Design and Implementation of Cellular Networks

Course Overview

This module examines the evolution, design and application of the cellular networking technologies 4G Long Term Evolution (LTE) to 5G. A specific look at how 4G LTE will be used within the Emergency Services Network (ESN). Additionally, an analysis of different methods of wireless backhaul are examined to highlight network versatility and capability to provide services to rural areas.

Duration

5 Days

Delivery Method

Classroom based, instructor led tuition with elements of guided research to develop academic writing skills.

Audience

The course is aimed at people who are looking to establish themselves in the mobile telecommunications industry as network surveyors, architects, field engineers and planners.

Course Prerequisites

Students attending this course should have completed 7CS005 Radio and Wireless Engineering or have relevant industrial experience.

Course Objectives

On completion of the course delegates will be able to:

- Describe the organisations governing the use of wireless networks.

- Explain the fundamental concepts and operating principles in the design of a wireless network.

- Understand PMR, DMR and Tetra technologies, network topologies and functionality.

- Understand the principles and protocols of 4th Generation (4G) Long Term Evolution (LTE) mobile communications.

- Identify the key elements of LTE architecture and describe their function.

- Understand what defines a true 4G network.

- Understand how satellite and microwave communications can be used for remote connectivity.

- Understand the different wireless technologies used by professional organisations and emergency services.

- Identify the key elements of 5G architecture and describe their functionality.

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Design and Implementation of Cellular Networks (continued)

Content Headings

LTE

- Introduction to LTE
- LTE network topology
- LTE air interface
- OFDMA and SC-FDMA
- The importance of CSFB
- VoLTE
- Emergency Services Network
- LTE Advanced & beyond

5G

- Move to 5G
- IMT 2020
- 5G UE
- NG-RAN
- Core Network
- Network deployment types
- Key associated technologies
- Frequencies
- SDN/NFV

Microwave

- Introduction to microwave
- Link planning
- Fresnel Zones
- Fade margin / system operating margins

Satellite

- Satellite theory
- Satellite services
- Frequency allocation
- Types of orbit

PMR/DMR/TETRA

- ETSI
- PMR466
- Spectrum allocation
- Digital PMR
- DMR standards
- DMR tiers
- TETRA 1 & 2
- ESN case study

Assignment/Assessment

The student will submit a 4000-6000 word assignment on a subject covered in the course syllabus within 6 months of course completion.

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