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Course ID	Course Title
HSDPA-ADV	**HSDPA: An Advanced Tutorial**
Course Duration	
2 days	

Related Courses

- Traffic Engineering Models for 3G Network Design (TRAFFIC3G, 2 days)
- HSUPA: Network Architecture, Operation, and Design (HSUPA, 2 days)
- UMTS-TDD: Network Architecture, Operation, and Design (UMTS-TDD, 2 days)
- 3G LTE/4G: The Next Generation Mobile Networks (3GLTE-4G, 2 days)
- 1xRTT: Network Architecture, Operation, and Design (1XRTT, 2 days)
- 1xEVDO: Network Architecture, Operation, and Design   (EVDO, 2 days)
- IP-Based Systems: TCP/IP and Mobile IP (IPSYS, 2 days)
- Multimedia Applications: IMS, SIP, and VoIP (MULTIMEDIA, 2 days)

Aimed At

Engineers and others responsible for the planning, design, and deployment of HSDPA technologies and who possess some prior exposure to UMTS and HSDPA.

Group Size

5-25

Prerequisites

- HSDPA: Network Architecture, Operation, and Design (HSDPA, 2 days)
- UMTS-FDD: Network Architecture, Operation, and Design (UMTS-FDD, 2 days)

Course In a Nutshell

High Speed Downlink Packet Access (HSDPA) has been gaining popularity throughout the wireless operator community and deployments are ongoing worldwide.   Operators who have deployed WCDMA/UMTS will be able to offer subscribers faster data rates, in the range of 1 to 5 Mbps, and with the introduction of Multiple Input Multiple Output (MIMO) technology, up to 20 Mbps access is possible. HSDPA includes Adaptive Modulation and Coding techniques, fast cell search, Hybrid ARQ (H-ARQ), and advanced receiver design.

This course is an advanced tutorial designed to build on the foundations laid in out introductory HSDPA course or on the design/deployment knowledge already acquired in the field. In this course, we will take a deeper look at frame structures, timing and synchronization of the network, technology enhancements, and the operation of such features as H-ARQ.

Customize It!

For little to no extra charge, you may customize this course to the needs of audience groups such as: RF and network design and optimization engineers, chipset manufacturers, R&D personnel, managers and executives, planners and strategists, sales and marketing personnel, and operations and support staff.

Course Outline

- UTRAN Architecture
  - Network architecture model
  - Network components
  - MAC enhancements
  - Control plane enhancement
  - Node B & RNC enhancements
  - UE enhancements

- HSDPA Overview
  - HSDPA power management
  - Packet scheduler
  - MAC scheduling function
  - QPSK and 16-QAM
  - Channel quality feedback mechanisms (CQI)
  - Multi-user diversity (MUD)
  - Multiple Input Multiple Output (MIMO)
  - High speed downlink shared channels (HS-DSCH)
  - Hybrid ARQ (H-ARQ)
  - Adaptive modulation and coding
  - H-ARQ operation
  - Fast scheduling
  - Resource management
  - UE measurements/reporting/capabilities

- HSDPA Physical Layer
  - Frame structure HS-SCCH
  - Frame structure HS-DPSCH
  - Frame structure HS-PDSCH
  - Uplink and downlink signaling
  - CQI
  - Timing relationships
  - Link adaptation
  - Soft combining
  - Frame size optimization

- HSDPA MAC Layer
  - MAC-d
  - MAC-c/sh
  - MAC-hs
  - Explain MAC entities for different transport channels
  - HARQ protocols and information
  - Signaling

- Error handling
- Transport block sizes
- Channelization codes
- Measurement feedback rate
- HS-PDSCH power offset
- HS-SCCH Cyclic Sequence Number (HCSN)
- Uplink signaling parameters measurement report

- HSDPA Control Plane

  - Radio Resource Control (RRC) protocol
  - Node B application part (NBAP) protocol
  - Radio network subsystem application part (RNSAP) protocol

- HSDPA User Plane
  - HS-DSCH FP
  - Transport blocks
  - MAC layer functionality
  - Synchronization
  - Control of MAC-d PDUs and flow control
  - Capacity allocation messages

- Traffic Channel Operations & Mobility
  - Packet scheduler
  - RAB and multi-RAB
  - RRC connection enhancements
  - Radio bearer setup
  - Channel assignments
  - Inter node B handover
  - Intra node B handover
  - Radio bearer reconfiguration

- HSDPA Design
  - Adaptive Modulation Coding (AMC) modeling
  - Ec/Nt HS-PDSCH prediction plots
  - CQI prediction plots
  - RLC throughput prediction plots

- Course Wrap-up: Future Evolution, Recap, Q/A, and Evaluations

How You Will Learn

- We will teach this course as a tutorial, with plenty of opportunity for interaction, questions/answers, and discussion.
- Your instructor will be an engineer well versed with wireless technologies, especially the GSM/WCDMA technology family.
- If you already know something about HSDPA design and deployment, we will build on that base to get you farther ahead with the technology.
- If your background is less technical, we will leverage examples and analogies to make the complex material easier to understand.
- The participant course book will provide a record of the instructor presentation and your own notes, making it easier to recall and retain the important concepts and techniques learned in the class.

Revised   *April 10, 2007*