# Unit 2- Network Connecting Devices

➢ Network devices, or networking hardware, are physical devices that are required for communication and interaction between hardware on a computer network.
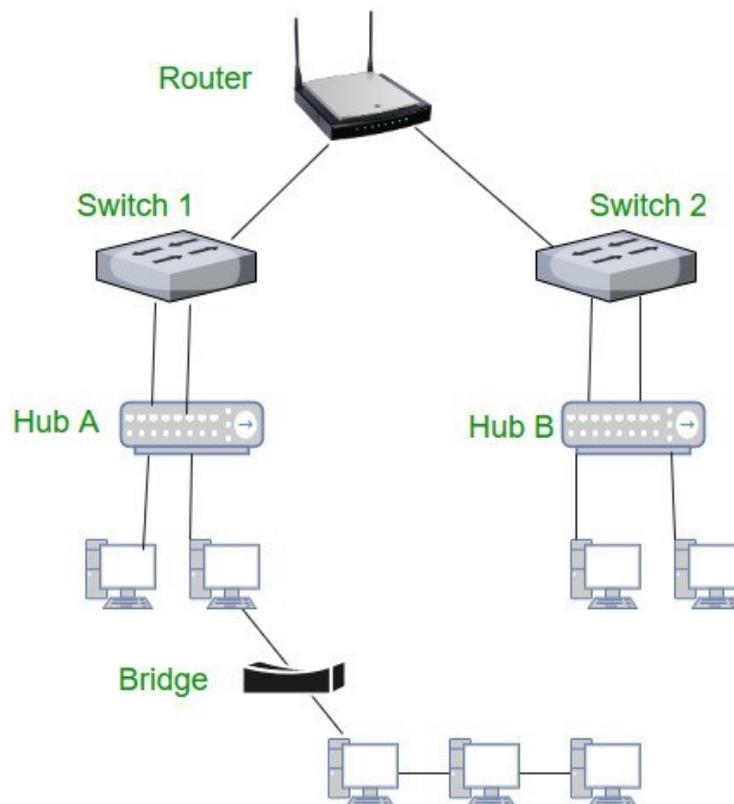
➢ Connecting devices at various layers

Application	Gateway		Application
Transport	Router or three-layer switch		Transport
Network	Bridge or two-layer switch		Network
Data link	Repeater or hub		Data link
Physical	Passive hub		Physical
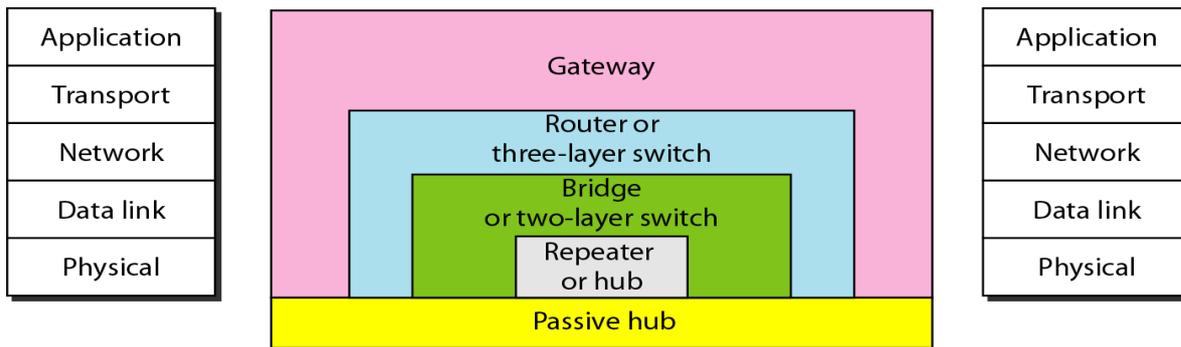
> There are various network connecting devices which are given here:

- o **Hub:** Those hubs which operate below the physical layer are passive hub. Those hubs which operate at the physical layer are called a repeater or an active hub.
- o A passive hub is just a connector. It connects the wires coming from different branches.
- o An active hub is actually a multipart repeater.

- o **Repeater:** Repeaters are low-level devices that just amplify or regenerate weak signals.
- o A repeater is a device that operates only in the physical layer.
- o Signals that carry information within a network can travel a fixed distance before attenuation endangers the integrity of the data.
- o A repeater receives a signal and, before it becomes too

weak or corrupted, regenerates the original bit pattern.

o The repeater then sends the refreshed signal.

o A repeater can extend the physical length of a LAN

Terminating Resistors

Ethernet Network 1

Ethernet Network 2

MAU

MAU

Repeater

Attachment Unit Interface Cable (AUI)
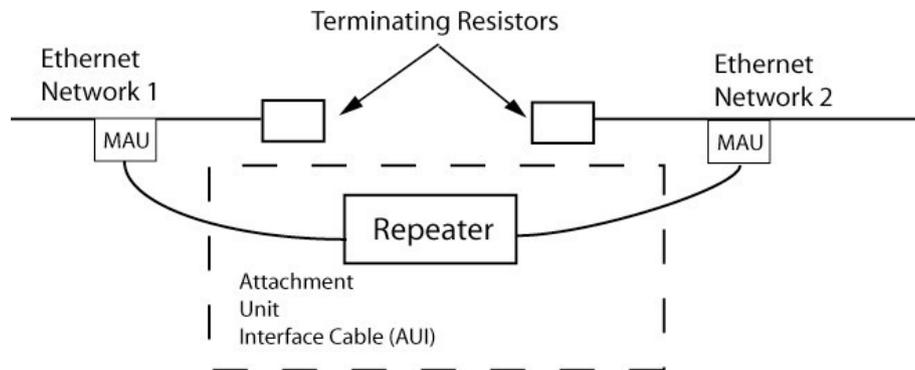
MAU (Medum Attachment Unit) and AUI can be optionally combined in a single unit with the Repeater

Source: Datapro Reports on PC & LAN Communications: LAN Internetworking Overview 521-104   May 1992

o **Bridge:** Bridges are store and forward devices.

Address	Port
71:2B:13:45:61:41	1
71:2B:13:45:61:42	1
64:2B:13:45:61:12	2
64:2B:13:45:61:13	2

Bridge Table

71:2B:13:45:61:41   71:2B:13:45:61:42

64:2B:13:45:61:12   64:2B:13:45:61:13

Bridge

LAN 1

LAN 2
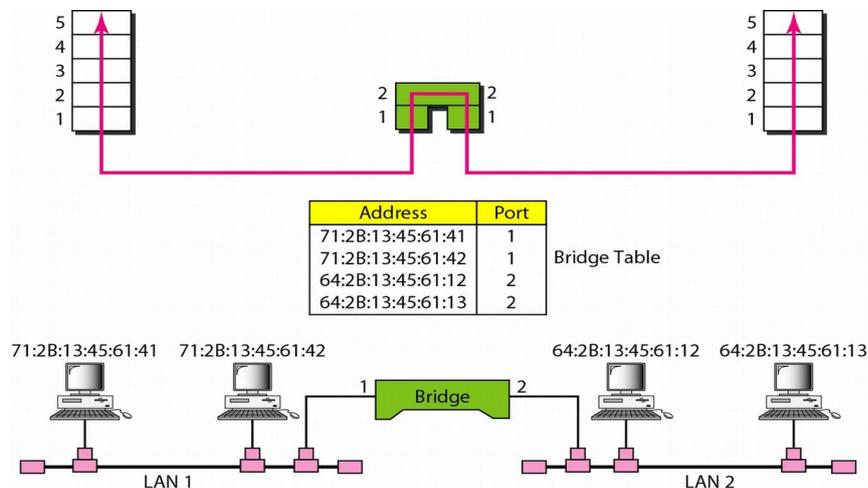
o A bridge operates in both the physical and the data link layer. As a physical layer device, it regenerates the signal it receives.

o As a data link layer device, the bridge can check the physical (MAC) addresses (source and destination) contained in the frame.

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- o There are various types of bridges such as transparent bridges, remote bridges, spanning tree and source routing bridges.
- o A bridge with many ports and design allows better (faster) performance. A bridge with a few ports can connect a few LANs together.
- o A bridge with many ports may be able to allocate a unique port to each station, with each station on its own independent entity. This means there is no competing traffic (no collision).
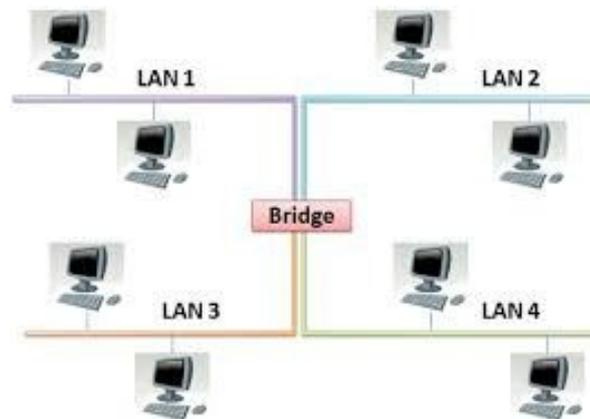

- o **L2 Switch:** When we use the term switch, we must be careful because a switch can mean two different things. We must clarify the term by adding the level at which the device operates.
- o We can have a layer 2 (L2) switch or a layer 3 (L3) switch.
- o The L3 switch is used at the network layer; it is a kind of router.
- o The L2 switch performs at the physical and data link layers.
- o A L2 switch is a bridge.
- o A L2 switch, as a bridge does, makes a filtering decision

based on the MAC address of the frame it received.

- o A L2 switch can have a buffer to hold the frames for processing.
- o It can have a switching factor that forwards the frames faster.
- o **L3 Switches:** A three-layer switch is a router, but a faster and more sophisticated. The switching fabric in a three-layer switch allows faster table lookup and forwarding. L3 switch and router is synonymous.
- o **Router:** Routers are conceptually similar to bridges, except that they are found in the network layer.
- o They just take incoming packets from one line and forward them on another, just as all routers do, but the lines may belongs to different networks and use different protocols.
- o A router is a three-layer device that routes packets based on their logical addresses (host-to-host addressing).
- o A router normally connects LANs and WANs in the Internet and has a routing table that is used for making decisions about the route.
- o The routing tables are normally dynamic and are updated using routing protocols.
- o Following figure shows a router placement.
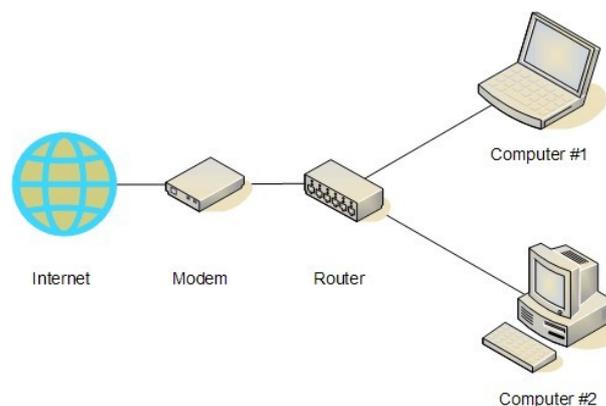
- o **Gateway:** Gateway is a device that connects two or more dissimilar networks.
- o Transport gateways make a connection between two networks at the transport layer.
- o Application gateways connect two parts of an application in the application layer.

- o A gateway is normally a computer that operates in all five layers of the Internet.
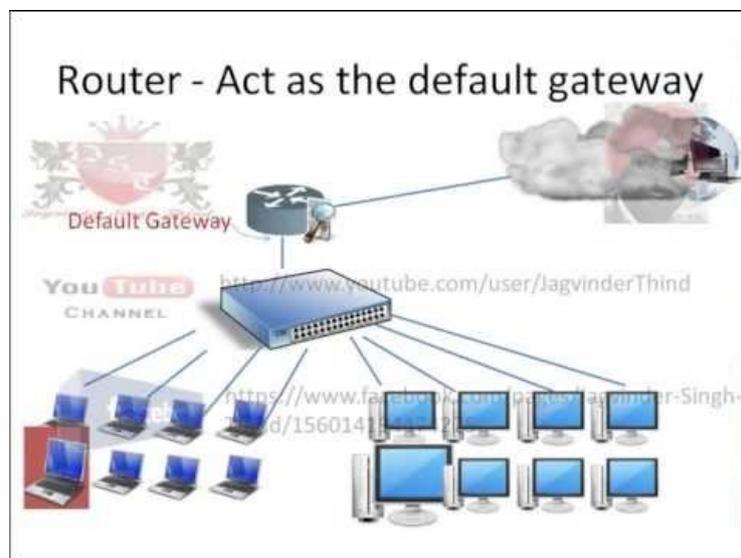
- o A gateway takes an application message, reads it, and interprets it.

- o This means that it can be used as a connecting device between two internetworks that use different models.

- o The gateway connecting the two systems can take a frame as it arrives from the first system, move it up to the OSI application layer, and remove the message.

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References

1. Data Communications and Networking by Behrouz A. Forouzan, McGraw-Hill Forouzan Networking Series