

TransNet

learntelecoms interactive e-learning suite of courses from PTT:
TransNet v6— Wide Area Networks

TransNet

is a suite of interactive, multimedia e-learning courses designed to run under Windows™ XP, Vista or Windows 7.

- provides training in the technical aspects of Wide Area Networks and data services.
- consists of five separate but integrated courses:

Introduction to Wide Area Networks
Principles of ATM
IP networks
IP routing
Advanced IP networks

Each TransNet course:

- provides in-depth, authoritative technical training.
- employs interactive simulations, hypertext links and question sessions to fully involve the trainee in the learning experience.
- provides personalised training - each trainee can make his/her own notes and place bookmarks.
- provides a record of progress and level of achievement for each trainee.
- can be followed as a structured assessed course or browsed for revision or reference.
- provides revision links to relevant screens in other modules.

Target audience:

TransNet is designed for:

- Those studying for a career in telecommunications and who require a detailed knowledge of modern Wide Area Networks and data services.
- Technical staff involved in the operation, design or maintenance of Wide Area Networks.

Course aim:

To explain the principles of operation, capabilities and features of various types of Wide Area Network and describe the requirements of different types of traffic and how these can be met.

Pre-requisites:

An understanding of the basic principles of data communications over packet-switched networks. It is recommended that the PTT course SLA: “Telecoms fundamentals” is studied before attempting this course.

Course content:

- Describe the principles of operation of the various types of network that transport traffic over wide areas with reference to the concepts of circuits and virtual circuits and possible network topologies.
- Give examples of the various types of wide area network (WAN) including ATM, Frame Relay and IP networks and compare their principle of operation, application and facilities.
- Explain the concept of, and benefits offered by, a Virtual Private Network (VPN).
- Explain the concept of tunnelling as applied to the provision of secure VPN connections over an IP-based network such as the Internet.
- Describe the principles and applications of the various types of addressing used in telecommunications systems and describe the basic principles of routing.
- Describe the transmission characteristics and requirements of WAN applications such as file transfer, and telephone and video services with reference to bandwidth requirement, maximum tolerable delay and delay variation and the effects of errors.
- Describe the cause of impairments such as delay and errors.
- Compare the ability of TDM and packet-switched networks to provide the sustained bandwidth and low delay required by voice and video traffic.
- Explain the principles, benefits and limitations of various error detection and correction technique.
- Explain the meaning, relevance and application of the terms “Quality of Service” and “Class of Service” as applied to packet switched networks
- Compare the ability of networks such as Frame Relay, ATM, MPLS, Ethernet VLANs and 4G mobile systems to offer an assured Quality of Service.

Course aim:

This course provides an introduction to the fundamental concepts and protocols underlying data networks employing the Asynchronous Transfer Mode (ATM).

Pre-requisites:

Understanding of the basic principles of packet switching and the concepts of virtual channels and the OSI Reference Model (OSIRM). It is recommended that TransNet course A – Introduction to Wide Area Networks – is studied before attempting this course.

Course content:

Introducing ATM: Overview and capabilities of ATM networks; transport of multimedia traffic over existing transmission networks.

ATM cell structure: Benefits of small, fixed sized cells; ATM cell structure: function of information fields in UNI and NNI cell headers.

Virtual paths and channels: Concepts of virtual path and virtual channel connections; relationship between ATM virtual paths and channels and SDH transmission paths; functions of ATM switches and cross-connects; features of Permanent Virtual Circuits (PVCs) and Switched Virtual Circuits (SVCs).

ATM protocol layers: Physical, ATM and AAL layers of the Broadband ISDN (B-ISDN) protocol stack and their relationship to the OSI Reference Model (OSIRM); roles of the different ATM Adaptation Layer (AAL) protocols; sending timing information over a Virtual Channel Connection (VCC) using the AAL 1 protocol; functions of the Segmentation and Re-assembly (SAR) sub-layer and the Convergence Sub-layer (CS) of the AAL protocol.

Providing a quality of service: Role and content of a traffic contract; definitions of traffic parameters including Peak Cell Rate (PCR) and Sustainable Cell Rate (SCR); definition of quality of service (QoS) parameters including Cell Loss Ratio (CLR) and Cell Transfer Delay (CTD); features of the QoS classes.

Traffic Control: Functions of traffic shaping and policing; principles and use of the “leaky bucket” algorithm; concepts of the User Network Interface (UNI) and the Network Network Interface (NNI); role of the Usage Parameter Control (UPC) and Connection Admission Control (CAC) functions.

Congestion Control: Recommended methods of avoiding congestion; operation and use of rate based and credit based flow control; use of the Explicit Forward Congestion Indication (EFCI); methods of recovering from congestion.

Course aim:

This course describes the features, facilities, structure and basic operation of networks using the Internet suite of protocols.

Pre-requisites:

Understanding of the basic principles of packet switching and connectionless operation. It is recommended that TransNet course A – Introduction to Wide Area Networks – is studied before attempting this course.

Course objectives:

At the end of this course, the trainee will be able to:

- Describe the basic structure of the Internet, the role of the various Internet administrative bodies and the role of, and relationship between, Tier 1 and Tier 2 Internet service providers.
- Describe the role, operation and facilities offered by the Internet Protocol (IP) with reference to the role of the various IPv4 and IPv6 packet header fields.
- Describe the role, basic operation and facilities of routers and route discovery protocols.
- Explain the concept, advantages and implementation of IPv4 and Ipv6 addressing with reference to subnetting and Classless Inter-Domain Routing (CIDR).
- Describe the role, operation and administration of the Domain Name System with reference to the name server hierarchy and the process of address resolution.
- Describe the role, operation and limitations of the Transmission Control Protocol (TCP) with reference to flow control and error correction.
- Describe the role of TCP and UDP port numbers.
- Describe the role of protocols involved in file transfer (FTP), web browsing (HTTP and HTML), emailing (POP and SMTP), multicasting (IGMP) and the transport of IP packets over links (PPP).

Course aim:

This e-learning course describes in detail the role, facilities, and operation of the various protocols that discover routes over an IP network. The course also discusses methods of increasing the efficiency of the routing process and IP address allocation.

Pre-requisites:

You will get the most out of this course if you already have a basic understanding of the basic principles and operation of networks based on the Internet Protocol (IP).

It is recommended that the PTT e-learning course TAF: “IP networks and the Internet” is studied before attempting this “IP Routing” course:

Course objectives:

At the end of this course, the trainee will be able to:

- Describe the use, operation and limitations of the distance vector routing protocol, RIP.
- Describe the use and operation of the link state routing protocol, OSPF.
- Describe the hierarchical routing and traffic engineering facilities offered by the link state routing protocol, OSPF
- Describe and compare protocols that advertise routing information between autonomous systems.
- Explain the concept, role and use of subnet masking.
- Describe the role, advantages and principles of variable length subnet masking (VLSM).
- Describe the principles and advantages of route summarisation with reference to OSPF areas.
- Describe the principles of Classless Inter-Domain Routing (CIDR) and its role in improving the efficiency of IP address allocation.

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learntelecoms TransNet suite of e-learning courses
Course TAH: Advanced IP networks

Course aim:

This course describes the various methods of transporting traffic with particular quality of service requirements over an IP network with particular reference to the transport of Voice over IP.

Pre-requisites:

Understanding of the use and operation of the TCP/IP protocols and principles of route discovery in a network operating in the connectionless mode. It is recommended that the “IP networks and the Internet” course in the TransNet suite is studied before attempting this course. An appreciation of voice encoding techniques and the principles of voice transmission would also be beneficial. The study of the StarTel course “Principles of voice encoding and transmission” is, therefore, recommended.

Course objectives:

At the end of this course, the trainee will be able to:

- Describe the role and operation of the Resource Reservation Protocol (RSVP) in reserving network resources for a traffic stream.
 - Describe how the DiffServ protocol allows a particular class of service to be provided for a traffic stream.
 - Describe how RSVP can be used in conjunction with Diffserv.
 - Describe the facilities, operation and components of an IP network using Multiple Protocol Label Switching (MPLS) with reference to Label Switched Paths (LSPs), Label Edge Routers (LERs) and Label Switch Routers (LSRs).
 - Describe how traffic engineering considerations can be taken into account when provisioning MPLS label switched paths.
 - Describe the transport of encoded voice samples over an IP network with reference to the Real-time Transport Protocol (RTP) and the RTP Control Protocol (RTCP).
 - Describe the role of, and relationship between, the various protocols used by a Voice over IP (VoIP) system including SIP, SDP, RTP and RSVP.
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Associated courses:

The following PTT e-learning courses will provide further information about IP-based telecommunication services and networks:

MDB: Voice over IP

MDE: Video over IP

NGA: “Next Generation Networks”