

CSS2C08

COMPUTER NETWORKS

MODULE 4

1. LINK LAYER SERVICES
2. ERROR DETECTION AND CORRECTION
3. MULTIPLE ACCESS PROTOCOLS
4. LAN ADDRESS
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WIRELESS LINKS

- A wireless local area network (WLAN) links two or more devices over a short distance using a wireless distribution method, usually providing a connection through an access point for internet access.
- The IEEE 802.11 standard defines the physical layer and media access control (MAC) layer for a wireless local area network.
- **Architecture**
 - ❖ The standard defines two kinds of services:
 1. Basic service set (BSS)
 2. Extended service set (ESS).

1. Basic Service Set

- IEEE 802.11 defines the basic service set (BSS) as the building block of a wireless LAN.
- A basic service set is made of stationary or mobile wireless stations and an optional central base station, known as the access point (AP).
- The BSS without an AP is a stand-alone network and cannot send data to other BSSs. It is called an ad hoc architecture.
- A BSS with an AP is sometimes referred to as an infrastructure network.



Station



Station



Station



Station

Ad hoc network (BSS without an AP)



Station



AP



Station



Station



Station

Infrastructure (BSS with an AP)

2. Extended Service Set

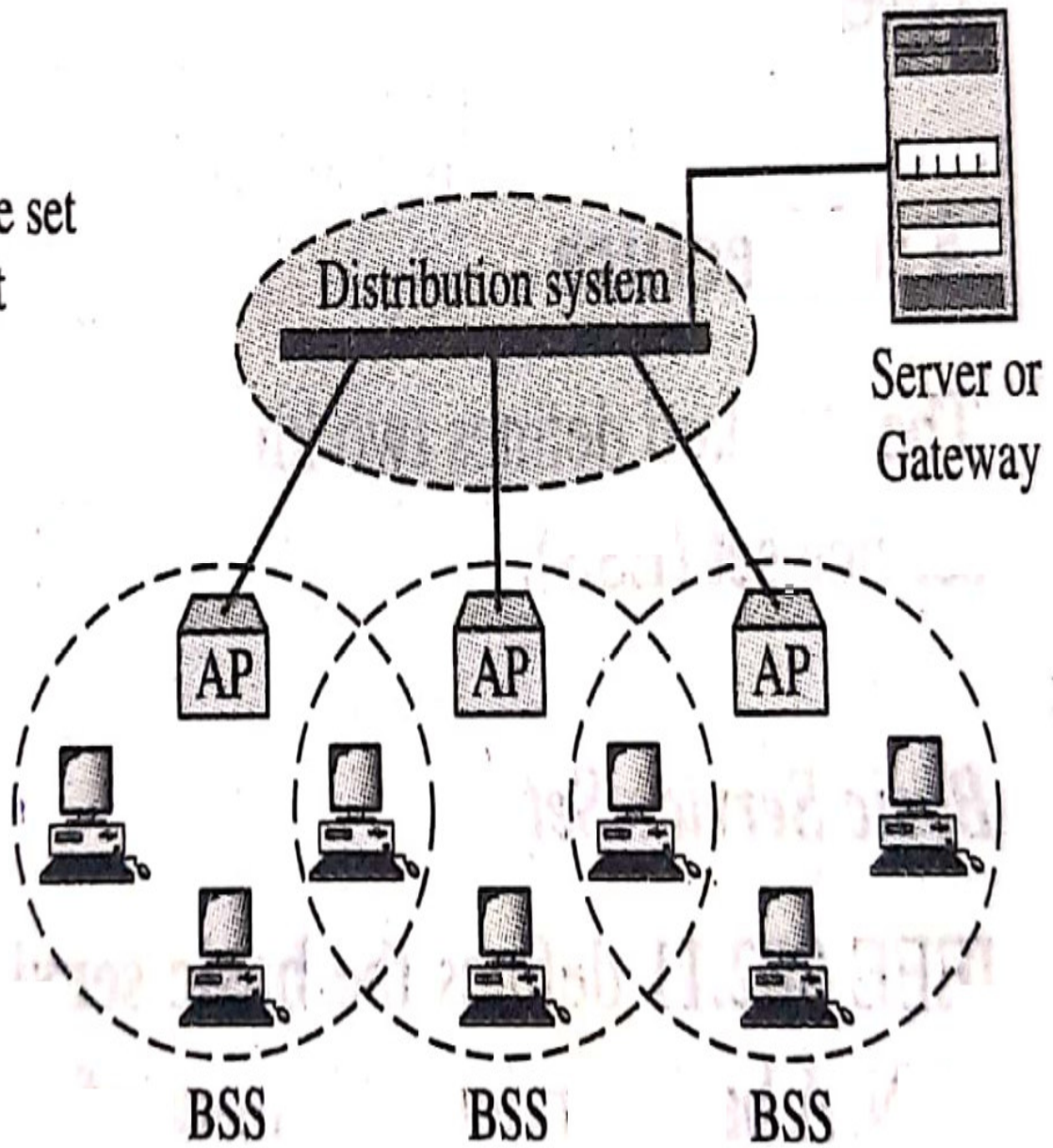
- An extended service set (ESS) is made up of two or more BSSs with APs. In this case, the BSSs are connected through a distribution system, which is usually a wired LAN. The distribution system connects the APs in the BSSs.
- The extended service set uses two types of stations: mobile and stationary.
 - ✓ The mobile stations are normal stations inside a BSS.
 - ✓ The stationary stations are AP stations that are part of a wired LAN.

- When BSSs are connected, the stations within reach of one another can communicate without the use of an AP. However, communication between two stations in two different BSSs usually occurs via two APs. A mobile station can belong to more than one BSS at the same time.

ESS: Extended service set

BSS: Basic service set

AP: Access point



❖ Station Types

- IEEE 802.11 defines three types of stations on the basis of their mobility in wireless LAN. These are:
 1. **No-transition Mobility:** These types of stations are either stationary *i.e.* immovable or move only inside a BSS.
 2. **BSS-transition Mobility:** These types of stations can move from one BSS to another but the movement is limited inside an ESS.
 3. **ESS-transition Mobility:** These types of stations can move from one ESS to another. The communication may or may not be continuous when a station moves from one ESS to another ESS.

➤ **MAC Sublayer**

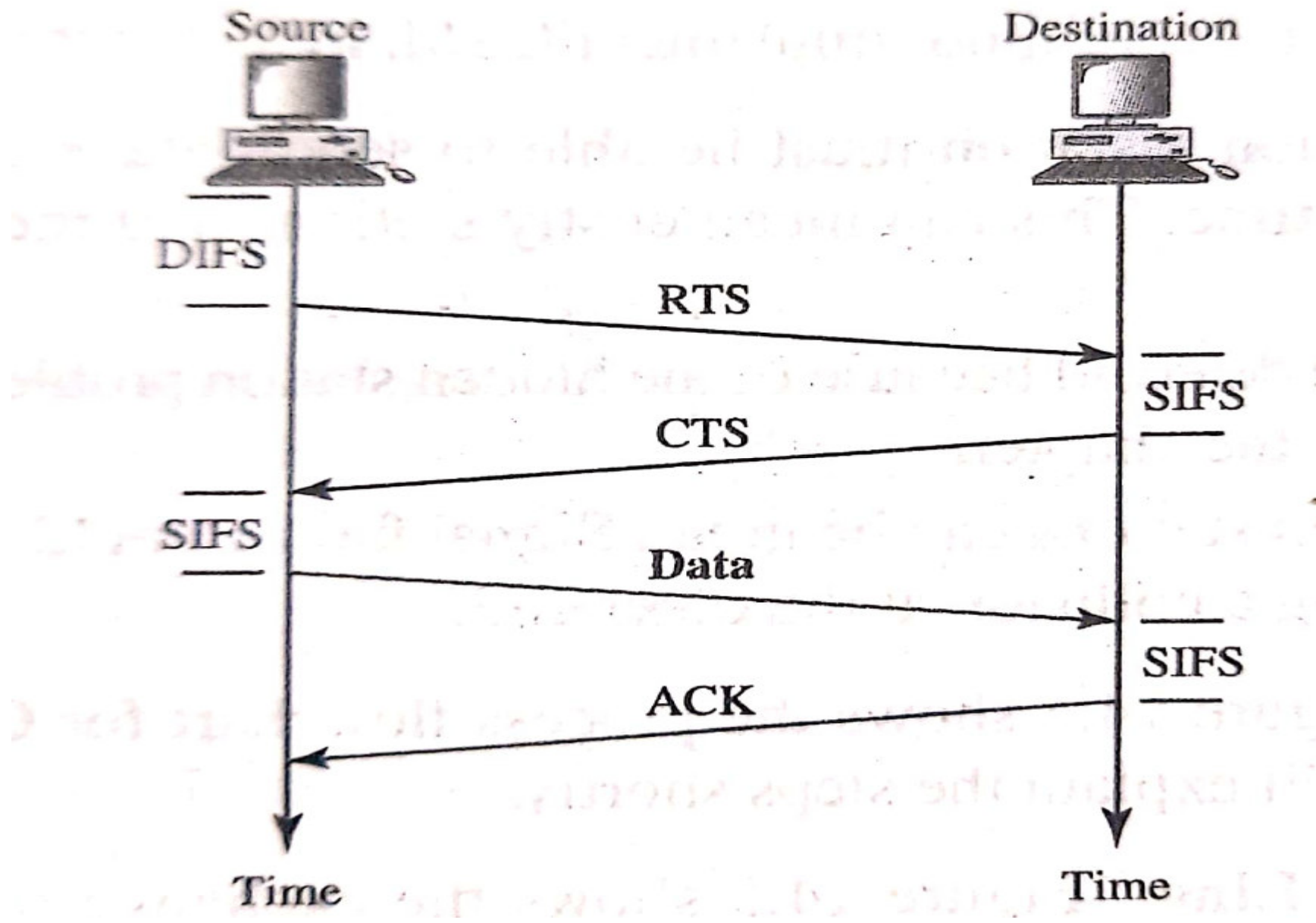
802.11 support two different modes of operations. These are:

1. Distributed Coordination Function (DCF)
2. Point Coordination Function (PCF)

1. Distributed Coordination Function (DCF)

- ❖ The DCF is used in BSS having no access point. DCF uses CSMA/CA protocol for transmission.
- ❖ The following steps are followed in this method.
 - a) When a station wants to transmit, it senses the channel to see whether it is free or not.
 - b) If the channel is not free the station waits for back off time.
 - c) If the station finds a channel to be idle, the station waits for a period of time called distributed interframe space (DIFS).

- d) The station then sends control frame called request to send (RTS)
- e) The destination station receives the frame and waits for a short period of time called short interframe space (SIFS).
- f) The destination station then sends a control frame called clear to send (CTS) to the source station. This frame indicates that the destination station is ready to receive data.
- g) The sender then waits for SIFS time and sends data.
- h) The destination waits for SIFS time and sends acknowledgement for the received frame.



2. Point Coordination Function (PCF)

- ❖ The point coordination function (PCF) is an optional access method that can be implemented in an infrastructure network (not in an ad hoc network).
- ❖ It is implemented on top of the DCF and is used mostly for time-sensitive transmission.
- ❖ PCF has a centralized, contention-free polling access method. The AP performs polling for stations that are capable of being polled. The stations are polled one after another, sending any data they have to the AP.

- ❖ To give priority to PCF over DCF, another interframe space called PIFS is defined. PIFS (PCF IFS) is shorter than DIFS. If at the same time, a station is using DCF and AP is using PCF, then AP is given priority over the station.
- ❖ Due to this priority of PCF over DCF, stations that only use DCF may not gain access to the channel. To overcome this problem, a repetition interval is defined that is repeated continuously. This repetition interval starts with a special control frame called beacon frame. When a station hears beacon frame, it start their NAV for the duration of the period of the repetition interval.

