

## CNT 4704: Analysis of Computer Communication Networks

### Homework 2 (Fall 2014)

Assigned Nov. 19<sup>th</sup>; Due midnight Nov. 30<sup>th</sup> via WebCourse

#### **1. Knowledge-based Questions (18 points)**

- a). What is the size of a typical TCP header? What is the size of a typical UDP header? What is the size of a typical IP header?
  
- b). Is it possible for an application to enjoy reliable data transfer even when the application runs over UDP? If so, how?
  
- c). What are the three main routing protocols used in current Internet (according to the textbook)? Please provide their full names and their acronyms.
  
- d). What are the three main architectures for Internet routers? Their speed relationship?
  
- e). Do routers have IP addresses? If so, how many?
  
- f). Suppose an application generates chunks of 20 bytes of data every 20 msec, and each chunk gets encapsulated in a TCP segment and then an IP datagram. What percentage of each datagram will be overhead?

#### **2. Autonomous System Finding (17 points)**

Autonomous System (AS) is a concept used in global BGP routing. Please find out what is the AS number for UCF network? What is the AS number for Univ. of Florida network? Please explain the procedure on how you derive your answers.

#### **3. Longest Prefix Matching (15 points)**

Consider a datagram network using 8-bit host addresses, i.e., IP addresses range from 0 to 255. Suppose a router uses longest prefix matching and has the following forwarding table:

Prefix Match	Interface
001	0
0	1
011	0
11	1

10	2
Otherwise	3

For each of the four interfaces, please give the associated range of destination host address and the number of addresses in the range.

#### 4. IP Subnet (10 points)

A /20 block of addresses is granted to an organization. We know that one of the addresses is 129.118.40.12. How many IP addresses are contained in this subnet? What is its x.y.z.t/n representation?

#### 5. Distance Vector Routing (20 points)

Consider the 3-node network example shown in lecture notes 'Chapter4-part2.ppt' on Page 34 and 35. Use the similar way to illustrate how the three nodes exchange and update their distance table to converge, when the link cost between the three nodes are:  $c(x,y)=3$ ,  $c(y,z) = 6$ ,  $c(x,z) = 2$ .

#### 6. Link State Routing (20 points)

Considering the following network. With the indicated link cost, use Dijkstra's shortest path algorithm to compute the shortest paths from **node v** to all other nodes. You need to show how the algorithm works by computing a table similar to the table shown in Page 25 in Chapter4-part2.ppt.

