CIS 350 – INFRASTRUCTURE TECHNOLOGIES HOMEWORK # 6

NAME(S): Abdulaziz Arrak

(You may do this homework in groups of 2 students maximum.)

Topics: Networks and Data Communications (Chapter 12), Ethernet and TCP/IP Networking (Chapter 13), Communication Channel Technology (Chapter 14)

Show your calculations!

Problem 1

A mask representing some IP address is 255.192.0.0. Write the mask in

the binary form: 1111111.11000000.000000.000000

the prefix notation: /10

Problem 2

What is the class of the following IP addresses?

10000011.10000111.11001100.00000011

Class B

011111110.10000111.11001100.00000011

Class A

200.10.56.0 (decimal form)

Class C

Problem 3

Your start-up company has been assigned the following IP address by IANA: 138.226.0.0. You are to design 200 subnetworks within this network, with each subnetwork supporting up to 500 hosts. Can these subnetworks and hosts be designed? If not, which address class A, B, or C would allow for this particular design?

10001010.11100010.000000000.00000000, Class B

Class B addresses have the following mask: 255.255.0.0 11111111111111111111000000000.00000000 Or /16 32-16=16

Problem 4

Your company has been assigned the following IP address by IANA: 135.100.0.0. Design a network th	at
consists of 500 subnetworks with each subnetwork having up to 60 hosts.	

(a) What address class is it? Class B

(b) What is the mask associated with this IP address? Write the mask in the decimal, binary and prefix form.

Mask in decimal **255.255.0.0**

Mask in prefix form /16

(c) Perform calculations below to check if this network can be designed.

(d) What is the subnetwork mask? Write the subnetwork mask in the decimal, binary and prefix form.

Mask in decimal

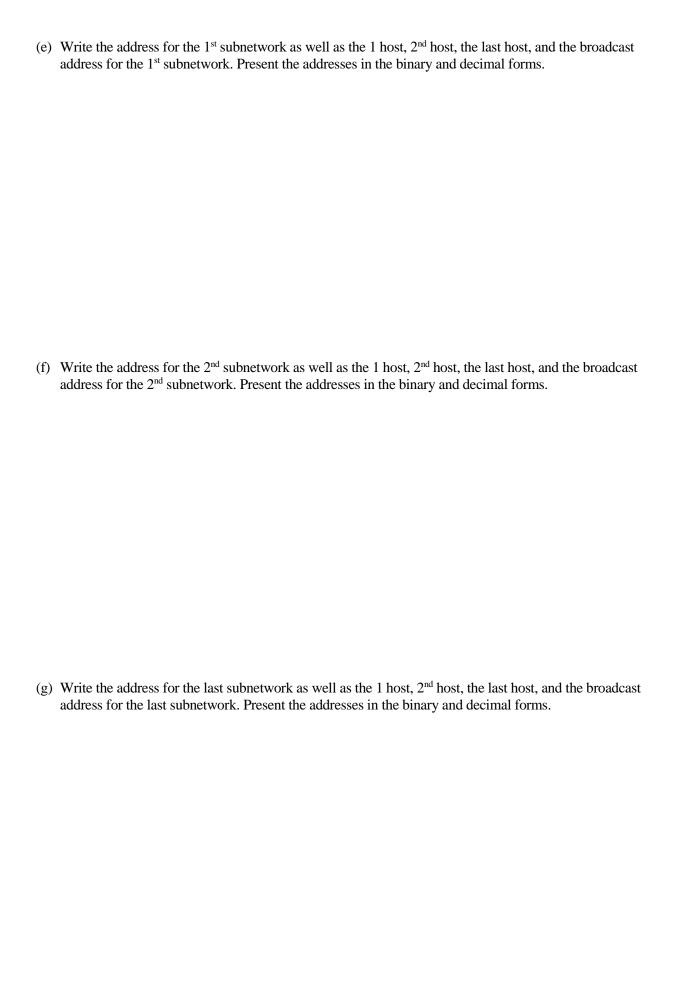
Mask in decimal

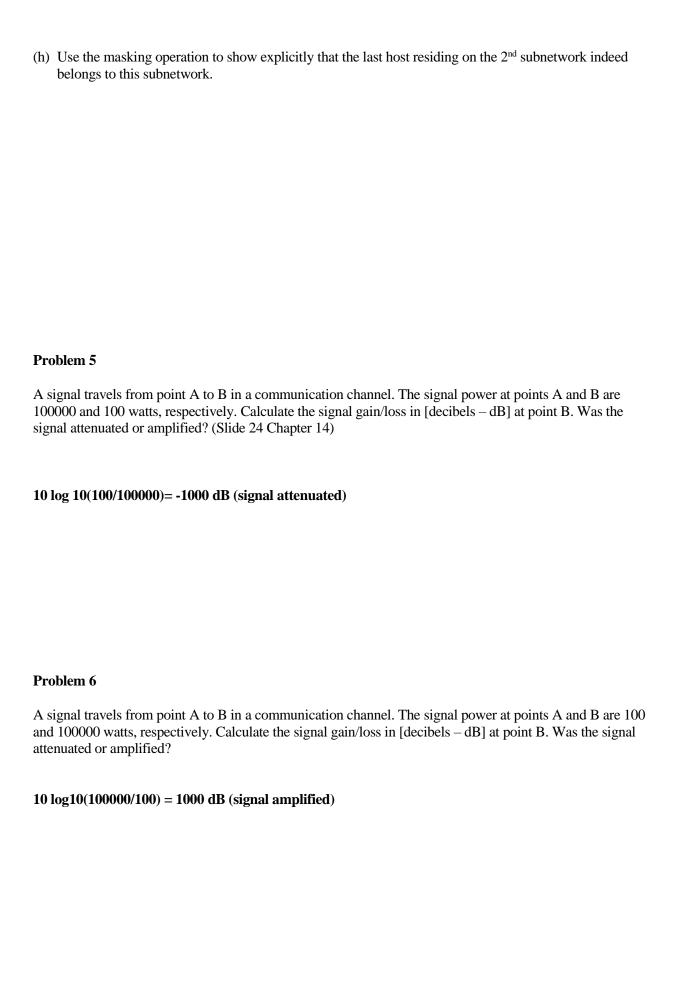
Mask in binary

Mask in prefix form

For questions (e) through (h) do <u>not</u> follow the Cisco approach with AllZero and AllOnes addresses for subnetworks briefly discussed in class and described at this link http://www.cisco.com/en/US/tech/tk648/tk361/technologies_tech_note09186a0080093f18.shtml,

but rather use the approach covered in the class examples.





Problem 7

You should know from the slides on chapter 14 covered in the classroom that the speed of data transmission over a communication channel depends on the bandwidth of the channel [expressed in Hz] as well as the power of the signal and noise of the channel [both expressed in Watts]. Shannon proposed a formula that allows one to calculate the maximum data rate [expressed in bps (bits/second)] for an analog signal with noise send over a channel.

$$S = f \times \log_2 (1 + W/N)$$

where:

- S data transfer rate in bps
- f signal bandwidth [expressed in Hz]
- W signal power [in Watts], and
- N noise power [in Watts]

Calculate the data rate (speed of transmission) of the telephone signal of 8 KHz bandwidth, 2 watts of power, and 0.002 watts of noise? (Note that the log function uses <u>base 2</u>.)

You may use Excel function =LOG(x, 2) to calculate $\log_2(x)$, where x is an argument and 2 is the base; or you may use your calculator with the LOG₁₀(x) function knowing that $\log_{10}(x)/\log_{10}(2) = \log_2(x)$.