

## Fill-in-the-Blanks Exercise: Routing Fundamentals

### Instructions:

Fill in the blanks with the correct words or phrases.

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### Basic Routing Concepts

1. \_\_\_\_\_ is the process that routers use to determine the path that IP packets should take over a network.
  2. The primary job of a router is to \_\_\_\_\_ packets to their correct destination.
  3. Routers store information about known destinations in a \_\_\_\_\_ table.
  4. A router uses its routing table to find the best \_\_\_\_\_ for forwarding packets.
  5. The two primary methods of learning routes are \_\_\_\_\_ routing and \_\_\_\_\_ routing.
  6. **Dynamic routing** allows routers to share routing information automatically using protocols like \_\_\_\_\_.
  7. **Static routing** requires network administrators to \_\_\_\_\_ configure routes.
  8. A **route** is an \_\_\_\_\_ that tells a router how to forward packets.
  9. The router checks its routing table for the best route and then forwards packets to the correct \_\_\_\_\_.
  10. \_\_\_\_\_ If a packet's destination is directly connected to the router, it sends the packet \_\_\_\_\_.
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### Routing Tables & Routing Methods

11. \_\_\_\_\_ Routers maintain a database of network routes in the \_\_\_\_\_.

12. The command to display the routing table on a Cisco router is **show ip** \_\_\_\_\_.
  13. A **connected route** is a route to a network that is \_\_\_\_\_ to the router.
  14. A **local route** is a route to the exact \_\_\_\_\_ configured on a router's interface.
  15. A **connected route** is indicated in the routing table by the letter \_\_\_\_\_.
  16. A **local route** is indicated in the routing table by the letter \_\_\_\_\_.
  17. **Next-hop** refers to the next \_\_\_\_\_ in the path to a destination.
  18. Routers use **longest prefix match** to select the \_\_\_\_\_ matching route.
  19. A **/32 subnet mask** is used to identify a \_\_\_\_\_ IP address on the router.
  20. If multiple routes match a destination, the router will choose the route with the \_\_\_\_\_ subnet mask.
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### IP Addressing & Subnetting in Routing

21. An IP address consists of two parts: the \_\_\_\_\_ portion and the \_\_\_\_\_ portion.
  22. The network portion of an IP address is determined by the \_\_\_\_\_.
  23. A subnet mask of **255.255.255.0** corresponds to a /\_\_\_\_\_ prefix length.
  24. A subnet mask of **255.255.255.255** is used for a /\_\_\_\_\_ prefix length.
  25. The route for a network like **192.168.1.0/24** matches all IPs from **192.168.1.0** to **192.168.1.\_\_\_\_\_**.
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## Routing Table Operations

- 26. When an IP address is configured on an interface and the interface is enabled, \_\_\_\_\_ routes are automatically added.
  - 27. If an interface is **shut down**, the connected and local routes \_\_\_\_\_ from the routing table.
  - 28. The **show ip route** command lists the **codes** at the top and the actual \_\_\_\_\_ at the bottom.
  - 29. The two automatically added routes when an interface is configured are \_\_\_\_\_ and \_\_\_\_\_.
  - 30. If a packet does not match any route in the routing table, the router will \_\_\_\_\_ it.
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## Packet Forwarding & Route Selection

- 31. Routers use the concept of \_\_\_\_\_ matching to determine the best route for a packet.
  - 32. If two routes match a destination, the router selects the route with the \_\_\_\_\_ prefix length.
  - 33. If a router receives a packet destined for its own local route, it will \_\_\_\_\_ the packet instead of forwarding it.
  - 34. A **connected route** includes all devices in the same \_\_\_\_\_.
  - 35. A router forwards a packet to the next-hop router based on its \_\_\_\_\_ table.
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## Comparing Routers & Switches

- 36. Unlike switches, routers never \_\_\_\_\_ packets when they do not know the destination.
- 37. Switches use \_\_\_\_\_ addresses to forward frames, while routers use \_\_\_\_\_ addresses.

38. A switch forwards frames based on its **MAC address table**, while a router forwards packets based on its \_\_\_\_\_ **table**.
39. A router must perform **de-encapsulation** to read the \_\_\_\_\_ address before forwarding a packet.
40. In Ethernet LANs, frames are forwarded using \_\_\_\_\_ addresses, whereas packets are forwarded using \_\_\_\_\_ addresses.
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### WAN & LAN Routing Concepts

41. WAN stands for \_\_\_\_\_ **Area Network**, while LAN stands for \_\_\_\_\_ **Area Network**.
42. A WAN typically connects networks across \_\_\_\_\_ geographical areas.
43. The routing table entry **192.168.1.0/24** indicates a \_\_\_\_\_ connection.
44. The routing table entry **192.168.1.1/32** indicates a \_\_\_\_\_ connection.
45. If a network engineer manually enters routes into the router, this is called \_\_\_\_\_ routing.
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### Real-World Routing Scenarios

46. If a packet's destination address is **not found** in the routing table, the router will \_\_\_\_\_ the packet.
47. In a real network, routers typically use a combination of **static** and \_\_\_\_\_ routing.
48. If R1 receives a packet destined for **192.168.1.1/32**, it will \_\_\_\_\_ the packet instead of forwarding it.
49. If a router has multiple paths to the same destination, it will choose the one with the \_\_\_\_\_ **prefix length**.

50. The purpose of **subnetting** is to divide larger networks into smaller \_\_\_\_\_.
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## Fill-in-the-Blanks: Static Routing

### Instructions:

Fill in the blanks with the correct words or phrases.

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### Basic Routing Concepts

- \_\_\_\_\_ routes and \_\_\_\_\_ routes are automatically added when an IP address is configured on a router interface.
  - A **local route** provides a route to the router's own \_\_\_\_\_ address.
  - A **connected route** provides a route to the network the router's \_\_\_\_\_ is connected to.
  - If a router does not have a route to a destination, it will \_\_\_\_\_ the packet.
  - The process of manually adding routes to a router is called \_\_\_\_\_ routing.
  - Unlike connected and local routes, static routes must be \_\_\_\_\_ added to the routing table.
  - A router needs to be able to forward packets to \_\_\_\_\_ networks that are not directly connected.
  - The **show ip** \_\_\_\_\_ command displays a router's routing table.
  - Next-hop** refers to the next \_\_\_\_\_ in the path to a destination.
  - To send packets to remote destinations, routers need either \_\_\_\_\_ or \_\_\_\_\_ routes.
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## Static Routing Configuration

11. The command used to configure a static route is **ip route** followed by the \_\_\_\_\_ network, subnet mask, and next-hop.
  12. If an interface is **shut down**, the connected and local routes will \_\_\_\_\_ from the routing table.
  13. If R1 wants to send a packet to **192.168.4.0/24**, it must forward the packet to \_\_\_\_\_ as the next-hop router.
  14. When using static routing, you can specify the next-hop IP address or the \_\_\_\_\_ interface.
  15. If multiple paths exist to a destination, routers can use **load** \_\_\_\_\_ to balance traffic.
  16. The most specific matching route is determined by the longest \_\_\_\_\_ length.
  17. If a router has multiple matching routes, it will choose the one with the most \_\_\_\_\_ bits.
  18. A static route is indicated in the routing table by the letter \_\_\_\_\_.
  19. The command **show ip route** lists different types of routes along with their \_\_\_\_\_ in the routing table.
  20. When configuring static routes, administrators should ensure two-way \_\_\_\_\_ between devices.
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## Understanding Routing Tables

21. If a router has no route to a destination, it will \_\_\_\_\_ the packet instead of forwarding it.
22. A static route to **192.168.2.0/24** with next-hop **192.168.1.1** would be configured as **ip route 192.168.2.0 255.255.255.0** \_\_\_\_\_.
23. The administrative distance of a static route is typically \_\_\_\_\_.

24. The two types of static routes that can be configured are routes with a next-hop IP address and routes with an \_\_\_\_\_ interface.
  25. A route with a **/32** subnet mask is called a \_\_\_\_\_ route.
  26. A router will always select the route with the most \_\_\_\_\_ prefix length.
  27. A static route can be configured with either a next-hop address or an \_\_\_\_\_ interface.
  28. If R1 receives a packet for **10.0.1.10**, but has no matching route, it will \_\_\_\_\_ the packet.
  29. If multiple static routes exist to the same destination, routers will choose the route with the \_\_\_\_\_ metric.
  30. The static route command **ip route 192.168.5.0 255.255.255.0 192.168.1.1** directs packets to the \_\_\_\_\_ router.
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### Next-Hop and Exit Interface

31. Instead of specifying a next-hop IP, you can configure a static route with an \_\_\_\_\_ interface.
32. When specifying an exit interface, the router assumes the destination is \_\_\_\_\_ connected.
33. The command **ip route 10.0.0.0 255.0.0.0 GigabitEthernet0/1** is an example of a static route using an \_\_\_\_\_ interface.
34. If Proxy ARP is enabled, the router can determine the next-hop MAC address using \_\_\_\_\_.
35. Proxy ARP allows a router to respond to an \_\_\_\_\_ request for a destination beyond the local network.
36. A static route with only the exit interface relies on \_\_\_\_\_ to function correctly.

- 37. If Proxy ARP is disabled, a static route with only an exit interface may fail due to missing \_\_\_\_\_ information.
  - 38. The safest way to configure a static route is to use both the next-hop IP and the \_\_\_\_\_ interface.
  - 39. To configure a static route via **192.168.2.1** on **GigabitEthernet0/0**, the command would be **ip route 192.168.3.0 255.255.255.0 \_\_\_\_\_**.
  - 40. When troubleshooting static routes, use **show ip route** and **ping** to verify next-hop \_\_\_\_\_.
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## Default Routes

- 41. A default route is used when no other \_\_\_\_\_ route matches a destination.
- 42. A default route directs all unknown traffic to a specific \_\_\_\_\_.
- 43. The network address for a default route is always \_\_\_\_\_/0.
- 44. The command to configure a default route with next-hop **192.168.1.1** is **ip route \_\_\_\_\_ 0.0.0.0 192.168.1.1**.
- 45. In the routing table, a default route is often referred to as the \_\_\_\_\_ **of last resort**.
- 46. A router connected to the internet usually has a default route pointing to its \_\_\_\_\_ router.
- 47. The default route ensures that packets with unknown destinations are not automatically \_\_\_\_\_.
- 48. The command **show ip route** displays whether a default route has been \_\_\_\_\_ or not.
- 49. If a router receives a packet for an unknown destination and no default route exists, the packet will be \_\_\_\_\_.
- 50. In a business network, a default route is often used to direct all outbound traffic toward the \_\_\_\_\_.