CHAPTER 4

Introduction to Network Layer

Exercises

1. We mention one advantage and one disadvantage for a connectionless service:

a. The connectionless service has at least one advantage. A connectionless service is simple. The source, destination, and the routers need to deal with each packet individually without considering the relationship between them. This means there are no setup and teardown phases. No extra packets are exchanged between the source and the destination for these two phases.

b. The connectionless service has at least one disadvantage. The packets may arrive out of order; the upper layer that receive them needs to reorder them.

3. An *n*-bit label can create 2^n different virtual-circuit identifier.

5. Each packet started from the source needs to have a fragmentation identification, which is repeated in each fragment. The destination computer use this identification to reassemble all fragments belonging to the same packet.

7. The delay in the connection-oriented service is always more than the delay in the connectionless service no matter the message is long or short. However, the ratio of the overhead delay (setup and teardown phases) to the data transfer delay (transmission and propagation) is smaller for a long message than a short message in a connection-oriented service.

9. A router is normally connected to different link (networks), each with different MTU. The link from which the packet is received may have a larger MTU than the link to which the packet is sent, which means that router needs to fragment the packet. We will see in Chapter 27 that IPv6 does not allow fragmentation at the router, which means the source needs to do some investigation and make the packet small enough to be carried through all links.

11. A fragment may have been lost and never arrives. The destination host cannot wait forever. The destination host starts a time and after the time-out, it can sends an error message (see Chapter 9) to inform the source host that the packet is lost and, if necessary, should be resent. The time-out duration can be based on the informa-

tion the destination host may collect about the status of the Internet. If there are many delays in the previous packet arrivals, it means that the Internet is congested, and the fragment may arrive soon (it is not necessarily lost).