

Initiation Réseaux

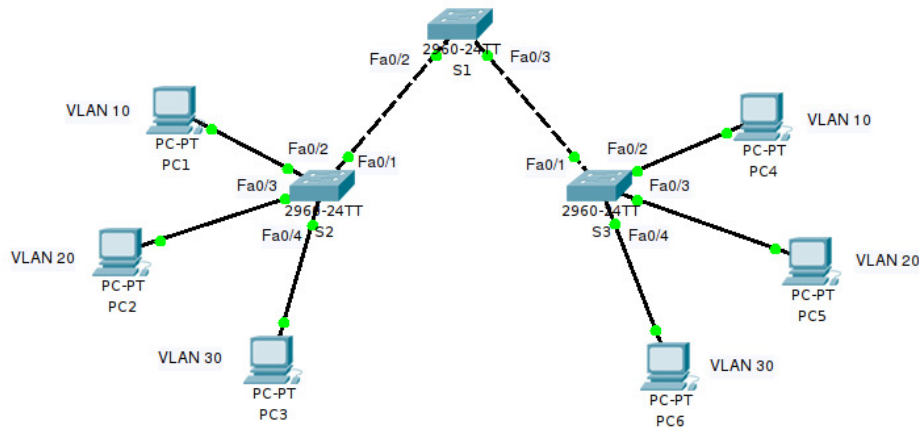
TP3 - Configuration of VLANs

1 Objective

1. Practice the software Cisco Packet Tracer.
2. Practice basic configurations of switches and routers.
3. Review basic concepts of VLAN.

Evaluation: When you finish the subject or certain steps, ask me to check your work in order to evaluate your participation. You do NOT have a report to submit for this session.

2 Network Configurations



3 Network Model

Figure 1: The network model

Open Cisco Packet Tracer, you see a workspace where you can put your network equipments: PCs, switches, routers, etc. You can choose your network equipments at the left bottom of the workspace. Just click on the equipment you want, and then click on the workspace where you want to put your equipment. You can also find the cable at the same place. Use the cables to connect the network equipments.

Your first work is to build a network as shown in Figure 1. For switches, choose the **2960** model. For PCs, choose the **Generic** fix PC model. You use _____ (type of cable) to connect one PC to a switch, and you use

Device	Interface	IP Address	Subnet Mask	Default Gateway
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

Table 1: IP Address Table

Device	Interface	Assignment	Network
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

Table 2: VLAN Assignment Table

_____ (type of cable) to connect two switches. Note that a switch **2960** has 24 FastEthernet ports, you can use any interface of each device for connection. You don't have to use the interfaces indicated in Figure 1.

Now configure the IP addresses for all the PCs (PC1 to PC6) according to the Table 1. To do that, you click your PC, then **Desktop** and then **IP Configuration**. The IP addresses for the switches and the router in the table are not used for now. You will use them later in your practice session.

4 Create VLANs

Now configure the switch S1. Set its hostname to S1 (its default name would be something else, e.g., switch0), and then set the **enable secret** to **cisco**.

Click on a switch, then click the **CLI** which allows you to open the Command Line Interface. First, you are in the **user mode** which allows you to check some configurations of the switch by the command **show target content** with limited rights. When you are in the **user mode**, command prompt lists the hostname followed by a **>**. In order to reach a more powerful mode, you need to pass to **enable mode** (also called **privileged mode**) by the command **enable** as shown in the following lines:

```
1 switch0>enable
2 switch0#
```

Once you are in the **enable mode**, command prompt lists the hostname followed by a **#**. If you want to configure your switch, you need a another mode, **configuration mode**. To pass to the **configuration mode**, you use the following command:

```
1 switch0#configure terminal
2 switch0(config)#
```

Now you can set the hostname of your switch:

```
1 switch0(config)#hostname S1
2 S1(config)#
```

Set the password for the **enable mode**:

```
1 S1(config)#enable secret cisco
```

To check the configurations, you need to quit the **configuration mode** by using **end**. Then use the following command to check the global configuration of the switch, including the hostname and the secret password.

```
1 S1#show running-config
```

```
1 hostname S1
2 !
3 enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
4 !
```

Create three VLANs on switch S1: VLAN 10 with name of staff, VLAN 20 with name of students and VLAN 30 with name of guest as shown in Table 2. For example, you create VLAN 10 by using the following commands:

```
1 S1(config)#vlan 10
2 S1(config-vlan)#name staff
```

Then check the VLAN status using the command:

```
1 S1#show vlan brief
```

If you want to get more details about the VLAN configuration, you are strongly recommended to read: <http://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus5000/sw/configuration/guide/cli/CLIConfigurationGuide/VLANs.html#pgfId-1062308>

How many VLANs have you seen? Which are active? _____

Do the same configuration at switch S2 as well as switch S3.

5 Assign switch ports to a VLAN

Switches S2 and S3 have interfaces connected to PCs (PC1 to PC6). They are the access interfaces. An access interface can only belong to a single VLAN. Assign these interfaces to the corresponding VLANs, VLAN 10 to VLAN 30, with **access mode** based on the Table 2. If you don't know what is the **access mode**, ask your good friend Google!

For example, assign the interface S2-Fa0/2 to VLAN 10 with **access mode** by using the following commands:

```
1 S2(config)#interface fa0/2
2 S2(config-if)#switchport mode access
3 S2(config-if)#switchport access vlan 10
```

To check the configuration, use the following command:

```
1 S2#show interfaces fa0/2 switchport
```

Repeat the same process for the other interfaces connected to PCs.

6 Configure the Trunk interfaces

Trunks are connections between the switches (or a switch and a router) that allow the switches to exchange information for all VLANs. By default, a trunk interface belongs to all VLANs. Then the interface needs to be configured to the **trunk mode**. For example, the interface S1-Fa0/2 is a trunk interface and should be configured by the following commands:

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

Which interfaces should be configured in the same way? _____ Configure them! (If you are not sure, ask me to check.)

Once you finish all the configurations of trunk interfaces, use the following command to check your configuration.

```
1 S1#show interfaces trunk
```

7 Test the Connectivities

Now you can start your first connectivity test. Try pings between PCs.

Can PC1 ping PC4? _____

Can PC1 ping PC5? _____ Why? _____

8 InterVLAN Routing

If you understood why PC1 cannot ping PC5, you should know that in order to solve this problem, you need a router. Add a router which connects to switch S1 as shown in Figure 2. Set its name to R1. (the configuration of a router can be done in the same way as a switch.) You use _____ (type of cable) to connect R1 to S1.

Set the interface S1-Fa0/1 to **trunk mode**.

Now we need to configure three networks on the same router interface, R1-Fa0/0. It means that we need to configure three IP addresses to the same interfaces. In order to achieve that, we need to use the sub-interfaces to carry VLANs. For example, the configuration of the sub-interface R1-Fa0/0.1, used to carry VLAN 10, can be done as follows.

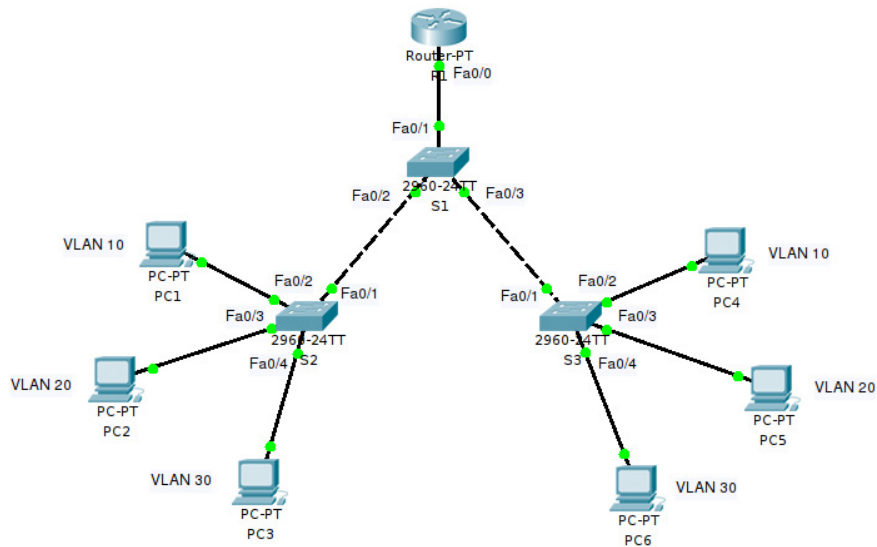


Figure 2: The network model with interVLAN routing

```

1 R1(config)#interface fa0/0.1
2 R1(config-subif)#encapsulation dot1Q 10 //To use a router sub-interface to carry a VLAN (here is VLAN 10), you
   need to specify the encapsulation type of this interface.
3 R1(config-subif)#ip address 192.168.10.254 255.255.255.0
4 R1(config-subif)#no shutdown //Remember, the default status of a router interface is shutdown. So you need to
   reopen this interface.

```

Configure three sub-interfaces of router R1 for VLANs, VLAN 10, VLAN20 and VLAN30. Once you finish the configuration, try to ping PC2 from PC1. Is the ping successful? _____ The ping request goes through which equipments in the network? _____

9 Management Network

In order to manage the LAN network, we can assign IP addresses to switches for remote control through IP network. A management VLAN is any VLAN that you configure to access the management capabilities of a switch. For this purpose, you create a management VLAN network 192.168.99.0/24 at each switch. Then you assign an IP address to the VLAN 99 at each switch according to the Table 1. And you also need to declare the VLAN 99 as the **Native VLAN**. For example, you use the following commands for switch S1:

```

1 S1(config)#interface vlan 99
2 S1(config-if)#ip address 192.168.99.1 255.255.255.0
3 S1(config-if)#interface fa0/1
4 S1(config-if)#switchport trunk native vlan 99

```

Configure the VLAN 99 at switches S2 and S3.

Configure the sub-interface Fa0/0.99 at router R1-Fa0/0, and declare this VLAN as the **Native VLAN** by:

```

1 R1(config)#int fa0/0.99
2 R1(config-subif)#encapsulation dot1Q 99 native
3 R1(config-subif)#ip address 192.168.99.254 255.255.255.0
4 R1(config-subif)#no shutdown

```

Try to ping S1/S2/S3 from R1. Does it work? _____ If it works, it means that we have a IP network access to the switches inside a LAN.