Final Review

VIII. HTTP
   A. Web Terminology
      1. object, base-HTML page, URL
   B. HTTP Overview
      1. uses TCP, port 80
      2. stateless
   C. Connections
      1. non-persistent
      2. persistent
   D. HTTP Request Message
   E. HTTP Response Message
   F. Cookies
   G. Web Caching (Proxy Server)
-------- Mid Term covered up to here --------------
IX. DNS
  A. Distributed Hierarchy of Servers
      1. Root DNS servers
      2. TLD – Top-level domain servers
      3. Authoritative name servers
      4. Local name servers
  B. DNS Name Resolution
      1. Iterated query
      2. Recursive query
      3. Caching
  C. DNS Records and Protocol
X. Introduction to Security
  A. Malware definitions
      1. Spyware, botnet, virus, worm, Trojan horse
  B. Denial of Service (DoS) and Distributed DOS (DDoS) attacks
      1. Using packet sniffing
         a. Masquerading attacks
         b. Man-in-the-Middle Attacks
XI. Transport Layer (front part)
  A. TCP vs UDP
      1.   TCP demultiplexing (only)
  B. UDP
      1.   Some details (e.g., UDP header)
      2. Checksum
XII. Reliable Data Transfer Protocols {Treatment is TCP(end-to-end) and data link layer
     concurrently}
  A. Tanenbaum's Data Link Layer protocols
      1. Modeling Assumptions
         a. ARQ

      2. Utopia
      3. Stop-and-Wait   {introduce ACKs}
      4. PAR   {noisy channel}
        a. old version
          1. ACK, timer, duplicate frames
        b. "new version"   {ACKs, timers, premature timeouts}
      5. Sliding Window Protocols
        a. piggybacking ACKs
        b. 1-bit sliding window (protocol 4)
        c. Go Back N (protocol 5)
          i. cumulative ACKs
        d. Selective Repeat (protocol 6)
        e. NAKs, ACKtimer
XIII. Transport Layer (middle)
  A. Pipelining and Window Buffers
     1. max window size relative to sequence number rang
  B. TCP Flow Control
     1. advertised window (rwnd)
XIV. TCP Congestion Control (Transport Layer –back)
  A. Causes and Effects of Congestion
     1. Two of K&R scenarios discussed
  B. General Approaches to Congestion Control
     1. network-assisted with explicit indicators (e.g. ECN)
     2. end-to-end (e.g., TCP congestion control)
  C. AIMD
     1. cwnd – congestion window
     2. linear increase (AI) – congestion avoidance approach
  D. TCP Tahoe
     1. Slow Start
       a. ssthresh
     2. Fast Retransmit
  E. TCP Reno
     1. Fast Recovery
  F. Other TCP 'flavors' : New-Reno, SACK, Cubic and more!
  G. TCP three-way handshake
  H. Setting the RTO (not covered)
XV. Network Layer (part 1)
  A. Forwarding versus Routing (Lookup Tables)
  B. Routing Overview/Categorization
     1. Non-Adaptive
       a. flooding, shortest path
     2. Adaptive
       a. isolated and centralized
       b. link metrics (hops, delay, inverse of capacity)
  C. Distributed Routing

       1. IGP versus EGP

    D. Distance Vector Routing

       1. Bellman-Ford algorithm

       2. DV packets

       3. neighbors

       4. bad news slowly, good news quickly

       5. RIP (covered later)

XV. Network Layer (part 2)

    A.   IP Issues

       1. fragmentation/reassembly and IP header

       2. subnets, subnet masks, CIDR

    B. DHCP

       1. dynamic addressing protocol over UDP

    C. NAT

       1. Motivation – problems addressed

       2. Operation

    D. Link State Routing

       1. Dijkstra's Algorithm (not covered)

       2. Reliable Flooding

       3. LSP details

    E. Hierarchical Routing using AS's

       1. Intra-routing – OSPF

         a. multiple router types and LSA's

    F. Inter-routing –BGP

       1. reachability

XVI. Introduction to LANs, Ethernet and ARP

    A. IEEE802

    B. CSMA

    C. CSMA-CD

    D. Ethernet definition

       1. 1-persistent CSMA

       2. BEB – Binary Exponential Backoff

    E. ARP

       1. mapping Ethernet addresses to IP addresses

XV11. Wireless

    A.   WiFi - IEEE802.11b,g,n