Understanding

LTE - Long Term Evolution - in Depth

The Next Step in Mobile Evolution in Detail

Course Description

With 3G mobile technology already rolled out by over 200 operators in over 80 countries, preparations are well under way to create the next generation of mobile technology.

The UMTS standards body, 3GPP, has been following its plan to achieve ambitious goals for the future of mobile communications.. This is Long Term Evolution LTE. Work on this is contained in Release 8 of the 3GPP Specifications. A headline goal is 100 Mbps in the downlink and 50 Mbps on the uplink, representing roughly a ten-fold improvement on HSDPA today.

This in-depth course covers all aspects of LTE, from the environment and forces shaping it, the physical changes involving MIMO antennas and the move from CDMA to OFDM, through the logical air interface channels to the necessary architectural and core network changes.

Some specific aspects such as security and handover to non-3GPP technologies are included.

LTE is not the end of the story and LTE Advanced has reached the level of stable standards at Release 10. The enhancements of LTE Advanced are discussed.

Students Will Learn

- **Understand the Mobile Arena and the Goals of LTE**
- **Appreciate the Evolutionary Path towards LTE**
- **Be Aware of Major Air Interface Features including SC-FDMA**
- **Gain an Understanding of the Radio Channels at both Physical and Logical Levels.**
- **Know the Principles of LTE Security.**
- **Appreciate the Next Stage of Development, True 4G LTE Advanced**
- **And More...**

Target Audience

Anyone needing an in-depth overall understanding of LTE (Long Term Evolution). Such attendees would be employed or contracted to operators, manufacturers, integrators or regulators. Anyone requiring to focus on the air interface or core network are directed to the specific courses for these topics.

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Prerequisites

The course assumes some familiarity with existing UMTS systems.

Course Outline

Module I: Goals of LTE

Performance Aims and Objectives

Capability Goals

System Performance Aims

Deployment Requirements

Architecture and Migration Requirements

Complexity Targets

Module II: Evolution of UMTS
UMTS Architecture

HSPA Directions of Change Antennas, Modulations and Common Channels

Problems with the UMTS Approach

LTE Architecture

Module III: Physical Layer: Moving Antennas On
MIMO Concepts

Space Time Diversity Coding and Spatial Multiplexing

Module IV: Physical Layer Downlink : Orthogonal Frequency Division Multiplexing OFDM
Proposed use in LTE

Changes to Modulation

Turbo Coding Refresher

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Module V: **Physical Layer Uplink: SC-FDMA**

Overall Description

Benefits and Capabilities

Module VI: **Physical Layer: Radio Interface Channels**

Evolved UMTS Terrestrial Radio Access (E-UTRA)

Radio Channels and their Usage

Module VII: **Layer 2: MAC, RL, PDCP, etc.**

MAC Sublayer

RLC Sublayer

PDCP Sublayer

RRC

E-UTRAN Entities

ARQ and HARQ

Mobility Management

Scheduling and Rate Control

Module VIII: Core Network Aspects

LTE Architectural Concepts

SAE System Architecture Evolution

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Reference Points:

The S Series of Reference Points

The Application Protocol Interface X2

Handover and Mobility to Non-3GPP Technologies

Module IX: Security Aspects

Principles

Access Security Management Entity (ASME)

Module X: **LTE Advanced**

Aims

Spectrum Aggregation

MIMO Advances

Delivery Method

Instructor-Led with numerous case studies and exercises.

Equipment Requirements

(This apply's to our hands-on courses only)

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

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Course Length

3 Days

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