第一章

Problem 6

a) $d_{prop} = m/s$ seconds.

b) $d_{trans} = L/R$ seconds.

c) $d_{end-to-end} = (m/s + L/R)$ seconds.

d) The bit is just leaving Host A.
e) The first bit is in the link and has not reached Host B.
f) The first bit has reached Host B.
g) Want

$$m = \frac{L}{R}s = \frac{120}{56 \times 10^3}\left(2.5 \times 10^8\right) = 536\,\text{km}.$$

Problem 10

The first end system requires L/R_1 to transmit the packet onto the first link; the packet propagates over the first link in d_1/s_1; the packet switch adds a processing delay of d_{proc}; after receiving the entire packet, the packet switch connecting the first and the second link requires L/R_2 to transmit the packet onto the second link; the packet propagates over the second link in d_2/s_2. Similarly, we can find the delay caused by the second switch and the third link: L/R_3, d_{proc}, and d_3/s_3.
Adding these five delays gives

$$d_{end-end} = L/R_1 + L/R_2 + L/R_3 + d_1/s_1 + d_2/s_2 + d_3/s_3 + d_{proc} + d_{proc}$$

To answer the second question, we simply plug the values into the equation to get 6 + 6 + 6 + 20+16 + 4 + 3 + 3 = 64 msec.

Problem 22

Probability of successfully receiving a packet is: $p_s = (1-p)^N$.

The number of transmissions needed to be performed until the packet is successfully received by the client is a geometric random variable with success probability p_s. Thus, the average number of transmissions needed is given by: $1/p_s$. Then, the average number of re-transmissions needed is given by: $1/p_s - 1$.

第二章

Problem 1

a) F
b) T
c) F
d) F
e) F

Problem 3

Application layer protocols: DNS and HTTP
Transport layer protocols: UDP for DNS; TCP for HTTP

Problem 7

The total amount of time to get the IP address is

$RTT_1 + RTT_2 + \cdots + RTT_n$.

Once the IP address is known, RTT_O elapses to set up the TCP connection and another RTT_O elapses to request and receive the small object. The total response time is

$2RTT_o + RTT_1 + RTT_2 + \cdots + RTT_n$