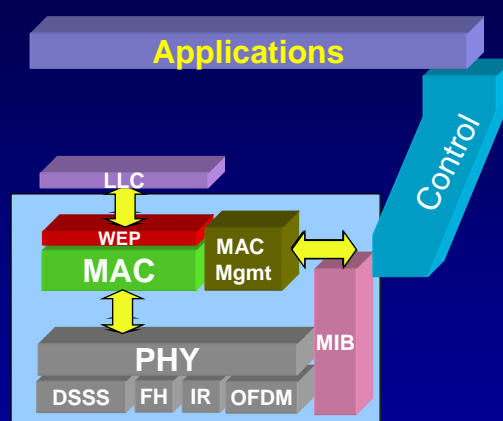


# 802.11 specifications overview

1

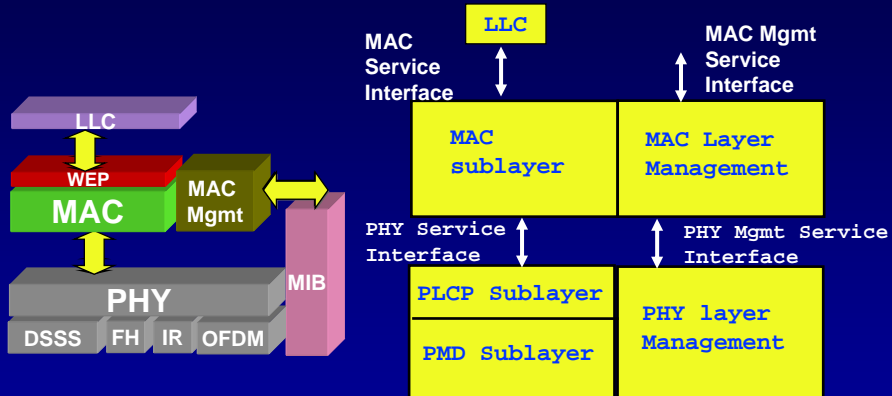
## 802.11 Specifications



- Specification of layers below LLC
- Associated management/control interfaces

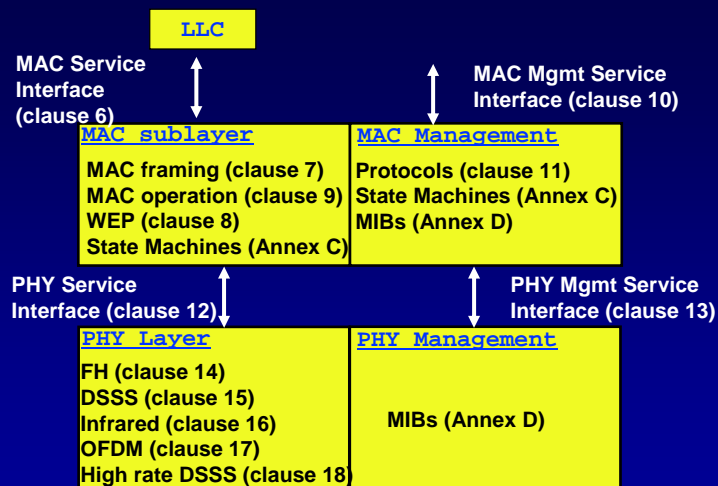
2

## 802.11 Specifications



3

## 802.11 Specifications

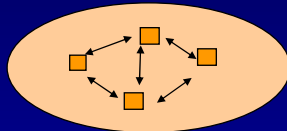


4

## 802.11 System Architecture

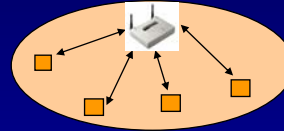
Basic Service Set (BSS): a set of stations which communicate with one another

Independent Basic Service Set (IBSS)



- only direct communication possible
- no relay function

Infrastructure Basic Service Set (BSS)

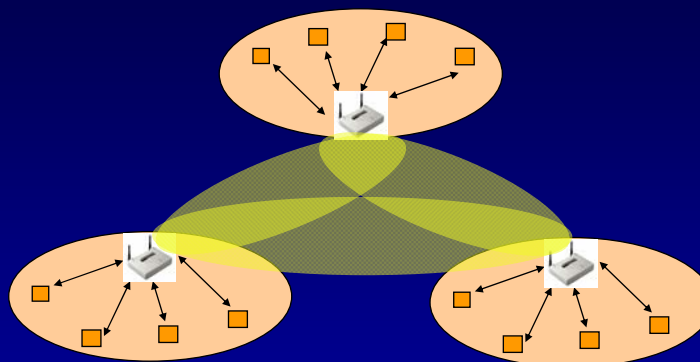


- AP provides
  - connection to wired network
  - relay function
- stations not allowed to communicate directly

5

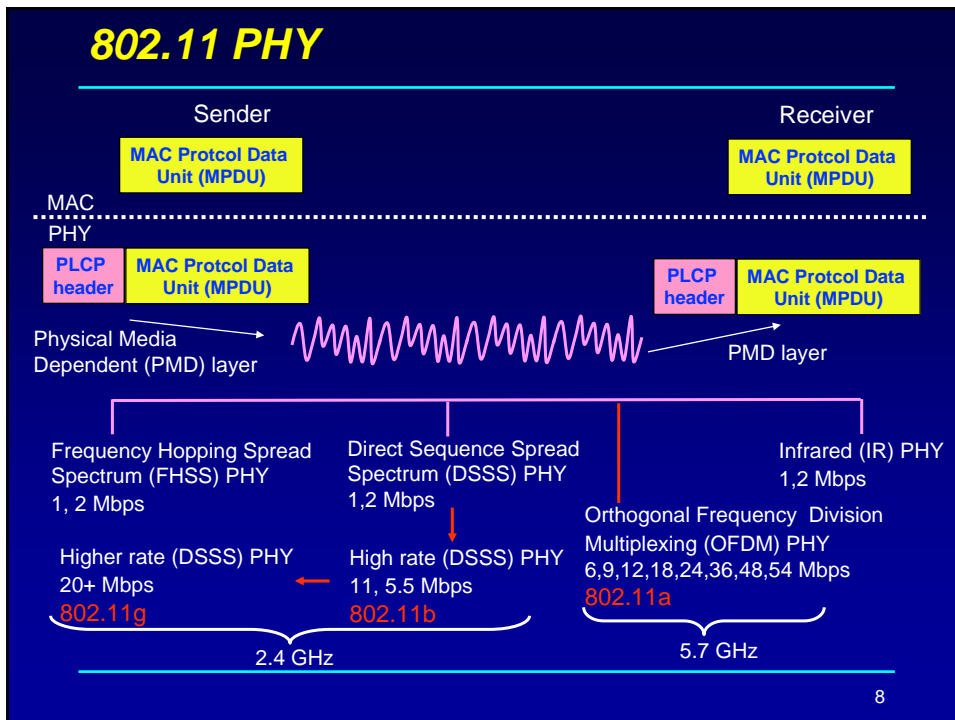
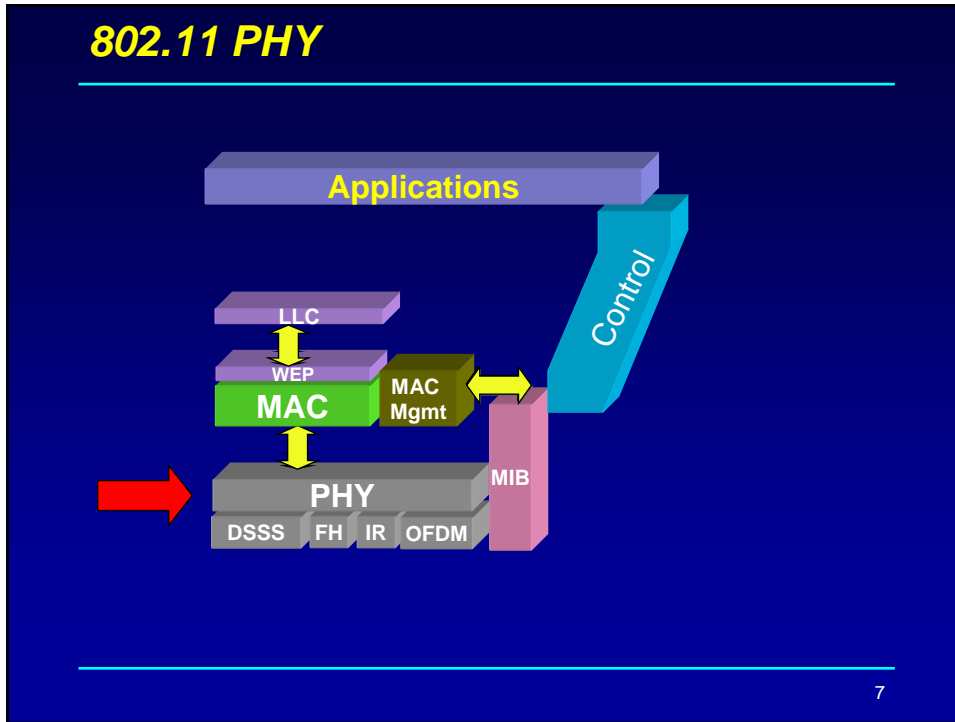
## Extended Service Set

ESS: a set of BSSs interconnected by a distribution system (DS)



- ESS and all of its stations appear to be a single MAC layer
- AP communicate among themselves to forward traffic
- Station mobility within an ESS is invisible to the higher layers

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## DSSS PHY

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Preamble 1 Mbps Header 1, 2 Mbps MPDU

DPSK modulation

Transmitter baseband signal

Spread the signal using Barker word (11 bits)  
+1, -1, +1, +1, -1, +1, +1, +1, -1, -1, -1

Transmitted signal after spreading

Received signal after despreading

DPSK de-modulation

- Baseband signal is spread using Barker word (10 dB processing gain)
- Spread signal occupies approximately 22 Mhz bandwidth
- Receiver recovers the signal by applying the same Barker word
- DSSS provides good immunity against narrowband interferer

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## DSSS PHY

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Ch 1 Ch 6 Ch 11

22 Mhz

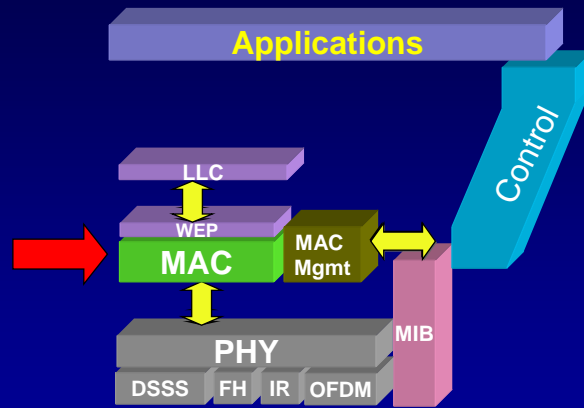
83.5 Mhz

- Direct sequence spread spectrum
  - ▶ Each channel is 22 Mhz wide
- Symbol rate
  - ▶ 1 Mb/s with DBPSK modulation
  - ▶ 2 Mbps with DQPSK modulation
  - ▶ 11, 5.5 Mb/ps with CCK modulation
- Max transmit power
  - ▶ 100 mW = ?? dBm = ?? dBW??

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## 802.11 MAC



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## 802.11 MAC

### ■ Carrier sensing (CSMA)

#### ▶ Rules:

- carrier ==> do not transmit
- no carrier ==> OK to transmit

#### ▶ But the above rules do not always apply to wireless.

- Solution: RTS/CTS

### ■ Collision detection (CD)

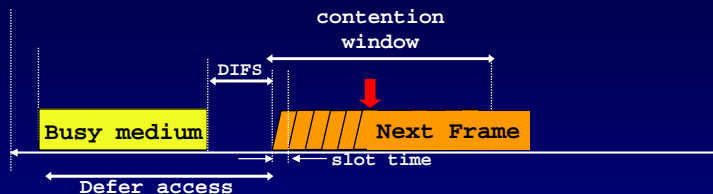
#### ▶ Does not work over wireless

#### ▶ Therefore, use collision avoidance (CA)

- random backoff
- priority ack protocol

12

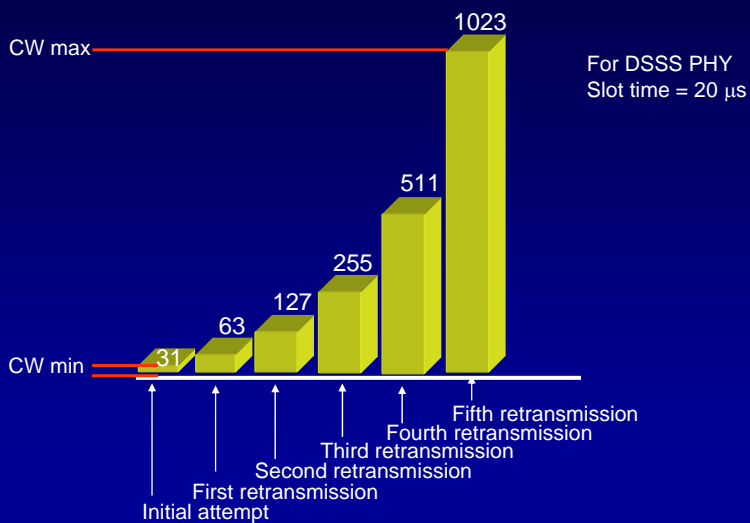
## 802.11 MAC protocol: CSMA/CA



- Use CSMA with collision Avoidance
  - ▶ Based on carrier sense function in PHY called Clear Channel Assessment (CCA)
- Reduce collision probability where mostly needed
- Efficient backoff algorithm stable at high loads
- Possible to implement different fixed priority levels

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## 802.11 MAC : Contention window



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