Computer Networks

Midterm Review

Based on Qian Yan (qiany7@) slides 2017

Midterm Review

- Network Components
  - ~~Application~~, Host, Router(Hub), Link
- Review by Layers
  - Physical
  - Link
  - Network

Network Components

- Parts of a Network
  - Application, Host, Router, Link
- Protocols and Layers
  - Encapsulation
  - What is a Phy layer protocol?
  - What is a Link layer protocol? MAC layer?
  - What is a Network layer protocol?
  - Interfaces between layers

Physical Layer

- Passband Modulation
  - Amplitude, Frequency, Phase
- Latency
  - Transmission delay
    - 1st bit on the wire -> last bit on the wire
  - Propagation delay
    - Bit travel from one end to another
- Bandwidth-delay product (Delay RTT)

Physical Layer - Wireless vs. Wired

- Wireless Links
  - Broadcast to Frequency
  - Listen vs. Broadcast?
  - Hidden Node Problem / Exposed Node Problem

Physical Cable

- Note on Old vs. New Ethernet Protocol

Link Layer

- Retransmissions
  - ARQ (Automatic Repeat reQuest)
  - Stop-and-Wait & Sliding Window
- Multiple Access
  - CSMA/CD
  - Binary Exponential Backoff
  - Hidden Terminals & Exposed Terminals
  - CSMA/CA (RTS/CTS)

Link Layer

- Framing Methods
  - Byte Count
  - Byte Stuffing
  - Bit Stuffing
- Error Detection and Correction
  - Hamming Distance
  - Parity bit encoding
  - Hamming encoding

Link Layer

- Switching (Switch)
  - Importance of Switch
  - Backward Learning
    - Learn sender's port when sender sends packets
- Spanning Tree Solution
    - Initial setup
    - Update root & Keep shortest path to root
    - Turn off other ports

Network Layer

- Core protocols
  - ICMP- What does it do?
  - ARP- Layer 2 to Layer 3. What does it do?
  - DHCP- What does it do?
- Shortcomings of Switches
  - Scalability
  - Compatibility
- Routing vs. Forwarding
  - Routing – decide where to send
  - Forward – send