



## **Course Outline**

### **Course Outline for the Training Course on 3G: An Advanced Overview**

**Duration: 3 Days**

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## **Title: 3G - An Advanced Overview**

**Duration:** 3 days

**Course Code:** NSE-WLS-601

### **Course Description:**

This training course is on the advance overview of 3G technologies; it discusses the network architecture – access and core networks with related functionalities, specifications, and concepts. In progress, this course will discuss the elements of the Operation Support Subsystem (OSS) related to management and service assurance. The final Section of this course will highlight the basic considerations of designing and planning a 3G network.

### **Course Objective and key benefits:**

- ✓ Learn the Evolution Path of Mobile Communications
- ✓ Identify 3G Network Components and Describe respective functions
- ✓ Understand 3G Transport Technologies and Learn Selection and Design principles
- ✓ Learn Operation Support System Components and Functions
- ✓ Learn 3G Network Design and planning principles

### **Pre Requisite**

Basic Understanding of Wireless Communications, Knowledge of 2G and Plus

### **Who Should Attend?**

Engineers / Technicians /Network Designers & Planners / Design & Deployment Engineers/ Network Integration & operations Engineers

## Course Outline:

### I. Introduction to 3G

- A. The Evolution Line
- B. 3G Specifications
- C. Basic 3G Radio Communications
  - 1. Radio Communication Fundamentals
  - 2. Cellular Communication Basics
  - 3. Frequency Bands

### II. 3G Network Architecture

- A. User Equipment
  - 1. International Standards
  - 2. UE Modes of Operation
- B. 3G Radio Access Network
  - 1. Air Interface Overview
    - i. IMT-2000 Requirements
    - ii. CDMA Principles and Requirements
    - iii. Protocol Architecture
    - iv. TDD/FDD Physical layer Implementations
    - v. Mobile Procedures
  - 2. Base Station Structure and Functions
    - i. Air Interface Transmission/Reception
    - ii. Modulation/Demodulation
    - iii. Channel Coding
    - iv. Power Control

3. Radio Network Controller and Functions

- i. Radio Resource Control
- ii. Admission Control
- iii. Channel Allocation
- iv. Handover Control

4. Internal Access Network Interfaces

- i. Access to Core Packet Switched Services
- ii. Access to Core Circuit Switched Services

C. 3G Core Network

1. Circuit or Packet Switched

- i. Mobile Switched Centers
- ii. GPRS Support Nodes

2. Network Control

- i. Home and Visitor Location Registers (HLR,VLR)
- ii. Authentication Center (AuC)
- iii. Equipment Identity Register (EIR)

3. Internal Core Network Interfaces

4. Core Network Signaling

- i. Mobile Application Part (MAP)
- ii. MAP Signaling

5. IP Multimedia Subsystem in the Core Networks

III. 3G Transport Network

A. MPLS Technologies Overview

1. MPLS Fundamentals
2. MPLS Architecture

3. MPLS Traffic Engineering
4. MPLS Transport profile
5. GMPLS
- B. MPLS Advantages in 3G
- C. Optical Transport Networks
  1. SDH Overview
    - i. SDH Transmission Systems
    - ii. SDH Network Architecture
    - iii. Synchronization Aspects
    - iv. Basics of Network Management
  2. SDH- Based MSTP for Access Networks
    - i. MSTP platform
    - ii. MSTP Characteristics
  3. Core Transport Networks
    - i. ASON Overview
    - ii. ASON Characteristics
    - iii. WDM Overview
    - iv. ASON + WDM Solution

#### IV. Operation Support Subsystem

- A. OSS Overview
  1. Telecommunication Management Network Layers
- B. OSS Application Areas

1. Network Management Systems
  2. Service Delivery and Fulfillment
  3. Service Assurance
  4. Customer Care
- C. Equipment and Products
1. Problem Troubleshooting
  2. Quality of Service Assurance

## V. 3G Network Design & Planning

- A. Network Design Basics
1. Spectrum Requirements
  2. Frequency Allocation
  3. Frequency Re-use and Hopping
  4. Coverage Modeling
- B. Radio Propagation Principles
1. Diversity Systems
  2. Diffraction Modeling
  3. Fading
  4. Carrier Frequency Separation
- C. Frequency Optimization
1. Cell Design and Structure
  2. Re-use Patterns
- D. Backward Compatibility