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Unlock the Power of Private 5G: Top Applications and Key Business Outcomes

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Introduction

- This document is a perspective written by Analysys Mason on behalf of Cisco that examines the private 5G market. It identifies key sectors that will deploy private 5G networks, which applications will be used, and which key business outcomes will result from these deployments.

- A private LTE/5G network is a cellular network that is built specifically for an individual enterprise. Such networks are commonly deployed on a single site (for example, in a factory or a mine). A table of definitions can be found on slide 25.

- The remainder of this report is structured as follows:

  - market overview

  - key industries

  - key applications

  - business outcomes

  - conclusion

  - overview of Cisco's private 5G solution.

Executive summary

- The private 5G market is at an early stage of development, but activity in the market is increasing. 5G accounted for over 50% of all publicly disclosed private network announcements at the end of 2022, according to Analysys Mason's *Private LTE/5G networks tracker.*[1] 5G's share is lower when non-public announcements are included, but it is expected that most private networks will eventually use 5G.

- Enterprises are deploying private 5G for several reasons. 5G can help enterprises with their digitization goals by connecting devices to generate useful data for the enterprise. Private 5G will enable automation, streamline production processes, and bring sizable cost efficiencies. Private 5G will also help to develop emerging applications such as autonomous vehicles, drones and robotics.

- Enterprises can use private 5G to replace ageing technology (such as TETRA) or provide a cheaper and less complex alternative to wired networks. Private networks are typically deployed to complement existing Wi-Fi networks. Wi-Fi is well-suited to connecting many indoor applications and will continue to do so through the development of Wi-Fi 6 and Wi-Fi 7, but private 5G is particularly suited to outdoor applications, and indoor applications that require dedicated, licensed spectrum.

- The manufacturing sector has led the deployment of private 5G thus far, followed by industrial sectors such as transport and logistics, mining, and oil and gas. Private 5G has also been deployed to a lesser extent in other sectors, such as healthcare and the public sector, and opportunities in these sectors will grow significantly over time. Common private 5G applications include industrial equipment, automated/autonomous vehicles, location services and connected sensors. New 5G applications, such as those utilizing AR/VR, digital twins and robotics will emerge over time.

- Many enterprises that have deployed private LTE/5G networks are already seeing positive business outcomes. Automation is the most common goal and can help to reduce costs and increase productivity. Private 5G can also provide significant energy savings, helping firms to meet sustainability goals, and improve on-site worker safety and security.

- The private 5G market is evolving rapidly. Enterprises that explore private 5G early will be well-placed to understand the technical and commercial challenges associated with deploying a private network and will be able to see how private 5G can complement existing networks such as Wi-Fi. 5G could also give enterprises a competitive edge by improving productivity and developing new, advanced applications before competitors do so.

[1] For more information, see Analysys Mason's *Private LTE/5G networks tracker*.

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# Market overview: the private networks market is nascent, but is growing rapidly

5G networks are accounting for an increased share of the growing private networks market.

Analysis Mason's *Private LTE/5G networks tracker* captures the details of 400 publicly disclosed private network contract announcements as of the end of 2022; we are also aware of over 1000 private network deployments that have not been disclosed publicly.[1] The market will grow rapidly; there will be almost 40 000 networks by 2027 and USD7.7 billion in network spend.[2]

LTE remains the most deployed technology for private networks, but the 5G share of networks is growing. 5G accounted for over 50% of all publicly disclosed private network announcements at the end of 2022. The 5G share is lower when non-public announcements are included because firms are more likely to publicly announce a 5G network than an LTE network given the high interest in 5G. In addition, many private 5G networks remain at the trial/test stage.

Some of the barriers to 5G adoption are detailed on the next slide. 5G adoption will accelerate as these barriers are removed and will eventually be used in most private network deployments. However, private 5G will be more suited to some sectors than others. Industrial sectors such as manufacturing and transport have been early adopters of private 5G, and others such as healthcare and public sector will follow. The opportunities in these sectors are outlined in slides 9–12.

Figure 1: 5G share of all publicly announced private LTE/5G networks, 2019–2022
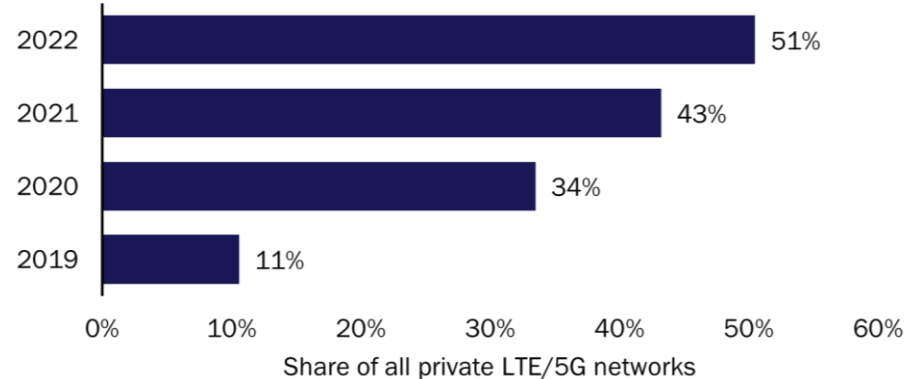
Source: Analysys Mason

Figure 2: 5G share of newly announced private LTE/5G networks, 2019–2022
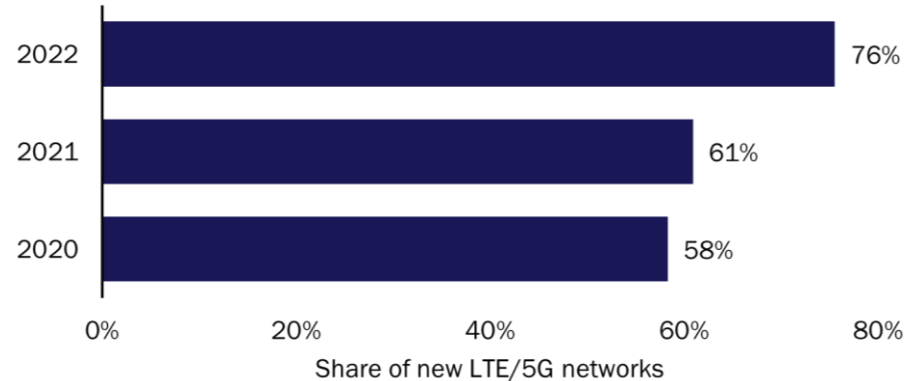
Source: Analysys Mason

[1] For more information, see Analysys Mason's *Private LTE/5G networks tracker*.
[2] For more information, see Analysys Mason's *Spending on private networks will reach USD7.7 billion in 2027, but challenges to adoption persist*.

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Market overview: drivers and barriers for the adoption of private 5G networks

DRIVERS

DIGITIZATION
Enterprises are digitizing their data and using it to create new digital products and services. The need for high-bandwidth, low-latency networks to support increased automation will grow as data processing requirements increase.

REPLACE AGING TECHNOLOGY
Enterprises are deploying private 5G as a relatively cost-effective alternative to extending existing wired networks or replacing aging wireless technologies such as TETRA.

CONNECT NEW APPLICATIONS
5G will drive the development of new applications such as drones, AR/VR and digital twins.

BOOST IoT GROWTH
Private 5G will complement existing IoT wide area applications. Devices will be able to seamlessly move from an on-site private network to the public wide area network.

BARRIERS

COST
Private LTE/5G networks can be more costly to deploy than Wi-Fi networks. Network components have been designed to cater for public networks, and many existing business and pricing models are designed as such.

DEVICE AVAILABILITY
The 5G device ecosystem remains immature. Many 5G sensors and devices are not readily available or are currently prohibitively expensive.
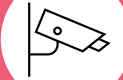
SPECTRUM AVAILABILITY
The availability of spectrum varies significantly by geography. Industrial spectrum is available in some countries, but spectrum remains controlled by mobile network operators in many countries.

SCALABILITY
Enterprise requirements differ by industry vertical and by enterprise size, and many businesses need bespoke solutions. Developing scalable solutions is a challenge.

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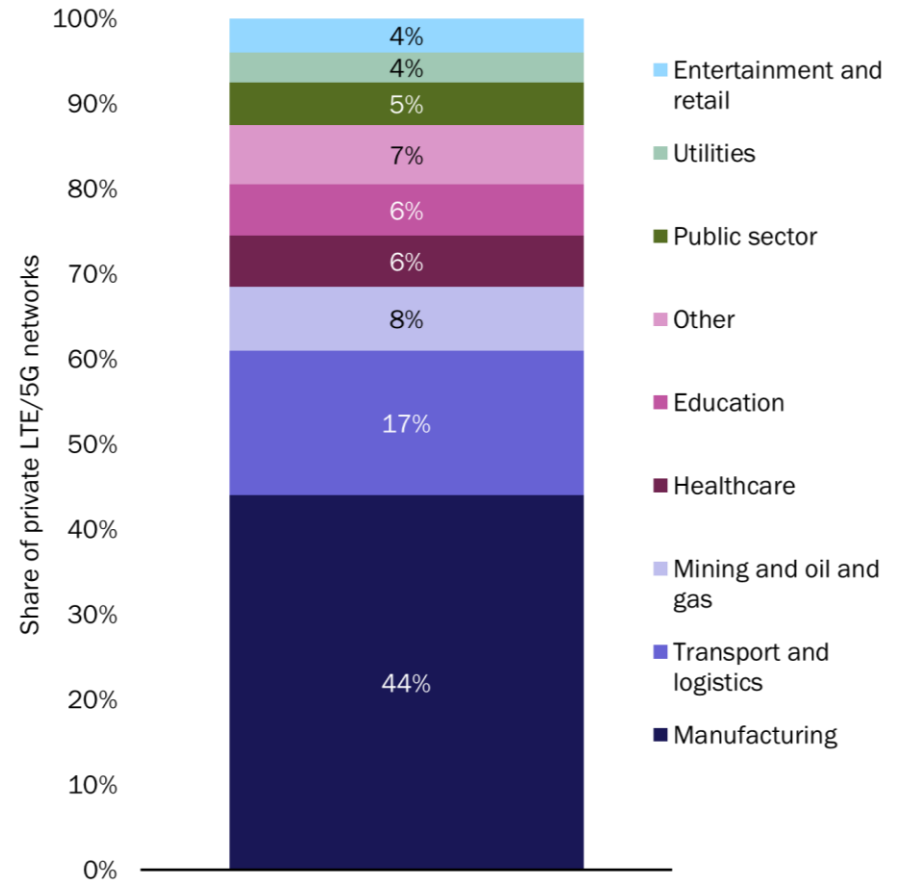mason

Top industries: summary

Industrial sectors such as manufacturing and transport and logistics will drive the deployment of private 5G.

The manufacturing sector has been the main adopter of private 5G networks, driven by investments to support the automation of factory processes. It accounts for 46% of all publicly announced private 5G deployments as of 4Q 2022. This share will decline over time as many indoor manufacturing sites will be served with Wi-Fi 6.

Automation is a driver of private 5G adoption in other industrial sectors: transport and logistics and mining and oil and gas. These sectors account for 25% of the publicly announced private 5G deployments to-date. 5G is well-suited to connect outdoor sites such as mines and industrial plants. 5G enables the remote control of vehicles and heavy equipment, thereby reducing the need for on-site personnel and the likelihood of accidents.

Healthcare and the public sector currently account for just 11% of private 5G networks, but this share will increase over time. Private 5G will be deployed at hospitals and medical facilities because these sites require dedicated networks to connect medical devices and carry sensitive medical data. 5G will also be used in the public sector for surveillance and dedicated networks at military bases. Other sectors, such as utilities and education, currently account for a small share of private 5G and this is unlikely to increase significantly. Private LTE is usually sufficient to connect the simple applications supported in these sectors.

Figure 3: 5G share of publicly announced private networks, 2022

Source: Analysys Mason

Top industries: summary

Figure 4: Summary of the top five industries that will deploy private 5G

	Example use cases	Why private 5G is a good fit
Manufacturing	AGVs, inspection cameras, machine tools and robotics	• Several high-bandwidth, low-latency use cases (AGVs and robotics) • Key business outcome of cost efficiencies is to reduce downtime • Large enterprises are willing to spend • Need for 'clean' dedicated spectrum for indoor use cases
Transport and logistics	AGVs, asset tracking and industrial equipment	• Provides the ability to connect large number of devices
Mining and oil and gas	AGVs, autonomous vehicles and push-to-talk/voice communications	• Better suited to underground and remote sites than public cellular/Wi-Fi
Healthcare	Connected medical devices, remote examinations and remote surgery	• Meets regulatory requirements around transfer of medical data • High-bandwidth, low-latency use cases (remote surgery)
Public sector	Occupancy management, drones and security cameras	• High-bandwidth, low-latency use cases (real-time video streaming)

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Top industries: industrial sectors are the early adopters of private 5G
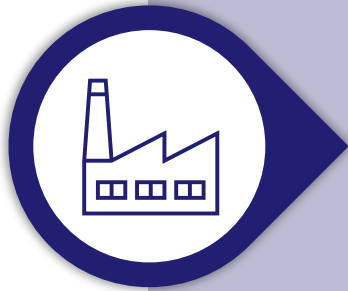
Manufacturing

The manufacturing sector is the largest private networks sector in terms of the number of addressable sites. It contains many large, multinational enterprises that are willing to invest in private LTE/5G networks as part of ongoing digital transformation processes. Analysys Mason estimates that almost half of existing private LTE/5G networks use 5G, and this will rise to almost 90% by 2030.

Automotive manufacturers have been at the forefront of private network adoption. Companies such as Volkswagen, BMW and Mercedes Benz have deployed private 5G as a foundation for further automation and cost efficiencies, and most automotive players have adopted 5G to support new automation use cases. A few manufacturers such as Porsche and Airbus have also trialed hybrid public–private networks to which vehicles stay connected when moving from the private 5G network to the wide-area public network.

Transport and logistics

Operators of transport hubs such as airports and ports are among the early adopters of private networks. Private networks at airports and railways allow their operators to separate travelers' connected devices (using Wi-Fi) from staff's. Devices used by staff, such as asset trackers, AGVs and point-of-sale terminals will be connected to private LTE/5G networks, which provide better coverage than Wi-Fi, and can meet the bandwidth requirements of various types of device.

Port and airports are also deploying private networks to monitor and remotely control assets. For example, 5G connected stevedore cranes can be operated via remote control stations to avoid the need for an in-cabin operator. AGVs and autonomous vehicles are also prevalent at airports and ports and will benefit from the high bandwidth and low latency provided by private 5G.

Mining and oil and gas

Mines and industrial plants are often located in remote locations outside of the coverage of public cellular networks, thereby making private LTE/5G an attractive option. Private networks can help to improve worker safety by monitoring workers' locations and automating dangerous manual tasks.

Most private network deployments in this sector to-date have used LTE and relatively simple applications such as push-to-talk and simple asset tracking. However, 5G will enable higher-bandwidth use cases, such as autonomous drills and autonomous vehicles (for example, autonomous carts for traveling within a mine).

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Top industries: the healthcare and public sectors have deployed private 5G to some extent; more opportunities in these sectors will arise in the long term

Healthcare

The COVID-19 pandemic helped to accelerate the digitization of the healthcare sector. It also raised awareness of private cellular networks and their potential use in healthcare settings. Public cellular networks are rarely an option in hospitals due to strict regulatory requirements for the exchange of medical data on non-dedicated networks; private 5G can meet these requirements.

Private 5G deployments in hospitals to-date are mostly at the trial stage. However, there is significant interest due to the ability to connect a range of applications. These include simple use cases such as bed occupancy and cold chain monitoring, but advanced applications with high-bandwidth/low-latency requirements are also being developed. For example, Korea Telecom used private 5G to test the use of robots to deliver supplies to operating rooms at the Samsung Medical Center in South Korea. Vodafone Germany is also using a private 5G network to test a mixed reality solution for computer-assisted tumor surgery at Universitätsklinikum Düsseldorf.

Public sector

Several sub-segments of the public sector are interested in private 5G. Private 5G networks can be deployed by city municipalities and made available for use by local businesses and institutions. For example, the City of Las Vegas deployed a private 5G network across the city, including coverage of public spaces such as parks and event venues.

Private 5G networks can also be deployed for the sole use of the government or military organizations for surveillance and monitoring purposes. Applications such as CCTV and drones require data streaming in real time, which 5G supports. Military organizations are especially interested in the added security from using dedicated networks as opposed to public cellular or Wi-Fi networks.
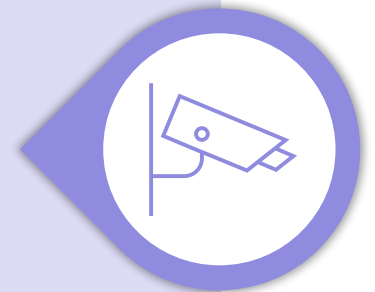
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Top applications: summary

Figure 5: Summary of the top five applications for private 5G

	Typical devices	Sectors
Industrial equipment	Connected cranes, machine tools and robotics	Manufacturing, mining and oil and gas and transport and logistics
Automated/ autonomous vehicles	AGVs and autonomous vehicles	Manufacturing, mining and oil and gas and transport and logistics
Track and trace	Baggage trackers and monitoring tags	Public sector, mining and oil and gas and transport and logistics
Massive data download	CCTV cameras, drones and medical devices	Healthcare and public sector
Production line inspection	Inspection cameras	Manufacturing and transport and logistics

Figure 6: Applications listed in publicly disclosed private LTE/5G networks, 2022

Application	Number of private LTE/5G networks
Smart grid	19
Massive data download	20
Inspection cameras	28
Security cameras	35
MBB connectivity	36
Push-to-talk/voice comms	44
Asset tracking	57
AGVs/autonomous vehicles	71
Industrial equipment	104

Legend: 5G, LTE, LTE/5G
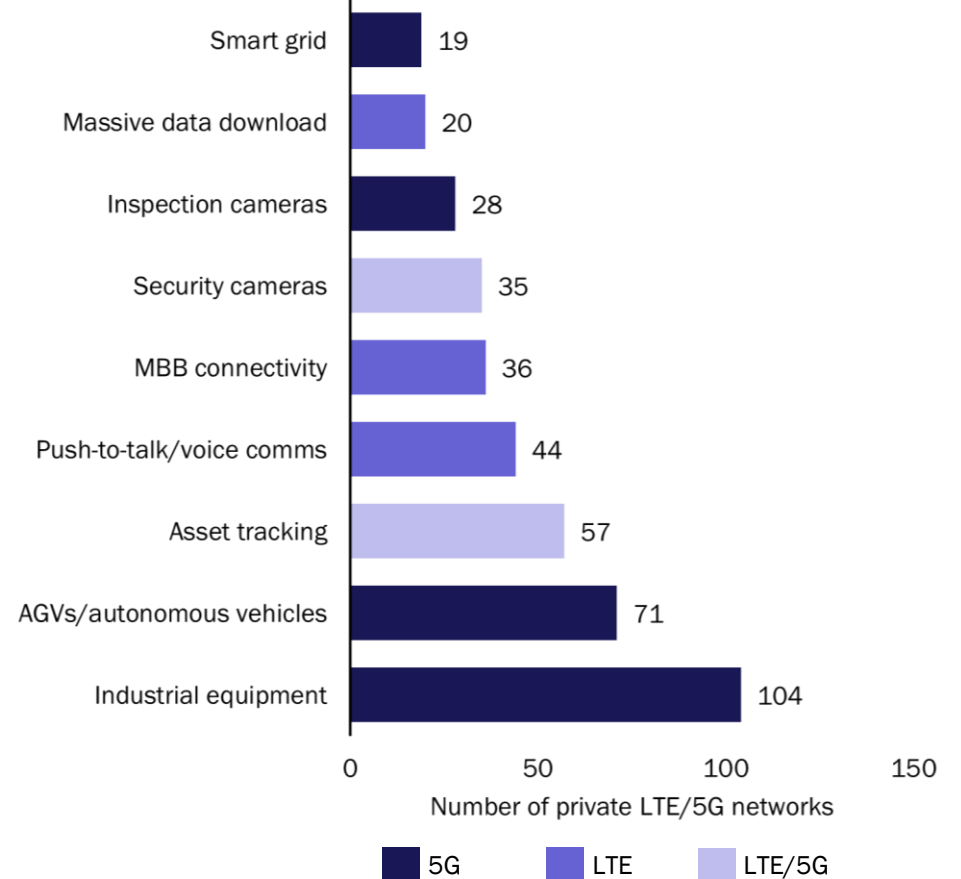
Source: Analysys Mason

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Top applications: automated machinery and vehicles are commonly deployed in private networks at industrial sites
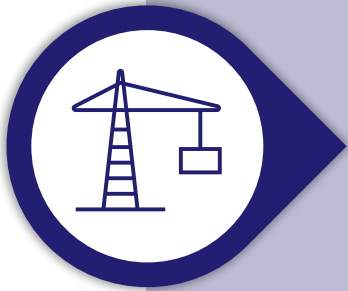
Industrial equipment

Examples of industrial equipment include machines, welding equipment and robotic arms on the production line. 5G enables this equipment to be connected without the need for a wired connection and with better download speeds and latency performance than Wi-Fi (particularly for outdoor applications). It also allows production processes to be increasingly automated, which will help to boost productivity. Heavy equipment such as cranes and lifts can also be connected via 5G to allow them to be operated remotely.

Automated/autonomous vehicles

AGVs are commonly used in the manufacturing and transport and logistics sectors. They tend to use a wired connection, thereby making updates and additions to guided routes expensive. Private 5G can provide greater flexibility. Autonomous mobile robots (AMRs) are increasingly being trialed. AGVs follow a pre-set fixed route and can detect obstacles but do not navigate around them. AMRs, however, use software to map out the most efficient route and can navigate around obstacles. Private 5G can provide a better response time, a more stable connection and more precise geo-positioning than Wi-Fi.

Autonomous vehicles are also being tested in other sectors. For example, a private 5G network deployed by AIS in Thailand is being used to connect unmanned electric vehicles in order to transport material and equipment to and from a mine.[1]

Sensors and inspection

5G-connected inspection cameras can help to automate aspects of the production process. For example, Singtel deployed a private 5G network for Micron Technology at its flash memory fabrication plant and is using an automated visual inspection system for individual chips.

Inspection cameras can also be used to allow employees to conduct remote inspections without physically being present on-site. For example, Samsung deployed a private 5G network at Optage's remotely located facility and live-streamed video in 4K from cameras across the facility to allow site inspections to be conducted off-site.[2]

5G will also be used as a backhaul method for outdoor sensors. These sensors will generate large volumes of data, and 5G can provide the necessary throughput and coverage for backhaul.

[1] SCG News Channel, *SCG-AIS 5G-Huawei develop autonomous vehicle systems powered by 5G Remote control for industrial zones sets new standard to level up BCG economy First ever full deployment in Thailand*.
[2] Samsung Newsroom (2021), *Samsung and OPTAGE Join to Build Private 5G Network in Japan*.

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Top applications: 5G provides rapid and reliable download speeds and will enable the real-time tracking of assets and people

Massive data download

Private 5G allows for the rapid download of large quantities of data on-site in order to provide data insights in real time. This can be applied across several sectors including manufacturing, media and entertainment and healthcare.

For example, the private 5G network deployed by Korea Telecom at SMC is being used to share pathological data obtained during surgery; each data packet contains about 4GB of data. Vodafone also deployed a private 5G standalone network at one of Lufthansa's aircraft carriers. Up to four large aircrafts can park in the connected Lufthansa base at the same time, so very high bandwidth is required to manage demand. The private 5G network provided a capacity of more than 1Gbit/s and latencies of less than 10ms.[1]

Location services

Asset tracking is a common IoT use case on wide-area networks and is being applied in private network settings. 5G can provide accurate location service to within centimeters. Indoor sites such as factories and warehouses can use private networks to track the movement of components, as BT is doing with a private 5G network for AE Aerospace.[2]

Assets can also be tracked outdoors in transport hubs such as airports, ports, mines and industrial plants. For example, Edzcom deployed a private 5G network at Steveco's port terminals in Finland to obtain real-time container handling data.[3] Private networks can also be used to track people, such as lone workers in remote sites.

[1] Vodafone (2020), _Lufthansa Technik and Vodafone Business launch 5G private network_.
[2] Black Country LEP (2021), _West Midlands company is first of its kind to use 5G to transform manufacturing_.
[3] Edzcom (2021), _EDZCOM's pioneering solution based on 5G architecture Edge Connectivity to optimize Steveco's port operations_.

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Key business outcomes: private 5G can enable automation and bring significant cost savings

Production line improvements

5G-connected sensors on factory production lines can help to identify and resolve issues on the production line in real time. The use of AI and automated systems can also improve productivity.

- Airtel trialed private 5G for Bosch at Bosch Automotive Electronics India. It connected Bosch's Automatic Optical Inspection (AOI) system, which required high speeds and low latency to send data in real time. This reduced the time taken for quality assessment and Airtel cited reductions in the mean time to repair (MTTR) and the mean time between failures (MTBF).[1]

- Celona deployed a private LTE network on behalf of a steel manufacturer. This helped to reduce the unplanned downtime in the manufacturer's scrap yard by approximately 70%.[2]

- A private 5G network deployed at Jiangnan Shipyard used an AI-based inspection system, AGVs and connected welding tools to help shorten part of the shipbuilding process from 14 hours to 2 hours.
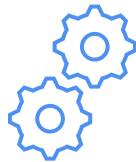
Automation

Automation can provide significant cost savings for manufacturers and industrial firms. It can reduce the number of workers that are needed on factory floors or remote locations (such as oil rigs). Large vehicles and machinery such as cranes can also be operated remotely without a licensed operator needing to be physically present.

- Vale invested BRL21 million (USD4 million) in a private LTE network at its Carajas mine to connect autonomous drills and a fleet of autonomous trucks. The use of autonomous equipment led to an increase in equipment useful life by almost 15% and a reduction in fuel consumption and maintenance costs by almost 10%.[3]

- A private 5G network deployed at Jiangnan Shipyard was able to save more than CNY10 million (USD1.5 million) a year in spending on labor and raw materials. It reduced the spending on production line personnel by 10%.
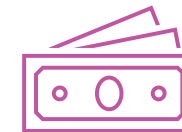
[1] Airtel (2022), *Airtel deploys India's first private 5G network at Bosch facility*.
[2] Celona, *Pennsylvania steel manufacturer taps Celona for 5G LAN*.
[3] Vale (2019), *Vale will operate the first private LTE network in partnership with Vivo*.

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Key business outcomes: private 5G can help enterprises to improve worker safety and reduce the energy consumption of industrial sites and buildings

Safety and security

Private networks can be used to track the location of workers in real time. This is particularly important in sectors such as mining and oil and gas, where workers are in remote or difficult-to-reach areas. The coverage of public cellular networks and Wi-Fi may be poor, but private networks deployed on-site can provide reliable connectivity. Push-to-talk and other forms of voice communications can also provide a dependable channel if workers need assistance. Safety in the workplace can be further improved by using automated vehicles and equipment instead of human operators to remove a worker from risky areas.

- LG deployed a private LTE network for BASF at a chemical factory. The private network was used to track the real-time location of all people entering the chemical factory and to connect an access point beacon used for communication and evacuation alerts in the event of a chemical accident.[1]

Energy savings

Private cellular networks can help to reduce the energy consumption of industrial sites. Enterprises can connect lighting and HVAC equipment and monitor water consumption to realize energy savings.

- Orange tested a private 5G network at a Schneider Electric factory and found that digitizing the factory could reduce energy consumption by up to 50%.[2]

- A network equipment provider deployed a private 5G network at one of its factories and found that it resulted in a 25% decrease in the factory's energy consumption and a 75% decrease in wastewater.

- Cisco, JTOWER, MKI and Airspan Networks collaborated on a private 5G O-RAN trial in Japan to test in-building infrastructure sharing. The trial resulted in reduced CO_2 emissions and reduced power consumption.[3]

[1] BASF (2021), *BASF and LG Uplus to establish safe and smart manufacturing environment*.
[2] Orange Business Services, *The factory of the future takes its first steps with 5G*.
[3] Cisco (2022), *Cisco, JTOWER, MKI, and Airspan Successfully Conduct Open RAN Trial*.

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About the authors and Analysys Mason

Conclusion

The private networks market is at an early stage of development, particularly so for the 5G segment. The private 5G market will look considerably different in 5- and 10-years' time for several reasons.
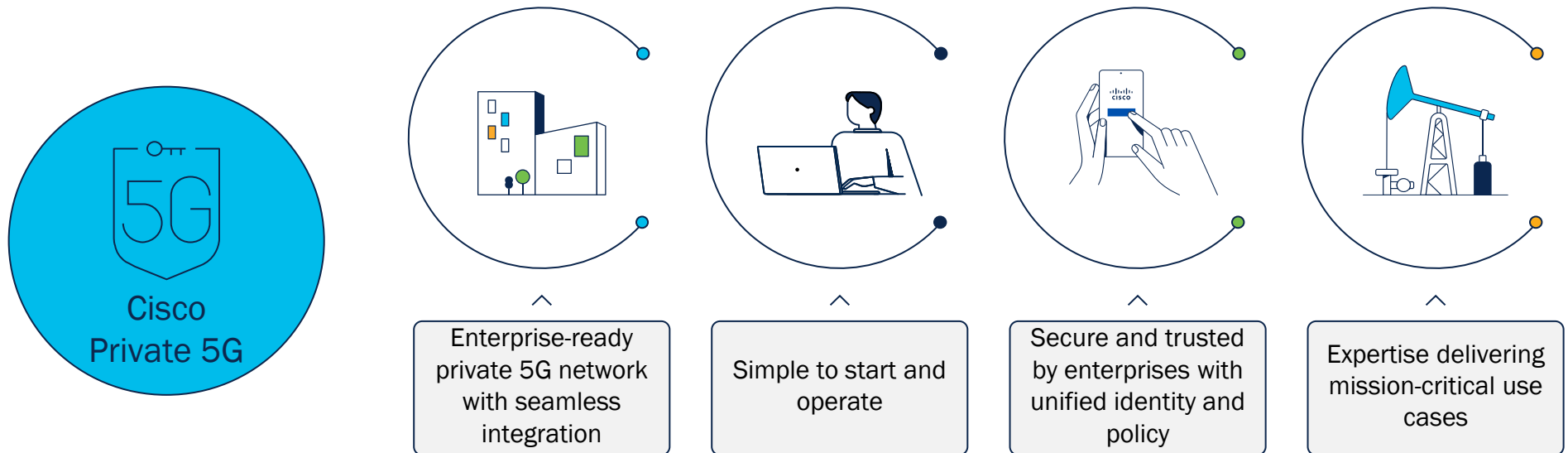
- Most private 5G deployments are currently at the trial or proof-of-concept stage and many LTE networks are described as '5G-ready'. It will take time for these networks to be optimised and for 5G devices to become readily available. The key use cases will become clearer as these networks eventually translate to commercial deployments, and how 5G can lead to tangible benefits for enterprises will be more obvious. Nevertheless, as the previous section of this paper demonstrates, many enterprises that have deployed commercial networks are already realising benefits, ranging from automation-related savings to improved energy efficiency.

- Most of the enterprises that have deployed private networks so far have been very large enterprises. These firms have significant resources to spend on building private networks and have their own in-house networking teams to understand and manage the network. Private networks will have to be smaller, cheaper and less complex than existing networks to tap into the wider market beyond large firms. Private networks will become more like Wi-Fi networks in some regards – relatively easy to deploy and manage – while also co-existing along Wi-Fi to support demanding applications that require dedicated, licensed spectrum and a guaranteed level of performance.

- Private networks need to evolve to comply with enterprise operational requirements and standards such as security and worker safety. Enterprises that begin private 5G trials now will be well-placed to understand these requirements and how to tackle them, putting them in a strong position to scale up when the market matures.

- Geographic variation already exists in the private networks market. Unsurprisingly, most activity to-date has taken place in developed countries or developing countries with mature IoT markets (such as China). There is also significant variation between countries within a region due to the availability of spectrum. As such, some countries will race ahead with private 5G (China, Japan and Germany are early frontrunners) and others will lag behind. This also creates opportunities for enterprises to gain an advantage over rivals by deploying private networks before their competitors in countries where there is not yet much private networks activity.

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Cisco Private 5G: take the complexity out of private 5G and IoT

Cisco's Private 5G as-a-Service, delivered with global partners, provides enterprise customers with a comprehensive solution for managing their private 5G networks. We enable enterprise and industrial edge use cases for IoT and industrial use cases that will help customers across all industries to digitize their businesses and monetize their services.

With this solution, enterprises can reduce technical, financial, and operational risks associated with managing their networks. Cisco's Private 5G simplifies the financial aspect of network management, enabling enterprises to save money on infrastructure costs while easily scaling services as needed. By integrating Wi-Fi 6, Wi-Fi 6E, and 5G networks, enterprises can simplify operations and avoid the need for their IT staff to learn and operate complex carrier-class private licensed radio networks. This future-proof solution enhances existing networks and provides trusted coverage and mobility in unique business-critical environments. Cisco's Private 5G is a cost-effective, secure, and efficient way for enterprises to deploy cellular services while maintaining IT policy and identity.

For more information, visit www.cisco.com/go/private5G

Cisco Private 5G

Enterprise-ready private 5G network with seamless integration

Simple to start and operate

Secure and trusted by enterprises with unified identity and policy

Expertise delivering mission-critical use cases

Source: Cisco

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Annex: definitions

Figure 8: table of definitions

Term	Definition
Private cellular network	An LTE or 5G cellular network that is built specifically for the use of an individual enterprise/organization. Such networks are commonly deployed on a single site (for example, in a factory or a mine). Private LTE/5G networks can also be deployed to address wide-area network requirements such as a utility company's need to monitor a transmission network.
AGV (automated guided vehicle)	Semi- or fully autonomous robots used to transport and deliver raw materials and goods along predefined routes.
Autonomous vehicles	A vehicle such as a car, shuttle bus or truck which controls its own operation without the need for a human driver. It differs from an AGV in that it does not need to follow a predefined route.
TETRA (Terrestrial Trunked Networks)	A European standard (via ETSI) for a trunked radio system, commonly used by public sector organisations such as emergency services, transport firms and the military.
Wi-Fi 6	An IEEE standard for wireless local-area networks (LANs), also known as IEEE 802.11ax. Wi-Fi 6 uses the 2.4GHz and 5GHz bands and Wi-Fi 6E uses the 6GHz band.

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Annex: definitions

Figure 9: sector definitions

Sector	Definition	ISIC codes
Entertainment	The operation of facilities and provision of services to meet the cultural and entertainment interests of their customers. This includes the production of live performances, events or exhibits intended for public viewing and the provision of artistic, creative or technical skills to produce artistic products and live performances.	90
Healthcare	Institutions providing medical and surgical treatment such as hospitals, healthcare research centres and other care facilities (both public and private).	86
Logistics	Operation of storage, warehouse facilities and logistics activities, i.e. planning, designing and supporting operations of transportation, warehousing and distribution.	52
Manufacturing	Discrete manufacture of goods (e.g. furniture, machinery. electric equipment) and process manufacture of goods (e.g. food, paper products, chemical products).	10--32
Mining & oil and gas	The mining and extraction of oil and minerals occurring naturally as solids, liquids or gases (including metallic ores).	05-09
Public sector	Provision of public administration, defence and social security (includes provision of public goods such as streetlights).	80, 84
Retail	Trade of goods in stores, wholesale trade of goods (includes supermarket chains).	46-47
Transport	Provision of passenger or freight transport, whether scheduled or not, by rail, pipeline, road, water or air and associated activities such as terminal and parking facilities.	51-52
Utilities	Supply of electricity, gas, steam and air conditioning, and supply of water, sewerage and waste management.	35-39

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Annex: supporting charts

Figure 10: private network announcements in the public domain by year, 2019-2022
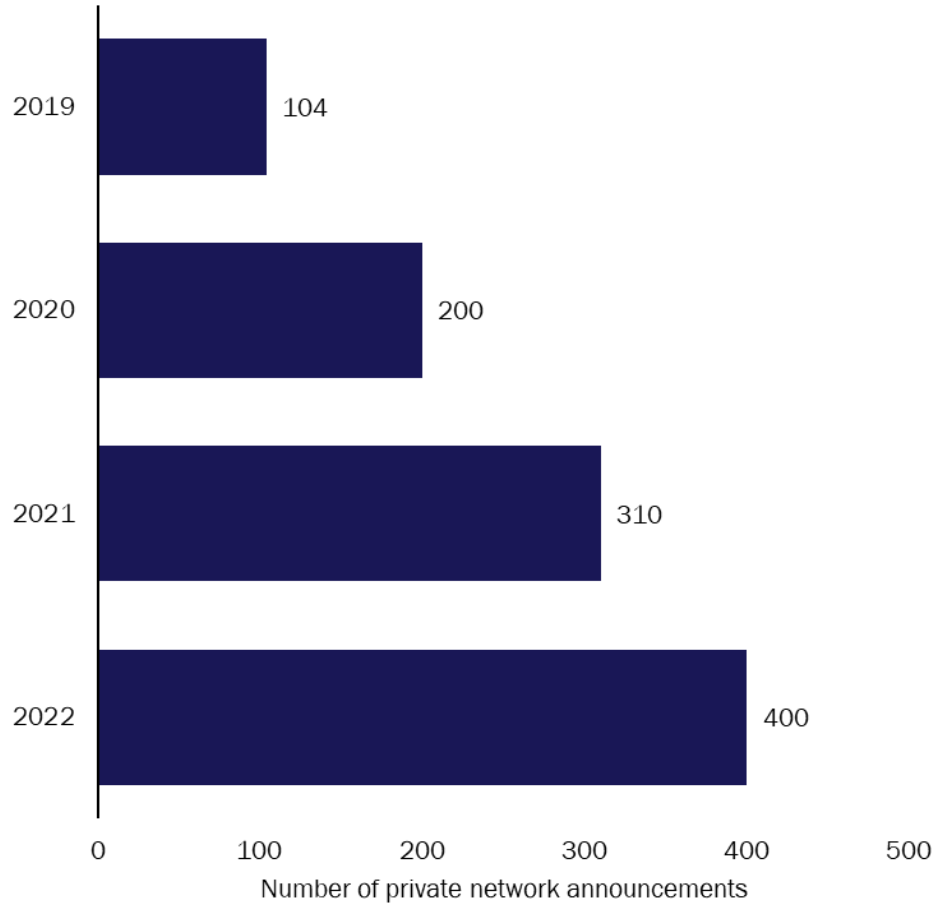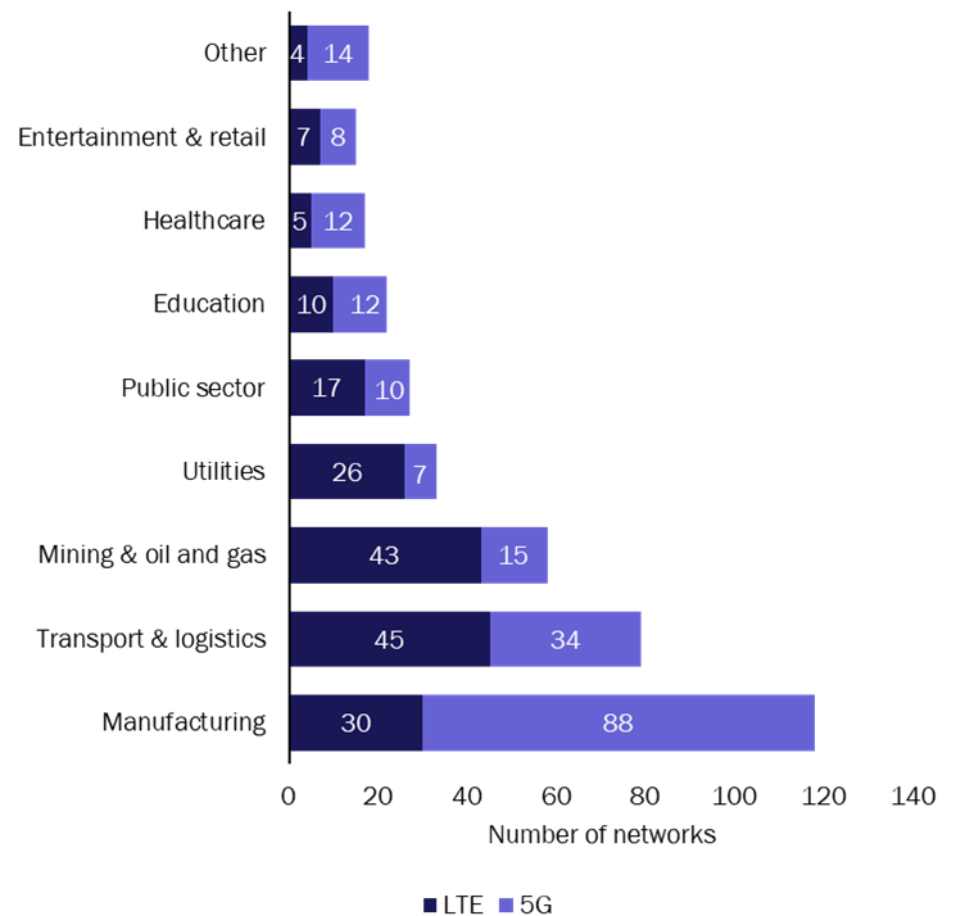

Figure 11: private networks in the public domain by sector and technology, 2022

Annex: supporting charts

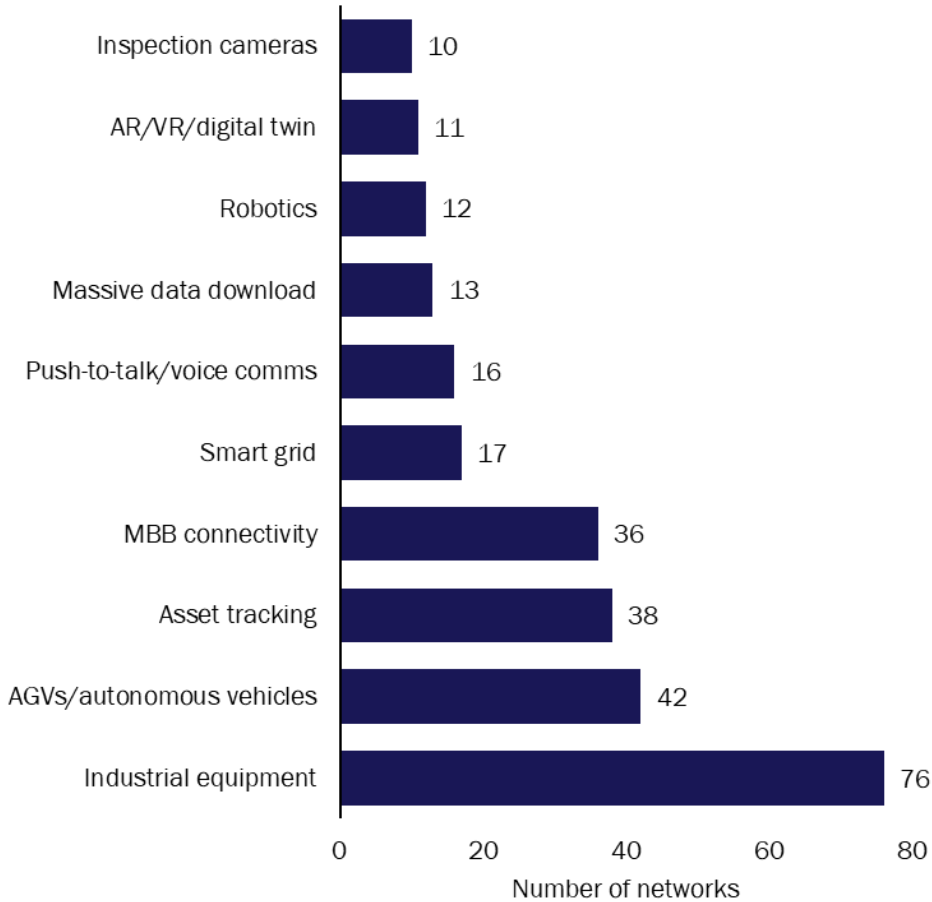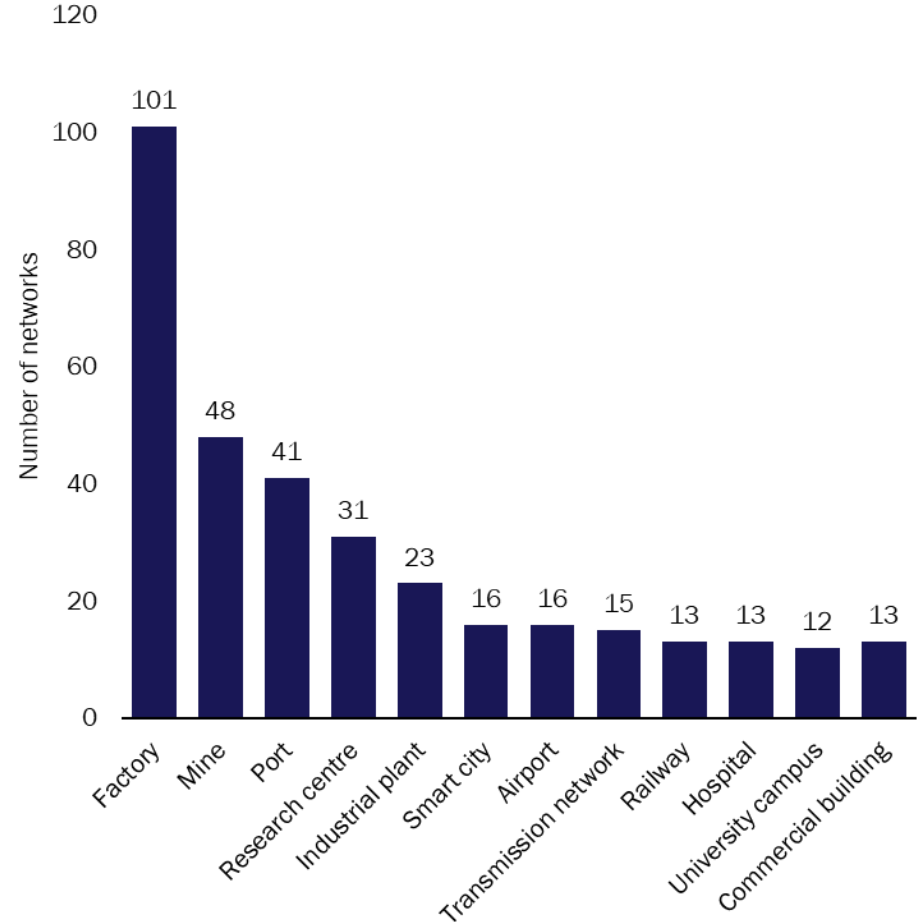**Figure 12: primary application listed in publicly disclosed private networks, 2022**

Application	Number of networks
Inspection cameras	10
AR/VR/digital twin	11
Robotics	12
Massive data download	13
Push-to-talk/voice comms	16
Smart grid	17
MBB connectivity	36
Asset tracking	38
AGVs/autonomous vehicles	42
Industrial equipment	76

Number of networks

Figure 13: type of site of publicly disclosed private networks, 2022

Type of site	Number of networks
Factory	101
Mine	48
Port	41
Research centre	31
Industrial plant	23
Smart city	16
Airport	16
Transmission network	15
Railway	13
Hospital	13
University campus	12
Commercial building	13

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About the authors and Analysys Mason

About the authors

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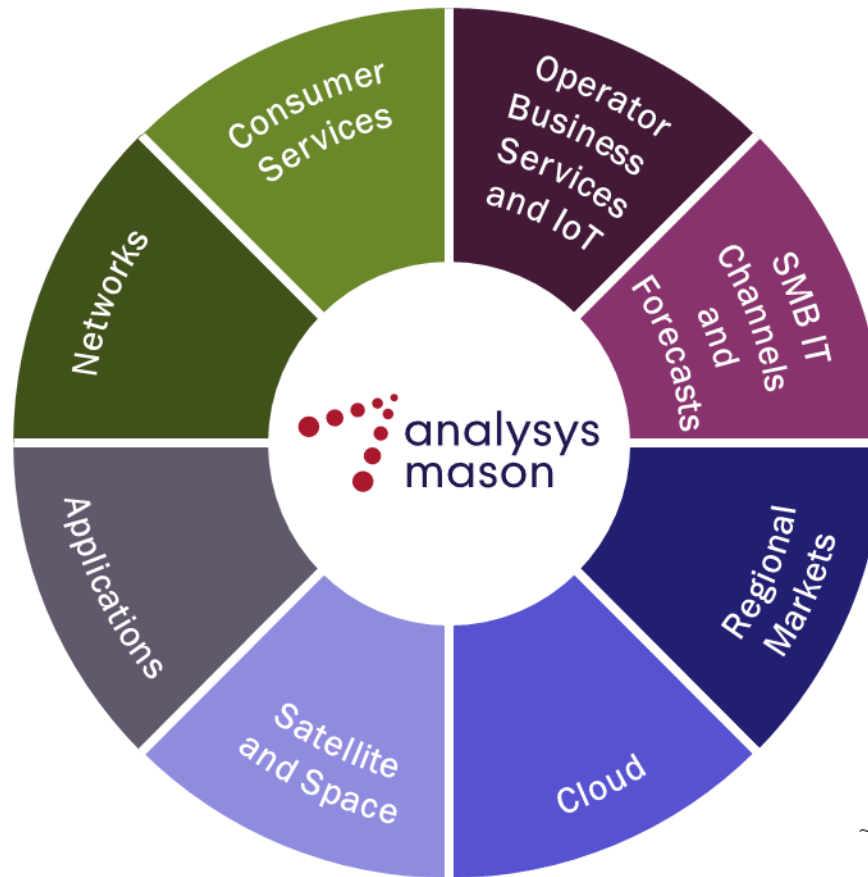
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