

# Lecture 24: Final review

Anirudh Sivaraman

2020/12/09

We'll go over a few questions for the final.

## General advice

Focus on understanding the why or how behind a concept rather than the descriptive details (when, where, who). For instance, it is more important to understand how WiFi and ALOHA are different, rather than when/where WiFi was developed or who developed it. If you're confused about specific concepts, please ask us publicly (anonymous is fine) on Piazza, rather than privately over email. It is very likely your friends share your confusion. You're responsible for everything from and including the Oct 19 lecture on packet forwarding, unless the notes explicitly say that it is not going to be tested.

**Exercise 1** *Where would you use exact-match packet forwarding? Where would you use longest-prefix? Why is 2-choice better than standard hashing?*

**Exercise 2** *What are the different types of queueing structures in a router? What are the pros and cons of each? Explain the HoL blocking problem in input-queued routers.*

**Exercise 3** *Describe the ALOHA protocol. Derive the optimal transmission probability in ALOHA. What is the overall utilization of the medium with this probability?*

**Exercise 4** *How are the operating conditions of WiFi different from ALOHA? How is WiFi different from Ethernet?*

**Exercise 5** *What is modulation? What is the signal-to-noise ratio? What is a checksum?*

**Exercise 6** *Explain the problem of wireless bit-rate adaptation. Explain the SampleRate algorithm.*

**Exercise 7** *What are some performance metrics you might care about during video streaming? Give an example of a design that optimizes for each metric in isolation.*

**Exercise 8** *What distinguishes a peer-to-peer application from a client-server application? Compare and contrast the networking characteristics of Bitcoin and BitTorrent.*

**Exercise 9** *How many hosts can a leaf-spine topology made up of  $\frac{3k}{2}$  switches with  $k$  ports each support? Describe the load balancing algorithm between the leaf and spine switches.*

**Exercise 10** *Describe the two core concepts behind software-defined networking. Explain what policy routing is.*

**Exercise 11** *What are the three properties that a correct implementation of TLS guarantees? What is one property it explicitly does not guarantee? Explain the difference between public-private key encryption/decryption and symmetric key encryption/decryption.*

---

**Exercise 12** *What is the main difference between the security adversary in network surveillance and censorship and the security adversary in standard discussions of security protocols? Explain a few ways in which a network censor can censor access to the Internet for its customers.*

**Exercise 13** *Give some examples of Denial of Service attacks along with the resource that is being exhausted (e.g., CPU, network, memory) in each example.*

**Exercise 14** *Give an example of amplification in the context of Denial of Service attacks.*