Final Review

---------------------------- *Final Material Begins Here* -------------------------

V. Local Area Networks
  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
  D.   CSMA/CD
  E.   Ethernet
     1. binary exponential backoff
     2. Ethernet evolution (10Base5, 10Base2, 1Base5, 10BaseT)
  F.   Switched Ethernet
     1. backward learning
VI. More LAN Topics
  A. Bridges
    1. backward learning
    2. collision domains
    3. loops
       a. transparent bridges (spanning trees)
       b. source routing bridges
  B. Token Ring
VII. Wireless LANs
  A.   Classification
   1.   Infrastructure
   2.   Ad Hoc
   3.   MANET
  B.   802.11 Protocols
   1.   infrared
   2.   FHSS
   3.   DHSS
       a.   11-bit chipping Barker sequence
       b.   CDMA
   4.   802.11a
       a.   OFDM
   5.   802.11b
       a.   HR-DHSS
   6.   802.11g
   7.   802.11n
       a.   MIMO

   C. Management Functions
    1. Channel Selection and Power Management
    2. Authentication, Association, Beacon Management
    3. Passive and Active Scanning
  D. MAC Sublayer
   1. Hidden Terminal Problem
   2. Exposed Station Problem
   3. DCF
    a. CSMA/CA
     i. MACA
     ii. RTS/CTS
     ii. MACAW with Virtual channel sensing
     iv. 1-persistent physical carrier sensing
     v. timer countdown
     vi. SIFS, DIFS
   4. 802.11 frame addresses
   5. Frame fragmentation
   6. PCF
    a. beacon frame
   7. Implementation Details
    a. Dynamic Rate Adaptation
VIII. Wireless Measurement
  A. "Characterization of 802.11 Wireless Networks in the Home"
  B. "Performance Anomaly of 802.11b"
IX. Cellular and Mobile Networks
  A. Cellular Architecture
   1. Base Station and MSC
   2. combined FDM/TDM
   3. CDMA
   4. GSM
  B. 2G {voice}
   1. BSS, BTC, BSC
  C. 2.5G {voice and data}
   1. GPRS, EDGE, CDMA-2000
   2. SGSN, GGSN (parallel data network)
  D. 3G {voice/data}
   1. UTMS, CDMA-2000, EVDO
  E. 4G LTE
   1. PRB
  E. Mobile Networks
   1. home network, agents, correspondent, visited network
   2. permanent address, care-of-address (COA), registration
   3. Indirect Routing
   4. Direct Routing
    a. anchor foreign agent

X. Wireless Sensor Networks
 A. Berkeley Mote Revolution
   1. Trends, Low Power
   2. Periodic versus Triggered events
   3. Zigbee Radio
 B. Details
   1. Network Lifetime
   2. Energy wastes:
      a. Idle listening, collisions, overhearing, control overhead, overmitting
   3. Communication patterns
      a. Broadcast, multicast, convergecast, local gossip
   4. Lower Duty Cycle
      a. TDMA
      b. Scheduling
      c. LPL
 C. WSN Types
   1. Tiered
   2. Cluster-based
 D. Power-Aware MAC protocols
   1. S-MAC
   2. T-MAC
   3. LPL
   4. SCP-MAC
XI. Introduction to TinyOS and nesC
 A.   nesC
    1. Components and interfaces
 B. Component Model
    1. Commands and Events
    2. User and Provider
    3. Call and signal
    4. Event Handlers and tasks
    5. Modules
       a. Provide interfaces
       b. Signature/implementation
    6. Configurations
       a. Wiring and callbacks
 C. Syntax/ constructs in nesC
    1. 'as'
    2. Generic Interfaces – types
    3. Module variables (private)
    4. Generic Components 'new'
 D. Split-phase Interfaces
    1. Read
    2. Send
XII. TinyOS Applications
 A. LEDS, Timer, Boot

B. Light Sensing
C. Active Messages (AM)
D. Platform independent types and structs
E. AMSend, packet payloads
F. SplitControl
G. Receive
XIII. High Speed LANs
  A.   FDDI
    1.   differences from 802.5 token ring
    2.   4B/5B encoding
    3.   dual ring
    4.   TTRT
  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
    10.   10 and 100 Gigabit Ethernet
XIV. 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 overhead
  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
XV. 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

---------------------------- *Final Covers up to Here* --------------------------

XV. Firewalls and Intrusion Detection Systems (IDS)
A. Stateless Packet Filtering
B. Stateful Packet Filtering
C. Application Gateways
D. IDS
XVI. Distributed Denial of Service (DDoS)   {not covered}
A. Flood-based DDoS Attack
B. Direct Attack
    1. TCP-SYN Flooding
C. Reflector Attack
    1. Smurf Attack
    2. SYN-ACK Attack