# Chapter 6

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

Answer：

IP数据报的最大长度为65535字节，其中包括20字节的固定头部（最小长度）和IP有效载荷。因此，IP有效载荷的最大大小是65515字节。整个TCP段必须适应IP数据包的65515字节有效载荷字段。由于TCP头部最小为20字节，因此TCP段的最大有效载荷是65495字节。

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.

Answer：

RTT ’ = a\*RTT+(1-a)\*R

RTT1 = =29.6 msec

RTT2 = 0.9\*RTT1+0.1\*32=29.84 msec

RTT3 = 0.9\*RTT2+0.1\*24=29.256 msec

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?

Answer：

maximum data rate = 128\*8\*(2^8-1)/30=8704bps

1. 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.

Answer：

2^64\*8 / (75\*10^12) / (3600\*24) =22.77 days

# Chapter 7

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

Answer：

可以。因为IP地址由网络号和主机号组成。 如果一台机器有两张以太网卡，它可以连接到两个独立的网络，为此，它就需要两个IP地址。

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?

Answer：

Base64编码后的长度 = 4 \* ceil（二进制文件长度 / 3）

在这种情况下，3072字节的二进制文件经过base64编码后的长度为：4 \* ceil（3072 / 3）= 4096字节。如果把这些字节每 80 字节划分一行，将需要 52 行所以需要加52个CR和52个LF。4096+52+52=4200

1. 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?

Answer：

首先，我会考虑预期的邮件量，以确定存储需求。对于存储空间有限的服务器，POP3是首选协议，因为它会将所有电子邮件下载到用户的本地磁盘。但如果本地存储空间有限，则可能不太适用。对于存储空间有限的服务器，IMAP不是最佳选择，因为电子邮件不会下载到本地磁盘，这会导致服务器存储空间的增加。其次，我会考虑订阅者的邮件是否从每个用户的多台设备访问，还是从每个用户的单一设备访问。在POP3中，邮件一次只能从一个设备访问，而在IMAP中，消息可以跨多个设备访问。最后，我会考虑订阅者中的主要使用模式。因为IMAP允许用户同步电子邮件并在下载之前搜索邮件内容，而POP3不支持这一功能。

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

Answer：

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?

Answer：

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