Practical work #2

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Abstract

We are going to discover the Internet, starting by your station and its the neighbors This PW contains 3 sections :

- Discovering an example network ;
- Discovering tour network ;
- Discobering the rest of the Internet.

Contents

1 Discovering an example network

This case study will help you understand the theoretical concepts of the course.

1.1 IP addressing

We are going to discover your station and its network. Using a console and *ip address show* command, we obtain :

```
test@debian11-desktop : ~
$ ip address show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
2: ens3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default
    qlen 1000
    link/ether 52:54:00:6b:0a:9f brd ff:ff:ff:ff:ff:ff
    altname enp0s3
    inet 192.168.122.90/24 brd 192.168.122.255 scope global dynamic ens3
       valid_lft 2286sec preferred_lft 2286sec
```

1.1.1 Question : how many network interfaces can you see, excluding *lo* ?

1.1.2 Question : What is the external IP address of the host and the netmask and the format of these netmask ?

1.1.3 Question : Calculate the mask in its binary and canonical form

1.1.4 Question : Calculate the network address of this host

1.1.5 Question : What should be and what is the broadcast address in this network ?

1.1.6 Question : What are the address that we can use for hosts in this network ?

1.2 IP routing

Using a console and *ip route show* command, we obtain :

```
test@debian11-desktop : ~
$ ip route show
default via 192.168.122.254 dev ens3
192.168.122.0/24 dev ens3 proto kernel scope link src 192.168.122.90
```

1.2.1 Question : What does the first row represent in the result above and what it is used for ?

1.2.2 Question : What does the second row represent in the result above and what it is used for ?

1.2.3 Question : What should be and what is the default gateway router address ?

1.2.4 Question : Is the host 8.8.8.8 belonging to our network ?

2 Discovering your network

2.1 IP addressing

2.1.1 To do : Open a console and input *ip address show*

2.1.2 Question : how many network interfaces can you see ?

2.1.3 Question : What is the external IP address of the host and the netmask and the format of these netmask ?

2.1.4 Question : Calculate the mask in its binary form

2.1.5 Question : Calculate the network address of this host

2.1.6 Question : What should be and what is the broadcast address in this network ?

2.1.7 Question : What are the address that we can use for hosts in this network ?

2.2 IP routing

2.2.1 To do : Open a console and input *ip route show* command

2.2.2 Question : What does the first row represent in the result above and what it is used for ?

2.2.3 Question : What does the second row represent in the result above and what it is used for ?

2.2.4 Question : What should be and what is the default gateway router address ?

2.2.5 Question : Is the host 8.8.8.8 belonging to our network ?

3 Discovering the rest of the internet

To analyze the networks traversed between our host and a destination host, we will use the tool *traceroute*. It is based on **RFC 791** and **RFC 792** relating to IP routing process.

3.1 The rules of the game

3.1.1 To do : Have a look at the RFC 791

You can find the document at https://datatracker.ietf.org/doc/html/rfc791. Read carefully the section 2.4 about gateways.

3.1.2 To do : Read the RFC 792

You can find the document at https://datatracker.ietf.org/doc/html/rfc792. Read carefully the section about TIME EXCEEDED MESSAGE and mainly the description of the message.

3.1.3 Question : what happens when a message go thought a gateway ?

3.1.4 To do : Read traceroute manpage

Open an console and input *man traceroute*. You will browse with arrow keys or wheel mouse and close the man whith *CTRL+q*.

3.1.5 Question : How traceroute uses RFC 792 rules ?

3.2 Map the Internet

3.2.1 Todo : Use traceroute ?

Use traceroute to show the path from your host to :

- Your default gateway (identified using *ip route show*) ;
- `www.epf.fr` using it IP address 136.243.104.86 ;
- `www.montpellier.fr` using its IP address 31.193.50.86 ;
- Google DNS server 8.8.8.8

3.2.2 Todo : Draw a network map

Try to draw à network tree map using the information you get above.