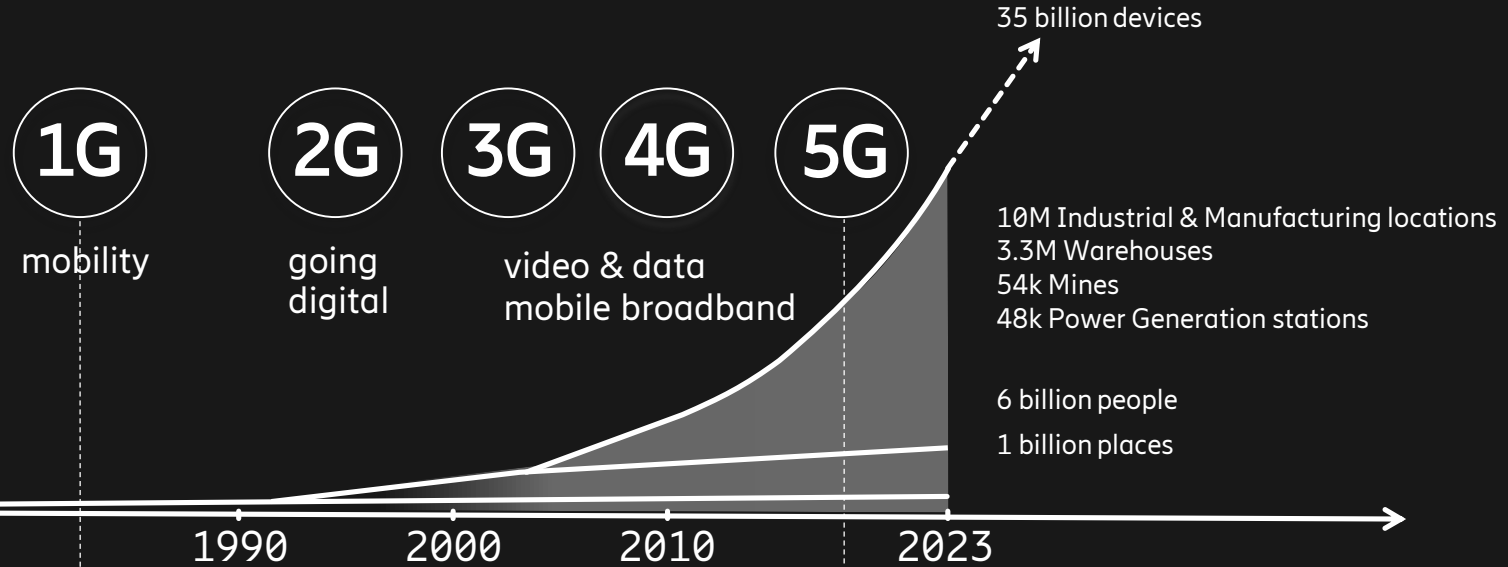


A worker in a high-visibility vest stands in a factory next to a large white robotic arm holding a complex assembly of electronic components. The scene is set in a modern industrial environment with various machinery and equipment visible in the background.

Shaping Industrial applications with 5G technology

Erik Josefsson - Vice President and Head of Advanced Industries

5G – enabling digitalization and transformation



Consumers have gone wireless
— factories have just started



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CABLES

Inflexible
Production

Stable
Secure
Simple

Unlicensed

(Wifi, LoRA, ZigBee, Bluetooth)

Network
Restrictions

Data highways - difference of wireless roads



Unlicensed – Wifi, Bluetooth, LoRa...

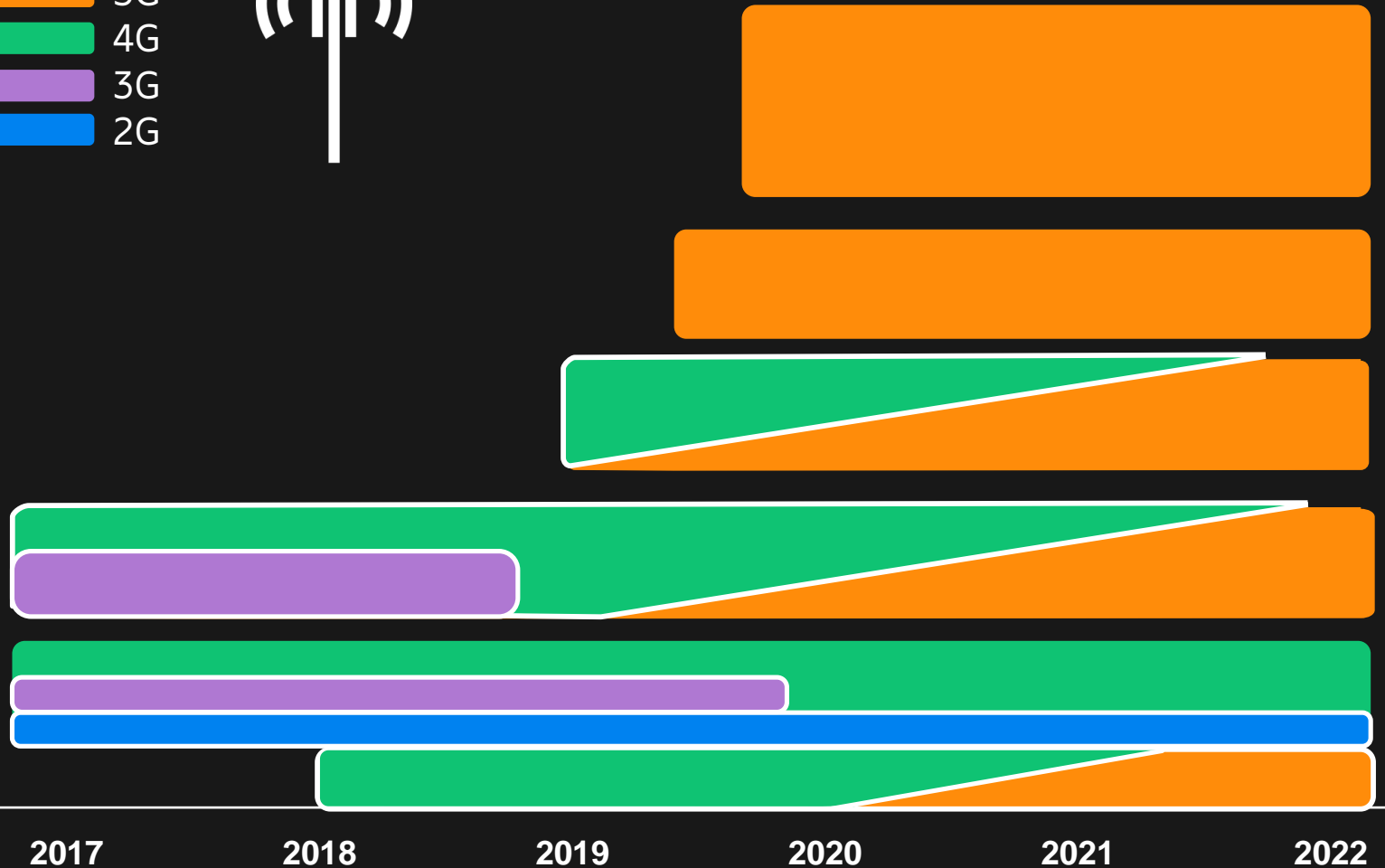


Licensed - 4G/5G

Spectrum use and allocation



- 5G
- 4G
- 3G
- 2G



High bands
(24 GHz – 52 GHz)



High capacity
hotspot / dense urban

Mid bands
(3 GHz – 6 GHz)



Moderate capacity
Wide area /
outside-in coverage







Low bands
(0-3 GHz)





6 super powers of 5G that make it future proof



5G	20 / 10 Gbps	1 ms	99.999%	500 km/h	dm	2.5 Mn / sq mi
			 Availability Reliability Security *			
	Peak rate down Peak rate up	Low Latency		Mobility	Position accuracy	Device density
4G	1 / 0.2 Gbps	10 ms	99.99X%	350 km/h	>10m	250 k / sq mi

Start with 4G. Evolve to 5G



Massive IoT

Broadband IoT

Critical IoT

Industrial Automation IoT

PLC data collection

Asset sensors

Inventory management

AR/VR instruction

AGV guidance

Remote control

Collaborative robotics

HA collision avoidance

Advanced Automation & Control

4G (3GPP Rel13..), 5G (3GPP Rel15..)

- NB-IoT + Cat-M1
- Low cost, simple devices
- Low data rates
- initial use cases...

4G (3GPP Rel 13..), 5G (3GPP Rel 15..)

- High data rates
- Low latency
- Extended coverage
- Tailored features for e.g. AGV, Drones,..)

5G (3GPP Rel 15, Rel 16..)

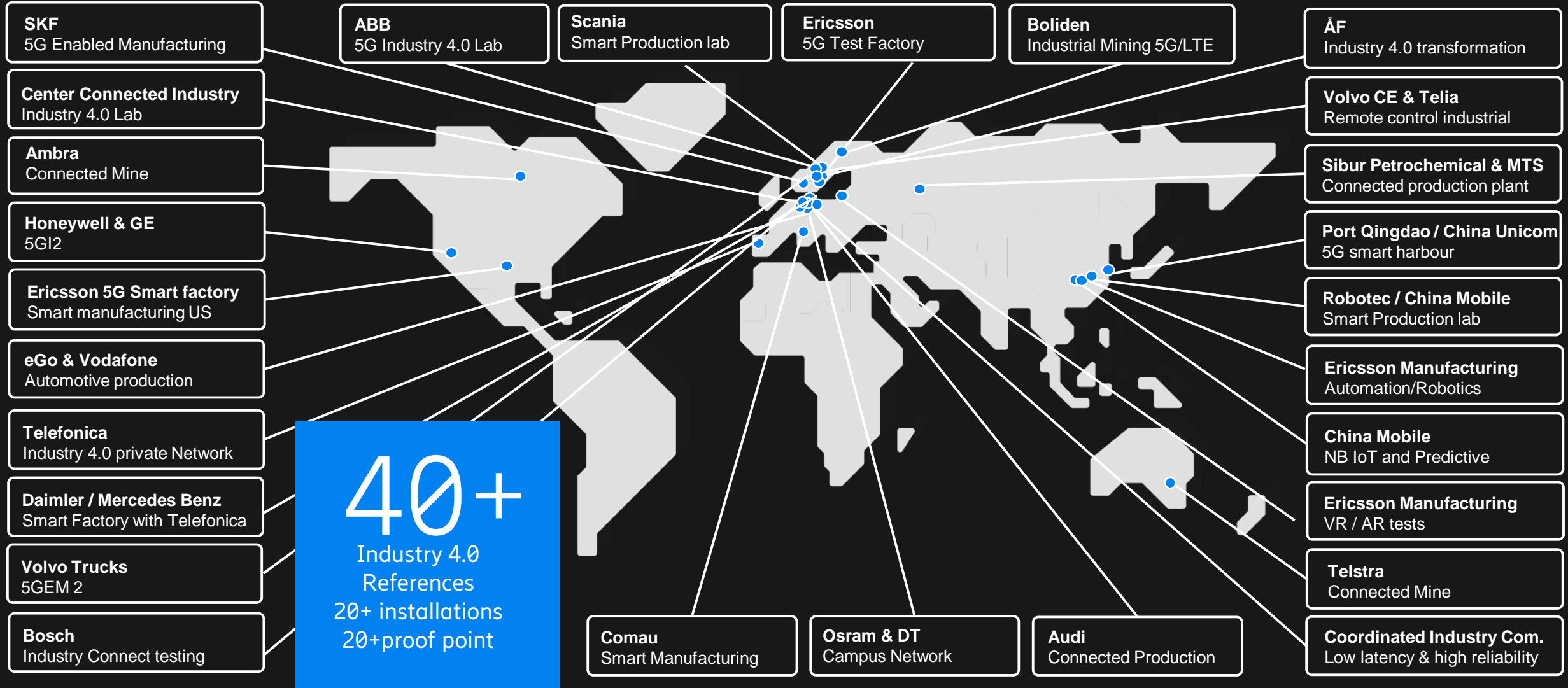
- Low to High data rates
- URLLC
 - Extremely low latency
 - Ultra reliability
- Complex use case

5G (3GPP Rel 16..)

- Industrial protocols over ethernet
- TSN (Time Sensitive Networking)
- High accuracy positioning



Industry 4.0 at Ericsson



Scania Smart Factory Lab

Case: Scania

The Challenge:

To investigate the potential for 4G and 5G technology in the manufacturing of commercial vehicles – specifically heavy trucks and buses flexible production



The Solution

Industry Connect as a test platform, where industrial equipment integrations have been performed

The Result:

- 4G connected screwdrivers
- 4G connected UWB tags
- 4G connected robots

Partners

- Atlas Copco
- HD wireless
- HMS

Tailored 4G/5G mobile network for factory needs

Case: OSRAM

The Challenge

Defining one central factory infrastructure system that digitally connects all machines and planning processes in real-time, for maximum efficiency.

Data traffic is kept local on campus site for low latency and high security



The Solution

First campus network at OSRAM in Schwabmünchen

Campus network based on a dual slice approach, combining public and private LTE connectivity, enhanced with a local edge cloud deployment

The Result

- High reliability, even if public layer fails
- Use case testing started January 2019 on AGVs



Partners

- Deutsche Telekom
- OSRAM



5G monitored manufacturing of bladed disks

Case: BLISK

The challenge

Lack real time control of 15-20 hours milling process on high value product component blade integrated disks

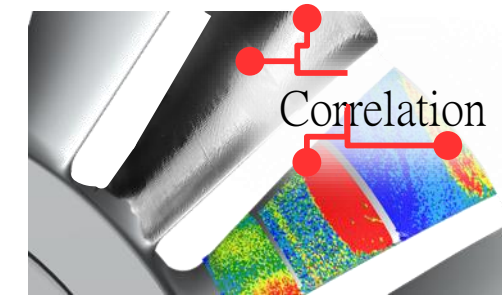
Ensuring maximum quality avoiding costly and energy-heavy rework

Partners:



Solution

Real-time monitoring and control of the production process (1ms), The world's first enabled through 5G New Radio



Results

- 27M€ per factory, annual savings
- 16 M worldwide metric tons* of CO2 annual savings

Partners

- MTU Aero Engines
- Fraunhofer IPT

Comau Factory of the Future

Customer: Comau

The Challenge

For industrial robots connected via dedicated cellular network, and controlled in the cloud:

- Replace Ethernet cables with 5G
- Increase floorplan flexibility to introduce new services
- Move computing nodes in cloud to reduce installation costs (remote virtual PLC) and change business model

"5G is an enabling driver for the digital transformation within the Industry 4.0 environment, specifically for low latency, bandwidth and plug & play connectivity of factory equipment."

Maurizio Cremonini, Comau Head of Marketing and Digital Initiatives Platform.

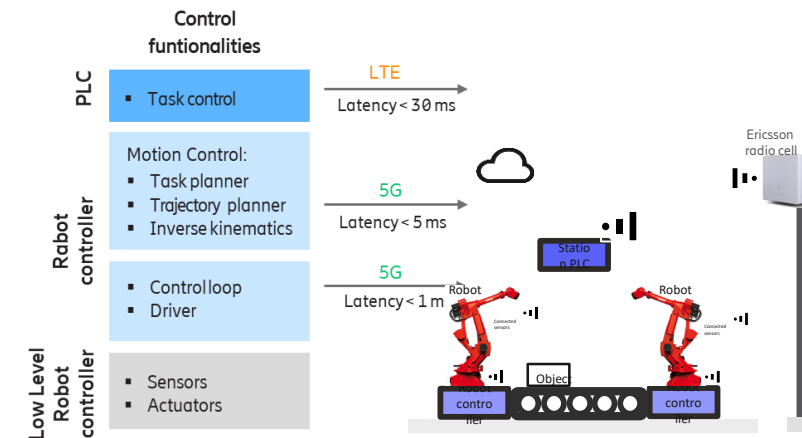


The Solution

Dedicated 4G & 5G network for factory automation/control virtualized in cloud/preventive maintenance/AGVs

The Result

An industrial robotic cell operating over 4G and 5G with virtual PLC demonstrated (PoC) in Comau's plant, including latency-critical functionalities at mS level.



Partners

- Comau
- TIM (Telecom Italia)

Smart Mining

Case: Ambra Mining

The Challenge

Connected mining needs state-of-the-art wireless connectivity underground

Challenge with coverage and stability of current solutions.



The Solution

Ericsson radio solution for 4G and later 5G wireless solution

The Result

End-to-end connected 4G/5G mining solution for 8 mines and 90 km of tunnels

Simplify network deployments replace up to 60 Wi-Fi access points with a single Ericsson solution

Partners

- Ambra Solutions
- Agnico Eagle

Future wireless automation

Case: ABB

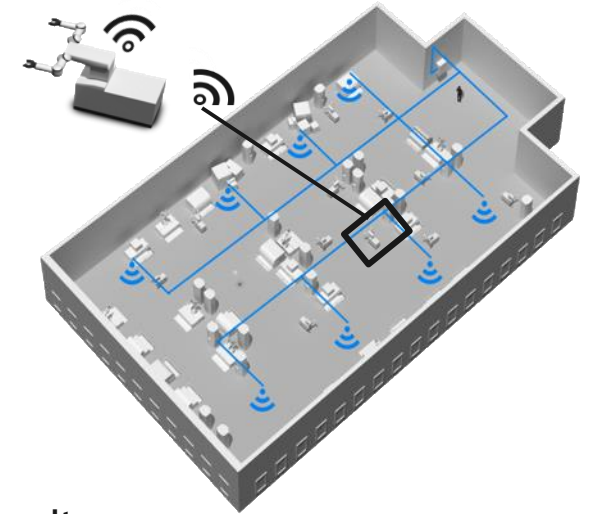
The Challenge

Ericsson and ABB share the same vision of wireless industrial automation. Both companies want to automate and connect their sites and products, and offer solutions.



The Solution

Global partnership to accelerate industrial digital transformation



The Result

Global partnership based on 4 pillars

- 1) Research 5G lab
- 2) Connect own factories
- 3) New business opportunities
- 4) Communication with joint industrial value

Partners

- All five ABB business lines

Private 4G/5G Network

Industry Connect Fast, secure wireless connectivity for Industry 4.0

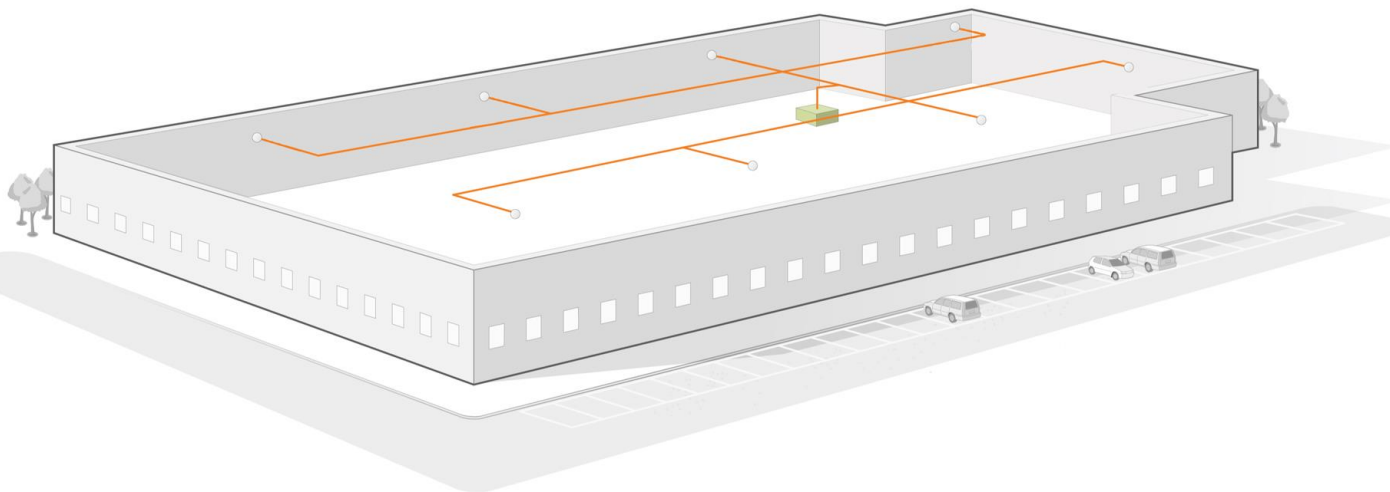


✓ Easy

✓ Turnkey

✓ Reliable

✓ Path to 5G



Profinet over Industry Connect



Release the full potential with 5G



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