Cisco Networking Academy CCNA Semester 4

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1.5 Access List Overview

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1.5.2 How access lists work
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1.5.4 How to identify access lists
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1.5.6 How to use wildcard mask bits
1.5.7 How to use the wildcard any
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1.5.9 Where to place IP access lists

1.6 IPX Routing Overview
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1.6.2 Novell netware protocol suite
1.6.3 Novell IPX addressing
1.6.4 Cisco encapsulation names
1.6.5 Novell uses RIP for routing
1.6.6 SAP service advertisements
1.6.7 GNS get nearest server protocol
1.6.8 Novell IPX configuration tasks
1.6.9 Verifying IPX operation

Chapter 2: WANs

2.1 WAN Technology
2.1.1 WAN services
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2.1.3 WAN virtual circuits
2.1.4 WAN line types

2.2 WAN Devices
2.2.1 Fundamental WAN devices
2.2.2 Routers and WAN switches
2.2.3 Describe modems on a WAN
2.2.4 CSU/DSUs on a WAN
2.2.5 ISDN Terminal Adapters on a WAN

2.3 How WANs relate to the OSI Model
2.3.1 Organizations that deal with WAN standards
2.3.2 WAN physical layer standards
2.3.3 Name, and briefly describe, six WAN data link encapsulations

2.4 WAN Encapsulation Formats
2.4.1 Serial line frame fields
2.4.2 PPP
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2.5 WAN Link Options
2.5.1 Two basic WAN link options
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2.5.4 Packet-switched connections
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2.5.7 DDR
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3.2 The First Steps in WAN Design
3.2.1 WAN design goals
3.2.2 The gathering requirements phase of WAN design
3.2.3 Analyzing requirements
3.2.4 WAN sensitivity testing

3.3 How to Identify and Select Networking Capabilities
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3.3.2 A hierarchical WAN design model
3.3.3 Three hierarchical WAN design layers
3.3.4 Describe the three-layer design model components
3.3.5 Core-layer functions
3.3.6 Distribution-layer functions
3.3.7 Access-layer functions
3.3.8 One-layer network designs
3.3.9 Two-layer network designs
3.3.10 The benefits of hierarchical WAN designs
3.3.11 Server placement in WANs
3.3.12 Alternatives to dedicated WAN links

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4.1 PPP
4.1.1 The need for PPP
4.1.2 PPP components
4.1.3 PPP layer functions
4.1.4 The six fields of a PPP frame

4.2 PPP Session Establishment
4.2.1 The four phases through which PPP establishes a point-to-point connection
4.2.2 Phase 1: link establishment and configuration negotiation
4.2.3 Phase 2: link-quality determination
4.2.4 Phase 3: network-layer protocol configuration negotiation
4.2.5 Describe phase 4: link termination

4.3 PPP Authentication
4.3.1 PAP
4.3.2 CHAP
4.3.3 Writing the IOS command steps to configure PPP authentication
4.3.4 Writing the IOS command to configure CHAP authentification

Chapter 5: Integrated Services Digital Network (ISDN)

5.1 ISDN
5.1.1 What is ISDN
5.1.2 Basic ISDN components
5.1.3 ISDN reference points
5.1.4 ISDN switches and SPIDs
5.1.5 Differentiate between E, I, and Q ISDN protocols

5.2 How ISDN Relates to the OSI Reference Model
5.2.1 The ITU-T standards of the first three layers of ISDN
5.2.2 The ISDN physical layer
5.2.3 The ISDN data link layer
5.2.4 The ISDN network layer
5.2.5 ISDN encapsulation

5.3 ISDN Uses
5.3.1 Three uses for ISDN
5.3.2 ISDN remote nodes
5.3.3 ISDN SOHO connectivity

5.4 ISDN Services: BRI and PRI
5.4.1 ISDN BRI and ISDN PRI

5.4.2 How BRI connectivity is established

5.5 ISDN Configuration Tasks
5.5.1 ISDN global and interface parameter configuration tasks
5.5.2 Write the IOS commands to configure ISDN BRI
5.5.3 Writing the IOS commands to define an ISDN switch type
5.5.4 Write the IOS commands pertaining to SPIDs
5.5.5 Write the IOS commands for a complete ISDN BRI configuration
5.5.6 Describe how to confirm BRI operations

5.6 Dial-on-Demand Routing
5.6.1 DDR considerations
5.6.2 Writing IOS commands pertaining to verifying DDR operation
5.6.3 Write IOS commands pertaining to troubleshooting DDR operation

Chapter 6: Frame Relay

6.1 Frame Relay Technology
6.1.1 What is frame relay?
6.1.2 Local access rate, DLCI, LMI, CIR, committed burst, excess burst, FECN, BECN, and DE
6.1.3 Frame relay operation
6.1.4 Frame relay DLCIs
6.1.5 The fields of the frame relay frame format
6.1.6 Frame relay addressing

6.2 LMI: Cisco's Implementation of Frame Relay
6.2.1 LMI operation
6.2.2 The fields of the LMI frame format

6.3 LMI Features
6.3.1 Global addressing
6.3.2 Multicasting and inverse ARP
6.3.3 Frame relay mapping
6.3.4 Frame relay switching tables

6.4 Frame Relay Subinterfaces
6.4.1 What are frame relay subinterfaces?
6.4.2 Split horizon routing environments
6.4.3 The resolution of point-to-point and multipoint reachability issues

6.5 The Configuration of Basic Frame Relay
6.5.1 Writing the IOS command sequence to completely configure frame relay
6.5.2 The commands for verifying frame relay operation
6.5.3 The steps in confirming that the frame relay line is up
6.5.4 The steps in confirming the frame relay maps
6.5.5 The steps in confirming connectivity to the central site router
6.5.6 The steps you must use to configure the serial interface for a frame relay connection
6.5.7 The steps in verifying a frame relay configuration
6.5.8 The steps in configuring frame relay subinterfaces
6.5.9 Optional frame relay commands

Chapter 7: Network Management

7.1 The Administrative Side of Network Management
7.1.1 What does a network look like?
7.1.2 Understanding and establishing the boundaries of the network

7.1.3 Costs of a network
7.1.4 Error report documentation

7.2 Monitoring the Network
7.2.1 Why is it necessary to monitor a network?
7.2.2 Connection monitoring
7.2.3 Traffic monitoring
7.2.4 Simple network management protocol
7.2.5 Remote monitoring (RMON)

7.3 Troubleshooting Networks
7.3.1 Problem solving
7.3.2 Troubleshooting methods
7.3.3 Software tools

Chapter 8: Network + Certification Exam Review

8.1 Basic Networking Knowledge
8.1.1 Star, bus, mesh, and ring topologies
8.1.2 Segments and backbones
8.1.3 The major network operating systems (NOS): Microsoft Windows NT, Novell NetWare, and Unix
8.1.4 The clients that best serve specific network operating systems and their resources
8.1.5 The directory services of the major network operating systems
8.1.6 IP, IPX, and NetBEUI and associate them with their functions
8.1.7 Mirroring, duplexing, striping, volumes, tape backup
8.1.8 The OSI model and the protocols, services, functions that pertain to each layer
8.1.9 Cat 3, Cat 5, fiber optic, UTP, and STP
8.1.10 10BASE2, 10BASE5, 10BASE-T, 100BASE-T, 100BASE-TX, 100BASEVG-AnyLAN
8.1.11 Full and Half-Duplexing, WAN and LAN; server, workstation, and host; server-based networking and peer-to-peer networking; cable, NIC, and router; broadband and baseband; Gateway (as both a default IP router and as a method to connect dissimilar systems or protocols)

8.2 Understand Physical Layer
8.2.1 Troubleshooting the physical layer when you have network problems after installing or replacing a NIC
8.2.2 Hubs, MAUs, switching hubs (switches), repeaters, transceivers

8.3 The Data Link Layer
8.3.1 Bridges, what they are and why they are used
8.3.2 The 802 specifications
8.3.3 The function and characteristics of MAC addresses

8.4 The Network Layer
8.4.1 Routing occurs at the network layer
8.4.2 The difference between a router and a brouter
8.4.3 The difference between routable and non-routable protocols
8.4.4 The concept of default gateways and subnetworks
8.4.5 The reason for employing unique network Ids
8.4.6 The difference between static and dynamic routing

8.5 The Transport Layer
8.5.1 The distinction between connectionless and connection-orientated transport
8.5.2 Explain the purpose of name resolution

8.6 TCP/IP Fundamentals

8.6.1 IP default gateways
8.6.2 DHCP, DNS, WINS, and host files
8.6.3 TCP, UDP, POP3, SMTP, SNMP, FTP, HTTP, and IP
8.6.4 Why TCP/IP is supported by every operating system and millions of hosts worldwide
8.6.5 The purpose and function of internet domain name server hierarchies (how email arrives in another country)
8.6.6 Class A, B, and C addresses and their default subnet mask numbers
8.6.7 The port numbers used (for example HTTP, FTP, SMTP) for a given service
8.6.8 Proxy and why it is used
8.6.9 IP address, DNS, default gateway, IP proxy, WINS, DHCP, host name, and internet domain name

8.7 TCP/IP Suite: Utilities

8.7.1 How and when to use ARP to test, validate, and troubleshoot IP connectivity
8.7.2 How and when to use Telnet to test, validate, and troubleshoot IP connectivity
8.7.3 How and when to use NBTSTAT to test, validate, and troubleshoot IP connectivity
8.7.4 How and when to use TRACERT to test, validate, and troubleshoot IP connectivity
8.7.5 How and when to use NETSTAT to test, validate, and troubleshoot IP connectivity
8.7.6 How and when to use IPCONFIG/WINIPCONFIG to test, validate, and troubleshoot IP connectivity
8.7.7 How and when to use FTP to test, validate, and troubleshoot IP connectivity
8.7.8 How and when to use PING to test, validate, and troubleshoot IP connectivity

8.8 Remote Connectivity

8.8.1 The distinction between PPP and SLIP
8.8.2 The purpose and function of PPTP and the conditions under which it is useful
8.8.3 The attributes, advantages and disadvantages of ISDN and PSTN (POTS)
8.8.4 The modem configuration parameters which must be set (serial port IRQ, I/O address, maximum port speed) for dial-up networking to function
8.8.5 The requirements for a remote connection

8.9 Security

8.9.1 Selection of a security model (user and share levels) as a good practice to ensure network security
8.9.2 The use of standard password practices and procedures as a good practice to ensure network security
8.9.3 The need to employ data encryption to protect network data as a good practice to ensure network security
8.9.4 The use of a firewall as a good practice to ensure network connectivity

8.10 Implementing Installation of the Network

8.10.1 Administrative and test accounts, passwords, IP addresses, IP configurations, and relevant SOPs
8.10.2 The impact of environmental factors on computer networks
8.10.3 Common peripheral ports, external SCSI connections (esp. DB-25), print servers, hubs, routers, brouters, bridges, patch panels, UPSs, NICs, and token ring media filters
8.10.4 The consequences of trying to install an analog modem into a digital jack
8.10.5 The uses of RJ-45 connectors may differ greatly depending on the cabling
8.10.6 Patch cables contribute to the overall length of the cabling segment

8.11 Maintaining and Supporting the Network

8.11.1 The kinds of test documentation that are usually available regarding a vendors patches, fixes, upgrades, etc.
8.11.2 Demonstrate awareness of standard backup procedures back up media storage practices
8.11.3 The need for periodic application of software patches and other fixes to the network
8.11.4 The need to install anti-virus software on the server and workstation

8.11.5 The need to frequently update virus signatures

8.12 Troubleshooting the Network

8.12.1 Troubleshooting approach
8.12.2 Distinguish whether a problem is attributable to the operator or the system
8.12.3 A second method for determining whether a problem is attributable to the operator or the system
8.12.4 The need to check the following as physical and logical indicators of trouble: link lights, power lights, error displays, error logs and displays, and performance monitors
8.12.5 Given a network problem scenario, determine the problem.
8.12.6 The purpose and function of common network tools including: a crossover cable, hardware loopback, tone generator, tone locator (fox and hound)

Chapter 9: CCNA Exam Preparation

9.1 OSI Model

9.1.1 Layer functions
9.1.2 The application layer
9.1.3 The presentation layer
9.1.4 The session layer
9.1.5 The transport layer
9.1.6 The network layer
9.1.7 The data-link layer
9.1.8 The physical layer
9.1.9 Data encapsulation

9.2 Creating Subnets

9.2.1 How to create a subnet
9.2.2 Subnet planning
9.2.3 Sample problems

9.3 Router Commands

9.3.1 Basic router configuration
9.3.2 Testing and other basic commands
9.3.3 Configuring IPX routing
9.3.4 Configuring standard and extended IP access lists
9.3.5 PPP encapsulation with PAP and CHAP
9.3.6 ISDN
9.3.7 Frame relay - simple configuration
9.3.8 Frame relay - multipoint subinterfaces configuration
9.3.9 Frame relay - point-to-point subinterfaces configuration
9.3.10 Monitoring frame relay
9.3.11 Booting up the router

9.4 LAN Switching

9.4.1 Full-Duplex and Half-Duplex Ethernet Operations
9.4.2 Ethernet Frame
9.4.3 The MAC Address
9.4.4 Functions of the MAC Address - The Hub
9.4.5 Functions of the MAC Address - The Switch

9.5 Microsegmentation of a Network

9.5.1 LAN Segmentation using Switches
9.5.2 Switches and Buffering
9.5.3 A " Flat Network "
9.5.4 LAN Segmentation Using Routers

9.6 Who to ARP for?

9.6.1 ARP Request/Reply
9.6.2 Example 1: The ARP Request and Reply

9.7 Switching Methods
9.7.1 Symmetric and Asymmetric Switching
9.7.2 Cut-through and store-and-forward LAN switching

9.8 The Benefits of Virtual LANs (VLANs)
9.8.1 Layer 2 Broadcast Control
9.8.2 Why Use Port-Centric VLANs?
9.8.3 Routing and VLANs
9.8.4 VLAN Tagging

9.9 Spanning Tree Protocol
9.9.1 STP Function

9.10 Skills Based Sample Scenario - Lab Test
9.10.1 Skills-Based Exam Preparation