Final Review

VII. Wireless LANs
- A. Classification
  1. Infrastructure
  2. Ad Hoc
  3. MANET

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

- 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. MANET Routing

A. "A Performance Comparison of Multi-Hop Wireless Ad Hoc Network Routing Protocols'

X. 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. 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

XI. 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

XII. 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

XIII. 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

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

XVI. Distributed Denial of Service (DDoS)
A. Flood-based DDoS Attack
B. Direct Attack
   1. TCP-SYN Flooding
C. Reflector Attack
   1. Smurf Attack
   2. SYN-ACK Attack
D. Solutions
   1. Prevention
   2. Detection and Filtering
   3. Attack Source Traceback

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

XVII. Firewalls and Intrusion Detection Systems (IDS)
A. Stateless Packet Filtering
B. Stateful Packet Filtering
C. Application Gateways
D. IDS