ECE 435 – Network Engineering
Lecture 37

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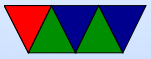
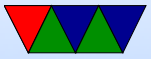
Announcements

- Final is Monday, May 5th 10:30am, here
- Will review for it today
- Will go over HW#11 today
- Don't forget course reviews!
- Still looking for people willing to move presentation from Friday to Wednesday



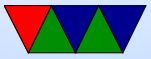
Final Exam Preview

- Final on Monday 5th of May at 10:30am, here
- Can have one single-side 8.5x11" piece of paper for notes
- Cumulative, but focusing on things after the first midterm
- Know the 7 OSI layers
- Physical layer: know things like the tradeoffs fiber/copper, satellite, fiber
- Link Layer: Ethernet (why it won over token ring), how collision detection works. Wireless ethernet, how



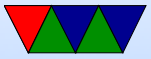
collision detection works.

- IPv4 – addresses. traceroute output
- IPv6 – addresses, why necessary
- TCP/UDP – why use one over the other, three-way handshake
- Cellphones, Bluetooth, Security – be aware of these topics but any questions on them will be brief
- Probably no socket programming
- Might show packet dumps, not expect you to memorize all the offsets, will provide the info you need to decode them



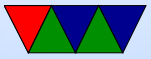
HW#11 Review – Bridges/Switches

- How does switch find destination it hasn't seen? Broadcasts
- Why separate VLANs? Bandwidth, security. Excessive broadcast traffic



HW#11 – Wifi Power

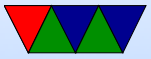
- 31dbm – 1.26W
  $P = 1W * 10^{Pdbm/10}/1000$
  $P = 1W * 10^{3.1}/1000 = 1.26W$
- How is CSMA/CA different than CSMA/CD?
  mostly can't reliably detect collisions so tries to avoid collisions pre-emptively and tells if frames got through via ACKs



HW#11 – Frame Decode

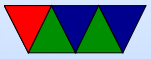
- This is a bit tricky, as the bits are backwards and everything else
- A frame I gathered on my old network that was still WEP which explains the WEP-ICV data at end
- Decoding – 0x08 0x42 0x2c 0x00

```
Frame Control Field: 0x0842
        .... ..00 = Version: 0
        .... 10.. = Type: Data frame (2)
        0000 .... = Subtype: 0
        Flags: 0x42
            .... ..10 = DS status: Frame from DS to a STA via AP
                        (To DS: 0 From DS: 1) (0x2)
```

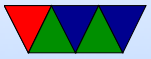


```
          .... .0.. = More Fragments: This is the last fragment
          .... 0... = Retry: Frame is not being retransmitted
          ...0 .... = PWR MGT: STA will stay up
          ..0. .... = More Data: No data buffered
          .1.. .... = Protected flag: Data is protected
          0... .... = +HTC/Order flag: Not strictly ordered
.000 0000 0010 1100 = Duration: 44 microseconds
```

- Next 3 are MAC addresses Transmitter=Cisco/Linksys router Destination=Apple device Source=Cisco/Linksys router
- 30 e9 = fragment/sequence number
- Didn't ask for, but next was WEP Initialization Vector: 0xd210bf



- encrypted data
- At end – WEP-ICV
- Checksum



HW#11 – Bluetooth

- Bluetooth and 802.11b both live at 2.4GHz. This is allowed, both are in ISM band