PROJECT:
NexLink Company

QAL1_ISS2_M1e

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Scenario Overview:

A company has several buildings (Building A, Building B, and Building C) connected to a Headquarters (HQ). Each building has its own internal networks segmented by VLANs, with dynamic IP assignment through DHCP. The company uses BGP as its external routing protocol to communicate with other branches or the internet, while internal communication between the different buildings and HQ uses inter-VLAN routing.

Additionally, SSH is implemented for secure remote management of network devices across the network.

Company Structure

Network Requirements:

1. Routing Protocol: BGP for external routing.
2. Internal Routing: Inter-VLAN routing using a Layer 3 switch.
3. DHCP: Each VLAN in every building and HQ should have DHCP assigned IP addresses.
4. SSH: Enable SSH on all routers for secure management.
5. Connectivity: Each building connects to HQ through routers.

Company Structure

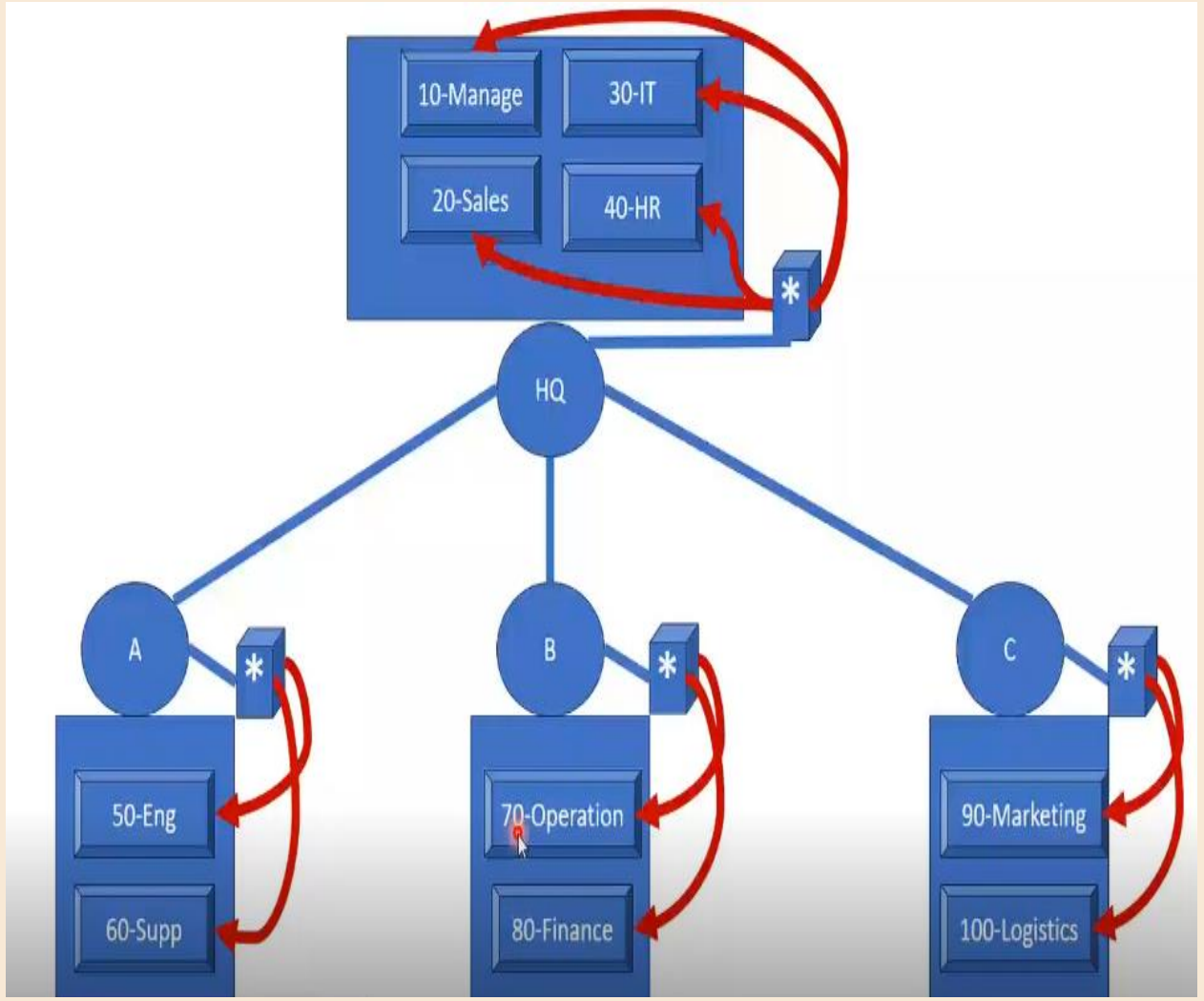
Network Topology:

1) Headquarters (HQ):

- Router: HQ-Router (BGP-enabled)
- Layer 3 Switch: HQ-Switch (Inter-VLAN
- routing)
- VLANS:
    - VLAN 70 (Management): 70.0.0.0/24
    - VLAN 80 (Sales): 80.0.0.0/24
    - VLAN 90 (IT): 90.0.0.0/24
    - VLAN 100 (HR): 100.0.0.0/24.

2) Building A:

- Router: BuildingA-Router (BGP-enabled)
- Layer 3 Switch: BuildingA-Switch (Inter-VLAN routing)
- VLANS:
    - VLAN 50 (Engineering): 50.0.0.0/24
    - VLAN 60 (Support): 60.0.0.0/24



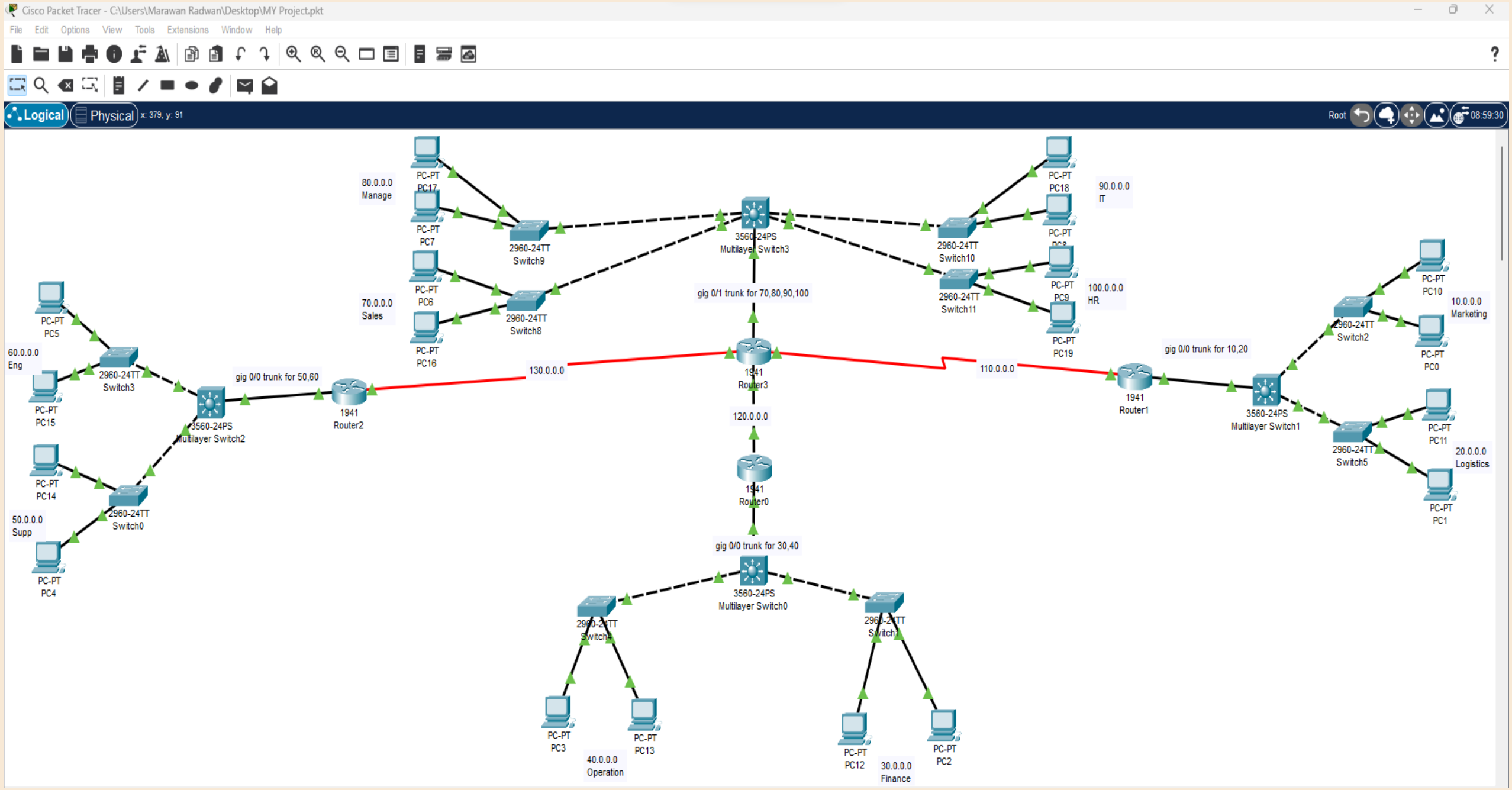
Network Topology

3) Building B:

- **Router: BuildingB-Router (BGP-enabled)**
- **Layer 3 Switch: BuildingB-Switch (Inter-VLAN routing)**
- **VLANS:**
  - VLAN 40 (Operations): 40.0.0.0/24
  - VLAN 30 (Finance): 30.0.0.0/24

4) Building C:

- **Router: BuildingC-Router (BGP-enabled)**
- **Layer 3 Switch: BuildingC-Switch (Inter-VLAN routing)**
- **VLANS:**
  - VLAN 20 (Logistics): 20.0.0.0/24
  - VLAN 10 (Marketing): 10.0.0.0/24


Cisco Packet Tracer - C:\Users\Marawan Radwan\Desktop\MY Project.pkt
File Edit Options View Tools Extensions Window Help
Logical
Physical
x: 379, y: 91
Root
08:59:30
80.0.0.0
Manage
PC-PT PC17
PC-PT PC7
2960-24TT Switch9
3560-24PS Multilayer Switch3
90.0.0.0
IT
PC-PT PC18
2960-24TT Switch10
70.0.0.0
Sales
PC-PT PC6
PC-PT PC16
2960-24TT Switch8
gig 0/1 trunk for 70,80,90,100
2960-24TT Switch11
PC-PT PC9
PC-PT PC19
100.0.0.0
HR
PC-PT PC5
60.0.0.0
Eng
2960-24TT Switch3
PC-PT PC15
gig 0/0 trunk for 50,60
3560-24PS Multilayer Switch2
1941 Router2
130.0.0.0
1941 Router3
110.0.0.0
1941 Router1
gig 0/0 trunk for 10,20
3560-24PS Multilayer Switch1
2960-24TT Switch2
PC-PT PC10
PC-PT PC0
10.0.0.0
Marketing
2960-24TT Switch5
PC-PT PC11
PC-PT PC1
20.0.0.0
Logistics
120.0.0.0
1941 Router0
PC-PT PC14
2960-24TT Switch0
50.0.0.0
Supp
PC-PT PC4
gig 0/0 trunk for 30,40
3560-24PS Multilayer Switch0
2960-24TT Switch4
2960-24TT Switch1
PC-PT PC3
PC-PT PC13
40.0.0.0
Operation
PC-PT PC12
PC-PT PC2
30.0.0.0
Finance

Network Configuration Plan:

1. BGP Configuration:

- Each building and HQ will have BGP configured with a unique Autonomous System Number (ASN). For simplicity:
  - HQ uses ASN 65000.
  - Building A uses ASN 65001.
  - Building B uses ASN 65002.
  - Building C uses ASN 65003.
- External BGP (eBGP) neighbors will be established between the HQ and each building router.

2. Inter-VLAN Routing:

- Layer 3 switches at each location will handle inter-VLAN routing.
- VLANs are assigned different subnets, and the Layer 3 switch will route traffic between VLANs at each location.

Network Configuration Plan:

3. **DHCP Configuration:**
   - Each building and HQ will have DHCP pools configured for each VLAN.
   - Routers will act as DHCP relay agents, forwarding DHCP requests to the DHCP servers in each building or HQ.
4. **SSH Configuration:**
   - SSH will be enabled on all routers for secure remote management.

1. BGP Configuration:

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip add
Router(config-if)#ip address 110.0.0.2 255.255.255.0
Router(config-if)#no shu
Router(config-if)#no shutdown
```

```
Router(config)#int se0/0/0
Router(config-if)#ip add 110.0.0.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#no shutdown
```

```
Router(config-if)#
Router(config-if)#
Router(config-if)#int g0/0
Router(config-if)#ip add
Router(config-if)#ip address 120.0.0.2 255.255.255.0
Router(config-if)#no shu
Router(config-if)#no shutdown
```

```
Router(config)#int g0/1
Router(config-if)#ip add
Router(config-if)#ip address 120.0.0.1 255.255.255.04
Bad mask 0xFFFFFF04 for address 120.0.0.1
Router(config-if)#ip address 120.0.0.1 255.255.255.0
Router(config-if)#no shu
Router(config-if)#no shutdown
```

```
Router(config-if)#
Router(config-if)#int s0/0/1
Router(config-if)#ip add
Router(config-if)#ip address 130.0.0.2 255.255.255.0
Router(config-if)#no shu
Router(config-if)#no shutdown
```

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip add
Router(config-if)#ip address 130.0.0.1  255.255.255.0
Router(config-if)#no shut do
Router(config-if)#no shut
Router(config-if)#no shutdown
```

```
Router(config-router)#net
Router(config-router)#network 50.0.0.0 ma
Router(config-router)#network 50.0.0.0 mask 255.255.255.0
Router(config-router)#network 60.0.0.0 mask 255.255.255.0
Router(config-router)#nei
Router(config-router)#neighbor 130.0.0.2 re
Router(config-router)#neighbor 130.0.0.2 remote-as 5
Router(config-router)#do wr
Building configuration...
[OK]
```

```
Router(config)#router bgp 3040
Router(config-router)#netw
Router(config-router)#network 30.0.0.0 mas
Router(config-router)#network 30.0.0.0 mask 255.255.255.0
Router(config-router)#network 40.0.0.0 mask 255.255.255.0
Router(config-router)#nei
Router(config-router)#neighbor 120.0.0.2 re
Router(config-router)#neighbor 120.0.0.2 remote-as 5
Router(config-router)#do wr
Building configuration...
[OK]
```

```
Router(config)#router bgp 1020
Router(config-router)#net
Router(config-router)#network 10.0.0.0
Router(config-router)#mas
Router(config-router)#mas
Router(config-router)#network 10.0.0.0  mas
Router(config-router)#network 10.0.0.0  mask 255.255.255.0
Router(config-router)#network 20.0.0.0  mask 255.255.255.0
Router(config-router)#nei
Router(config-router)#neighbor 110.0.0.2
% Incomplete command.
Router(config-router)#neighbor 110.0.0.2 ?
  next-hop-self  Disable the next hop calculation for this neighbor
  remote-as      Specify a BGP neighbor
Router(config-router)#neighbor 110.0.0.2 re
Router(config-router)#neighbor 110.0.0.2 remote-as 5
```

```
Router(config)#router bgp 5
Router(config-router)#netw
Router(config-router)#network 70.0.0.0 mas
Router(config-router)#network 70.0.0.0 mask 255.255.255.0
Router(config-router)#network 80.0.0.0 mask 255.255.255.0
Router(config-router)#network 90.0.0.0 mask 255.255.255.0
Router(config-router)#network 100.0.0.0 mask 255.255.255.0
```

```
Router(config-router)# no neighbor 110.0.0.1  remote-as 3040
Router(config-router)# neighbor 110.0.0.1  remote-as 1020
Router(config-router)#%BGP-5-ADJCHANGE: neighbor 110.0.0.1 Up

Router(config-router)#neighbor 120.0.0.1  remote-as 3040
Router(config-router)#%BGP-5-ADJCHANGE: neighbor 120.0.0.1 Up

Router(config-router)#neighbor 130.0.0.1  remote-as 5060
Router(config-router)#%BGP-5-ADJCHANGE: neighbor 130.0.0.1 Up

Router(config-router)#
Router(config-router)#
Router(config-router)#do wr
Building configuration...
[OK]
```

```
C:\>ping 70.0.0.2

Pinging 70.0.0.2 with 32 bytes of data:

Reply from 70.0.0.2: bytes=32 time=2ms TTL=126
Reply from 70.0.0.2: bytes=32 time=22ms TTL=126
Reply from 70.0.0.2: bytes=32 time=1ms TTL=126
Reply from 70.0.0.2: bytes=32 time=2ms TTL=126

Ping statistics for 70.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0%
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 22ms, Average = 6ms
```

```
C:\>ping 90.0.0.2

Pinging 90.0.0.2 with 32 bytes of data:

Request timed out.
Reply from 90.0.0.2: bytes=32 time=1ms TTL=126
Reply from 90.0.0.2: bytes=32 time=25ms TTL=126
Reply from 90.0.0.2: bytes=32 time=13ms TTL=126

Ping statistics for 90.0.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 25ms, Average = 13ms

C:\>ping 100.0.0.2
```

BGP Applied at Building A,B,C and Headquarters (HQ)

2. Inter-VLAN Routing:

```
Switch(config)#int range fastEthernet 0/1-24
Switch(config-if-range)#swi
Switch(config-if-range)#switchport mo
Switch(config-if-range)#switchport mode acc
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#sw
Switch(config-if-range)#switchport acc
Switch(config-if-range)#switchport access vlan 10
% Access VLAN does not exist. Creating vlan 10
Switch(config-if-range)#
Switch(config-if-range)#exit
Switch(config)#vlan 10
Switch(config-vlan)#name vlan 10
                           ^
% Invalid input detected at '^' marker.

Switch(config-vlan)#name vlan10
Switch(config-vlan)#name 10
Switch(config-vlan)#exit
```

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 20
Switch(config-vlan)#name 20
Switch(config-vlan)#exit
Switch(config)#it ran
Switch(config)#int ran
Switch(config)#int range fa0/1-24
Switch(config-if-range)#sw
Switch(config-if-range)#switchport mo
Switch(config-if-range)#switchport mode acc
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#sw
Switch(config-if-range)#switchport acc
Switch(config-if-range)#switchport access valn 20
                                           ^
% Invalid input detected at '^' marker.

Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#exit
```

```
Switch(config)#vlan 10
Switch(config-vlan)#name 10
Switch(config-vlan)#vlan 20
Switch(config-vlan)#name 20
Switch(config-vlan)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
FastEthernet0/1 (10).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
FastEthernet0/1 (20).

Switch(config-vlan)#
Switch(config-vlan)#exit
Switch(config)#int fa
Switch(config)#int fastEthernet 0/2
Switch(config-if)#swit
Switch(config-if)#switchport mod
Switch(config-if)#switchport mode acc
Switch(config-if)#switchport mode access
Switch(config-if)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
FastEthernet0/1 (10).
sw
Switch(config-if)#switchport acc
Switch(config-if)#switchport access vla
Switch(config-if)#switchport access vlan 10
Switch(config-if)#int fastEthernet 0/3
Switch(config-if)#switchport mode access
Switch(config-if)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
FastEthernet0/1 (20).
switchport access vlan 20
Switch(config-if)#switchport access vlan 20
Switch(config-if)#do wr
Building configuration...
[OK]
```

```
Switch(config-if)#do show vlan br

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, 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, Gig0/1, Gig0/2
10   10                               active    Fa0/2
20   20                               active    Fa0/3
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
Switch(config-if)#
```

```
Switch(config)#int f0/1
Switch(config-if)#sw
Switch(config-if)#switchport mod
Switch(config-if)#switchport mode tru
Switch(config-if)#switchport mode trunk
```

Assign VLAN10&20 at Building C on two switches and multilayer switch

```
Router(config)#int g0/0.10
Router(config-subif)#ip add
Router(config-subif)#ip address 10.0.0.1 255.255.255.0
Router(config-subif)#no shut
Router(config-subif)#no shutdown
Router(config-subif)#en
Router(config-subif)#encapsulation do
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#exit
```

```
Router(config-subif)#exit
Router(config)#int g0/0.20
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.20, changed st

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEther

Router(config-subif)#
Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 20.0.0.1 255.255.255.0
Router(config-subif)#no shu
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#do wr
Building configuration...
[OK]
```

Inter VLAN Routing Done on Building C

```
Switch(config)#vlan 30
Switch(config-vlan)#name 30
Switch(config)#int f0/2
Switch(config-if)#sw
Switch(config-if)#switchport mo
Switch(config-if)#switchport mode acc
Switch(config-if)#switchport mode access
Switch(config-if)#sw
Switch(config-if)#switchport  acc
Switch(config-if)#switchport  access vlan 30
Switch(config-if)#int rangf0/2
Switch(config-if)#int range  f0/1-24
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport  access vlan 30
Switch(config-if-range)#do wr
Building configuration...
[OK]
```

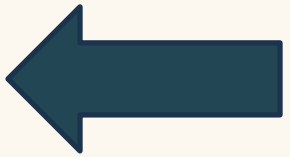
```
Switch(config)#vlan 40
Switch(config-vlan)#name 40
Switch(config-vlan)#exit
Switch(config)#int ra
Switch(config)#int range f0/1-24
Switch(config-if-range)#sw
Switch(config-if-range)#switchport mod
Switch(config-if-range)#switchport mode  acc
Switch(config-if-range)#switchport mode  access
Switch(config-if-range)#sw
Switch(config-if-range)#switchport  acc
Switch(config-if-range)#switchport  access vla
Switch(config-if-range)#switchport  access vlan 40
Switch(config-if-range)#do wr
Building configuration...
[OK]
```

```
Switch(config)#vlan 30
Switch(config-vlan)#nam
Switch(config-vlan)#name 30
Switch(config-vlan)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN misma
FastEthernet0/1 (40).
vlan 30
Switch(config-vlan)#
Switch(config-vlan)#vlan 40
Switch(config-vlan)#name 40
Switch(config-vlan)#exit
Switch(config)#int f0/2
Switch(config-if)#sw
Switch(config-if)#switchport mod
Switch(config-if)#switchport mode  acc
Switch(config-if)#switchport mode  access
Switch(config-if)#sw
Switch(config-if)#switchport acc
Switch(config-if)#switchport access vl
Switch(config-if)#switchport access vlan 40
Switch(config-if)#
Switch(config-if)#int f0/1
Switch(config-if)#switchport mode  access
Switch(config-if)#switchport access vlan 30
```

Assign VLAN30&40 at Building B on two switches and multilayer switch

```
Switch(config-if)#int f0/4
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#switchport mode ttr
Switch(config-if)#switchport mode tru
```

```
Router(config-if)#int g0/0.30
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30, change

Router(config-subif)#enc
Router(config-subif)#encapsulation do
Router(config-subif)#encapsulation dot1Q 30
Router(config-subif)#ip add
Router(config-subif)#ip address 30.0.0.1 255.255.255.0
Router(config-subif)#no sh
Router(config-subif)#no shutdown
Router(config-subif)#int g0/0.40
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.40, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.40, change

Router(config-subif)#
Router(config-subif)#ip address 40.0.0.1 255.255.255.0

% Configuring IP routing on a LAN subinterface is only allowed if that
subinterface is already configured as part of an IEEE 802.10, IEEE 802.1Q,
or ISL vLAN.

Router(config-subif)#
Router(config-subif)#
Router(config-subif)#encapsulation dot1Q 40
Router(config-subif)#ip address 40.0.0.1 255.255.255.0
Router(config-subif)#no shutdown
```



Inter VLAN Routing Done on Building B

```
Switch(config)#vlan 50
Switch(config-vlan)#nam
Switch(config-vlan)#name 50
Switch(config-vlan)#ex
Switch(config-vlan)#exit int ra
Switch(config-vlan)#int ra
Switch(config-vlan)#int ran
Switch(config-vlan)#exit
Switch(config)#int ra
Switch(config)#int range f0/1-24
Switch(config-if-range)#swi
Switch(config-if-range)#switchport mo
Switch(config-if-range)#switchport mode acc
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#sw
Switch(config-if-range)#sw
Switch(config-if-range)#sw
Switch(config-if-range)#switchport acc
Switch(config-if-range)#switchport access vk
Switch(config-if-range)#switchport access vl
Switch(config-if-range)#switchport access vlan 50
Switch(config-if-range)#do wr
Building configuration...
[OK]
Switch(config-if-range)#
```

```
Switch>ena
Switch#conf t
Enter configuration commands, one per line.  End with
Switch(config)#vlan 60
Switch(config-vlan)#name 60
Switch(config-vlan)#exit
Switch(config)#int ran
Switch(config)#int range f0/1-24
Switch(config-if-range)#sw
Switch(config-if-range)#switchport mo
Switch(config-if-range)#switchport mode ac
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#sw
Switch(config-if-range)#switchport  acc
Switch(config-if-range)#switchport  access vlan 60
Switch(config-if-range)#do wr
Building configuration...
[OK]
```

```
Switch(config)#vlan 50
Switch(config-vlan)#name 50
Switch(config-vlan)#vlan 60
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch di
FastEthernet0/1 (50).

Switch(config-vlan)#name
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch di
FastEthernet0/1 (60).
60
Switch(config-vlan)#vlan 60
Switch(config-vlan)#name 60
Switch(config-vlan)#exit
Switch(config)#int f0/1
Switch(config-if)#sw
Switch(config-if)#switchport mod
Switch(config-if)#switchport mode  acc
Switch(config-if)#switchport mode  access
Switch(config-if)#sw
Switch(config-if)#sw
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch di
FastEthernet0/1 (50).

Switch(config-if)#switchport acc
Switch(config-if)#switchport access vlan
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch di
FastEthernet0/1 (60).
50
Switch(config-if)#switchport access vlan 50
Switch(config-if)#int f0/2
Switch(config-if)#switchport mode  access
Switch(config-if)#switchport access vlan 60
```

```
Switch(config)#int f0/3
Switch(config-if)#sw
Switch(config-if)#switchport mod
Switch(config-if)#switchport tr
Switch(config-if)#switchport trunk enc
Switch(config-if)#switchport trunk encapsulation d
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#sw
Switch(config-if)#switchport mod
Switch(config-if)#switchport mode tr
Switch(config-if)#switchport mode trunk
```

Assign VLAN 50&60 at Building A on two switches and multilayer switch

```
Router(config-if)#int g0/0.50
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.50, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.50

Router(config-subif)#
Router(config-subif)#ip add
Router(config-subif)#encap
Router(config-subif)#encapsulation do
Router(config-subif)#encapsulation dot1Q 50
Router(config-subif)#ip add
Router(config-subif)#ip address 50.0.0.1 255.255.255.0
Router(config-subif)#no shu
Router(config-subif)#no shutdown
Router(config-subif)#int g0/0.60
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.60, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.60

Router(config-subif)#
Router(config-subif)#encapsulation dot1Q 5
Router(config-subif)#encapsulation dot1Q 60
Router(config-subif)#int g0/0.60
Router(config-subif)#encapsulation dot1Q 60
Router(config-subif)#ip address 60.0.0.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
```

Inter VLAN Routing Done on Building A

```
Switch#conf t
Enter configuration commands, one per line.  End w
Switch(config)#vlan 70
Switch(config-vlan)#name 70
Switch(config-vlan)#exit
Switch(config)#int ra
Switch(config)#int range f0/1-24
Switch(config-if-range)#sw
Switch(config-if-range)#switchport mo
Switch(config-if-range)#switchport mode ac
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#ssw
Switch(config-if-range)#sw
Switch(config-if-range)#switchport acc
Switch(config-if-range)#switchport access vl
Switch(config-if-range)#switchport access vlan 70
Switch(config-if-range)#do wr
Building configuration...
[OK]
```

```
Switch(config)#vlan 80
Switch(config-vlan)#nam
Switch(config-vlan)#name 80
Switch(config-vlan)#exit
Switch(config)#int ran
Switch(config)#int range f0/2-24
Switch(config-if-range)#int range f0/1-24
Switch(config-if-range)#sw
Switch(config-if-range)#switchport mod
Switch(config-if-range)#switchport mode  acc
Switch(config-if-range)#switchport mode  access
Switch(config-if-range)#sw
Switch(config-if-range)#sw
Switch(config-if-range)#switchport acc
Switch(config-if-range)#switchport access vl
Switch(config-if-range)#switchport access vlan 80
Switch(config-if-range)#do wr
```

```
Switch(config)#vlan 90
Switch(config-vlan)#name 90
Switch(config-vlan)#exit
Switch(config)#int ra
Switch(config)#int range f0/1-24
Switch(config-if-range)#sw
Switch(config-if-range)#switchport mo
Switch(config-if-range)#switchport mode acc
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#sw
Switch(config-if-range)#switchport  acc
Switch(config-if-range)#switchport  access vl
Switch(config-if-range)#switchport  access vlan 90
Switch(config-if-range)#do wr
Building configuration...
[OK]
```

```
Switch(config)#vlan 100
Switch(config-vlan)#name 100
Switch(config-vlan)#exit
Switch(config)#int ran
Switch(config)#int range f0/1-24
Switch(config-if-range)#sw
Switch(config-if-range)#switchport mo
Switch(config-if-range)#switchport mode accc
Switch(config-if-range)#switchport mode accc
                                           ^
% Invalid input detected at '^' marker.

Switch(config-if-range)#switchport mode accc
Switch(config-if-range)#switchport mode acc
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#sw
Switch(config-if-range)#switchport acc
Switch(config-if-range)#switchport access vlan 100
Switch(config-if-range)#do wr
Building configuration...
[OK]
```

```
Switch(config-if)#int f0/5
Switch(config-if)#sw
Switch(config-if)#switchport tr
Switch(config-if)#switchport trunk enc
Switch(config-if)#switchport trunk encapsulation d
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#switchport mod
Switch(config-if)#switchport mode tr
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trun
Switch(config-if)#switchport trunk all
Switch(config-if)#switchport trunk allowed vlan 70,80,90,100
```

Assign VLAN 70,80,90&100 at Headquarters (HQ) on four switches and multilayer switch

```
Router(config-if)#int g0/1.70
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1.70, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.70, changed state to up

Router(config-subif)#
Router(config-subif)#enc
Router(config-subif)#encapsulation do
Router(config-subif)#encapsulation dot1Q 70
Router(config-subif)#ip add
Router(config-subif)#ip address 70.0.0.1 255.255.255.0
Router(config-subif)#no shu
Router(config-subif)#int g0/1.80
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1.80, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.80, changed state to up

Router(config-subif)#encapsulation dot1Q 80
Router(config-subif)#ip address 80.0.0.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#int g0/1.90
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1.90, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.90, changed state to up

Router(config-subif)#encapsulation dot1Q 90
Router(config-subif)#ip address 90.0.0.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#int g0/1.100
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1.100, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.100, changed state to up

Router(config-subif)#encapsulation dot1Q 100
Router(config-subif)#ip address 100.0.0.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#
```

Inter VLAN Routing Done on Headquarters (HQ)

3. DHCP Configuration:

```
Router(config)#service dhcp
Router(config)#ip dh
Router(config)#ip dhcp po
Router(config)#ip dhcp pool 10
Router(dhcp-config)#net
Router(dhcp-config)#network  10.0.0.0  ?
  A.B.C.D  Network mask
Router(dhcp-config)#network  10.0.0.0  255.255.255.0
Router(dhcp-config)#?
  default-router  Default routers
  dns-server      Set name server
  domain-name     Domain name
  exit            Exit from DHCP pool configuration mode
  network         Network number and mask
  no              Negate a command or set its defaults
  option          Raw DHCP options
Router(dhcp-config)#def
Router(dhcp-config)#default-router 10.0.0.1
Router(dhcp-config)#dn
Router(dhcp-config)#dns-server 10.0.0.1
Router(dhcp-config)#dom
Router(dhcp-config)#domain-name uhia
Router(dhcp-config)#ip dhcp pool 20
Router(dhcp-config)#dns-server 20.0.0.1
Router(dhcp-config)#network  20.0.0.0  255.255.255.0
Router(dhcp-config)#domain-name uhia
Router(dhcp-config)#default-router 20.0.0.1
Router(dhcp-config)#exit
Router(config)#do wr
Building configuration...
[OK]
Router(config)#
```

```
Router(config)#service dhcp
Router(config)#ip dhc
Router(config)#ip dhcp poo
Router(config)#ip dhcp pool 30
Router(dhcp-config)#net
Router(dhcp-config)#network 30.0.0.0 255.255.255.0
Router(dhcp-config)#def
Router(dhcp-config)#default-router 30.0.0.1
Router(dhcp-config)#dns
Router(dhcp-config)#dns-server 30.0.0.1
Router(dhcp-config)#dom
Router(dhcp-config)#domain-name uhia
Router(dhcp-config)#?
  default-router  Default routers
  dns-server      Set name server
  domain-name     Domain name
  exit            Exit from DHCP pool configuration mode
  network         Network number and mask
  no              Negate a command or set its defaults
  option          Raw DHCP options
Router(dhcp-config)#ip dhcp pool 40
Router(dhcp-config)#network 40.0.0.0 255.255.255.0
Router(dhcp-config)#domain-name uhia
Router(dhcp-config)#dns-server 40.0.0.1
Router(dhcp-config)#default-router 40.0.0.1
Router(dhcp-config)#do wr
```

```
Router(config)#service dhcp
Router(config)#ip dhcp poo
Router(config)#ip dhcp pool 50
Router(dhcp-config)#netw
Router(dhcp-config)#network 50.0.0.0 255.255.255.0
Router(dhcp-config)#def
Router(dhcp-config)#default-router 50.0.0.1
Router(dhcp-config)#dns
Router(dhcp-config)#dns-server 50.0.0.1
Router(dhcp-config)#dom
Router(dhcp-config)#domain-name uhia
Router(dhcp-config)#?
  default-router  Default routers
  dns-server      Set name server
  domain-name     Domain name
  exit            Exit from DHCP pool configuration mode
  network         Network number and mask
  no              Negate a command or set its defaults
  option          Raw DHCP options
Router(dhcp-config)#ip dhcp pool 60
Router(dhcp-config)#domain-name uhia\
Router(dhcp-config)#domain-name uhia
Router(dhcp-config)#dns-server 60.0.0.1
Router(dhcp-config)#dns-server 60.0.0.1
Router(dhcp-config)#default-router 60.0.0.1
Router(dhcp-config)#do wr
Router(dhcp-config)#ip dhcp pool 60
Router(dhcp-config)#net
Router(dhcp-config)#network 60.0.0.0 255.255.255.0
Router(dhcp-config)#default-router 60.0.0.1
Router(dhcp-config)#dns-server 60.0.0.1
Router(dhcp-config)#domain-name uhia
```

DHCP applied for Building A on VLAN 50&60

DHCP applied for Building B on VLAN 30&40

DHCP applied for Building C on VLAN 10&20

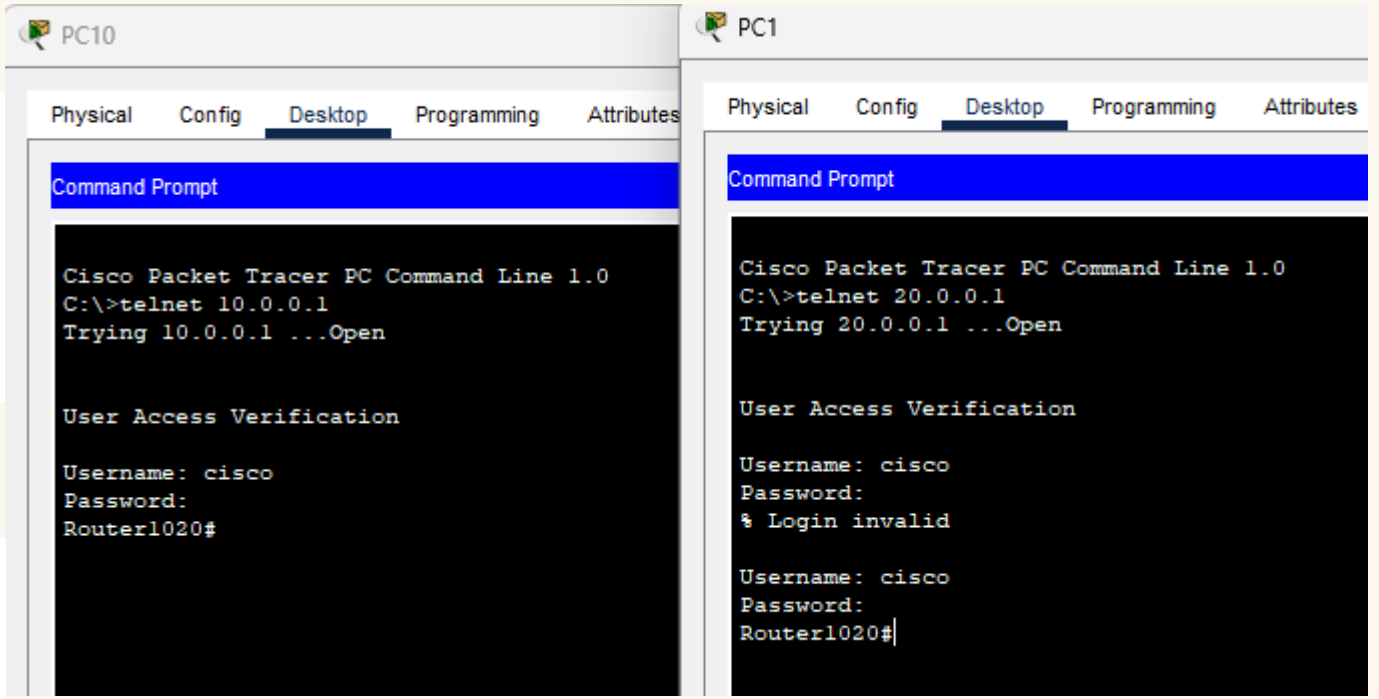
```
Router(config)#service dhcp
Router(config)#ip dhcp poo
Router(config)#ip dhcp pool 70
Router(dhcp-config)#net
Router(dhcp-config)#network 70.0.0.0 255.255.255.0
Router(dhcp-config)#def
Router(dhcp-config)#default-router 70.0.0.1
Router(dhcp-config)#dns
Router(dhcp-config)#dns-server 70.0.0.1
Router(dhcp-config)#dom
Router(dhcp-config)#domain-name uhia
Router(dhcp-config)#?
  default-router  Default routers
  dns-server      Set name server
  domain-name     Domain name
  exit            Exit from DHCP pool configuration mode
  network         Network number and mask
  no              Negate a command or set its defaults
  option          Raw DHCP options
Router(dhcp-config)#ip dhcp pool 80
Router(dhcp-config)#network 80.0.0.0 255.255.255.0
Router(dhcp-config)#dns-server 80.0.0.1
Router(dhcp-config)#default-router 80.0.0.1
Router(dhcp-config)#domain-name uhia
Router(dhcp-config)#dns-server 80.0.0.1
Router(dhcp-config)#ip dhcp pool 90
Router(dhcp-config)#network 90.0.0.0 255.255.255.0
Router(dhcp-config)#default-router 90.0.0.1
Router(dhcp-config)#domain-name uhia
Router(dhcp-config)#dns-server 90.0.0.1
Router(dhcp-config)#ip dhcp pool 100
Router(dhcp-config)#network 100.0.0.0 255.255.255.0
Router(dhcp-config)#default-router 100.0.0.1
Router(dhcp-config)#dns-server 100.0.0.1
Router(dhcp-config)#domain-name uhia
Router(dhcp-config)#do wr
```

DHCP applied for Headquarters (HQ) on VLAN 70,80,90&100

4. SSH Configuration:

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostna
Router(config)#hostname Router1020
Router1020(config)#username cisco priv
Router1020(config)#username cisco privilege 15 secret cisco1020
Router1020(config)#line vty 0 4
Router1020(config-line)#login local
Router1020(config-line)#^Z
Router1020#
```

Telnet applied (Unsecure)



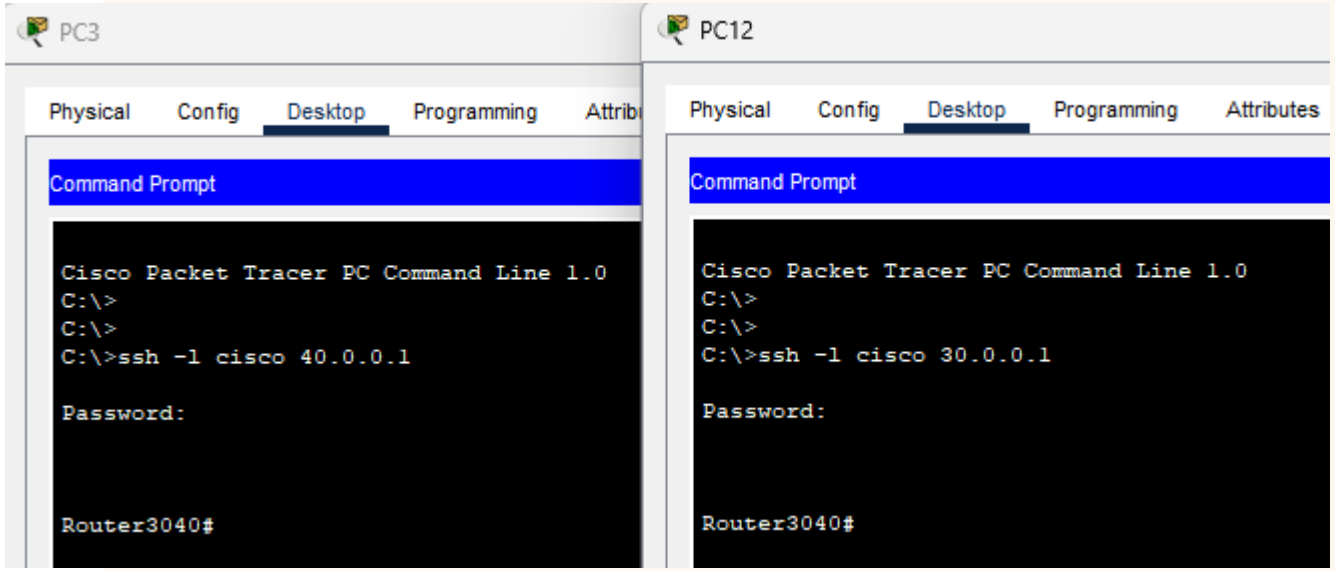

```
Router1020#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router1020(config)#ip domain name uhia
Router1020(config)#crypto key gen
Router1020(config)#crypto key generate RSA
The name for the keys will be: Router1020.uhia
Choose the size of the key modulus in the range of 360 to 4096 for your
  General Purpose Keys. Choosing a key modulus greater than 512 may take
  a few minutes.

How many bits in the modulus [512]: 1023
% Generating 1023 bit RSA keys, keys will be non-exportable...[OK]

Router1020(config)#line vty 0 4
*Mar 1 0:13:35.289: %SSH-5-ENABLED: SSH 1.99 has been enabled
Router1020(config-line)#transport input ssh
Router1020(config-line)#do wr
Building configuration...
[OK]
Router1020(config-line)#
```

```
Router1020#
Router1020#
Router1020#ssh -l cisco 10.0.0.1

Password:



Router1020#
```

```
Router1020#
Router1020#
Router1020#ssh -l cisco 20.0.0.1

Password:



Router1020#
```

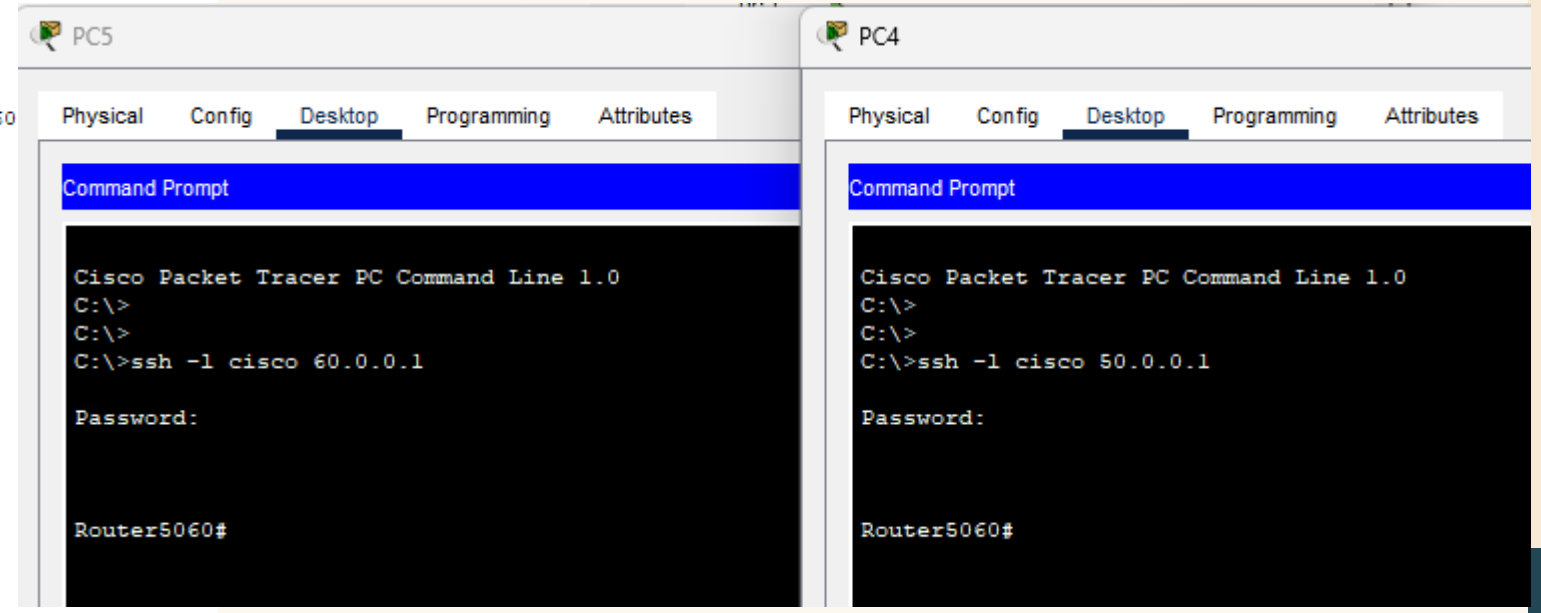
SSH applied (secure) for building C

```
Router(config)#conf t
%Invalid hex value
Router(config)#hostname Router3040
Router3040(config)#username cisco priv
Router3040(config)#username cisco privilege 15 secret cisco3040
Router3040(config)#line vty 0 4
Router3040(config-line)#login local
Router3040(config-line)#^Z
Router3040#
%SYS-5-CONFIG_I: Configured from console by console

Router3040#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router3040(config)#ip domain name uhia
Router3040(config)#crypto kay gener
Router3040(config)#crypto kay genera
Router3040(config)#crypto kay generate RSA
                                  ^
% Invalid input detected at '^' marker.

Router3040(config)#crypto key generate RSA
The name for the keys will be: Router3040.uhia
Choose the size of the key modulus in the range of 360 to 4096 for your
  General Purpose Keys. Choosing a key modulus greater than 512 may take
  a few minutes.

How many bits in the modulus [512]: 1023
% Generating 1023 bit RSA keys, keys will be non-exportable...[OK]

Router3040(config)#line vty 0 4
*Mar 1 0:25:47.664: %SSH-5-ENABLED: SSH 1.99 has been enabled
Router3040(config-line)#transport ssh
                                  ^
% Invalid input detected at '^' marker.

Router3040(config-line)#transport input ssh
Router3040(config-line)#do wr
Building configuration...
[OK]
Router3040(config-line)#
```



SSH applied (secure) for building B

```
Router>
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router5060
Router5060(config)#username cisco priv
Router5060(config)#username cisco privilege 15 secret cisco5060
Router5060(config)#line vty 0 4
Router5060(config-line)#login local
Router5060(config-line)#^Z
Router5060#
%SYS-5-CONFIG_I: Configured from console by console

Router5060#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router5060(config)#ip domain namer uhia
                                  ^
% Invalid input detected at '^' marker.

Router5060(config)#ip domain namee uhia
                                  ^
% Invalid input detected at '^' marker.

Router5060(config)#ip domain name uhia
Router5060(config)#crypto key gen
Router5060(config)#crypto key generate RSA
The name for the keys will be: Router5060.uhia
Choose the size of the key modulus in the range of 360 to 4096 for your
  General Purpose Keys. Choosing a key modulus greater than 512 may take
  a few minutes.

How many bits in the modulus [512]: 1023
% Generating 1023 bit RSA keys, keys will be non-exportable...[OK]

Router5060(config)#line vty 0 4
*Mar 1 0:35:22.288: %SSH-5-ENABLED: SSH 1.99 has been enabled
Router5060(config-line)#trans
Router5060(config-line)#transport inp
Router5060(config-line)#transport input ssh
Router5060(config-line)#do wr
Building configuration...
[OK]
Router5060(config-line)#
```

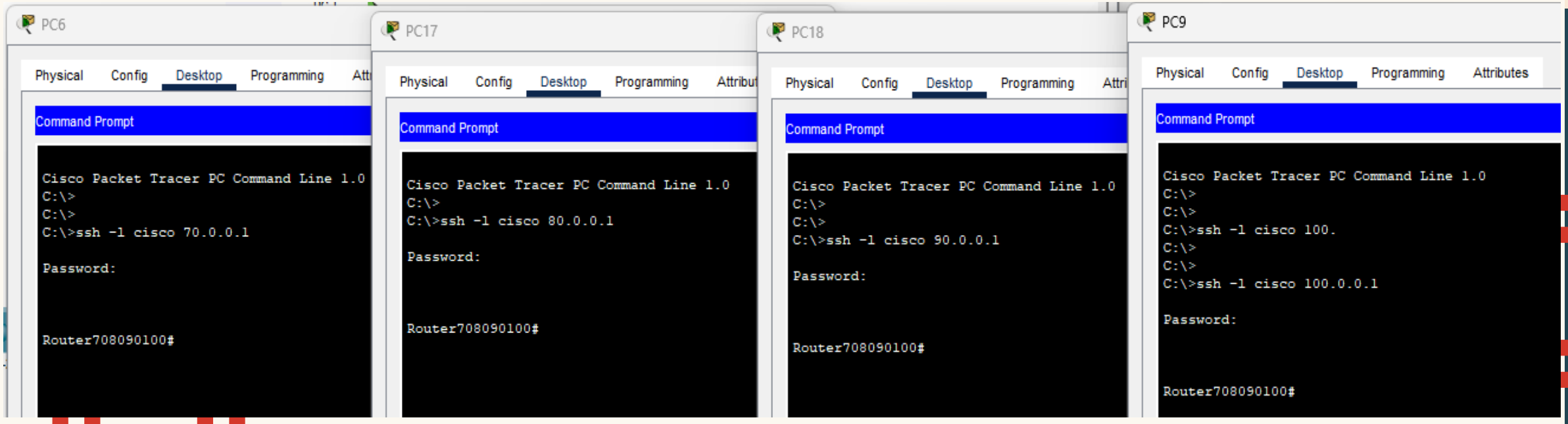


SSH applied (secure) for building A

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router708090100
Router708090100(config)#username cisco priv
Router708090100(config)#username cisco privilege 15 secret cisco708090100
Router708090100(config)#^Z
Router708090100#
%SYS-5-CONFIG_I: Configured from console by console

Router708090100#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router708090100(config)#ip domain name uhia
Router708090100(config)#cryp
Router708090100(config)#crypto key
Router708090100(config)#crypto key gener
Router708090100(config)#crypto key generate RSA
```

```
The name for the keys will be: Router708090100.uhia
Choose the size of the key modulus in the range of 360 to 4096 for your
  General Purpose Keys. Choosing a key modulus greater than 512 may take
  a few minutes.

How many bits in the modulus [512]: 1023
% Generating 1023 bit RSA keys, keys will be non-exportable...[OK]

Router708090100(config)#line vty 0 4
*Mar 1 0:42:4.972: %SSH-5-ENABLED: SSH 1.99 has been enabled
Router708090100(config-line)#tran
Router708090100(config-line)#transport input ssh
Router708090100(config-line)#do wr
Building configuration...
[OK]
Router708090100(config-line)#login local
Router708090100(config-line)#^Z
```

SSH applied (secure) for Headquarters (HQ)



Thank You