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LTE Advanced E-UTRAN R10/R11

LTE Advanced E-UTRAN R10/R11 course focuses on **differences** between E-UTRAN R8/R9 and E-UTRAN R10/R11 also known as LTE-Advanced. The training covers a functional description of all major R10/R11 enhancements together with the required signalling protocols modifications.

Target audience

The course is intended for E-UTRAN protocol stack developers, experienced network engineers, network tuning staff and anyone with network experience, who needs deep technical knowledge on functionality of E-UTRAN R10/R11.

Training contents

- **Introduction**
  (4G/IMT-Advanced requirements, LTE-Advanced requirements, R10/R11 features' overview),
- **Carrier aggregation**
  (general concept, backward compatibility, intra-band contiguous, intra-band non-contiguous and inter-band carrier aggregation, operating bands, terminal capabilities, coverage scenarios, primary and secondary component carriers/cells, protocol impact, secondary cell activation/deactivation, multiple timing advance values, regular and cross-carrier scheduling, cross-carrier scheduling in HetNet, periodic and aperiodic SRS, uplink multi-cluster transmission, simultaneous PUCCH and PUSCH transmission, handover scenarios and new reporting events),
- **Multi-antenna solutions**
  (R8/R9 and R10/R11 MIMO comparison, beamforming, backward compatibility, protocol impact, DL MIMO: transmission mode 9 and 10, DCI format 2C, Channel State Information Reference Signals – CSI-RSs, UE-specific Reference Signals – URSs, antenna ports mapping to physical antennas, UL MIMO: transmission mode 1 and 2, DCI format 4, Orthogonal Cover Codes – OCC, UL MU-MIMO enhancements),
- **eNB Relay**
  (general concept, backward compatibility, inband and outband relay, architecture, S1 and X2 U/C-plane protocol aspects, radio protocol aspects, RN start-up and reconfiguration procedure, E-RAB activation/modification, physical layer modifications, Uu/Un interface time multiplexing, R-PDCCH channel, O&M, relay versus repeater),
- **Enhanced Inter-Cell Interference Control (eICIC)**
  (Heterogeneous Network - HetNet, interference problems, Almost Blank Subframes - ABS, X2 load indication procedure, UE measurements),
- **Coordinated Multi-Point transmission (CoMP)**
  (evolution of the bases station architecture, Centralised-RAN architecture, fronthaul and backhaul requirements, DL CoMP: Joint Transmission - JT, Dynamic Point Selection - DPS / muting, Coordinated Scheduling/Beamforming - CS/CB, Dynamic Cell Selection - DCS versus handover, UL CoMP: Joint Reception – JR, Coordinated Scheduling and Beamforming - CS/CB, CoMP sets, CSI reporting),
- **SR-VCC enhancements**
  (Attach and TAU procedures for SR-VCC, reversed SR-VCC, Single Radio Video Call Continuity – vSR-VCC procedures),

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- **EPDCCH, DCI & UCI**
  (EPDCCH, DL control signalling capacity, DL control signalling performance, EPDCCH transmission method, MIMO and CoMP, EPDCCH structure, DCIs, UCIs, PUCCH format 1b CS, PUCCH format 3).

Prerequisites

The participants should have attended "Signalling in E-UTRAN/LTE" course or should have the equivalent knowledge.

Training method

Lecture

Duration

1 day

Level

Advanced