Bridging and Switching

Yudhie Kurnia M.

*Bridges and switches are data communications devices that operate principally at **Layer 2** of the OSI reference model*

Bridging and Switching

- Bridging and switching occur at the link layer, which controls data flow, handles transmission errors, provides physical (as opposed to logical) addressing, and manages access to the physical medium.
- Bridges and switches are not complicated devices. They analyze incoming frames, make forwarding decisions based on information contained in the frames, and forward the frames toward the destination.
- Bridges are capable of filtering frames based on any Layer 2 fields. For example, a bridge can be programmed to reject (not forward) all frames sourced from a particular network.

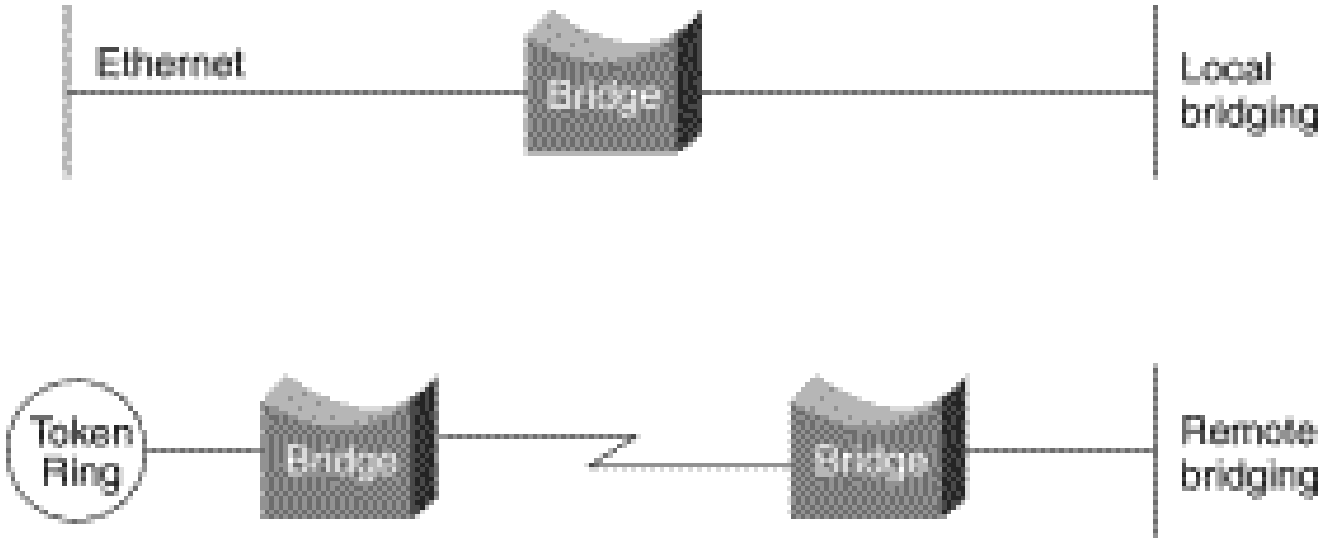
Bridging and Switching

- Bridges are generally used to segment a LAN into a couple of smaller segments. Switches are generally used to segment a large LAN into many smaller segments.
- Bridges generally have only a few ports for LAN connectivity, whereas switches generally have many.
- Switches can also be used to connect LANs with different media—for example, a 10-Mbps Ethernet LAN and a 100-Mbps Ethernet LAN can be connected using a switch.
- Some switches support cut-through switching, which reduces latency and delays in the network, while bridges support only store-and-forward traffic switching.
- Finally, switches reduce collisions on network segments because they provide dedicated bandwidth to each network segment.

Types of Bridges

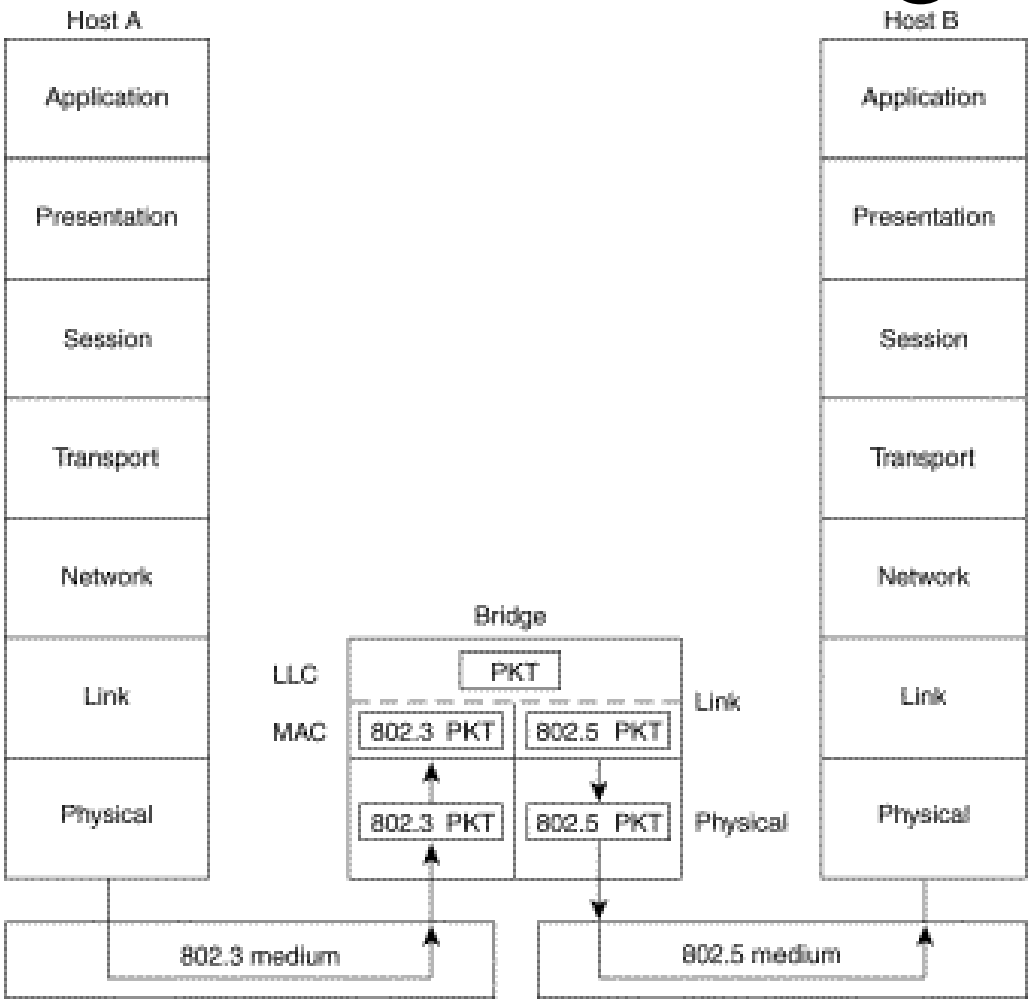
- *Local bridges* provide a direct connection between multiple LAN segments in the same area.
- *Remote bridges* connect multiple LAN segments in different areas, usually over telecommunications lines

Types of Bridges



Local and Remote Bridges Connect LAN Segments in Specific Areas

Bridges



- Some bridges are *MAC-layer bridges*, which bridge between homogeneous networks (for example, IEEE 802.3 and IEEE 802.3),
- other bridges can translate between different link layer protocols (for example, IEEE 802.3 and IEEE 802.5).

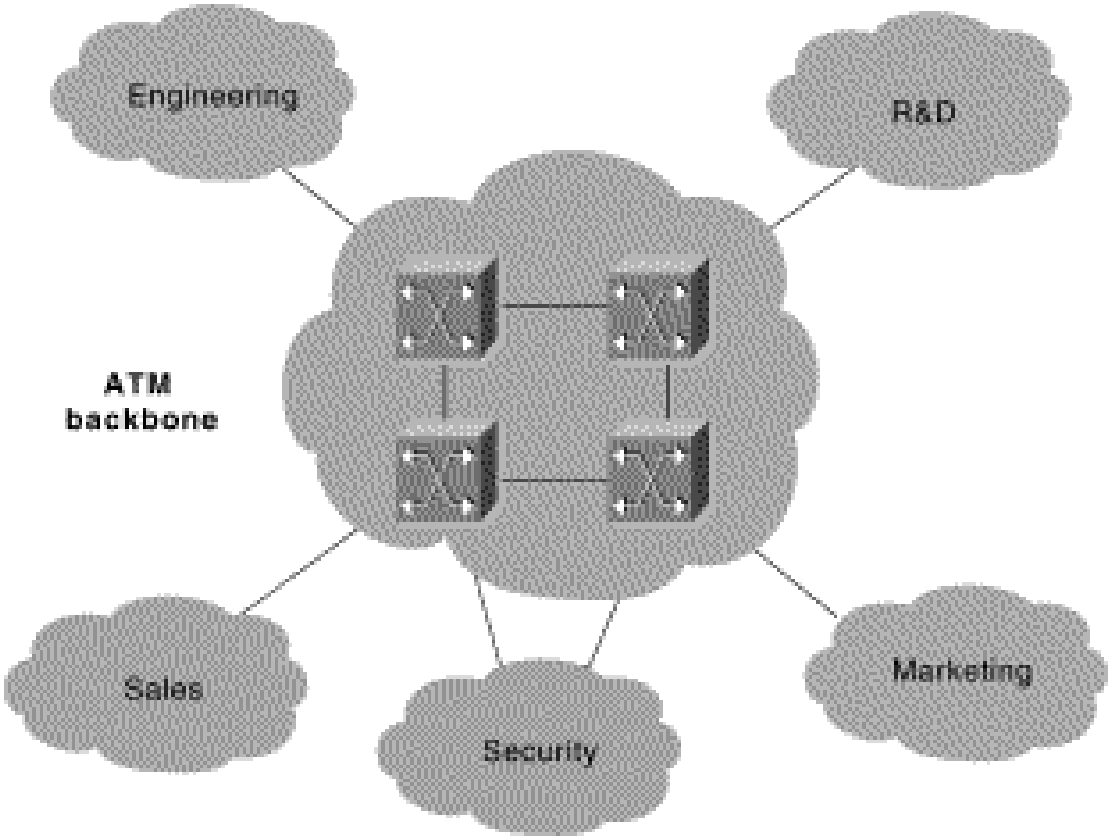
Types of Switches

- Switches can use different forwarding techniques—two of these are store-and-forward switching and cut-through switching.
- In *store-and-forward switching*, an entire frame must be received before it is forwarded.
- *Cut-through switching* allows the switch to begin forwarding the frame when enough of the frame is received to make a forwarding decision. This reduces the latency through the switch.
- Store-and-forward switching gives the switch the opportunity to evaluate the frame for errors before forwarding it.
- Cut-through switching does not offer this advantage, so the switch might forward frames containing errors.

ATM Switch

- *Asynchronous Transfer Mode (ATM) switches* provide high-speed switching and scalable bandwidths in the workgroup, the enterprise network backbone, and the wide area.
- ATM switches support voice, video, and data applications, and are designed to switch fixed-size information units called cells

ATM Switch

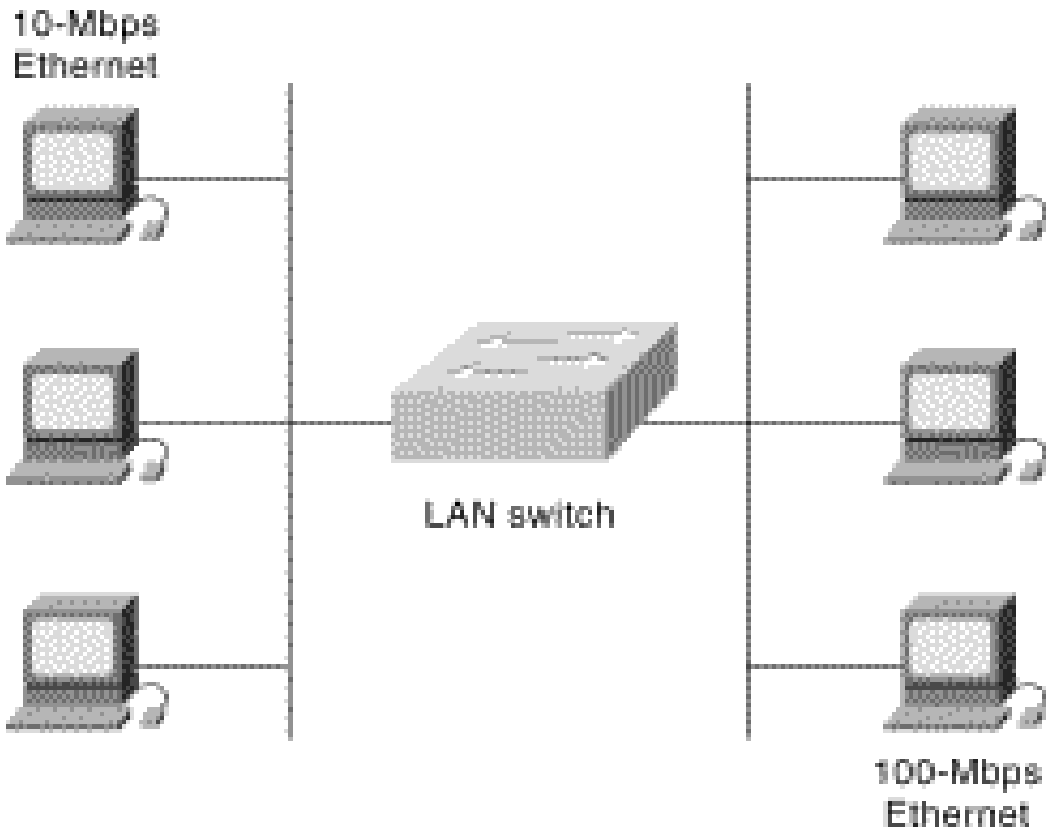


Multi-LAN Networks Can Use an ATM-Based Backbone When Switching Cells

LAN Switch

- *LAN switches* are used to interconnect multiple LAN segments.
- LAN switching provides dedicated, collision-free communication between network devices, with support for multiple simultaneous conversations.
- LAN switches are designed to switch data frames at high speeds.

LAN Switch



A LAN Switch Can Link 10-Mbps and 100-Mbps Ethernet Segments