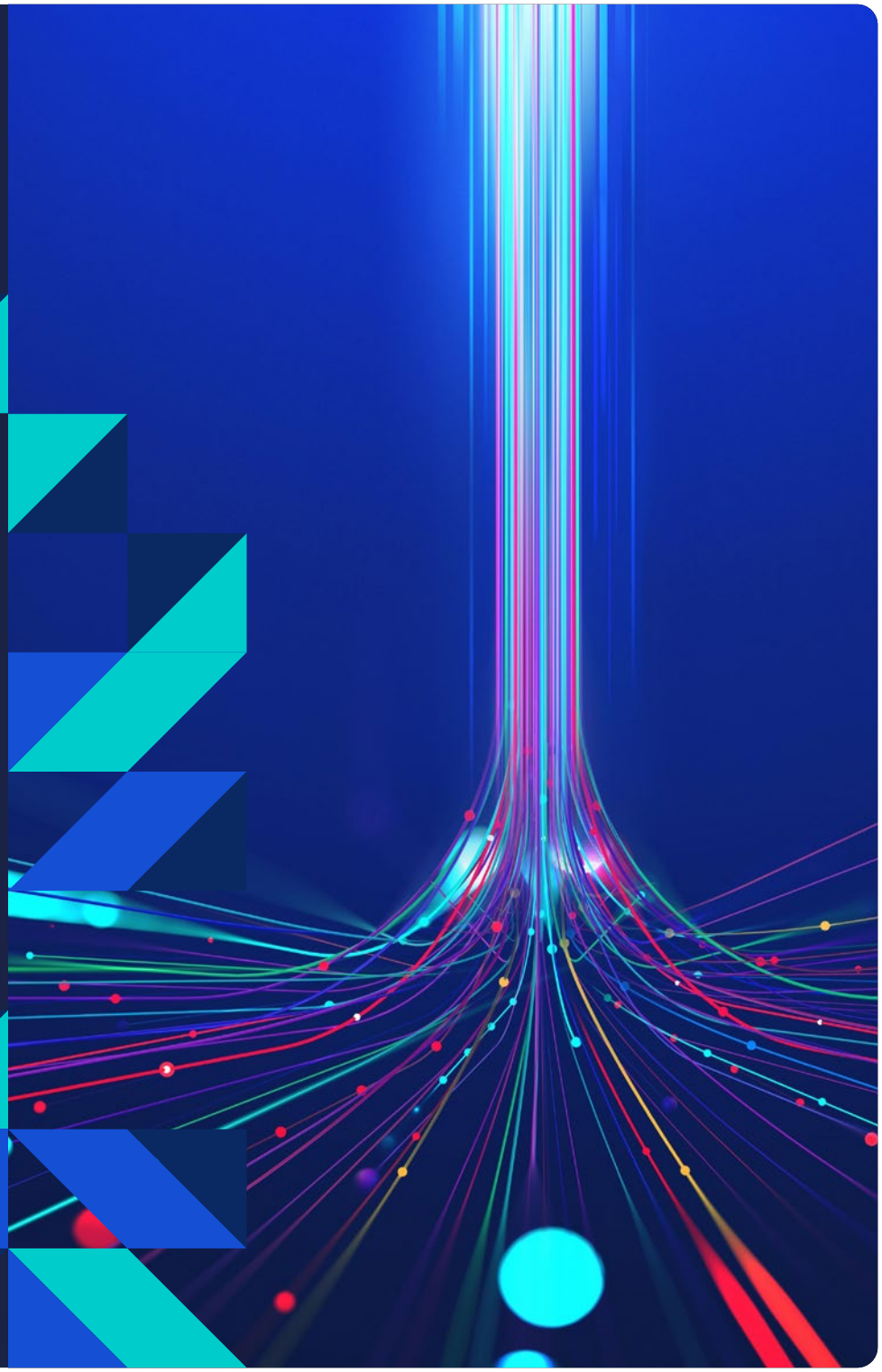
Telecoms & Tech Academy

5G Networks:

Planning, Design and Optimisation



Brought to you by informatech

CPD
The CPD Certification Service

5G Networks:
Planning, Design and Optimisation
Foundation Level

With the technology offering faster speeds and more reliable connections than ever before, ultimately unlocking a diverse set of use cases from the Internet-of-Things (IoT) to mission-critical control, it is easy to understand the hype.

Yet, with the hype comes high expectations on operators to deliver and, therefore, it is important that LTE operators contemplating the transition to 5G are prepared.

Through the utilisation of demonstrations, this programme offers delegates practical insight that will enable them to effectively

PROGRAMME MODULES

- Radio Access Architecture
- Backbone and Core: Software Defined Networking
- IoT and Edge Computing
- 5G Security
- Operation Control and Management

WHO IS IT FOR?

The course is designed for operators, vendors, regulators, engineers as well as staff involved in the architecture, optimisation, management, monitoring or testing of the 5G network would benefit from this training programme.

LEARNING OUTCOMES

This course offers delegates an in-depth understanding on what they can do to prepare their network for the roll-out of 5G. Avoiding generalisations, the course provides delegates with skills that can directly be applied to their work.

Attendees will leave the course with a deeper understanding of:

- 5G concepts, enablers and main characteristics
- 5G backwards-compatibility
- Use Cases and their mapping to carriers and applications/services
- Spectrum, interfaces and coding in 5G New Radio
- Radio planning principles, challenges and methods for radio coverage and capacity
- Access network requirements and front-haul design methods
- Centralized/virtual Radio Access Network planning using clustering methods
- 5G core (5GC) architecture, network elements and compatibility with 4G EPC
- 5G Security and the threats posed to the new technology
- SDN, NFV and cloudification, benefits and user/control plane design
- Optical backbone transport, resilience and wavelength assignment
- Flow control, slicing and orchestration
- IoT radio access and design principles
- Purpose and functions of edge computing
- Requirements and challenges of 5G network management; Quality of Service and Service Level Agreements
- Big Data and machine learning in network diagnostics and fault detection
- Virtualisation and the use of multiple layers
- Use of a radio planning tool to demonstrate actual 5G planning

Programme Agenda

5 Half Day Course Modules Include:

Day 1

Module 1
Radio Access Architecture

5G Radio Interface
- Network Elements: remote radio heads (RRH), base-band unit (BBU) and hotels (BBH); different types of radio units.

5G New Radio: Spectrum Overview
- An information theoretic primer
- Non-standalone and standalone 5G
- Multiple access: OFDMA, NOMA
- Use Cases to carrier mapping
- Modulation scheme: PSK, QAM, APSK
- Error coding

5G Radio Planning Overview
- Radio characteristics; fading, reflection, diffraction and scattering
- Clutter types, propagation models and link budgets
- Cells and antenna types
- Indoor coverage; small (micro, pico and femto) cells, Hetnets, Wifi off-loading
- Ad-hoc networking and D2D communication
- Use of Radio Planning tool to simulate an actual planning session

Day 2

Centralized and virtualized radio (C-RAN/ vRAN)
- Technical requirements and limitations
- Benefits, costs and objective functions
- Clustering under constraints
- Baseband hotel selection
- Optimization methods

Module 2
Backbone and Core I: Software Defined Networking

5G core (5GC) network elements
- Interfaces and protocols in 5GC.Management and control functions: authentication, session management, mobility, quality of service (QoS) etc. Fixed/mobile access. Comparison with EPC and migration options.

SDN and NFV
- Difference between SDN, NFV and cloudification
- Resource pools
- Centralised and distributed control
- SDN Orchestration
- Flows in the user and control planes
- Resilience aspects and migration
- OpenFlow capabilities

Day 3

Module 3
SDN & NFV

Telco Cloud Design
- Hypervisor considerations
- Fabric options
- Understanding East/West and North/South flows
- Designing for Mobile Applications onboarding
- Resource allocation control and data plane applications.

Data Centers
- SDN and NNF in clouds. Job scheduling and load balancing algorithms. Online algorithms and repacking
- Load balancing

Module 4
IoT and Edge Computing

Internet of Things
- IoT design aspects; lifetime, coverage and connectivity
- WSN radio interfaces
- Random network deployment and IoT protocols
- Mobility modeling
- Mobility: wearables and drones
- Case study: Energy efficient protocol for WSN

Massive Machine Type Communications and Big Data
- Data representation and bandwidth
- Discretization
- Data sketches
- Approximate counting

Edge Computing
- Edge compared to cloud (and fog) computing. Data pre-processing, cleansing and compression. Queries.

Day 4

Module 5
5G Security

Front-Haul & Aggregation Layer Design
- 5G Core Security
- 3GPP Security standards
- Network Splicing Security
- Security control plane and management
- Signaling Security
- 5G RAN security
- Data confidentiality and handling (GDPR)

Security Threats
- Understanding DDOS and the Types of different attacks
- IoT secure Architecture
- Security lifecycle management
- Holistic view
- Exercise: Prepare a generic security guideline for 5G

Day 5

Module 6
Operation, Control and Management

Service Levels & Resource Mapping
- Quality of Service, Quality of Experience and Service Level Agreements; requirements and realization of eMBB, mMTC and URLLC services
- QoS and SLA monitoring and enforcement; statistics and hard limits
- Dynamic resource management
- Admission control, priority and preemption features
- Mission critical services (autonomous cards, telemedicine)

Network Management
- Challenges on network management in 5G: extreme throughputs, dense deployment, increased heterogeneity, and virtualization; Security aspects.
- Cognitive management
- Self-organization and self-optimization
- Orchestration and risk management
- Network management as a service (NmaaS)

Exercise: Prepare a list of 5 key points you feel will be essential to 5G in the future.

Summary, Q&A and discussion

Big Data and Machine Learning Methods

- Traffic estimation and SLA enforcement, machine learning versus optimization.
- Data types in the 5G networks
- Heavy hitters
- Entropy
- Supervised and unsupervised learning
- Pattern recognition
- Network roll-out
- Global 5G roll-out status

Summary, Q&A and discussion

Telecoms & Tech Academy

Informa Telecoms & Tech Academy, part of Informa Tech, has been providing training programmes and workshops for organisations within the telecoms/ICT space for the past 20+ years.

We have a wide portfolio of telecoms/technology/ICT specific 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. Our programmes include the latest relevant market research, analysis and insights from Omdia – the biggest research organisation in the industry. We train right across an organisation.

Job Functions include:

- CxO
- Director
- Senior Manager
- Middle Manager
- Identified Talent
- Enterprise Sales
- Retail Sales
- Technology Teams
- Supporting Functions (Finance, HR, Marketing, Operations)

32,000+
Industry professionals trained

520+
Global enterprise clients

50+
Specialist trainers

Trusted in-company training provider across the tech and telecoms ecosystem

BT · Digicel · ITU · Microsoft · MTN · ooredoo · STC الاتصالات السعودية · vodafone

Get in touch with our Training team now to find out more **telecomsacademygroups@informa.com**