ECE PARIS · LYON
ÉCOLE D'INGÉNIEURS

ING4 SI01

Computer Network

Network Configuration

Networking Lab 1

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1 Router configuration using virtual console and virtual line interface

1.1 Display the running configuration of the router

- enable allow us to pass in privilged mode, so we have more access
- show running-config show the current operating system

1.2 Q1.2

- config t (conf t) allow us to configure the router

We have our ethernet connection on the ethernet port : FastEthernet0/0 (fa0/0) So to configure it we do interface fa0/0, now we can configure the ip address like : ip address 192.168.10.1 255.255.255.0

then we need to configure the pc that need to communicate with the router, so we set : ip address 192.168.10.2 mask 255.255.255.0 and default gateway 192.166.10.1 so it sends all it's packets to the router (which has this ip (192.168.10.1)

So if we try to ping the router from the pc ping 192.168.10.1 we have a reply from the router so it works

1.3 Q1.3

conf t hostname R1

```
R1# copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Figure 1: R1 config

Current configuration : 696 bytes ! version 12.2 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname R1 ! ip cef no ipv6 cef ! interface FastEthernet0/0 ip address 192.168.10.1 255.255.255.0 duplex auto speed auto !

1.4 Q1.4

There is 6 network interfaces

line console 0 password root exit * 2 copy running-config startup-config to save reload

1.5 Q1.5

conf t line vty 0 4 password toor

1.6 Q1.6

```
!
interface FastEthernet0/0
 ip address 192.168.10.1 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet1/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial2/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial3/0
 no ip address
 clock rate 2000000
 shutdown
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
 password root
!
line aux 0
!
line vty 0 4
 password toor
 login
!
```

Figure 2: R1 passwords

1.7 Q1.7

PC2 : 192.168.0.2 255.255.255.240 default gateway 192.168.0.1

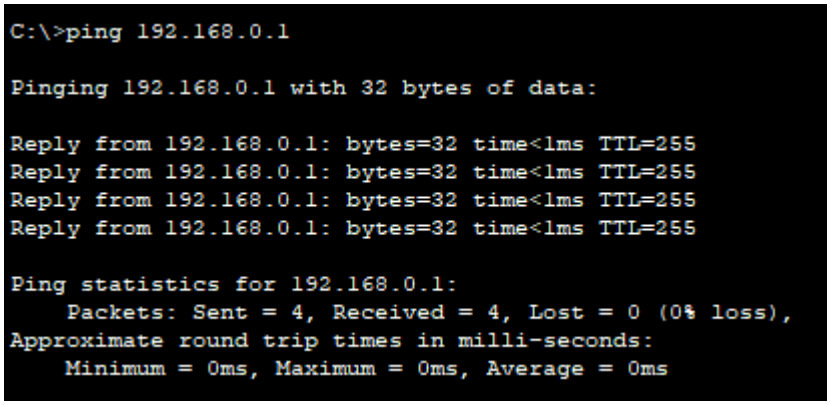

Figure 3: Ping

1.8 Q1.8

The right password to use with Telnet is the one in vty
In order to enable with the use of telnet, there need to be a password set for enable So in the router enable conf t enable password password (set the password to password)

Then can ask to enable from telnet and use password to gain access.

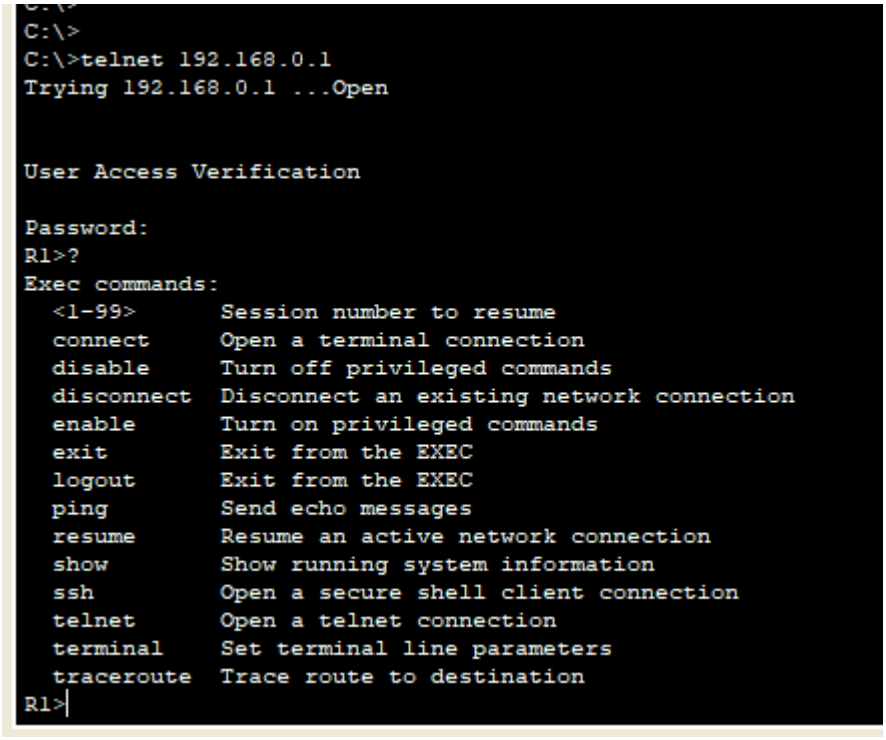

Figure 4: R1 passwords

2 Sub-netting

2.1 Subnet mask

Address space 192.168.2.0/24 so netmask is 255.255.255.0
To have 8 subnets :
The subnet needs to range from 0 - 7 so in binary from 000 to 111. So it uses 3 bits. 24 + 3 = 27. So new network mask is /27 so 255.255.255.224. So we have 5 bits left, so 2^5 = 32 -2 = 30, so each subnet will have 30 hosts.

2.2 Sub-network ids

/27 – 8 Subnets – 30 Hosts/Subnet
Network IP Range Broadcast
.0 .1-.30 .31
.32 .33-.62 .63
.64 .65-.94 .95
.96 .97-.126 .127
.128 .129-.158 .159
.160 .161-.190 .191

.192 .193-.222 .223
.224 .225-.254 .255

2.3 PCs and Routers IP address

Network X :

- R0, FastEthernet 0/0:
  - IP : 192.168.2.33
  - Netmask : 255.255.255.224
- PC0, FastEthernet 0:
  - IP : 192.168.2.34
  - Netmask : 255.255.255.244
  - Default Gateway : 192.168.2.33

Network Y :

- R0, Serial 2/0 :
  - IP : 192.168.2.65
  - Netmask : 255.255.255.224
- R1, Serial 2/0 :
  - IP : 192.168.2.66
  - Netmask : 255.255.255.224

Network Z :

- R1, FastEthernet 0/0 :
  - IP : 192.168.2.97
  - Netmask : 255.255.255.224
- PC1, FastEthernet 0 :
  - IP : 192.168.2.98
  - Netmask : 255.255.255.224
  - Default Gateway : 192.168.2.97

2.4 Ping R0 on network X from PC0

It works ! Which is normal since we are pinging the router on the same network.

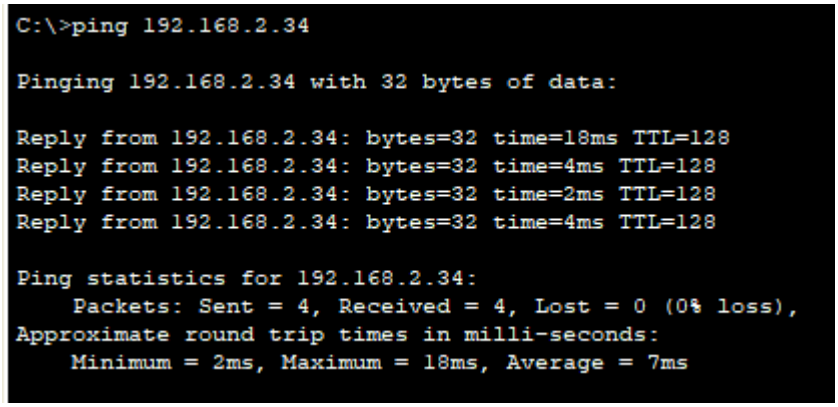

Figure 5: Ping R0 on network X from PC0

2.5 Ping R0 on network Y from PC0

It doesn't work ! Which is normal since they are not on the same network and we haven't configured static routing.

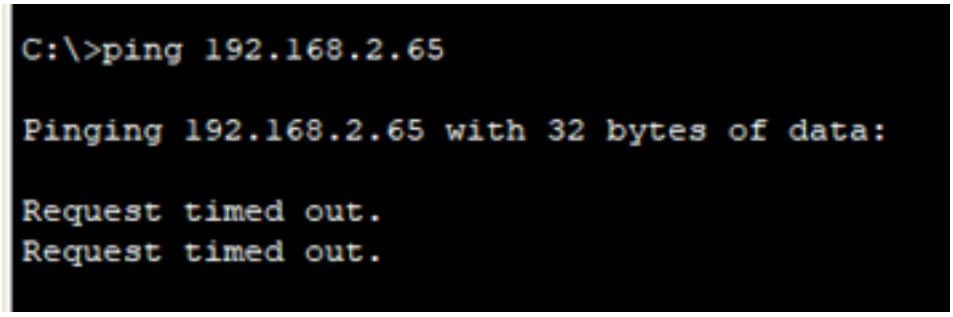

Figure 6: Ping R0 on network Y from PC0

2.6 Ping R1 on network Z from PC0

Same as previous : It doesn't work ! Which is normal since they are not on the same network and we haven't configured static routing.

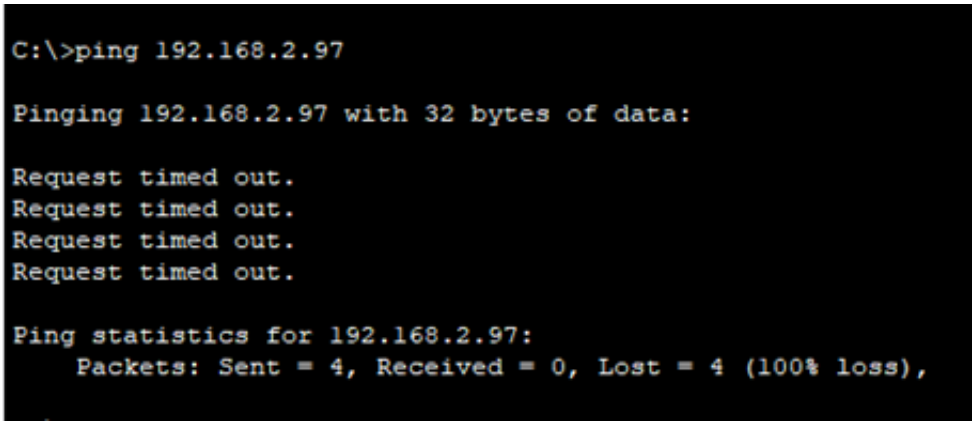

Figure 7: Ping R1 on network Z from PC0

2.7 Static Routing : Configuration of routers

In order to achieve a way for network X to communicate with network Z we need to configure the routers to redirect the information. We are signaling a router that if the information is destined for another subnet it should reroute it a certain way.
If in the network X we want to ping something on network Z, we need to say to R0 that everything in the subnet Z (ip : 192.168.2.96, netmask : 255.255.255.224) will need to pass by R1 address on network Y (192.168.2.66) :
ip route 192.168.2.96 255.255.255.224 192.168.2.66

In the same way: if in the network Z we want to ping something on network X, we need to say to R1 that everything in the subnet X (ip : 192.168.2.32, netmask : 255.255.255.224) will need to pass by R0 address on network Y (192.168.2.65) :
ip route 192.168.2.32 255.255.255.224 192.168.2.65

2.8 Static Routing : Pings

2.8.1 PC0 pinging PC1

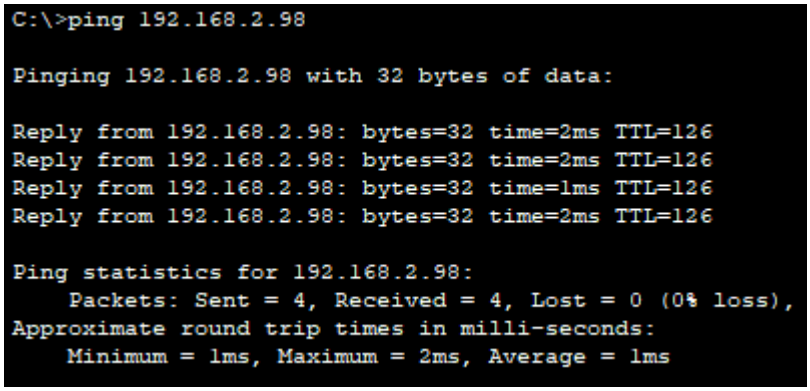

Figure 8: PC0 -> PC1

2.8.2 PC1 pinging PC0

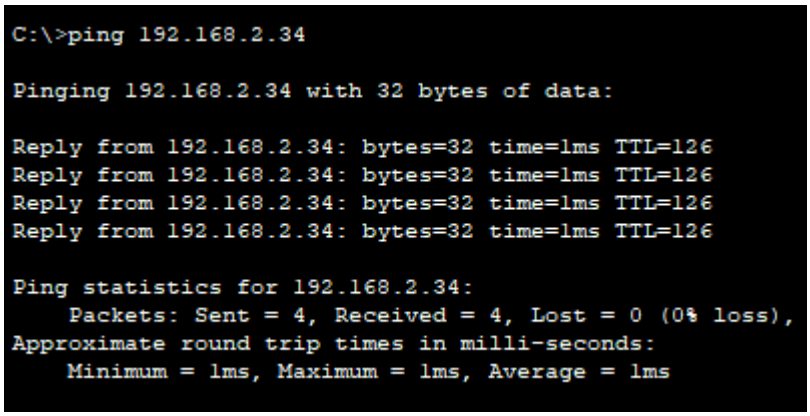

Figure 9: PC1 -> PC0

3 Network Extension

3.1 Fifth subnet

This fifth subnet use the next possible network available which is : 192.168.2.128 255.255.225.224, also written 192.168.2.128/27.

3.2 Configuration

- R0, FastEthernet 1/0 :
  - IP : 192.168.2.129
  - Netmask : 255.255.255.224
- PC2, FastEthernet 0 :
  - IP : 192.168.2.130
  - Netmask : 255.255.255.224
  - Default Gateway : 192.168.2.129
- PC3, FastEthernet 0 :
  - IP : 192.168.2.129
  - Netmask : 255.255.255.224
  - Default Gateway : 192.168.2.129

3.3 Ping PC0 from PC2

It works ! Which is normal since we are pinging a sub-network on the same router.

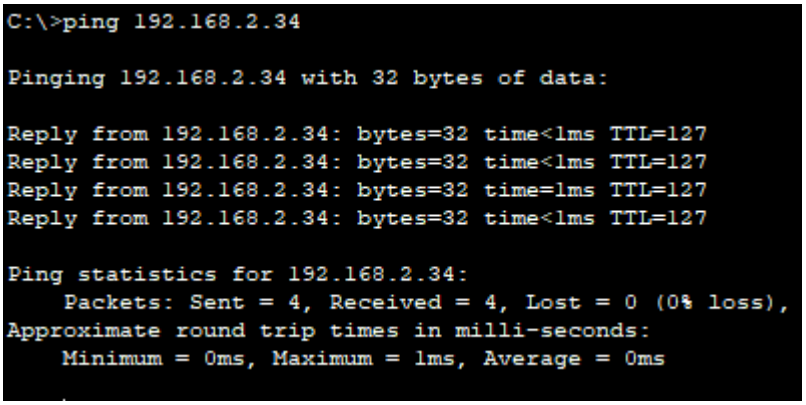

Figure 10: PC2 -> PC0

3.4 Updating the routing table

If right now we try to ping between PC1 and PC2 or PC3, we have a problem :

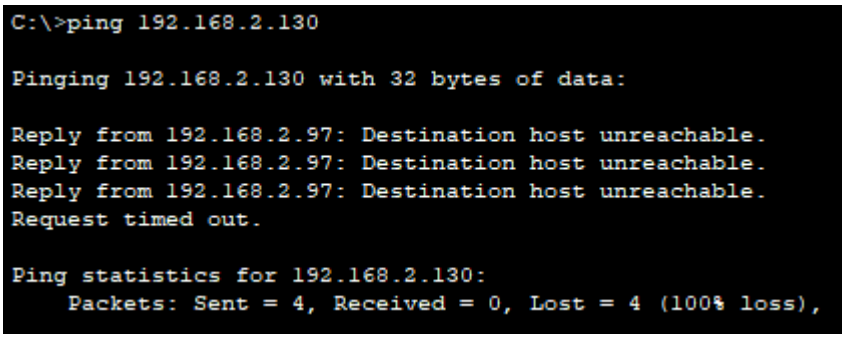

Figure 11: Before Update

In order to be able to ping from the network Z to the fifth network we need to configure the router 1. We will add a static route setting that every information that needs to go to the fifth sub-network with ip : 192.168.2.128, and netmask : 255.255.255.224 (192.168.2.128/27) needs to be retouted to router 0 on network Y (192.168.2.65).
We write : ip route 192.168.2.128 255.255.255.224 192.168.2.65

3.5 PC1 pinging PC3

It works ! Which is normal since we have added a static route to R1.

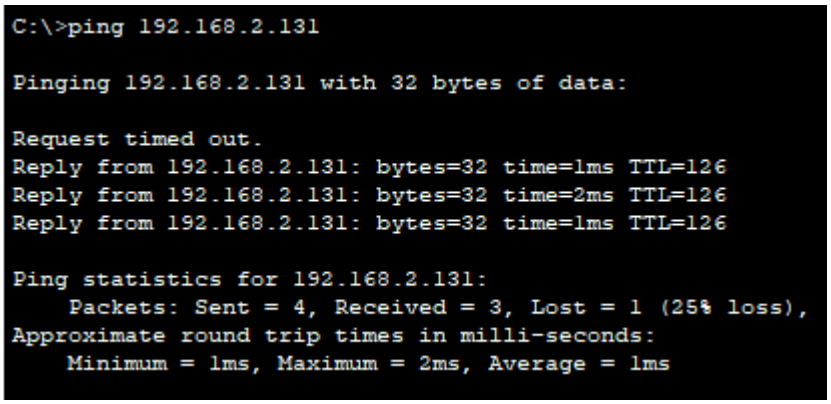

Figure 12: PC1 -> PC3