

## Study Guide

The following is meant to give you an idea of which topics might potentially appear on the midterm.

### Ethernet

- Differences between channel partitioning protocols, random access protocols, and controlled access protocols
- Differences between random access protocols: Aloha, Slotted Aloha, CSMA, CSMA/CD
- How/why does collision detection work in CSMA/CD – why do we have a minimum packet size? How is a collision detected?
- Understand ways of dealing with a collision – wait random time vs. exponential backoff
- Wireless protocols: why doesn't CSMA work in wireless protocols?

### Bridges and Spanning Tree

- Differences between hubs, bridges, and switches
- Selective forwarding – be comfortable with process of building out forwarding tables
- Spanning Tree Protocol:
  1. Messages sent between bridges during protocol
  2. Which ports will shut off at the end
  3. Understand implications of ports being shut off (i.e., this is essentially breaking the connection between the LAN and bridge at the port)

### Routing

- IP addresses – hierarchical nature, how networks can be characterized by an IP prefix
- Given a network, know network/broadcast/host addresses
- Private vs. public IP addresses
- Address Resolution Protocol (ARP)
- Difference between routing and switching
- Distance Vector:
  1. How each router updates its tables in each step (Bellman-Ford)
  2. Link changes: count to infinity problem, poison reverse
  3. BGP hijacking: be able to explain at a high-level what it is
- Link state:
  1. How each router calculates its shortest paths, given the full topology (Dijkstra)
  2. Link changes: temporary loops are possible

### Longest Matching Prefix

- Decide which interface a packet should be sent to, given a forwarding information base

- Unibit trie, multibit trie, Lulea compressed trie: what they are, how to form them from a forwarding information base, and pros/cons of each
- Binary search on prefix lengths: how it works (array of tables), why we have markers, why best matching prefix is stored with each marker, i.e., to avoid backtracking
- Binary search on prefix ranges: given a list of prefixes, be able to show ranges and form tree of range endpoints with > and = values for each node

### **Packet Classification**

- Converting firewall rules (in plain English) to a rule base (similar to hw)
- Two dimensional schemes: grid of tries -> understand the three methods from class:
  1. Form the grid of tries adding each source prefix exactly once, and use a backtracking algorithm to find the best matching rule
  2. Form the grid of tries, adding each source prefix to every source trie corresponding to a matching destination prefix and do not backtrack
  3. Form the grid of tries, adding each source prefix exactly once, and use switch pointers to move between the different source tries
- Beyond two dimensions: using bitmaps to find the least cost rule