# Chapter 6

1．The maximum payload of a TCP segment is 65495 bytes. Why was such a strange number chosen?

The max length of IP datagram is 65535 bytes which includes 20 bytes fixed header(minimum) and IP payload.

So the **maximum** size of **IP payload** could be **65535-20=65515 bytes.**

The entire TCP segment must fit in the 65515 byte payload field of an IP packet.

Since the TCP header is a minimum of 20 bytes,

the **maximum payload of a TCP segment** is **65515-20=65495 bytes**

2．If the TCP round-trip time RTT is currently 30 msec and the following acknowledgements come in after 26, 32 and 24 msec, respectively, what is the new RTT estimate using the Jacobson algorithm? Use a = 0.9.

3．In a network that has a maximum TPDU size of 128 bytes, a maximum TPDU lifetime of 30 sec, and an 8-bit sequence number, what is the maximum data rate per connection?

4．To get around the problem of sequence number wrapping around while old packets still exist, one could use 64-bit sequence number. However, theoretically, an optical fiber can run at 75 Tbps. What maximum packet lifetime is required to make sure that future 75 Tbps networks do not have wraparound problems even with 64-bit sequence numbers? Assume that each byte has its own sequence number, as TCP does.

# Chapter 7

1. Can a machine with a single DNS name have multiple IP addresses? How could this occur?

Yes.

IP address consists of a network number and a host number.

If a machine has two Ethernet cards, it can be on two separate networks, and if so, it needs two IP addresses.

1. A binary file is 3072 bytes long. How long will it be if encoded using base64 encoding, with a CR+LF pair inserted after every 80 bytes sent **and** at the end?
2. From an ISP's point of view, POP3 and IMAP differ in an important way. POP3 users generally empty their mailboxes every day. IMAP users keep their mail on the server indefinitely. Imagine that you were called in to advise an ISP on which protocol it should support. What considerations would you bring up?

You would need to discuss the volume of mail expected so that you can determine storage needs if using IMAP. POP3 is a preferred protocol for servers with limited storage space as all emails are downloaded to a user’s local disk. But not a good choice if you have small local storage. IMAP is not the best choice for servers with limited storage space as the emails are not downloaded to the local disk. As a result, more server storage is consumed.

You also need to considerate what type of usage do the majority of the subscribers use? As IMAP can allows a user to sync their emails and a user can search the content of mail for a specific string before downloading while POP3 cannot.

You also need to know whether the subscriber mail being accessed from multiple machines for each user or is it being accessed from a single machine for each user? As in POP3 the mail can only be accessed from a single device at a time while use IMAP messages can be accessed across multiple devices.

1. The standard http URL assumes that the Web server is listening on port 80. However, it is possible for a Web server to listen to some other port. Devise a reasonable syntax for a URL accessing a file on a nonstandard port

http://dns-name:port/file

1. Imagine that someone in the CS Department at Stanford has just written a new program that he wants to distribute by FTP. He puts the program in the FTP directory ftp/pub/freebies/newprog.c. What is the URL for this program likely to be?

ftp://www.cs.stanford.edu/ftp/pub/freebies/newprog.c