DEVICES AND COMMUNICATION BUSES FOR DEVICES NETWORK–

Lesson-28: WIRELESS AND MOBILE SYSTEM PROTOCOLS– IEEE802.11

Wireless Personal Area Network (WPAN)

- IrDA (Infrared Data Association)
- Bluetooth 2.4 GHz
- 802.11 WLAN and 802.11b WiFi
- ZigBee 900 MHz

802.11 Wireless LAN connected devices

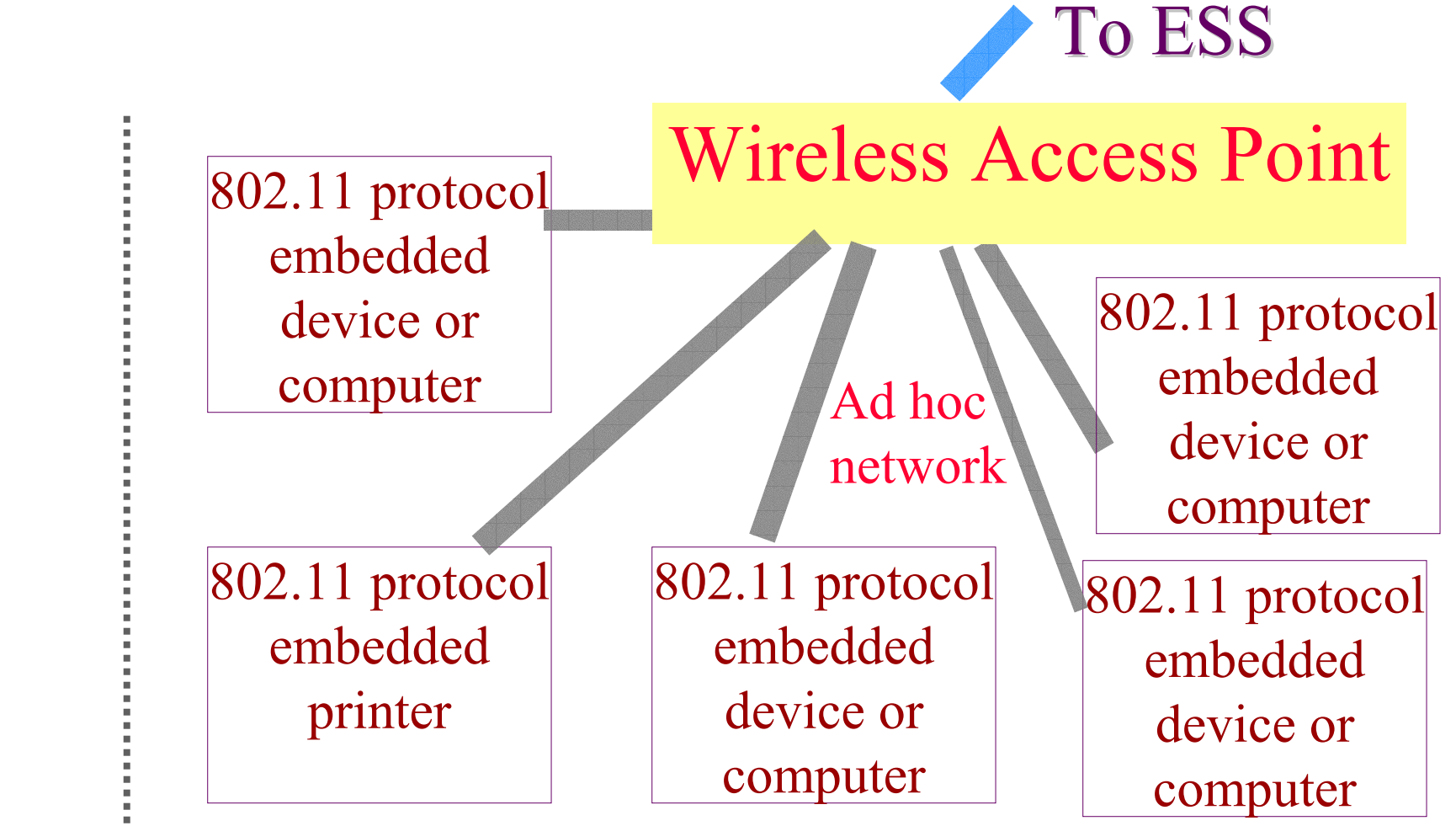
- IEEE standards 802.11a to 802.11g
- 802.11a data transfer rates— 1 Mbps and 2 Mbps
- 802.11b data transfer rates— 5.5 Mbps and 2 Mbps
- FHSS or DSSS or Infrared 250 ns

802.11b

- Called wireless fidelity (WiFi)
- 802.11b support data rates of 5.5 Mbps by mapping 4 bits
- 11 Mbps mapping 8 bits simultaneously during modulation.

Basic service set (BSS)

- Has one wireless station, which communicates to an access point, also called hotspot.
- BSS support ad-hoc network, which as and when node come nearby in range of access point it forms the network through extended service set (ESS).
- A node free to move from one BSS to another.

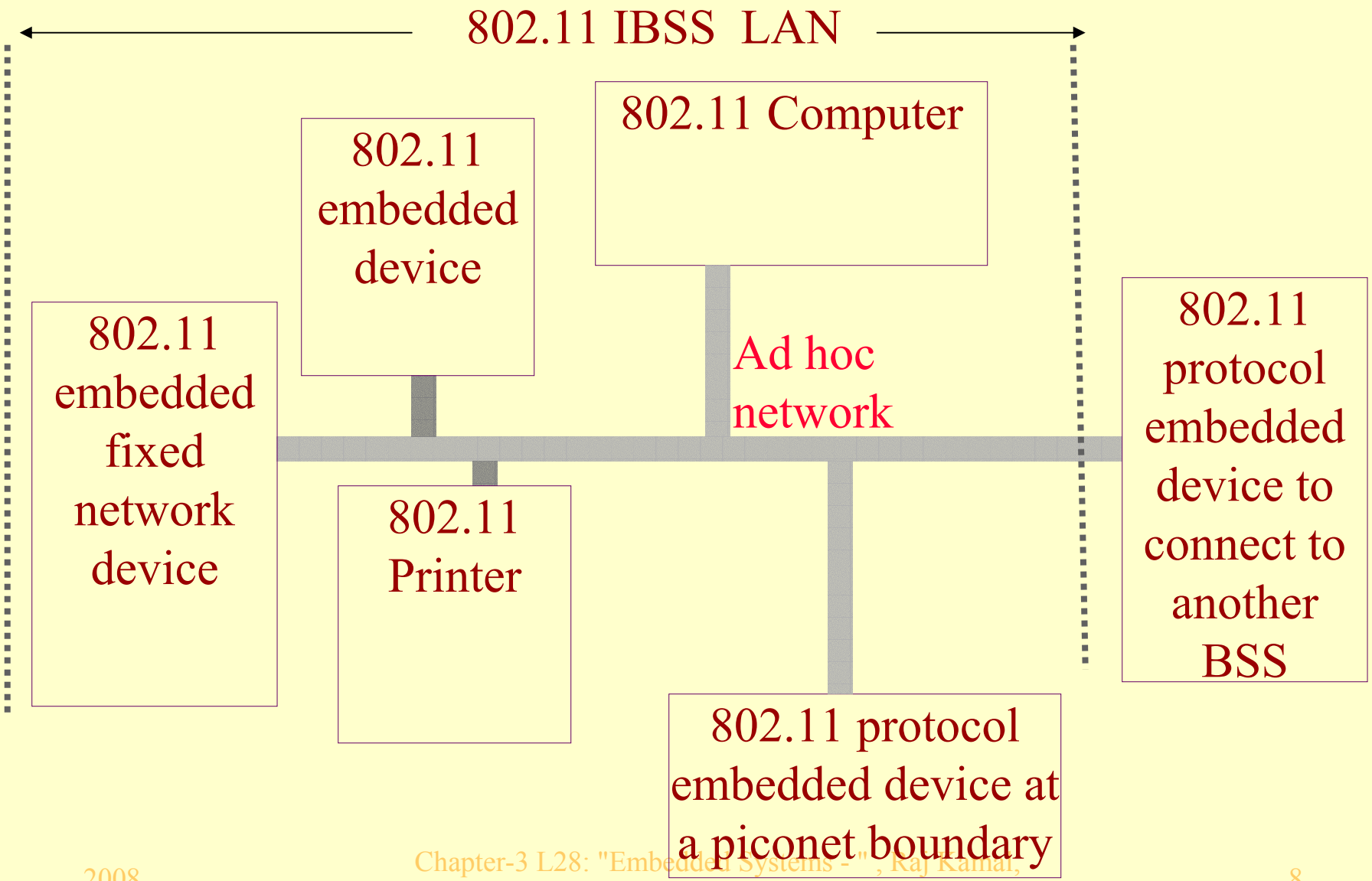


BSS [Basic Service Set] WLAN

Independent basic service set (IBSS)

- No access point.
- Does not connect to the distribution system.
- May have multiple stations, which also cannot communicate among themselves.
- IBSS support ad-hoc network, which as and when nodes come nearby in range they form the network

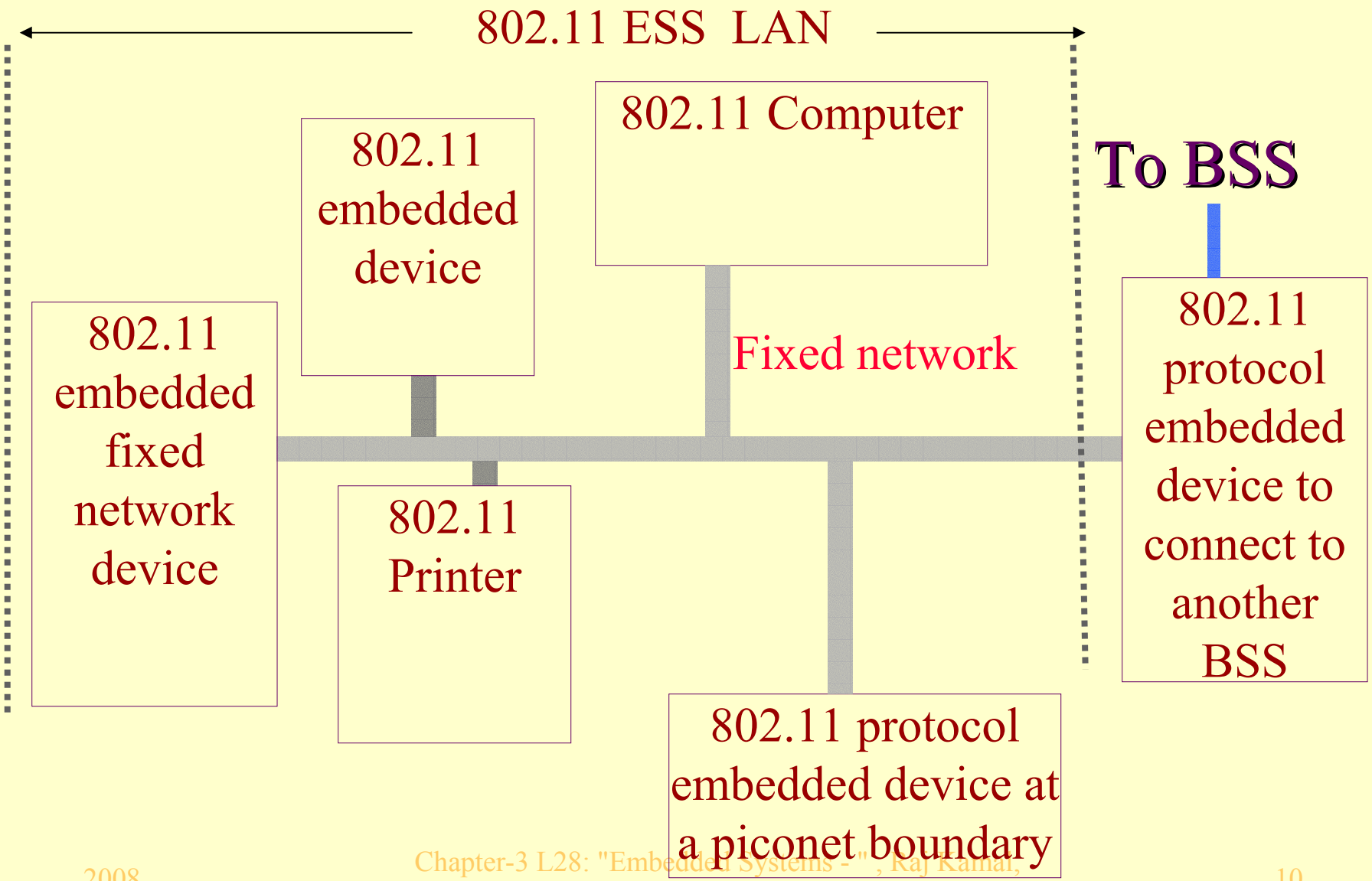
802.11 IBSS LAN



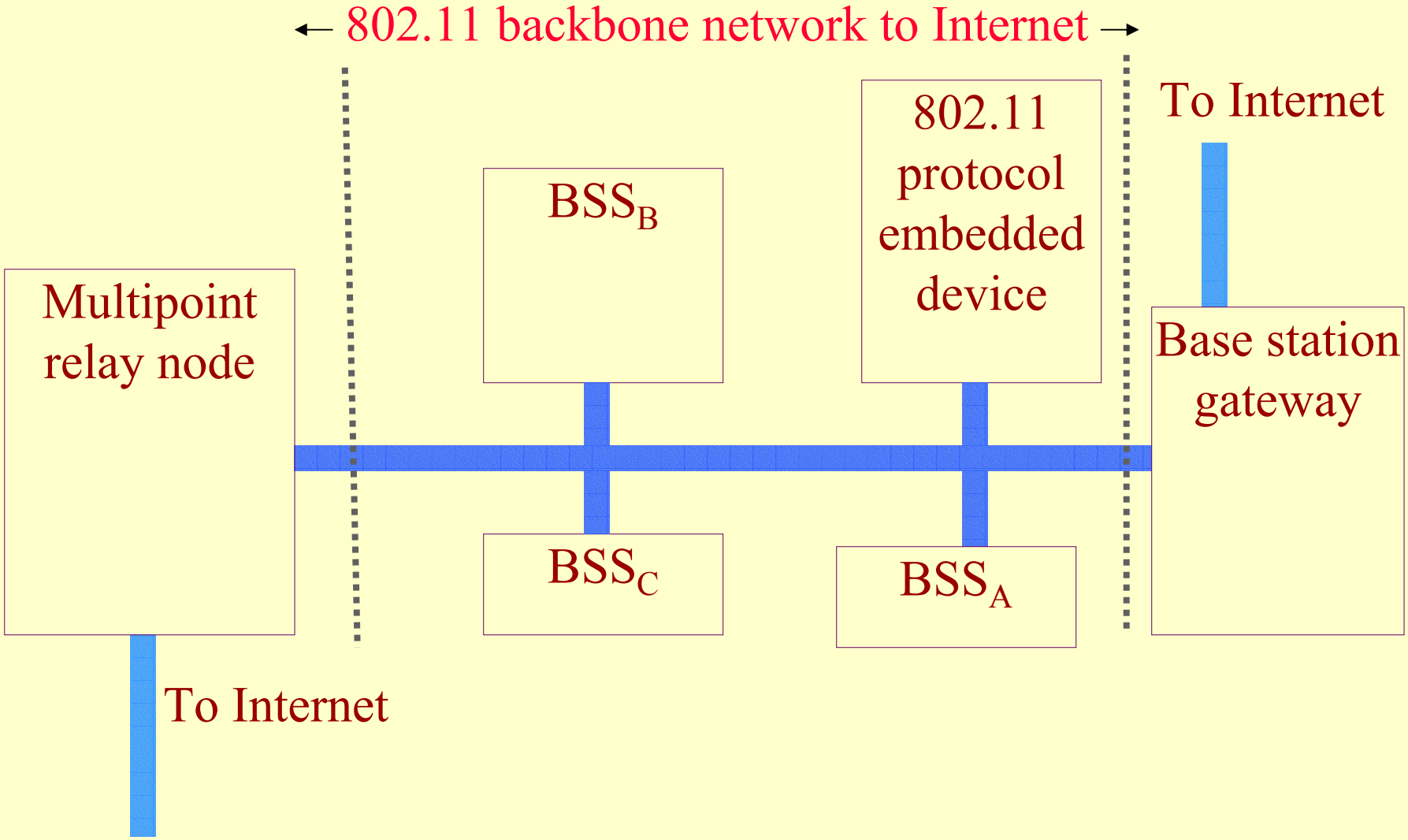
LAN-station access-points networked together

- Called extended service set (ESS)
- Backbone distribution system.
- A backbone set may network through Internet
- ESS support fixed infrastructure network

802.11 ESS LAN



802.11 Backbone



802.11 protocol

- 802.11 provides specifications for physical layer and data link layers

802.11 physical and data link layers

Data link layer– MAC layer for power management, handover and registration of roaming mobile node within the backbone network at a new BSS within the ESS
Physical layer– Physical Medium Dependent (PMD) protocol, Physical Layer Convergence Protocol (PLCP) 802.11b additional sub-layer for specifying Complementary Code Keying (CCK)

802.11 protocol data link layer

- Specifies a MAC layer
- MAC layer specifies power management, handover and registration of roaming mobile node within the backbone network at a new BSS within the ESS

802.11 packet for MAC

- Packet called request to send (RTS), which is first sent
- If other end responses by the packet called clear to send (CTS), then the layer data is transmitted.

MAC layer

- Uses carrier sense multiple access and collision avoidance (CSMA/CA) protocol.
- A station listens to the presence of carrier during a time interval is called distributed inter-frame spacing (DIFS) interval.
- If carrier is not sensed (detected) during DIFS then the station backs off for a random time interval to avoid collision and retries after that interval.

802.11 protocol MAC Acknowledgment

- A receiver always acknowledges within a short inter-frame spacing (SIFS)
- Acknowledgment after successful CRC (cyclic redundancy check)
- If there is no acknowledgement within SIFS, then transmitter retransmits and upto 7 retransmission attempts are made

802.11 Physical Layer communication methods

- Three— FHSS or DSSS or Infrared 250 ns pulses.
- 802.11a Physical layer has two sub-layers
- One is Physical Medium Dependent (PMD) protocol, Physical Layer Convergence Protocol (PLCP)
- 802.11b additional sub-layer for specifying Complementary Code Keying (CCK)

Physical Medium Dependent (PMD) protocol 802.11 sublayer

- Specifies the modulation and coding methods.

Physical Layer Convergence Protocol (PLCP) 802.11 sub-layer

Specifies the header and payload for transmission. It specifies the sensing of the carrier at receiver. It specifies how packet formation takes place at the transmitter and packets assemble at the receiver. It specifies ways to converge MAC (Medium Access Control) to PMD at transmitter and separate MAC (Medium Access Control) from PMD at the receiver.

An additional sub-layer in 802.11b

- Specifying Complementary Code Keying (CCK).

Summary

We learnt

- IEEE standard 802.11a to g protocols
- FHSS or DSSS or IR 259 ns
- BSS with wireless access point and IBSS without access point
- ESS between several BSSs
- ESS backbone connects to Internet

We learnt

- MAC
- PMD
- PLCP
- CCK

End of Lesson 28 of Chapter 3