WLAN – CSMA/CA – Frame

By

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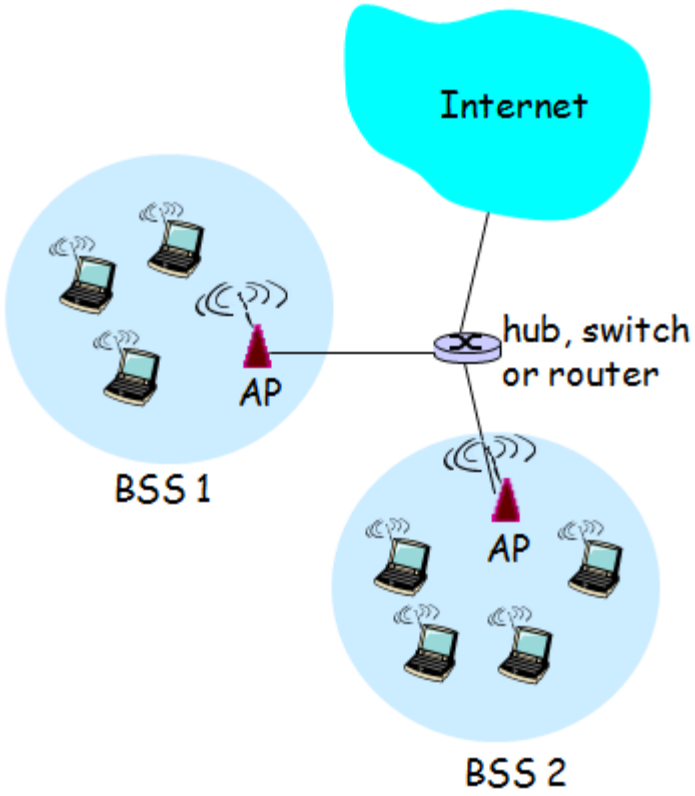
Wireless LAN – IEEE 802.11 - Architecture



- ✓ Multiple Access

- ✓ Avoid collisions: 2+ nodes transmitting at same time
- ✓ 802.11: CSMA - Sense before transmitting
- ✓ Don’t collide with ongoing transmission by other node

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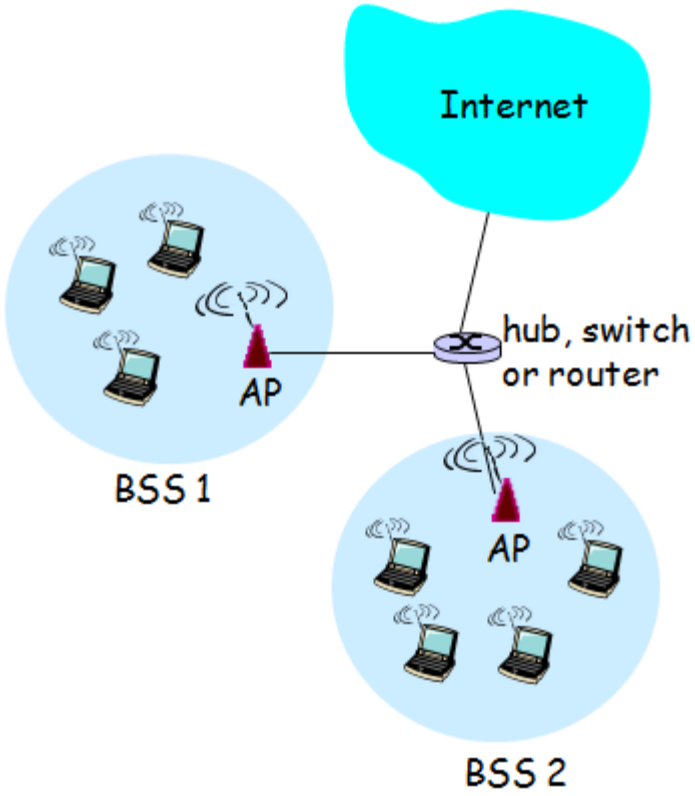

- ✓ Multiple Access

- ✓ 802.11: No collision detection!
- ✓ Difficult to receive (sense collisions) when transmitting due to weak received signals (fading)
- ✓ Can’t sense all collisions in any case: Hidden terminal, Fading
- ✓ Goal: Avoid collisions: CSMA/C(ollision)A(voidance)

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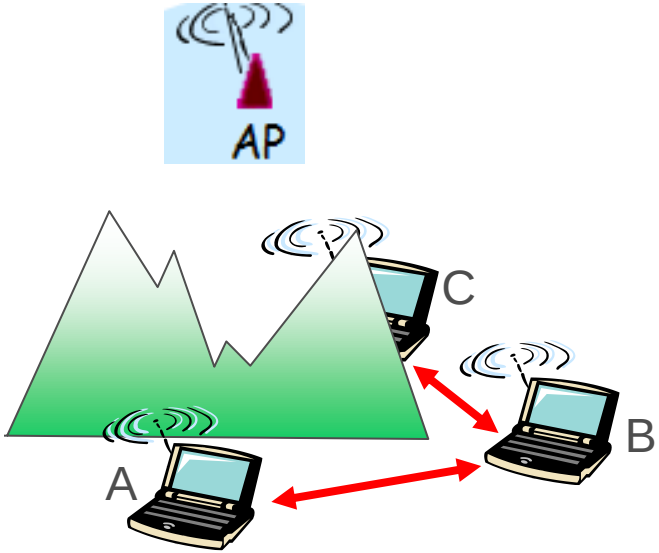

- ✓ Hidden Terminal

- ✓ B, A hear each other
- ✓ B, C hear each other
- ✓ A, C can not hear each other
- ✓ A, C unaware of their interference at B
- ✓ Solution: CSMA/ CA

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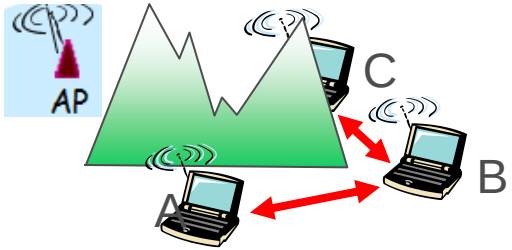

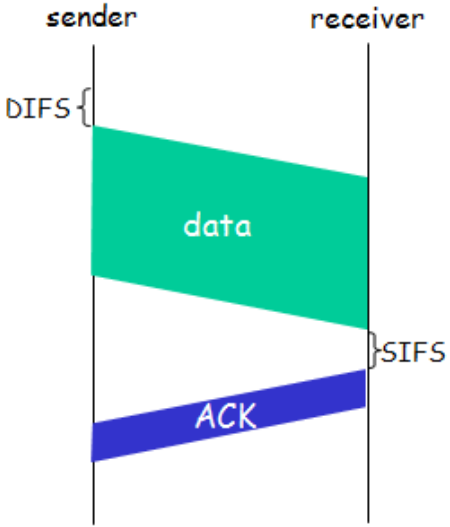

- ✓ CSMA/ CA: Sender

- ✓ 1. Sense the channel, if idle for DIFS, then transmit entire frame (no CD)
- ✓ 2. If Channel is busy, then
  - Start Random Backoff time
  - Timer counts down
  - While channel idle transmit
  - When timer expires, Sense the link
- ✓ Also for no ACK, increase Random Backoff interval, repeat 2

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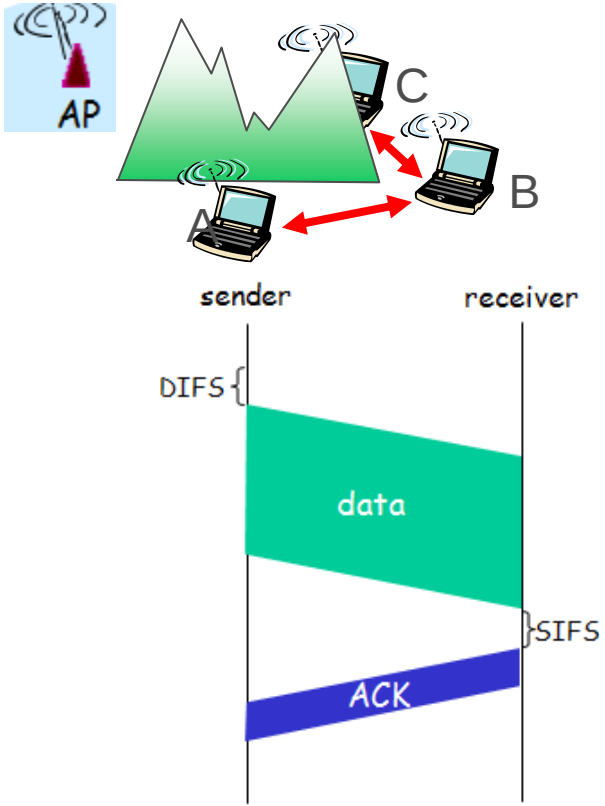

- ✓ CSMA/ CA: Receiver

- ✓ If frame received OK
- ✓ Return ACK after SIFS (ACK needed due to hidden terminal problem)

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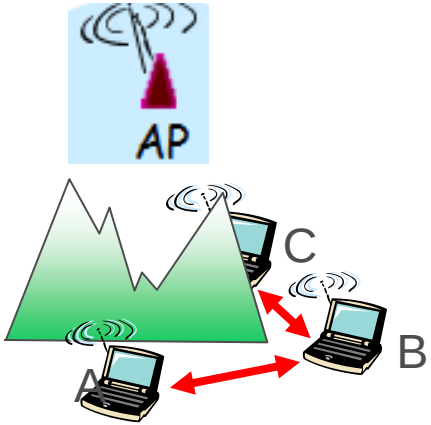
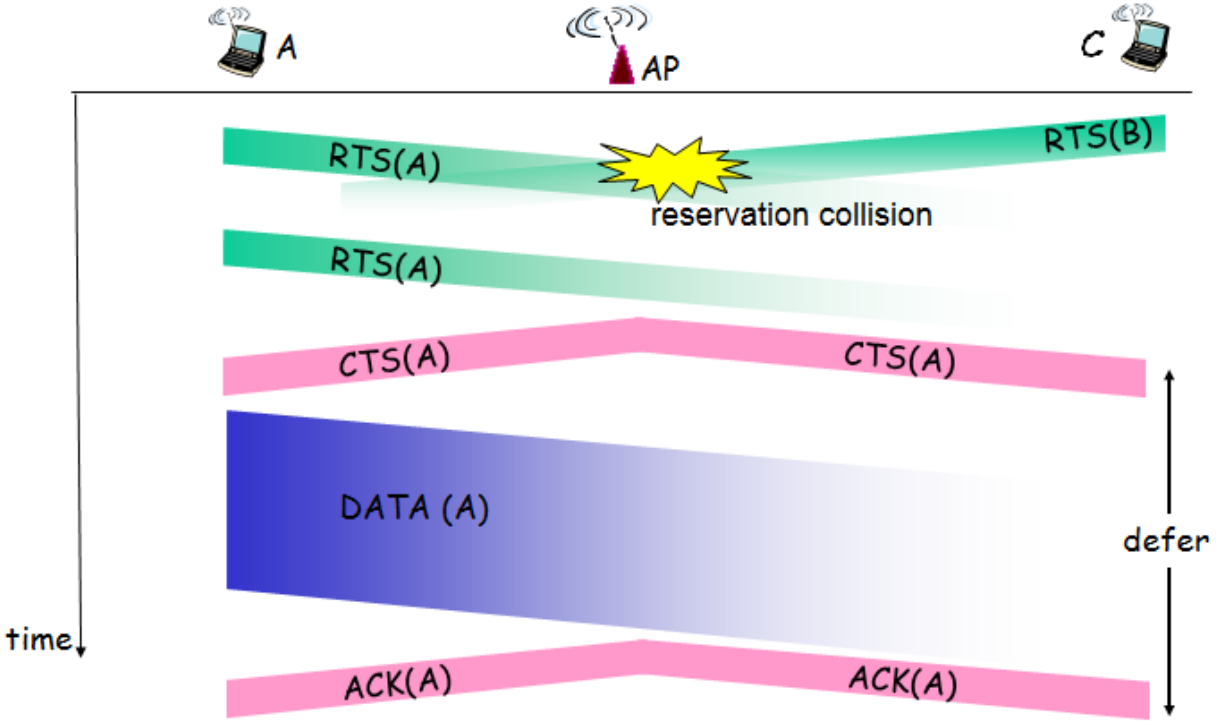


✓ CSMA/ CA



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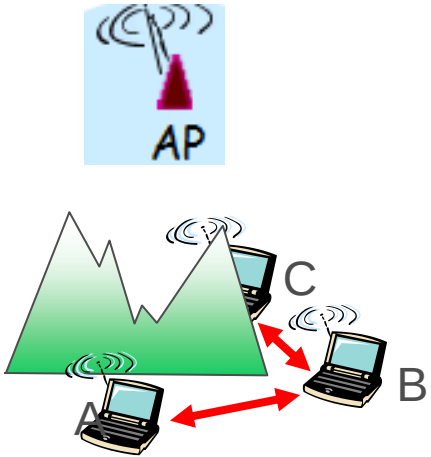


- ✓ CSMA/ CA

- ✓ Idea: allow sender to “reserve” channel rather than random access of data frames: avoid collisions of long data frames
- ✓ Sender first transmits small Request-To-Send (RTS) packets to BS using CSMA
- ✓ RTSs may still collide with each other (but they’re short)
- ✓ BS broadcasts Clear-To-Send (CTS) in response to RTS
- ✓ RTS heard by all nodes
- ✓ Sender transmits data frame, if CTS is received
- ✓ Other stations defer transmissions

Wireless LAN – IEEE 802.11- Frame Format

Address 1: Receiver's MAC address (Wireless host or AP)

Address 2: Sender's MAC address (Wireless host or AP)

Address 3: Router's MAC address

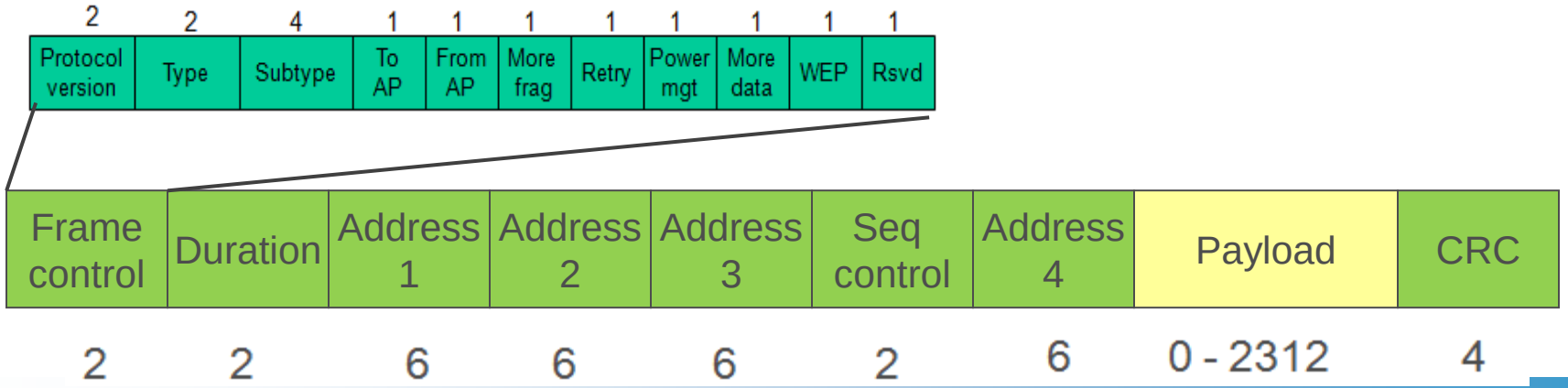
Address 4: Used only in Adhoc Mode

Duration: Reserved Time Limit to Transmit (RTS/CTS)

Seq Control: Seq # of Frame

Frame Control Filed

Frame Type: RTS, CTS, ACK, DATA



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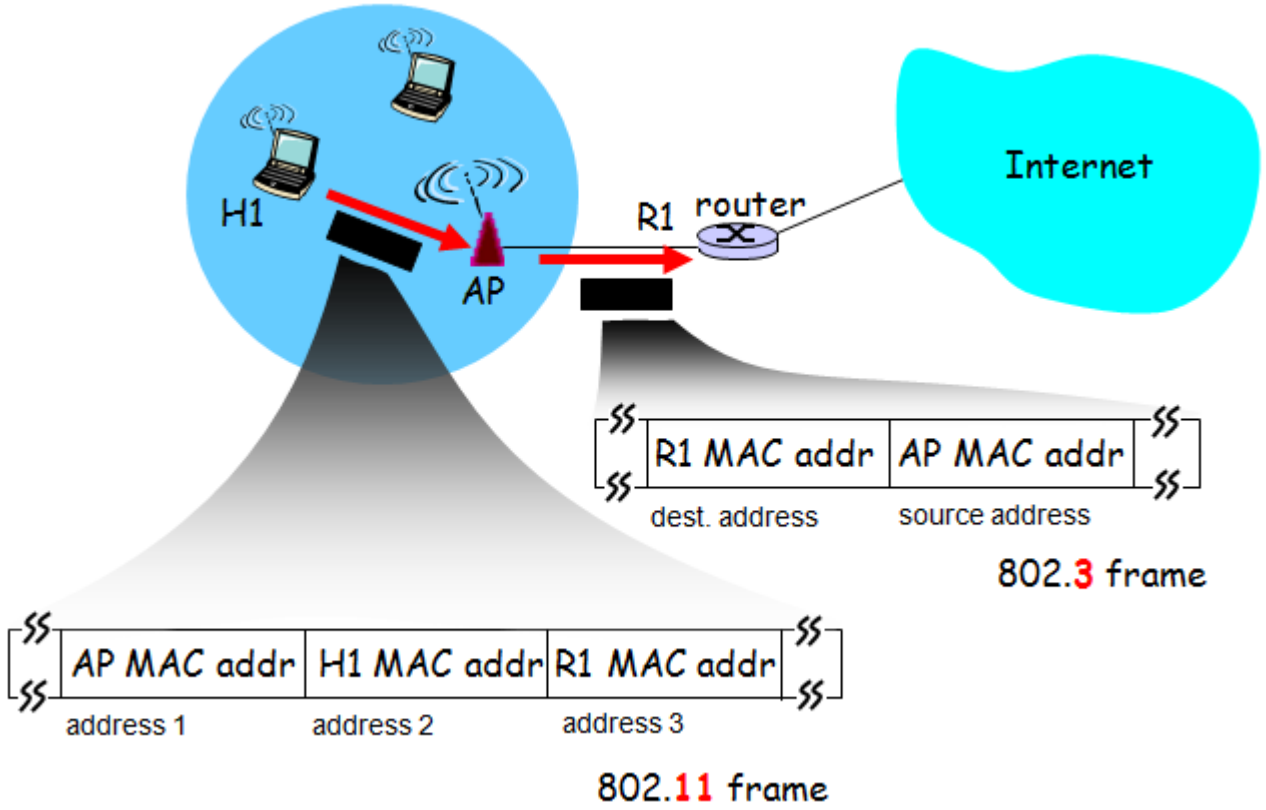

References

- ✓ Book: Computer Networking: A Top Down Approach Featuring the Internet, 3rd edition. Jim Kurose, Keith Ross Addison-Wesley, July 2004

- ✓ Various Relevant Websites

Thank You