Foundation In Telecommunications

COURSE DESCRIPTION:

This course has been designed for people wanting to gain an understanding of the modern world of telecommunications, perhaps starting out in or moving into the telco industry. Starting at the beginning, it will explain the main principles of Voice, Data, Video and Text communications over fixed line (copper and fibre) and wireless (wi-fi, mobile, radio and satellite) networks. Learn how technologies have moved from circuit switched voice over copper networks to newer packet switched data over fibre and mobile networks.

No previous experience is required – this is a foundation course

WHO SHOULD ATTEND:

Anyone looking to understand todays telecommunications technologies and how they work together to provide the services we require for our business and personal applications.

SOME COURSE BENEFITS:

- Understand the language and acronyms surrounding telecommunications
- Understand how the different technologies fit together
- Understand networks and applications
- Have credible conversations around technology & products with your peers and customers
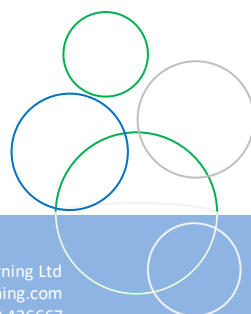
COURSE OBJECTIVES:

- To clarify the language & technologies surrounding telecommunications networks
- To provide a foundation knowledge level
- To explain the technologies involved in making current networks function
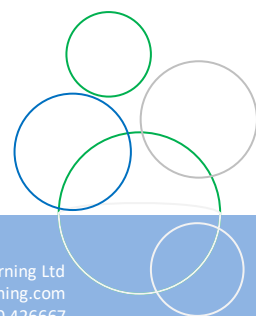
DURATION:

- 4.5 days

PRICE:

- $1,995.00 + GST per person

CONTENT:

Day 1 – The Big Picture

- Terminology exercise
- Why Digital?
- Analogue & digital
- Encoding
- PCM (G.711) - voice
- ASCII – data
- Binary, MP3, JPEG, MPEG
- Applications – Real Time & Non RT
- Data and Voice explained
- Circuits & packets
- Transmission Mediums
  - Copper
  - Fibre
  - Wireless
- The aging Local Loop
  - PSTN
  - ISDN (BRI & PRI)
  - x-DSL
- The new fibre based broadband (G-PON)
- LAN's & WAN's
- A Simple Reference Model (OSI & IP Stack)
- Fibre Optics Advantages
- Fibre Optic Technology Overview
- Global Broadband Projects Explained
- Multiplexing explained
- Fibre broadband implementations (G-PON)
- Mobile Networks : 1G to 3G history,
- Mobile 4G & 5G Technology overview
- Wireless Mobile Broadband Implementations
- 5G Broadband shaping consumer lives & changing Business models
- Wi-Fi – 802.11x
- Local Area Networks (LAN's)
- V-LAN's, Class of Service and Quality of Service (CoS & QoS)
- Wide Area Networks (WAN's)
- The Internet
- TCP/IP
- CoS & QoS in IP Networks (TCP & UDP)
- VPN's & SD-WAN
- The Worldwide Web
- Applications: Voice over IP & SIP

Day 2 – Layer 1: Fibre Optics

- The principles of light (simplifying the language)
- Fibre optic system basics
- Fibre safety considerations
- Single mode & multi mode fibres
- Fibre construction
- Fibre connectors
- Connector colour codes
- Fibre cables
- Air blown fibre
- LED's & lasers
- Fibre receivers
- Attenuation (loss)
- Dispersion overview
- Wavelength multiplexing
  - CWDM
  - DWDM
  - ROADM's
- G-PON and FTTX
- Fibre Broadband Networkd: The UFB (NZ) & NBN (AU)
- Fibre care and cleaning (practical)
- Fibre cable preparation (practical)
- Fibre fusion splicing (practical)
- Fibre testing theory
  - inspection probes
  - visible fault locators
  - live fibre identifiers
  - light source
  - power meters
  - OTDR overview
- Fibre Optic Applications


Day 3 – Layer 2: Ethernet & Carrier Ethernet

- LAN's – Ethernet, Speeds, Cabling,
  - Hubs
  - Switches
  - Routers
  - Servers
  - Firewalls
- Ethernet Framing – DIX-V2 and 802,3
- LLC & SNAP
- MAC addressing
- Switched Ethernet
- V-LAN's – Port based, V-LAN tagging, (802.1Q) headers
- 802.1p (support QoS/CoS)
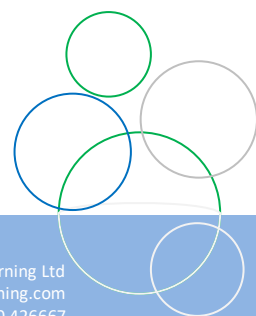
- MAC & VLAN limitations
- Metro Ethernet
- Ethernet Virtual Circuits
- MetroE Services (E-Line and E-LAN)
- MAC in MAC
- Q in Q
- Carrier Ethernet Traffic Profiles
  - Committed Information Rate
  - Committed Burst Size
  - Excess Information Rate
  - Excess Burst Size
  - Peak Information Rate
- Traffic Shaping (customer)
- Traffic Policing (carrier)
  - Single and Dual Leaky Bucket Algorithms
- Ethernet Testing Overview
  - RFC2544 (UNI Testing)
  - Y.1564 (EVC Testing)

Day 4 – Layer 3: TCP/IP & Converged Networks

- Modern data applications explained
- How throughput, latency, loss & jitter affect applications
- The TCP/IP protocol stack
- The evolution of the Internet
- IP addressing (IPv4) – Public, private, static & dynamic
- IP v4 sub-netting – Why and how it is used (with exercises)
- IP version6 – It's purpose.
- IPv6 Addressing, Security, header format, compatibility with IPv4
- CoS & QoS in IP networks
- Ports, TCP and UDP – Quality of service for IP
- IP supported protocols: DNS, DHCP, ICMP
- TCP/IP related application protocols – FTP, HTTP
- Routing overview (BGP, OSPF, IS-IS)
- Routing vs. switching
- Voice over IP
  - Applications
  - Terminology
  - Components
  - RTP, RTCP and call quality
- Issues with VoIP
  - Delay
  - Packet Loss
  - Jitter
- IP Signalling Overview (SIP)
- Multi Protocol Label Switching
  - Labels
  - Label switching routers
  - Label switched paths
  - Label distribution protocol
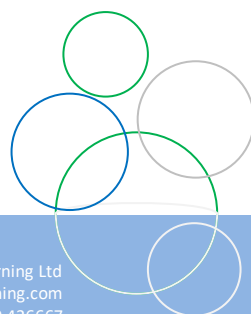
Day 5 (half day) – Transport Backbones

- Transport network evolution
- PDH technology hierarchy overview
- G.711 encoding (Analogue to Digital conversion)
- G.703 & G.704 framing (E1)
- Higher order PDH (E2 – E4)

- SDH network overview
- SDH network elements
- Network topologies and transmission media
- Timing and network synchronisation
- The STM-1 framing structure
- PoS – Ethernet & IP over SDH
- GFP, VC & LCAS for frame based service mapping
- Higher order SDH signals (STM-4 thru STM1024)

- WDM Overview
- Optical Spectrum – C and L Bands
- Channel Spacing
- WDM Evolution

- OTN introduction
- OTN standards
- OTN network layers
- OTN advantages
- OTN frame (ODU, OTU, OPU)
- Forward Error Correction (FEC)

- Bringing it all together
- Wrap Up