Location

CCG-Center, Technologiepark Argelsrieder Feld 11, D-82234 Wessling-Oberpfaffenhofen

A list of nearby accommodations, a description of the location and hints for travel will be mailed to the participants upon registration. Please make your own hotel accommodation.

Fee

EUR 1,790.--

CCG is a non-profit organisation, exempt from value-added tax in Germany. For foreign seminar locations the local tax regulations are applicable. Members of CCG receive a discount of 10 %. Where several employees from one company / office apply for the same course, each participant will receive a discount of 10 %. For students special rates are available on request. Discounts cannot be combined. Please pay by non-cash means after receiving the invoice.

Registration

Please write or call (up to 3 weeks before the seminar) to Carl-Cranz-Gesellschaft e.V.; P.O. Box 11 12, D-82230 Wessling Tel. +49 (0) 8153 / 88 11 98 -12, Fax -19, E-Mail: anmelden@ccg-ev.de

Internet: www.ccg-ev.de

After receipt of registration, a confirmation letter will be sent.

Further Information

For more information on the content of the seminar please contact Eiko Seidel, Nomor Research GmbH Brecherspitzstr. 8, D-81541 Munich Tel. +49 (0) 89 / 9789-8007, E-Mail: seidel@nomor.de

Substitutions and Cancellations

Substitutions may be made at any time. Cancellation of an accepted registration made up to 7 days prior to the start of the seminar is subject to a EUR 25.-- administrative fee. Participants canceling after that date are responsible for the entire seminar fee. CCG reserves the right to cancel a course up to 10 days before the course’s beginning in case of low number of participants or for other significant reasons. Furthermore, CCG reserves the right, against the announcement in the programme, to possibly replace at short notice a lecturer and also the lecturer’s topic. Any claims for damages shall be excluded.

Who Should Attend

The course is meant for engineers already working on LTE that want to get a detailed understanding of the evolution of LTE towards LTE-Advanced.

Focus

LTE networks are in commercial operation around the globe. Still wireless broadband internet access, providing IP based services to mobile users, continues to grow rapidly worldwide. Therefore 3GPP has been working on further enhancements of the LTE air interface. This new standard is called LTE-Advanced and fulfills all requirements as set by the ITU-R for 4G. Already today it has been acknowledged in the industry that LTE-Advanced will be the dominating 4G Technology globally.

LTE Advanced promises to deliver peak data rates of up to 1 Gbps in stationary downlink and up to 500 Mbps in the uplink and further improves spectral efficiency and fairness. For new fragmented spectrum it increases flexibility, while keeping backward compatibility to LTE networks and terminals. By means of carrier aggregation LTE Advance can operate in bandwidths up to 100 MHz in contiguous or non-contiguous frequency allocations. After a recap of the LTE radio access scheme, the protocol stack and the architecture, the course will step by step introduce newly standardized LTE-Advanced enhancements. Among others, these include carrier aggregation, uplink and downlink multi-antenna enhancements, uplink multi-cluster transmission, enhanced Inter-cell Interference Coordination, Coordinated Multipoint Transmission as well as LTE Advanced relays. Although not specific to Release 10, a focus of this course will be the operation of future heterogeneous networks, including LTE Home Base Stations (HeNB) and small cells, as well as network enhancements for cost savings during deployment and operation. Various functions of Self Organising Networks (SON) and Minimization of Drive Tests (MDT) are introduced.

Requirement

Background of LTE is essential for attending this advanced course. If you do not have sufficient background, please attend the LTE Technology Overview training beforehand.

Language

English

Course Book

Each attendant will be provided with detailed course material in English.

Scientific Coordination

Eiko Seidel
Nomor Research GmbH, Munich
Seminar Outline

Monday, October 26, 2015
09.00 – 17.00

09.00 – 09.15 Welcome, Organisation
E. Seidel

09.15 - 10.45 LTE Review Physical Layer
E. Seidel
OFDM Radio Access, Scheduling, Link Adaptation, Adaptive Coding Modulation, HARQ, MIMO, Reference Symbols, Up- and Downlink Frame Structures

11.00 – 12.30 LTE Review Protocol/Architecture
E. Seidel
Evolved Packet Core Architecture, Control Plane, User Plane Architecture, Random Access, RRC Connection Setup, Initial Attach, Handover, Release 9 Enhancements

13.30 – 15.00 LTE Advanced Introduction
E. Seidel

15.30 – 17.00 Self-Organising Networks I (SON)
E. Seidel

Tuesday, October 27, 2015
08.30 – 16.30

08.30 – 10.00 Self-Organizing Networks II
E. Seidel
Mobility Robustness Optimization, X2 Radio Failure and Handover Report Indication, Too Early and Too Late Handover, Handover to Wrong Cell, eNB Energy Saving, On/Off Switching of Cells, Cell Probing

10.30 – 12.00 Home Base Stations / Femto-cells
E. Seidel
Home eNB Architecture, Deployment Options, Interference Issues, Access Control, CSG Management, HeNB Identification, Mobility Issues, SIB Signalling, PCI Split for HeNBs, Autonomous Cell Search, S1 and X2 eNB Handover with Gateway

13.00 – 13.45 LTE-Advanced Relays
E. Seidel
Relay Modes, Relay Architecture, Interfaces, Deployment Options, Scheduling, In- and Outband Backhaul, Un Interface, R-PDCCH Control Channel

13.45 – 14.30 Heterogeneous Networks (HetNet)
E. Seidel
HetNet Introduction, Co-Channel Deployment, HetNet Interference Issues, Range Expansion, Inter-Cell Interference Coordination (ICIC), PDCCH Robustness

15.00 – 16.30 Enhanced Inter-cell Interference Coordination (eICIC)
E. Seidel
Almost Blank Subframes, X2 Coordination, RRM and CSI Measurement Restrictions, Further Enhanced ICIC, CRS Interference, MBSFN Subframe Configuration, UE Interference Canceller, Dedicated UE SIB Signalling

approx. 17.30 Social Event
Guided tour through the city center of Munich (voluntary)

Wednesday, October 28, 2015
08.30 – 16.30

08.30 – 10.00 Carrier Aggregation (CA)
E. Seidel
Multi-Carrier Operation, CA Principles, Downlink Control Channel Issues, Carrier Indicator Field, Band Combination Types, PCell versus SCell, PCell Change, SCell Activation/Deactivation

10.30 – 11.15 Advanced HetNet Carrier Aggregation
E. Seidel
HetNet using Carrier Aggregation, Multi-Site Carrier Aggregation using Centralized Architecture, Enhanced Uplink Control Channel (ePDCCH), Uplink Multiple Timing Advance

11.15 – 12.00 Enhanced LTE-A Uplink Transmission
E. Seidel
Uplink Carrier Aggregation, Uplink Multi-Cluster Transmission, Simultaneous Uplink Control Information

13.00 – 14.30 Enhanced MIMO Transmission
E. Seidel
Enhanced Dl Spatial Multiplexing (SU-MIMO), Dedicated Reference Symbols, Enhanced DL Multi-User MIMO and Beamforming, Channel State Information Reference Symbols, Uplink MIMO Transmission

15.00 – 16.30 Coordinated Multipoint Transmission (CoMP)
E. Seidel

Thursday, October 29, 2015
08.30 – 15.00

08.30 – 09.30 Minimization of Drive Tests (MDT)
E. Seidel
UE Measurements and Measurement Reports, Immediate and Measurement Reports, MDT Architecture, MDT Configuration and Procedure, Network Initiation

09.30 – 10.00 UE Capabilities
E. Seidel
Capability Exchange, LTE-A UE Capability Classes, Band Combinations

10.30 – 12.00 Other Advanced Features
E. Seidel
Machine Type Communication (MTC), Access Class Barring and Network Overload Control for M2M, Extended Access Barring, Diverse Data Applications, UE Power Preference Indicator, Interference Avoidance for In-Device Coexisting

13.00 – 15.00 Outlook to the Future of LTE-A and 5G
E. Seidel
LTE-A Release 12 Outlook, Ultra Dense Small Cells, Frequency Separated HetNets, RRC Diversity and Dual Connectivity, Potential Architecture Enhancements, UE Proximity Detection, Device to Device Communication, New Access Schemes, New Carrier Type, 3D Beam Forming and Active Antenna Arrays

Lecturer:
Eiko Seidel
Nomor Research GmbH, Munich

Additional Course
- "Future LTE Public Safety Systems", 20.–22.10.2015
  (Code DK 2.27)