**CSCE 560 Homework / Wireshark Lab 2**

**Chapter 2 – Application Layer**

**Fall 18**

**Assigned: Monday, 15 Oct**

**Due: Wednesday, 24 Oct, 1400**

**Problem 1**. Chapter 2, R.1

List five nonproprietary Internet applications and the application-layer protocols that they use.

**Problem 2**. Chapter 2, R.3

For a communication session between a pair of processes, which process is the client and which is the server?

**Problem 3**. Chapter 2, R.5

What information is used by a process running on one host to identify a process running on another host?

**Problem 4**. Chapter 2, R.10

What is meant by a handshaking protocol?

**Problem 5**. Chapter 2, R.12

Consider an e-commerce site that wants to keep a purchase record for each of its customers. Describe how this can be done with cookies. [Describe how the cookies are created and exchanged between the computers. Discuss how and which headers are modified.]

**Problem 6**. Chapter 2, R.16

Suppose Alice with a Web-based e-mail account (such as Yahoo! mail or Hotmail) sends a message to Bob, who accesses his mail from his mail server using POP3. Discuss how the message gets from Alice's host to Bob's host. Be sure to list the series of application-layer protocols that are used to move the message between the two hosts.

**Problem 7**. Chapter 2, R.18

From a user's perspective, what is the difference between the *download-and-delete mode* and the *download-and-keep mode* in POP3? [How do these modes affect the user?]

**Problem 8**. Chapter 2, P1

True or false?

*a.* A user requests a Web page that consists of some text and three images. For this page the client will send one request message and receive four response messages.

*b.* Two distinct Web pages (for example, www.mit.edu/research.html and www.mit.edu/students.html) can be sent over the same persistent connection.

*c.* With nonpersistent connections between browser and origin server, it is possible for a single TCP segment to carry two distinct HTTP request messages.

*d.* The Date: header in the HTTP response message indicates when the object in the response was last modified.

**Problem 9**. Chapter 2, P7 **(this problem has been modified)**

Suppose within your Web browser you click on a link to obtain a Web page. The IP address for the associated URL is not cached in your local host, so that a DNS lookup is necessary to obtain the IP address. Suppose that *n* DNS servers are visited before your host receives the IP address from DNS; the successive visits incur an RTT of RTT1, ..., RTTn. Further suppose that the Web page associated with the link contains exactly one object, a small amount of HTML text. Let RTT0 denote the RTT between the local host and the server containing the object. Assuming a transmission time of t1 ­for the object, how much time elapses from when the client clicks on the link until the client receives the object?

**Problem 10**. Chapter 2, P9

Consider Figure 2.12, for which there is an institutional network connected to the Internet. Suppose that the average object size is 850,000 bits and that the average request rate from the institution’s browsers to the origin servers is 16 requests per second. Also suppose that the amount of time it takes from when the router on the Internet side of the access link forwards an HTTP request until it receives the response is three seconds on average (see Section 2.2.5). Model the total average response time as the sum of the average access delay (that is, the delay from Internet router to institution router), and the average Internet delay. For the average access delay, use /(1 – ), where  is the average time required to send an object over the access link and  is the arrival rate of objects to the access link. [You may assume the response time for a cache hit (i.e., LAN delay) is 0 seconds.]

*a.* Find the total average response time.

*b.* Now suppose a cache is installed in the institutional LAN. Suppose the **miss** rate is 0.4. Find the total response time.

**Problem 11**. Chapter 2, Supplemental Question 1

What is the difference between persistent HTTP with pipelining and persistent HTTP without pipelining? [What event causes the requests to be sent?] Which of the two is used by HTTP/1.1?

**Problem 12**. Chapter 2, Supplemental Question 2

Why is it said that FTP sends control information “out-of-band”?

**Wireshark Lab**

Complete the lab in 02 - Wireshark\_HTTP.pdf.

The last page of this lab instructs you to go to <http://www.motobit.com/util/base64-decoder-encoder.asp> in order to decode a string. Another good website is <http://www.opinionatedgeek.com/dotnet/tools/base64decode/> , paste the string in the box then click the Decode button.