

# Definitive WANs for engineers

A 5 day **Hands on** training course



## Description

A hands on Introduction to Wide Area Networks for engineers. This course covers all current major WAN technologies from a perspective of design, evaluating technologies available as well as hands on to consolidate the theory.



## Key outcomes

By the end of the course delegates will be able to:

- ✓ Describe the seven-layer model and realise how it applies to the real world.
- ✓ Evaluate and describe WAN technologies.
- ✓ Describe the architecture of WANs in the core.
- ✓ Use WANS to interconnect LANS.



## Training approach

This structured course uses Instructor Led Training to provide the best possible learning experience. Small class sizes ensure students benefit from our engaging and interactive style of teaching with delegates encouraged to ask questions throughout the course. Quizzes follow each major section allowing checking of learning. Hands on sessions are used throughout to allow delegates to consolidate their new skills.



## Details

### Who will benefit?

Technical staff wishing to find out more about how their WAN works.

### Prerequisites

Introduction to data communications & networking.

**Duration:** 5 days

**Customer rating:** ★★★★★

### Generic training



Generic training compliments product specific courses covering the complete picture of all relevant devices including the protocols "on the wire".

*"Friendly environment with expert teaching that teaches the why before the how."*  
G.C. Fasthosts

### Small class sizes



We limit our maximum class size to 8 delegates; often we have less than this. This ensures optimal interactivity between delegates and instructor.

*"Excellent course. The small class size was a great benefit..."*  
M.B. IBM

### Hands On training



The majority of our courses use hands on sessions to reinforce the theory.

*"Not many courses have practice added to it. Normally just the theoretical stuff is covered."*  
J.W. Vodafone

### Our courseware



We write our own courses; courseware does not just consist of slides and our slides are diagrams not bullet point text.

*"Comprehensive materials that made the course easy to follow and will be used as a reference point."*  
V.B. Rockwell Collins

### Customise your course



Please contact us if you would like a course to be customised to meet your specific requirements. Have the course your way.

*"I was very impressed by the combination of practical and theory. Very informative. Friendly approachable environment, lots of hands on."*  
S.R. Qinetiq

# Definitive WANs for engineers

## Course content

### Introduction

LANs, MANs and WANS. Protocols, the OSI seven layer model, ITU-T, ETSI, DTE, DCE, and the overall picture.

### WAN architectures

Service providers, core, access, DTE, DCE, CPE. Dialup, circuit switched, packet switched, how to choose a WAN, common bandwidths. Site to site, remote access. Topologies: Star, Full mesh, partial mesh.

### History of WANs

Before IP was ubiquitous, The PSTN, Dial up networks, modems, ISDN, Stat mux, TDM, 64k, N\*64, E1, X25, Frame Relay.

### The role of IP and routers

The growth of IP, the role of routers, routing tables, routing protocols. Hands on: IP and routing.

### Layer 1 Physical

Copper, Fibre, Wireless, Microwave, Phone lines, FTTC, FTTH, mobile networks.

### Service provider technologies

The transport plane, SDH, SONET, DWDM.

### WAN access

Phone lines, leased lines, xDSL, WiMax, Satellite. The role of PPP.

### Broadband

xDSL, ADSL, SDSL. Local loops, DSLAM, DSL architecture.

### ATM

Cell switching principles, ATM switching, Virtual paths, QOS, CBR, VBR, ABR, UBR, AAL1 to AAL5, MPOA, LANE, Voice over ATM.

### The Internet

VPNs, IPSEC, QOS.

### What is MPLS?

Core MPLS, MPLS and the 7 layer model, MPLS protocol, MPLS standard, MPLS runs on routers, MPLS history, Why MPLS?.

### MPLS architecture

LSRs, PE and P router roles, FEC, swapping labels, MPLS packet format, Loops, TTL control. MPLS TE, MPLS VPN.

### Ethernet

What is Ethernet? LANs, MANs, WANs, Ethernet and switches in the LAN. Traditional LAN/WAN integration, routers. The Ethernet interface for the WAN. Standards: Transporting carrier Ethernet.

