ADHOC – MAC : a new, flexible and reliable MAC architecture for ad-hoc networks

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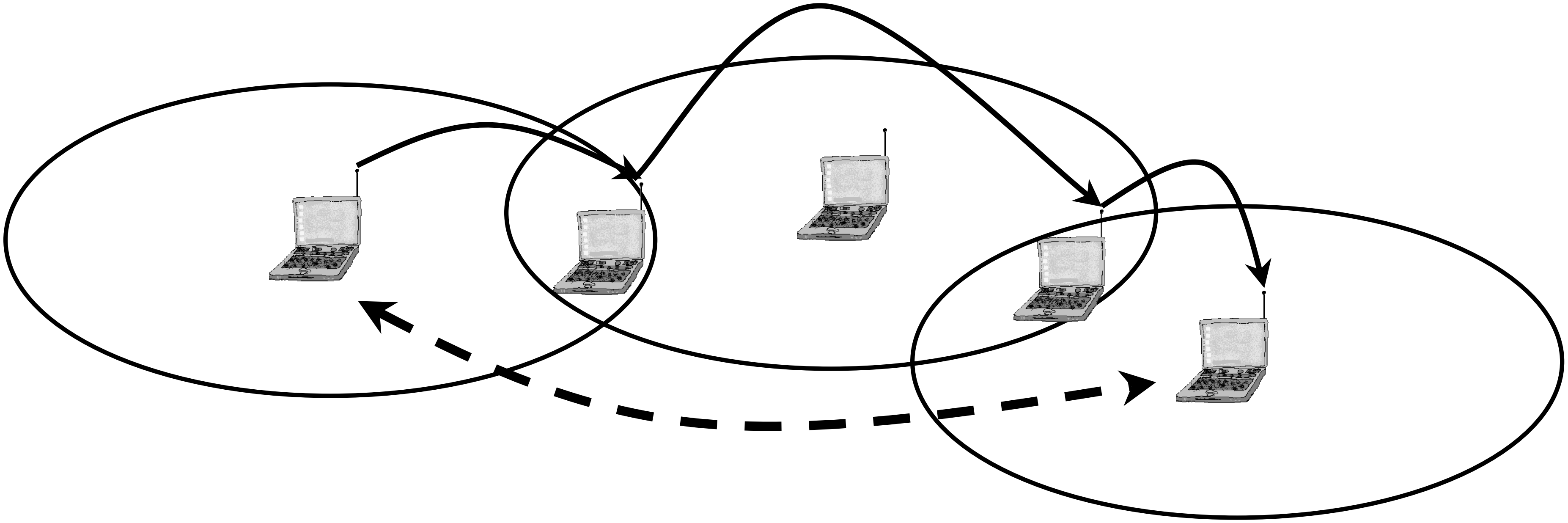
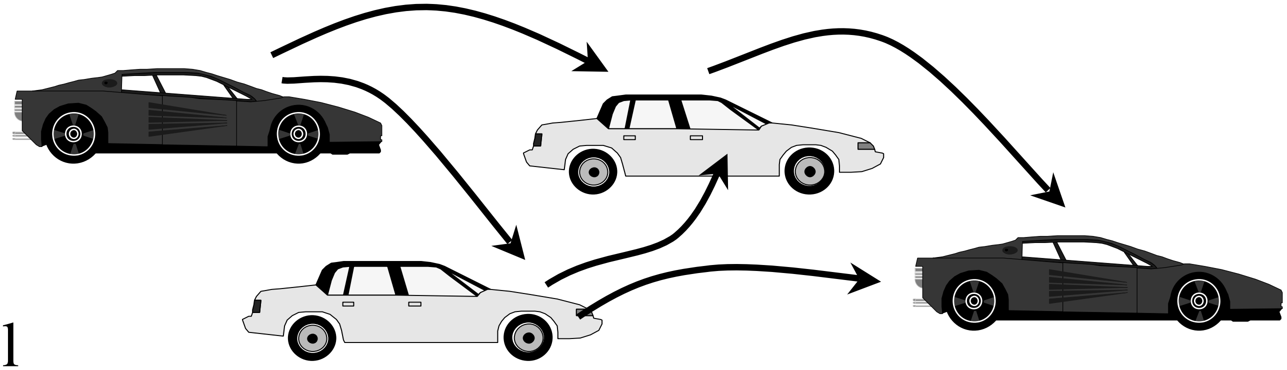
Ad-Hoc Networks



- No fixed infrastructure
- Limited propagation range
- Need for terminal relaying/routing

Inter-vehicles ad-hoc Networks



- Traffic control
- Entertainment
- Internet access

Speed poses stringent requirements

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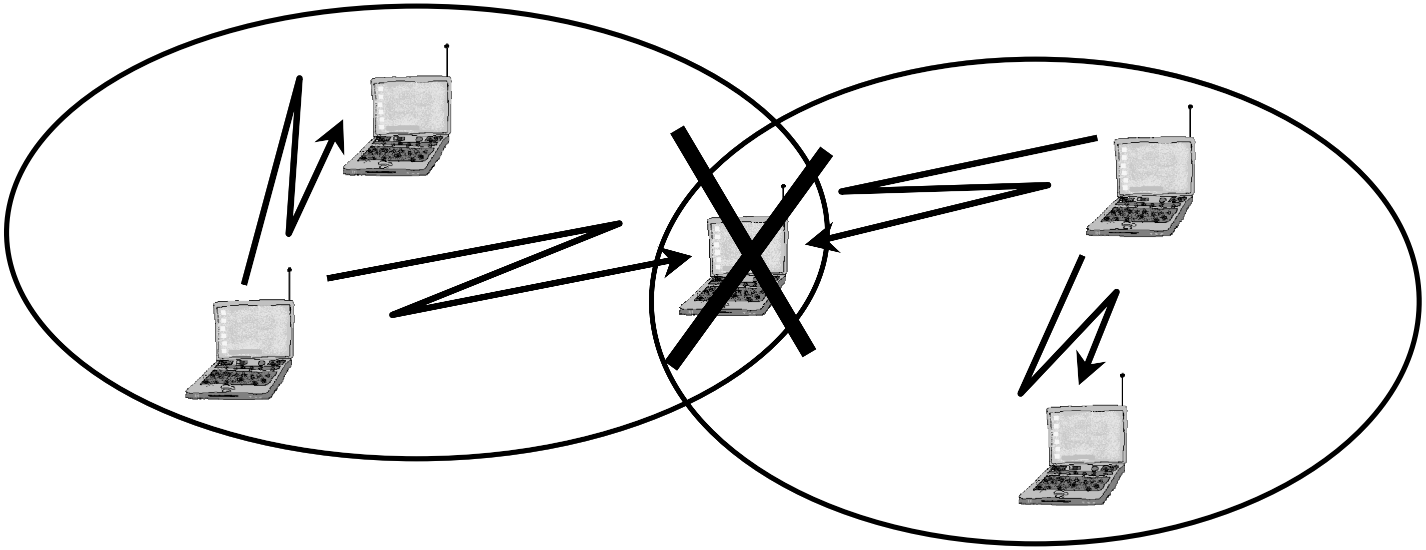
No centralized operation

MAC problem: Hidden terminal

not completely solved by IEEE 802.11(CSCA)

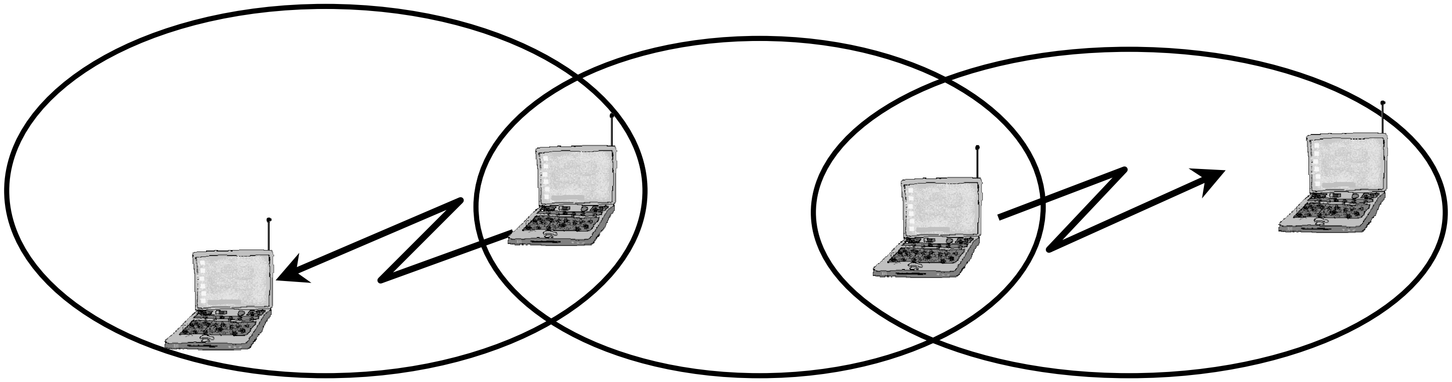


Impact on :

- radio access
- local broadcast

MAC problems: exposed terminal

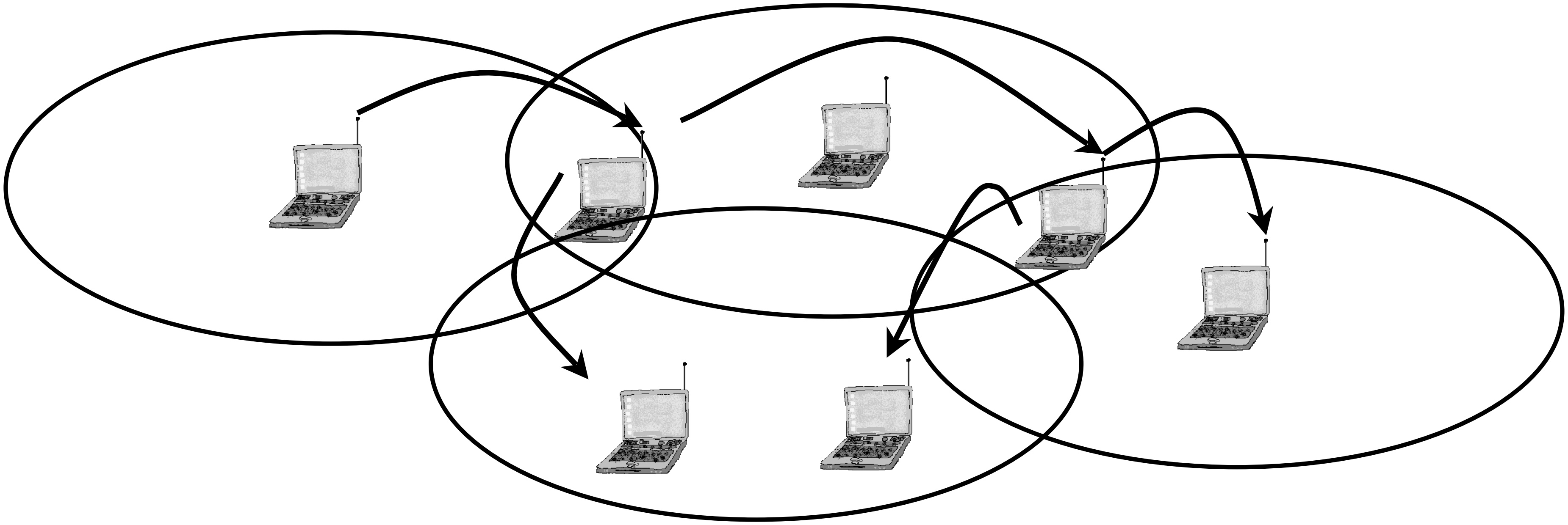
unsolved by IEEE 802.11 (RQS/CLS)



Impact on efficiency since parallel
transmissions can be prevented

MAC problems: broadcast service

how to chose bridges



Tree-based protocols not applicable due to dynamic topology

Flooding highly inefficient with high degree of connectivity

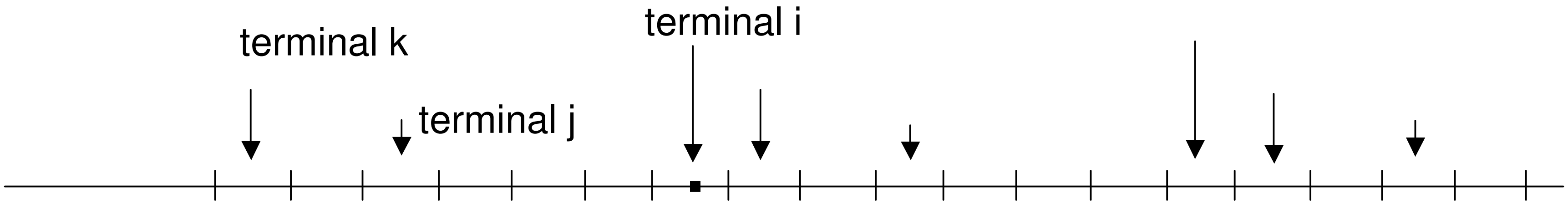
(n transmissions instead of 1)

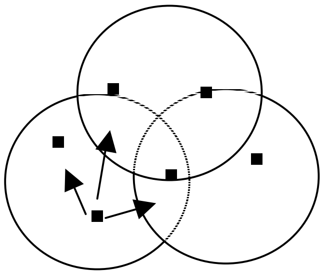
ADHOC MAC

- **Features:**
  - Layer two connectivity information
  - Access to a reliable single-hop broadcast
  - QoS support for different applications
  - Efficient point-to-point communication (parallel transmissions)
  - Efficient multi-hop broadcast

ADHOC MAC

- Time slotted channel (eg, using GPS time synch)
- Basic Channel (BCH)
  - Each active terminal owns a slot (Basic Channel)
  - It periodically transmits channel status information in it
  - Slots are grouped into virtual frames (VF) of length N
  - Transmissions are received by all terminals within one hop range



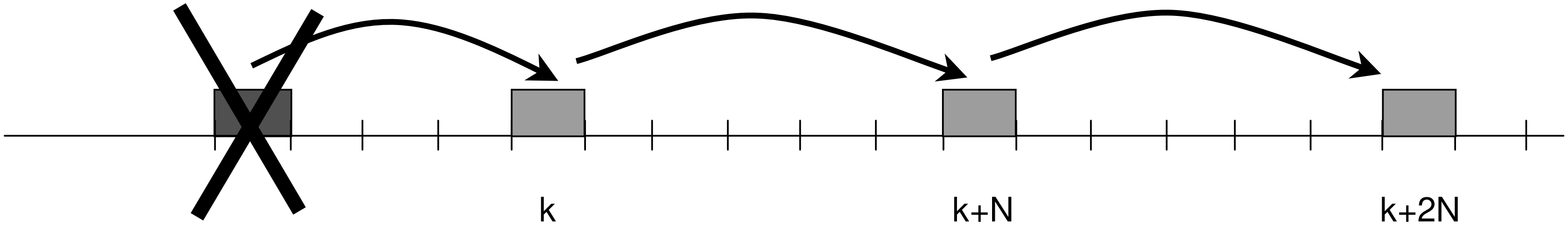


BCH is established using the **Reliable Reservation ALOHA** protocol

Reservation ALOHA

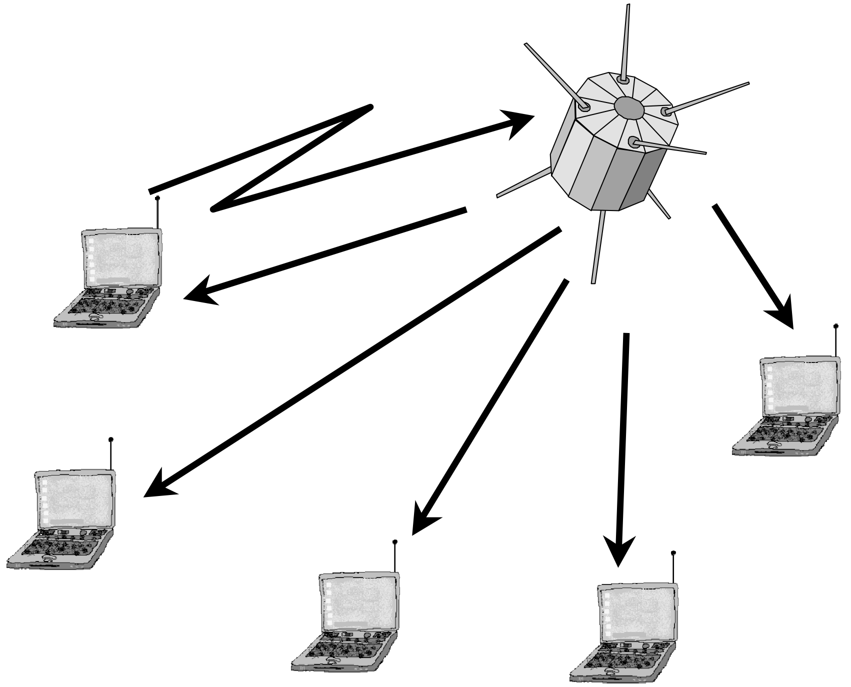
a distributed way to establish TDMA channels

a slot successfully captured is periodically reserved (every N slots) until released



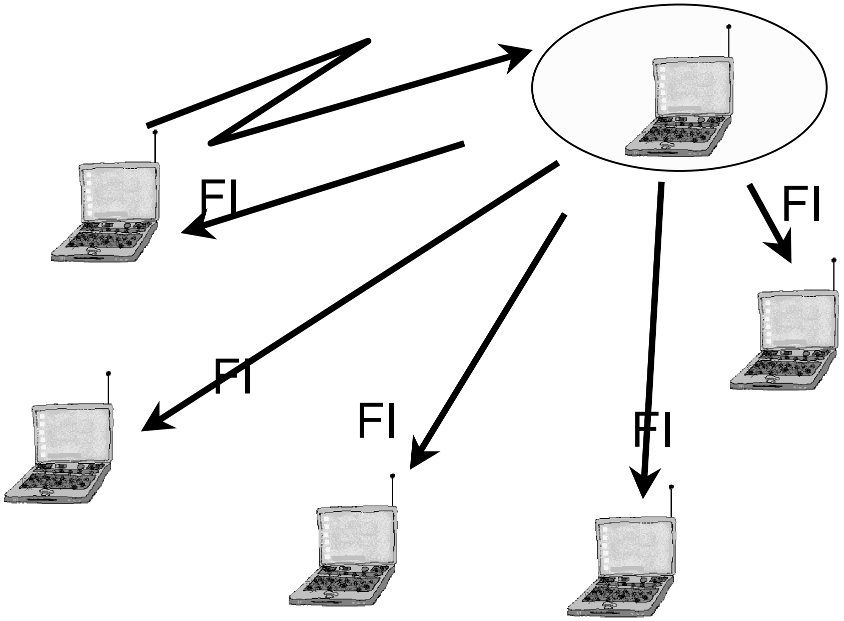
Reservation ALOHA

needs a centralized radio environment with central station feedback, so that all terminals "see" the same slot status: busy, free, collided



Reliable Reservation ALOHA

- operates in a distributed radio environment
- each terminal propagates slot status information (Frame Information) using BCH



Reliable Reservation ALOHA

- all active terminals transmit the **Frame Information** every N slots (within the virtual frame)
- FI specifies the status of the previous N slots (in the Sliding Virtual Frame) as observed by the terminal
    - BUSY correct transmission
    - FREE no transmission or collision