

CSE 123a

Computer Networking

Winter 2005

Final Review

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Final Mechanics

- Will cover entire year of material (but likely 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 (although I will try to make more of the questions more focused)

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

MobileIP

- What are the problems in supporting mobility for TCP/IP?
- What were the design constraints of mobile IP?
- What is the relation between correspondent host, home agent, foreign agent and mobile host?

Questions?

Thanks

- Its been a tough class but you guys have gotten through it (almost :-)
- You're ready to cause problems on the Internet...

- See you at the final and good luck!