

# Week 1. Review Questions

## SECTION 1.1

- R1. What is the difference between a host and an end system? List several different types of end systems. Is a Web server an end system?
- R2. Describe the protocol that might be used by two people having a telephonic conversation to initiate and end the conversation, i.e., the way that they talk.
- R3. Why are standards important for protocols?

## SECTION 1.2

- R4. List four access technologies. Classify each one as home access, enterprise access, or wide-area wireless access.
- R5. Is HFC transmission rate dedicated or shared among users? Are collisions possible in a downstream HFC channel? Why or why not?
- R6. What access network technologies would be most suitable for providing internet access in rural areas?
- R7. Dial-up modems and DSL both use the telephone line (a twisted-pair copper cable) as their transmission medium. Why then is DSL much faster than dial-up access?
- R8. What are some of the physical media that Ethernet can run over? R9. HFC, DSL, and FTTH are all used for residential access. For each of these access technologies, provide a range of transmission rates and comment on whether the transmission rate is shared or dedicated.
- R10. Describe the different wireless technologies you use during the day and their characteristics. If you have a choice between multiple technologies, why do you prefer one over another?

## SECTION 1.3

- R11. Suppose there is exactly one packet switch between a sending host and a receiving host. The transmission rates between the sending host and the switch and between the switch and the receiving host are  $R_1$  and  $R_2$ , respectively. Assuming that the switch uses store-and-forward packet switching, what is the total end-to-end delay to send a packet of length  $L$ ? (Ignore queuing, propagation delay, and processing delay.)
- R12. What advantage does a circuit-switched network have over a packet-switched network? What advantages does TDM have over FDM in a circuit-switched network?
- R13. Suppose users share a 2 Mbps link. Also suppose each user transmits continuously at 1 Mbps when transmitting, but each user transmits only 20 percent of the time. (See the discussion of statistical multiplexing in Section 1.3.)
- When circuit switching is used, how many users can be supported?
  - For the remainder of this problem, suppose packet switching is used. Why will there be essentially no queuing delay before the link if two or fewer users transmit at the same time? Why will there be a queuing delay if three users transmit at the same time?
  - Find the probability that a given user is transmitting.

- d. (optional) Suppose now there are three users. Find the probability that at any given time, all three users are transmitting simultaneously. Find the fraction of time during which the queue grows.

R14. Why will two ISPs at the same level of the hierarchy often peer with each other? How does an IXP earn money?

R15. Why is a content provider considered a different Internet entity today? How does a content provider connect to other ISPs? Why?