# Auf dem Weg zur 5G -Technologie:
Beispiele industrieübergreifender Forschungs- und Entwicklungskooperationen

**Stefan Koetz**
Vorsitzender der Geschäftsführung, Ericsson GmbH

# Ericsson at a glance

Enabling the full value of connectivity
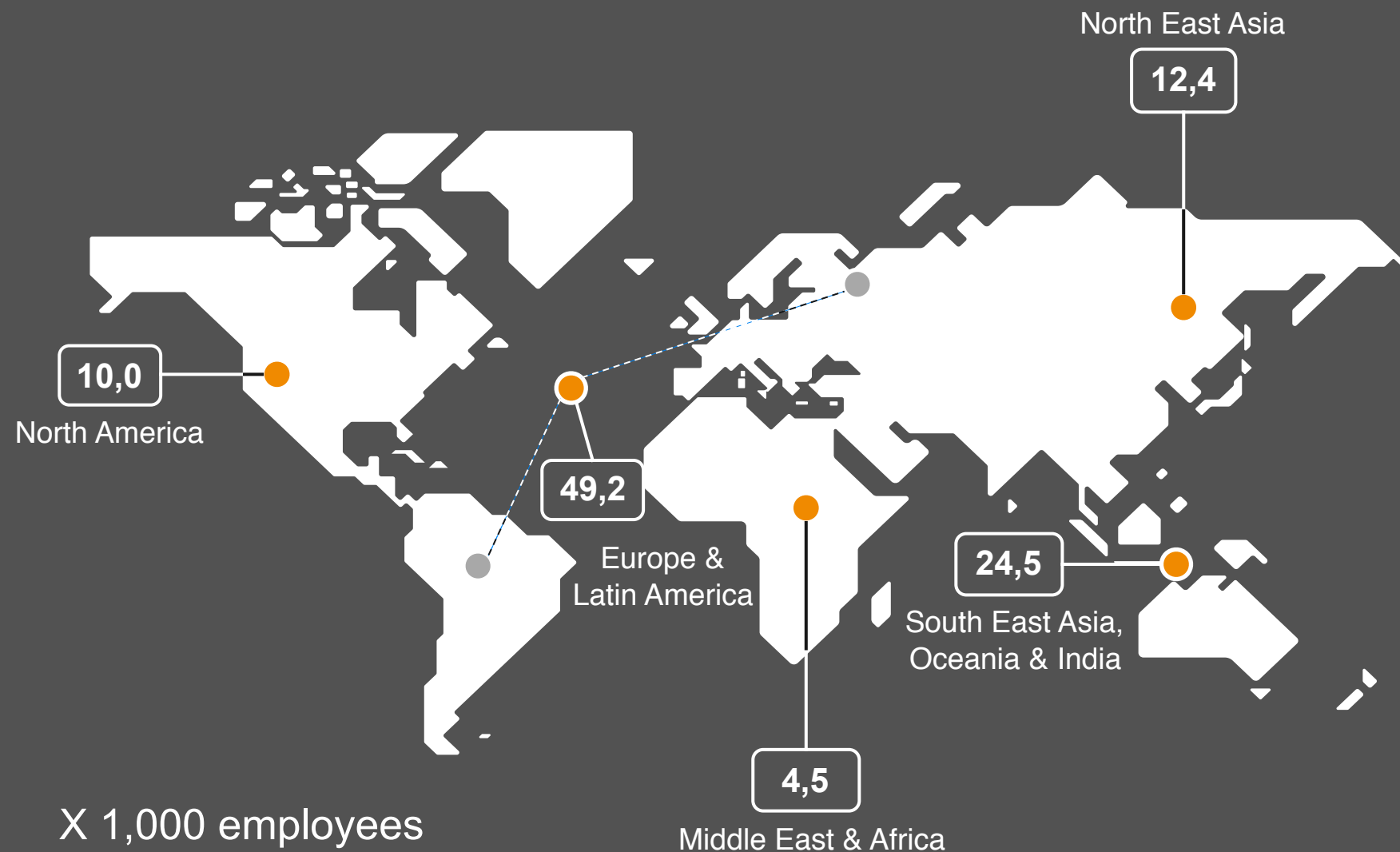for service providers

**Business areas:**
— Networks
— Digital services
— Managed services
— Technology and
   emerging business

**By the numbers:**
— 180+ countries
— 201.3 b.sek in sales
— 100,700 employees
— 45,000 patents

**Image:** Ericsson headquarters, Kista, Sweden

# Global presence

North East Asia
**12,4**

**10,0**
North America

**49,2**
Europe &
Latin America

**4,5**
Middle East & Africa

**24,5**
South East Asia,
Oceania & India

X 1,000 employees

**100,700**
employees worldwide

**55,000**
of our employees are
active within Services

**23,600**
of our employees are
dedicated to R&D

# Ericsson in Germany

**Presence in Germany**

For over
60
Years

**Employees**

1,800
(950 in R&D)

**Research & development**

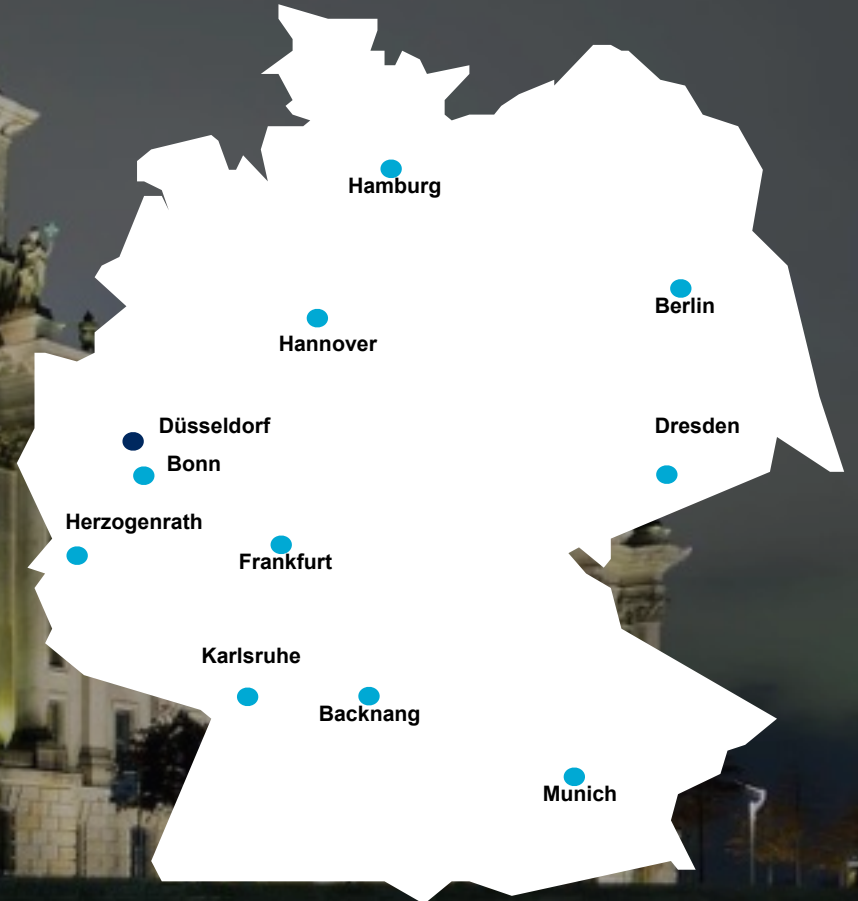ICT Development Centre Eurolab Herzogenrath (Aachen)

**Locations**

11

**Headquarters in Germany**

Düsseldorf



Hamburg

Berlin

Hannover

Düsseldorf
Bonn

Dresden

Herzogenrath

Frankfurt

Karlsruhe

Backnang

Munich

## Core business segments in Germany:

Mobile broadband

Managed services

Core & Cloud solutions

System integration

OSS and BSS

TV and media

# The Ericsson Eurolab
## Over 25 YEARS OF RESEARCH & DEVELOPMENT IN GERMANY

| Founding | Employees | Patents per year | Nationalities |
|----------|-----------|------------------|---------------|
| 1991 | ~550 | 80-100 | 45+ |

▶ **The Ericsson Eurolab near Aachen is a strategic location for Ericsson's global efforts in research and development**

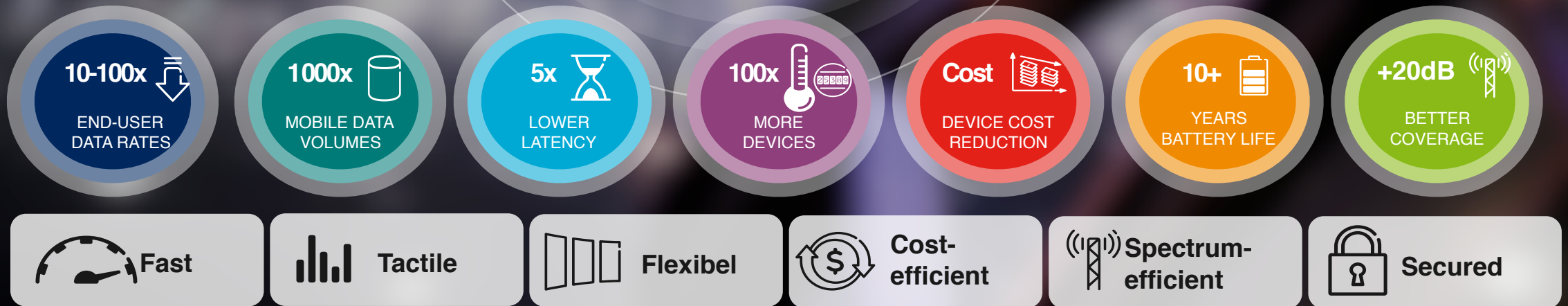| | |
|---|---|
| July 2015: | Opening of the Ericsson Cloud Lab |
| September 2015: | 5G-for-Germany program started (5G Proof-of-Concept Network Core) |
| June 2016: | Opening of the 5G Innovation Facility & Ericsson Garage Eurolab |
| March 2018: | Opening of the IoT Business Lab |

▶ R&D projects with partners:   5G   |   ITS   |   Energy   |   Industry 4.0   |   Public Safety

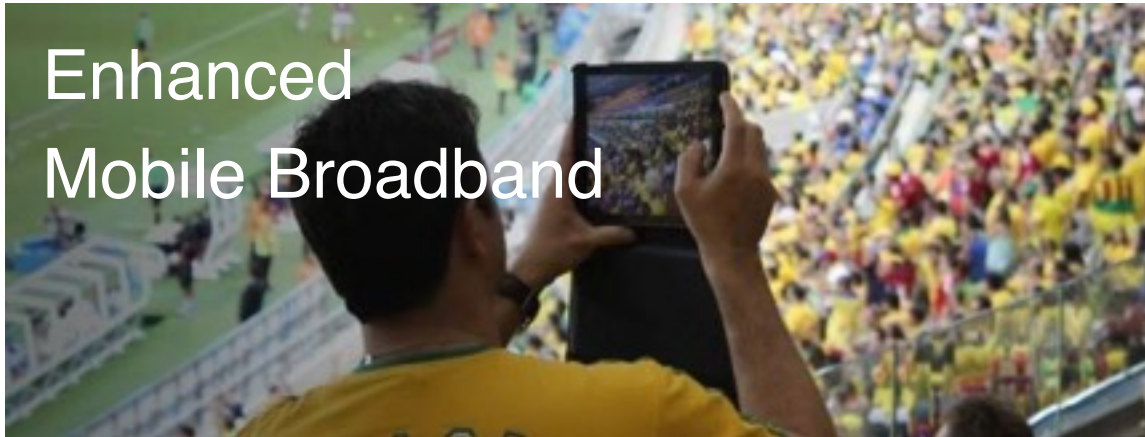# 5G technology requirements are use case driven technology


Massive Machine Type Communication


Critical Machine Type Communication


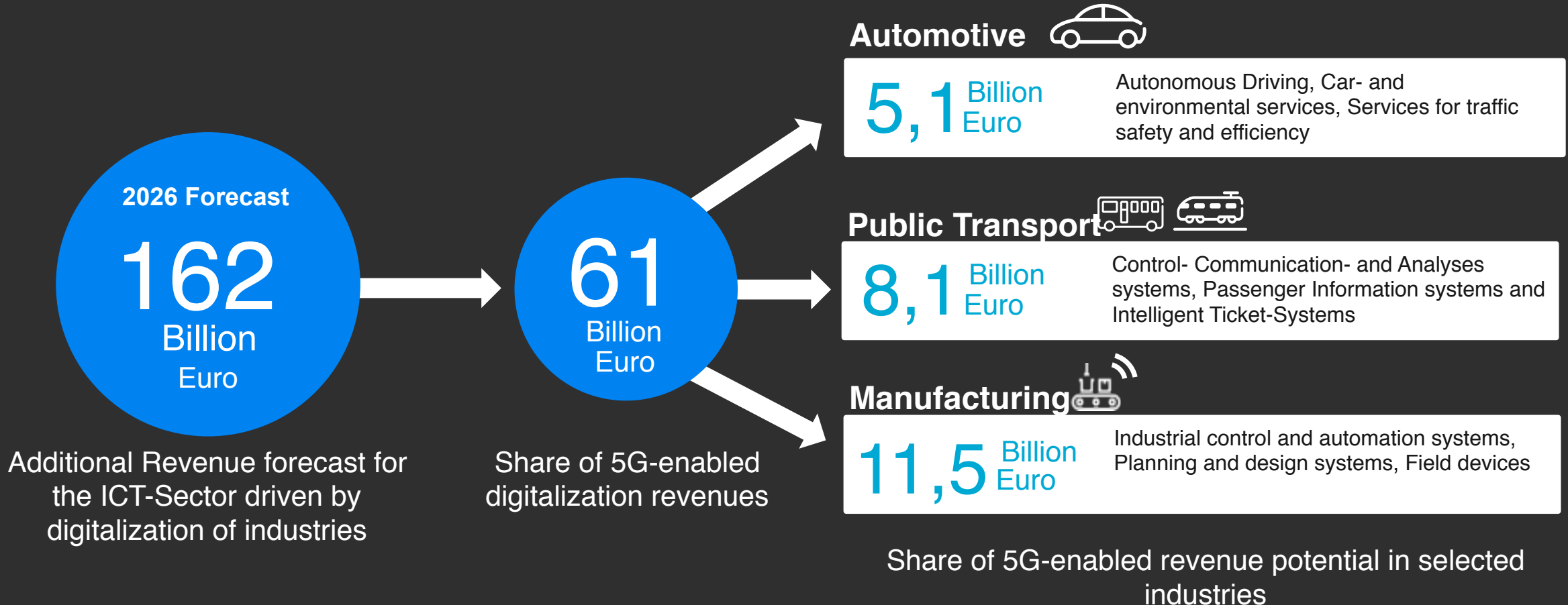Enhanced Mobile Broadband


Fixed Wireless Access

# The money in 5G for ICT in Germany

**2026 Forecast**

**162** Billion Euro

Additional Revenue forecast for the ICT-Sector driven by digitalization of industries

**61** Billion Euro

Share of 5G-enabled digitalization revenues

**Automotive**

**5,1** Billion Euro — Autonomous Driving, Car- and environmental services, Services for traffic safety and efficiency

**Public Transport**

**8,1** Billion Euro — Control- Communication- and Analyses systems, Passenger Information systems and Intelligent Ticket-Systems

**Manufacturing**

**11,5** Billion Euro — Industrial control and automation systems, Planning and design systems, Field devices

Share of 5G-enabled revenue potential in selected industries

Source: Ericsson Study "The 5G Business Potential" with Arthur D. Little

# Ericsson 5G-for-Germany Program
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

## Example of partners

### Automotive and Rail 5G pilots

- **5G-ConnectedMobility:** V2X Communication test field in Germany
- **CONVEX:** V2V, V2I based on LTE
- **5GNetMobil:** Tactile connected driving and platooning
- **5GCAR:** Automotive V2X lane merge, see through testing

VW
Scania
Audi
BMW
Deutsche Bahn
bast
PSA
5GLab Germany

### 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

Deutsche Telekom
SICK
Bosch
KUKA
Vodafone
Siemens
Telefonica
Fraunhofer
TU-Dresden
I'Telligence
BNetzA
Stromnetz
BMVI
Berlin
Qualcomm
TU-Dresden
RWTH Aachen
Schildknecht
BMBF
Deutsche Telekom
Swisscom
Qualcomm
PSI Logistics

## Association partnerships

# 5G-ConnectedMobility (5G-CM)

**5G-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

**5G Core network Cloud infrastructure**

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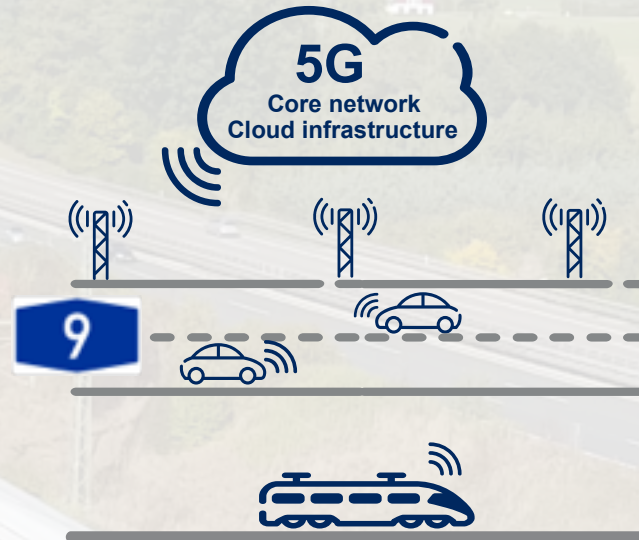
› **A dedicated infrastructure not depending on any existing commercial network**
  - 5G prototype-applications installation and testing
  - Network configurations flexibility
  - Network sites provided by Telefónica Germany, Deutsche Telekom, ABDN and Deutsche Bahn
› **Ericsson received BNetzA permission 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  BMW  MINI  DB  T··  Telefónica  vodafone  5G Lab GERMANY  bast  BNetzA

Supported by:

Bundesministerium für Verkehr and digitale Infrastruktur  Autobahndirektion Nordbayern

# Automotive Edge Computing Consortium
## Driving the network and computing infrastructure needs of automotive big data

— Building an ecosystem comprising of …
  - mobile communication industry leaders
  - big data cloud and analytics service providers
  - and leading automotive industry players

  ▶
  - Development of use cases and requirements for connected services for emerging mobile devices, with a particular focus on automobiles
  - Discuss and agree on reference architectures, such as for next-generation mobile networks and cloud, which are suitable for automotive-oriented use cases



AECC
AUTOMOTIVE EDGE
COMPUTING CONSORTIUM

Partners:


TOYOTA    ERICSSON    intel    AT&T    NTT    DELL    DENSO    SUMITOMO    KDDI

# Living Lab Aachen
## Driving the Future of Mobility

— Aachen as a demonstration laboratory for the mobility of tomorrow
  - Electromobility
  - Autonomous and connected driving
  - Networked traffic management

  ▶
  - Exploring smart city concepts
  - Improved traffic safety
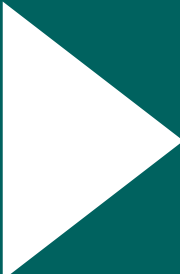  - Higher traffic efficiency



Partners:

# 5G NetMobil
## 5G solutions for the connected mobility of the future

Explore 5G technology for ITS use-cases in detail, extract requirements, and develop a system architecture

— High Density Platooning

— Off-road Platooning

— Connected driving in urban environment

— Coexistence of safety critical and non-critical services

▶
- Improved traffic & pedestrian safety
- Higher traffic efficiency
- More cost-efficient operation of
  – Truck fleets
  – Semi-automated farming
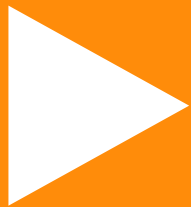


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Partners:

# ConVeX
## Connected vehicle of tomorrow

— Exploring benefits of LTE-V2X connectivity
- Integrate LTE-V2X into cars & road infrastructure
- Benchmark achievable performance
- Deploy real-time ITS & connected vehicle services

▶
- Highlight new use-cases
- Optimize traffic flow
- Improve traffic safety

Partners:

QUALCOMM    Audi    ERICSSON    Bundesministerium für Verkehr und digitale Infrastruktur

swarco    Technische Universität Kaiserslautern

# Success factors to realize 5G in 2020 for Germany and Europe

**Allocation and management of suitable spectrum**

Availability of bandwidth below 6 GHz as well as between 6 and 30 GHz

**5G area coverage and fibre**

Prioritizing area coverage to population coverage. Higher availability of mobile networks are required to complement population coverage with fibre.

**The right balance towards net neutrality**

Critical services based on 5G networks will require technical prioritization to guarantee service quality and reliability

**Encourage investments in 5G for various industry sectors**

Continuation of financial support for 5G Research- and Standardization activities to secure planning security in an innovation friendly regulatory framework

**Intensifying on 5G R&D activities with cross-industry scope**

Foundation to implement technology requirements from various industries into upcoming international 5G-standardization activities.

Ericsson.com/5G