

Wireless Telecommunications

INTRODUCTION

The course is designed to provide an introduction to the key issues, developments and trends within the telecommunications sector. Policy and regulation within telecommunications have to be able to address a dynamic and rapidly changing environment. Exponentially developing technologies that spawn new services and applications, coupled with regulatory reform, changing legal frameworks and the emergence of new markets, have given rise to increased demands for training and skills development. This course will cover in details the concepts and fundamentals of wireless telecommunications.

PRESENTER

Prof. Ahmed.I. Al-Shamma'a

Dr. Al Shamma'a was born in Baghdad, Iraq, in 1964. He received the Electrical Engineering and Electronics BSc degree from the University of Baghdad in 1987 and his MSc and PhD degrees from the University of Liverpool, UK, in 1990 and 1993 respectively. His PhD studies focused on the design and construction a novel industrial laser system. Since 1994 he has been working on various training and research activities including applied electromagnetism, RF and microwave engineering, wireless sensors, RFID, network security, wireless telecommunications, Antennas, software engineering. Currently he is a Professor and head of RF and Microwave Group at Liverpool John Moores University, UK.

PROGRAM

MODULE 1

Course Introduction

- Course Outline and Objectives
- History of Wireless

MODULE 2

Electromagnetic Energy and Propagation

- Electromagnetic Waves and Spectrum
- Loss, Gain, and The Decibel (dB)
- Antennas and Propagation
- Radio Transmission, Interference and Noise
- Waveguides
- HFSS design and simulations

MODULE 3

Fundamentals of Radio Systems

- Basic Radio Communications
- Digital Radio Basics
- Fundamentals of Modulation

MODULE 4

Wireless telecommunications (An Overview of technology, business and industry issues)

- Wireless Telecomm industry
- What is the wireless phone industry
- Infrastructure
- Engineering and IT Functions
- Future
- Challenges
- Resources
- Manufactures

MODULE 5

Cellular System Fundamentals

- Frequency Re-Use and System Capacity
- Cellular System Architecture
- Cellular Handoff

MODULE 6

Network Aspects of Cellular Systems

- Making and Receiving Calls
- Automatic Call Delivery and Roaming
- Authentication and Encryption
- Roll of SS7

MODULE 7

Radio Frequency (RF) Access Techniques

- Frequency Division Multiple Access (FDMA)
- Time Division Multiple Access (TDMA)
- Code Division Multiple Access (CDMA)
- 2G Comparison and US Operating Brands

MODULE 8

Evolution of Cellular Wireless Data

- Wireless Data in 2G Networks
- Circuit vs. Packet Access
- Data Evolution in 2G Networks
- 3G Networks Overview

MODULE 9

Wireless Local Area Networks

- Wireless 802.11 Wi-Fi LANs
- Bluetooth Technology

MODULE 10

Development of Mobile Telecommunication System

- GSM (overview, advantages and disadvantages)
- GSM architecture
- GSM Cellular network
- Security in GSM