Wireless LANs

- Protocol Stack
- Physical Layer
- MAC sublayer
- Frame structure
- Services

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802.11 Protocol Stack

- LLC: <u>Intended to hide the differences between different 802 standards</u>
- MAC & Physical: _____
  - – 3 low speed: _____
  - – 3 high speed: _____

	Logical link control					Data link layer
MAC sublayer						
802.11 Infrared	802.11 FHSS	802.11 DSSS	802.11a OFDM	802.11b HR-DSSS	802.11g OFDM	Physical layer

Upper layers

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802.11 Physical Layer

802.11 Infrared	Infrared	1Mbps or 2Mbps	Gray code
802.11 FHSS	2.4GHz ISM band	1.6Mbps	79*1MHz channels
802.11 DSSS	2.4GHz ISM band	1Mbps or 2Mbps	1Mbaud at 1/2 bits/baud
802.11a OFDM	5GHz ISM band	54Mbps	52 frequencies
802.11b HR-DSSS	2.4GHz ISM band	11Mbps	1.375Mbaud at 1/2 bits/baud
802.11g OFDM	2.4GHz ISM band	54Mbps	

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Wireless Problems

■ Hidden station: _____

_____

■ Exposed Station: _____

_____

■ Half Duplex: _____

_____

■ 802.11 Modes of Operation
  – DCF
  – PCF

Range of C's radio

A   B   C

C is transmitting

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DCF: _____

- CSMA/CA
  1. Sense _____
     - If Idle then _____
     - If Busy then _____
     - If Collision then _____
  2. MACAW: _____
     - RTS & CTS: _____
     - May need to estimate ACK _____
     - NAV: _____

A	RTS		Data	
B		CTS		ACK
C		NAV		
D		NAV		

Time ⟶

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Fragmented frames

- Wireless networks are _____
  - Smaller units have a greater chance of success
    - 802.11 allows frames to be broken into _____
    - Transmitted using _____
  - NAV only works for _____

Fragment burst

A	RTS		Frag 1	Frag 2	Frag 3
B		CTS	ACK	ACK	ACK
C		NAV			
D		NAV			

Time ⟶

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PCF: _____

- Base station polls the stations _____ _____
  - Since order is controlled _____
- Polling mechanism is specified but _____ _____
- For new stations the base station issued a beacon _____ _____

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Combined PCF & DCF

- Time after a frame
  - SIFS: _____
  - PIFS: _____
  - DIFS: _____
  - EIFS: _____

Control frame or next fragment may be sent here

|←— SIFS —→|

PCF frames may be sent here

|←———— PIFS ————→|

DCF frames may be sent here

|←———— DIFS ————————→|

Bad frame recovery done here

|←———— EIFS ————————————→|

ACK

Time ———————→

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Frame Structure

- Data frames:

Bytes	2	2	6	6	6	2	6	0-2312	4
	Frame control	Dur-ation	Address 1	Address 2	Address 3	Seq.	Address 4	Data	Check-sum

Bits	2	2	4	1	1	1	1	1	1	1	1	
	Version	Type	Subtype	To DS	From DS	MF	Re-try	Pwr	More	W	O	Frame control

- Management frames: _____ _____
- Control frames: _____ _____

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Distribution Services

- Association: _____
- Disassociation: _____
- Reassociation: _____
- Distribution: _____
- Integration: _____

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Intracell Services

- Authentication: _____
- Deauthentication: _____
- Privacy: _____
- Data Delivery: _____

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