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Industrial 5G

For the industry of tomorrow

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Why Industrial 5G?
Growing Flexibility, Autonomous Logistic and more

Mobile Equipment

Assisted Work

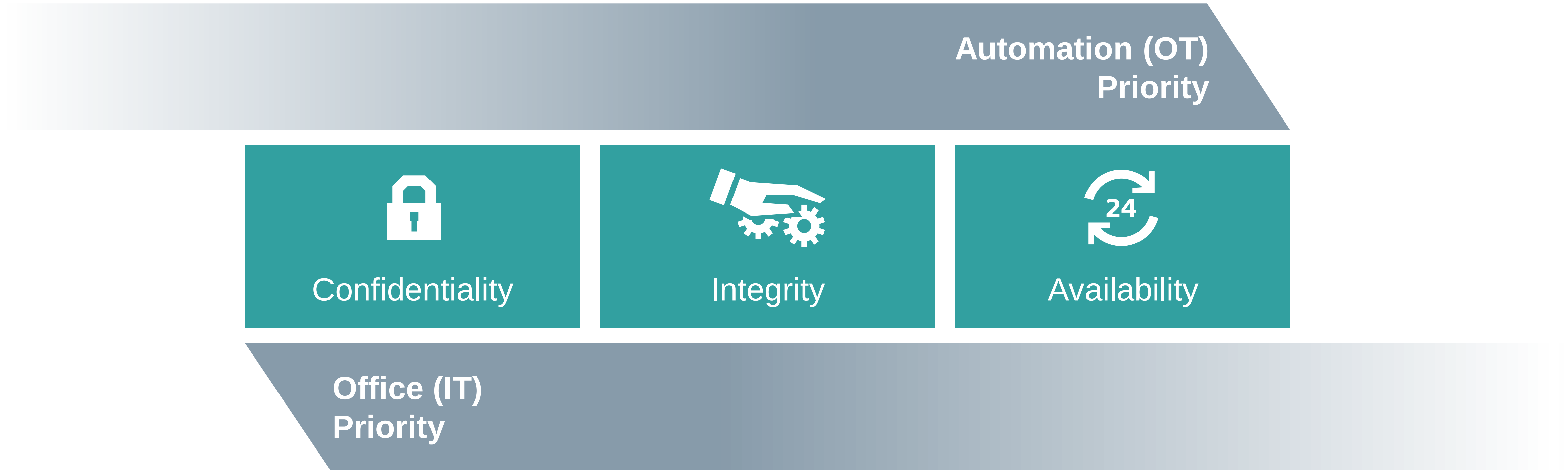
Backhaul

Autonomous Machines

Autonomous Logistic

Edge

IT and OT have different priorities



Automation (OT)
Priority

Confidentiality

Integrity

Availability

Office (IT)
Priority

5G addresses 3 application scenarios, but there is no “one-fits-all” scenario for everything

Public Profile (Mobile Network Operator)

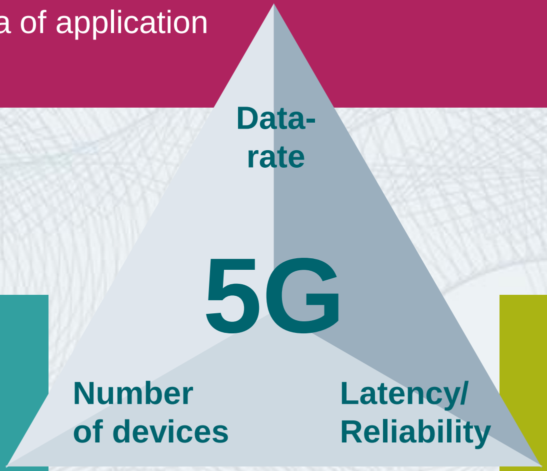
Enhanced Mobile Broadband (eMBB)

- High data rates for data driven applications
- Wide spectrum range
- Wide area of application

Industrial Profile (Industrie 4.0 Factory)

Massive Machine-Type Communications (mMTC)

- Scalable connectivity
- Wide Area Coverage
- Deep indoor penetration

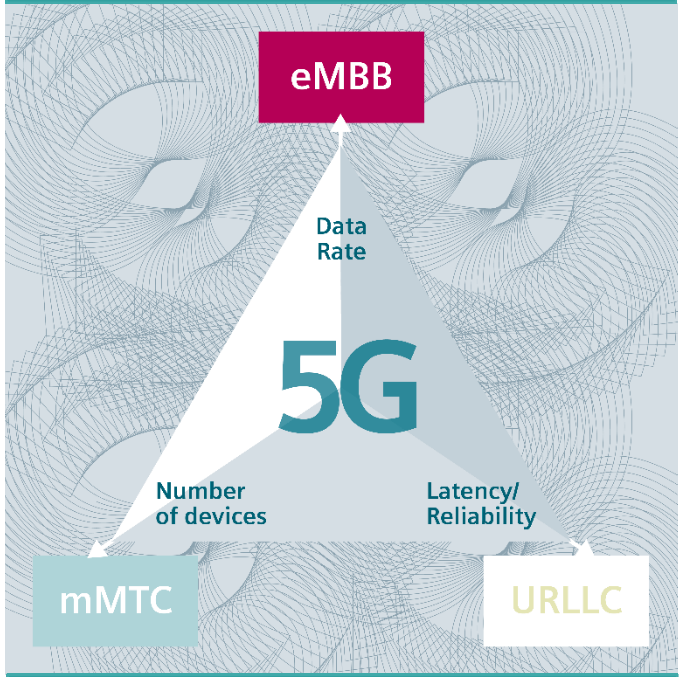


Ultra-Reliable Low Latency Communications (URLLC)

- Ultra-reliable for mission critical applications
- Low latency for real-time applications
- Suitable for industrial control

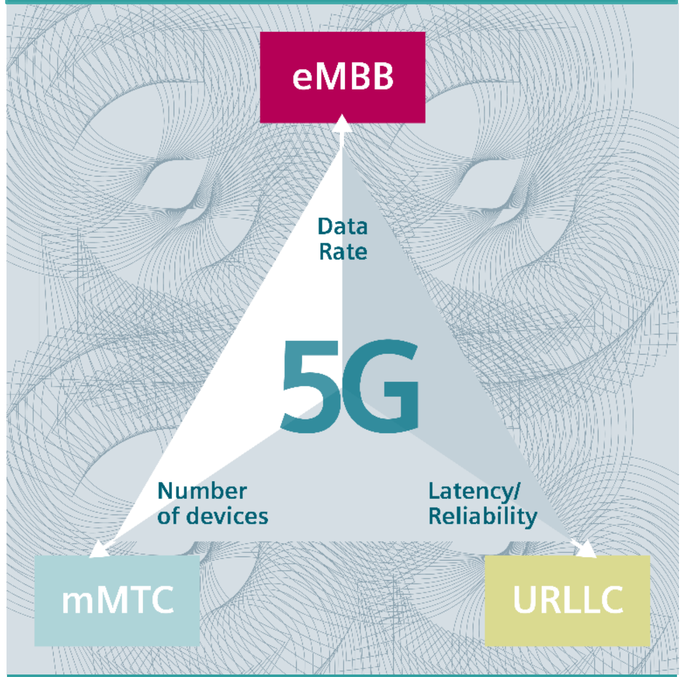
5G is divided into multiple releases and these include different features related to the main application scenarios

Release 15



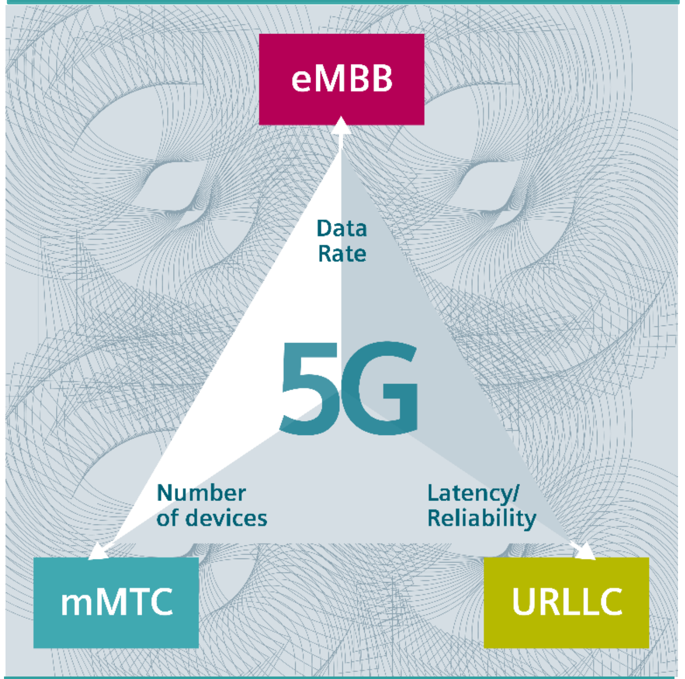
Available: December 2018

Release 16



Planned for: June 2020

Release 17



Planned for: January 2022

Improved security in 5G compared to previous standards

✓ The 5G system has been designed considering that it must support different use cases such as mission critical applications in industrial environments. These new use cases have been considered in the security implementation in 5G.

✓ 5G security has been enhanced and improved compared to previous mobile technologies (2G, 3G and 4G). In particular regarding the initial authentication.

✓ Multiple identifications methods are available, different use cases can work with different methods.

✓ Additionally any 5G mobile network can also be assessed by an assurance audit according to the protocol defined by the GSMA[1] and the 3GPP (NESAS)[2].

1 GSMA: GSM Association; **2** NESAS: Network Equipment Security Assurance Scheme

What needs to be done until we can say 5G is fit for industry?

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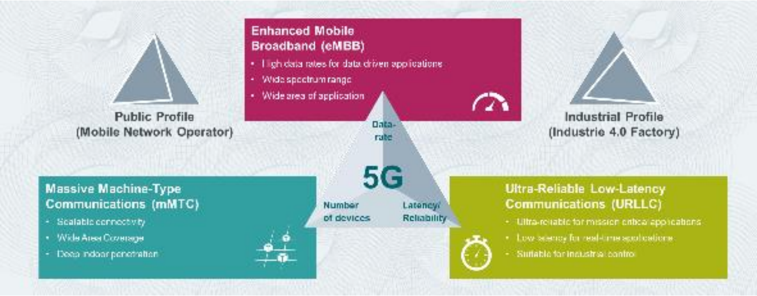
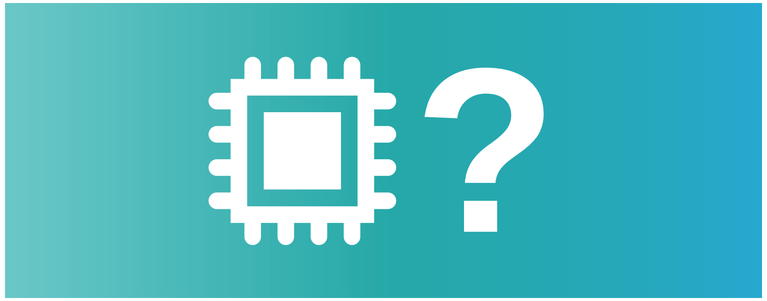
Release 16

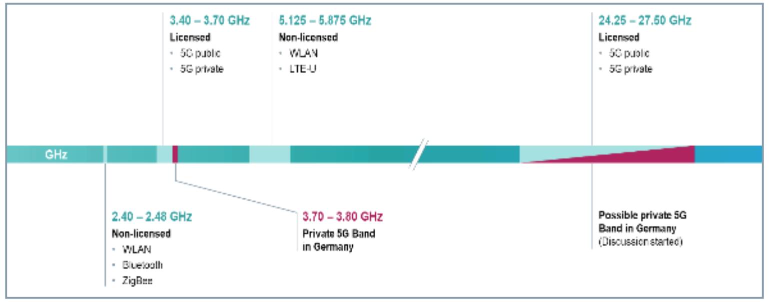


Enhanced Mobile Broadband (eMBB)
High data rates for data driven applications
Wide spectrum range
Wide area of application
Public Profile (Mobile Network Operator)
Industrial Profile (Industrie 4.0 Factory)
Data-rate
5G
Number of devices
Latency/ Reliability
Massive Machine-Type Communications (mMTC)
Scalable connectivity
Wide Area Coverage
Deep indoor penetration
Ultra-Reliable Low-Latency Communications (URLLC)
Ultra-reliable for mission critical applications
Low latency for real-time applications
Suitable for industrial control

Hardware-Availability



Local/Industrial Frequency

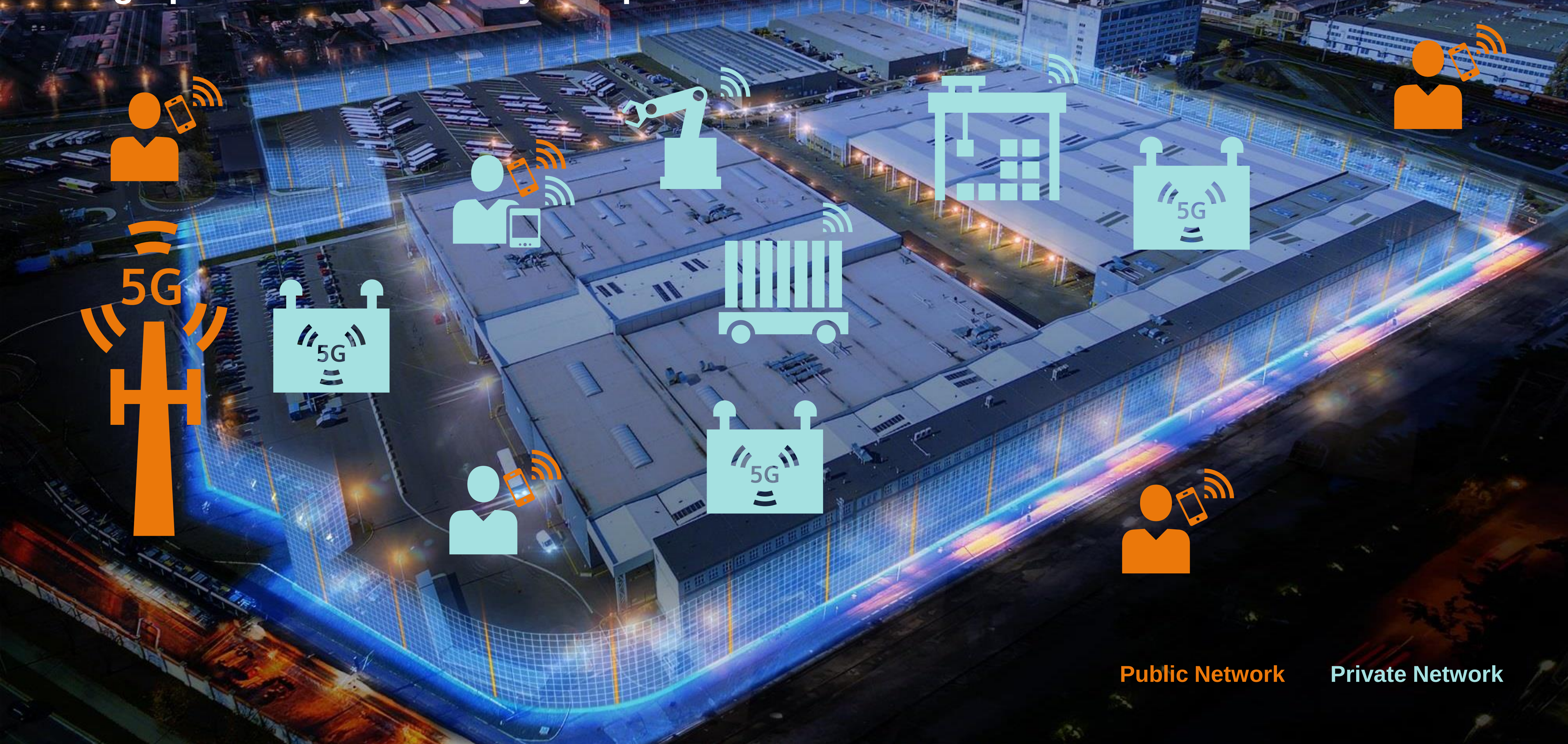


+ Support industrial protocols

- PROFINET
- OPC UA
- Engineering

Industrial 5G!

Coexistence of public and private 5G networks to enable high-performance industry-campus networks



Possible 5G deployment scenarios

Public deployment[1]

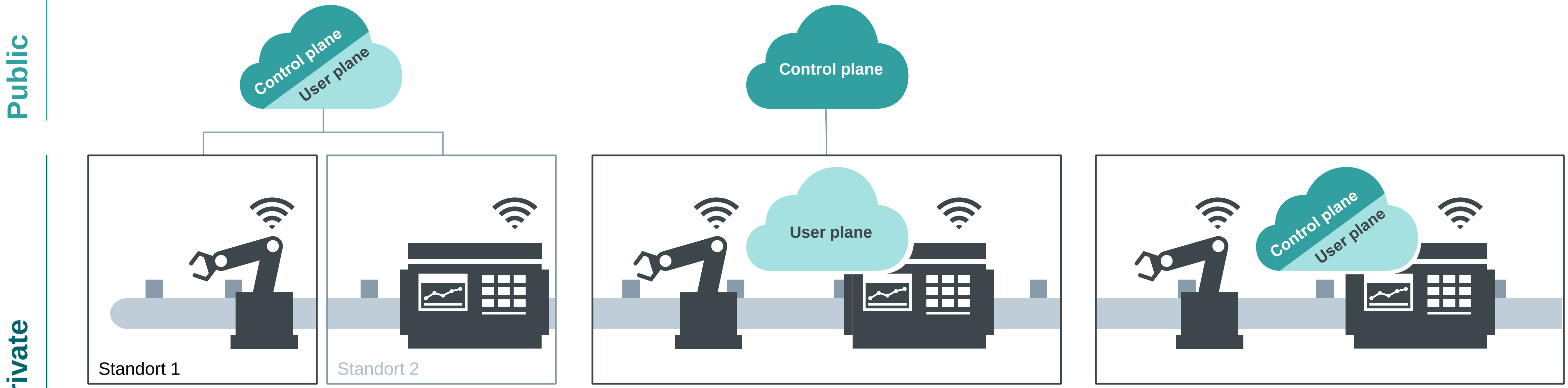
Flexibility:	Very limited, depends on provider
Privacy:	Insufficient w/o additional precaution
QoS:	Not guaranteed
Network:	Depends on implementation of provider

Semi public deployment[1]

Flexibility:	Limited, depends on provider
Privacy:	UEs are visible outside
QoS:	Best effort
Network:	This scenario is 1 possible way of slicing, depends on provider

Local, private deployment[1]

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



Used frequency: 3.4 … 3.7 GHz (Public)

Used frequency: 3.4 … 3.7 GHz (Public)

Used frequency: 3.7 … 3.8 GHz (Private)

1 Depends on the implementation of the provider, most likely variants are shown

Private networks bring additional security to wireless networks compared to public deployments

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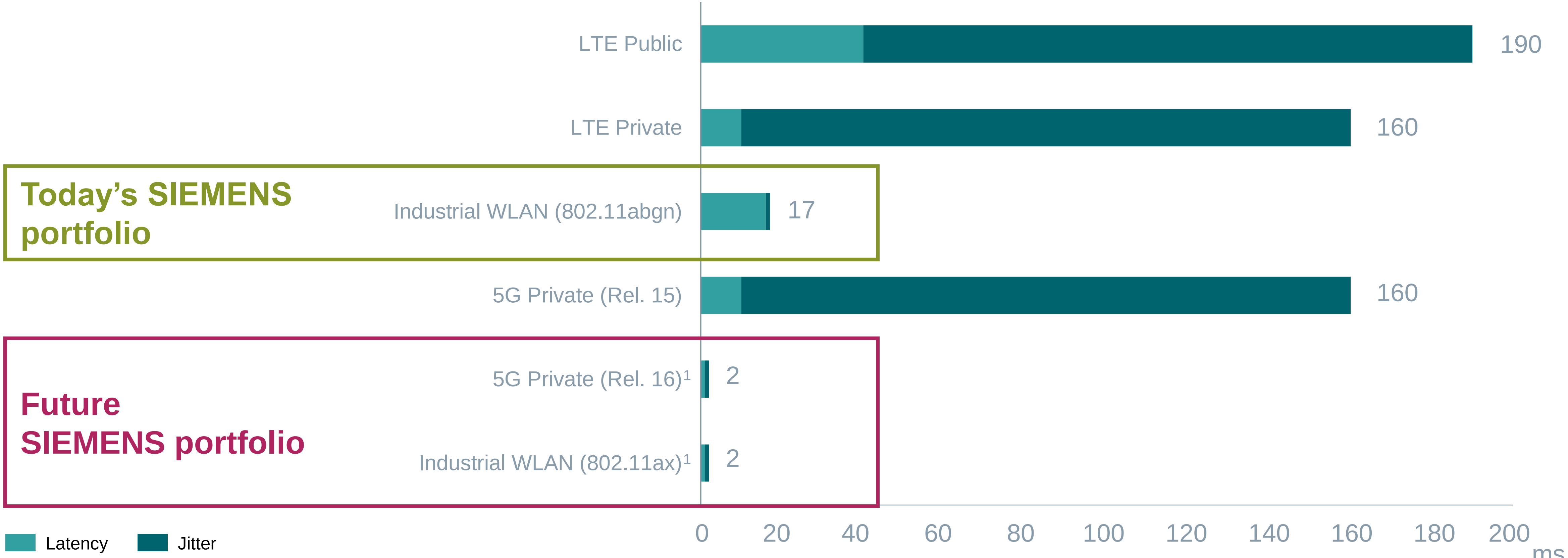
Private networks – A private network provides a higher security level “compared to a public one”

- Limited geographical area deployment, any attack must be conducted locally
- There is no data privacy risk since the data will not leave the premises
- The network owner has direct control on the equipment installed and the security measures to be applied
- Network slicing allows isolation of parts of the network which need a different level of security
- The complete OT network is secured with “defense in depth” approach throughout all levels

A private network is the best viable solution to provide such a **high level of security**

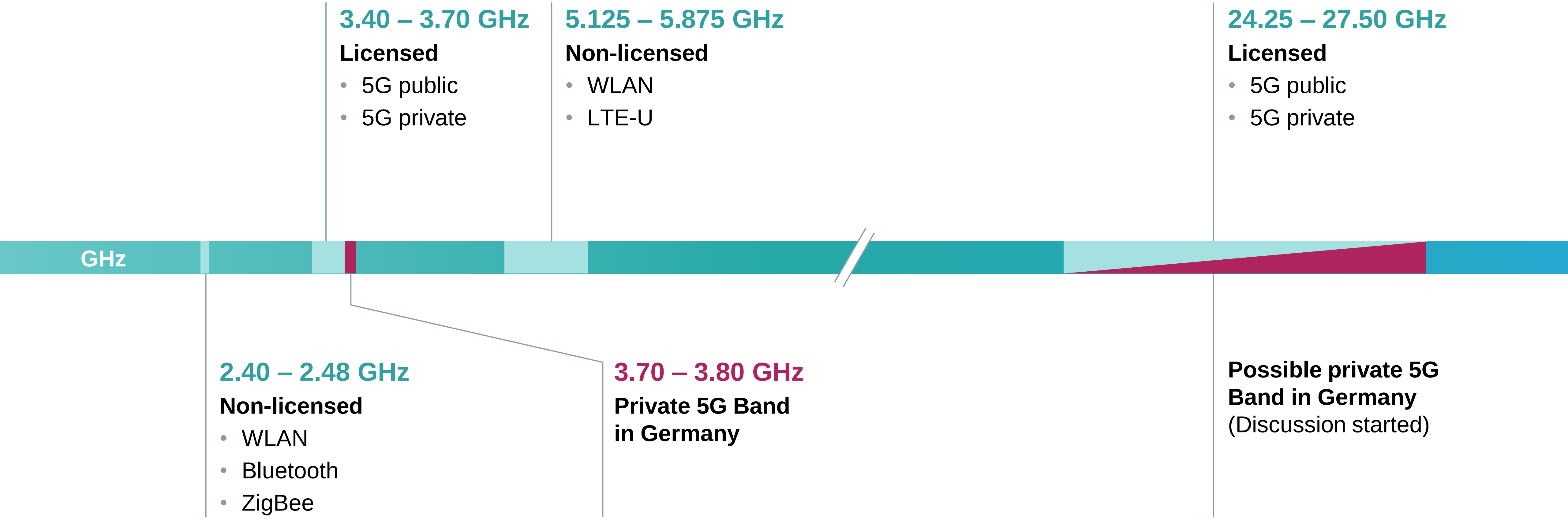
No real-time with cycle times of 160 ms – 5G release 16 makes the difference!

**The most important factor in industrial networks is the latency and its possible jitter.
Typical latency and jitter for wireless network technologies, results in the following best-case cycle times:**



1 Based on expectations of the current standard

Dedicated spectrum is necessary in industry and brings a competitive edge. Is Germany an example for other countries?



2.40 – 2.48 GHz

Non-licensed

- WLAN
- Bluetooth
- ZigBee

3.40 – 3.70 GHz

Licensed

- 5G public
- 5G private

3.70 – 3.80 GHz

Private 5G Band in Germany

5.125 – 5.875 GHz

Non-licensed

- WLAN
- LTE-U

24.25 – 27.50 GHz

Licensed

- 5G public
- 5G private

Possible private 5G Band in Germany
(Discussion started)

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Thanks for your attention!