Redes 5G Industriais
Impulsionador da transformação digital na indústria
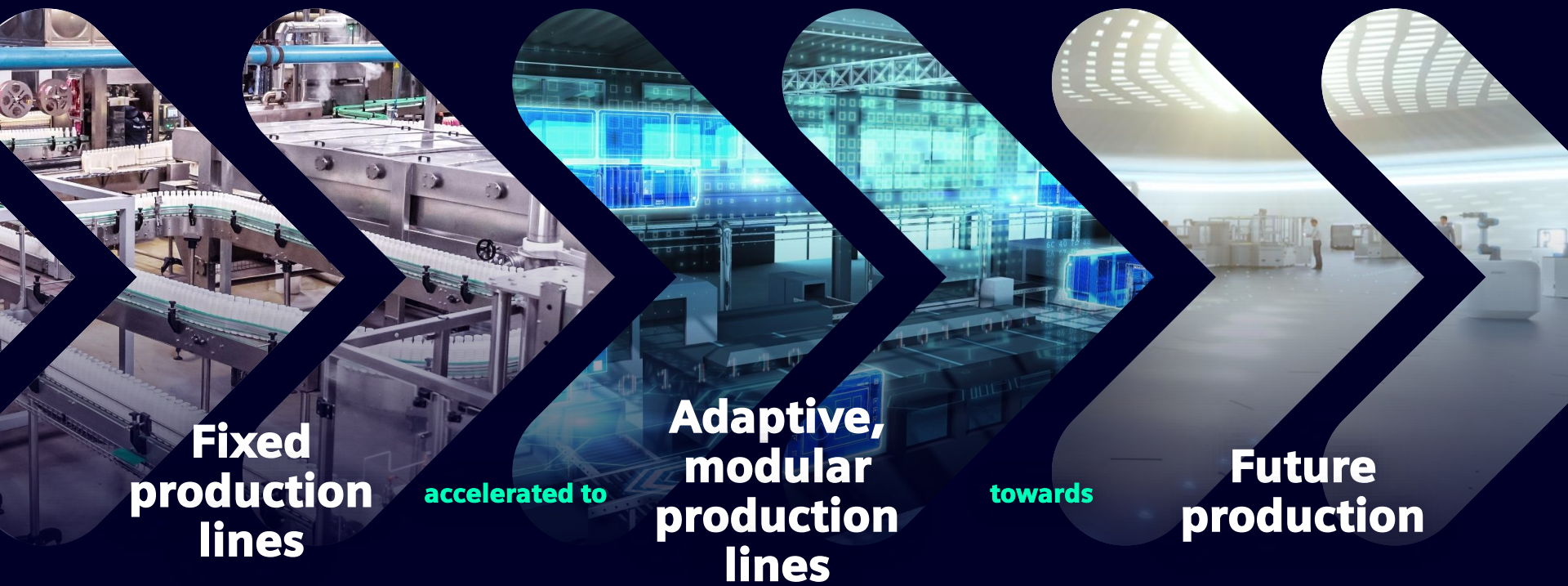
AVISO IMPORTANTE

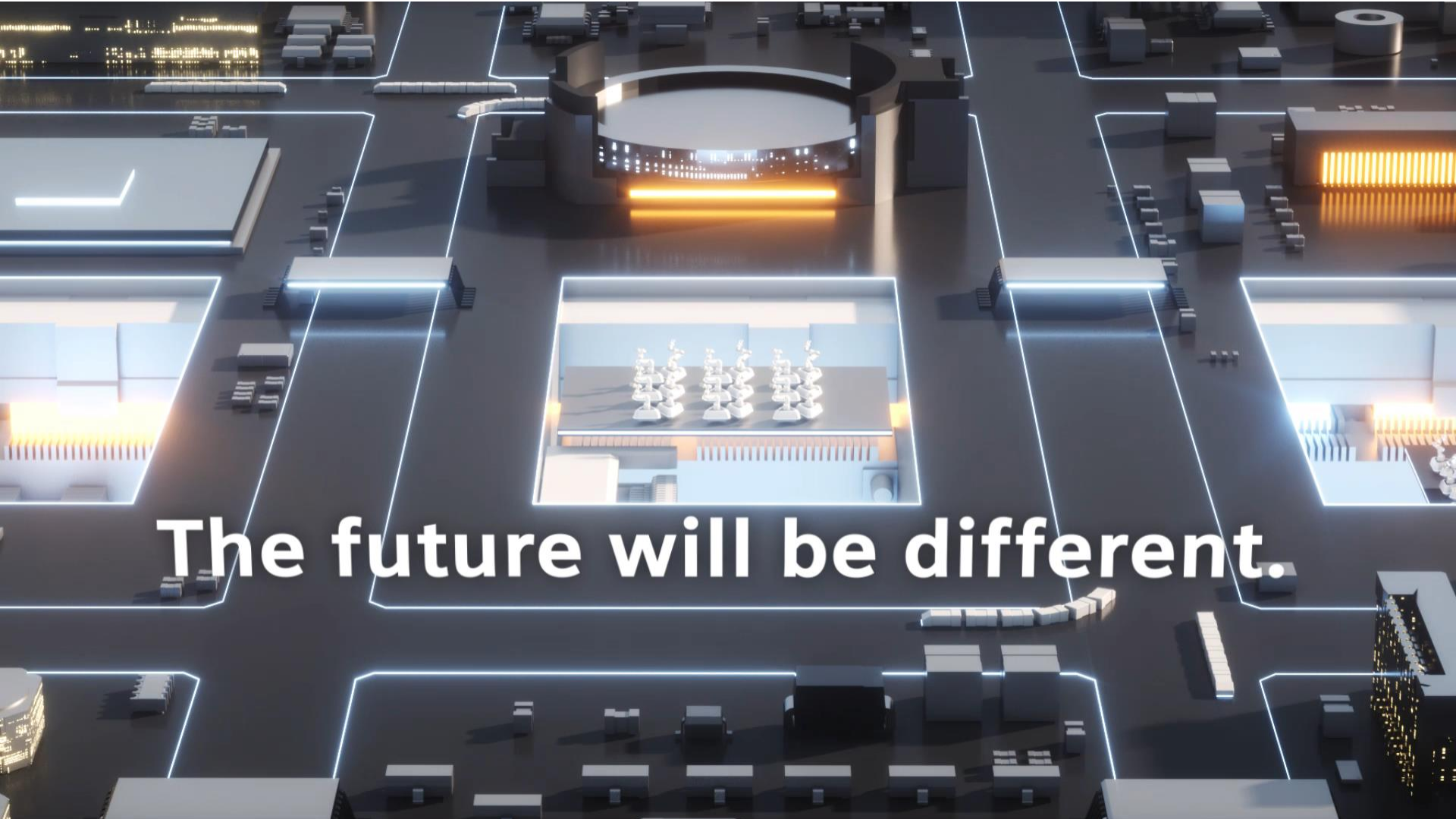O conteúdo técnico da palestra é de responsabilidade da empresa palestrante.

Fique à vontade para baixar o arquivo em PDF e se atualizar com as novas tecnologias apresentadas nesta edição.

<u>NÃO É PERMITIDO COPIAR AS INFORMAÇÕES E IMAGENS E REPRODUZIR SEM A AUTORIZAÇÃO DA EMPRESA.</u>

Qualquer dúvida em relação ao conteúdo apresentado, você pode entrar em contato direto com o palestrante.

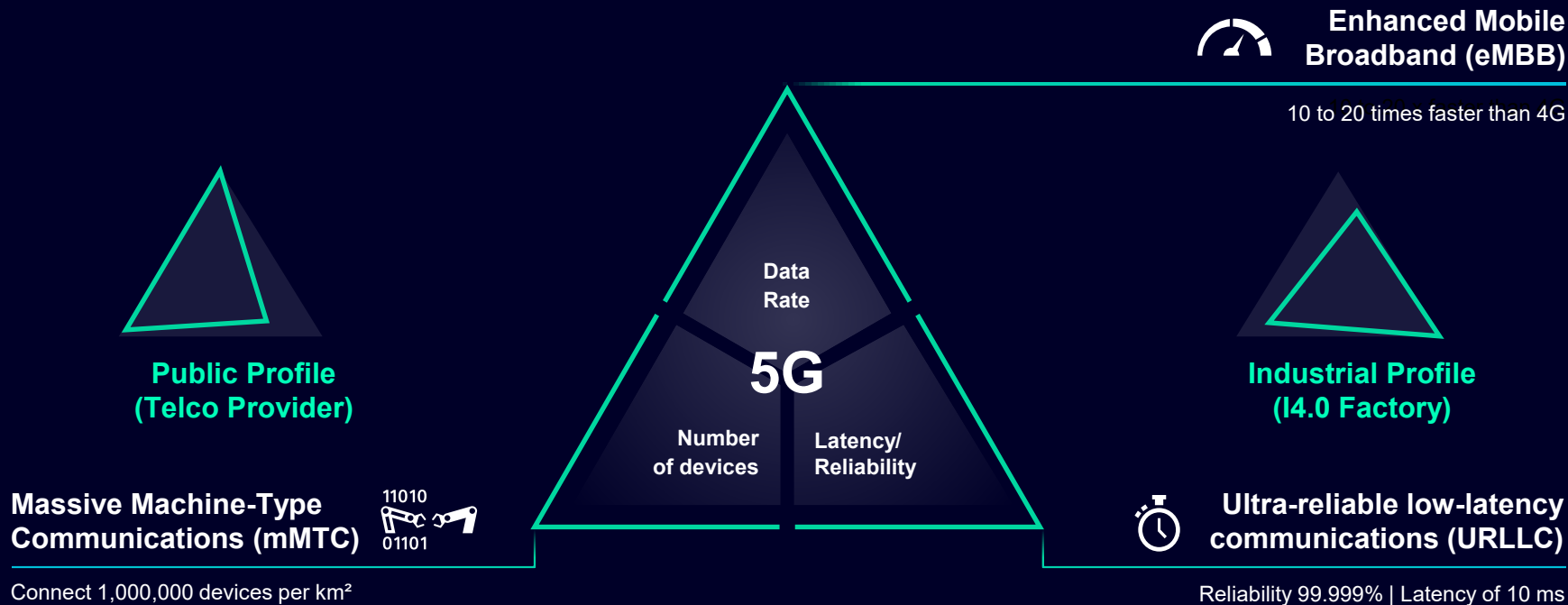# Rethinking production towards more adaptability

Fixed production lines *accelerated to* **Adaptive, modular production lines** *towards* **Future production**

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The future will be different.

Qual é o papel do 5G nessa evolução?

5G fulfills various network requirements

Enhanced Mobile Broadband (eMBB)

10 to 20 times faster than 4G

Public Profile (Telco Provider)

Industrial Profile (I4.0 Factory)

Data Rate

5G

Number of devices

Latency/ Reliability

Massive Machine-Type Communications (mMTC)

11010 01101

Ultra-reliable low-latency communications (URLLC)

Connect 1,000,000 devices per km²

Reliability 99.999% | Latency of 10 ms

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Standardisation and product availability

Release 16
Available: July 2020

Release 18
Planned: Q2 2024

Products R15
Available: Q2 2021

Products R16
Expected: late 2023

Products R17
Expected: 2025/26

Release 15
Available: December 2018

Release 17
Available: June 2022

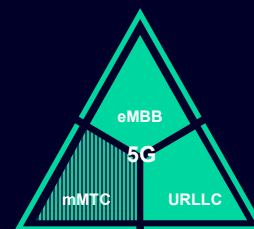Unrestricted | © Siemens 2024
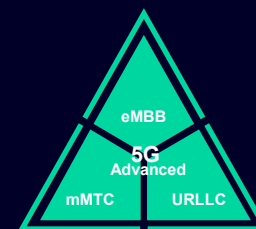
SIEMENS

Feature roadmap of the 5G standard
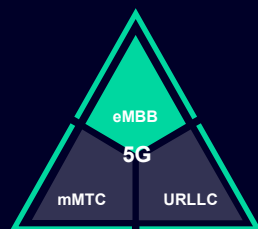
Release 15
Available: Dec. 2018
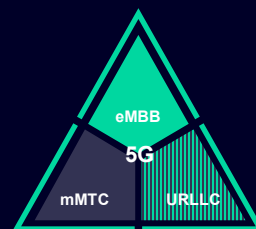
Release 16
Available: July 2020

Release 17
Available: June 2022

Release 18
Planned: Q2/2024

	Release 15	Release 16	Release 17	Release 18
Data rate / Area traffic capacity (20 Gbps)	Complete	Complete	Complete	Complete
Spectrum efficiency (3 x 4G)	Complete	Complete	Complete	Complete
Network Energy efficiency (100x 4G)	Complete	Complete	Complete	Complete
Connection density (1,000,000 / km^2)	Partially	Partially	Complete	Complete
Latency (<10 ms)	None	Partially	Complete	Complete
Reliability (99.999% under 10 ms)	None	Partially	Complete	Complete
Mobility (handover/ roaming with 500 km/h)	Complete	Complete	Complete	Complete
Localization (Phase 1: 1 meter accuracy)	None	Partially	Partially	Complete
Non-public networks (Private Networks)	None	Partially	Complete	Complete
Industrial IoT (TSN Support)	None	Partially	Partially	Complete
Network slicing (Multiple networks on shared network)	Complete	Complete	Complete (+ more)	Complete (+ more)
SideLink (Direct Communication between end-devices)	None	Partially	Partially	Complete

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Como usar o 5G na indústria de forma prática e sustentável?

Why does industry need 5G?

Mobile Robots working together

They need low latencies
to synchronize their tasks
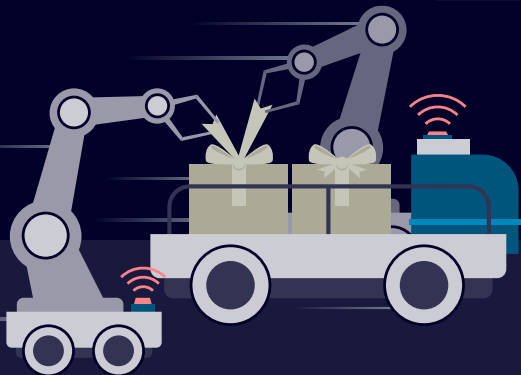
Emergency stops

Latencies and reliability are key to make sure that
a machine really stops instantly when
an emergency stop has been pressed
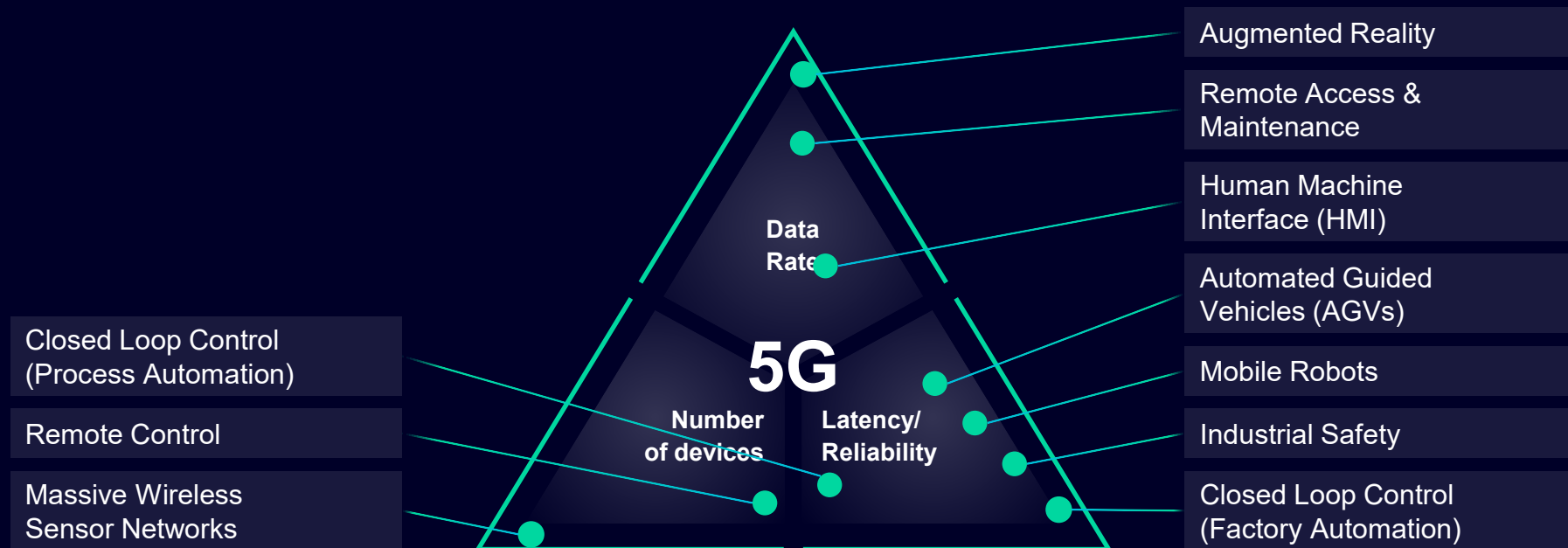
Augmented workforce

High bandwidths are needed to
provide high data rates for handheld
devices on the shopfloor

5G is the first mobile wireless standard that has been developed with industrial use cases in mind

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Classification of applications according to network requirements
Factory and Process Automation

Data Rate

5G

Number of devices

Latency/ Reliability

Augmented Reality

Remote Access & Maintenance

Human Machine Interface (HMI)

Automated Guided Vehicles (AGVs)

Mobile Robots

Industrial Safety

Closed Loop Control (Factory Automation)

Closed Loop Control (Process Automation)

Remote Control

Massive Wireless Sensor Networks

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Coexistence of public and private 5G networks

Private Network

Public Network

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Which 5G deployment is right for your application?

Public deployment

Private deployment

Public

Private

Control plane

User plane

Location 1   Location 2

Used frequency: 3.4 … 3.7 GHz (Public)

Flexibility:	Very limited, depends on provider
Privacy:	Insufficient w/o additional precaution
QoS:	Not guaranteed
Network:	Depends on implementation of provider

Local, private

Control plane

User plane

Used frequency: 3.7 … 3.8 GHz (Private)

Flexibility:	Unlimited
Privacy:	Optimal
QoS:	Optimal
Network:	This scenario is only possible with access to spectrum

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Private Industrial 5G solution

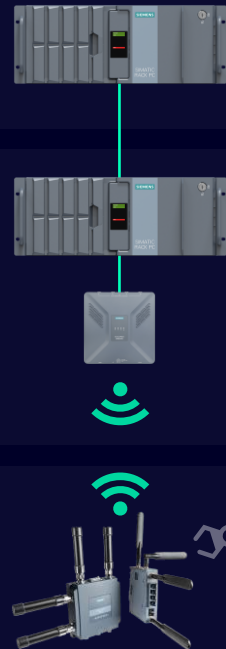|		
5G Core	Management of 5G network incl. UEs and data traffic	
Radio Access Network (RAN)	Central Unit (CU): control of the radio network Distributed Unit (DU): conversion of the radio signal Radio Units (RUs): transmission of the radio signal	
User Equipment (UEs)	Connection of end devices to 5G network	

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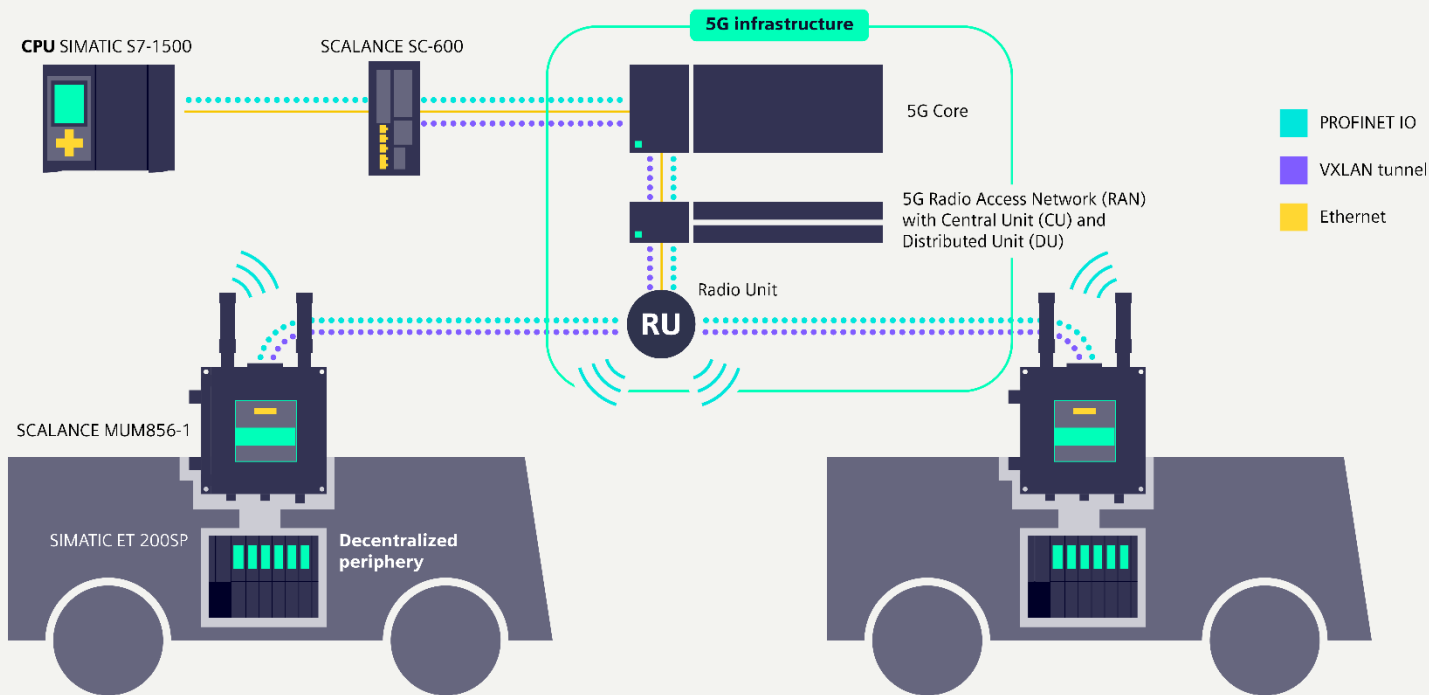# Industrial 5G Routers for public & private networks

- Industrial routers SCALANCE MUB852-1, MUM853-1 & MUM856-1

- Support of 5G and 4G

- Compatible with public and private 5G networks

- Ideal for industrial applications due to industrial form factor and design

- Easy secure remote access in combination with the SINEMA Remote Connect VPN management platform

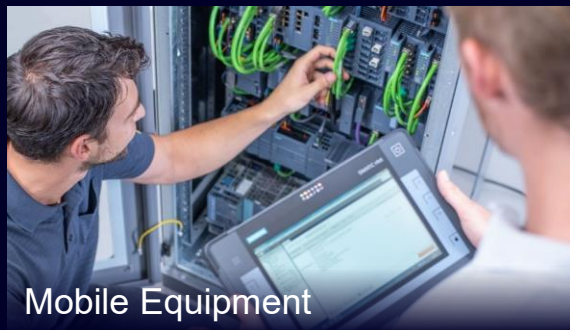**SIEMENS**

Private Industrial 5G infrastructure

Radio Unit (RU)

5G Core

Central Unit (CU) &
Distributed Unit (DU)

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SCALANCE MUM853-1 & SCALANCE MUM856-1
Enabling PROFINET communication over 5G Networks

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Aplicações industriais

Potential industrial applications with Industrial 5G

Mobile Equipment

Remote Access

Backhaul

Autonomous Machines

Autonomous Logistics

Edge

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SCALANCE 5G Routers & SINEMA Remote Connect

Secure remote access via public 5G networks

- Remote connectivity via public 5G networks to enable remote maintenance and telecontrol applications to remote locations

- Easy secure remote access when used in combination with for example the SINEMA Remote Connect VPN management platform

- Utilizing the benefits from 5G routers able to connect in both public and private 5G networks

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Siemens manufacturing plant in Karlsruhe

- Implementation of a private 5G network in the production facility

- Private Industrial 5G standalone network

- Private spectrum for campus networks (3.7 – 3.8 GHz band)

- Connection of an intralogistics AMR

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Remote control of vehicles in mines

- Siemens Industrial 5G Network to control machines and for video transmission

- Direct control of remote machines from ergonomic workstation

- Response to shortage of skilled workforce, 24/7 operation possible, employees do not have to work in challenging environments

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Resumindo (ufa!!!)

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Balduino Bailão
Diretor Comercial do segmento de indústrias – Embratel

Vamos ficar conectados

Márcio Santos
Consultor Técnico
marcio.santos@siemens.com