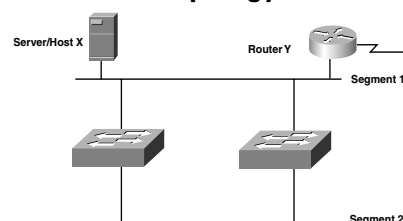


Basic Layer 2 Switching (Bridging) Functions Summary

- Ethernet switches are Layer 2 devices that increase a network's available bandwidth by creating separate network segments.
- Switches have three modes of frame transmission:
 - **Cut-through**—Only the destination address is checked before the frame is forwarded.
 - **Store and forward**—The entire frame is checked before being forwarded.
 - **Fragment-free**—Only the first 64 bytes are checked before forwarding.
- Switches learn, store, and use MAC addresses to determine where a frame should be transmitted.
- A frame is forwarded to a specific port only when the destination address is known. Otherwise, it is flooded out all ports other than the one it was received on.

Redundant Topology Overview



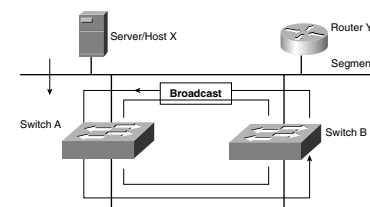
A *redundant topology* has multiple connections to switches or other devices. Redundancy ensures that a single point of failure will not cause the entire switched network to fail. However, redundancy can cause problems in a network, including broadcast storms, multiple copies of frames, and MAC address table instability.

Broadcast Storms

The flooding of broadcast frames can cause a broadcast storm (indefinite flooding of frames) unless there is a mechanism in place to prevent it.

An example of a broadcast storm is shown in the figure and is described here:

1. Host X sends a broadcast frame, which is received by switch A.
2. Switch A checks the destination and floods it to the bottom Ethernet link, segment 2.
3. Switch B receives the frame on the bottom port and transmits a copy to the top segment.
4. Because the original frame arrives at switch B through the top segment, switch B transmits the frame a second time. The frame now travels continuously in both directions.



Multiple Frame Transmissions

Most protocols cannot correctly handle duplicate transmissions. Protocols that use sequence numbering assume that the sequence has recycled. Other protocols process the duplicate frame with unpredictable results. Multiple frame transmissions occur as follows:

1. Host X sends a frame to Router Y. One copy is received over the direct Ethernet connection, segment 1. Switch A also receives a copy.
2. Switch A checks the destination address. If the switch does not find an entry in the MAC address table for Router Y, it floods the frame on all ports except the originating port.
3. Switch B receives the frame on segment 2. Switch B then forwards the frame to segment 1.

Note: Router Y has now received two copies of the same frame.

Database Instability

Database instability occurs when a switch receives the same frame on different ports. The following example shows how this occurs:

1. Host X sends a frame to Router Y. When the frame arrives at switch A and switch B, they both learn the MAC address for host X and associate it with 0.
2. The frame is flooded out port 1 of each switch (assuming that Router Y's address is unknown).