9

TCP/IP Internetworking II

# Homework

Last Name:

First Name:

E-Mail:

Due Date: Wednesday, April 6, 2016

To answer a question part, put your cursor at the end of the question part and hit enter.

This should put you in the A or Answer style.

If it does not, you can click on the answer and apply the A or Answer style.

# CORE TCP/IP MANAGEMENT TASKS

## IP Subnet Planning

Test Your Understanding

**1. a) Why is IP subnet planning important?**

**b) If a subnet part is X bits long, how many subnets can you have?**

**c) If you have a subnet part of 9 bits, how many subnets can you have? (Check figure: 510 subnets)**

**d) If you have a subnet part of 6 bits, how many subnets can you have?**

**e) Your firm has an 8-bit network part. If you need at least 250 subnets, what must your subnet part size be? (Check figure: 8 bits)**

**f) Continuing the last question part, how many hosts can you have per subnet? (Check figure: 65,534 hosts per subnet)**

**g) Your firm has an 18-bit network part. If you need at least 16 subnets, what must your subnet part size be?**

**h) Continuing the last question part, how many hosts can you have per subnet?**

**i) Your firm has a 22-bit network part. What subnet part would you select to give at least 10 subnets?**

**j) Continuing the last question part, how many hosts can you have per subnet?**

## Network Address Translation (NAT)

Test Your Understanding

2. a) What is NAT? (Do not just spell it out.)

b) Describe NAT operation.

**c) What are the two benefits of NAT?**

**d) How does NAT enhance security?**

**e) How does NAT allow a firm to deal with a shortage of IP addresses given to it by its ISP?**

f) How are private IP address ranges used?

g) What are the three ranges of private IP addresses?

~~h) What problems may firms encounter when using NAT?~~

## The Domain Name System (DNS)

Test Your Understanding

3. a) Is the Domain Name System only used to send back IP addresses for given host names? Explain.

**b) What is a domain**?

**c) Distinguish between the DNS root and top-level domains**.

**d) What are the two types of top-level domains**?

**e) Which level of domain name do corporations most wish to have**?

f) What are DNS root servers?

**g) How does a company or individual obtain a second-level domain name**?

h) After you get a second-level domain name, what more must you do to have a working website for your company?

## Simple Network Management Protocol (SNMP)

Test Your Understanding

4. **a) Explain the difference between managed devices and objects**.

b) List one object in each of the following areas: the system, IP, TCP, UDP, ICMP, and an interface.

**c) Why are firms often reluctant to use *Set* commands**?

~~d) Describe SNMPv1’s poor authentication method.~~

~~e) Describe SNMPv3’s good authentication method.~~

**f) How can good security be an enabler with SNMP**?

# SECURING INTERNET TRANSMISSION

## Virtual Private Networks

## IPsec Transport Mode

## IPsec Tunnel Mode

## Remote-Site-Access and Site-to-Site VPNs

## IPsec Security Associations and Policy Servers

Test Your Understanding

5. **a) At what layer does IPsec operate**?

**b) What layer content does IPsec protect**?

**c) Does IPsec protect upper-layer protocols transparently**?

~~d) Describe IPsec tunnel mode.~~

~~e) What is the main advantage of tunnel mode? Explain.~~

~~f) What is the main disadvantage of tunnel mode? Explain.~~

~~g) Describe IPsec transport mode.~~

~~h) What is the main advantage of transport mode? Explain.~~

~~i) What is the main disadvantage of transport mode? Explain.~~

~~j) Describe the problem that firewalls have with IPsec transport mode VPNs.~~

~~k) In which IPsec mode are clients and servers required to have digital certificates?~~

~~l) Which IPsec mode does not require clients and servers to have digital certificates?~~

m) Is IPsec used for remote-site-access VPNs, site-to-site VPNs, or both?

6. **a) In IPsec, what are security associations (SAs**)?

b) Must security associations be the same in the two directions?

**c) Describe how IPsec gateways can be managed centrally to ensure that weak SAs are not permitted**.

## SSL/TLS VPNs

Test Your Understanding

7. a**) Why are SSL/TLS VPNs attractive**?

**b) Compare the relative advantage of SSL/TLS over IPsec**.

**c) Compare the relative advantages of IPsec over SSL/TLS**.

**d) How can you tell if your connection to a server uses SSL/TLS**?

# MANAGING IP VERSION 6 (IPV6)

## Internet Layer Protocol Stacks

Test Your Understanding

8. a) What is the advantage of having a dual stack for IP?

**b) Why is having only an IPv6 stack problematic**?

## IPv6 Subnetting

**9. a) What field in an IPv6 global unicast address corresponds to the network part of an IPv4 address?**

**b) What field in an IPv6 global unicast address corresponds to the subnet part of an IPv4 address?**

**c) If the subnet ID is 16 bits long, how long is the routing prefix?**

**d) If you are a large company, do you want a large routing prefix or a small routing prefix?**

**10. a) What field in a global unicast IP address corresponds to the host part of an IPv4 address?**

**b) How long is this field in an IPv6 global unicast address?**

**c) Convert the following EUI-48 address to a modified EUI-64 address: AA-00-00-FF-FF-00. (Check figure: ae00:00ff:feff:ff00)**

**d) Repeat for this EUI-48 address: 9B-E5-33-21-FF-0D**.

## The Domain Name System for IPv6

Test Your Understanding

11. **In the Domain Name System, distinguish between the information contained in the A and AAAA records for a host name**.

# OTHER TCP/IP STANDARDS

## Dynamic Routing Protocols

Test Your Understanding

**12. a) What is the purpose of dynamic routing protocols?**

**b) For its own network, can an organization choose its interior dynamic routing protocol?**

**c) What is the IETF interior dynamic routing protocol?**

**d) When might you use EIGRP as your interior dynamic routing protocol?**

**e) May a company select the routing protocol its border router uses to communicate with the outside world?**

**f) What is the almost-universal exterior dynamic routing protocol**?

## Internet Control Message Protocol (ICMP) for Supervisory Messages at the Internet Layer

Test Your Understanding

**13. a) For what general class of messages and at what layer is ICMP used?**

**b) Explain error advisement in ICMP.**

**c) What two ICMP message types are used in *ping?***

**d) What security concern do ICMP error advisement messages and echo response messages create**?

# CONCLUSION

## Synopsis

## End-of-Chapter Questions

Thought Questions

~~9-1. Both DNS servers and DHCP servers send your client PC an IP address. Distinguish between these two addresses.~~

9-2. Assume that an average SNMP response message is 100 bytes long. Assume that a manager sends 400 SNMP *Get* commands each second. a) What percentage of a 100 Mbps LAN link’s capacity would the resulting response traffic represent?

b) What percentage of a 1 Mbps WAN link would the response messages represent?

c) What are the management implications of your answers?

9-3. A firm is assigned the network part 128.171. It selects an 8-bit subnet part. a) Write the bits for the four octets of the IP address of the first host on the first subnet.

b) Convert this answer into dotted decimal notation. (If you have forgotten how to do this, it was covered in Chapter 1.)

c) Write the bits for the second host on the third subnet. (In binary, 2 is 10, while 3 is 11.)

d) Convert this into dotted decimal notation.

e) Write the bits for the last host on the third subnet.

f) Convert this answer into dotted decimal notation.

9-4. A firm is assigned the network part 128.171. It selects a 10-bit subnet part. a) Draw the bits for the four octets of the IP address of the first host on the first subnet. (Hint: Use Windows Calculator.)

b) Convert this answer into dotted decimal notation.

c) Draw the bits for the second host on the third subnet. (In binary, 2 is 10, while 3 is 11.)

d) Convert this into dotted decimal notation.

e) Draw the bits for the last host on the third subnet.

f) Convert this answer into dotted decimal notation.

Troubleshooting Question

9-5. In your browser, you enter the URL of a website you use daily. After an unusually long delay, you receive a DNS error message that the host does not exist. a) List the troubleshooting steps in Chapter 1.

1.

2.

3.

4.

b) Apply them to this situation.

1.

2.

3.

4.

This Hands-On Project

9-6. After Sal Aurigemma received his PhD from the University of Hawaii, he became an assistant professor at the University of Tulsa. There, he introduced the school to Aloha Friday, when people come to work in their colorful Aloha shirts. He got the idea of creating Aloha shirts with Tulsa’s school colors and an emblem of the university on the shirt pocket. Suppose that he wants to create a company to sell school-specific Aloha shirts. He will need a company name and a second-level domain name. Got to an Internet domain name registrar. Thoughtfully come up with three appropriate and available domain names. Explain why each is good. Select one and explain why it is best.

1.

2.

3.

Perspective Questions

9-7. What was the most surprising thing to you about the material in this chapter?

9-8. What was the most difficult thing for you in the chapter?