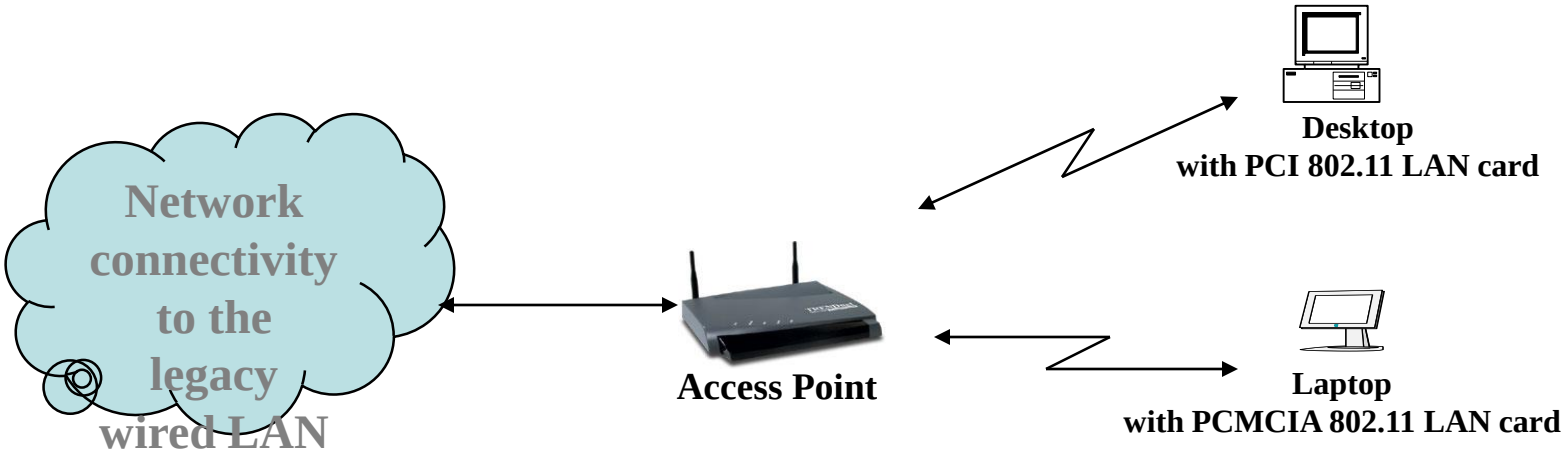
802.11 Wireless LAN

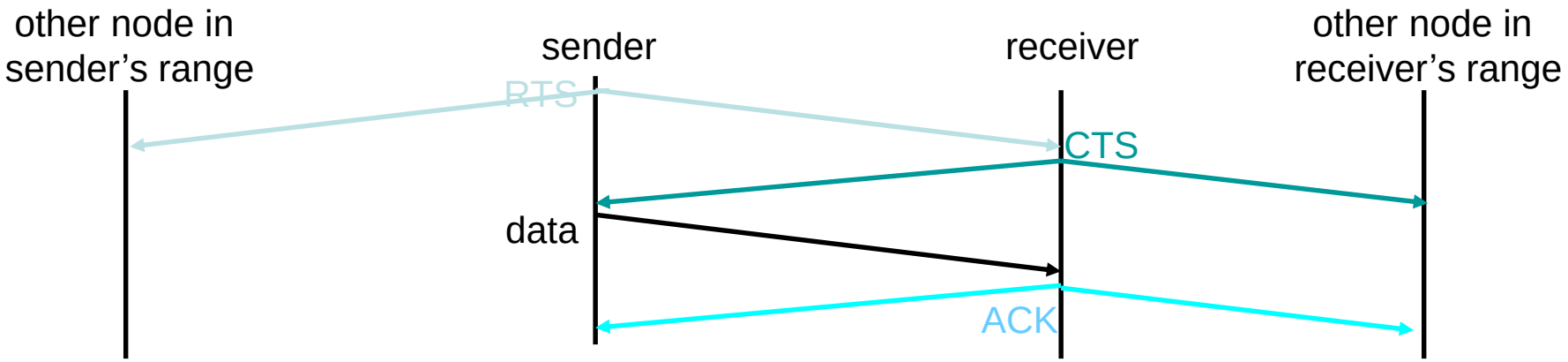


- Provides network connectivity over wireless media
- An Access Point (AP) is installed to act as Bridge between Wireless and Wired Network
- The AP is connected to wired network and is equipped with antennae to provide wireless connectivity

802.11 Wireless LAN

- **Range (Distance between Access Point and WLAN client) depends on structural hindrances and RF gain of the antenna at the Access Point**
- **To service larger areas, multiple APs may be installed with a 20-30% overlap**
- **A client is always associated with one AP and when the client moves closer to another AP, it associates with the new AP (Hand-Off)**
- **Three flavors:**
  - 802.11b
  - 802.11a
  - 802.11g

Multiple Access with Collision Avoidance (MACA)



- **Before every data transmission**
  - Sender sends a Request to Send (RTS) frame containing the length of the transmission
  - Receiver respond with a Clear to Send (CTS) frame
  - Sender sends data
  - Receiver sends an ACK; now another sender can send data
- **When sender doesn't get a CTS back, it assumes collision**

WLAN : 802.11b

- The most popular 802.11 standard currently in deployment.
- Supports 1, 2, 5.5 and 11 Mbps data rates in the 2.4 GHz ISM (Industrial-Scientific-Medical) band

WLAN : 802.11a

- Operates in the 5 GHz UNII (Unlicensed National Information Infrastructure) band
- Incompatible with devices operating in 2.4GHz
- Supports Data rates up to 54 Mbps.

WLAN : 802.11g

- Supports data rates as high as 54 Mbps on the 2.4 GHz band
- Provides backward compatibility with 802.11b equipment

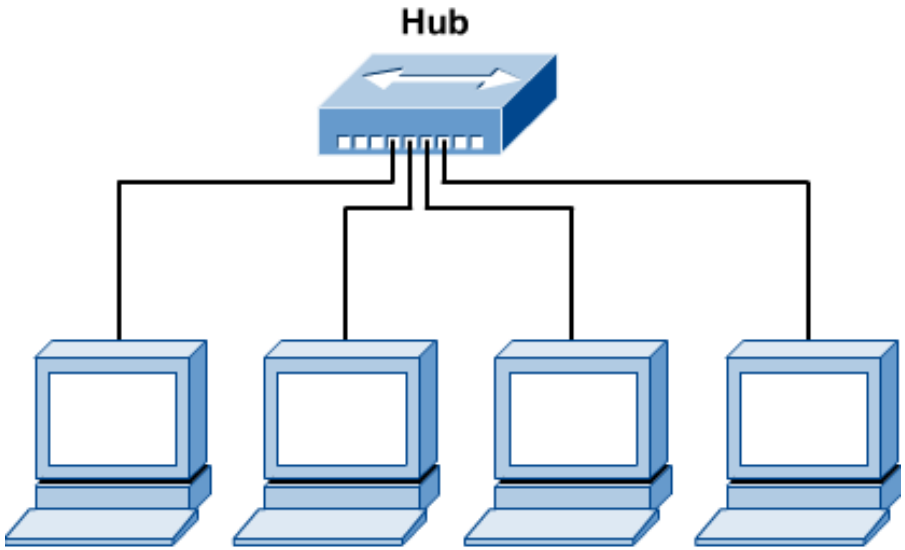
REPEATER, HUB, BRIDGE AND SWITCH

Repeater

- A repeater receives a signal, regenerates it, and passes it on.
- It can regenerate and retime network signals at the bit level to allow them to travel a long distance on the media.
- It operates at Physical Layer of OSI
- The Four Repeater Rule for 10-Mbps Ethernet should be used as a standard when extending LAN segments.
- This rule states that no more than four repeaters can be used between hosts on a LAN.
- This rule is used to limit latency added to frame travel by each repeater.

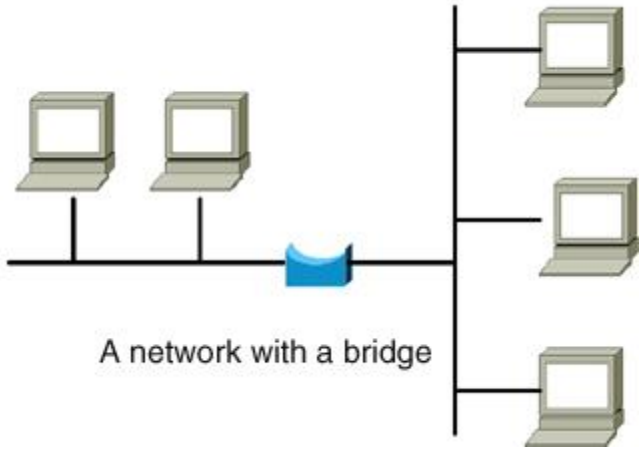
Hub

- Hubs are used to connect multiple nodes to a single physical device, which connects to the network.
- Hubs are actually multiport repeaters.
- Using a hub changes the network topology from a linear bus, to a star.
- With hubs, data arriving over the cables to a hub port is electrically repeated on all the other ports connected to the same network segment, except for the port on which the data was sent.



Bridge

- Bridges are used to logically separate network segments within the same network.
- They operate at the OSI data link layer (Layer 2) and are independent of higher-layer protocols.
- The function of the bridge is to make intelligent decisions about whether or not to pass signals on to the next segment of a network.
- When a bridge receives a frame on the network, the destination MAC address is looked up in the bridge table to determine whether to filter, flood, or copy the frame onto another segment
- Broadcast Packets are forwarded



A network with a bridge

Switch

- Switches are Multiport Bridges.
- Switches provide a unique network segment on each port, thereby separating collision domains.
- Today, network designers are replacing hubs in their wiring closets with switches to increase their network performance and bandwidth while protecting their existing wiring investments.
- Like bridges, switches learn certain information about the data packets that are received from various computers on the network.
- Switches use this information to build forwarding tables to determine the destination of data being sent by one computer to another computer on the network.

Switches: Dedicated Access

- Hosts have direct connection to switch
- Full Duplex: No collisions
- Switching: A-to-A' and B-to-B' simultaneously, no collisions
- Switches can be cascaded to expand the network