MCNS
Mobile | Cloud | Network Services

MCNS Training Program

5G RAN SA Signaling Analysis

5G RAN SA Signaling Analysis

5G RAN SA Signaling Analysis will offer delegates a good presentation and deep understanding on the signaling messages and procedures for 5G NR RAN SA scenario

COURSE REVIEW

This 5G training course leads the audience into a deep dive towards 5G Stand Alone (SA) signaling procedures. Participants will be able to study the **5G SA RAN signaling flows** with extensive analysis, based on log files extracts with intuitive exercises, and will exploit the overall idle mode and connected mode functionality.

Emphasis will be given to both **RRC signaling** as well as **MAC signaling analysis**. Moreover **5GC QoS signaling** and **IP flows** will be explained. Finally the course will discuss in details the handover call flows, properly presented **using signaling diagrams together with optimization procedures.**

AIMED AT

5G RAN SA Signaling Analysis is mainly aimed at a technical audience. It is suitable for technical professionals, **RAN engineers**, **RF engineers**, **system engineers**, **RAN optimization engineers**, **Research Institutes**, **defense sector**, who currently are or will be involved in 5G NR SA deep inspection and optimization or troubleshooting procedures, analyzing log files and trace logs.

Prerequisites: Those wishing to take this course should have a good and solid understanding **of 5G NR air interface, 5G NR RAN protocols** and **5G NR SA Operational Procedures.**

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Course Benefits for individuals (Professionals)

Understanding 5G SA RAN signaling procedures
Gain a competitive advantage by developing a greater understanding of **5G NR SA Log Analysis**
Explore the 5G NR SA signaling flows
Dive into 5G SA system information, **RACH procedures**, **DL** and **UL** data operation, **SA mobility** and beam management
Understand the **5GC QoS** and **E2E** service Quality
Practice on trace logs for signaling analysis, troubleshooting and/or optimization
Delegates will have an opportunity to explore the topic by **industry expert driven content**

Course Benefits for your Organization

•Equip organization engineers with the necessary knowledge to accomplish difficult and complex tasks related to **5G NR SA RAN optimization**, **troubleshooting and analysis**
•Keep ahead of competitors in offering well planned and high quality customers' 5G services
•Prepare for future network expansions and quality performance optimization
•Enhance your team's technical skills and understanding of **5G NR SA Log Analysis**
•**Real world case studies and scenarios are used** to ensure delegates can practically apply their knowledge

Training Format

Instructor-Led Training
On-Site Classroom: 4 days
Web delivered (Virtual): 4 days
Excellent and descriptive course material (pdf file) will be provided

Customer Tailored!

We can tailor the included topics, tech level, and duration of this course right to your team's technical requirements and needs

Section 1: 5G SA Network Support

Course Program Outline

Module 1: 5G SA Architecture review

- 3GPP standards for 5G Network
- 3GPP Rel 15 phase I and phase II overview
- 3GPP Rel 16 overview
- 5G NG Architectures
- 5G EPC to 5GC migration
- 5GC Service Based Architecture
- 5GC Reference point Architecture
- 5G NR SA option 2 review
- UE context in AMF (RRC Connected)

Section 2: 5G SA Idle Mode Procedures

Course Program Outline

Module 2: 5G SA idle mode

- 5G NR SA initial synchronization (Sss & Pss)
- 5G NR SA SSB measurements
- 5G NR SA initial cell selection criteria
- 5G NR SA cell reselection
- 5G NR SA priority based cell reselection

Module 3: 5G SA System Info

- 5G NR SA SSB
- 5G NR SA MIB content
- 5G NR SA CORESET0 determination
- 5G NR SA SIB1 determination and content analysis
- 5G NR SA broadcasted SIBx determination and content analysis
- 5G NR SA on-demand SIBx procedure
- Trace log analysis presentation

Section 3: 5G SA Connected Mode Procedures

Course Program Outline

Module 4: 5GC SA QoS

- 5GC QoS overview
- QoS IP flows vs. QoS Bearers
- 5GC QoS terms and definitions
- SDAP Protocol
- Explicit QoS flows to radio resources mapping
- Implicit (reflective) QoS flows to radio resources mapping
- Trace log analysis with exercise

Module 5: 5GC Security procedures

- 5G EPC authentication
- 5GC authentication
- 5GC Access Management
- 5GC identities and SUPI/SUCI
- 5GC authentication signaling flow establishment
- 5G NR SA NAS security
- 5G NR SA AS security
- Trace log analysis with exercise

Module 6: 5G SA Layer 3 procedures

- 5G NR SA NAS procedures
- 5G NR SA RRC protocol messages
- 5G NR SA RRC procedures
- 5G NR SA Initial Access RAN analysis
- 5G NR SA Initial Access E2E analysis
- 5G NR SA RRC Inactive state
- RRC Connected to Inactive transition
- RRC Inactive to connected transition
- Trace log analysis with exercise

Section 3: 5G SA Connected Mode Procedures

Course Program Outline

Module 7: 5G SA L2 procedures

- 5G NR SA PDCP protocol & procedures
- 5G NR SA RLC protocol & procedures
- RLC ACK/NACK ARQ procedure & parameters
- 5G NR SA MAC protocol
- 5G NR SA MAC RACH procedure (CBRA vs CFRA)
- 5G NR SA Msg1-Msg4 signaling flow & content analysis
- UL Time Alignment Maintenance

See next box

Module 7: 5G SA L2 procedures

Cont'd from previous box

- MAC on demand SIBx configuration
- MAC reconfiguration
- MAC Semi-persistent scheduling
- MAC PHR, BSR, SR reports
- MAC UL power control procedures
- Measurement gap handling
- MAC CA activation/Deactivation
- Trace log analysis with exercise

Module 8: 5G SA Radio Connection Supervision procedures

- 5G NR SA Inactivity
- 5G NR SA measurements
- 5G NR SA RLC radio link failure
- 5G NR SA synchronization problems
- Trace log analysis with exercise

Section 4: 5G SA mobility

Course Program Outline

Module 9: SA mobility

- SA A2, A3 events
- SA intra-frequency handover
- SA inter-frequency handover
- 5G SA inter-technology RwR
- 5G SA inter-technology handover
- Trace log analysis with examples

Module 10: SA beam management procedures

- p1, p2, p3 procedures
- Initial SSB beam sweeping
- Beam management parameters
- Initial Beam Selection Signaling analysis
- TX Beam refinement Signaling analysis
- RX beam refinement Signaling analysis

Module 11: SA beam switching procedures

- SSB and CSI-RS beam measurements
- Beam switching
- Beam failure handling
- Optimization and parameter configuration (Optional)
- Practical examples with full signaling analysis