Course ID
HSUPA
Course Duration
2 days

Course Title
HSUPA: Network Architecture, Operation, and Design

Related Courses

- UMTS-TDD: Network Architecture, Operation, and Design (UMTS-TDD, 2 days)
- 1xRTT: Network Architecture, Operation, and Design (1XRTT, 2 days)
- 1xEVDO: Network Architecture, Operation, and Design (EVDO, 2 days)
- Traffic Engineering Models for 3G Network Design (TRAFFIC3G, 2 days)
- IP-Based Systems: TCP/IP and Mobile IP (IPSYS, 2 days)
- Multimedia Applications: IMS, SIP, and VoIP (MULTIMEDIA, 2 days)
- GSM: Network Architecture, Operation, and Design (GSM-I, 5 days)

Aimed At

Those experienced with HSDPA who wish to learn more about HSUPA. The standard presentation of this course assumes a bachelor of science in Electrical Engineering, Mathematics, Physics, or a related subject along with an appropriate background in communications engineering.

Group Size

5-25

Prerequisites

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

Course in a Nutshell

High Speed Uplink Packet Access (HSUPA), a technology that complements High Speed Downlink Packet Access (HSDPA), is an evolutionary step that makes the uplink of WCDMA packet-based for data services. Together, HSDPA and HSUPA offer reduced latency and much higher data rates on the downlink and uplink, theoretically as high as 14.0 Mbps in the downlink and up to 5.8 Mbps in the uplink. They are expected to help usher in a mass market for mobile IP multimedia services.

In this course, you will undertake a comprehensive review of the layer 1 and layer 2 protocol functionality introduced in the UTRAN to support HSUPA, also known as Enhanced DCH or E-DCH. We will pay particular attention to the new Medium Access Control protocol entities, namely MAC-hs, MAC-e, and MAC-es. We will study in depth the functionality and coding of the new transport and physical channels, e.g. E-DCH, E-AGCH, and E-HICH. We will discuss how HSUPA impacts the UTRAN architecture as well as the key considerations involved in the planning of HSUPA networks. We will conclude the course with a look at the future of HSUPA and WCDMA.

Customize It!

Customize this course to your specific needs at little-to-no additional cost. We offer distinct versions tailored for:

- Network design and optimization engineers
- Equipment or application designers

- Less technical audiences such as managers, executives, business planners, sales and marketing specialists, and operations and support personnel.

Combination courses that provide integrated treatment of related topics are also available. These include composites such as:

- HSDPA and HSUPA
- UMTS-FDD, HSDPA, and HSUPA
- EVDO, HSDPA, HSUPA

If you can benefit from such a combined class, ask us about our 'combo discount'.

Course Outline

- UMTS: A Refresher
  - UMTS network architecture
  - UMTS WCDMA air interface
  - UMTS coverage versus capacity trade-off

- HSDPA: A Refresher
  - HSDPA network architecture
  - HSDPA air interface
  - HSDPA performance issues

- Why Do We Need HSUPA?
  - Data-centric applications
  - How HSUPA improves system capacity
  - Beyond HSDPA & HSUPA

- HSUPA Architecture and Protocols
  - RRC architecture
  - HSUPA user plane architecture
  - HSUPA protocol states

- HSUPA vs. WCDMA Release 99

- HSUPA Technologies
  - Layer 1 Hybrid ARQ
  - HSUPA packet scheduling

- HSUPA E-DCH Channels
  - E-DCH transport channel
  - E-DCH physical channel
  - E-DCH physical control channel
  - E-DCH HARQ indicator channel
  - E-DCH relative channel
  - E-DCH absolute channel
  - QoS and TTI length

- Physical Layer Operation

- Hybrid ARQ process
- HARQ - soft handover
- HSUPA measurements

- MAC Layer Operation
  - HSUPA user plane
  - HSUPA UE MAC
  - HSUPA UTRAN MAC
  - Overall HSUPA MAC architecture
  - HSUPA advanced scheduling

- HSUPA Handovers
  - Iub interface parameters
  - Soft Handover
  - HSUPA in compressed mode

- HSUPA Radio Resource Management (RRM)
  - RNC algorithms
  - Node B algorithms

- HSUPA Performance Considerations
  - Performance factors
  - Cell capacity
  - Performance enhancements
  - UE capabilities and data rates

- HSUPA Network Planning & Optimization
  - Radio planning process
  - Link budget
  - HSUPA Radio Resource Management (RRM)
  - DL capacity
  - UL capacity
  - HSUPA performance enhancements
  - Planning for HSUPA applications
  - End-to-end applications optimization

- Course Wrap-up
  - HSDPA, HSUPA, HSPA, LTE, and EUTRA, …
  - Course recap, Q/A and evaluations

How You Will Learn

- A seasoned instructor will present this course in interactive lecture format.
- If you already know something about the technology, we will build on that. We'll compare and contrast what's familiar with what's new, making new ideas easier to learn as well as more relevant.
- If your background is less technical, we will use meaningful and ingenious examples and analogies to simplify the complex subject matter.
- You will receive a printed Participant Handbook which will help you remember and retain what you learned in class and apply it on your job.

Revised *Sept. 28, 2006*