



Namal Institute Mianwal

Computer Networks Laboratory

Project

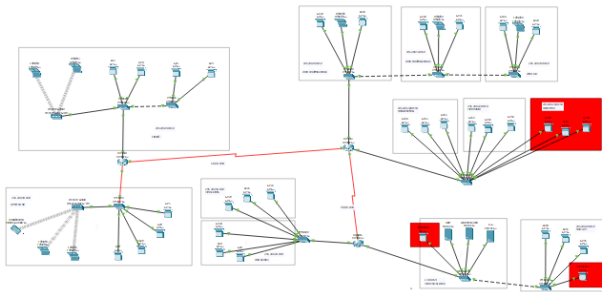
Course Title	Computer Networks	Course Code	CS – 331 L
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Introduction:

In this project, we make a network which is distributed over small, different network and also resemble with Namal University Network. Router are used to combine them using OSPF routing and make them a one network. In these small networks, we make vlans using Access link and Trunk link with different switches and assign them different IP and Network addresses. We also make a server Network which provide different services like access of Website, Email configuration, File transmission, giving different and unique IP to the HOST which are connected to our Network. We also make an Access point for giving wireless connection with network.so, different mobiles and laptop type devices facilitate with our services. We also provide security for critical section of the networks. Like server room PC etc. which are not access easily. We use access list and extended list to block the traffic of different network for accessing these critical point.

Distribution of Network:

Our Network is distributed over 12 different Networks with 3 Routers, Two wireless access points, 10 switches and many PC, laptops, mobile phones etc.



First Router is connected with two different network (Library and Huawei lab). In Huawei lab, one switch and one Wireless access point is available to facilitate the student. And one switch and one wireless access point is available for Library for accessing the server services.

Second router is connected with six different Networks (computer lab 1, 2, HR office, Transport office, Admin office and Exam office).

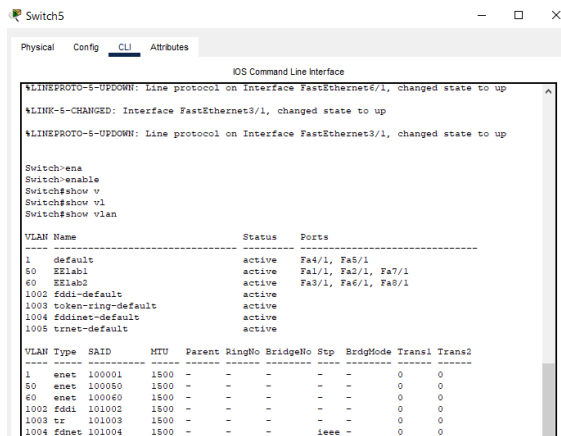
```
Switch10
Physical Config CLI Attributes
IOS Command Line Interface
%LINK-6-CHANGED: Interface FastEthernet0/7, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7, changed state to up
Switch>enable
Translating "enable"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address
Switch>enable
Switch#show vlan

VLAN Name                Status    Ports
-----
1    default                active    Fa0/16, Fa0/17, Fa0/18, Fa0/19,
                Fa0/20, Fa0/21, Fa0/22, Fa0/23,
                Fa0/24, Gig0/2
25   transport              active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
35   admin                  active    Fa0/5
45   exam                   active    Fa0/6, Fa0/7, Fa0/8, Fa0/9,
                Fa0/10
1002 fddi-default            active
1003 token-ring-default    active
1004 fddinet-default       active
1006 trinet-default       active

VLAN Type  SAID      MTU    Parent RingNo BridgeNo Stp  BdgMode Transl Trans2
-----
1    enet    100001    1500    -      -      -      -      0      0
25   enet    100025    1500    -      -      -      -      0      0
35   enet    100035    1500    -      -      -      -      0      0
--More--
```

Three switches are used which combine the computer lab 1, 2,HR office using Vlan and one switch is used to configure the Transport office, Admin office and Exam office. We use make the Vlan in the switches which distributes the ports of switches to different Networks

Third Router is to configure the four different networks (server room, ITSC, Electrical lab 1, 2 etc). one switch is used to facilitate Electrical lab 1, 2.



```
Switch5
Switch>enable
Switch>show v
Switch>show vl
Switch>show vlan

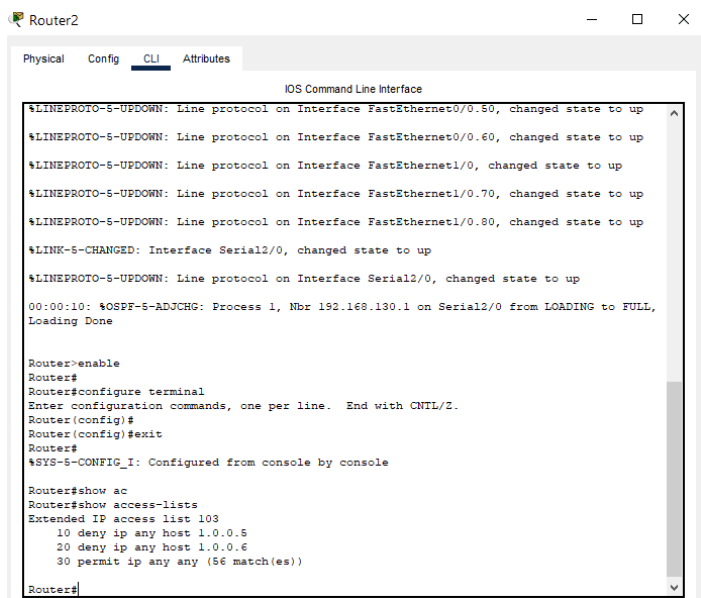
VLAN Name                Status    Ports
-----
1    default                 active    Fa4/1, Fa5/1
60   EE1ab1                  active    Fa1/1, Fa2/1, Fa7/1
60   EE1ab3                  active    Fa3/1, Fa6/1, Fa8/1
1002 fddi-default          active
1003 token-ring-default    active
1004 fddinet-default        active
1005 trnet-default          active

VLAN Type  SAID      MTU   Parent RingNo BridgeNo Stp    BrdgMode Transl Trans2
-----
1    enet  100001    1500  -     -     -     0    0
60   enet  100050    1500  -     -     -     0    0
60   enet  100060    1500  -     -     -     0    0
1002 fddi  101002    1500  -     -     -     0    0
1003 tr   101003    1500  -     -     -     0    0
1004 fddnet 101004    1500  -     -     -     ieee  0    0
```

Two switches are used to configure the server room, ITSC . We use make the Vlan in the switches which distributes the ports of switches to different Networks.

Block Traffic:

We use the Extended list to block the traffic of all the Networks for accessing the server PCs and Exam office. No one is able to access them without permission.

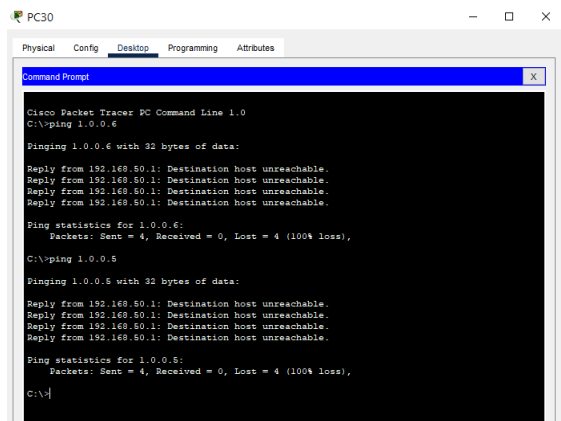


```
Router2
Router>enable
Router#
Router>configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ac
Router#show access-lists
Extended IP access list 103
 10 deny ip any host 1.0.0.5
 20 deny ip any host 1.0.0.6
 30 permit ip any any (56 match(es))

Router#
```

We make an extended access list on router 2 which control and stop the traffic of all other networks from accessing the server PCs. Now, we check that server PC will block or not.



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 1.0.0.6

Pinging 1.0.0.6 with 32 bytes of data:

Reply from 192.168.50.1: Destination host unreachable.
Reply from 192.168.50.1: Destination host unreachable.
Reply from 192.168.50.1: Destination host unreachable.
Reply from 192.168.50.1: Destination host unreachable.

Ping statistics for 1.0.0.6:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 1.0.0.5

Pinging 1.0.0.5 with 32 bytes of data:

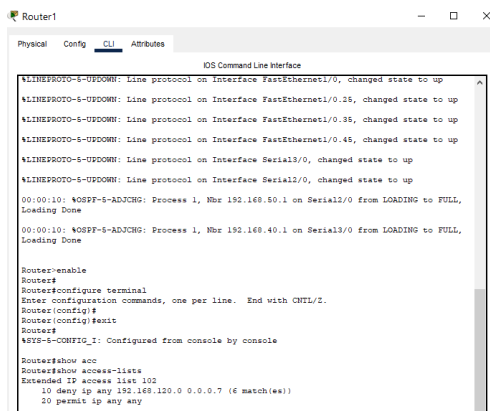
Reply from 192.168.50.1: Destination host unreachable.
Reply from 192.168.50.1: Destination host unreachable.
Reply from 192.168.50.1: Destination host unreachable.
Reply from 192.168.50.1: Destination host unreachable.

Ping statistics for 1.0.0.5:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

As we seen that traffic is block from any other PC networks.

The process is same for exam office(PCs) which are block from whole traffic.



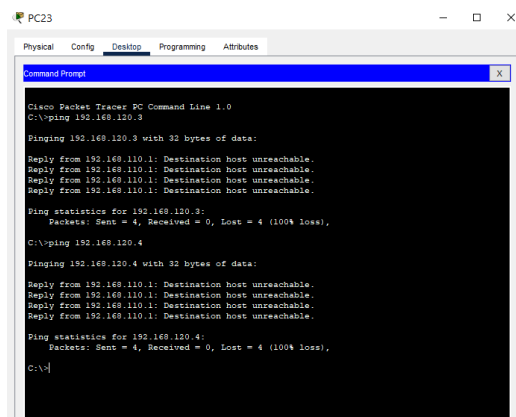
```
Router1
Physical Config CLI Attributes
IOS Command Line Interface

*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0/25, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0/35, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0/45, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
00:00:10: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.50.1 on Serial3/0 from LOADING to FULL, Loading Done
00:00:10: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.40.1 on Serial3/0 from LOADING to FULL, Loading Done

Router#enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#ext
Router#
*SYS-5-CONFIG_1: Configured from console by console

Router#show aac
Router#show access-lists
Extended IP access list 102
 10 deny ip any 192.168.120.0 0.0.0.7 (6 match(es))
 20 permit ip any any
```

On Router 1 we make extended access list for blocking the traffic. We see that blocking result in figure.



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.120.3

Pinging 192.168.120.3 with 32 bytes of data:

Reply from 192.168.110.1: Destination host unreachable.
Reply from 192.168.110.1: Destination host unreachable.
Reply from 192.168.110.1: Destination host unreachable.
Reply from 192.168.110.1: Destination host unreachable.

Ping statistics for 192.168.120.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.120.4

Pinging 192.168.120.4 with 32 bytes of data:

Reply from 192.168.110.1: Destination host unreachable.
Reply from 192.168.110.1: Destination host unreachable.
Reply from 192.168.110.1: Destination host unreachable.
Reply from 192.168.110.1: Destination host unreachable.

Ping statistics for 192.168.120.4:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

Routing:

We need to combine these network for communication and make them one network. So, we make some configuration in different router. Three router are used to separate all the networks from each other. We need to combine these router using routing.

There are three type of routing

Static

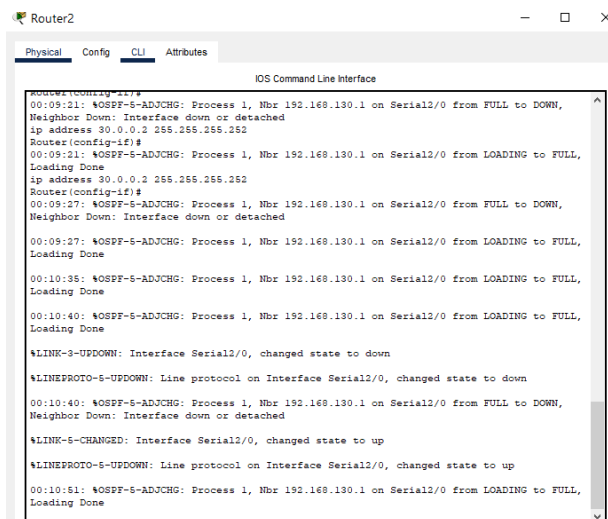
Rip(Routing information Protocol)

OSPF(Open Shortest Path First)

In Static, we statically give the path (IPs and gateway) of all the routers and its gateways to every router. In Rip and OSPF, we only give the connected router path (IPs and gateway). We use OSPF routing here to configure the path. In this ways, every Host is connected to every other Host of different network except critical section Host.

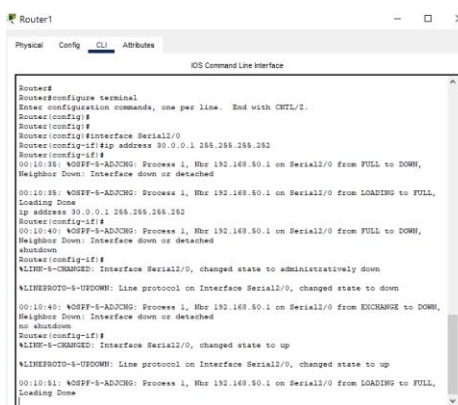
The configuration of routing is given below:

For router 2:



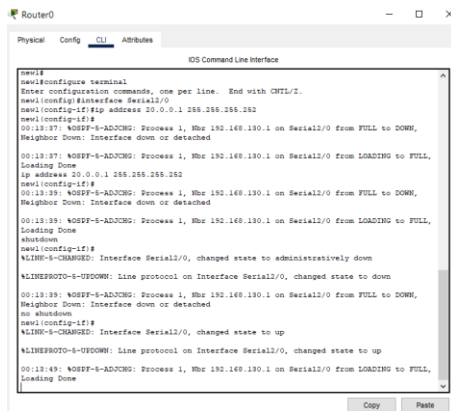
```
Router2
Physical Config CLI Attributes
IOS Command Line Interface
Router# configure terminal
00:09:21: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from FULL to DOWN, Neighbor Down: Interface down or detached
Router(config)#
ip address 30.0.0.2 255.255.255.252
Router(config-if)#
00:09:21: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from LOADING to FULL, Loading Done
ip address 30.0.0.2 255.255.255.252
Router(config-if)#
00:09:27: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from FULL to DOWN, Neighbor Down: Interface down or detached
00:09:27: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from LOADING to FULL, Loading Done
00:10:35: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from LOADING to FULL, Loading Done
00:10:40: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from LOADING to FULL, Loading Done
%LINK-3-UPDOWN: Interface Serial2/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
00:10:40: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from FULL to DOWN, Neighbor Down: Interface down or detached
%LINK-3-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
00:10:51: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from LOADING to FULL, Loading Done
```

For Router 1



```
Router1
Physical Config CLI Attributes
IOS Command Line Interface
Router#
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)# interface Serial2/0
Router(config-if)# ip address 30.0.0.1 255.255.255.252
Router(config-if)#
00:10:38: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.50.1 on Serial2/0 from FULL to DOWN, Neighbor Down: Interface down or detached
00:10:38: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.50.1 on Serial2/0 from LOADING to FULL, Loading Done
ip address 30.0.0.1 255.255.255.252
Router(config-if)#
00:10:40: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.50.1 on Serial2/0 from FULL to DOWN, Neighbor Down: Interface down or detached
shut down
Router(config-if)#
%LINK-3-CHANGED: Interface Serial2/0, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
00:10:40: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.50.1 on Serial2/0 from EXCHANGE to DOWN, Neighbor Down: Interface down or detached
no shut down
Router(config-if)#
%LINK-3-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
00:10:51: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.50.1 on Serial2/0 from LOADING to FULL, Loading Done
```

For router 3:



```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

cwi1#
cwi1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
cwi1(config)#interface Serial2/0
cwi1(config-if)#ip address 20.0.0.1 255.255.255.252
cwi1(config-if)#
00:13:37: %OSPF-6-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from FULL to DOWN,
Neighbor Down: Interface down or detached

00:13:37: %OSPF-6-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from LOADING to FULL,
Loading Done
ip address 20.0.0.1 255.255.255.252
cwi1(config-if)#
00:13:39: %OSPF-6-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from FULL to DOWN,
Neighbor Down: Interface down or detached

00:13:39: %OSPF-6-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from LOADING to FULL,
Loading Done
shutdown
cwi1(config-if)#
%LINK-6-CHANGED: Interface Serial2/0, changed state to administratively down
%LINEPROTO-6-UPDOWN: Line protocol on Interface Serial2/0, changed state to down

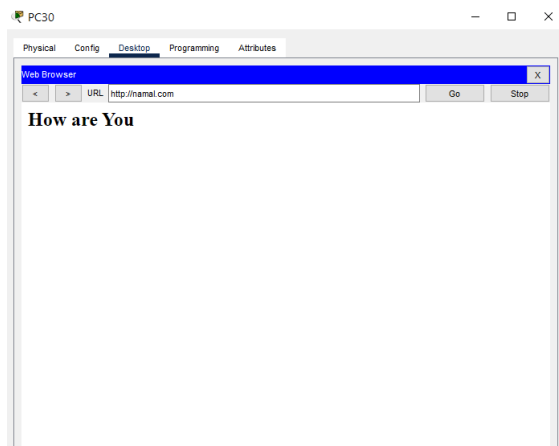
00:13:39: %OSPF-6-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from FULL to DOWN,
Neighbor Down: Interface down or detached
no shutdown
cwi1(config-if)#
%LINK-6-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-6-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

00:13:49: %OSPF-6-ADJCHG: Process 1, Nbr 192.168.130.1 on Serial2/0 from LOADING to FULL,
Loading Done
```

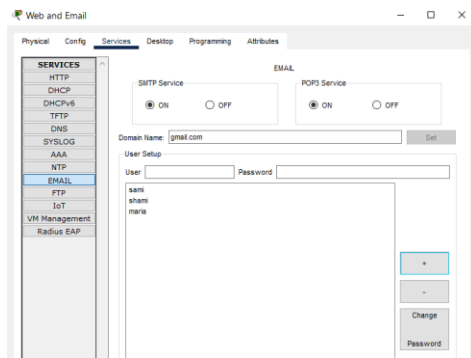
Server Configuration:

In our Network, we give different services to facilitate our connected Host. So, we use three different server to give their services. First server is DNS server, which have IP address of every domain which we access. If DNS have no IP address against specific domain which we need to access. Then we not able to access them until if we have their IP address. If we search sepecific domain with their domain name, then our request go to DNS server which check the IP address against searching domain name. if it have then we get the services of domain otherwise not.

Second server facilitate us with web, Email and DHCP configuration. In Web, HTTP server have IP address against every domain name. We make domain on this server with unique addresses. Web page is written in HTML (a markup language), which can be parsed by an application called web browser presenting the page the way we want to see it. However, if the same page is to be accessed over the network, HTTP (hypertext transport protocol) is used be the server and client to effectively exchange messages carrying HTML. we make a domain namal.com, which is accessible for every network.

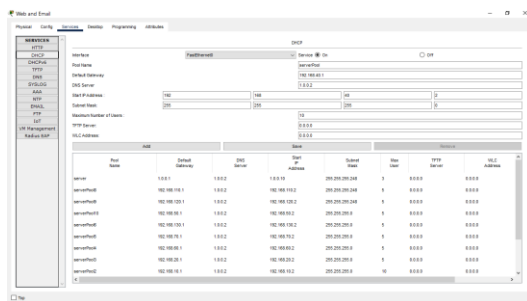


Email server have every user name and password with domain like “edu.pk”, “gmail.com” etc. if email server have no that user which we login on our pc then we not able to send the message to other user.



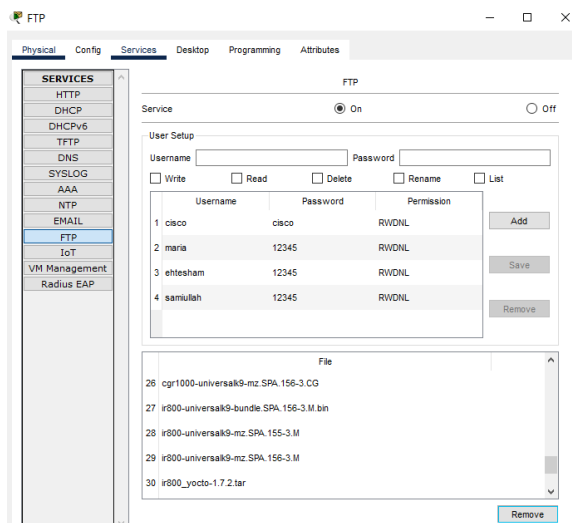
In this server, we make three email account, which are used to access the send and receive message from other user.

DHCP server is also used to configure the IP address of connected Hosts dynamically. It give unique IP address to every Host in the network. we use different Network, how can we give the different IPs with Different Network. So, we make small pool (which have gateway of every network)in our DHCP server which help us to configure that what IP address is need to assign in different Networks.



Third server is used for FTP(File Transfer Protocol) which is used to download and upload the files on server. Every file which is on the server is accessible for every PC of our network.

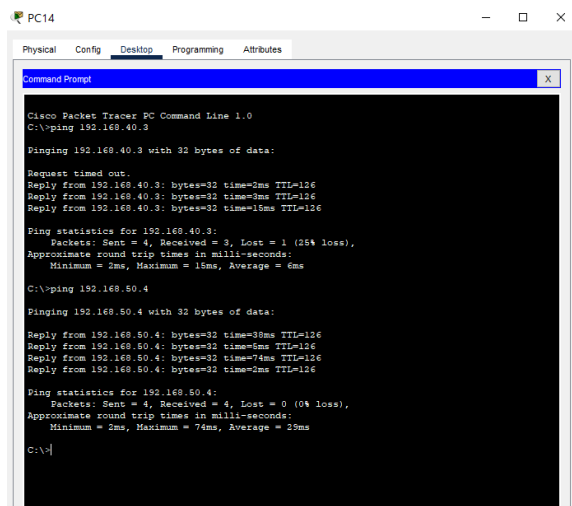
We make three user accounts which make, download and upload every file Through FTP server. Now , we use every host in a network to access the file through the configuration of login account.



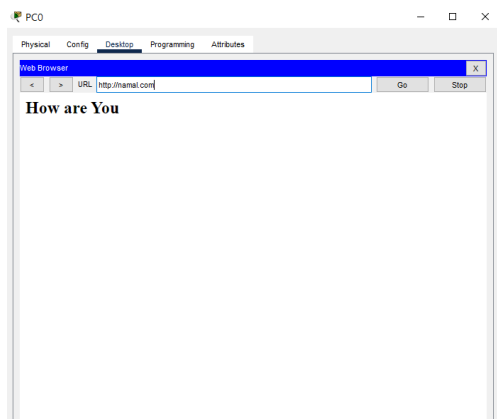
HOST Connection:

In this part, we need to check that our network is work properly or not. First, we check that every PC is connected to every PC or not.

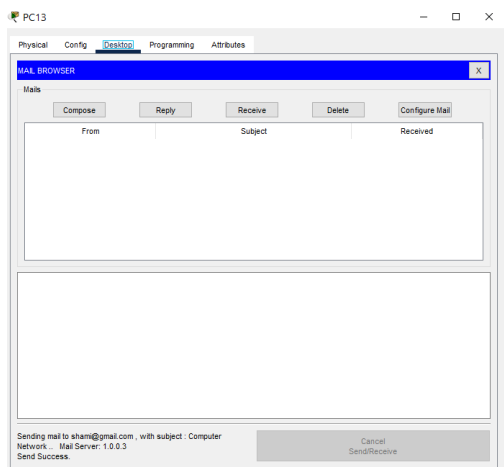
First, we check that every PC is accessible to every other PC.



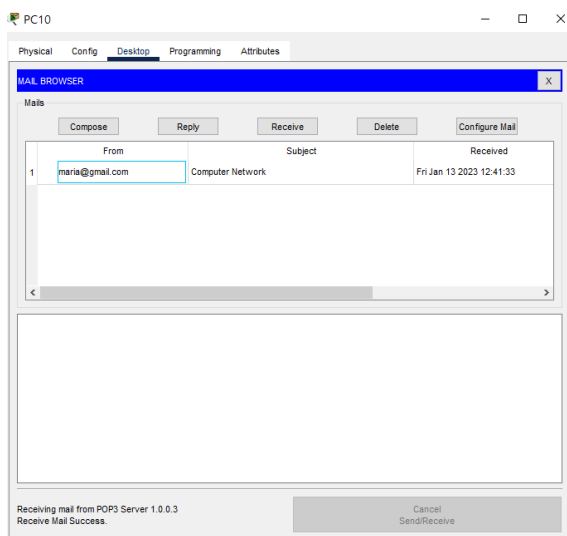
Now we check that every server is accessible for every PC. First we check web server



Now we check that our Email server is work properly or not. In this server, we save the accounts and their details. If we send the mail then first it go to server then it goes to the other user.



Now, other user check that email is receive or not.



Now, we configure that our FTP server is accessible for everyone or not.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ftp 1.0.0.4
Trying to connect...1.0.0.4
Connected to 1.0.0.4
230- Welcome to PT Ftp server
Username: samiullah
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>put samiullah.txt

Writing file samiullah.txt to 1.0.0.4:
File transfer in progress...

[Transfer complete - 73 bytes]

73 bytes copied in 0.013 secs (5615 bytes/sec)
ftp>|
```

now check that file is accessible for other networks, which we uploaded on the ftp server.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ftp 1.0.0.4
Trying to connect...1.0.0.4
Connected to 1.0.0.4
230- Welcome to PT Ftp server
Username: ehtesham
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>get samiullah.txt

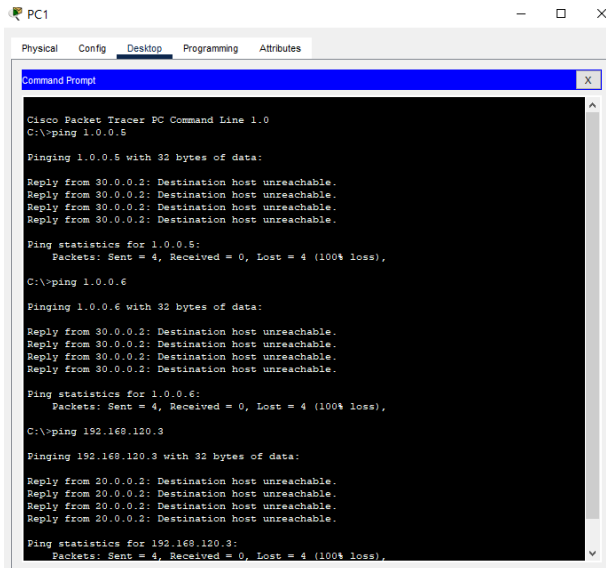
Reading file samiullah.txt from 1.0.0.4:
File transfer in progress...

[Transfer complete - 73 bytes]

73 bytes copied in 0.01 secs (7300 bytes/sec)
ftp>|
```

```
Listing /ftp directory from 1.0.0.4:
0 : asa942-k8.bin 5571594
1 : asa923-k8.bin 30468096
2 : c1841-advipservicesk9-ms.124-15.T1.bin 33591768
3 : c1841-ibase-ms.123-14.T7.bin 13832032
4 : c1841-ibasek9-ms.124-12.bin 16599160
5 : c1800-universalk9-ms.SPA.155-3.M4a.bin 33591768
6 : c2600-advipservicesk9-ms.124-15.T1.bin 33591768
7 : c2600-i-ms.122-28.bin 5571584
8 : c2600-ibasek9-ms.124-8.bin 13163700
9 : c2800nm-advipservicesk9-ms.124-15.T1.bin 50938004
10 : c2800nm-advipservicesk9-ms.151-4.M4.bin 33591768
11 : c2800nm-ibase-ms.123-14.T7.bin 5571584
12 : c2800nm-ibasek9-ms.124-8.bin 15622644
13 : c2800-universalk9-ms.SPA.155-3.M4a.bin 33591768
14 : c2950-16q412-ms.121-22.EA4.bin 3058048
15 : c2950-16q412-ms.121-22.EA0.bin 3117390
16 : c2960-lanbase-ms.122-25.FX.bin 4414921
17 : c2960-lanbase-ms.122-25.SEE1.bin 4670455
18 : c2960-lanbasek9-ms.150-2.SE4.bin 4670455
19 : c3560-advipservicesk9-ms.122-37.SEL1.bin 9662192
20 : c3560-advipservicesk9-ms.122-46.S3.bin 10712279
21 : c800-universalk9-ms.SPA.152-4.M4a.bin 33591768
22 : c800-universalk9-ms.SPA.154-3.M4a.bin 83023236
23 : cat3k_osa-universalk9.16.03.02.SPA.bin 505532849
24 : cgr1000-universalk9-ms.SPA.154-2.CG 159487552
25 : cgr1000-universalk9-ms.SPA.156-3.CG 184530138
26 : ir800-universalk9-bundle.SPA.156-3.M.bin 160968869
27 : ir800-universalk9-ms.SPA.155-3.M 61750062
28 : ir800-universalk9-ms.SPA.156-3.M 63753767
29 : ir800_yocto-1.7.2.tar 2877440
30 : ir800_yocto-1.7.2.python-2.7.3.tar 6912000
31 : pt1000-i-ms.122-28.bin 5571584
32 : pt3000-16q412-ms.121-22.EA4.bin 3117390
33 : samiullah.txt 73
ftp>|
```

Now, we check that exam office and server room PCs is blocked from all Network.



```
PC1
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 1.0.0.5
Pinging 1.0.0.5 with 32 bytes of data:
Reply from 30.0.0.2: Destination host unreachable.
Reply from 30.0.0.2: Destination host unreachable.
Reply from 30.0.0.2: Destination host unreachable.
Reply from 30.0.0.2: Destination host unreachable.
Ping statistics for 1.0.0.5:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 1.0.0.6
Pinging 1.0.0.6 with 32 bytes of data:
Reply from 30.0.0.2: Destination host unreachable.
Reply from 30.0.0.2: Destination host unreachable.
Reply from 30.0.0.2: Destination host unreachable.
Reply from 30.0.0.2: Destination host unreachable.
Ping statistics for 1.0.0.6:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.120.3
Pinging 192.168.120.3 with 32 bytes of data:
Reply from 20.0.0.2: Destination host unreachable.
Reply from 20.0.0.2: Destination host unreachable.
Reply from 20.0.0.2: Destination host unreachable.
Reply from 20.0.0.2: Destination host unreachable.
Ping statistics for 192.168.120.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

From all the result, we see that our Network is work properly. Configuration is successfully completed.

Conclusion:

We learn that how can we make the network and make configuration on them. We see that every network is connected with every other network and how can we block the traffic on some part of Network from whole network. We learn that how we can use one switch for different network using Vlans and how to make connection with other Vlans. So, if we need to make a huge network which consist of different small network. This learning of network is help us to create different Networks.