802.11 Wireless LAN

Network connectivity to the legacy wired LAN

Desktop
with PCI 802.11 LAN card

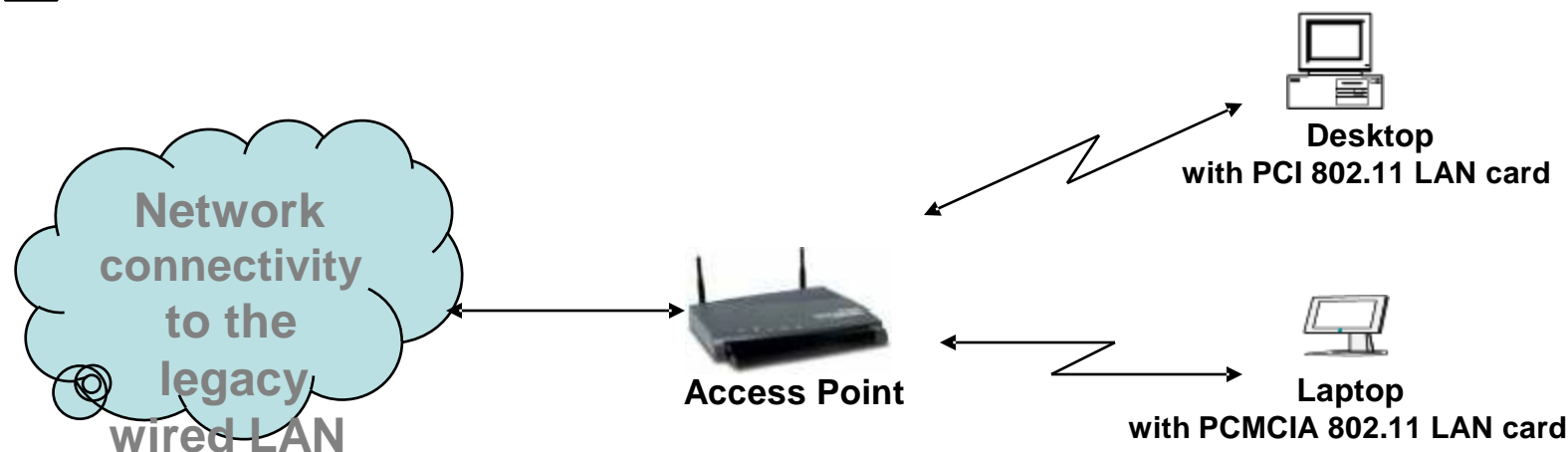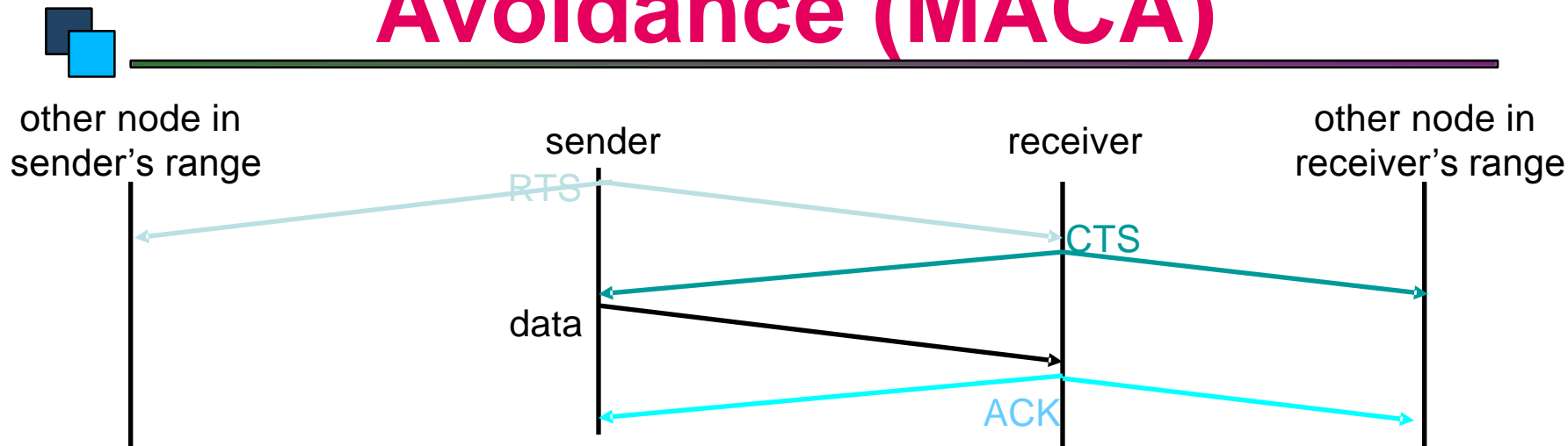**Access Point**

Laptop
with PCMCIA 802.11 LAN card

- **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**

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- **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)

other node in sender's range

sender

receiver

other node in receiver's range

RTS

CTS

data

ACK

- **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**

IEEE 802 Standards Working Groups

Number	Topic
802.1	Overview and architecture of LANs
802.2 ↓	Logical link control
802.3 *	Ethernet
802.4 ↓	Token bus (was briefly used in manufacturing plants)
802.5	Token ring (IBM's entry into the LAN world)
802.6 ↓	Dual queue dual bus (early metropolitan area network)
802.7 ↓	Technical advisory group on broadband technologies
802.8 †	Technical advisory group on fiber optic technologies
802.9 ↓	Isochronous LANs (for real-time applications)
802.10 ↓	Virtual LANs and security
802.11 *	Wireless LANs
802.12 ↓	Demand priority (Hewlett-Packard's AnyLAN)
802.13	Unlucky number. Nobody wanted it
802.14 ↓	Cable modems (defunct: an industry consortium got there first)
802.15 *	Personal area networks (Bluetooth)
802.16 *	Broadband wireless
802.17	Resilient packet ring

Categories of Wireless Networks

- *Base Station* :: all communication through an *access point*. Other nodes can be fixed or mobile.

- *Infrastructure Wireless* :: base station network is connected to the wired Internet.

- *Ad hoc Wireless* :: wireless nodes communicate directly with one another.

- *MANETs* (Mobile Ad Hoc Networks) :: ad hoc nodes are mobile.

Wireless LANs
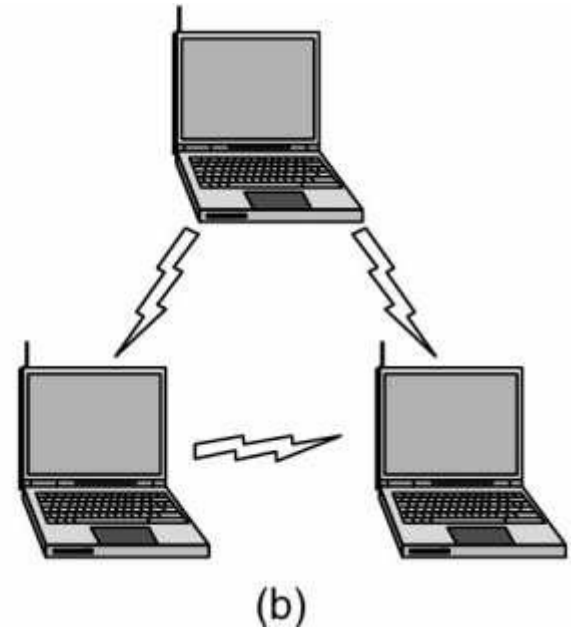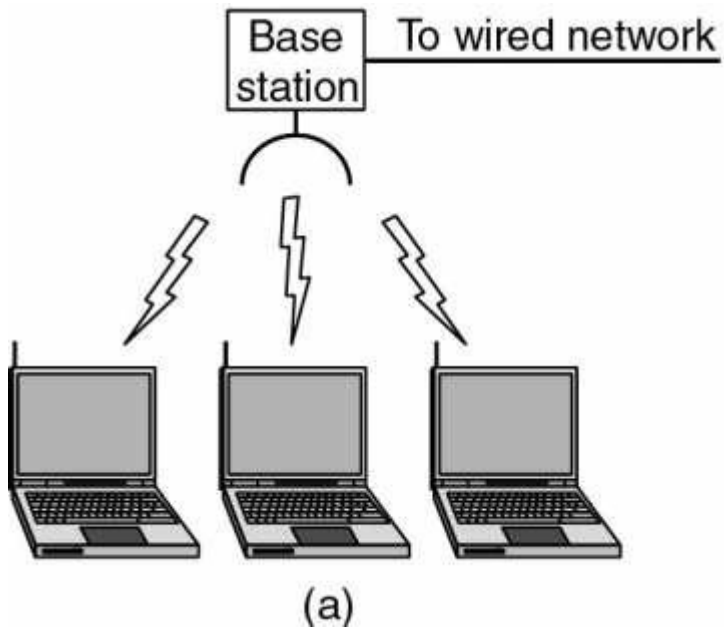
.(a) Wireless networking with a base station. (b) Ad hoc networking.