3G Radio Planning

DURATION

3 Days

TECHNICAL LEVEL

1 2 3 4 5

COURSE DESCRIPTION
Provides an in depth appreciation of 3G (and specifically UMTS) radio network planning issues. A comprehensive review of the W-CDMA physical layer and channels is given, before Coverage, Capacity and Quality planning issues are explained in detail with the aid of exercises using an industry-standard 3G planning tool. Techniques used to enhance coverage and performance are also explained.

Traffic Issues, System Dimensioning, Cell Planning and Optimisation Issues are all presented in a clear and concise format. Some preliminary engineering design procedures used for planning a W-CDMA system are also considered.

PRE-REQUISITES
An understanding of the following areas would be an advantage:

- Basic operation of the UMTS system, particularly the radio interface
- Familiarity with the basic concepts and techniques employed in a radio planning environment
- Basic understanding of the operation of the physical layer of a digital mobile radio such as modulation, channel coding and link budgets
- Basic operation of the CDMA radio interface including spreading and scrambling

COURSE OBJECTIVES:

At the end of the course, the delegate will be able to:

- Explain the basic CDMA planning concepts
- Describe in detail the W-CDMA physical layer, including spreading, scrambling, soft handover and power control
- Discuss the need for the various traffic models that are used to calculate the performance of the network
- Detail the considerations necessary for the dimensioning of a network
- Discuss the issues and effects when cell planning
- Explain with confidence the interworking between a GSM system and a UMTS system
CONTENTS

Section 1
Introduction to UMTS
- UMTS R99 Architecture
- UE Capabilities
- Quality of Service
- WCDMA Basics
- WCDMA Channels
- Radio Resource Management

Section 2
Technology Principles
- Radio Propagation
- Spread Spectrum
- Modulation
- Signal Basics
- Channel Coding
- Test Scenarios

Section 3
Traffic Issues and Network Dimensioning
- Network Dimensioning
- Link Budget
- Uplink Interference
- Downlink Interference and Transmit Power
- Capacity and Coverage

Section 4
Cell Planning
- Site selection
- Antenna issues
- Cell design
- Sectorisation
- Micro-cells, tunnels and cell enhancers
- Cell site design issues

Section 5
Optimisation
- Optimisation issues
- Coverage planning
- Code planning
- Parameter planning
- Radio resource management
- Soft handover
- Other cell interference
- Optimisation

Practical scenarios covered in this course:

Practical 1
In this first practical, the effects of spreading factor, data bandwidth, number of users and system range are all examined for a simple CDMA system model.

Practical 2
The model considered in the previous example is expanded to include multiple cells, the presence of multiple access interference and the inclusion of user density hot spots. The effects of these different parameters are examined in terms of quantities such as cell coverage and capacity.

Practical 3
This practical considers the effects of imperfect power control and soft handover hysteresis margins on the performance of the system in terms of capacity and range for both a single cell system as well as a multi-cell system for circuit switched type of traffic models.