

5G from the View of a Network Operator

The future is exciting. Ready?

Dipl.-Ing. Ingo Willmowski
Senior Customer Solution Architect
19.03.2019

vodafone business

Agenda

- Mission
- The way to 5G
 - Radio
 - Core
- Private Networks
 - Slicing
 - Dedicated Networks
- Summary

Vodafone 5G Mission

5G is **not only** a new generation in mobile communications, but will enable **many new applications**, that are **still a vision today** and to enable **completely new business potentials**.

Mission: Vodafone makes your business „5G ready“:

- Development of new business models through the use of intelligent systems and networking of machine/infrastructure and people → Strengthening of one's own competitive position
- Efficiency increase and thus cost reduction for your own profitability
- Individual Use Cases

Agenda

- Mission
- The way to 5G
 - Radio
 - Core
- Private Networks
 - Slicing
 - Dedicated Networks
- Summary

The rapid development of the network: with 5G starts the age of machine communication

Industry 4.0 Digitalization

Year	Network Generation	Key Features/Services
1991	2G	• Telephony • SMS • M2M
2001	3G	• Featurephone • Smartphone • Bilder • M2M
2010	4G	• Mobile Internet • Smartphones • Tablets • Fixed network substitution • M2M • Video
Heute 2020	5G	• Revolution of business models • Internet of Things • Highly reliable networks • Tactile Internet • Gigabit • Connected Devices/Machines/People

5G High Level Time Plan (without obligation)

Year	Key Milestones/Standards
2014	3GPP Rel. 12, ITU IMT-2020 (5G) Vision & Spectrum, Equipment SW/RW
2015	5G Research
2016	3GPP Rel. 13, ITU IMT-2020 (5G) Requirements
2017	3GPP Rel. 14, 5G Standardization Pilot Projects
2018	3GPP Rel. 15 (IMT-2020) Targeted Service, Techn. Evaluation
2019	3GPP Rel. 16 (IMT-2020) Targeted Service, Product Development
2020	3GPP Rel. 17, R15 1st/2nd NR, R16 NR
2021	5G Performance

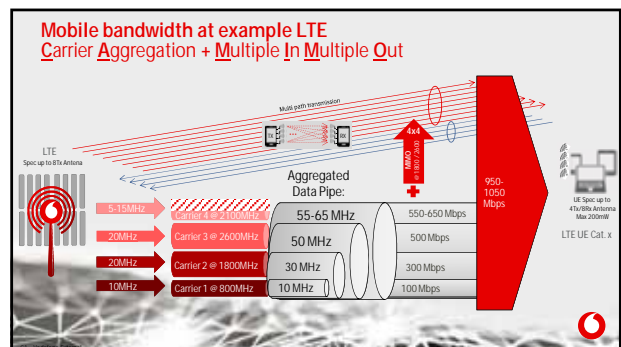
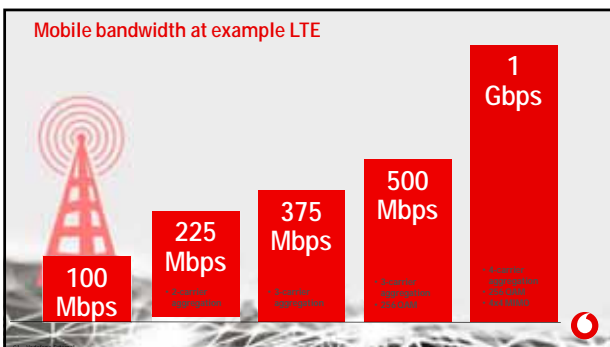
4G as bridge to 5G

- Two generations of technologies are closely linked.
- Both, 4G Evo and 5G, offer the possibility of higher speed and capacity, Real-time transmission and new possibilities in the area of IoT.
- 5G includes 4G Evo, 5G New Radio and a new 5G Core, supported by a transport and core architecture development.

Significant advantages of the 5G network lie in 3 dimensions

- 1 Millisecond*** Signal delay (radio latency)
- Mobile Edge Computing** Applications that are integrated in the network
- More demanding applications** e.g. robotics, virtual reality, smart cities
- 1Mio connections/km**** number of equipment in an area
- 10 Mbit/s/m** (DL)*** Transport capacity in an area
- 100 Mbit/s – 1 Gbit/s** 100 Mbit/s (DL) / 50 Mbit/s (UL)* data rate at the end customer
- 20 Gbit/s (DL) / 10 Gbit/s (UL)*** Maximum data rate (theoretical maximum)
- Individual Network Slices** Enable new services and products
- Individual customer networks** Properties adapted to customer requirements

*Standardization, 3GPP, R14, 2015
**Standardization, 3GPP, R14, 2015



Already established 4G technologies will be integrated into the 5G infrastructure, which will be operational by 2020

- 5G uses multiple technologies simultaneously.
- Technologies from 4G are transferred to 5G and useable.
- Example: **Narrowband IoT** is essential for the use of 5G and is already operational.

