CISCO STUDY GUIDE

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Cisco Building Cisco Remote Access Networks Exam 640-505

Edition 1

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Key Concepts Building Cisco Remote Access Networks

Wide Area Networks (WANs)

A WAN is a data communication network covering a relatively broad geographic area often using transmission facilities generally provided by service providers and telephone companies.

Defining WAN Connection Types

Commonly used WAN connections include:

- 1. Leased Lines (dedicated connectivity)
- 2. Modem (asynchronous serial connection, Integrated Service Digital Network (ISDN), Basic Rate Interface (BRI) and ISDN Primary Rate Interface (PRI))
- 3. Frame Relay (packet-switched network)

Defining WAN Encapsulation Protocols

Typical WAN protocols include:

- Asynchronous Transfer Mode (ATM)
- Frame Relay
- High Level Data Link Control (HDLC)
- Point-to-Point Protocol (PPP)
- Serial Line Internet Protocol (SLIP)
- X.25/Link Access Procedure, Balanced (LAPB)

PPP Encapsulation

PPP Encapsulation is the international standard used for the following three types of connections:

1

- Asynchronous Serial
- ISDN
- Synchronous Serial

Determining the Type WAN to Use

Consideration / Location	Central Site	Branch Office
Access Control	Х	Х
Authentication		Х
Availability		Х
Cost	Х	Х
Multiple access connections	Х	Х
Quality of Service	Х	Х
Redundancy and Backup	Х	Х
Scalability	Х	

Telecommuter Site Considerations

Typical WAN connection deployed at telecommuter sites are as follows:

- Asynchronous dial-up
- ISDN BRI
- Frame Relay

Determining the Appropriate Interface

Typical interfaces that are found on a Cisco router and a typical WAN connection supported are as follows:

- Asynchronous Serial
- Synchronous Serial
- BRI
- Channelized T1 or E1

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Assembling and Cabling the WAN Components

Central site and Branch office router equipment

	Central	Office	Branch Office		Telecommuter				
7000	AS5x00	4000 3600	2600	2500	1700	1600	1000	800	700

Configuring Asynchronous Connections with Modems

A modem converts digital signals to analog and vice versa. The typical maximum data rate is usually limited to 28.8 to 56 Kbps.

Digital	Conversion	Analog	Conversion	Digital
Computer	Modem	Dial-up network	Modem	Computer

Modem Signaling and Cabling

The eight interesting signals can be grouped into three categories by their functionality:

- 1. Data transfer group
- 2. Data flow control group
- 3. Modem control group

Communication Termination

The communication termination can be **DTE initiated (PC)** or **DCE initiated (modem)**.

Error Control and Data Compression

These methods were developed to ensure data integrity at any speed. Some of the methods include Microcom Networking Protocol (MNP) and Link Access Procedure for Modems (LAPM).

Line Types and Numbering

Cisco devices have following types of lines:

- CON: Console Line
- AUX: Auxiliary Line
- TTY: Asynchronous Line
- VTY: Virtual Terminal Line

Automatic Configuration of Modems

Modem autoconfiguration facilitates the configuration of modems on access servers. To set up a modem using modem autoconfiguration, connect the phone line and power cable to the modem, and use the **modem autoconfigure** command on the line with the modem.

Modem Autodiscovery

If no modem is specified for a particular line and the **modem autoconfigure discovery** command is provided, the access server attempts to autodiscover the type of modem to which it is attached.

Chat-Scripts for Async Lines

These are used for following tasks:

- Modem configuration
- Dialing and remote login commands.
- Failure detection

Configuring Point-to-Point Protocol and Controlling Network Access

PPP Architecture

PPP is a standard encapsulation protocol for the transport of different network-layer protocols across serial, point-to-point links.

PPP Mechanisms

PPP describes mechanisms for the following:

- Network layer (OSI layer 3) protocol multiplexing
- Link configuration
- Link-quality testing
- Authentication
- Header compression
- Error detection
- Link parameter negotiation

PPP Link Control Protocol Options

The configuration features negotiated through the LCP are:

- **PAP and CHAP Authentication** With PPP, callers can be authenticated with PAP or CHAP. Both PAP or CHAP authentication are two-way processes. With CHAP, the peer repeatedly sends an Id/Password pair to the authenticator until the authentication is acknowledged or the connection is terminated.
- **PPP Callback** PPP callback is based on a client-server relationship between routers of a point-to-point connection. PPP callback allows a router to request that a dial-up peer router call back. The call back feature can be used to control security access and toll costs between the routers.
- **PPP Compression** Data compression decreased transmission time by enabling higher data throughput across the link.
- **PPP Multilink** Multilink over PPP provides load balancing over two or more WAN links. Multilink PPP (MP) can improve throughput and reduce latency between systems by splitting packets and sending the fragments over two or more point-to-point links.

Accessing the Central Site with Windows 95

Windows 95 provides many tools to help and increase mobile users productivity:

• Remote mail

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- Direct cable connection
- Windows 95 briefcase
- Deferred printing
- Support for other vendors tolls for dial-up

Using ISDN and DDR Technologies

ISDN delivers a faster alternative analog dialup modems, and is generally less expensive than switched services and expensive leased lines.

BRI Functional Groups and Reference Points

ISDN technology involves many functional devices, also known as functional groups.

The 4 ISDN reference points are as follows:

$\begin{array}{cccc} R \rightarrow & S \rightarrow & T \rightarrow & U \\ (Device) & & (Central Office) \end{array}$

ISDN Call Teardown

The release procedures are based on three message approach:

- 1. Disconnect/Release
- 2. Released
- 3. Release complete

Static and Default Routing

The use of static and default routes eliminates the need to send routing updates over expensive leased lines or to trigger a DDR call. Optional Configuration for ISDN include the following:

- B channel aggregation
- ISDN Caller identification

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- Called-Party Number Answering
- ISDN Rate Adaption

Optimizing the Use of DDR Interface

Dialer rotary groups allow a single interface configuration to apply to a set of physical interfaces. To configure a rotary group, configure each BRI interface as part of a rotary group.

Dialer Profile

Dialer profiles provide customized services and unique interfaces based on an individual profile Profiles can define customized encapsulation, access control lists, and minimum or maximum calls, as well as turn features on and off.

Components of Dialer Profile

The dialer profile consists of the following components:

- Dialer interface
- Dialer map-class
- Dialer pool
- Physical interfaces

Dialer Interface

A dialer interface is a logical configuration based on a per-destination dialer profile. A dialer interface is configured with following characteristics:

- IP address of destination network
- Encapsulation type
- PPP authentication type (CHAP)
- Dialer remote name
- Dialer string or dialer map
- Dialer pool number

- Dialer group number
- Dialer list number
- Multilink PPP

The **dialer map class** is an optional element that defines specific characteristics for a call to a specified dialer string.

Dialer Pool

Each dialer interface references a **Dialer pool**, which is a group of one or more physical interfaces in charge of placing the call.

Configuring a Cisco 700 Series Router

All the routers in the Cisco 700 series product family offer maximum flexibility for remote access. The product family includes the Cisco 761M, 762M, 765M, 766M, 771M, 772M, 775M and 776M routers. Configuration includes system level configuration, LAN profile configuration, and User profile configuration.

Using X.25 for Remote Access

X.25 is a standard that defines the connection between a terminal and a packet-switching network. The X.25 offers the closet approach to worldwide data communication available.

X.25 DTE and DCE

Data terminal equipment (DTE) and Data Circuit-terminating equipment (DCE) for X.25 identify the responsibilities of the two stations on an X.25 attachment.

The Packet Assembler/Deassembler (PAD)

The PAD is a device that collects data from a group of asynchronous terminals and periodically outputs the data in X.25 packets.

X.25 Virtual Circuits

VCs are used interchangeably with the terms Virtual Circuit Number (VCN), Logical Channel Number (LCN) and Virtual Channel Identifier (VCI). Three phases are associated with SVCs:

- 1. Call setup
- 2. Information transfer
- 3. Call clear

Crucial X.25 parameters are as follows:

- Virtual circuit range
- Default packet sizes
- Default window sizes
- Window modulus

Frame Relay Connection and Traffic Flow Control

Frame Relay is an International Telecommunication Union (ITU) Telecommunication Standardization Sector and American National Standard Institute (ANSI) standard that defines the process of for sending data over a public data network.

Frame Relay Signaling

Local Management Interface (LMI) is a signaling standard between the Customer-Premises Equipment (CPE) device and the Frame Relay switch that is responsible for managing the connection and maintaining status between the devices. Three types of LMI are supported:

- 1. cisco
- 2. ansi
- 3. q933a

Frame Relay Topologies

These include the following:

- Star topology
- Full-mesh topology
- Partial-mesh topology

Subinterfaces can be configured to support point-to-point or multipoint connection types.

Configure Frame Relay Traffic Shaping

To enable frame relay traffic shaping perform the following steps:

- 1. Specify a map class
- 2. Define the map class
- 3. Enable frame relay on an interface
- 4. Enable frame relay traffic shaping on an interface with the frame relay traffic shaping command.
- 5. Map the map class to virtual circuits on the interface

Enabling Backup to a Permanent Connection

A backup interface is an interface that stays idle until certain circumstances occur and then it is activated. The backup interface can be a physical interface or an assigned backup interface to be used in a dialer pool.

Managing Network Performance with Queuing and Compression

Quality of Service (QoS) is used to process traffic that arrives at a router interface. The switching process includes the delivery of traffic to an outgoing interface buffer and its respective prioritization. First-in, first-out (FIFO) queuing is the basic algorithm for packet transmission.

Cisco IOS software offers three queuing options as alternatives to FIFO queuing:

- 1. Weighted fair queuing (WFQ)
- 2. Priority Queuing
- 3. Custom Queuing

Weighted Fair Queuing (WFQ)

It is an automated method for all network traffic up to E1 speed (<2.048 Mbps). WFQ provides traffic priority management that dynamically sorts traffic into messages that makeup a conversation and prioritizes smaller conversations. Common conversation discriminators are the following:

- Source/destination network address
- Source/destination MAC address
- Source/destination port or socket numbers
- Frame relay data-link connection identifier (DLCI) value
- Quality of service /type of service value

Custom Queuing Operation

Custom queuing can take one of two forms; traffic filtering or queued message forwarding.

Scaling IP Addresses with Network Address Translation

NAT Operation

Network Address Translation (NAT) allows you to:

- Translate an inside local address
- Overload an inside global address
- Perform TCP Load distribution
- Handle Overlapping Networks

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Traffic Types Supported in a Cisco IOS NAT

The following traffic types are supported by Cisco IOS NAT:

- Any TCP/IPUDP traffic that does not carry source or destination IP addresses in the application data stream.
- HTTP
- TFTP
- Telnet
- Archie
- Finger
- NTP
- NFS
- rlogin, rsh, rcp

Using AAA to Scale Access Control in an Expanding Network

Cisco provides the following AAA solutions:

- Clients
- Client protocols
- Access servers
- Central site protocols
- Security servers

The Cisco source has three major components:

- The AAA Server
- The Netscape Fastrack Server
- The relational database management system (RDBMS)

The three parts of AAA are defined as:

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- Authentication
- Authorization
- Accounting

WARNING:

It is important that you read and study the "KEYPOINTS" portion of this study guide. We have identified important "KEYPOINTS" in this section that contain required knowledge for the exam. Please ensure that you absolutely know and understand these prior to testing.

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Remote Access Keypoints

- 1. The 3 dial-up networking protocols that can be used by Windows 95 are:
 - TCP/IP
 - IPX/SPX
 - NetBEUI
- 2. NT1 ISDN equipment is generally supplied by the customer in North America and the service provider in Europe.
- 3. The easiest way to verify the proper initial installation of Cisco routers is by the LEDS.
- 4. The **aaa authorization exec local** command authorizes a user for EXEC process using the local username/password data base.
- 5. The **show interface serial0** command displays the status information including LAPB for an interface serial0 that is running IP traffic over an X.25 network.
- 6. The **ISDN switch-type** T1 controller command configures the controller for ISDN PRI operation.
- 7. X.25 is available at speeds higher than 64 –Kbps. It is not used unless you need to reach small remote locations with basic technology. It is a reliable protocol because there is reliability at both X.25 Layer 3 and LAPB Layer 2.
- 8. The **linecode b8zs** command configures a T1 PRI for binary 8.0 substitution line coding.
- 9. Weighted Fair Queuing is enabled by default on low speed Serial Links.
- 10. There are three possible LMI types. With IOS release 11.2 or later, no LMI type needs to be entered.

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- 11. Do not use FIFO queuing if WAN traffic across a T1 link suffers only occasional congestion at which time certain interactive applications suffer poor performance, or it has become evident that large graphics files transfers between the marketing office and the central printing facility are adversely affecting interactive applications whose traffic shares the same T1 link.
- 12. You need to specify and define a map class as the first configuration step necessary to enable frame relay traffic shipping.
- 13. The **priority-list 3 ip medium** command assigns all IP traffic in priority list 3 to a medium priority queue.
- 14. The network layer (IP) address must be removed from the physical interface when using frame relay sub-interfaces on a physical interface.
- 15. ISDN is both a global and an interface command. It defines the type of signaling used by the ISDN service provider switch.
- 16. Use Payload Compression if you wanted to compress traffic on your frame relay connection to maximize the usage over the WAN.
- 17. The **frame-relay lmi-type ansi** command sets the local management interface to use the ANSIT1.617 standard.
- 18. The dialer interface is the primary element of a dialer profile.
- 19. The **show dialer** command is used to review the source and destination address of the packet that brought up BRI0 and to verify that the dialer came up properly.
- 20. The packets specified by the dialer hold queue command are held in the queue while dialing takes place.
- 21. The dialerpool-member 100 command assigns the interface to dialer pool 100.

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- 22. A company should use an E1 line at the European side to connect its US office to its European Headquarters.
- 23. An ISDN BRI type WAN connection provides the most widely available access from any remote site.
- 24. Asynchronous WAN connection types typically have the lowest speed.
- 25. The RJ-45 cable connector is typically used to connect a Cisco766 to an ISDN connection.
- 26. Cisco security has 3 major components:
 - RTBMS
 - AAA Server
 - Netscape fast track Server
- 27. Tthe **show ip nat translation** command is used to display the active NAT transactions.
- 28. The **aaa authentication default tacacs local** command for AAA authentication enables a TACACS plus authentication server. If there is no response, it enables the local username/password database.
- 29. NAT allows the pool of valid addresses to be shared by multiple hosts.
- 30. The **tacacs-server host 172.31.100.35** command specifies that a router should use a TACACS plus server at IP address 172.31.100.35.
- 31. The four PPP LCP options include:
 - Callback
 - Multi-link
 - Compression

- Authentication
- 32. Use the **dialer callback-secure** command so that calls configured for callback can connect.
- 33. The **ppp callback accepts** command is used on the server side of a PPP callback configuration.
- 34. The **debug ppp negotiation** command allows you to verify that PAP or CHAP authentication was successful between two routers.
- 35. The effect of using the **ip unnumbered Ethernet 0/0** command, when issued in configuration mode for a Serial interface, causes the IP address of the Ethernet interface to be used by the serial interface.
- 36. Cisco multi-link PPP is compatible with and supports four items:
 - RFC1517
 - Cisco 700 series routers
 - All Cisco routers running IOS software
 - Most routers conforming to RFC1990
- 37. To configure the BRI interface to allow dialup operation as well as backup services, configure one B channel of the BRI as standby backup, and the other B channel as DDR.
- 38. The **backup load AT 10** command disables a secondary line when the load on the primary falls below 10% of its available bandwidth.
- 39. You can backup the serial interface and still use the BRI interface by configuring the dialer interface with a Cisco router with both a BRI and a serial interface.
- 40. A reverse telnet connection is permitted using the **ip host corp1 2097 155.32.43.15** command, and the configuration applies to line 97.

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- 41. The **modem autoconfigure type usr sportster** command causes the access server to send an initialization string to the US Robotics modem upon dial up.
- 42. Speed and flow control parameters are set using the line command.
- 43. The modem attribute lock DTE prevents the speed between the modem and the DTE to be varied.
- 44. The **modem inout** command enables a line to both incoming and outgoing modem connections.
- 45. The three functions of chat scripts include:
 - Logging into a remote system
 - Instructing the modem to dial out
 - Initializing the directly attached modem
- 46. The **modem cap edit** command is used to add a new entry to the modem cap database.
- 47. DTR is the signal used by a DTE to indicate that it is willing to accept a call.
- 48. Dialer map classes are used to provide dialer parameters used by a particular destination.
- 49. ITU-T Q.931 is the protocol for Layer 3 and D channel.
- 50. The three functions that LCP is responsible for negotiating include:
 - Call back
 - IP address
 - Authentication type

- 51. The two primary interface configuration tasks for ISDN BRI include; assigning the interface to a dialer group and specifying the ISDN providers switch type.
- 52. ADSS1 is a subset of Q.931.
- 53. Do not use backup interfaces for DDR.
- 54. Modem initialization strings are sent to a modem before dial out and can be used to disable certain modem functions.
- 55. Reverse telnet is used to connect to an attached modem.
- 56. The **login** command requires a password before a connection will be allowed between a line.
- 57. You need to configure SPIDs on an ISDN interface when required by your service provider.
- 58. Flow control and allowing outgoing and incoming calls parameters are set using the interface **ASYNCH** command.
- 59. The **modem cap edit <modem name>** command is used to add a new entry to the modem cap database.
- 60. A loopback interface is a logical interface that never goes down.
- 61. The **dialer inband** or **dialer map** command should be used to enable DDR on a synchronous interface.
- 62. Basic-net3 is the most commonly used ISDN switch type in Europe.
- 63. The **interface serial 1/0:23** command configures serial interface 1/0 to use DSO 23 as the D channel of a T1 PRI connection.

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- 64. Packet switched connections use permanent virtual circuits to provide end-to-end connectivity.
- 65. The four WAN serial standards that are supported on a Cisco router include:
 - V.35
 - X.21
 - EIA/TIA-232
 - EIA/TIA-449
- 66. A corporate staff requiring dialog access and a mobile sales force requiring dial in access should use an access server.
- 67. The **encapsulation x25 dce** command should be used to enable X.25 switching on an interface.
- 68. Configure a new dialup networking connection at the "my computer/dialup networking" tab in Windows 95.
- 69. The **ISDN incoming-voice modem** command enables switching of analog calls to internal modems.
- 70. The **x25 map ip 135.22.12.123 31234567890 broadcast** command uses the "broadcast" parameter to send routing updates.
- 71. Use the **standard access list permit configuration** command to configuring the inside IP addresses eligible for transactions that are defined with NAT dynamic assignment.
- 72. The **show ip nat translations** command can be used to view and verify NAT.
- 73. The purpose of authentication is to determine the identity of a user.

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- 74. NAT increases delay, supports static address translation, and is always processedswitched.
- 75. The **ip nat inside** command enables NAT for an interface on your router that connects to the inside network.
- 76. Multilink PPP can improve throughput by fragmenting packets sent over the same link.
- 77. Multilink PPP is most effective with ISDN. It splits packets and sends fragments over multiple links.
- 78. The **ppp authentication chap** command configures CHAP authentication on a serial port using PPP encapsulation.
- 79. At 50% of traffic load, the **dialer load-threshold 128** command specifies for multilink PPP additional links will be bought up.
- 80. The ASYNCH mode dedicated command will works with the following three configuration commands:
 - ip unnumbered
 - ppp authentication chap
 - auto select during-login
- 81. The physical-layer ASYNCH command sets a serial interface to asynchronies mode.
- 82. The **framing esf** command configures extended super framing for PRI over a T1 line.
- 83. The **dialer-list protocol ip permit** command defines interesting traffic for a dialerlist as all IP traffic.
- 84. D channel is governed by DDR.

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- 85. The **dialer-list** command is used to define interesting traffic for DDR.
- 86. ISDN PRI serial interface is used for configuring D channel parameters.
- 87. X.121 addressing includes a country code. Only one address is allowed per interface. Addresses must match the one designated by the PDN.
- 88. X.25 is more commonly seen on SVCs and frame relay is more commonly seen on PVCs. Since X.25 is older than frame relay, it requires error correction mechanisms that are not necessary when frame relay standards are set.
- 89. X.25 DCE devices provide clocking at the physical layer. An example of the X.25 DCE device is a network switch or concentrator.
- 90. The U reference point defines the North American demarcation point between the CPE and the service provider's ISDN equipment.
- 91. When connecting multiple branch offices to a central office via X.25, the flow control parameters of the central office should roughly equal to the combined branched parameters.
- 92. The **show frame map** command displays information about all maps and trees connection information.
- 93. The **interface serial 0.2** command specifies point to point subinterface on the serial interface 0 of a router.
- 94. The **encapsulation frame-relay ietf** command is for frame relay encapsulation over a link connecting to a long Cisco router at a remote office.
- 95. In a frame relay PVC environment, using inverse ARP, you can dynamically map a network layer address such as IP to a virtual connection identified by a DLCI. This can also be done statically, using the **frame relay map** command.
- 96. Use priority queuing to specify which type of traffic to always send first.

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- 97. The **show queuing custom** command is used to view detailed information on custom queuing on all interfaces.
- 98. The **frame-relay traffic-shaping** command should be used to enable frame relay traffic shaping on an interface.
- 99. STAC compression method is used by Cisco HTLC.
- 100. No compression method is set by default for Cisco routers.
- 101. The **show frame-relay pvc <number>** command should be used on a router to view status and traffic statistics for a specific connection.
- 102. The **frame-relay adaptive-shaping BECN** command selects BECN as the mechanism to which traffic shaping will adapt.
- 103. The **priority-group <number>** command links a priority list to an interface.
- 104. Frame Relay is available to run on SVCs, is Layer 2-based technology, and is a connection-oriented datalink technology.
- 105. NAT reduces address overlap occurrence, conserves legally-registered addresses, and eliminates address renumbering when networks merge.
- 106. The three options available for a Cisco network access server to validate users to a network security server include:
 - MD5
 - RADIUS
 - TACACS+
- 107. The **aaa authentication** command should be used to restrict a user to certain IOS commands.

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- 108. The **dialer idle-timeout 10** command is used to disconnect a call after ten seconds of idle time.
- 109. The **dialer pool-member <number>** command assigns the interface to the dialer rotary group that was created with the **Router(config)#interface dialer 12** command.
- 110. The **passive-interface** command creates an interface that will not initiate router updates.
- 111. The **backup delay 20, 40** configuration command causes a backup line to be activated after the primary is down for 20 seconds and deactivated 40 seconds after the primary is reenabled.
- 112. The line number 65 is the line number of the first interface in an 8-port asynchronous module placed in slot 2 of a Cisco 3640.
- 113. The modem command ATI4 will display the current modem settings.
- 114. The purpose of the command flow control hardware used when configuring an asynchronous line is to set the line to use CTS/RTS flow control.
- 115. Three groups of modem signals containing the eight "interesting" signals include:
 - Data transfer
 - Modem control
 - Data flow control
- 116. If the CD is not dropped or recognized when a user logs into a line, it is possible to connect to someone else's session.
- 117. The **autoselect during-login** command automatically starts a PPP session upon reception of a flag character (7Eh sof).

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- 118. CHAP a better authentication mechanism than PAP because it sends hashed passwords.
- 119. IP Control Protocol (IPCP) is the network control protocol used by PPP for IP.
- 120. The autoselect feature of a Cisco access server allows a PPP session to start automatically.
- 121. Use the BRI S/T interface if your WAN connection from a 760 series router attaches to an external NT1.
- 122. Yyou must specify the physical connector for the serial cable that matches the CSU/DSU when ordering the cable for a frame relay connection from a Cisco 1603 router.
- 123. Dedicated connections more cost-effective because they involve shorter distances and allow longer connect times.
- 124. Cisco 766 and 776 routers have both a serial and an ISDN BRI interface.
- 125. When installing Dialup networking on a client, previously installed protocols are automatically enabled for dialup networking.
- 126. X.25 PAD performs buffering and translation functions.
- 127. Dedicated leased lines are better than frame relay connections because they provide full guaranteed bandwidth and offer more control over the connection.

Remote Access Practice Problems

- 1. A small business wants a dedicated WAN connection to the Internet and dial in capabilities for its mobile sales force. Additional connectivity is not an issue for the near future. Which Cisco system product best meets these requirements while keeping cost low?
 - *A*: 3600 series
- 2. The output from a show frame relay PVC command includes the following line: DLCI = 300, DLCI usage = local, PVC status = inactive, Interface = Serial 0.103. Which statement regarding the output is true?
 - *A:* The connection is up and functional but no traffic is currently flowing across the circuit.
- 3. What is the configuration command for data encapsulation on the serial interface 0 on Router R1?



A: encapsulation X25

4. Given the following configuration:

access-list 101 permit any any

access-list 1.1 deny TCP any any eq ftp

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dialer list 2 protocol ip list 101

Why does the configuration fail to prevent ftp traffic from dialing the line?

- *A*: The deny restriction is read after the permit line has already allowed packet forwarding.
- 5. A small remote office needs connectivity to corporate headquarters. Bandwidth requirements are initially small. The customer wants the ability to start with ISDN but later utilize higher speed dedicated connections. Which two Cisco System Series best match the customer requirements?
 - A: Series 1600

Series 2600

6. Which X.25 interface configuration command will cause IP traffic from router R1 to be routed to Router R2?



A: x25 map ip 10.60.8.2 31237654321

7. Given these connection and technology specifications:

- A single LAN connection
- One synchronous serial interface

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• Future expansion includes one additional WAN connection for back up. (WAN type not yet specified) one additional LAN connection.

Which Cisco systems equipment best meets the above specifications?

- A: 1700 series router
- 8. Once a day a telecommuter calls into a company site to forward large file transfers to his boss. The average call time is two hours. Assuming all technologies are available, which LAN connection best meets this user's needs?

A: ISDN_BRI

9. A company's field sales staff requires access to corporate data from their home/office. Pricing and product catalog information, product specification and marketing literature are commonly downloaded to create customer proposals and sales orders. Scheduling requests are uploaded. A typical home/office to corporate headquarters session occurs once each evening and involves a transfer of 8 MB to 15 MB of data. What is the best connection type to make the field to corporate headquarters connection?

A: ISDN BRI

10. A network administrator in London must order a Cisco router to setup an ISDN connection. Which type of ISDN interface meets this requirement?

A: *S*/*T* interface

11. A corporate central office wants to replace 30 low-speed leased lines with ISDN service to maximize utilization of network resources. Several remote sites only use the leased line occasionally, and some telecommuters use leased lines throughout the day but not on a constant basis. Which solution best meets the needs of the corporate central office?

A: Multiple BRI ISDN

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- 12. A company recently opened a branch office away from the corporate headquarters on the other side of the city. The network at the new branch supports several users that require regular access through out the day to data and applications residing on the corporate network. Which two connections are most likely to meet the connectivity requirements?
 - A: ISDN Serial

Frame Relay

- 13. A branch office wants to connect to the corporate office using dialup ISDN BRI. Which two routers would meet this need?
 - *A: Cisco1603*

Cisco1604

14. A corporate office supports many different remote connections. These include many Asynch modem access server connections for field sale personnel. ISDN connections with ISDN dialup for some individuals and dedicated connections for small branch connectivity are also supported. Which Cisco system series best meets the connectivity needs of the corporate office?

A: AS5000

15. Which Cisco router should be suitable for a mid-sized central site requiring incoming dial up or ISDN connections?

- 16. Which two Cisco systems series are best suited for a company's remote locations that service residential telecommuters and /or very small remote offices?
 - A: 700 800

17. Given the following global configuration command:

A: Cisco 3640

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ip route 10.115.0.0 255.255.255.0 10.130.0.2

What is indicated by the value 10.130.0.2?

- *A*: *The next hop router of a static route*
- 18. You are configuring R1 with a route to R2. Which interface configuration command is used to create a Frame Relay static address mapping?



- A: frame-relay map ip 10.60.8.2.117
- 19. A network administrator in New York must order a Cisco router with an ISDN PRI supported interface. The administrator must also consider which communication integration device. Which product best meets the network administrator's needs?
 - A: NT1
- 20. Which Cisco product meets the highest performance and port density requirements of enterprise central sites?
 - *A*: 7200 series

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- 21. Your PDN provider has assigned you an X.121 address of 31234567890. Which interface command assigns the address to interface serial 2?
 - A: x25 address 31234567890

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