



Course Synopsis

Course : HSDPA - The Next Step for UMTS

Duration: 2 days

Q6 Code : GEN3037

Introduction

As 3G networks roll out across Europe, they provide users with data rates of up to 384 kbps. Whilst this is a great improvement on GSM (9.6 kbps or 14.4 kbps) and GPRS (30 to 40 kbps), it is still woefully slow compared with wireless LANs (11 Mbps, 52 Mbps and looking to run at 100 Mbps and beyond), broadband wireless access at 1 – 5 Mbps as well as wireline Broadband being sold today at 0.5 – 3 Mbps.

High Speed Downlink Packet Access (HSDPA) is currently rolling out across Europe and user devices that support it are already available.

HSDPA is a feature of Releases 5 and 6 of UMTS which will allow downstream packet data at between 4 and 10 Mbps by introducing a package of technologies: new radio modulation techniques, fast hybrid ARQ, channel dependent scheduling and using several channel codes in parallel.

Course Objectives

The course explores each of these components of HSDPA in detail, explaining how they work in synergy to create this major step forward for UMTS.

HSDPA already has an evolution path mapped out for it that is regarded as capable of delivering 20 Mbps to users. Some aspects of this evolution are described.

Who Should Attend

The course is aimed mainly at network operators and companies supplying user devices.

Prerequisites

The course assumes that delegates are familiar with the operation of UMTS and are aware of the major features of CDMA.

Course Outline

Introduction

- Comparisons of 3G Technologies
- Another Industry Forum
- HSDPA and 1xEV-DV Comparison
- What throughput do we get?
- Deployment

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HSDPA Major Change Areas

- Power Control
- Spreading Code Usage
- Packet Scheduling – Channel Dependant
- Fast Link Adaptation
- Higher Order Radio Modulation – 16 QAM
- Coding Scheme
- Fast ARQ and Soft Combining
- New Logical Channels
- HSDPA Enhancements

High Speed Data Channel Characteristics

- Channel Structure
- Channel Structure of HS-DSCH
- Coded Composite Transport Channel:CCTrCH
- The HS-DSCH Channel
- In the TDD World
- Downlink Control Channel – HS-SCCH
- HS-SCCH for FDD
- CRC Attachment
- Timing
- HSDPA Time Multiplexed Downlink Channel
- Uplink Control Channel: HS -DPCCH
- FDD Downlink Physical layer Model
- TDD Downlink Physical layer Model
- Uplink Support of High Speed Downlink
- Transport Channel Attributes
- Overall Transmit Chain
- Interleaving
- Bit Rearrangement for 16-QAM

MAC Architecture for HSDPA

- Radio Interface Protocol Architecture
- Overall Architecture
- MAC-d
- MAC-hs
- HS-DSCH
- Signalling Parameters

Hybrid ARQ Mechanism

- Chase and Incremental Redundancy
- Soft Combining
- HARQ Signalling

Mobility and Cell Change

- Principles of HS Handover
- Serving HS-DSCH Cell Change
- Intra Node B Synchronised Serving HS-DSCH Cell Change
- During Hard Handover

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After Active Set Update
HS-DSCH Mobility Procedures

Fast Cell Selection
Multi User Diversity

Receive and Transmit Diversity
Performance Gains
Impact on RAKE
Impact on Antennas and Physical Design

Implementation Decisions
Feature Selection
Deployment Priorities

The Evolution Route for HSDPA
CQI (Channel Quality Indicator) Enhancement for FDD mode
Dynamic Range Extension for the TDD CQI Report
Multiple Simultaneous Transmissions to a UE
Code Reuse for Downlink HS-DSCH
Fast Signalling between Node-B and UE
Fast Adaptive Emphasis

High Speed Uplink Packet Access – HSUPA
Goals
Standardisation and Forum
E-DCH
Major Features