

Private 5G networks and Industry 4.0

Enabling the next level of
the digitalized production

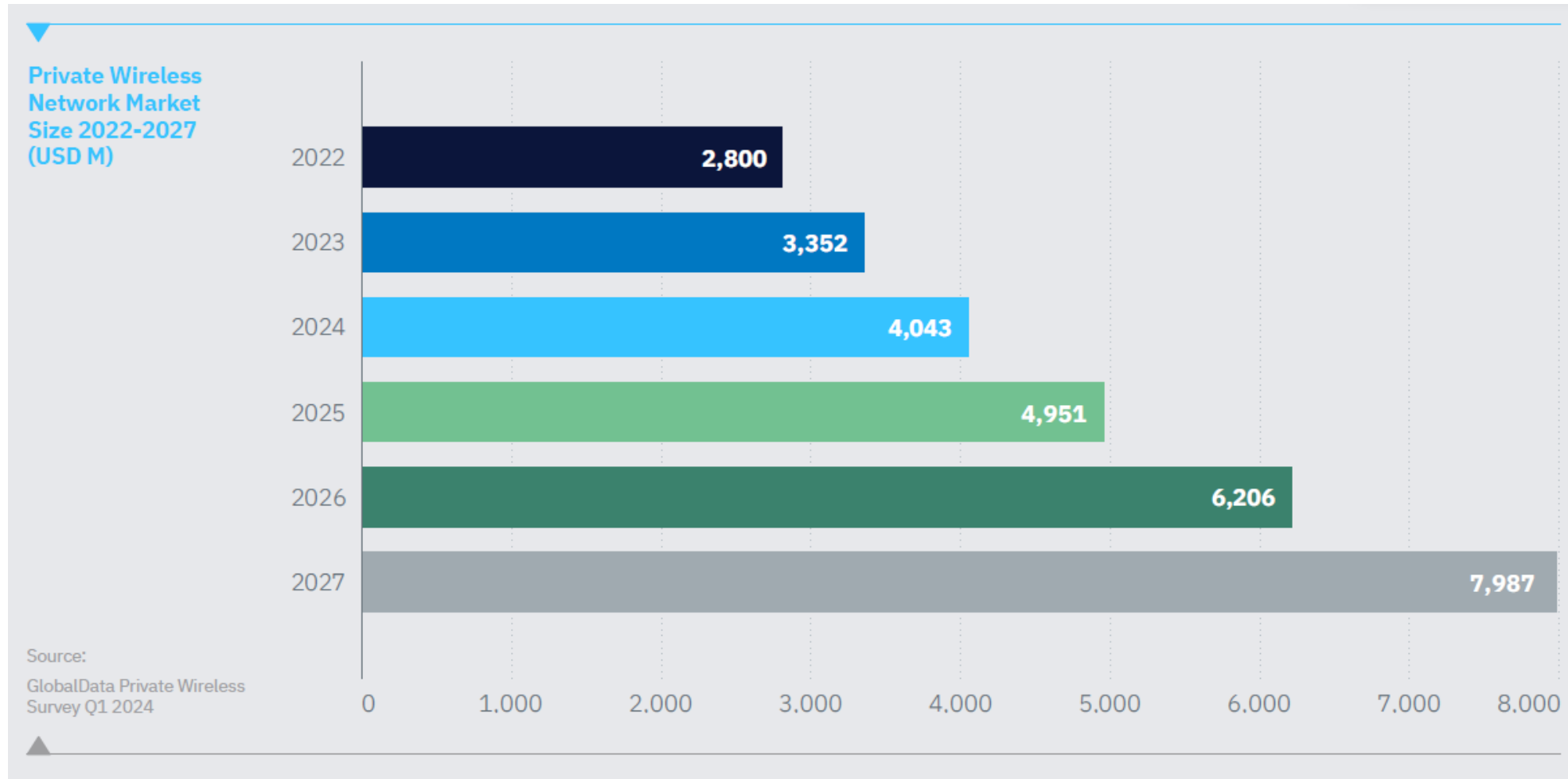


alfredo.gonzalez_herrero@nokia.com
Manufacturing Latin America Head of Sales
San José, February 26th, 2024



NOKIA

Private wireless market: By 2027 will have grown by 100% vs. 2024
By the end of 2024 will have grown by 49% compared to 2022



78% of early adopters see ROI within 6 months, 93% in 1 year

Within how long did you achieve a Return on Investment (ROI) on your private wireless solution (including industrial applications)?

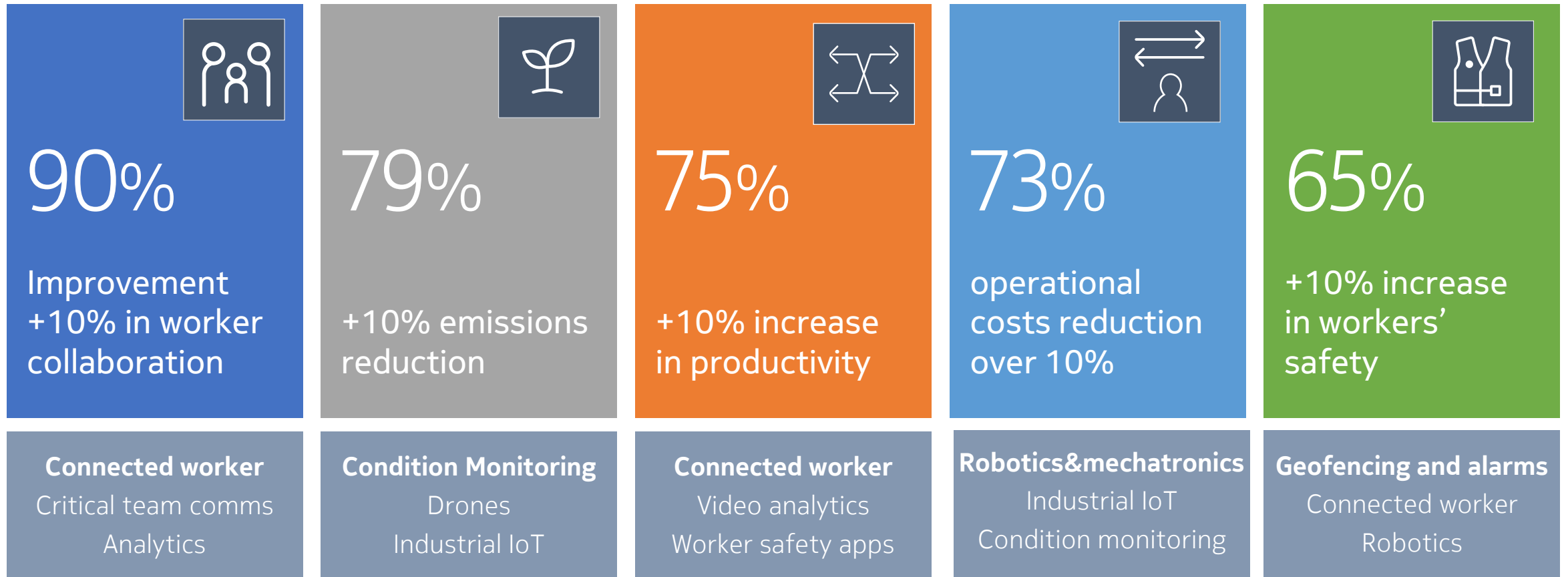


- Within 1 week (2%)
- Within 1 month (22%)
- Within 6 months (55%)
- Within 1 year (24%)
- Within 2 years (8%)
- Within 3+ years (0%)
- Have not achieved RoI yet (0%)

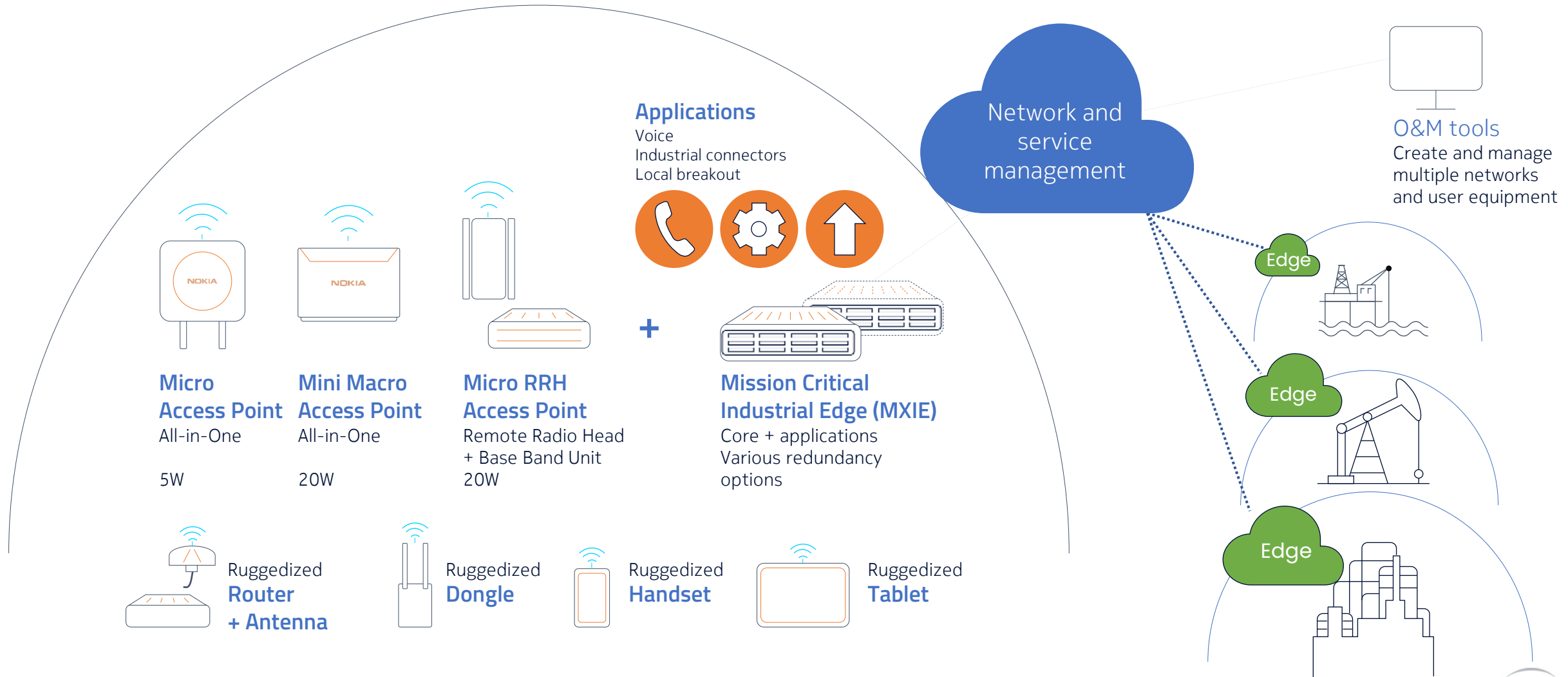
- GlobalData interviewed 100 pLTE / p5G **early adopters** in manufacturing, transportation and energy industries in 6 countries: USA, Germany, France, UK, Japan, and Australia
- All are using private wireless LTE / 5G networks in **additional locations**, or have expanded their use by launching **more use cases** in existing locations

p5G for Industry 4.0 is delivering real-life business benefits

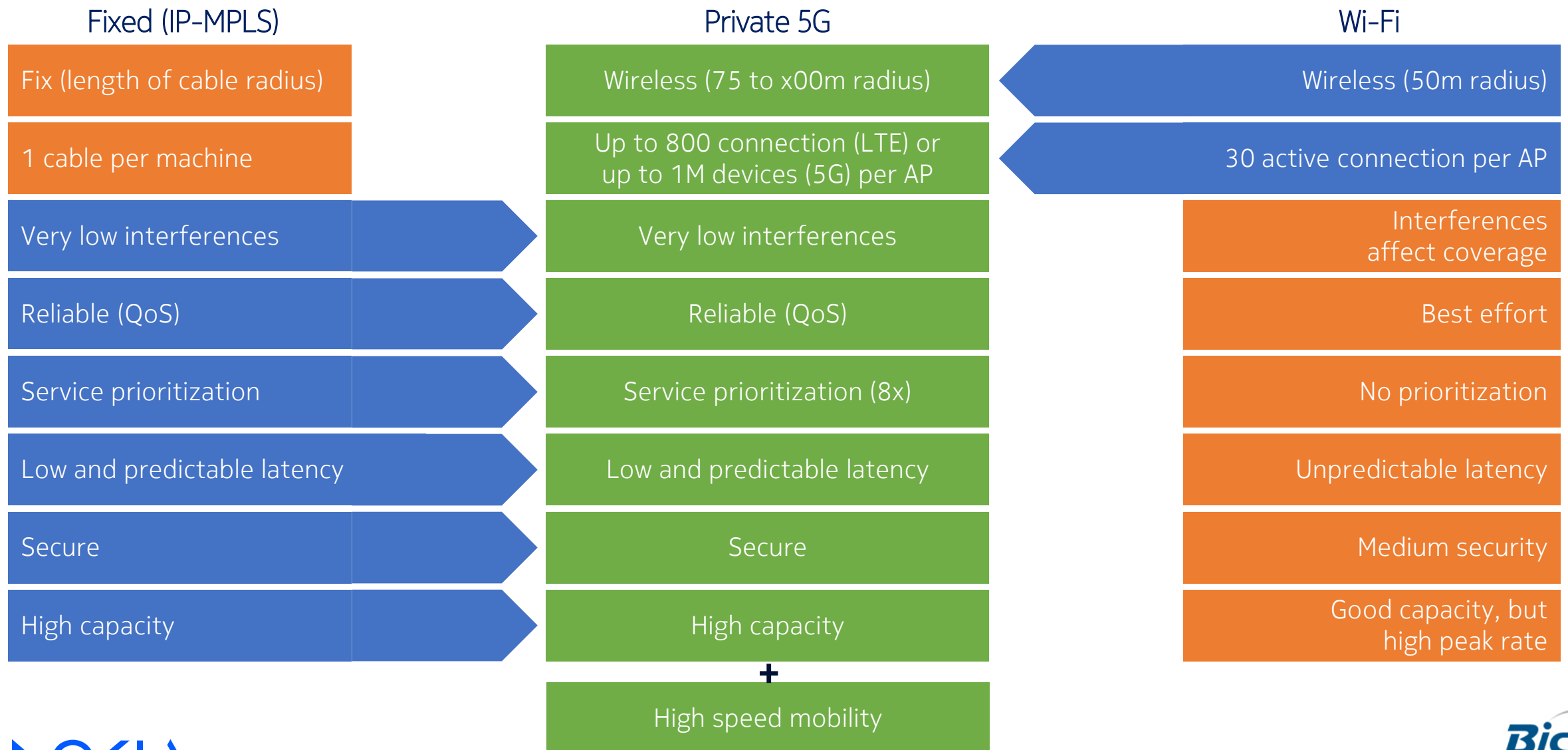
% of industrial companies surveyed which quantified improvements in more than 10%



p5G network: Platform for digitalization and automation



Cellular private 5G wireless – Best of Wi-Fi and fixed DNA



Private 5G as future wireless technology of choice

Fragmentation of existing systems

- Multiple networks and systems = **high TCO**
- Multi-devices for operations = **inconvenient and unsafe**

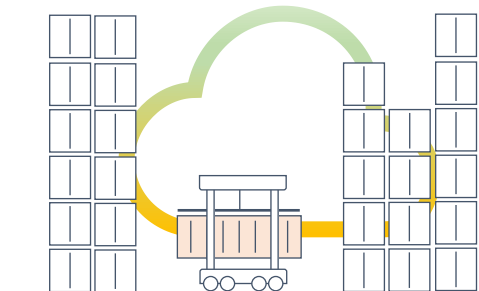
Voice	Data	Data (backup)	Localization	M2M	...
Private PMR (TETRA / P25)	Private Wi-Fi	Public 3G / LTE	Private Transponder network	Private Proprietary	...

Voice	Data	Data (backup)	Localization	M2M	...
Private5G					

Converged wireless infrastructure

Low reliability of existing systems

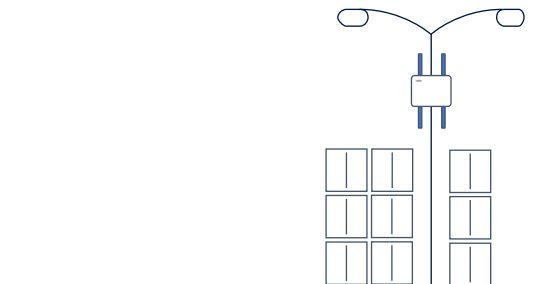
- Interferences of neighbour networks = **risk of downtime**
- Reflections of container blocks = **unreliable data**
- Signal blocked by cranes = **blind spots**



High reliability by seamless coverage with QoS

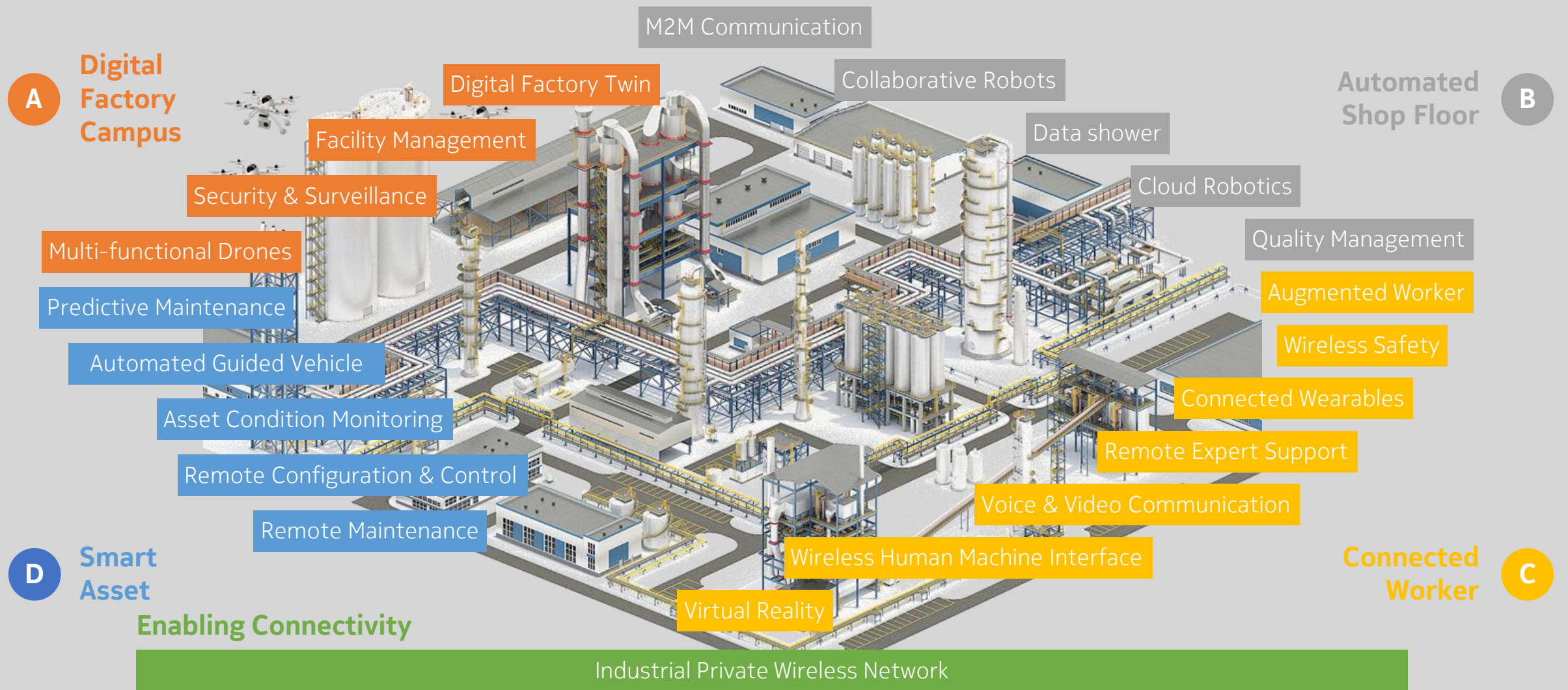
High network expansion and maintenance cost

- Wi-Fi with low output power requires cells at every light masts = **high TCO**
- Cell located in middle of 24/7 operations = **difficult maintenance**



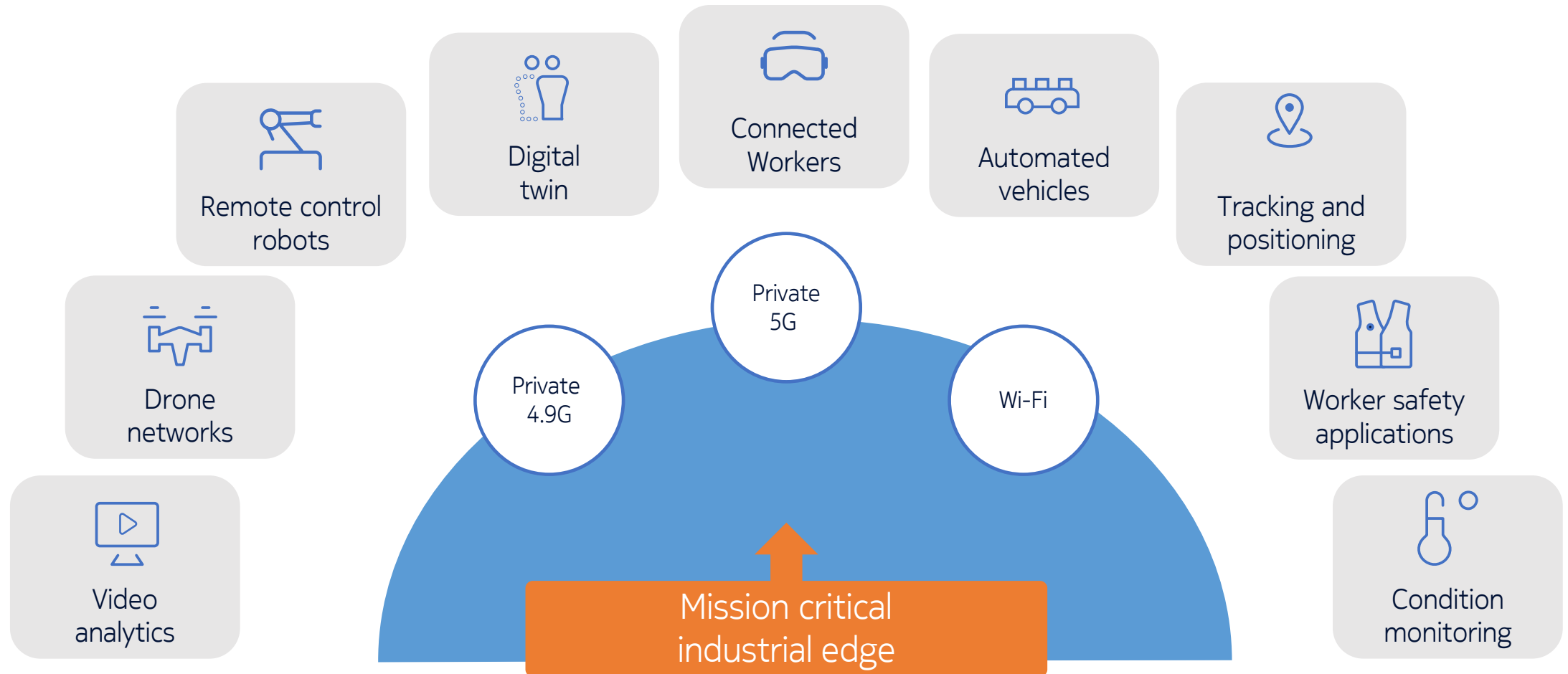
Fewer cell sites (factor 5-10x)

Industry 4.0 use cases enhanced by p5G connectivity



The magic of Digital Transformation happens at the Industrial Edge

39% of early adopters of PW currently deploy Edge. 52% is planning deployment



Source:  GlobalData.

Industry 4.0 use cases driving these real-life business benefits

Top remote control and industrial 4.0 use cases in Manufacturing

The use cases and ROI for Industrial Digitalization



Content to the Worker and AR/VR

1. Worker collaboration
2. Productivity
3. Worker safety



Mobile Robots and AGVs

1. Productivity
2. -20% energy costs
3. Worker safety



Video Analytics and Camera Vision

1. Site security
2. Quality improvement
3. Worker safety



Conditional Monitoring + Digital Twins

1. -33% downtime costs
2. Energy reduction
3. Productivity

Dow transforms the way they do maintenance tasks with p5G



Customer confidential



Business Benefits

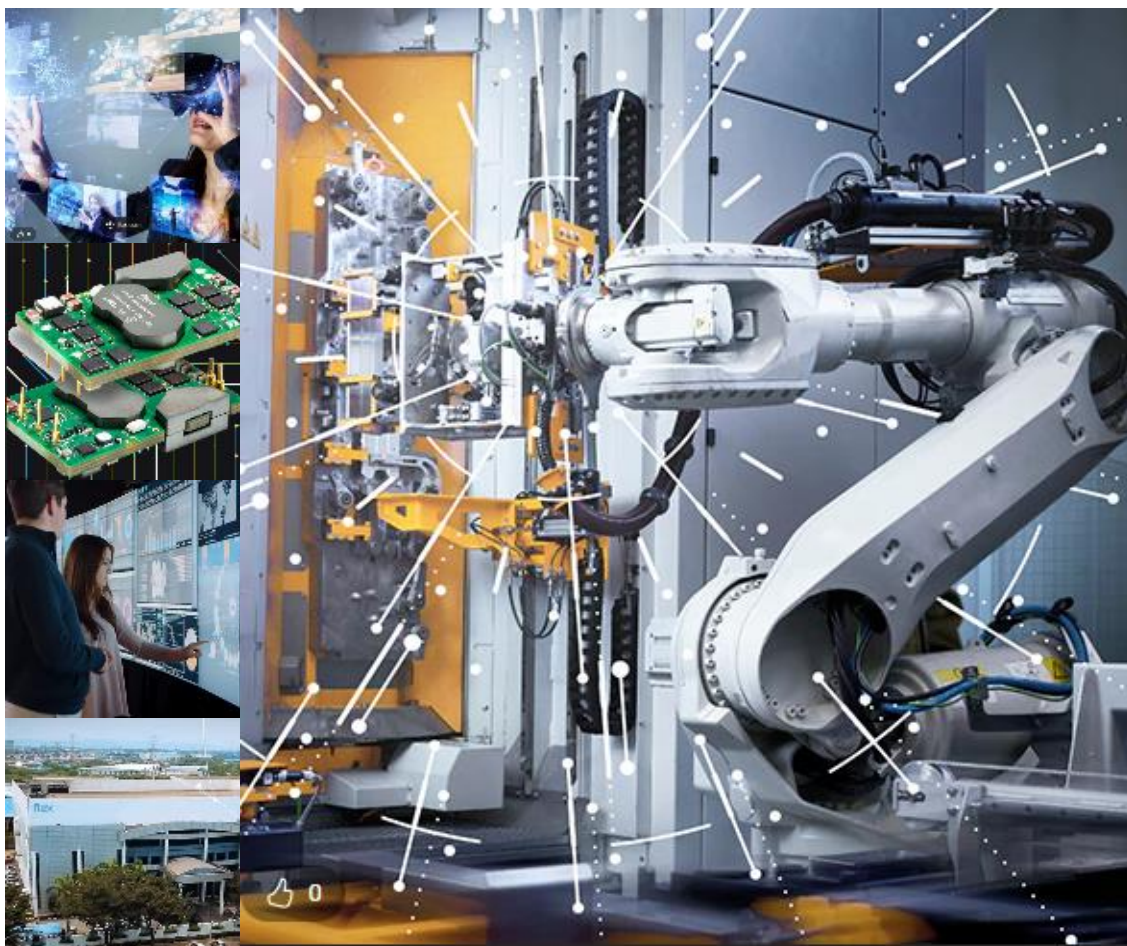
- The entire plant has gone paperless, putting data at workers' fingertips
- Getting information into the field improves collaboration and problem-solving
- Flexibly for employees to select their own devices to fit the needs of their role
- Workers enabled by remote audio and video collaboration and real-time smart procedures
- Maintenance processes simplification while respecting security, sustainability and flexibility along the production
- Productivity increase and production cost reduction
- Enablement for IoT and Industry 4.0 apps

 Website

 Press release

NOKIA

Flex deploys 5G for Industry 4.0 advanced manufacturing



Use Cases

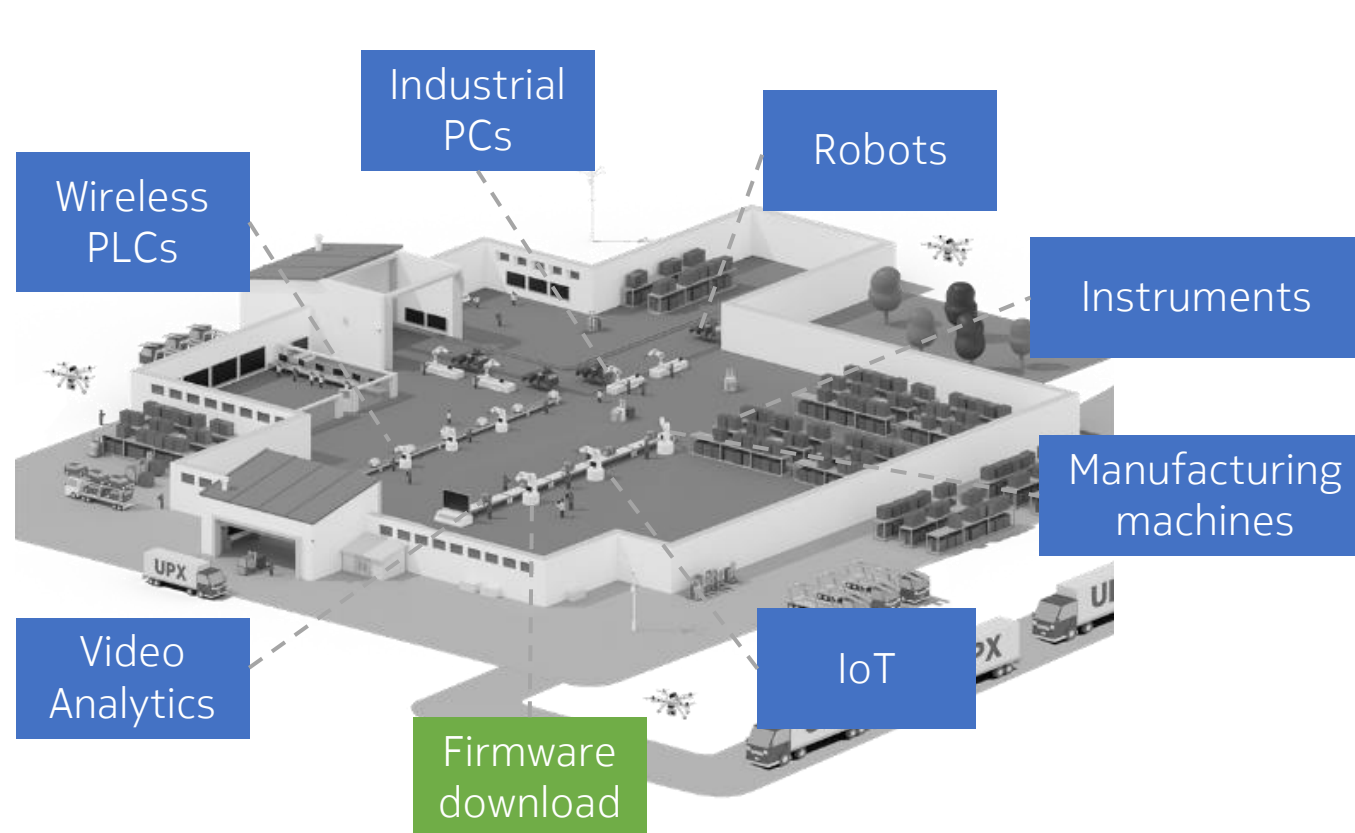
- Massive operational data transfers
- Flexible manufacturing shop floor
- Network Digital Twin
- 5G wireless applications

Business Benefits

- More agile, flexible and cost-effective manufacturing operations
- Acceleration of the digital transformation program to increase efficiency, agility and sustainability
- Improve competitiveness

Private 5G for advanced discrete manufacturing

Flexible wireless production lines



\$20k

Cabling costs of one production line

7

Days

Time to recabling a production line

1x

Quarter

Frequency a new product is launched

10x

Reduction factor in FW & SW downloads

Private 5G for production on its way to smart



Use Cases

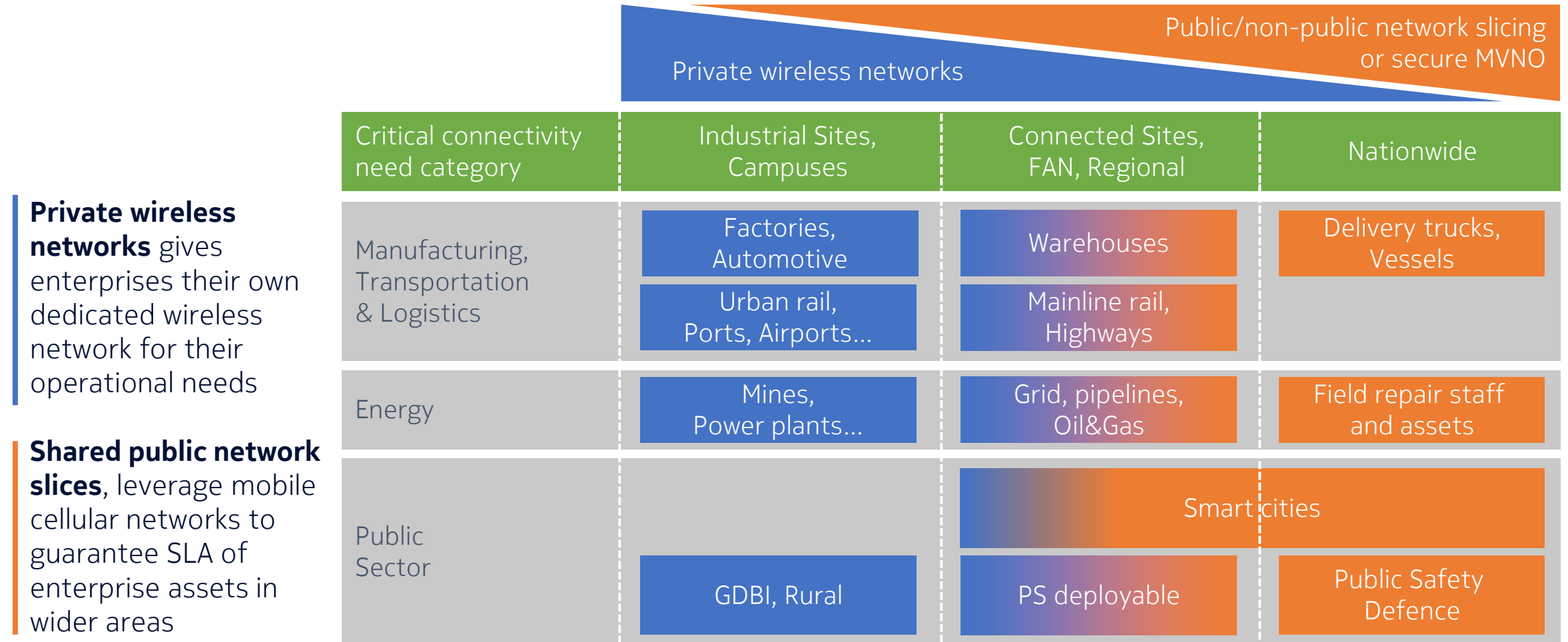
- Co-creation and validation of industrial use cases to optimize existing production processes:
 - Wireless screwdriver (torque tool control)
 - Smart devices for system monitoring and remote control
 - Upload of data (data shower) to manufactured cars and Robots/AGVs to update control units
 - Factory2Car: Software provisioning

Business Benefits

- Reducing downtime due to stable wireless connectivity
- Savings on WLAN access points & less wires
- Leverage lessons learned for process design and factory blueprints to roll out globally

Private 5G connectivity vs. public 5G services

Vertical critical connectivity needs and cellular wireless more adequate solution



An entire ecosystem collaborating to drive Industry 4.0



Telecom vendors and service providers

Expertise in building & operating mobile networks, public clouds, spectrum partners...

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Industrial bodies and ecosystem vertical partners

5G industrial connected things and industry operation expertise



System integrators & consultants

Deep industry and use cases expertise
specialized channel to market



NOKIA

**Bicsi
CALA**

Questions?

The Nokia logo is displayed in white, bold, sans-serif capital letters. A runner's foot in a red and black shoe is positioned over the letter 'O', with the sole of the shoe visible. The background is a dark, textured surface, possibly a running track.

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The Bicsi CALA logo is shown in white, bold, sans-serif capital letters. Above the word 'Bicsi' is a stylized white arc. The background is a dark blue field with a network of white dots connected by thin white lines, forming a globe-like structure.

Bicsi
CALA