

CSS2C08

COMPUTER NETWORKS

MODULE 4

1. LINK LAYER SERVICES
2. ERROR DETECTION AND CORRECTION
3. MULTIPLE ACCESS PROTOCOLS
4. LAN ADDRESS
5. ARP
6. ETHERNET
7. HUBS ,**BRIDGES** and SWITCHES
8. WIRELESS LINKS
9. PPP
10. ATM

BRIDGES

- A bridge operates at data link layer. A bridge is a repeater, with add on the functionality of filtering content by reading the MAC addresses of source and destination. It is also used for interconnecting two LANs working on the same protocol. It has a single input and single output port, thus making it a 2 port device.
- Types of Bridges:
 1. Transparent Bridges
 2. Source Routing Bridges

1. **Transparent Bridges:** These are the bridge in which the stations are completely unaware of the bridge's existence i.e. whether or not a bridge is added or deleted from the network, reconfiguration of the stations is unnecessary. These bridges make use of two processes i.e. bridge forwarding and bridge learning.
2. **Source Routing Bridges:** In these bridges, routing operation is performed by source station and the frame specifies which route to follow. The host can discover frame by sending a special frame called discovery frame, which spreads through the entire network using all possible paths to destination.

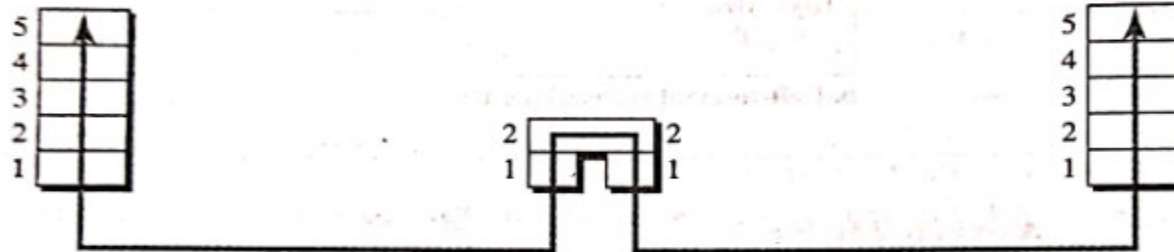
- Bridges are full-fledged packet switches that forward and filter frames using the LAN destination addresses.
- When a frame comes into a bridge interface, the bridge does not just copy the frame onto all of the other interfaces. Instead, the bridge examines the destination address of the frame and attempts to forward the frame on the interface that leads to the destination.

➤ Bridges can overcome many of the problems that plague hubs.

1. bridges permit inter-departmental communication while preserving isolated collision domains for each of the departments.
2. bridges can interconnect different LAN technologies, including 10 Mbps and 100 Mbps Ethernets.
3. there is no limit to how big a LAN can be when bridges are used to interconnect LAN segments: in theory, using bridges, it is possible to build a LAN that spans the entire globe.

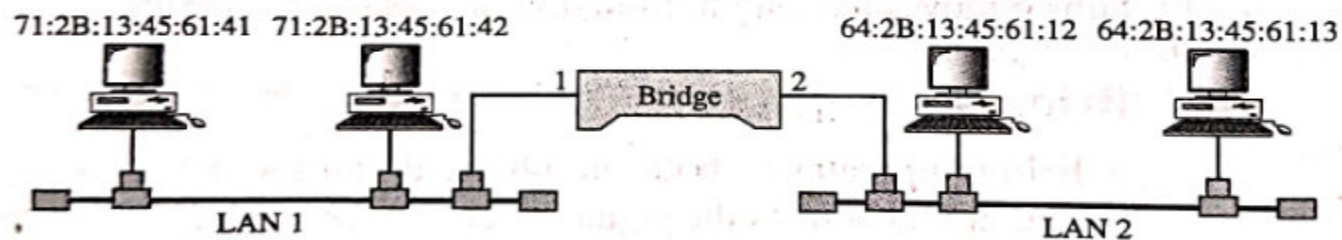
➤ **Bridge Forwarding and Filtering:**

- ❖ **Filtering** is the ability to determine whether a frame should be forwarded to an interface or should just be dropped.
- ❖ When the frame should be forwarded, **forwarding** is the ability to determine which of the interfaces the frame should be directed to.
- ❖ Bridge filtering and forwarding are done with a **bridge table**.
- ❖ For each node on the LAN, the bridge table contains :
 1. the LAN address of the node
 2. the bridge interface that leads towards the node.
 3. the time at which the entry for the node was placed in the table.



Address	Interface	Time
71:2B:13:45:61:41	1	8:52
71:2B:13:45:61:42	1	9:36
64:2B:13:45:61:12	2	10:32
64:2B:13:45:61:13	2	10:38

bridge table



A bridge connecting two LANs

➤ **Self-Learning:**

- ❖ A bridge has the very cool property of building its table automatically, dynamically and autonomously – without any intervention from a network administrator or from a configuration protocol.
- ❖ In other words, bridges are **self-learning**.
- ❖ This is accomplished as follows.
 1. The bridge table is initially empty.

2. When a frame arrives on one of the interfaces and the frame's destination address is not in the table, then the bridge forwards copies of the frame to the output buffers of all of the other interfaces.
3. For each frame received, the bridge stores in its table (1) the LAN address in the frame's *source address field*, (2) the interface from which the frame arrived, (3) the current time. In this manner the bridge records in its table the LAN segment on which the sending node resides. If every node in the LAN eventually sends a frame, then every node will eventually get recorded in the table.

4. When a frame arrives on one of the interfaces and the frame's destination address is in the table, then the bridge forwards the frame to the appropriate interface.
5. The bridge deletes an address in the table if no frames are received with that address as the source address after a period of time (the *aging time*). In this manner, if a PC is replaced by another PC (with a different adapter), the LAN address of the original PC will eventually be purged from the bridge table.

- ❖ Bridges are **plug and play devices** because they require absolutely no intervention from a network administrator or user.
- ❖ When a network administrator wants to install a bridge, it does no more than connect the LAN segments to the bridge interfaces. The administrator does not have to configure the bridge tables at the time of installation or when a host is removed from one of the LAN segments. Because bridges are plug and play, they are also referred as **transparent bridges**.