

# 5G for FWA & private industrial networks

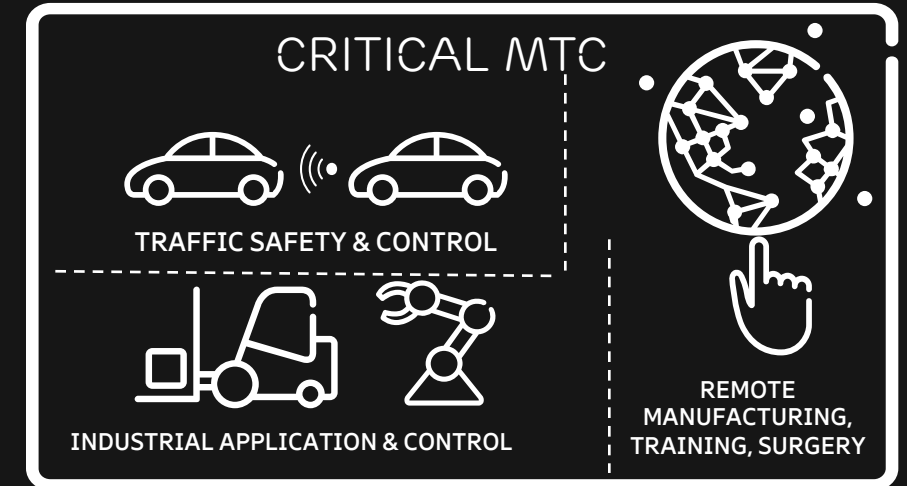
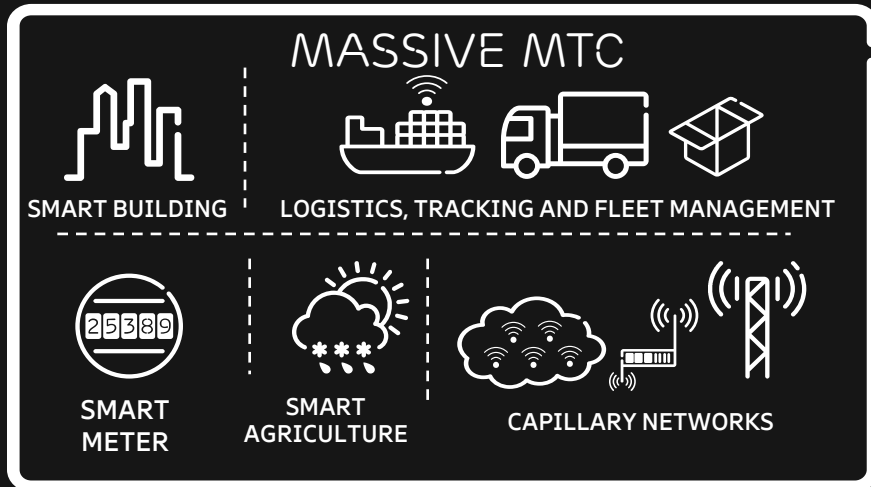


Dr. Matus Turcsany  
Chief Technology Officer  
Czech, Hungary, Slovakia, Slovenia

5G is a state of mind and  
an enabler for non-traditional  
business models.



# 5G – use case driven technology



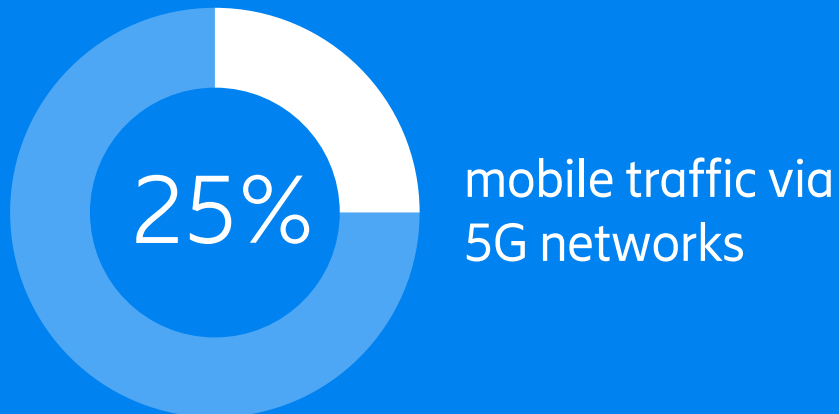
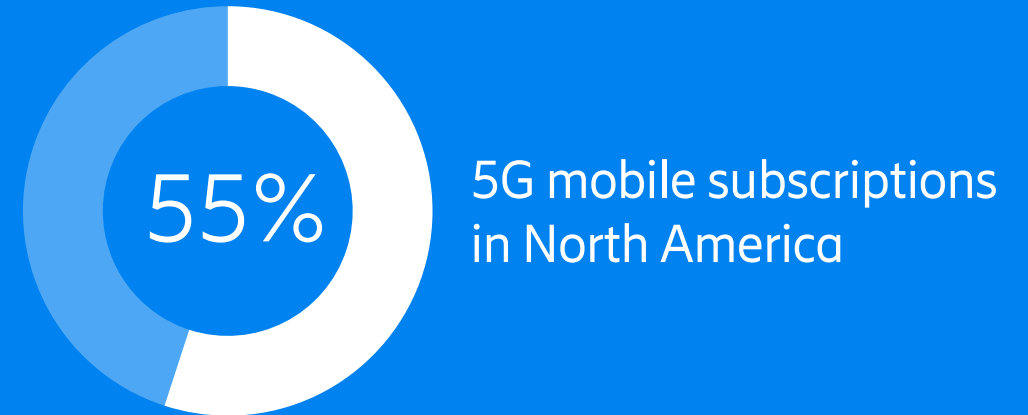
LOW COST, LOW ENERGY  
SMALL DATA VOLUMES  
MASSIVE NUMBERS

## ENHANCED BROADBAND



ULTRA RELIABLE  
VERY LOW LATENCY  
VERY HIGH AVAILABILITY

# Ericsson Mobility Report: 5G insights by 2024



# Ericsson 5G momentum

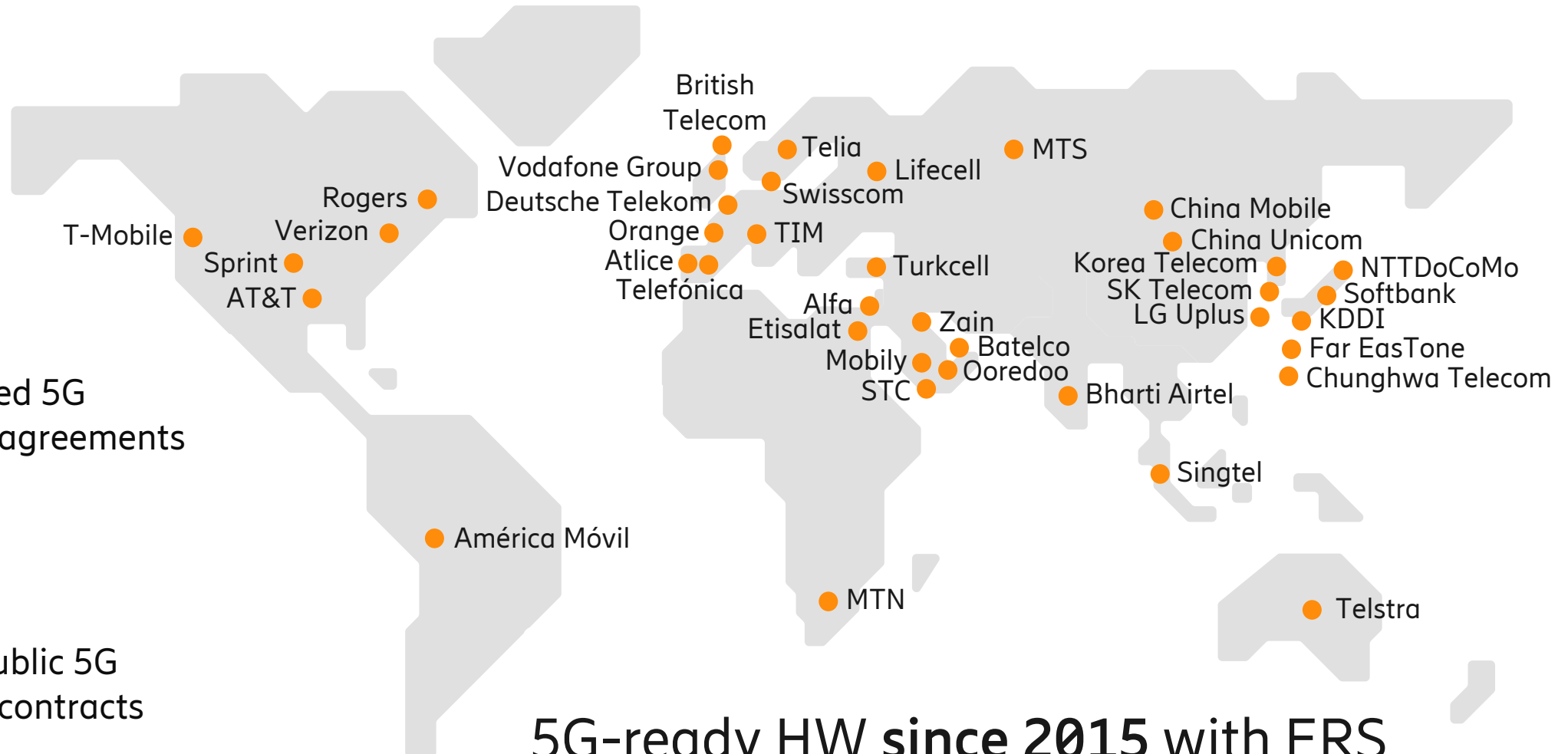


43

Announced 5G  
operator agreements

18

Signed public 5G  
operator contracts



5G-ready HW since 2015 with ERS  
3 million 5G-ready radios shipped

# Ericsson world's first 3GPP compliant 5G call: 600MHz, 3.5GHz, 39GHz



## Low-band first call

- December 2018 in lab, 7<sup>th</sup> January with TMO
- 10MHz call on n71, 20MHz band 1 LTE anchor
- Using 4449 + commercial SW track

## Mid-band first call

- Jun 2018 in lab, 16<sup>th</sup> July with Telstra
- 20MHz call on n78, 20MHz band 1 LTE anchor
- Using 6488 + commercial SW track

## High-Band first call

- Sept 2018 with AT&T, Verizon and T-Mobile US
- 100MHz call on n260, 20MHz B66 LTE anchor
- Using commercial 5331 + commercial SW track

NEWS

## T-Mobile, Ericsson and Intel Complete World's First 5G Call on 600 MHz

January 07, 2019

[TMO 5G first call](#)

Achievement marks another milestone on the road to nationwide 5G



[Telstra 5G first call](#)



# Strong 5G momentum around the world



- **North America**

- 2018 launches on mmW
- Low-band FDD NR early 2019
- Mobile broadband and FWA

- **Europe**

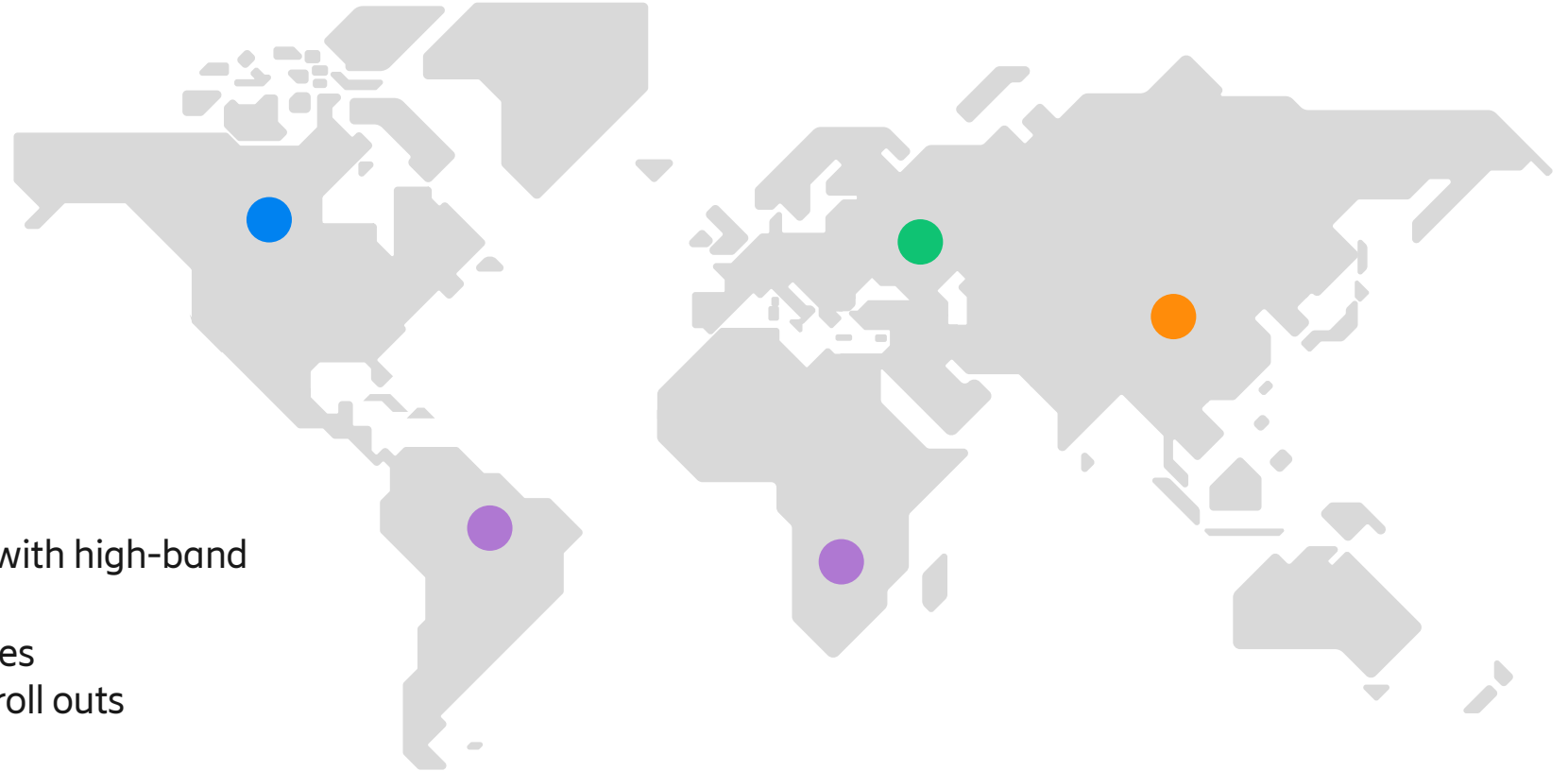
- Initial focus on mid-band
- Focus on industry use-cases
- Low-band NR for coverage
- High-band as capacity booster

- **Asia**

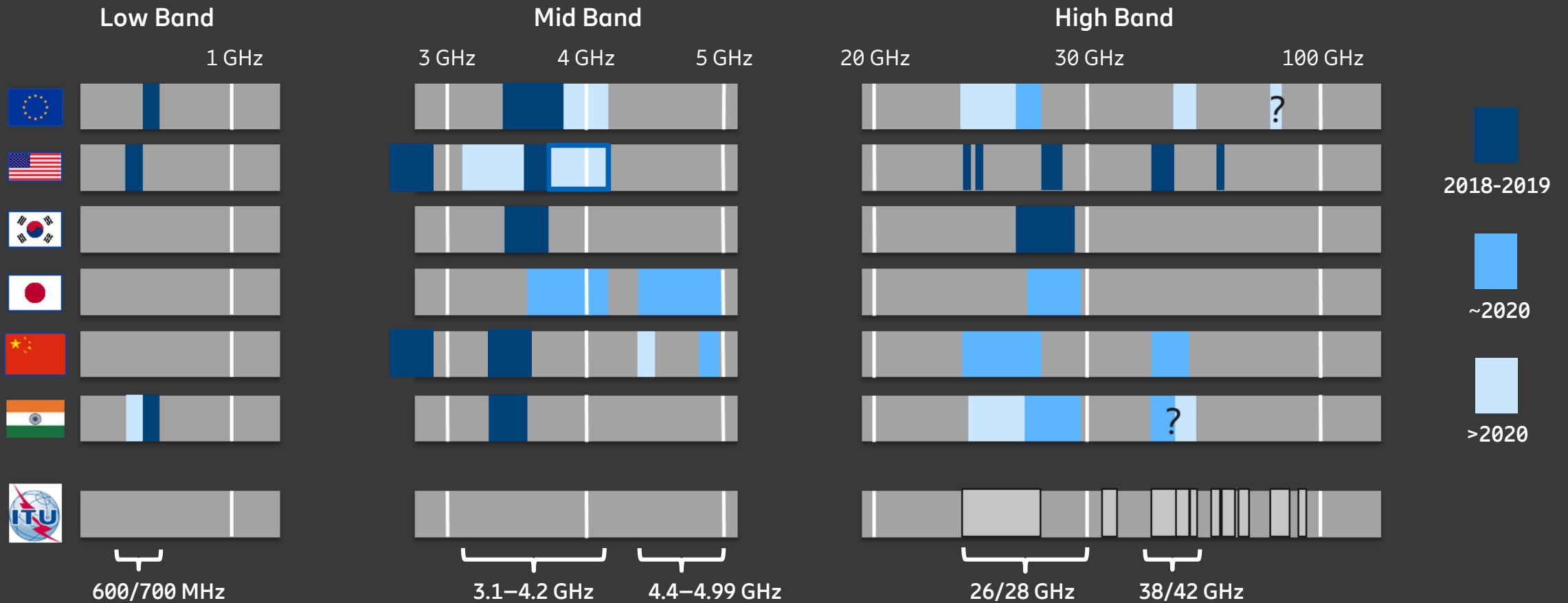
- Initial focus generally on mid-band, with high-band as second wave
- Korea early mover with 2019 launches
- China and Japan driving large scale roll outs

- **South America and Africa**

- Deploying 5G at later date



# 5G frequency bands





# Synchronization in the 3-4 GHz range



It's TDD!

Therefore time & phase synch is required.

Also, TDD patterns must be aligned between operators.

And co-existence with LTE/WiMAX has to be ensured.

If not, huge guard-bands are required ( $>20\%$  of BW).

Market specific filters are not an option for Advanced Antenna Systems.

# A bit of history: 5G origin



Initial (2015) 3GPP goal for 1<sup>st</sup> IMT-2020 specs: December 2019

WRC15: mixed feelings, no support for 6-20 GHz 5G

First 3GPP time plan acceleration in June 2016, second acceleration in March 2017

The outcome for R15:

- Early drop: March 2018

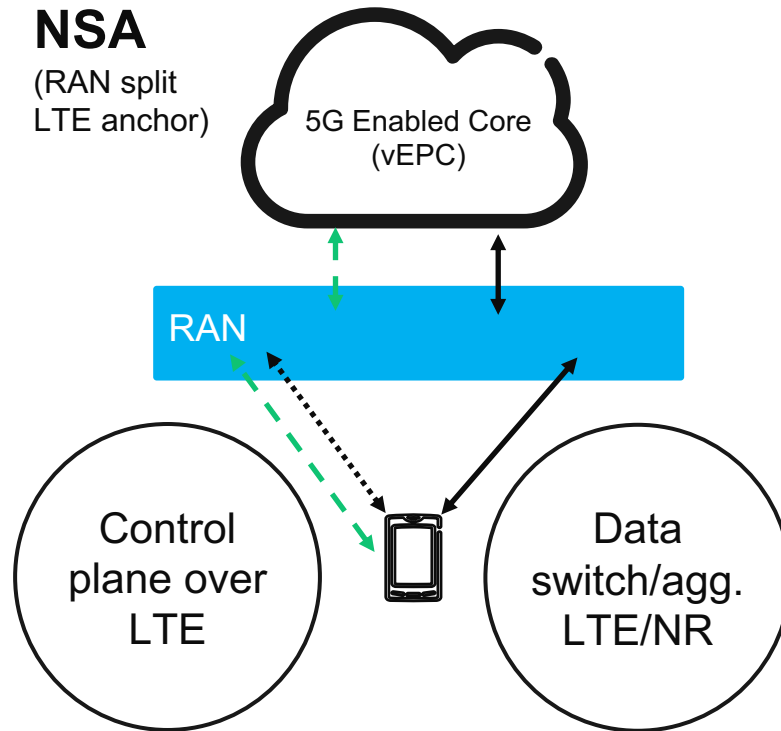
- Main drop: September 2018 (stable from December 2018)

- + non-compatible early drop changes

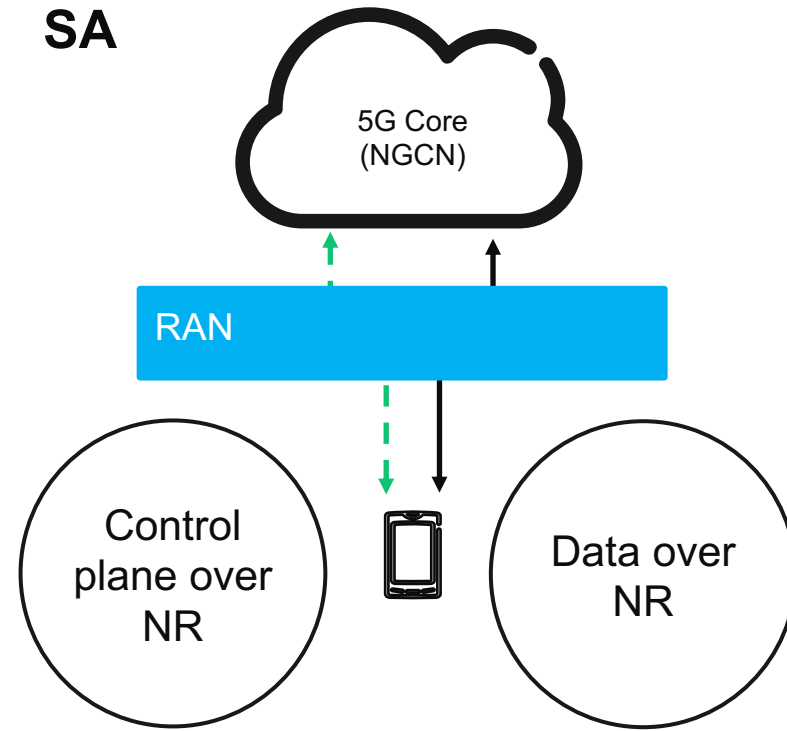
- Late drop: June 2019

Release 16 to be ready in June 2020

# NSA & SA



Tight interworking with LTE  
Evolved CN  
→ Fastest TTM



“Independent” overlay  
Totally new CN architecture  
→ Highest performance potential

↔ Data  
↔ Ctrl

Use cases:



eMBB

FWA

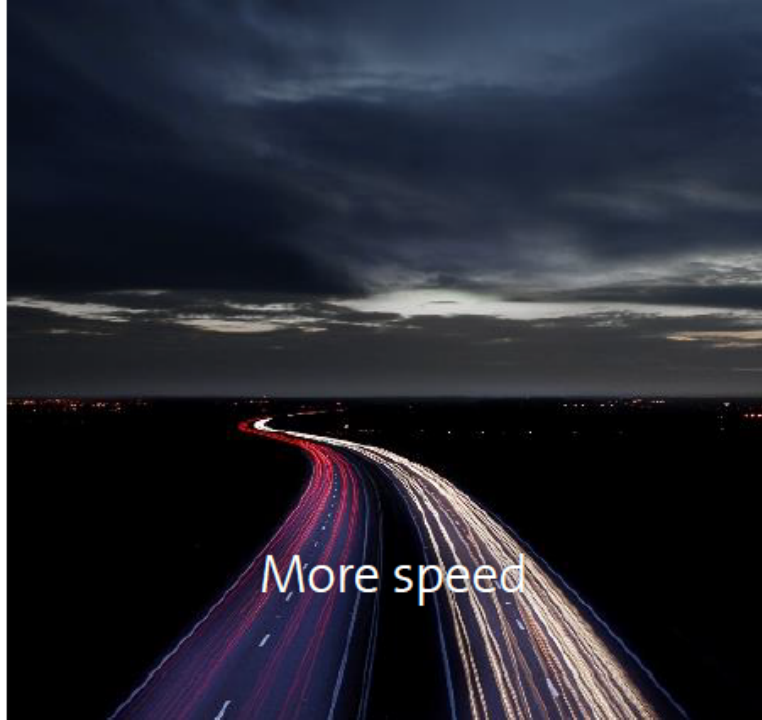
Private networks (Campus)



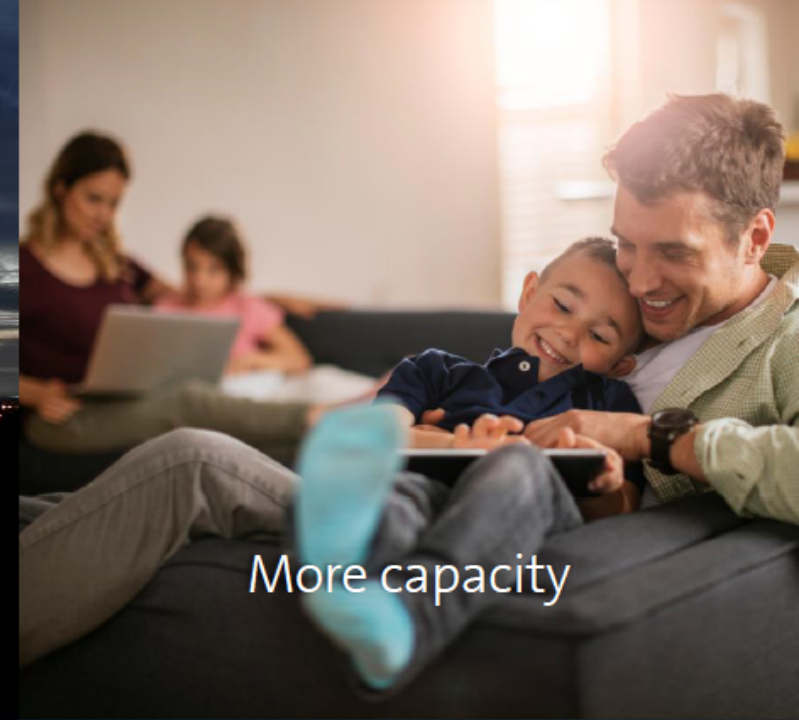
**That's why we are  
making the best  
net even better**

Swisscom's 5G launch  
Powered by Ericsson

Wednesday, April 10<sup>th</sup>



More speed



More capacity



Short response times



New opportunities

# Verizon first 5G FWA with “5G Home”



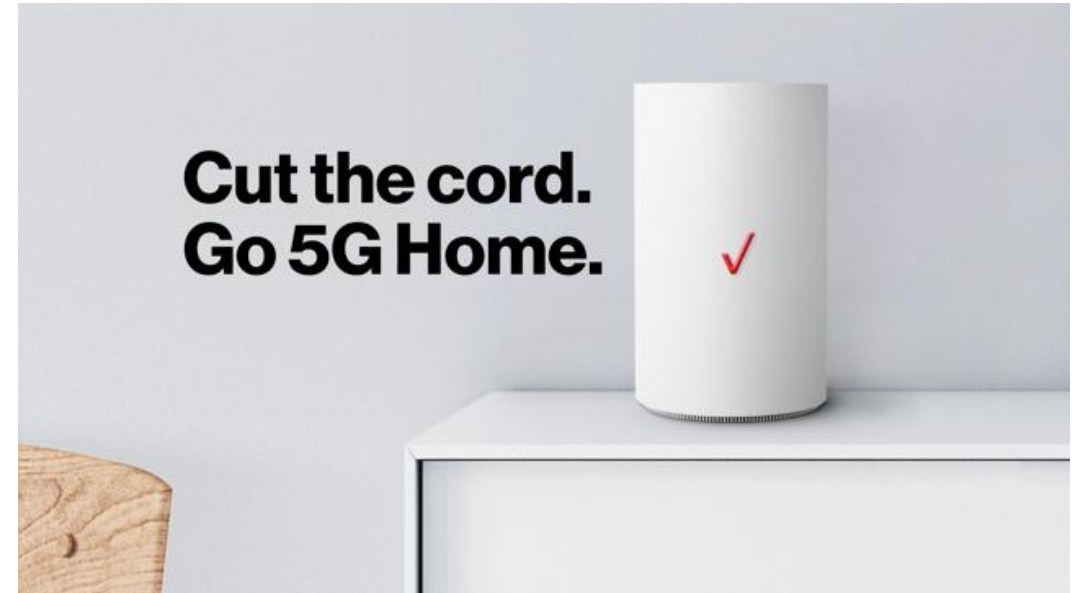
Verizon’s 5G broadband internet service is world’s first commercial 5G launch

\$70/month (\$50 for existing Verizon customers), typical speeds 300 Mbps , 1 Gbps in some areas

Launch on October 1<sup>st</sup> , no data caps, no minimum contract;

Initial markets are Houston, Indianapolis, Los Angeles and Sacramento

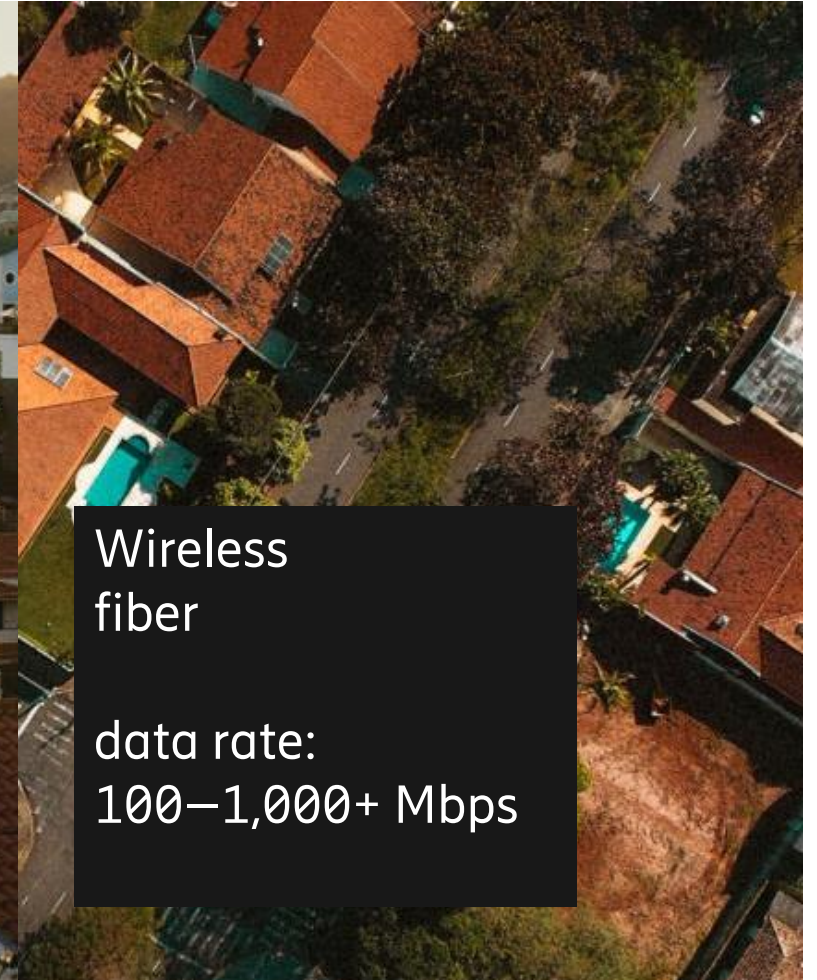
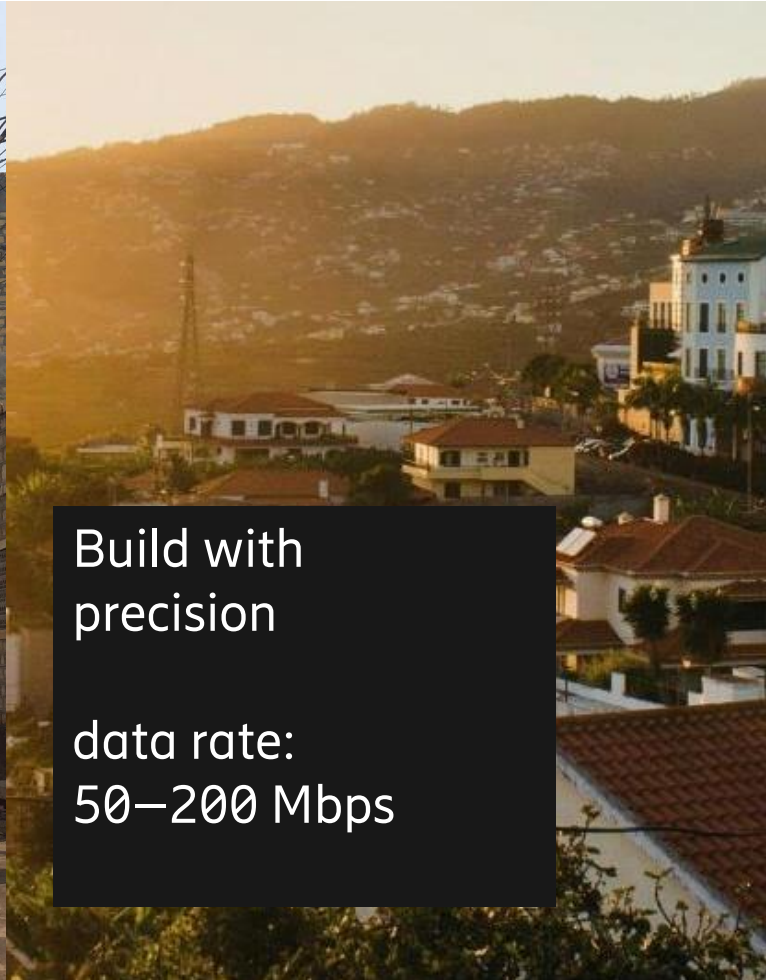
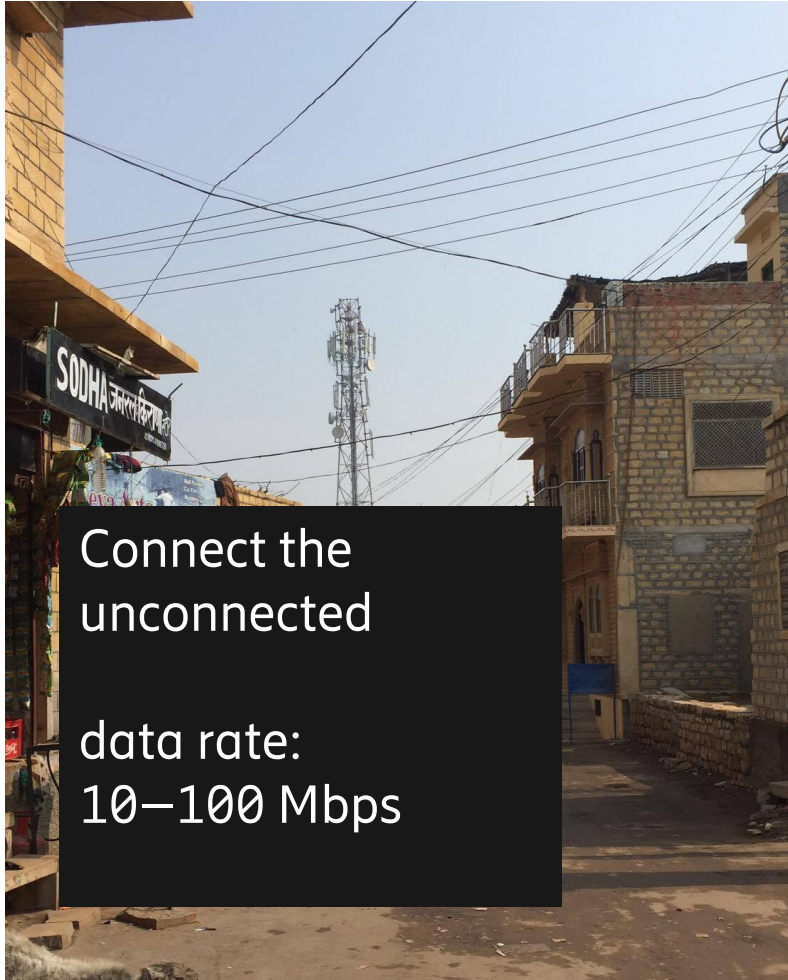
The service targets “cord cutters” and cable companies



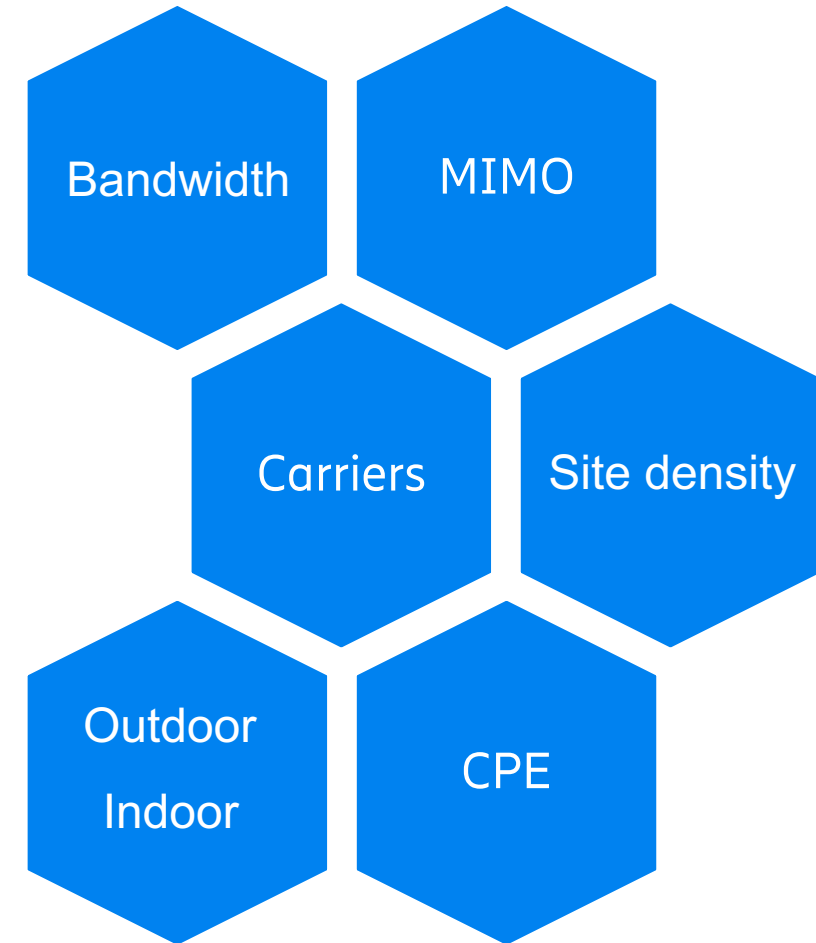
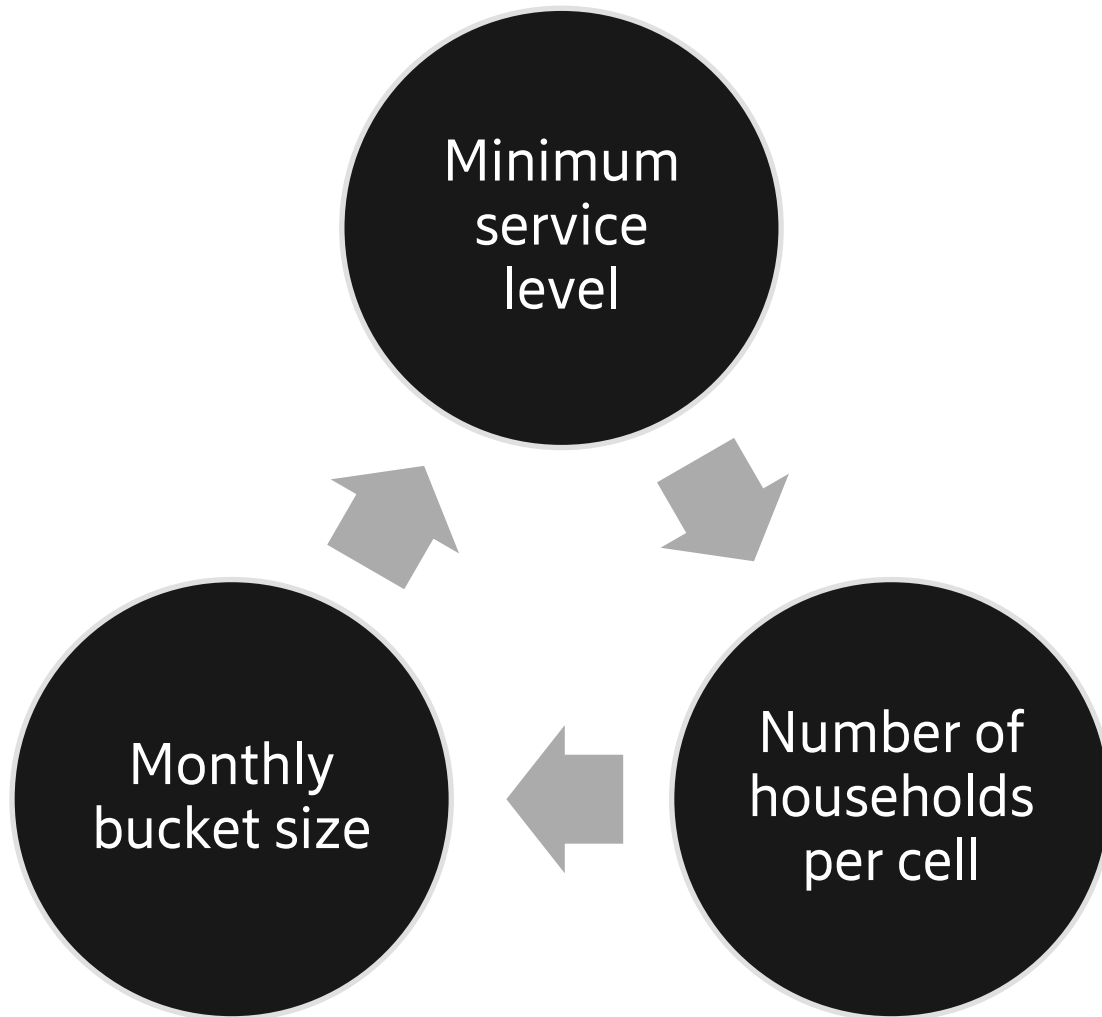
Verizon 5G Home comes with free white glove installation and equipment, professional installation and set-up of all Wi-Fi devices, as well as a free router and router upgrades as they become available in 2019. Some users to get free Chromecast or Apple TV 4K, and 3 months YouTube TV



# FWA: 3 segments

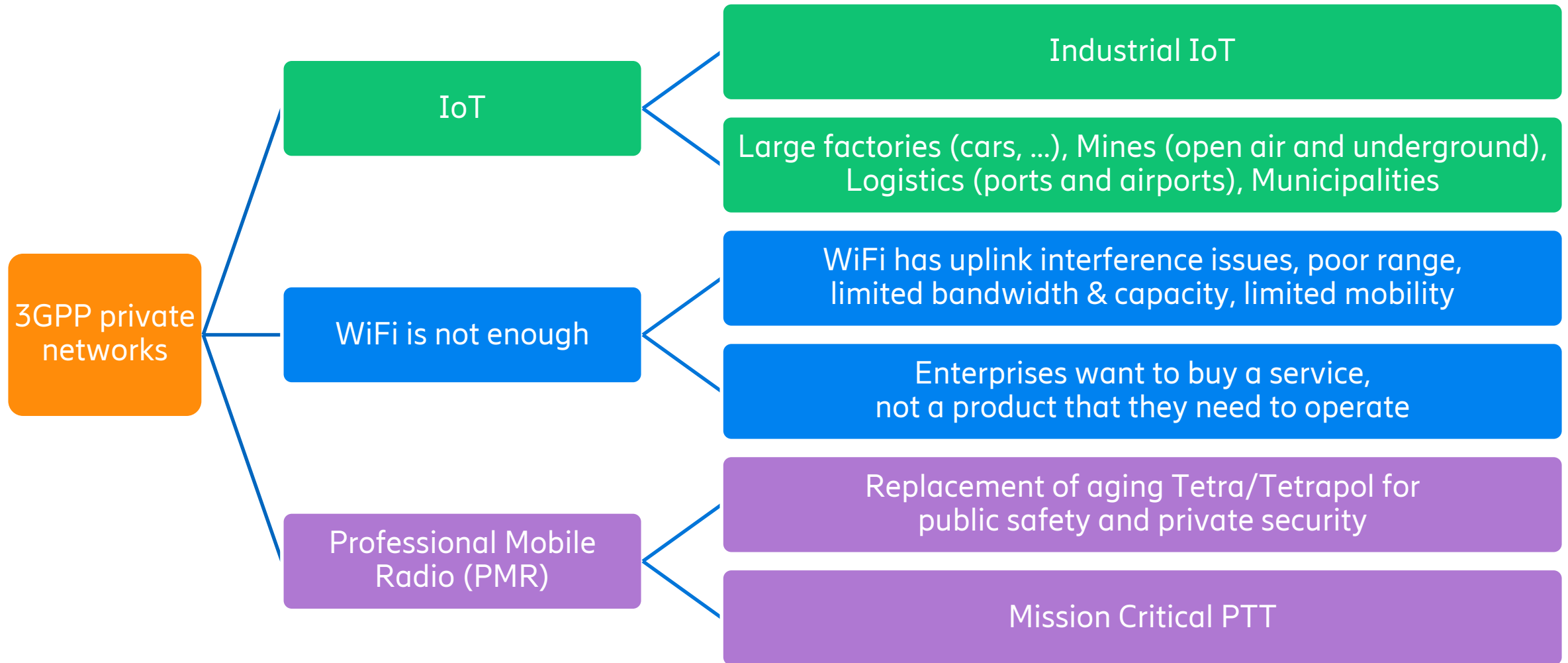


# FWA: a game of 3 variables

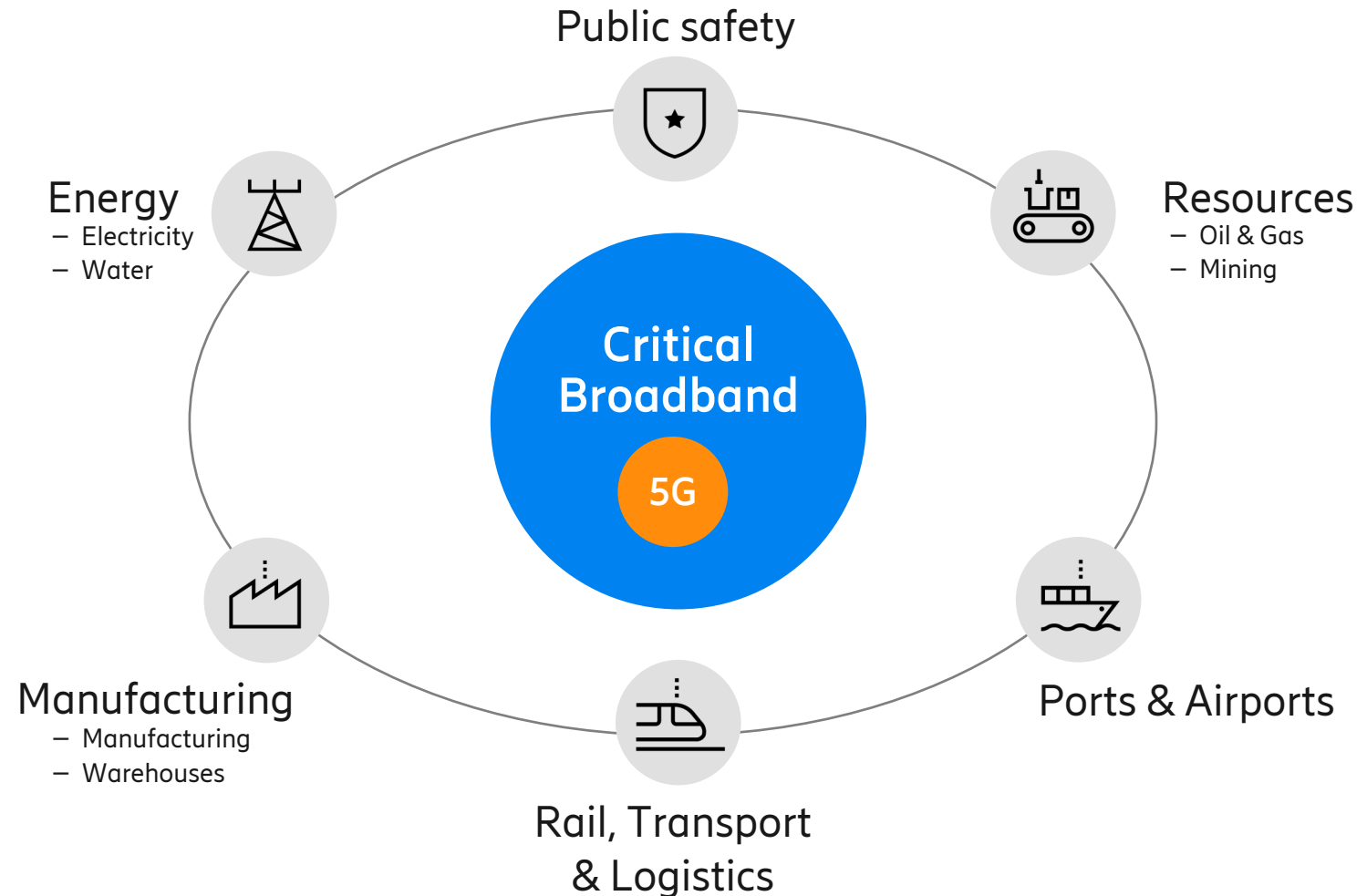




# Reasons for going to 3GPP-based networks for industrial use-cases



# Critical industries require critical broadband



It's no longer a question of 'if' critical broadband services are needed, but rather 'when' and 'how'

# Spectrum options for industries



1

## SLAs provided by MNOs

- Short term vs long term expectations
- SLAs fulfillment: i.e. production stop or safety issues

2

## Lease Spectrum

- Not an established market
- New rules & business case
- No benefit from MNO knowledge

3

## New regulated licenses

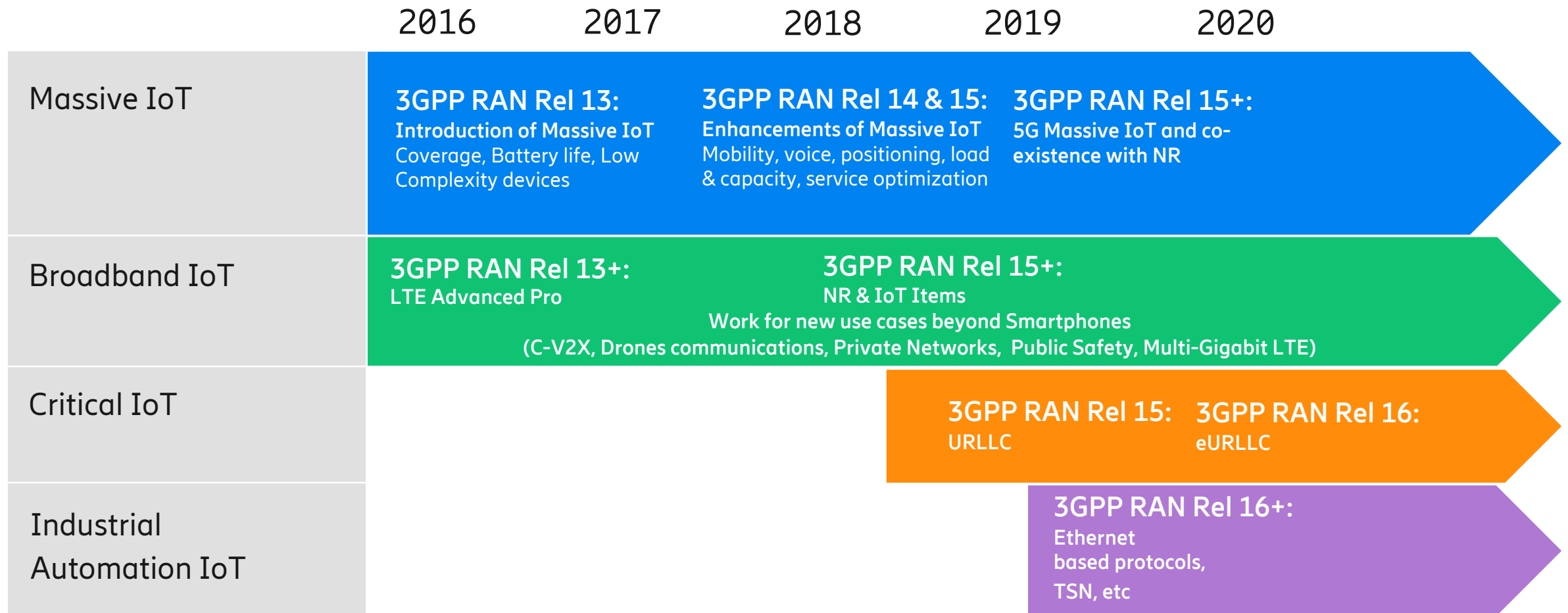
- Driven by e.g. "5G ACIA". Getting traction in e.g. EU

4

## Unlicensed Spectrum

- Useful in many applications, but it can't offer full URLLC
- Risk of costly outages due to interference

# 3GPP and Cellular IoT – proven standards



# Selected references



## Public Safety



### FirstNet with AT&T

- Ericsson has been a vendor of AT&T for many years and will be a supplier in their efforts to build out the first responder network
- FirstNet covers 50 states, 5 US territories & Washington D.C.
- 2 x 10 MHz for Public Safety in 700 MHz (B14)

## Power Utility



### Southern Linc Wireless

- Regional carrier in South Eastern USA providing reliable wireless communications service
- Replacing the existing LMR (iDEN) network by LTE
- Delivery of eMBMS for Mission Critical Push-To-Talk

## Mining



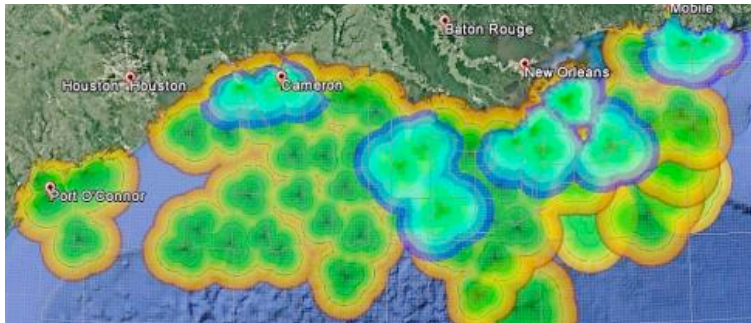
### Roy Hill mine

- Ericsson & Telstra deploy LTE network in Australian mine
- Enabling smart mining-related tasks for open pits or underground areas
- Flexible and efficient coverage
- Health & ambient monitoring, remote operation of mining machinery

# Selected references



## Oil & Gas



### Tampnet, Gulf of Mexico

- LTE-based MBB services to the offshore oil & gas industry
- Plans to have 60+ base stations operational by the end of 2018 covering 98% of all manned offshore assets in the Gulf area
- Transport based on microwave and redundant fiber

## Ports



### Rotterdam World Gateway

- First automated container terminals in the world
- Highest security, quality, performance and availability standards
- Data connectivity for the automated guided vehicles (AGV's), terminal trucks and tablets

## Manufacturing



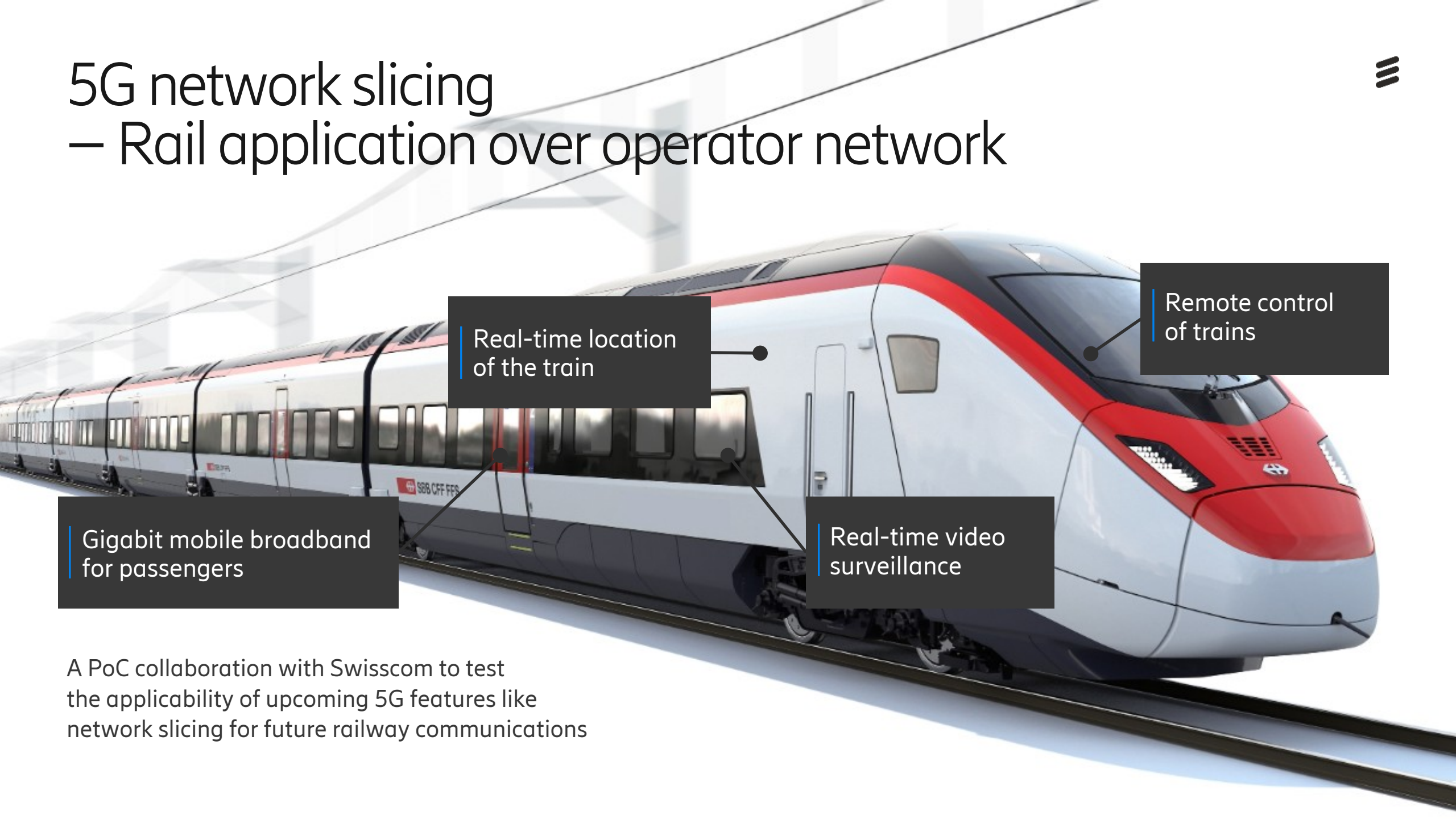
### Industrie 4.0 Reference Factory, FIR-RWTH Aachen

- Connected to Ericsson's 5G E2E Trial network
- Environment to test the digital transformation of industries
- Includes ULL radio and PLC in the cloud



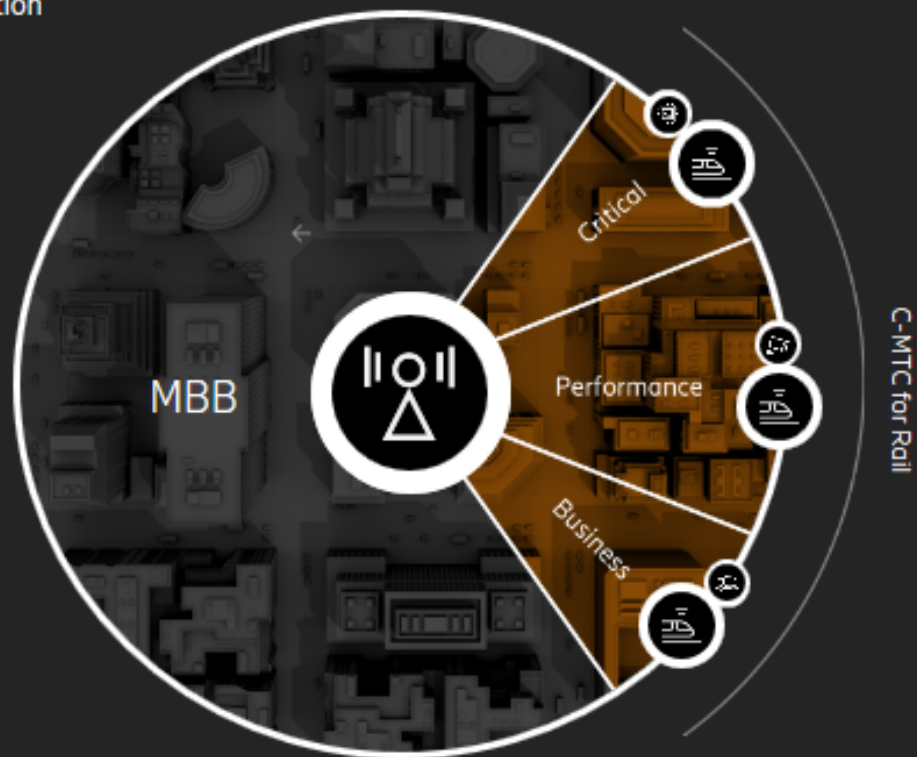
# 5G network slicing

- Rail application over operator network

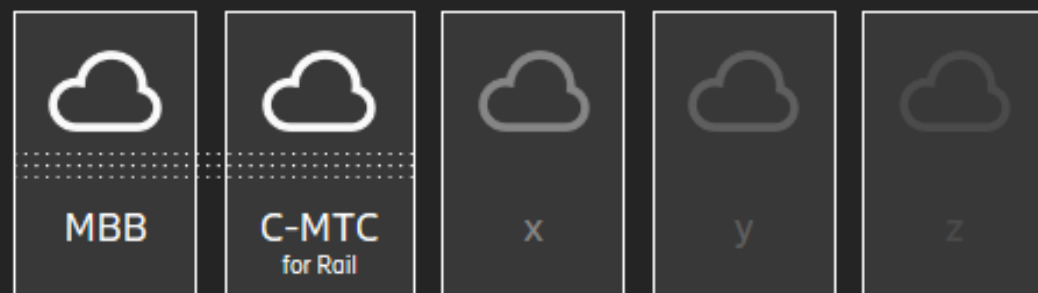


A PoC collaboration with Swisscom to test the applicability of upcoming 5G features like network slicing for future railway communications

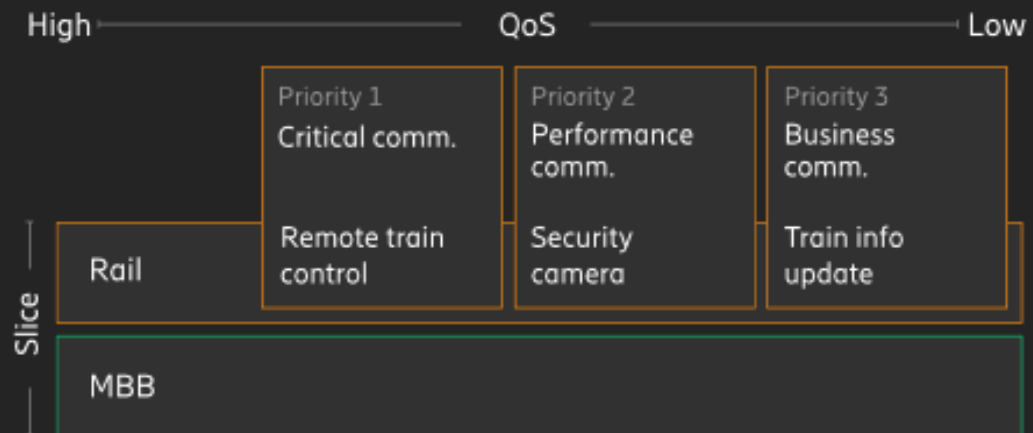
## Base station



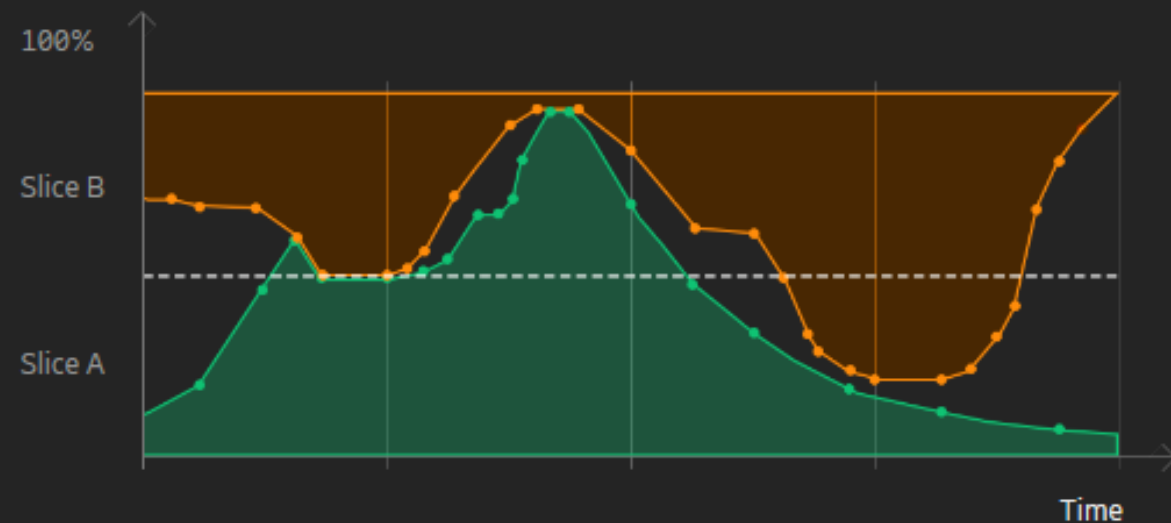
## Core network



## QoS configuration



## Radio resource partitioning





# Flexible robotics: 5G-enabled factory in Comau

