ECE/CS 372: Intro to Computer Networks
Final Review

FINAL EXAM THURSDAY JUNE 12TH
9:30AM LPSC 125
Chapter 4: Network Layer

Forwarding versus routing
- FW = process to move packets in to out
- RT = process by which FW table built/maintained
- Routing algorithm constructs forwarding table

Network layer service models
- Reliability, delay, in-order, throughput, jitter
- Connection vs. connection-less services
- Internet’s Network layer is connection-less
Chapter 4: Network Layer

Longest Prefix Matching
• Used for forwarding

Subnetting and IP addressing
• IP addr = 32 bit identifier (subnet and host part)
• Subnet = device interfaces with same subnet part
• Classful addressing vs. CIDR
• Subnetting example
• Why NAT?
Chapter 4: Network Layer

IP fragmentation and reassembly
- Different link types and MTUs

IPv6 vs IPv4
- Motivation?
- Tunneling

Routing algorithms (path selection)
- Link state (Dijkstra)
- Distance vector (based on Bellman-Ford Equation)
- Why hierarchical routing (Intra vs. Inter AS)
- RIP, BGP, OSPF
Chapter 5: Data Link Layer

Data link layer responsible for transferring datagram from one node to adjacent node over a link
- Links may have different protocols, links and services

Link layer services
- Link access and sharing, reliable delivery, error detection and correction

Error detection: single bit parity, 2D bit parity, CRC (modulo-2 arithmetic)
Chapter 5: Data Link Layer

Link-layer addressing

- IP is network layer address to get datagram to destination IP subnet
- MAC address get from one interface to another connection interface (same network)
- MAC is to IP as social security is to postal address
Chapter 5: Data Link Layer

Why not use just IP address?
- Can move NIC from one network to another, IP cannot
- Must reconfigure IP to NIC every time we move
- LANs designed for all layer protocols, not just IP

Why not just use MAC address?
- No addressing structure, hard coded by manufacturer
Chapter 5: Data Link Layer

Multiple access protocols

◦ Two types of links (point to point and broadcast)
◦ Single channel prone to interference and collision
  ◦ Need to share channel while reducing collisions
◦ Allows for multiple concurrent access to share channel
◦ No coordination and no out-of-band channel thus agreement about channel sharing must use channel itself
Chapter 5: Data Link Layer

Multiple access protocols (cont’d)

- Three broad classes: channel partitioning, taking turns, random access
- FDMA, TDMA, CSMA/CD, slotted and unslotted Aloha
- Example: Ethernet
Chapter 6: Wireless

Components of wireless networks

- Taxonomy

Wireless characteristics

- Decayed signal strength, interference, multipath propagation
- Hidden node problem and signal attenuation

Multiple access schemes

- FDMA, TDMA, CDMA and CSMA/CA
Chapter 6: Wireless

Wireless LANs
- Use 802.11 MAC protocol
- CSMA/CA: PCF and DCF
- Simple MAC and improved MAC examples
- Why SIFS, DIFS, exponential backoff?
- RTS/CTS mechanism

Carrier sense mechanisms
- Virtual sensing and physical sensing
Chapter 6: Wireless

Mobility terminology
- Home network, home agent, permanent address
- Visited network, foreign agent, care-of-address
- Correspondent

Mobility approaches
- Mobility handled by routing or at end-systems
- Mobility registration and indirect vs. direct routing

Mobile IP using indirect routing (pkt within pkt)
- Challenges: packet loss/delay due to handoff, congestion, bandwidth
Chapter 8: Security

Security concerns?
◦ Eavesdropping, change, impersonation, DOS

What is network security?
◦ Confidentiality, Integrity, Authentication, Availability

Two main types of network security
◦ Symmetric key cryptography
◦ Public/private key cryptography
Chapter 8: Security

Confidentiality (makes sure message not decrypted)
  ◦ Symmetric and private/public key

Integrity (make sure message is not altered)
  ◦ Cryptographic Hash

Authentication (make sure sender is sender)
  ◦ Sender encrypts with private key, CA

Availability (resource should be available to users)
Chapter 8: Security

Symmetric Key
- Caesar cipher
- Monoalphabetic cipher (Problems?)
- Polyalphabetic cipher
- Block cipher (Problems?)
- Block cipher chaining

Public/private key cryptography

Securing E-Mail
What We Covered

In Class
- Chapter 4: Network
- Chapter 5: Data-Link
- Chapter 6: Wireless
- Chapter 8: Security

Out of Class
- Assignments 3,4,5
- Labs 3,4
- Book Reading
How and what to study

Understand lectures
  ◦ From Previous Slide
  ◦ Tables
  ◦ Examples

Understand labs

Understand assignments

Study techniques?
Exam Format

Similar to midterm

90% new stuff, 10% old stuff (background)

Lots of multiple choice
  ◦ Conceptual
  ◦ Multiple Answer

Some short answer

Some involved problems

1 hour 50 minutes to finish