



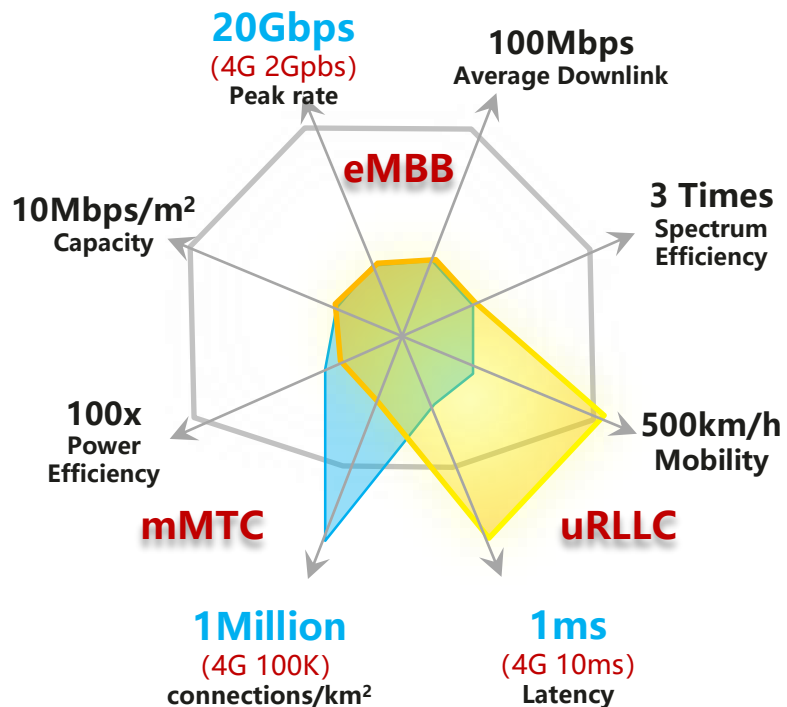
# 5G für ein besseres Leben

5G Week NRW  
26. Oktober 2020

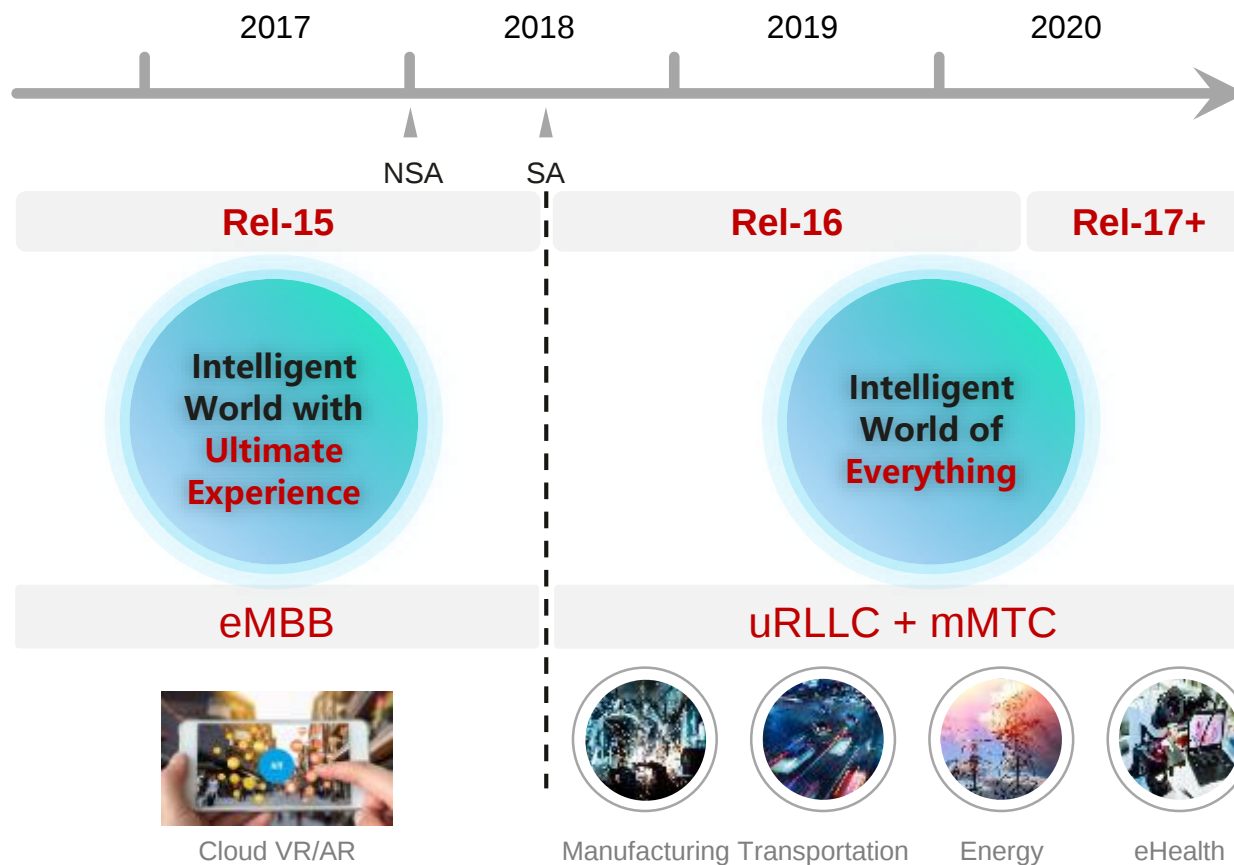
Dr. Michael Lemke, Senior Technology Principal  
Huawei Technologies Deutschland GmbH

# Was ist 5G ?

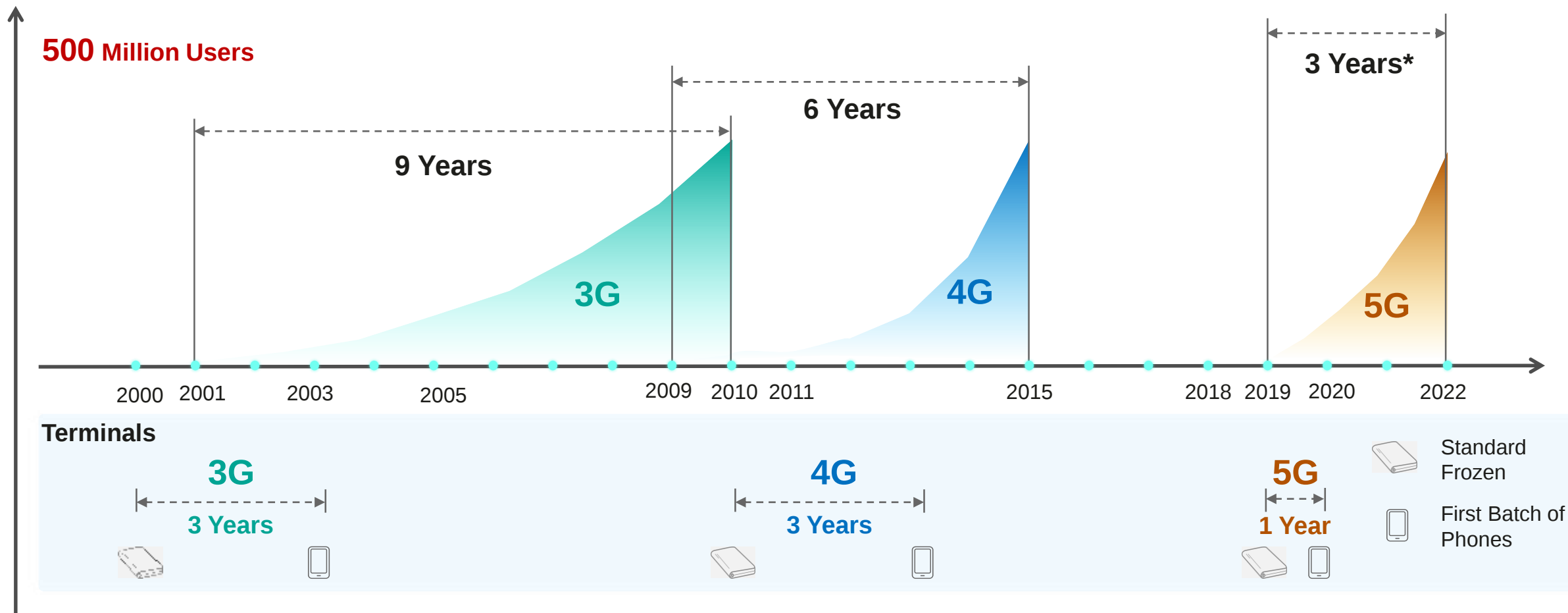
Der neue drahtlose Kommunikationsstandard aus dem globalen Ökosystem der Telekommunikationsindustrie 3GPP (~700 companies)



eMBB: Enhanced Mobile Broadband  
uRLLC: Ultra-Reliable and Low-Latency Communications  
mMTC: Massive Machine Type Communications



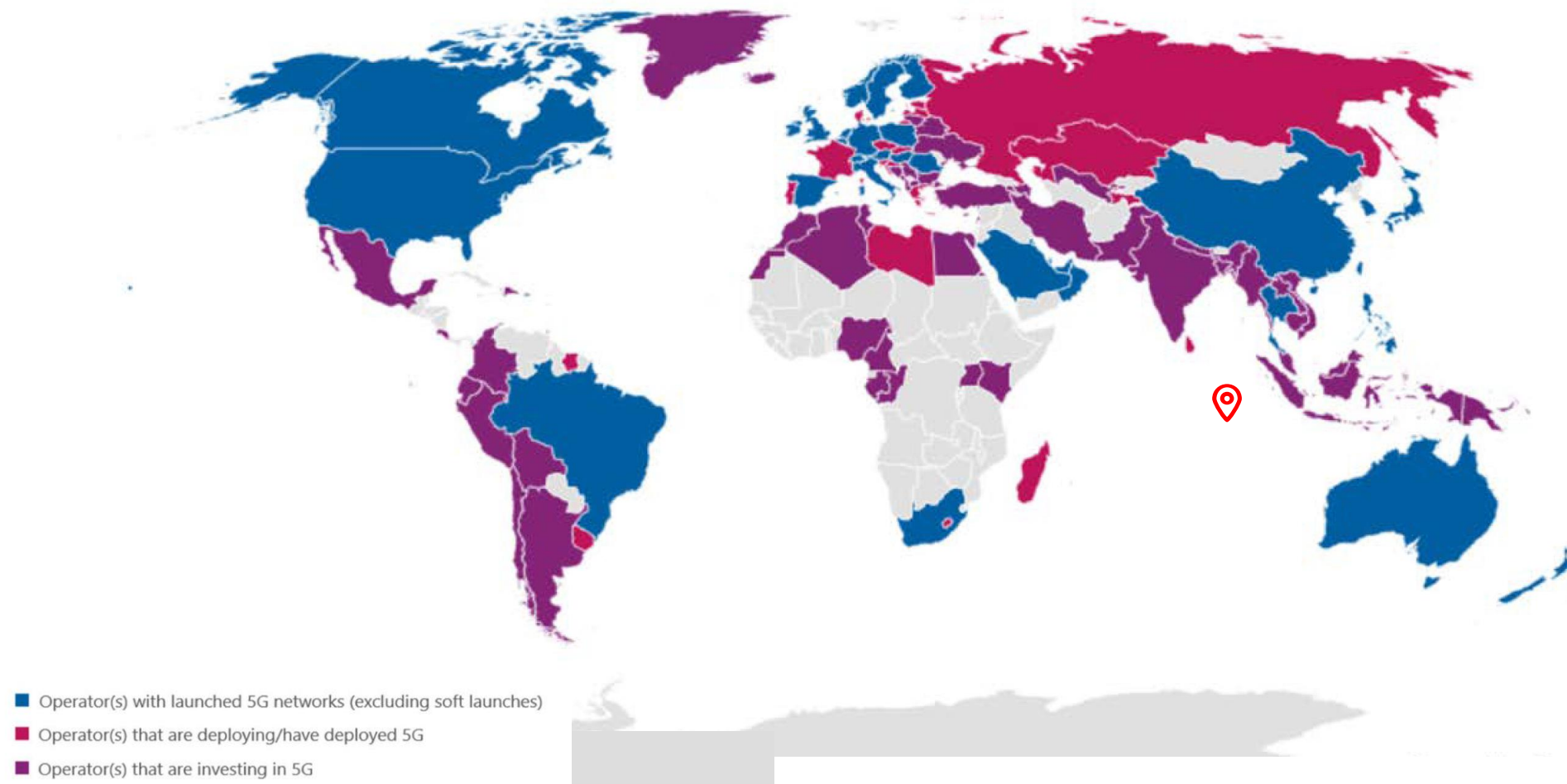
# 5G entwickelt sich schneller als alle vorherigen Technologien



\* Source: IHS Markit Predication

# 5G Netze weltweit

**92** commercial 5G Networks in **38** countries



Source: GSA, 07.2020

# 5G Nutzung International: Süd Korea

South Korea, Global 1st country of 5G commercialization

**5.9M** Subscribers    **115K** Base station    **30GB**/Month    **9.67%** Penetration    **93%** Population coverage

**SKT** Baseball + VR + HD Movie + Game

**VR**



**HD Movie**



**Game**



**Baseball live broadcast**



**KT** Communication + Live Broadcast + Game

**Communication**



**Live Broadcast**



**Games**



**U+** VR + AR + 3 Live Broadcast

**U+ VR**



**U+ AR**



**U+ Idol Live**



**U+ Golf**



**professional baseball**



# 5G Nutzung International: China – 5G und Industrien

**500K** 5G Sites till Aug. 2020 In China, **10K** increase per Week; **100M+** Subscribers, **10M+** increase per Month

Driven firstly by **Vertical industries'** Requirement and then Consumer with a total **400+** Applications



Smart Mine **9**



Smart Port **11**



Smart Education **9**



Smart Campus **11**



Smart Factory **27**



Smart Grid **9**



Smart Police **19**



Smart Medicine **35**



Smart Traffic **25**



Smart Media **68**



Smart Water **3**



Smart Agriculture **3**



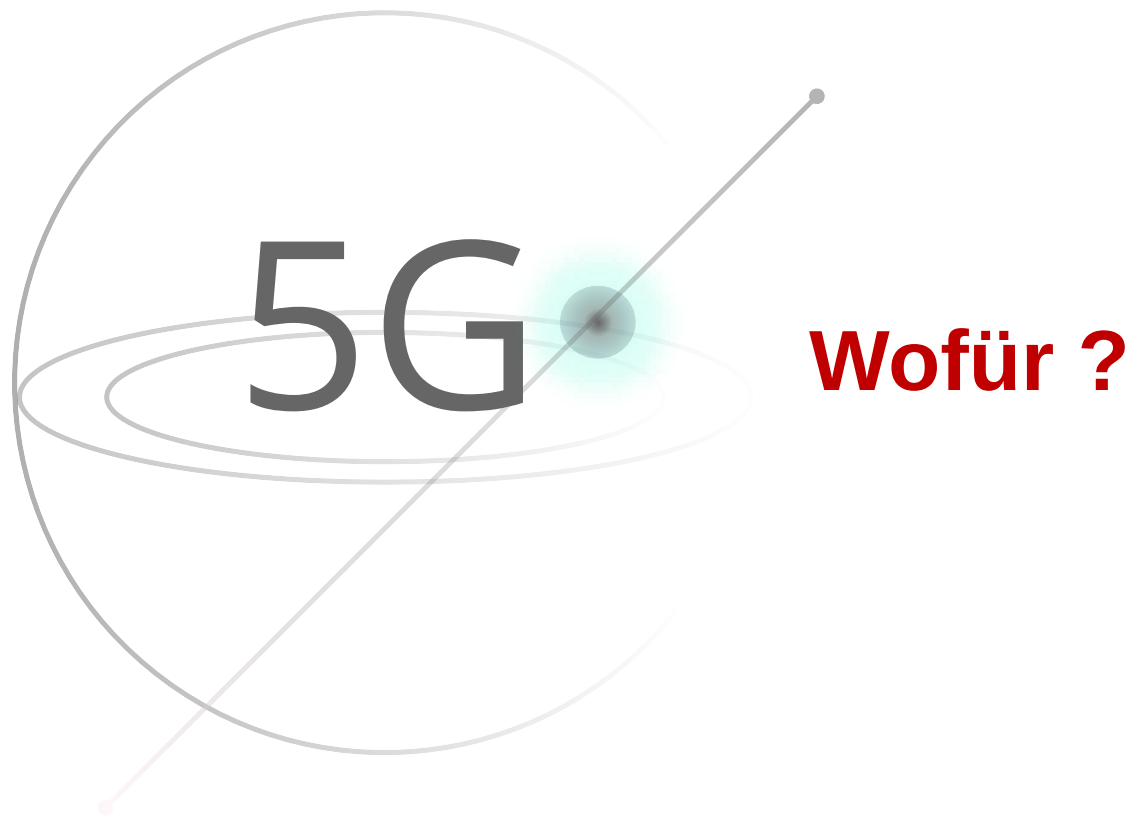
Smart Tourist **14**



Smart Fishery **2**



Others



**Wofür ?**

# 5G als potente Konnektivitäts – Plattform für *Digitale Städte*

## Digital Sky

 Flight WiFi

 Drone Logistics

 Drone Surveillance

 Drone Aid

## Digital Crowded Area

 VR Live Stadium

 360 Concert

 AR Live Museum

 Crowd Management

## Digital Transportation

 Tele-Operated Driving

 Autonomous Bus

 Autonomous Car

 Fleet Management

## Digital Community

 Home Broadband

 Public WiFi

 4K/8K IPTV

 VR Entertainment

## Digital Manufacturing

 Digital Oil Field

 Smart Grid

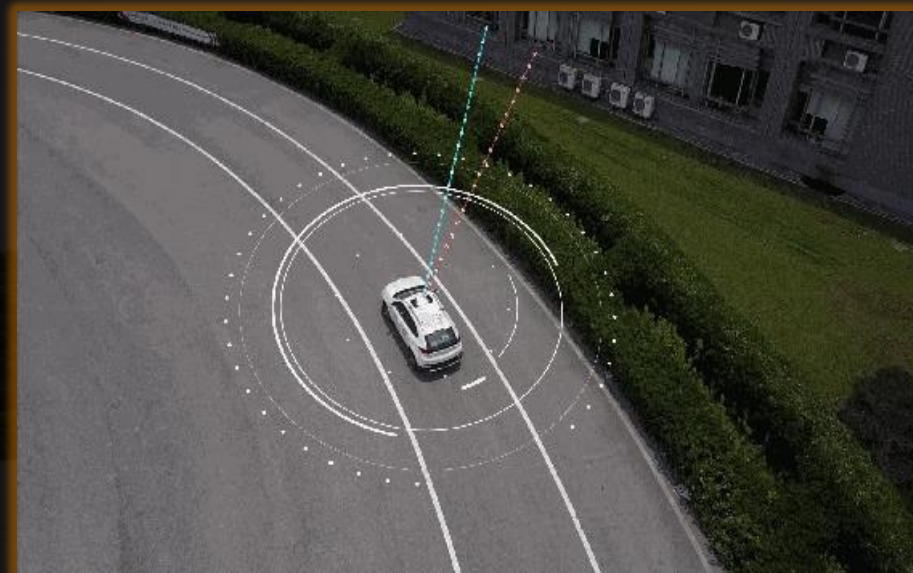
 Robotics

 Remote Control

# 5G



# 5G Fernsteuerung (Tele-operated Driving)



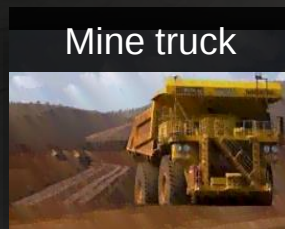
## Application Scenario



Load truck



Shuttle bus



Mine truck

**10<sub>ms</sub>**

E2E Latency  
0.12m Break Distance

**50Mbps**

For HD FoV Uploading

**5G NR**

 UL Live Video

 DL Remote Control

Transmission

**52.3 km**

  
**Car & Cameras**

  
**Remote Control**

# 5G Campus ist der Treiber für Digitalisierte (autonome) Logistik

Campus Shuttle Bus



Tourist spot



Airport



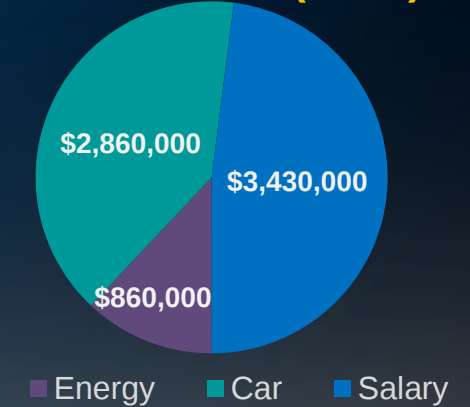
Port



3 Years TCO (As Is)



60 Shuttles + 60 Drivers

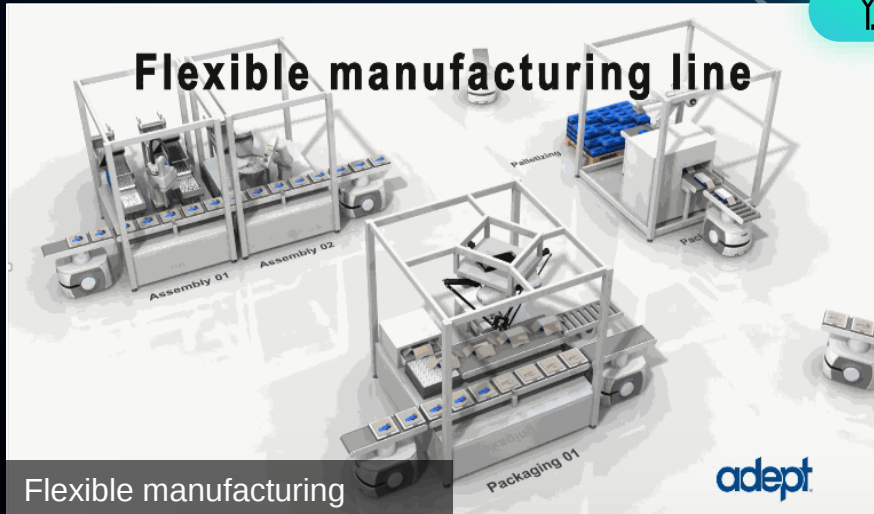


|               | Stage 1                      | Stage 2                  |
|---------------|------------------------------|--------------------------|
| Technology    | V2X                          | V2X+surveillance+<br>TOD |
| Driver needed | Driverless<br>Safety Officer | No Need                  |
| Throughput    | UL > 20Mbps                  | UL > 60Mbps              |
| Latency       | 20ms                         | 10ms                     |

# Digitalisierte Fertigung ist der neue Zukunftsmarkt

Cellular see a CAGR of  
in industry IoT, 2022-2026 | **464%**

## Factory Cloud



**+200%**  
productivity

**-30%**  
reduced energy

**+30%**  
longer product life  
source: ABI

Mobile  
beyond Giga

**20Gbps**

Real Time  
World

**<4ms**

All-online  
Everywhere

**1mn /km<sup>2</sup>**

## 5G ACIA

5G Alliance for Connected Industries and Automation

### Manufacturing



### Telecom Industry



### Chipset Industry



### Others



- Huawei and Industry Partners kicked off 5G-ACIA: Jointly Designing 5G for Industrial Use.

- <http://www.huawei.com/en/press-events/news/2018/4/Industry-Partners-kicked-off-5G-ACIA>

# Aus aktuellem Anlass: 5G & KI in der Medizin

## Challenges for healthcare

- Emergency communication requirements surges, urgent network coverage is required



**China:** 48 designated hospitals, 2 new hospitals, 30 temporary hospitals  
**Italy:** Hundreds of new tent hospitals, 1 new hospital ship

- Video conferences for emergency collaboration



1. Roll-out within 24 hrs
2. Video SLA guaranteed.

- Medical resources are far from enough



Lack of experts



Wait days for results



Long queue

## Telemedicine practices during pandemic

- 5G network fast roll out for temporary hospitals



- 30 hours deployment,
- 3 days roll-out
- 20 cities across 12 province join the live stream

- Large scale usage of 5G collaborative video conference



1. Remote collaboration
2. Remote diagnosis and treatment:

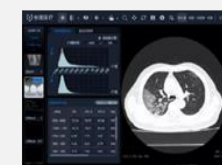
- 5G+ Innovative Medical Cases



Thermal imaging for body thermometry



ICU visiting



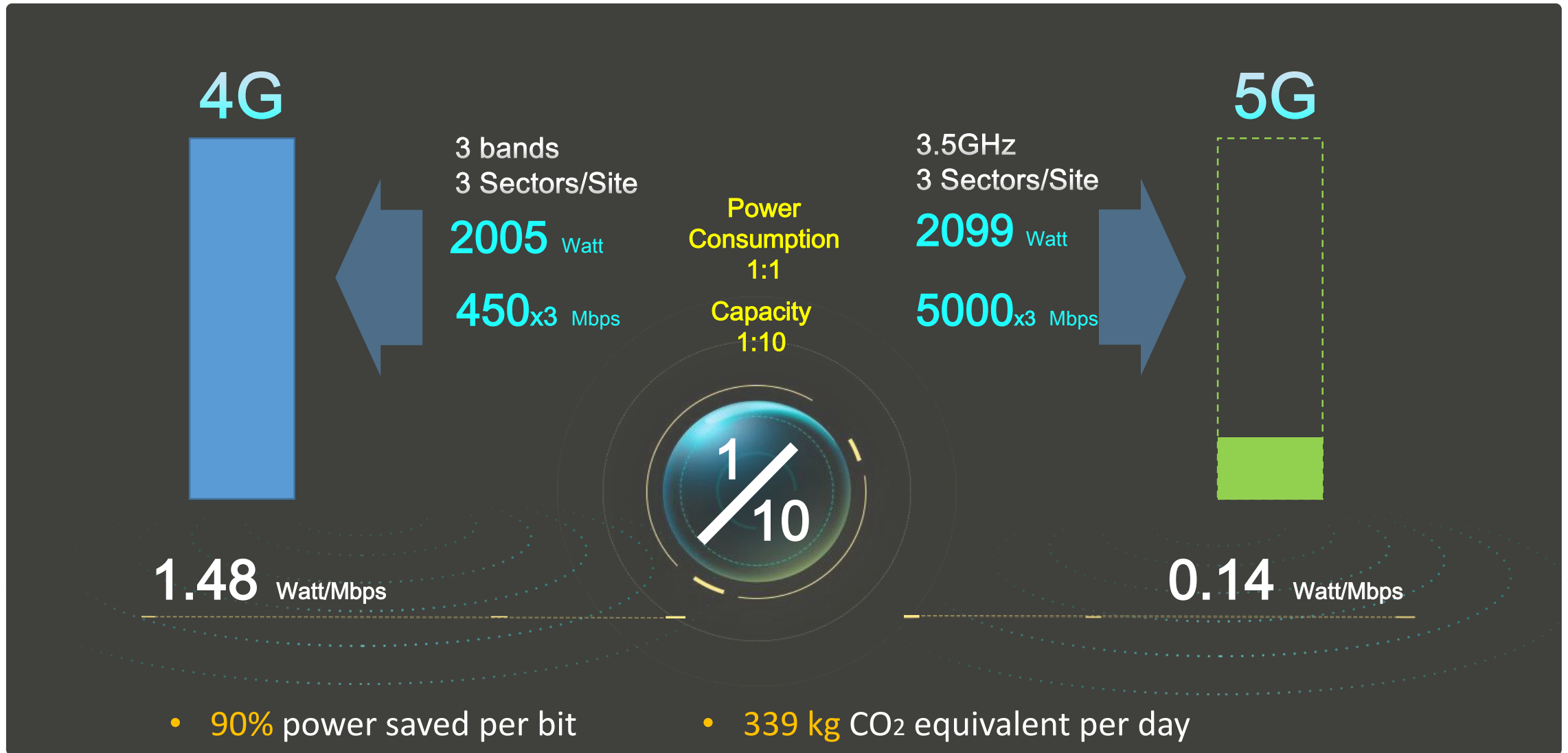
CT AI Analysis



Disinfection (spraying) robot

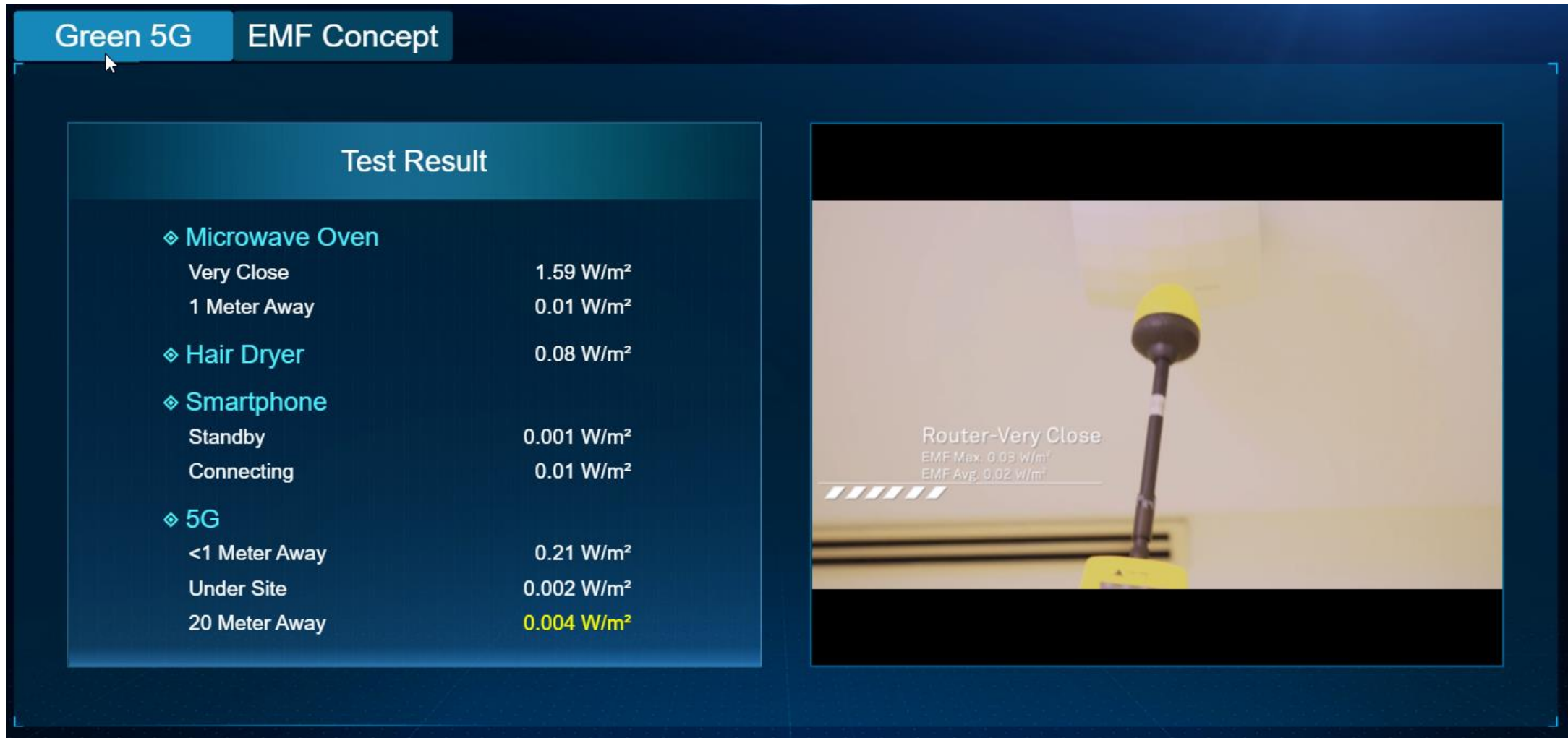


# 5G Energieeffizienz\* (Beispiel)



\*Huawei Green 5G

# 5G und Elektromagnetische Strahlung



# Thesen ....

- 5G ist verfügbar von dem globalen gesunden 3GPP Ökosystem (modular und interoperabel) der Mobilfunkindustrie
- 5G ist eine (potentiell omni-potente) Konnektivitätstechnologie und damit Bestandteil der Digitalisierung (weniger Kabel lokal, mehr Flexibilität, höhere Nutzbarkeit)
- 5G ist da: die Aufgabe besteht in der Erschließung seines Potentials über viele globale und lokale Anwendungen einschließlich der entsprechenden Win-Win Geschäftsmodelle (Förderung → z.B. 5G.NRW)
- 5G ist (noch) sicher(er) als 4G (3GPP Sicherheitsarchitektur)
- 5G Technologie trägt zur Nachhaltigkeit bei (→ Digitalisierung)

*Für  
ein besseres  
Leben*

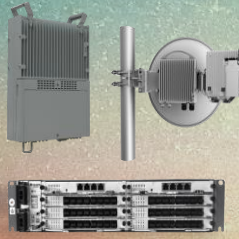


# Bring digital to every person, home and organization for a fully connected, intelligent world

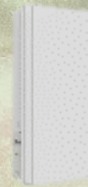
End-to-end 5G  
system



Core



Transport



C-Band



mmWave



BBU



CPE



<https://www.huawei.com/de/deu/magazin>



5G  
smartphone

