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Networking, Fibre Optics and Telecommunications Fundamentals Course

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Networking, Fibre Optics and Telecommunications Fundamentals Course

Introduction:

Networking, fibre optics and telecommunications fundamentals are the basic principles and hands-on skills behind data networks, the optical fibre that links them and the telecom systems that carry their traffic between sites. This 1-week course is for junior network and telecom technicians and engineers, IT support staff, fibre installers and operations staff new to telecom, and each delegate leaves with an End-to-End Link Lab Workbook. It is taught at foundation level with practitioner depth through daily labs, built around the OSI reference model, a seven-layer framework for describing network functions, and IEEE and ITU-T standards.

Course Objectives:

- Distinguish the OSI reference model from the TCP/IP suite and apply both to describe where a network fault sits
- Apply IPv4 addressing, subnetting and VLAN separation to configure a small switched and routed network
- Compare Wi-Fi, mobile and fibre access connections and select the medium that fits a given site
- Apply fibre preparation, connector cleaning, end-face inspection and fusion splicing to produce a working fibre joint
- Interpret optical power meter readings and basic OTDR and visual fault locator results to decide whether a fibre link is healthy
- Apply a layered troubleshooting method, from the physical layer upwards, to isolate faults across copper, fibre and IP

Target Audience:

- Junior network technicians who patch, configure and support switches and routers, deciding which address, VLAN or cable each device needs
- Telecom technicians and engineers early in their careers who work on transmission and access sites, judging whether a link is fit to hand over
- IT support staff who handle connectivity tickets, deciding whether a fault lies in the cable, the fibre, the wireless link or the IP settings
- Fibre installers who terminate, splice and patch cables, judging when a joint or connector has to be remade
- Project and operations staff new to telecom networks who coordinate installation work, deciding whether field test records are complete and plausible

Course Outline:

Day 1: Foundations: How Data Networks and Telecom Networks Carry Traffic

- LAN vs WAN: How Local and Wide Area Networks Connect Users and Sites
- OSI Reference Model: Seven Layers Used to Describe and Locate Network Functions
- TCP/IP Suite: Four Layers, Common Protocols and How Data Is Encapsulated
- Copper, Fibre and Radio Media: Where Each Carries Traffic in Working Networks
- Telecom Network Structure: Core, Transmission and Access Segments Explained for Newcomers

Day 2: Data Network Architecture: Ethernet, IP Addressing, Switching, Routing and Wi-Fi

- IEEE 802.3 Ethernet: Frames, MAC Addresses and Twisted-Pair Cabling to TIA-568
- IPv4 vs IPv6: Address Formats, Private Ranges and Basic Host Configuration
- Subnetting and CIDR Notation: Dividing an Address Block Between Departments and Sites
- IEEE 802.1Q VLANs and Static Routes: Separating Traffic and Forwarding Between Subnets
- IEEE 802.11 Wi-Fi: Access Points, Frequency Bands and Basic Wireless Security Settings

Day 3: Fibre Optic Core Skills: Cable Handling, Connectors, Cleaning and Splicing

- Fibre Cable Anatomy: Core, Cladding, Buffer Tubes and Colour Codes for Identification
- Laser Safety and Fibre Shard Handling: Safe Bench Practice for Fibre Work
- LC vs SC Patch Cords: Recognising Connector Styles, Adapters and Patch Panel Layouts
- IEC 61300-3-35 Inspection: Cleaning and Scoping Connector End Faces Before Mating
- Fusion Splicer Operation: Stripping, Cleaving, Splicing and Protecting a Joint Step by Step

Day 4: Telecom Access, Mobile Basics and Troubleshooting Faults Across Copper, Fibre and IP

- ITU-T G.984 GPON Basics: OLT, Passive Splitters and ONT at the Customer Premises
- 4G vs 5G Mobile Networks: Radio Sites, Backhaul Links and the 3GPP Standards Family
- Optical Power Meter and Light Source: Measuring Link Loss and Recording Readings in dB
- Visual Fault Locator and Entry-Level OTDR Use: Finding Breaks, Bends and Poor Splices
- Layered Troubleshooting Method: Link Lights, Interface Status and Address Checks From Layer One Upwards

Day 5: Lab Practice: Building and Testing an End-to-End Network and Fibre Link

- Lab Build: Splicing, Patching and Loss-Testing a Fibre Link Between Two Switches
- Lab Configuration: Assigning Subnets, VLANs and Static Routes Across the Test Network
- Ping vs Traceroute Results: Verifying End-to-End Reachability Across the Test Network
- Lab Fault-Finding: Diagnosing Injected Faults With Packet Capture and a Fault Locator
- End-to-End Link Lab Workbook: Final Test Records, Network Diagrams and Fault Log Assembly

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Skills You Will Gain:

- Subnet Calculation
- VLAN Configuration
- Fibre End-Face Inspection
- Fibre Splice Preparation
- Optical Loss Measurement
- Packet Capture Analysis
- Layered Network Troubleshooting
- GPON Access Basics

Why Attend This Course:

- From recognising network equipment by sight to explaining how a packet moves through each OSI and TCP/IP layer
- From copying IP settings from colleagues to calculating subnets and assigning addresses and VLANs independently
- From watching others splice and test fibre to cleaning, splicing and measuring a fibre link with sound bench practice
- From scattered notes and screenshots to an End-to-End Link Lab Workbook with diagrams, test readings and a fault log

Conclusion:

A working network is a chain of copper, fibre, radio and IP settings, and a fault anywhere in that chain stops traffic from end to end. The course makes three distinctions clear: the OSI reference model versus the TCP/IP suite, IPv4 versus IPv6 addressing, and power meter loss readings versus OTDR and visual fault locator results. It suits delegates who are new to networks or fibre, or who know one side and need the other, and who want practical foundation skills before moving on to intermediate transmission and design training.

Frequently Asked Questions FAQ:

What do delegates need before a networking, fibre optics and telecommunications fundamentals course?

No prior networking or fibre experience is needed. Basic computer skills and comfort with simple arithmetic are enough, because subnetting and decibel loss figures are built up step by step in the labs. Delegates should be able to handle small hand tools carefully.

How does a networking, fibre optics and telecommunications fundamentals course differ from an intermediate fibre network course?

It starts from first principles and joins three subjects. Intermediate courses assume field experience and focus on transmission design and detailed fault analysis, while this course builds core networking, fibre handling and testing skills for newcomers.

Why does connector cleaning matter in networking, fibre optics and telecommunications fundamentals?

Dirt on a connector end face is a common cause of high loss and reflections in fibre links. A single dust particle on the fibre core can block light, so inspecting and cleaning every connector before mating is a basic habit of sound fibre work.

What do delegates take back to work from networking, fibre optics and telecommunications fundamentals training?

Each delegate takes back an End-to-End Link Lab Workbook: network diagrams, a subnet and VLAN plan, splice and power meter records, fault locator and OTDR notes, and a fault log that serves as a reference on the job.