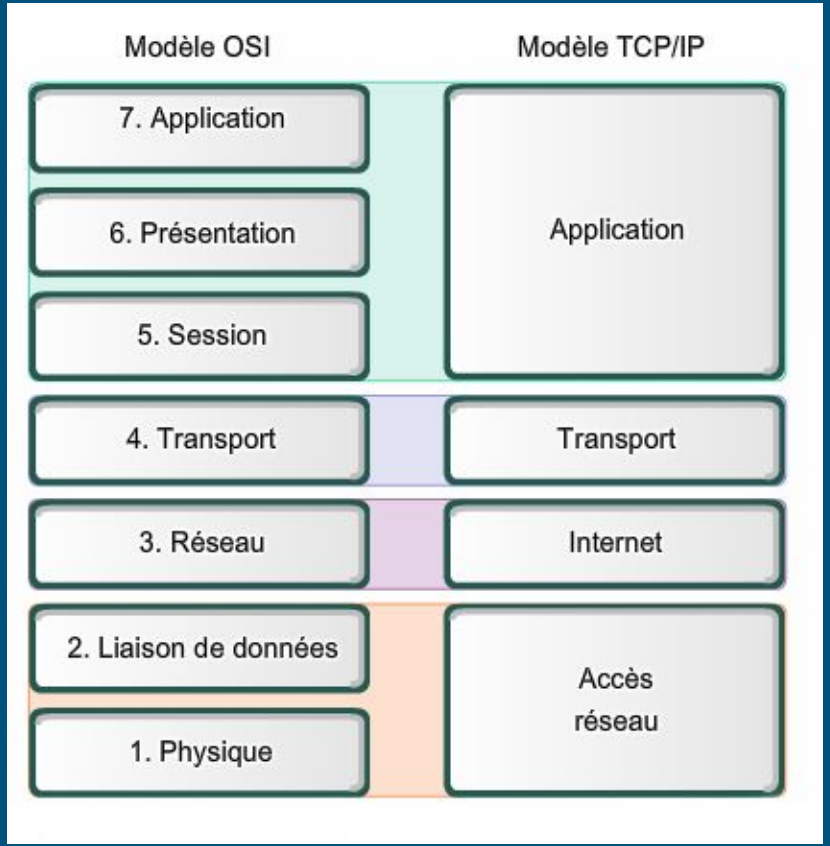
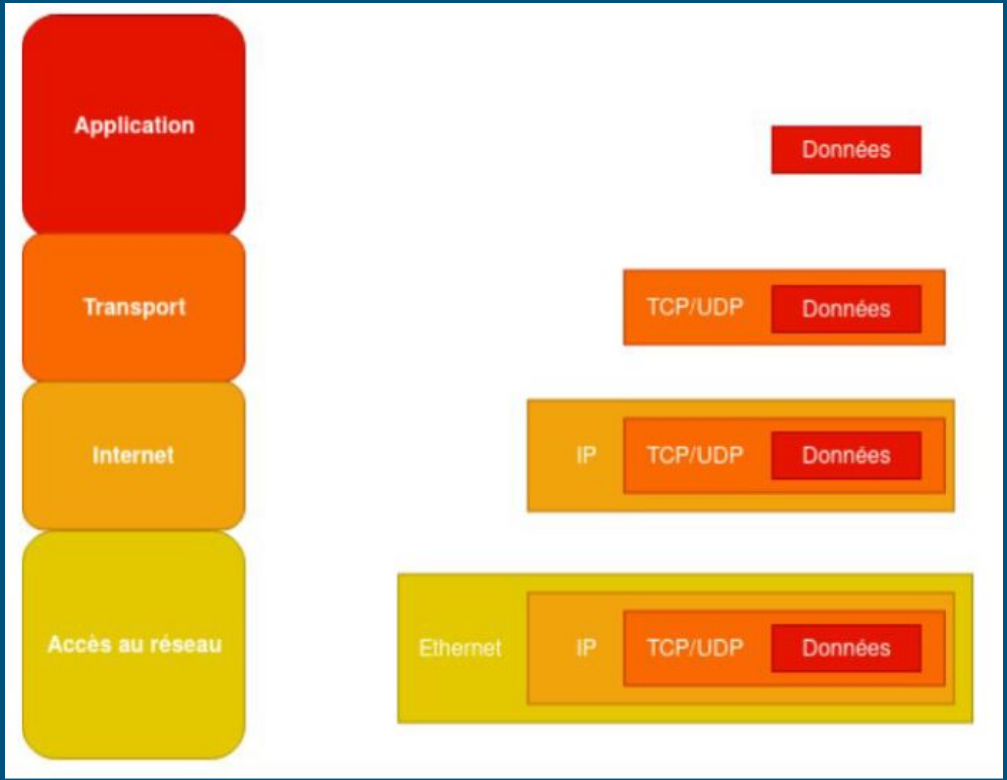
Formation
Les bases du réseau

Alexandre & Clément
05/10/2022

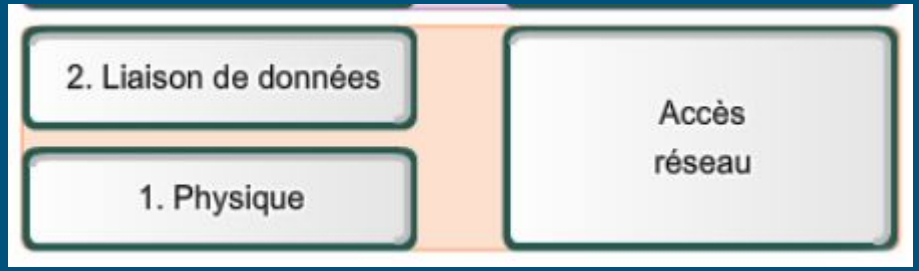
Modèle en couche



L’encapsulation



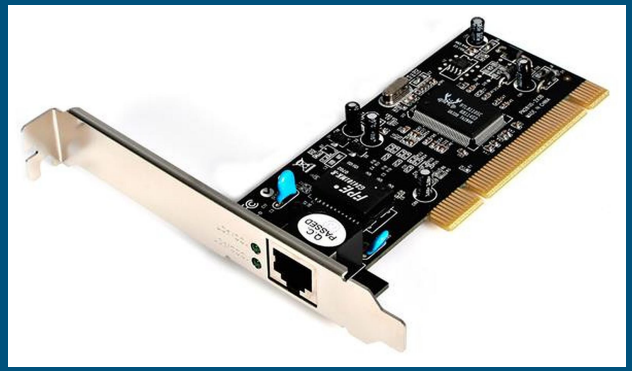
Couche Accès réseau



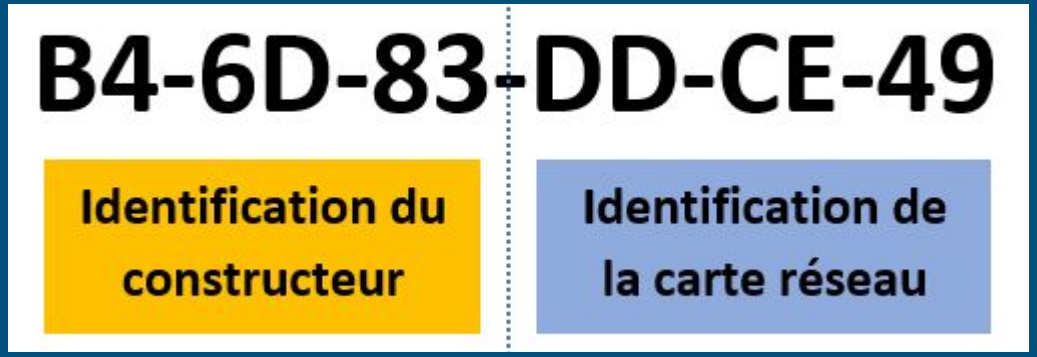
- **Physique** : Comment les données sont transmises

(WiFi, Câble ethernet, Fibre optique, …)

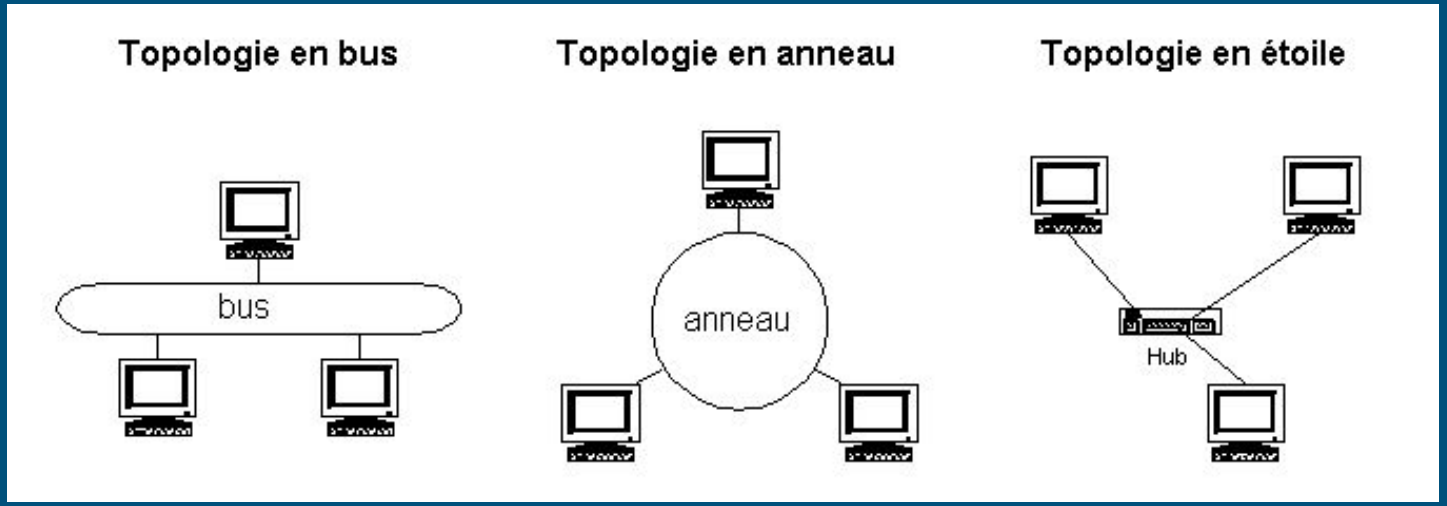
- **Liaison de données** : Identifie une interface dans un réseau local, définit les communication sur un réseau local



- **Adresse MAC** :



Topologie


Topologie en bus
bus
Topologie en anneau
anneau
Topologie en étoile
Hub

Hub vs Switch

HUB

- Aucune intelligence

Répète le trafic sur tous les ports

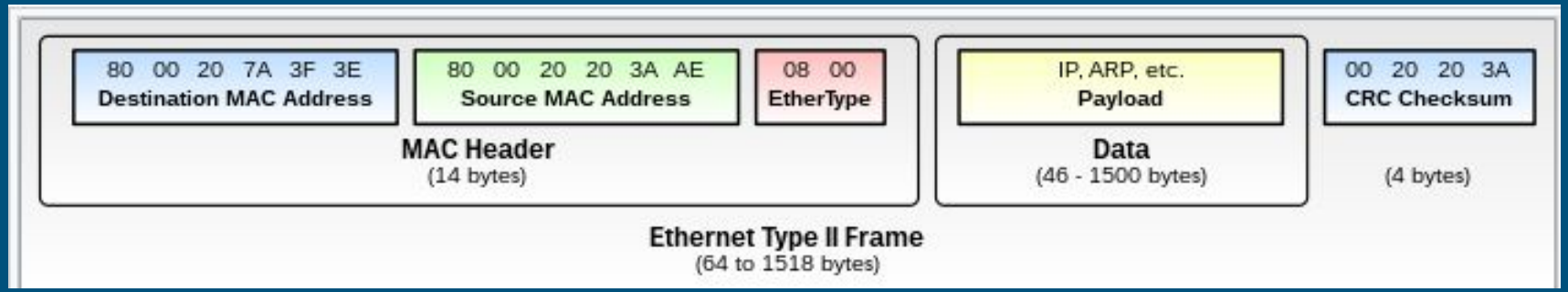
Switch (Commutateur)

- Table de commutation

->Très gros cerveau , sait où tu habites

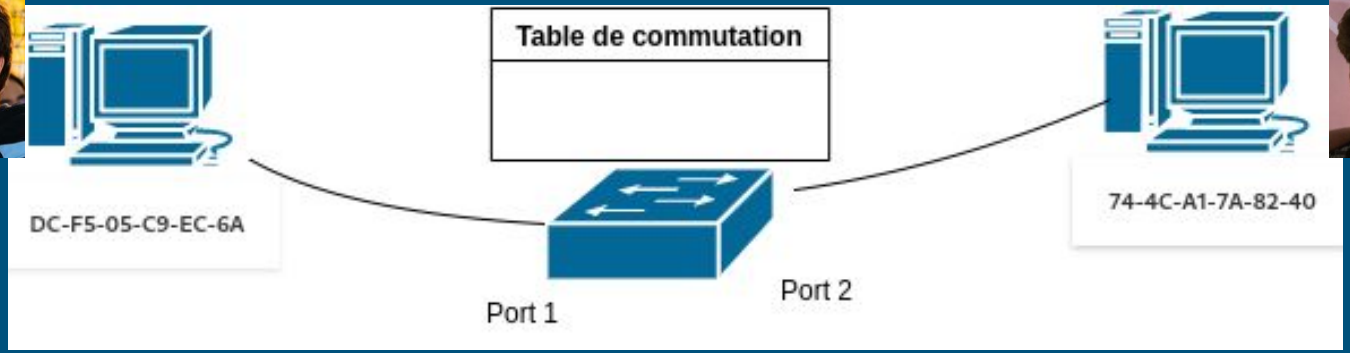
Redirige le trafic à la bonne personne

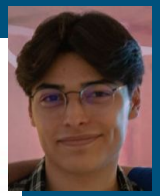
La trame Ethernet



Piti exemple

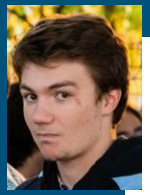
Alice



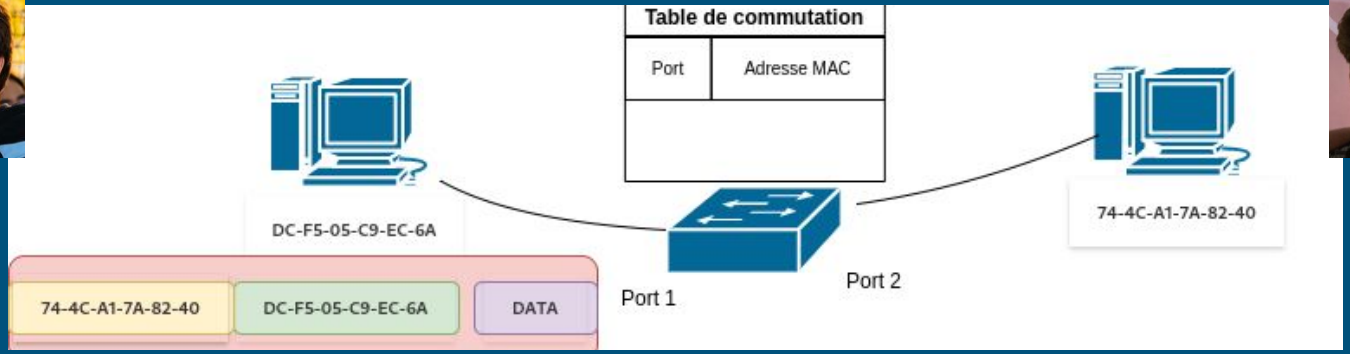


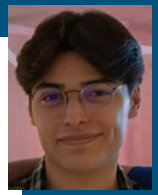
Bob

Piti exemple



Alice





Bob

Piti exemple

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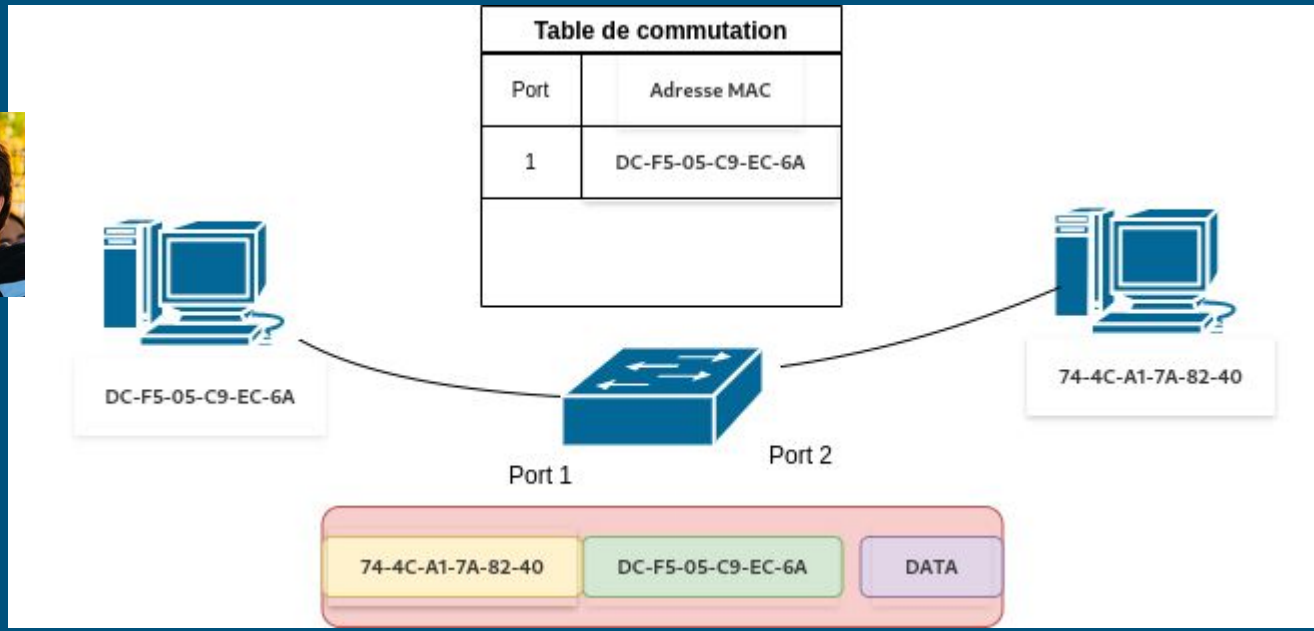

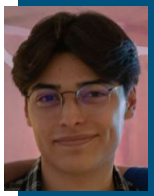

Bob

Piti exemple

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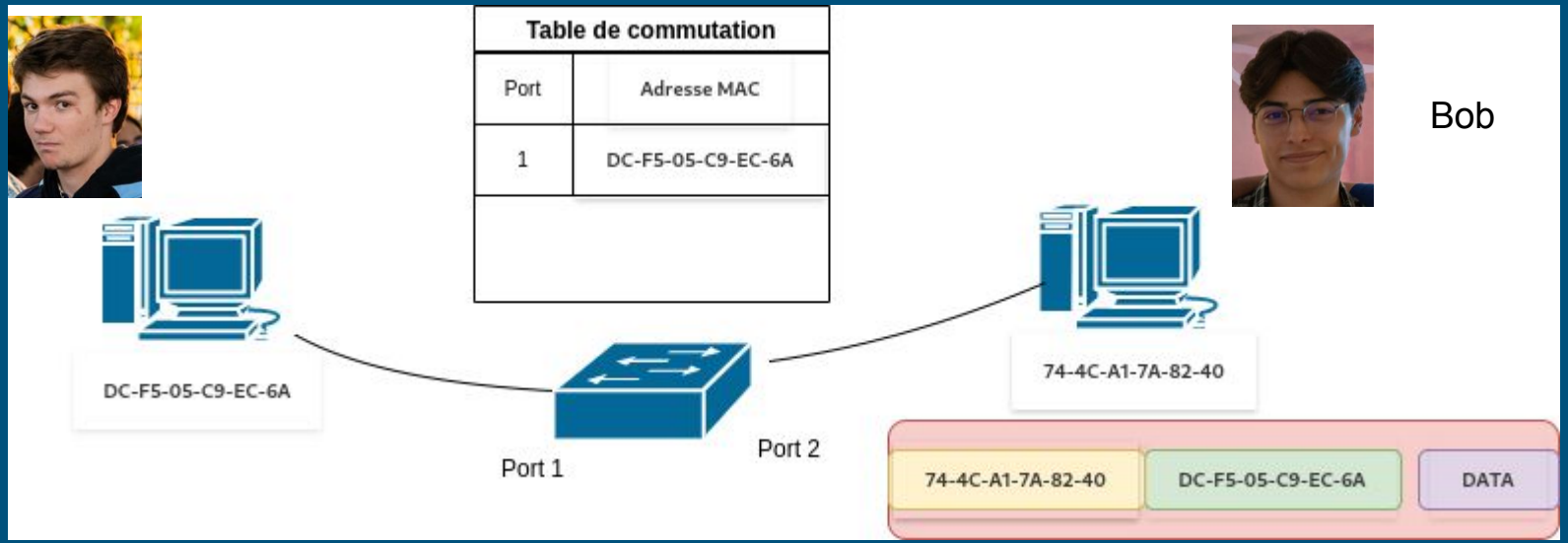
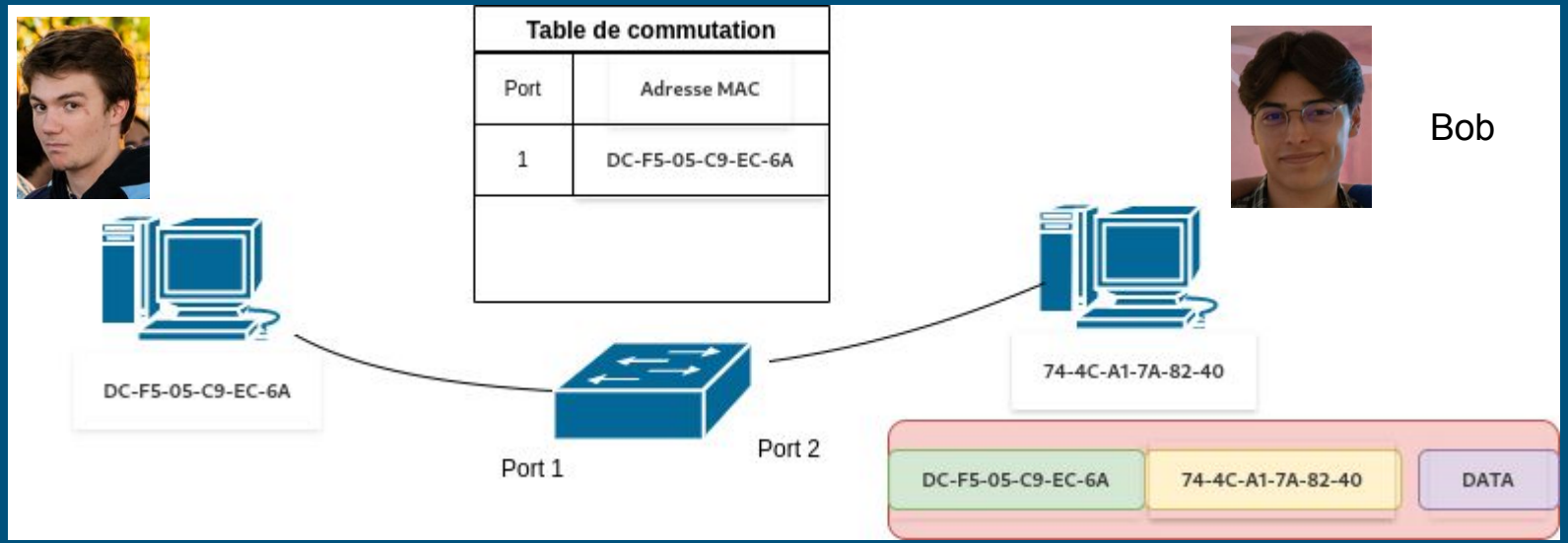


Bob

Piti exemple

Alice

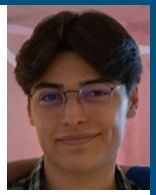


Bob

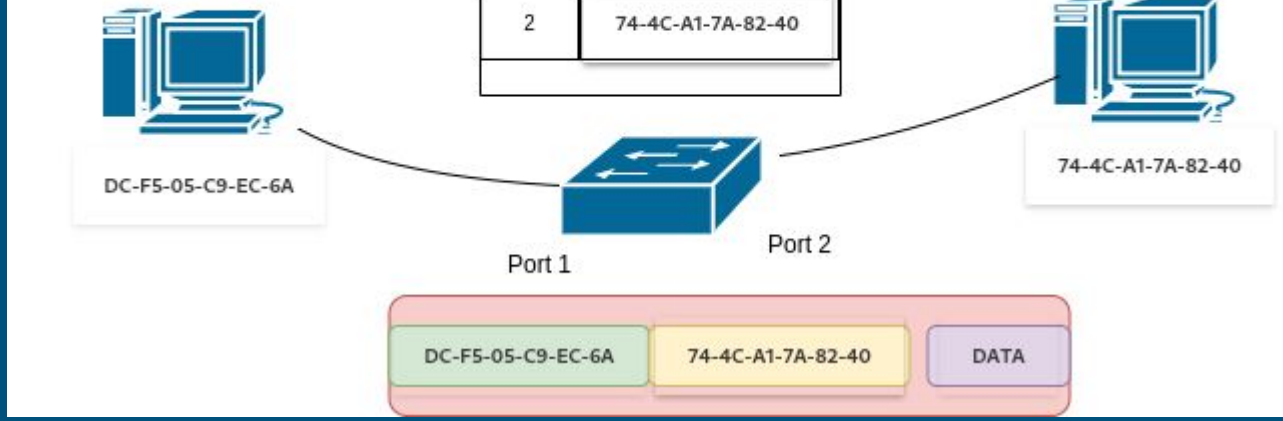
Piti exemple

Alice

Table de commutation	
Port	Adresse MAC
1	DC-F5-05-C9-EC-6A
2	74-4C-A1-7A-82-40

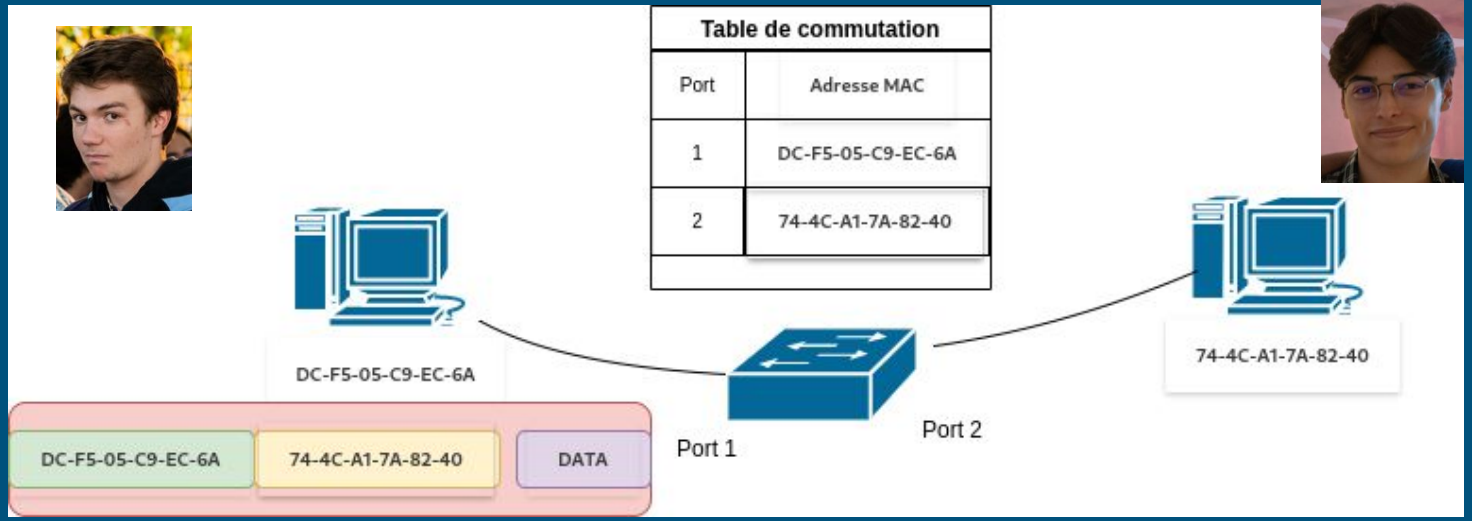


Bob



Piti exemple

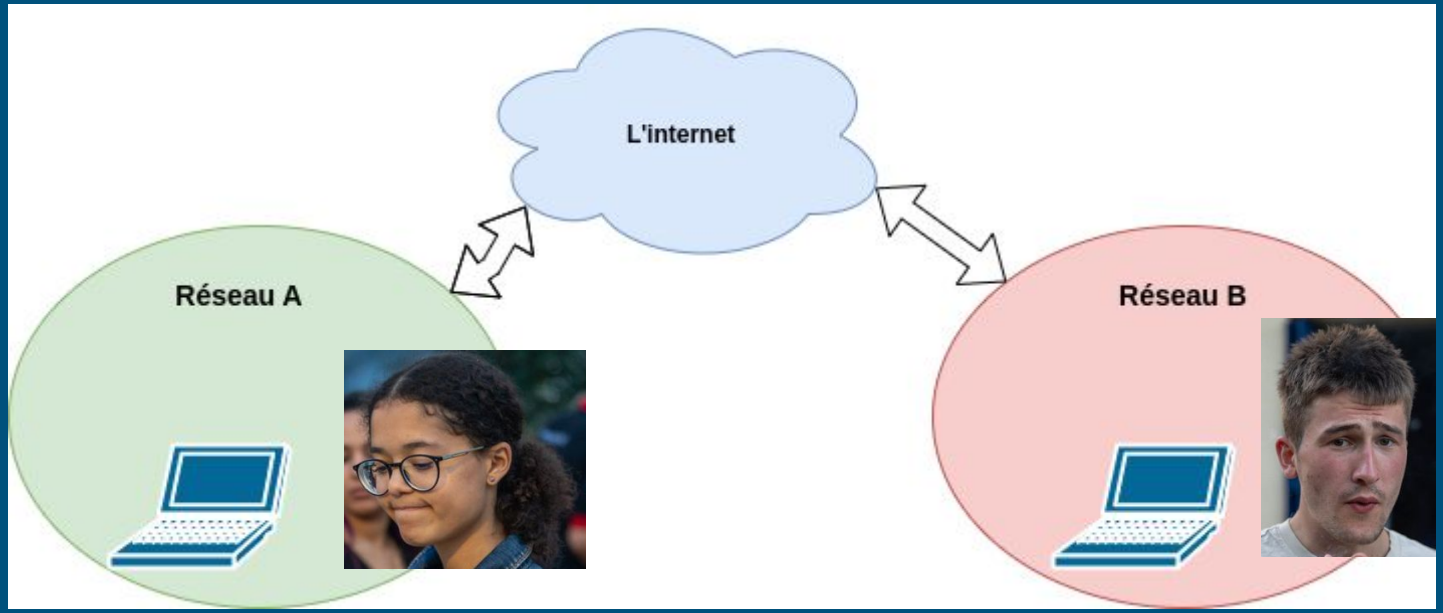
Alice



Bob

Allo Internet ?

- Connecter des réseaux
- L’IPv4
- L’IPv6



Allo Internet ? L'IPv4

- 32 bits, 4 mots de 8 bits
- ex : 10011101.10011111.00101001.00000001 -> 157.159.41.1
- Le masque de sous-réseau
  - Une ip <-> un réseau

Allo Internet ? L'IPv4

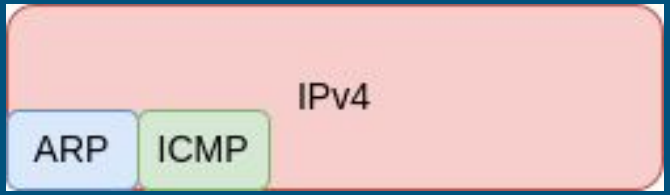
10011101.10011111.00101001 .00000001 → 157.159.41.1
11111111.11111111.11111111 00000000 → 255.255.255.0 → /24
=
10011101.10011111.00101001 .00000000 → 157.159.41.0

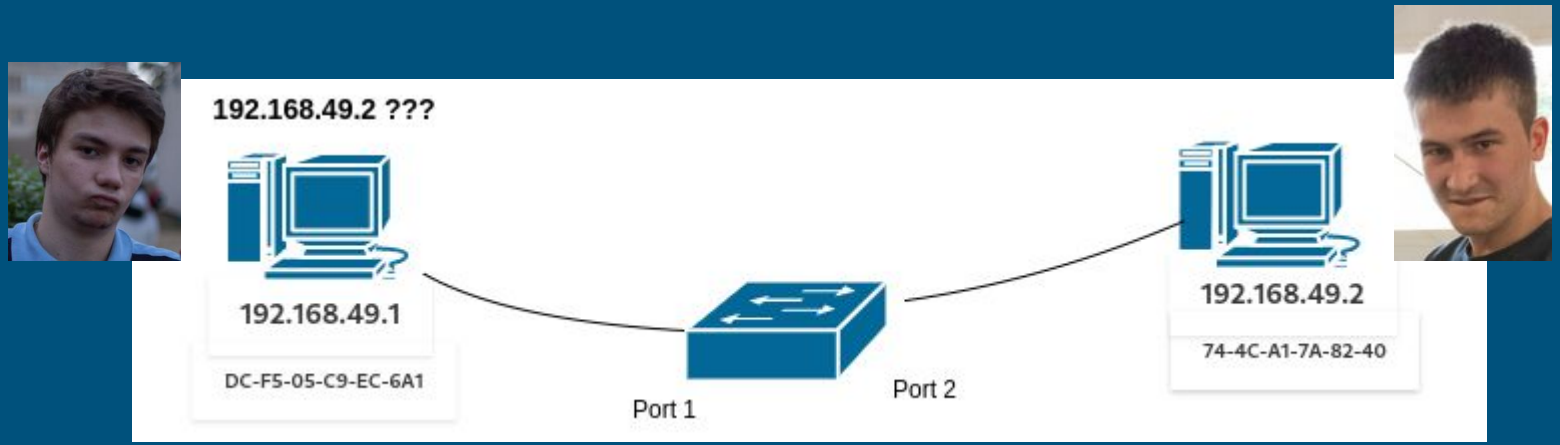
Partie réseau Partie Hôte

157.159.41.0/24 → 2^8 -2 = 254 machines disponibles

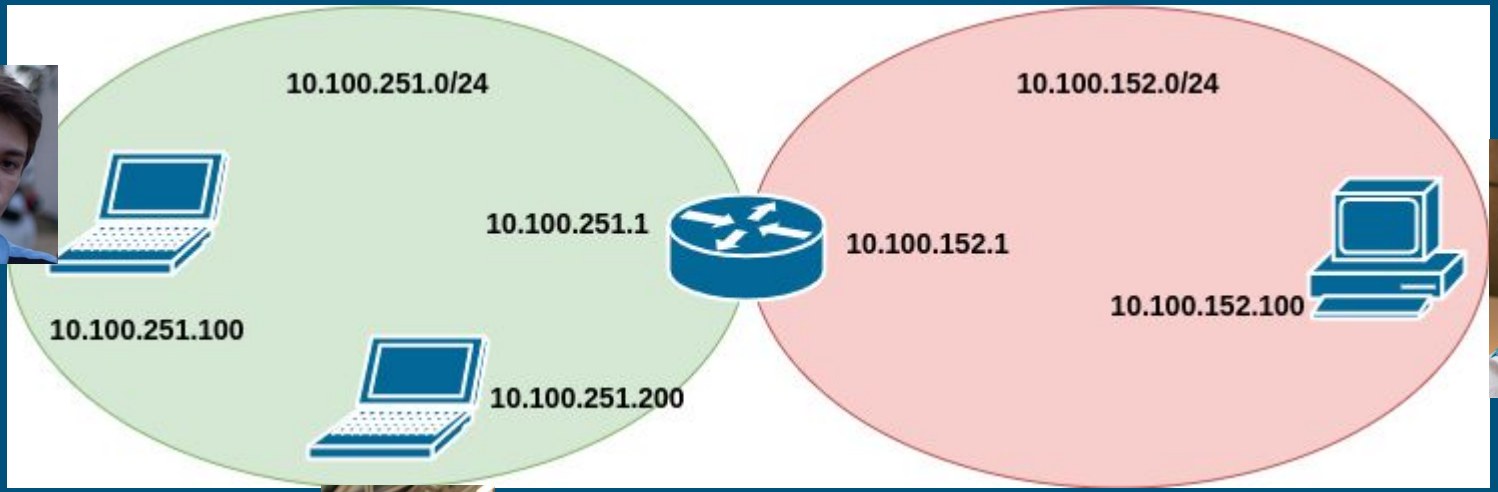
Allo Internet ? L'IPv4

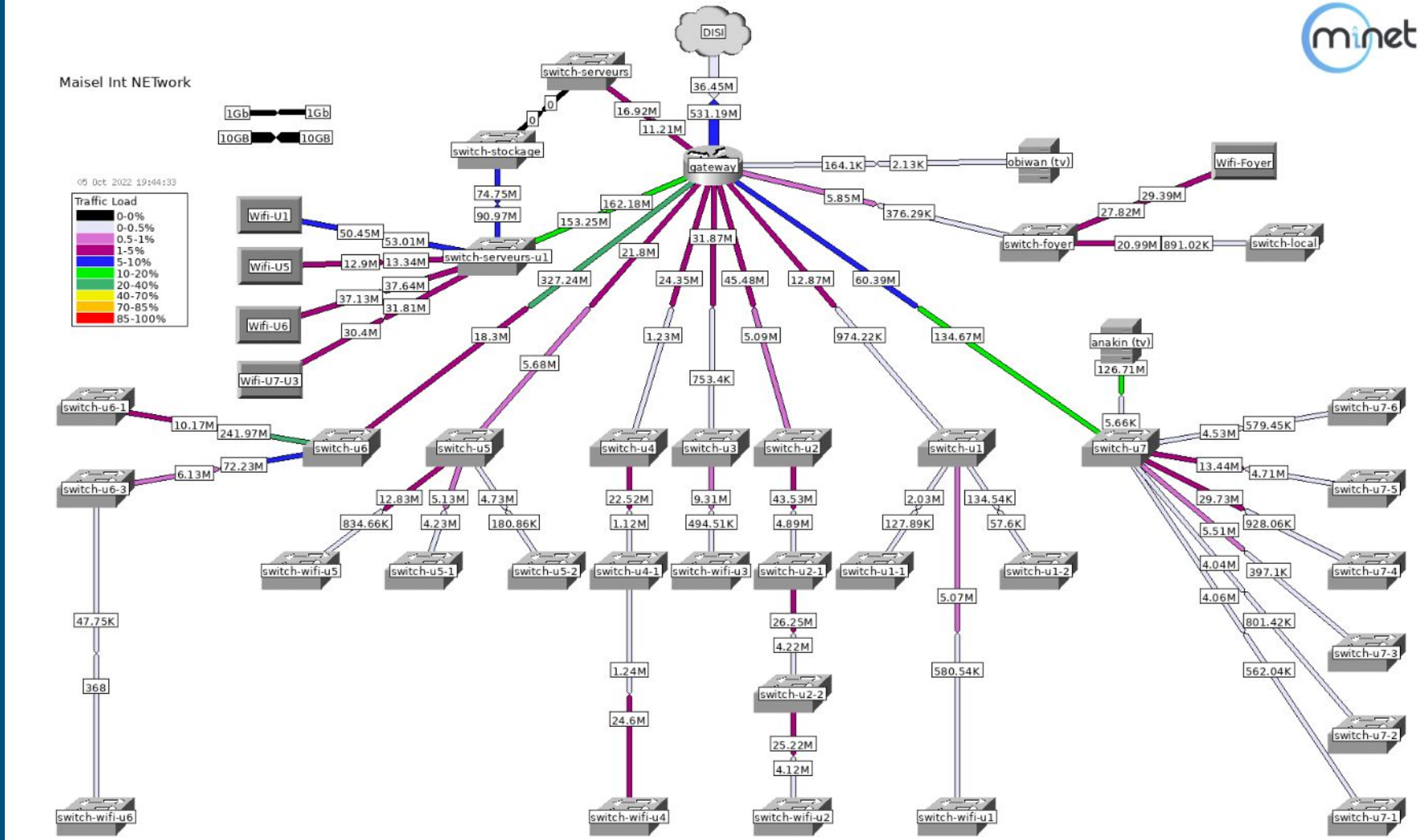
- ICMP (=Ping)
- ARP (Address Resolution Protocol)





QOMENT confé pour sortir ?



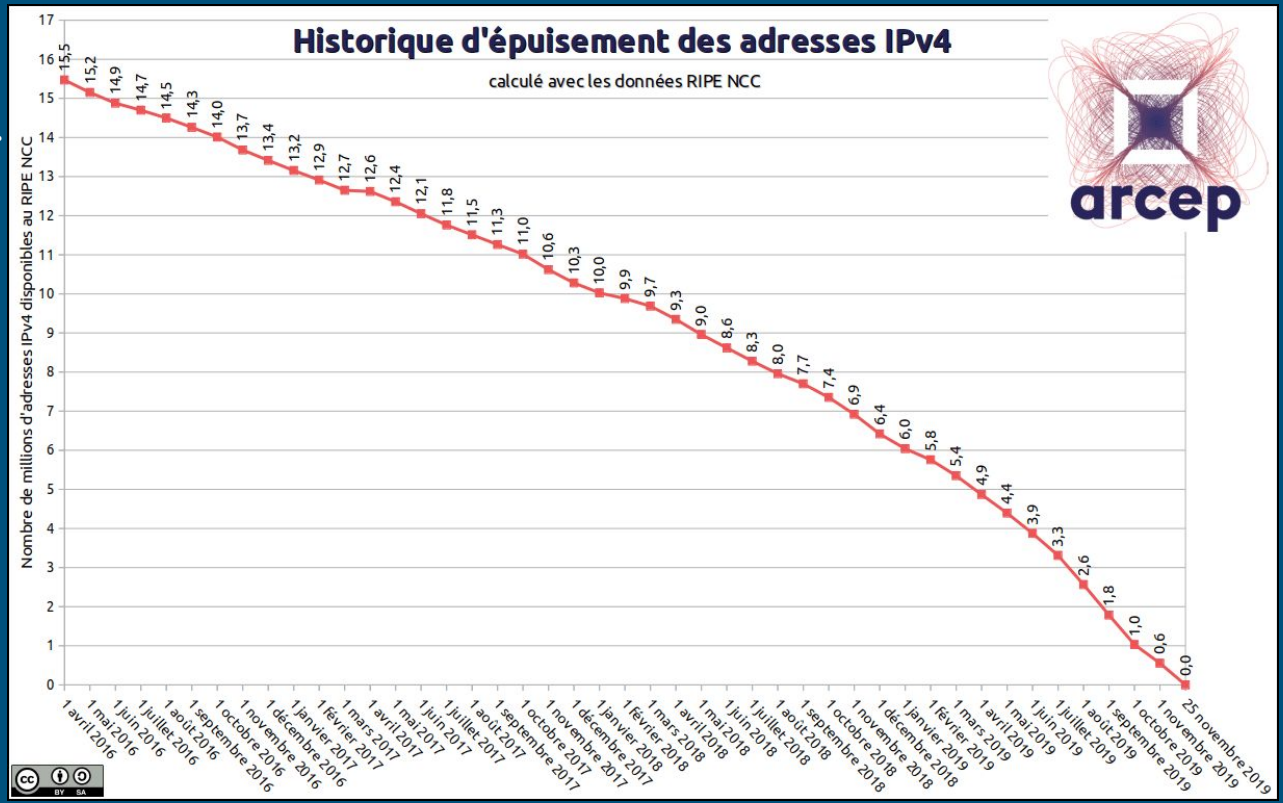

Maisel Int NETwork
1Gb
1Gb
10GB
10GB
05 Oct 2022 19:44:33
Traffic Load
0-0%
0-0.5%
0.5-1%
1-5%
5-10%
10-20%
20-40%
40-70%
70-85%
85-100%
DISI
switch-serveurs
36.45M
531.19M
16.92M
11.21M
0
0
switch-stockage
74.75M
90.97M
gateway
164.1K
2.13K
obiwan (tv)
Wifi-Foyer
29.39M
27.82M
5.85M
376.29K
switch-foyer
20.99M
891.02K
switch-local
Wifi-U1
Wifi-U5
Wifi-U6
Wifi-U7-U3
50.45M
53.01M
12.9M
13.34M
37.64M
37.13M
31.81M
30.4M
switch-serveurs-u1
162.18M
153.25M
21.8M
327.24M
31.87M
24.35M
45.48M
12.87M
60.39M
anakin (tv)
126.71M
5.66K
134.67M
974.22K
1.23M
5.09M
753.4K
18.3M
5.68M
switch-u6-1
10.17M
241.97M
switch-u6
6.13M
72.23M
switch-u6-3
switch-u5
switch-u4
switch-u3
switch-u2
switch-u1
switch-u7
switch-u7-6
switch-u7-5
switch-u7-4
switch-u7-3
switch-u7-2
switch-u7-1
4.53M
579.45K
13.44M
4.71M
29.73M
928.06K
5.51M
4.04M
397.1K
4.06M
801.42K
562.04K
12.83M
5.13M
4.73M
834.66K
4.23M
180.86K
22.52M
1.12M
9.31M
494.51K
43.53M
4.89M
2.03M
127.89K
134.54K
57.6K
switch-wifi-u5
switch-u5-1
switch-u5-2
switch-u4-1
switch-wifi-u3
switch-u2-1
switch-u1-1
switch-u1-2
47.75K
368
switch-wifi-u6
1.24M
24.6M
switch-wifi-u4
26.25M
4.22M
switch-u2-2
25.22M
4.12M
switch-wifi-u2
5.07M
580.54K
switch-wifi-u1

Les types d’IPv4

- Les IPs privées :
  - 10.0.0.0/8
  - 172.16.0.0/12
  - 192.168.0.0/16
- Les IPs public :
  - 157.159.0.0/16 (plage IP appartenant à l’école)
  - Le reste .. modulo les ips réservé

La pénurie d'IPv4 ..

- 2^{32} = 4 Milliards ..



L’IPv6

- 128 bits, 8 mots de 16 bit
- $2^{128} = 3{,}4 \times 10^{38}$
- ex : 2001:660:3203:d408:0:0:0:a51-> 2001:660:3203:d408::a51
- Même concept (ou presque)

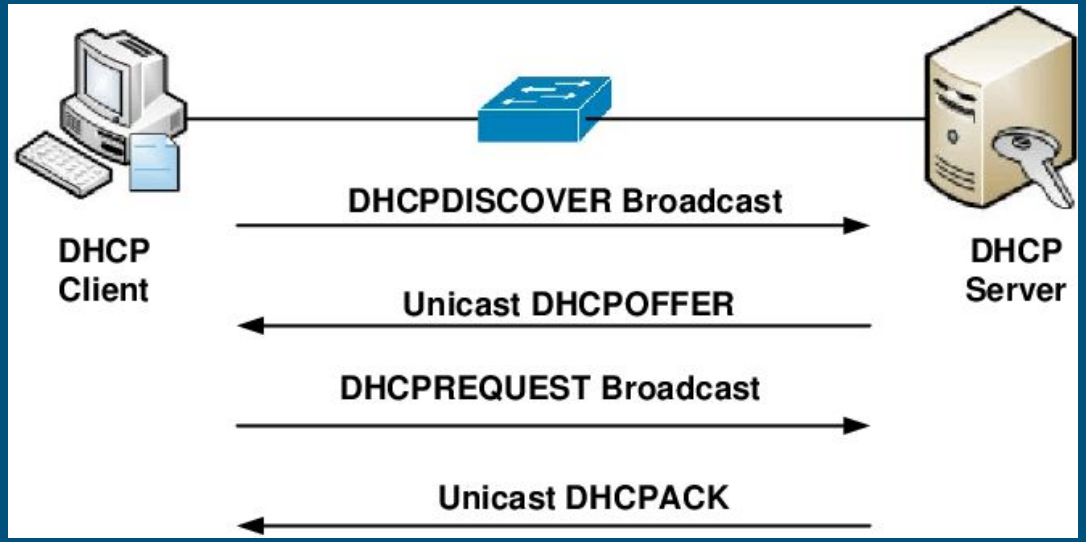
Mais si je veux pas tout faire à la main ?

Notamment sur le réseau MiNET, il y a pas mal d’adresses IP pour les adhérents

Mais si je veux pas tout faire à la main ?

Serveur DHCP : Dynamic Host Configuration Protocol

-> Permet d’assigner des adresses IP / donner des infos de configuration aux appareils d’un réseau



Le transport

Comment les données des applications transportées ?

- TCP
- UDP
  - QUIC

TCP

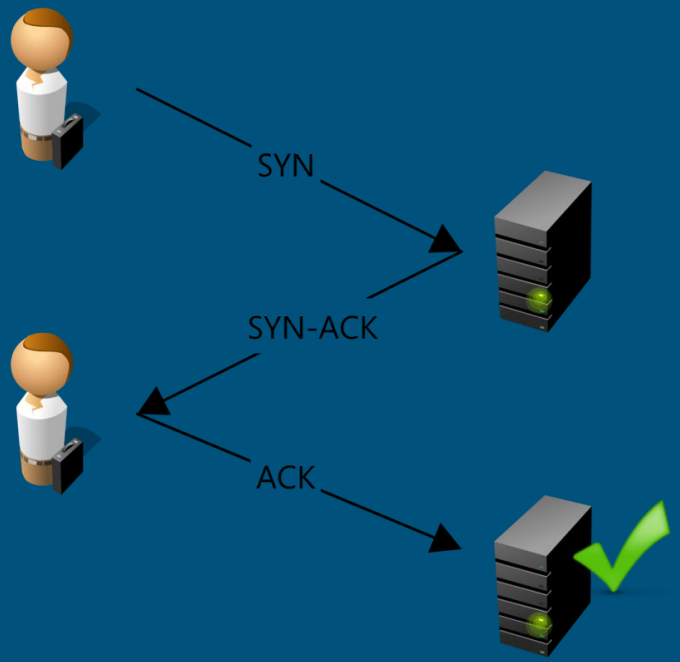
- Mode connecté
- Garantie la transmission des données
- L'ordonnance des données
- Contrôle de flux
- Contrôle de congestion
- ..

Utilité :

Transfert de fichier, navigation web

-> Pas de pertes de données

TCP - Three-way handshake



UDP

- Mode non connecté

Utilité :

Vidéo & Voix

-> On veut du rapide, tant pis si ya des pertes

QUIC

- Surcouche d’UDP
- Sécurité intégrée
- Echange de données plus rapide
- Orienté WEB (avec HTTP/3)

Couche transport : les ports

Un Port : identifie une application

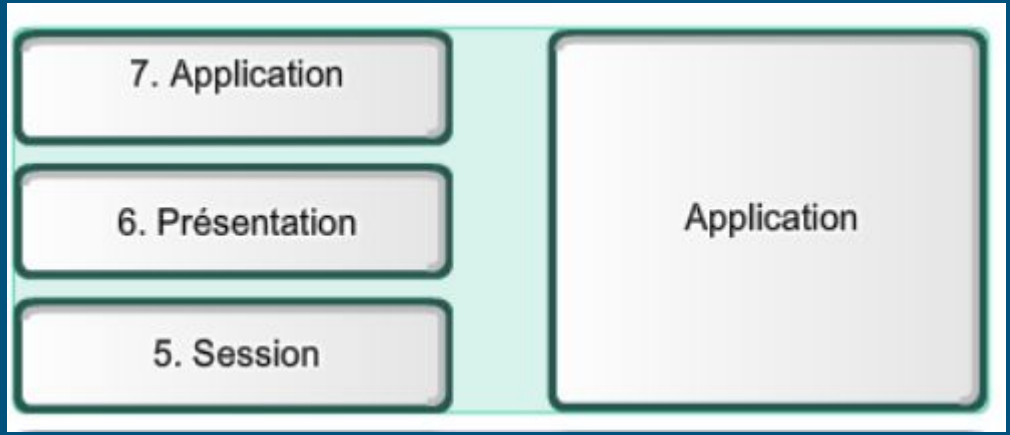
Ports de 0 à 65535

De 0 à 1023 : réservés pour applications


Kirk Bater
@KirkBater
Follow
This image is a TCP/IP Joke. This tweet is a UDP joke. I don't care if you get it.
Thread
iamkirkbater and jkjustjoshing
iamkirkbater Aug 23rd, 2017 at 9:37 AM
in #www
Do you want to hear a joke about TCP/IP?
7
7 replies
jkjustjoshing 5 months ago
Yes, I'd like to hear a joke about TCP/IP
iamkirkbater 5 months ago
Are you ready to hear the joke about TCP/IP?
jkjustjoshing 5 months ago
I am ready to hear the joke about TCP/IP
iamkirkbater 5 months ago
Here is a joke about TCP/IP.
iamkirkbater 5 months ago
Did you receive the joke about TCP/IP?
jkjustjoshing 5 months ago
I have received the joke about TCP/IP.
iamkirkbater 5 months ago
Excellent. You have received the joke about TCP/IP. Goodbye.

Application

- HTTP
- FTP
- SMTP
- DNS



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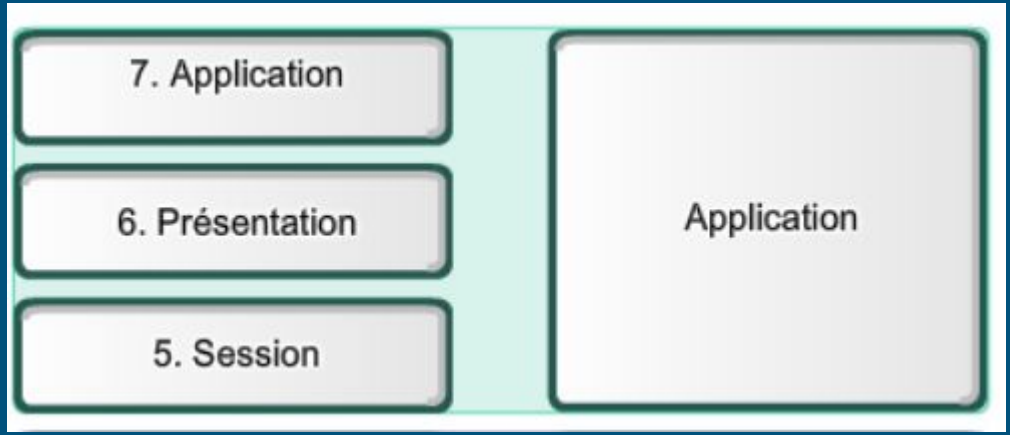
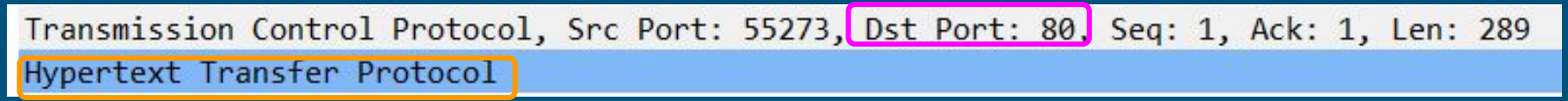
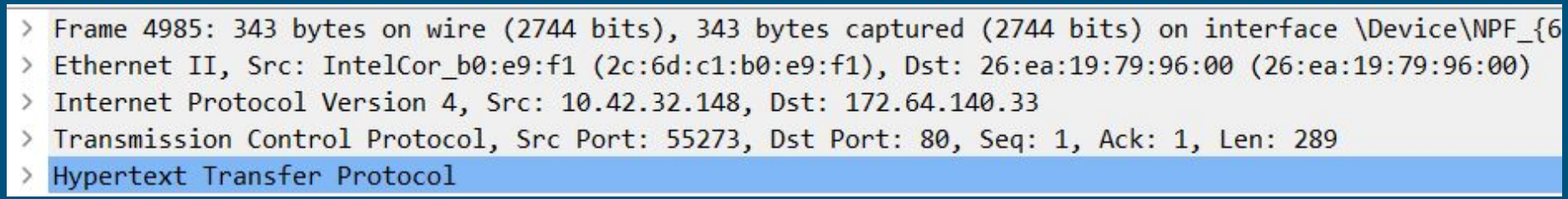


Port 80 : HTTP
Port 443 : HTTPS



Wireshark : encapsulation



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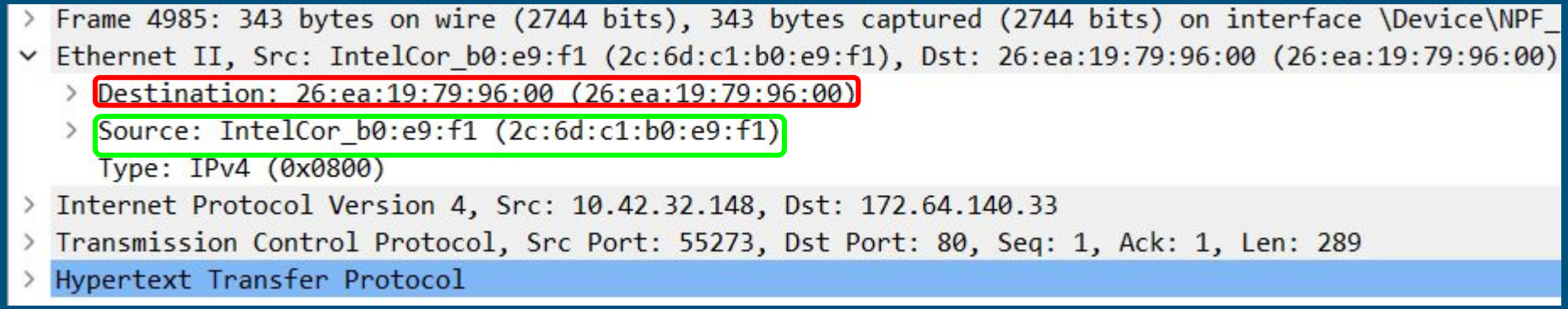

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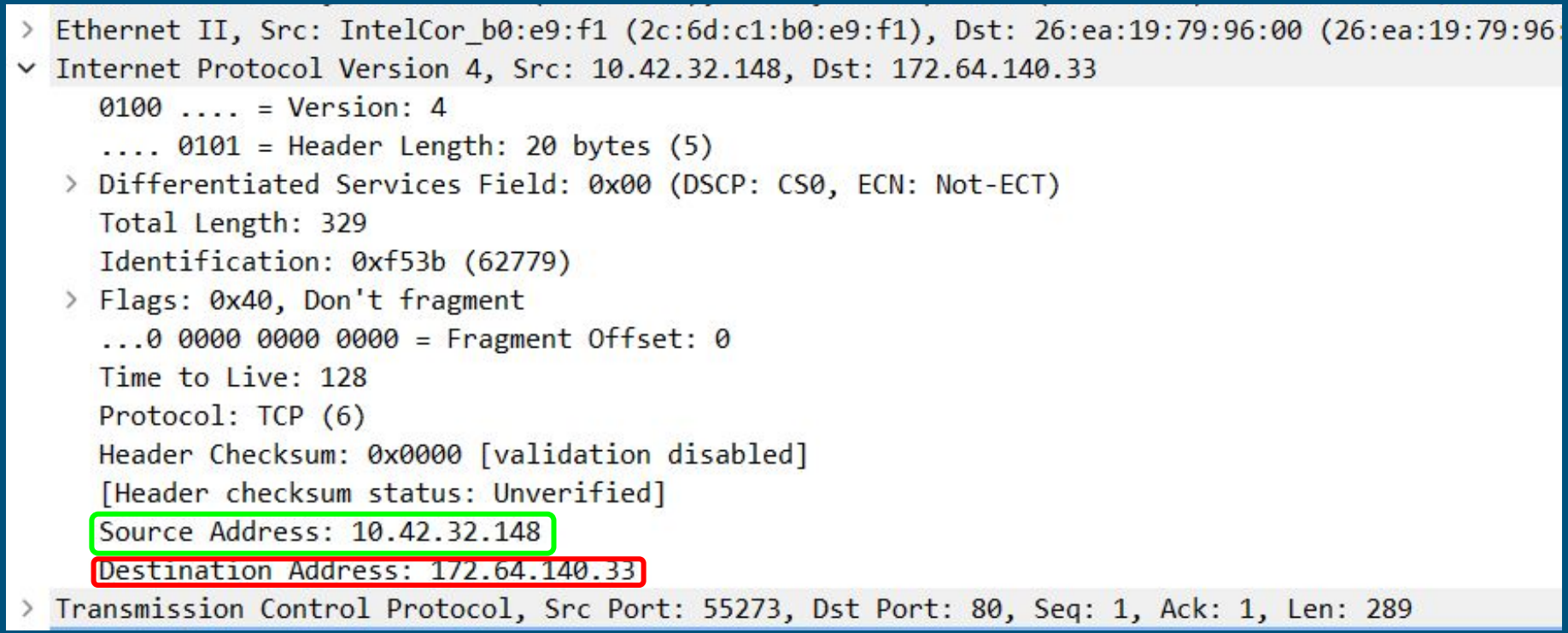

Des questions ??

KAHOOT