Lab #8
CSCI 201

Title
Networking Worksheet

Lecture Topics Emphasized
Networking Theory

Introduction
Networking is a very important topic for everyone, but especially for computer scientists. There are very few programs that operate outside of a network, and many companies nearly shut down if their network and/or internet connection fails. Network administrators are tasked with keeping a network running, but programmers definitely need to understand the basics of how computers connect to a network and operate.

Description
This lab is going to give you some experience answering some networking questions to ensure that you understand how IP addresses, subnets, NAT, DHCP, routers, and the internet behave in a general sense. There is a lot more information about networking that can be learned, but hopefully you will understand more about your computer and the networks to which it connects after completing this lab.

Part 1 – Your Computer

1. What is the IPv4 address of your computer?

Dotted decimal notation

Binary notation

2. What is the IPv6 address of your computer?

Dotted decimal notation

Binary notation

3. Is your IP address public or private?

4. What IPv4 class is your computer on?

5. What is the IPv4 network address of your computer?

Dotted decimal notation

Binary notation

6. What is the IPv4 subnet mask of your computer?

Dotted decimal notation

Binary notation

7. What is the IPv4 network and subnet address of your computer?

Dotted decimal notation

Binary notation

8. How many hosts can be on the same network as your computer?

9. How many hosts can be on the same subnet as your computer?

10. What is the gateway IPv4 address of your computer?

Dotted decimal notation

Binary notation

11. What is one DNS server IPv4 address of your computer?

Dotted decimal notation

Binary notation

Part 2 – Other Computers

12. What is the IPv4 address of USC's web server (i.e. the server at location www.usc.edu)?

Dotted decimal notation

Binary notation

13. In which IPv4 class is the above IPv4 address?

14. Is the IPv4 address above public or private?

15. Assume your computer is assigned the IPv4 address 183.215.75.33 with a subnet mask of 255.255.255.224. Answer the following questions.
    a. What is the IPv4 address in binary notation?

b. What is the subnet mask in binary notation?

c. What IPv4 class is the IPv4 address?

d. What is the network address of the IPv4 address?

Dotted decimal notation

Binary notation

e. What is the network and subnet address combination of the IPv4 address?

Dotted decimal notation

Binary notation

f. What is the broadcast address for this subnet?

Dotted decimal notation

Binary notation

g. What is the range of IPv4 addresses that can assigned to hosts on this subnet (in dotted decimal notation)?

h. How many hosts can be part of the network?

i. How many hosts can be part of the subnetwork?

16. Your co-worker who went to UCLA tells you that DHCP is not enabled at your new job, so you should just use the same IP address that you have at home to connect to the internet. He told you it should work because your computer is communicating with a unique public IP address at home, so no other computer in the world would have it. When you try this, your computer does not have internet access. Give two reasons why.

    Reason #1

    Reason #2

17. Perform a trace route to http://www.amazon.com and to http://www.facebook.com. From those two trace routes, draw a diagram showing the routers the data goes through to get there. Your diagram should include squares for the hosts, circles for the routers, and a cloud around the routers that are not part of your network, Amazon's network, or Facebook's network. Include the IPv4 address of all of the devices (if possible).

18. For the following questions, assume that your network does not have DHCP enabled and uses static IP addresses instead. A network administrator has told you that you should use 87.199.3.100/26 to connect to the internet.
    a. What is the IPv4 class?
    b. What is the IPv4 network address?

    Dotted decimal notation

    Binary notation

    c. What is the IPv4 broadcast address for the network?

    Dotted decimal notation

    Binary notation

    d. How many hosts can be on the network?
    e. What is the subnet mask?

    Dotted decimal notation

    Binary notation

    f. What is the network and subnet address combination?

    Dotted decimal notation

    Binary notation

    g. How many hosts can be on the subnetwork?

h. What is the broadcast address for the subnetwork?

Dotted decimal notation

Binary notation

i. What is the first assignable host address for the subnetwork?

Dotted decimal notation

Binary notation

j. What is the last assignable host address for the subnetwork?

Dotted decimal notation

Binary notation

19. Your friend comes over to your house on July 19, 2017 between 3:00-4:00p.m., and you let him connect through your WiFi network. Two weeks later, there is a knock on your door from a police officer saying that there was illegal activity coming from your computer at 3:30p.m. on July 19, 2017. You insist that it wasn't your computer, but the officer says that the IP address committing the crime is the public IP address your ISP assigned to you.
    a. What device on your network has that public IP address?

    b. Explain how NAT works.

c. Give two reasons how can you protect yourself against illegal activity on your network.

Reason #1

Reason #2

d. If you could go back in time, how could you track that the activity originated from your friend instead of you?

Grading Criteria

Labs are not graded based on any given criteria but are instead graded on effort and attendance. If you arrived to lab within the first 10 minutes and worked on it the for the entire duration of the lab, you will receive full credit regardless of whether you completed it. TAs will not grade labs until after at least half the lab period has elapsed. Use the lab time as an opportunity to more fully understand the course material and ask your TA questions.