

7.1.2 Routing Facts

A *router* is a device that sends packets from one network to another. Routers receive packets, read their headers to find addressing information, and forward them to the correct destination on the network or Internet. Routers can forward packets through an internetwork by maintaining routing information in a database called a *routing table*. The routing table typically contains the following information:

- The address of a known network.
- The interface or next hop router used to reach the destination network.
- A cost value (also called a *metric*) that identifies the desirability of the route to the destination network (using distance, delay, or cost).
- A timeout value that identifies when the route expires.

Routers automatically have an entry in their routing tables for each directly connected network. Information about other networks can be added to the routing table using one of two methods:

Method	Description
Static	<p>Static routing requires that entries in the routing table be configured manually.</p> <ul style="list-style-type: none">▪ Network entries remain in the routing table until manually removed.▪ When changes to the network occur, static entries must be modified, added, or removed.
Dynamic	<p>Routers can dynamically learn about networks by sharing routing information with other routers. The routing protocol defines how routers communicate with each other in order to share and learn about other networks. The routing protocol determines:</p> <ul style="list-style-type: none">▪ The information that is contained in the routing table.▪ How messages are routed from one network to another.▪ How topology changes (i.e., updates to the routing table) are communicated between routers. <p>Use a routing protocol to allow a router to learn about other networks automatically. The routing protocol generates some network traffic for the process of sharing routes, but it has the advantage of being dynamic and automatic (i.e., changes in the network are propagated automatically to other routers).</p>

Be aware of the following when managing routing tables:

- You do not need to create static entries for directly connected networks.
- You can use dynamic and static routing together. You can add static routes to identify networks that are not learned about through the routing protocol.
- The most common reason for creating a static routing table entry is to define a default route.
 - The default route is similar to a default gateway setting on a workstation. It identifies the router that is used to forward packets to networks that do not appear in the routing table.
 - If a default route does not exist, the router will drop any packets that do not match a route in a routing table.
 - A route entry of 0.0.0.0 with a mask of 0.0.0.0 identifies the default route in the routing table.
- When you configure a router for dynamic routing, you enable a routing protocol and identify the interfaces that will participate in the exchange of routing information. Enabling a routing protocol on an interface configures the router to:
 - Share information in its routing table with other routers accessible on that interface.
 - Share information about that network with other routers.
- When a routing protocol is used, changes in routing information take time to propagate to all routers on the network. The term *convergence* is used to describe the condition when all routers have the same (or correct) routing information.
- A loopback interface is a software interface which can be used to emulate a physical interface. By default, loopback interfaces are not enabled, so they need to be created. A loopback interface:
 - Uses the loopback interface's IP Address to determine a router's OSPF Router ID.
 - Is always up and running and always available, even if other physical interfaces in the router are down.
 - Allows Border Gateway Protocol (BGP) neighborhood between two routers to stay up even if one of the outbound physical interface connected between the routers is down.
 - Used as the termination points for Remote Source-Route Bridging (RSRB), and Data-Link Switching Plus (DLSW+).
 - Can be assigned IP addresses. To create a loopback interface, use the following syntax.
 - Router(Config)#int loopback <loopback_interface_number>
Router(Config-if)#ip address <ip_address> <subnet_mask>

For example,

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Router(Config)#int loopback 5
Router(Config-if)#ip address 200.0.0.10 255.255.255.0
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