Microtel
Training institute

LTE SIGNALING

CURSUS:
TÉLÉCOMS

CODE DE LA FORMATION:
MTI-TLC-LTES

DURÉE:
3 JOURS

La formation à la signalisation LTE RAN est une formation qui couvre les aspects de signalisation de la couche de protocoles LTE, y compris les protocoles de signalisation LTE couche 2 (L2) et couche 3 (L3) comme spécifié par 3GPP Evolved Radio Access Network (E-UTRAN). Les participants découvriront les protocoles L3, l'interface radio, l'interface S1 et les aspects de signalisation L1. D'autres sujets tels que la planification et la fiabilité (ARQ et HARQ) sont également abordés.

PRÉREQUIS:
Connaissances basiques des technologies RAN

PUBLIC:
Ingénieurs RAN, Ingénieurs d'optimisation Radio

OBJECTIFS:
- Avoir une connaissance approfondie des couches de protocole L1, L2 et L3
- Avoir une connaissance approfondie des mécanismes ARQ et HARQ
- Avoir une connaissance approfondie des procédures de signalisation

CONTENU:
1. E-UTRAN Introduction
1.1. Nodes, interfaces, areas, bearer concepts and identity
1.2. E-UTRA frequency bands and UE capabilities
2. E-UTRAN Protocol Architecture
2.1. Logical, Transport and Physical channels
2.2. X2, S1 and S11-interface protocol stacks
3. E-UTRA Layer 3 Protocols
3.1. NAS protocols and procedures
3.2. Idle mode mobility mechanisms
3.3. NAS security mechanisms
3.4. RRC procedures
3.5. UE states and state transitions
4. Packet Data Convergence Protocol
4.1. PDCP functionality for Control and User Plane
4.2. PDCP security mechanisms, including key derivation functions and security algorithms
4.3. PDCP ARQ functionality at handover
4.4. PDCP PDU format for Data and Control
5. Radio Link Control Protocol
5.1. RLC modes and associated PDU formats
5.2. RLC ARQ mechanism

5.3. RLC control procedures and control PDUs
6. Medium Access Control Protocol
6.1. MAC functionality in UE and eNodeB
6.2. MAC PDU formats for data transmission
6.3. MAC Control PDUs
7. E-UTRA Scheduling and HARQ
7.1. Scheduling Requests and Buffer Status reports
7.2. Dynamic scheduling for Non Real-time services
7.3. Persistent scheduling for Real-time services
7.4. Implicit and explicit UL grants
7.5. Hybrid-ARQ type I, II and III
7.6. Incremental Redundancy and selection of Redundancy Version through rate matching
7.7. HARQ processes and ACK/NACK timing
8. E-UTRA Physical Layer
8.1. E-UTRA refresh: modulation, OFDM basics and channel-to-resource mapping
8.2. UL and DL physical channels for data and L1/L2 control signaling
8.3. Mapping of control channels onto CCE and REG
8.4. PDCCH and PUCCH formats
8.5. PDCCH candidates and search spaces
8.6. Determination of MCS and TB size
8.7. Channel coding for the DL-SCH, including Turbo coding and HARQ rate matching
9. S1 and S11-Interfaces
9.1. S1 Application Protocol (S1AP) procedures
9.2. eGTP
9.3. EPS QoS mechanisms
10. X2-Interface
10.1. X2 Application Protocol (X2AP) procedures
10.2. Data forwarding and in-order delivery of data PDUs at handover
11. Interworking
11.1. Interworking with legacy R8 or pre-R8 3GPP networks
11.2. Interworking with non-3GPP access networks
11.3. LTE CS domain Interworking
12. E-UTRAN Signaling Procedures
12.1. The random access procedure
12.2. RRC connection establishment
12.3. Attach procedure, including establishment of Default EPS bearer and security associations.
12.4. Dedicated EPS bearer establishment and interaction with PCC
12.5. Handover with data forwarding via X2-interface
12.6. Handover with data forwarding via S1-interface
12.7. Inter-RAT handover with data forwarding via the S12-interface (Direct Tunnel