

UMTS Signalling Protocols & Procedures with HSPA

Covers: Channels, RRC, RAN, NBAP, RANAP, RNSAP, SS7, ATM, AAL2 Signalling, HSPA

Overview

The implementation of a UMTS network is as an overlay to an existing GSM network infrastructure, and reuses much of the existing GSM/GPRS core network. However many aspects of this new network are radically different in operation from GSM, particularly in the Radio Access Network, which introduces new technologies such as WCDMA and ATM transmission.

This course is intended to provide a highly detailed explanation of the inner workings of the UMTS network through an exploration of the signalling protocols and mechanisms involved in maintaining and administering resources in a UMTS network. Participants are taken through a step-by-step guide to the network structure, and presented with practical examples of typical call scenarios that they will encounter. They will learn how to interpret these signalling messages, through analysis of signalling traces, and how to verify correct operation of the network, and appropriate resource allocation for different traffic scenarios.

You Will Learn

- The role of signalling in a UMTS network
- A review of UMTS networking
- The operation of UMTS signalling protocols
- The structure of the UMTS interfaces
- The operation & structure of ATM
- ATM applications to the UMTS radio access network
- Use of AAL2 signalling
- Structure & content of broadcast information
- UMTS network synchronisation procedures
- RAN transport of core network signalling
- Detailed explanation of signalling procedures
- How to use a 3G protocol analyser and interpret captured signalling messages
- Practical examples of common UMTS signalling messages and call scenarios

Who Can Benefit

Technical personnel involved in UMTS network implementation, planning, optimisation and troubleshooting

Pre-requisite Knowledge

The participant should have a solid understanding of cellular 3G/UMTS networks

Outline

Overview of UMTS

- UMTS network architecture
- UMTS bearer model and QoS classes
- Radio Resource Management (RRM) function
- Operation of the WCDMA air interface
- Logical, transport and physical channels
- Adaptive Modulation and Coding
- Rationale for ATM in UMTS

The Radio Network Interface

- Radio network protocol stack
- Operation of the Media Access Control (MAC) & Radio Link Control (RLC) layer
- Operation of the Packet Data Convergence Protocol (PDCP) and Broadcast/Multicast Protocol (BMC)
- Radio Resource Control (RRC) Protocol

UMTS Radio Access Network (UTRAN)

- UTRAN architecture
- UTRAN mobile states and mobility management

- General interface protocol model
- Operation of the Iub, Iu and Iur interfaces
- Operation of the NBAP, RANAP and RNSAP protocols
- UMTS system information & synchronisation
- The ATM layer, ATM header structure and virtual circuits
- The use of AAL1, AAL2 and AAL5 across the UMTS transport layer interfaces
- ATM, AAL2 & broadband SS7 signalling
- IP-based RAN Transport
- Comparison between IP & ATM in the RAN
- IP RAN transport for data and control planes

High-Speed Packet Access (HSPA)

- Key HSDA capabilities & channels
- Adaptive Modulation and Coding
- Incremental Redundancy and Fast Scheduling
- HARQ protocol
- Impact on existing network architecture & protocols

- HSDPA terminal capabilities and data rates
- NodeB scheduling algorithms
- Roadmap and improvements with HSPA+ and DC-HSPA

Common Traffic Scenarios

- Use of a Protocol Analyser: NetHawk
- Establishment of a Signalling Connection
- Location Registration/Update
- Type 1 and Type 2 Paging
- Radio Access Bearer Establishment/Reconfiguration/Release
- Circuit & Packet Switched Call
- HSPA session establishment & capacity requests
- Soft/softer and hard handover scenarios

DURATION 5 days

CLASS SIZE 12