Assignment #5 for Computer Networks (CNT 4004) for Fall 2018

Due November 1, 2018 at the start of class

This assignment primarily covers material from chapters 4 and 5 (with the exception of material related to SDNs – we will cover this later) of the textbook and from class lecture. Each problem is worth 10 points.

Problem #1

Answer the following questions coming from your Chapter 4 reading (through section 4.2).

a) The network layer can be decomposed into two interacting parts. Name these two parts.

b) What is the most important function implemented in the data plane?

c) In short, how are a routers forwarding tables configured?

d) The Internet's network layers provides a single service, what is it?

e) What is a switch fabric (what does it do)?

f) What is the "longest prefix matching rule" for forwarding?

g) Name three switching techniques

h) Where exactly are packets typically dropped?

i) What is priority queueing? Give an example of two types of traffic where one type could be deemed to have priority over the other.

j) What is work conserving queueing?

Problem #2

Answer the following questions coming from your Chapter 4 reading (section 4.3).

a) What are the two versions of IP in use today?

b) Assuming no options, how if an IP datagram carries a TCP segment, how many bytes of header are there?

c) What does MTU stand for and what does it do (or achieve)?

d) Why does IP fragment datagrams?

e) A CIDR address has format a.b.c.d/x. What are these x bits called?

f) What existed before CIDR?

g) Who manages IP addresses?

h) What does DHCP stand for?

i) DHCP is often referred to as a _____ or _____ protocol. What goes in the blanks?

j) What fields does a NAT translation table use?

Problem #3

Answer the following questions coming from your Chapter 5 reading (through section 5.4).

a) What is the goal of a routing algorithm?

b) Algorithms with global state information are often called _____ algorithms. What is the blank?

c) A distance-vector algorithm is what classification of routing algorithm according to the textbook?

d) Oscillations with congestion-sensitive routing is possible. For LS algorithms, what is a feasible/possible solutions?

e) What is an autonomous system (AS)?

f) What routing algorithm does the OSPF protocol use?

g) What is the inter-AS protocol that all AS's run?

h) Why is BGP an important protocol?

i) For BGP the best router will be determined by based on _____. Fill in one work.

j) What does IP-Anycast achieve?

Problem #4

Do Review Questions R1 and R4 (page 362) from the text book.

Problem #5

Do Review Questions R18 and R28 (page 363) in the text book.

Problem #6

Do Problem P1 (page 364) in the text book.

Problem #7

Do Problem P7 (page 367) in the text book.

Problem #8

Do Review Question R8 (page 427) in the text book.

Problem #9

Do Problem P3 (page 429) in the text book. You do not need to show the table, just give the shortest paths from X to all other nodes.

Problem #10

Answer the following questions regarding RFCs and routing.

a) In what way are diagrams (e.g., network topologies) drawn in RFCs? Why might this be?

b) What is the purpose (or function) of Hello packets in OSPF? Hint: Go read the RFC for OSPF.