=上 林華

# Introduction to Computer Networks

Midterm-1, Fall 2014

Name:_____ ID:_____ Score:_____

1. (6%) Give the full names of the following abbreviations.
   (a) ISP
   (b) DoS
   (c) HTTP
2. (9%) Explain the following terms. Hint: Just providing a Chinese translation of the terms will not earn you a full credit.
   (a) protocol
   (b) throughput
   (c) Web cache
3. Consider two hosts, A and B, connected through a router, as shown in Figure 1. Assume that the transmission rate of the two links between the hosts and the router are both equal to R=2 Mbps. Also assume that the lengths of the two links are both equal to 10,000 kilometers. Suppose that the propagation speed over the links is $2*10^8$ meters/sec.
   (a) (5%) What is the propagation delay from host A to host B?
   (b) (10%) Suppose that an application in host A wants to send a packet to host B. Assume that when the packet is ready to be transmitted, there are five packets in front of it in host A's buffer. We further assume that as the packet reaches the router, there are 10 packets waiting in router's buffer to be transmitted to host B. Assume that all packets have the same length of 1000 bytes. Under these assumptions, what is the total queuing delay that the packet experiences.
   (c)

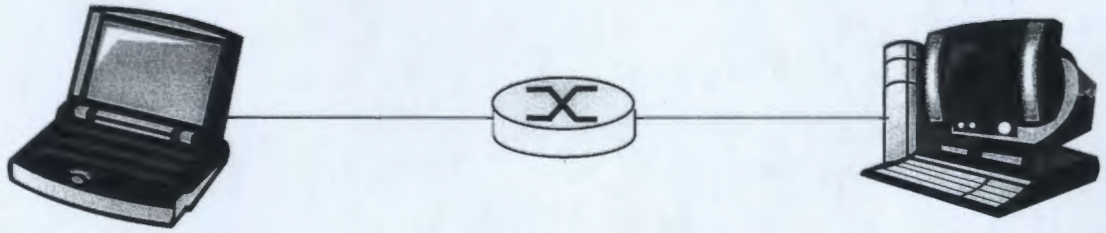


Figure 1. Two hosts connected through a router.

4. (20%) Assume that a Web client requests a Web page from a Web server. Suppose that the Web page contains a base HTML file and 10 JPEG images. Let $T_p$ be the round-trip propagation delay between the client and the server. Assume that the two ways between the client and the service have the same throughputs. That is, we assume that throughput from the client to the server is the same as that from the server to the client. Denote the throughput between the client and the server by R. Assume that the base HTML file is very small. Thus, we assume that the HTTP response message containing the base HTML file is approximately equal to that of the HTTP GET message. Denote the length of the packet that contains a GET message by $L_1$ bits. Assume that all the ten JPEG images have the same size. Denote the length of a packet containing each one of the JPEG images by $L_2$ bits. Assume that the first two control packets that TCP uses in three-way handshaking to set up connections are so small that their transmission times are negligible. Express the length of time interval from the instant that the client sends a GET message to the instant that the client receives the last image in terms of $T_p$, R, $L_1$, and $L_2$ for
   (a) persistent connections between the client and the server; and
   (b) non-persistent connections with up to 20 parallel TCP connections.
5. (6%) What are the three major components of the Internet mail system?
6. (9%) Explain the problems with a centralized design of a DNS system?
7. (5%) Describe the functions of a local name server.
8. (6%) (a) When a host wishes to find the IP address of a Web server, where does the host send the DNS query?
   (b) Suppose that a new company wishes to have a domain name. What type of name server is required to be installed?
9. (8%) Describe why an application developer may choose to run an application over UDP rather than TCP?
10. (5%) Is it possible for an application to enjoy reliable data transfer even when the application runs over UDP? If so, how?
11. (6%) What information are used to identify an UDP socket and a TCP socket.
12. (5%) Suppose a process in Host C has an UDP socket with port number 6789. Suppose both Host A and Host B each sends an UDP segment to Host C with destination port number 6789. Will both of these segments be directed to the same socket at Host C? If so, how will the process at Host C know that these two segments originated from two different hosts?