MCNS
Mobile | Cloud | Network Services

MCNS Training Program

LTE (4G) RAN Network Optimization

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LTE (4G) RAN Network Optimization will offer delegates a good presentation and deep understanding on the LTE RAN network optimization process, including signaling analysis, parameter configuration and LTE RAN procedures

COURSE REVIEW

This LTE(4G) training course leads the audience into a deep dive **towards LTE RAN network** optimization procedures. Course content is split into several sectors including LTE accessibility/connection optimization, **LTE MBB** service retainability optimization, LTE RAN throughput optimization and **LTE RAN mobility optimization.** Participants will be able to study or review **the LTE RAN signaling** flows with extensive trace log analysis. They will exploit the overall accessibility/connection setup, service setup and release, mobility as well as throughput performance.

This course will also discuss in details the related protocol layer configuration parameters as well as the corresponding proposed KPIs either from network perspective or from drive test analysis perspective. Finally it is worth mentioning **that this course will be also supported with trace log file analysis and exercises.**

AIMED AT

LTE (4G) RAN Network Optimization is considered to be a valuable companion and expertise topic mainly for **Radio Network Planners** and **Radio Network Optimizers**, technical professionals, **RAN engineers**, **RF engineers** whose daily job is to plan and **optimize the LTE RAN network performance**. It is considered also to be valuable **for 5G System Architects**, **3GPP consultants**, **5G R&D Researchers**, **5G System Analysts** and **5G network consultants,** contributing into further insight to the LTE RAN technology's potentials and performance.

Prerequisites: Those wishing to take this course should have a very good and solid understanding of **LTE air interface**, **LTE RAN signaling** and subsequent protocols with relevant **LTE RAN Operational Procedures**.

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Course Benefits for individuals (Professionals)

- Understanding **LTE RAN network optimization** procedures associated with relevant signaling flows and procedures
- Gain a competitive advantage by developing a greater understanding of **LTE RAN Signaling Analysis** for service integrity, throughput, accessibility and mobility performance optimization.
- Explore the LTE RAN signaling flows from procedural perspective.
- Deep dive into **LTE RAN RACH** procedures, DL and UL data performance and network capacity.
- Delegates will have an opportunity to explore the topic **by practical and industry expert driven content.**

Course Benefits for your Organization

- Equip organization engineers with the necessary knowledge to accomplish the most difficult and complex tasks related to **LTE RAN network optimization and troubleshooting**.
- Keep ahead of competitors in offering well planned and high quality customers' LTE network services (**which could be justified by proper benchmarking analysis**)
- Prepare for future network expansions and quality performance optimization
- Enhance your team's technical skills and understanding of **LTE RAN Signaling Analysis** and optimization processes
- **Real world case studies and scenarios are used** to ensure delegates can practically apply their knowledge

Training Format

Instructor-Led Training
On-Site Classroom: 3 days
Web delivered (Virtual): 3 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: LTE RAN Network requirements

Course Program Outline

Module 1: LTE RAN Architecture review

- 3GPP LTE standards
- LTE EPC Architecture
- LTE RAN architecture

Module 2: LTE RAN requirements review

- Frequency bands and Channel Bandwidth
- Licensed TDD or FDD – vendor specific
- LTE TDD patterns and special slots
- LTE TDD configuration
- MIMO and mMIMO antenna panels
- UL/DL spatial multiplexing – vendor specific
- UL/DL TM8-TM10 beamforming
- Vendor specific SU-MIMO or MU-MIMO
- Capacity - RRC connected user licenses
- Cell peak throughput supported (Baseband unit licenses)
- LTE RAN carrier aggregation support
- LTE RAN unlicensed band carrier aggregation support

Module 3: LTE idle mode requirements

- LTE UE measurements (CRS, DMRS and CSI-RS)
- Idle mode behavior review
- Cell search procedure
- Synchronization
- SIB1 & SIB2 detection probabilty vs. SINR
- Initial Cell Selection optimization
- Initial Cell Reselection optimization
- Parameter check (Priority, Inter RAT, etc)
- LTE RAN Optional Features
- Trace log analysis presentation

Section 2: LTE RAN Connectivity Procedures

Course Program Outline

Module 4: LTE Accessibility optimization

- LTE RAN accessibility call flow analysis
- LTE RAN RRC connection establishment success rate (KPI)
- LTE RAN authentication and security analysis
- LTE RAN Bearer establishment KPI
- LTE RAN call flow and failure analysis
- Trace log analysis presentation

Section 2: LTE RAN Connectivity Procedures

Course Program Outline

Module 5: LTE RACH accessibility optimization

- LTE RACH parameters analysis
- LTE RAN Access common issues
- LTE RACH failure analysis
- LTE RACH KPI analysis
- Random Access successful probability performance analysis
- msg1 Detection probability vs. SINR
- msg1 preamble accessibility vs. Cell capacity
- msg2 Detection probability vs. SINR

See next box

•Module 5: LTE RACH accessibility optimization

(cont'd from previous box)

- msg3 Detection probability vs. SINR
- msg4 Detection probability vs. SINR
- RACH preamble pattern vs. Cell range
- Random Access coverage improvements
- TDD frame structure optimization
- TDD special slot vs. Cell range
- LTE RACH successful probability estimation vs. cell range and users
- LTE RACH performance excel calculator exercises

Section 3: LTE RAN Service retainability Optimization

Course Program Outline

Module 6: LTE UE context release Analysis

- Common Reasons for abnormal service release
- LTE MAC parameter description
- LTE MAC and RLC parameter description
- RLC failure and parameters optimization
- LTE Radio connection supervision (RCS) in 3GPP
- Physical layer RCS parameters and optimization
- LTE release signaling flow analysis
- LTE release KPIs
- Trace log analysis with examples

Section 4: LTE throughput Optimization

Course Program Outline

Module 7: LTE RAN parameter analysis

- LTE PDCP parameters optimization
- LTE PDCCH parameter optimization
- LTE PDSCH parameter optimization
- LTE PUCCH parameter optimization
- LTE PUSCH parameter optimization
- Trace log file analysis
- Excel calculator with parameter configuration vs. throughput examples

Section : LTE throughput Optimization

Course Program Outline

Module 8: LTE RAN throughput estimations

- Factors & Prerequisites to maximize LTE Throughput
- Maximum cell throughput estimation (excel file)
- Link Adaptation and scheduler performance
- Time/frequency scheduling parameters
- LTE RB Throughput vs. SINR (Vendor specific curves)
- Practical Drive Test analysis
- LTE RAN average Throughput Calculation (excel file)

See next box

•Module 8: LTE RAN throughput estimations

(cont'd from previous box)

- LTE cell edge user maximum throughput estimation (excel file)
- Throughput estimation from Logfile analysis
- RLC MAC Throughput KPIs
- Scheduler algorithm and configuration
- Scheduler Optional features – Vendor Specific
- PDCP throughput and data volume KPIs

Section : LTE throughput Optimization

Course Program Outline

Module 9: LTE low throughput troubleshooting

- Troubleshoot low DL/UL NR throughput
- Number of Grant and RB Troubleshooting
- Low MCS Troubleshooting
- High BLER Troubleshooting
- Low MIMO rank Troubleshooting
- LTE Carrier Aggregation optimization
- Cross-Link Interference detection and solution (TDD frames optimization)
- DL/UL unbalance

See next box

•Module 9: LTE low throughput troubleshooting

(cont'd from previous box)

- UE power saturated
- Troubleshoot interference
- Check LTE/5G NR FDD/TDD frequency planning
- TDD Adjacent Channel Interference
- NR to LTE TDD frame matching
- LTE RAN to transport QoS mapping
- S1 transport network capacity
- Trace log file analysis

Section 5: LTE mobility optimization

Course Program Outline

Module 10: LTE mobility planning

- LTE A2, A3, A5 and B1/B2 events
- Intra-frequency and inter-frequency handover KPIs
- LTE mobility failure analysis
- Trace log analysis with examples