

HSPA+ Protocols, Procedures and Signaling (R7, R8 & R9) Training

HSPA+ Training, HSPA+ Protocols, Procedures and Signaling (R7, R8 & R9)

Learn about 3GPP HSPA+ protocols, procedures, and signaling as covered in Releases 7, 8 and 9. HSPA+ provides many L1 and L2 enhancements and optimizations to eHSPA and it is able to improve and increase both uplink and downlink data rates including peak throughput, air interface efficiency, UTRA-capacity and latency reduction for RRC and user data transfer.

Course Objectives

Upon completing of this course, the attendees are able to:

- Discuss the basic enhancements of HSPA+
- Discuss key HSPA+ features
- Describe Key HSPA+ protocols
- Explain HSPA+ key procedures
- Explain HSPA+ key signaling and messaging
- List HSPA+ radio and core optimization components
- Identify HSPA+ design and detailed system features
- List features of HSPA+ (R7, R8 and R9)
- Describe HSPA+ interworking with other 3GPP GERAN, UMTS/HSPA and LTE

Course Agenda

Overview of HSPA+

- What is Evolved HSPA/HSPA+
- HSPA+ Features
- UMTS and HSPA+ Network Architecture
- UMTS evolution to HSPA+ and beyond
- HSPA+ RAN & CN
- HSPA+ applications
- Push-to-Talk over Cellular (PoC)
- Picture and video sharing
- Video and Voice over Internet Protocol (VoIP)

HSPA+ Features and Services

- HSPA+ features R7
- HSPA+ features R8
- HSPA+ features R9
- Optional and mandatory features
- HSPA+ impacts on UE and network
- HSPA+ architecture
- HSPA+ functional entities
- Higher bandwidth
- Battery life improvements
- wake-from-idle time
- Always-on connection
- HSPA+ deployments
- Small cells with HSPA+
- HSPA+ lessons learned
- Procedures and erroneous protocol behaviors

HSPA+ Air Interface

- HSPA+ channels
- HSPA+ carrier aggregation evolution
- single-carrier operations
- multi-carrier operations
- Higher order modulation (64QAM)
- 64QAM and 2X2 MIMO
- DC + 64QAM
- 2X2 MIMO + 64QAM
- DC + 2X2 MIMO + 64QAM
- Continuous Packet Connectivity (CPC)
- Dual-Cell HSDPA
- MIMO (multiple-input and multiple-output)
- 4-way MIMO
- Throughput enhancements
- High-Order Modulation (HOM)
- MIMO and transmit diversity
- F-DPCH enhancements
- Latency and power reduction
- DTX/DRX

- Direct tunnel architecture

HSPA+ Operations and Procedures

- Voice Call Setup
- SMS & USSD Transfer
- Selected PS Scenarios
- PDP Context Activation & Modification
- RRC States & supported Bearers
- Protocol Architecture
- General Signaling Procedures
- UE & RAN/CN Identifiers
- System Information Broadcasting
- Service Area Broadcasting
- CS/PS Paging
- Paging Coordination
- Registration (MM/GMM)
- PLMN & Cell Search
- Location Update & Attach Procedure
- Combined Attach for PS & CS
- Location & Routing Area Update
- CS/PS Detach Scenarios
- RRC Establishment & Re-Establishment
- Random Access using RACH/FACH
- Random Access

HSPA+ Protocols

- HSPA+ protocol architecture
- HSPA+ protocol stack
- HSPA+ protocol layers
- PHY, MAC, RLC and RRC
- Layer 2 RLC/MAC
- MAC Protocol Functionality R99
- Cell Update & Cell Update Confirm
- HARQ Signaling for HS
- DSCH & E-DCH
- CQI Reporting per Category
- RLC Modes for CS & PS Bearers
- RRC Protocol Procedures

- RRC Connection Management
- Radio Bearer Control
- Measurement & Control
- RRC Connection Mobility

HSPA+ Signaling

- HSPA+ Signaling
- Signaling enhancements
- HSPA+ call setup signaling
- RRC and radio link enhancements
- Radio bearer setup enhancements
- Channel assignments and configurations
- HSPA+ Mobility and Paging
- RRC connection establishment
- Radio bearer setup
- Resource management
- Paging and mobility
- Uplink and downlink data transmissions
- Changing serving cells
- Paging procedures
- RRC and NAS Signaling for E-DCH Setup
- HSPA+ Interworking
- Dual Cell signaling
- MIMO Feedback Procedure (PCI)