Réalisation du projet SAE 2.01 : Mise en place d'une infrastructure de réseau d'entreprise

PROBLÉMATIQUE PROFESSIONNELLE :

Vous travaillez au sein d'une société de services du domaine du numérique.

• Une entreprise passe une commande à votre société : Elle demande de déployer un réseau d'entreprise dans son nouveau siège.

• Votre mission consistera à :

▪ Proposer et mettre en place une infrastructure de réseau d'entreprise dotée de services réseaux et de règles de sécurité ;

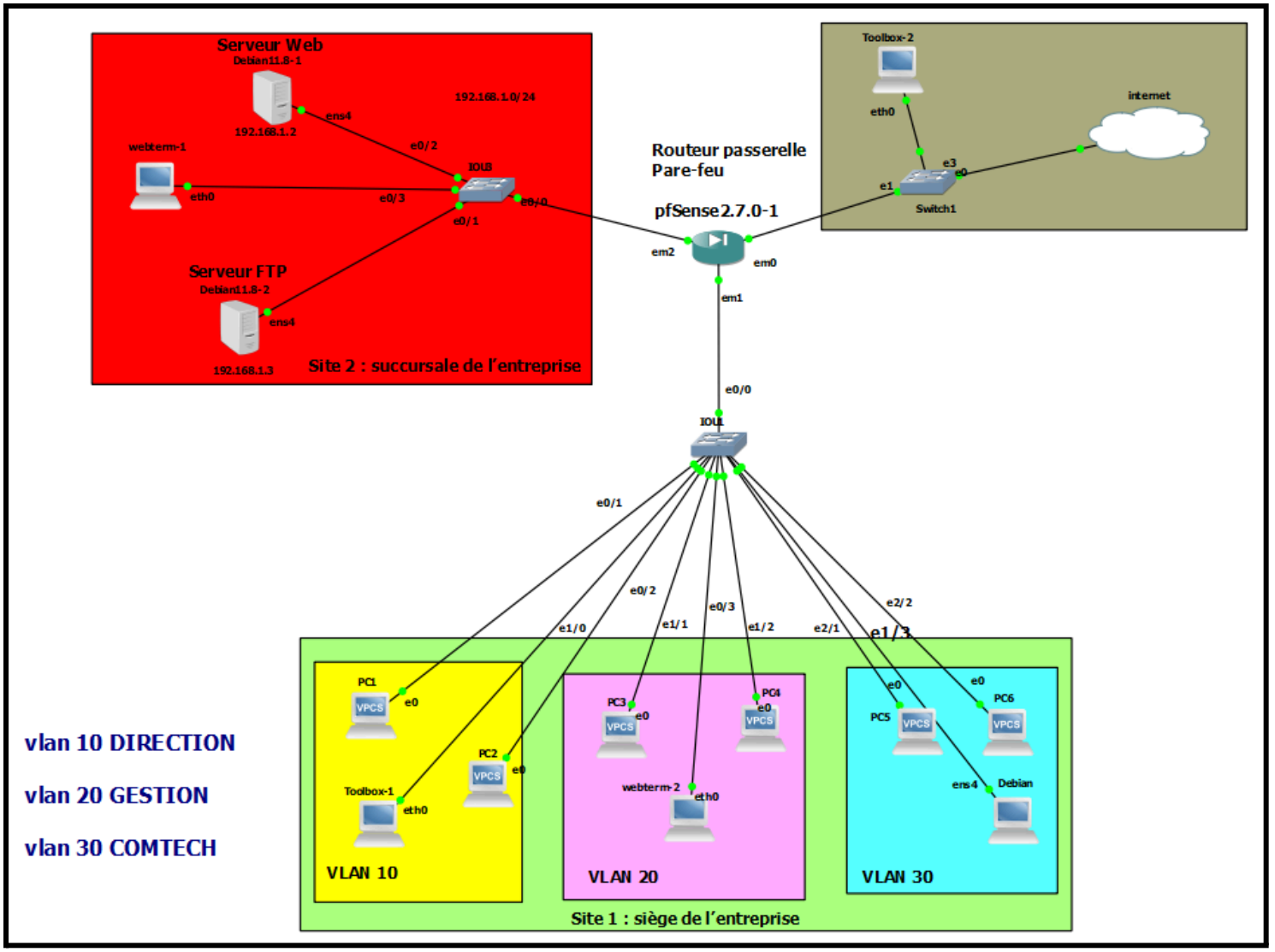
▪ Mettre en place une DMZ pour héberger les serveurs publics de l'entreprise ;

▪ Configurer l'accès à Internet ;

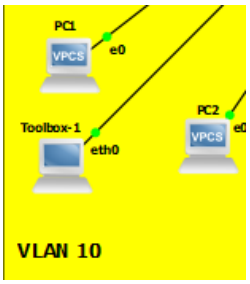
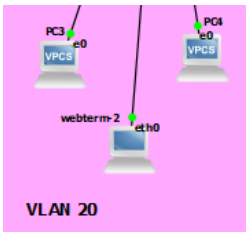
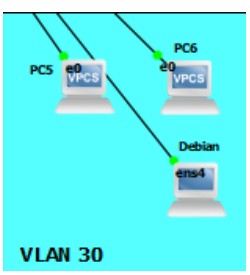
▪ Mettre en place des règles de sécurité ;

▪ Produire une documentation technique sur la solution déployée.

Maquette du réseau de l'entreprise :



Étape 1 : Élaboration du plan d'adressage IPv4 :

Périphérique	interface	adresse ip	Masque	passerelle
serveur ftp	ens4	192.168.1.3	255.255.255.0	192.168.1.1
serveur web	ens4	192.168.1.2	255.255.255.0	192.168.1.1
pfsense	em0	192.168.122.19 (dhcp)	255.255.255.0	
	em1			
	em1.10	192.168.10.1	255.255.255.0	
	em1.20	192.168.20.1	255.255.255.0	
	em1.30	192.168.30.1	255.255.255.0	
	em2	192.168.1.1	255.255.255.0	
vlan 10		192.168.10.10-100(dhcp)	255.255.255.0	192.168.10.1
vlan 20		192.168.20.10-100(dhcp)	255.255.255.0	192.168.20.1
vlan 30		192.168.30.10-100(dhcp)	255.255.255.0	192.168.30.1

Étape 2 : création d'un réseau segmenté avec la mise en place et la configuration des VLAN et Mise en place et configuration du routage inter-VLAN .

```
configure terminal
vlan 10
 name Direction
no shut
int vlan 10
no shut
exit

vlan 20
 name Gestion
no shut
int vlan 20
no shut
exit

vlan 30
 name COMTECH
no shut
int vlan 30
no shut
exit

interface eth0/0
 switchport trunk encapsulation dot1q
 switchport mode trunk
no shut
exit

interface range eth0/1-3
 switchport mode access
 switchport access vlan 10
no shut
exit

interface range eth1/0-3
 switchport mode access
 switchport access vlan 20
no shut
exit

interface range eth2/0-3
 switchport mode access
 switchport access vlan 30
no shut
end
wr
```

Configuration du switch

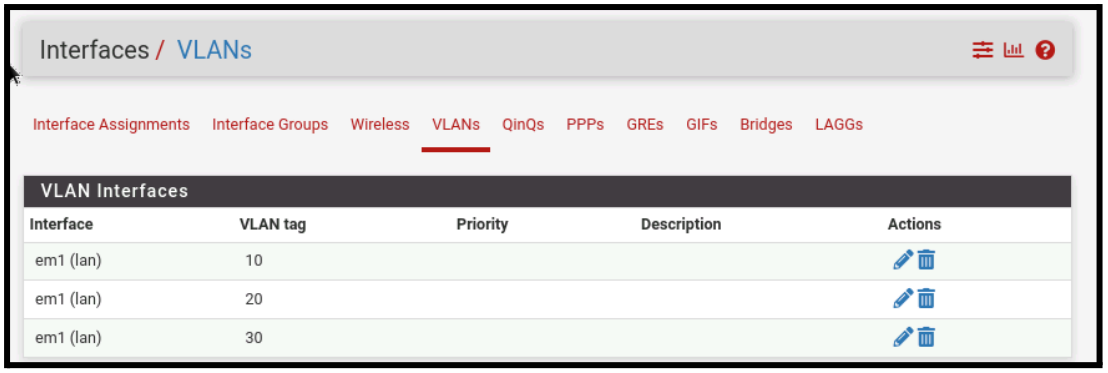
```
IOU2#show vlan br

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Et3/0, Et3/1, Et3/2, Et3/3
10   Direction                        active    Et0/1, Et0/2, Et0/3
20   Gestion                          active    Et1/0, Et1/1, Et1/2, Et1/3
30   COMTECH                          active    Et2/0, Et2/1, Et2/2, Et2/3
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup
IOU2#
```

```
IOU2#sh ip int br
Interface              IP-Address      OK? Method Status                Protocol
Ethernet0/0            unassigned      YES unset  up                    up
Ethernet0/1            unassigned      YES unset  up                    up
Ethernet0/2            unassigned      YES unset  up                    up
Ethernet0/3            unassigned      YES unset  up                    up
Ethernet1/0            unassigned      YES unset  up                    up
Ethernet1/1            unassigned      YES unset  up                    up
Ethernet1/2            unassigned      YES unset  up                    up
Ethernet1/3            unassigned      YES unset  up                    up
Ethernet2/0            unassigned      YES unset  up                    up
Ethernet2/1            unassigned      YES unset  up                    up
Ethernet2/2            unassigned      YES unset  up                    up
Ethernet2/3            unassigned      YES unset  up                    up
Ethernet3/0            unassigned      YES unset  up                    up
Ethernet3/1            unassigned      YES unset  up                    up
Ethernet3/2            unassigned      YES unset  up                    up
Ethernet3/3            unassigned      YES unset  up                    up
Vlan1                  unassigned      YES unset  up                    up
Vlan10                 unassigned      YES unset  up                    up
Vlan20                 unassigned      YES unset  up                    up
Vlan30                 unassigned      YES unset  up                    up
IOU2#
```

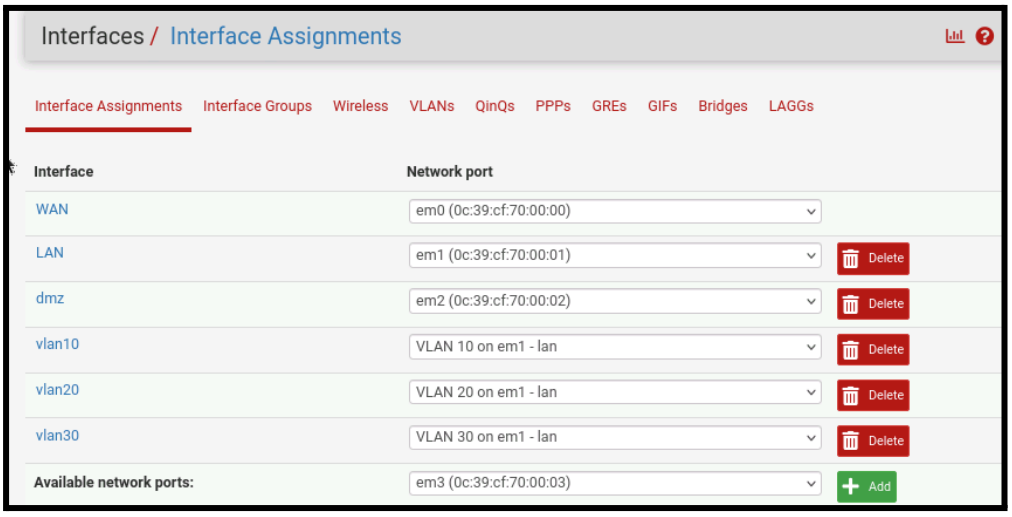
```
IOU2#show int trunk

Port        Mode             Encapsulation  Status        Native vlan
Et0/0       on               802.1q         trunking      1

Port        Vlans allowed on trunk
Et0/0       1-4094

Port        Vlans allowed and active in management domain
Et0/0       1,10,20,30

Port        Vlans in spanning tree forwarding state and not pruned
Et0/0       1,10,20,30
```

Configuration du pfsense

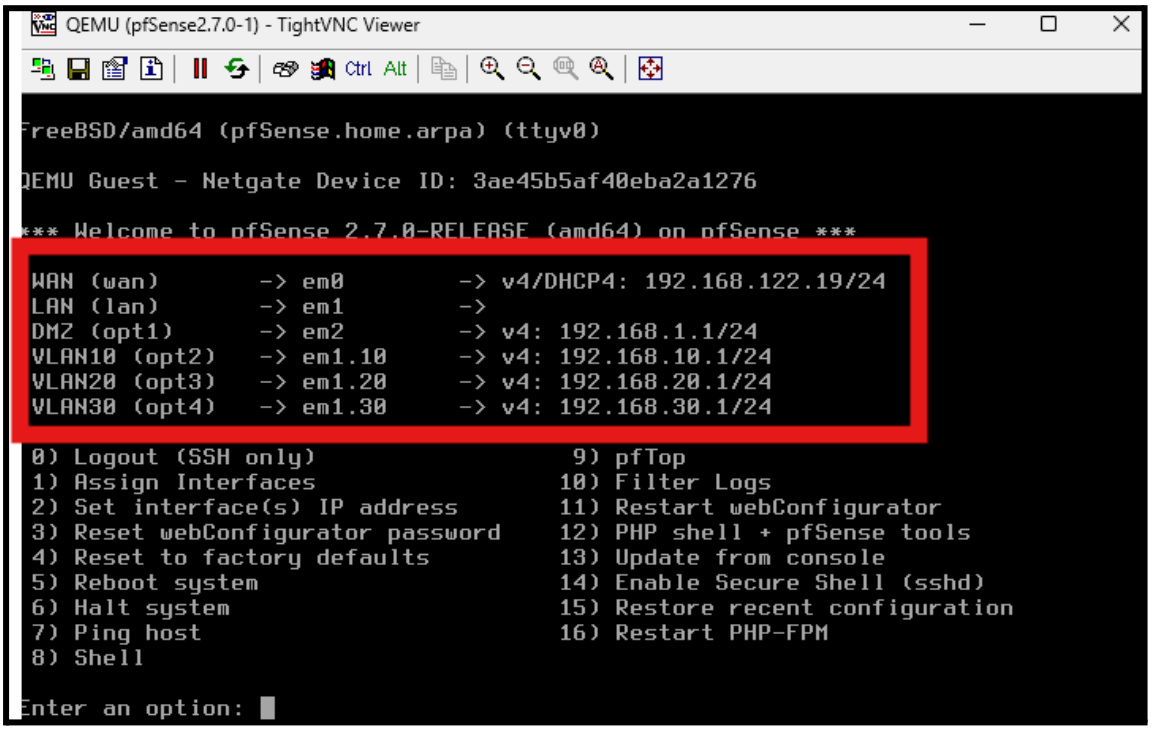
Attribution des vlans au port em1 (LAN)



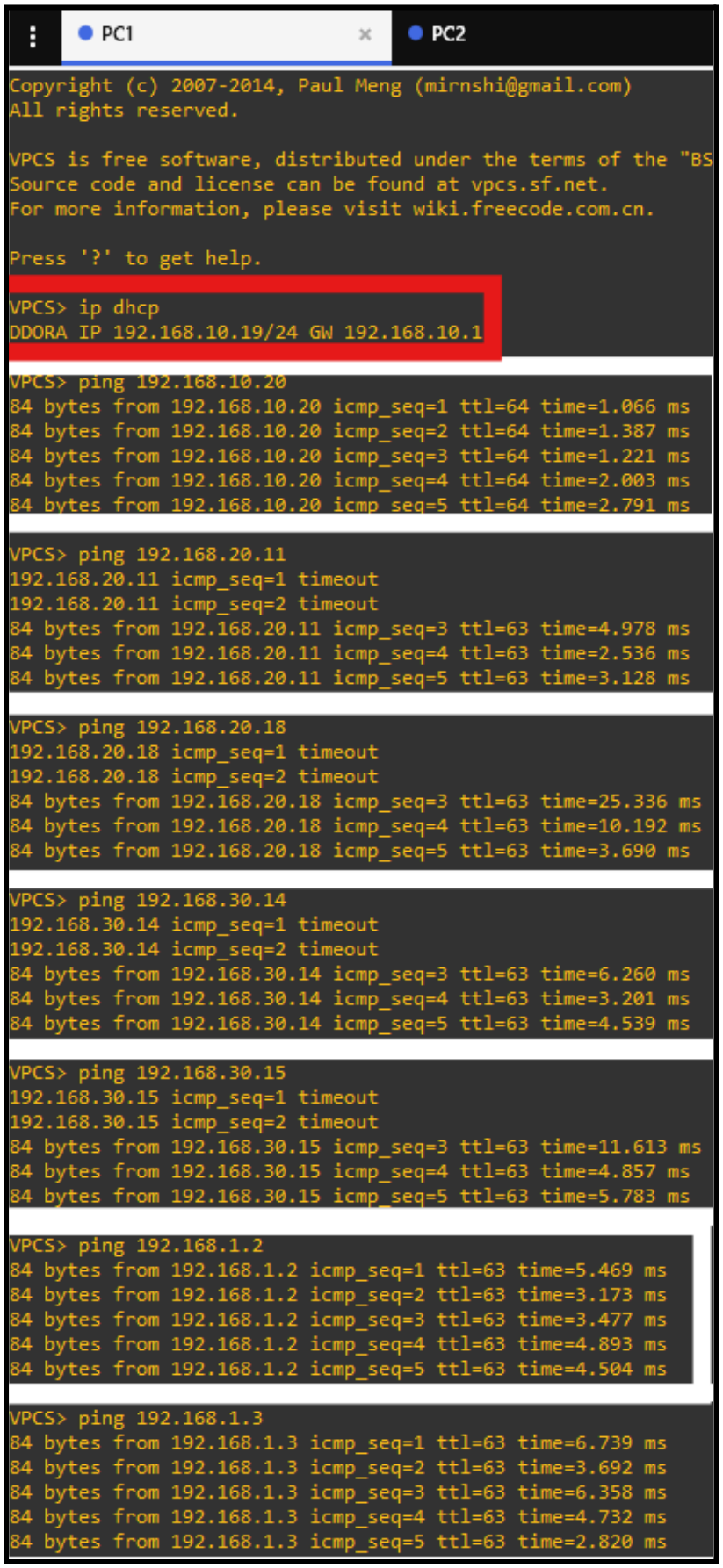
Création de l’interface Vlan 10-20-30



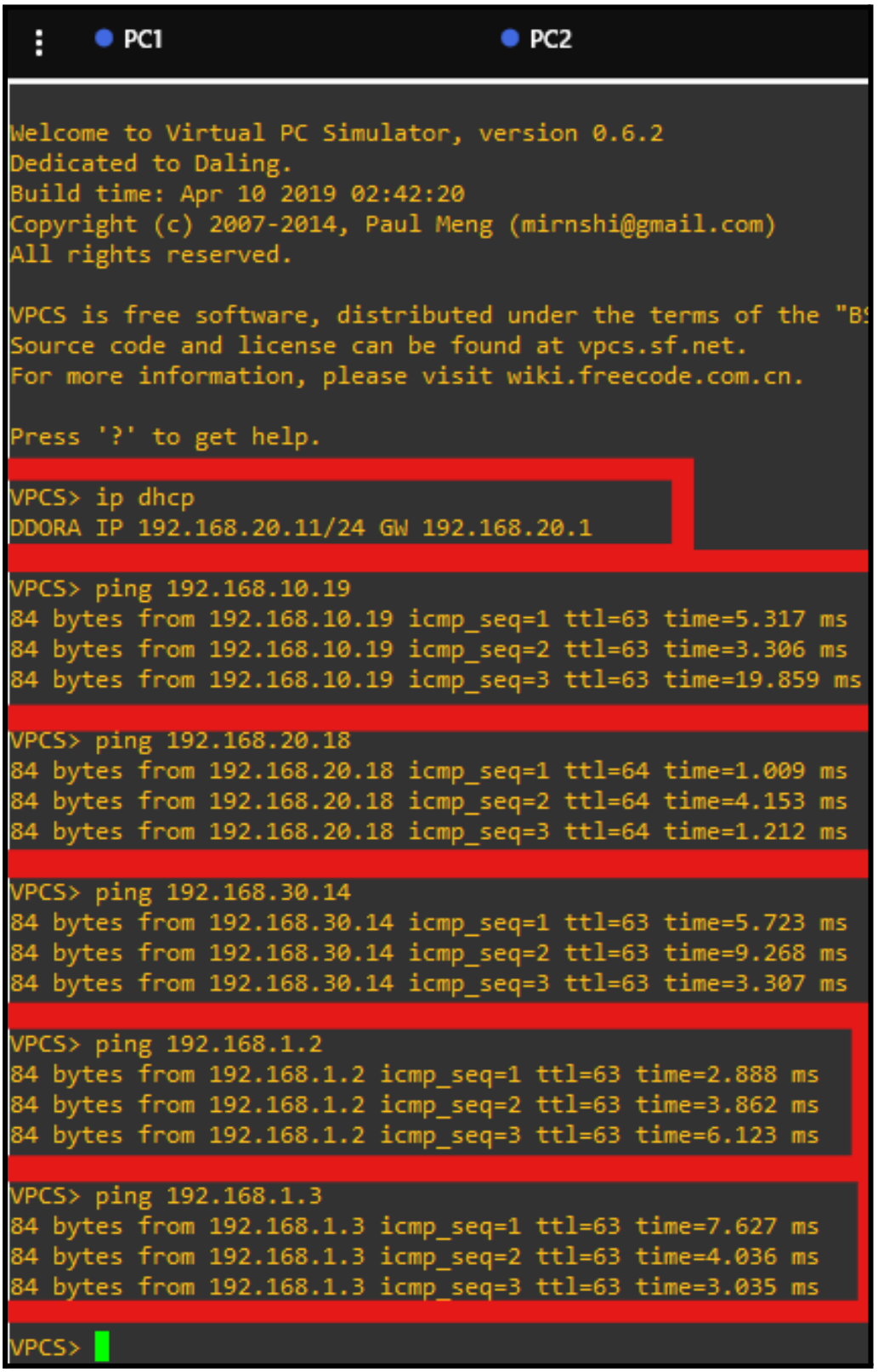
Vérification des attribution des port



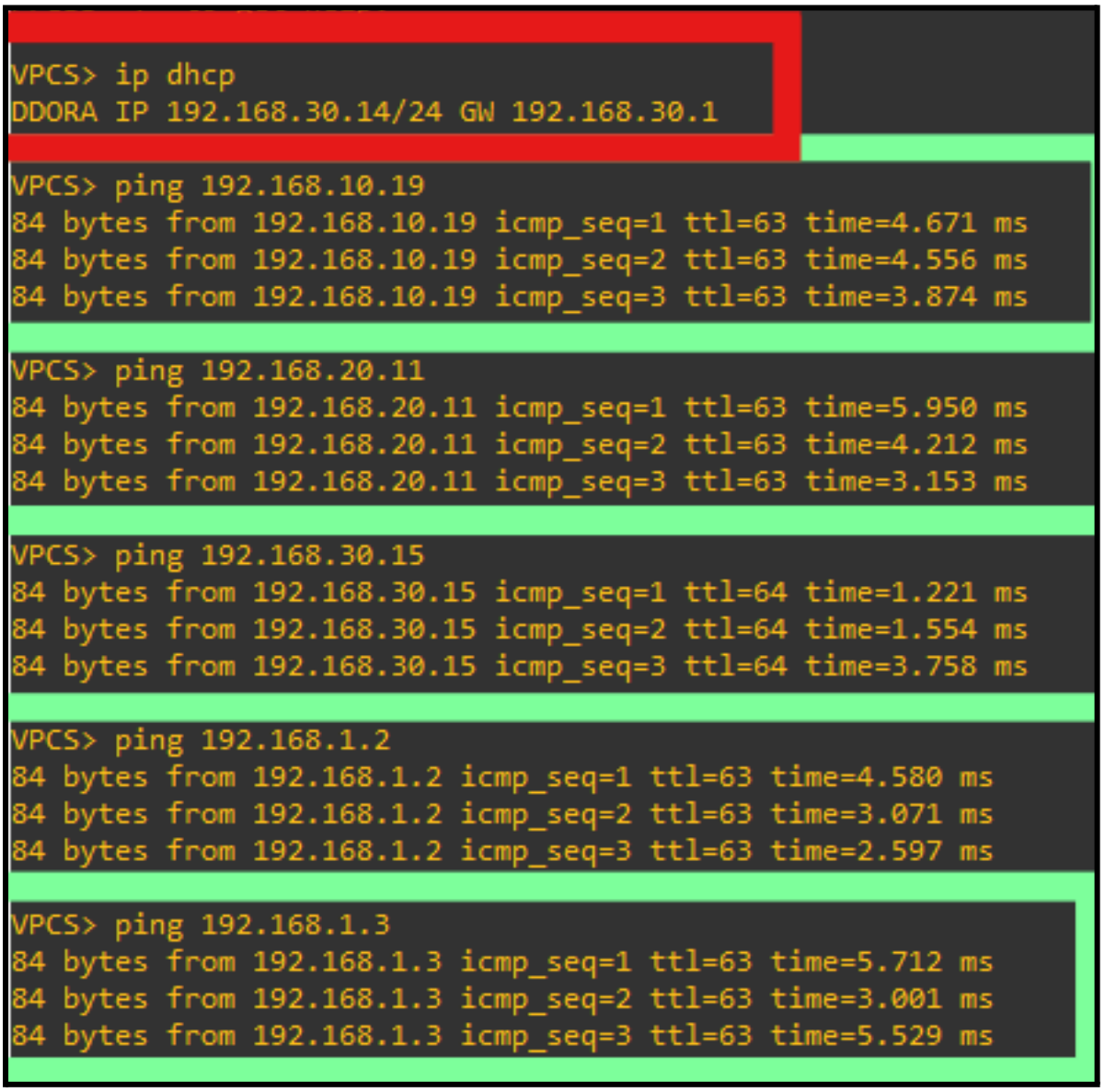
Ping du PC1(vlan1) au PC des autre vlan et serveur WEB et FTP :



Ping du PC3(vlan2) au PC des autre vlan et serveur WEB et FTP :

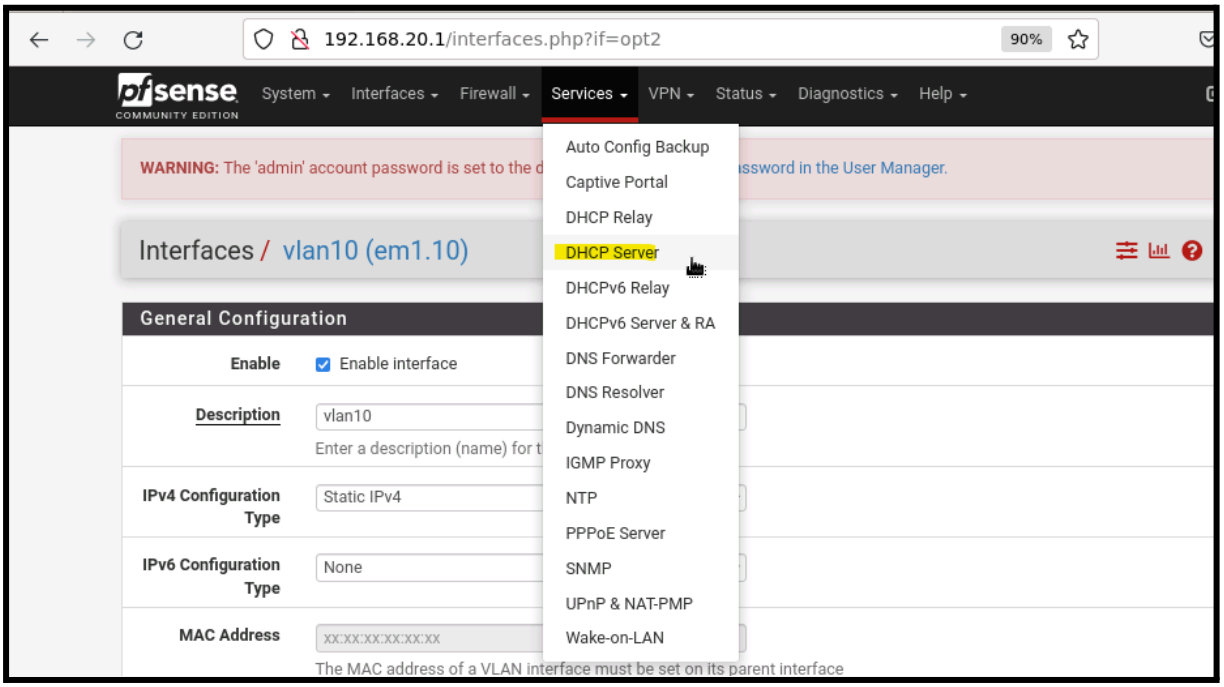


Ping du PC5(vlan 3) au PC des autre vlan et serveur WEB et FTP :

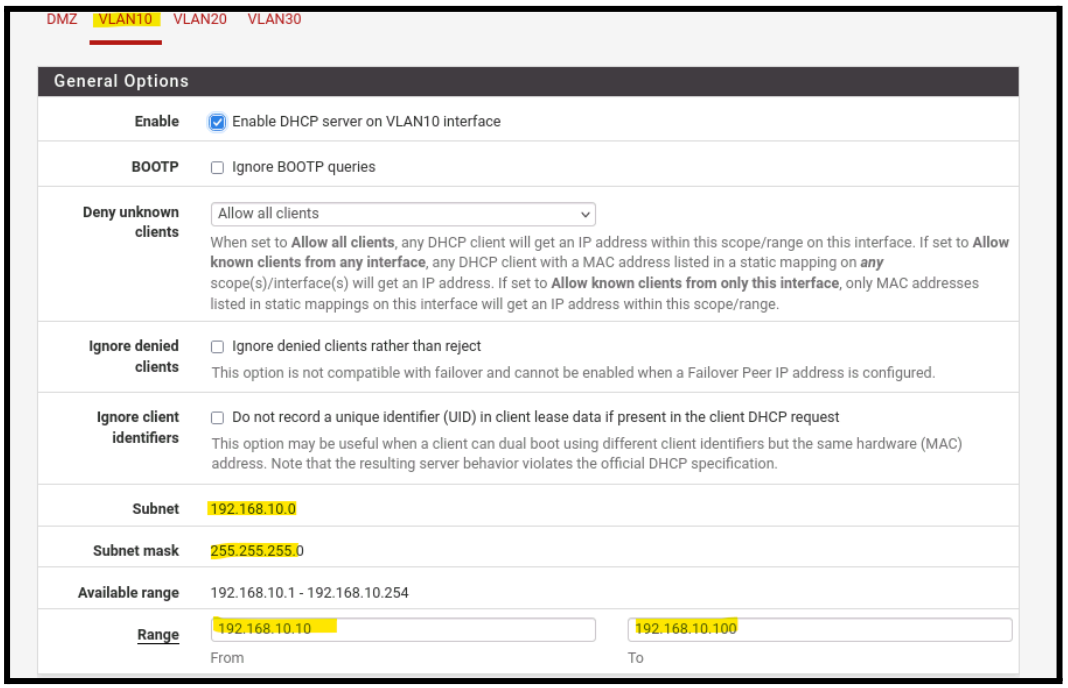


Etape 3 - installation et configurations des services DHCP, SSH, FTP et HTTP sur des serveurs (virtualisés) de l'infrastructure réseau -> prendre machine Debian 11.8

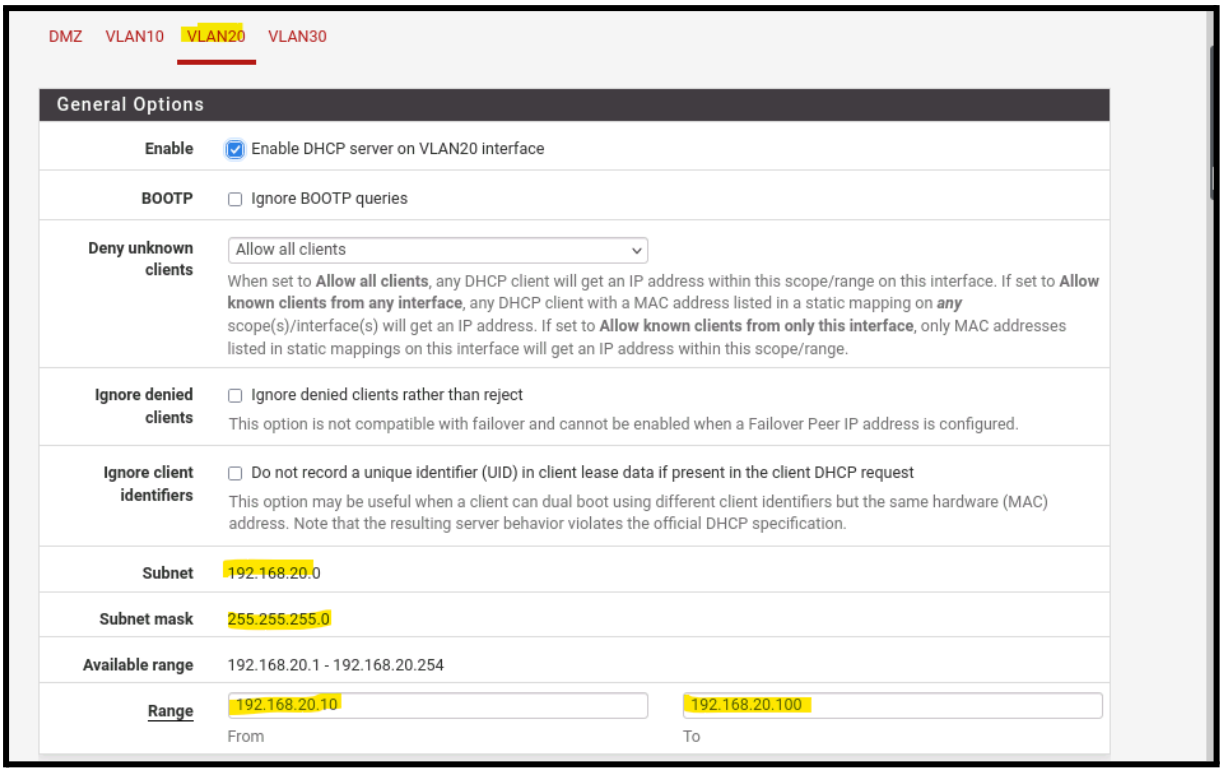
Configuration du *DHCP*(dans pfSense) :



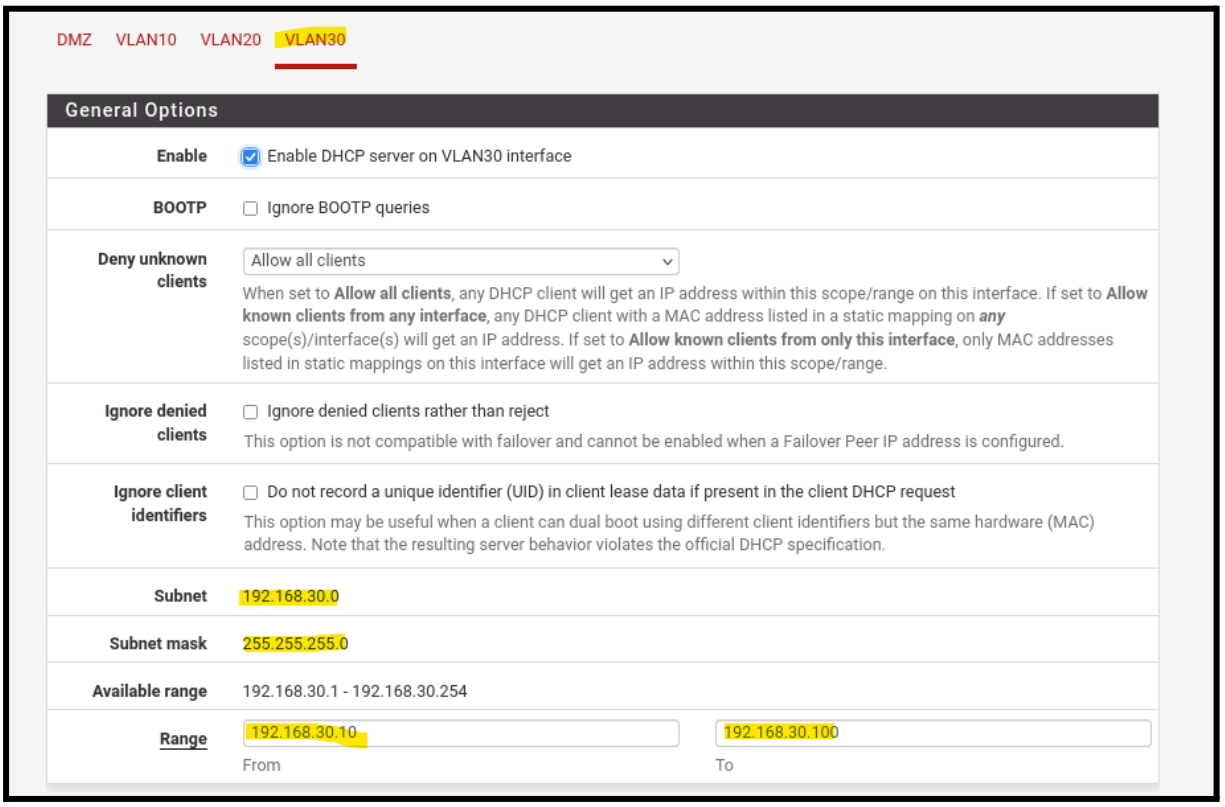
Configuration de la plage d'adresse ip VLAN 10 192.168.10-100:



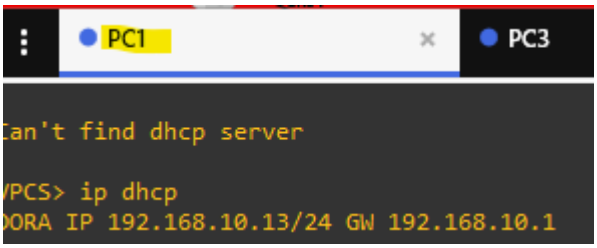
configuration de la plage d’adresse ip VLAN20 192.168.10-100:

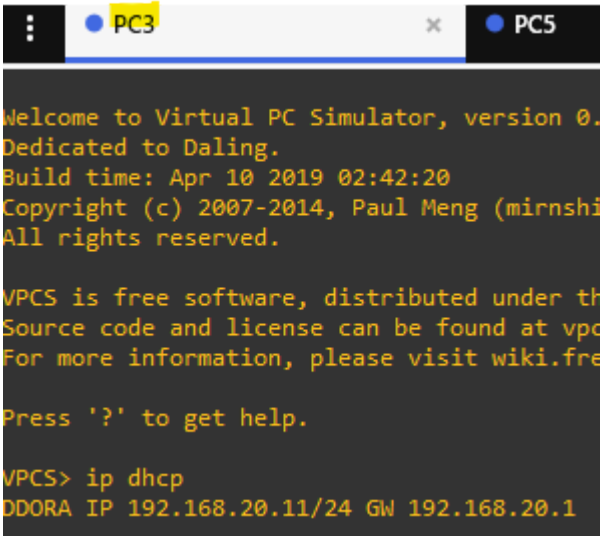


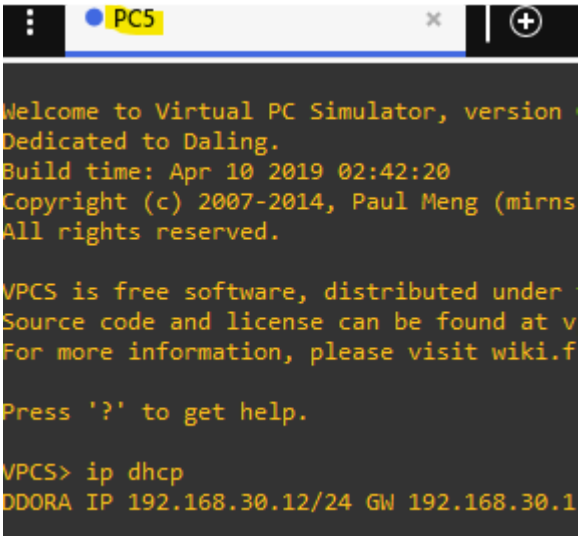
Configuration de la plage d’adresse ip VLAN 30 192.168.10-100:



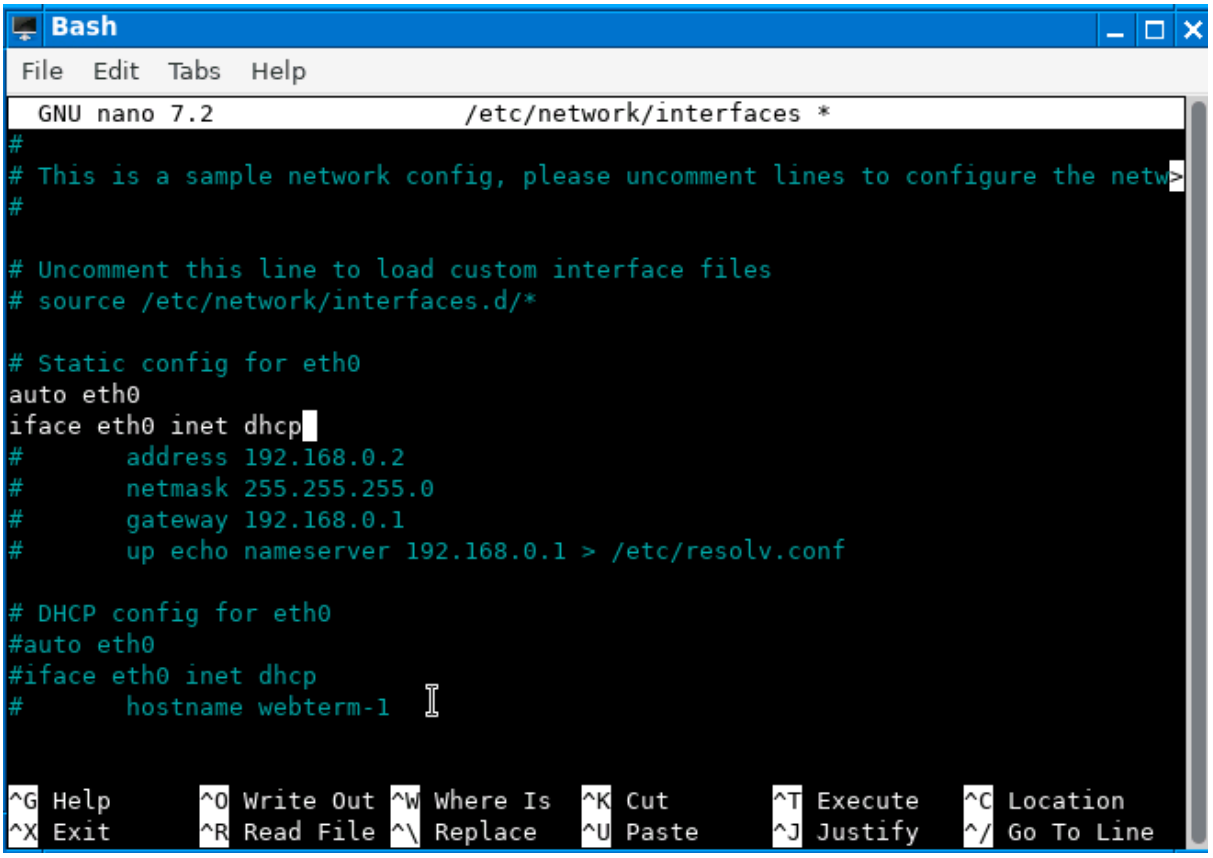
Test du *dhcp* sur les différents PCs de chaque Vlans : “ip dhcp”



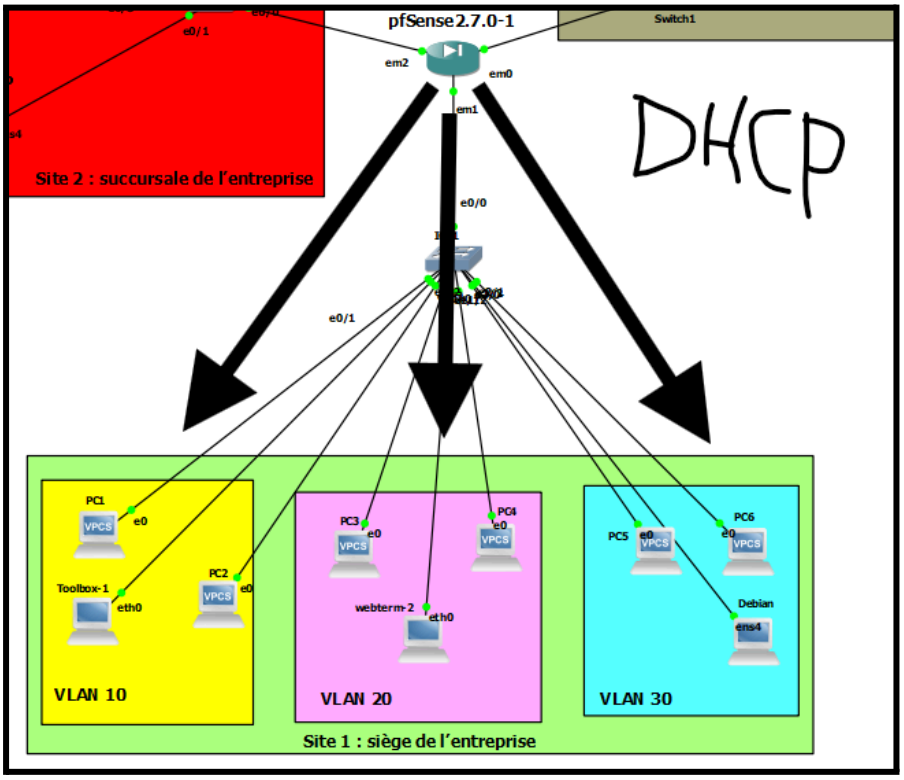




Activer le service dhcp sur un webterm(linux) :



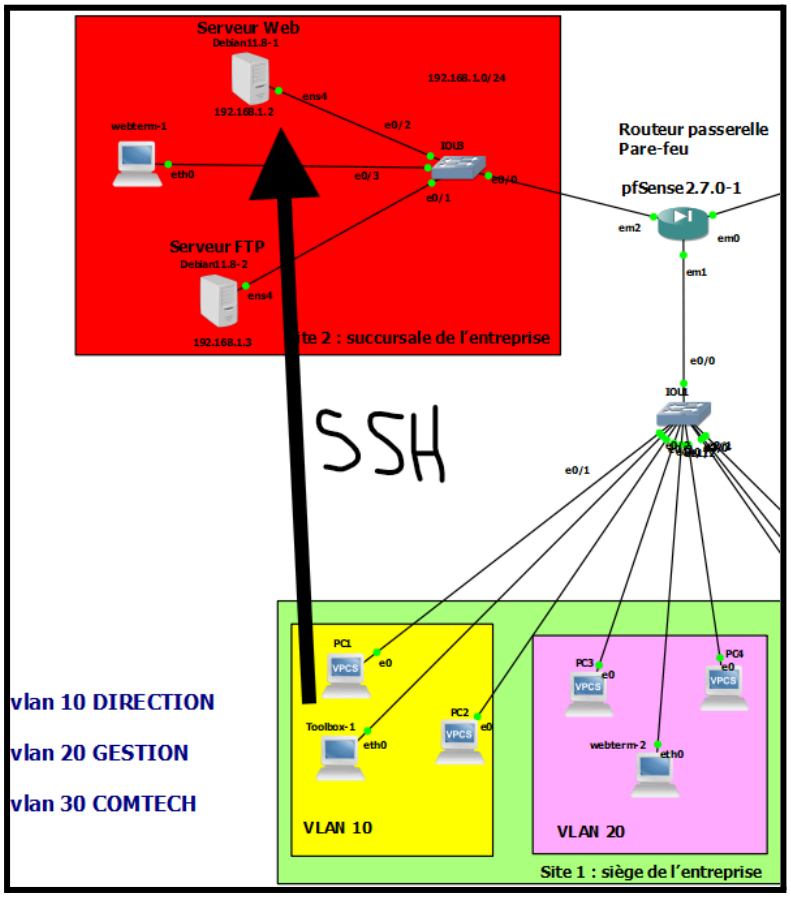
Schema du service dhcp sur les vlans :



Test du SSH depuis un PC de la vlan 10 au serveur WEB :

```
root@Toolbox-1:~# ip -c a
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
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
41: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UNKNOWN group default qlen 1000
    link/ether 22:2a:d5:7c:ec:10 brd ff:ff:ff:ff:ff:ff
    inet 192.168.10.17/24 scope global eth0
       valid_lft forever preferred_lft forever
root@Toolbox-1:~# ssh debian@192.168.1.2
debian@192.168.1.2's password:
Linux debian 5.10.0-30-cloud-amd64 #1 SMP Debian 5.10.218-1 (2024-06-01) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sun Jun 16 21:32:58 2024
debian@debian:~$ sudo -i
root@debian:~#
```

Schéma SSH :



Installation et configuration de FTP et de ses utilisateur :

- **sudo apt install vsftpd**

```
debian@debian:~$ sudo apt install vsftpd
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  vsftpd
0 upgraded, 1 newly installed, 0 to remove and 31 not upgraded.
Need to get 153 kB of archives.
After this operation, 358 kB of additional disk space will be used.
Get:1 http://deb.debian.org/debian bullseye/main amd64 vsftpd amd64 3.0.3-12+b1 [153 kB]
Fetched 153 kB in 0s (759 kB/s)
Preconfiguring packages ...
Selecting previously unselected package vsftpd.
(Reading database ... 22642 files and directories currently installed.)
Preparing to unpack .../vsftpd_3.0.3-12+b1_amd64.deb ...
Unpacking vsftpd (3.0.3-12+b1) ...
Setting up vsftpd (3.0.3-12+b1) ...
Created symlink /etc/systemd/system/multi-user.target.wants/vsftpd.service → /lib/systemd/system/vsftpd.service.
Processing triggers for man-db (2.9.4-2) ...
debian@debian:~$
```

Création du dossier partagé share

```
debian@debian:~$ sudo mkdir -p /srv/ftp/share
debian@debian:~$ sudo chmod 777  /srv/ftp/share
```

Création d'utilisateur ftp1 et ftp2

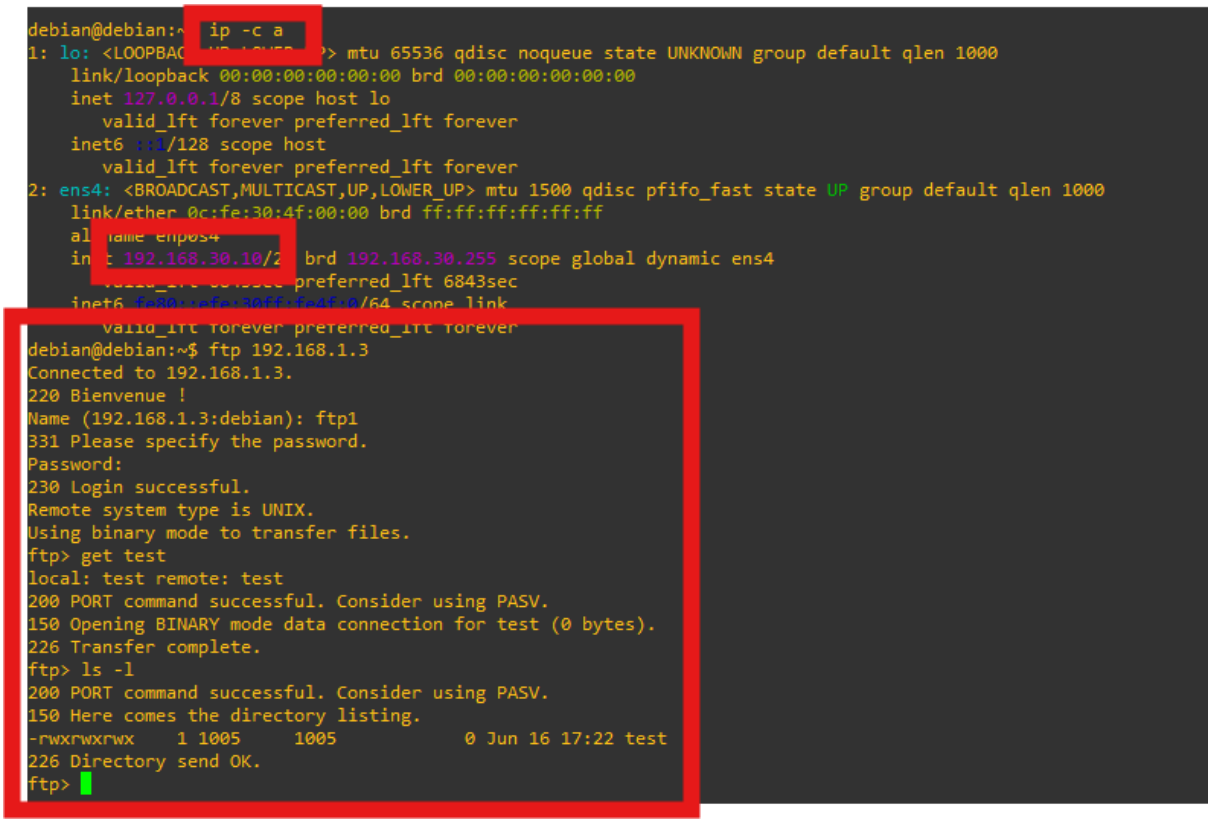
```
debian@debian:~$ sudo adduser ftp1
Adding user `ftp1' ...
Adding new group `ftp1' (1004) ...
Adding new user `ftp1' (1004) with group `ftp1' ...
Creating home directory `/home/ftp1' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for ftp1
Enter the new value, or press ENTER for the default
        Full Name []:
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] y
debian@debian:~$
```

```
debian@debian:~$ sudo adduser ftp2
Adding user `ftp2' ...
Adding new group `ftp2' (1005) ...
Adding new user `ftp2' (1005) with group `ftp2' ...
Creating home directory `/home/ftp2' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for ftp2
Enter the new value, or press ENTER for the default
        Full Name []:
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] y
debian@debian:~$
```

ajout des utilisateurs aux groupe ftpaccess et commande pour donner les droits :

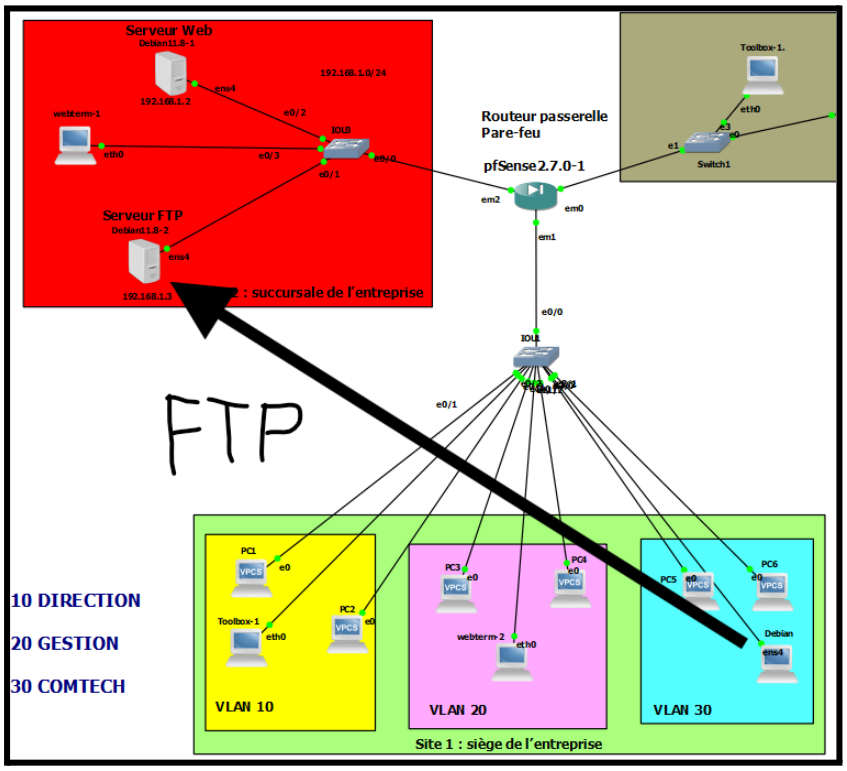
```
debian@debian:~$ sudo groupadd ftpaccess
debian@debian:~$ sudo usermod -aG ftpaccess ftp1
debian@debian:~$ sudo usermod -aG ftpaccess ftp2
debian@debian:~$ sudo chgrp ftpaccess /srv/ftp/share/
debian@debian:~$ sudo chmod 770 /srv/ftp/share/
debian@debian:~$
```

Test *"ftp 192.168.1.3"* *des deux compte crée (ftp1 et ftp2) depuis* un PC de la Vlan 30 sur le serveur ftp 192.168.1.3 :




```
debian@debian:~$ ftp 192.168.1.3
Connected to 192.168.1.3.
220 Bienvenue !
Name (192.168.1.3:debian): ftp2
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls -l
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
-rwxrwxrwx    1 1005     1005            0 Jun 16 17:22 test
226 Directory send OK.
ftp>
```

SCHÉMA DU PROTOCOLE FTP EFFECTUE :



Installation et configuration de HTTP et de ses utilisateur :

sudo apt update
sudo apt install apache 2

```
debian@debian:~$ sudo apt install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
apache2 is already the newest version (2.4.59-1~deb11u1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

ls -l pour voir les fichier dans /var/www/html pour le fichier de la page web

```
debian@debian:~$ cd /var/www/html/
debian@debian:/var/www/html$ ls
index.html
```

Modification du code html pour avoir un rendu personnel

```
  GNU nano 5.4                        index.html *
<! DOCTYPE html>
<html>
<head>
        <title>Bienvenue sur sae201.com</title>
</head>
<body>
        <h1>Serveur WEB SAE201</h1>
        <p>SERVEUR DE SUCURSAL</p>
</body>
</html>
```

Accès à la page apache de la vm depuis pc vlan 20

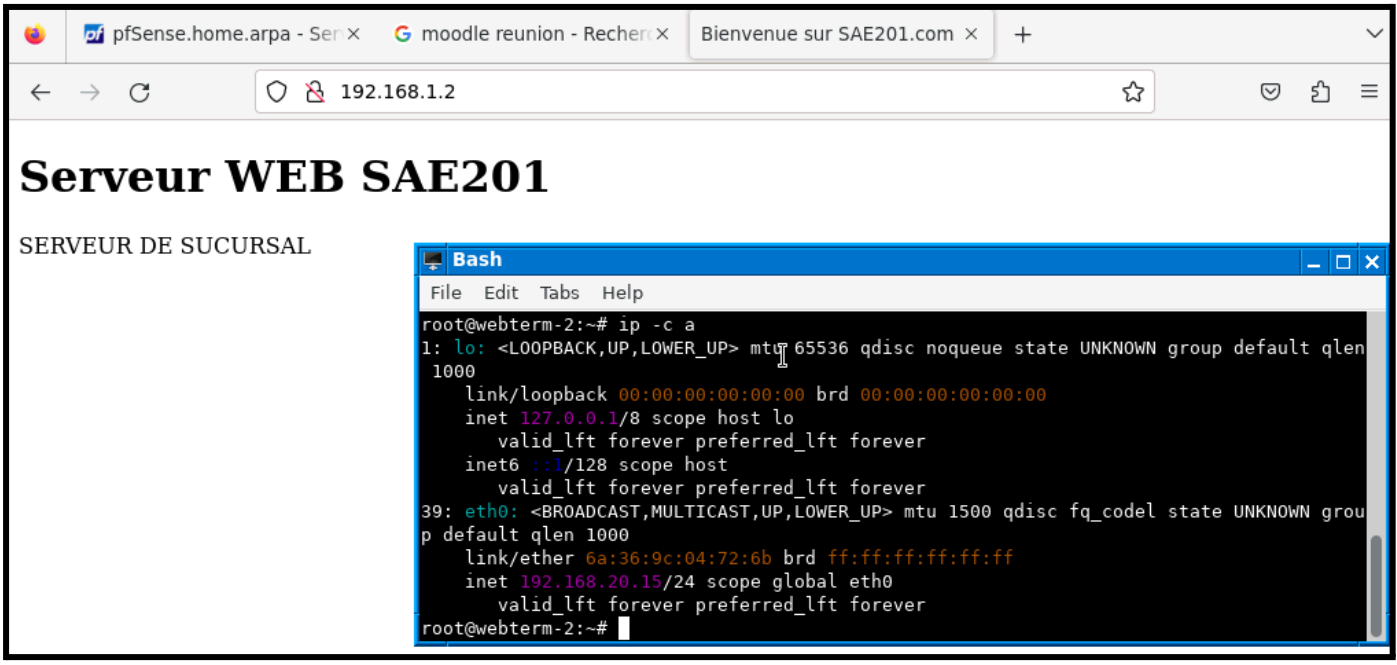
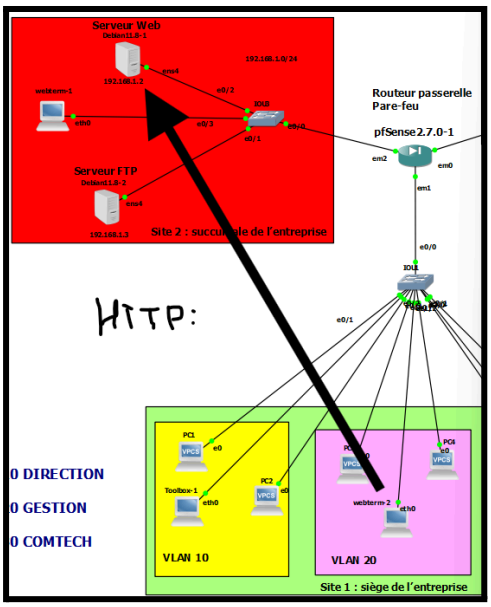
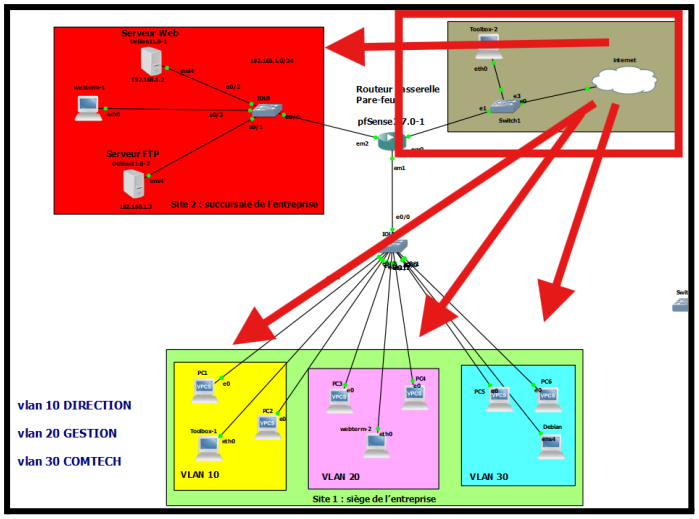


SCHÉMA DU PROTOCOLE HTTP EFFECTUE

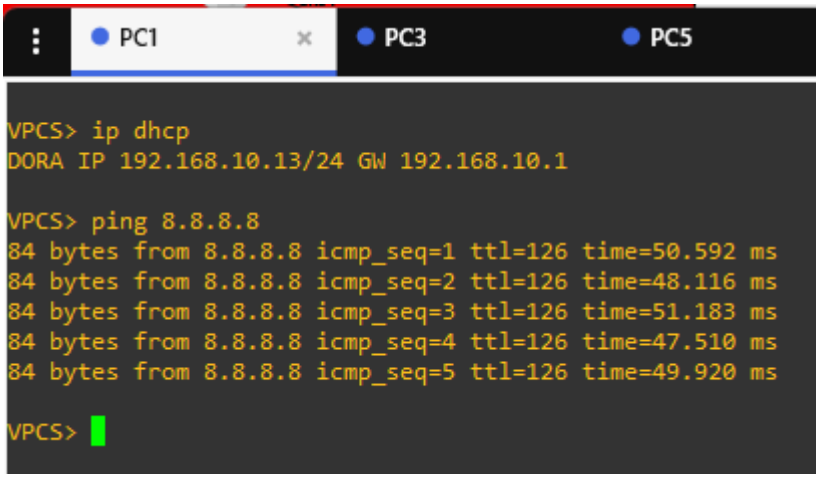


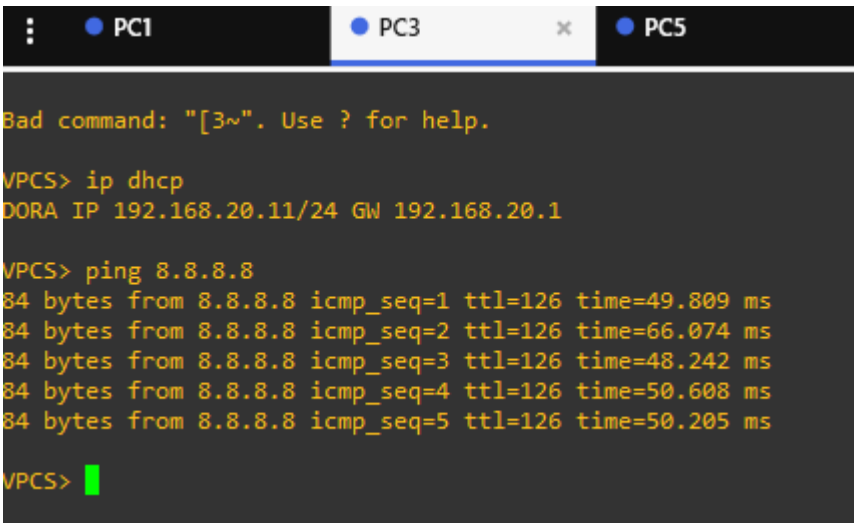
Etape 4 - Mise en place et configuration de l’accès à Internet

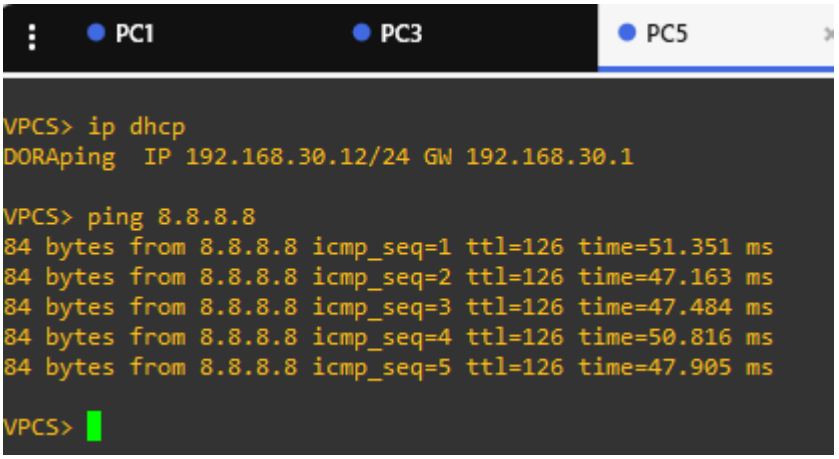
Grâce au nuage (NAT) on nous donne ici internet



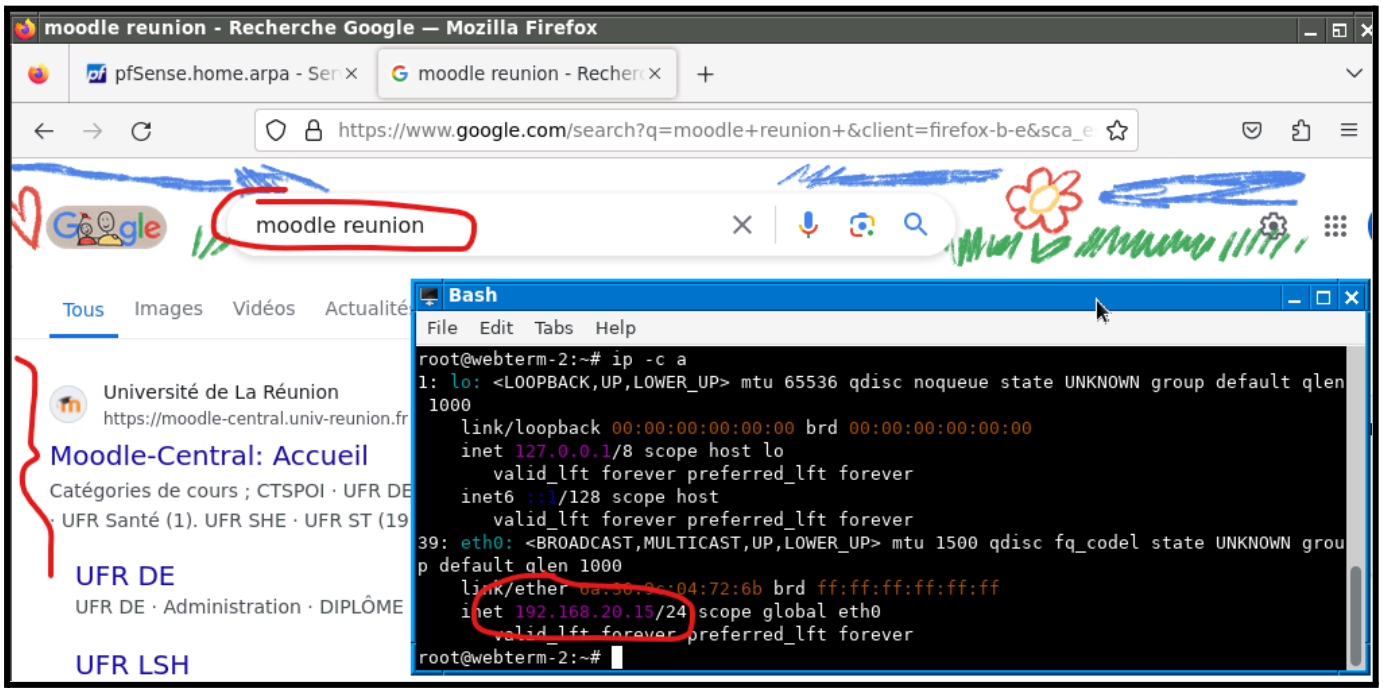
Test pingServeur google (8.8.8.8) des périphérique de chaque vlan :





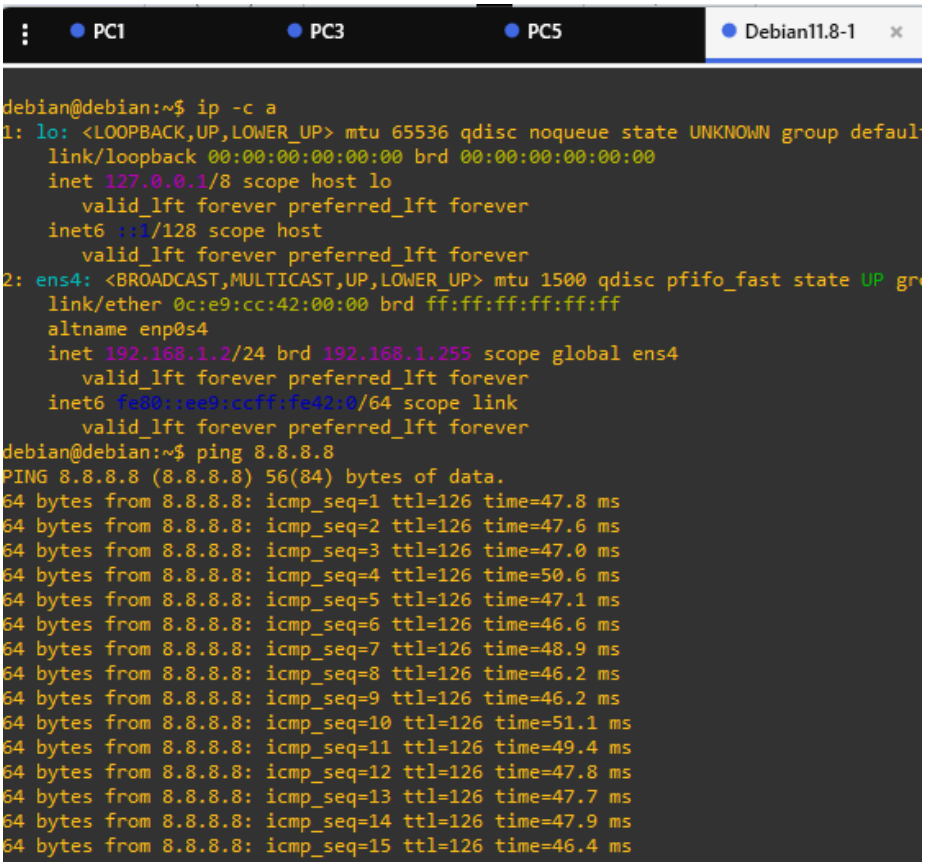


(LAN) PC de la vlan 20 vers internet (ex: moodle reunion)

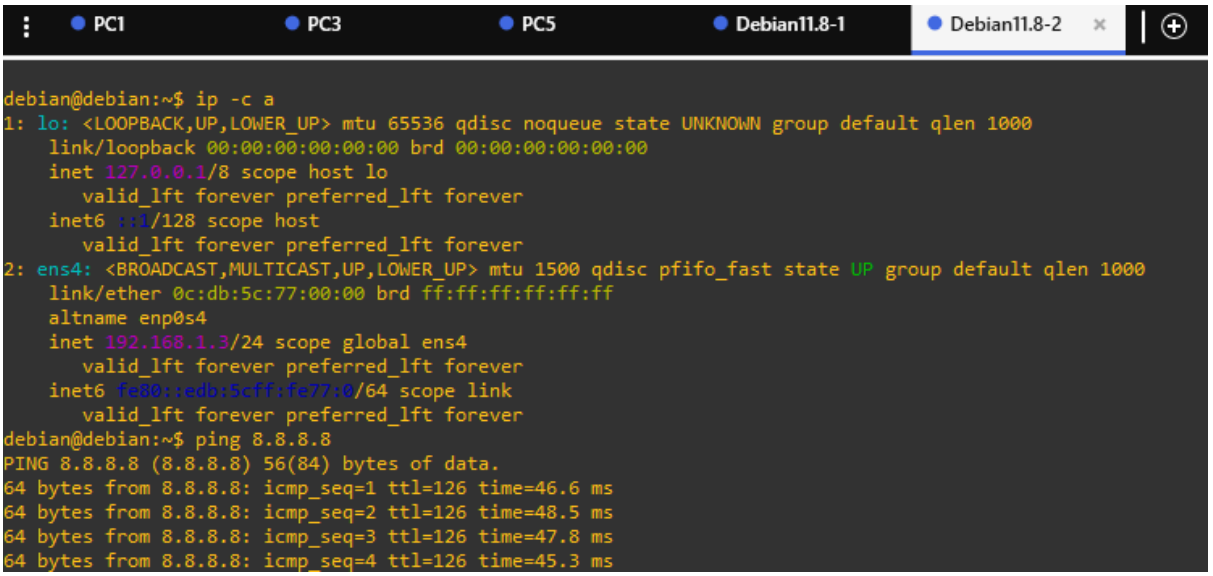


Test du ping internet depuis les serveurs (WEB et FTP)

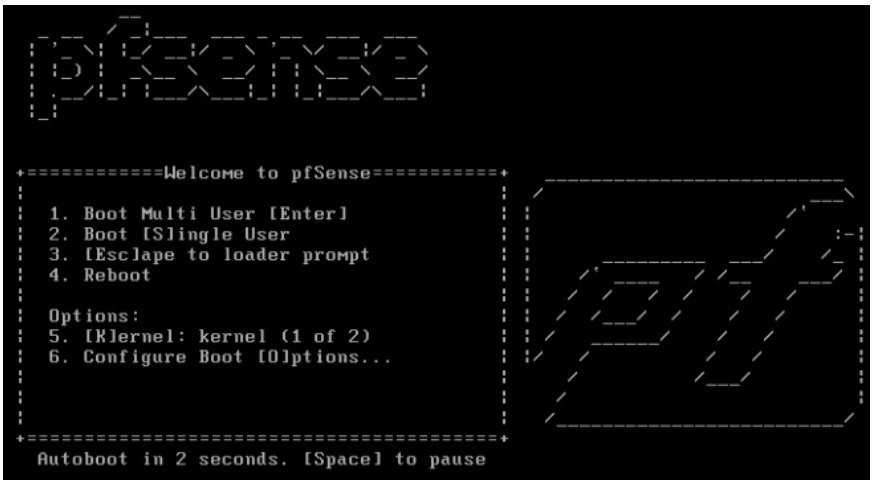
Serveur web -

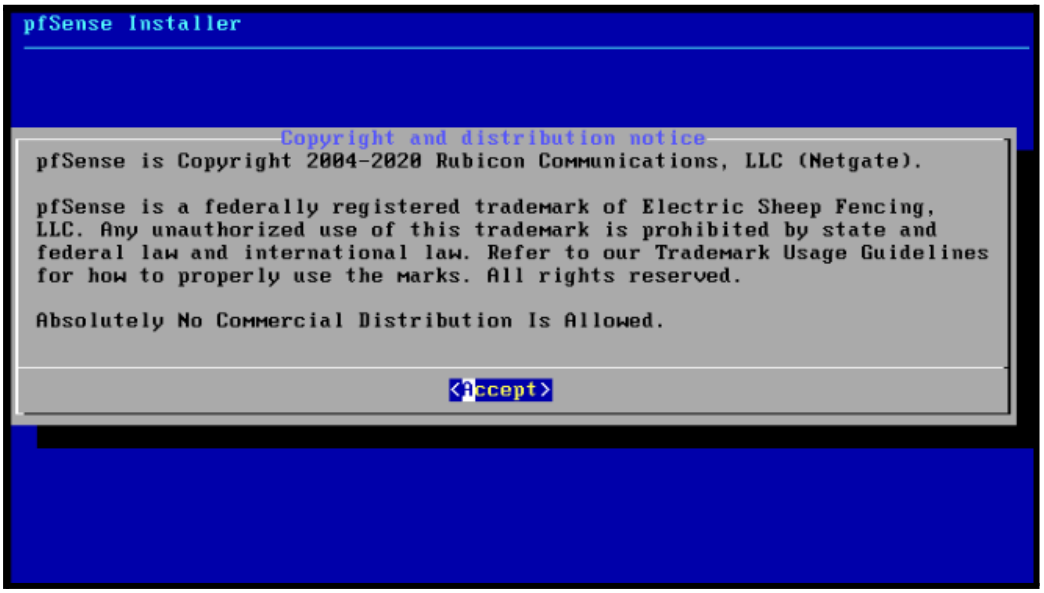


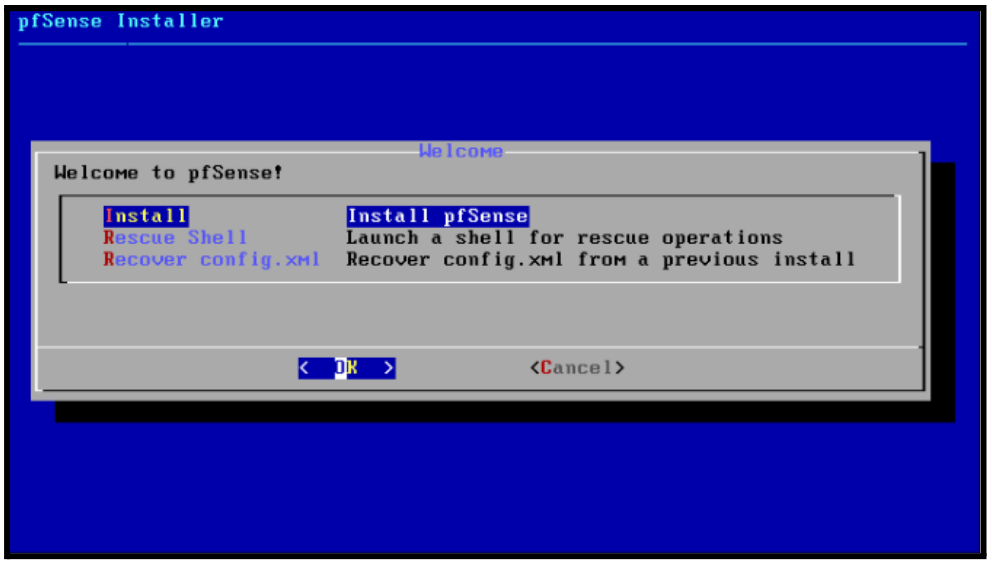
Serveur FTP-

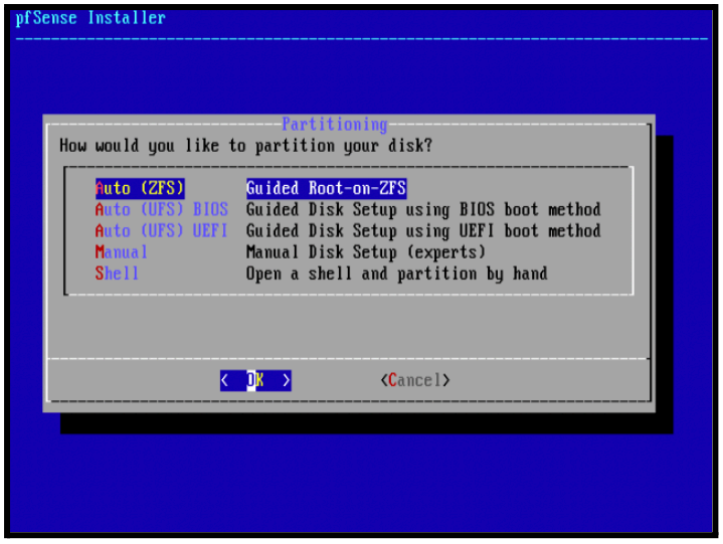


Installation et configuration d’un pare-feu PfSense :

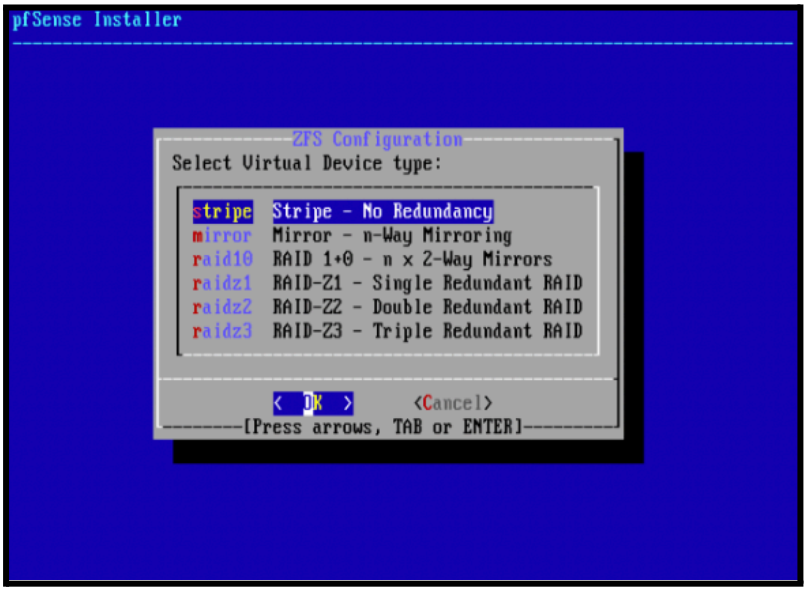


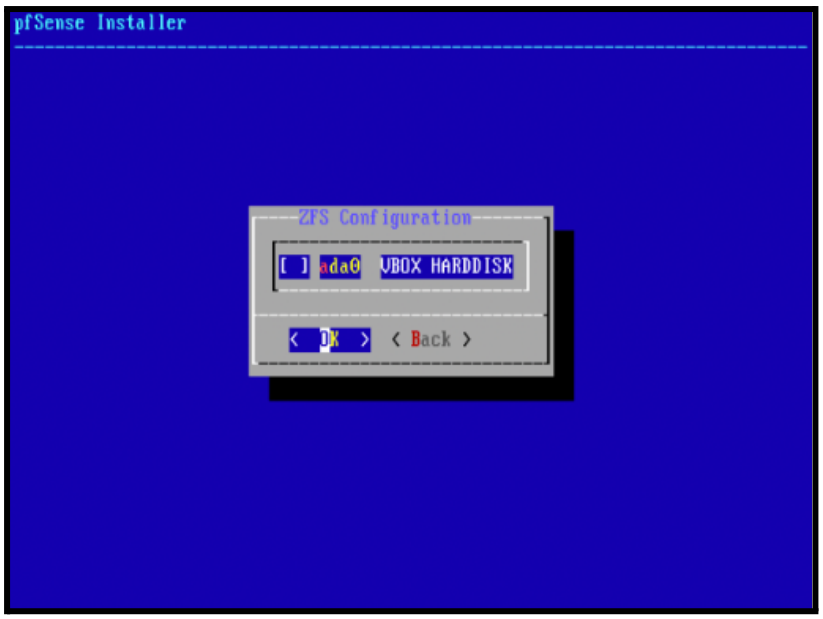


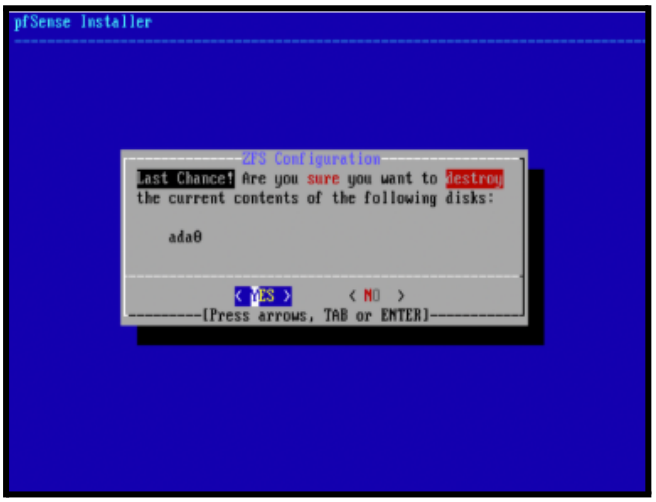


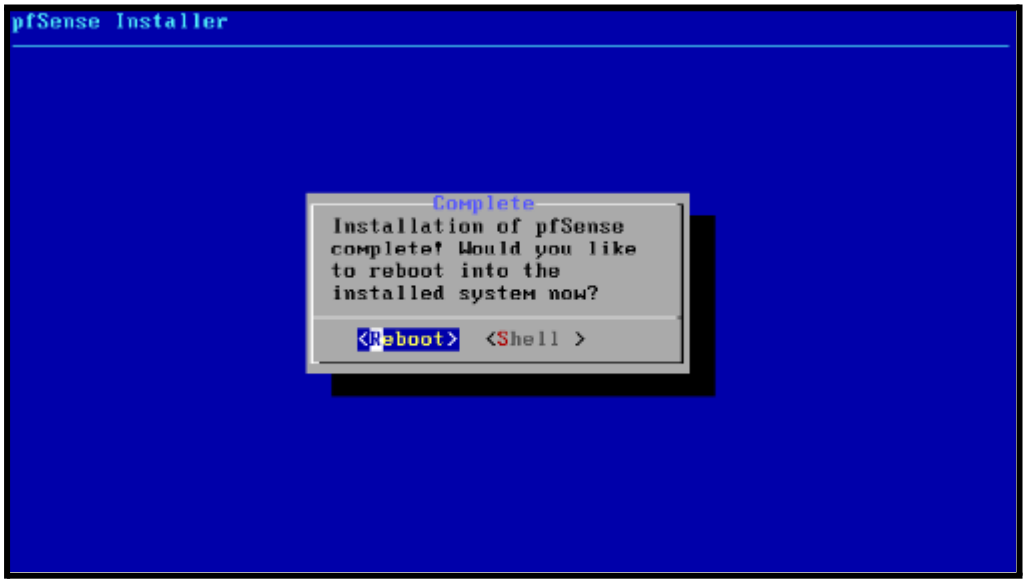

pfSense Installer
Partitioning
How would you like to partition your disk?
Auto (ZFS) Guided Root-on-ZFS
Auto (UFS) BIOS Guided Disk Setup using BIOS boot method
Auto (UFS) UEFI Guided Disk Setup using UEFI boot method
Manual Manual Disk Setup (experts)
Shell Open a shell and partition by hand
< OK >
<Cancel>

pfSense Installer
ZFS Configuration
Configure Options:
>>> Install Proceed with Installation
T Pool Type/Disks: stripe: 0 disks
- Rescan Devices *
- Disk Info *
N Pool Name pfSense
4 Force 4K Sectors? YES
E Encrypt Disks? NO
P Partition Scheme GPT (BIOS)
S Swap Size 2g
M Mirror Swap? NO
W Encrypt Swap? NO
<Select> <Cancel>

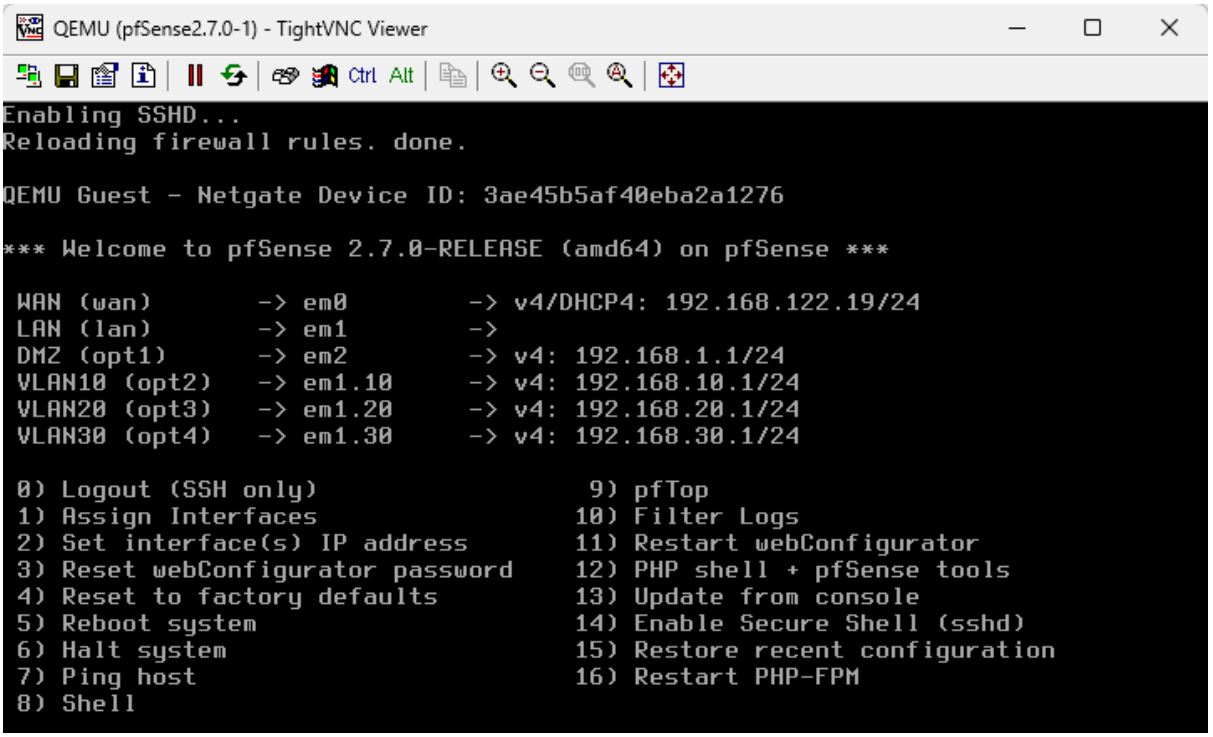

pfSense Installer
ZFS Configuration
Select Virtual Device type:
stripe Stripe - No Redundancy
mirror Mirror - n-Way Mirroring
raid10 RAID 1+0 - n x 2-Way Mirrors
raidz1 RAID-Z1 - Single Redundant RAID
raidz2 RAID-Z2 - Double Redundant RAID
raidz3 RAID-Z3 - Triple Redundant RAID
< OK > <Cancel>
[Press arrows, TAB or ENTER]


pfSense Installer
ZFS Configuration
[ ] ada0 VBOX HARDDISK
< OK > < Back >

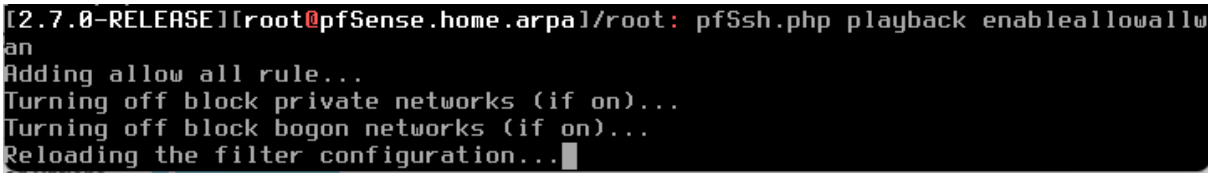

pfSense Installer
ZFS Configuration
Last Chance! Are you sure you want to destroy
the current contents of the following disks:
ada0
< YES > < NO >
[Press arrows, TAB or ENTER]


pfSense Installer
Complete
Installation of pfSense
complete! Would you like
to reboot into the
installed system now?
<Reboot> <Shell >

on arrive dans les options :

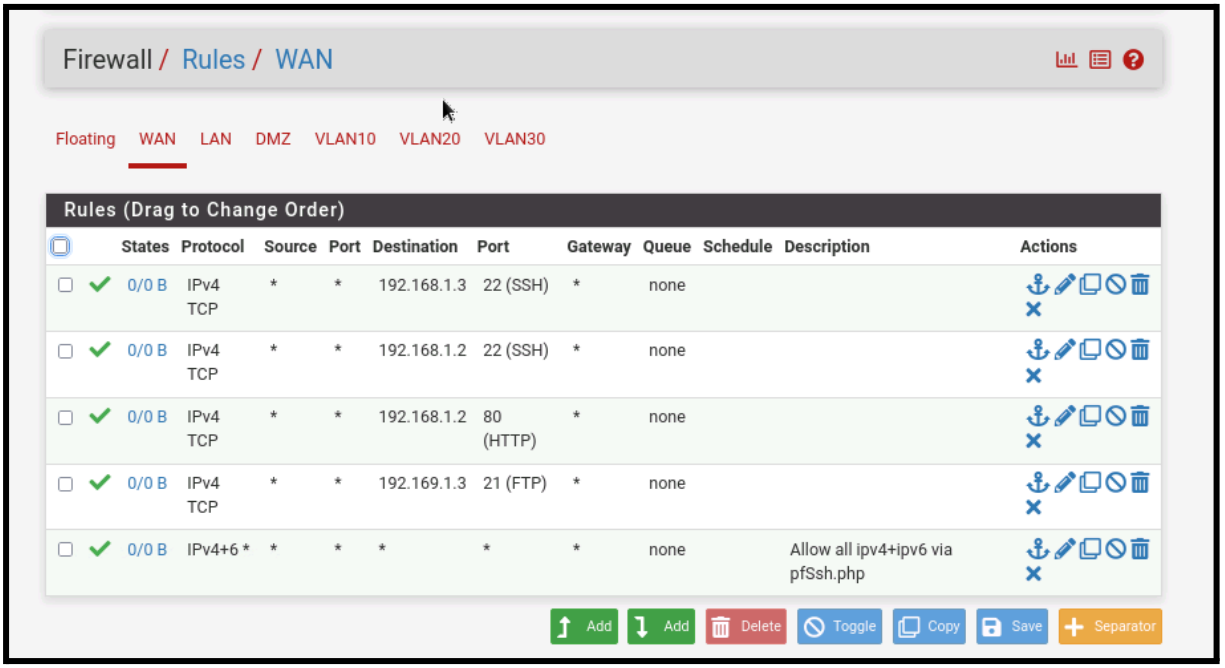


Commande pour attribuer les règles de base au port WAN pour les protocole qui passe par lui:

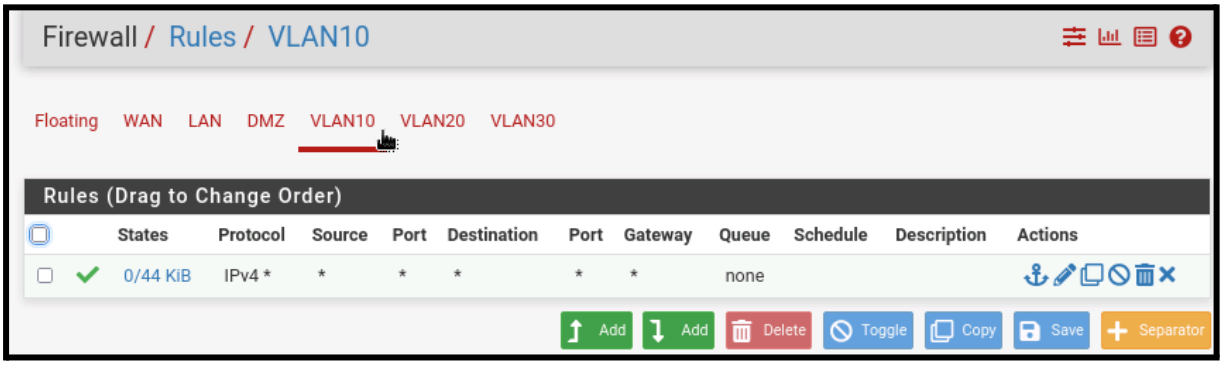


Règles sur le parefeu pfSense (Mettre en place et configurer la DMZ pour les serveurs FTP et Web (HTTP):

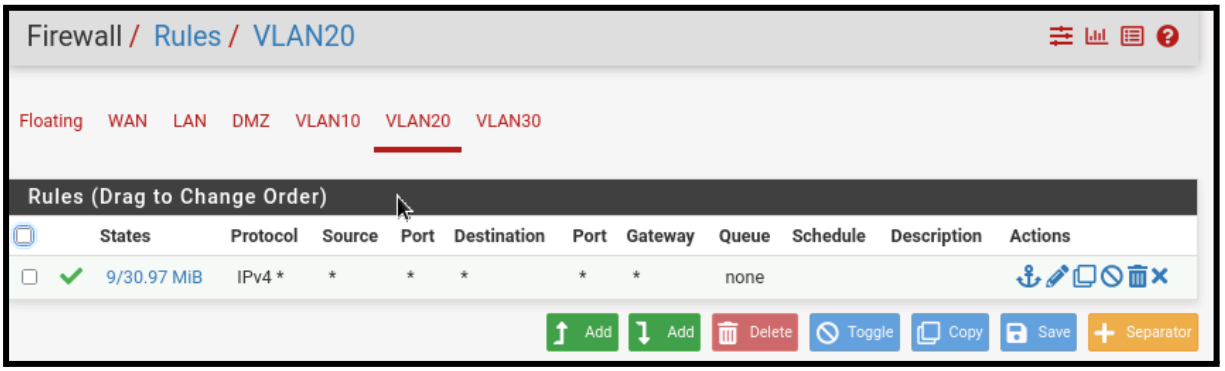
règle du port pour le WAN (on laisse passer le protocole ssh sur les deux serveur:



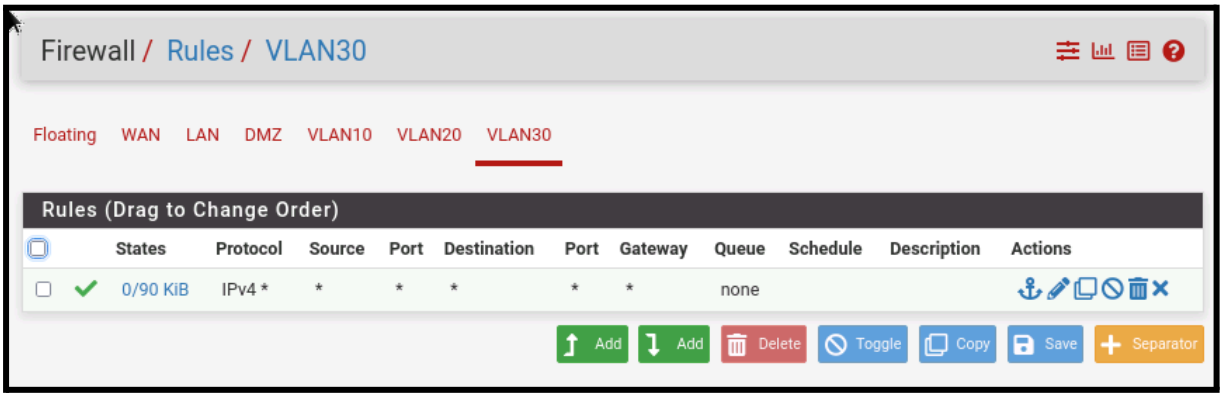
règle du port pour le Vlan 10(on laisse tout passer)



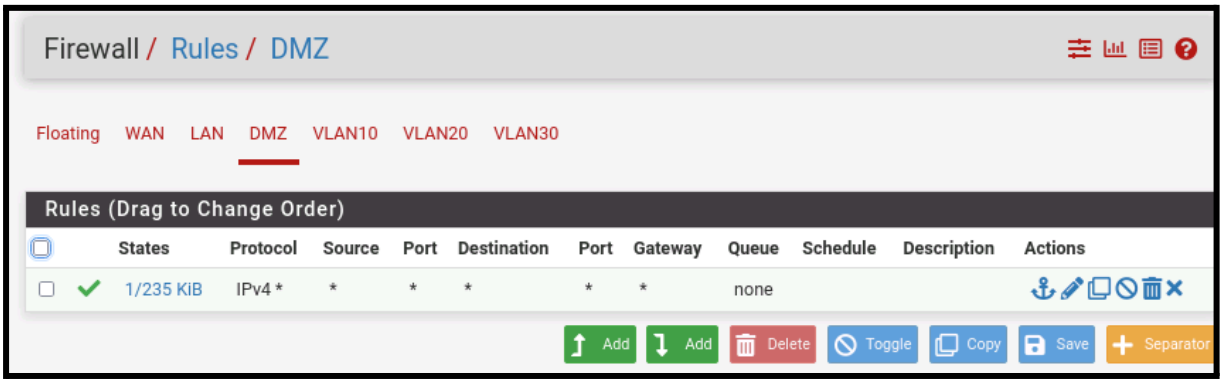
règle du port pour le Vlan 20(on laisse tout passer)



règle du port pour le Vlan 30(on laisse tout passer)



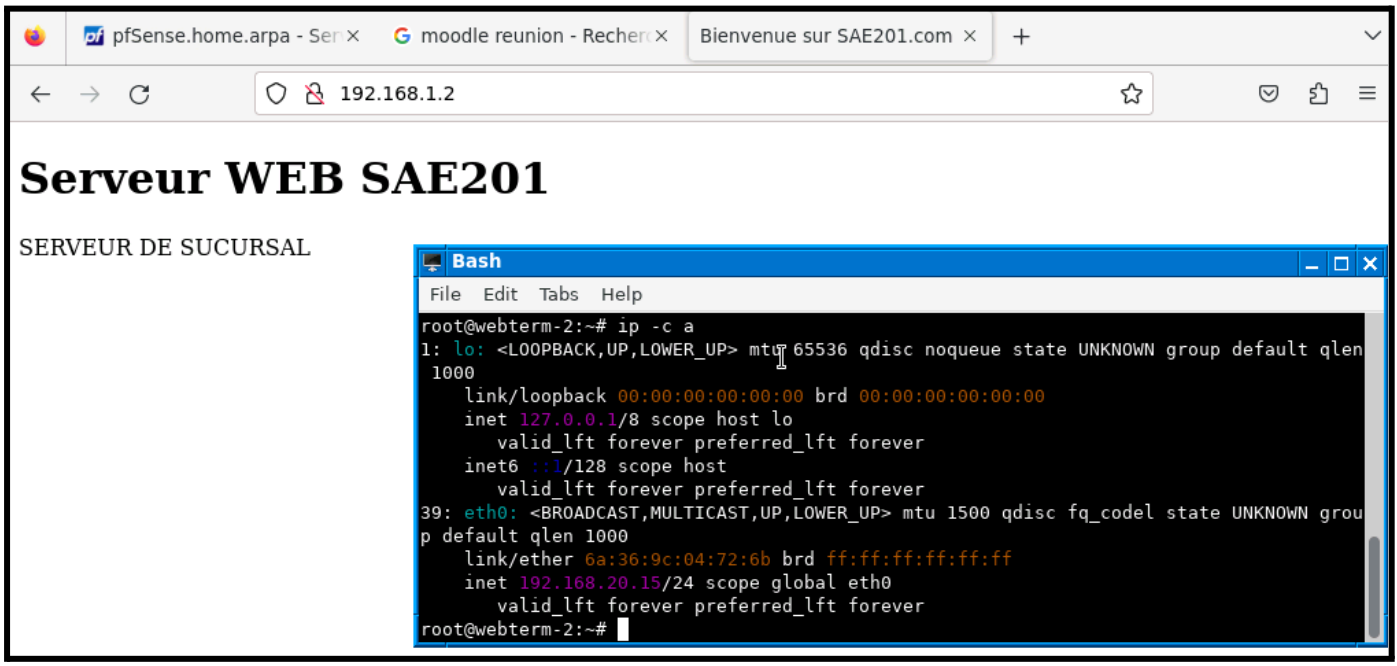
règle du port pour le DMZ(on laisse tout passer)



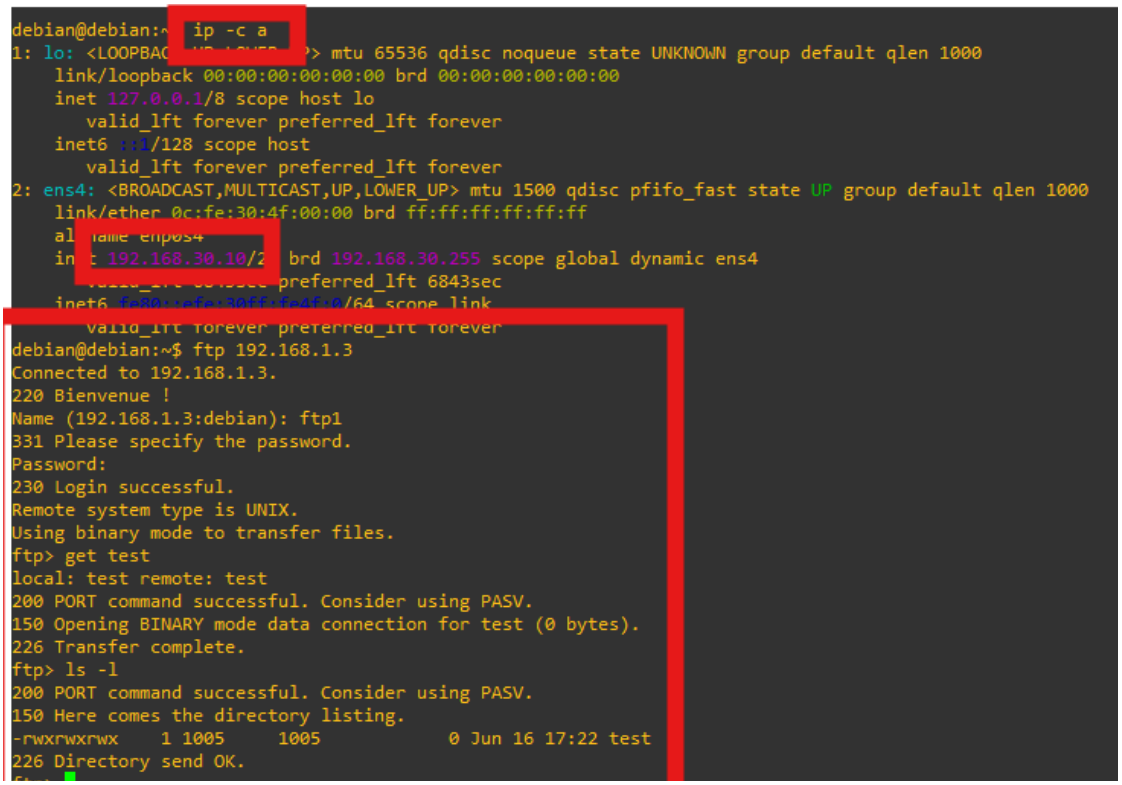
TEST FINAUX :

- **Vérifier qu'un utilisateur interne à l'entreprise peut accéder aux services réseaux installés :**

Test du ping d'un pc du vlan 20 au serveur WEB



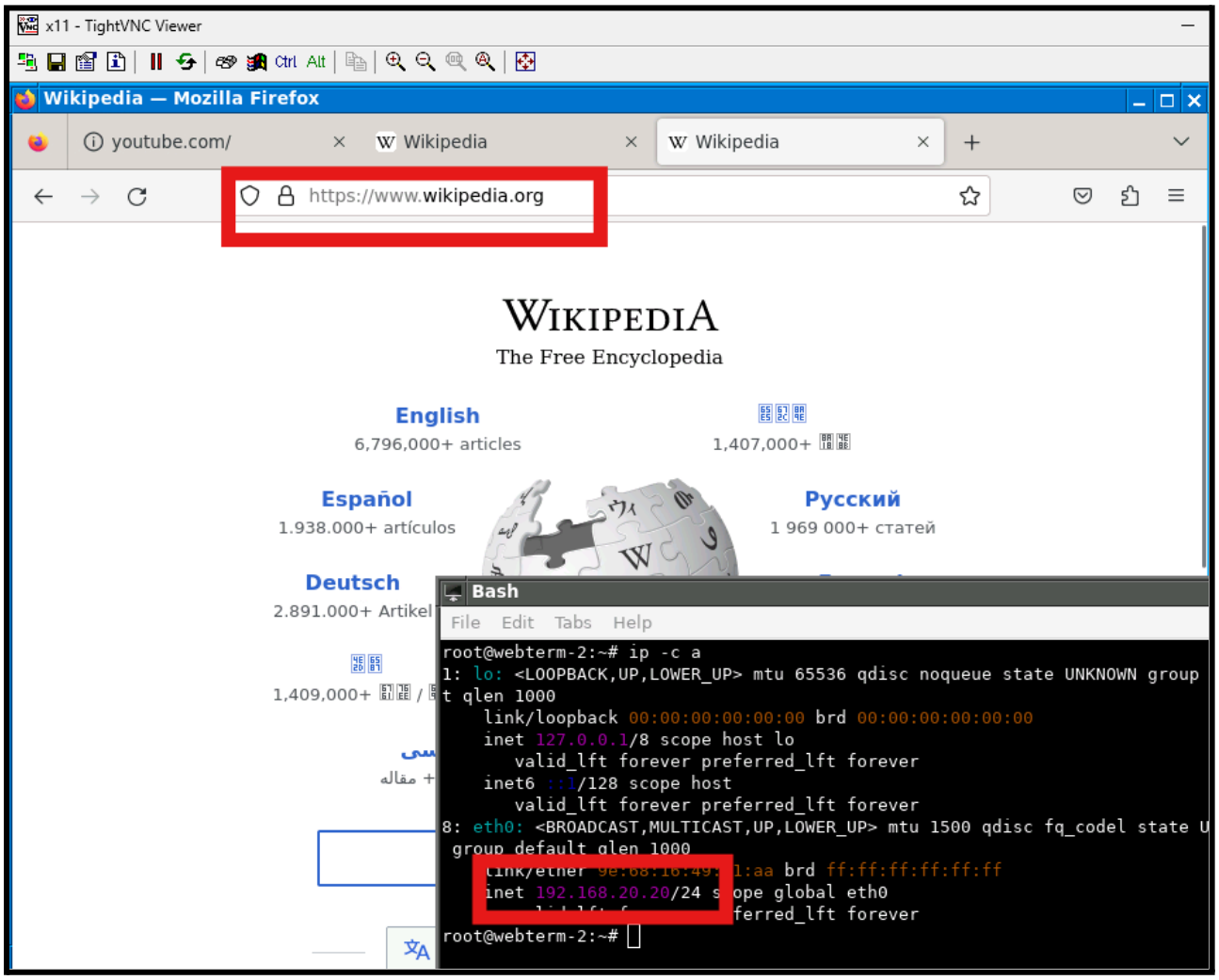
Test *"ftp 192.168.1.3"* *des deux compte crée (ftp1 et ftp2) depuis* un PC de la Vlan 30 sur le serveur ftp 192.168.1.3 :



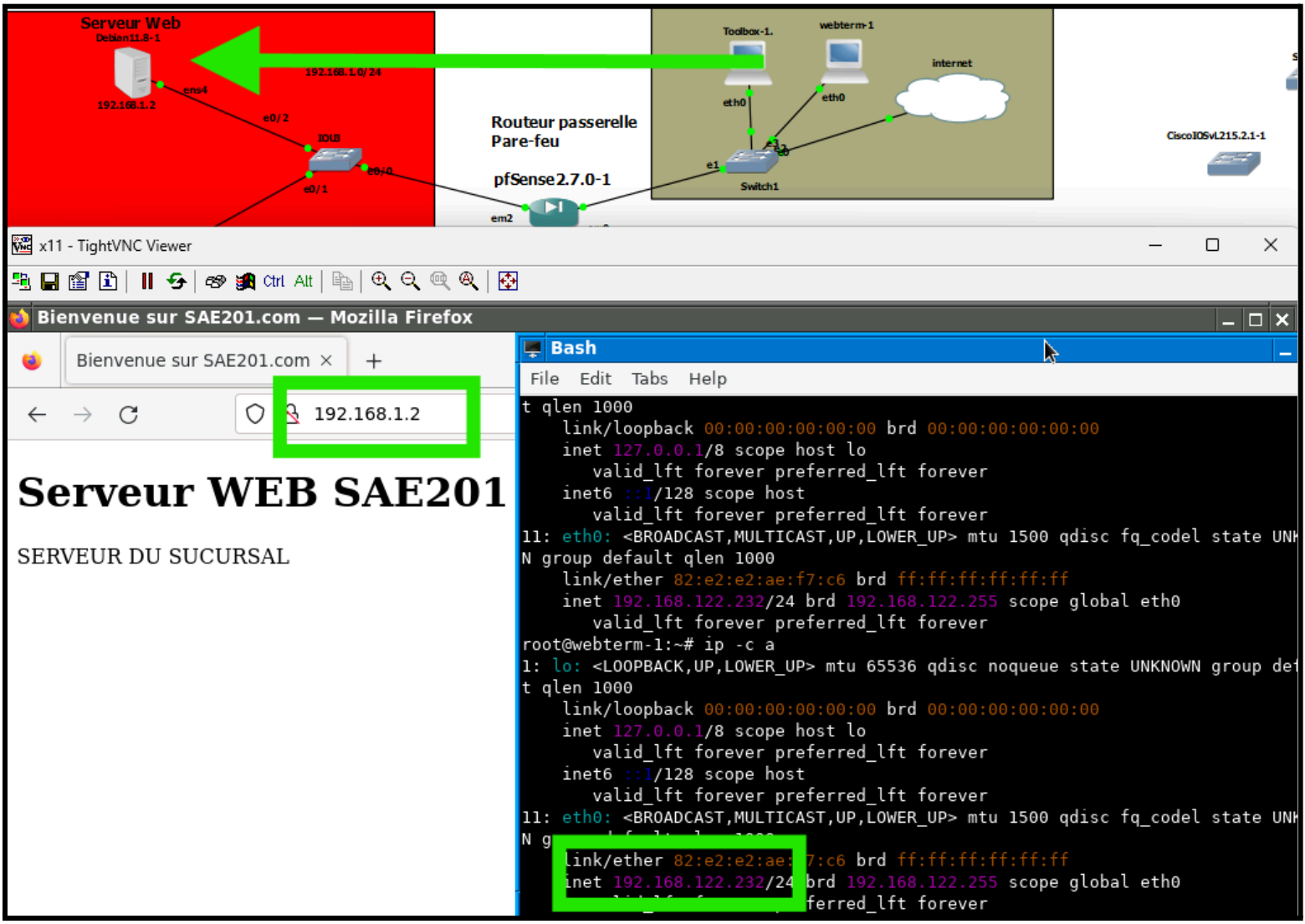
```
debian@debian:~$ ftp 192.168.1.3
Connected to 192.168.1.3.
220 Bienvenue !
Name (192.168.1.3:debian): ftp2
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls -l
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
-rwxrwxrwx    1 1005     1005            0 Jun 16 17:22 test
226 Directory send OK.
ftp>
```

Vérifier qu'un utilisateur interne à l'entreprise peut se connecter à Internet

(LAN) PC de la vlan 20 vers internet (ex: wikipedia)



Vérifier si un utilisateur externe à l'entreprise peut se connecter au serveur Web depuis l'extérieur (placer un objet webterm ou Firefox dans la partie WAN)



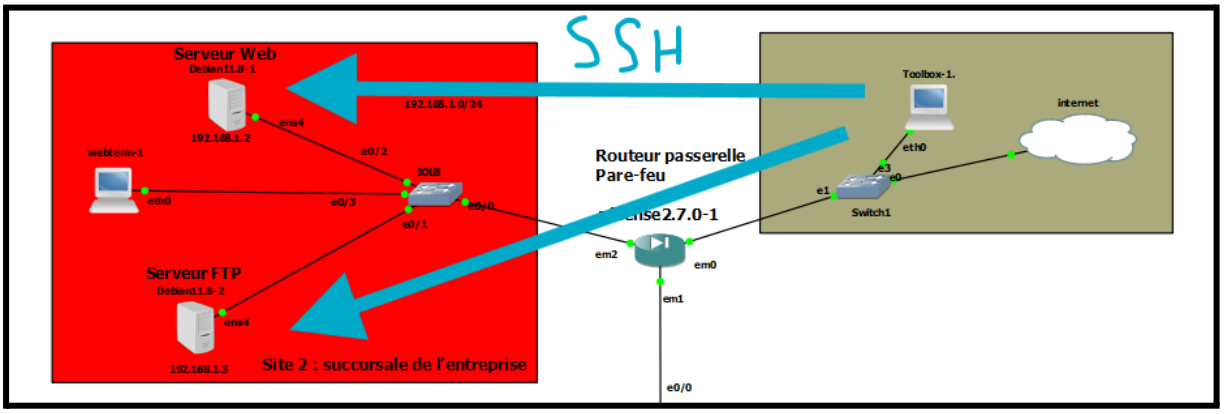
Vérifier si l'administrateur réseau de l'entreprise peut gérer les équipements à l'aide d'une connexion SSH à l'intérieur de l'entreprise

Test du pc de la vlan 10 en ssh au serveur web

```
root@Toolbox-1:~# ip -c a
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
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
41: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UNKNOWN group default qlen 1000
    link/ether 22:2a:a5:7c:ec:10 brd ff:ff:ff:ff:ff:ff
    inet 192.168.10.17/24 scope global eth0
       valid_lft forever preferred_lft forever
root@Toolbox-1:~# ssh debian@192.168.1.2
debian@192.168.1.2's password:
Linux debian 5.10.0-30-cloud-amd64 #1 SMP Debian 5.10.218-1 (2024-06-01) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sun Jun 16 21:32:58 2024
debian@debian:~$ sudo -i
root@debian:~#
```

Vérifier si l'administrateur réseau de l'entreprise peut gérer les équipements à l'aide d'une connexion SSH hors de l'entreprise

TEST SSH DEPUIS LE WAN



SSH sur le serveur WEB

```
root@Toolbox-1:~# ssh debian@192.168.1.2
debian@192.168.1.2's password:
Linux debian 5.10.0-30-cloud-amd64 #1 SMP Debian 5.10.218-1 (2024-06-01) x86_64

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permitted by applicable law.
Last login: Sun Jun 16 21:42:56 2024 from 192.168.10.17
debian@debian:~$ sudo -i
root@debian:~# exit
logout
debian@debian:~$ exit
logout
Connection to 192.168.1.2 closed.
```

SSH sur le serveur FTP

```
root@Toolbox-1:~# ssh debian@192.168.1.3
debian@192.168.1.3's password:
Linux debian 5.10.0-26-cloud-amd64 #1 SMP Debian 5.10.197-1 (2023-09-29) x86_64

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the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

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permitted by applicable law.
Last login: Mon Jun 17 06:15:33 2024
debian@debian:~$ sudo -i
root@debian:~#
```