



# **Fundamentals of Cellular Network Planning, Dimensioning, and Optimization: From 4G to 5G**

Training Programme  
by  
Faculty of Engineering  
Multimedia University

## Overview

This course provides an overview of the processes and techniques used for cellular 4G and 5G radio access network (RAN) planning, dimensioning, deployment, and optimization. It also offers delegates practical insight on market opportunities and new revenue streams that can be enabled through 5G.

## Objectives

Upon completion of this course, the attendees are able to:

- Carry out link budget calculations and perform nominal cell coverage and capacity dimensioning for 3GPP-based cellular RANs.
- Understand the factors and techniques to improve RAN coverage, throughput, and capacity.
- Understand cellular RAN planning, dimensioning, deployment, and optimization processes for 4G LTE and 5G NR.
- Understand the key technologies of 5G NR and apply best practices to deploy 5G NR networks.

## Target Audience

Operators, vendors, regulators, managers, and engineers either new to, or already working in, telco/mobile communications.

## Prerequisite

Familiarity with telecommunications and general engineering terminology is assumed.

## Training Methodology

Classroom, hands-on lab work and exercises.

## Course Duration

2 days (7 hours/day online delivery).

## Content/Outline

### 4G LTE RAN Planning, Dimensioning, and Optimization

- Fundamentals of Cellular Networks
- Ecosystem of Cellular Communications
- 3GPP Standardization Activities
- LTE Network Architecture & Radio Network Elements
- Frequency Reuse, Duplexing, Coding, Modulation, Multiplexing in LTE
- LTE Radio Resource Management & Frame Structure
- Key Features of LTE-Advanced & LTE-Advanced-Pro
- 3GPP Standards for IoT Connectivity: NB-IoT & LTE-M
- Basics of RAN Planning & Rollout Strategy
- LTE RAN Planning Process
- LTE Nominal Coverage & Capacity Dimensioning, Hands-on Exercises
- Overview of LTE Detailed RAN Planning & Optimization

### 5G NR Technologies and Deployment Strategies

- Introduction to 5G – Key Requirements & Use Cases
- 5G NR Spectrum & Deployment Strategy
- 5G NR Technologies, Scalable OFDM Numerology, Frame Structure
- LTE/NR Spectrum Co-Existence & Dynamic Spectrum Sharing
- Enabling Technologies for eMBB, mMTC, uRLLC
- 5G NR Cell Throughput Calculation
- 5G Network Slicing
- 5G Network Architecture & Deployment Options
- Physical RAN Deployment Architectures & Network Sharing Mechanisms
- 5G Network Planning & Rollout Considerations

## Course Instructor

### Dr. Chuah Teong Chee

Dr. Chuah Teong Chee is currently a Professor in Digital Communications at the Faculty of Engineering, Multimedia University in Malaysia. He has served as a Technical Consultant and Research Fellow to Telekom Malaysia on xDSL networks for nearly 10 years. He has conducted multiple corporate training in the areas of wireless/cellular communications and xDSL to the telco industry. His current research interests include resource allocation and optimization for fixed, mobile, and hybrid broadband networks.

## Administrative Details

### Programme Logistics

Duration: 2 days

Dates, registration deadline and registration form:

Please refer to: <https://www.mmu.edu.my/foe/short-courses/>



### Your Investment

	<b>Condition</b>	<b>Price per Pax</b>
Regular Fee	Students / MMU Alumni	RM600
	Public	RM1000
	Public (Group >5 pax)	RM900
	IEM/IEEE Members	RM900
Early Bird Fee	Students / MMU Alumni	RM400
	Public	RM800
	Public (Group >5 pax)	N/A
	IEM/IEEE Members	RM700

### Method of Payment

Please refer to the next page.

Type of Payment	Method	Details
Local Transaction / Payment within Malaysia	Online Payment with JomPay	<ul style="list-style-type: none"> <li>To get started, login to any preferred internet banking.</li> <li>Look for JomPay to begin the payment process.</li> <li>Enter Ref 1 &amp; Ref 2.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;">  <p><b>Billor Code :</b> 22202  <b>Ref-1 :</b> &lt;Participant IC/Passport&gt;  <b>Ref-2 :</b> Event Name*</p> </div> <p><b>JomPAY</b> online at Internet and Mobile Banking with your Current, Savings or Credit Card account</p> <p>*Ref. 2: FOE4Gto5G</p>
		<ul style="list-style-type: none"> <li>To get started, go to <b>MMU website</b> (<a href="https://www.mmu.edu.my/">https://www.mmu.edu.my/</a>) &gt; <b>Admission &gt; Financial Info &gt; Payment Channel &gt; Non Student ;</b></li> </ul> <div style="border: 1px solid gray; padding: 5px; margin: 10px 0;"> <p><b>E-Payment</b>          To begin the payment process, please click Student or Non Students</p> <p>  </p> <p><a href="#">Student</a>   <a href="#">Non-Student</a></p> </div> <p>or scan the QR code below to begin the process:</p> <div style="text-align: center; margin: 10px 0;">  <p><b>SCAN ME</b></p> </div> <ul style="list-style-type: none"> <li>Choose Category: <b>Public Training</b></li> <li>Workshop Name</li> <li>Choose Your Participant Type:             <ul style="list-style-type: none"> <li>✓ <b>STUDEN</b> (MMU, IEEE, IEM, Other Higher Learning Institution )</li> <li>✓ <b>PUBLIC</b></li> <li>✓ <b>GROUP</b> ( Group &gt; 5 Pax )</li> <li>✓ <b>IEEE/M</b> (IEEE/IEM Members)</li> </ul> </li> </ul>

Type of Payment	Method	Details
International Payment / Payment outside Malaysia	Online payment with Flywire 	<ul style="list-style-type: none"> <li>To get started, go to <a href="http://mmulanding.flywire.com">mmulanding.flywire.com</a>; or scan the QR code to begin the payment process: </li> <li>Choose Conference for Non-students related</li> </ul>

**Note:**

Please submit the proof of payment to organizer for clearance updating purposes within 2 working days.

**Refund and Cancellation**

Any refunds will be processed in 60 days. Should there be any cancellation, it may be due to the organizer not getting the minimum participants or the participant failing to attend the workshop due to unavoidable reason.

**Disclaimer**

Faculty of Engineering, Multimedia University reserves the right to change the instructors, date and to vary/cancel the programme should unavoidable circumstances arise. All effort will be taken to inform participants of the changes. Upon submission of the registration form, you are deemed to have read and accepted the terms.

**Enquiries**

Dr. Zubaida Yusoff: [zubaida@mmu.edu.my](mailto:zubaida@mmu.edu.my)

Ms. Sherry Dalilla Abd. Rahim: [dalilla.rahim@mmu.edu.my](mailto:dalilla.rahim@mmu.edu.my)