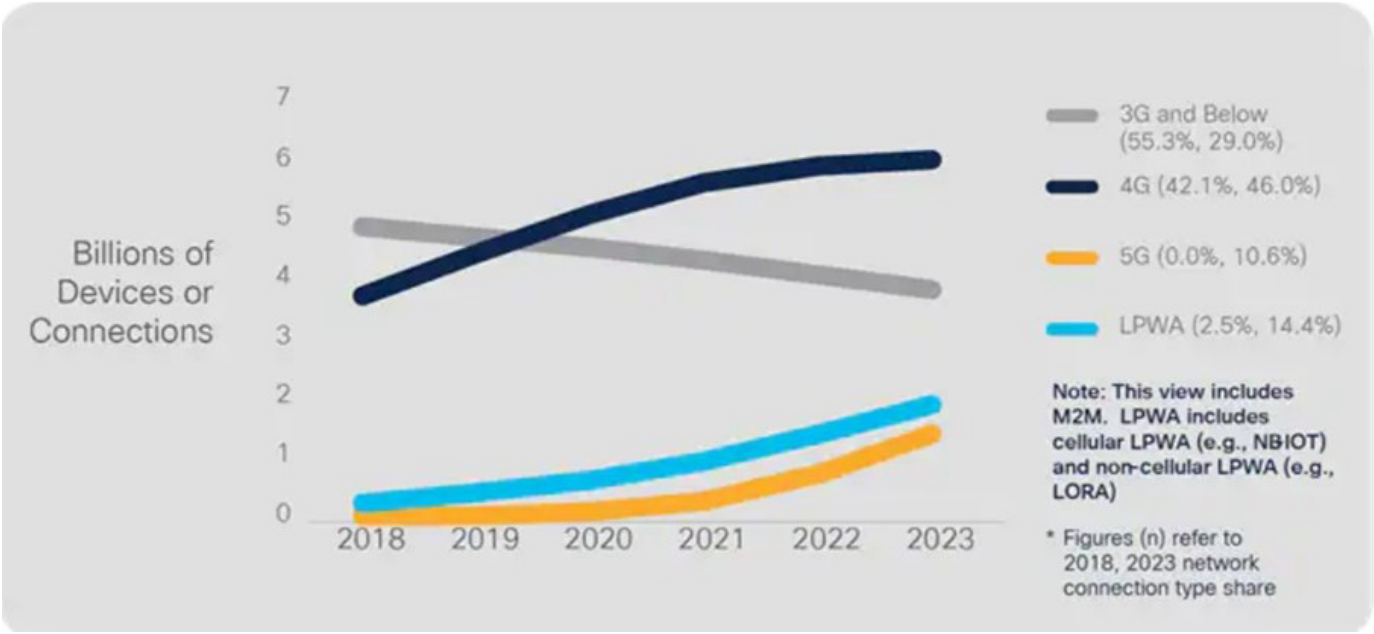
Everything is networked...

People and machines, machines and machines, machines and sensors: In our modern world, just about everything is networked. This so-called second wave of digitalisation offers great opportunities and development possibilities for companies, but equally great challenges. If companies want to meet the requirements of modern, digital business models, they have to think ahead and open their business to new technologies.

If you want to keep up, your network must be able to connect people, machines and sensors securely and reliably in the future. And that should be fast and stable. Whether right where you are or on the road. 5G campus networks make this seamless wireless connectivity possible: They mark a turning point in the industrial and business landscape and ensure that companies can realise their full potential - if they do it right.

5G - rapid growth, endless possibilities

The digital transformation is omnipresent and is changing everything in a company. Especially during the global crisis, it has continued to gain massively in importance. The "Cisco Annual Internet Report"[1] also paints a clear picture of this development. According to the report, IoT devices will account for about 50 per cent of all networked devices by 2023 - a third of them via wireless connections. At the same time, IT and service providers expect 5G to play a decisive role. The mobile network will have a major impact on a wide range of business segments such as manufacturing and automotive. It is hardly surprising, then, that 5G connections will grow from around 13 million in 2019 to 1.4 billion in 2023 - more than a hundredfold. At the same time, a 5G connection will generate almost three times more data volume than a 4G connection in 2023.[2] Big numbers to deal with.



Global growth in mobile connectivity

1. Cisco Annual Internet Report, 2018-2023
2. Cisco Annual Internet Report, 2018-2023

What exactly is 5G?

5G describes the further development of the current mobile radio standard LTE (Long Term Evolution) - also called 4G. Compared to LTE, 5G has a

- 20 times higher bandwidth,
- 10 times shorter latency times
- and the possibility of involving 1,000 times the number of participants per square kilometre.

With these improvements, applications can be realised that were previously not possible in this form - for example, 4K video transmissions, the establishment of sensor networks or Industry 4.0 applications beyond one's own location.

Differentiation from other radio technologies

4G, DECT, WiFi, LoRaWAN, Bluetooth, Tetra, ZigBee, NB-IoT - different wireless technologies currently exist in companies. 5G can replace the various standards or also connect them. This allows WiFi and private 5G to coexist in the company environment. WiFi offers simple network access and can be used for the transmission of non-critical data; with 5G, the reliable and fast transmission of sensitive, time-critical data is possible.
Likewise, LoRaWAN and Tetra networks can be integrated into the 5G world via gateways.

5G campus networks enable tomorrow's connectivity

Mobile connections via campus networks

Wherever things move or need to be moved, wherever data is captured or output on the move, mobile networks play a role. And this is largely for very practical reasons. Because wireless connections offer numerous advantages over wired ones - at least as long as bandwidth and reliability are given. Quick set-up, no annoying cables and easy access. This freedom of mobile, wireless connectivity opens up a wide range of potential applications - this includes augmented reality, autonomous vehicles and networked supply chains. But how can company IT ensure low latencies and high bandwidths in data transmission - and also make this transmission secure? The answer is: with private 5G campus networks.

Localised and secure

A 5G campus network is a geographically limited or local mobile network in which the data sovereignty and infrastructure remain the responsibility of the company. Within a licensed radio spectrum, 5G technology is used for internal data transmission. Sensors, cameras, people, machines and applications are connected to each other via a radio access network (RAN). Up to one million devices within one square kilometre can be networked with such a campus network.

Campus networks can be operated both in isolation as so-called private 5G and in connection with publicly accessible mobile networks. The private part is only accessible to authorised devices and users - making it extremely secure. The integration of public mobile radio networks can be done via special gateways. Here, the radio infrastructure of the private network is used for the public network supply. The public part can be used by all employees, customers and partners via mobile devices.

Since November 2019, there has been a frequency spectrum in Germany - supporting the technical possibilities - exclusively for campus networks. With this, the Federal Network Agency (BNetzA) has created the option for corporate customers to create an independent mobile network on demarcated properties under the sovereignty of the customer.

5G campus networks: the advantages

5G campus networks enable new business models and meet the requirements of the second wave of digitalisation in terms of

· low latencies,

· high data speed

· and large network capacity.

Low latencies

5G guarantees extremely low latency. In industrial use cases, for example, 5G can achieve a round trip time of less than 10 ms - a decisive factor when it comes to time-critical use cases such as controlling robots or networking machines. In addition, the failure rates are very low and 5G is therefore extremely reliable.

High data speed

With its bandwidth of up to 100 MHz, the private 5G network is designed for data transmission in the Gbit/s range. This means that high-resolution images and videos, telemetry data from production facilities can be transmitted securely without delay.

Large network capacity

5G is designed for locations with high terminal density in a small space. This could be many IoT sensors, for example, or many users in a stadium. A private 5G network is the optimal solution for such locations.

And what about security?

5G campus networks are excellent not only in terms of low response times, large capacities and high data throughput. They are also characterised by a high degree of security - and that in several aspects.

1. In principle, **mobile networks** can be considered **more secure wireless connections** than WiFi, for example. This is because a SIM card is needed to access a particular mobile network. For private 5G networks, this access is thus only granted to authorised persons and devices.

2. The **secure design of** campus networks coupled with **firewalls, intrusion detection systems (IDS), access controls and encryption** protects the network from internal and external attacks, malware, unauthorised use and other tampering.

3. Thanks to the **clearly defined availability spaces**, companies have network sovereignty in their campus network and the **sole right to use** the radio frequencies licensed to them. External users do not have access.

4. 5G campus networks can be divided into **virtual areas**, called **slices**, which are used by the different applications or user groups. Applications can be **prioritised** in the private 5G network and corresponding **areas can be reserved for them**.

5. Another advantage in terms of security: the **high reliability of campus networks**. Redundancy concepts ensure an availability of more than 99.99 percent. In addition, the operating parameters are continuously **monitored**; backup and optimisation processes are handled **automatically**.

Edge Cloud

However, 5G campus networks only fully exploit their multiple advantages if the transmitted data is stored in the so-called edge cloud. In contrast to cloud computing, edge computing refers to decentralised data processing at the edge of the network.

The collection, aggregation, processing and analysis of applications, data and services take place - instead of centrally in the data centre - in the network periphery. Right there, where they are created. Data streams can thus be processed in a resource-saving manner and with short response times. At the same time, the bandwidth of the entire company network is used more efficiently: Data is pre-filtered at the edge nodes and only globally required data is sent to the data centre for further processing.

Application of local 5G campus networks

Application of 5G campus networks in logistics

Where up to one million devices per square kilometre can be securely and resiliently networked, almost anything is possible. This makes the application of private 5G networks virtually predestined in numerous company divisions and industries. In the following, we take a look at the possible uses of local campus networks in the areas of logistics, manufacturing and healthcare.

Logistics

The use of private 5G in logistics and transport is versatile. Thanks to the modern communication standard, companies can track and improve flows of goods, monitor their inventories or coordinate autonomous transport systems such as forklift trucks or mobile robots. Thanks to real-time communication supported by 5G, AGVs (Automated Guided Vehicles) can automatically detect obstacles and react immediately to changing situations. This prevents accidents and improves loss prevention. A factor that can be reflected in higher profit margins.

Automated object monitoring, intelligent security systems or the autonomous maintenance and repair of systems are further application scenarios in which campus networks can fully exploit their advantages for logistics.

The objects located on campus can also be comprehensively secured with the achievements of 5G. Using high-resolution cameras, drone area monitoring or asset tracking, objects are identified and monitored in real time. For example, static safety corridors or a local SLAM (Simultaneous Localisation and Mapping) can be set up to determine the position and map objects.

Rapid help with product recalls

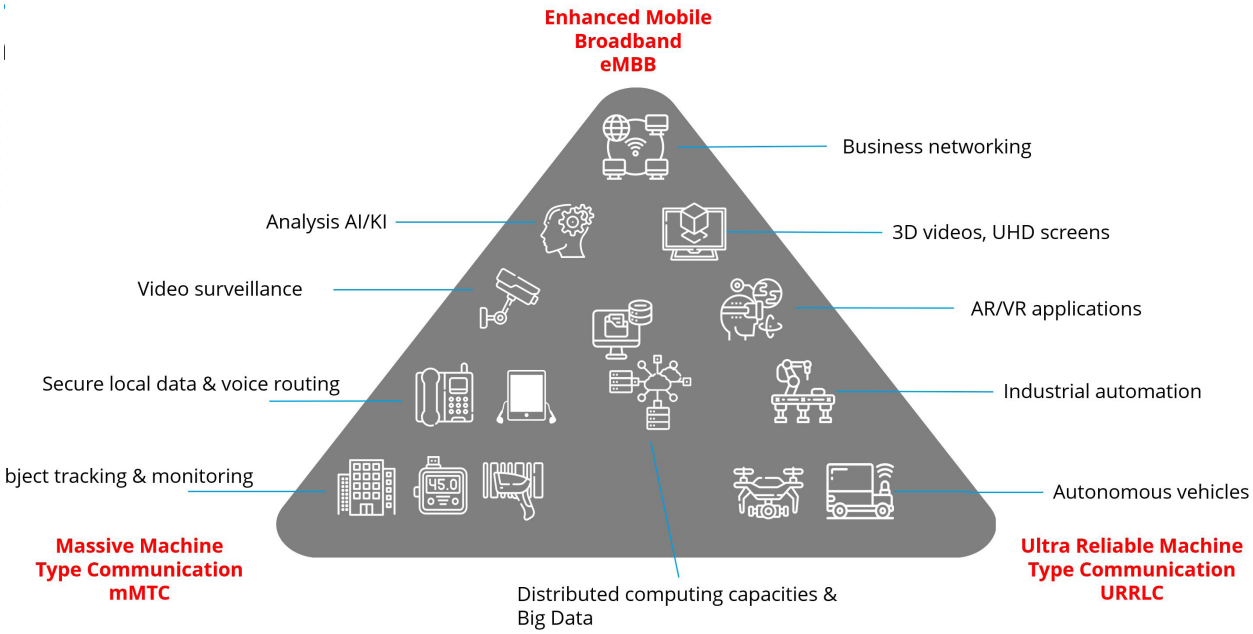
5G campus networks can also provide significant support in the event of a product recall. If irregularities occur in the manufacturing chain, for example in food processing, it may be necessary to recall the entire batch. Because with current technologies, the path of the defective goods cannot be traced in detail.

A private 5G network allows closer monitoring and thus facilitates the detection of defective products. Failures and damages for the affected company can be reduced. The higher transparency and information security reduce costs and possible image damage.

Industry 4.0

The term Industry 4.0 refers to the networking of people, machines and processes. The goal: optimising manufacturing and logistics by collecting and evaluating data. Industry 4.0 also enables predictions that can be used to avoid potential failures or manufacturing deviations.

Process robotics, autonomous vehicles or artificial intelligence (AI): 5G opens up a multitude of possibilities for manufacturing and the design of Industry 4.0. For example, the quality of the products can be tracked and necessary corrective measures can be implemented promptly to minimise losses. Parts that are out of tolerance are selected immediately by being captured by high-resolution video cameras and compared with a digital twin. The finishing operation can also be optimised in this way. In addition, thanks to local campus networks - especially with regard to the speed and immediacy of communication - the cooperation of manufacturing with other company divisions, such as purchasing or project management, improves.



The use cases of 5G in industry are diverse

Plant monitoring and maintenance

In private campus networks, sensors record vibrations, temperature, power consumption, oil quality and other parameters of machines and compare them with target values. This way, operators, applications and other machines are continuously kept up to date on the machine status.

Thanks to improved mobile broadband, 5G accelerates the networking of people and machines - for example via mobile manufacturing apps. Problems and malfunctions can be solved even faster.

The distributed network design and the edge nodes positioned close to the resources ensure that the data from the measuring devices and sensors connected to the campus network are analysed quickly. Faults can be prevented before they occur (predictive maintenance); remote monitoring and maintenance improve control options and help minimise downtime and thus costs.

Security in manufacturing

The topic of security also plays a major role with regard to Industry 4.0. And not only the digital, but also the physical security of people and machines. For example, the deployment of 5G campus networks can improve physical access control. This is done, for example, via perimetric protection devices on doors and cabinets or so-called geofencing, the definition and monitoring of authorised rooms.

Personal security is also taken care of in the campus network. The whereabouts of people can be determined or alarms can be sent via data-driven apps or communication with the control centre. The 5G-supported use of AGVs (Automated Guided Vehicles), AGRs (Automated Guided Robots) and UAVs (Unmanned Aerial Vehicles) in hazardous work areas minimises safety risks for employees.

In addition, safety-relevant sensors can be networked and operated safely in the 5G network, for example in the monitoring of air pollutants.

Comprehensive networking in the industrial environment

Healthcare

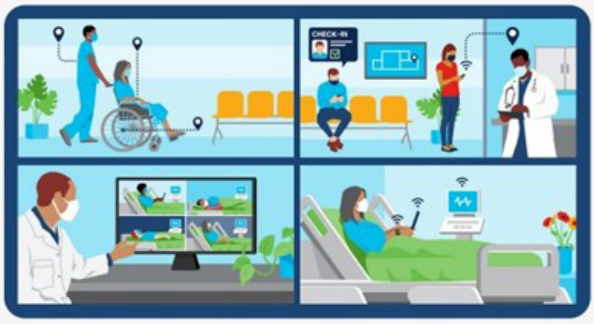
Healthcare companies and institutions can also take their digital transformation a big step forward with the deployment of 5G campus networks. Whether ambulances, intensive care equipment or radiology:
Tomorrow's supply is already tied to numerous IT systems today. The quality of healthcare thus depends heavily on the reliability, bandwidth and latency of IT networks.

Thanks to its improved bandwidth, the use of private 5G enables, for example, the transmission of large amounts of data generated by MRIs, X-ray machines or other medical imaging devices, among others. Digital medical records - whether for medication or viewing imaging procedures - will also become the status quo by means of 5G campus networks.

The requirements of modern technology also require long-range and reliable radio connections in other areas. For example, a 5G campus network serves as the basis for connecting mobile equipment such as patient trolleys, diagnostic devices or self-propelled disinfection robots. Remotely controlled operations can also be carried out more stably and safely with a private 5G network due to its high reliability.

Trouble-free elementary services

The introduction and operation of a dedicated 5G campus infrastructure ensures the trouble-free operation of elementary services. All data traffic remains within the hospital network and is not routed via an external infrastructure operated by a provider. The division into securely separated sub-networks also allows the smooth operation of various applications - for example, the provision of resources for broadcasting public 5G networks in buildings that are otherwise difficult to access with mobile technology.



Application of 5G campus networks in healthcare

Logicalis - strong partner for setting up and operation of campus networks

The advantages that 5G campus networks bring are therefore obvious. But: companies that (want to) use these networks need to find a balance between the advantages of a private 5G network and the challenges that implementation, operation and maintenance bring. Since the operation of 5G networks is usually not one of the core expertise of company IT, this is where reliable IT partners come into play to provide support in setting up and operating a private 5G network.

As a Cisco Global Gold Partner and selected partner for private 5G, Logicalis has the expertise available to implement demanding 5G projects. In doing so, we support customers in all phases of their private 5G project - from proof-of-concept to network design and implementation of the campus network. Managed services for the operation and monitoring of the private 5G infrastructure round off our range of services.

Our private 5G services at a glance

1. **Consultancy:** What software and sensors are needed? Which manufacturers come into question?
2. **Network planning & proof of concept:** Including interaction with the existing network and application for frequencies with the German Network Agency (BNetzA)
3. **Commissioning:** Construction and configuration of the private 5G network including the infrastructure for managing the SIM cards
4. **Managed services:** Operation and maintenance in various service models up to fully managed services

Our 5G solutions are based on Cisco Mobile Core technology and Cisco's IoT portfolio. These include powerful IoT sensors and gateways, device management software, monitoring tools and central dashboards. With regard to the Open Radio Access Network (RAN) technology, it is possible - depending on the application and requirement - to choose from various manufacturers.

Some of the Private 5G components can be deployed as cloud-native functions (e.g. SA 5G Core), allowing parts of the solution to be hosted in the cloud, at the edge or on-premise.

The Logicalis solution is available as an as-a-service and can thus be flexibly adapted to the needs of the respective customer. It integrates into the existing infrastructure and perfectly complements the existing wired and wireless transmission technologies. Central management and policies facilitate administration. And, last but not least, our campus networks are extremely flexible thanks to consumption-based pay-as-you-use models.

Conclusion: 5G? Yes please, but only with an experienced partner

Times are changing rapidly. Requirements on IT and OT are increasing at an ever faster pace. Only those who keep up will ultimately enjoy the competitive advantages needed to be successful in their respective industries. 5G campus networks promise improved performance and efficiency in numerous areas. They accelerate communication between sensors, machines and people and are able to securely process and output large amounts of data in the shortest possible time.

However, the potential of this new generation of mobile networks can only be fully exploited as a tool suitable for business if all factors mesh perfectly like cogs. Choosing an experienced and knowledgeable partner prevents problems during implementation, operation and their consequences.

We are architects of change, working to help companies enjoy success in the digital world.

At Logicalis, we use our extensive technological expertise to support our customers on the path to lasting results.

More information can be found at www.logicalis.de

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