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Mobile Radio Communication System

Course objective:

- To give the student the knowledge about mobile radio communication system
- To present the basic and fundamental of mobile radio standard.
- To give student the roadmap of mobile radio technology as well as application.

Audience Qualification:

Technical Manager or Senior engineer

Course Duration : 2 day

Course Outline:

1. Introduction to Mobile Radio Communication System

- Black ground and History
- Conventional Mobile Radio Versus Cellular Mobile Radio
- Mobile Radio System Around the World
- Trends in Mobile Radio Communication

2. The Mobile Radio Environment

- Multipath Propagation: Path Loss, Doppler Effect, Raleigh Fading and Rician Fading.
- Statics of Slow and Fast Fading.
- Classification of Channels: Time Dispersion and Frequency Selective.
- Fading, Frequency Dispersion and Time Selective Fading.
- Mathematical Modeling of Fading Multipath Channels: Bello Functions, Description of Random Time Variant Channels
- Discrete Time Representation of Channels
- Computational Channel Models: Gaussian Rayleigh, Rician and Wideband Channels

3. Diversity Schemes and Combining Techniques

- Diversity Schemes: Space, Frequency, Polarization, Field Component, Angle Time and Multipath Diversity
- Combining Techniques: Selective, Switched, Maximal Ratio, Equal Gain and Baseband Combining.

4. Modulation Techniques Overview

- Analog modulation methods
- Digital modulation methods
 - Frequency-shift keying (FSK)
 - Amplitude-shift keying (ASK)
 - Phase-shift keying (PSK)

- Quadrature amplitude modulation (QAM)
- Continuous phase modulation (CPM) : Minimum-shift keying (MSK), Gaussian minimum-shift keying (GMSK)
- Orthogonal frequency division multiplexing (OFDM) modulation
- Digital baseband modulation or line coding

5. Multiple Access Techniques for Mobile Radio Communication

- Frequency Division Multiple Access (FDMA)
- Time Division Multiple Access (TDMA)
- Spread Spectrum Multiple Access : Frequency Hopped Multiple Access (FHMA), Code Division Multiple Access (CDMA)

6. The Cellular Concept on Mobile Radio Communication

- Frequency Reuse
- Channel Assignment
- Co channel and Adjacent Channel Interference
 - Noise Limited and Interference Limit Environment
 - Co channel Interference
 - Adjacent Interference
 - Near End To Far End Ratio
- Capacity of Cellular Systems
- Trunking Theory
- Components of Cellular Systems
- Handover

7. Existing Digital Cellular Radio Systems

- Analog FDMA Systems : AMPS, NMT900
- Digital TDMA Systems : GSM, DCS1800, GSM Evolution (HSCSD, GPRS, EDGE)
- Digital CDMA Systems : IS-95 CDMA
- 3rd Generation CDMA Systems: WCDMA, CDMA2000, TD-CDMA

8. Other Interesting Mobile Radio Systems

- HSDPA (High Speed Downlink Packet Access)
- WiMAX (World Interoperability for Microwave Access)