

TK942: 5G NR Fundamentals

Target

Personnel who optimize 5G Radio Algorithm and Parameters

Personnel who optimize and monitor 5G Network Signaling

Duration

3 Days

Prerequisites

Good knowledge about 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
- 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
 - 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**