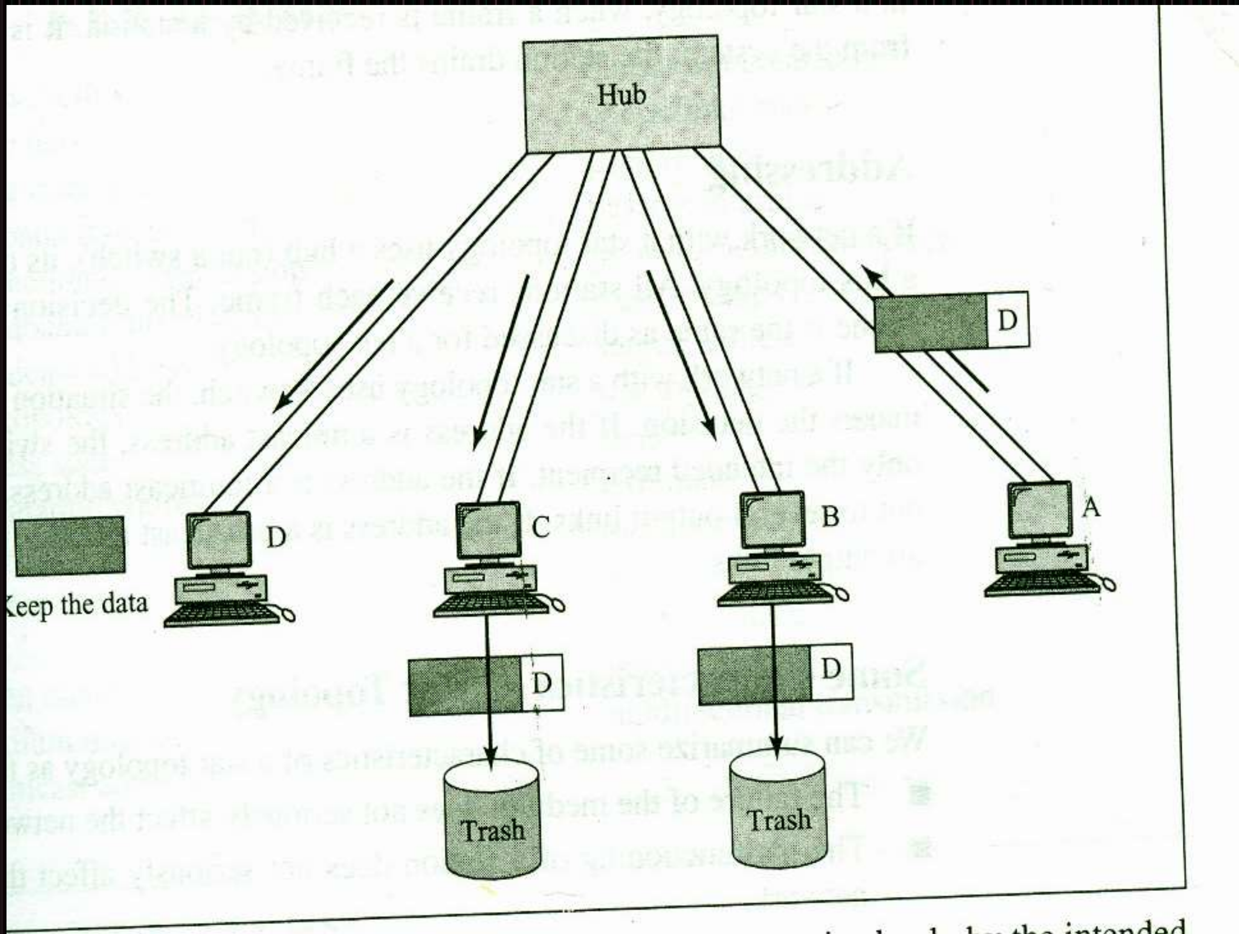
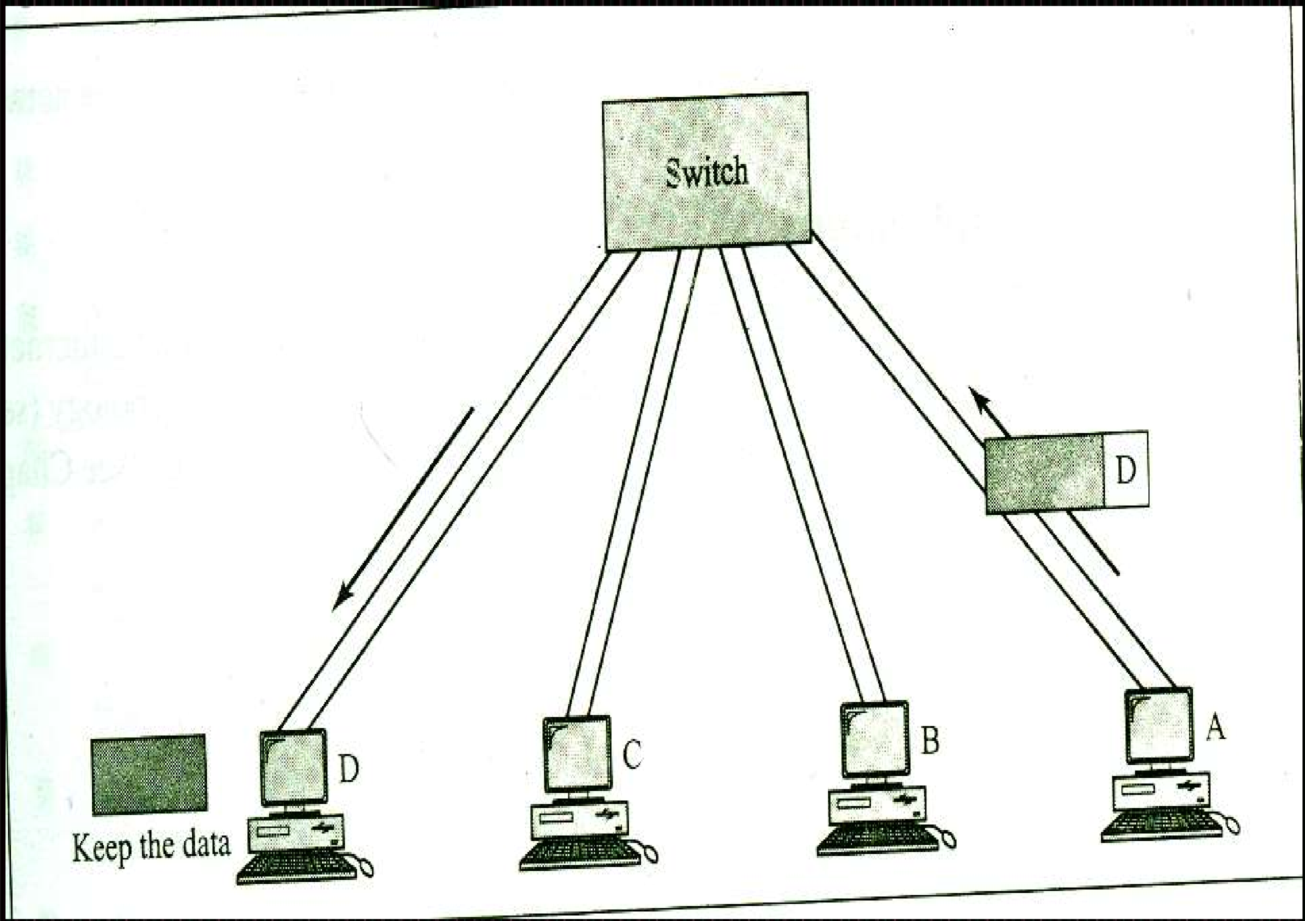
NETWORKING DEVICES

HUB is either Passive or Active. A Passive hub receives a frame from an incoming link and propagates it to outgoing links. An Active hub receives the frame from an incoming link, regenerates it and sends it to all outgoing links.

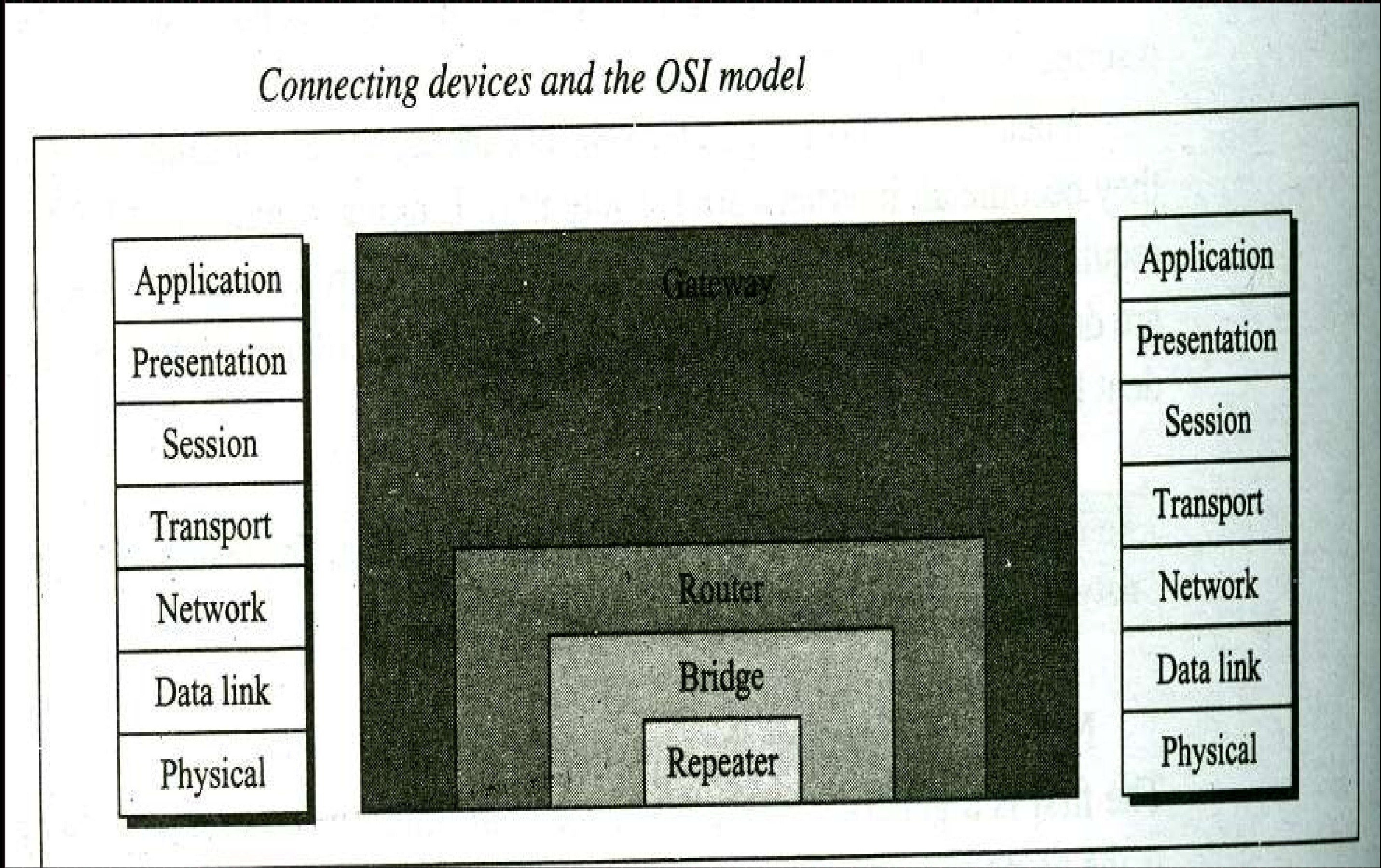
A Switch is a device that can recognize the destination address. The switch receives a frame from an incoming link, finds the destination address and routes the frame to the appropriate outgoing link. In this case, only the destination station receives the frame, not the other stations.


Hub
D
D
C
B
A
Keep the data
D
D
Trash
Trash


Switch
D
Keep the data
D
C
B
A


CONSENTRY
Hub/Switch

NETWORK DEVICES



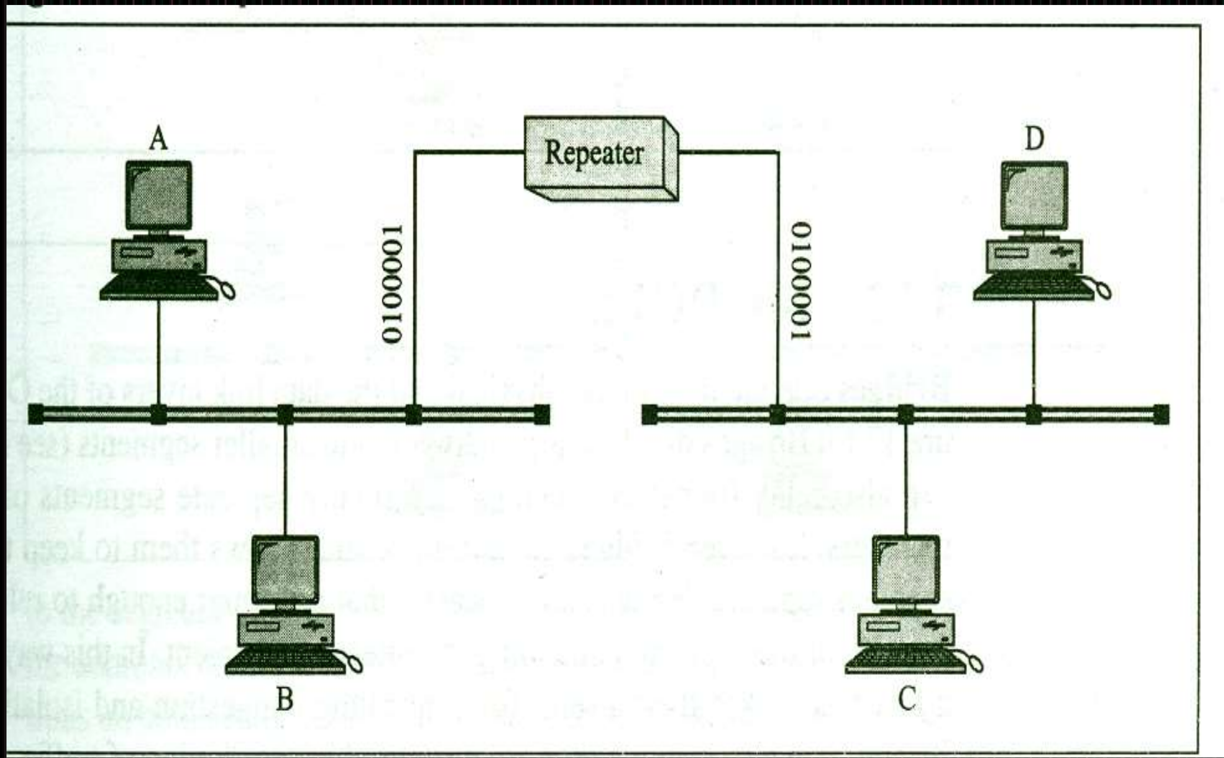
REPEATER :

A repeater (or regenerator) is an electronic device that operates on only the physical layer of the OSI model Signals that carry information within a network can travel a fixed distance before attenuation endangers the integrity of the data. A repeater installed on a link receives the signal before it becomes too weak or corrupted, regenerates the original bit pattern, and puts the refreshed copy back onto the link.

A repeater allows us to extend only the physical length of a network. The repeater does not change the functionality of the network in any way (see Figure). The two sections connected by the repeater in Figure are, in reality, one network.

If station A sends a frame to station B, all stations (including C and D) will receive the frame, just as they would without the repeater. The repeater does not have the intelligence to keep the frame from passing to the right side when it is meant for a station on the left. The difference is that, with the repeater, stations C and D receive a truer copy of the frame than would otherwise have been possible.

REPEATER



A REPEATER

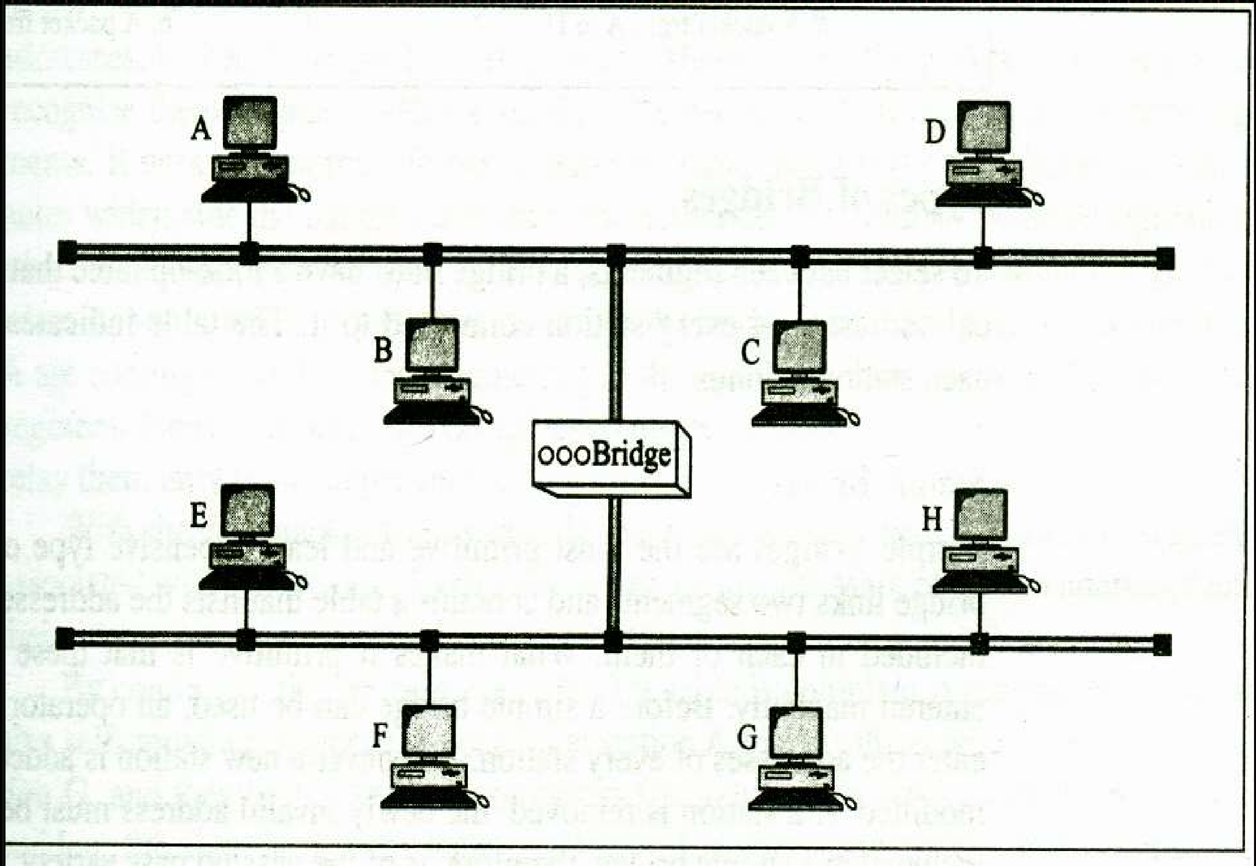
BRIDGE :

Bridges operate in both the physical and the data link layers of the OSI model. Bridges divide a large network into smaller segments. They can also relay frames between two originally separate segments of one type. Unlike repeaters, however, bridges contain logic that allows them to keep the traffic for each segment separate. Bridges are repeaters that are smart enough to relay a frame only to the side of the segment containing the intended recipient. In this way, they filter traffic, a fact that makes them useful for controlling congestion and isolating problem links. Bridges can also provide security through this partitioning of traffic.

Bridges do not modify the structure or contents of a packet in any way and can therefore be used only between segments that use the same protocol.

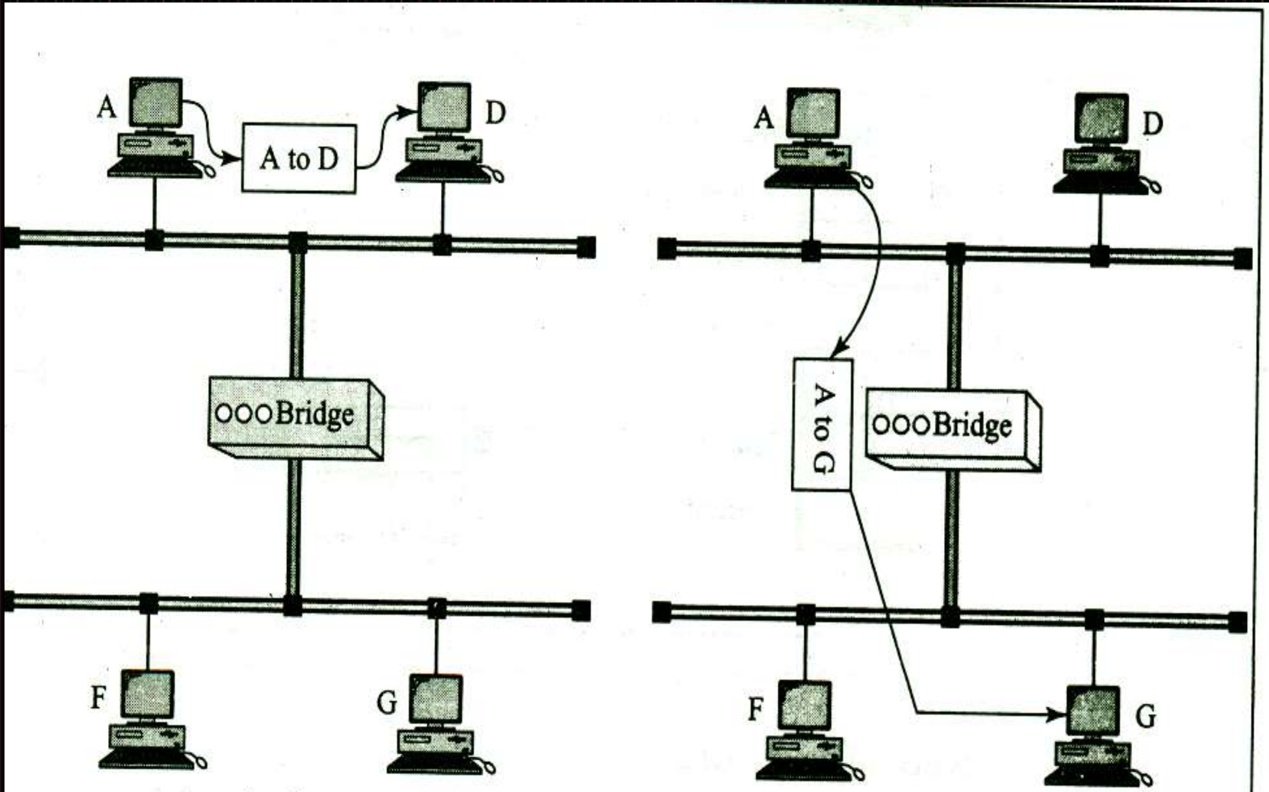
BRIDGE

A bridge operates at the data link layer, giving it access to the physical addresses of all stations connected to it. 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. As a bridge encounters a packet, it reads the address contained in the frame, and compares that address with a table of all the stations on both segments. When it finds a match, it discovers to which segment the station belongs and relays the packet only to that segment.


A
D
B
C
oooBridge
E
H
F
G

For example, Figure-*A* shows two segments joined by a bridge. A packet from station A addressed to station D arrives at the bridge. Station A is on the same segment as station D; therefore, the packet is blocked from crossing into the lower segment. Instead the packet is relayed to the entire upper segment and received by station D.

In Figure –B, a packet generated by station A is intended for station G. the bridge allows the packet to cross and relays it to entire lower segment, where it is received by station G.



a. A packet from A to D

b. A packet from A to G

ROUTER :

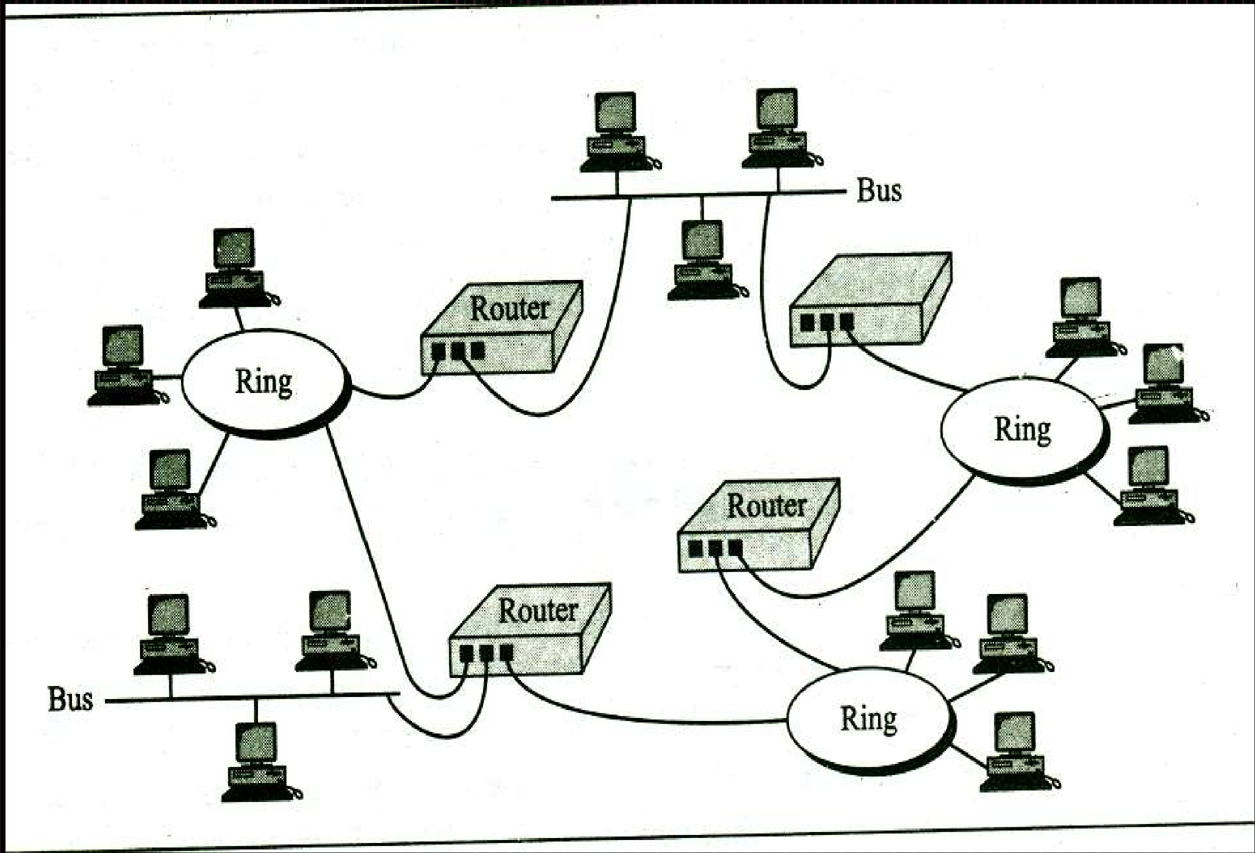
Repeaters and bridges are simple hardware devices capable of executing specific tasks. Routers are more sophisticated. They have access to network layer addresses and contain software that enables them to determine which of several possible paths between those addresses is the best for a particular transmission. Routers operate in the physical, data link, and network layers of the OSI Model.

ROUTER

Routers relay packets among multiple interconnected networks. They route packets from one network to any of a number of potential destination networks on an internet. Figure shows a possible internetwork of five networks. A packet sent from a station on one network to a station on a neighboring network goes first to the jointly held router, which switches it over to the destination network. If there is no one router connected to both the sending and receiving networks, the sending router transfers the packet across one of its connected networks to the next router in the direction of the ultimate destination. That router forwards the packet to the next router on the path, and so on, until the destination is reached.

Routers act like stations on a network. But unlike most stations, which are members of only one network. routers have addresses on, and links to, two or more networks at the same time. In their simplest function they receive packets from one connected network and pass them to a second, connected, network. However, if a received packet is addressed to a node on a network of which the router is not a member, the router is capable of determining which of its connected networks is the best next relay point for the packet.

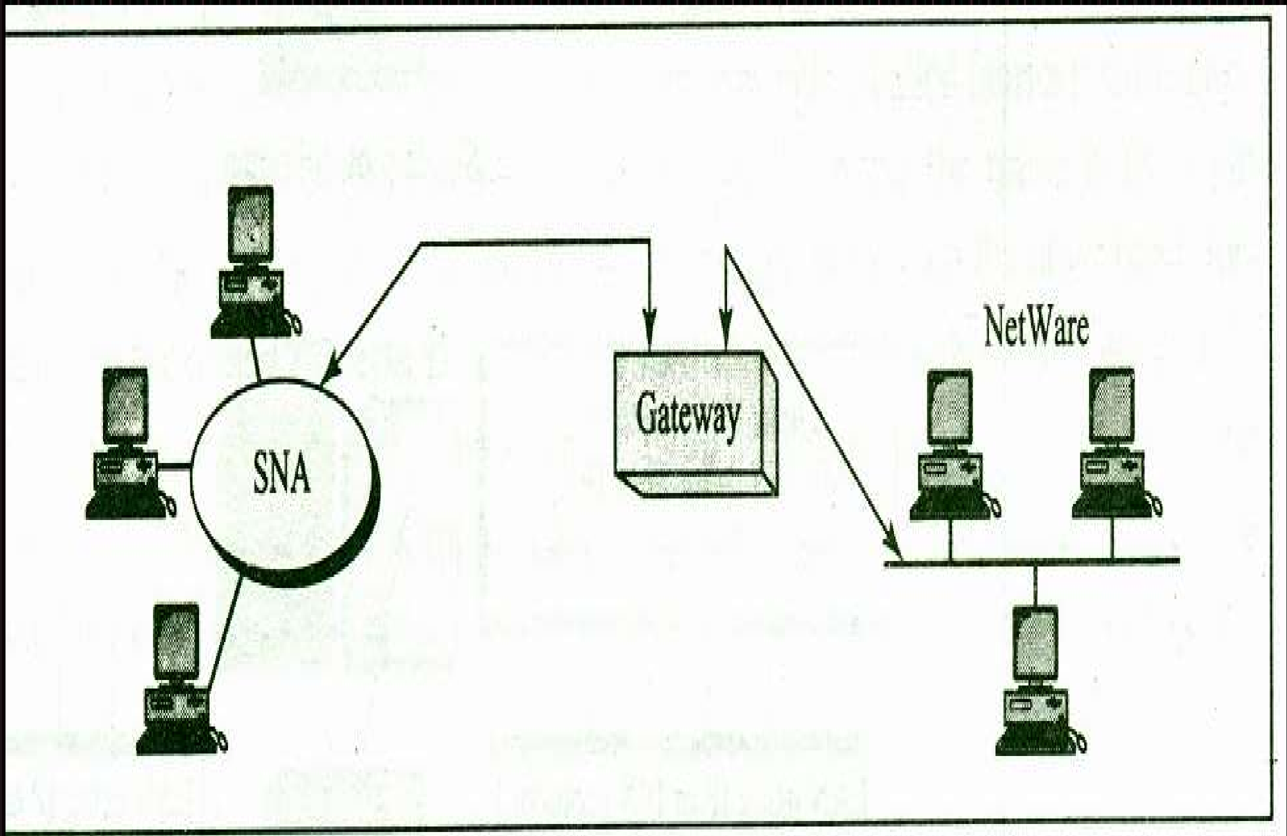
Once a router has identified the best route for a packet to travel, it passes the packet along to the appropriate network to another router.


Bus
Router
Ring
Ring
Router
Bus
Router
Ring

GATEWAY :

Gateways potentially operate in all seven layers of the OSI model. A gateway is a protocol converter. A gateway can accept a packet formatted for one protocol and convert it to a packet formatted for another protocol before forwarding it.

A gateway is generally software installed within a router. The gateway understands the protocols used by each network linked into the router and is therefore able to translate from one to another. In some cases, the only modifications necessary are the header and trailer of the packet. In other cases, the gateway must adjust the data rate, size, and format as well.


NetWare
Gateway
SNA

MODEM :

Modem is short for "MOdulator-DEModulator." It is a hardware component that allows a computer or another device, such as a router or switch, to connect to the Internet. It converts or "modulates" an analog signal from a telephone or cable wire to digital data (1s and 0s) that a computer can recognize. Similarly, it converts digital data from a computer or other device into an analog signal that can be sent over standard telephone lines.

The first modems were "dial-up," meaning they had to dial a phone number to connect to an ISP. These modems operated over standard analog phone lines and used the same frequencies as telephone calls, which limited their maximum data transfer rate to 56 Kbps. Dial-up modems also required full use of the local telephone line, meaning voice calls would interrupt the Internet connection.

MODEM