

Midterm Review

I. Introduction

A. Definitions

1. network vs distributed system
2. classify networks
 - a. transmission technology - broadcast, multicast, point-to-point
 - b. size - LAN, MAN, WAN
 - c. topology - star, ring, tree
3. performance measures
 - a. throughput
 - b. utilization
 - c. response time
 - d. end-to-end delay
 - i. processing delay
 - ii. queueing delay
 - iii. transmission delay
 - iv. propagation delay
 - e. latency
 - f. goodput
 - g. fairness

B. Elementary TCP Sockets

1. Client/server model
2. structure of `sockaddr_in`
3. socket functions
 - a. *socket*
 - b. *connect*
 - c. *bind*
 - d. *listen*
 - e. *accept*
 - f. *close*

C. Seven Layer ISO OSI Reference Model

D. Layering Examples

1. IP addresses
2. HTTP example with Web browsing {TCP example}
3. DNS example {UDP example}

II. Miscellaneous topics before physical layer

A. Multiplexing

*{Note – multiplexing was covered just before
PCM in the Physical Layer section}*

1. TDM
2. FDM
3. statistical multiplexing {concentrator}

B. Switching

1. circuit switching
2. message switching
3. packet switching

- C. Store-and-Forward Networks
 - 1. virtual circuit networks
 - 2. datagram networks
 - 3. connectionless versus connection-oriented networks

III. Physical Layer

- A. Definitions
 - 1. baud {modulation rate}
 - 2. data rate {capacity}
 - 3. bandwidth
 - 4. voice-grade line
- B. Nyquist Theorem
 - 1. signal constellations
- C. Shannon's Result
 - 1. signal-to-noise ratio
 - 2. decibel definition
- D. Analog vs Digital
 - 1. data
 - 2. signals
 - 3. transmissions
 - 4. attenuation
 - 5. amplifiers vs repeaters
 - 6. modem
 - 7. codec
 - 8. advantages vs disadvantages
- E. Data Encoding Techniques
 - 1. digital data, analog signals
 - a. Amplitude modulation
 - b. Frequency modulation
 - c. Phase modulation
 - 2. digital data, digital signals
 - a. NRZL
 - b. NRZI
 - i. differential codes
 - c. Bi-phase codes
 - i. Manchester
 - ii. differential Manchester
 - d. Bi-polar codes
 - 3. analog data, digital signals
 - a. PCM
 - b. T1 carrier
 - c. delta modulation
- F. Transmission Media
 - 1. twisted pair
 - a. UTP Cat 3,4, 5
 - b. ADSL

- c. Hub topology
 - 2. Coaxial cable
 - a. baseband
 - i. 10BASE2
 - ii. 10BASE5
 - b. broadband {CATV}
 - 3. Optical Fiber
 - a. three types of fiber
- IV. Data Link Layer
- A. Transmission Errors
 - 1. error detection and error correction
 - 2. Hamming distance
 - 3. CRC
 - a. polynomial code
 - b. generating function $G(x)$
 - c. CRC algorithm
 - B. Synchronous vs asynchronous transmissions
 - 1. bit, character, block level
 - C. Framing
 - 1. bit stuffing
 - 2. byte stuffing
 - D. Tanenbaum's DL protocols
 - 1. Utopia
 - 2. Stop-and-Wait {introduce ACKs}
 - 3. PAR {noisy channel}
 - a. old version
 - 1. ACK, timer, duplicate frames
- only up to here for Mid Term!!**-----
- b. new version
 - 4. sliding window protocols
 - a. Go BACK N
 - b. Selective Repeat