CPE654– Design and analysis of network systems

Spring 2017: Assignment 4

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Problem 1: Exercise 1, Chapter 6 (McCabe p293): Represent each address below in binary format. What is the class of each address?
a. 192.12.102.0
b. 10.20.30.100
c. 130.5.77.15

Solution: a. 192.12.102.0
Binary format (base 2): 11000000.00001100. 01100110.00000000-Class C
b. 10.20.30.100
Binary format (base 2): 00001010.00010100.00011110.01100100-Class A
c. 130.5.77.15
Binary format (base 2): 10000010.00000101.01001101.00001111-Class B

Problem 2: Exercise 4, Chapter 6 (McCabe p294): Where are the functional areas for this network design?

Solution: The different functional areas for the network design are: Sales, PR, legal, accounting, operations1, operations2, HQ, and Engineering.

Problem 3: Exercise 5, Chapter 6 (McCabe p294): Where are the potential logical and physical boundaries for this network design?

Solution: *Logical boundaries:* Logical boundaries exist at each place where there are firewalls present in the diagram. These are meant to be present there so that people in the outside world would not be able to access the sensitive data or information of the company. Few more features are introduced apart from this that is a few more logical boundaries can be presented in the system: first between Legal and Accounting in Building 1 and second between HQ and engineering in Building 2.
Physical boundaries: They exist between the different cities, as no one is closer as much as necessary to directly connect the offices in a cost-effective way. Likewise, if the distance separating the two buildings in Chicago wasn't too much, they might be no physical boundary necessary and could've been connected to each other.

Problem 4: Exercise 6, Chapter 6 (McCabe p294): Given the network address 129.99.0.0/16, develop a variable-length addressing scheme that best fits the design, with the following numbers

of users. **Note**: Please note that addressing and routing go together. You want to assign addresses (subnetting) to have efficient routing of the traffic.

Solution:

For addressing number 1: 129.99.32.0/19 (7 subnets)

a. Legal: 129.99.36.0/22
b. Accounting: 129.99.40.0/22
c. Headquarters: 129.99.44.0/22; 129.99.48.0/22
d. Engineering: 129.99.52.0/22

For addressing number 2: 129.99.64.0/19 (7 subnets)

a. Sales: 129.99.68.0/22
b. PR: 129.99.72.0/22
c. Sales: 129.99.76.0/22

For addressing number 3: 129.99.96.0/19 (7 subnets)

a. Operations 1: 129.99.100.0/22; 129.99.104.0/22
b. Operations 2: 129.99.108.0/22
c. Sales: 129.99.112.0/22

Problem 5: After reading Section 6.4.3 and critique it. Note: The purpose of this exercise is to help you appreciate the complexities associated with routing traffic through the BGP protocol.

Solution: In this section the basics of routing are described; default routes, routing filter, route aggregation and policies. These are then explained using simple examples. They are all explained in a line each below. The first being talked about is a default route, which is set by the admin. If a packet for some address for e.g. aa.bb.cc.d is present, it should be sent on the specific output line. Then a route filter is talked about, packages for/from/for and from IP aa.bb.cc.d must be dropped or bound for to a certain port of the router. Route aggregation is the exchanging of routes between different routers, making the router more aware of networks around it and the next hops available for going to the routers. Policies of the router are the rules that govern how it should choose a route to a network, if multiple paths are available.