CSE 561 Lecture 13 (ooh)

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Today

GPSR

Wired $\rightarrow$Wireless (special wireles problems)

Multiple Access wireless

802.11

MACAW discussion

GPSR

Ad-hoc vs. hybrids with fixed infrastructure

Making routing scale:

- Hierarchy
- On-demand routes
- Geograpy

GPSR = Greedy + Right-Hand-Rule

- Make a planar graph
- Relies on location service

GPSR thoughts (from reviews)

What about power?

- Perimeter nodes do a lot of work
- Send to less distant nodes?
- Exploit stations with lots of transmit power?

Know your neighbors

- What about Indoors (no GPS)?
- What if the destination is moving?
- How to set beacon interval?

Multiple Access Wireless

token slide on cellular wireless networks.

centralized division of medium to active stations

- FDMA - Frequency division multiple access
- TDMA - Time
- CDMA - Code

but back to decentralized packet-switched computer networks and statistical multiplexing. ;)

Wired $\rightarrow$Wireless

What are the problems?

ALOHA

An early wireless protocol connecting Hawaiian islands

ALOHA (1970) inspired Ethernet (1976)

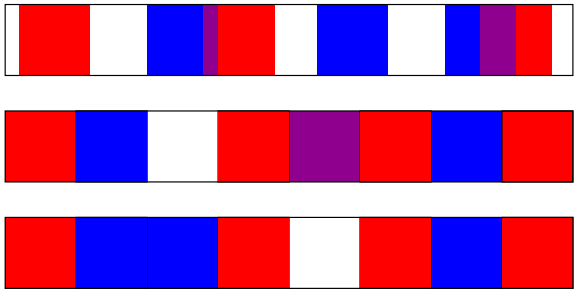
No carrier sense. No collision detection circuit.

Detect collisions by ack or implicitly.

Basic: send whenever

Slotted: synchronize frame start

Reservation: slotted + finders keepers



Still around in cell phone networks.

CSMA/CD and CSMA/CA

Scheme: wait until the medium is idle *before* transmitting.

Ethernet ≈ 1-persistent CSMA/CD

rule?

802.11 ≈ p-persistent CSMA/CA, optional RTS/CTS

rule?

Why no collision detection in 802.11?

receiver overloaded by transmitter

congestion matters at the receiver

but how do you know a transmission was successful?

Wireless Challenge: Hidden stations

The medium may not be idle at the receiver (fading).

What happens when your advisor has a phone headset? :P

Hidden stations and RTS/CTS

RTS: Please don’t send until I get a CTS.

CTS: Please don’t send until I’ve got my frame.

Wireless Challenge: Exposed stations

Waiting for the medium to be idle, but ...

Starvation of the best-placed station?

Exposed stations solutions

DS in MACAW. How does it help?

p-persistence in 802.11’s CSMA/CA. How can it help?

What about MACA/MACAW?

MACA $\rightarrow$MACAW

Why ACK?

Why RRTS?

Is DS needed in 802.11?

Why “MILD” backoff strategy?

More questions

What if frame size $<$ RTS size?

Wireless + TCP

Congestion signaling: Split TCP

Spurious retransmissions: Eifel

WEP

Turns out not so much.