

# Project II and review session

3/6/06

# Mobility and routing

- Mobility makes routing in ad hoc networks difficult.
  - Network topology changes.
  - Maintaining the network state creates heavy overhead.
  - Without global knowledge, route discovery has to rely on flooding.
  - Challenge: what information is maintained in the network that facilitates routing?

# Mobility and routing

- However, mobility is not always a bad thing.
  - Explicitly use mobility to help deliver messages.
  - From the information theory point of view, mobility helps to improve the capacity of the network.
  - Challenge: how to design routing protocols that explicitly use node mobility?

# Project II: routing in ad hoc mobile networks

- Design routing algorithms for ad hoc **mobile** networks.
  - Consider a realistic application scenario.
  - Identify mobility model and traffic patterns.
  - Quality-of-service requirements.
- Example I: vehicles on highways.
  - Mobility model is simple.
  - High requirement on delay.
  - Cars have GPS.

# Project II: routing in ad hoc mobile networks

- Example II: autonomous robots.
  - Mobility model is complicated.
  - Low requirement on delay.
  - Ask a robot to physically move to the destination to deliver the packet.
  - Contention resolution.

# Use mobility to help routing

- Design an algorithm that use mobility to help routing.
  - For example, in geographical forwarding, choose the neighbor that is moving towards the destination.
  - Hold the packet until the trajectory leads away from the destination.
  - Test your mobility-aware algorithm against, say, mobility-unaware algorithms.

# Midterm

- In-class midterm on Friday 3/10/05.
- Closed book exam.
- Scope: what have been covered in class.
- Focus: basic design principles.
- Suggestion for preparation: required readings.

# Overview

- Wireless transmission fundamentals
  - Signal, signal representation
  - Three basic parameters: frequency, amplitude, phase.
  - Signal propagation, multi-path propagation.
  - Path loss, fading



# Overview

- Modulation
  - Digital data → analog data
  - ASK, FSK, PSK.
  - QPSK: change both amplitude & phase.
- Multiplexing
  - Space, frequency, time, code.

# Overview

- Medium Access
  - Multiple users share the same medium
  - SDMA, FDMA, TDMA, CDMA
- TDMA
  - Random access: Aloha, Slotted Aloha.
  - CSMA (carrier sense medium access), Exponential backoff scheme.
  - Hidden terminal problem.
  - Reservation.

# Overview

- CDMA
  - How to choose good codes?
  - Encoding, decoding, error correction.
- Wireless network infrastructures
  - Infrastructure-based networks: access points, cellular networks.
  - Ad hoc networks: Bluetooth.

# Overview

- Routing protocols for ad hoc networks
  - Proactive protocols
  - Reactive protocols
  - DSR (dynamic source routing)
  - DSDV (destination sequence distance vector routing)
  - AODV (ad hoc on-demand distance vector routing)
  - Geographical routing.

# Questions?