Expanding the 5G Eco-System

3GPP Standards for Vertical Service Integration

Georg Mayer, Huawei, 3GPP TSG SA Chair

January 2021

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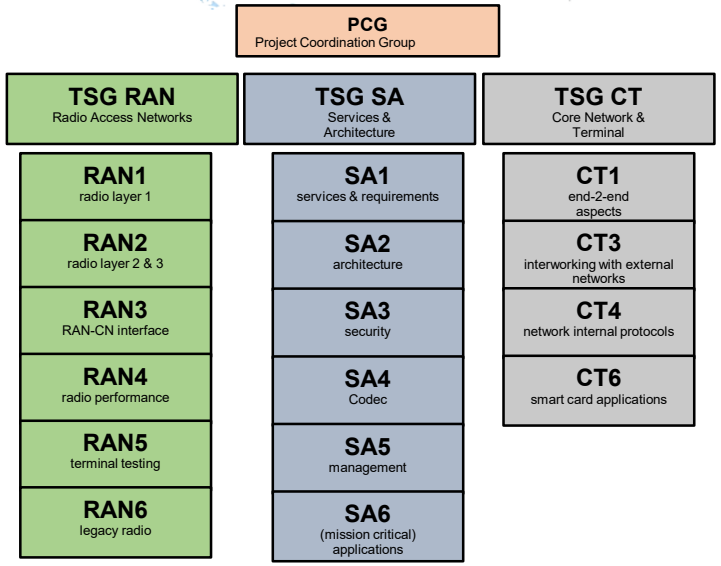

- Global standards organization for mobile communication
- 700+ Companies from all over the world actively participating
- A new Release every 15 to 24 months
- A new Generation every 10 years – 3G/UMTS, 4G/LTE, 5G
- Standards for all sectors of mobile communication – VoLTE, NB-IoT
- ~20 Working Groups & TSGs, each meeting 4 to 8 times a year
- Contribution driven
- Consensus based

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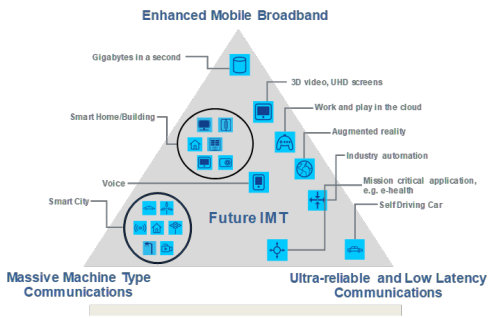
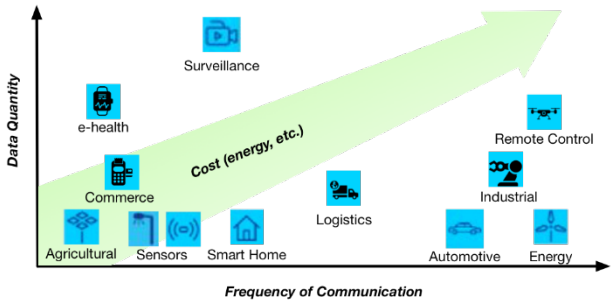
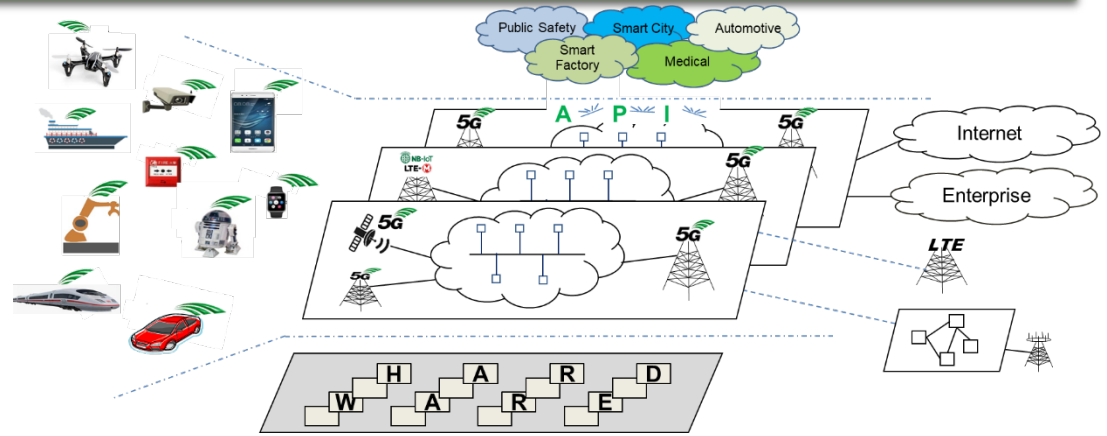
5G
Smartphone Evolution
Service Enabling Revolution

Where We Are Now – 5G Eco System







New Stakeholders …
- Critical Communications (MCC)
- Automotive (e.g. 5GAA)
- Railways (e.g. UIC)
- Industrial Manufacturing, Smart Factories
- Maritime
- Satellites
- Autonomous Systems (robots, drones, …)
- Smart Cities
- Water & Energy Providers
- Broadcast Agencies
- …

… require a flexible enabler platform
- Exposure of Core capabilities to 3rd parties
- On-demand resource allocation – local and end-2-end
- Core Architecture needs to be service centric
- Guarantee certain capabilities exclusively
- Ultra low latency & high reliability

Software & Service Centric Transformation

5G as a Flexible Enabler

One Network fits all	→	Open & Flexible Enabler
Telecom Operators	→	Multiple Stakeholders
Phones	→	Things
Procedures	→	Services
Static Topology	→	On-demand Resources
Dedicated Hardware	→	Orchestrated Resources
Network Function	→	Virtualized Function
Single Network	→	Slice

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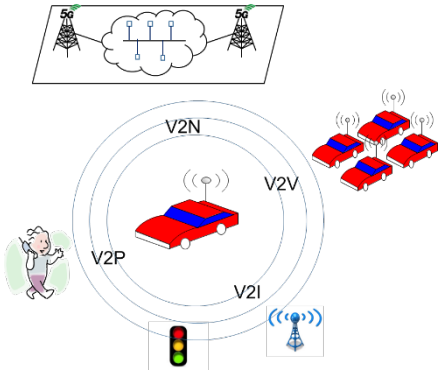
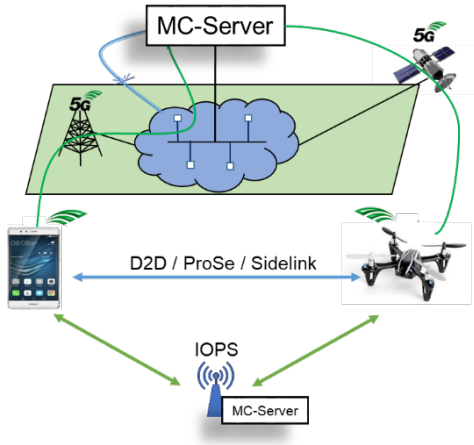
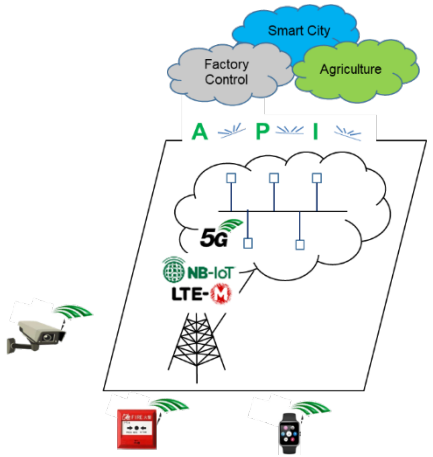
Verticals & 5G Standards

- industry organizations such as 5GAA and 5G-ACIA help stakeholders of one sector to coordinate their work
- cross industry coordination is still lacking, it starts to take place in research projects (5G-IA), public-private partnership initiatives (5G-PPP) and so-called vertical users workshops
- 3GPP started a number of internal initiatives to make its work more accessible to new participants from vertical industries







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3GPP Releases – The 5G Story Continues

Dreams

Hopes

Visions

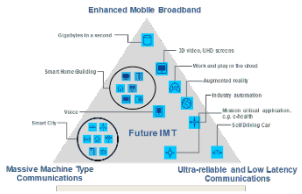
Rel-15 Standards

Non-Standalone (NSA) roll-out

Rel-16 Standards

5G CoreNetwork (SA) roll-out

today



filling the area

Experience

Integration

Enhancements

New Services

Rel-17 Standards

Rel-18/19/… Standards

Industrial Applications

Service Harmonization

Connecting the Planet

■ ■ ■

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Verticals, Operators & Vendors @3GPP

ABS
Airbus
Alibaba
BBC
Bosch

Convida
DLR
EBU
ESA
Eutelsat

Fraunhofer
IRT (Germany)
IPCom
ITRI
ligado networks

NHK
Novamint
Omesh
Philips
Sennheiser

Siemens
Suomen Virveverkko
Tencent
Thales
NL Police

TNO
Toyota
UIC
Volkswagen
ZITiS

AT&T // Avanti // Bell Canada // BT // CableLabs // CAICT // Charter // China Mobile // China Telecom // China Unicom // CISA // FirstNet

Hughes // Immarsat // Intelsat // KDDI // KPN // KT // LG U+ // NTT DoCoMo // Orange // Rogers // SES // SK Telecom // Softbank

Sprint // Telecom Italia // Telefonica // Telenor // Leonardo // Telia // Telstra // Telus // T-Mobile // Turkcell // UK HO // Verizon // Vodafone

Affirmed Networks // Apple // Blackberry // Broadcomm // CATT // Cisco // Ericsson // ETRI // Futurwei // Google // HP // Huawei

Infineon // Intel // Interdigital // Juniper // Kapsch // Kyocera // Lenovo // LG // Matrixx Sw // Mavenir // MediaTek // Mitsubishi

Motorola Mobility // Newtec // Nokia // OPPO // Samsung // Sandvine // Sharp // Sony // Spirent // Vivo // XiaoMi // ZTE

(this slide only names a subset of companies which attended September 2019 3GPP plenaries)

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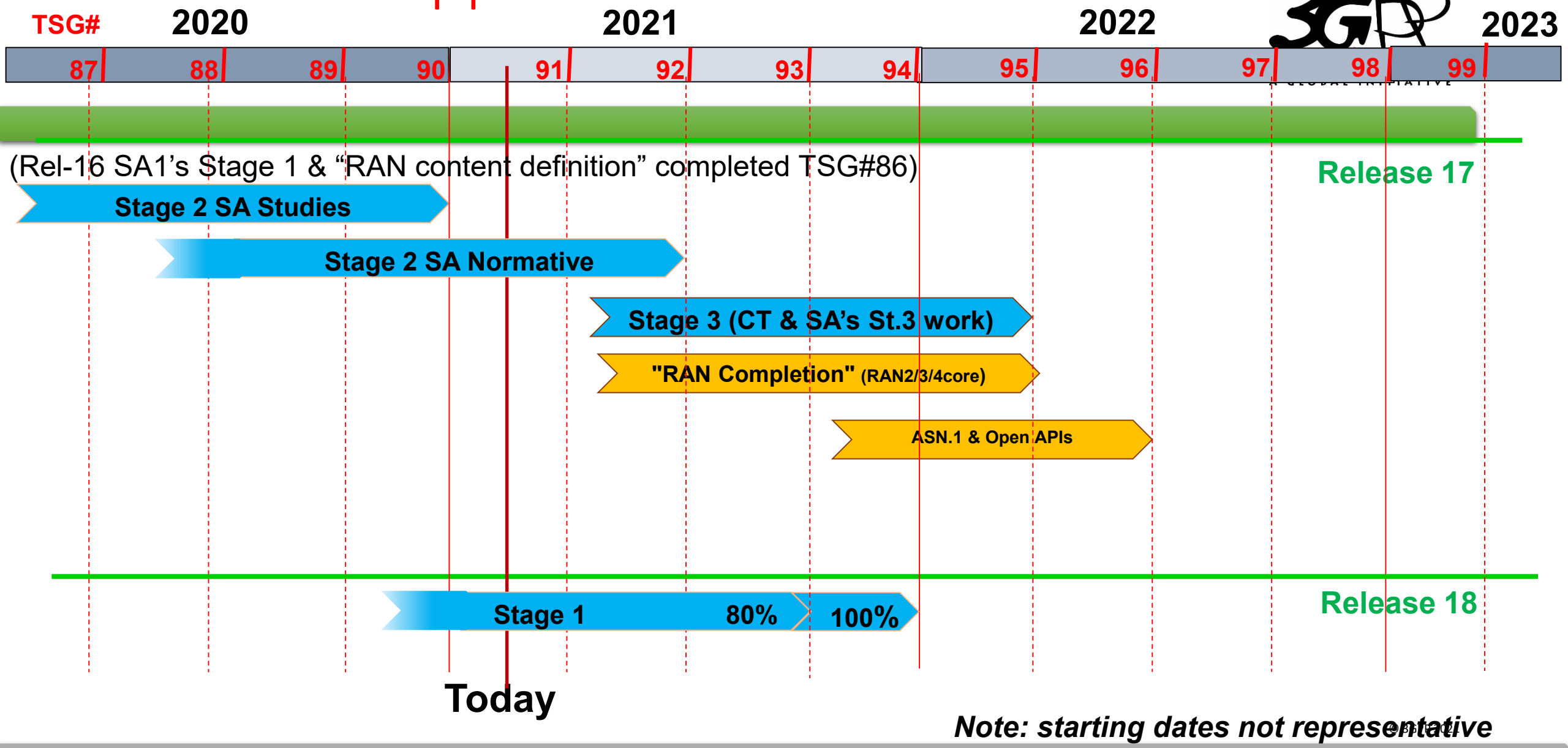
Approved Release 17 Timeline



Note: starting dates not representative

Enabling Services Everywhere

5G in

- Factories
- Trains
- Cars
- Drones
- Broadcast
- Hospitals
- Farms
- Utilities (Water, Energy, …)
- Robots
- Home Appliances

3GPP Rel-17 Work Items (selection)

- Network Slicing *
- Non-Public Networks *
- 5G via Satellites
- Proximity Services
- Edge Computing *
- Service Based Architecture *
- NB-IoT / 5G IoT *
- Multicast & Broadcast
- Network Automation *
- Location Services *

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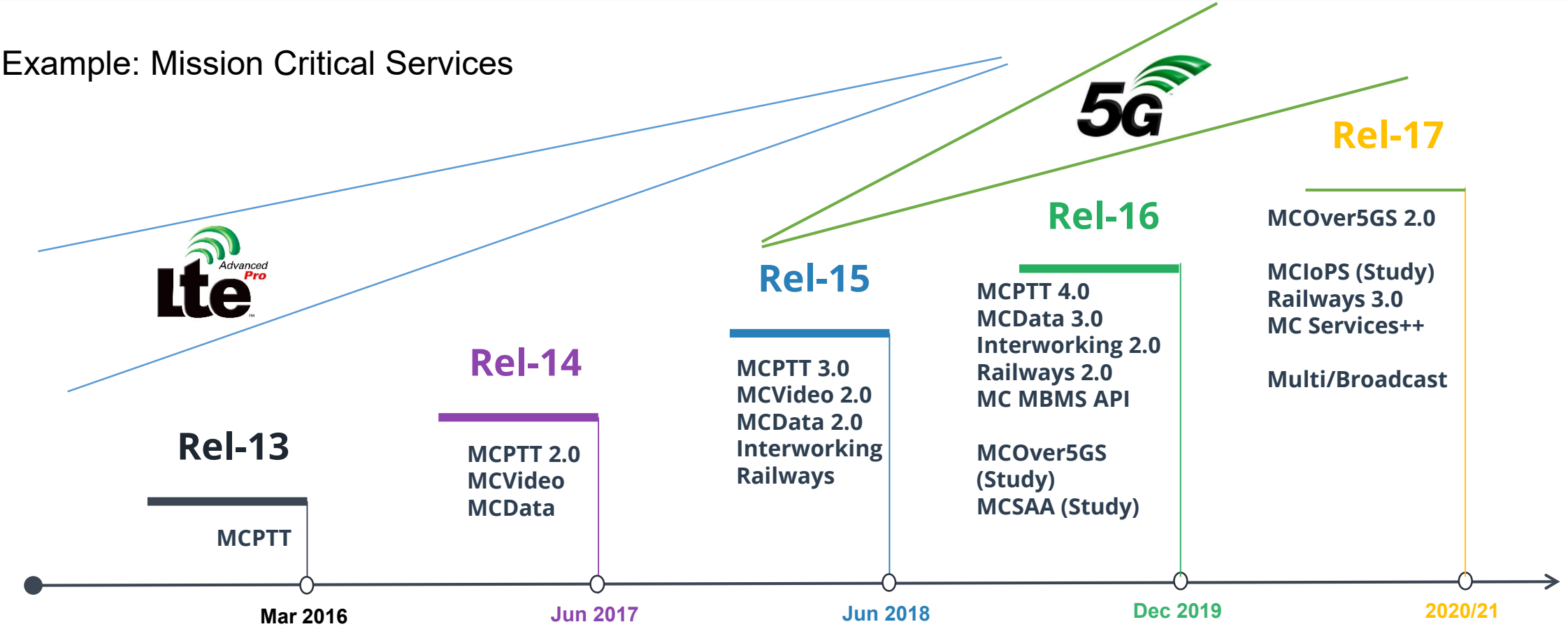
* enhancements of existing R15/R16 services

Service Evolution in 3GPP Releases

Example: Mission Critical Services



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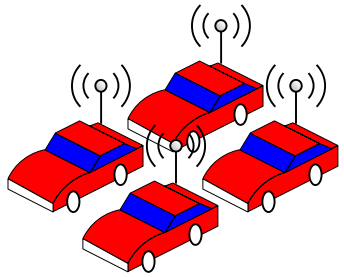
Cross-Industry Service Harmonization

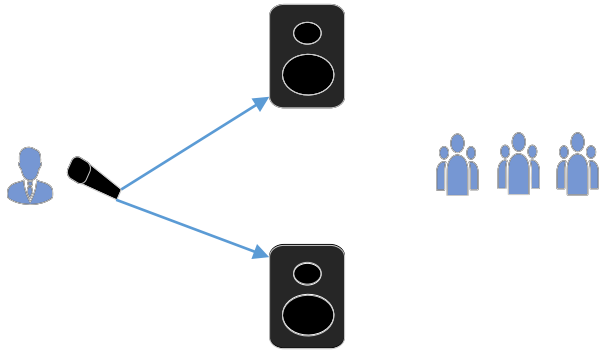
Car-to-Car (V2V)
e.g. platooning

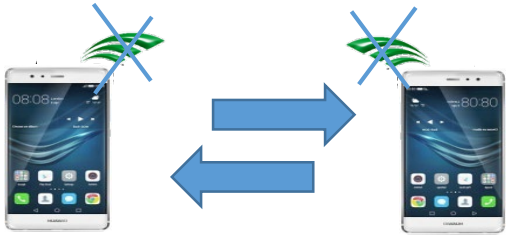


Sidelink / ProSe

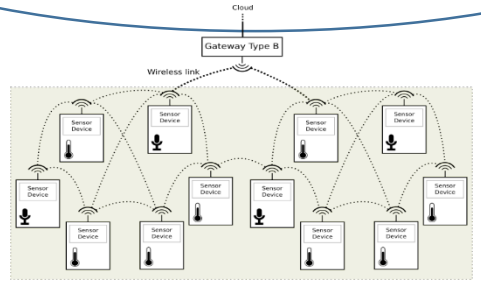
Diverse Scenarios & Applications
One Standardized Solution
5G drives Cross-Industry Harmonization

AV-Distribution
e.g. entertainment system





Off-Network
Device-to-Device



Multi-Hop Relays
e.g. Smart Home,
Containers

Ship-to-Ship

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Key Drivers for 5G Success

- standards are defined based on business and market needs
- vertical participation in standardization – from requirements to protocol definition
- global collaboration of all stakeholders
- consensus carried by the industry, enabling interoperable solutions
- iterative standards development, to keep pace with reality

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5G – What's Next

- new technologies
  - 6G, AI, …
  - much more service centric
- new services & industries
  - once a first set of coherent 5G services is rolled out, users will gain experience, "play with them", see more potential and ask for enhanced services
  - more industries will bring their requirements to 3GPP to make 5G meet their needs
- breaking the vertical silos on the service level
  - new services go beyond specific industries
  - 5G technology is common to all services, regardless for which industry
  - services will be open and communicate with each other
  - 5G will integrate services into bigger end-to-end business solutions

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Summary

- 3GPP in concert with many other standards organizations continuous to develop 5G beyond the initial ideas and visions
- vertical industry participation in standards is key
- services are built step-by-step, following the 3GPP release concept
- Rel-17 provides a huge list of enhancements and new work items, showing that 5G truly is on its way to become the main communication enabler across all industries
- 5G technology furthers service integration and flexible application building
- upcoming technologies, e.g. 6G, will further enable and accelerate this process

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Thank You!

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