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# Analyzing HSPA+

## Course Description

With the ever increasing demand for bandwidth, service providers have upgraded their third generation network based on UMTS to support mobile broadband. Termed HSPA (High Speed Packet Access), this course focuses on the modifications that have been made to the packet channels operating across the radio interface in terms of throughput enhancement methods, HSPA+ sessions and HSPA+ operational procedures.

**Prerequisites:** UMTS Air Interface

2

Days  
(LiveOnsite, LiveOnline)

12

CPD Learning  
Credits



Level: 3  
(Advanced)

**This course will contain the following sections:**

## **1. HSPA+ Throughput Enhancement Methods**

### **Topic areas covered include:**

- High Order Modulation:
  - Downlink 64QAM (R7).
  - Uplink 16QAM (R7):
    - 4PAM.
- Multiple Input Multiple Output (R7):
  - Radio Propagation Basics.
  - Multi-Antenna Systems.
  - MIMO Operation in HSPA+.
  - Non-MIMO Mode Space Time Transmit Diversity.
  - Transmit Antenna/Adaptive Array.
- Release 8 MIMO Improvements.
- Enhanced F-DPCH (Optional Release 7).
- Flexible Downlink Layer 2 (Release 7):
  - The RLC AMD PDU.
  - RLC TM Mode.
- Enhancements to the MAC Layer:
  - ehs-MAC.
- Dual Cell Operation (Release 8):
  - DC-HSDPA Categories.
  - Dual Cell verses MIMO.
  - MIMO Performance.

## **2. HSPA+ Latency and Power Enhancements**

### **Topic areas covered include:**

- Continuous Packet Connectivity (Release 7):
  - DTX (Discontinuous Transmission).
  - DRX (Discontinuous Reception).
  - HS-SCCH-less Operation.
  - HS-SCCH Types.
- Uplink DPCH Formats.
- Enhanced Cell\_FACH (Release 7):
  - HS-DSCH in Connected States.
  - Release 8 Enhanced Cell\_FACH in the Uplink.
- Direct Tunnel Operation.
- HSPA+ Voice:
  - HSPA+ VoIP Capacity.

## **3. The HSPA+ Session**

### **Topic areas covered include:**

- Session Establishment:
  - System Information.
  - HSPA+ Key Identities.
  - Initial Access.
- The HSPA+ RRC Connection:
  - RRC Connection Request.
  - RRC Connection Setup.
  - RRC Connection Setup Complete.
- Iub Configuration.

**2**

**Days**  
(LiveOnsite, LiveOnline)

**12**

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**LiveOnsite,  
LiveOnline**

## The HSPA+ Session (cont.)

- Data Delivery:
  - HSDPA Data Delivery.
- CS voice over HSPA+:
  - Benefits.
  - Voice Deployment Options.
- Mobility:
  - Cell\_DCH Mobility.
  - E-DCH Mobility.
  - Cell\_FACH, Cell\_PCH and URA\_PCH Mobility.

## 4. HSPA+ Operational Procedures

### Topic areas covered include:

- MIMO CQI and PCI Feedback:
  - Precoding Control Indication:
    - PMI.
  - Channel Quality Indicator:
    - CQI.
  - Feedback Process.
  - CQI Signalling.
  - MIMO HARQ Feedback.
  - ACK/NACK Signalling.
- Enhanced Cell\_FACH:
  - RRC Connection Setup.
  - Data in the Enhanced Cell\_FACH State.
  - Cell Update in the Enhanced Cell\_FACH State.
- Enhanced Paging on the HS-DSCH.
- E-AGCH and E-DPCCH Enhancements:
  - E-AGCH Changes.
  - E-DPCCH Changes.
- Dual Cell HSDPA Operation.
- Interworking:
  - Interworking with 2.5G.
  - Interworking with LTE (Long Term Evolution).
- Release 9 Features:
  - Dual Cell HSUPA.
  - Support for Different Bands for Dual-Cell HSDPA.
  - Combination of DC-HSDPA with MIMO.
  - UTRAN 2ms TTI Uplink Range Improvement.



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