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Implementation of Virtual LAN (VLAN) using Layer3 Switches

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Abstract: In this paper, the vlan has been configured using layer3 switch. Actually vlan is the virtual lan, these are a group of network users connected administratively defined ports on switch. The configuration of vlan is done by considering a topology in 'Cisco Packet Tracer'. The results are verified using the ping command from the pc's that are connected on the same network.

Keywords: Vlan,layer3 ,switch, Cisco, Cisco packet tracer, ping, Virtual lan.

I. INTRODUCTION

Virtual LAN is nothing but a group of devices that are connected virtually but may or may not physically connected. It depends mainly on the port-by-port basics. For every vlan the ip address has been assigned if the systems that are connected to the same group of network and in same vlan then the access between them occur instead of they having a physical connection does not allow the users to access the group it mainly depends on the area of port access only. Here in this paper, the vlan is implemented using Layer 3 switch because now-a-days the usage and data transferring rate has been decreasing because of more load on the switches normally we use layer2 switches instead of that here in this paper we choose the layer 3 switches to maintain the transfer constant.

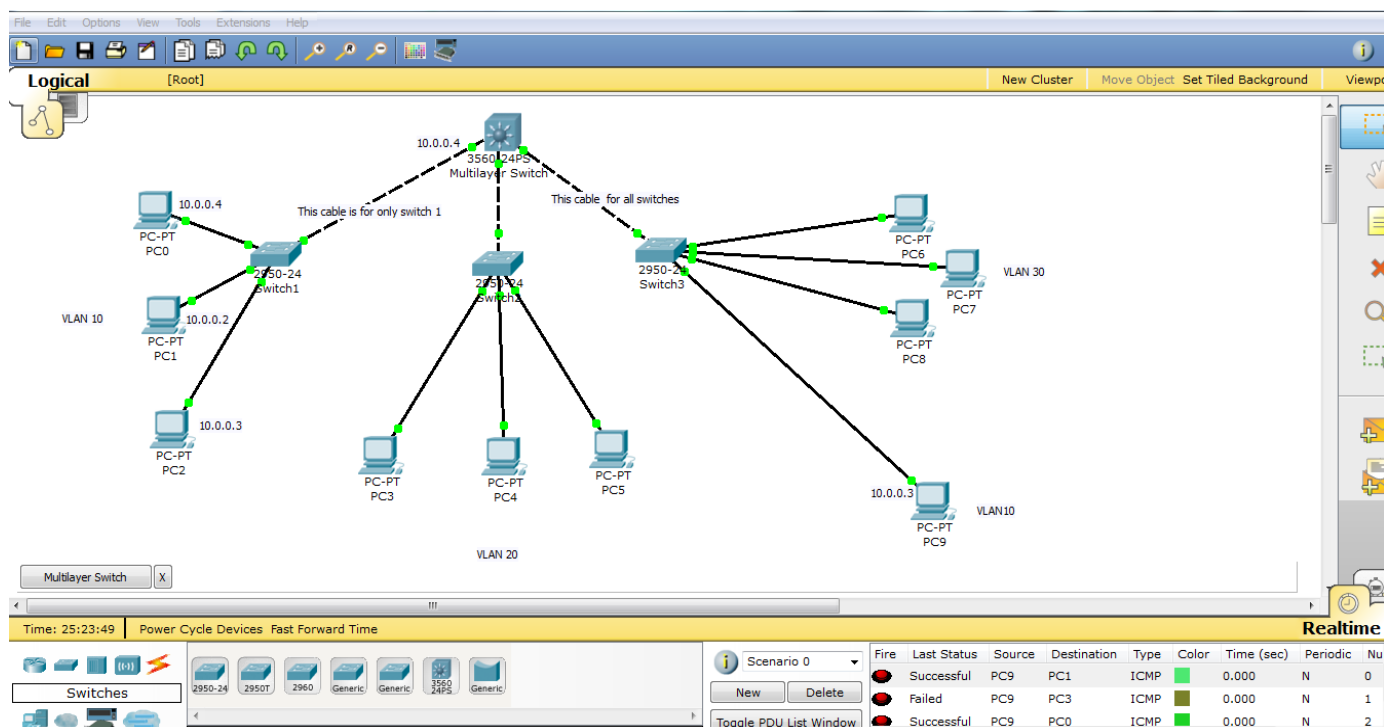## II. TOPOLOGY FOR VIRTUAL LAN (VLAN) USING LAYER3 SWITCHES

FIGURE: showing the network model using for implementing the vlan using layer 3 switch

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The topology considered the three layer2 switches, 10 pc's (end devices) and one layer 3 switch. Here, we are configuring the vlan10 on switch1, vlan20 on switch2, vlan 30 on switch 3 and also vlan10 on the pc9 on same switch 3.Now we are aiming to send the data from pc9 to pc0, pc1,pc2 because they are in the same vlan 10 so, that they can exchange their data.

III. CONFIGURE VALN TOPOLOGY

a. First assign the ip address to the 10 pc's that are connected to their respective switches. The assign of ip addressas shown in the below figures:
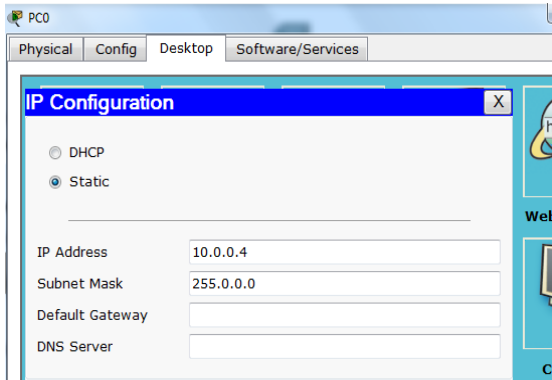

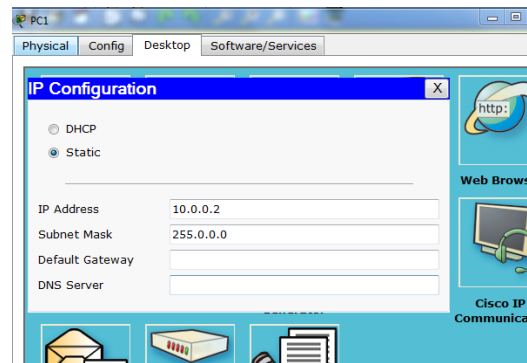FIGURE: configuring the ip address of pc0

FIGURE: configuring the ip address of pc1
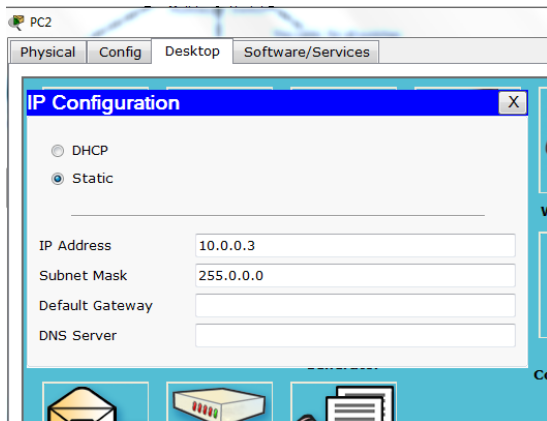

FIGURE: configuring the ip address of pc2

FIGURE: configuring the ip address of pc3

FIGURE: configuring the ip address of pc4

FIGURE: configuring the ip address of pc5

FIGURE: configuring the ip address of pc6
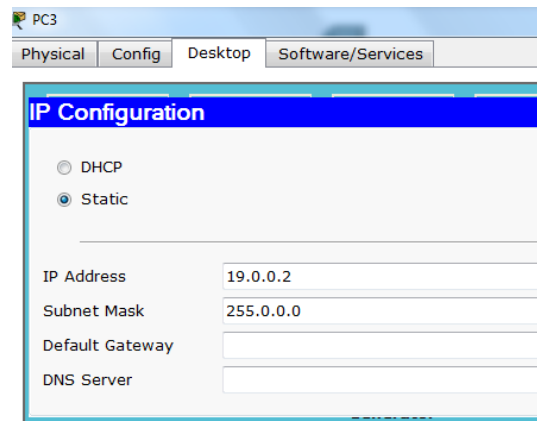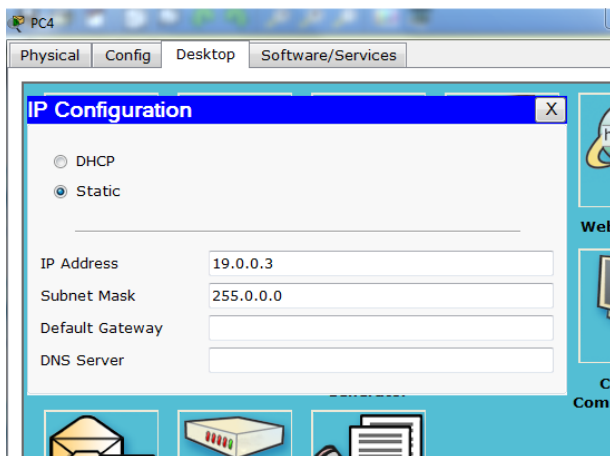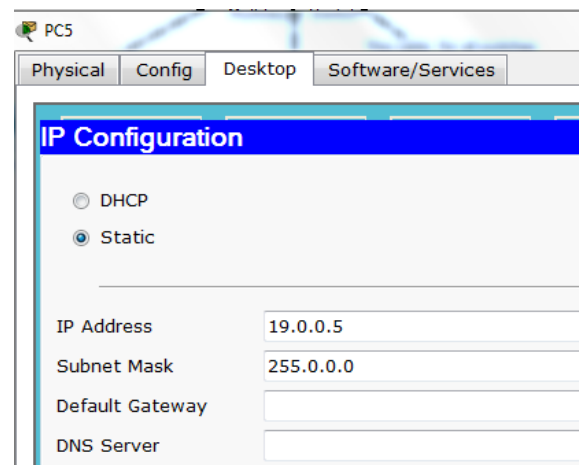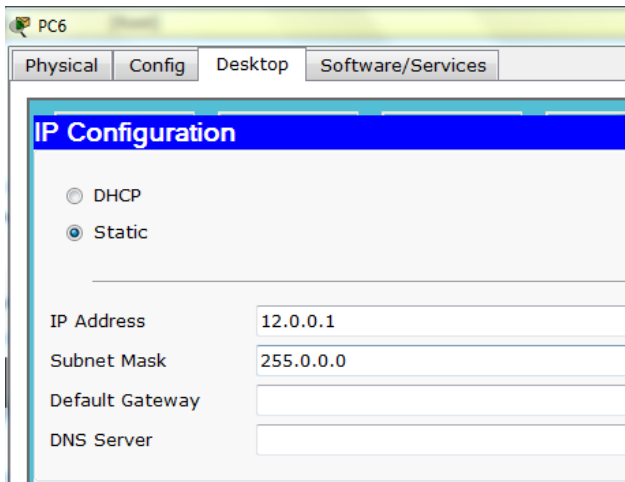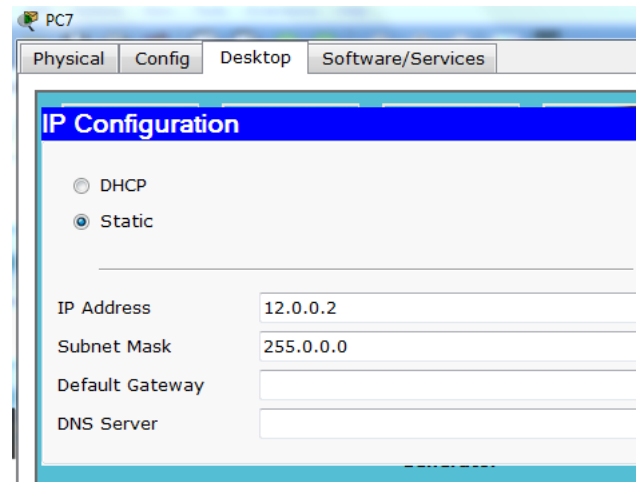
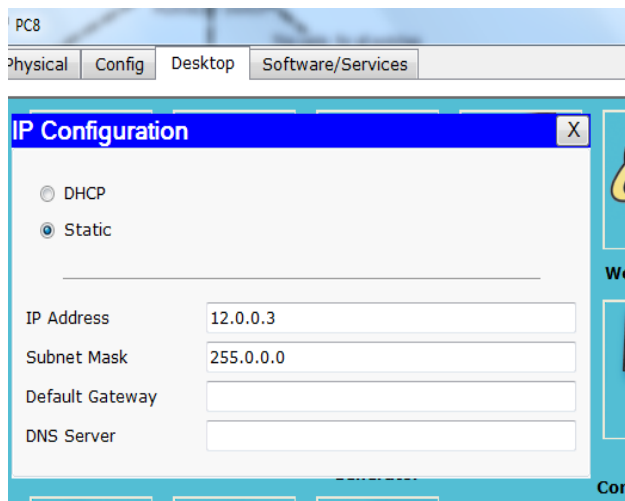FIGURE: configuring the ip address of pc7

FIGURE: configuring the ip address of pc8
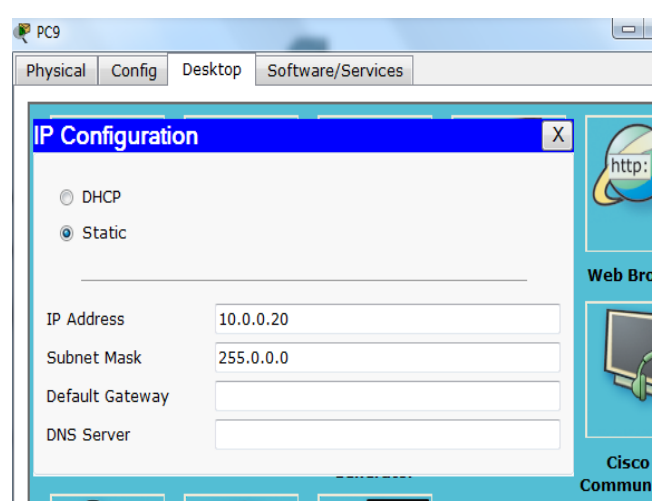
FIGURE: configuring the ip address of pc9

b. after the configuring the ip the switch is configured as mentioned below:

```
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name lab1
Switch(config-vlan)#exit
Switch(config)#vlan 10
Switch(config-vlan)#interface range f0/1-3

    Switch(config-if-range)#switchport mode access
    Switch(config-if-range)#switchport access vlan 10
    Switch(config-if-range)#no shut
    Switch(config-if-range)#exit
    Switch(config)#interface vlan 10
    Switch(config-if)#ip address 10.0.0.5 255.0.0.0
    Switch(config-if)#no shut
    Switch(config-if)#interface range f0/1-3^Z
    Switch#^Z
    Switch#exit
```

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```
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface range f0/5
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 10
Switch(config-if-range)#no shut
Switch(config-if-range)#exit
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/4, 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
10   lab1                             active    Fa0/1, Fa0/2, Fa0/3, Fa0/5
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup
```

c. The code states that fast Ethernet ports of 1,2,3,5 are assigned for vlan 10.The f0/5 is assigned to vlan10 because of the cable attached to the multilayer switch(layer3) switch is f0/5.

d. And also the configuration of switch 2 is shown below:

```
Switch>en
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 20
Switch(config-vlan)#name lab2
Switch(config-vlan)#exit
Switch(config)#interface range f0/1-3
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#exit
Switch(config)#interface vlan 20
Switch(config-if)#ip address 19.0.0.1 255.0.0.0
Switch(config-if)#no  shut
Switch(config-if)#^Z
Switch#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    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
20   lab2                             active    Fa0/1, Fa0/2, Fa0/3
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup
```

e. The configuration of switch 2 is shown below:

```
Switch>en
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 30
Switch(config-vlan)#name lab3
Switch(config-vlan)#exit
Switch(config)#vlan 10
Switch(config-vlan)#name lab1
Switch(config-vlan)#interface range f0/1-3
Switch(config-if-range)#switchport mode access
```

```
Switch(config-if-range)#switchport access vlan 30
Switch(config-if-range)#exit
Switch(config)#interface range f0/4
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 10
Switch(config-if-range)#exit
Switch(config)#interface range f0/5
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#no shut
Switch(config-if-range)#^Z
Switch#write
Building configuration...
[OK]
Switch#
```

```
Switch(config-if)#ip address 12.0.0.1 255.0.0.0
Switch(config-if)#exit
Switch(config)#interface vlan 10
Switch(config-if)#ip address 10.0.0.7 255.0.0.0
Switch(config-if)#exit
Switch(config)#
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface vlan 30
Switch(config-if)#no shut
Switch(config-if)#exit
Switch(config)#interface vlan 10
Switch(config-if)#no shut
Switch(config-if)#exit
Switch(config)#interface vlan 30
```

f. The configuration of switch 3(multilayer switch) is shown below:

```
Switch>en
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name lab1
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name lab2
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name lab3
Switch(config-vlan)#exit
Switch(config)#interface range f0/1
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 10
Switch(config-if-range)#exit
Switch(config)#interface range f0/2
Switch(config-if-range)#switchport mode trunk
Command rejected: An interface whose trunk encapsulation is "Auto" can not be co
nfigured to "trunk" mode.
Switch(config-if-range)#exit
Switch(config)#interface range f0/3
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#exit
Switch(config)#interface vlan 10
Switch(config-if)#ip address 10.0.0.8 255.0.0.0
Switch(config-if)#no shut
Switch(config-if)#exit
Switch(config)#interface vlan 20
Switch(config-if)#ip address 19.0.0.8 255.0.0.0
Switch(config-if)#no shut
Switch(config-if)#interface vlan 30
Switch(config-if)#ip address 12.0.0.8 255.0.0.0
Switch(config-if)#no shut
Switch(config-if)#exit
Switch(config)#
```

Here , in the above figure the command rejected due to the reason that the layer 3 switches are in built they are auto trunk mode .So, we have not necessary for assigning the trunk mode to it.

As if you observed the topology figure, the connections between switch1-layer3 switch is assigned to vlan10,switch2-layer3 is assigned to vlan20, switch3-layer3 is a trunk port such that the traffic from switches can flow and sharing can takes places in this switch 1 and switch3 because of the trunking port enable in multilayer switch and switch3

IV. EXAMING THE VALN

Here using ping command the topology can be verified .The figure shown below is stating that the data can transfer frompc9 to pc0,pc1,pc2 because they are in same vlan.

FIGURE: Showing the data reply from the pc0,pc1,pc2 from pc9

V. CONCLUSION

Vlan is a Virtual lan generally used in the labs,schools,offices for sharing the data.Acutally the main use is creating the database access to the specific number of systems such that they are protected .For normal connection from outside they seemed to be physically connected but they cannot shared the data until the access are provided.In this paper, the advanced level of vlan is presented .Because of using layer 3 switches these topologies can be used in high traffic areas for fast data trasfering.

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