

# UMTS/HSPA+ Overview

Course Number: UMTS3000-01EN | Duration: 4 Days

## Target Audience

- UE & UTRAN Development Staff
- Network Engineering & Optimisation Personnel
- System Design Engineering Staff, IOT & System Test Engineers
- Technical Sales and Marketing people

## Prerequisites

- None

## Learning Objectives

After completing this course, the students will be able to:

- Explain the differences between scrambling and spreading and what consequences of 1/1 re-use.
- Judge the performance improvements of HSDPA, HSUPA, MIMO and dual carrier vs. Rel. 99 DCH.
- Understand the relationship between SIR-Target, BLER and required power resp. Noise Rise.
- Describe the tasks and functions of RNC and NodeB for Rel. 99 and high speed evolution.
- Know the differences between SRB's and RAB's and the various services supported by UMTS.

## Course Outline

1. Radio Frequency Fundamentals
  - 1.1 Frequency Bands for UMTS
  - 1.2 Coverage & Pathloss
  - 1.3 DS-CDMA ↔ WCDMA
  - 1.4 Modulations & Physical Bit Rates
2. WCDMA Basics
  - 2.1 Network Topology
  - 2.2 Chiprate & Processing Gain
  - 2.3 Forward & Backward Error Correction
  - 2.4 Noise Rise & Near Far Effect
  - 2.5 UL & DL Resources in (W)CDMA
3. Spreading Codes
  - 3.1 OVSF Tree
  - 3.2 Spreading & De-Spreading
  - 3.3 Auto-Correlation & Cross-Correlation
  - 3.4 Physical Channels and their SF
  - 3.5 Various Bit Rates (DL/UL)
4. Scrambling Codes
  - 4.1 Why Scrambling
  - 4.2 DL & UL Scrambling Codes
  - 4.3 Auto- & Cross-Correlation
  - 4.4 Multi-User Detection & IC
5. Channel Concept in UMTS
  - 5.1 Logical Channels & Bearers
  - 5.2 R99 TrCH's & PHY Channels
  - 5.3 Rel.5-Rel.9 TrCH's & PHY Channels
  - 5.4 DCH versus High Speed Evolution
  - 5.5 Compressed Mode Configuration
6. HSDPA+ Introduction
  - 6.1 HSDPA Setup and Reconfigurations
  - 6.2 UE Categories & max. Throughput
  - 6.3 HARQ and Link Adaptation
  - 6.4 CQI Reporting for QPSK, MIMO, QAM
  - 6.5 Dual Carrier HSDPA vs. MIMO
7. HSUPA+ Introduction
  - 7.1 E-DCH Scaling & Serving Grant
  - 7.2 UE Categories & max. Throughput
  - 7.3 E-DCH HARQ & Link Adaptation
  - 7.4 Dual Carrier HSUPA vs. 16QAM
8. RRC Procedures & Synchronisation
  - 8.1 Time- Synchronisation for SHO
  - 8.2 CFN and Activation Time
  - 8.3 RRC Procedures & Delays
9. SRB's & User Data Bearer Design
  - 9.1 RRC States & State Changes
  - 9.2 (WB-) AMR Voice Call Bearer Setup
  - 9.3 SMS Transfer
  - 9.4 CS Video Call
  - 9.5 R99 PS Bearer Setup & Reconfigurations
  - 9.6 Rel. 5 - R9 PS Bearer Setup & Reconfigurations
  - 9.7 Multi-RAB (CS&PS)
10. Idle & Connected Mode Mobility
  - 10.1 Cell Selection & Reselection
  - 10.2 Inter-RAT Reselections (3G ↔ 2G/4G)
  - 10.3 Soft HO versus Hard HO
  - 10.4 Inter-Frequency HO
  - 10.5 SRNC Changes and Iur Signaling
  - 10.6 IRAT Cell Changes & HO (3G ↔ 2G/4G)