Use Cases für 5G

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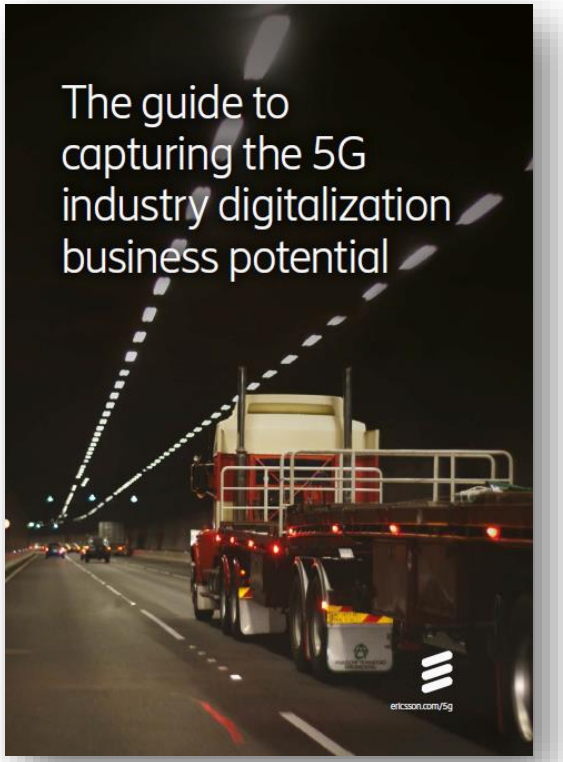
Agenda

1. 5G Markt Überblick
2. Use Cases für 5G
3. Umsetzung der Use Cases für 5G
4. Ausblick

Capturing the 5G industry digitalization business potential

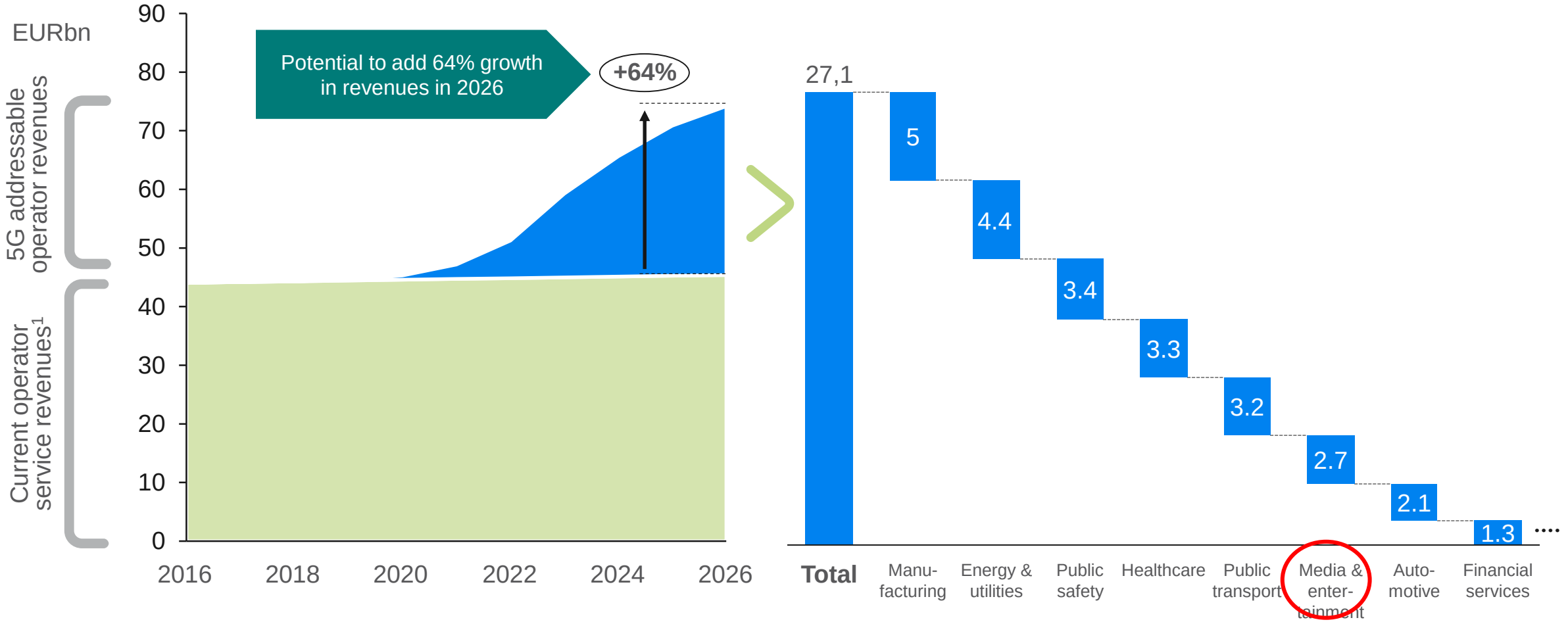
- Ericsson has examined over 200 5G-enabled use cases across 10 industries.
- Clustering analysis resulted in 9 use case clusters, covering almost 90 percent of the addressable 5G business potential opportunity.
- The nine clusters enable shared investments and resource allocation across a larger revenue pool.
- This approach has the additional benefit of increased scalability across industries.

Next phase of 5G Business Potential with focus on how to capture based on



Role in the ecosystem, business models, technical requirements, business case…

Additional operator addressable 5G revenue potential



Source: Ericsson and Arthur D. Little; Major strategic choices ahead of TelCos: Reconfiguring for value, Arthur D. Little; IDC; Gartner

Note: 1) Excludes revenues from equipment's

5G FOR GERMANY

Nationaler IT Gipfel — Fokusgruppe 5G

Sub-group of “Digitale Netze und Mobilität” of German national IT-Summit to succeed with 5G in Germany

vodafone — Gigabitgesellschaft

Driving 5G Research as a essential technology part to enable the Gigabit-Society

5G Lab GERMANY

Understanding and drive the holistic requirements and solutions of 5G with partners

TECHNISCHE UNIVERSITÄT DRESDEN

Innovation Lab 5G:Haus

Collaborative 5G development in DT European research facilities

RWTH AACHEN CAMPUS SMART LOGISTIK — CENTER CONNECTED INDUSTRY

FIR (RWTH Aachen) eröffnet im Cluster Smart Logistik auf dem RWTH Campus das neue Center Connected Industry

5G for Germany
Ericsson Programm

Collaborative 5G Research- and Innovation project to strengthen the European economy

ERICSSON

Ericsson 5G Engagement Lab in Aachen

Strengthening European competitiveness in 5G together with academic, research and industry partners

Delivering industry pilots powered by local 5G trial networks to experiment, learn, and industrialize new use cases across industries

Manufacturing 5G pilots

- **KOI:** Coordinated Communication
- **5GANG:** 5G Applied in Industries
- **FastRobotics:** URLLC concept
- **5G-BLISK:** 5GNR Adaptive Production
- **5G-COS:** Collaborative Services & Augmented reality
- **5G-PLC:** Profinet via 5G/NR
- **5Grid:** Smart grid control

Automotive and Rail 5G pilots

- **5G-ConnectedMobility:** Test field at the A9 focusing on V2X and Railway
- **CONVEX:** V2V, V2I based on LTE
- **5GNetMobil:** Tactile connected driving and platooning
- **5GCAR:** Automotive V2X lane merge, see through testing

Example of partners

SICK	Stromnetz Berlin	Deutsche Telekom
Bosch	TU-Dresden	Swisscom
KUKA	RWTH Aachen	Qualcomm
Siemens	Schildknecht	PSI Logistics
Fraunhofer	BMBF	
ITelligence		

VW	PSA	Telefónica
Scania	5GLab Germany	TU-Dresden
Audi	Deutsche Telekom	BNetzA
BMW	Vodafone	BMVI
Deutsche Bahn		Qualcomm
bast		

Association partnerships

5GAA Automotive Association · CENTER CONNECTED INDUSTRY · 5GACIA 5G Alliance for Connected Industries and Automation · 5G:haus · 5G Lab GERMANY · 5G GRONINGEN · 5G for Switzerland

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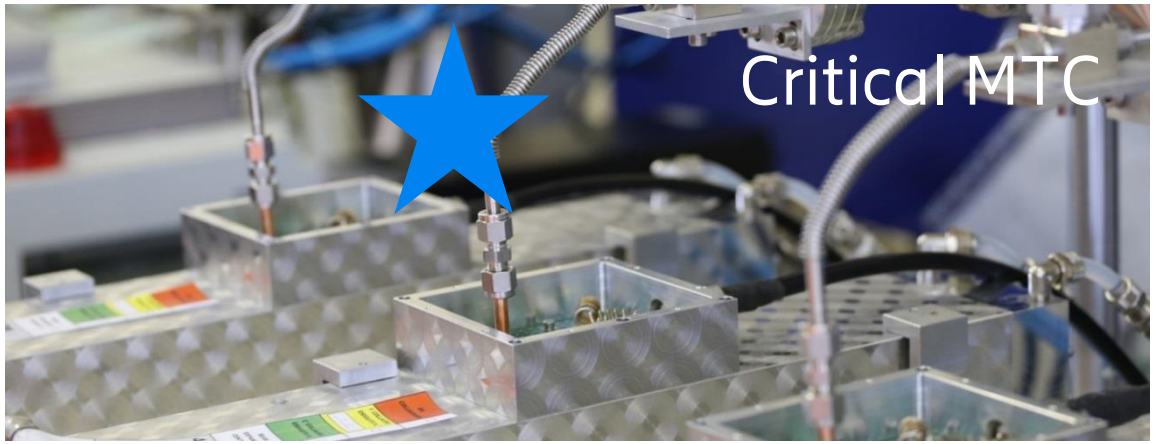
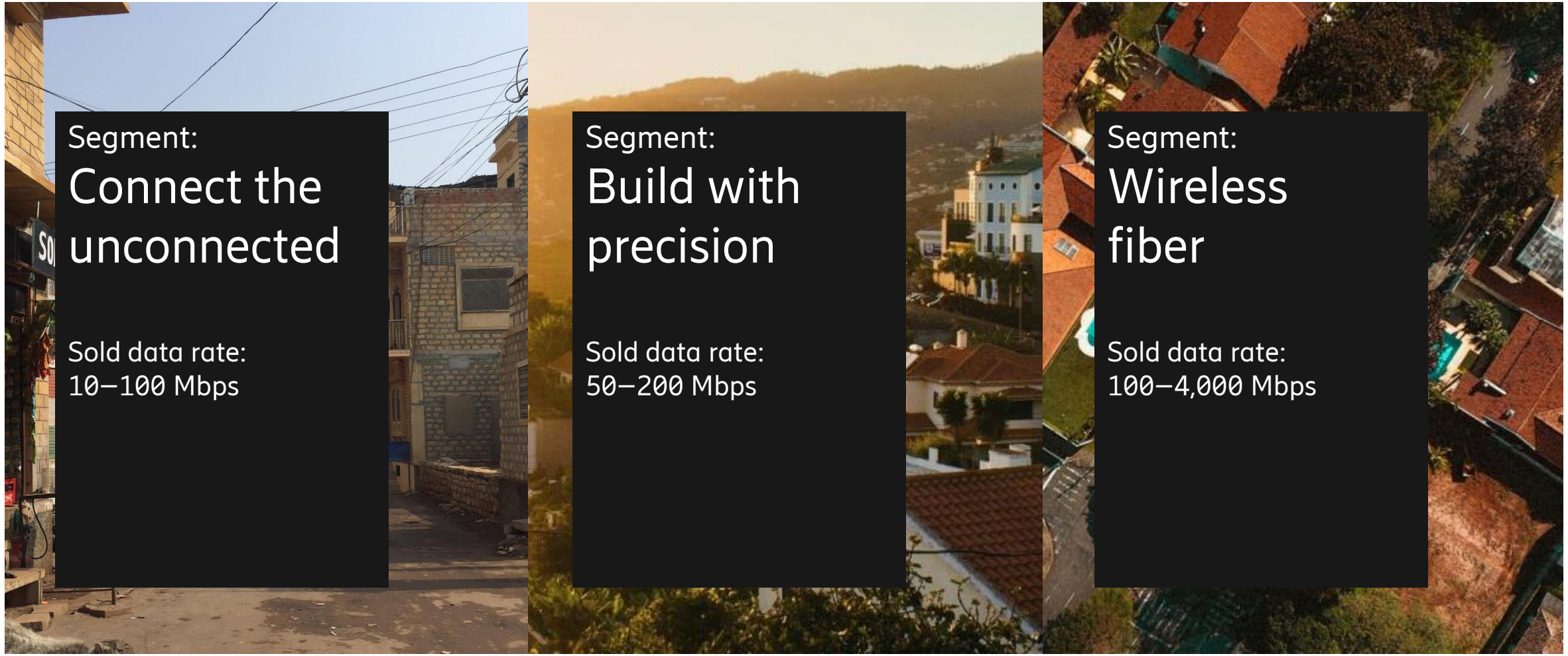
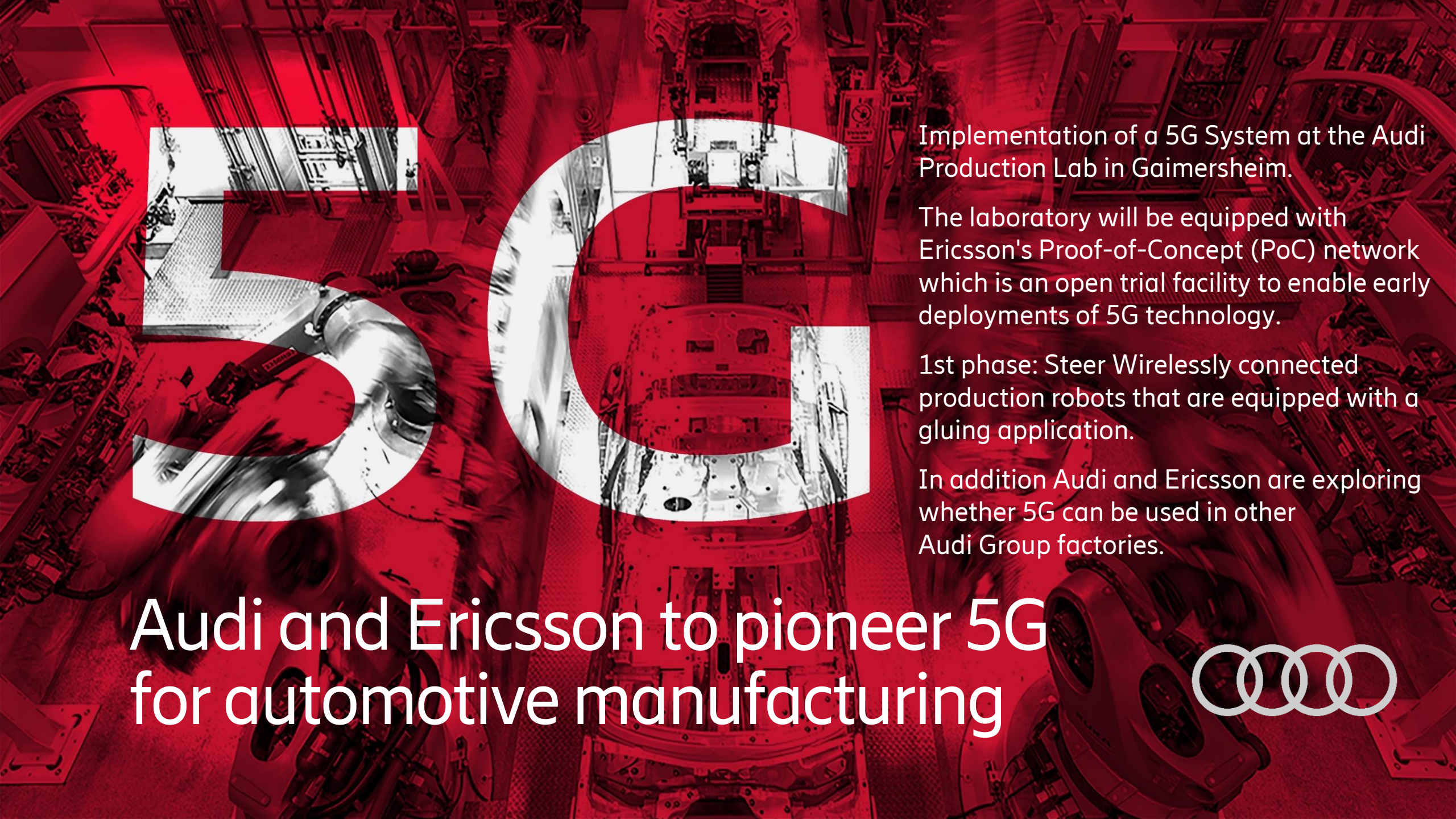
5G technology requirements are use case driven technology



Typical sold data rates for three segments





Audi and Ericsson to pioneer 5G for automotive manufacturing

Implementation of a 5G System at the Audi Production Lab in Gaimersheim.

The laboratory will be equipped with Ericsson's Proof-of-Concept (PoC) network which is an open trial facility to enable early deployments of 5G technology.

1st phase: Steer Wirelessly connected production robots that are equipped with a gluing application.

In addition Audi and Ericsson are exploring whether 5G can be used in other Audi Group factories.

FIR Center "Connected Industry"

5G powered "Industry 4.0 Reference Manufacturing"

Industry 4.0 Reference Factory Aachen

The Industry 4.0 Reference Factory, part of the Smart Logistics Cluster, is connected to Ericsson's 5G e2e trail network.

Covering the e.GO Streetscooter and GoKart production with cellular connectivity in manufacturing.

e.Go Life (Car) production connectivity in discussion

RWTH AACHEN CAMPUS SMART LOGISTIK CENTER CONNECTED INDUSTRY

5G-ConnectedMobility (5G-CM)

5C-CM Objective

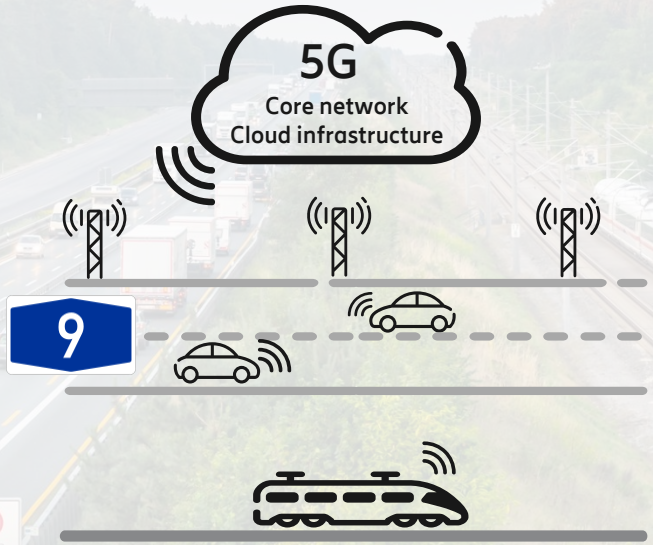
Accelerating 5G Research & Development (R&D) in Germany and in Europe. Facilitating the integration of technology requirements from various industries into upcoming international 5G-standardization activities.

5G-CM Project Description

- **A cross-industry consortium driving 5G R&D in Germany and in Europe**
- **Creating a network infrastructure and application environment for 5G analysis and testing in real-time for**
  - Vehicle-to-vehicle
  - Vehicle-to-infrastructure
  - Railway-to-infrastructure

- **Test track of approx. 30 km along the A9 motorway and a high speed railway track between Nuremberg-Feucht and Greding**
- **5G-CM is part of the „Digital test field motorway"-Initiative of the German Federal Ministry for Transportation and Digital Infrastructure**

5G-CM Project Infrastructure



- **A dedicated infrastructure not depending on any existing commercial network**
  - 5G prototype-applications installation and testing
  - Network configurations flexibility
  - Network sites provided by Telefónica Germany, Deutsche Telekom, ABDN and Deutsche Bahn
- **Ericsson received BNetzA permission to use frequencies in the 700 MHz band and will act as Network Operator**
- **The core network and cloud infrastructure are operated at the Ericsson ICT Development Center EUROLAB close to Aachen, Germany**
  - Connection to core network realized by Vodafone "Interconnected Access" of ABDN

www.5g-connectedmobility.com

Members of the consortium are:

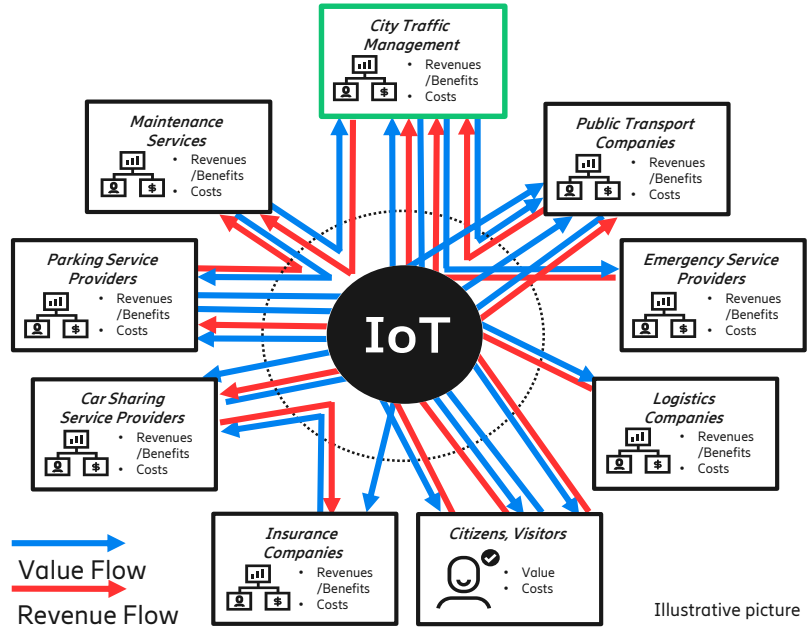
ERICSSON, BMW GROUP, MINI, DB, T, Telefónica, vodafone, 5G Lab GERMANY, bast, BNetzA

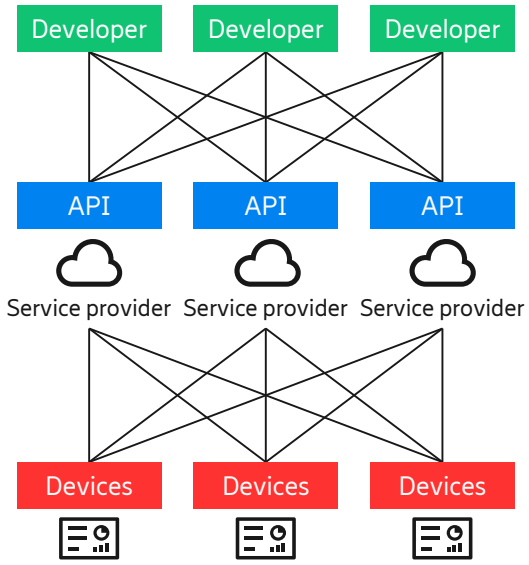
Supported by:

Bundesministerium für Verkehr und digitale Infrastruktur, Autobahndirektion Nordbayern

Smart City 5G Use Cases

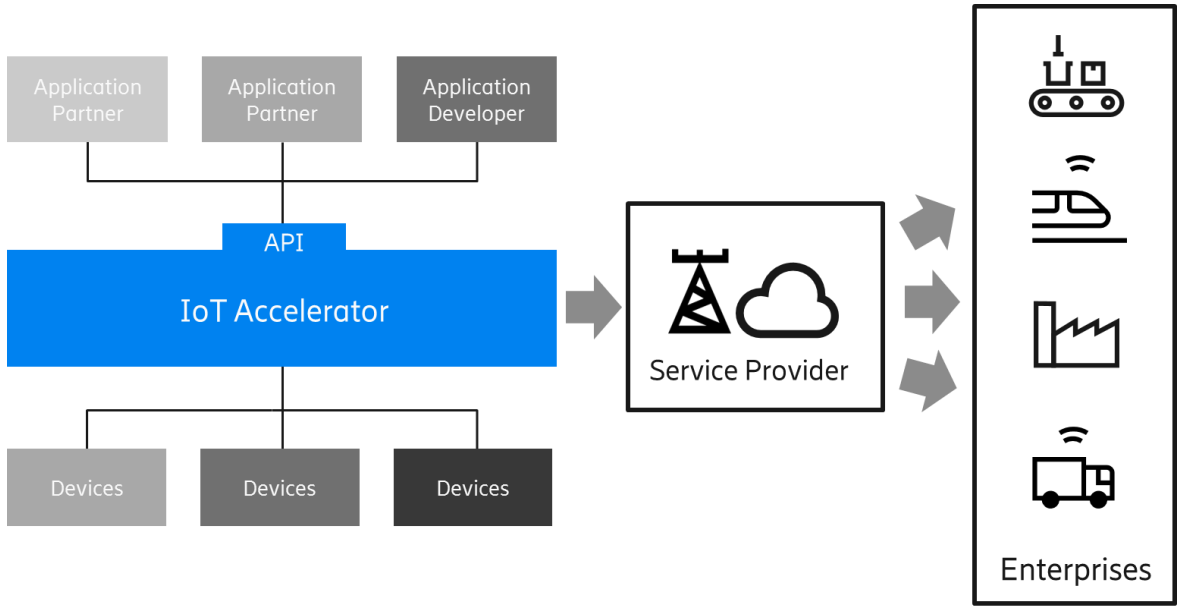
- Smart Traffic & Transport
- City Marketing & Tourism
- Stadium & Arenas
- Energy & Utility
- Waste Management
- Environmental Sustainability (Air, Water, Buildings)





- Vertical implementations
- Fragmented eco-system
- Difficult to enhance new business models

- Creating a collaborative ecosystem
- Standardized device stack
- Support to build an ecosystem



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Umsetzung der Use Cases für 5G

5G Deployment

— Macro Sites
  - 5G deployment at existing macro sites (roof-top, tower, etc.)
  - Deployment of new macro sites

— Small cell sites
  - Poles: light poles, traffic lights, traffic signs
  - City furniture: advertising pillar/column, billboards, bus stops
  - Wall mounting: municipal buildings

Important considerations

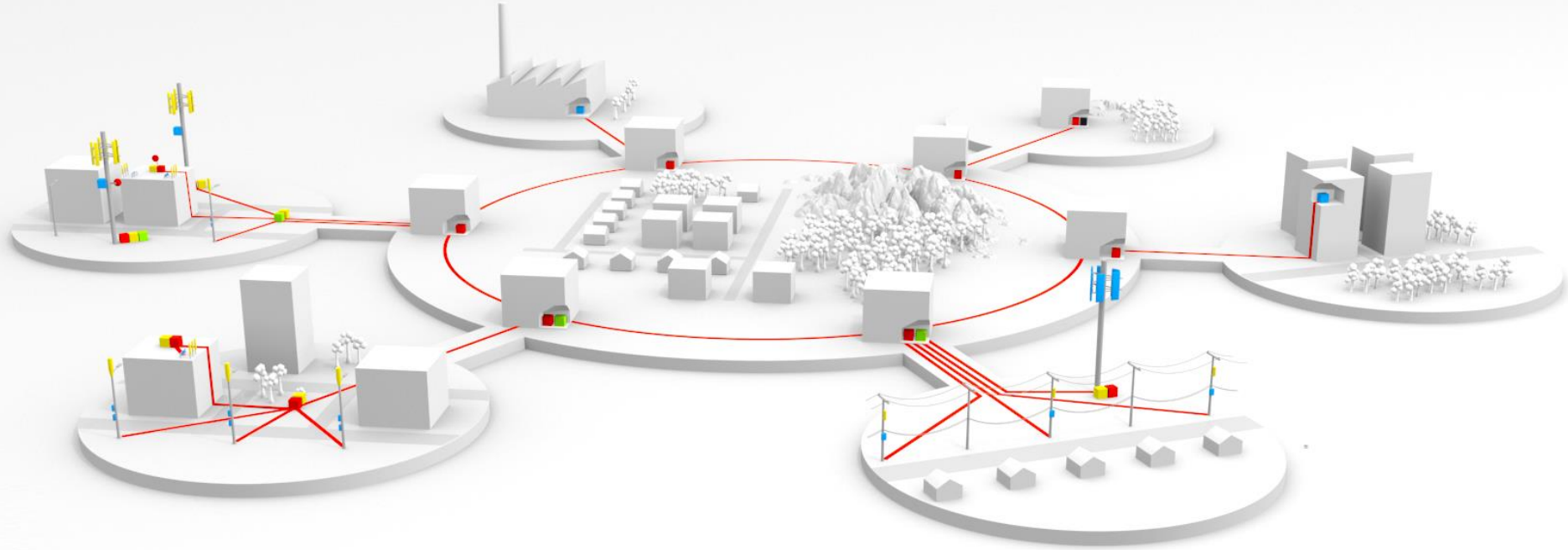
— Existing sites
  - Co-usage with existing technologies
  - Limitations due to space, permissions, EMF

— General prerequisites for new sites
  - Power supply (small cell 230V, macro 380V)
  - Transmission fiber

– Operational aspects
  - Standardized solutions
  - Automated processes, e.g. site access
  - Digital interfaces for information exchange

Ericsson Radio System

In more than
190
networks



Radio + Small cell

Baseband

Transport

Radio site system

2G 3G 4G 5G

5G Plug-ins

M-IoT

Software

ENM

Services

Small Cell Offerings

Micro radio

Mobile broadband customers want and expect a high-quality, consistent experience, whether they are connected via a macro cell or a small cell. In urban city streets and squares, outdoor micro cells are very handy, as they have sufficient power to cover both – a sizeable outdoor area and indoor users on lower floors of the buildings.

Ericsson Lightpole Site

Ericsson`s Zero Site models are multi-application pole solutions that support municipalities and utilities in: gaining new revenues from site leasing; and installing LED lighting to meet their sustainability goals. The solution also enables network operators to meet citizens' demand for connectivity everywhere to everything.

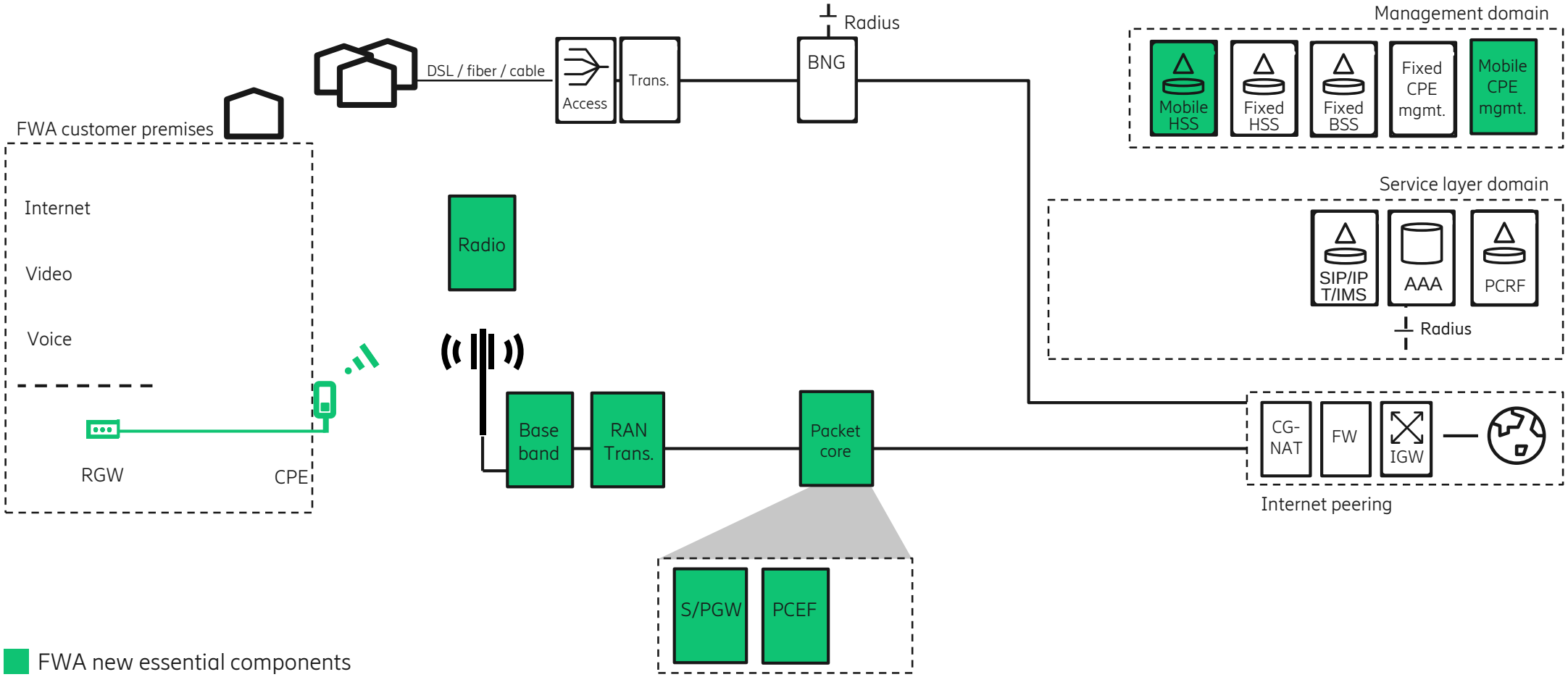
Capacity in dense urban areas with minimal visual impact - New Vault Radio 2268

Did you know that the use of existing street manholes where fiber and power already exists lowers total cost of ownership by 50 percent? Ericsson's vault solutions effectively address cities' needs by enabling the reuse of existing assets and underground space.

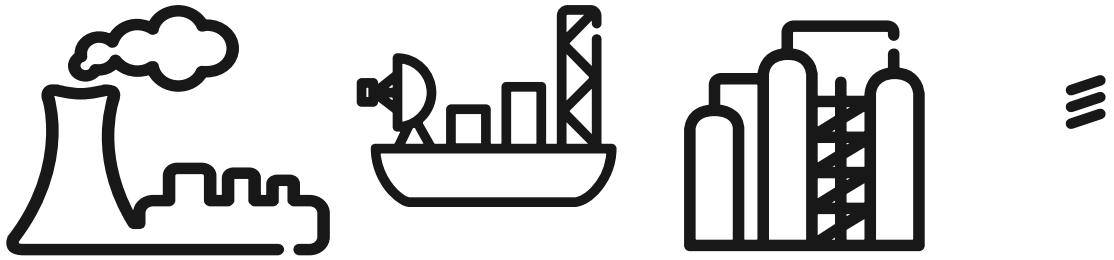
Street furniture sites

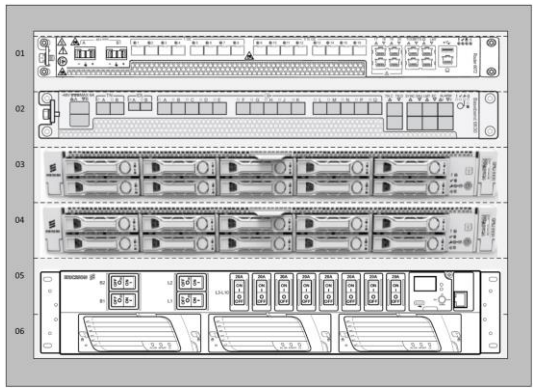
Connected street furniture, like connected bus stops and connected outdoor advertising, provides a great platform for offering seamless connectivity and digital services.

FWA for a converged operator



PRIVATE LTE
COMPACT COMMERCIAL





- Ericsson Router 6000 → IP Connectivity
- Ericsson Baseband → LTE Radio

- Ericsson HDS → Enterprise Core (vEPC and vUDC)
- Ericsson HDS → Enterprise-OSS, PTT and other

- Power Rectifier, 110-240 to 48 Volt → redundant power for router and Baseband (48V)

Radio Unit

LTE/5G

Devices

Local
IT Network

Local Services
Device Mgmt

Enterprise OSS

Internet

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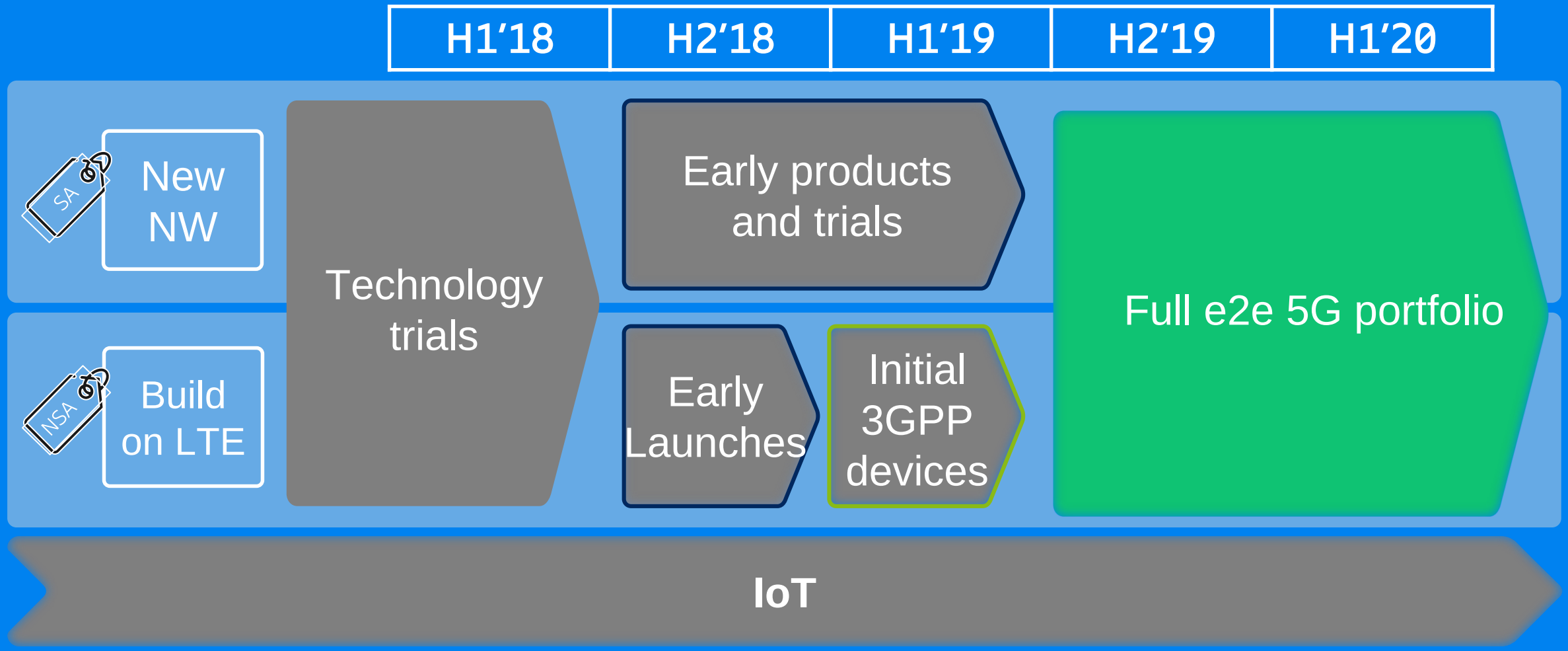
5G Timeplan


H1'18
H2'18
H1'19
H2'19
H1'20
SA
New NW
NSA
Build on LTE
Technology trials
Early products and trials
Early Launches
Initial 3GPP devices
Full e2e 5G portfolio
IoT

Ericsson.com/5G