Assignments -- Chapter 6

1. Why does UDP exist? Would it not have been enough to just let user processes send raw IP packets?

参考答案：

No. IP packets contain IP addresses, which specify a destination machine. Once such a packet arrived, how would the network handler know which process to give it to? UDP packets contain a destination port. This information is essential so they can be delivered to the correct process.

2. Consider the effect of using slow start on a line with a 10-msec round-trip time and no congestion. The receive window is 24 KB and the maximum segment size is 2 KB. How long does it take before the first full window can be sent?

参考答案：

The first bursts contain 2K, 4K, 8K, and 16K bytes, respectively. The next one is 24 KB and occurs after 40 msec.

3. Suppose that the TCP congestion window is set to 18 KB and a timeout occurs. How big will the window be if the next four transmission bursts are all successful? Assume that the maximum segment size is 1 KB.

参考答案：

The next transmission will be 1 maximum segment size. Then 2, 4, and 8. So after four successes, it will be 8 KB.

4. A TCP machine is sending full windows of 65,535 bytes over a 1-Gbps channel that has a 10-msec one-way delay. What is the maximum throughput achievable? What is the line efficiency?

参考答案：

One window can be sent every 20 msec. This gives 50 windows/sec, for a maximum data rate of about 50*65535=3.3 million bytes/sec.
3.3*8=26.4，So the line efficiency is then 26.4 Mbps/1000 Mbps or 2.6 percent.

5. A TCP connection is established between two hosts, with 1KB MSS, a 64KB buffer at Host B and RTT of 2ms. The TCP send window (W) grows exponentially（指数形式的增长）, as shown in the following figure. How long will it take, when W reaches 32KB (threshold)? Please explain the window change process.
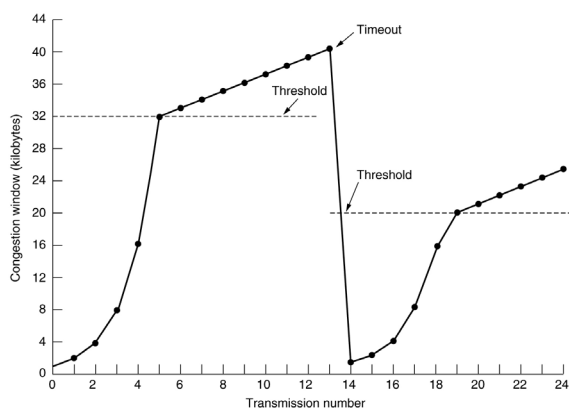
参考答案：

From the very beginning of the TCP connection, the send window of Host A grows exponentially, starting with 1 MSS, that is, 1→2→4→8→16→32, In 5 RTTs, the TCP send window (Host A) reaches 32KB. Therefore, 5*RTT=10ms.