10.1.3. Bridges:

10.1.3.1. Introduction:

- ✓ Bridges operate in both the physical and the data link layers of the OSI model.
- ✓ The main idea of using a bridge is to divide a big network into smaller sub-networks, called as ***segments.***

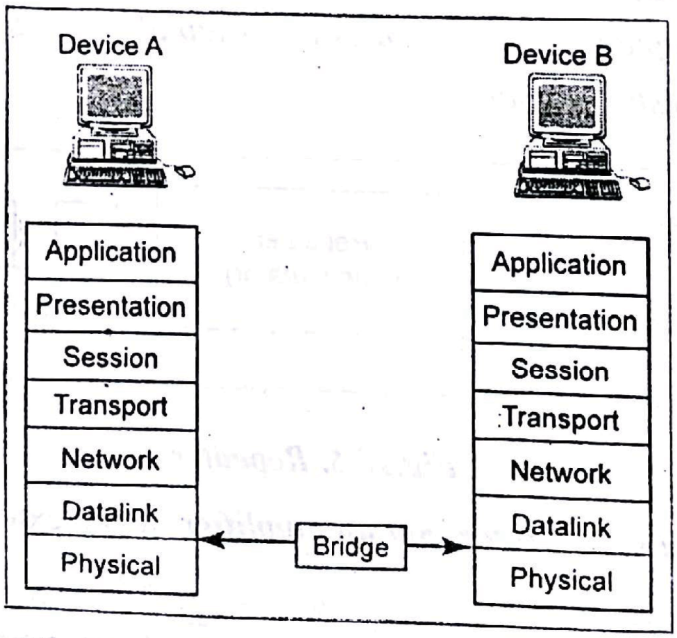

Fig.10.7. Bridges at the last two OSI layer

- ✓ A bridge operates at the data link layer, giving access to the physical (source and destination) addresses of all stations connected it.

✓ As a physical layer device, it generates the signal it receives.

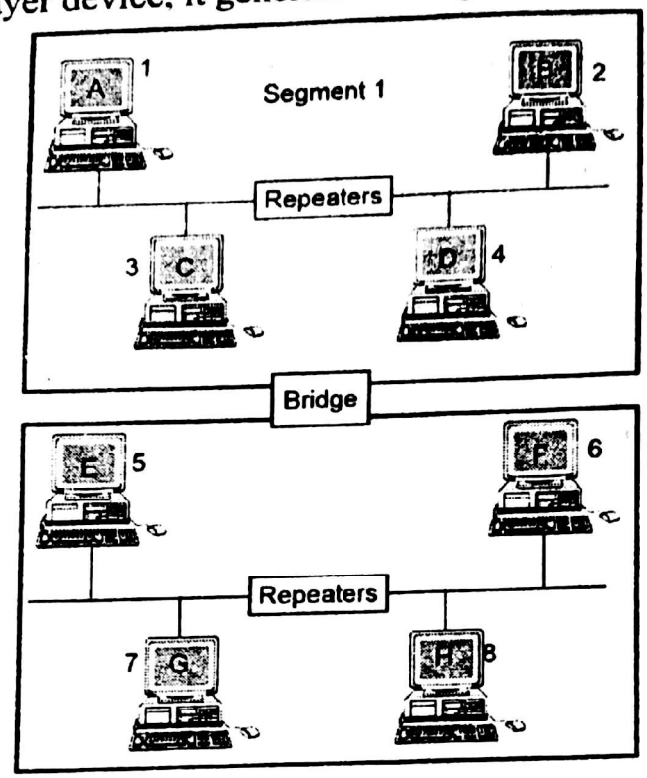

Fig.10.8. Bridge connecting two segments

✓ When a frame enters a bridge, the bridge not only regenerates the signal but checks the address of the destination and forwards the new copy only to the segment to which the address belongs.

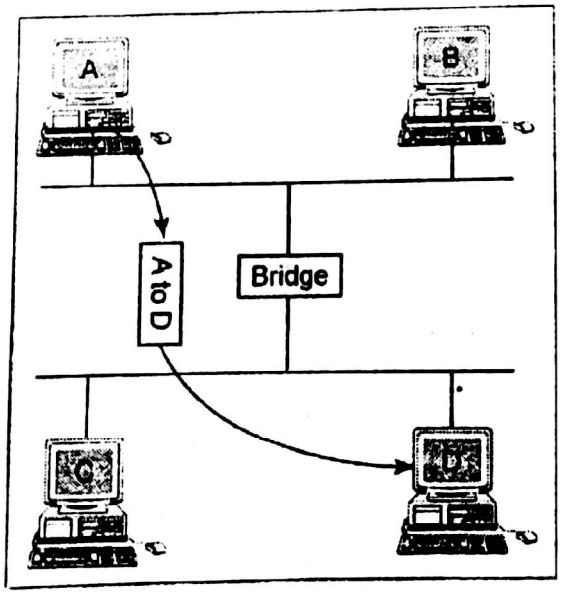

Fig. 10.9. A packet from A to D

✓ A packet generated by station A is intended for station D. The bridge allows the packet to cross and relays it to the entire lower segment, where it is received by station D.

Filtering: Filtering

- ✓ *A bridge has **filtering capability**. It can check the destination address of a frame and decide if the frame should be forwarded or dropped.*
- ✓ If the frame is to be forwarded, the decision must specify the port. A bridge has a table that maps addresses to ports.

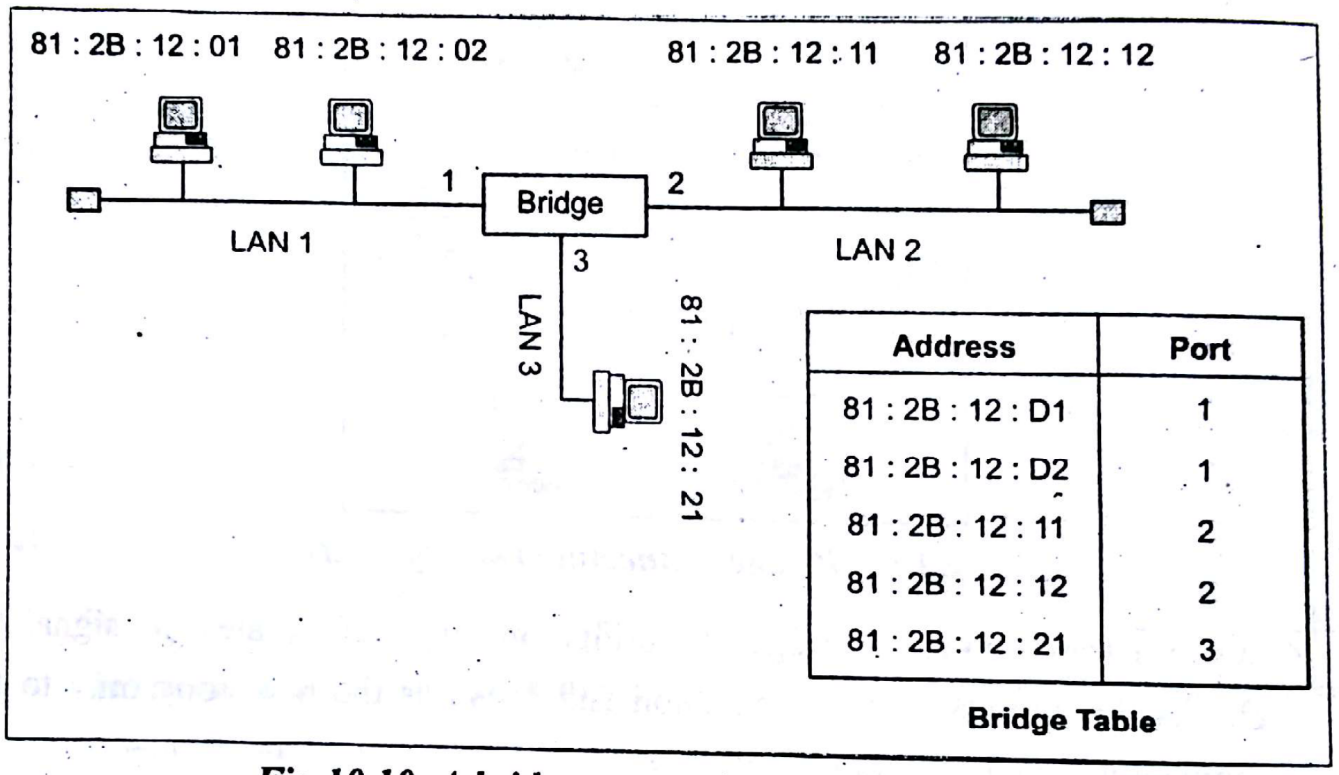

Fig.10.10. A bridge connecting LANs using table

10.1.3.2. Types of Bridges:

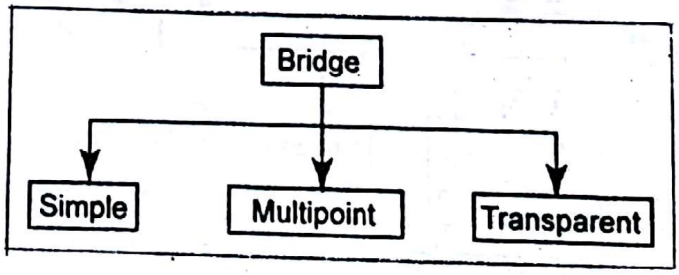

Fig.10.11. Types of bridges

Simple bridge:

- ✓ *Simple bridges are the most **primitive** and **least expensive** type of bridge. A simple bridge connects two segments.*
- ✓ Therefore, it maintains a table of host addresses versus segment numbers mapping for the two segments.
- ✓ For example from the Fig. (Bridge connecting two segments)

Host address	Segment number
A	1
B	1
C	1
D	1
E	2
F	2
G	2
H	2

Fig.10.12. Host address to segment mapping

- ✓ This table has to be entered by an operator manually by doing data entry of all the host addresses and their segment numbers.
- ✓ Whenever a new host is added, or an existing host is replaced / deleted, the table has to be ***updated*** again.
- ✓ For these reasons, simple bridges are the ***cheapest***, but they also have a lot of scope for error due to ***manual intervention***.

✦ *Multiport Bridge:*

- ✓ A multiport bridge is a special case of either the simple or the ***learning bridge.*** *When a simple or learning bridge connects more than two network segments (LANs). It is called as* ***multiport bridge.***

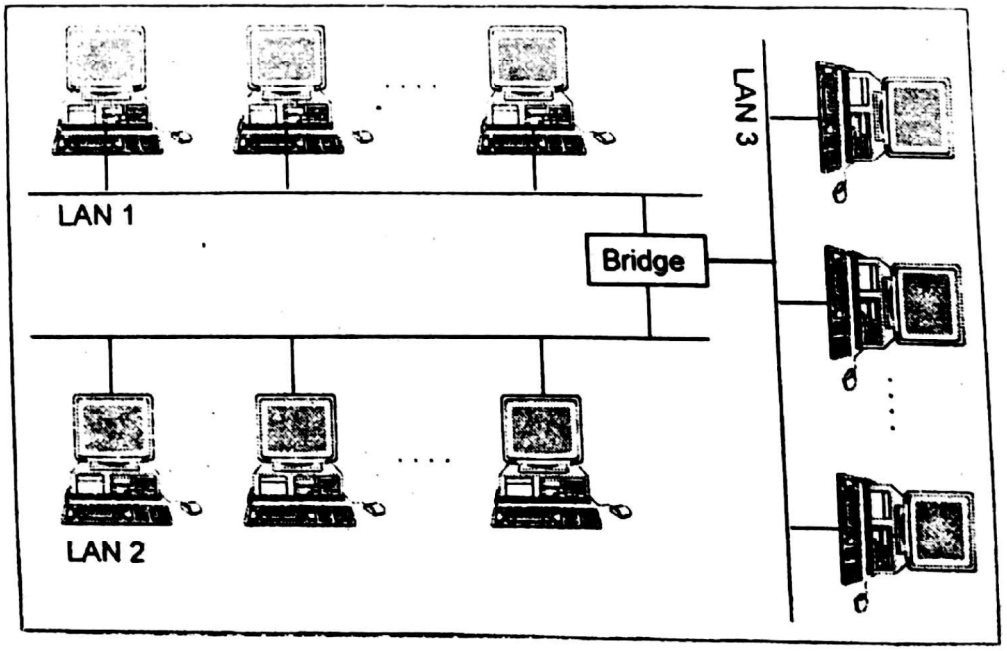

Fig.10.13. Multiport bridge

- ***Transparent bridge:***
  - ✓ *A transparent bridge can forward and filter frames and automatically build its forwarding table.*
  - ✓ A ***transparent*** also called as an ***adaptive bridge***, does not have to be programmed manually unlike a simple bridge. Instead, it performs its own bridging functions.
  - ✓ When the transparent bridge is first installed, its table is empty. As it encounters each packet, it looks as both destination and the source addresses. It checks the destination to decide where to send the packet.
  - ✓ If it does not yet recognize the destination address. It relays the packet to all of the stations on both segments.
  - ✓ It must meet ***three criteria***.
    - → **Forwarding** – Frames must be forwarded from one station to another.
    - → **Learning** – The forwarding table is automatically made by learning frame movements.
    - → **Looping** – Loops in the system must be prevented.