

CAMPUS LAN DESIGN WITH FULL DOCUMENTATION

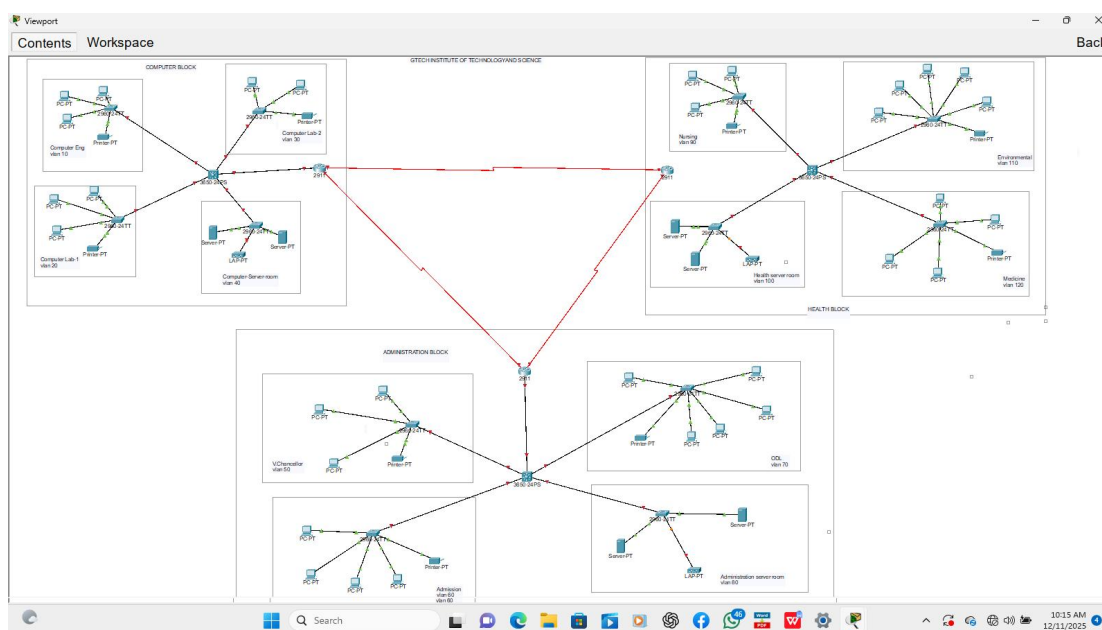
You just got hired to the new institution as a Network Engineer at Gtech Institute Of Science and technology. The following are the available resources

- 3 Buildings in the same area
- 3 Routers for each building
- 3 Layer 3 Switches
- 3 AP one per building
- 13 Layer 2 switches
- Serial cables for routers connections

The network address is 192.168.0.0 subnet it to meet the needs for Gtech Institute Of Technology. All vlan should support 14 hosts

SOLUTION

NETWORK TOPOLOGY



LAYER 2 CONFIGURATION ALL BUILDINGS

BUILDING 1

VLAN 10

Hostname IT-SW

Enable secret Admin

Username Admin password Admin123

Line console 0

Login local

Line vty 0 15

Login local

Banner motd # ADMINS ONLY#

Service password-encryption

Vlan 10

Name IT

```
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 10
Exit
Do wr
VLAN 20
Hostname LAB-1-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 20
Name LAB-1
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 20
Exit
Do wr
```

```
VLAN 30
Hostname LAB-2-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 30
Name LAB-2
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 30
Exit
Do wr
```

```
VLAN 40
Hostname SERVER-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 40
Name SERVERS
Exit
Int range fa0/1-24
```

```
Switchport mode access
Switchport access vlan 40
Exit
Do wr
VLAN 50
Hostname V.C-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 50
Name V.CHANCELLOR
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 50
Exit
Do wr
VLAN 60
Hostname ADMIN-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 60
Name ADMIN
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 60
Exit
Do wr
VLAN 70
Hostname ODL-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 70
Name ODL
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 70
Exit
```

Do wr

VLAN 80

```
Hostname ADMIN-SERVERS-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 80
Name ADMIN-SERVERS
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 80
Exit
Do wr
```

VLAN 90

```
Hostname NURSING-SERVERS-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 90
Name NURSING
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 90
Exit
Do wr
```

VLAN 100

```
Hostname ENVIRONMENTAL-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 100
Name ENVIRONMENTAL
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 100
Exit
Do wr
```

VLAN 110

```
Hostname HEALTH-SERVERS-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 110
Name HEALTH-SERVERS
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 110
Exit
Do wr
```

VLAN 120

```
Hostname MEDICINE-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Vlan 120
Name MEDICINE
Exit
Int range fa0/1-24
Switchport mode access
Switchport access vlan 120
Exit
Do wr
```

LAYER 3 SWITCHES CONFIGURATIONS

BUILDING 1

```
Hostname BUILDING1-MLS-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Int gig1/0/1
Switchport mode access
Switchport access vlan 10
Int gig1/0/2
Switchport mode access
Switchport access vlan 20
Int gig1/0/3
Switchport mode access
Switchport access vlan 30
```

```
Int gig1/0/4
Switchport mode access
Switchport access vlan 40
Int gig1/0/5
Switchport mode trunk
Do wr
```

BUILDING TWO

```
Hostname BUILDING2-MLS-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Int gig1/0/1
Switchport mode access
Switchport access vlan 50
```

```
Int gig1/0/2
Switchport mode access
Switchport access vlan 60
Int gig1/0/3
Switchport mode access
Switchport access vlan 70
Int gig1/0/4
Switchport mode access
Switchport access vlan 80
Int gig1/0/5
Switchport mode trunk
```

BUILDING THREE

```
Hostname BUILDING3-MLS-SW
Enable secret Admin
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
```

```
Int gig1/0/1
Switchport mode access
Switchport access vlan 90
```

```
Int gig1/0/2
Switchport mode access
Switchport access vlan 100
Int gig1/0/3
Switchport mode access
Switchport access vlan 110
Int gig1/0/4
Switchport mode access
Switchport access vlan 120
Int gig1/0/5
```

Switchport mode trunk

SUBNETTING

VLAN	HOST	MASK	NETWORK	USABLE ADDRESSES	BROADCAST
10	14	/28	192.168.0.0	192.168.0.1-14	192.168.0.15
20	14	/28	192.168.0.16	192.168.0.17-30	192.168.0.31
30	14	/28	192.168.0.32	192.168.0.33-46	192.168.0.47
40	14	/28	192.168.0.48	192.168.0.49-62	192.168.0.63
50	14	/28	192.168.0.64	192.168.0.65-78	192.168.0.79
60	14	/28	192.168.0.80	192.168.0.81-94	192.168.0.95
70	14	/28	192.168.0.96	192.168.0.97-110	192.168.0.111
80	14	/28	192.168.0.112	192.168.0.113-126	192.168.0.127
90	14	/28	192.168.0.128	192.168.0.129-142	192.168.0.143
100	14	/28	192.168.0.144	192.168.0.145-158	192.168.0.159
110	14	/28	192.168.0.160	192.168.0.161-174	192.168.0.175
120	14	/28	192.168.0.176	192.168.0.177-190	192.168.0.191

LAYER 3 CONFIGURATIONS

BUILDING ONE

```
Hostname BUILDING1-MAIN-ROUTER
Enable secret Admin1
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Int gig0/0
No shut
Ex
Int gig0/0.10
Enca dot1q 10
Ip add 192.168.0.1 255.255.255.240
Ex
Int gig0/0.20
Enca dot1q 20
Ip add 192.168.0.17 255.255.255.240
Ex
Int gig0/0.30
Enca dot1q 30
Ip add 192.168.0.33 255.255.255.240
Ex
Int gig0/0.40
Enca dot1q 40
Ip add 192.168.0.49 255.255.255.240
Ex
Ip dhcp excluded-address 192.168.0.1 192.168.0.5
Ip dhcp pool COMP-ENG
Network 192.168.0.0 255.255.255.240
Default-router 192.168.0.1
Dns-server 8.8.8.8.
Ip dhcp excluded-address 192.168.0.17 192.168.0.22
Ip dhcp pool COMP-LAB1
```

Network 192.168.0.16 255.255.255.240
Default-router 192.168.0.17
Dns-server 8.8.8.8

Ip dhcp excluded-address 192.168.0.33 192.168.0.38
Ip dhcp pool COMP-LAB2
Network 192.168.0.32 255.255.255.240
Default-router 192.168.0.33
Dns-server 8.8.8.8

Ip dhcp excluded-address 192.168.0.49 192.168.0.54
Ip dhcp pool SERVER-ROOM
Network 192.168.0.48 255.255.255.240
Default-router 192.168.0.49
Dns-server 8.8.8.8
DO WR

BUILDING TWO

Hostname BUILDING2-MAIN-ROUTER
Enable secret Admin1
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption
Int gig0/0
No shut
Ex
Int gig0/0.50
Enca dot1q 50
Ip add 192.168.0.65 255.255.255.240
Ex
Int gig0/0.60
Enca dot1q 60
Ip add 192.168.0.81 255.255.255.240
Ex
Int gig0/0.70
Enca dot1q 70
Ip add 192.168.0.97 255.255.255.240
Ex
Int gig0/0.80
Enca dot1q 80
Ip add 192.168.0.113 255.255.255.240
Ex
Ip dhcp excluded-address 192.168.0.65 192.168.0.70
Ip dhcp pool VC
Network 192.168.0.64 255.255.255.240
Default-router 192.168.0.65
Dns-server 8.8.8.8
Ip dhcp excluded-address 192.168.0.81 192.168.0.86
Ip dhcp pool ADMISSION

Network 192.168.0.80 255.255.255.240
Default-router 192.168.0.81
Dns-server 8.8.8.8

Ip dhcp excluded-address 192.168.0.97 192.168.0.102
Ip dhcp pool ODL
Network 192.168.0.96 255.255.255.240
Default-router 192.168.0.97
Dns-server 8.8.8.8

Ip dhcp excluded-address 192.168.0.113 192.168.0.118
Ip dhcp pool SERVER-ROOM
Network 192.168.0.112 255.255.255.240
Default-router 192.168.0.113
Dns-server 8.8.8.8
DO WR

BUILDING THREE

Hostname BUILDING3-MAIN-ROUTER
Enable secret Admin1
Username Admin password Admin123
Line console 0
Login local
Line vty 0 15
Login local
Banner motd # ADMINS ONLY#
Service password-encryption

Int gig0/0
No shut
Ex
Int gig0/0.90
Enca dot1q 90
Ip add 192.168.0.129 255.255.255.240
Ex
Int gig0/0.100
Enca dot1q 100
Ip add 192.168.0.145 255.255.255.240
Ex
Int gig0/0.110
Enca dot1q 110
Ip add 192.168.0.161 255.255.255.240
Ex
Int gig0/0.120
Enca dot1q 120
Ip add 192.168.0.177 255.255.255.240
Ex
Ip dhcp excluded-address 192.168.0.129 192.168.0.134
Ip dhcp pool NURSING
Network 192.168.0.128 255.255.255.240
Default-router 192.168.0.129
Dns-server 8.8.8.8
Ip dhcp excluded-address 192.168.0.145 192.168.0.150
Ip dhcp pool ENVIROMENTAL
Network 192.168.0.144 255.255.255.240
Default-router 192.168.0.145
Dns-server 8.8.8.8

```
Ip dhcp excluded-address 192.168.0.161 192.168.0.166
Ip dhcp pool SERVER-ROOM
Network 192.168.0.160 255.255.255.240
Default-router 192.168.0.161
Dns-server 8.8.8.8
```

```
Ip dhcp excluded-address 192.168.0.177 192.168.0.182
Ip dhcp pool MED
Network 192.168.0.176 255.255.255.240
Default-router 192.168.0.177
Dns-server 8.8.8.8
DO WR
```

[POINT TO POINT LINK](#)

We could use the same network address but for this project we will have to get another network block which is 10.0.0.0 we have to subnet it to all the serial connection.

[POINT TO POINT SUBNETTING](#)

LINKS	MASK	NETWORK	USABLE ADDRESSES	BROADCAST
BUILDING 1-2	/30	10.0.0.0	10.0.0.1-2	10.0.0.3
BUILDING 1-3	/30	10.0.0.4	10.0.0.5-6	10.0.0.7
BUILDING 2-3	/30	10.0.0.8	10.0.0.9-10	10.0.0.11

```
Building 1
Int se0/3/0
No shut
ip add 10.0.0.1 255.255.255.252
Ex
Int se0/3/1
No shut
ip add 10.0.0.5 255.255.255.252
Ex
Building 2
Int se0/3/0
No shut
ip add 10.0.0.6 255.255.255.252
Ex
Int se0/3/1
No shut
ip add 10.0.0.10 255.255.255.252
Ex
Building 3
Int se0/3/0
No shut
ip add 10.0.0.2 255.255.255.252
Ex
Int se0/3/1
No shut
ip add 10.0.0.9 255.255.255.252
Ex
```

ROUTING PROTOCOL

We could use static where me as an administrator I configure all the routes to all vlans but thankfully I don't have to do that the router will learn other routes via a routing protocol, in this project I will use Open Shortest Path First (OSPF)

BUILDING ONE

Router ospf 1

Router-id 1.1.1.1

Network 192.168.0.0 0.0.0.15 area 0

Network 192.168.0.16 0.0.0.15 area 0

Network 192.168.0.32 0.0.0.15 area 0

Network 192.168.0.48 0.0.0.15 area 0

Network 10.0.0.0 0.0.0.3 area 0

Network 10.0.0.4 0.0.0.3 area 0

BUILDING TWO

Router ospf 1

Router-id 2.2.2.2

Network 192.168.0.64 0.0.0.15 area 0

Network 192.168.0.80 0.0.0.15 area 0

Network 192.168.0.96 0.0.0.15 area 0

Network 192.168.0.112 0.0.0.15 area 0

Network 10.0.0.4 0.0.0.3 area 0

Network 10.0.0.8 0.0.0.3 area 0

BUILDING THREE

Router ospf 1

Router-id 3.3.3.3

Network 192.168.0.128 0.0.0.15 area 0

Network 192.168.0.144 0.0.0.15 area 0

Network 192.168.0.160 0.0.0.15 area 0

Network 192.168.0.176 0.0.0.15 area 0

Network 10.0.0.0 0.0.0.3 area 0

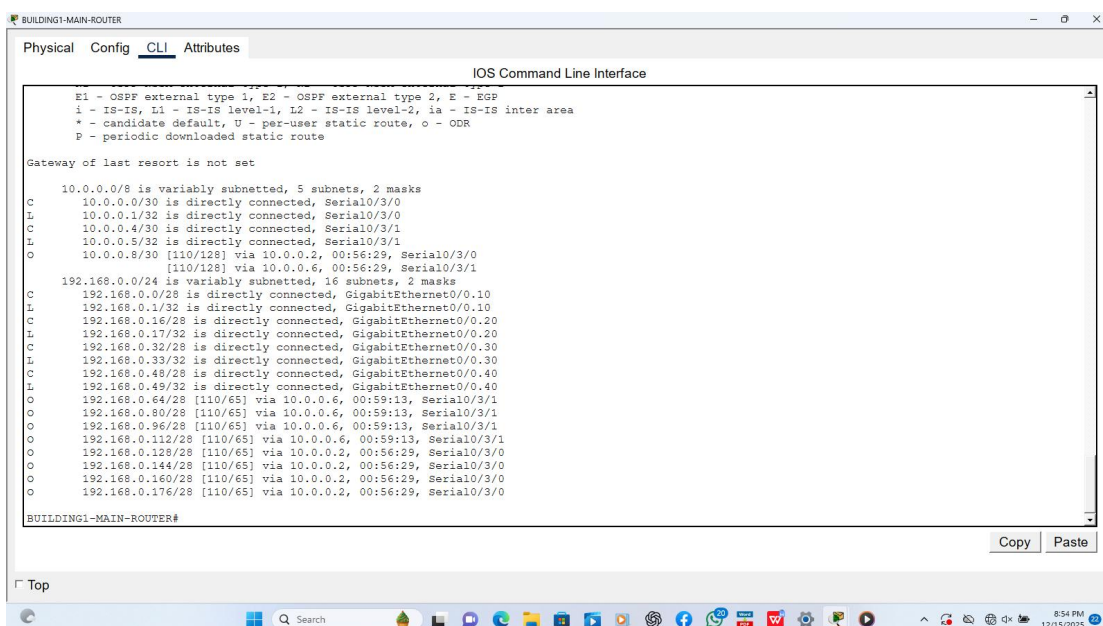
Network 10.0.0.8 0.0.0.3 area 0

Let us verify our routing protocol,

Building one

Show ip route

OUTPUT



```

BUILDING1-MAIN-ROUTER
Physical Config CLI Attributes
IOS Command Line Interface

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

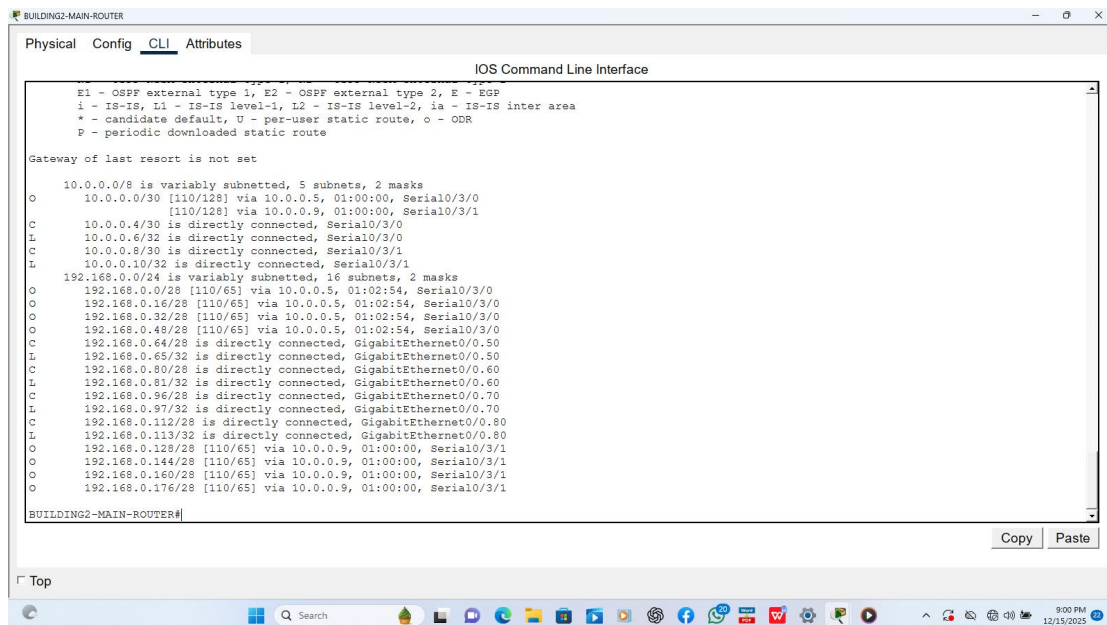
10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C    10.0.0.0/30 is directly connected, Serial0/3/0
L    10.0.0.1/32 is directly connected, Serial0/3/0
C    10.0.0.4/30 is directly connected, Serial0/3/1
L    10.0.0.5/32 is directly connected, Serial0/3/1
O    10.0.0.8/30 [110/128] via 10.0.0.2, 00:56:29, Serial0/3/0
    [110/128] via 10.0.0.6, 00:56:29, Serial0/3/1
192.168.0.0/24 is variably subnetted, 16 subnets, 2 masks
C    192.168.0.0/28 is directly connected, GigabitEthernet0/0.10
L    192.168.0.1/32 is directly connected, GigabitEthernet0/0.10
C    192.168.0.16/28 is directly connected, GigabitEthernet0/0.20
L    192.168.0.17/32 is directly connected, GigabitEthernet0/0.20
C    192.168.0.32/28 is directly connected, GigabitEthernet0/0.30
L    192.168.0.33/32 is directly connected, GigabitEthernet0/0.30
C    192.168.0.48/28 is directly connected, GigabitEthernet0/0.40
L    192.168.0.49/32 is directly connected, GigabitEthernet0/0.40
O    192.168.0.64/28 [110/65] via 10.0.0.6, 00:59:13, Serial0/3/1
O    192.168.0.80/28 [110/65] via 10.0.0.6, 00:59:13, Serial0/3/1
O    192.168.0.96/28 [110/65] via 10.0.0.6, 00:59:13, Serial0/3/1
O    192.168.0.112/28 [110/65] via 10.0.0.6, 00:59:13, Serial0/3/1
O    192.168.0.128/28 [110/65] via 10.0.0.2, 00:56:29, Serial0/3/0
O    192.168.0.144/28 [110/65] via 10.0.0.2, 00:56:29, Serial0/3/0
O    192.168.0.160/28 [110/65] via 10.0.0.2, 00:56:29, Serial0/3/0
O    192.168.0.176/28 [110/65] via 10.0.0.2, 00:56:29, Serial0/3/0

BUILDING1-MAIN-ROUTER#
```

Building two

Show ip route

OUTPUT



```
Building2-MAIN-ROUTER
Physical Config CLI Attributes
IOS Command Line Interface

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

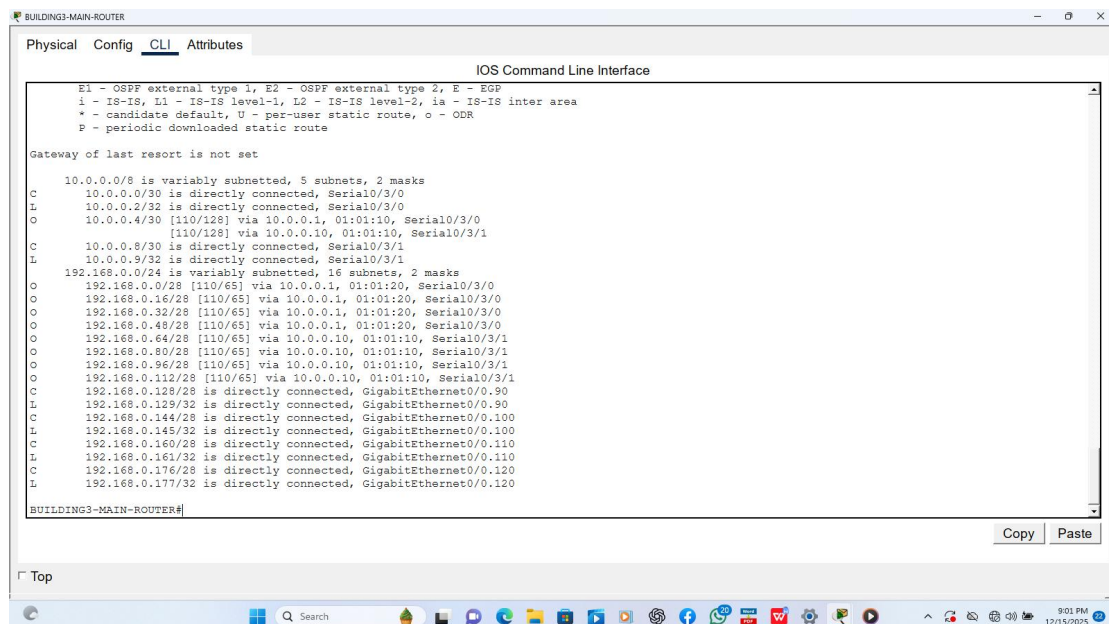
10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
O 10.0.0.0/30 [110/128] via 10.0.0.5, 01:00:00, Serial0/3/0
   [110/128] via 10.0.0.9, 01:00:00, Serial0/3/1
C 10.0.0.4/30 is directly connected, Serial0/3/0
O 10.0.0.6/32 is directly connected, Serial0/3/0
C 10.0.0.8/30 is directly connected, Serial0/3/1
L 10.0.0.10/32 is directly connected, Serial0/3/1
192.168.0.0/24 is variably subnetted, 16 subnets, 2 masks
O 192.168.0.0/28 [110/65] via 10.0.0.5, 01:02:54, Serial0/3/0
O 192.168.0.16/28 [110/65] via 10.0.0.5, 01:02:54, Serial0/3/0
O 192.168.0.32/28 [110/65] via 10.0.0.5, 01:02:54, Serial0/3/0
O 192.168.0.48/28 [110/65] via 10.0.0.5, 01:02:54, Serial0/3/0
C 192.168.0.64/28 is directly connected, GigabitEthernet0/0.50
L 192.168.0.65/32 is directly connected, GigabitEthernet0/0.50
C 192.168.0.80/28 is directly connected, GigabitEthernet0/0.60
L 192.168.0.81/32 is directly connected, GigabitEthernet0/0.60
C 192.168.0.96/28 is directly connected, GigabitEthernet0/0.70
L 192.168.0.97/32 is directly connected, GigabitEthernet0/0.70
C 192.168.0.112/28 is directly connected, GigabitEthernet0/0.80
L 192.168.0.113/32 is directly connected, GigabitEthernet0/0.80
O 192.168.0.128/28 [110/65] via 10.0.0.9, 01:00:00, Serial0/3/1
O 192.168.0.144/28 [110/65] via 10.0.0.9, 01:00:00, Serial0/3/1
O 192.168.0.160/28 [110/65] via 10.0.0.9, 01:00:00, Serial0/3/1
O 192.168.0.176/28 [110/65] via 10.0.0.9, 01:00:00, Serial0/3/1

BUILDING2-MAIN-ROUTER#
```

Building three

Show ip route

OUTPUT



```
Building3-MAIN-ROUTER
Physical Config CLI Attributes
IOS Command Line Interface

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C 10.0.0.0/30 is directly connected, Serial0/3/0
L 10.0.0.2/32 is directly connected, Serial0/3/0
O 10.0.0.4/30 [110/128] via 10.0.0.1, 01:01:10, Serial0/3/0
   [110/128] via 10.0.0.10, 01:01:10, Serial0/3/1
C 10.0.0.8/30 is directly connected, Serial0/3/1
L 10.0.0.9/32 is directly connected, Serial0/3/1
192.168.0.0/24 is variably subnetted, 16 subnets, 2 masks
O 192.168.0.0/28 [110/65] via 10.0.0.1, 01:01:20, Serial0/3/0
O 192.168.0.16/28 [110/65] via 10.0.0.1, 01:01:20, Serial0/3/0
O 192.168.0.32/28 [110/65] via 10.0.0.1, 01:01:20, Serial0/3/0
O 192.168.0.48/28 [110/65] via 10.0.0.1, 01:01:20, Serial0/3/0
O 192.168.0.64/28 [110/65] via 10.0.0.10, 01:01:10, Serial0/3/1
O 192.168.0.80/28 [110/65] via 10.0.0.10, 01:01:10, Serial0/3/1
O 192.168.0.96/28 [110/65] via 10.0.0.10, 01:01:10, Serial0/3/1
C 192.168.0.112/28 is directly connected, GigabitEthernet0/0.90
L 192.168.0.129/32 is directly connected, GigabitEthernet0/0.90
C 192.168.0.144/28 is directly connected, GigabitEthernet0/0.100
L 192.168.0.145/32 is directly connected, GigabitEthernet0/0.100
C 192.168.0.160/28 is directly connected, GigabitEthernet0/0.110
L 192.168.0.161/32 is directly connected, GigabitEthernet0/0.110
C 192.168.0.176/28 is directly connected, GigabitEthernet0/0.120
L 192.168.0.177/32 is directly connected, GigabitEthernet0/0.120

BUILDING3-MAIN-ROUTER#
```

From the output above we can see that all the routers have learned other router's routes. We can confirm that our OSPF configurations are working properly.

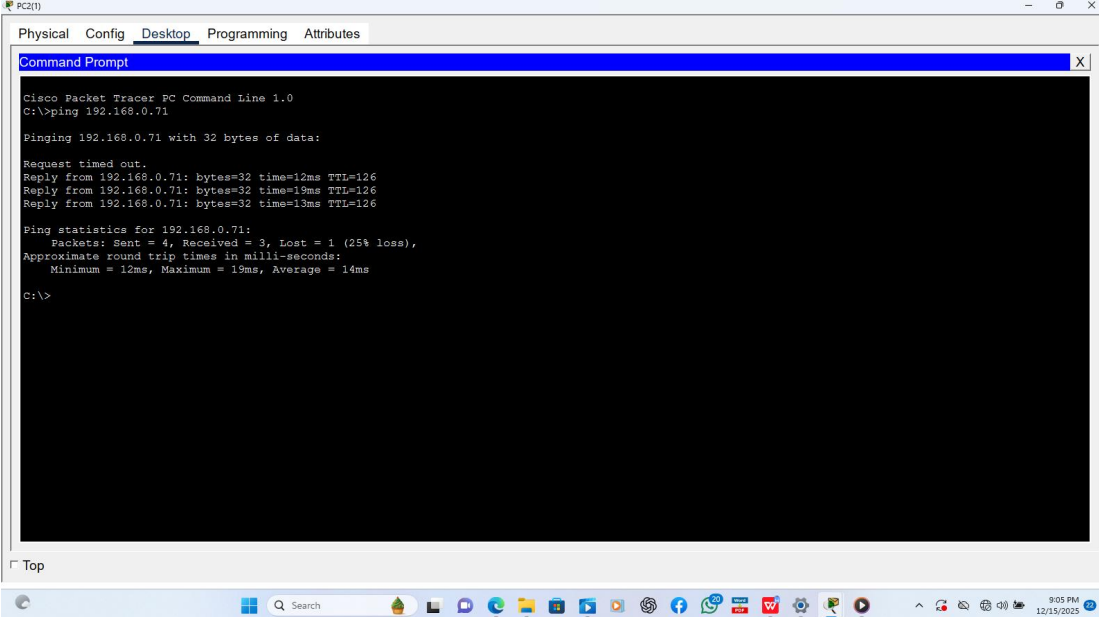
Next lets test connectivity between the vlans from one building to the other

Building one to building two

Vlan 20 to vlan 50

Ping 192.168.0.71

OUTPUT



The screenshot shows a Cisco Packet Tracer PC Command Line interface for PC2(T1). The user has entered the command 'ping 192.168.0.71'. The output shows a successful ping with 32 bytes of data. The statistics indicate 4 packets sent, 3 received, and 1 lost (25% loss). The approximate round trip times are: Minimum = 12ms, Maximum = 19ms, Average = 14ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.71

Pinging 192.168.0.71 with 32 bytes of data:

Request timed out.
Reply from 192.168.0.71: bytes=32 time=12ms TTL=126
Reply from 192.168.0.71: bytes=32 time=19ms TTL=126
Reply from 192.168.0.71: bytes=32 time=13ms TTL=126

Ping statistics for 192.168.0.71:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 19ms, Average = 14ms

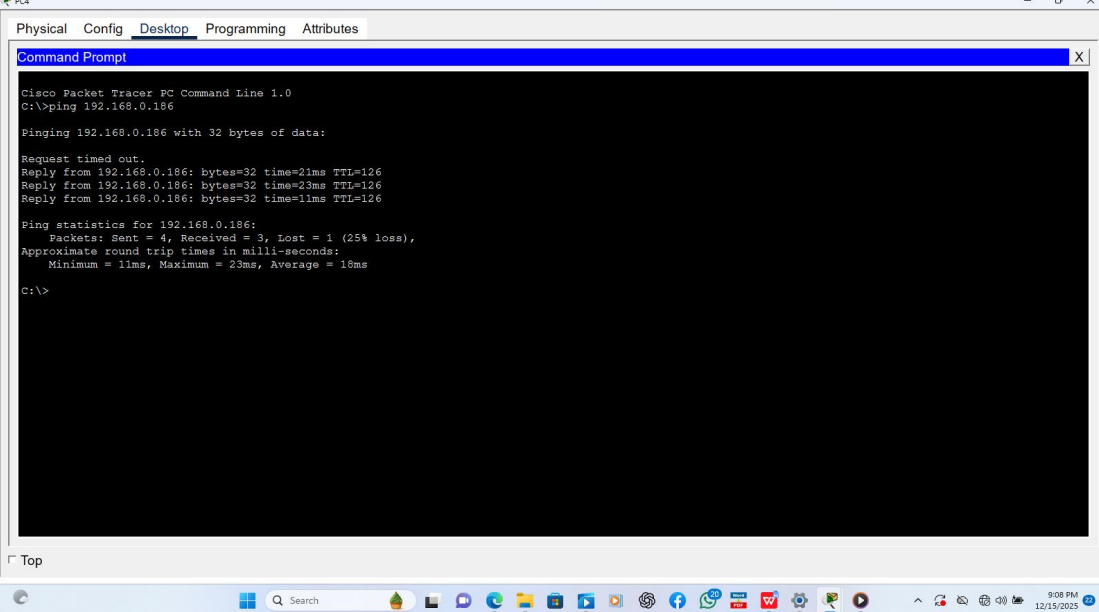
C:\>
```

Building two to building three

Vlan 70 to vlan 120

Ping 192.168.0.186

OUTPUT



The screenshot shows a Cisco Packet Tracer PC Command Line interface for PC4. The user has entered the command 'ping 192.168.0.186'. The output shows a successful ping with 32 bytes of data. The statistics indicate 4 packets sent, 3 received, and 1 lost (25% loss). The approximate round trip times are: Minimum = 11ms, Maximum = 23ms, Average = 18ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.186

Pinging 192.168.0.186 with 32 bytes of data:

Request timed out.
Reply from 192.168.0.186: bytes=32 time=21ms TTL=126
Reply from 192.168.0.186: bytes=32 time=23ms TTL=126
Reply from 192.168.0.186: bytes=32 time=11ms TTL=126

Ping statistics for 192.168.0.186:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 23ms, Average = 18ms

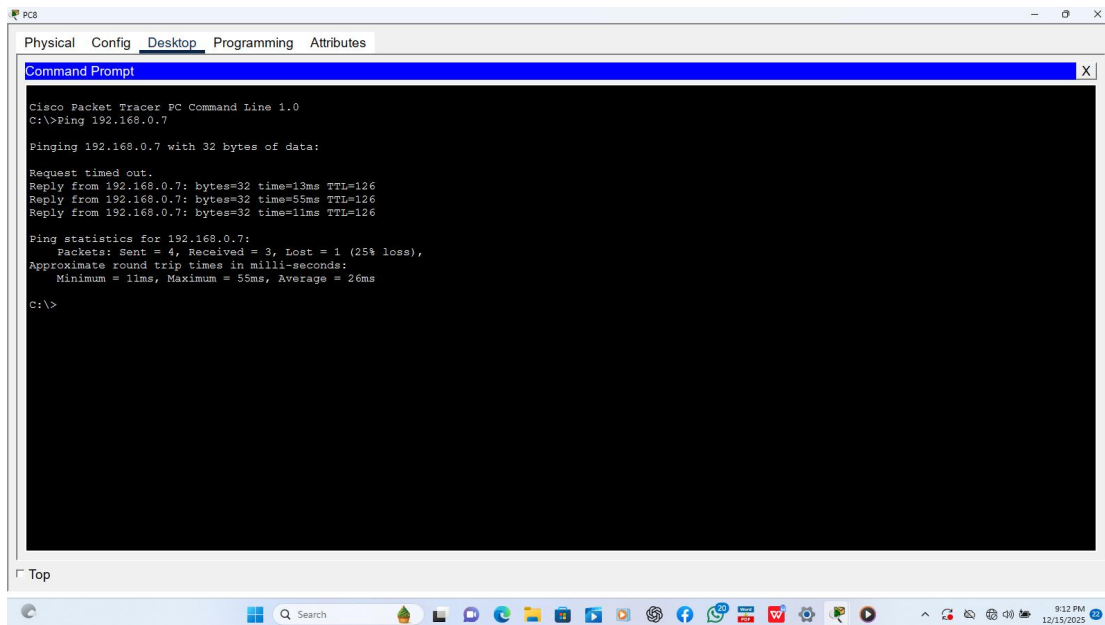
C:\>
```

Building three to building one

Vlan 60 to vlan 10

Ping 192.168.0.7

OUTPUT



```
PC8
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>Ping 192.168.0.7

Pinging 192.168.0.7 with 32 bytes of data:

Request timed out.
Reply from 192.168.0.7: bytes=32 time=13ms TTL=126
Reply from 192.168.0.7: bytes=32 time=55ms TTL=126
Reply from 192.168.0.7: bytes=32 time=11ms TTL=126

Ping statistics for 192.168.0.7:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 55ms, Average = 26ms

C:\>
```

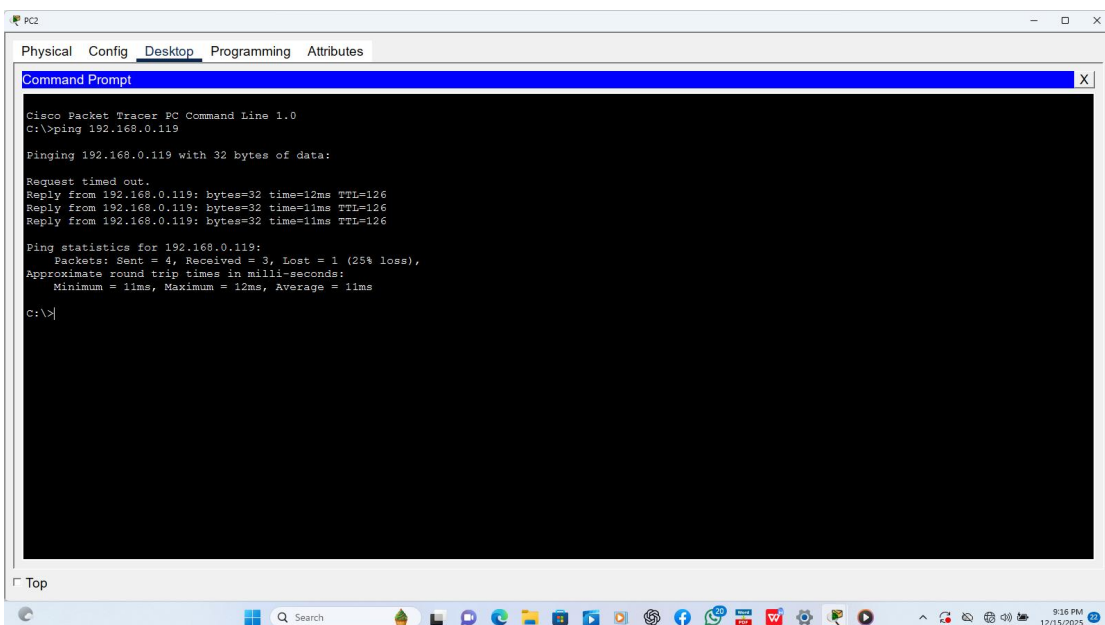
We can see that we have connectivity between the vlans, let try with the server rooms

Building one to building two server room

Vlan 10 to building two server 1

Ping 192.168.0.119

OUTPUT



```
PC2
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.119

Pinging 192.168.0.119 with 32 bytes of data:

Request timed out.
Reply from 192.168.0.119: bytes=32 time=12ms TTL=126
Reply from 192.168.0.119: bytes=32 time=11ms TTL=126
Reply from 192.168.0.119: bytes=32 time=11ms TTL=126

Ping statistics for 192.168.0.119:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 12ms, Average = 11ms

C:\>
```

We could do for all the buildings but to keep this project simple and short we will just do one. We have a situation here, normally its not good ideal for vlans to access other vlan servers, it's good ideal to isolate all the servers by preventing vlans from accessing other vlan serves eg vlan 10 from building two server room vlan 80,

In short we have to prevent building one hosts from accessing building two server room and building three server room, and vice versa. To do this we have to implement or configure Access List Control.

ACCESS LIST CONTROL

for this project am going to use extended access list. Extended check the traffic based on both source and destination address.

BUILDING TWO HOSTS FROM BUILDING ONE SERVERS

Ip access-list Extended block-buiding-two-hosts

deny ip 192.168.0.64 0.0.0.15 host 192.168.0.55

deny ip 192.168.0.80 0.0.0.15 host 192.168.0.55

deny ip 192.168.0.96 0.0.0.15 host 192.168.0.56

deny ip 192.168.0.64 0.0.0.15 host 192.168.0.56

deny ip 192.168.0.80 0.0.0.15 host 192.168.0.56

deny ip 192.168.0.96 0.0.0.15 host 192.168.0.56

Permit ip any any

Ex

Int se0/3/1

Ip access-group block buiding-two-hosts in

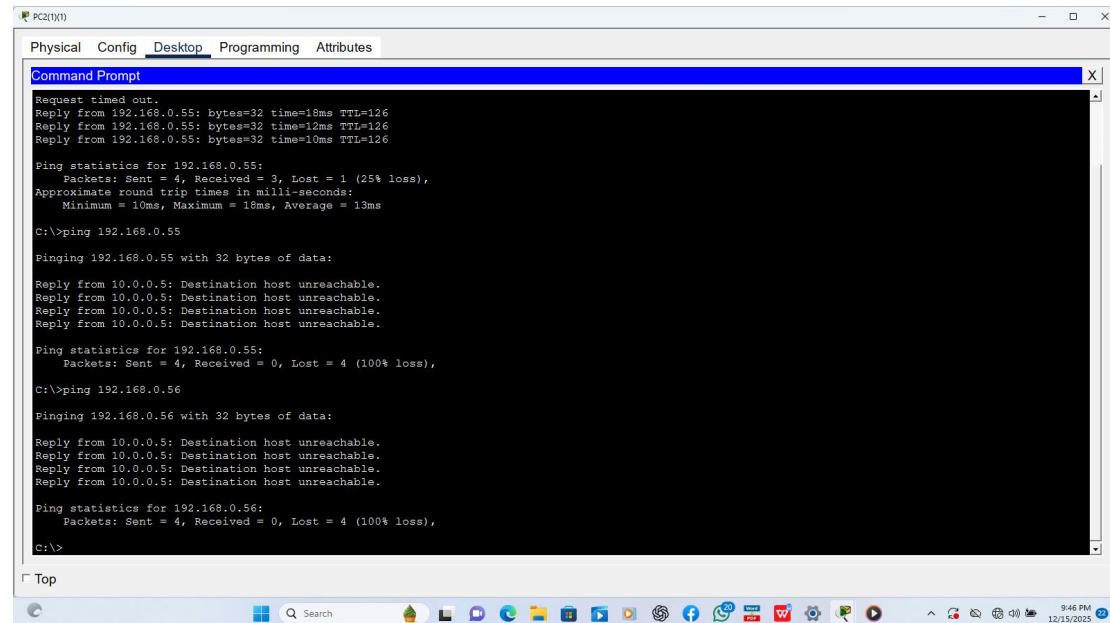
Lets try to ping building one servers from building two host

We will try for both servers 1 and 2

192.168.0.55 and 192.168.0.56

Ping 192.168.0.55

OUTPUT



```
PC2(TXT)
Physical Config Desktop Programming Attributes
Command Prompt
Request timed out.
Reply from 192.168.0.55: bytes=32 time=18ms TTL=126
Reply from 192.168.0.55: bytes=32 time=12ms TTL=126
Reply from 192.168.0.55: bytes=32 time=10ms TTL=126

Ping statistics for 192.168.0.55:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 18ms, Average = 13ms

C:\>ping 192.168.0.55

Pinging 192.168.0.55 with 32 bytes of data:

Reply from 10.0.0.5: Destination host unreachable.
Reply from 10.0.0.5: Destination host unreachable.
Reply from 10.0.0.5: Destination host unreachable.
Reply from 10.0.0.5: Destination host unreachable.

Ping statistics for 192.168.0.55:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.0.56

Pinging 192.168.0.56 with 32 bytes of data:

Reply from 10.0.0.5: Destination host unreachable.
Reply from 10.0.0.5: Destination host unreachable.
Reply from 10.0.0.5: Destination host unreachable.
Reply from 10.0.0.5: Destination host unreachable.

Ping statistics for 192.168.0.56:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

The ACLs are well configured

Lets continue blocking,

BUILDING THREE HOSTS FROM BUILDING ONE SERVERS

Ip access-list Extended block-building-three-hosts

deny ip 192.168.0.128 0.0.0.15 host 192.168.0.55

deny ip 192.168.0.144 0.0.0.15 host 192.168.0.55

deny ip 192.168.0.176 0.0.0.15 host 192.168.0.56

deny ip 192.168.0.128 0.0.0.15 host 192.168.0.56

deny ip 192.168.0.144 0.0.0.15 host 192.168.0.56

deny ip 192.168.0.176 0.0.0.15 host 192.168.0.56

Permit ip any any

Ex

Int se0/3/0

Ip access-group block-building-three-hosts in

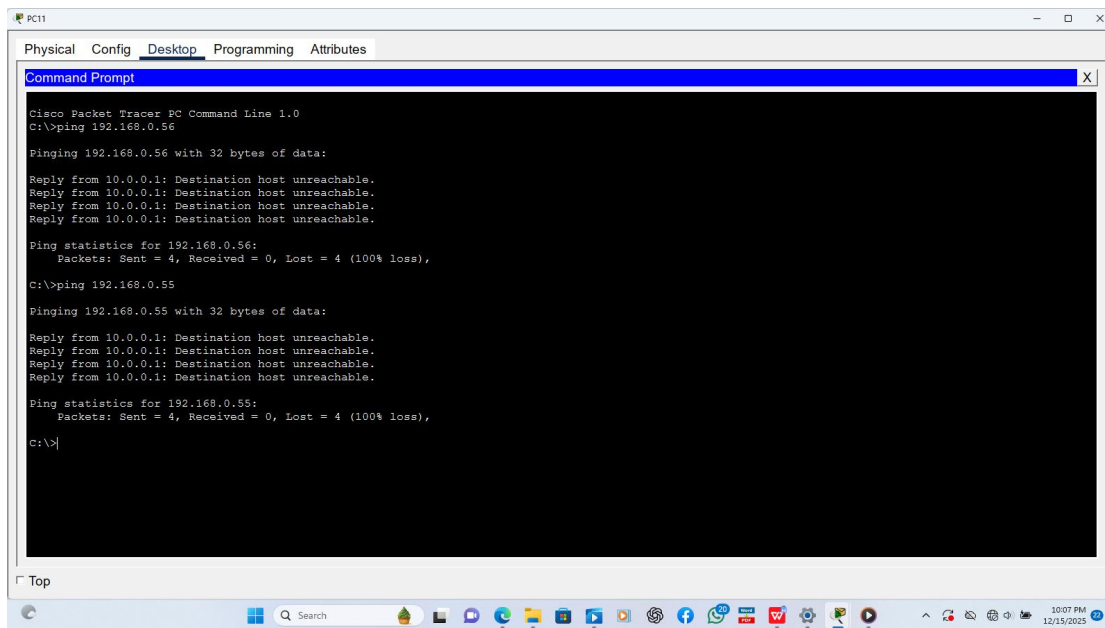
Let's ping from building three to building one servers

Ping 192.168.0.55

And also

Ping 192.168.0.56

OUTPUT



```
PC11
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.56
Pinging 192.168.0.56 with 32 bytes of data:
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Ping statistics for 192.168.0.56:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.0.55
Pinging 192.168.0.55 with 32 bytes of data:
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Ping statistics for 192.168.0.55:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

We can also see that the ACLs are working perfectly

We now go to building two

BUILDING ONE HOSTS FROM BUILDING TWO SERVERS

Ip access-list Extended block-building-one-hosts

deny ip 192.168.0.0 0.0.0.15 host 192.168.0.119

deny ip 192.168.0.16 0.0.0.15 host 192.168.0.119

deny ip 192.168.0.32 0.0.0.15 host 192.168.0.119

deny ip 192.168.0.0 0.0.0.15 host 192.168.0.120

deny ip 192.168.0.16 0.0.0.15 host 192.168.0.120

deny ip 192.168.0.32 0.0.0.15 host 192.168.0.120

Permit ip any any

Ex

Int se0/3/0

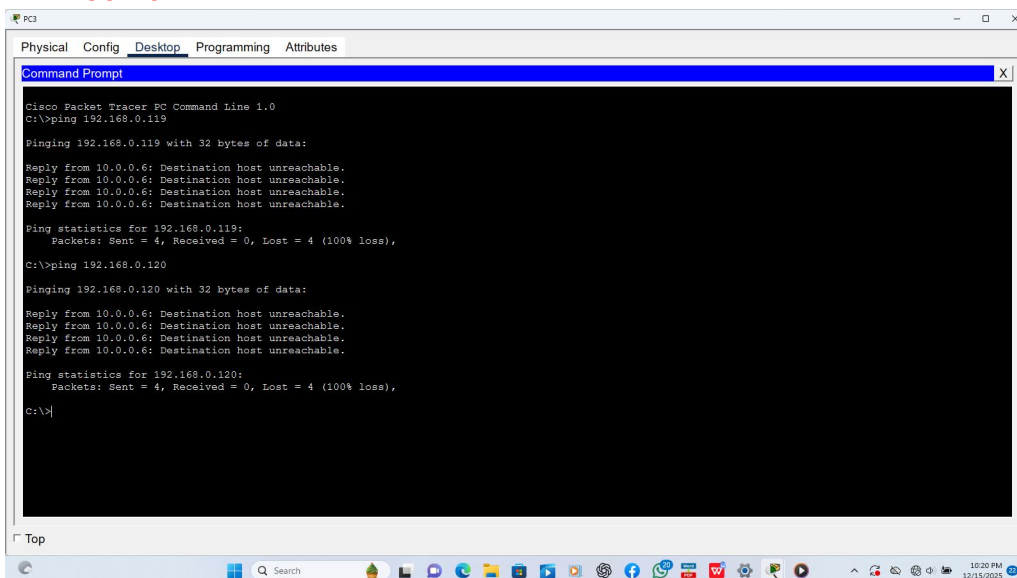
Ip access-group block-building-one-hosts in

Let us test from building one to building two servers

Ping 192.168.0.119

And 192.168.0.120

OUTPUT



```
PC3
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.119
Pinging 192.168.0.119 with 32 bytes of data:
Reply from 10.0.0.6: Destination host unreachable.
Reply from 10.0.0.6: Destination host unreachable.
Reply from 10.0.0.6: Destination host unreachable.
Reply from 10.0.0.6: Destination host unreachable.
Ping statistics for 192.168.0.119:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.0.120
Pinging 192.168.0.120 with 32 bytes of data:
Reply from 10.0.0.6: Destination host unreachable.
Reply from 10.0.0.6: Destination host unreachable.
Reply from 10.0.0.6: Destination host unreachable.
Reply from 10.0.0.6: Destination host unreachable.
Ping statistics for 192.168.0.120:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```


We can see that the ACLs are also working , lets continue

BUILDING THREE HOSTS FROM BUILDING TWO SERVERS

```
Ip access-list Extended block-building-Three-hosts
deny ip 192.168.0.128 0.0.0.15 host 192.168.0.119
deny ip 192.168.0.144 0.0.0.15 host 192.168.0.119
deny ip 192.168.0.176 0.0.0.15 host 192.168.0.119
deny ip 192.168.0.128 0.0.0.15 host 192.168.0.120
deny ip 192.168.0.144 0.0.0.15 host 192.168.0.120
deny ip 192.168.0.176 0.0.0.15 host 192.168.0.120
Permit ip any any
```

Ex

Int se0/3/1

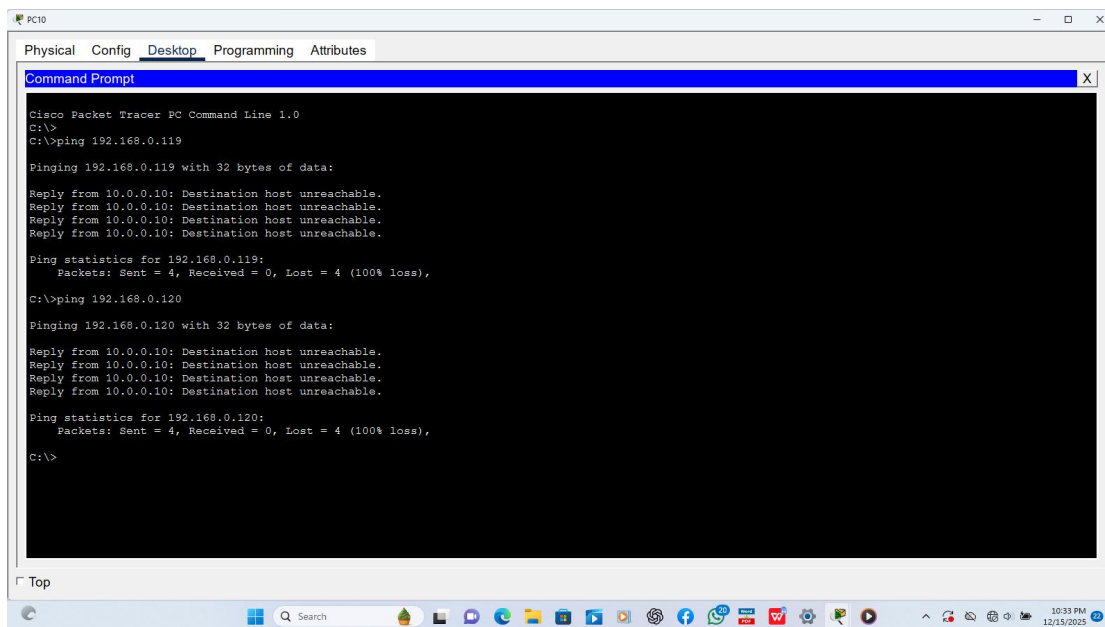
Ip access-group block-building-Three-hosts in

Lets do the ping

Ping 192.168.0.119

Ping 192.168.0.120

OUTPUT



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC10. The window has tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, showing a Command Prompt window. The Command Prompt displays the following output:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>
C:\>ping 192.168.0.119

Pinging 192.168.0.119 with 32 bytes of data:

Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.

Ping statistics for 192.168.0.119:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.0.120

Pinging 192.168.0.120 with 32 bytes of data:

Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.

Ping statistics for 192.168.0.120:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

We are good here so let us go to building three now

BUILDING ONE HOSTS FROM BUILDING THREE SERVERS

```
Ip access-list Extended block-building-one-hosts
deny ip 192.168.0.0 0.0.0.15 host 192.168.0.166
deny ip 192.168.0.16 0.0.0.15 host 192.168.0.166
deny ip 192.168.0.32 0.0.0.15 host 192.168.0.166
deny ip 192.168.0.0 0.0.0.15 host 192.168.0.167
deny ip 192.168.0.16 0.0.0.15 host 192.168.0.167
deny ip 192.168.0.32 0.0.0.15 host 192.168.0.167
Permit ip any any
```

Ex

Int se0/3/0

Ip access-group block-building-one-hosts in

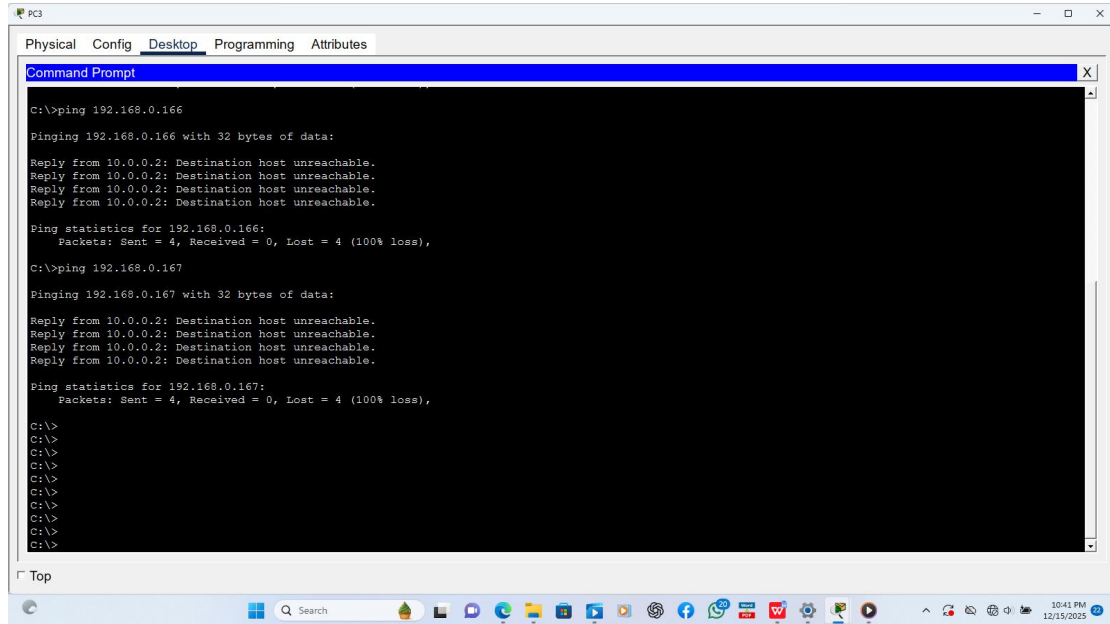
Let us try to ping

Ping 192.168.0.166

And

Ping 192.168.0.167

OUTPUT



```
PC3
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ping 192.168.0.166
Pinging 192.168.0.166 with 32 bytes of data:
Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Ping statistics for 192.168.0.166:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.0.167
Pinging 192.168.0.167 with 32 bytes of data:
Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Ping statistics for 192.168.0.167:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
```

ACLs successfully implemented
Now let us finish with building two hosts

BUILDING TWO HOSTS FROM BUILDING THREE SERVERS

Ip access-list Extended block-building-two-hosts
deny ip 192.168.0.64 0.0.0.15 host 192.168.0.166
deny ip 192.168.0.80 0.0.0.15 host 192.168.0.166
deny ip 192.168.0.97 0.0.0.15 host 192.168.0.166
deny ip 192.168.0.64 0.0.0.15 host 192.168.0.167
deny ip 192.168.0.80 0.0.0.15 host 192.168.0.167
deny ip 192.168.0.97 0.0.0.15 host 192.168.0.167
Permit ip any any

Ex

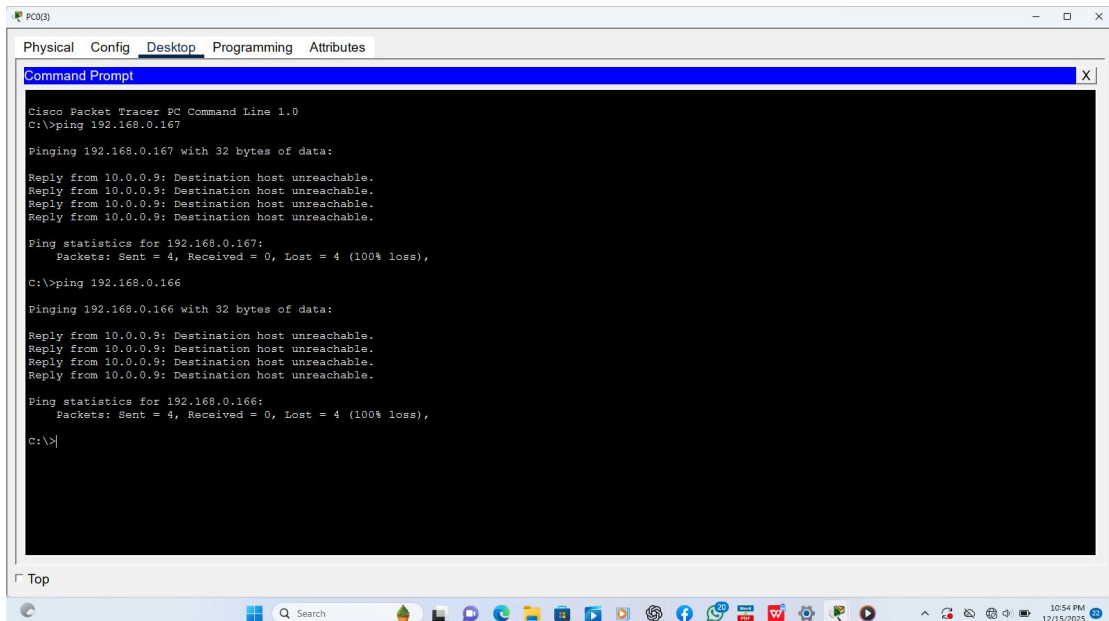
Int se0/3/1

Ip access-group block-building-two-hosts in

Ping 192.168.0.166

And ping 192.168.0.167

OUTPUT



```
PC0(3)
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.167
Pinging 192.168.0.167 with 32 bytes of data:
Reply from 10.0.0.9: Destination host unreachable.
Reply from 10.0.0.9: Destination host unreachable.
Reply from 10.0.0.9: Destination host unreachable.
Reply from 10.0.0.9: Destination host unreachable.
Ping statistics for 192.168.0.167:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.0.166
Pinging 192.168.0.166 with 32 bytes of data:
Reply from 10.0.0.9: Destination host unreachable.
Reply from 10.0.0.9: Destination host unreachable.
Reply from 10.0.0.9: Destination host unreachable.
Reply from 10.0.0.9: Destination host unreachable.
Ping statistics for 192.168.0.166:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

Everything is now working as needed.

that's the end of this project

The goal/achievements are;

- **Inter vlan routing**
- **DHCP configured**
- **Access Control List (isolating servers)**
- **Dynamic routing- Open Shortest Path First**