# TP VLAN

TP U6 SISR

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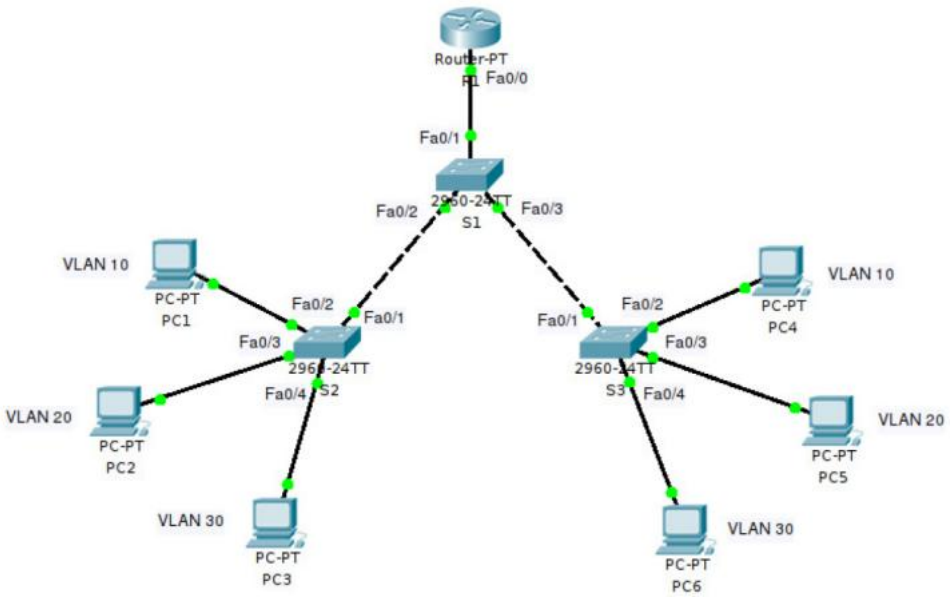
# 1-Introduction

Nous allons réaliser la configuration suivante dans Cisco Packet Tracer :




| Equipement | Interface | Adresse IP | Masque de sous réseau | Routeur par défaut |
|---|---|---|---|---|
| PC1 | NIC | 192.168.10.1 | 255.255.255.0 | 192.168.10.254 |
| PC2 | NIC | 192.168.20.1 | 255.255.255.0 | 192.168.20.254 |
| PC3 | NIC | 192.168.30.1 | 255.255.255.0 | 192.168.30.254 |
| PC4 | NIC | 192.168.10.2 | 255.255.255.0 | 192.168.10.254 |
| PC5 | NIC | 192.168.20.2 | 255.255.255.0 | 192.168.20.254 |
| PC6 | NIC | 192.168.30.2 | 255.255.255.0 | 192.168.30.254 |
| S1 | VLAN 99 | 192.168.99.1 | 255.255.255.0 | N/A |
| S2 | VLAN 99 | 192.168.99.2 | 255.255.255.0 | N/A |
| S3 | VLAN 99 | 192.168.99.3 | 255.255.255.0 | N/A |
| R1 | Fa0/0.1 | 192.168.10.254 | 255.255.255.0 | N/A |
| R1 | Fa0/0.2 | 192.168.20.254 | 255.255.255.0 | N/A |
| R1 | Fa0/0.3 | 192.168.30.254 | 255.255.255.0 | N/A |
| R1 | Fa0/0.99 | 192.168.99.254 | 255.255.255.0 | N/A |

Tableau 1: Adresses IP

| Equipement | Interface | Affectation | Réseau |
|---|---|---|---|
| S1 | Fa0/1,Fa0/2,Fa0/3 | 802.1Q Trunk (Native VLAN 99) | 192.168.99.0/24 |
| S2/S3 | Fa0/1 | 802.1Q Trunk (Native VLAN 99) | 192.168.99.0/24 |
| S2/S3 | Fa0/2 | VLAN 10 (staff) | 192.168.10.0/24 |
| S2/S3 | Fa0/3 | VLAN 20 (students) | 192.168.20.0/24 |
| S2/S3 | Fa0/4 | VLAN 30 (guest) | 192.168.30.0/24 |

Une fois l'adressage IP des PC effectué, nous allons ensuite créer les VLAN

# 2-Création des VLANs

On commence par créer les 3 VLANS sur chaque Switch

SW1 :

```
S1(config)#
S1(config)#
S1(config)#vlan 10
S1(config-vlan)#name staff
S1(config-vlan)#exit
S1(config)#
S1(config)#vlan 20
S1(config-vlan)#name students
S1(config-vlan)#exit
S1(config)#
S1(config)#vlan 30
S1(config-vlan)#name guest
S1(config-vlan)#exit
S1(config)#
S1(config)#exit
S1#
%SYS-5-CONFIG_I: Configured from console by console

S1#show vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig0/1, Gig0/2
10   staff                             active
20   students                          active
30   guest                             active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
S1#
```

SW2 :

```
S2#
S2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
S2(config)#
S2(config)#vlan 10
S2(config-vlan)#name staff
S2(config-vlan)#exit
S2(config)#
S2(config)#vlan 20
S2(config-vlan)#name students
S2(config-vlan)#exit
S2(config)#
S2(config)#vlan 30
S2(config-vlan)#name guests
S2(config-vlan)#exit
S2(config)#exit
S2#
%SYS-5-CONFIG_I: Configured from console by console

S2#
S2#show vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig0/1, Gig0/2
10   staff                             active
20   students                          active
30   guests                            active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
S2#
```

SW3 :

```
S3(config)#
S3(config)#vlan 10
S3(config-vlan)#name staff
S3(config-vlan)#exit
S3(config)#
S3(config)#vlan 20
S3(config-vlan)#name students
S3(config-vlan)#exit
S3(config)#
S3(config)#vlan 30
S3(config-vlan)#name guests
S3(config-vlan)#exit
S3(config)#
S3(config)#exit
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                Gig0/1, Gig0/2
10   staff                            active
20   students                         active
30   guests                           active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
S3#
```

# 3-Affectation des interfaces access des switchs aux VLANs

On configure ensuite les interfaces access qui correspondent aux interfaces des switchs qui sont connectées aux PC.

On commence par SW2 :

```
S2(config)#
S2(config)#int fa0/2
S2(config-if)#switchport mode access
S2(config-if)#switchport access vlan 10
S2(config-if)#exit
S2(config)#
S2(config)#int fa0/3
S2(config-if)#switchport mode access
S2(config-if)#switchport access vlan 20
S2(config-if)#exit
S2(config)#
S2(config)#int fa0/4
S2(config-if)#switchport mode access
S2(config-if)#switchport access vlan 30
S2(config-if)#exit
S2(config)#
S2(config)#exit

S2#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/5, Fa0/6, Fa0/7
                                                Fa0/8, Fa0/9, Fa0/10, Fa0/11
                                                Fa0/12, Fa0/13, Fa0/14, Fa0/15
                                                Fa0/16, Fa0/17, Fa0/18, Fa0/19
                                                Fa0/20, Fa0/21, Fa0/22, Fa0/23
                                                Fa0/24, Gig0/1, Gig0/2
10   staff                            active    Fa0/2
20   students                         active    Fa0/3
30   guests                           active    Fa0/4
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
S2#
```

```
S2#show interfaces fa0/2 switchport
Name: Fa0/2
Switchport: Enabled
Administrative Mode: static access
Operational Mode: static access
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: 10 (staff)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: All
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false
 --More--
```

On continue sur SW3 :

```
S3(config)#int fa0/2
S3(config-if)#switchport mode access
S3(config-if)#switchport access vlan 10
S3(config-if)#exit
S3(config)#
S3(config)#int fa0/3
S3(config-if)#switchport mode access
S3(config-if)#switchport access vlan 20
S3(config-if)#exit
S3(config)#
S3(config)#int fa0/4
S3(config-if)#switchport mode access
S3(config-if)#switchport access vlan 30
S3(config-if)#exit
S3(config)#
S3(config)#exit
S3#
```

```
S3#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/5, Fa0/6, Fa0/7
                                                Fa0/8, Fa0/9, Fa0/10, Fa0/11
                                                Fa0/12, Fa0/13, Fa0/14, Fa0/15
                                                Fa0/16, Fa0/17, Fa0/18, Fa0/19
                                                Fa0/20, Fa0/21, Fa0/22, Fa0/23
                                                Fa0/24, Gig0/1, Gig0/2
10   staff                            active    Fa0/2
20   students                         active    Fa0/3
30   guests                           active    Fa0/4
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
S3#
```

```
S3#show interfaces fa0/2 switchport
Name: Fa0/2
Switchport: Enabled
Administrative Mode: static access
Operational Mode: static access
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: 10 (staff)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: All
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false
 --More--
```

# 4-Configuration des interfaces Trunk

Les interfaces Trunk sont les liens entre les switchs qui permettent aux switchs d'échanger des informations sur tous les VLANs. Nous allons maintenant les configurer

SW1 :

```
S1(config)#int fa0/1
S1(config-if)#exit
S1(config)#
S1(config)#
S1(config)#int fa0/2
S1(config-if)#switchport mode trunk

S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

S1(config-if)#exit
S1(config)#
S1(config)#int fa0/3
S1(config-if)#switchport mode trunk

S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

S1(config-if)#exit
S1(config)#
S1(config)#
```

```
S1#show interfaces trunk
Port        Mode         Encapsulation  Status        Native vlan
Fa0/2       on           802.1q         trunking      1
Fa0/3       on           802.1q         trunking      1

Port        Vlans allowed on trunk
Fa0/2       1-1005
Fa0/3       1-1005

Port        Vlans allowed and active in management domain
Fa0/2       1,10,20,30
Fa0/3       1,10,20,30

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/2       1,10,20,30
Fa0/3       1,10,20,30

S1#
```

SW2 :

```
S2(config)#
S2(config)#int fa0/1
S2(config-if)#switchport mode trunk
S2(config-if)#
S2(config-if)#exit
S2(config)#
S2(config)#
```

```
S2#
S2#show interfaces trunk
Port        Mode         Encapsulation  Status        Native vlan
Fa0/1       on           802.1q         trunking      1

Port        Vlans allowed on trunk
Fa0/1       1-1005

Port        Vlans allowed and active in management domain
Fa0/1       1,10,20,30

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/1       1,10,20,30

S2#
```

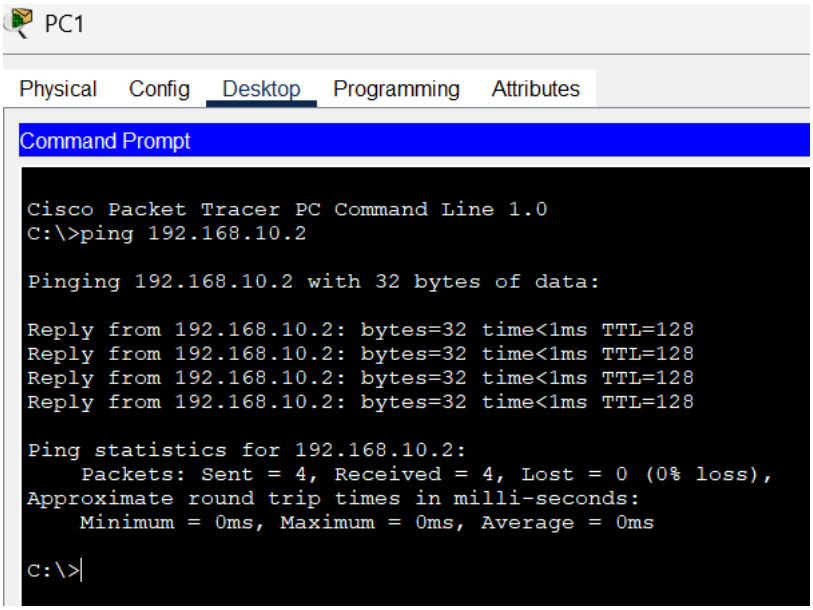
SW3 :

```
S3(config)#
S3(config)#int fa0/1
S3(config-if)#switchport mode trunk
S3(config-if)#exit
S3(config)#

S3#show interfaces trunk
Port        Mode         Encapsulation  Status        Native vlan
Fa0/1       on           802.1q         trunking      1

Port        Vlans allowed on trunk
Fa0/1       1-1005

Port        Vlans allowed and active in management domain
Fa0/1       1,10,20,30

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/1       1,10,20,30

S3#
```

# 5-Test de connectivité

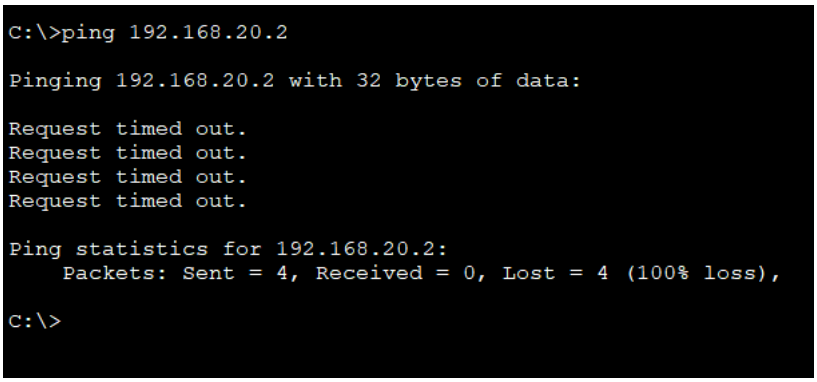
Testons désormais les pings entre PC.

Ping de PC1 vers PC4 :




Le ping est réussi

Ping de PC1 vers PC5 :




Le ping a échoué car PC1 et PC5 ne sont pas dans le même VLAN. Il faut donc configurer le routeur afin que les VLANs puissent communiquer entre eux.

# 6-Routage inter-VLAN

On configure désormais le routage inter-VLAN afin que tous les VLANs puissent communiquer entre eux.

On commence par configurer en mode trunk l'interface fa0/1 du switch SW1 :

```
S1(config)#
S1(config)#int fa0/1
S1(config-if)#switchport mode trunk

S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

S1(config-if)#
```

Nous devons donc maintenant configurer 3 réseaux différents sur l'interface R1-Fa0/0 de notre routeur R1.

Pour cela, nous allons configurer des sous-interfaces

Sous-interface fa0/0.1 :

```
R1(config)#int fa0/0.1
R1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up

R1(config-subif)#encapsulation dot1Q 10
R1(config-subif)#ip address 192.168.10.254 255.255.255.0
R1(config-subif)#no shutdown
```

Sous-interface fa0/0.2 :

```
R1(config)#int fa0/0.2
R1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.2, changed state to up

R1(config-subif)#encapsulation dot1Q 20
R1(config-subif)#ip address 192.168.20.254 255.255.255.0
R1(config-subif)#no shutdown
R1(config-subif)#exit
R1(config)#
```

Sous-interface fa0/0.3 :

```
R1(config)#int fa0/0.3
R1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.3, changed state to up

R1(config-subif)#encapsulation dot1Q 30
R1(config-subif)#ip address 192.168.30.254 255.255.255.0
R1(config-subif)#no shutdown
R1(config-subif)#exit
R1(config)#
```

Testons la connectivité.

Ping de PC1 vers PC2 :

```
C:\>ping 192.168.20.1

Pinging 192.168.20.1 with 32 bytes of data:

Reply from 192.168.20.1: bytes=32 time<1ms TTL=127
Reply from 192.168.20.1: bytes=32 time<1ms TTL=127
Reply from 192.168.20.1: bytes=32 time<1ms TTL=127
Reply from 192.168.20.1: bytes=32 time=8ms TTL=127

Ping statistics for 192.168.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 2ms
```

Ping de PC1 vers PC6 :

```
C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.30.2: bytes=32 time<1ms TTL=127
Reply from 192.168.30.2: bytes=32 time<1ms TTL=127
Reply from 192.168.30.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.30.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Désormais, tous les équipements du réseau peuvent communiquer entre eux

# 7-Gestion du réseau avec un VLAN natif

Afin de pouvoir mieux gérer le réseau LAN, nous allons attribuer des adresse IP à chaque switch et créer un VLAN de gestion.

On commence donc par créer le VLAN de gestion 99 sur chaque switch

SW1 :

```
S1(config)#
S1(config)#int vlan 99
S1(config-if)#ip address 192.168.99.1 255.255.255.0
S1(config-if)#int fa0/1
S1(config-if)#switchport trunk native vlan 99
S1(config-if)#exit

S1(config-if-range)#int range fa0/2-3
S1(config-if-range)#switchport trunk native vlan 99
S1(config-if-range)#exit
S1(config)#

S1(config)#vlan 99
S1(config-vlan)#
%LINK-5-CHANGED: Interface Vlan99, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to up

S1(config-vlan)#name nativeVLAN
S1(config-vlan)#exit
S1(config)#
```

SW2 :

```
S2(config)#int vlan 99
S2(config-if)#ip address 192.168.99.2 255.255.255.0
S2(config-if)#int fa0/1
S2(config-if)#switchport trunk native vlan 99
S2(config-if)#exit

S2(config)#vlan 99
S2(config-vlan)#
%LINK-5-CHANGED: Interface Vlan99, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to up

S2(config-vlan)#name native VLAN
                  ^
% Invalid input detected at '^' marker.

S2(config-vlan)#
S2(config-vlan)#name nativeVLAN
S2(config-vlan)#exit
S2(config)#
```

SW3 :

```
S3(config)#
S3(config)#int vlan 99
S3(config-if)#ip address 192.168.99.3 255.255.255.0
S3(config-if)#int fa0/1
S3(config-if)#switchport trunk native vlan 99
S3(config-if)#exit
S3(config)#

S3(config)#vlan 99
S3(config-vlan)#
%LINK-5-CHANGED: Interface Vlan99, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to up

S3(config-vlan)#name nativeVLAN
S3(config-vlan)#exit
S3(config)#
```

On configure l'interface Fa0/0.99 sur R1 :

```
R1(config)#int fa0/0.99
R1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.99, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.99, changed state to up

R1(config-subif)#encapsulation dot1Q 99 native
R1(config-subif)#ip address 192.168.99.254 255.255.255.0
R1(config-subif)#no shutdown
R1(config-subif)#exit
R1(config)#
```

On vérifie la configuration avec un ping depuis R1 vers SW1, SW2 et SW3 :

| Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete |
|---|---|---|---|---|---|---|---|---|---|---|
| | Successful | R1 | S3 | ICMP | | 0.000 | N | 0 | (edit) | (delete) |
| | Successful | R1 | S1 | ICMP | | 0.000 | N | 1 | (edit) | (delete) |
| | Successful | R1 | S2 | ICMP | | 0.000 | N | 2 | (edit) | (delete) |

Le ping est réussi, notre VLAN 99 est donc accessible sur tout le réseau