TK941: 5G NR Fundamentals

Description

In this Course we explore the concepts of 5G wireless network technology, including features and capability requirements, the technologies that will deliver the core capabilities, and the impact on the customer proposition. We look holistically at the role of 5G in the technology roadmap and what it means for communication services providers.

Participants will build a comprehensive picture of 5G, as it stands, enabling them to make more informed technology and business decisions and contribute more effectively to successful strategy development.

Duration

3 Days

PREREQUISITES

General telecommunications background

Course Content

1. The need for 5G
2. 5G System requirements
   - 2.1. 5G Performance Requirements
   - 2.2. Bitrate
   - 2.3. latency
3. 5G potential use cases
   - 3.1. Extreme Mobile Broadband
   - 3.2. Massive Machine Communication
   - 3.3. Critical Machine Communication
   - 3.4. Usage scenarios of IMT for 2020 and beyond
4. 5G standards and roll-out
   - 4.1. 3GPP Specifications
   - 4.2. Key milestones for 5G research and developments
   - 4.3. Time line for 5G standards and roll-out
   - 4.4. 5G chipset and devices timeline

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5. 5G NR-RAN Architecture, interfaces and protocols
6. 5G NR Spectrum
7. Multiple access and Physical resources
   7.1. Multiple access scheme
   7.2. Multiple numerologies
   7.3. Physical resources
8. Bandwidth part operation
9. NR Frame structure
   9.1. NR Frame structure
   9.2. Slot and Mini-Slot
   9.3. Slot patterns
10. 5G NR Channels and Physical Reference Signals
   10.1. 5G NR Channels and Physical layer signals
   10.2. PBCH
   10.3. Synchronization signal
   10.4. PDCCH
   10.5. PUCCH
   10.6. PDSCH and PUSCH
   10.7. PRACH
   10.8. Physical reference signals
11. Physical-layer-processing chain
   11.1. Channel coding
   11.2. Modulation scheme
   11.3. Multi-antenna systems in NR
12. Massive MIMO and beamforming principles
   12.1. Active Antenna System
   12.2. Massive MIMO and Beamforming principles
   12.3. Multi-antenna technology in NR
13. Beam Management
   13.1. Beam based design
   13.2. Beam Management
   13.3. Beam Management in initial access
   13.4. Beam Management in connected state
   13.5. Beam measurements
   13.6. Beam recovery
14. Random access procedure
   14.1. Initial random access

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14.2. Random access procedure
14.3. Beam based PRACH
15. NR Mobility
16. Multi-RAT Dual Connectivity
16.1. Multi-connectivity in cellular networks
16.2. Multi-RAT Dual Connectivity in 5G
16.3. Network interfaces
16.4. Non-standalone Option 3X
16.5. Next steps in NR Rel.15 and beyond
17. 5G System QoS

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