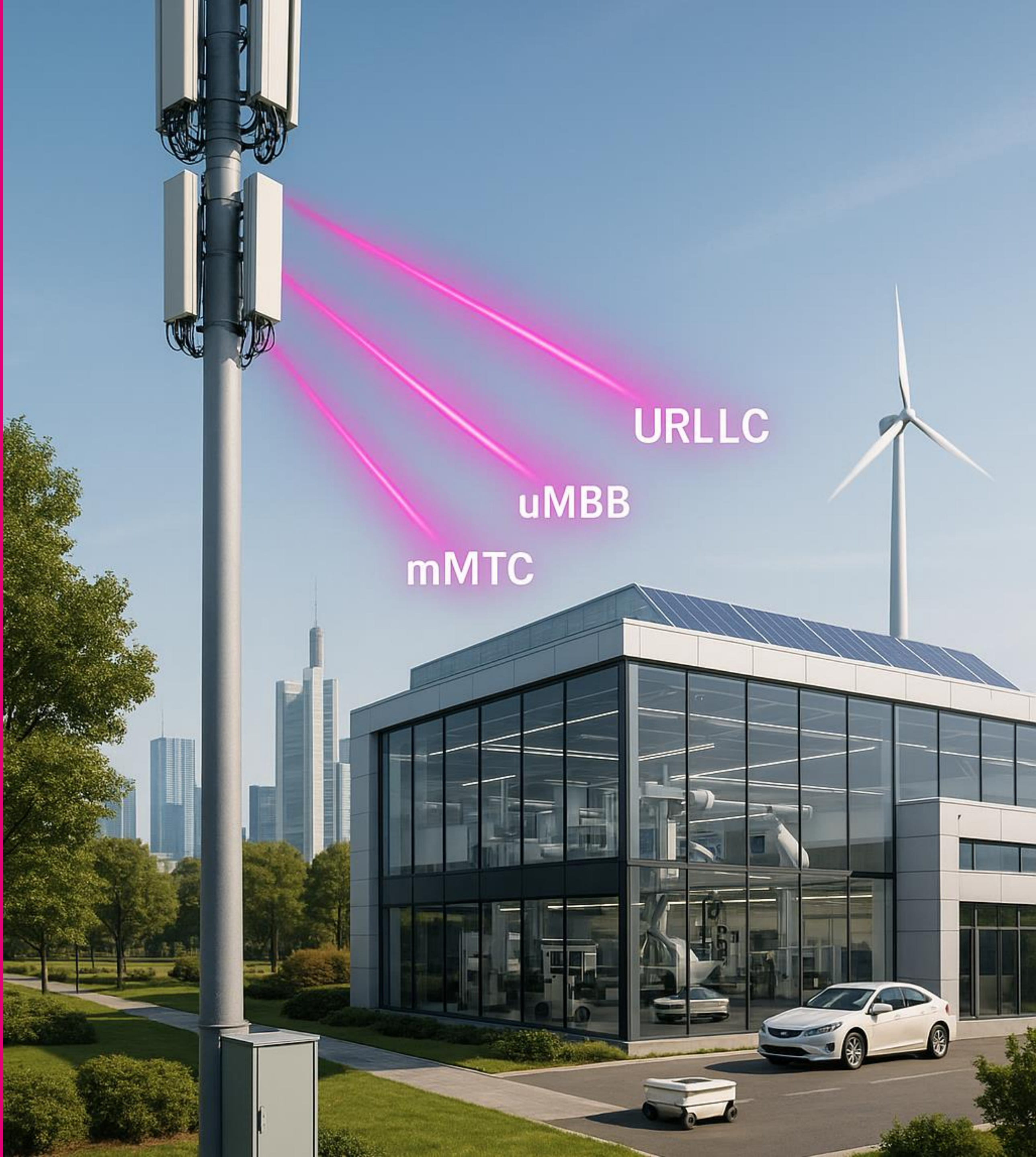
Time efficiency in practice: 5G private networks, digital shopfloor and AI for energy optimization

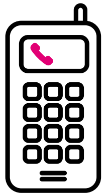
Rudolf Končok, Product owner 5G private

T Business



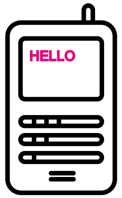
Slovak Telekom

5G is changing mobile communications



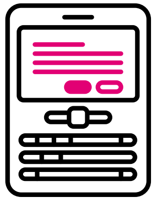
1G

Enable voice communication



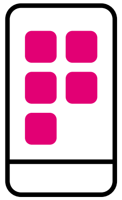
2G

Messaging is added to voice communication



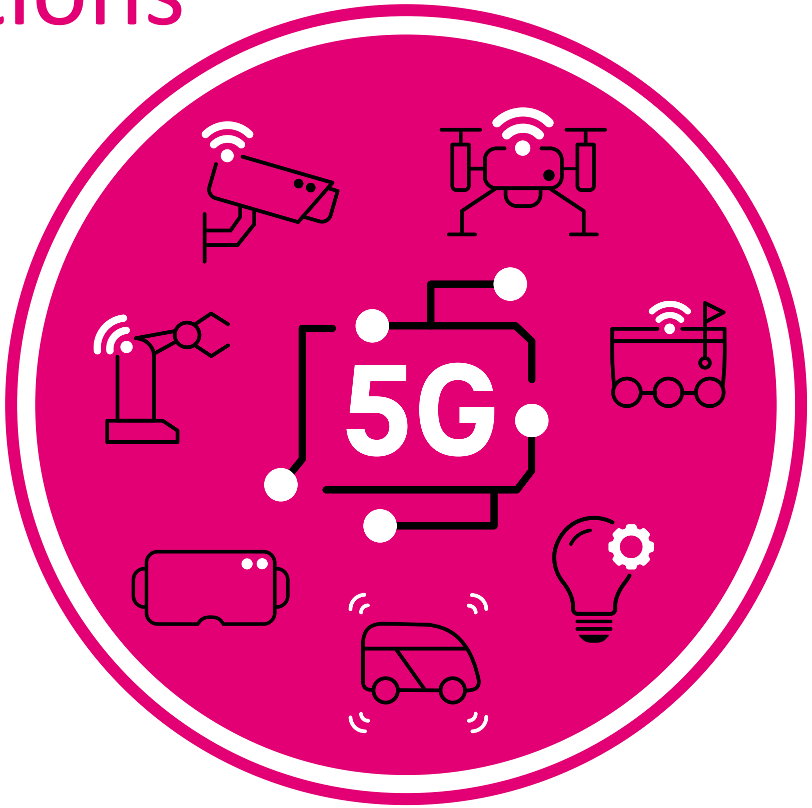
3G

Mobile phones are becoming basic computers + mobile internet



4G

Application for mobile phones + fast internet



A network designed to meet the needs of emerging technologies

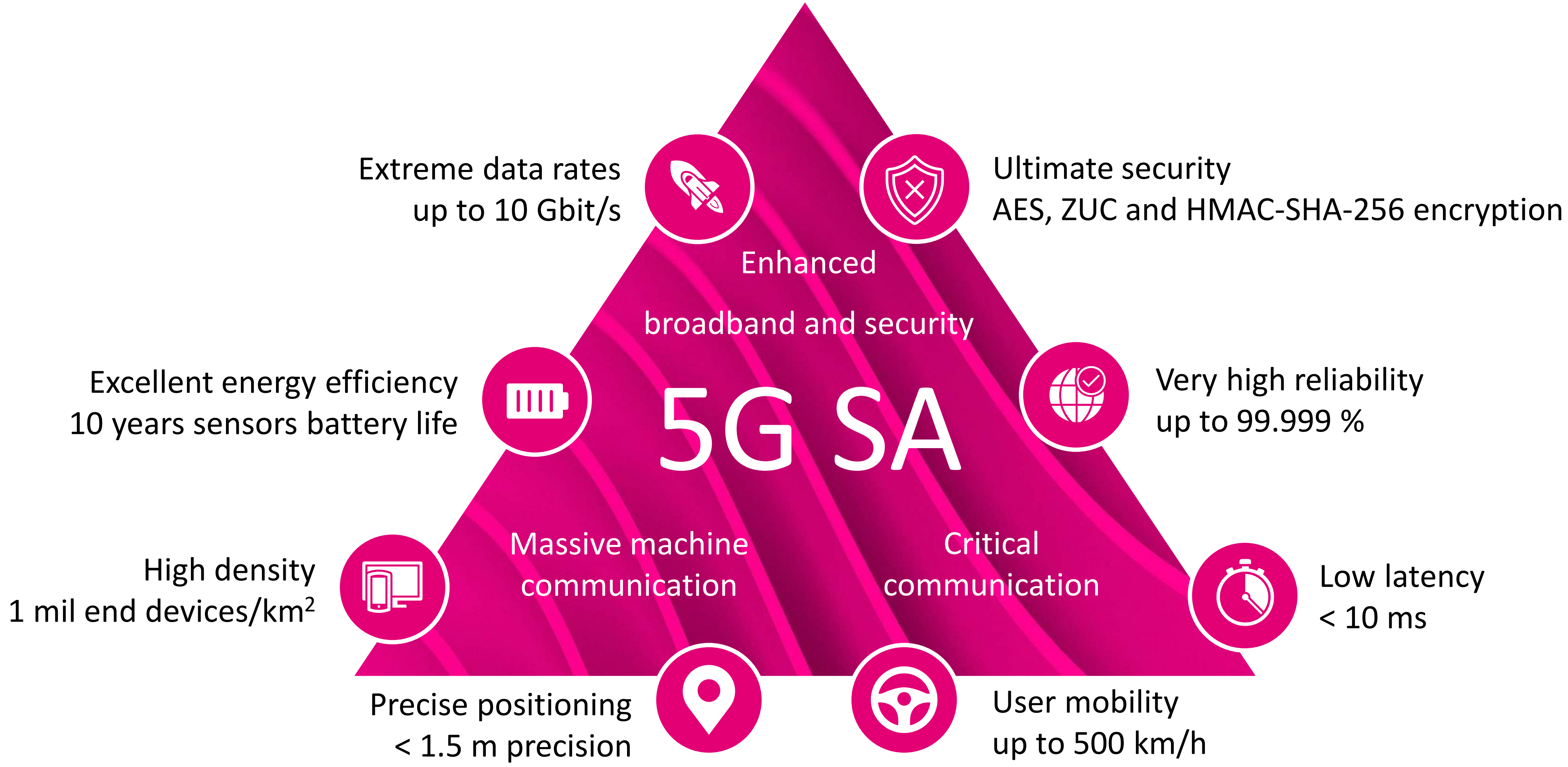
From 1G to 4G, these were technology upgrades

1980

2009

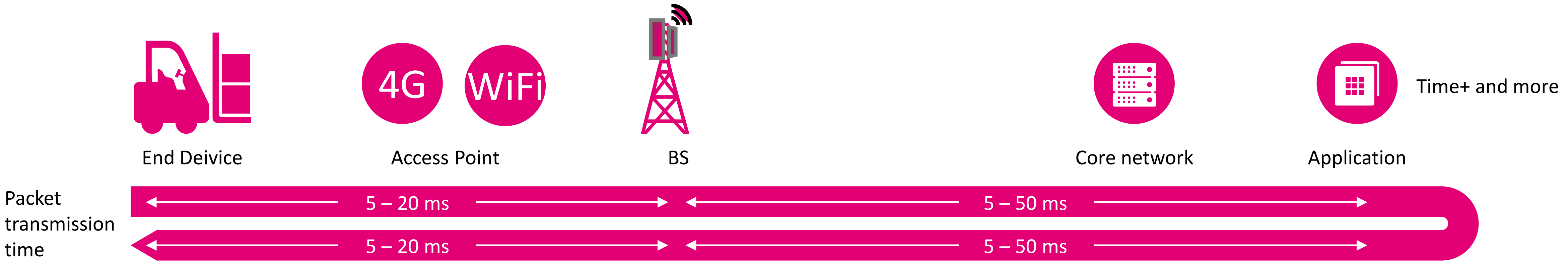
5G is built on a new, different infrastructure

5G Private Network

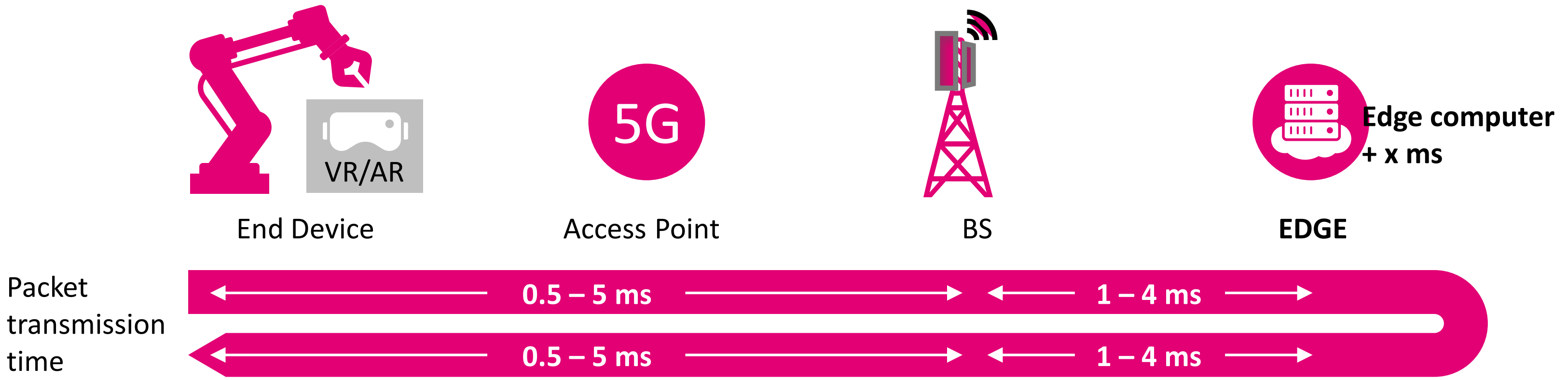


5G Edge Computing

4G or WiFi – Current Industrial use cases



5G EDGE – Real-time solution with < 20ms latency



Edge Computing significantly reduces latency by performing the necessary data processing as close as possible to the user or end device.

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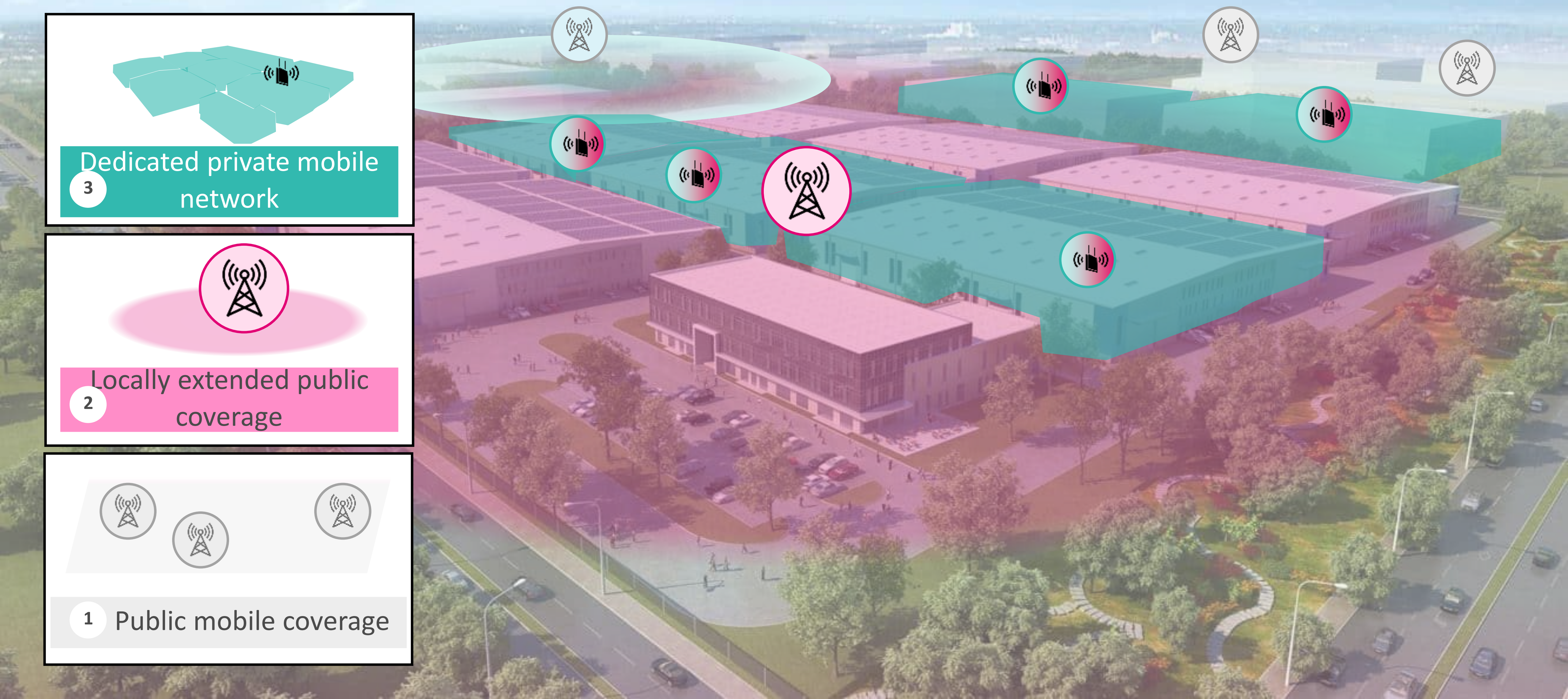
Private campus network



5G private networks at universities and the development of use cases

VSB TECHNICAL UNIVERSITY OF OSTRAVA

- 4G/LTE
- 5G NSA and 5G SA soon

CTU CZECH TECHNICAL UNIVERSITY IN PRAGUE – CZECH INSTITUTE OF INFORMATICS, ROBOTICS AND CYBERNETICS

- 5G SA
- **2nd SA testbed in Europe**
- Industrial IoT

TECHNICKÁ UNIVERZITA V LIBERCI www.tul.cz

- 5G SA
- **1st. ORAN testbed in CEE**

TECHNICKÁ UNIVERZITA V KOŠICIACH

1st 5G SA testbed in SK
- Industrial IoT

BRNO UNIVERSITY OF TECHNOLOGY

- 5G SA
- Industrial IoT

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

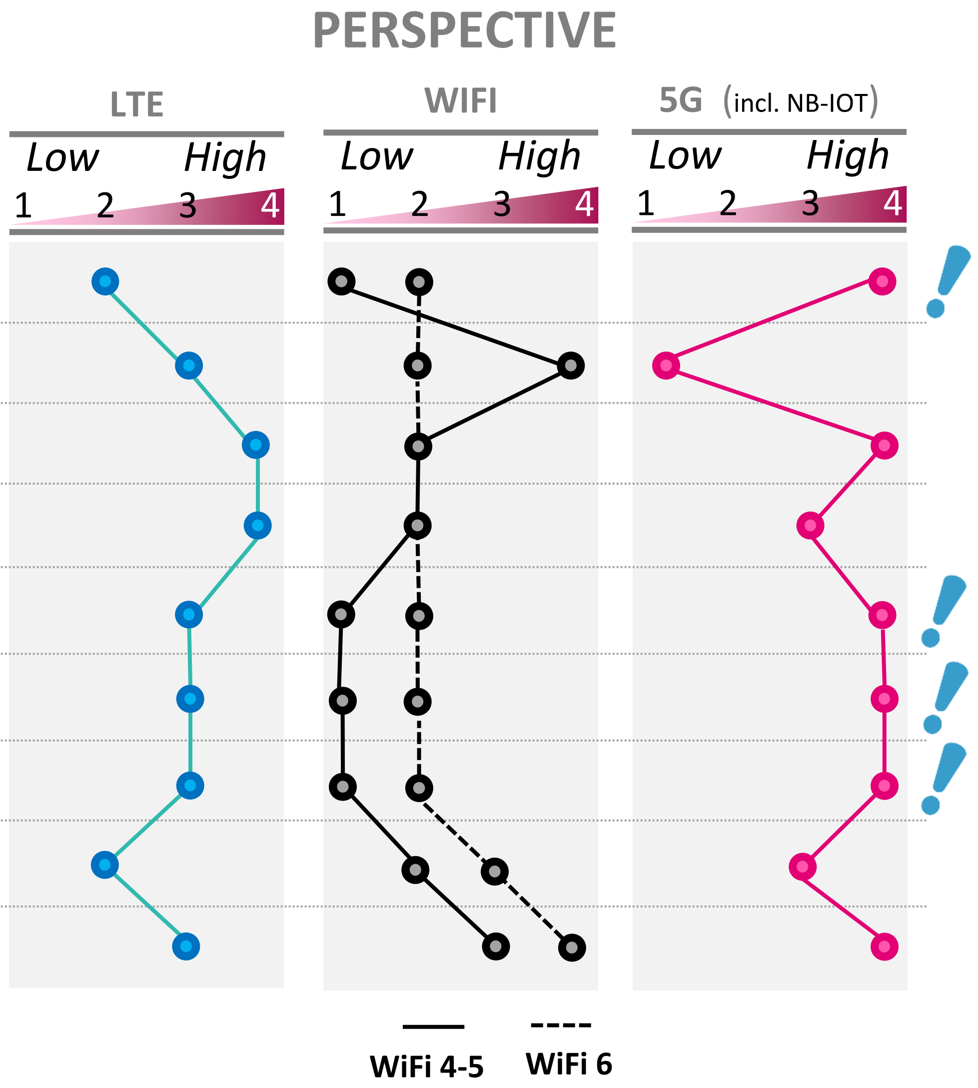
- 5G SA
- Industrial IoT

WiFi vs LTE vs 5G

LTE WiFi 5G

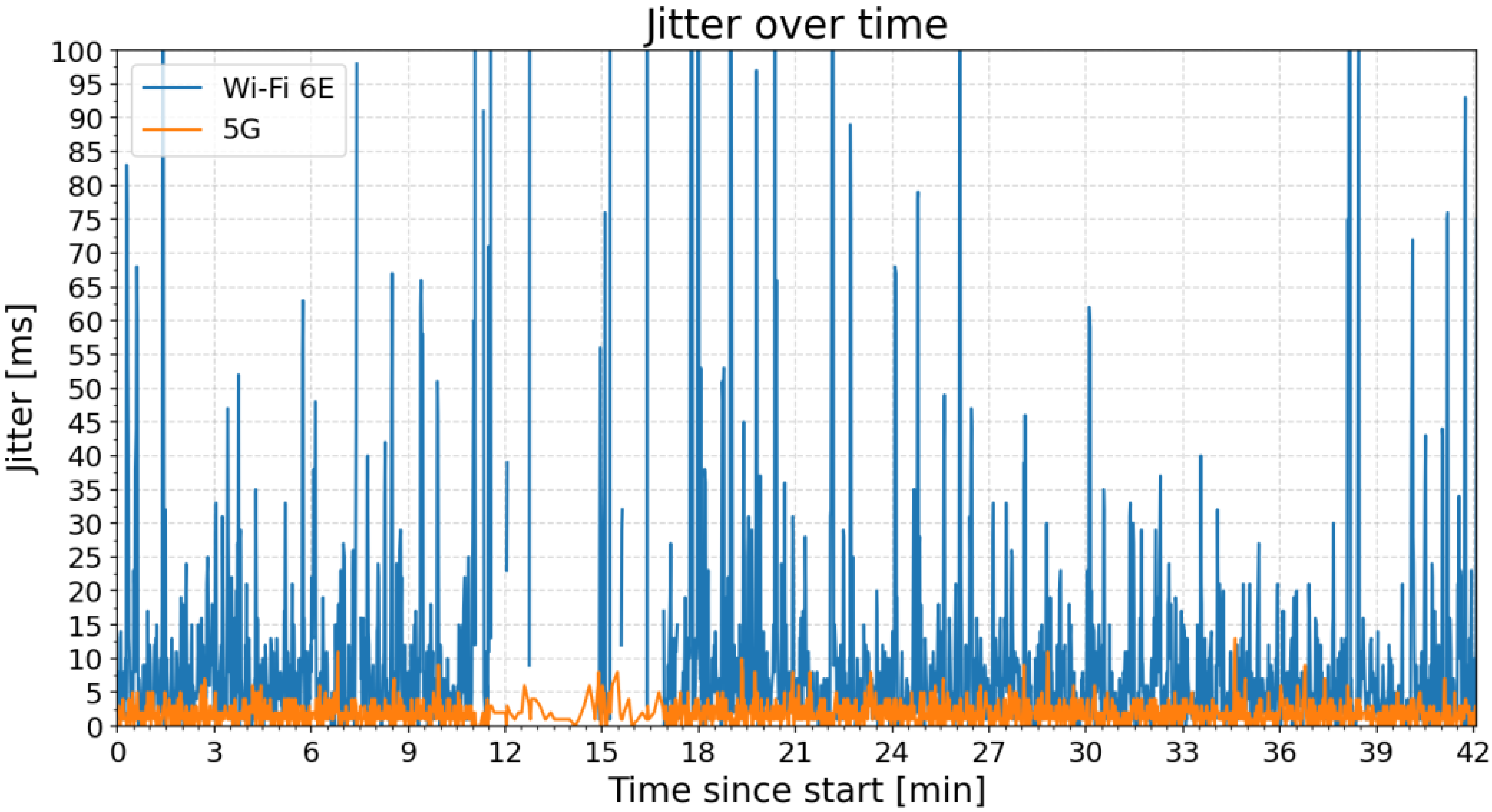
5G key advantages

DIMENSIONS	KEY DIFFERENTIATING FACTORS
Setup and network management	**Network resource flexibility** *(low & high bandwidth applications / diversity of use cases)*
	End device availability / penetration
	Ability of seamless network integration *(to public macro networks)*
Coverage & Mobility	Long distance capabilities *(cell coverage and wide area*)
	Mobility *(high velocity for end devices, e.g. outdoor*)
Massive Machine-Type Communication (mMTC)	**Device density** *(number of connections per access point / cell)*
Ultra-Reliable Low-Latency Communication (URLLC)	**Security & anti-interference capability**
	Latency *(access network only)*
enhanced Mobile Broadband (eMBB)	Maximum Bandwidth *(available spectrum with efficiency)*



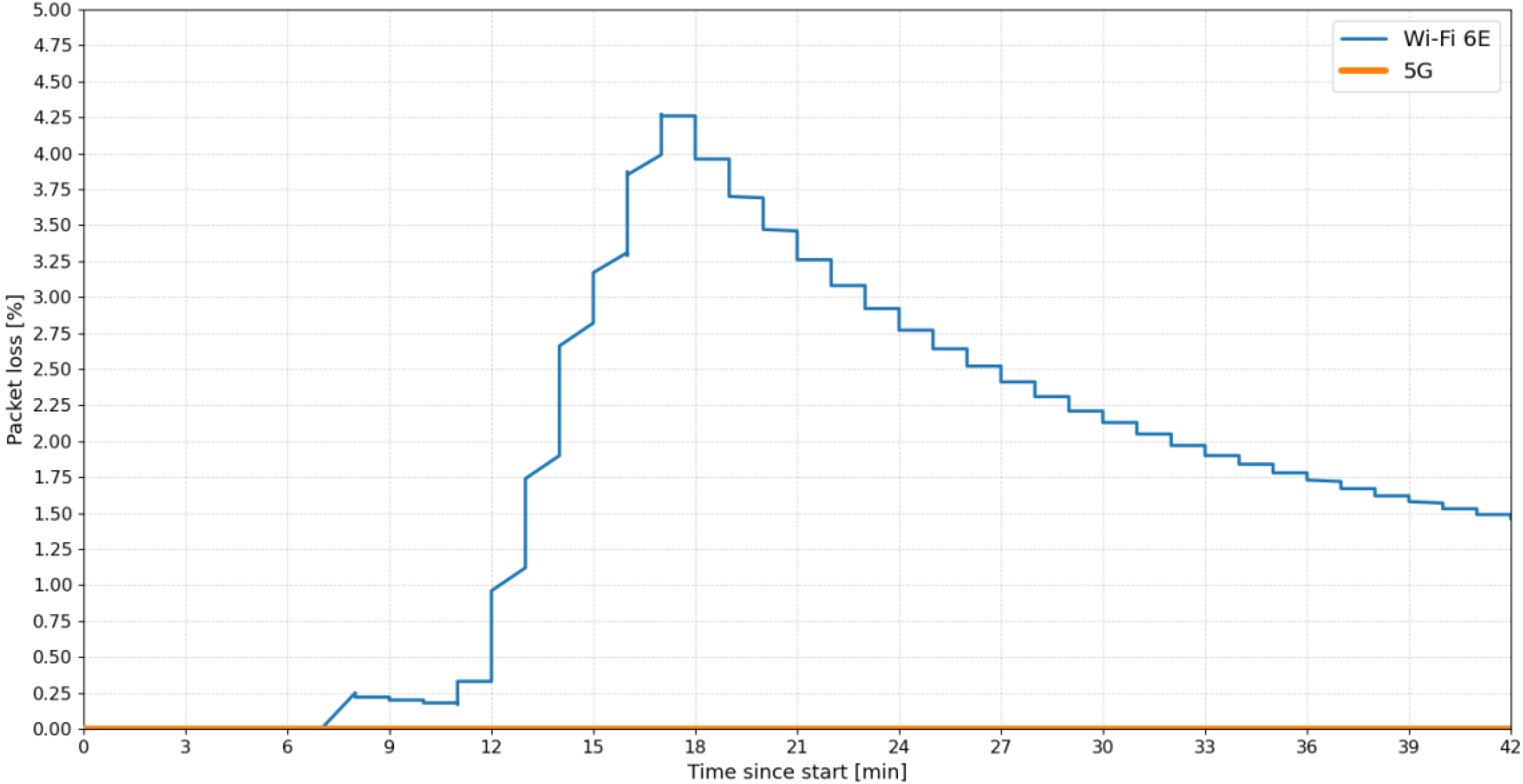
WiFi vs 5G private network - JITTER

Research study by Faculty of Manufacturing Technologies Technical University of Košice, 2025



WiFi vs 5G private network – PACKET LOSS

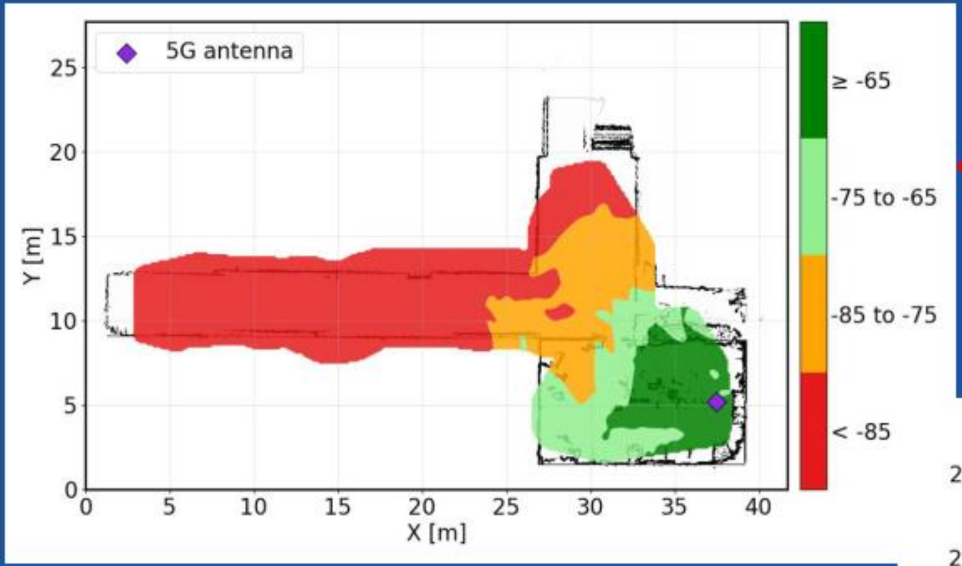
Research study by Faculty of Manufacturing Technologies Technical University of Košice, 2025



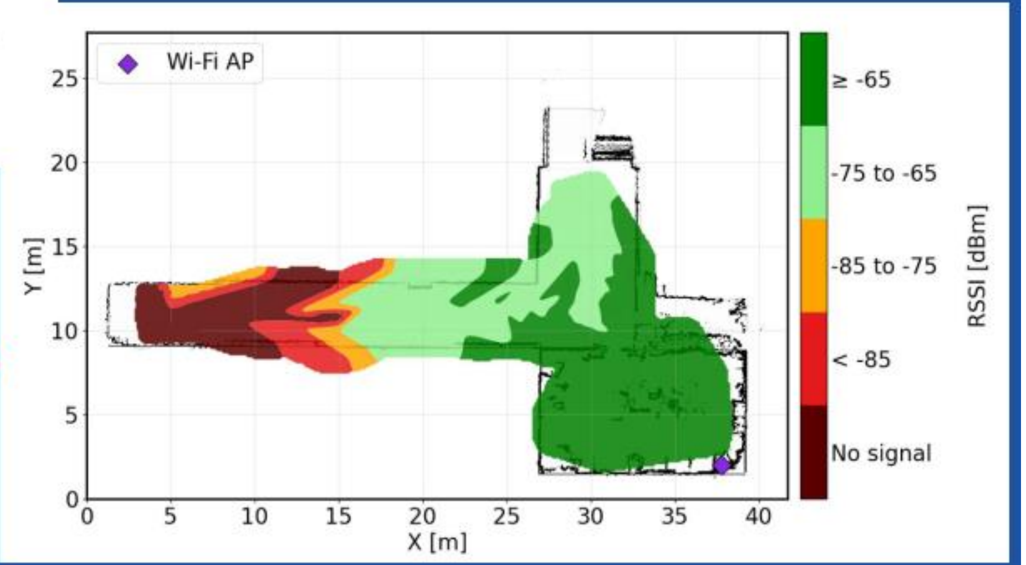
WiFi vs 5G private network – COVERAGE

Research study by Faculty of Manufacturing Technologies Technical University of Košice, 2025

Coverage maps for Wi-Fi 6E and 5G



RSSI Distribution in 5G Network



RSSI Distribution in Wi-Fi Network

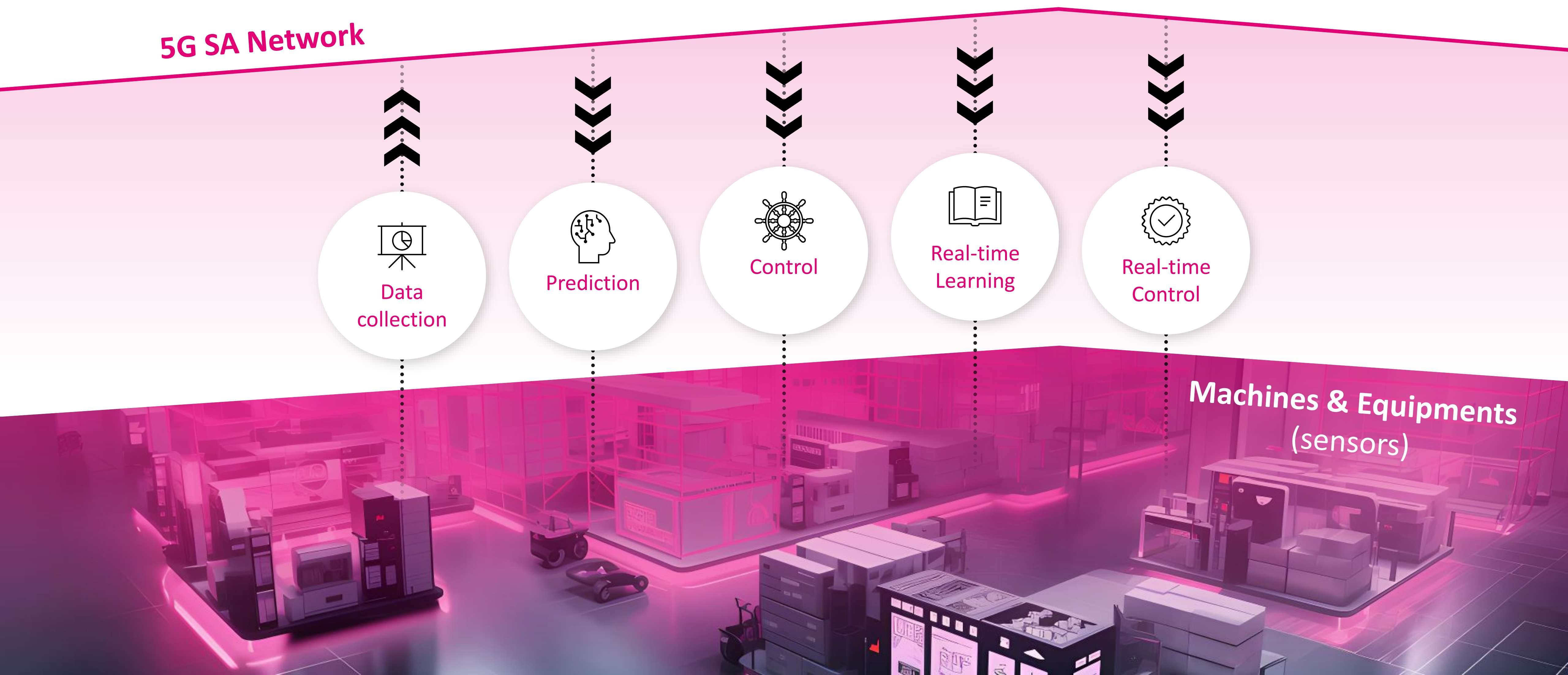
Everything is about data

1 000+

Devices, Sensors, …

Environment
Vibrodiagnostics
Energy
Machines Configuration
Logistics
Production parameters
Warehouses
People
Tools & Machines
Material
Temporary Material Storage
Panels
Palets, Forklifts

Data Collection



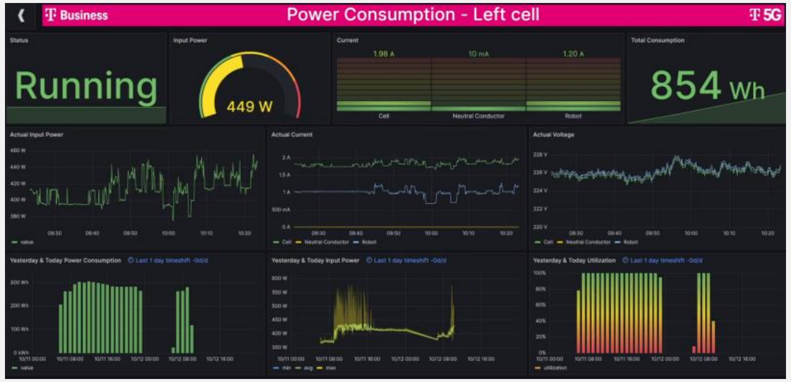
Specific examples of 5G use: Data collection

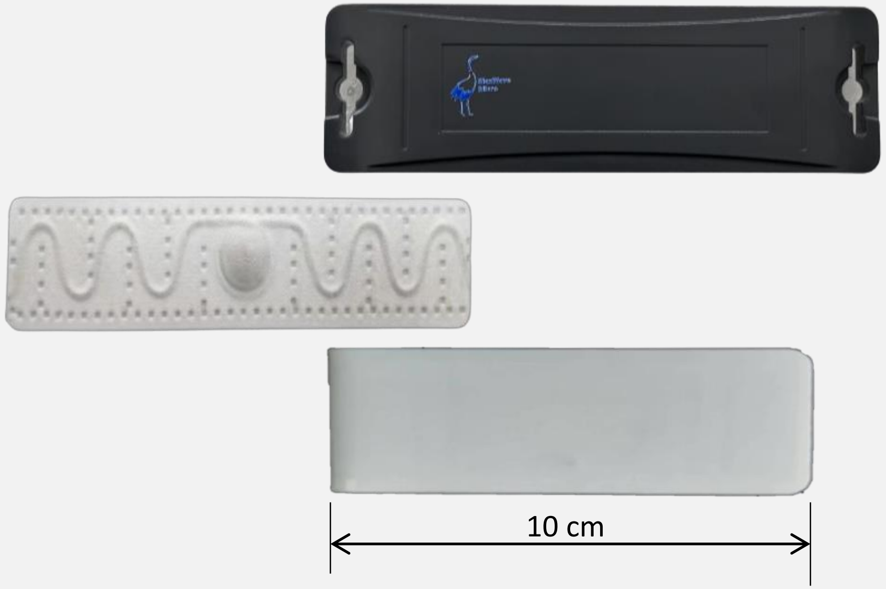
Real-time data processing:
- Robot control
- Quality Control
- AGV

Processing of data from production:
- Data from production machines
- Electricity consumption. Energy, gases, ...
- Measurement of other quantities

Position:
- Placement of materials, pallets, products
- Position of tools, transporters, ...
- Movement of workers

- Optimal utilization of resources – cost savings, reduction of the number of employees





Concrete examples of 5G use: Logistics

Warehouse robotization

- Significant reduction in the number of employees – up to 1/3
- Significant increase in efficiency by 200-300%
- More efficient use of storage space
- Significant energy cost savings
- Increase in quality – significant reduction in error rates
- ROI 1-3 years

- Increase flexibility, reduce costs, reduce workforce

SOURCE: Geek Robotics, partner of Kvados Group, a. s.

Real projects

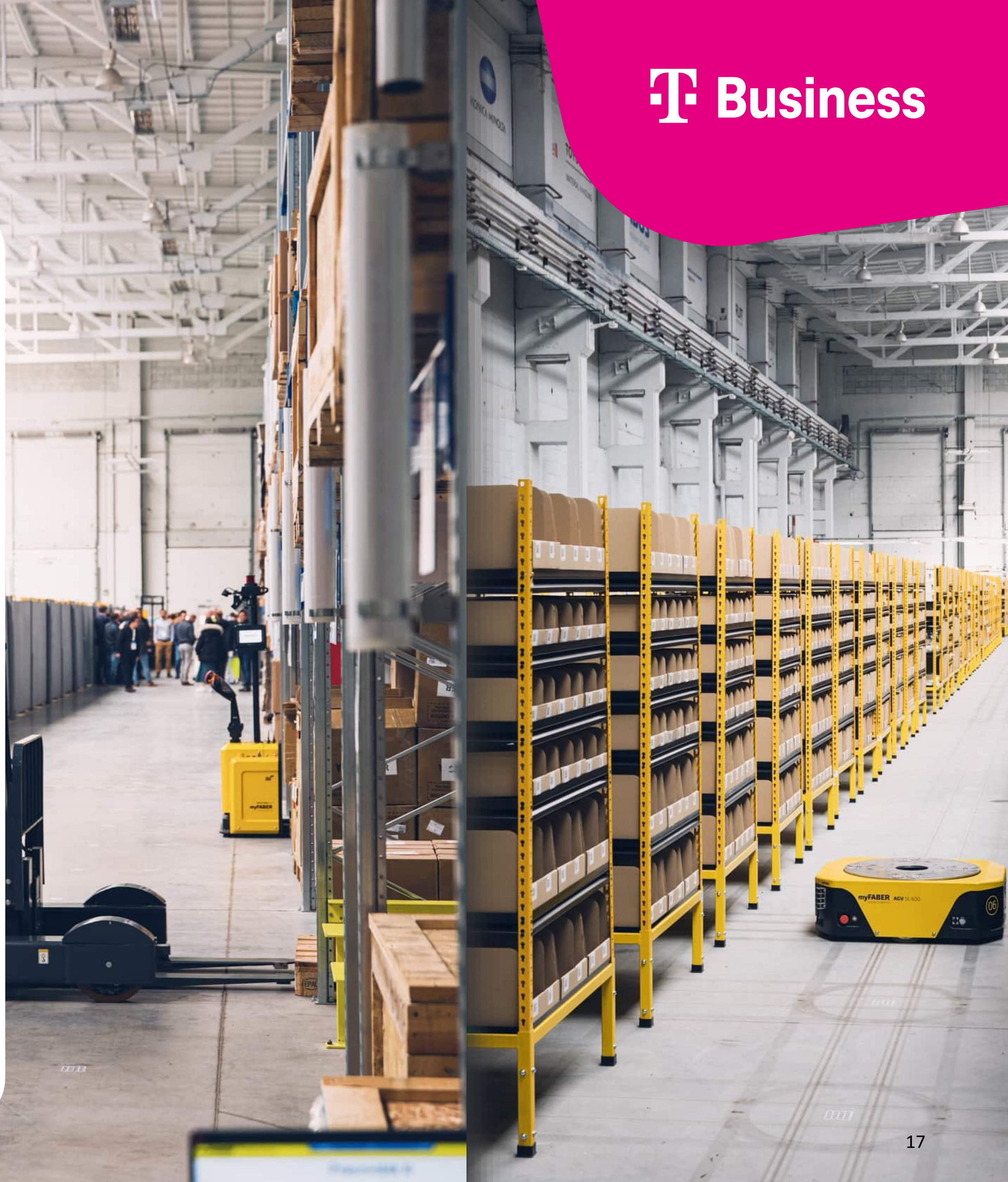
DEXTRUM FULFILLMENT

AUTOMATED WAREHOUSE

- Significant savings on heating, lighting and the number of employees
- **20%** faster with 5G connectivity

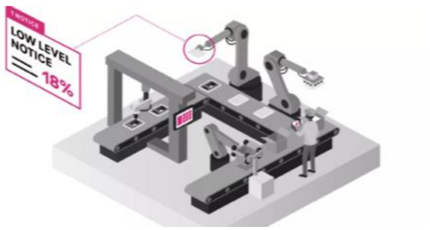
AUTOMATED FORKLIFT

- **24/7 operation**
- Navigation with **3mm** accuracy



Real projects

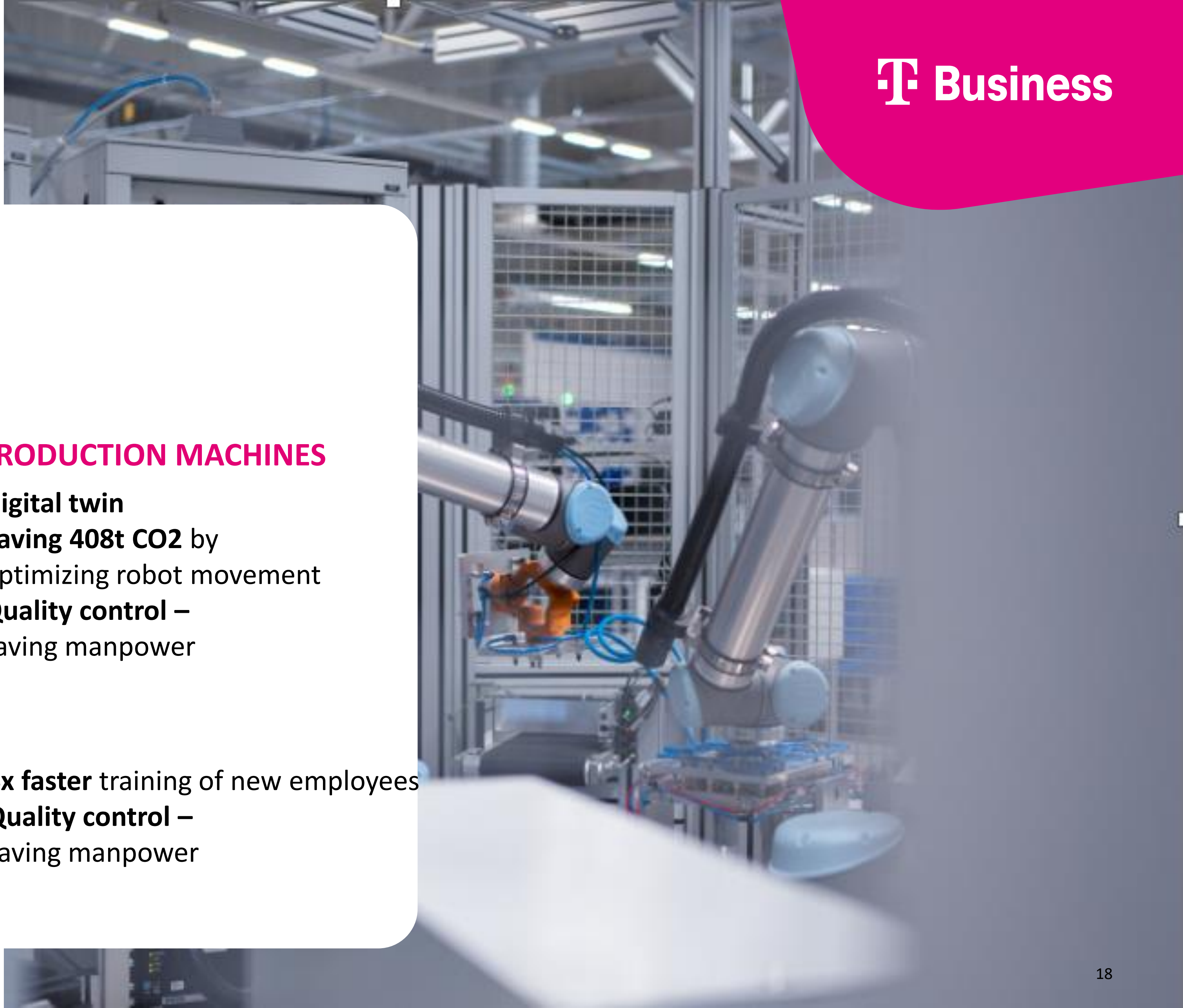
DATA ACQUISITION FROM PRODUCTION MACHINES



- **Digital twin**
- **Saving 408t CO2** by optimizing robot movement
- **Quality control –** saving manpower

ARMENTED REALITY

- **4x faster** training of new employees
- **Quality control –** saving manpower



Commercial 5G Campus NW

Domů » V kolínském závodě Toyota běží privátní 5G T-Mobile

V kolínském závodě Toyota běží privátní 5G T-Mobile

Redakce, 7. Prosinec 2022 - 11:31

Spuštění 5G standalone sítě ve výrobním závodě povede k migraci služeb kontroly produkce do nové sítě. Zároveň vzroste integrace dat logistiky a kontroly díky možnosti využít širší škálu senzorů.

Privátní 5G sítě jsou podle analytiků globálním technologickým skokanem pro toto desetiletí. Široké aplikační pokrytí, vysoká úroveň bezpečnosti a nízká latence je předurčují pro nasazení v průmyslu. Dosud spouštěné privátní sítě v Česku byly doménou akademického prostředí, kde mají velký potenciál pro výzkum a realizaci testbedů. Komerční nasazení v exponovaném segmentu automotive je ale o několik kroků blíže k praxi a samozřejmě ukazuje, proč je potřeba mít na zřeteli vysoký potenciál 5G z hlediska vývoje. Pro Toyotu není tato síť první, v podobném režimu je 5G nasazeno také v Belgii a v Polsku. Mezi první aplikace bude patřit řízení řízení autonomních vozíků včetně přesného určování polohy ve skladech i při dodávce materiálu na linku. Velký potenciál má pro Toyotu nasazení senzorů pro kontrolu kvality a dalších zařízení kategorie IoT. Spolehlivé připojení a nízká latence umožní analyzovat data v reálném čase.

Continental The Future in Motion

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Press > Press Releases > Digital Factory: First Continental Plant in Europe Equipped with 5G Network

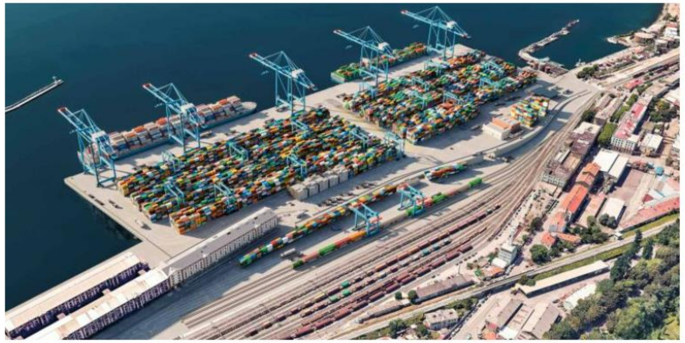
Press Release August 24, 2023

Digital Factory: First Continental Plant in Europe Equipped with 5G Network

- Private 5G network from T-Mobile will connect more than 1,000 devices and sensors at Continental's plant in Brandýs nad Labem
- Smart connectivity provides a basis for overcoming current and future challenges in display manufacturing
- 5G optimizes manufacturing processes, allows for greater efficiency and reduces downtime
- "With the introduction of a private 5G network at our location in Brandýs nad Labem, Czechia, we have reached a significant milestone on the road to the digital factory," says Thomas Ebenhöch, head of Operations in the User Experience business area at Continental Automotive

Tawesco in Kopřivnice is testing Smart Factory. It is based on T-Mobile's 5G network.

We have launched a pilot project called Smart Factory – the intelligent factories of the future. Its data backbone consists of a private 5G network built in cooperation with T-Mobile.



Credit: APM Terminals

Rijeka Gateway, a new terminal developed by APM Terminals and ENNA Group, is setting new standards in maritime digital connectivity with the adoption of a private 5G campus network.

Business Stream & ThingsBoard Industrial Data Visualization

Effortlessly display IoT dashboards and real-time business info on digital screens in your industrial operations

- Instantly display production and logistics data on any screen
- No API integration: just embed ThingsBoard dashboards via URL/iframe
- All Business Stream features: scheduling, remote management, content mixing
- Fast setup, scalable for any industrial client
- Competitive edge: combine IoT data and corporate messaging on one screen


Where is the corresponding fuse box?

Q&A

T Business