

Initiation Réseaux

TP2 - First Network Interconnection

1 Objective

1. Build your first network of 3 PCs **Linux**.
2. Learn and get familiar with the routing concept.
3. Practice routing configurations.

Evaluation: When you finish the subject or certain steps, ask me to check your work in order to evaluate your participation. You do NOT have a report to submit for this session.

2 Network Model

Your first work is to connect 3 PCs, PC1, PC2 and PC-Router by Ethernet cables. Figure 1 shows the network model you are going to build. Note that the interface numbers illustrated in the picture may not be the same as those of your PCs. You could have eth3 or eth4 instead of eth0, for example.

ATTENTION: Remove the Ethernet cable which connects the PC to the Internet! You are building an independent network.

Once you finish the interconnection of the network, you need first disable the network-manager for all the three PCs by the console command:

```
root@username#service network-manager stop
```

Then you can use the following console commands to check the interface status of your PC:

```
root@username#ifconfig
root@username#dmesg
```

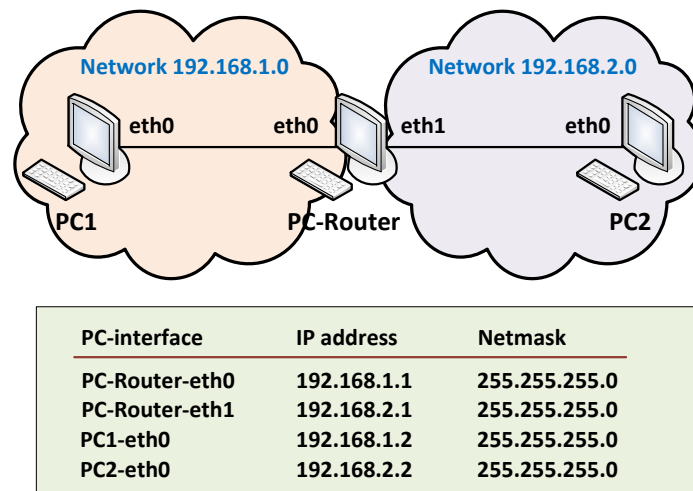


Figure 1: The network model and the IP address Table

Next step, set IP addresses to the corresponding interfaces according to the IP address table in Figure 1. Please check the IP addresses configured by the command **ifconfig**.

3 Check the connectivity in a local network

Once you have finished the configuration of the IP addresses, check the connectivity in the network 192.168.1.0 and in the network 192.168.2.0. More precisely, check the connectivity between PC1-eth0 and PC-Router-eth0 and the connectivity between PC2-eth0 and PC-Router-eth1 by the console command:

```
root@username#ping destination IP address
```

If the ping succeeds, it means the local network has been built.

4 Activate the IP forwarding on the PC-Router

The PC-Router needs to activate the IP forwarding in order to act as a router and forward IP packets. First check the current status of the PC-Router by the console:

```
root@PC-Router#cat /proc/sys/net/ipv4/ip_forward
```

If the returned value is **0**, it means that the IP forwarding is NOT activated and you need to activate it. To achieve that, you just enter the command:

```
root@PC-Router#echo 1 >/proc/sys/net/ipv4/ip_forward
```

Then check again the activation of the IP forwarding to make sure it has been set to **1**. Now your PC-Router can work like a **router**! Check your routing table at the PC-Router by:

```
root@PC-Router#route
```

Which routes are already in the routing table?

5 Configure the route

Now ping PC2 from PC1, does it work? Probably NO! Why? Because PC1 only knows the network 192.168.1.0 where it is. It does not know the other networks. Check your routing table at the PC1. Which routes are already in the routing table?

So, you need to add a static route at PC1, telling it through which gateway can reach which network. This can be done by the command:

```
root@PC1#route add -net dest. network netmask netmask of the dest. network gw the gateway IP dev the out interface
```

Now check again the routing table at PC1. Which route has been added?

Try to ping 192.168.2.1 from PC1. Does it work?

Try to ping 192.168.2.2 from PC1. Does it work? Why?

Note that the **ICMP** works with an Echo Request and an Echo Reply which means a communication in two directions. Therefore, PC2 has to know how to send the Echo Reply back to PC1. Since PC2 does not yet know the network 192.168.1.0, you have to add a static route of this network at PC2.

This time, try the **default gateway** by:

```
root@PC2#route add default gw the gateway IP
```

Now check the routing table of PC2. Which routes have you seen?

Try to ping PC2 from PC1 (or ping PC1 from PC2). Does it succeed?

Ask me to check the connectivity between PC1 and PC2. Explain me what is a default route!

6 Wireshark

Now the your first network interconnection has been finished. You can open the Wireshark to observe the **ICMP** traffic when you ping a PC from another one.

When PC1 pings PC2, can you observe the **ICMP** traffic at the PC-Router?

7 Wanna try with Windows? (Optional)

If you are interested, you can try your PC1 and PC2 (the hosts) under the Windows system.