

## **Location Based Services – Technology and System Operation**

### **Course Duration:**

2 Days

### **Course Description:**

- ▶ This course addresses the needs of network operators who want to implement and offer Location Based Services in their network.
- ▶ This course provides detailed information for design engineers of location based service equipment.
- ▶ The course also covers the needs of those who are involved in the development and implementation of applications on top of location based services.

### **Pre-Requisites:**

- ▶ Good understanding of GSM, GPRS and UMTS networks and overall mobile system operation.

### **Course Target:**

- ▶ The student will obtain a thorough understanding of the different location techniques like E-OTD, U-TDOA or A-GPS in GSM, GPRS and UMTS-networks and the potential accuracy which can be achieved.
- ▶ The course provides detailed information about the implementation issues of the different LCS-technologies in today's 3GSM-networks.
- ▶ The student will develop an in-depth understanding of the signal and information flow in a 3GSM-network, which supports location based services.
- ▶ The course provides detailed information to 3<sup>rd</sup> party application developers who require an understanding of the implications of location technologies in mobile networks.

## **Some of your questions that will be answered:**

- Which methods can be used to determine the subscribers geographic location?
- Which services can be provided to the subscriber?
- What are the accuracy requirements for the provided service?
- Which changes are required in the network to provided location based services?
- Which additional resources must be provided in the network?
- Which additional network elements are needed?
- What is the “hearability problem” with OTDOA in UMTS?
- What is the difference between OTDOA and OTDOA-IPDL?
- Why is it necessary to provide assistance data to the mobile station for the GPS positioning method?
- What is the difference between mobile station based and mobile station assisted positioning methods?
- Why is it mandatory to synchronize the LMUs for U-TDOA?
- What is the accuracy required by the US FCC mandate?
- What is the legislative situation of location based services in Europe?

## **Who should attend this class ?**

- Network Operators who want to provide location based services to the subscribers.
- Engineers who have to implement location based services.
- Application developers and 3<sup>rd</sup> party providers who want to offer location bases services.

## Table of Contents:

### Introduction to Location Based Services

- ▶ **What are Location Based Services?** / General Description of Location Based Services
- ▶ **Description of Potential Location Based Services** / Location Based Charging / Tracking Services / Public Safety Services / Emergency Services / Commercial Services / Location Based Information Services / ...
- ▶ **The Business Perspective of Location Services** / Charging of Location Services ⇔ Accuracy of the Location Determination / Accuracy requirement of the offered Service / Accuracy required by the US FCC mandate / What are the future developments on the LCS sector?
- ▶ **The different Positioning Mechanisms used for LCS** / Received Signal Strength / Timing Advance / Angle of Arrival / Time of Arrival / Observed Time Difference / Global Positioning System

### Mobile Station Positioning for Location Based Services

- ▶ **Overview of Different LCS Releases (Rel.99, Rel.4 and Rel5)**
- ▶ **Generic LCS Logical Architecture** / Network Architecture in GERAN and UTRAN
- ▶ **Network Elements and Interfaces** / SMLC / GMLC / LMU Type A / LMU Type B / ...
- ▶ **Mobile Station Assisted vs. Mobile Station Based Positioning Technologies** / Differences / Pros & Cons / Overview of Specified Technologies in GERAN and UTRAN
- ▶ **Mobile Station Assisted Positioning Technologies** / Detailed description of Mobile Station Assisted E-OTD, OTDOA, U-TDOA, A-GPS / Flow Diagrams / Procedures / Pros & Cons / Which additional Resources are required in the Network?
- ▶ **Mobile Station Based Positioning Technologies** / Detailed Description of Mobile Station Based A-GPS and E-OTD / Flow Diagrams / Procedures / Pros & Cons / Which additional Resources are required in the Network?
- ▶ **Comparison** / Costs / Accuracy / Pros & Cons

### Signaling Protocols and Selected Procedures

- ▶ **Signaling Protocols and Interfaces** / BSSAP-LE / BSSLAP / LLP / RRLP / SMLCPP
- ▶ **Selected Procedures** / Mobile Originated Location Request / Information Transfer Between a BSS Based SMLC and a Target Mobile Station / Information Transfer between a BSS based SMLC and a Type B LMU