Department of Computer Engineering

Faculty of Engineering, University of Peradeniya

CO 323 Computer Communication Networks

Laboratory session 1

Semester 5, 2017

Building and configuring a VLAN using Packet tracer

In this lab exercise, you will learn about VLANs, why they are so important and how to build and configure one.

In addition, you will be introduced to the Packet Tracer network simulation tool and how to use it.

What is a VLAN?

VLAN: Virtual Local Area Network

Virtual LANs (VLANs) are a solution to allow you to separate users into individual networks. The separation is done in the link layer. VLAN membership can be configured through software instead of physically relocating devices or connections
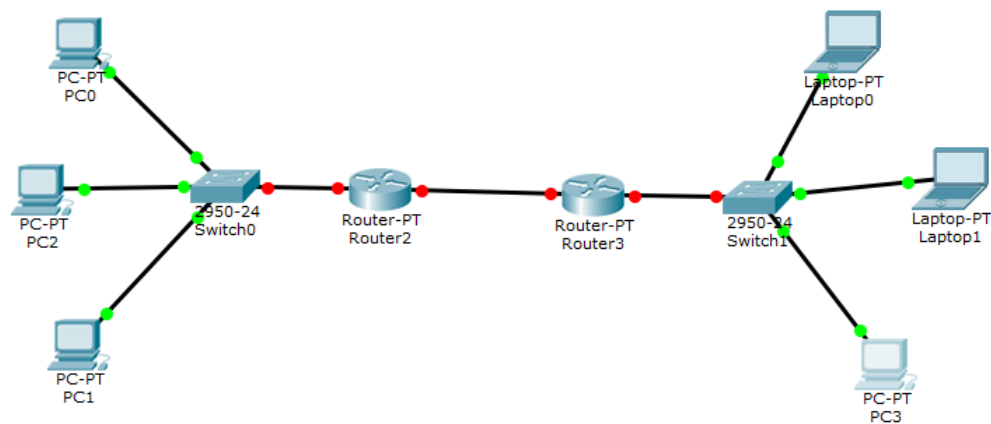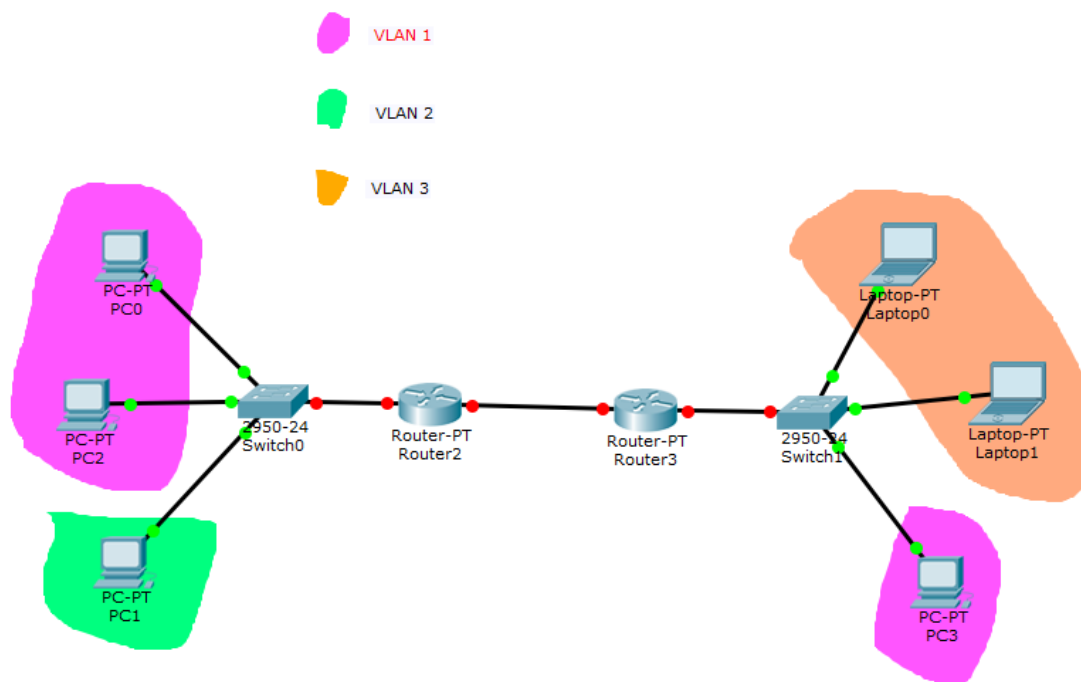

Figure 1: A common network

Figure 2: Same network configured into several VLANs

Why are they so important?

- Can segment networks without extra switches and routers
- Increase scalability and security.
- Can decrease network traffic

How do VLANs work?

Frames the client devices send are delivered to the switch which then takes care of making sure that the frame is sent only to ports assigned as members of the VLAN that are assigned to the port where the frame entered the switch.

If a frame enters the switch on a port assigned as a member of VLAN 2 then the switch will only send that frame out ports that are members of VLAN 2. The switch knows the VLAN number assigned to a port from which it receives a frame and knows to deliver this frame only to ports of the same VLAN.

Types of port configurations

There are two types of configurations available for ports in a switch, Access port and Trunk port

What is an access port?

These ports are dedicated to accessing a single VLAN. The devices plugged into these ports have no special configuration themselves. These devices don't know that any VLANs are present.

What is a trunking?

Regular ethernet frames don't have anything to show to which VLAN they belong to. Hence another protocol is needed.

In order to use trunking, the ports of a switch (specifically, the ports that will have to carry the traffic of several VLANs) must be configured as trunk ports. When a packet travels through such a port (a trunk port) a certain piece of data is added so that it shows to which VLAN that packet belongs to. This process is known as encapsulation.
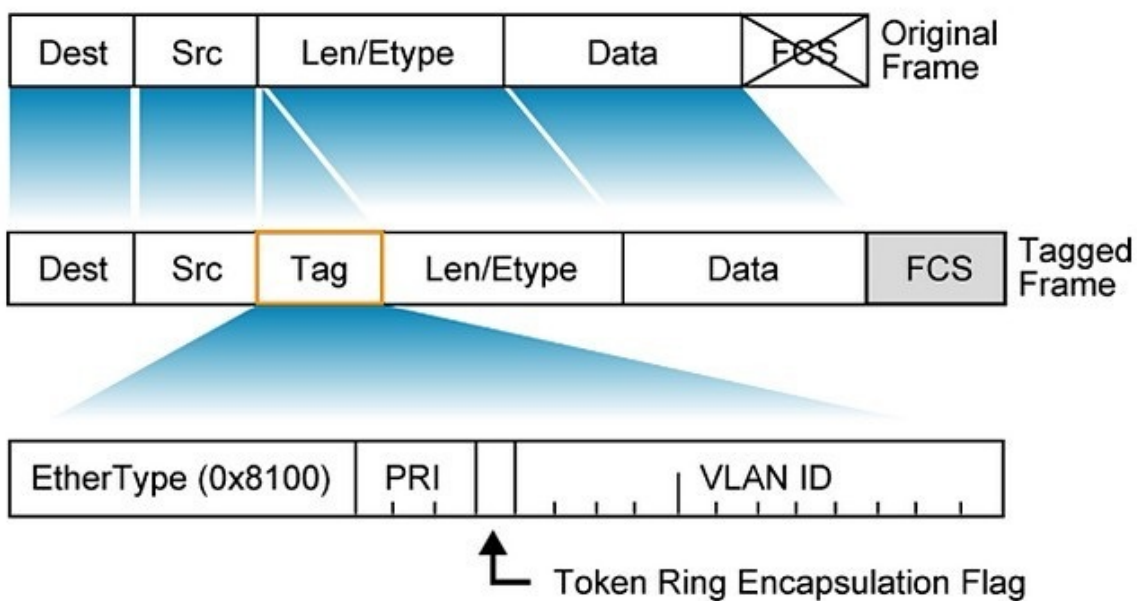

Figure 3: The VLAN tag

There are two types of trunking protocols.

- **802.1Q**: This is the most common trunking protocol. It's a standard and supported by many vendors. Also the one available in Packet Tracer.
- **ISL**: This is the Cisco trunking protocol. Not all switches support it.

What is a sub-interface?

A subinterface is a logical interface. (i.e. it is not physical) that can be considered as a 'child' of a physical interface. It uses its 'parent' interface to actually move data.

A physical interface of a router can only be connected to one network. Hence, in the case of VLANs, a typical router cannot handle the traffic. Therefore, we need to divide the interface that is connects the router to the VLAN.

When we create the sub interfaces on the routers, we tell the router which VLAN to associate with that sub interface.

Examples

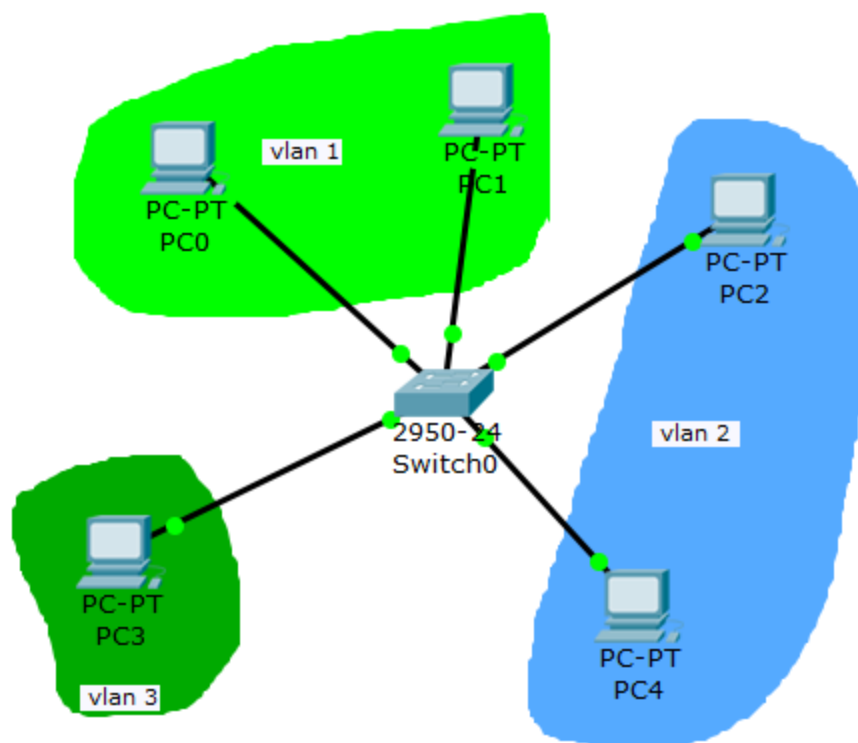The following examples show how to use VLANs in several scenarios.

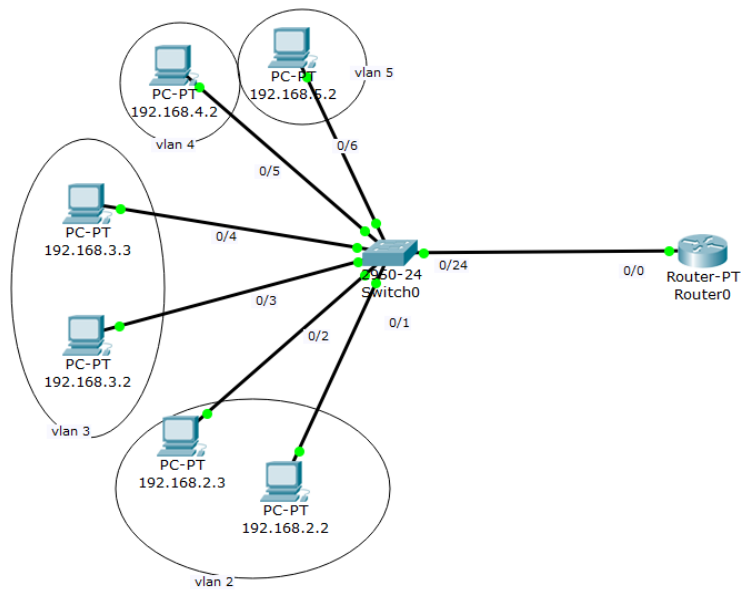Figure 4: Separating into several VLANs
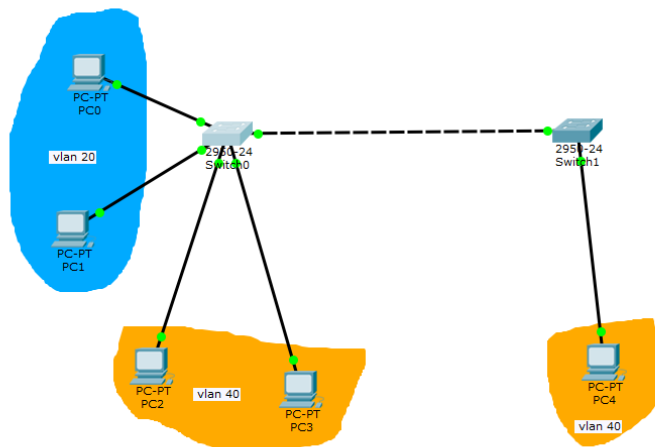
Figure 5: Inter VLAN routing enabled

Figure 6: Inter VLAN routing-a different situation

Exercise

Build the given network (will be given in the lab session) in Packet Tracer. ''Ping" from each VLAN **(no need to ping from each machine in every VLAN**) to every other VLAN. Also try 'tracert' command similarly and show the results in a table as below.

Source VLAN	Destination VLAN	Route	Round trip time
vlan 10	vlan 20	tracert result	1 ms
vlan 20	vlan 10	tracert result	1 ms

Cisco commands and their meaning

Command	Meaning
enable	enter switch/router terminal
configure terminal	enter configuration mode
show vlan	show vlans available
vlan 10	create a vlan with id 10
no vlan 10	remove vlan 10
name vlan_name	name the vlan
interface fastethernet 0/1	start configuring the port: fastethernet 0/1
switchport mode access	set the port type to access
switchport mode trunk	set the port type to trunk
switchport access vlan 10	assign the interface to vlan 10
no ip address	remove ip address assignment from interface
ip address 192.168.2.2 255.255.255.0	assign IP address to interface
encapsulation dot1Q 10	assign trunking protocol of vlan 10 to an interface
ip route 192.168.20.0 255.255.255.0 192.168.1.2	create a rule in the routing table