

## 3.2.2 Network Connection Device Facts

The following table lists several common connection devices used within a LAN.

Device	Description
Hub	<p>A <i>hub</i> is the central connecting point of a physical star, logical bus topology. Hubs manage communication among hosts using the following method:</p> <ol style="list-style-type: none"> <li>1. A host sends a frame to another host through the hub.</li> <li>2. The hub duplicates the frame and sends it to every host connected to the hub.</li> <li>3. The host to which the frame is addressed accepts the frame. Every other host ignores the frame.</li> </ol> <p>Hubs are Layer 1 devices; they simply repeat incoming frames without examining the MAC address in the frame.</p>
Bridge	<p>A <i>bridge</i> is a device that connects two (or more) media segments on the same subnet, and it filters traffic between both segments based on the MAC address in the frame. A bridge builds a database based on MAC addresses to use for making forwarding decisions.</p> <ul style="list-style-type: none"> <li>▪ The process begins by examining the source MAC address of an incoming frame. If the source address is not in the forwarding database, an entry for the address is made in the database, associating the MAC address with the media segment.</li> <li>▪ The destination address is then examined: <ul style="list-style-type: none"> <li>▪ If the destination address is not in the database, the frame is sent out on all segments except for the one on which it was received.</li> <li>▪ If the destination address is in the database, the frame is forwarded to the appropriate segment if the segment is different from the one on which it was received.</li> <li>▪ Broadcast frames are forwarded to all segments except the one on which they were received.</li> </ul> </li> </ul> <p>You should be aware of the following regarding bridges:</p> <ul style="list-style-type: none"> <li>▪ Bridges are used to separate one part of a subnet from another. This eliminates unnecessary traffic between segments and keeps the network from wasting bandwidth.</li> <li>▪ All segments connected to a bridge are on the same subnet and share a common subnet address.</li> <li>▪ Bridges can connect two segments that use different types of network architecture. For example, a bridge can connect a segment using Ethernet to a segment using 802.11 wireless.</li> <li>▪ Bridges are Layer 2 devices; they read the MAC address contained in a frame to make forwarding decisions.</li> <li>▪ Frame forwarding happens independently of the upper-layer protocols (such as TCP/IP).</li> </ul>
Switch	<p>A <i>switch</i> is a multi-port bridge that performs filtering based on MAC addresses and provides additional features not found in a bridge.</p> <ul style="list-style-type: none"> <li>▪ While most bridges can process only a single frame at a time, switches can process multiple frames simultaneously.</li> <li>▪ Switches offer guaranteed bandwidth to each switch port.</li> <li>▪ Switches can make additional forwarding decisions based on the MAC address. For example, a switch can be configured to accept frames from specific MAC addresses.</li> <li>▪ Like bridges, switches operate at Layer 2.</li> <li>▪ Unmanaged switches are autonomous in their function, requiring no port management or configuration. Managed switches allow administrators to change the port configurations, including the following: <ul style="list-style-type: none"> <li>▪ Port speed</li> <li>▪ Duplexing</li> <li>▪ Filters based on network adapter MAC addresses</li> <li>▪ VLAN assignment</li> </ul> </li> </ul>
Wireless Access Point (AP)	<p>A <i>wireless access point (AP)</i> is a hub for a wireless network.</p> <ul style="list-style-type: none"> <li>▪ As with a hub, any message sent to any wireless host connected to the AP can be received by all other wireless hosts.</li> <li>▪ An AP is a Layer 2 device; it can read the Data Link layer address in a frame.</li> <li>▪ An AP is often configured as a bridge, connecting a wireless segment to a wired segment. Both wireless and wired hosts are on the same subnet.</li> <li>▪ Some APs are combination devices that include a wired switch and even a router.</li> </ul>