

**Related Courses**

- RF Propagation, Fading and Link Budget Analysis (2-3 days, RFPROP)
- Traffic Engineering Models for 3G Network Design (3 days, TRAFFIC3G)
- Traffic Engineering Models for Network Design (3 days, TRAFFIC)
- UMTS-FDD Network Design and Optimization (2 days, UMTS-FDD-DO)
- UMTS-TDD: Network Architecture, Operation, and Design (2 days, UMTS-TDD)
- UMTS-TDD Network Design and Optimization (2 days, UMTS-TDD-DO)
- HSDPA: An Advanced Tutorial (2 days, HSDPA-ADV)
- HSUPA: Network Architecture, Operation, and Design (2 days, HSUPA)
- Optimizing HSPA (HSDPA and HSUPA) Networks (3 days, HSPAOPT)

**Aimed At**

Engineers who have prior experience with GSM, GPRS, EDGE and WCDMA/HSPA and wish to learn how to plan and dimension WCDMA/HSPA networks.

**Group Size**

5-25

**Prerequisites**

- GSM: Network Architecture, Operation, and Design (5 days, GSM-I)
- GSM: Optimization and Advanced Features (2 days, GSM-A)
- GPRS: Network Architecture, Operation, and Design (3 days, GPRS)
- EDGE: Network Architecture, Operation, and Design (2 days, EDGE)
- UMTS-FDD: Network Architecture, Operation, and Design (3 days, UMTS-FDD)
- HSDPA: Network Architecture, Operation, and Design (2 days, HSDPA)

**Course presentation in a Nutshell**

The planning and dimensioning of WCDMA/HSPA networks based on capacity, coverage, and service considerations is not something that can be boiled down to a few simple rules of thumb. For one, WCDMA/HSPA networks provide different services to different customer requirements. But different services impose different capacity requirements on the air interface (link budgets, maximum cell capacity, codes and bandwidth), on the transport network (ATM or IP bandwidth), and on the core network (MSC servers and MGWs). Finally different capacity requirements have different coverage

implications. Good planning/dimensioning and pre-/post-launch optimization are key to successful network deployment and operability.

In this course, you will study the planning and dimensioning of WCDMA/HSPA networks in all its complexity. We will start with a quick review of the workings of a UMTS network (both WCDMA/HSPA and core part) and follow through with a thorough discussion of capacity (considering both the uplink/downlink traffic for the various services), coverage (including power budgets calculations, margins and losses on antennae and air interface), cell planning (power planning and code planning) and dimensioning. We will also review the WCDMA performance statistics (counters description, KPI's), performance recording, and performance event handling. The course includes hands-on exercises.

### **Customize It!**

If you'd like us to focus the course on a specific area (capacity, coverage, or services) or a particular vendor technology, we can do that. We can also design case studies specific to your network that can be the basis of in-class hands-on design exercises.

### **Course Outline**

- Introduction to the Technology and Planning/Dimensioning Principles
  - An overview of WCDMA
  - CN (Core Networks) architecture
  - An overview of HSPA
  - Radio network dimensioning principles
  - Capacity planning requirements
  - Coverage planning requirements
- Service Approach: Dimensioning Considerations
  - WCDMA traffic profiles
  - Services requirements
- Capacity Dimensioning
  - CS dimensioning principles
  - PS dimensioning principles
  - $E_c/N_0$  considerations: Maximum cell load considerations
  - Power control principles
  - Uplink and downlink dimensioning
- Coverage Considerations
  - Transmission models
  - Transmission losses
  - Link budget margins and antennae gains
  - Uplink link budget dimensioning
  - Downlink link budget dimensioning

- Assignment to other cells
- Intracell handover
- Cell load sharing
- OL/UL subcells
- Cell Planning Principles
  - WCDMA cell planning
  - CDMA code planning
  - WCDMA power planning (setting the thresholds)
  - Handover planning (setting appropriate event triggering Thresholds)
- Coverage Expansion Techniques
  - Capacity expansion
  - Power tuning
  - Cell splitting
  - Network reconfiguration
  - Repeater techniques
  - Bandwidth expansion
  - Interference sources (adjacent channel and outer source)
  - Interference degradation of service
  - Suppressing interference
- WCDMA Statistics
  - Counters
  - Accessibility KPI definitions
  - Retainability KPI definitions
  - Service integrity KPI definition
  - RNC-UE measurements (BLER, Power)
  - Performance event handling
- Course Recap and Discussion

**How You Will Learn**

- You will be taught by an instructor who is expert at WCDMA (UTRAN) network operability, design, and dimensioning.
- The course will be presented as an interactive lecture interspersed with quizzes, puzzles, practical case studies, and interesting group activities to enrich the instruction and drive home the essential points.
- 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 9, 2008f*