

Lab 2: Subnets and Routing

In this lab, you will practice your understanding of subnets. As a team, you determine the appropriate network numbers, and configurations. Each team will turn in answers to the questions in this lab. Note: for this lab, you will only be able to access the machines within your own row of desks. This is your private LAN.

Boot into single-user mode

Step 1. Boot your system into single user mode. To accomplish this, reboot the system, and interrupt the Red Hat splash screen at the beginning of the boot process with Control-X. Then type **linux single** at the **boot:** prompt.

Configure a subnetted network

Step 2. It is important to know your network numbers before attempting to configure your network. Incorrect IP settings will cause problems for others on the network. Assume that an IP administrator has given this class one Class C IP address: **192.10.20.0**. You are to subnet this address to a **/27** subnet, creating some number of smaller subnetted-networks. Your row has been assigned as either the 1st, 2nd, ..., Nth subnet of the possible subnets. Consult the table at the end of this lab to determine which subnet you are - this will help you to determine your subnetted network address. Determine the information necessary to correctly setup your subnetted network. The questions below will help guide you through this.

Q1. How many subnetted networks are possible using this subnet scheme? _____

Q2. How many distinct IP addresses exist for your subnet? _____

Q3. Which IP addresses are reserved? _____

Q4. What are the valid, usable IP addresses for your subnet? _____

Q5. What is your subnet mask? _____

Q6. What is the bit pattern of the last octet of your subnet mask? _____

Q7. How many bits are used for the network? _____

Q8. How many bits are used for the host? _____

Q9. Using proper terminology, what is your network address? _____

Q10. What is your broadcast address? _____

Step 3. You can create your own hostname, but it is a common practice to choose hostnames that fit a common theme. Consult with the other members in your row to choose a theme.

Q11. What is you row's theme? _____

Step 4. Fill in the table below for each machine on your network. Circle the row that corresponds to your system.

Machine Number	Hostname	IP Address

Step 5. Fill in the table below with the starting and ending IP addresses for each of the subnets in the lab.

<i>N</i> th Subnet	Subnet's First IP Address	Subnet's Last IP Address
1		
2		
3		
4		
5		

- Step 6. Configure your **eth0** network interface using the IP information you determine earlier. Bring up the **eth0** interface. Also, bring up the loopback interface **lo**. For systems with two interfaces, the **eth0** interface should use the **3c509** network driver module since the cable is usually plugged into this interface already.
- Step 7. Add entries to the **/etc/hosts** table for each machine on your network. This will allow any system on your network to use hostnames as well as IP addresses to access any other machine on your network. The format of the table is:

```
ip-address    hostname
```

Learning the route table

- Step 8. Examine your system's route table with either the **netstat -rn** or **route -n** commands. Fill in the table below with the routing information.

Destination	Gateway	Genmask	Flags	Interface

Q12. What does the **U** mean in the *Flags* column? _____

Q13. What is the meaning of 0.0.0.0? _____

- Step 9. Run **netstat** or **route** again, this time without the **-n** option.

Q14. What differences in output do you see? _____

Q15. What is the purpose of the **-n** option? _____

Learning the arp table

- Step 10. Examine the ARP table on your machine using the **arp** command. Try with and without the **-a** option.

Q16. How many entries do you have? _____

- Step 11. Now ping each machine on your subnetted network. Examine at the ARP table again.

Q17. What were the changes? _____

- Step 12. Enter the arp table entry for your own machine in the table below.

Machine Number	Host	IP Address	HWType	Ethernet Address	Flags	Interface

Q18. How long do the arp entries last in the table? _____

Step 13. Shutdown your system with the command: **shutdown -h now**. Be sure to turn off the power switch if needed after the systems claims to be halted.

