Course Description:

Good understanding of GSM technology and cellular networks is essential for anyone working in GSM or related areas. This course is structured and presented to suite individual’s comfort with basic wireless concepts to gain familiarity with all aspects of a GSM network. The course covers complete overview of the system and the delivery can be tuned to focus on Air Interface, Radio Network and Core Network. This course covers the interfaces of GSM network and explains how network nodes coordinate for mobility and call setup. This course also covers other concepts such as authentication, time synchronization, network identities etc. The participants will gain a good understanding of services commonly deployed in GSM network.

Course Main Features:

- One Month Internship at ZTE Pakistan (Karachi) for top 3 Students.
- One Day BTS visit to all course registered students in Batches.

Target Audience:

The target audience for this course includes:
Anyone who needs understanding of GSM-based networks, details on Radio Network & Core Network, Network deployment, network engineering, RF and BSS Engineers, Transmission and switching engineers.

Delivery Method:

The delivery will be instructor-led classroom training with extensive practical case studies, interactive discussions and Q&A.

Course Material:

The course material will be in the form of hardcopy notes

Pre-requisites:

The participants are expected to have prior knowledge of:
- Basic knowledge of 2G networks

Course Duration/Timings:

- 3 Months
- Saturday and Sunday
Course Fees:

- Rs. 10,000/- per participant

Course Outline

Cellular Network Fundamentals
- PSTN Network fundamentals and architecture
- Public Land mobile network
- Cellular Network architecture
- Cellular concepts like
- Cell structure and overlapping cells
- Frequency re-use concepts and cluster
- Paging for incoming calls
- Handover for mobility
- Location area concept
- Antenna Theories and its usage in cellular network
- Digital Transmission theories
- Microwave Transmission
- PDH and SDH
- Optical Network
- Switching Concepts (Circuit and Packet Switching)

Introduction to GSM Network
- GSM History
- GSM Network Architecture
- GSM Network Components and its functions
- BTS, BSC, TRAU, MSC, OMC-R, OMC-S, MS, GSM Network Interfaces
- GSM Frequency bands
- Air Interface fundamentals
- Carrier Bandwidth
- Duplex Separation
- Access Technique
- Number of carriers
- GSM services
- Voice Call
- Call waiting, Call forwarding, etc
- SMS
- Roaming Services
- Prepaid and Postpaid Services
- Additional nodes in Commercial GSM Network
Billing Server, IN, SMSC

GSM Network Identities

- Mobile Identities (IMEI, SIM, IMSI, TMSI, MSISDN, SN)
- Network Identities (CI, BSIC, CGI, MCC, MNC, LAI, PLMN ID)

GSM Channels and frame structure

- Logical channels
- Traffic channels
- Broadcast Channels
- Common control channels (CCCH)
- Multiplexing logical channels onto physical channels
- Combined Signaling
- Non Combined Signaling
- Timeslots and TDMA frame
- Frame type on Um Interface
- Super frames and hyper frames
- GSM Bursts
- GMSK Modulation
- Speech channel coding
- Speech channel encoding (260bits-456 bits)
- Interleaving
- Transmission timing Advance
- Multipath Fading
- Equalization
- Diversity technique

Air Interface - Frequency Re-use concepts

- ARFCN Concept and Frequency calculation
- Frequency allocation for Cellular Operator
- BCCH and Traffic Frequency
- Co channel and Adjacent Channel interference
- Frequency Hopping

Processes / Procedures in GSM System

- MS Switching on procedure
- Authentication Procedure
- Location update procedure
- Cell Selection and Reselection procedure
- Mobile Originated (OM) call
- Mobile Terminated (MT) call
Connection Management
Handover Management
Types of Handovers

GSM Network Coverage and Capacity (Traffic) Theory
- Outdoor and Indoor coverage areas
- Macro / Micro / PICO Cells
- Erlang theory
- Signaling and voice traffic
- Full rate and half rate voice calls

Signaling and Protocols in GSM
- Protocol and Signaling Architecture
- Protocol Planes in GSM Nodes
- Radio Resource Management Messages
- Call Control Management messages
- Mobility Management Messages

System Information Messages
- During idle mode
- During dedicated mode