Project report

Course code: CSE 314

Course title: Computer Networks Lab

Project title: Campus network using cisco packet tracer.

Submitted by :

Abdur Rahman Apu

ID: 191-15-13025

Tahmid Hasan

ID: 191-15-12920

Submitted to :

Md. Peyal Molla

Lecturer,

Department of CSE,

Daffodil international University

Submission date: 3rd April, 2021

Project title: Campus network using cisco packet tracer.

Objective:

- Implement mesh topology and build a network.
- Implement dynamic routing algorithm.
- Implement Dynamic host configuration protocol (DHCP).
- Implement Virtual local area network (VLAN)

Introduction:

This project is about campus network using mesh topology. A campus has four buildings in different places and an ip address is given which is 172.16.0.0/16. Four buildings are-

- Office: required 500 hosts.
- Cse building: required 500 hosts.
- Main building: required 500 hosts.
- S- building: required 500 hosts.

This ip address is distributed among them by using variable length subnet mask (VLSM). DHCP, routing algorithm (RIP2) and VLAN's are used in this project.

Methodology:

In this project, mesh topology, DHCP, routing algorithm (rip2) and VLAN's are used.

- **Mesh topology:** In mesh topology, all nodes are connected with each other. The number of connections in this network can be calculated using the following formula: n(n-1)/2, where n is the number of computers. Some advantages are- manages high amount of traffic, and failure of one device does not cause any problem in the network. But it has some demerits such as implementation cost is high, maintain is difficult.

- **Variable length subnet mask (VLSM):** VLSM is the extended version of FLSM subnetting. It is a subnet design system that allows all subnet masks to have variable sizes as per the requirement. In VLSM, there is a minimum wastage of IP addresses.
- **Dynamic Host Configuration Protocol (DHCP):** DHCP is used on IP networks and DHCP server assign an IP address automatically. DHCP reduces the errors that are made when IP addresses are assigned manually.
- **Routing algorithm (RIPv2):** RIP means Routing Information Protocol. It is a distance vector, interior gateway and classless routing protocol. It is used by routers for exchanging routing information. In distance vector algorithm, router shares its information to its adjacent routers. It prevents routing loops by implementing a limit number of hops allowed in a path from the source to a destination. The immediate benefit of switching to RIPv2 is the ability to use VLSM.
- **VLAN:** VLAN means Virtual local area network. It is a custom network which is created from one or more local area networks.

Project network scenario:

This campus network scenario is about designing a mesh topology and LAN for a campus in which various computers of different buildings are set up so that they can communicate with each other's. An ip address 172.16.0.0/16 is given to the campus. This ip address is divided by using VLSM and distributed to the whole network. VLAN is applied on office router to add two different networks.

Number of subnets:

No of subnet	Network address	No of hosts	Broadcast address
1	172.16.0.0/23	500	172.16.1.255
2	172.16.2.0/23	500	172.16.3.255
3	172.16.4.0/23	500	172.16.5.255
4	172.16.6.0/23	500	172.16.7.255

5	172.16.8.0/30	2	172.16.8.3
6	172.16.8.4/30	2	172.16.8.7
7	172.16.8.8/30	2	172.16.8.11
8	172.16.8.12/30	2	172.16.8.15
9	172.16.8.16/30	2	172.16.8.19
10	172.16.8.20/30	2	172.16.8.23

Subnets for VLAN:

Vlan name	Company	Network address
Vlan 10	Photocopy shop	192.168.10.0
Vlan 20	Canteen	192.168.20.0

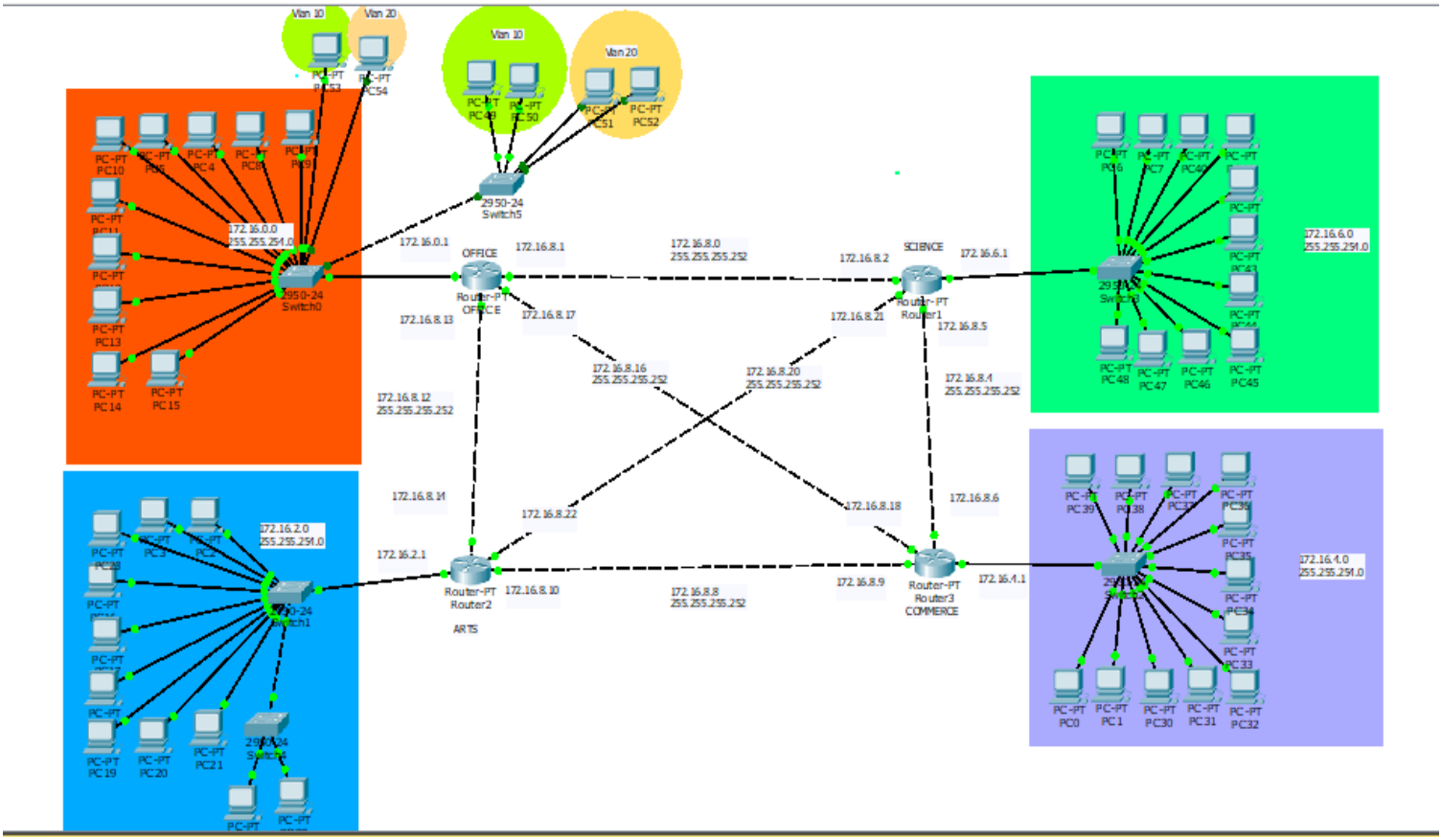


Figure 1: The scenario of the project (Campus network)

- **Switch configuration:**
  In the office routers switch, VLAN is applied.

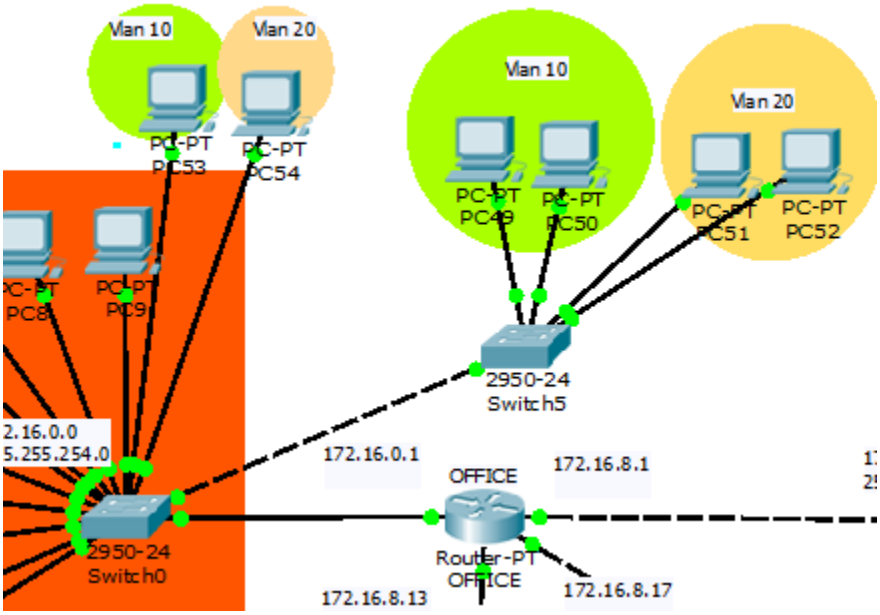


Figure2: Office router's switch VLAN scenario

VLAN setup:

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name Fotostat
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name Canteen
Switch(config-vlan)#exit
Switch(config)#int fa0/13
Switch(config-if)#switchport access vlan 10
Switch(config-if)#switchport mode access
Switch(config-if)#exit
Switch(config)#int fa0/14
Switch(config-if)#switchport access vlan 20
Switch(config-if)#switchport mode access
Switch(config-if)#exit
Switch(config)#int fa0/12
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0
```

Figure3: VLAN setup

Router configuration:

```
int fa3/0
ip add 172.16.0.1 255.255.254.0
no shut
exit

int fa0/0
ip add 172.16.8.13 255.255.255.252
no shut
exit

int fa2/0
ip add  172.16.8.17 255.255.255.252
no shut
exit

int fa1/0
ip add 172.16.8.1 255.255.255.252
no shut
exit

ip dhcp pool office
network 172.16.0.0 255.255.254.0
default-router 172.16.0.1
exit

ip dhcp excluded-address 172.16.0.1
exit

router rip
version 2
network 172.16.0.0
network 172.16.8.12
network 172.16.8.16
network 172.16.8.0
no auto summary
exit
```

Figure4: Office router

```
int fa3/0
ip add 172.16.6.1 255.255.254.0
no shut
exit

int fa0/0
ip add 172.16.8.2 255.255.255.252
no shut
exit

int fa2/0
ip add  172.16.8.21 255.255.255.252
no shut
exit

int fa1/0
ip add 172.16.8.5 255.255.255.252
no shut
exit

ip dhcp pool cse
network 172.16.6.0 255.255.254.0
default-router 172.16.6.1
exit

ip dhcp excluded-address 172.16.6.1
exit

router rip
version 2
network 172.16.6.0
network 172.16.8.4
network 172.16.8.20
network 172.16.8.0
no auto summary
exit
```

Figure5: CSE router

```
int fa3/0
ip add 172.16.2.1 255.255.254.0
no shut
exit

int fa0/0
ip add 172.16.8.14 255.255.255.252
no shut
exit

int fa2/0
ip add  172.16.8.22 255.255.255.252
no shut
exit

int fa1/0
ip add 172.16.8.10 255.255.255.252
no shut
exit

ip dhcp pool s
network 172.16.2.0 255.255.254.0
default-router 172.16.2.1
exit

ip dhcp excluded-address 172.16.2.1
exit

router rip
version 2
network 172.16.2.0
network 172.16.8.12
network 172.16.8.20
network 172.16.8.8
no auto summary
exit
```

Figure 6: S-building router

```
int fa3/0
ip add 172.16.4.1 255.255.254.0
no shut
exit

int fa0/0
ip add 172.16.8.6 255.255.255.252
no shut
exit

int fa2/0
ip add  172.16.8.18 255.255.255.252
no shut
exit

int fa1/0
ip add 172.16.8.9 255.255.255.252
no shut
exit

ip dhcp pool main
network 172.16.4.0 255.255.254.0
default-router 172.16.4.1
exit

ip dhcp excluded-address 172.16.4.1
exit

router rip
version 2
network 172.16.4.0
network 172.16.8.8
network 172.16.8.16
network 172.16.8.4
no auto summary
exit
```

Figure 7: Main-building router

Result:

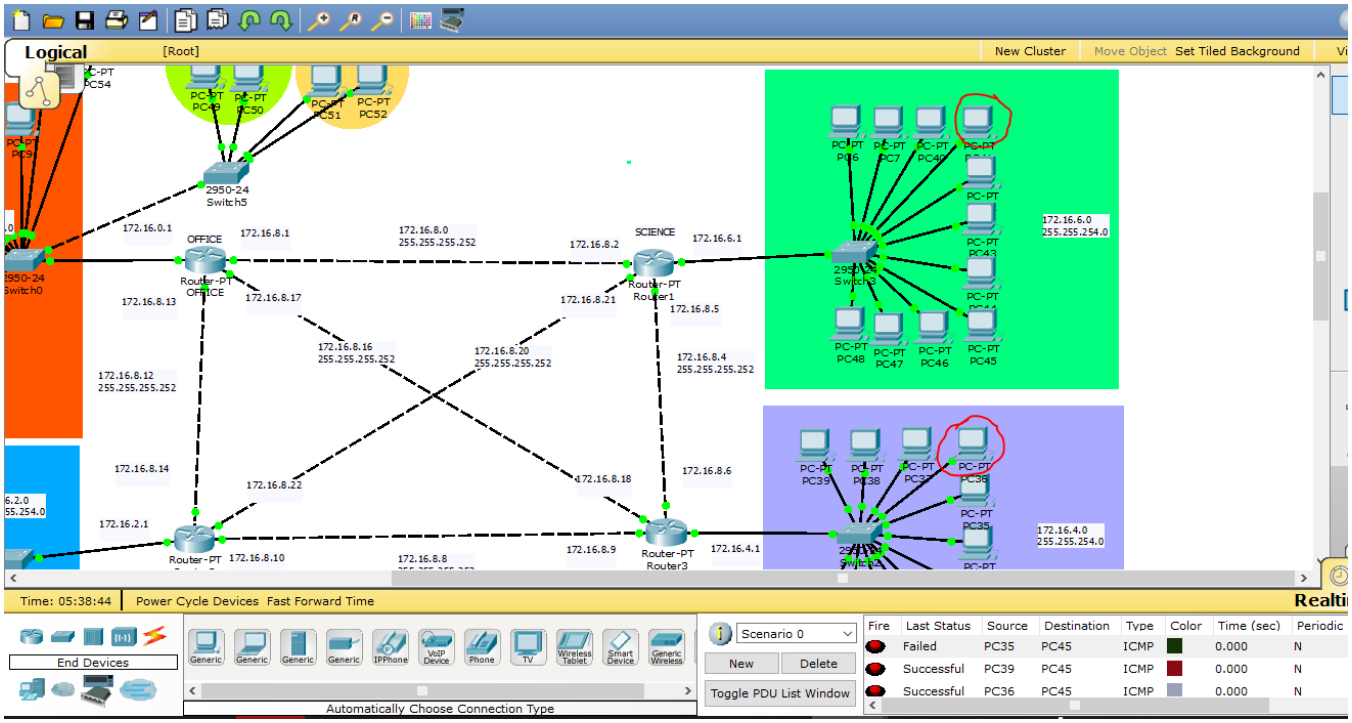
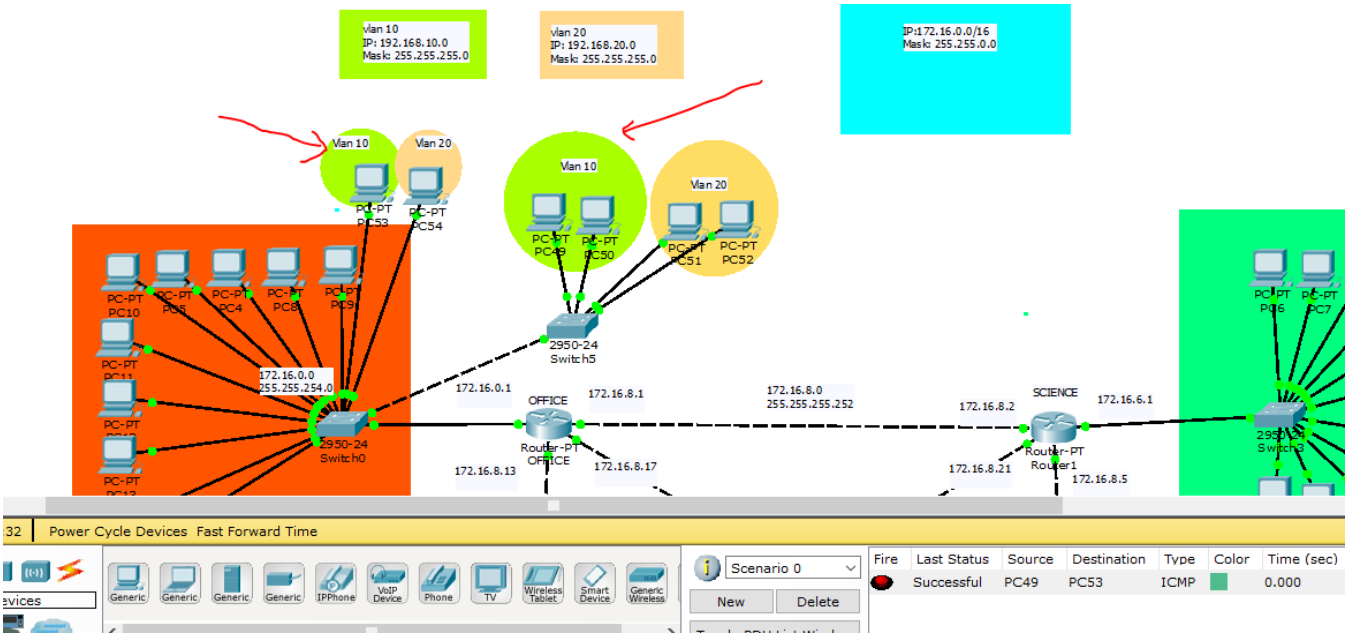
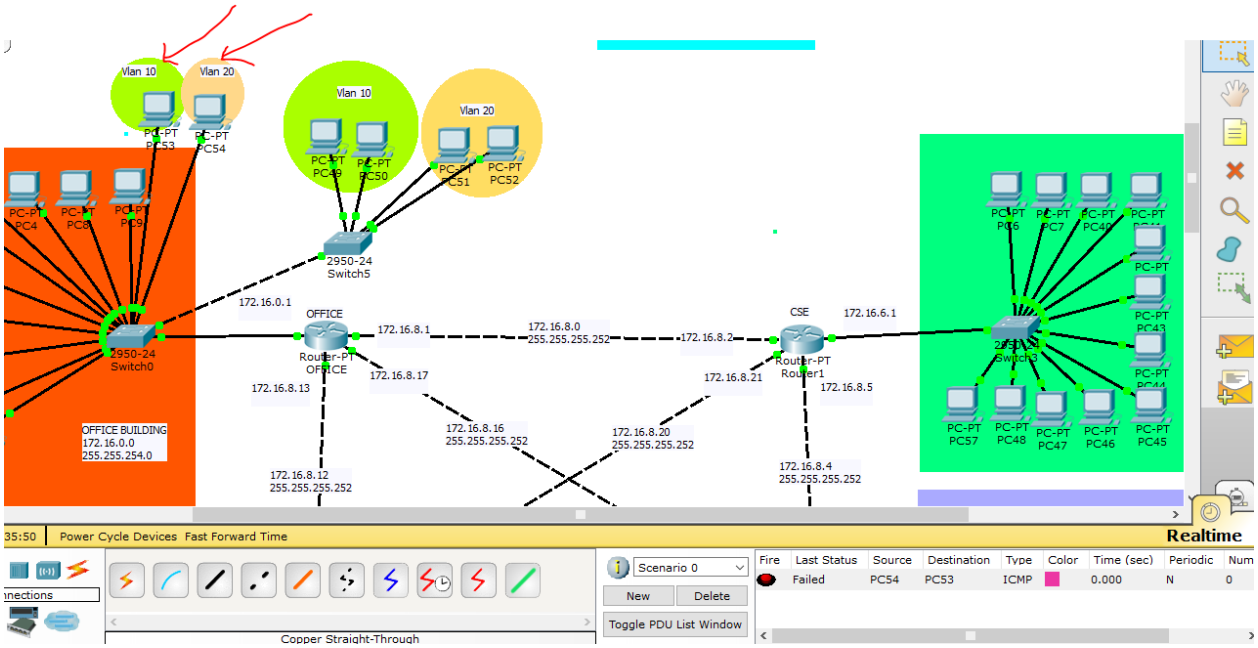


Figure 8: Successful and failed scenario

VLAN successful scenario:



VLAN Failed scenario:



Conclusion:

The pocket tracer is used to implement the network of our project which is about college campus network and clarity the conception of the VLANs, DHCP, and router configurations. Networking devices are so expensive that we cannot buy and use them for our practice. So, the pocket tracer is easy and best to implement structure of the network before implementing it on the real ground.