

Course Title: Design and Implementation of Cellular Networks – 7CS004
Duration: 5 Days

Course Overview

This module examines the evolution, design and application of the networking technologies Long Term Evolution (LTE) and New Radio (5G). Additionally, an analysis of different methods of wireless backhaul are examined to highlight network versatility and capability to provide services to rural areas.

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 and laws governing the use of wireless networks.
- Explain the fundamental concepts and operating principles of wireless in a design.
- Understand PMR, DMR and Tetra technologies, network topologies and functionality.
- Understand the principles and protocols of 4th Generation (4G) mobile communications (Long-Term Evolution LTE).
- Identify the key elements of LTE architecture and describe their function.
- Understand what defines a true 4G network.
- Identify the key elements of New Radio (Nr) 5G and describe their function.
- Understand 5G protocols and their function.
- Understand how microwave communications can be used for remote connectivity.
- Understand how satellite communications can be used for remote connectivity.
- Understand the different wireless technologies used by professional organisations and emergency services.

Content Headings

LTE:

- Introduction to LTE
- LTE network topology
- LTE air interface
- The importance of CSFB
- VoLTE
- LTE Advanced & beyond

New Radio 5G:

- Introduction to 5G
- 5G network topology
- 5G air interface
- 5G protocols
- mMIMO

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
- TETRA case study

Assignment/Assessment

The student will submit a 4-6000-word assignment on a subject covered in the course syllabus within 6 months of course completion.

