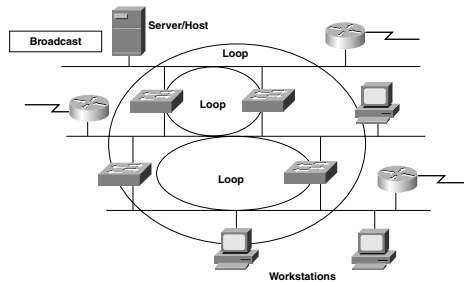


3. Switch A and switch B receive the frame on port 1 and incorrectly associate host X's MAC address with that port.
4. This process repeats indefinitely.

### Multiple Loops



Multiple loops can occur in large switched networks. When multiple loops are present, a broadcast storm clogs the network with useless traffic. Packet switching is adversely affected in this case and might not work at all. Layer 2 cannot prevent or correct broadcast storms.

### Redundant Topology Summary

- A broadcast storm occurs when broadcast messages propagate endlessly throughout a switched network.
- Multiple transmissions of the same message cause errors in most protocols.
- A switch's MAC address table becomes unstable when the switch receives the same frame on different ports.
- Layer 2 devices cannot recognize or correct looping traffic without help.

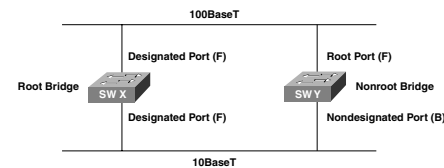
## Spanning-Tree Protocol

The *Spanning-Tree Protocol* prevents looping traffic in a redundant switched network by blocking traffic on the redundant links. If the main link goes down, the spanning tree activates the standby path. Spanning-Tree Protocol operation is transparent to end stations. The Spanning-Tree Protocol was developed by DEC and was revised in the IEEE 802.1d specification. The two algorithms are incompatible. Catalyst switches use the IEEE 802.1d Spanning-Tree Protocol.

### Spanning Tree Operation

Spanning-Tree Protocol assigns roles to switches and ports so that there is only one path through the switch network at any given time. This is accomplished by assigning a single root bridge, root ports for nonroot bridges, and a single designated port for each network segment. On the root bridge, all ports are designated ports. On the root bridge, all ports are designated ports. On the root bridge, all ports are designated ports.

Link Speed	Cost (Reratify IEEE Spec)	Cost (Previous IEEE Spec)
10 Gbps	2	1
1 Gbps	4	1
100 Mbps	19	10
10 Mbps	100	100



One designated port is assigned on each segment. The bridge with the lowest-cost path to the root bridge is the designated port. Nondesignated ports are set to the blocking state (which does not forward any traffic).