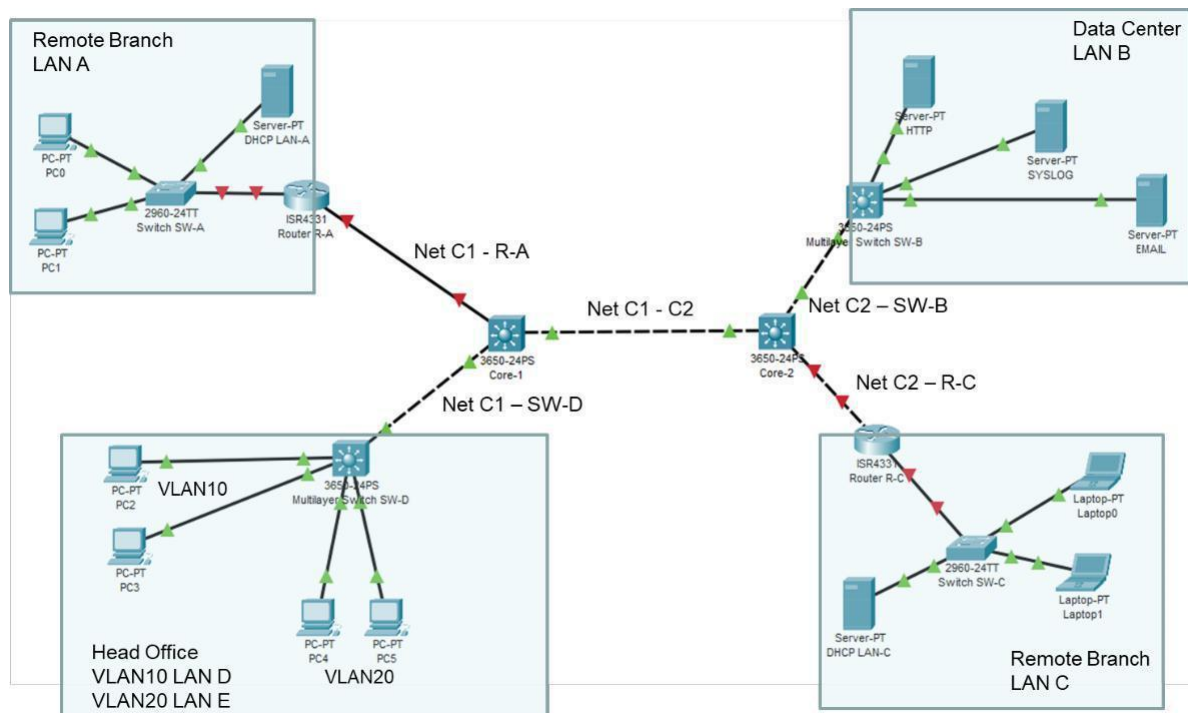


**AMC Lab 2****Instruction****Deadline: 7.1.2021****Name: Rubaiya Kabir Pranti**

## Enterprise IP Network (version2, minor corrections in task 5)

**Tasks:**

In this AMC lab you prepare an enterprise network, which is the basic network for final QoS implementation.

**Tasks****Create PT Topology****IP addressing from the Homework to the topology****Configure network devices****Configure hosts and servers****Test connectivity****Important Note:**

Write your answers in this PDF with red color

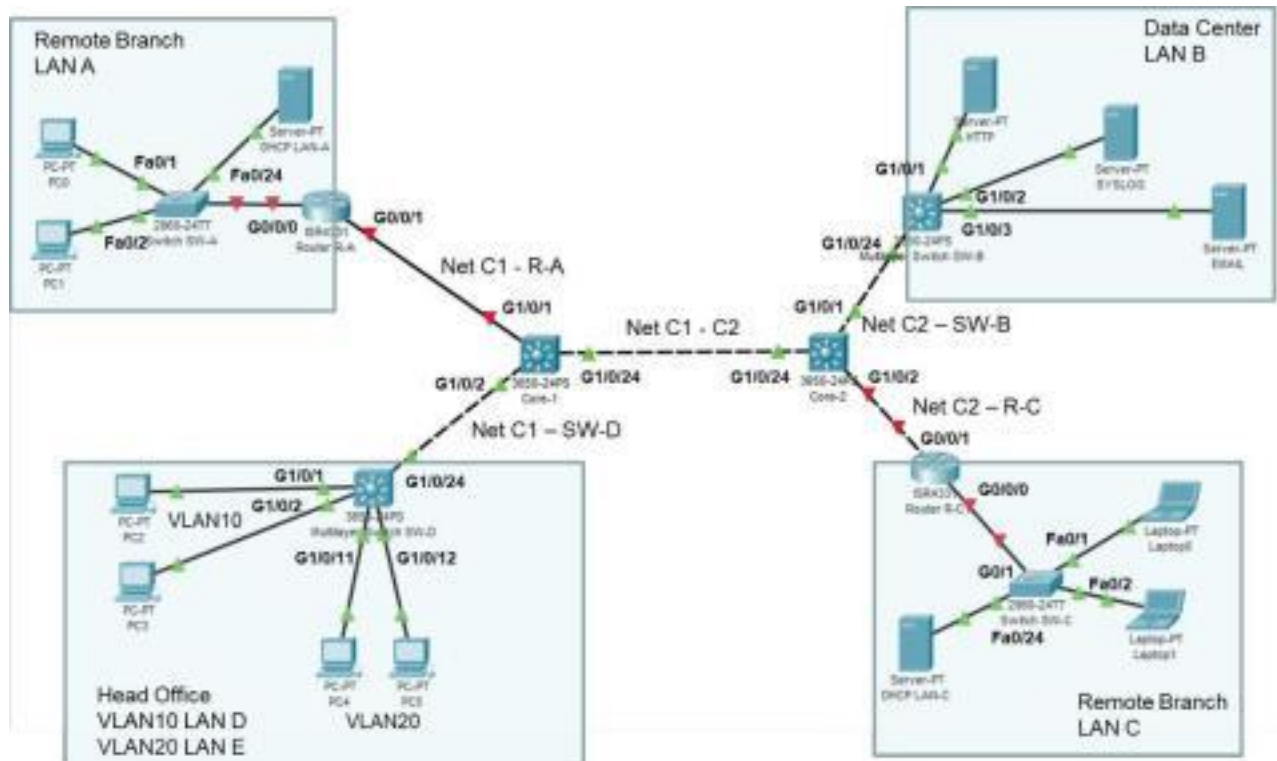
- with free Adobe Acrobat you may use

Comments/Notes Do not change the layout of this text Do not use any other file format.

Do not create archive files

## Task 1 - Create Enterprise Network

### Topology



The topology is given in the network above. It includes



- 2 Routers ISR 4331
- 4 Multilayer Switches 3650-24PS
- 2 Switches 2960-24TT
- 2 DHCP Servers, 3 Data Center Servers
- 6 PC Hosts, 2 Laptop Hosts

**Note:** All interface to be used in this lab are named in the topology.

### Part 1: Set Up Network Topology in PT

#### Step 1: Build topology in Packet Tracer.

**COVID-19 Version:** Build topology in **Packet Tracer**. Use and re-label the following devices:

- Build the network with ISR4331 Routers, 3650- Multilayer Switches, 2960 Switches, Servers, PCs and Laptops in Packet Tracer.
- Rename the devices.
- Cable the network according to the topology with straight-through TP cables  and cross-over cables .

## Part 2: Subnet Addressing

Available are the IP addresses of the homework 172.16.0.0 / 16. In the following prepare the IP addressing table with IP address for each single interface.

You already calculated the IP Addresses and Subnet Masks for the required networks in your AMC Lab2 Homework.

### Step 1: Inter-Router-Links

The following design rules are given for Inter-Router-Links

- Core-1 gets the first, Core-2 gets the second IP address of the interconnecting subnet
- Core-1 gets the first, R-A gets the second IP address of the interconnecting subnet
- Core-2 gets the first, SW-B gets the second IP address of the interconnecting subnet
- Core-2 gets the first, R-C gets the second IP address of the interconnecting subnet
- Core-1 gets the first, SW-D gets the second IP address of the interconnecting subnet
- Record the correct Inter-Router-Link addresses and masks in the following table 1.

Provide the correct IP Addresses from the calculated Subnets according to the design rules.

Device	Interface	IP Address	Subnet Mask	Default Gateway
Core-1	G1/0/1	172.16.2.165	255.255.255.252	N/A
	G1/0/2	172.16.2.169	255.255.255.252	N/A
	G1/0/24	172.16.2.161	255.255.255.252	N/A
Core-2	G1/0/1	172.16.2.173	255.255.255.252	N/A
	G1/0/2	172.16.2.177	255.255.255.252	N/A
	G1/0/24	172.16.2.162	255.255.255.252	N/A
R-A	G0/0/1	172.16.2.166	255.255.255.252	N/A
SW-B	G1/0/24	172.16.2.174	255.255.255.252	N/A
R-C	G0/0/1	172.16.2.178	255.255.255.252	N/A
SW-D	G1/0/24	172.16.2.170	255.255.255.252	N/A

**Step 2: LAN Addressing**

The following design rules are given for LAN-A to LAN-E.

- LAN A:
  - R-A G0/0/0 is the Default Gateway in LAN A and gets the last available IP Address.  
**172.16.2.62**
  - DHCP Server gets the second to the last available IP Address.  
**172.16.2.61**
  - PC0 and PC1 get IP Address, Network Mask, and Default Gateway from DHCP Server.  
**Assigned by DHCP**
  
- LAN B:
  - SW-B Interface G1/0/24 is Router Interface.
  - Switch Virtual Interface (SVI) Interface VLAN 1 is Default Gateway for LAN B and gets the last available IP Address. **172.16.2.158**
  - HTTP-Server gets first (**172.16.2.129**), SYSLOG-Server gets second (**172.16.2.130**) and EMAIL-Server gets third available IP Address (**172.16.2.131**)
  
- LAN C:
  - R-C G0/0/0 is the Default Gateway in LAN C and gets the last available IP Address.  
**172.16.2.126**
  - DHCP Server gets the second to the last available IP Address.  
**172.16.2.125**
  - Laptop0 and Laptop1 get IP Address, Network Mask, and Default Gateway from DHCP Server. **Assigned by DHCP**
  
- LAN D and LAN E:
  - SW-D Interface G1/0/24 is Router Interface.
  - Interface VLAN 10 is Default Gateway for LAN D and gets the last available IP Address.  
**172.16.0.254**
  - PC2 and PC3 get first and second available IP Address in LAN D.  
**172.16.0.1**  
**172.16.0.2**
  - Interface VLAN 20 is Default Gateway for LAN E and gets the last available IP Address.  
**172.16.1.254**
  - PC4 and PC5 get first and second available IP Address in LAN D.  
**172.16.1.1**  
**172.16.1.2**

Provide the correct IP Addresses from the calculated Subnets according to the design rules.

Record the LAN Interface Addresses and Masks in the following table2. If automatically provided by network protocol write DHCP.

Device	Interface	IP Address	Subnet Mask	Default Gateway
R-A	G0/0/0	172.16.2.62	255.255.255.192	N/A
	G0/0/1	172.16.2.166	255.255.255.252	N/A
SW-B	G1/0/24	172.16.2.174	255.255.255.252	N/A
	VLAN 1	172.16.2.158	255.255.255.224	N/A
R-C	G0/0/0	172.16.2.126	255.255.255.192	N/A
	G0/0/1	172.16.2.178	255.255.255.252	N/A
SW-D	G1/0/24	172.16.2.170	255.255.255.252	N/A
	VLAN 10	172.16.0.254	255.255.255.0	N/A
	VLAN 20	172.16.1.254	255.255.255.0	N/A
PC-0	NIC	BY DHCP(172.16.2.2)	255.255.255.192	172.16.2.62
PC-1	NIC	BY DHCP(172.16.2.1)	255.255.255.192	172.16.2.62
DHCP-LAN A	NIC	172.16.2.61	255.255.255.192	172.16.2.62
HTTP-Server	NIC	172.16.2.129	255.255.255.224	172.16.2.158
SYSLOG-Ser.	NIC	172.16.2.130	255.255.255.224	172.16.2.158
EMAIL-Server	NIC	172.16.2.131	255.255.255.224	172.16.2.158
Laptop-0	NIC	BY DHCP(172.16.2.65)	255.255.255.192	172.16.2.126
Laptop-1	NIC	BY DHCP(172.16.2.66)	255.255.255.192	172.16.2.126
DHCP-LAN C	NIC	172.16.2.125	255.255.255.192	172.16.2.126
PC-2	NIC	172.16.0.1	255.255.255.0	172.16.0.254
PC-3	NIC	172.16.0.2	255.255.255.0	172.16.0.254
PC-4	NIC	172.16.1.1	255.255.255.0	172.16.1.254
PC-5	NIC	172.16.1.2	255.255.255.0	172.16.1.254

## Task 2 – Configure Network Devices

### Part 3: LAN Routers ISR 4331

#### Step 1: Configure ISR 4331 Router R-A

Open CLI of router R-A and configure the following tasks

- Enter the privileged EXEC mode **Router> enable**
- Enter configuration mode **Router# configure terminal**
- Assign a device name **R-A** to the router. **Router(config)# hostname R-A**
- Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names. **R-A(config)# no ip domain-lookup**

#### Step 2: Configure Router R-A Interfaces

- Set Interface G0/0/0 description to LAN-A
- Set IP Address and Subnet Mask for Interface G0/0/0, and switch-on Interface G0/0/0  
**R-A(config)# interface g0/0/0 R-A(config-if)#  
description Connected to LAN-A  
R-A(config-if)# ip address 172.16.2.62  
255.255.255.192 R-A(config-if)# no shutdown**
- Set Interface G0/0/1 description to Link-to-Core-1
- Set IP Address and Subnet Mask for Interface G0/0/1, and switch-on Interface G0/0/0  
**R-A(config)# interface g0/0/1 R-  
A(config-if)# description Link-to-Core-1  
R-A(config-if)# ip address 172.16.2.166 255.255.255.252  
R-A(config-if)# no shutdown**

#### Step 3: Configure Static Default Route in Router R-A

- Configure a static default route in Router R-A with exit interface G0/0/1.  
**R-A(config)# ip route 0.0.0.0 0.0.0.0 g0/0/1**

#### Step 4: Check IP Routing Table of Router R-A

- Record, which networks are routed in Router R-A.

```
R-A# sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B -
BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       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 0.0.0.0 to network 0.0.0.0

    172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks
C       172.16.2.0/26 is directly connected, GigabitEthernet0/0/0
L       172.16.2.62/32 is directly connected, GigabitEthernet0/0/0
C       172.16.2.164/30 is directly connected, GigabitEthernet0/0/1
L       172.16.2.166/32 is directly connected, GigabitEthernet0/0/1
S*     0.0.0.0/0 is directly connected, GigabitEthernet0/0/1
```

**Step 5: Configure ISR 4331 Router R-C**

Open CLI of router R-C and configure the following tasks

- Enter the privileged EXEC mode **Router> enable**
- Enter configuration mode **Router# configure terminal**
- Assign a device name **R-C** to the router **Router(config)# hostname R-C**
- Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names  
**R-C(config)# no ip domain-lookup**

**Step 6: Configure Router R-C Interfaces**

- Set Interface G0/0/0 description to LAN-C
- Set IP Address and Subnet Mask for Interface G0/0/0, and switch-on Interface G0/0/0  
**R-C(config)# interface g0/0/0 R-C(config-if)#  
description Connected to LAN-C  
R-C(config-if)# ip address 172.16.2.126 255.255.255.192  
R-C(config-if)# no shutdown**
- Set Interface G0/0/1 description to Link-to-Core-2
- Set IP Address and Subnet Mask for Interface G0/0/1, and switch-on Interface G0/0/1  
**R-C(config)# interface g0/0/1 R-C(config-if)#  
description Link-to-Core-2  
R-C(config-if)# ip address 172.16.2.178 255.255.255.252  
R-C(config-if)# no shutdown**

**Step 7: Configure Static Default Route in Router R-C**

- Configure a static default route in Router R-C with exit interface G0/0/1.  
**R-C(config)# ip route 0.0.0.0 0.0.0.0 g0/0/1**

**Step 8: Check IP Routing Table of Router R-C**

- Record, which networks are routed in Router R-C.

```
R-C#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B -
BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       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 0.0.0.0 to network 0.0.0.0

    172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks
C       172.16.2.64/26 is directly connected, GigabitEthernet0/0/0
L       172.16.2.126/32 is directly connected, GigabitEthernet0/0/0
C       172.16.2.176/30 is directly connected, GigabitEthernet0/0/1
L       172.16.2.178/32 is directly connected, GigabitEthernet0/0/1
S*     0.0.0.0/0 is directly connected, GigabitEthernet0/0/1
```



## Part 4: Core Multilayer Switches 3650

### Step 1: Configure MS 3650 Core-1

Open CLI of switch 3650 and configure the following tasks

- Enter the privileged EXEC mode **Switch > enable**
- Enter configuration mode **Switch# configure terminal** or **Switch# config t**
- Assign a device name **Core-1** to the switch **Switch(config)# hostname Core-1**
- Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names **Core-1(config)# no ip domain-lookup**

### Step 2: Configure MS 3650 Core-1 Interfaces

- Disable switchport mode at interfaces G1/0/1, G1/0/2, and G1/0/24  
**Core-1(config)# int range g1/0/1-2**  
**Core-1(config-if-range)# no switchport**  
**Core-1(config-if-range)# exit**  
**Core-1(config)# int g1/0/24**  
**Core-1(config-if)# no switchport**  
**Core-1(config-if)# exit**
- Set Interface G1/0/1 description to Link-to-R-A
- Set IP Address and Subnet Mask for Interface G1/0/1, and switch-on Interface G1/0/1  
**Core-1(config)# interface g1/0/1** **Core-1(config-if)# description Link-to-R-A**  
**Core-1(config-if)# no switchport**  
**Core-1(config-if)# ip address 172.16.2.165 255.255.255.252** **Core-1(config-if)# no shutdown**
- Set Interface G1/0/2 description to Link-to-SW-D
- Set IP Address and Subnet Mask for Interface G1/0/2, and switch-on Interface G1/0/2  
**Core-1(config)# int g1/0/2** **Core-1(config-if)# description Link-to-R-A** **Core-1(config-if)# no switchport**  
**Core-1(config-if)# ip address 172.16.2.169 255.255.255.252** **Core-1(config-if)# no shutdown**
- Set Interface G1/0/24 description to Link-to-Core-2
- Set IP Address and Subnet Mask for Interface G1/0/24, and switch-on Interface G1/0/24  
**Core-1(config)# int g1/0/24** **Core-1(config-if)# description Link-to-Core-2** **Core-1(config-if)# no switchport**  
**Core-1(config-if)# ip address 172.16.2.161 255.255.255.252** **Core-1(config-if)# no shutdown**

### Step 3: Configure Static Routes in MS 3650 Core-1

- Enable IP Routing **Core-1(config)# ip routing**
- For each LAN A – LAN E, configure a recursive static route to the LAN network with the next hop for each route.  
**Core-1(config)# ip route 172.16.2.0 255.255.255.192 172.16.2.166 (LAN-A)**  
**Core-1(config)# ip route 172.16.2.128 255.255.255.224 172.16.2.162 (LAN-B)**  
**Core-1(config)# ip route 172.16.2.64 255.255.255.192 172.16.2.162 (LAN-C)**  
**Core-1(config)# ip route 172.16.0.0 255.255.255.0 172.16.2.170 (LAN-D)**  
**Core-1(config)# ip route 172.16.1.0 255.255.255.0 172.16.2.170 (LAN-E)**



- For each non-connected Inter-Router-Network (Link Core-2 to SW-B, and Core-2 to R-C), configure a static route to the network with exit interface G1/0/24.

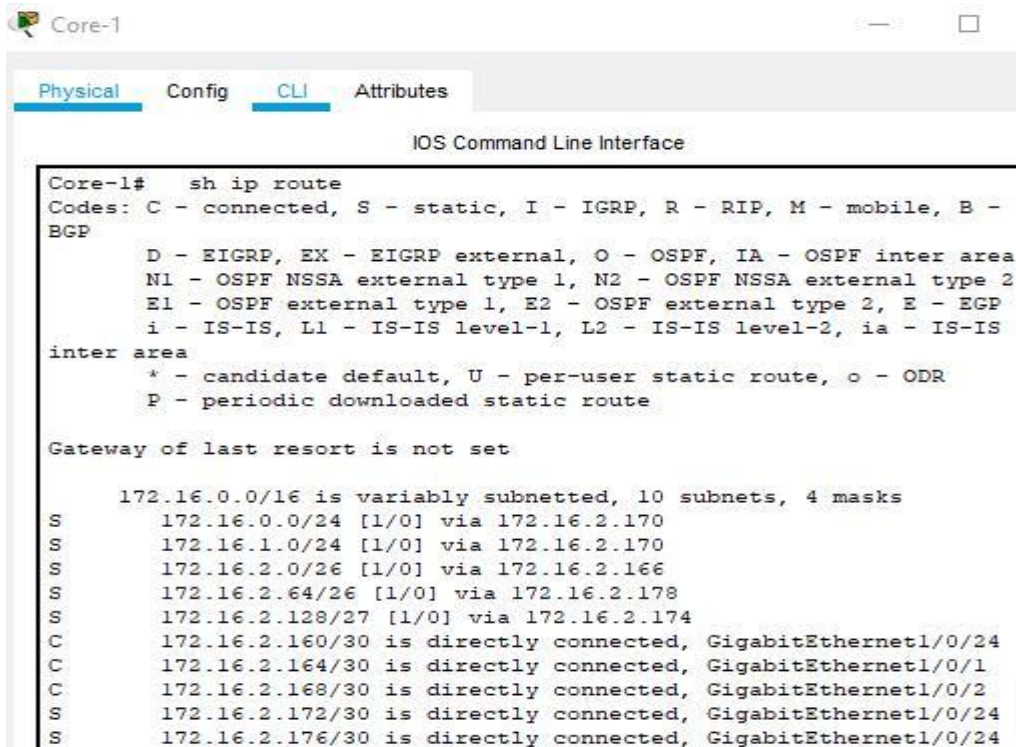
**Core-1(config)# ip route 172.16.2.172 255.255.255.252 g1/0/24**

**Core-1(config)# ip route 172.16.2.176 255.255.255.252 g1/0/24**

If you know how to define **summary routes**, you may use summary route configuration, but **DO NOT use any static default route**.

#### Step 4: Check IP Routing Table of MS 3650 Core-1

- Record, which networks are routed in MS 3650 Core-1 (sh ip route).



```
Core-1# sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       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

172.16.0.0/16 is variably subnetted, 10 subnets, 4 masks
S       172.16.0.0/24 [1/0] via 172.16.2.170
S       172.16.1.0/24 [1/0] via 172.16.2.170
S       172.16.2.0/26 [1/0] via 172.16.2.166
S       172.16.2.64/26 [1/0] via 172.16.2.178
S       172.16.2.128/27 [1/0] via 172.16.2.174
C       172.16.2.160/30 is directly connected, GigabitEthernet1/0/24
C       172.16.2.164/30 is directly connected, GigabitEthernet1/0/1
C       172.16.2.168/30 is directly connected, GigabitEthernet1/0/2
S       172.16.2.172/30 is directly connected, GigabitEthernet1/0/24
S       172.16.2.176/30 is directly connected, GigabitEthernet1/0/24
```

#### Step 5: Configure MS 3650 Core-2

Open CLI of switch 3650 and configure the following tasks

- Enter the privileged EXEC mode **Switch> enable**
- Enter configuration mode **Switch # configure terminal** or **Switch# config t**
- Assign a device name **Core-2** to the switch **Switch(config)# hostname Core-2**
- Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names **Core-2(config)# no ip domain-lookup**

#### Step 6: Configure MS 3650 Core-2 Interfaces

- Disable switchport mode at interfaces G1/0/1, G1/0/2, and G1/0/24  
**Core-2(config)#int range g1/0/1-2**  
**Core-2(config-if-range)#no switchport**  
**Core-2(config-if-range)#exit**  
**Core-2(config)#int g1/0/24**  
**Core-2(config-if)#no switchport**  
**Core-2(config-if)#exit**
- Set Interface G1/0/1 description to Link-to-SW-B  
**Core-2(config)# interface g1/0/1 Core-**  
**2(config-if)# description Link-to-SW-B**  
**Core-2(config-if)# no switchport**  
**Core-2(config-if)# ip address 172.16.2.173 255.255.255.252**  
**Core-2(config-if)# no shutdown**

- Set Interface G1/0/2 description to Link-to-R-C
- Set IP Address and Subnet Mask for Interface G1/0/1, and switch-on Interface G1/0/2  
**Core-2 (config)# interface g1/0/2**  
**Core-2(config-if)# description Link-to-R-C**  
**Core-2(config-if)# no switchport**  
**Core-2(config-if)# ip address 172.16.2.177**  
**255.255.255.252** **Core-2(config-if)# no shutdown**
- Set Interface G1/0/24 description to Link-to-Core-1
- Set IP Address and Subnet Mask for Interface G1/0/24, and switch-on Interface G1/0/24  
**Core-2 (config)# interface GigabitEthernet1/0/24**  
**Core-2(config-if)# description Link-to-Core-1**  
**Core-2(config-if)# no switchport**  
**Core-2(config-if)# ip address 172.16.2.162**  
**255.255.255.252** **Core-2(config-if)# no shutdown**

### Step 7: Configure Static Routes in MS 3650 Core-2

- Enable IP Routing **Core-2(config)# ip routing**
- For LAN B and LAN C, configure a recursive static route to the LAN network with the next hop for each route.  
**Core-2(config)# ip route 172.16.2.128 255.255.255.224 172.16.2.174 (LAN-B)**  
**Core-2(config)# ip route 172.16.2.64 255.255.255.192 172.16.2.178 (LAN-C)**
- For all other non-connected Networks, configure a static **default** route to the exit interface G1/0/24 to router Core-1.  
**Core-2(config)# ip route 0.0.0.0 0.0.0.0 g1/0/24**

### Step 8: Check IP Routing Table of MS 3650 Core-2

- Record, which networks are routed in MS 3650 Core-2 (sh ip route).

```
Core-2#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       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 172.16.2.161 to network 0.0.0.0

    172.16.0.0/16 is variably subnetted, 5 subnets, 3 masks
S       172.16.2.64/26 [1/0] via 172.16.2.178
S       172.16.2.128/27 [1/0] via 172.16.2.174
C       172.16.2.160/30 is directly connected, GigabitEthernet1/0/24
C       172.16.2.172/30 is directly connected, GigabitEthernet1/0/1
C       172.16.2.176/30 is directly connected, GigabitEthernet1/0/2
S*    0.0.0.0/0 [1/0] via 172.16.2.161
```

## Part 5: LAN Multilayer Switches 3650

### Step 1: Configure MS 3650 SW-B

Open CLI of switch 3650 and configure the following tasks

- Enter the privileged EXEC mode **Switch> enable**
- Enter configuration mode **Switch # configure terminal** or **Switch # config t**
- Assign a device name **SW-B** to the switch **Switch(config)# hostname SW-B**
- Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names **SW-B(config)# no ip domain-lookup**

## Step 2: Configure MS 3650 SW-B VLAN, Interfaces and Routing

Switch SW-B is access switch for data center servers and routes to the core network.

- Enable IP Routing **SW-B(config)# ip routing**
- Disable switch port behavior at interface g1/0/24 and create a layer 3 router interface. Switch-on the interface.  
**SW-B(config)# ip default-gateway 172.16.2.158**
- Set Interface G1/0/24 description to Link-to-Core-2  
**SW-B(config)# interface g1/0/24**  
**SW-B(config-if)# description Link-to-Core-2**  
**SW-B(config-if)# no switchport**  
**SW-B(config-if)# ip address 172.16.2.174 255.255.255.252**  
**SW-B(config-if)# no shutdown**
- Configure a static default route to the router Core-2 interface G1/0/1 IP address.  
**SW-B(config)# ip route 0.0.0.0 0.0.0.0 172.16.2.173**  
or **SW-B(config)# ip route 0.0.0.0 0.0.0.0 g1/0/1**

All servers are connected by default to VLAN1.

- Create a virtual (SVI) interface VLAN1 with the IP address of table 2 as Default Gateway for VLAN 1. Switch-on this interface.  
**SW-B(config)# interface Vlan1**  
**SW-B(config-if)# ip address 172.16.2.158 255.255.255.224**  
**SW-B(config-if)# no shutdown**

## Step 3: Check IP Routing Table of MS 3650 SW-B

- Record, which networks are routed in MS 3650 SW-B (sh ip route).

```
SW-B#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       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 172.16.2.173 to network 0.0.0.0

    172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.16.2.128/27 is directly connected, Vlan1
C       172.16.2.172/30 is directly connected, GigabitEthernet1/0/24
S*    0.0.0.0/0 [1/0] via 172.16.2.173
```

**Step 4: Configure MS 3650 SW-D**

Open CLI of switch 3650 and configure the following tasks

- Enter the privileged EXEC mode **Switch> enable**
- Enter configuration mode **Switch# configure terminal** or **Switch # config t**
- Assign a device name **SW-D** to the switch **Switch(config)# hostname SW-D**
- Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names **SW-D(config)# no ip domain-lookup**

**Step 5: Configure MS 3650 SW-D VLANs and VLAN Interfaces**

Switch SW-D is access switch for VLAN 10 and VLAN 20.

- Create VLAN 10, name voice, and VLAN 20, name data  
**SW-D(config)# vlan 10**  
**SW-D(config-vlan)# name voice**  
**SW-D(config-vlan)# vlan 20**  
**SW-D(config-vlan)# name data**
- For interface range G1/0/1 to G1/0/10, configure switchport access mode to VLAN 10  
**SW-D(config)# interface range g1/0/1-g1/0/10**  
**SW-D(config-if-range)# switchport mode access**  
**SW-D(config-if-range)# switchport access vlan 10**
- For interface range G1/0/11 to G1/0/20, configure switchport access mode to VLAN 20  
**SW-D(config)# interface range g1/0/11-g1/0/20**  
**SW-D(config-if-range)# switchport mode access**  
**SW-D(config-if-range)# switchport access vlan 20**

- Cross-check VLAN mapping (sh ip vlan br)  
 Reconfigure, if mapping is not matched.

```
SW-D#sh vlan br
```

VLAN Name	Status	Ports
1 default	active	Gig1/0/21, Gig1/0/22, Gig1/0/23, Gig1/1/1 Gig1/1/2, Gig1/1/3, Gig1/1/4
10 voice	active	Gig1/0/1, Gig1/0/2, Gig1/0/3, Gig1/0/4 Gig1/0/5, Gig1/0/6, Gig1/0/7, Gig1/0/8 Gig1/0/9, Gig1/0/10
20 data	active	Gig1/0/11, Gig1/0/12, Gig1/0/13, Gig1/0/14 Gig1/0/15, Gig1/0/16, Gig1/0/17, Gig1/0/18 Gig1/0/19, Gig1/0/20

- Create a virtual (SVI) interface VLAN10 with the IP address of table 2 as Default Gateway for VLAN 10. Switch-on this interface.  
**SW-D(config)# interface vlan10**  
**SW-D(config-if)# ip address 172.16.0.254 255.255.255.0**  
**SW-D(config-if)# no shutdown**

- Create a virtual (SVI) interface VLAN20 with the IP address of table 2 as Default Gateway for VLAN 10. Switch-on this interface.

**SW-D(config)# interface vlan20**

**SW-D(config-if)# ip address 172.16.1.254 255.255.255.0**

**SW-D(config-if)# no shutdown**

**SW-D(config-if)# exit**

#### Step 6: Configure MS 3650 SW-D Routing

Switch SW-D routes to the core network.

- Enable IP Routing **SW-D(config)# ip routing**
- Disable switch port behavior at interface g1/0/24 and create a layer 3 router interface. Switch-on the interface.

- Set Interface G1/0/24 description to Link-to-Core-1

**SW-B(config)# interface g1/0/24**

**SW-B(config-if)# description Link-to-Core-1**

**SW-B(config-if)# no switchport**

**SW-B(config-if)# ip address 172.16.2.170 255.255.255.252**

**SW-B(config-if)# no shutdown**

- Configure a static default route to the router Core-1 interface G1/0/2 IP address.

**SW-B(config)# ip route 0.0.0.0 0.0.0.0 172.16.2.169**

#### Step 7: Check IP Routing Table of MS 3650 SW-D

- Record, which networks are routed in MS 3650 SW-D (sh ip route).

```
SW-D#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       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 172.16.2.169 to network 0.0.0.0

    172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
C       172.16.0.0/24 is directly connected, Vlan10
C       172.16.1.0/24 is directly connected, Vlan20
C       172.16.2.168/30 is directly connected, GigabitEthernet1/0/24
S*    0.0.0.0/0 [1/0] via 172.16.2.169
```



## Task 3 – Configure PCs, Laptops, Servers

### Part 1: PCs and Laptops in LAN A, LAN C, LAN D, and LAN E

#### Step 1: LAN A

- Configure DHCP Server LAN A to provide the IP addresses, network mask and default gateway of table 2 network, excluding the IP address of DHCP Server and Default Gateway in LAN A. Configure the PCs to get IP connectivity by DHCP.

Server-PT (DHCP LAN-A)

Physical Config Services **Desktop** Programming Attributes

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 172.16.2.61

Subnet Mask 255.255.255.192

Default Gateway 172.16.2.62

DNS Server 0.0.0.0

PC0

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 172.16.2.1

Subnet Mask 255.255.255.192

Default Gateway 172.16.2.62

DNS Server 0.0.0.0

PC1

Physical **Config** Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static

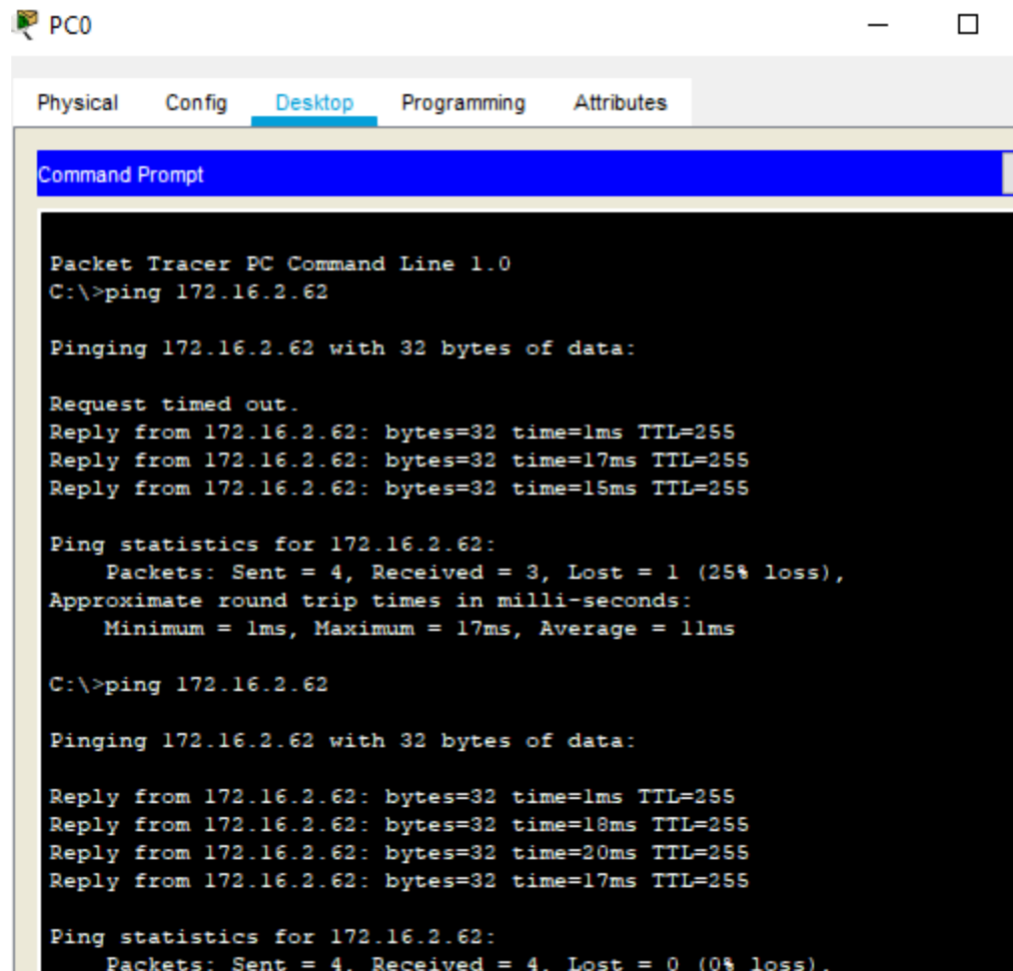
IPv4 Address 172.16.2.2

Subnet Mask 255.255.255.192

Default Gateway 172.16.2.62

DNS Server 0.0.0.0

- Test connectivity by pinging the Default Gateway. **Successful**



PC0

Physical Config **Desktop** Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping 172.16.2.62

Pinging 172.16.2.62 with 32 bytes of data:

Request timed out.
Reply from 172.16.2.62: bytes=32 time=1ms TTL=255
Reply from 172.16.2.62: bytes=32 time=17ms TTL=255
Reply from 172.16.2.62: bytes=32 time=15ms TTL=255

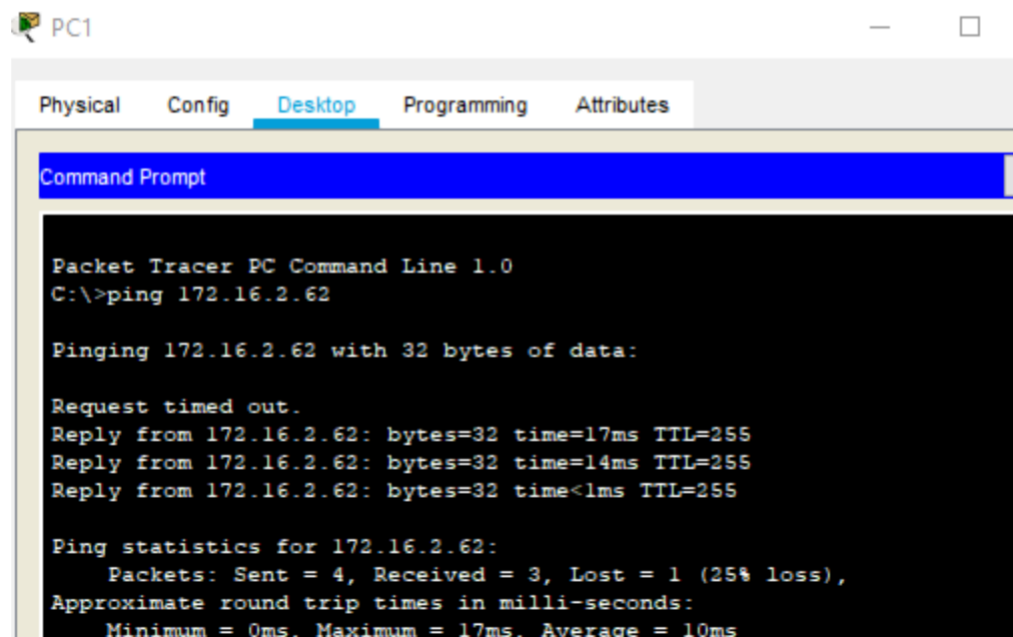
Ping statistics for 172.16.2.62:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 17ms, Average = 11ms

C:\>ping 172.16.2.62

Pinging 172.16.2.62 with 32 bytes of data:

Reply from 172.16.2.62: bytes=32 time=1ms TTL=255
Reply from 172.16.2.62: bytes=32 time=18ms TTL=255
Reply from 172.16.2.62: bytes=32 time=20ms TTL=255
Reply from 172.16.2.62: bytes=32 time=17ms TTL=255

Ping statistics for 172.16.2.62:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```



PC1

Physical Config **Desktop** Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping 172.16.2.62

Pinging 172.16.2.62 with 32 bytes of data:

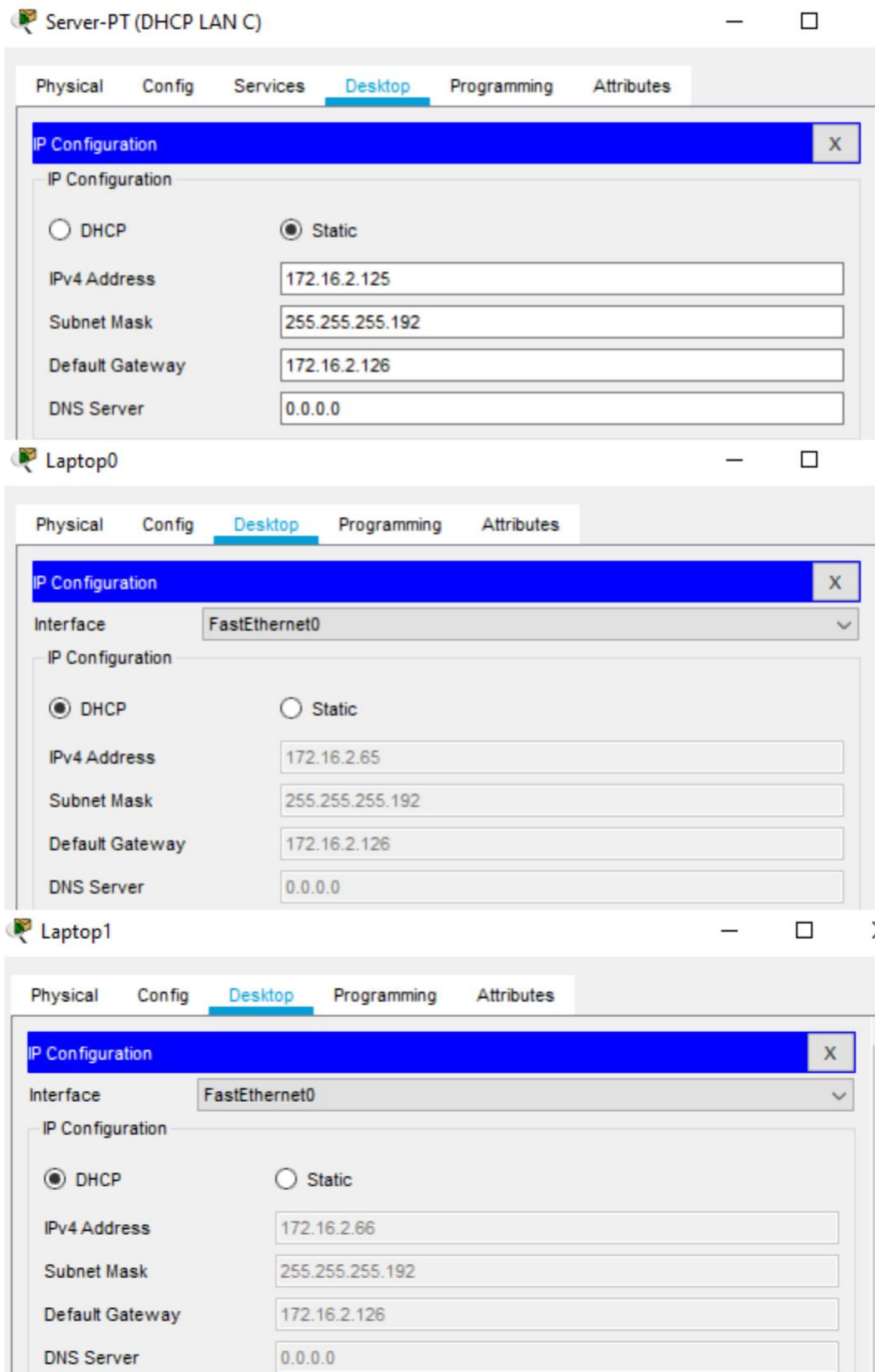
Request timed out.
Reply from 172.16.2.62: bytes=32 time=17ms TTL=255
Reply from 172.16.2.62: bytes=32 time=14ms TTL=255
Reply from 172.16.2.62: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.2.62:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 17ms, Average = 10ms
```

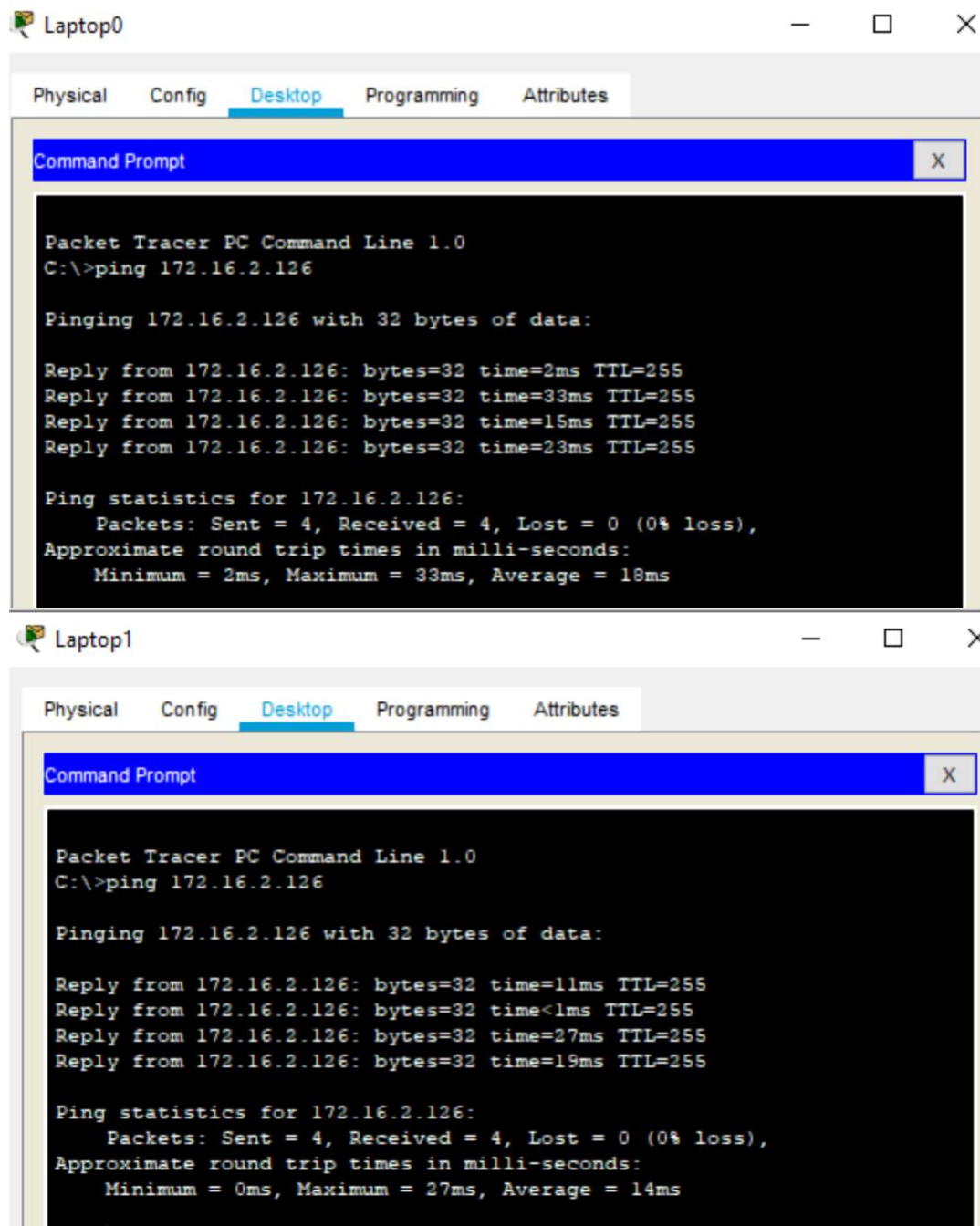
## Step 2: LAN C

- Configure DHCP Server LAN C to provide the IP addresses, network mask and default gateway of table 2 network, excluding the IP address of DHCP Server and Default Gateway in LAN C. Configure the Laptops to get IP connectivity by DHCP.



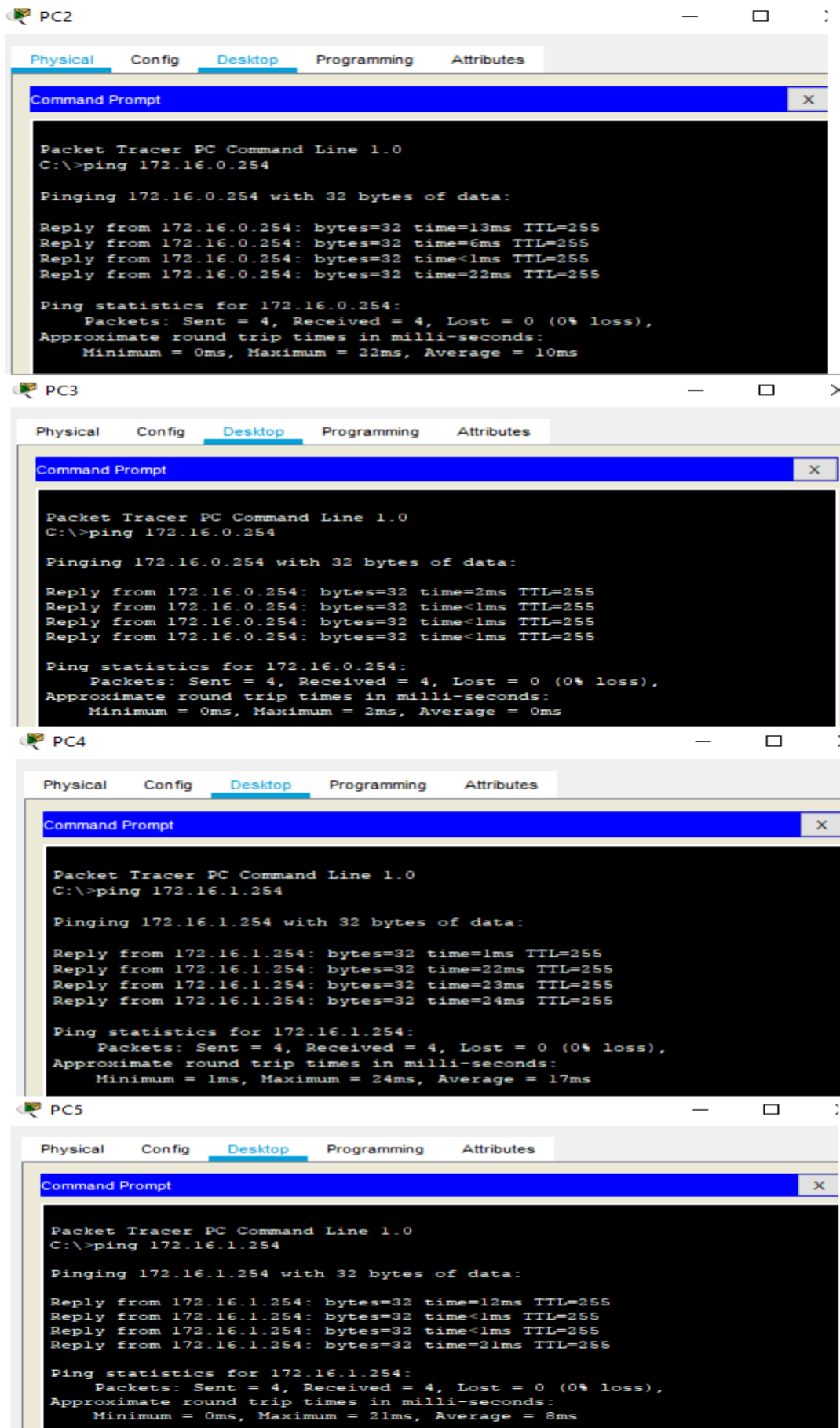


- Test connectivity by pinging the Default Gateway. **Successful as following**



### Step 3: LAN D and LAN E

- Configure the IP Addressing of PCs according to your Addressing Table.
- Test connectivity by pinging the Default Gateway. **Successful as following**



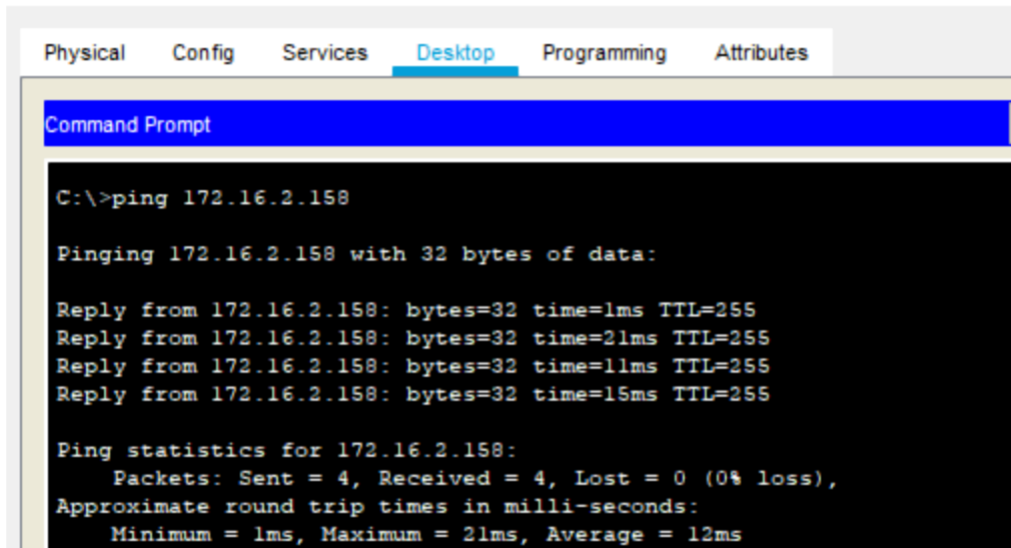
## Part 2: Servers in LAN B and Connectivity Test

### Step 1: LAN B

- Configure static IP addresses to the servers according to addressing table 2.
- From each server, test connectivity by pinging the Default Gateway.

Successful

Server-PT(HTTP)



```
Physical  Config  Services  Desktop  Programming  Attributes

Command Prompt

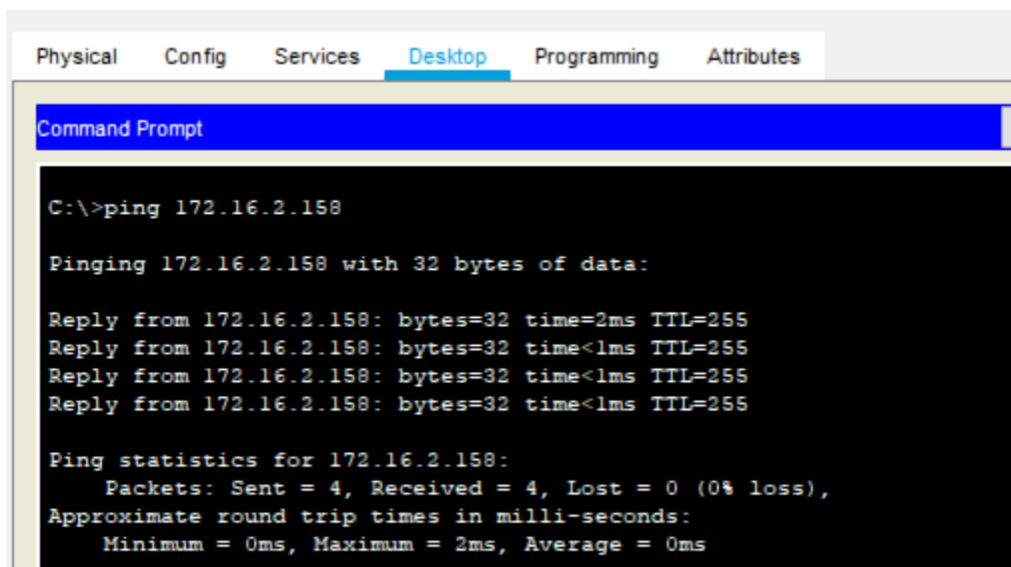
C:\>ping 172.16.2.158

Pinging 172.16.2.158 with 32 bytes of data:

Reply from 172.16.2.158: bytes=32 time=1ms TTL=255
Reply from 172.16.2.158: bytes=32 time=21ms TTL=255
Reply from 172.16.2.158: bytes=32 time=11ms TTL=255
Reply from 172.16.2.158: bytes=32 time=15ms TTL=255

Ping statistics for 172.16.2.158:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 21ms, Average = 12ms
```

Server-PT(SYSLOG)



```
Physical  Config  Services  Desktop  Programming  Attributes

Command Prompt

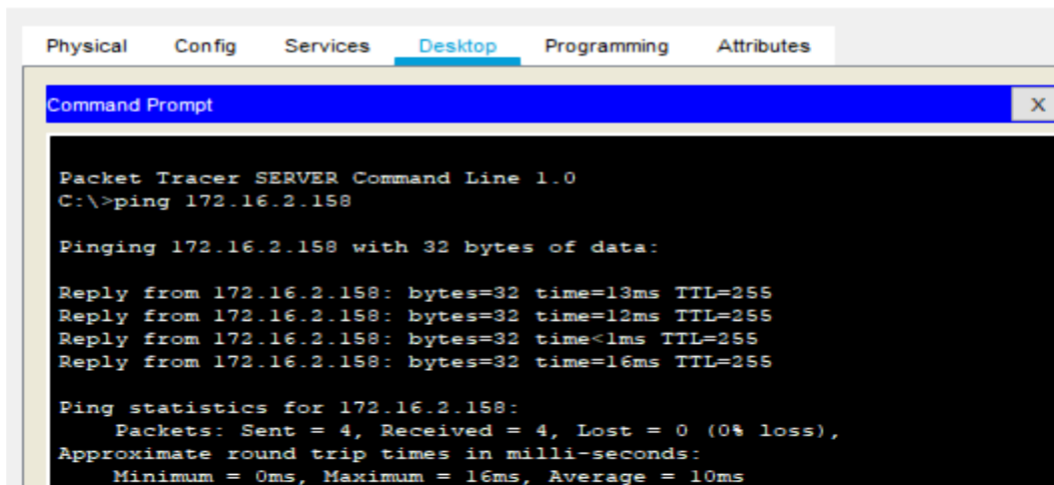
C:\>ping 172.16.2.158

Pinging 172.16.2.158 with 32 bytes of data:

Reply from 172.16.2.158: bytes=32 time=2ms TTL=255
Reply from 172.16.2.158: bytes=32 time<1ms TTL=255
Reply from 172.16.2.158: bytes=32 time<1ms TTL=255
Reply from 172.16.2.158: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.2.158:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms
```

Server-PT (EMAIL)



```
Physical  Config  Services  Desktop  Programming  Attributes

Command Prompt

Packet Tracer SERVER Command Line 1.0
C:\>ping 172.16.2.158

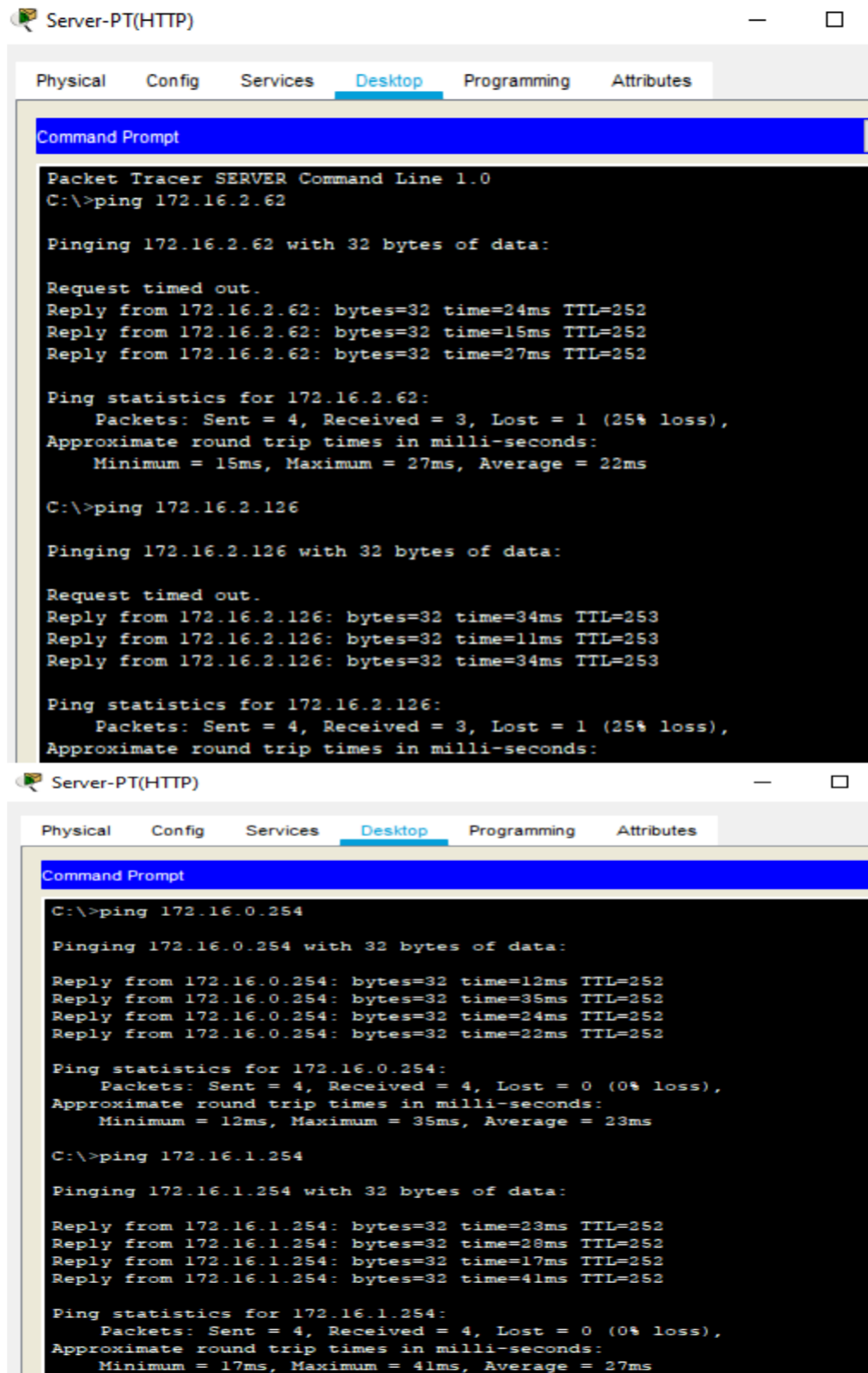
Pinging 172.16.2.158 with 32 bytes of data:

Reply from 172.16.2.158: bytes=32 time=13ms TTL=255
Reply from 172.16.2.158: bytes=32 time=12ms TTL=255
Reply from 172.16.2.158: bytes=32 time<1ms TTL=255
Reply from 172.16.2.158: bytes=32 time=16ms TTL=255

Ping statistics for 172.16.2.158:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 16ms, Average = 10ms
```

- From each server, test to ping the Default Gateway of LAN A, LAN C, LAN D, and LAN E. Search for routing errors and reconfigure your network, if ping is not working.

**Successful for each server (but only HTTP server has been shown)**



The image shows two screenshots of a Packet Tracer Server-PT(HTTP) Desktop tab. The top screenshot shows the results of ping tests to 172.16.2.62 and 172.16.2.126. Both tests show a 25% loss of packets. The bottom screenshot shows the results of ping tests to 172.16.0.254 and 172.16.1.254. Both tests show 0% loss of packets.

```
Packet Tracer SERVER Command Line 1.0
C:\>ping 172.16.2.62

Pinging 172.16.2.62 with 32 bytes of data:

Request timed out.
Reply from 172.16.2.62: bytes=32 time=24ms TTL=252
Reply from 172.16.2.62: bytes=32 time=15ms TTL=252
Reply from 172.16.2.62: bytes=32 time=27ms TTL=252

Ping statistics for 172.16.2.62:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 15ms, Maximum = 27ms, Average = 22ms

C:\>ping 172.16.2.126

Pinging 172.16.2.126 with 32 bytes of data:

Request timed out.
Reply from 172.16.2.126: bytes=32 time=34ms TTL=253
Reply from 172.16.2.126: bytes=32 time=11ms TTL=253
Reply from 172.16.2.126: bytes=32 time=34ms TTL=253

Ping statistics for 172.16.2.126:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
```

```
C:\>ping 172.16.0.254

Pinging 172.16.0.254 with 32 bytes of data:

Reply from 172.16.0.254: bytes=32 time=12ms TTL=252
Reply from 172.16.0.254: bytes=32 time=35ms TTL=252
Reply from 172.16.0.254: bytes=32 time=24ms TTL=252
Reply from 172.16.0.254: bytes=32 time=22ms TTL=252

Ping statistics for 172.16.0.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 35ms, Average = 23ms

C:\>ping 172.16.1.254

Pinging 172.16.1.254 with 32 bytes of data:

Reply from 172.16.1.254: bytes=32 time=23ms TTL=252
Reply from 172.16.1.254: bytes=32 time=28ms TTL=252
Reply from 172.16.1.254: bytes=32 time=17ms TTL=252
Reply from 172.16.1.254: bytes=32 time=41ms TTL=252

Ping statistics for 172.16.1.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 17ms, Maximum = 41ms, Average = 27ms
```

- From PC0, Laptop0, PC3, and PC5 ping the HTTP Server in LAN B. Search for routing errors and reconfigure your network, if ping is not working.

**Successful**

PC0

```
Physical Config Desktop Programming Attributes
Command Prompt

C:\>ping 172.16.2.129

Pinging 172.16.2.129 with 32 bytes of data:

Reply from 172.16.2.129: bytes=32 time=38ms TTL=124
Reply from 172.16.2.129: bytes=32 time=16ms TTL=124
Reply from 172.16.2.129: bytes=32 time=20ms TTL=124
Reply from 172.16.2.129: bytes=32 time=37ms TTL=124

Ping statistics for 172.16.2.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 16ms, Maximum = 38ms, Average = 27ms
```

Laptop0

```
Physical Config Desktop Programming Attributes
Command Prompt

C:\>ping 172.16.2.129

Pinging 172.16.2.129 with 32 bytes of data:

Reply from 172.16.2.129: bytes=32 time=41ms TTL=125
Reply from 172.16.2.129: bytes=32 time=19ms TTL=125
Reply from 172.16.2.129: bytes=32 time=13ms TTL=125
Reply from 172.16.2.129: bytes=32 time=106ms TTL=125

Ping statistics for 172.16.2.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 13ms, Maximum = 106ms, Average = 44ms
```

PC3

```
Physical Config Desktop Programming Attributes
Command Prompt

C:\>ping 172.16.2.129

Pinging 172.16.2.129 with 32 bytes of data:

Reply from 172.16.2.129: bytes=32 time=23ms TTL=124
Reply from 172.16.2.129: bytes=32 time=13ms TTL=124
Reply from 172.16.2.129: bytes=32 time=21ms TTL=124
Reply from 172.16.2.129: bytes=32 time=12ms TTL=124

Ping statistics for 172.16.2.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 23ms, Average = 17ms
```

PC5

```
Physical Config Desktop Programming Attributes
Command Prompt

C:\>ping 172.16.2.129

Pinging 172.16.2.129 with 32 bytes of data:

Reply from 172.16.2.129: bytes=32 time=27ms TTL=124
Reply from 172.16.2.129: bytes=32 time=35ms TTL=124
Reply from 172.16.2.129: bytes=32 time=26ms TTL=124
Reply from 172.16.2.129: bytes=32 time=39ms TTL=124

Ping statistics for 172.16.2.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 26ms, Maximum = 39ms, Average = 31ms
```

## Checkout

When you successfully finished this Lab

1. Save your results and answers **in this PDF file**.
2. Save the running configuration of **Router Core-1** and of **Multilayer Switch SW-D** in a text file (.txt).
3. Upload 2 files (.pdf and .txt) in Ilias.

## Lab Demonstration

Following the deadline for the delivery of Lab2, you will have to present your PT solution in a ZOOM Session.

- Date for the ZOOM Session will be Tuesday Jan. 12 from 2 pm.
- The Link and schedule will be provided after Lab2 deadline.
- You will share your desktop to display your PT solution.