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UMTS Air Interface

Course Description

This course provides a comprehensive and detailed explanation of the UMTS Air Interface. In so doing, the architecture of the radio interface, 6 channel structures, the CDMA physical layer, the protocols, procedures and operation will all be discussed. For a complete picture, the course also includes focus on enhancements to the air interface through HSPA.

Prerequisites: UMTS System Engineering.

9

Hours learning
(OnlineAnytime)

9

CPD Learning
Credits



Level: 3
(Advanced)

This course will contain the following sections:

1. The UMTS Air Interface

Topic areas covered include:

- Frequency Bands:
 - ITU Regions.
 - Mobile Frequencies.
 - UMTS Bands.
- CDMA Basics:
 - Codes.
 - User Channel.
 - Spreading and De-spreading.
 - Code Requirements.
- 4 Modulation Techniques and Coding:
 - Basic Modulation Techniques.
 - UMTS Modulation.
 - Adaptive Modulation and Coding.
- Cell Planning for UMTS:
 - UMTS Cells and Sectors.
 - Scrambling Codes.
 - Cell Footprint.
 - Adjusting a Cell to Provide Coverage.
 - Frequency Layers.

2. UMTS Structure & Channels

Topic areas covered include:

- UMTS Air Interface Architecture:
 - The Non Access Stratum.
 - The Access Stratum.
 - UMTS Channels.
- UMTS Channel Types.

UMTS Structure & Channels (cont.)

- Logical Channel Architecture:
 - Logical Channels - Control.
 - Logical Channels - Traffic.
 - MBMS Channels.
- Transport Channel Architecture.
 - UMTS Transport Channels.
- Physical Channels:
 - Downlink Physical Channels.
 - Uplink Physical Channels.
- Channel Mapping:
 - Logical to Transport Mapping.
 - Downlink Transport to Physical Channel Mapping.
 - FDD Uplink Transport to Physical Channel Mapping

3. UMTS Physical Layers

Topic areas covered include:

- UMTS Spread Spectrum:
 - Channel Rates.
 - Spreading.
 - Direct Sequence Spread Spectrum.
 - De-spreading.
 - UMTS Code.
- Synchronization Codes:
 - P-SCH and S-SCH.
- Scrambling Codes:
 - Downlink Scrambling Codes.
 - Uplink Scrambling Codes.

9

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OnlineAnytime

UMTS Physical Layers (cont.)

- Spreading Codes:
 - OVFS Codes.
 - Code Allocation.
 - Static Codes.
 - Processing Gain.
- Basic DSSS System:
 - Transmission.
 - Reception.
 - Rake Receiver.
- Uplink Code Processing:
 - Dedicated Uplink Channels.
 - Common Uplink Channels.
- Downlink Code Processing:
 - Channel Combining.
- Frame Timing:
 - Node B Timing.
 - Cell Timing.
 - UE Timing.

4. UMTS Physical Channels

Topic areas covered include:

- Downlink Physical Channels:
 - CPICH.
 - CPICH Measurements.
 - Example CPICH Measurements.
 - Primary Common Control Physical Channel:
 - P-CCPCH.
 - Primary and Secondary Synchronization Channel:
 - P-SCH and S-SCH.
 - S-CCPCH.
 - DPCH.
 - PICH.
- Uplink Physical Channels:
 - DPCH.
 - PRACH:
 - AICH.
 - Physical Channel Timing.
- Compressed Mode:
 - Transmission Gap Position.
 - Compressed Mode Pattern Parameters.

5. UMTS Radio Resource Control

Topic areas covered include:

- RRC Functions:
 - RRC Architecture.
 - RRC Procedures.
- Radio Bearers.
- Idle Mode Procedures:
 - Broadcast System Information.
 - System Information Blocks.
 - Paging.
- Connected Mode:
 - Identities:
 - RRC Connection.
 - Direct Transfer.
 - Paging.
 - UE Capability.
 - Security.
 - Radio Bearer Procedures.

6. UMTS Operational Procedures

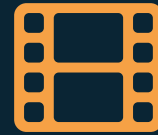
Topic areas covered include:

- UMTS Initial Procedures:
 - PLMN Selection.
 - Cell Selection.
 - UMTS Attach.
 - Initial Direct Transfer.
- Power Control:
 - Uplink Power Control.
 - Downlink Power Control.
- Circuit Switched Operation:
 - Radio Bearer Setup.
 - Speech Transport Format Combinations.
 - RRC Connection Release.
- Packet Switched Operation:
 - Activating the Packet Switched RAB.
 - Packet Switched RAB.
 - Transport Format Combination for Packet Data.
 - Volume Triggers.
 - Data Sub-states.

7. UMTS Mobility and Interworking

Topic areas covered include:

- Idle Mode Mobility:
 - Cell Reselection.
 - Cell Reselection Criteria.
- Connected Mode Mobility:
 - Periodic Measurements.
 - Event Measurements.
 - Intra-Frequency Measurement Reporting.
 - Measurement Control.
 - Measurement Report.
- Soft Handovers:
 - Rake Receiver.
 - Rake Receiver in Soft Handover.
 - Soft Handover Regions.
 - Soft Handover Triggers.
 - Active Set Update.
 - Hard Handover.
- Common State Mobility:
 - Cell Update Procedure.
 - URA Update Procedure.
- Interworking with GERAN:
 - Inter-RAT Mobility Messages.
 - Inter-RAT Measurements.



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