CSE 123a
Computer Networking

Fall 2005

Final Review

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When/when/who?

- Tuesday 3:00-6:00 in this room

- I need to be giving a talk in Toronto so the final will be proctored by the TAs
Final Mechanics

- Will cover entire year of material (but with some bias to the material post-midterm)

- Based on lecture material, homeworks, textbook reading and project work

- Closed book, closed note, closed PDA, cell phone, etc
  - You get one 8.5x11 sheet of notes (both sides is fine)

- Will be similar in style to midterm
Protocol Layering & Internetworking

- Why do we layer protocols? Pros/Cons?
  - What are the layers and what functions do they serve?
  - What layer do the protocols we’ve studied fall into?

- What is Internetworking? What is it good for?

- What features does the IP protocol provide and why (and why not others?)

- What is the end-to-end principle and how you might use it when designing a set of protocols?
Physical layer

- **Signaling**
  - Shannon’s law (limits from noise)
  - Nyquist limit (limits from sampling)

- **Clock Recovery**
  - Asynchronous coding (e.g. start bit)
  - Synchronous coding (e.g. NRZI, Manchester, 4B5B)
Data-link layer

- Framing
  - Sentinel schemes
  - Length based
  - Clock-based
- Error detection codes
  - Parity schemes, CRC
- Media Access Control
  - Channel Partitioning (FDMA, TDMA, etc)
  - Random access
    - Contention based (Aloha, CSMA, CSMA/CD)
    - Contention-free (RTS/CTS, Token Ring, Polling)
  - Special issues for wireless
Bridges & switching

- Repeaters/Hubs
- Learning bridges
- Spanning tree protocol
Reliable communications

- What is the difference between ARQ and FEC?
- How does ARQ work?
- How to detect delayed or duplicated packets?
- How to detect lost packets?

- What are Stop and wait and sliding window?
  - How does the window size impact throughput?
  - How to implement each?

- How does flow control work in sliding window protocols?
Connections

- How to differentiate packets belonging to different “sessions”? (distinct conversations between pairs of processes)
- Connection-oriented vs connection-less protocols
  - Usefulness of each?

- How to establish a reliable connection?
- How to tear down a reliable connection?
- How do you use state machines to implement this?

- How do TCP and UDP work wrt these issues?
Congestion Control

- How does queuing work? How is congestion caused?
- What techniques can be used to reduce/manage congestion?

- How to detect congestion?
- How to respond to it?

- How does TCP congestion control work?
  - Slow start?
  - Congestion Avoidance?
  - Fast retransmission and fast recovery?
  - What assumptions are being made in these protocols?
Packet Forwarding

- IP addressing & use
  - DHCP
  - Destination lookup

- Router design issues
Intra-domain Routing

- What purpose does routing serve?
  - What are the pros/cons of destination-based routing?
- What is the difference between routing and forwarding?
- How does Distance Vector Routing work?
  - Poison reverse and split horizon?
- How does Link State Routing work?
  - What is in a link-state packet?
  - Reliable Flooding? Shortest-Path algorithm?
Inter-domain routing

- Why are inter and intra-domain routing different?
- What is a path vector protocol?
  - Why is it appropriate for inter-domain routing?
- How is BGP used to enforce routing policies?
- Routing policies?
  - What is peering vs transit? Why do they exist?
Multicast

- What is it?
- How does it work in a local-area network (IGMP)?
- Shared tree vs source-based tree (pros/cons)
- How does RPM work?

- How does tunneling work?
QoS

- Integrated Services
  - Why?
  - Kinds of services offered
  - RSVP design
  - Token bucket mechanism
  - Scaling issues

- Differentiated services
  - Advantages vs IntServ
  - Difference in service guarantees
Questions?
Quick admin stuff

- Project 1
  - Max = 100, Mean 86, Std Dev=20, Median = 96

- HW 2
  - Max = 20, Mean = 17.59, Std Dev=2.1, Median = 18
Thanks and good luck

- You are now ready to cause problems on the Internet…