

Course ID	Course Title
5GNSAST	5G Non-Stand-Alone Signaling Training
Course Duration	
3-4 days	
Aimed At	<i>5G Non-Stand-Alone Signaling Training</i> is aimed at technical professionals in the commercial, homeland security, or defense sectors.
Prerequisites	<i>5G Non-Stand-Alone Signaling Training</i> requires prior knowledge of LTE and 5G wireless technologies.
Related Courses	<ul style="list-style-type: none">• <i>5G New Radio Training</i> (5G-NR, 2-3 days)• <i>5G Wireless Training: Layers 1, 2, 3</i> (5G-TF1, 4-5 days)
Course in a Nutshell	In this course, <i>5G Non-Stand-Alone Signaling Training</i> , you will study the 5G NSA RAN signaling protocols including power up and system acquisition, RRC connection setup, SN split bearer setup with 5G NR, and DL/UL operations on 5G NSA NR. The discussion will include call flows and details of major messages and their key parameters. Important network procedures such as signaling connection establishment, registration, service request, and handover are discussed and presented using signaling diagrams together with optimization procedures.
Customize It!	We can tailor the included topics, tech level, and duration of <i>5G Non-Stand-Alone Signaling Training</i> to your team's technical requirements, extending also to MAC and physical layer signaling.
Outline	<ul style="list-style-type: none">• <i>5G Non-Stand-Alone Signaling Training: 5G NSA Overview</i><ul style="list-style-type: none">○ 5G NSA architecture○ 5G NSA gNB functional blocks and interfaces○ 5G core (5GC)○ MIMO TM1-10 and massive MIMO introduction○ 5G NSA LTE & NR measurements○ EN_DC (option 3x) description○ EN_DC split bearer setup, maintain, release• <i>5G Non-Stand-Alone Signaling Training: 5G NSA L3 Signaling</i><ul style="list-style-type: none">○ 3GPP LTE/5G NAS signaling for (option 3x) EN_DC architecture

- 3GPP LTE/5G RRC signaling procedures and services
- 3GPP 5G RRC signaling messages
- 3GPP 5G RRC Information Elements (IE) and parameters
- BCCH SIB messages indicating EN_DC cell support
- SIB parameters description for 5G cell support
- 3GPP EN_DC service setup, split bearer setup, release signaling flow
- Practical exercises: RRC signaling log files analysis
- *5G Non-Stand-Alone Signaling Training: 5G NSA L2 Signaling*
 - 3GPP PDCP protocol procedures and services
 - 3GPP RLC protocol procedures and services
 - 3GPP MAC protocol procedures and services
 - 3GPP MAC scheduler
 - LTE random access analysis
 - EN_DC random access analysis
 - 5G NR HARQ procedures
 - 5G NR LDPC and polar coding
 - 5G NSA NR MIMO-OFDM mapping
 - 5G NSA & SA NR mMIMO-OFDM mapping (analog and digital beamforming)
 - Practical exercises: L2 MAC signaling log files analysis
- *5G Non-Stand-Alone Signaling Training: 5G NSA Mobility*
 - 5G NSA EN_DC mobility overview
 - 5G NSA re-establishment (EN_DC splitting bearer to LTE MCG bearer)
 - 3GPP re-establishment parameters – related discussion for vendor specific parameters
 - Practical exercises: EN_DC split bearer setup and EN_DC split bearer to LTE MCG bearer signaling log files analysis
- *5G Non-Stand-Alone Signaling Training: 5G NSA Optimization and Troubleshooting*
 - 5G NSA EN_DC split bearer failure and Optimization
 - Failure analysis and related parameters
 - Practical exercises: split bearer failure signaling log files analysis
- *5G Non-Stand-Alone Signaling Training: Parameter configuration and Optimization discussion*
- *5G Non-Stand-Alone Signaling Training: Wrap-up: Recap and Discussion*

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