

CSIS0234B Computer and Data Communication (Class B)

Tutorial 7

Subnetting

Imagine that you are in charge of the networking of a department of a corporation, which gave you a block of IP addresses (i.e., a subnet), which is part of the addresses that the corporation owns. You also obtained the complete administrative right over the set of addresses. That means you are now in charge of the addresses, as well as the routing of packets of those addresses. You are to build a local network out of it.

In this tutorial, you're going to set up this local network. You will need to make physical connections of the machines as well as setup the interfaces correctly so that the machines can communicate with each other.

Your tasks

Your task is simple: work in group of 3–4 to set up the things so that all the involved computers can talk to each other, and can talk to computers outside the network. We have a *primary gateway* which is connected to the outside world. You are to set up a *secondary gateway* to connect the computers in your subnet, which consists of two or three other hosts. You will be allocated a switch and enough ethernet cable to complete the task. We suggest the following steps when trying to achieve the goal:

1. Compute the network addresses and netmasks of the primary network and your subnet.
2. Setup your own subnet (including your secondary gateway), without connection to outside, using the interface `eth0` of the computers. You may use the `redhat-config-network` program provided by Redhat to setup the networking parameters. Using `ping`, test your network to make sure that each pair of computers are connected.
3. On the secondary gateway, use the other interface `eth1` to connect to the primary gateway. Configure the interface, and make sure the secondary gateway can talk to the primary gateway (again, using `ping`).
4. By default, a computer (the secondary gateway included) is configured as a multi-homed host. Configure it as a router, and see whether the subnet (other than the secondary gateway) can reach the primary gateway. You should notice that it fails. Use `ethereal` at the secondary gateway to identify the reason behind the failure, and correct it. (Hint: you might need to do something with the primary gateway.)
5. Try to see whether the secondary gateway and the hosts in it can connect to the departmental servers. Fix any problem that you see. (If you use programs other than `ping`, or if you use the DNS service, you must disable the firewall of your secondary gateway using `/etc/init.d/ipchains stop`.)
6. Once another group reaches this step, try to connect your hosts to the secondary gateway of their computer, and also to the hosts of their subnet. Do you expect that it will work? Why?
7. Use `traceroute` to see what is the path that is being used to send packets to hosts in their subnet. Note that packets travel through the primary network twice: once to the primary gateway, once from the primary gateway. Try to avoid that by changing the routing table of one of the secondary gateway. After that, see what routes is taken by both sides.