




5G and private networks for industrial automation

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A network diagram is located in the bottom right corner. It consists of a central yellow icon of a factory with three smokestacks. Three lines radiate from this central icon to three other yellow icons: a car with a signal tower on its roof, a shield with a padlock, and a lightbulb. The background of this diagram is a dark blue with a subtle pattern of white dots and lines.

ENABLING END-TO-END IOT SOLUTIONS

Any Market. Any Industry. Anywhere.

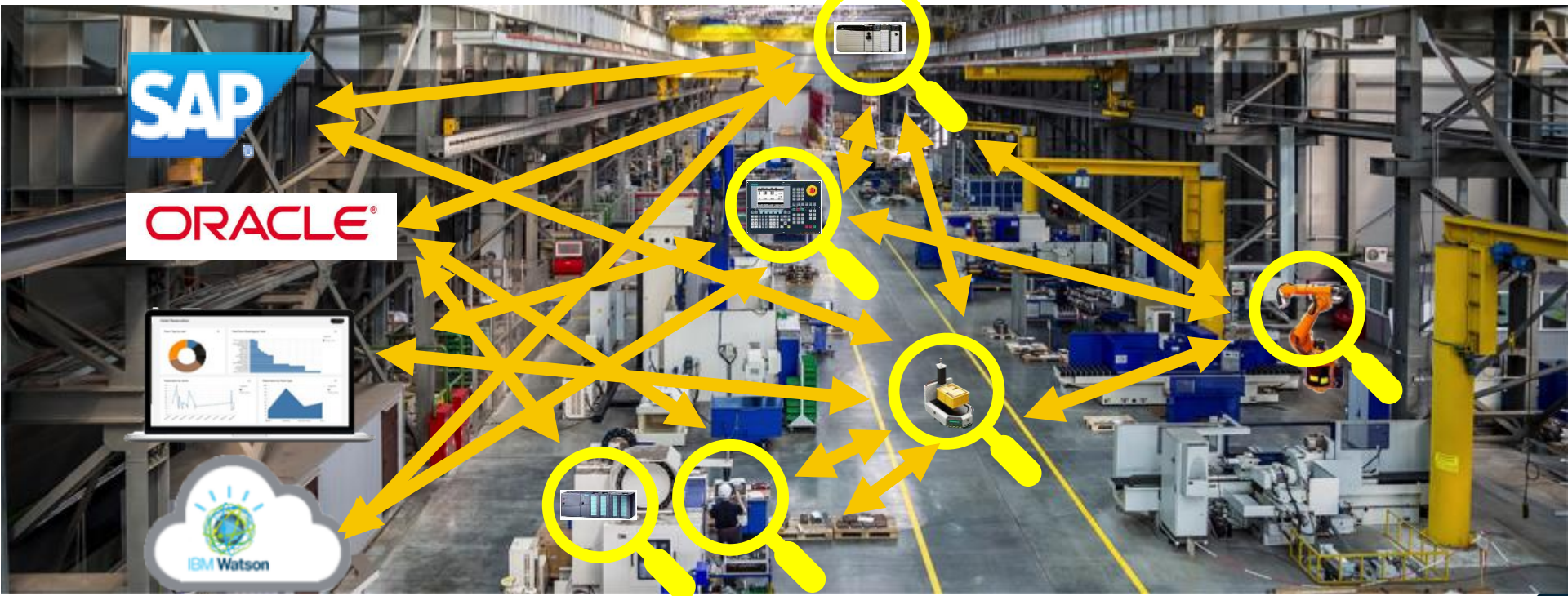
How does your factory look like?

Non IIoT factory

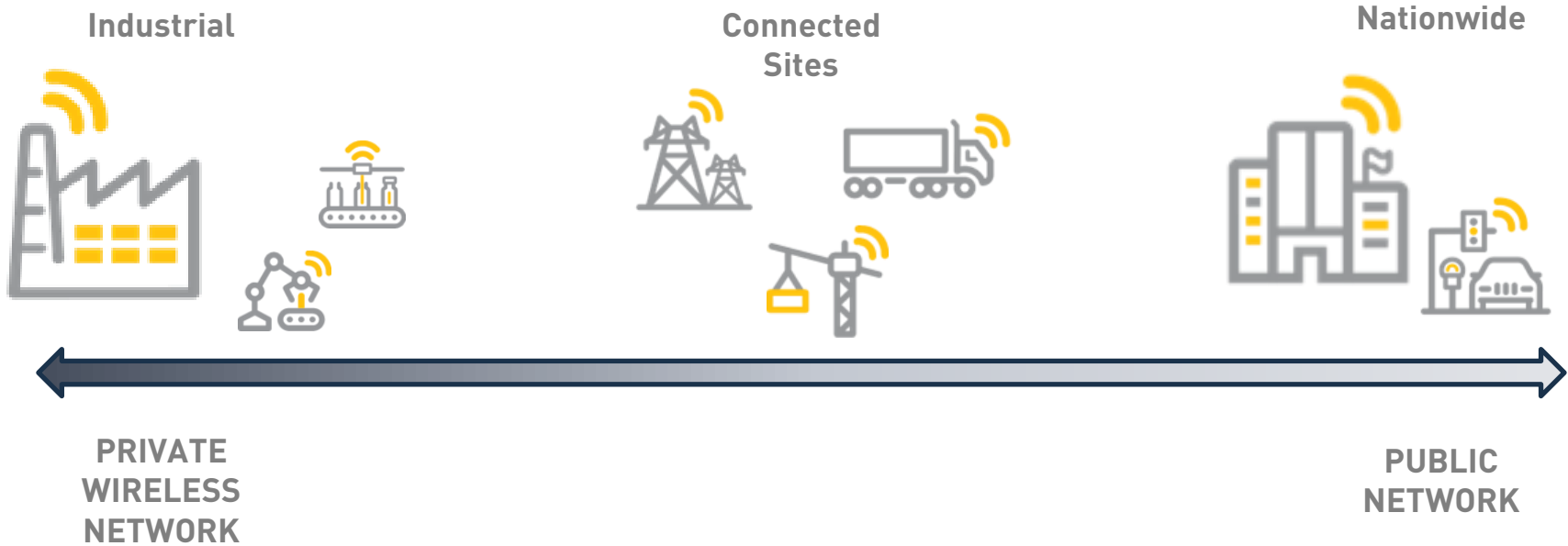


How does your factory look like?

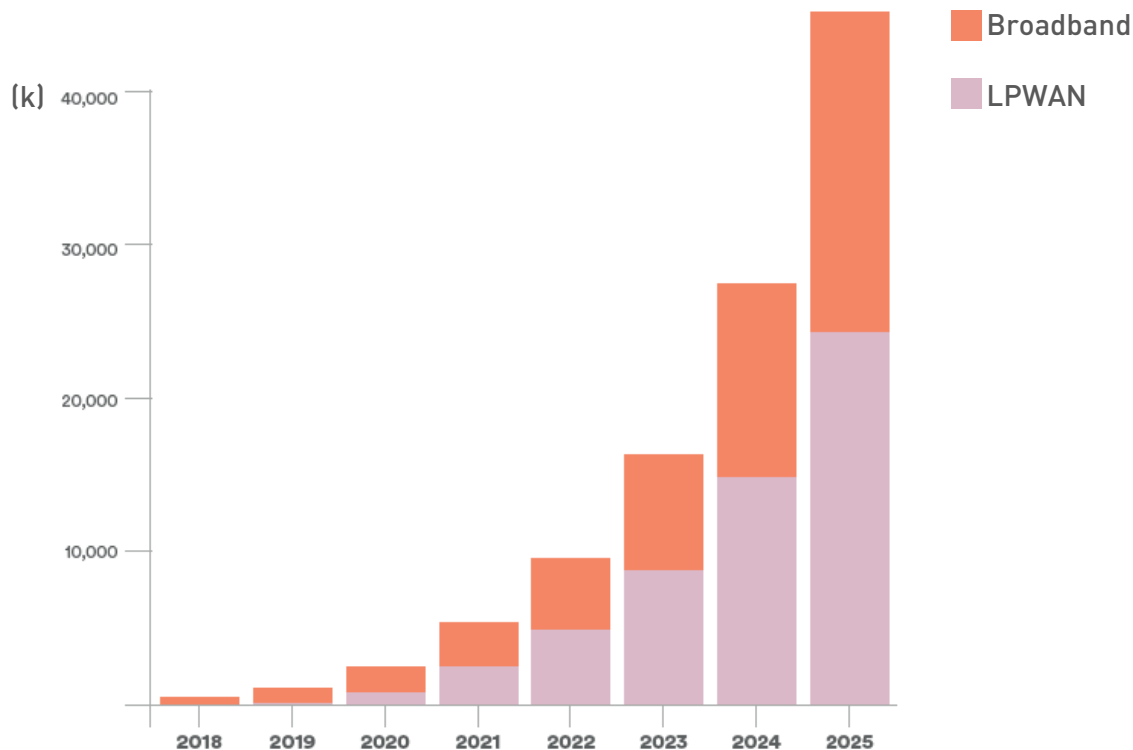
IIoT factory



Public vs Private

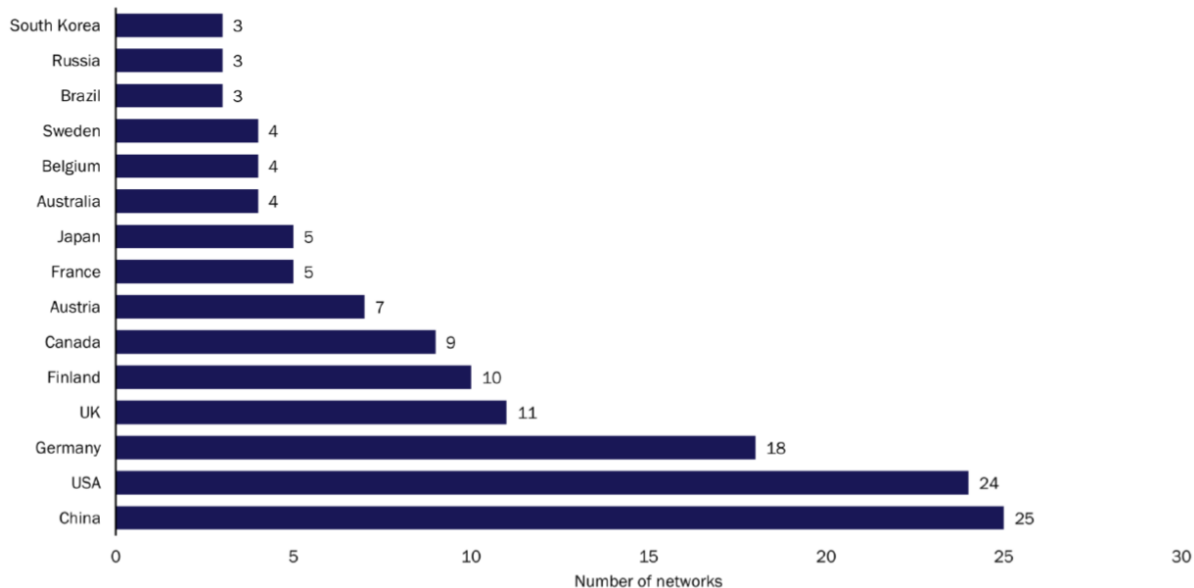


IoT Connections in Private Networks



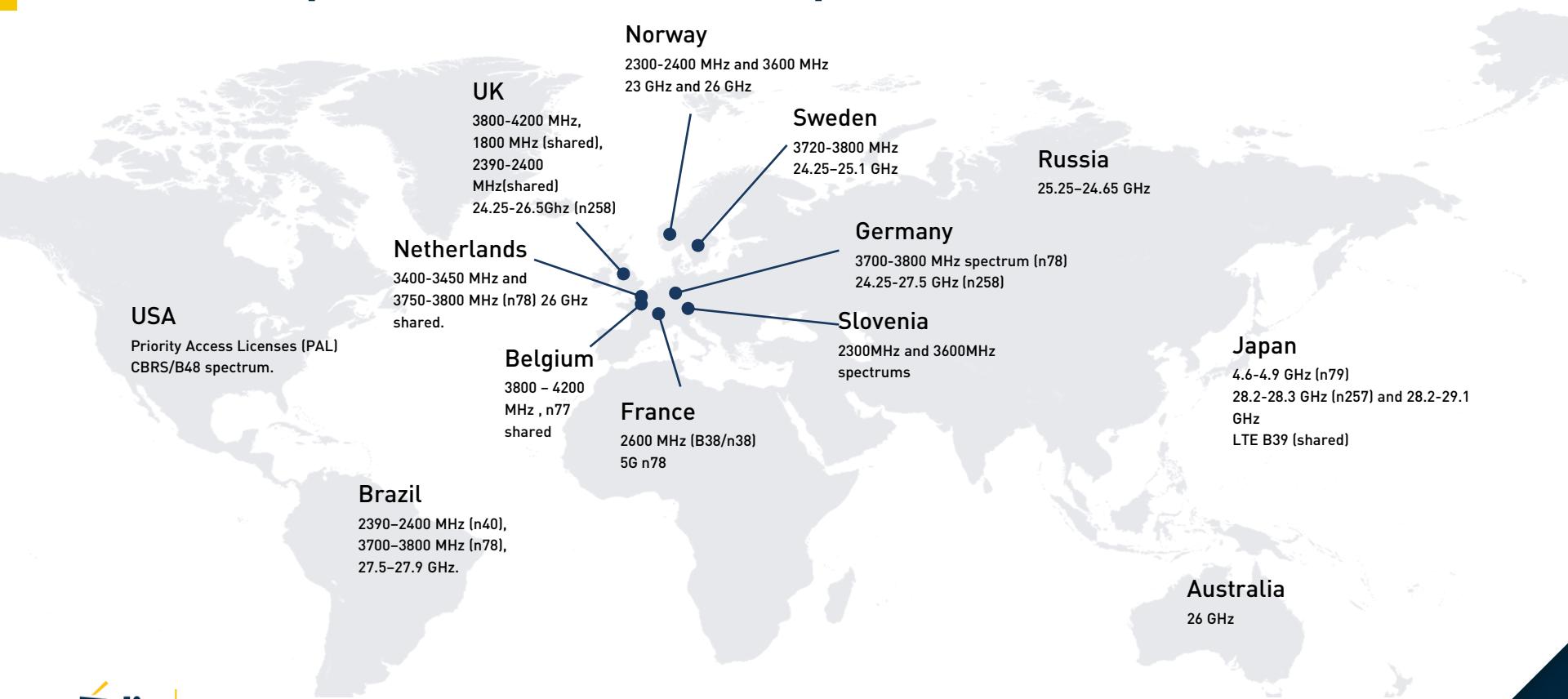
- Legacy 2G, 3G not relevant
- Opening of licensed or shared spectrum, e.g. CBRS, Japan, Germany, etc in 2020/2021 will enable the Private Networks market
- Growth expected around 70% YoY for BB
- By 2025, nearly 21 Mil broadband connection are expected
- Strong growth of LPWAN too: 24 Mil connections by 2025, at 136% rate

Private Networks by regions



- Western Europe leading region, with Germany alone ranking third
- Half of the US networks use CBRS spectrum
- China: Huawei presence and support of the state. Transport and smart cities leading use cases.

National spectrum initiatives for private networks



Benefits of Private Cellular Networks



Low Cost



Wider Coverage



Security



Reliability



Versatility

5G performs better than Wi-Fi

Wide and deep coverage

4-100x coverage



3 extra walls of penetration



Military grade security

HACKED

WiFi - WPA2/3



5G
SIM authentication
E2E encryption

One network for all apps

WiFi 5/6

-Does not include
IIoT LP capabilities

LTE integrates LPWAN

SIM authentication
E2E encryption



High speed mobility



WiFi

Up to 15 sec
latency on
fast hand-over



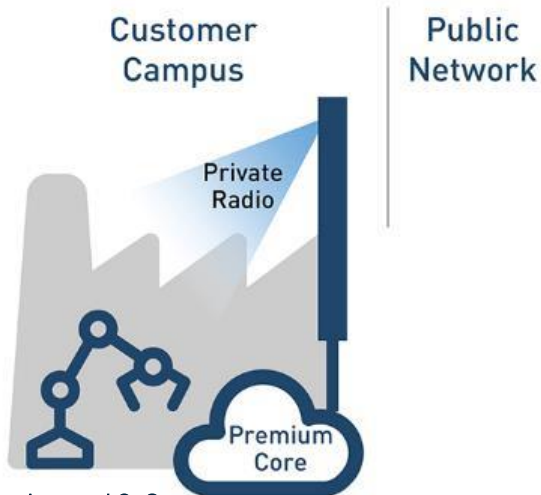
5G

Smooth hand-over up
to 350kph

Three Private Cellular Network (PCN) Options

Dedicated PCN

Physical standalone mobile private network



Assured QoS

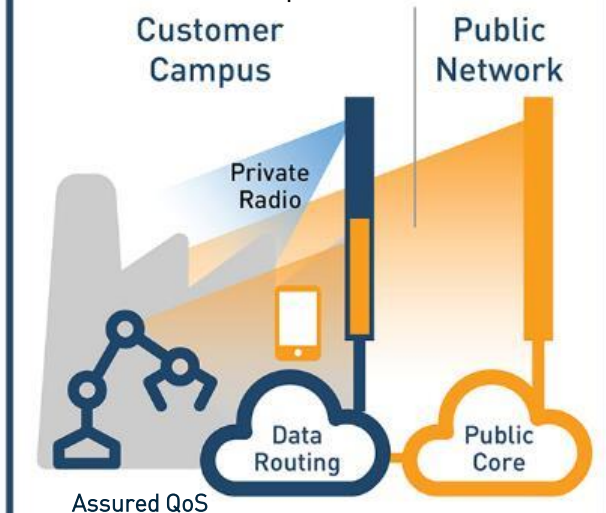
Keep your data safe on your campus

100% control through customer

Interworking with public network

Hybrid PCN

Physical private network elements deployed in conjunction with the public network



Assured QoS

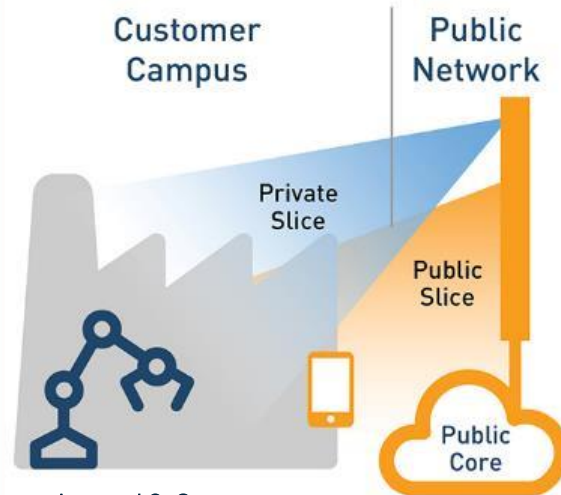
Keep your data safe on your campus

100% control through customer

Interworking with public network

Virtual PCN

QoS in the network with Network Slicing



Assured QoS

Keep your data safe on your campus

100% control through customer

Interworking with public network

Private 5G Networks – Deployment Scenarios

Physically isolated private 5G network (5G island)

- Built by enterprise (Local 5G Frequency, Full Private, No-Sharing)
- Built by MNO (MNO owned and Licensed Frequency, Full Private, No-Sharing)

Shared 5G network

- RAN sharing between private and public network (gNB shared)
- RAN and Control Plane shared between private and public network (gNB, 5GC-CP, UDM shared)
- RAN and Core Sharing (End-to-End Network Slicing) between private and public network (gNB, 5GC-CP, UDM, UPF, MEC shared)

Typical Sites

- Mining
- Large retail, events sites, stadiums
- Oil & gas
- Power generation
- Military bases
- Transport venues, airports & ports
- Hospitals & labs
- University campuses
- Warehouses
- **Industrial & manufacturing**
 - Automated Guided Vehicles (AGVs)
 - Collaborative robotics
 - Assembly line

Shopping Malls



Airports










Ports

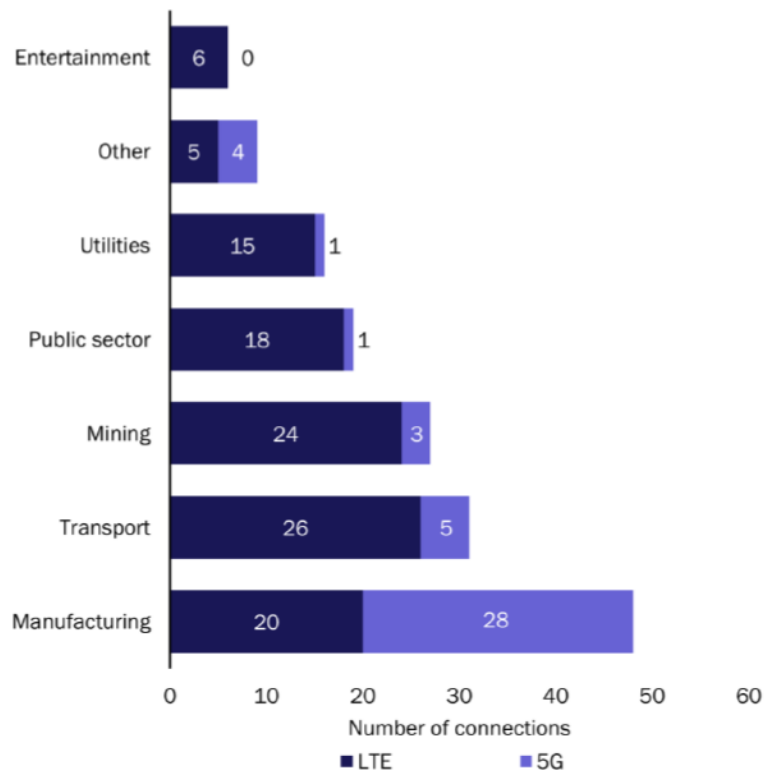


Warehouses

Private LTE/5G Networks by Sector

	Sector	Number of Networks	Sub-Sector	Use Cases
	Manufacturing	48	Automotive & industrial	Automated guided vehicles (AGVs), heavy equipment & machine tools
	Transport	31	Airports, ports & railways	AGVs, asset tracking & voice/video communications
	Mining	27	None	Heavy equipment, machine tools & voice/video communications
	Public Sector	19	Education, government & smart cities	Drones, security cameras & voice/video communications
	Utilities	16	None	Smart grid
	Other	9	Agriculture, entertainment, retail & healthcare	Irrigation sensors, voice/video communications & healthcare devices

Private Networks by sector & technology



- Manufacturing is the leading sector
- BMW, Bosch, Mercedes-Benz, Volkswagen among others
- Transportation is the emerging segment: Airports, railways and ports

Private 5G Networks for industrial automation

Flexible production floor, autonomous AGV, AR / VR applications

Customer Problem	Telit Solution
Leverage dedicated TDD spectrum for Industry 4.0 (e.g. US CBRS, Germany 3.7-3.8GHz, etc)	Support of TDD 3.5GHz / C-band
Secure and real-time monitoring of the factory	Support of 5G standalone (SA) mode
	Support of network slicing, dedicated QoS, URLLC (soon)

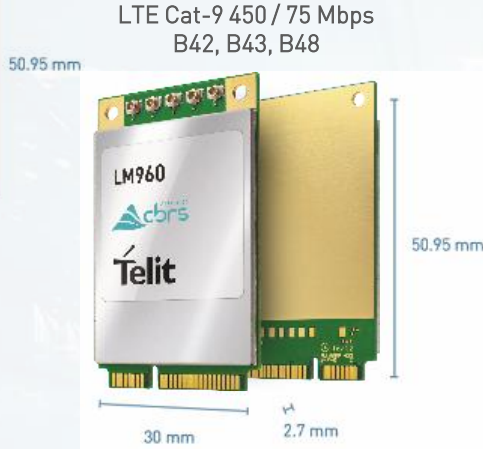
Telit Private LTE & Private 5G Enabled Products

Features & Performance



30 mm 2.7 mm

Cat-18 1.2 Gbps / 150 Mbps
Global MNO Certified
Routers / CPEs
Gigabit Broadband
mPCIe



LTE Cat-9 450 / 75 Mbps
B42, B43, B48

50.95 mm

30 mm 2.7 mm

CBRs / P-LTE Only
Cost Optimized
Routers / CPEs
Mid Tier Broadband
mPCIe

Cat-4 & Cat-6
(100/15 & 200/15 Mbps)
CBRS Only B42, B43,



CBRS / P-LTE Only
Low Tier Market
Routers / Gateways
USB Dongles
LCC

Cat-12 600 / 150 Mbps
MNO Bands + B42, B43, B48
Mid & High Tier Market
Routers and Gateways,
Mobile Computing
M.2



Cat-6 300 / 50 Mbps
MNO Bands + B42, B43, B48
M.2



Mid Tier Market.
Routers and Gateways,
Mobile Computing

LTE: 2 Gbps, 5GNR: ~5 Gbps
Global MNO Certified (ongoing)



Fixed Wireless Access
Indoor and outdoor High Power
CPEs, industrial grade, video
broadcasting, video surveillance
Private 5G Networking
M.2





Learn More: contact.telit.com/5G