CCNA 2, Version 3.0
MODULE 1 STUDY GUIDE

1. What does RBOC stand for?

   Regional Bell Operating Companies (RBOCs)

2. What characteristics and functions does router RAM perform?

   Stores routing tables
   Holds ARP cache
   Holds fast-switching cache
   Performs packet buffering
   Maintains packet-hold queues
   Provides temporary and/or running memory for the router's configuration file
   Loses contents when router is powered down or restarted

3. What is a router's major use?

   A router's main use is as a WAN device

4. What are the two main functions of a router?

   The two main functions of a router are the selection of best paths for incoming data packets and the switching of packets to the proper outgoing interface.

5. List several internal parts of a router.

   CPU
   RAM
   Flash
   NVRAM
   Buses
   ROM
   Interfaces
   Power supply

6. List several ports found on a 2600 series router.

   Serial ports
   FastEthernet ports
   Console ports
   Auxiliary ports

7. What are three basic types of connections found on a router?

   LAN connections
   WAN connections
   Management ports

8. What are the common management ports?

   Console port
   Auxiliary port

9. What type of cable is used to attach a computer to the console port on a router ?

   Rollover cable

10. What router port is used for the initial router configuration?

    Console port

11. What router ports are commonly used for LAN connections?

    Ethernet
    FastEthernet

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MODULE 2 STUDY GUIDE

1. What does Cisco call its operating system for routers and switches?

   Cisco Internetwork Operating System, or Cisco IOS

2. What network services does the Cisco IOS provide?

   Basic routing and switching functions
   Reliable and secure access to networked resources
   Network scalability

3. What does CLI stand for?

   Command-line interface

4. What router mode are you in if you see this 'router>' at the command prompt?

   User exec mode

5. What router mode are you in if you see this 'router#' at the command prompt?

   Privileged exec mode

6. The IOS image name has three parts to it. What are the three parts?

   Platform
   Features
   format

7. What are the three operating environments or modes for Cisco IOS devices?

   ROM monitor
   Boot ROM
   Cisco IOS

8. In what order does a router load configuration file, bootstrap, and operating system?

   Bootstrap
   Operating system
   Configuration file

9. What is the factory default setting for the configuration register?

   0x2102

10. What are the default parameters for the console port on a router?

    9600 baud
    8 data bits
    no parity
    1 stop bit
    no flow control

11. What command do you use in the user exec mode to switch to the privileged exec mode?

    enable

12. What command can you use to display a list of commonly used commands?

    ?

13. What symbol indicates an error in the typed command?

    A carat '^' symbol

14. What command displays information about the Cisco IOS software version currently running on the router?

    show version

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MODULE 3 STUDY GUIDE

1. _____ mode commands are used in a router to apply configuration statements that affect the system as a whole.

   Global configuration

2. What does the prompt look like when you are in the global configuration mode?

   Router(config)#

3. What router command do you enter in the privileged mode to change to global configuration?

   Configure terminal

4. How many virtual terminal lines does a typical Cisco router support?

   5 virtual terminals VTY 0-4

5. What does the 'show startup-configuration' command do?

   Displays the saved configuration located in NVRAM

6. What does the 'show startup-configuration' command do?

   Displays the configuration currently running in RAM

7. By default, interfaces are _____.

   Turned off or disabled.

8. How do you turn on or enable an interface?

   Use the no shutdown command

9. What steps do you need to follow to configure an Ethernet interface?

   a. enter global configuration mode
   b. enter interface configuration mode
   c. specify the interface address and subnet mask
   d. enable the interface

10. What is a standard?

    A standard is a set of rules or procedures that are either widely used or officially specified.

11. What command would you use to add a description to an interface?

    description

12. _____ is a message that is displayed at login and is useful for conveying messages that affect all network users.

    Login banner

13. _____ can be displayed on all connected terminals.

    Message-of-the-day (MOTD)

14. What process does a computer system use to associate a host name with an IP address?

    Host name resolution

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MODULE 4 STUDY GUIDE

1. What does CDP stand for?

   Cisco Discovery Protocol (CDP)

2. What layer does CDP operate at?

   Layer 2

3. What is the primary use of CDP?

   Discover all Cisco devices that are directly connected to a local device

4. What command displays CDP updates on the local device?

   Show cdp neighbors

5. What is the default status of CDP on Cisco IOS release 10.3 or higher?

   By default, CDP is disabled

6. How do you enable CDP?

   cdp enable command

7. What does Telnet do?

   Telnet provides a network terminal or remote login capability

8. At what layer of the OSI model does Telnet function?

   Application layer 7

9. On a Cisco router, is it necessary to enter the telnet command to establish a Telnet connection?

   No, you can enter the hostname or IP address of the remote router

10. What does ping allow you to do?

    `Ping` allows testing of end-to-end connections at the network layer.

11. How do you suspend a telnet session?

    Ctrl + Shift + 6 followed by pressing the letter x

12. What command will show you what telnet sessions are taking place?

    Show sessions

13. What command do you use to disconnect a telnet session?

    Disconnect followed by the name or IP address of the router

14. When using the ping command, what symbol indicates a successful echo?

    The exclamation point (!)

15. What does a period indicate with the ping command?

    If one or more periods (.) are received the application on the router timed out waiting for a given packet echo from the ping target.

16. What command can you use to find where data is being sent in a network?

    traceroute

17. What three commands are used to perform address-related troubleshooting?

    ping
    telnet
    traceroute

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MODULE 5 STUDY GUIDE

1. Where does the Cisco device look for an operating system to load?

   Flash
   TFTP server
   ROM

2. Where does the Cisco device look for a configuration file?

   NVRAM
   TFTP server
   Console

3. What command saves the running configuration in NVRAM?

   `running-config startup-config`

4. If the configurations register is set to this value, 0x0001, where will the router boot from?

   The router will boot from ROM

5. If the router fails to boot properly, list several things that could be wrong?

   Configuration file is missing or incorrect boot system statement
   Incorrect configuration register value
   Corrupted flash image
   Hardware failure

6. Where would you find the startup configuration on a router?

   NVRAM

7. Where would you find the running configuration on a router?

   RAM

8. Where would you find the IOS image on a router?

   Flash

9. What information would you find in the name of a Cisco IOS?

Hardware platform identification
The feature set identification
File format
Numerical release

10. What could you store on a TFTP server for backup purposes?

A copy of the running configuration on a router

11. What are two types of routes?

    Static
    Dynamic

12. When specifying a static route, the administrator has two options for indicating the gateway. What are they?

    Next-hop IP address
    Outgoing interface

13. What command is used to configure a static route?

    ip command

14. What types of routes are used to route packets with destinations that do not match any of the other routes in the routing table?

    Default routes

15. What command do you use to view the routing table?

    Show ip route

16. What is a routing protocol?

    A routing protocol is the communication used between routers. A routing protocol allows one router to share information with other routers regarding the networks it knows about as well as its proximity to other routers.

17. What is a routed protocol?

    A routed protocol is used to direct user traffic. A routed protocol provides enough information in its network layer address to allow a packet to be forwarded from one host to another based on the addressing scheme.

18. What is an autonomous system?

    An autonomous system (AS) is a collection of networks under a common administration sharing a common routing strategy.

19. Where does the autonomous system come from?.

    The American Registry of Internet Numbers (ARIN) or a provider assigns an identifying number to each AS.

20. What is the goal of a routing protocol?

    The goal of a routing protocol is to fill the routing table with known networks (destinations) along with the best route to get to these destinations.

21. List the two categories of routing protocols.

    Distance vector
    Link state

22. Using distance vector routing, where does a router get its routing table updates?

    From directly connected routers

13. Does a router using link-sate protocols have full knowledge of distant routers and how they interconnect?

    Yes

14. What two basic functions does a router use to determine the path of a packet from one data link to another?

    A path determination function
    A switching function

15. What does the network command do when configuring routing protocols?

    The `network` command enables the routing process to determine which interfaces participate in the sending and receiving of routing updates.

16. When using RIP, what happens to a packet if the hop count is greater than 15?

    The packet is discarded

17. What type of routing protocol is Border Gateway Protocol (BGP)?

    An exterior routing protocol

18. What types of routing protocols have slow convergence?

Distance vector

19. What types of routing protocols have fast convergence?

Link state

23. Distance vector algorithms call for each router to send _____to each of its adjacent neighbors?

    Its entire routing table

24. What can occur if slow convergence occurs on the network as a result of changes to the network causing inconsistent routing entries?

    Routing loops

25. How do distance vector routing algorithms prevent a count to infinity?

    Distance-vector protocols define infinity as a specific maximum number

26. What does route poisoning do?

    Route poisoning causes a routing protocol to advertise infinite-metric routes for a failed route.

27. When is a triggered update sent?

    Triggered update is sent immediately in response to some change in the routing table.

28. What are key characteristics of RIP?

    It is a distance-vector routing protocol
    Hop count is used as the metric for path selection
    If the hop count is greater than 15, the packet is discarded
    By default, routing updates are broadcast every 30 seconds

29. What command enables RIP?

    Router rip

30. What does configuring 'ip classless' do on a router?

    Configuring `ip classless` on the router resolves this problem by allowing the router to ignore the classful boundaries of the networks in its routing table and simply route to the default route.

31. What does RIP use to reduce routing loops and counting to infinity?

    Counting-to-infinity
    Split horizon
    Poison reverse
    Holddown counters
    Triggered updates

32. List two common ways to verify RIP is properly configured.

    Show ip route
    Show ip protocols

33. What does using the passive interface command prevent?

    Prevents routers from sending routing updates through a router interface.

34. What is IGRP?

    IGRP is a distance vector Interior Gateway Protocol (IGP).

35. RIP sends routing updates every 30 seconds. How often does IGRP sending routing updates?

    90 second intervals

36. What are the metrics IGRP uses by default?

    Bandwidth and delay

37. What metrics does RIP use?

    Hop count

38. List the five metrics for IGRP.

    Bandwidth
    Delay
    Reliability
    Load
    MTU

39. What type of routes can IGRP advertise?

    Interior
    System
    Exterior

40. What premise is split horizons derived from?

    Split horizons are derived from the premise that it is usually not useful to send information about a route back in the direction from which it came.

41. What command do you use to configure IGRP?

    Router igrp *as-number*

42. Which routing protocol converges faster, RIP or IGRP?

    IGRP

43. What is ICMP?

    ICMP is an error reporting protocol for IP.

44. What does ICMP do?

    ICMP reports on the status of the delivered packet to the sender.

45. How does are ICMP messages delivered?

    ICMP messages are delivered via the IP protocol. ICMP messages are encapsulated as data in datagrams in the same way any other data is delivered using IP.

46. When using the ping command, you can use the IP address or _____.

    Hostname

47. What does TTL stand for?

    Time to live

48. When a destination is unreachable, what does ICMP do?

    ICMP delivers back to the sender a destination unreachable message indicating to the sender that the datagram could not be properly forwarded.

49. What are control messages used for?

    Control messages are used to inform hosts of conditions such as network congestion or the existence of a better gateway to a remote network.

50. What is the only device that can initiate an ICMP redirect/change request?

    Gateway

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MODULE 9 STUDY GUIDE

51. What command displays the contents of the IP routing table?

    Show ip route

52. What are default routes used?

    Default routes are used when the router is unable to match a destination network with a more specific entry in the routing table. The router uses the default route to hand off to another router, the gateway of last resort, in an effort to forward the packet.

53. The network layer provides _____ packet delivery across interconnected networks.

    Best-effort, end-to-end

54. For a packet to get from the source to the destination, _____ addresses are used.

    both Layer 2 and Layer 3

55. What is a metric?

    A metric is a value that measures the desirability of a route.

56. When a router receives an incoming packet, what does it do?

    it checks the destination address and attempts to associate this address with a next hop.

57. When testing a network, at which layer of the OSI model should you start?

    Layer 1

58. What are the most common types of problems that occur on IP networks?

    The most common problems that occur on IP networks result from errors in the addressing scheme. It is important to test the address configuration before continuing with further configuration steps.

59. What is a very important part of the troubleshooting process?

Documentation

60. At what layer of the OSI model would you find these errors?

Broken cables
DTE device problems
Transceiver problems

61. At what layer of the OSI model would you find these errors?

Incorrect IP addresses
Incorrect subnet mask

62. What do TX and RX stand for?

TX transmitted
RX received

63. What is ping used for?

The `ping` utility is used to test network connectivity.

64. What does a successful Telnet connection indicate?

A successful Telnet connection indicates that the upper-layer application and the services of lower layers are functioning properly.

65. Every aspect of the router can be viewed with one or more _____ commands.

Show

66. What is perhaps the single most important tool to discover layer 1 and layer 2 problems with the router?

Show interfaces

67. List three possible cause of an interface being up and the line protocol being down.

No keepalives
No clock rate
Mismatch in encapsulation type

68. What can be a potential security hole because of the extensive amount of information it provides?

CDP

69. What troubleshooting utility is used to discover the routes packets take when traveling to their destination?

Traceroute

20. Should you use the debug command during peak network times?

No

70. What layer is responsible for reliable transport?

    Transport layer

71. What is the synchronization process called that TCP uses to prepare for data transmission?

    Three-way handshake

72. What does DoS stand for?

    Denial of service (DoS)

73. What are Denial of service attacks designed to do?

    Denial of service (DoS) attacks are designed to deny services to legitimate hosts attempting to establish connections.

74. What does the window size determine?

    The window size determines the amount of data that can be transmitted at one time before receiving an acknowledgment from the destination.

75. What are sequence numbers used for?

    Sequencing numbers act as reference numbers so that the receiver will know if it has received all of the data and how to identify the missing data pieces to the sender so it can retransmit the missing data.

76. If UDP does not use windowing or acknowledgements, then what provides error detection?

    Application layer

77. What are the most common types of problems that occur on IP networks?

    The most common problems that occur on IP networks result from errors in the addressing scheme. It is important to test the address configuration before continuing with further configuration steps.

78. What port numbers are assigned for public applications?

Numbers below 255

79. What port numbers are assigned to companies for marketable applications?

Numbers from 255 - 1023

80. What port numbers are unregulated?

Numbers above 1023

81. What happens when a client connects to a service on a server?

A source and destination port must be specified.

82. How are port numbers represented in a TCP or UDP segment?

Port numbers are represented by 2 bytes in the header of a TCP or UDP segment. This 16-bit value can result in port numbers ranging from 0 to 65535.

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MODULE 11 STUDY GUIDE

83. What does ACL stand for?

Access control list

84. What does an ACL do?

ACLs are lists of conditions that are applied to traffic traveling across a router's interface. These lists tell the router what types of packets to accept or deny.

85. How are ACLs defined?

ACLs must be defined on a per-protocol, per direction, per port basis.

86. List seven primary reasons for creating ACLs?

1 Limit network traffic and increase network performance
2 Provide traffic flow
3 Provide a basic level of security for network access
4 Decide with types of traffic are forwarded or blocked at the router interfaces
5 Allow an administrator to control what areas a client can access on a network
6 Screen certain hosts to either allow or deny access to part of a network
7 Grant or deny user permission to access only certain types of files

87. In what order does the Cisco IOS test packets in an ACL?

Top to bottom

88. What does a router do once a match is found in the ACL list?

Once a match is found in the list, the accept or reject action is performed and no other ACL statements are checked.

89. _____ operates in sequential, logical order.

ACL statements

90. Where are ACLs created?

Global configuration mode

91. What command do you use to create an ACL?

    Access-list *list-number*

92. What command is used to delete an ACL?

    No access-list *list-number*

93. What command is issued in the interface configuration mode to assign an ACL to an interface?

    Access-group

94. How many bits does a wildcard mask have?

    32-bit

95. What does a zero mean in an ACL wildcard mask?

    A zero means let the value through to be checked.

96. What does a one mean in an ACL wildcard mask?

    A one means block the value from being compared.

97. What does the keyword ‘any’ mean in an ACL?

    The keyword any means to ignore the entire IP address or accept any addresses.

98. What command do you use to look at the contents of an ACL?

    Show access-lists

99. What does a standard ACL check?

    Standard ACLs check the source address of IP packets that are routed.

100. What does an extended ACL check?

    Extended ACLs check the source and destination packet addresses as well as being able to check for protocols and port numbers.

19. Fill in the following table on Protocols with ACLs specified by numbers.

Protocol	Range
IP	**1-99**
Extended IP	**100-199**
AppleTalk	**600-699**
IPX	**800-899**
Extended IPX	**900-999**
IPX Service Advertising Protocol	**1000-1099**

101. Named ACLs are not compatible with Cisco IOS releases prior to _____.

Release 11.2

102. Where should you place extended ACLs?

The general rule is to put the extended ACLs as close as possible to the source of the traffic denied.

21. Where should you place standard ACLs?

Standard ACLs do not specify destination addresses, so they should be placed as close to the destination as possible.