Final Review

IV. Data Link Layer
D. Tanenbaum's DL protocols
1. Utopia
2. Stop-and-Wait {introduce ACKs}
3. PAR {noisy channel}
a. "old version" {timer}

----------***Mid Term Ended Here***----------

b. "new version" {ACKs, timers, premature timeouts}
4. Sliding Window Protocols
a. piggybacking ACKs
b. 1-bit sliding window (protocol 4)
c. Go Back N (protocol 5)
d. Selective Repeat (protocol 6)
e. window size versus max sequence number
f. NAKs, ACKtimer

V. Medium Access Sublayer (MAC)
A. "The Channel Allocation Problem"
1. assumptions
B. LAN Performance Notation
1. relative propagation time - **a**
2. S, I, and G {throughput, input load, offered load}
C. ALOHA
D. Slotted ALOHA
E. CSMA
1. non-persistent
2. 1-persistent
3. p-persistent
F. CSMA/CD and Ethernet
1. binary exponential backoff
2. Ethernet evolution (10Base5, 10Base2, 1Base5, 10BaseT)
G. Token Ring
1. token insertion choices
2. 802.5 token ring
H. Switched Ethernet
I. Bridges
1. backward learning
2. collision domains
J. Wireless LANs
1. Categories
2. 802.11
i. infrared
ii. FHSS
iii. DHSS
1. 802.11a

2. 802.11b
3. 802.11g
4. MAC Sublayer
    i. DCF
    ii. Hidden Terminal Problem
    iii. Exposed Station Problem
    iv. MACAW
    v. Virtual channel sensing
    vi. Frame fragmentation
    vii. PCF

VI. High Speed LANs

A. FDDI
1. differences from 802.5 token ring
2. 4B/5B encoding
3. dual ring

B. Fast Ethernet
1. 100 Base T4
    a. four twisted pairs
    b. 8B/6T encoding
    c. 33-1/3 Mbps per pair
2. 100 Base TX
3. 100 Base FX

C. Gigabit Ethernet
1. Fiber Channel technology
2. 8B/10B encoding
3. 1000 Base SX
4. 1000 Base LX
5. 1000 Base CX
6. 1000 Base T
7. carrier extension
8. frame bursting
9. buffered distributor

VII. SONET

A. optical fiber standard
1. common master clock
2. byte interleaved TDM

B. SONET architecture
1. ADM - add/drop multiplexor
2. REG - regenerator for optical signals
3. section/line/path

C. SONET frame
1. SPE Synchronous Payload Envelope
2. Overhead

D. Multiplexing hierarchy
1. up to STS-3 and beyond
2. down to virtual tributaries

VIII. ATM {Asynchronous Transfer Mode}
- A. Basics
  - 1. 53 byte cell-switching technology
  - 2. virtual circuits
- B. Conceptual Model Assumptions
- C. Header Details
  - 1. UNI versus NNI
  - 2. VPI/VCI
- D. Architecture
  - 1. variety of traffic types
    - a. original four types
    - b. revised traffic types
  - 2. AALs
    - a. AAL1
    - b. AAL3/4
    - c. AAL5
  - 3. CS and SAR sublayers
- E. Cell Switching Issues
  - 1. cells not reordered
  - 2. non-blocking switches
  - 3. PVCs versus SVCs

IX. Network Layer
- A. Routing
  - 1. Non-Adaptive
    - a. flooding
    - b. static
      - i. Dijkstra's Shortest Path routing algorithm
  - 2. Adaptive
    - a. centralized RCC
    - b. distributed
      - i. intradomain routing
      - ii. interdomain routing
  - 3. Distance Vector Routing
    - a. RIP
  - 4. Link State Routing
    - a. OSPF
  - 4. Border Gateway Protocols (BGP)

X. Transport Layer
- A. TCP Sliding Windows
  - 1. advertised window
- B. TCP Congestion Control
  - 1. router congestion notification
  - 2. congestion window (cwnd)
  - 3. AIMD
    - a. congestion avoidance
  - 4. slow start

----------***Course Ended Here***----------

5. fast retransmit
6. fast recovery
7. TCP Tahoe vs. TCP Reno