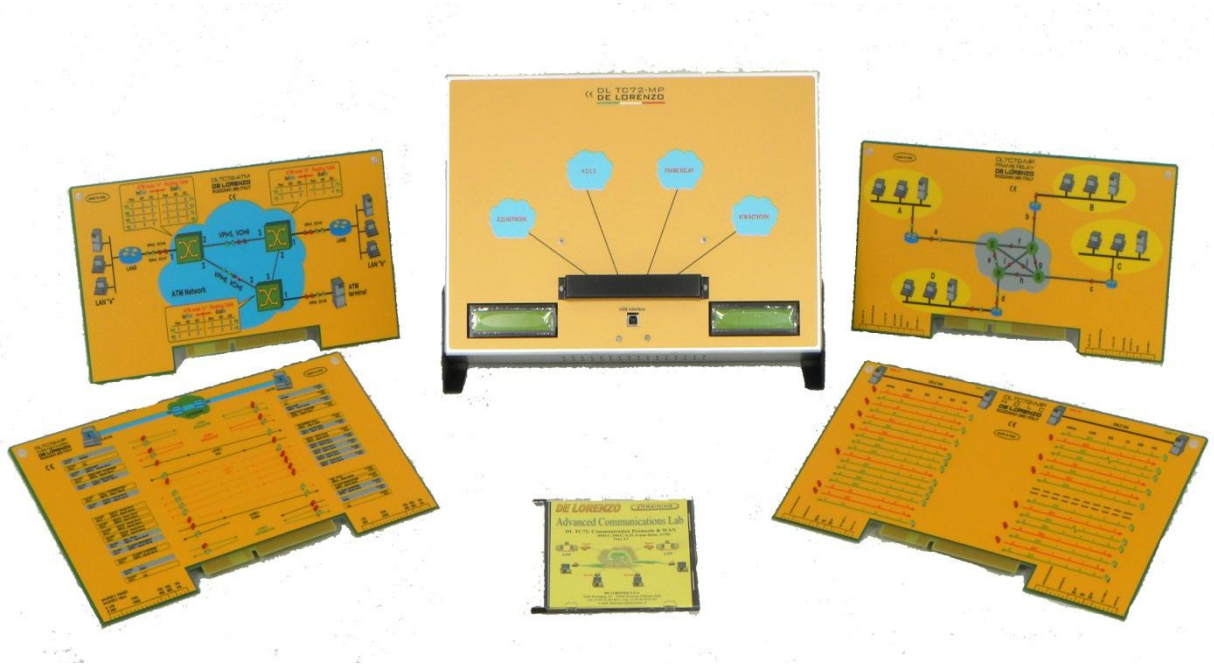
ICT

DL TC72

Communication Protocols: HDLC, SDLC, X.25, Frame Relay, ATM



Objectives:

Base training of an engineer for the installation and maintenance of Digital Telecommunications and Internetworking systems.
This package provides the “background” for the next training on the ISDN network, on the Wide Area Networks and on Internet.

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ICT

Educational Path:
The Educational Path of the Training Package covers the following subjects:

- **The communication architecture of the OSI model**
  Introduction to the communication protocols, The OSI reference model, Format of the information, The OSI model: Physical Level (level 1), Line Level (level 2), Network Level (level 3), Transfer Level (level 4), Session Level (level 5), Presentation Level (level 6), Application Level (level 7)
- **HDLC/SDLC Protocols**
  Introduction to the HDLC/SDLC Protocols, The structure of the HDLC frame, CONTROL field and type of frames, The HDLC frames: Information, Supervisory, Unnumbered, Examples of HDLC session: NRM and ABM connection
- **Frame Relay network and protocol**
  Introduction to the Frame Relay network and protocol, The Frame Relay and DLCI virtual circuits, The permanent (PVC) and switched (SVC) virtual circuits, Control of the congestion: parameters DE, FECN, BECN, Management of the throughput: parameters CIR, BC, BE, TC, LMI: Local Management Interface, Format of the Frame Relay frames, Format of the LMI frames
- **X.25 package switching network**
  Characteristics and operating parameters, Format of the level 2 frame, Format of the level 3 package, Addressing in the X.25 network
- **Asynchronous Transfer Mode – ATM**
  Characteristics and operating parameters, Format of the ATM cell, Connections, Virtual Paths and Channels, The ATM reference model

Composed of:

TC72-MP: Communication Protocols
This module allows the simulation of the operation of the communication protocols. It includes 2 LCD displays for the visualization of the frames and of the packages that the communication devices exchange.
Furthermore, it includes a simulation boards insertion system for the different protocols. The following simulation boards are provided:
HDLC protocol
Network X.25
Frame Relay

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DL TC74

Local Area Network (LAN) and Intranet

Objectives:

Training of an engineer for the installation and maintenance of Local Networks, capable of:

- knowing the principles, the standards and the devices that are normally used in LANs
- installing LANs and Intranet in compliance with the current cabling standards
- installing the protocols and presetting the configurations on the network computers
- performing maintenance, troubleshooting and tests on LANs

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Educational Path:
The Educational Path of the Training Package covers the following subjects:

- **Introduction to local networks**
  What is a local network, Components of a local network, The transmission media, The structured wiring, Network topologies, Network protocols: OSI Model, Technologies and standards for the local networks, Network devices, Network operating systems.
- **Signal coding and transmission media**
  Coding techniques, The transmission media, The coaxial cable, The telephone wire, The optical fibres.
- **The OSI model and the protocols LAN IEEE**
  The OSI reference model, OSI Model: Physical Level and Line Level, The project IEEE 802: Sublevel LLC, Sublevel MAC and Physical Level.
- **Networks: Ethernet, Fast Ethernet and Gigabit Ethernet**
  Standard Ethernet and IEEE 802.3, The sublevel MAC, CSMA-CD access method, the physical level, Ethernet: 10 Mbps (10 Base-T), Fast Ethernet: 100 Mbps, Gigabit Ethernet: 1000 Mbps
- **Network devices**
  The typical devices of an Ethernet networks, Transceivers, Repeaters, Media converters, Hubs, Switches.
- **Structured wiring according to standard EIA/TIA 568A - ISO/IEC11801**
  What is the structured wiring, The wiring standards, Content and purpose of the standards, Topology of a structured wiring, Main elements and nomenclature, Horizontal wiring, Dorsal networks.
- **Protocols: NetBIOS, NetBEUI, TCP/IP, IPX/SPX**
  The protocols of level 3, 4, 5, 6, 7, The interface NetBIOS, The protocol NetBEUI Netware protocols: IPX/SPX, IPX protocol, SPX protocol, Internet protocols: TCP/IP, IP protocol, TCP protocol.
- **Intranet and diagnostics on the networks**
  What is an Intranet, Terminal emulation, Files transfer, Electronic Mail, World Wide Web, TCP/IP tools.
- **Architecture of a Peer-to-Peer network Operating System**
  General architecture, Redirector and File System, Support of multiple networks, NDIS architecture, TCP/IP architecture, Client and Server Peer architecture, Programming interfaces, Architecture and serial communications.
- **Architecture of a network Server Operating System**
  General architecture, NDIS specifications, Network protocols, Transport Driver Interface, Network services: Server, Network services: Workstation, Service DHCP, DNS and WINS.

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Composed of:

TC74-MC: LAN structured cabling
This module shows the structure of the cabling of the LAN according to the standard EIA/TIA 568A and ISO/IEC 11801.
It includes:
Diagram of the structured cabling.
Sockets RJ45 and for optical fibre.
Patch panel
Users' sockets

TC74-DS: Switching HUB (Quantity 3)
IEEE 802.3, 802.3u compatible.
Transmission speed: 10/100 Mb/s.
4 RJ45 ports.
External power supply.

TC74-DM: Media Converter (Quantity two)
Conversion from RJ45 (10Base-T) to optical fibre (10Base-FL).
Connections: 1 x RJ45, 1 x ST (RX/TX).
Compatibility with: cat. 3, 4, 5, optical fibre cable 62,5/125 ST.
IEEE 802.3 compatible.

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DL TC75

Wide Area Network (WAN) and Internet

Objectives:

Training of an engineer for the installation and maintenance of WAN Networks and Internet, capable of:

- knowing the principles, the standards and the devices that are normally used in WANs
- installing private WANs and systems for accessing Internet
- programming and configuring the devices for accessing the WANs (routers)
- performing maintenance, troubleshooting and tests on WANs

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Educational Path:

The Educational Path of the Training Package covers the following subjects:

- **Introduction to Internetworking**
  Computer networks and Internetworking, The OSI reference model, Hierarchical structure of the networks, The protocols of the Internetworking, Addressing in data networks.
- **Technologies and devices of the WANs**
  Types of WANs and transmission protocols, Point-to-point connections, Circuit switching networks: PSTN and ISDN, Package switching networks: Frame Relay, ATM, X.25, WAN devices.
- **WAN protocols: Netware protocols**
  Netware protocols and OSI Model, IPX protocol, IPX addressing, IPX routing, SPX protocol.
- **WAN protocols: Internet protocols**
  Internet protocols and OSI Model, IP protocol, IP addressing, IP routing, Addressing protocols: ARP and RARP, Protocols ICMP, TCP and UDP, Higher protocols: FTP, DNS, HTTP, Telnet, etc.
- **Intranet/Internet and diagnostics on the networks**
  What is an Intranet and its services, Terminal emulation: Telnet, Files transfer, Electronic mail, World Wide Web, Domain Name System, TCP/IP tools and diagnostics tests, Address assignment to computers.
- **Routing and routing algorithms**
  Routing, Routing tables, Static routing, Dynamic routing, Routing algorithms: Distance vector, Routing algorithms: Link State.
- **The router: its structure and configuration**
  The router, Structure of the hardware, Structure of the software, User interface, The help system, The password, The management of the configuration, The saving of the IOS.
- **Static IP routing: configuration and test**
  Programming of the interfaces, LAN interfaces, WAN interfaces, Configuration of the IP routing, Static IP routing.
- **Dynamic IP routing: configuration and test**
  Dynamic routing, Configuration RIP, Configuration EIGRP, Consulting the configuration, Test and troubleshooting.

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Composed of:

TC75-MS: Structure of a WAN
The module includes:
The block diagram of the structure of a WAN.
The diagrams of the levels of the OSI model used in internetworking.
The connectors for the connection of the routers to the WAN.

TC75-DR: Router (Quantity two)
Serial type WAN interface V24/RS232.
10BaseT LAN interface.
RJ-45 or RS-232 port.
Internetworking Operating System.

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DL TC77

Voice over IP (VoIP)

Objectives:

Training of an installation and maintenance technician for IP telephony systems able to:

- know the principles, the standards and the devices normally used in the VoIP,
- install VoIP systems in existing IP networks,
- perform the maintenance, the troubleshooting, the tests on VoIP systems.

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Educational Path:

The Educational Path of the Training Package covers the following subjects:

- Introduction to the communication networks
- The practical advantages of the IP telephony
- How the IP telephony works
- The devices for the IP telephony
- How to implement connections and VoIP telephony
- Exercises with Gateway VoIP

Composed of:

DL TC77-VG: VoIP Gateway (Quantity two)
2 off analogue ports
Support for analogue telephones PSTN/PBX (FXS)
Protocols VoIP MGCP, H.323 and SIP
Network interface 10/100 base-TX
External power supply

DL TC77-PH: Analogue Telephone (Quantity two)
Display and keyboard
Internal memories
Line cable RJ11
External power supply

DL TC77-SW: Software with theory, questions, exercises, support programs
Based on Web technology
Theoretical lessons with questions
Practical exercises with questions
Support programs for testing and performing exercises

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DL TC78

Wireless LAN (WLAN)

Objectives:

Training of an installation and maintenance technician for wireless local networks, able to:

- know the principles, the standards and the devices normally used in WLAN,
- install and configure wireless networks,
- perform the maintenance, the troubleshooting, the tests on WLAN.

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Educational Path:

The Educational Path of the Training Package covers the following subjects:

- Introduction to the wireless local networks
- Structure of the MAC level (Media Access Control)
- Structure of the PHY level (Physical layer)
- The devices for the WLAN
- WLAN, exercises

Composed of:

DL TC78-AP: Wireless LAN Access Point
Compatible IEEE 802.11g/b 2.4 GHz
Data transmission speed: up to 54 Mbps
External antenna (with connector RP-SMA)
Transmission power: 16 dBm (typical)
Connector LAN: 10/100 Mbps RJ-45
External power supply

DL TC78-WA: Wireless LAN USB Adapter (Quantity two)
Compatible IEEE 802.11g/b 2.4 GHz
Data transmission speed: up to 54 Mbps
Internal antenna
Interface USB 2.0
Power supply from USB

DL TC78-SW: Software with theory, questions, exercises, support programs
Based on Web technology
Theoretical lessons with questions
Practical exercises with questions
Support programs for testing and performing exercises

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