



# Telecommunications Fundamentals Course: Transmission, Switching, Mobile and IP Networks

19 – 30 July 2027

Barcelona - Eixample district four-star



## Telecommunications Fundamentals Course: Transmission, Switching, Mobile and IP Networks

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### Introduction:

Telecommunications fundamentals for transmission, switching, mobile and IP networks are covered in this 10-day course for new joiners, non-specialist engineers, managers and procurement staff, ending in a Network Architecture Walk-Through and Service Design Note for a case operator. Staff outside engineering often misread network terms and accept vendor proposals they cannot question, which slows procurement decisions and service launches. Nominees already work around networks without formal grounding and learn through guided case studies on network diagrams and service data. CoreConcept Training Center runs this telecommunications fundamentals course for mixed fixed, mobile and enterprise cohorts.

### Course Objectives:

- Explain signals, bandwidth, spectrum and modulation in the terms used in network reports and vendor proposals
- Compare copper, fibre, microwave and satellite media and multiplexing methods for a given site and service
- Distinguish circuit and packet switching and trace how a call and a data session cross access and core domains
- Describe how mobile generations, fixed broadband access and IP/MPLS convergence carry voice, video and data services
- Interpret network operations, OSS/BSS and service assurance reports, operator business models and service KPIs when taking commercial or oversight decisions
- Produce a Network Architecture Walk-Through and Service Design Note for a case operator

### Target Audience:

- Graduate and new-joiner staff in operators who support engineering, product or operations teams
  - Engineers from adjacent disciplines such as power, civil or IT who are responsible for interfaces with telecom networks
  - Commercial, product and customer-facing staff responsible for selling or specifying connectivity services
  - Procurement and contracts staff responsible for buying network equipment, transmission links and managed services
  - Policy and market analysts in sector bodies responsible for reviewing operator plans and service data
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## Course Outline:

### Day 1: Signals, Bandwidth, Spectrum and Modulation Foundations

- Analogue and Digital Signals Compared Using Waveform Sketches
- Bandwidth and Channel Capacity Explained With Service Examples
- ITU Radio Spectrum Bands Mapped to Everyday Services
- ASK, FSK and PSK Keying Shown on Constellation Diagrams
- Decibels, Signal-to-Noise Ratio and Attenuation Worked Examples

### Day 2: Transmission Media Across Copper, Fibre, Microwave and Satellite

- Twisted-Pair Copper and Coaxial Cable Reach and Limits
- Optical Fibre Attenuation, Crosstalk Immunity and Capacity Overview
- Point-to-Point Microwave Links and Line-of-Sight Path Checks
- Geostationary and Low Earth Orbit Satellite Link Comparison
- Media Selection Matrix Weighing Cost, Capacity and Latency

### Day 3: Multiplexing Methods and Network Domain Architecture

- Frequency-Division and Time-Division Multiplexing Channel Sharing Exercises
- Wavelength-Division Multiplexing Concept Kept at Overview Depth
- Customer Premises, Access, Transport and Core Network Domains
- Star, Ring and Mesh Topology Patterns Compared
- Local Exchange, Central Office and Point of Presence Roles

### Day 4: Circuit Switching, Packet Switching and Signalling

- Circuit-Switched Telephone Exchange Call Set-Up Sequence Traced
- Packet Switching With Statistical Multiplexing and Rerouting Around Failures
- Per-Minute Versus Per-Volume Charging Behind Each Switching Method
- Signalling Versus Bearer Traffic Separation in Voice Networks
- Numbering, Addressing and Routing Tables Followed Through a Call

### Day 5: Week-One Case Study Tracing a Call and a Data Session

- Case Pack Review of a Mixed Copper, Fibre and Microwave Network
  - Case Task Tracing a Voice Call From Handset to Exchange
  - Case Task Mapping a Data Session Across Packet Domains
  - Case Task Choosing Media and Multiplexing for a Remote Site
  - Week-One Transmission and Switching Glossary and Briefing Note
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## **Day 6: Mobile Generations and Fixed Broadband Access**

- 3GPP Mobile Generations From 2G Voice to 5G Data
- 5G NR FR1 and FR2 Ranges With Massive MIMO
- Radio Access Network, Base Station and Mobile Core Roles
- Fixed Broadband Options Over DSL, Cable and Fibre Access
- Mobile Backhaul and Fixed Access Sharing One Transport Network

## **Day 7: IP/MPLS Convergence, Data Centres and Telecom Security**

- IETF Internet Protocol Suite Role in Converged Services
- MPLS Label Switching as Virtual Circuits Over IP
- Voice, Video and Data Convergence Onto One IP Core
- Telecom Data Centres, Cloud Platforms and Edge Computing Sites
- Telecom Security Basics Covering Signalling, Fraud and Physical Sites

## **Day 8: Network Operations, OSS/BSS and Service Assurance**

- Network Operations Centre Roles, Shifts and Escalation Paths
- FCAPS Fault, Configuration, Accounting and Performance Management Functions
- TM Forum eTOM Process Model for Fulfilment and Assurance
- OSS Inventory, Provisioning and Service Activation Flow
- BSS Ordering, Rating, Billing and Customer Care Chain

## **Day 9: Telecom Business Models, Interconnection and Emerging Services**

- Retail, Wholesale and Infrastructure-Sharing Operator Business Models
- Interconnection and Spectrum Economics Kept at Overview Depth
- Service KPIs Covering Availability, Latency and Customer Experience
- NB-IoT and eMTC Machine-Type Communication Use Cases
- Private 5G Networks and Non-Terrestrial Satellite Broadband Services

## **Day 10: Capstone Case Study Network Architecture Walk-Through and Service Design Note**

- Case Operator Data Pack Review Covering Fixed and Mobile Assets
  - Architecture Walk-Through From Customer Premises to Core and Cloud
  - Service Design Choices for Access, Transport and IP Core
  - Operations and Assurance Model Linking OSS, BSS and KPIs
  - Service Design Note Completion and Review Panel Presentation
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## Skills You Will Gain:

- Signal and Spectrum Literacy
- Transmission Media Comparison
- Switching Method Analysis
- Mobile and Broadband Access Mapping
- IP Convergence Awareness
- Network Operations Report Interpretation
- Telecom Business Model Assessment
- Service Design Documentation

## Why Attend This Course:

- Deliver a Network Architecture Walk-Through and Service Design Note that line managers and product owners can use as a reference for new service requests
- Judge whether a proposed link, access technology or managed service suits the capacity, latency and availability a business unit needs
- Avoid specification errors, mismatched purchases and delayed launches caused by misreading network terms or vendor diagrams
- Brief colleagues in finance, procurement and operations with a shared glossary and architecture map of fixed and mobile networks

## Conclusion:

Back at work, the participant gives the unit a Service Design Note and architecture walk-through that product, procurement and operations teams can consult before approving a new connectivity service or vendor proposal. Managers can use it to check whether access, transport and IP core choices match the capacity, latency and assurance a service requires, and to frame sharper questions for engineering teams and suppliers. After its first use on a live request, the unit should review which assumptions held, which terms still caused confusion and which KPIs belong in future service reviews.

## Frequently Asked Questions FAQ:

### What do participants need before joining the telecommunications fundamentals course?

No engineering degree or telecom background is needed. Participants should be comfortable reading simple diagrams and tables and should bring examples of network services, vendor documents or reports from their own work to use in the case studies.

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## **How does this telecommunications fundamentals course differ from specialist network engineering courses?**

It explains the whole telecom system at a conceptual level, from signals to services and business models. Specialist courses on optical transport design, radio planning, IP routing configuration or sector regulation go much deeper into one area and assume daily engineering practice.

## **Why does packet switching matter in telecommunications fundamentals today?**

Packet switching shares capacity dynamically through statistical multiplexing and can route traffic around failures, so voice, video and data now travel over one IP/MPLS core. Understanding this shift explains modern charging models, network design choices and the move away from circuit-switched exchanges.

## **What will participants take back to work from the telecommunications fundamentals course?**

Participants take back a Network Architecture Walk-Through and Service Design Note for a case operator, a working glossary of telecom terms and a set of questions for testing vendor proposals, service requests and network reports.

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