**CS 455/555**
**Introduction to Networks & Communication**
**Spring 2008**
**Solution for Homework #2**
**Points: 20**
**Due: February 5, 2008**
**The following questions are selected from Chapter 2.**

**Problem 10**
Parallel download would only share the 100K bandwidth among the 10 connections (each getting just 10K bits/sec) thus, there is no significant advantage here. With persistent HTTP we avoid the SYN and SYNACK exchange but that only requires 2 seconds (1 second to send the 100 bit SYN message over the 100 bps link, and 1 second to receive the ACK). Given that each object takes 101 seconds to send and receive the ACK, the use of pipelining gives only a 2 percent gain.

**Problem 7**
The total amount of time to get the IP address is
$RTT1 + RTT1 + \ldots + RTT_n$ .
Once the IP address is known, *RTT0* elapses to set up the TCP connection and another *RTT0* elapses to request and receive the small object. The total response time is
2RTT0 + RTT1 + RTT2 + …+ RTTn

**Problem 4**
a) The document request was http://gaia.cs.umass.edu/cs453/index.html. The Host : field indicates the server's name and /cs453/index.html indicates the file name.
b) The browser is running HTTP version 1.1,as indicated just before hte first <cr><lf> pair.
c) The browser is requesting a persistent connection, as indicated by the Connection: keep-alive.
d) This is a trick question. This information is not contained in an HTTP message anywhere. So there is no way to tell this from looking at the exchange of HTTP messages alone. One would need information from the IP datagrams (that carried the TCP segment that carried the HTTP GET request) to answer this question.

**Problem 16**
For calculating the minimum distribution time for client-server distribution, we use the following formula: $D_{cs} = max \{NF/u_s, F/d_{min}\}$
Similarly, for calculating the minimum distribution time for P2P distribution, we use the following formula: DP2P = $D\ max\{F/u\ ,\ F/d\ ,\ NF/\ /us + \sum_{i=1,N} u_i) \}$
Where, $F$ = 10 Gbits = 10 * 1024 Mbits
$u_s$ = 20 Mbps
$d_{min} = d_i$ = 1 Mbps

**Client Server**

| | | N | |
|---|---|---|---|
| | | **10** | **1000** |
| **U** | **200 Kbps** | 10240 | 512000 |
| | **1 Mbps** | 10240 | 512000 |

**Peer to Peer**

| | | N | |
|---|---|---|---|
| | | **10** | **1000** |
| | **200 Kbps** | 10240 | 47559.33 |
| | **1 Mbps** | 10240 | 10240 |