

CSIS0234B Computer and Communication Networks (Class B)

Tutorial 7

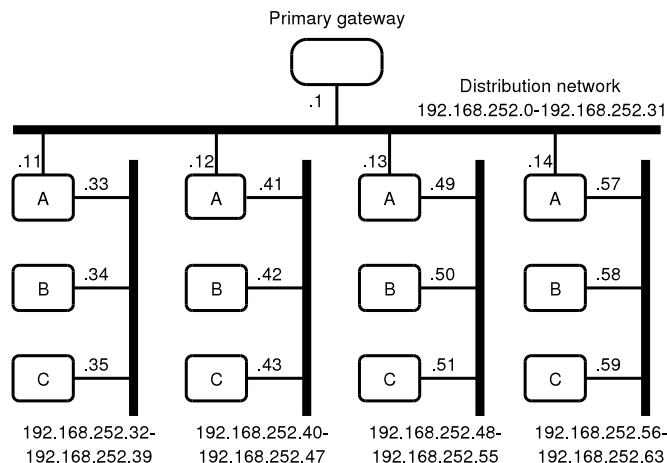
Subnetting

Imagine that you are a member of a subgroup in an organization. The organization gave you a block of IP addresses (i.e., a subnet) out of the address block of itself. You are to work in group of 3–4 to set up this subnet, by making physical connections and setup the software correctly. The eventual goal is that all the involved computers can talk to each other, and can talk to computers outside the network.

Your tasks

The organization has a set of IP addresses 192.168.252.0–192.168.252.255. It reserves 32 of its addresses (i.e., 192.168.252.0–192.168.252.31) for the backbone distribution network. The remaining addresses are allocated to its subgroups. Four parts of such addresses allocated ends with .32–.39, .40–.47, .48–.55 and .56–.63; you will be using one of these parts. The organization has a primary gateway, at 192.168.252.1, for connecting to the outside world.

With one of these address parts, you will connect a network of computers A, B and C using a hub. One of them (A) will also be connected to the main organization network. It is used as a *secondary gateway* to connect to the rest of the organization and the outside world. So the overall topology is as follows:



The following steps will guide you in building and testing the network.

1. Wait for your computer to boot. Since its network is failing, the computer is rather slow. Login in **text** console (press Control-Alt-F1) to stop the network interface `eth0` (using `ifconfig eth0 down`), which makes everything much faster. Then go back to GUI (Control-Alt-F7) and login as `root`.
2. Make all the necessary connections physically. Make sure all the connections are working well (by checking that the corresponding LED of the hub and switch lits). Some network cards do not work well with the switch used by the primary gateway, so you might need to try different interfaces in A.
3. Compute the netmasks of your subnet and the main distribution network. With this information, setup your own subnet (without connection to outside) using the configuration utility provided by Redhat (menu->System Settings->Network). Test your network with `ping` to make sure that each pair of computers are connected.

4. Set up the other interface of A to connect to the primary gateway. Test the connection with `ping`.
5. Configure A as a router (i.e., enable forwarding). Check that B and C cannot `ping` the primary gateway. To identify the problem, read the route cache by `route -C` at the primary gateway to see where replies to your `ping` requests are routed to. Correct the problem once you can identify it. (Hint: you need to modify the routing table of the primary gateway.)
6. Check also that B and C can `ping` the nameserver that you know, `172.16.0.15`. After that, let's do some real stuff: from the three computers, see whether you can surf the web and use `ssh`. You will need to stop the firewall at A with `service iptables stop` (since incoming and forward traffic to "reserved" ports are normally blocked).
7. Once another group reaches this step, try to connect your hosts to the secondary gateway of their A, B and C. Check whether it works, and use `traceroute` to see the route that is used.
8. You will find that the route is not the most efficient one: while the two A's are in the same departmental network, they do not directly send the packets among themselves. Fix the problem by adding some further routes at A.