



HSPA/HSPA+ Technical Overview

HSPA+, also known as Evolved High-Speed Packet Access is a wireless broadband standard defined in 3GPP release 7 and above. Participants attending this course will gain an in depth appreciation of the architecture and operation of the HSPA+ system and the evolution of the 3GPP specifications from WCDMA R99 to HSPA+. The architecture of the R5 HSDPA and R6 HSUPA network is explained and the functions of network nodes and interfaces discussed. The 3GPP study in Release 7 is introduced and the various HSPA+ enhancements, such as MIMO, 64QAM, CPC, described in detail. The HSPA+ protocol stack and the HSPA+ procedures are also covered in detail.

Expected Accomplishments

- Describe the HSPA and HSPA+ network architecture
- Describe the function of each HSPA & HSPA+ node
- Explain the functions of the main interfaces of the HSPA+ network
- Show how HSPA+ may inter-work with other networks
- Describe the advantages and disadvantages of the HSPA+ radio interface
- List the logical, transport and physical channels used on the HSPA & HSPA+ radio interface
- Explain the basic operation of MIMO in HSPA and describe its advantages
- Describe the functions of each layer of the HSPA+ protocol stack
- Describe the procedures for network entry and location management
- Show how data bearers are setup and QoS is managed in the HSPA+ system
- Chase combining, partial IR and full IR.
- Packet scheduling strategies
- Hybrid ARQ
- Protocol Enhancements and Extensions
 - Packet scheduler in Node B.
 - Interworking of MAC-hs in Node- B and MAC-d in RNC
 - Protocol extensions of NBAP
 - HSDPA data transfer
- HSDPA Operation
 - Establishing and stopping HSDPA service
 - Measurement event ID
 - Intra and inter Node B serving HS-DSCH cell change
 - Synchronized and unsynchronized handovers
- HSDPA Radio Resource Management
 - HSDPA code resource allocation strategies
 - HSDPA power allocation strategies
- HSUPA Principles
 - HSUPA channels
 - HSUPA operation
 - UE capabilities
 - HSUPA peak data rates
- HSUPA Physical Layer Channels and Processing
 - Physical Layer
 - HSUPA channel mapping
 - Channel coding
 - Physical channel Procedures
 - Timing relations between HSUPA channels
 - Compressed mode operation

Course Outline

- Introduction to HSDPA
 - Market outlook for high speed data
 - Network architecture
 - Benefits and drawbacks of HSDPA
- HSDPA Physical Layer
 - Coding of HS-DSCH, HS-SCCH and HS-DPCCH
 - Timing relations between HSDPA channels
 - 16-QAM and AMC





- MAC Protocols and Procedures
 - MAC operation
 - MAC architecture of UE and UTRAN
 - Reordering protocol and its mechanisms
 - Scheduling request mechanism
 - Grant allocation mechanism and their update
 - Transport format selection process
- RRC Protocols and Procedures
 - HSUPA RRC functions
 - Call flow for setting up HSUPA operations
 - Messages and IEs
 - E-DCH active set modification
 - E-DCH serving cell selection
 - UE state transitions on HSUPA operation
- Introduction to HSPA+
 - HSPA + R7 and R8 Features.
 - UE Categories
 - Throughput Enhancement Methods
- High Order Modulation.
 - 64QAM for HSDPA - 21.6Mbps Operation.
 - 16QAM for HSUPA.
 - MIMO Antennas - STC and Spatial Multiplexing.
 - MIMO Open Loop and Closed Loop Diversity.
 - 2x2 MIMO in Release 7 - 16QAM Configuration - 28.8Mbps Operation.
- F-DPCH Enhancements.
 - Enhancements to RLC Layer - Flexible RLC.
 - RLC TM Mode Allowing for HS-DSCH.
 - Enhancements to MAC - ehs-MAC.
 - DC-HSDPA - Dual Cell Operation - E1a and Active Set Update Dual Cell Information.
- Latency and Power Enhancements
 - CPC - DTX, DRX and HS-SCCH Less Operation.
 - Parameters Relevant for DTX Operation.
 - New Uplink DPCCCH Slot Format.
 - E-DCH Tx Start Time Restrictions.
 - Enhanced Cell_FACH.
- HS-DSCH Reception in CELL_PCH and URA_PCH.
- E-DCH Transmission in CELL_FACH State.
- Comparison of HS-SCCH Type 1 and 2.
- HSPA+ Session
 - Session Establishment.
 - HSPA+ R7 and R8 Configuration Parameters.
 - Optimized Support of Voice Services - CS over HSPA.
 - Mobility for HSPA+ Devices.
 - HS Serving Cell Change.
- HSPA+ Operational Procedures
 - Pre-coding Control Information.
 - CQI Reporting in HSPA+.
 - Feedback in CELL_FACH State.
 - H-ARQ Feedback Enhancements.
 - HS-SCCH Type 3.
 - Type A and Type B CQI.
 - BCCH Reception in Enhanced CELL_FACH State.
 - Uplink and Downlink Data Transfer.
 - Iub Frame Protocols

Who Can Benefit

Mobile Access Network engineers and Radio Planners.

Related Training

- 4G-Long Term Evolution (LTE) Technical Overview

Duration

4 days

Mode

Consultant led classes

Prerequisites

- Understanding UMTS

Course Code: TRC-465

