

Name \_\_\_\_\_ Date \_\_\_\_\_

## **Module 14 – Routing Concepts**

### **Switching, Routing, and Wireless Essentials – Semester 2**

### **Student Version**

#### **Module 14 Sections:**

- 14.0 Introduction
- 14.1 Path Determination
- 14.2 Packet Forwarding
- 14.3 Basic Router Configuration Review
- 14.4 IP Routing Table
- 14.5 Static and Dynamic Routing
- 14.6 Module Practice and Quiz

#### **Required Materials:**

Reading Organizer

Packet Tracer Activities:      14.3.5 - Basic Router Configuration Review

Labs:   None

Module's 14 - 16 Exam

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Name \_\_\_\_\_ Date \_\_\_\_\_

## Module 14 - Routing Concepts

### Reading Organizer

#### Instructor Version

**Note:** The Reading Organizer has weighted scoring. Any question with the word **explain, define, or describe** in it is expected to have a longer answer and is worth two points each.

**After completion of this module, you should be able to:**

- Explain how routers determine the best path.
- Explain how routers forward packets to the destination.
- Configure basic settings on a router.
- Describe the structure of a routing table.
- Compare static and dynamic routing concepts.

### 14.1 Path Determination

1. What are Ethernet switches used to connect?

2. What do routers connect?

3. The router uses its \_\_\_\_\_ table to determine which path (route) to use to forward a packet.

4. The best path in the routing table is also known as the \_\_\_\_\_.

5. The longest match is the route in the routing table that has the greatest number of far-left matching bits with the destination IP address of the packet. The route with the greatest number of \_\_\_\_\_, or the longest match, is always the preferred route.

6. List and describe the three methods routes use to learn routes.

a. \_\_\_\_\_ –

b. \_\_\_\_\_ –

c. \_\_\_\_\_ –

d. \_\_\_\_\_ –

c. \_\_\_\_\_ –

**14.2 Packet Forwarding**

7. List and describe the three things a router can do with a packet after it has determined the best path

a. \_\_\_\_\_ –

b. \_\_\_\_\_ -

c. \_\_\_\_\_ -

8. What is the primary responsibility of the packet forwarding function?

9. List and describe the three packet forwarding mechanisms routers support.

a. \_\_\_\_\_ -

b. \_\_\_\_\_ -

c. \_\_\_\_\_ -

### 14.3 Basic Router Configuration Review

10. List some common verification commands you can use on a router.

- a.
- b.
- c.
- d.
- e.
- f.

11. List the filtering parameters that can be configured after the pipe.

- a.
- b.
- c.
- d.

### 14.4 IP Routing Table

12. A routing table contains a list of routes to known networks (prefixes and prefix lengths). Where is the source of this information derived from?

- a.
- b.
- c.

13. Describe the following routing table codes.

a. \_\_\_\_\_ -

b. \_\_\_\_\_ -

c. \_\_\_\_\_ -

d. \_\_\_\_\_ -

e. \_\_\_\_\_ -

14. Describe the three routing table principles

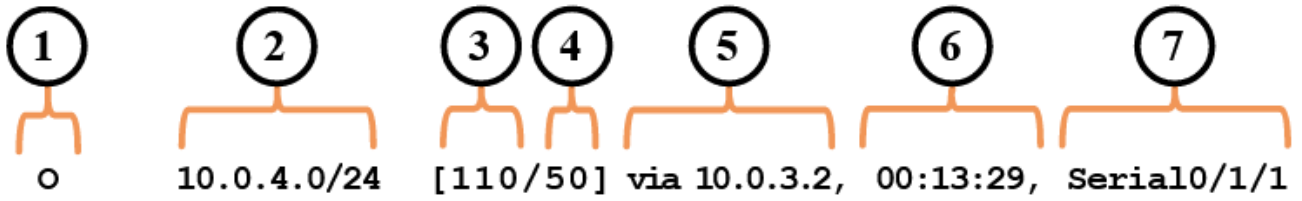
a.

b.

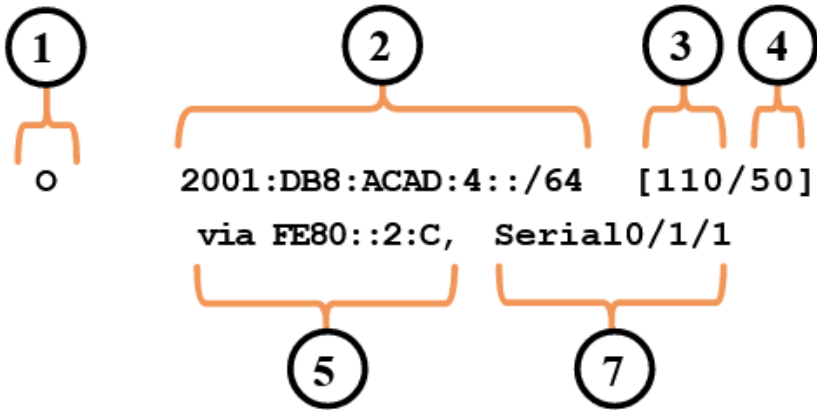
c.

15. Identify and explain each numbered portion of the IPv4

### IPv4 Routing Table



### IPv6 Routing Table



1. \_\_\_\_\_ -
2. \_\_\_\_\_ -
3. \_\_\_\_\_ -
4. \_\_\_\_\_ -
5. \_\_\_\_\_ -
6. \_\_\_\_\_ -
7. \_\_\_\_\_ -



16. Before a router can learn about any remote networks, it must have at least one \_\_\_\_\_ configured with an IP address and subnet mask (prefix length).

17. A directly connected network is denoted by a status code of \_\_\_\_\_ in the routing table.

18. The routing table also contains a local route for each of its directly connected networks, indicated by the status code of \_\_\_\_\_.

19. Explain the purpose of the local route?

20. What are the benefits of using static routes?

21. What is the main disadvantage to using static routes?

22. Describe the three primary uses of static routing.

a.

b.

c.

23. What does the status code of S in a routing table indicate?

24. Explain how dynamic routing protocols are used by routers?
25. What are the important advantages of dynamic routing protocols?
- a.
  - b.
26. Network discovery is the ability of a routing protocol to do what?
27. IPv6 routing protocols use the \_\_\_\_\_ address of the next-hop router.
28. A default route is similar to a default gateway on a host. The default route specifies a \_\_\_\_\_ to use when the routing table does not contain a specific route that matches the destination IP address.
29. A default route has an IPv4 route entry of \_\_\_\_\_ or an IPv6 route entry of \_\_\_\_\_ . This means that zero or no bits need to match between the destination IP address and the default route.
30. Why do most enterprise routers have a default route in their routing table?

31. Based on the *show ip route* output below, explain in detail why some of the route entries are left justified while others are not.

```
Router# show ip route
(Output omitted)
  192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.1.0/24 is directly connected, GigabitEthernet0/0
L    192.168.1.1/32 is directly connected, GigabitEthernet0/0
O    192.168.2.0/24 [110/65] via 192.168.12.2, 00:32:33, Serial0/0/0
O    192.168.3.0/24 [110/65] via 192.168.13.2, 00:31:48, Serial0/0/1
  192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.12.0/30 is directly connected, Serial0/0/0
L    192.168.12.1/32 is directly connected, Serial0/0/0
  192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
Router#
```

32. Cisco IOS uses what is known as the administrative distance (AD) to determine the route to install into the IP routing table. Explain in detail what the AD represents.

33. Directly connected networks have the lowest AD of \_\_\_\_\_.

34. Fill in the Administrative distances in the table below.

<b>Remote Source</b>	<b>Administrative Distance</b>
Directly connected	
Static route	
EIGRP summary route	
External BGP	
Internal EIGRP	
OSPF	
IS-IS	
RIP	
External EIGRP	
Internal BGP	

### 14.5 Static and Dynamic Routing

35. Describe scenarios where static routes are commonly used.

- a.
- b.
- c.
- d.

36. Describe scenarios where dynamic routes are commonly used.

a.

b.

c.

37. List the three advanced routing protocols that address the needs of larger networks.

a.

b.

c.

38. \_\_\_\_\_ (BGP) is also used between ISPs and some private organizations to exchange routing information.

39. List the purposes of dynamic routing protocols.

a.

b.

c.

d.

40. List and describe the main components of dynamic routing protocols.

a. \_\_\_\_\_ -

b. \_\_\_\_\_ -

c. \_\_\_\_\_ -

41. What is the primary benefit of dynamic routing protocols?

42. The best path is selected by a routing protocol based on the value or \_\_\_\_\_ it uses to determine the distance to reach a network.

43. A metric is the quantitative value used to measure the distance to a given network. The best path to a network is the path with the \_\_\_\_\_ metric.

44. Describe the metrics used by the dynamic routing protocols shown.

a. Routing Information Protocol (RIP) -

b. Open Shortest Path First (OSPF) –

c. Enhanced Interior Gateway Routing Protocol (EIGRP) –

45. What happens if a routing table has two or more paths with identical metrics to the same destination network?

46. What is this process called?

47. Only \_\_\_\_\_ supports unequal cost load balancing.