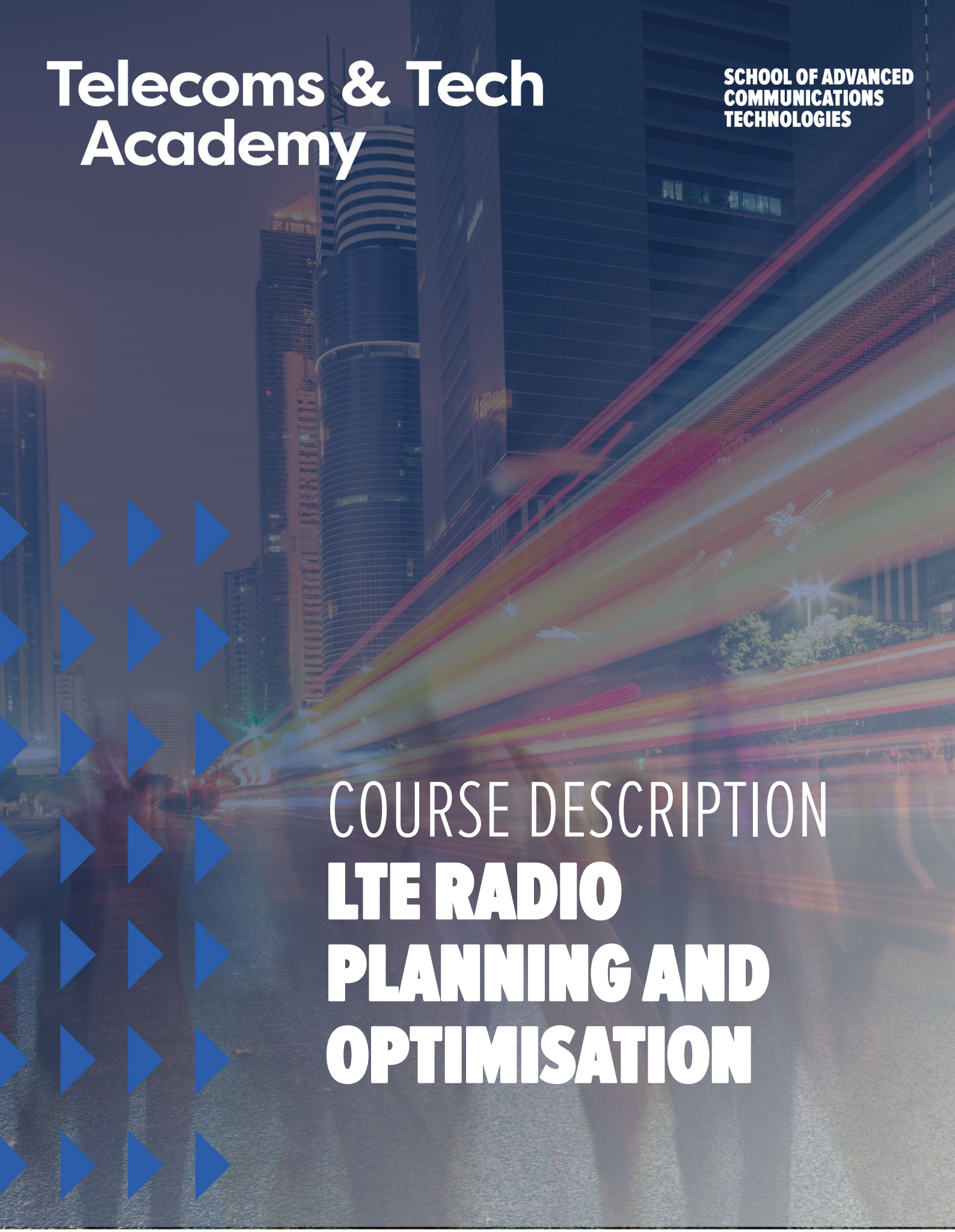
Telecoms & Tech Academy

SCHOOL OF ADVANCED COMMUNICATIONS TECHNOLOGIES



COURSE DESCRIPTION

LTE RADIO PLANNING AND OPTIMISATION

Format:
Classroom

Duration:
5 Day

KNect365 Learning
an informa business

COURSE SUMMARY

HIGHLIGHTS

- **Squarely focused on the effective planning and optimisation of LTE networks**
- **Hand-on certification programme with end of course practical test**
- **Case studies using industry leading software tools: Mentum Planet and Symena Capesso**
- **Capacity planning - with capacity modelling techniques demonstrated**
- **Coverage optimisation using industry-leading software tools**
- **LTE link budgets with worked examples**
- **FDD/TDD eNB configuration options**
- **IDLE mode and CONNECTED mode parameter optimisation**

"The course was very insightful and the lessons learnt from the course will be very relevant to the telecoms industry."

BL ETISALAT

COURSE SUMMARY

This certification programme covers the principles and execution of LTE radio planning and optimisation. The course begins with a discussion of the LTE physical layer explaining the time and frequency domain structures and covering those aspects of the LTE radio interface that will have an impact on coverage and capacity. A detailed examination of LTE link budgets is provided, identifying and calculating the typical link budget reference points and discussing elements of the budgeting process that are unique to LTE. Following the calculation of link budget pathloss, the course turns to propagation models and cell radius prediction.

Typical models are discussed and compared and full link budget and radius predictions are carried out. To support the link budget and modelling techniques, as well as apply the learning in an industry-leading software package, Mentum Planet will be used to demonstrated and analyse the LTE radio planning process. We also model and analyse typical LTE deployments, discussing the major variables and discuss LTE implementation options in detail.

Optimisation of the LTE radio plan is then explained and demonstrated, covering eNB configuration, as well as IDLE mode and CONNECTED mode parameters. The range and impact of the optimisation parameters are discussed followed by an opportunity to experiment and explore "hands on" with dedicated optimisation software. The impact of each of the parameters discussed are

OUTCOMES & COMPETENCY DEVELOPMENT

Participants will develop or be able to:

- Plan an effective LTE network, understanding the impact of the major capacity and coverage issues and the different technology choices.
- Gain a solid foundation on which to plan and facilitate advanced technology projects - with higher competency levels bringing operational efficiencies, cost savings, and time-to-market advantage.
- Use capacity modelling techniques to determine the overall system capacity and plan for future network expansion..
- Enhance your understanding of LTE physical layer theory.
- Fully understand and calculate LTE link capacity under different radio channel conditions.
- Build and calculate detailed LTE link budgets for both Rural and Urban areas .
- Compare and select typical propagation models used to predict cell range for LTE radio links.
- Use a capacity models to determine the likely requirements of a single LTE subscriber.
- Discuss eNB configuration parameters and understand the impact on planning and optimisation process.
- Use dedicated coverage optimisation software to explore the impact of specific parameter selections on the planning process.
- Build the confidence to make decisions on technology implementation and procurement that are commercially viable, minimise risk, and in line with the strategy and goals of the wider organization.

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COURSE CONTENTS

LTE ARCHITECTURE REVIEW

- LTE Development
- The E-UTRAN
    - eNB
    - LTE Uu and X2
- Evolved Packet Core (EPC)
- Serving Gateway (SGW)
    - Mobility Management Entity (MME)
    - Packet Data Network Gateway (PGW)
    - UMTS – LTE Inter-working
- Spectrum Requirements of LTE

LTE RADIO INTERFACE

- Overview of LTE air interface
- Role of Cyclic Prefix (CP) – (long and short CP)
- Logical, Transport and Physical channels
- Reference signals and channel estimation
- Synchronisation signals
- LTE synchronization schemes (time and frequency synchronization)
- Modulation and coding schemes
- Random access preamble
- LTE spectrum options
- LTE system data rates
- Adaptive modulation and coding
- Power control

LINK BUDGETS FOR LTE

- Defining link budget reference points
    - EiRP, IRL
- Setting coverage objectives
- LTE link budget
    - Parameter definitions
    - CINR, Rx Threshold, Noise
    - Worked examples
- Environmental margins
    - Fading, building, noise rise
- Determining cell radius from pathloss
- Propagation models
    - Common empirical and physical models
    - Model comparisons
    - Worked examples
- UE Radio Measurements
- Limitations of RSRP and RSRQ for Optimisation
- Formulation of RSRP and RSRQ Performance Targets
- LTE Measurement Tools

COVERAGE PLANNING

In this section the course will use Mentum Planet to demonstrate coverage planning, this will involve hands-on exercises to demonstrate the planning process and analysis of the prediction output.

- Setting up the planning project
- Single frequency network
- Interference coordination
- Multiple channel system
- MIMO
- Interference analysis
- Capacity and coverage analysis

ENB CONFIGURATION

- A Context for LTE Optimisation
- Physical Cell Identifier (PCI)
- Frequency Allocation
- Bandwidth Configuration, LTE Frequency Bands
- Centre Frequencies and EARFCNs
- SFN or Frequency Plan
- Interference Mitigation
- Cyclic Prefix Length
- Downlink/Uplink Switching in TDD Mode
- MIMO Options
- Control Channel Configuration
- SON Concepts

IDLE MODE PARAMETERS

- PLMN selection
- Cell selection
- Cell reselection
- RACH procedure

CONNECTED MODE PARAMETERS

- Intra-LTE handovers
- IRAT handovers
- Neighbour cell concepts in LTE
- Power control
- Timing advance

CAPACITY PLANNING FOR LTE

- LTE radio interface capacity
- Factors affecting capacity
- Setting capacity objectives
- The EPS Bearer Concept
- LTE Defined QoS Values
- Defining a subscriber profile
- Network design based on capacity

COVERAGE OPTIMISATION

In this section the course will discuss coverage optimisation and offer a hands on exercises using Capesso from Symena.

- Identifying optimisation targets
- Managing optimisation processes
- Running optimisations
- Analysing optimisation results

OUR TRAINING SERVICES

TELECOMS & TECH ACADEMY STRUCTURE

Our training programmes are delivered worldwide as part of the training and development plans of many operators, vendors, and service providers. The programmes cover a wide range of competency development requirements.

To ensure we meet the training needs of the industry as effectively as possible, we operate three schools:

School of Telecoms Management
Business training tailored to the telecoms industry, ranging from the intensive 5-day Telecoms Mini MBA to specialist leadership and marketing training.

School of Advanced Communication Technologies
Covering a multitude of technologies, these courses range from overviews aimed at nontechnical staff to in-depth engineering training.

Distance Leaning
Our comprehensive suite of Distance Learning programmes provide an excellent opportunity to expand knowledge and build confidence.

OUR TRAINERS

We only use trainers and programme directors that satisfy the following three criteria:

- Experts in their field
- High level of Industry Experience
- Expert facilitators and training professionals.

All our trainers have undergone a rigorous election process and are subject to continuous monitoring and evaluation. Each trainer is accredited for specific courses or topic areas. Whether engineers or business experts, all our trainers are required to continue their own development within their specialist areas, and to broaden their Industry view of trends, best practice and technology.

This is achieved by our on-going work with many tier 1 operators and vendors, and by full exposure to Ovum research and KNect 365 TMT worldwide events.

UNIVERSITY ACCREDITATION

Some of our programmes have been accredited by the University of Derby Corporate; a UK-based university highly acclaimed in the area of employer engagement. They are at the forefront of the drive to integrate highly focused industry -led training with the academic rigor and quality control of university-based education. Our comprehensive Advanced Telecoms Management Series have been accredited Post-Graduate Level, with our extensive suite of Distance Learning at Undergraduate Level)

We would be happy to discuss extending accreditation to tailored ATMS or programmes based on our Distance Learning modules. Although accreditation is specific to these programmes, the work we do with the University of Derby enable us to develop and apply best practice across our portfolio.

CUSTOMISED IN-HOUSE TRAINING

Telecoms & Tech Academy has worked with countless companies to deliver customised training programmes. We take time to understand your requirements, you'll work with our specialist training team to ensure that we deliver your perfect training programme for your business.

A customised training programme from Telecoms & Tech Academy ensures you get a course that precisely matches your organisation's needs, presented by a first-rate training organisation, with access to all the latest industry research and analysis.

WHY CHOOSE IN-HOUSE TRAINING FROM TELECOMS & TECH ACADEMY?

- Content can be customised to focus on the issues you want – work with us to develop the training course to match the exact needs.
- Unique industry research – from Ovum's team of industry leading analysts
- Expert trainers – our team of versatile trainers have the knowledge and experience to deliver a highly effective learning experience
- The most efficient way to train your staff – at the time and location to minimise disruption
- Flexible delivery options – with a range of instructor led, distance learning and virtual classroom formats available you can build a blended solution to maximise training effectiveness over the long term
- Pre and post course assessment – can be included in programmes to measure competencies and check on the required progress.

Contact us to discuss how we can build your perfect programme.

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