

THE SYLLABUS and ECNL CERTIFICATIONS

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● **JCNT** Junior Certified Network Technicians

■ **CLAND&A** Certified LAN Designer and Administrator

▲ **CWAND&A** Certified WAN Designer and Administrator

Introduction

The ECNL certifications (European Computer Networking License), highly supported by e_learning, show the basis and the engineer knowledge of networking and Network Operating System for home office, office, small enterprises and industry.

The ECNL certification skills, objectives and competences background refer to the project co-ordinated by International Co-operation Europe Ltd., that has as main goal setting up of a clear framework describing the roles, skills and competencies required by the ICT industry in Europe, addressed to students, institutions and government bodies (*)

[() This work was realized with the support of the European Commission, a consortium of eleven major ICT companies, (BT, Cisco Systems, IBM Europe, Intel, Microsoft Europe, Nokia, Nortel Networks, Philips Semiconductors, Siemens AG, Telefónica S.A., Thales), and EICTA, the European Information, Communications and Consumer Electronics Industry Technology Association. For further information, see: <http://www.career-space.com/lifestyles/index.htm>] Certifications are classified into two categories, technical and instructional:*

Certification types

Technical certification is further subdivided into levels and into areas of expertise with a focus on specific hardware (internetworking devices management, structured cabling, LAN-WAN topology and architecture, wireless) and software (Operating system, Devices managing) to provide solutions for industry, small enterprise, home-offices.

Instructional certification ensures that individuals presenting training on previous ECNL certifications are able to effectively teaching in the vocational training course for the Lifelong Learning and young students courses. There are three (3) active certifications within the program, each supported by examinations and training courses.

Goals for Certification

Provide business, industry, Schools, Campus, with a standard for ensuring high of in providing solutions to their networking and data communications needs;

Ensure a high degree of expertise to bodies etc...., in providing training to student and adult audiences on internetworking devices.

Job profile

ECNL certified professionals and engineers can install, configure, and operate LAN, WAN, and dial access services for small and medium sized networks. They can operate but they are not limited to use of these protocols:

Serial; PPP, ISDN, Ethernet; ATM; Frame Relay, VLAN; IP; IPX; RIP; IGRP; EIGRP; OSPF; NET-BEUI, TCP; UDP; SNMP.

They can operate but they are not limited to use layer 2 and layer 3 devices. They can manage TCP/IP and IPX/SPX protocol stack. They can use wireless devices and can implement them in the LAN network.

Concerning the software, the expertise conceives

the network operating software (e.g. Linux, and Windows), then specifies the overall structure which will support sustainable developments on it.

People with ECNL expertise are able to manage client and servers (HTTP, FTP, DHCP, DNS, TFTP, SMTP; POP3; IMAP; NFS; SSL; SNMP; etceteras).

These are the foundations of the software technology, which make up internetworking software technological solutions. This is a deep technological role, which involves software complexity but also the ability to work as a member of a team.

Incumbents work on software technologies and solutions which are the basis for computer applica-

tions, Internet and telecommunications network.

ECNL software and hardware technicians should follow up technical progress of a project ensuring compliance with, or enhancement of, existing architecture or design. Individuals might be asked to carry out researches, analyse, determine architecture and topology, design, build, test, implement or maintain such software and internetworking solutions.

The European Networking engineer who acquires the ECNL certification, specifies, designs, implements, tests, integrates, supports, and maintains switches and network management systems used to implement data communications networks.

He/she operates Networking operating systems for connecting and terminal equipment such as PCs to Local and Wide Area Networks. The European Networking engineer works with customers to determine requirements for equipment and services (such as Mobility, IP Telephony, Video Conferencing, IP Fax, and Security).

He/She develops network architectures to satisfy such requirements; simulating and analysing architectural solutions; taking decisions to build or buy the necessary equipment. Finally He/She finally designs, develops, tests, and integrates new products to fill gaps in existing product lines.

The certification' parts

2

The program has defined requirements for one level (divided into three parts) for technical certification and one for instructional certification. Besides the knowledge of the technology, the Teacher will be able to explain the methodological approach and how to manage the different tools (such as e_learning, distance learning, etc...). Teacher already having expertise in the networking field can have the credit admission.

Certification requires that individuals successfully complete evaluations based on defined tasks and objectives in that area. Tasks and objectives for the certifications are the result of a Job and Task analysis for individuals performing work in networking areas.

The Junior Certified Network Technician is able to basically use and maintain an enterprise LAN. This person knows the cabling standards, uses the inter-network devices and is able to select them at a basic level.

He uses and maintains Internet applications (mainly

The Certified LAN Designer and Administrator has all abilities provided by JCNT, and is also able to

Description of Certification Program

The tasks and objectives are arranged in a hierarchical manner to ensure that evaluations build incrementally without redundancy or gaps.

The design of the program allows flexibility in the certification process, allowing individuals to tailor certification to their particular area of expertise. In order to achieve this, the ECNL study was divided in modules and prerequisites have been established as necessary. These prerequisites are tested in baseline knowledge and skill evaluations. Further evaluations allow each individual to progress into advanced certification levels.

Current certifications include:

1) Junior Certified Network Technician

on client side), such as e-mail services, ftp, web.

He is also able to maintain and install Linux and Windows operating systems, and to configure them as required in the existing local area network.

JCNT certification is issued upon successful completion of the module evaluation.

2) Certified Lan Designer and Administrator

design and implement an enterprise LAN.

His/her main ability is to design all aspects of the

local area network, starting from cabling design up to the installation and management of complex application layer products, such as www server, ftp server, DNS server and mail server.

The operating systems of choice are, as in JCNT, Linux and Windows, with an advanced knowledge.

CLAND&A certification is issued upon successful completion of the module evaluation.

3 Certified Wan Designer and Administrator

The Certified Wan Designer and Administrator has all abilities provided by CLAND&A, extended to a Wan environment. While a CLAND&A certified person can install and manage the whole local area network for a small industry, CWAND&A certification allows to design, install and maintain more than one LAN, joined together with WAN links.

For this reason he/she is able to choose and use several kinds of Wan solutions. Wireless networks are also considered, both for local and wide area networks.

CWAND&A certification is issued upon successful completion of the module evaluation.

3

The instructional certification

The ECNL Instructor is able to provide in-depth technical training in a clear, understandable manner to young students and adult learners (Lifelong Learning).

This certification is based on skill sets. The technical competencies will be the same as detailed below.

The instructors will be encouraged to use typical

e_learning tools and correlate methodologies.

The instructor certification requires course work. The skills of a good quality instructor include excellent interpersonal skills, which can only be discovered through interaction with the instructional skills trainer.

4

Program overview

Implementation For the program details see below.

The certification program requires expertise in specific areas, supported by satisfying completion of evaluation test, which are based on defined set of goals covering all knowledge and skills required for the certification. The task list and objectives are available upon request .

The Certified WAN Designer and Administrator (CWAND&A) is the highest ECNL level of certification.

The normal progression through a certification path normally requires that a person becomes certified at the Certified WAN Designer and Administrator (CWAND&A) after attempting the Certified LAN Design and Administrator (CLAND&A) and Junior Certified Network Technician (JCNT) examination.

Under special circumstances a person may bypass

one or both of mentioned exams. Requests to bypass are analysed the ECNL_Portfolio and identification of competence documents.

Any person requesting to bypass one or two step of examination must provide adequate documentation showing their advanced status (for examples CCNA certified or Microsoft certified or Red-hat certified).

Examinations

Examinations are based on task analyses performed by ECNL project. Questions are based directly on objectives. Where an objective has specific items, those items define its scope.

Objectives that indicate a skill may be evaluated to the possible extent by written questions that test knowledge required to perform that skill, or by hands-on testing using supplied hardware and software, to manage the networking devices, to use operating

systems, and so on.

All questions are selected from an examination database, allowing a unique set of questions for each exam. Security measures are taken to ensure that exam materials are not compromised, and that evaluations are conducted in a fair and unbiased manner.

No external help of any form is allowed during examination.

Requirements for Certification

(a) Requirements:

To attain ECNL status, you must satisfy all applicable certification requirements stated in this document. At the discretion of ECNL commission, these requirements may be modified at any time. Certified Instructors may be asked to attend continuous training due to changes in requirements to maintain the status of certified instructor.

(b) Maintaining Certification:

To maintain your ECNL Certification, you must comply with all continuing certification requirements. Maintaining certification requires that the individual

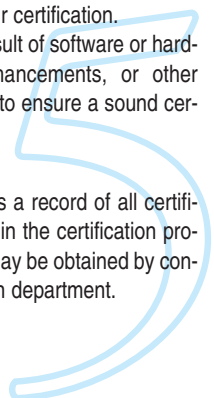
maintains currency in their particular area.

Certified individuals are contacted by email of any additional requirements for their certification.

These additions may be the result of software or hardware revisions, program enhancements, or other changes required by promoter to ensure a sound certification program.

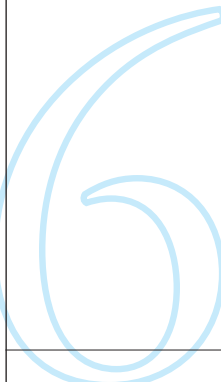
(c) Certification Records:

ECNL commission maintains a record of all certifications attained by individuals in the certification program. A copy of your records may be obtained by contacting the Customer Education department.



Standard unit titles

A.1 Networking and data communications

A.1.1 Networking and data communications basics	Knowledge (basic and intermediate levels)
<p>A.1.1.1 Signals and systems, network and standard</p> 	<p>Signals and systems: Electric signals, waveforms, frequencies, analog-to-digital, noise, attenuation, digital encoding, character codes, modulation introduced, digital-to-analog, channels and bandwidths, multiplexing, normal and common mode, differential signals, ground loop, spike, surge, sag, oscillation.</p> <p>Data transmission: serial and parallel, synchronous and asynchronous, error-checking, simplex, half and full duplex, DTEs and DCEs, modems, codecs, and DSUs, interfaces, physical media, unbounded transmission, satellite transmission, transmission size and speed, transmission delay, frequency and bandwidth, in-band and out of band signalling.</p> <p>Networks and Standards: PSTN and services, dial-up data links, dedicated links on- and off-line computing, host/terminal computing, distributed processing, network evolution, client/server computing, physical and logical network topologies, access methods, WAN switching methods, packet switching vs. circuit switching, introduction to standards, standards bodies, OSI model, TCP/IP model, wireless link.</p>
	<p>Activities. Explains the fundamentals of signal theory, list modulation techniques and explains how each works, identify modes of transmission; Describes the evolution of telecommunications networks, identifies LAN and WAN components, appreciates the importance of standards bodies; explains and describes network architecture, topologies.</p>
<p>A.1.1.2 Protocol layers, OSI model, networking protocols</p>	<p>Layers and the OSI Model: principle of layering, the OSI model, physical layer standards, layers 2 concepts, technologies and protocols basics (bit-oriented DL protocols, HDLC and SDLC, HDLC, the 802 series, 802.2 LLC, 802.3 CSMA/CD, 802.5 Token ring, FDDI), network, transport, session, presentation, application layers function and protocols.</p> <p>Networking Protocols: ARCnet, AppleTalk, FDDI, Introduction to TCP/IP model, the IP layer, IP protocol, IP addressing, network masking, subnetting, basics of IP routing, the transport layer (TCP and UDP), upper layer protocols (introduction to NetWare, IPX).</p>
	<p>Activities. Explains the principles of protocols and the OSI model in context,</p>

define standards at the physical layer of the OSI reference model and protocols at the data-link layer, define the major 802 standards as used in LANs, describe the functions of the upper and lower OSI layers; Describes some non-IEEE LAN lower-layer protocols, explains the TCP/IP protocols, discusses the NetWare protocol suite, discusses a range of proprietary networking protocol suites.

A.1.1.3 Transmission media

Transmission media

Transmission media types and characteristics, standards connectors, plugs, jacks, patch panels, coaxial cable, twisted Pair, TP category, optical fiber, wireless, tools.

Activities.

Identifies each transmission media;
Compares the main types of media in terms of expenses, interference, susceptibility, reliability, and security;
Chooses the correct transmission media.

A.2.1 LAN technology

Knowledge (basic and intermediate levels)

A.2.1.1 LAN technology

Definition and characteristics, the LAN Standards: IEEE 802 Project, the LAN architecture, the LAN topologies, LLC protocol (IEEE 802.2), IEEE 802.3/Ethernet, IEEE 803.5/Token Ring, IEEE 803.12 o 100VGAnyLAN, IEEE 802.3z, IEEE 802.3ab (Gigabit Ethernet), ISO 9314 o FDDI, IEEE 802.11 o Wireless LAN, The LAN internetworking, IEEE 802.1q.

Activities.

Recognizes a LAN and its characteristics, describes types of topology, explains the various access methods, describes the process of base-band signaling;
Describes the purpose of IEEE 802 standards in relation to the OSI model, know different types, protocols and realization rules of LANs and their evolutions;
Connects LANs using correct devices, principles and techniques of VLAN networking.

A.3.1 WAN technology

Knowledge (basic, intermediate and advanced levels)

A.3.1.1 WAN technology

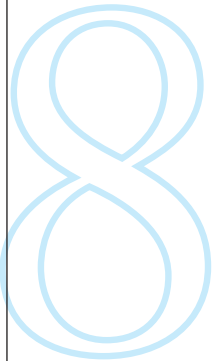
WAN Technologies (Principles, architecture and standard): PSTN, SDH, ISDN, xDSL, Packet Switching;
WANs: X.25 Network, Frame Relay, ATM, B-ISDN;

protocols that characterize each type of WAN and that are used to transmit data from origin to destination (HDLC family protocols, PPP, PPP security, etc...);
 Internet and intranet; Multimedia architecture and technologies;
 protocols: RSVP, RTP, RTCP, RTSP, SCTP;
 Videoconferencing technologies: protocols: SIP, SDP, H.323.

A.4.1 Internetworking

Knowledge (basic and intermediate levels)

A.4.1.1 Internetworking



switching, bridging and routing principles;
 bridge types (transparent bridge, etc...);
 bridging protocols;
 switching techniques (store and forward, fast forward, etc.)
 routing algorithms and protocols (RIP, IGRP, EIGRP, EGP, BGP, OSPF);
 router;
 TCP/IP architecture and routing (TCP/IP Model, TCP/IP layers, introduction to Internet addressing, address classes, subnetting and supernetting, routing and routers, routing protocols);
 TCP/IP internet, host-to-host and application protocols (telnet, FTP, SMTP, POP, WWW, NNTP, DNS);
 TCP/IP management (monitoring and control, management standards, standard MIB structure, the MIB object, the SNMP operation, the SNMP messages, SMNP v.2, RMON);
 NAT (Network address translation);
 Novell IPX, LAN Switching, Virtual LAN, Layers 3 switching

Activities.

Describes how bridging and routing fits in the OSI model;
 Describes different type of bridge and their operation mode;
 Describes the routers functions, compare routing with bridging and switching, explain the importance of addressing;
 Distinguishes between routed and routing protocols, outline the characteristics of routing protocols, evaluates and compares different routing protocols.

A.5.1 Laboratory skills	Knowledge (basic and intermediate levels)
A.5.1 Shared laboratory skills (0 to 25)	Labbs. 0: background, 1: PC Hw and Sw, 2: OSI and TCP/IP model, 3: cabling and use test equipment, 4: structured cabling , 5: network discovery and monitoring, 6: IP addressing and subnet mask , 7: packets and frame analysing, 8: router basic, 9: router access and testing, 10: router configuration, 11: router set-up, 12: router setup and routing, 13: router upgrade and backup, 14: switch basic , switch configuration, 15: VLANs, 16: VLAN advanced and VLAN configuration, 17: routing protocols, 18: access list, 19: WAN, 20: PPP, 21: ISDN, frame relay, 22: configure DNS server, 23: configure http server, 24: configure ftp/tftp server, 25: configure SMTP/POP3 server, 26: configure DHCP server, 27: configure proxy server.

B.1 Network operating system

B.1.1 Network operating system (translating in progress)	Knowledge (basic, intermediate and advanced levels)
B.1.1.0 Operating system basics	<p>basic concept on Network Operating System and personal computer;</p> <p>processes and thread;</p> <p>deadlock;</p> <p>memory management (mono and multiprogramming, virtual memory, memory pages management, algorithm for programs);</p> <p>input and output (Hardware and I/O management, I/O drivers software management);</p> <p>disk management;</p> <p>the file system (the files, the directory, file system implementation, file system examples);</p> <p>multimedia operating system (audio code, video compression, multimedia process schedule, file system paradigms, cache managing)</p> <p>distributed systems, multiprocessor systems;</p> <p>security (intrusions, accidental data losses, cryptography, user authentication, hacker attack to the system, protection mechanisms);</p> <p>main Internet server description (DNS Server; http server; ftp/tftp server; SMTP/POP3 server; DHCP server Proxy server).</p>

B.1.1.1 UNIX / LINUX

Overview of Computer Operating Systems - A History of the UNIX operating system - Main Distributed Computing Solution - User Accounts - Becoming Familiar with the Common Desktop Environment - Customizing your workspace with Style Manager - Introduction to the file system structure: Pathnames, Navigating the File System, Listing Directory Contents, Identifying and using metacharacters - File Systems Overview - File Processing Commands - Identifying Users - Text Editor - File Security Printing. Command Line Printing - Printer Status and Queue - Print Manager - Printing from File Manager - Backing up and Restoring - System Processes and Memory Management - Basic Features of the Korn and C Shells - Customizing Your Login Environment - Network Basics: Client-Server, Network Commands, Samba

the detail the basic skill will be:

To be able to...

1. Recognize main component of a computer CPU; RAM; I/O; Hard disk; Raid controller Tape
2. Install and configure a Server
File server configuration;
Printer server; Manage files and directories;
System administration; Shell programming;
3. Access the system via CLI or CDEUser account;
Login and password assignment; Boot and shutdown
Use CDE; Manage windows and desktop; Customize the workspace
Manage applications; Text editor
4. Manage Network access Use network command
5. Configure Internet servers
Configure DNS Server; Configure http server;
Configure ftp/tftp server; Configure SMTP/POP3 server;
Configure DHCP server; Configure Proxy server
6. Set the File system security; Security policies;
File system permission; File and directory access;
Virus protection; Remote access; Internet firewalls;
Read file log;
7. Backup and restore data; Backup strategies; Tape media;
Compress files and directories; Restore data;
Disaster recovery
8. Linux/Unix vs Windows internetworking.

Activities.

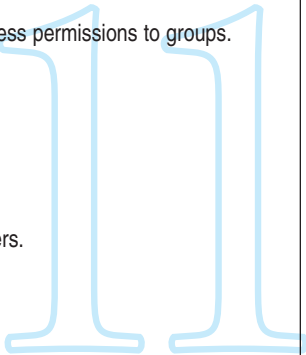
Logs in and log out of UNIX and CDE systems; navigates the environment file system; manipulates text files; creates files and directories; changes permissions of files and directories; uses the vi text editor; identifies and modifies initialization files; employs shell features to streamline command execution; uses basic network commands; uses commands to search directories and files Systems Administration in a Networked Environment

B.1.1.2 WINDOWS NT / 2000

Windows 2000 Network Management Tasks - Using Active Directory for Centralized Management - Delegating Administrative Control - Managing Network Resources - Active Directory Logical Structure - Active Directory Physical Structure - Introduction to Publishing Resources - Setting Up and Managing Published Printers - Implementing Printer Locations - Maintaining Printer Resources - Setting Up and Administering Published Shared Folders - Monitoring Access to Shared Folders - Troubleshooting User Access to Network File Resources - Troubleshooting Published Resources - Best Practices - Overview of the DNS Query Process - Creating Zones - Configuring Zones - Configuring DNS Updates - DNS Name Resolution in Active Directory - Maintaining and Troubleshooting DNS Servers - Implementing Group Policy - Managing Network Security - Managing Web Services

Activities.

Adds user accounts and grant access permissions to groups.
Administers users and groups.
Administers file resources.
Administers printer resources.
Manages data storage.
Monitors access to resources.
Audit access to resources.
Back up and restore files and folders.
Describes the DNS query process.
Creates zones.
Configure zones.
Configures DNS updates.
Describes the process of DNS name resolution in Active Directory.
Maintains and troubleshoot DNS servers.
Applies best practices to managing DNS.



C. Wireless internetworking

C.1 - Wireless networking	Knowledge (basic and intermediate levels)
C.1.1 - Wireless networking	<p>1. Wireless networks</p> <ul style="list-style-type: none">- LAN/WAN and wireless networks interconnection- Wireless network components, mobile devices- Collision detection on wireless channels- Performance and throughput of wireless networks- Alerting systems for mobile networks- Fault diagnosis: packet analyser- Network devices for wireless networks <p>2. The GSM architecture</p> <ul style="list-style-type: none">- Definition of the main components of the GSM network- Main types of MS and power classes, SIM (Subscriber Identity Module), BTS (Base Transceiver Station), BSC (Base Station Controller), MSC/VLR (Mobile Service Switching Centre/Visitor Location Register), HLR (Home Location Register)- Security issues in the GSM architecture- Main security mechanisms in the GSM architecture- User data organization and management- Telecommunication services supported by a GSM network, Teleservice- Bearer Services and Supplement Services (SS)- Architecture of the GPRS network- Service features (Radio-bearer and services, QoS: quality of service)- User and control plans- Main advantages of the GPRS-GPRS applications and limitations <p>3. WLAN 802.11 (WiFi networks)</p> <ul style="list-style-type: none">- Main fields of application of a WiFi networks- Main components of a WiFi, 802.11 compliant network (Access Point, Terminal Adapter, wireless bridge, mobile device, antennas)- Radio collision detection-Medium access mechanism and handover procedure in a 802.11 network- Applications and limitations of a 802.11 network- Introduction to the 802.11 project (802.11a, 802.11b, 802.11g)- Brief introduction to the Bluetooth standard- Main architecture and components of WLAN 802.11 (Access point, Basic Service Set, Extended Service Set)- Mobile IP: methods for automatic configuration of mobile IP addresses, management techniques- Authentication, authorization, accounting and security



Activities.

Describes 802.11 standard and wireless

Describes wireless topologies

Describes security issues of wireless LANs

Uses a simple 802.11 network

Sets simple wireless network for home and small office;

Sets simple Wi Fi network for small public hot spots;

To combine wired Wi - Fi network for home and office

Wireless backbone (or wired backbone);

Sets a connection over GSM, GPRS and UMTS (when and where available);

An example of use could be a mobile connection to pop and/or http server

Installs a mobile LAN based on IEEE 802.11, in particular with

point to point and access point based connection;

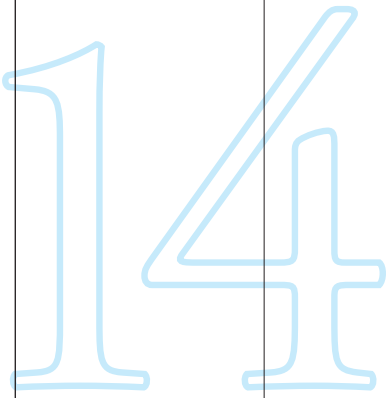
also security aspects will be considered as well.

D. Corporate network implementation

D.1.1 - Corporate network implementation	Knowledge (basic and intermediate levels)
D.1 - Structured Cabling and LAN-WAN enterprise project (Study case)	Structured cabling standard
<p>Activities.</p> <p>Uses appropriately the different elements of a corporate network, according to international standards; Designs structured cabling for a standard LAN network; Designs an EN50173 (generic cabling) compliant LAN cabling; Designs an ANSI/EIA/TIA 568-A compliant optic fiber LAN cabling; Performs tests on existing LAN cabling according to the IEEE, ANSI/EIA/TIA and ISO/IEC standards.</p>	

A.1 - Networking and data communications

A.1.1 - Networking and data communications basics		
<p>A.1.1.1 ● Signals and Systems, network and standard</p>	<p>A.1.1.1.1 ● Signals and Systems,</p>	<p>A.1.1.1.1.1 ● Electric signals, wave- forms, and frequencies</p> <p>A.1.1.1.1.2 ● Analog v. Digital</p> <p>A.1.1.1.1.3 ● Noise Attenuation</p> <p>A.1.1.1.1.4 ● Digital encoding Character codes</p> <p>A.1.1.1.1.5 ● Introduction to data transmission</p> <p>A.1.1.1.1.6 ● Serial and parallel data transmission</p> <p>A.1.1.1.1.7 ● Synchronous and asynch. data transmission</p> <p>A.1.1.1.1.8 ● Simplex, half-duplex, duplex</p> <p>A.1.1.1.1.9 ● Channels and bandwidths</p> <p>A.1.1.1.1.10 ● Multiplexing Modulation introduced</p> <p>A.1.1.1.1.11 ● HOST/terminal computing</p> <p>A.1.1.1.1.12 ● Distributed processing</p> <p>A.1.1.1.1.3 ● Network evolution</p>



	<p>A.1.1.1.2 ● Protocol Layers and the ISO/OSI Reference Model</p>	<p>A.1.1.1.1.14 ● Client/server computing</p> <p>A.1.1.1.1.15 ● LAN topologies</p> <p>A.1.1.1.1.16 ● Access methods</p> <p>A.1.1.1.1.17 ● WAN topologies</p> <p>A.1.1.1.1.18 ● WAN switching methods</p> <p>A.1.1.1.1.19 ● Introduction to standards</p> <p>A.1.1.1.1.20 ● Standards bodies</p> <p>A.1.1.1.2.1 ● Introducing protocols</p> <p>A.1.1.1.2.2 ● The principle of layering</p> <p>A.1.1.1.2.3 ● The principle of layering</p> <p>A.1.1.1.2.4 ● The OSI model</p> <p>A.1.1.1.2.5 ● Protocols type</p> <p>A.1.1.1.2.6 ● Protocols functions</p>	<p>A.1.1.1.2.5.1 ● Connectionless and connection Oriented protocols</p> <p>A.1.1.1.2.6.1 ● Connection management</p> <p>A.1.1.1.2.6.2 ● Encapsulaption</p> <p>A.1.1.1.2.6.3 ● Segmentation</p> <p>A.1.1.1.2.6.4 ● Multiplexing</p> <p>A.1.1.1.2.6.5 ● Error-checking and recovery</p>
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			A.1.1.1.2.6.6 Flow control [methods]	●
		A.1.1.1.2.7 Bit-oriented DL protocols	A.1.1.1.2.7.1 HDLC and SDLC	●
			A.1.1.1.2.7.2 HDLC and LAP-B	●
			A.1.1.1.2.7.3 The Point-to-Point Protocol (PPP)	●
		A.1.1.1.2.8 The 802 series	A.1.1.1.2.8.1 802.2 (LLC)	●
			A.1.1.1.2.8.2 802.3 (CSMA/CD)	●
			A.1.1.1.2.8.3 802.5	●
		A.1.1.1.2.9 The network layer		●
		A.1.1.1.2.10 The transport layer		●
		A.1.1.1.2.11 The session layer		●
		A.1.1.1.2.12 The presentation layer		●
		A.1.1.1.2.13 The application layer		●
	A.1.1.1.3 Transmission media	A.1.1.1.3.1 Transmission media characteristics		●
		A.1.1.1.3.2 Transmission media type	A.1.1.1.3.2.1 TP	●
			A.1.1.1.3.2.1 Coax	●
			A.1.1.1.3.2.1 Optical Fiber	●
			A.1.1.1.3.2.1 Wireless	●





































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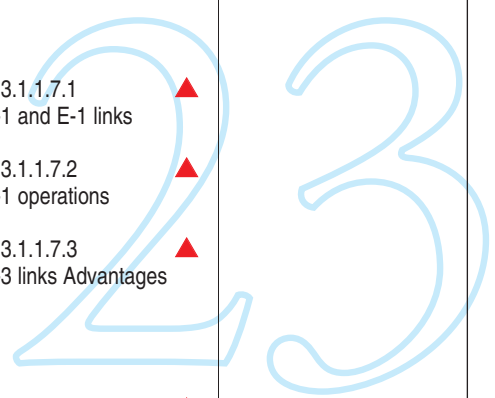
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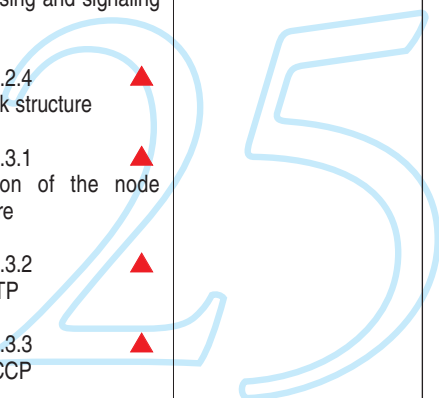
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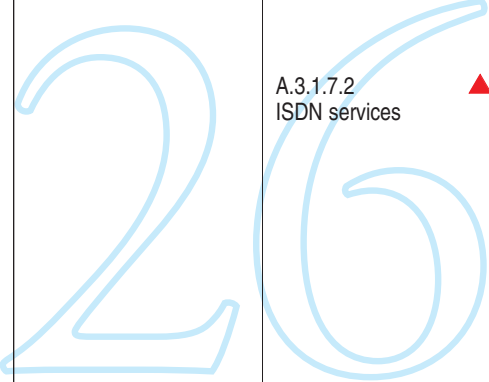
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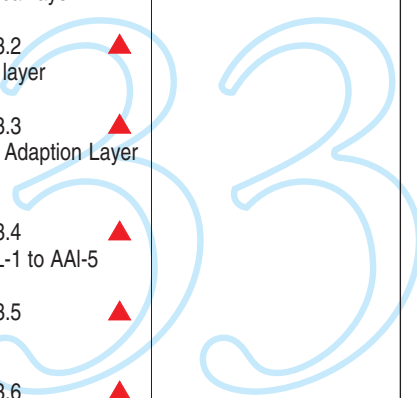


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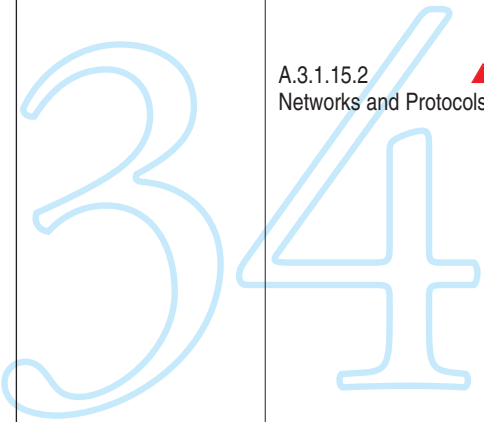
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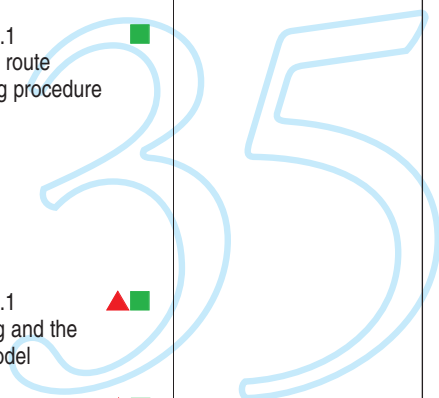
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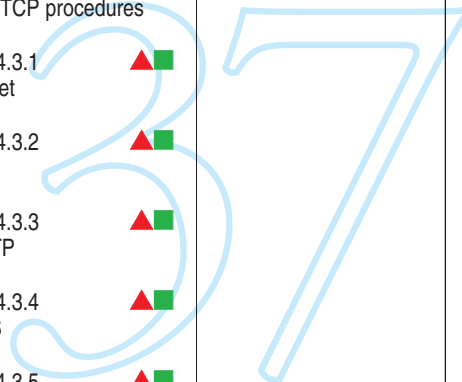
A.4.4.4.2 ▲ ■
Management standards















A.4.4.4.3 ▲ ■
Standard MIB structure
















A.4.4.4.4 ▲ ■
The MIB object

A.4.4.4.5 ▲ ■
The SNMP operation

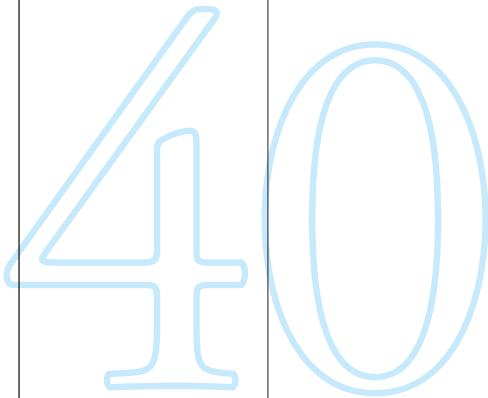
A.4.4.4.6 ▲ ■
The SNMP messages



<p>A.4.5  </p> <p>Virtual Private Network (VPN)</p>	<p>A.4.5.1  </p> <p>Definition of VPN</p> <p>A.4.5.2  </p> <p>VPN motivation</p> <p>A.4.5.3  </p> <p>Type of VPN's</p> <p>A.4.5.4  </p> <p>Non IP VPN's</p> <p>A.4.5.5  </p> <p>Quality of Service</p>	<p>A.4.4.4.7  </p> <p>SNMP v.2</p>	
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<p>A.5.1 - Wireless internetworking</p>			
<p>A.5.1.1   </p> <p>Fundamentals of wireless LANs</p>	<p>A.5.1.1.1 </p> <p>The principal wireless standards</p> <p>A.5.1.1.2 </p> <p>Wireless technologies</p> <p>A.5.1.1.3 </p> <p>Components and technologies</p>	<p>A.5.1.1.1.1 </p> <p>IEEE 802.11 standard</p> <p>A.5.1.1.1.2 </p> <p>Introduction of GSM standard</p> <p>A.5.1.1.1.3 </p> <p>Introduction of GPRS standard</p> <p>A.5.1.1.1.4 </p> <p>Introduction of UMTS standard</p> <p>A.5.1.1.1.5 </p> <p>Introduction of Bluetooth standard</p> <p>A.5.1.1.2.1 </p> <p>Digital Wireless</p> <p>A.5.1.1.2.2 </p> <p>Digital Cellular</p> <p>A.5.1.1.3.1 </p> <p>Components Overview</p> <p>A.5.1.1.3.2 </p> <p>Client Adapters and Clients</p>	

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		A.5.1.1.3.6 Cables and Accessories	●	
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		A.5.1.1.4.2 WLAN Growth and Applications	●	
		A.5.1.1.4.3 Market Requirements	●	
	A.5.1.1.5 Challenges and Issues	A.5.1.1.5.1 Radio Signal Interference and Degradation	● ■	
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A.5.1.2.1.4 ■
802.11a DSSS-direct
sequence spread
spectrum

A.5.1.2.1.5 ■
802.11b High Rate/WiFi

A.5.1.2.1.6 ■
802.11g

A.5.1.2.1.7 ■
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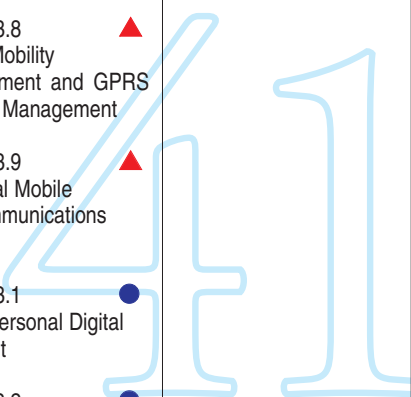
A.5.1.2.1.8 ■
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A.5.1.2.1.9 ■
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A.5.1.2.3.3 ▲
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Lilo

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Lilo configuration

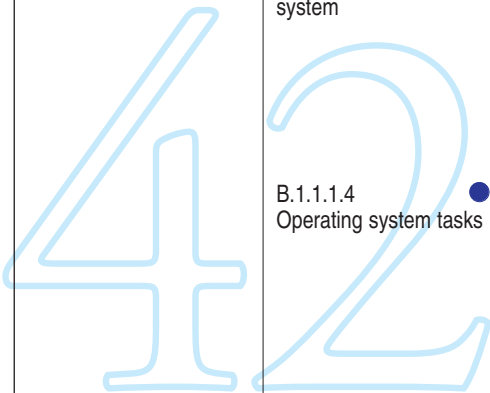
B.1.1.1.5.1.1 ●■
Syslog

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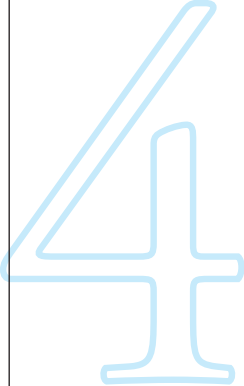
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