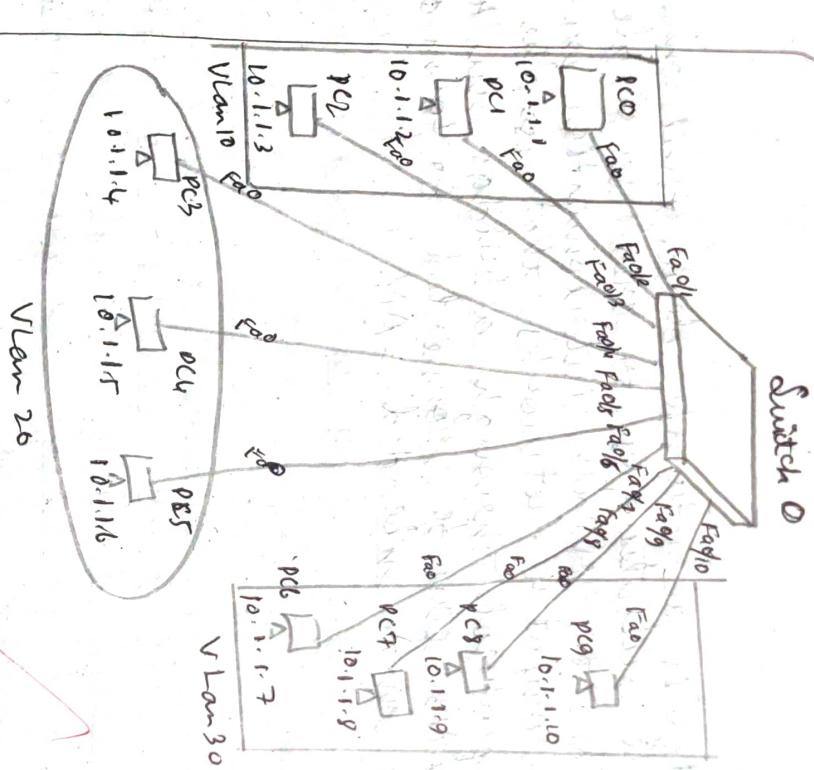


LIST OF EXPERIMENTS

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2	18/11/22	Experiment - 3 Setup wide area network using dynamic routing	18-27	5
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D D M M Y Y Y
18 1 1 2 0 2 2



- Experiment - 1**
- * Sketch & simulate three VLAN's
 - * virtual local area network: It is a virtualized connection that connects multiple devices to network nodes from different LAN's into one logical network.

~~the purpose of VLAN~~

- * To Improve performance
- * to tighten security
- * to ease administration

- * The primary advantage of VLAN is that it reduces the size of broadcast domain
- * The downside of VLAN is that an injected packet may lead to a cyberattack

~~Configuration~~

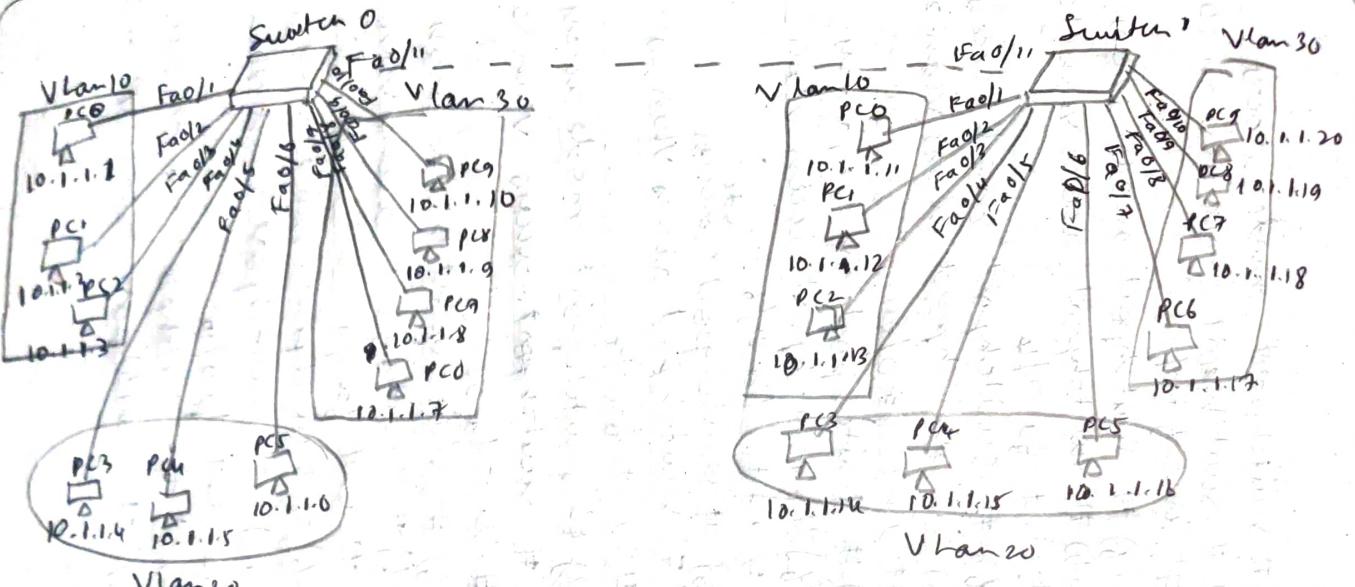
```
switch >enable
switch # config t
switch (config) # int fa 0/1
switch (config-if) # switchport mode access
switch (config-if) # switchport access vlan 10
switch (config) # int fa 0/2
```



```

switch(config-if) # switchport mode access
switch(config-if) # switchport access vlan 10
switch(config) # int fa 0/3
switch(config-if) # switchport mode access
switch(config-if) # switchport access vlan 10
switch(config) # int fa 0/4
switch(config-if) # switchport mode access
switch(config-if) # switchport access vlan 20
switch(config) # int fa 0/5
switch(config-if) # switchport mode access
switch(config-if) # switchport access vlan 20
switch(config) # int fa 0/6
switch(config-if) # switchport mode access
switch(config-if) # switchport access vlan 20
switch(config) # int fa 0/7
switch(config-if) # switchport mode access
switch(config-if) # switchport access vlan 30
switch(config) # int fa 0/8
switch(config-if) # switchport mode access
switch(config-if) # switchport access vlan 30
switch(config) # int fa 0/9
switch(config-if) # switchport mode access
switch(config-if) # switchport access vlan 30
switch(config) # int fa 0/10
switch(config-if) # switchport mode access
switch(config-if) # switchport access vlan 30

```



(12)

Setup an extended VLAN using trunk links.

-face Trunking:

- * A trunk interface is an interface that is connected to another switch. This type of interface can carry traffic of multiple VLAN's
- * A single VLAN can span over multiple switches
- * User of the same VLAN may connect on multiple switches in the LAN
- * Passing the same VLAN Traffic between switches using single link.

~~Frame Tagging~~

- * In order to make sure that same VLAN's can communicate with each other there is a method of tagging.
- * Happen on trunk links
- * Tag is added before a frame is send and removed once it is on trunk link.
- * Frame includes source & destination MAC entries
- * Tag includes the VLAN-ID

Trunk Configuration

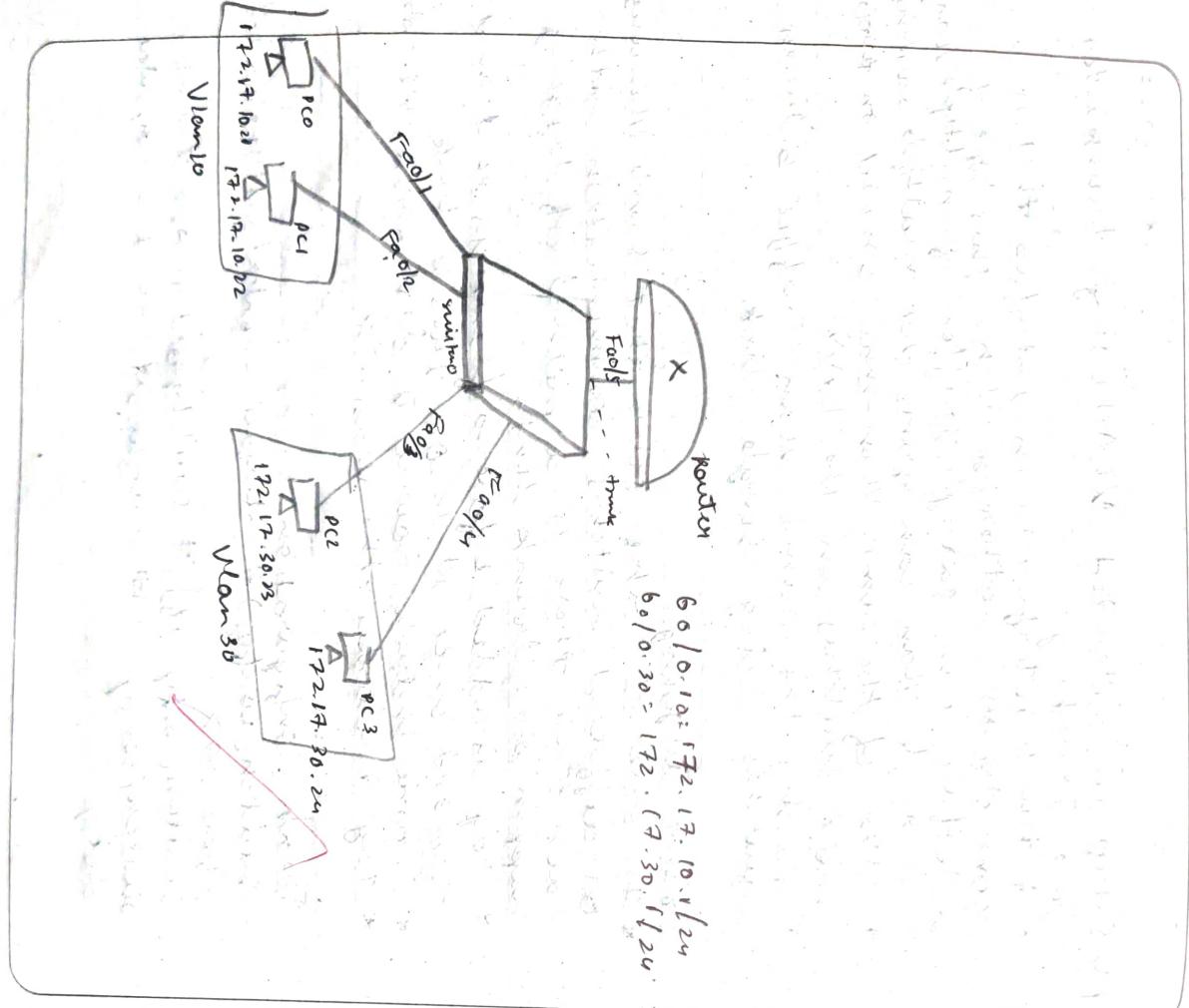
```
switch(config)# interface <interface-type> <int>
interface no>
switch(config-if-16) # switchport mode trunk
switch(config-if-16) # switchport trunk encapsulation
dot1q
```

D	D	M	M	V	V	V
1	8	1	1	2	0	2

(13)

(15)

D	D	M	M	Y	Y	Y	Y
1	8	1	1	2	0	2	2



~~Inter Vlan Routing~~

Allowing the users of one VLAN to access resources of other VLAN.

There are three methods of Inter Vlan routing.

- Separate physical backbone on Router
- Using sub-interfaces (Router on stick)
- Using Layer 3 switch

(16)

Switch sub-interfaces (Router on Stick)
 S1 (config) # Vlan 10
 S1 (config-vlan) # Vlan 30
 S1 (config-vlan) # Interface G0/5
 S1 (config-m6) # switchport mode trunk
 S1 (config-m6) # end
 S1 #

Configure Router on a Stick Router Subinterface Configuration

```

R1(config) # interface g0/0.10
R1(config-subif) # encapsulation dot1q 10
R1(config-subif) # ip address 172.19.10.1 255.255.255.0
R1(config-subif) # encapsulation dot1q 30
R1(config-subif) # ip address 172.17.30.1 255.255.255.0
R1(config) # interface g0/0
R1(config-if) # no shutdown
  
```

B

D	D	M	M	Y	Y	Y

(17)

D D M M Y Y Y Y

iii) OSPF : A routing protocol for Interior Proto-
 col networks. It uses link state routing (L.S.R)
 algorithm & falls under group of interior
 gateway protocols (IGP) operating within a
 single autonomous system.

Config :-
 (i) RIP

Router0
 Router > enable
 Router# config #
 Router(config)# router rip
 Router(config-router)# version 2
 Router(config-router)# network 198.10.10.0
 Router(config-router)# network 10.0.0.0
 Router(config-router)# end

Router1

Router>enable
 Router# config #
 Router(config-router)# version 1
 Router(config-router)# network 198.20.20.0
 Router(config-router)# network 10.0.0.0
 Router(config-router)# end

```

Router &
Router > enable
Router # config t
Router (config) # router sub
Router (config-router) # version 2
Router (config-router) # network 198.30.30.0
Router (config-router) # network 11.0.0.0
Router (config-router) # end

```

(ii) Router

```

Router 0:
Router # en
Router # config t
Router (config) # router eigrp 100
Router (config-router) # network 198.10.10.0
Router (config-router) # network 10.0.0.0
Router (config-router) # network 12.0.0.0
Router (config-router) # exit

```

Router 1:

```

Router # en
Router # config t
Router (config) # router eigrp 100
Router (config-router) # network 198.20.20.0
Router (config-router) # network 10.0.0.0
Router (config-router) # network 11.0.0.0
Router (config-router) # end

```

D D M M Y Y Y Y

Router 2

```
Router#  

Router# config t  

Router(config)# router eigrp 100  

Router(config-router)# network 198.30.30.0  

Router(config-router)# network 10.0.0.0  

Router(config-router)# network 12.0.0.0  

Router(config-router) # endt
```

(iii) OSPF

```
Router#  

Router# config t  

Router(config)# router ospf 1  

Router(config-router)# router-id 198.10.10.0  

Router(config-router)# network 198.10.10.0  

0.0.0.255 area 0  

Router(config-router) # network 10.0.0.0 0.255.255.255  

area 0  

Router(config-router) # network 12.0.0.0 0.255.255.255  

area 0
```

Router 1

```
Router#  

Router(config) # router ospf 1  

Router(config-router) # router-id 198.20.20.0  

Router(config-router) # network 198.20.20.0  

0.0.0.255 area 0  

Router(config-router) # network 11.0.0.0  

0.255.255.255 area 0  

Router(config-router) # network 12.0.0.0 0.255.255.255 area 0
```

5

D D M M Y Y Y Y

Poem 2:

PowerConfig # remote off!

Router config - router#router-1# 198.30.30.0

Router (config-router) # network 198.30.30.0

O. O. S. 233 Area 8
Sardinia - Monti # network 11.0.0.0

P-255-255.255 area 0

Router (config - router) # network 12.0.0.

~~0 . 255 - 255 - 255~~ 0000 0

THE JOURNAL OF CLIMATE

Red arrows indicate the direction of the flow of the water.

ANSWER

卷之三

[]

D D M M Y Y Y

Experiment -4

Practice IP addressing principles
 a) Set up a subnet (N) comprising 4 nodes. Change the subnet mask in some of the nodes & test the network ; set up another subnet(M) of 4 nodes; connect these two subnets using a switch.
 b) Create 4 equal sized subnets in the subnet N and test the network.
 c) Create 8 equal sized subnets in the subnet M and test the network.

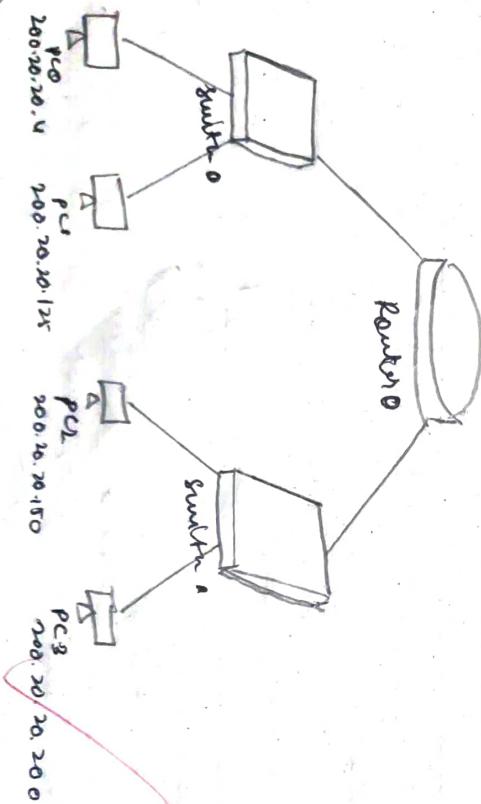
Common Principles of configuration

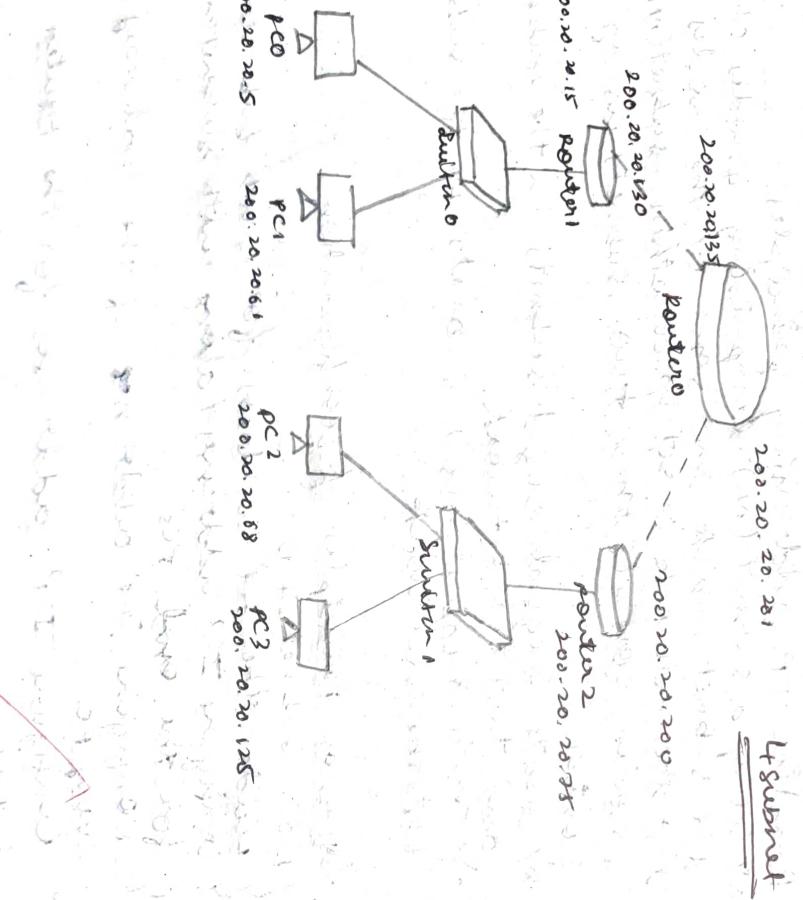
- a) Plan subnet ID
- b) Decide the IP address for each subnet
- c) Configure IP address (along with subnetmask) for the end PCs
- d) Configure IP address of the gateway in every PC
- e) Configure IP addresses for the Router interfaces

a) Create 2 subnets of the network.

network address = 200.20.20.0

Block size = 128





(b) Create 4 subnets of a network

Subnet	Valid IP	No of addresses	Broadcast address
1	200.20.20.1 - 200.20.20.126	200.20.20.0	200.20.20.127
2	200.20.20.129 - 200.20.20.254	200.20.20.128	200.20.20.255
3	200.20.20.129 - 200.20.20.190	200.20.20.128	200.20.20.191
4	200.20.20.193 - 200.20.20.254	200.20.20.192	200.20.20.255

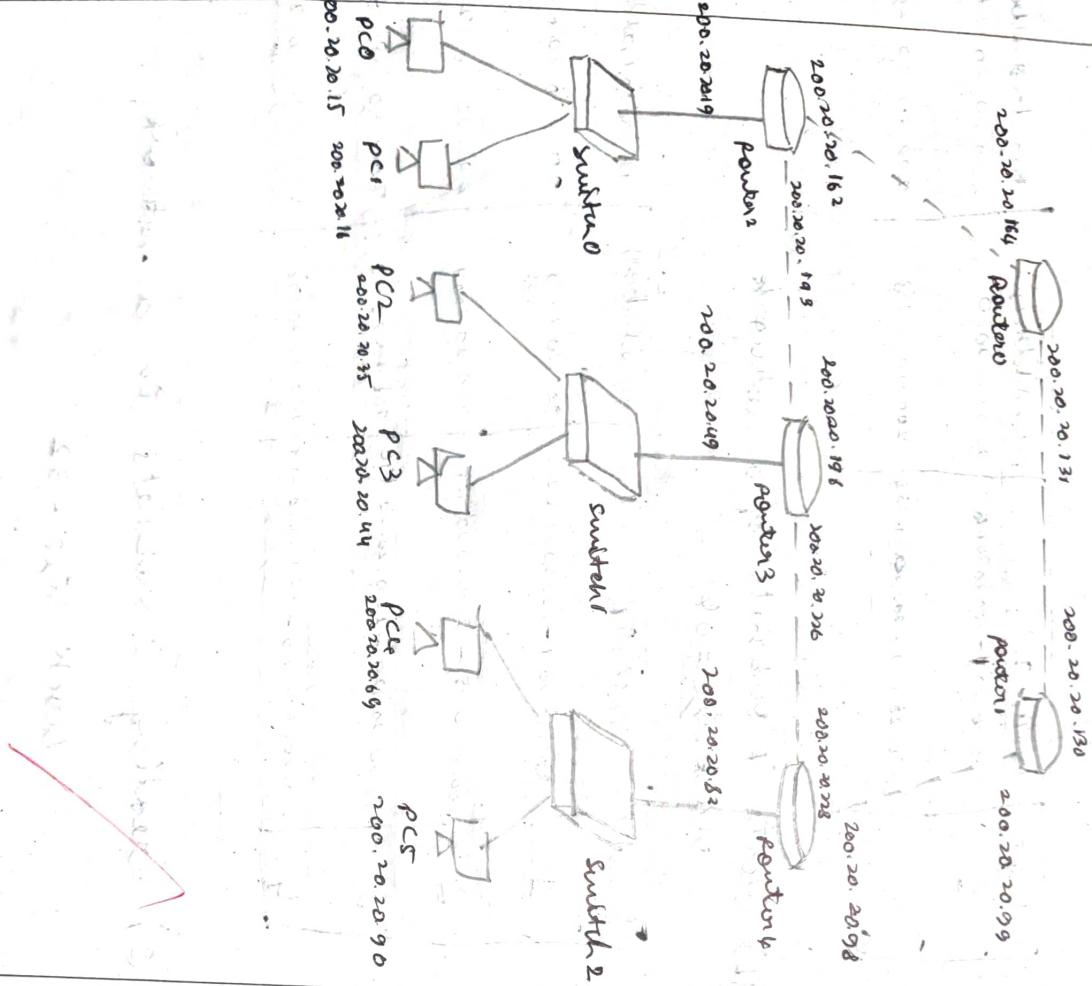
b) Create 4 subnets of a network
Block size = 64

Subnet	Valid IP	Network address	Broadcast address
1	200.20.20.1 - 200.20.20.62	200.20.20.0	200.20.20.63
2	200.20.20.65 - 200.20.20.126	200.20.20.64	200.20.20.127
3	200.20.20.129 - 200.20.20.190	200.20.20.128	200.20.20.191
4	200.20.20.193 - 200.20.20.254	200.20.20.192	200.20.20.255

(c) Creating 8 subnets in a network

Block size = 32

(32)



(33)

Subnet	Valid IP	N/W address	Broadcast address
1	200.20.20.1 - 200.20.20.30.	200.20.20.0	200.20.20.31
2	200.20.20.33 - 200.20.20.62	200.20.20.32	200.20.20.63
3	200.20.20.65 - 200.20.20.94	200.20.20.64	200.20.20.95
4	200.20.20.97 - 200.20.20.126	200.20.20.96	200.20.20.127
5	200.20.20.129 - 200.20.20.158	200.20.20.128	200.20.20.159
6	200.20.20.161 - 200.20.20.190	200.20.20.160	200.20.20.191
7	200.20.20.193 - 200.20.20.222	200.20.20.192	200.20.20.223
8	200.20.20.225 - 200.20.20.254	200.20.20.224	200.20.20.255

D D M M Y Y Y Y

Static address: 30-30-30-3

D D M M Y Y Y Y
88

Experiment-6

Implement static NAT, Dynamic NAT and PAT

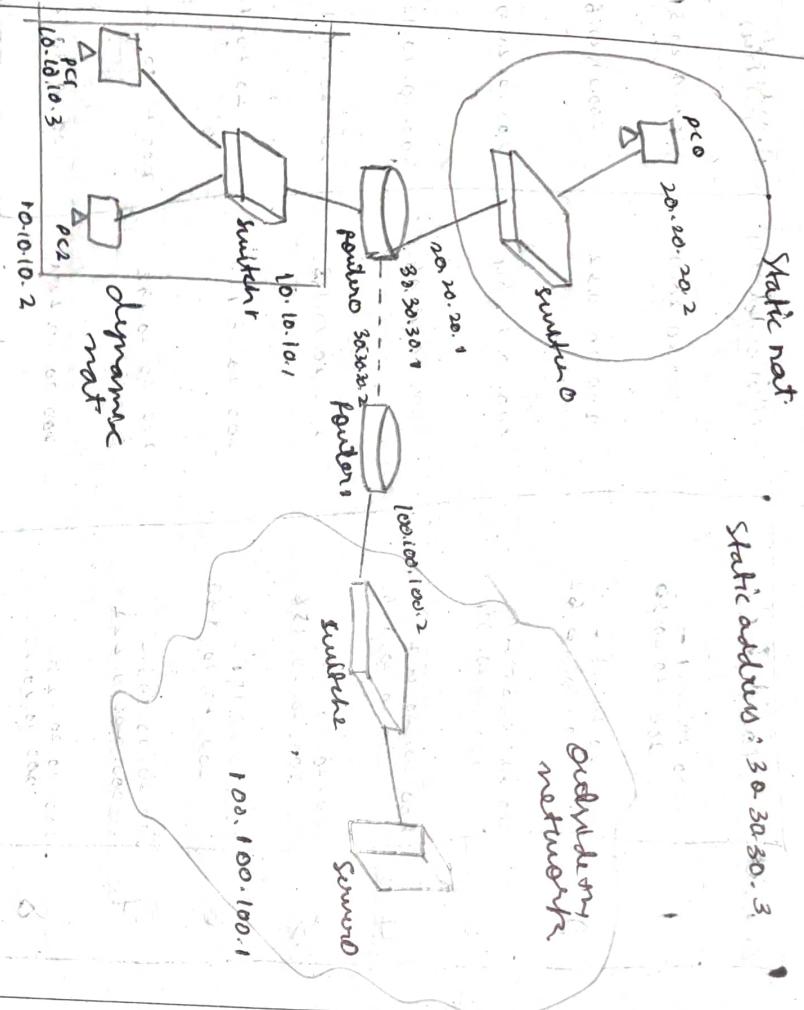
Steps to implement above configuration

- a. Select DHCP as services in the server
- b. Setup the pool of addresses
- c. Configure each client to DHCP mode
- d. Run simulation & analyse DHCP protocol

Configuration

Static NAT

```
Router #en  
Router # config t  
Router (config) # int gig 0/1  
Router (config-if) # ip nat outside  
Router (config) # int gig 0/2  
Router (config-if) # ip nat outside  
Router (config) # ip nat source static  
Router (config) # ip nat source static 20.20.20.2 30.30.30.3  
Router (config) # exit
```



Inspect tool
Portion of show IP: not translation

四

D D M M Y Y Y

37

(ii) Dynamic NAT

Router # en

Router # config #

Router(config)# int g0/0

Router(config-if)# ip nat inside

Router(config-if)# int g0/2

Router(config-if)# ip nat outside

Router(config-if)# end

Router(config)# ip nat pool cse 30.30.30.4

30.30.30.7 netmask 255.0.0.0

Router(config)# access-list 10 permit 10.10.10.5

pool cse

Router(config)#

ip nat source list 10

ip nat inside source list 10

ip nat outside source list 10

ip nat pool cse 30.30.30.4

ip nat pool cse 30.30.30.7

ip nat pool cse 30.30.30.8

ip nat pool cse 30.30.30.9

ip nat pool cse 30.30.30.10

ip nat pool cse 30.30.30.11

ip nat pool cse 30.30.30.12

Topology

10.10.10.3

10.10.10.4

PC6

PC7

10.10.10.1

10.10.10.5

PC4

PC8

Switch

Switch2

PC9



D	D	M	M	Y	Y	Y

Experiment -2

2a) Implement spanning tree protocol:

Step 1: Topology

Step 2:
Switch 0:Switch # sh spanning-tree
VLAN 0001Spanning tree enabled protocol ieee
Root FD Priority 32 769

Address 0002.1670.8c10

Cost 19
Port 4 (Fast Ethernet 0/4)

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID priority 32769 (priority 32768 + 1 default)

Address 0010.1125.6107

Hello Time 2 sec Max Age 20 sec forward delay 15 sec

Aging Time 20

Interface Port Sts Cost Prio. Nbr Type

Fa0/2 Deng FWD 19 128.2 P2p

Fa0/3 Deng FWD 19 128.3 P2p

Fa0/4 Root FWD 19 128.4 P2p

Fa0/1 Dng FWD 19 128.1 P2p

D D M M Y Y Y

Switch 1:

switch > sh spanning-tree

VLAN 0001

Spanning tree enabled protocol ieee

Root Ep Priority 32769

Address 0002.1640.8C10

Port 19

Port 14 (Fast Ethernet 0/4)

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 32769 (Priority 32768 by default)

Address 0000.BA4E.6583

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Aging Time 20

Interface Role stg Root Port. Mac Type

Fa 0/3 Actn Blk 19 128.3 P2p

Fa 0/1 Desg FWD 19 128.1 P2p

Fa 0/2 Desg FWD 19 128.2 P2p

Fa 0/4 Root FWD 19 128.4 P2p

Switch 2:

switch > sh spanning-tree

VLAN 0001

Spanning tree enabled protocol ieee

Root Ep Priority 32769

Address 0002.1670.8C10

This bridge is the root

u3

D	D	M	M	Y	Y	Y
□	□	□	□	□	□	□

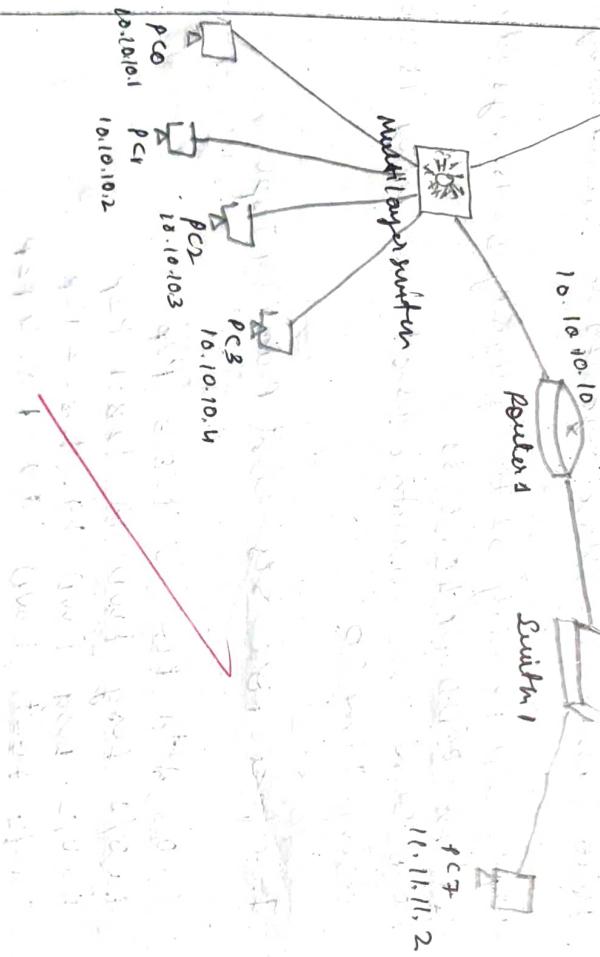
Hollo Time 2 sec Max Age 20 sec Forward Delay 15 sec

Aging Time 20

Step

Interface Port sets cost Prior. Net Type

```
Fa 0/2 Desg FWD 19 128.2 P2P
Fa 0/2 Desg FWD 19 128.3 P2P
Fa 0/3 Desg FWD 19 128.3 P2P
Fa 0/4 Desg FWD 19 128.4 P2P
```



Step Set up a network with Multi layer switch.

Step

Enter vlan communication using Multi-layer switch

Step 1 design the topology

Step 2:

Do the wlan configuration

Switch 0:

Switch > en

Switch # config t

Enter configuration commands, one per line. End with entr

Switch (config) # wlan 10

Switch (config-wlan)# name p1

Switch (config-wlan) # exit

Switch (config) # wlan 20

Switch (config-wlan) # name p2

Switch (config-wlan) # exit

D D M M Y Y Y

Step 3:

Trunking two switch:

Switch 0:

Switch (config) # interface 0/1

Switch (config-if) # switchport mode trunk

Switch(config-if) #

% LINEPROTO - 5 - UPDOWN : line protocol on

Interface GigabitEthernet0/1, changed state

to down

% LINEPROTO - 5 - UPDOWN : line protocol on Interface

GigabitEthernet0/1, changed state to up

Switch (config-if) # endt

Switch 1:

Switch (config) # int gig 0/2

Switch (config-if) # switchport mode trunk

Switch (config-if) # endt

Step 4

~~Connect the multi layer switch~~

Switch# config t

Enter Configuration commands. One per line. End with **CTRL/Z**.

Switch (config) # vlan 10

Switch (config-if) # name p1

Switch (config) # vlan 20

Switch (config-if) # name p2

Switch (config-if) # endt

D D M M Y Y Y Y

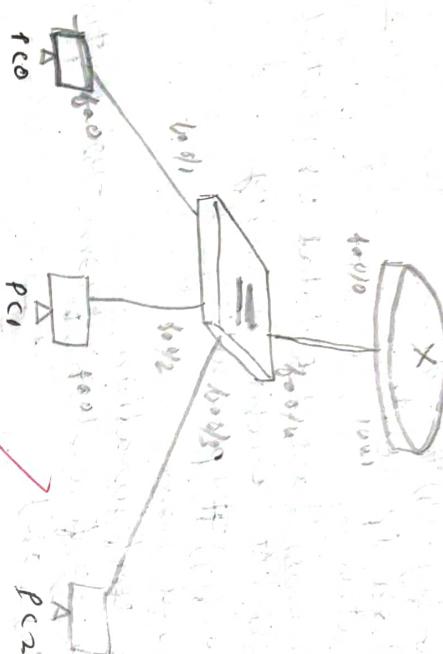
ng

Switch (config) # int vlan 20
Switch (config-w) # ip address 192.168.2.1 255.255.0.0
Switch (config -w) # end
Switch (config) # int giga 1/0/1
Switch (config -w) # switchport mode trunk
Switch (config -w) # end
Switch # sh ip route
Default gateway is not set
Host gateway fast use Total vry interface
Tcnf redirect cache is empty
switch (config) # ip routing
Switch # wrm mem
Building configuration...
Completed configuration from T383 bytes to
3601 bytes [0k]
[0k]
Switch #sn ip route
~~Survey of last report is not set~~
C 192.168.1.10/24 is directly connected, Vlan20
C 192.168.2.0/24 is directly connected, Vlan20
Gateway is not yet so set gateway at last.

D D M M Y Y Y Y

Experiment -5

A client single DNS server & a web server.
 Implementation of DHCP & DNS server



Router # config #

Enter configuration commands, one per line. End with CTR+C.

Router(config)# int fa0/0

Router(config-if)# ip add 192.168.1.1 255.255.255.0

Router(config-if)# no shutdown

Router(config-if)# !. link-5-change: Interface

changed. Fast ethernet 0/0 changed state to up

Router(config)# exit

Router(config) # ip dhcp pool cse

Router(dhcp-config) # default-router 192.168.1.1

Router(dhcp-config) # dns-server 8.8.8.8

Router(dhcp-config) # exit

Router(config) # write memory !. DHCP-4-PWR-
 CONFLICT DHCP address conflict server played 192.168.1.1

Router # 1. S45-5-(CONF16-I) configured from
 console by console

Implementation of DHCP when one DNS & one
 web server

Router#

D	D
M	M
Y	Y
Y	Y

dhcp configuration

Router (config-if) # ip dhcp pool R1
 Router (dhcp-config) # network 192.168.1.0
 255.255.255.0

Router (dhcp-config) # default-router 192.168.1.2

Router (dhcp-config) # end

Router (config-if) # ip dhcp pool R2

Router (config) # network 192.168.2.0 255.255.255.0
 Router (dhcp-config) # default-router 192.168.2.2

Router (dhcp-config) # end

