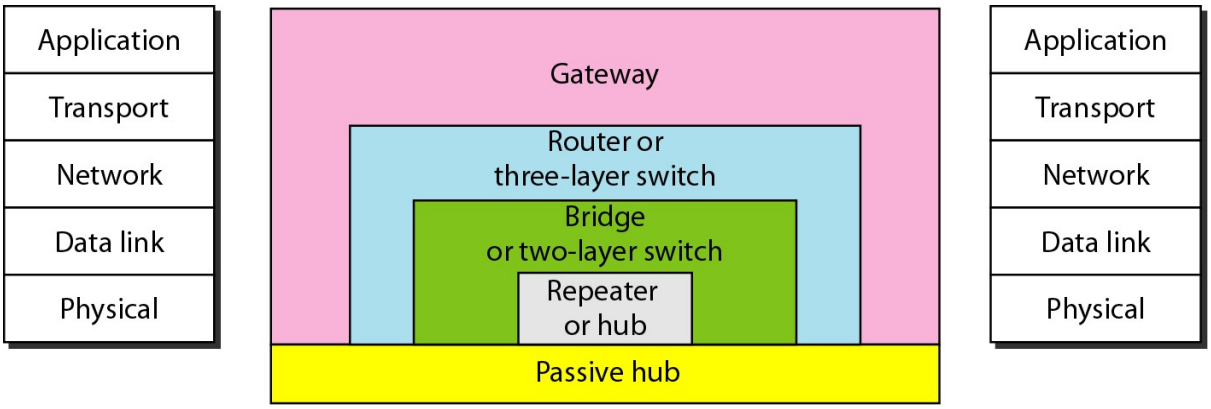
Course Name: A Level (2nd Sem) Subject: DCN

Topic: Connecting Devices Date: 01-06-20

Connecting Devices:

To connect LANs, or segments of LANs to one another or to the Internet, we use connecting devices. Connecting devices can be divided into five different categories based on the layer, in which they operate in a network.



The five categories contain devices which can be defined as

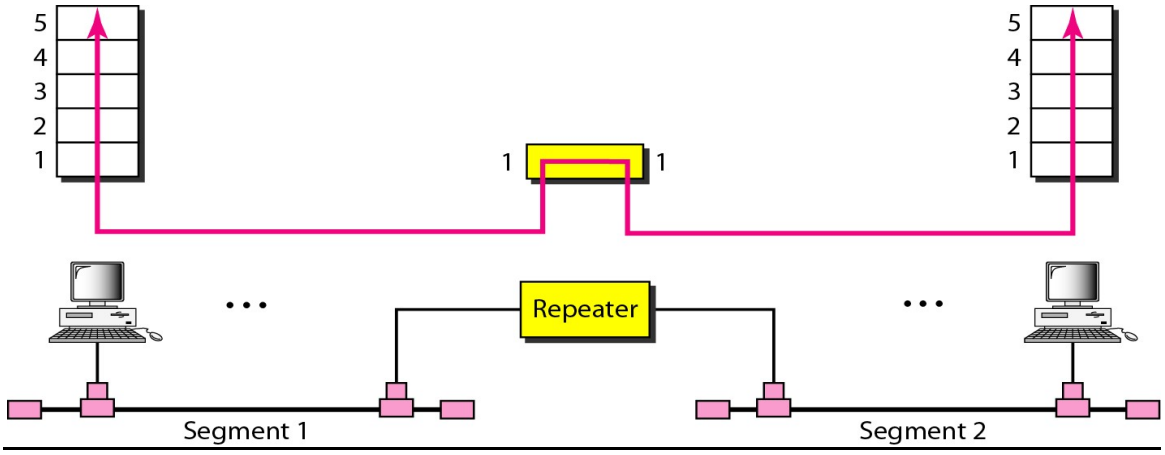
1. **Passive Hub**: Operates below the physical layer.
2. **Repeater or an active hub:** Operates at the physical layer.
3. **Bridge or two-layer switch:** Operates at the physical and data link layers.
4. **Router or three-layer switch**: Operates at the physical, data link, and network layers.
5. **Gateway:** Operates at all five layers.

Passive Hubs:

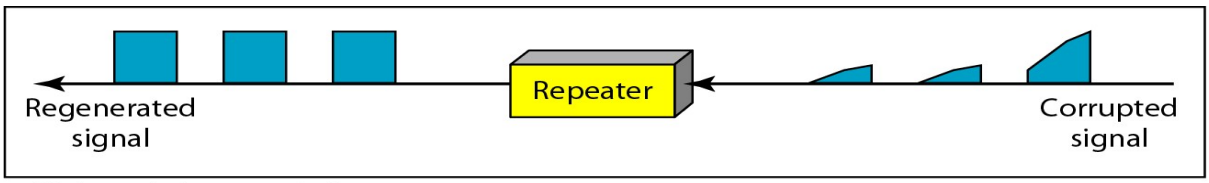
- A passive hub is just a connector. It connects the wires coming from different branches.
- In a star-topology Ethernet LAN, a passive hub is just a point where the signals coming from different stations collide; the hub is the collision point.
- This type of a hub is part of the media; its location in the Internet model is below the physical layer.

Repeaters:

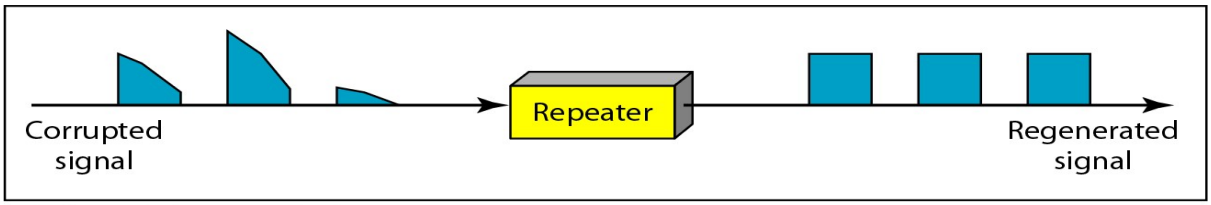
- A repeater is a device that operates only in the **physical layer**.
- Signals that carry information within a network can travel a fixed distance before attenuation endangers the integrity of the data.
- A repeater receives a signal and, before it becomes too weak or corrupted, regenerates the original bit pattern. The repeater then sends the refreshed signal.
- A repeater can extend the physical length of a LAN, as shown in Figure.



- A repeater does not actually connect two LANs; it connects two segments of the same LAN. The segments connected are still part of one single LAN. A repeater is not a device that can connect two LANs of different protocols.
- A repeater can overcome the 10Base5 Ethernet length restriction. In this standard, the length of the cable is limited to 500 m. To extend this length, we divide the cable into segments and install repeaters between segments. The whole network is still considered one LAN, but the portions of the network separated by repeaters are called segments.
- The repeater acts as a two-port node, but operates only in the physical layer. When it receives a frame from any of the ports, it regenerates and forwards it to the other port.
- A repeater does not amplify the signal; it **regenerates** the signal. When it receives a weakened or corrupted signal, it creates a copy, bit for bit, at the original strength.



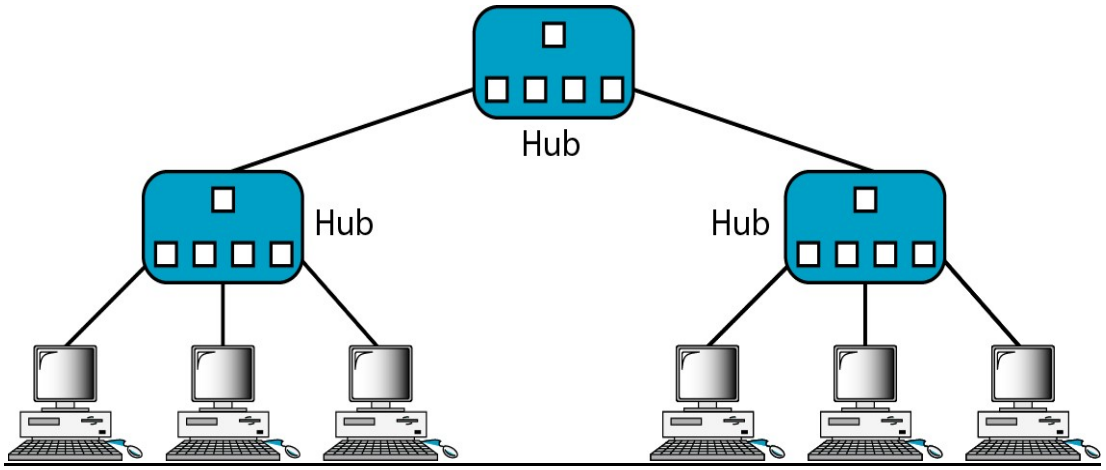
a. Right-to-left transmission.



b. Left-to-right transmission.

Active Hubs

- An active hub is actually a multiport repeater. It is normally used to create connections between stations in a physical star topology.
- Hubs can also be used to create multiple levels of hierarchy, as shown in figure. The hierarchical use of hubs removes the length limitation of 10Base-T (100 m).



Exercises:

1. **Name the connecting devices with the layers on which they work.**
2. **How is a repeater different from an amplifier?**
3. **How does a repeater extend the length of a LAN?**
4. **How is a hub related to a repeater?**