

2025

# COMPUTER NETWORK

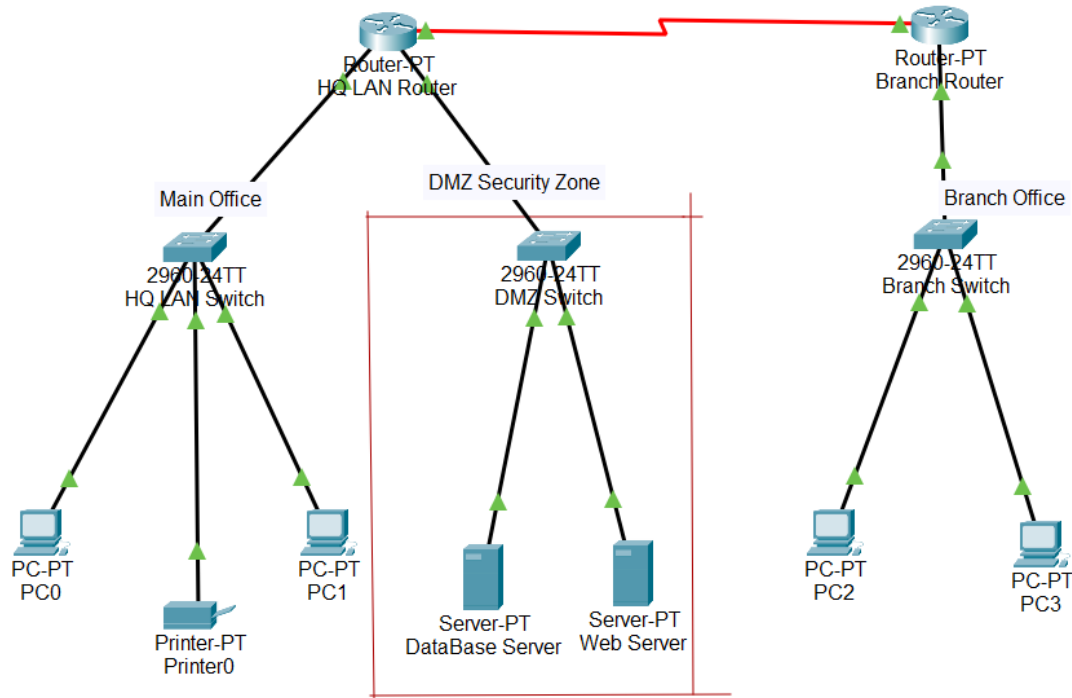


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*11/23/2025*

## Topology According to Given Scenario



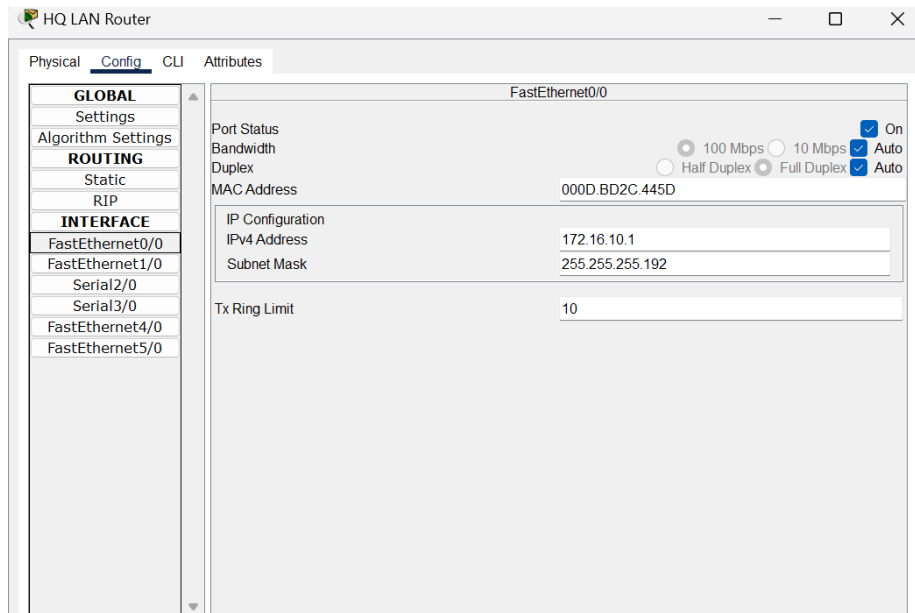
## Deliverables Checklist

1. VLSM Table Completed Task 1 table showing all calculations.

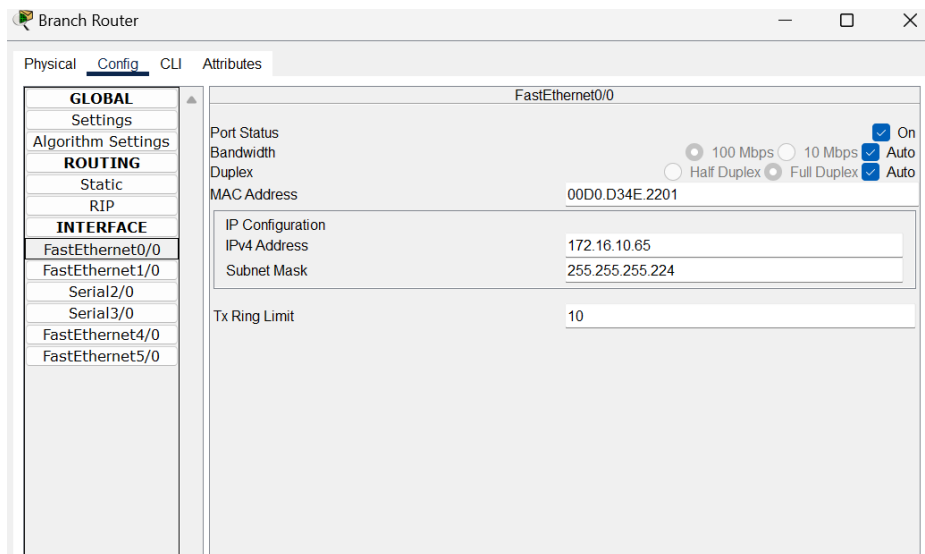
Segment Name	Required Hosts	Subnet Address	New Subnet Mask	Usable Range (First & Last Host)
1. Main Office LAN	60	<b>172.16.10.0/26</b>	255.255.255.192 (/26)	<b>172.16.10.1 – 172.16.10.62</b>
2. Branch Office LAN	28	<b>172.16.10.64/27</b>	255.255.255.224 (/27)	<b>172.16.10.65 – 172.16.10.94</b>
3. DMZ (Servers)	14	<b>172.16.10.96/28</b>	255.255.255.240 (/28)	<b>172.16.10.97 – 172.16.10.110</b>
4. WAN Link (R1–R2)	2	<b>172.16.10.112/30</b>	255.255.255.252 (/30)	<b>172.16.10.113 – 172.16.10.114</b>

## Notes (for documentation)

- Router/Gateway assignments used in the configuration:
  - R1 (HQ) Fa0/0 = **172.16.10.1** (Main LAN gateway)



- R2 (Branch) Fa0/0 = **172.16.10.65** (Branch gateway)



- R1 (DMZ) Fa0/1 = **172.16.10.97** (DMZ gateway)

The screenshot shows the configuration page for the FastEthernet1/0 interface on the HQ LAN Router. The left sidebar contains a tree view with categories: GLOBAL (Settings, Algorithm Settings), ROUTING (Static, RIP), and INTERFACE (FastEthernet0/0, FastEthernet1/0, Serial2/0, Serial3/0, FastEthernet4/0, FastEthernet5/0). The main panel is titled 'FastEthernet1/0' and contains the following settings:

- Port Status: ☒ On
- Bandwidth: 100 Mbps (selected), 10 Mbps
- Duplex: ☒ Full Duplex, ☐ Half Duplex
- MAC Address: 00E0.B000.3673
- IP Configuration:
  - IPv4 Address: 172.16.10.97
  - Subnet Mask: 255.255.255.240
- Tx Ring Limit: 10

- R1 Serial = **172.16.10.113**, R2 Serial = **172.16.10.114** (WAN)

R1 Serial2/0:

The screenshot shows the configuration page for the Serial2/0 interface on the HQ LAN Router. The left sidebar is the same as in the previous screenshot, with the 'Serial2/0' interface selected. The main panel is titled 'Serial2/0' and contains the following settings:

- Port Status: ☒ On
- Duplex: ☒ Full Duplex
- Clock Rate: 2000000
- IP Configuration:
  - IPv4 Address: 172.16.10.113
  - Subnet Mask: 255.255.255.252
- Tx Ring Limit: 10

## R2 Serial2/0:

The screenshot shows the 'Branch Router' configuration window with the 'Config' tab selected. The left sidebar lists various configuration categories: GLOBAL (Settings, Algorithm Settings), ROUTING (Static, RIP), and INTERFACE (FastEthernet0/0, FastEthernet1/0, Serial2/0, Serial3/0, FastEthernet4/0, FastEthernet5/0). The 'Serial2/0' interface is selected. The main configuration area for Serial2/0 includes:
 

- Port Status: ☒ On
- Duplex: ☒ Full Duplex
- Clock Rate: 2000000
- IP Configuration:
  - IPv4 Address: 172.16.10.114
  - Subnet Mask: 255.255.255.252
- Tx Ring Limit: 10

- Server static IPs (per plan):
  - Web Server = **172.16.10.98**

The screenshot shows the 'Web Server' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is highlighted. The configuration details are as follows:
 

- IP Configuration:**
  - ☐ DHCP
  - ☒ Static
    - IPv4 Address: 172.16.10.98
    - Subnet Mask: 255.255.255.240
    - Default Gateway: 172.16.10.97
    - DNS Server: 0.0.0.0
- IPv6 Configuration:**
  - ☐ Automatic
  - ☒ Static
    - IPv6 Address: [empty] / [empty]
    - Link Local Address: FE80::200:CFF:FEAD:6E6B
    - Default Gateway: [empty]
    - DNS Server: [empty]
- 802.1X:**
  - ☐ Use 802.1X Security
  - Authentication: MD5
  - Username: [empty]
  - Password: [empty]

- Database Server = **172.16.10.99**

DataBase Server

Physical Config Services **Desktop** Programming Attributes

IP Configuration [X]

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 172.16.10.99

Subnet Mask 255.255.255.240

Default Gateway 172.16.10.97

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::20A:41FF:FEC6:AEAA

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

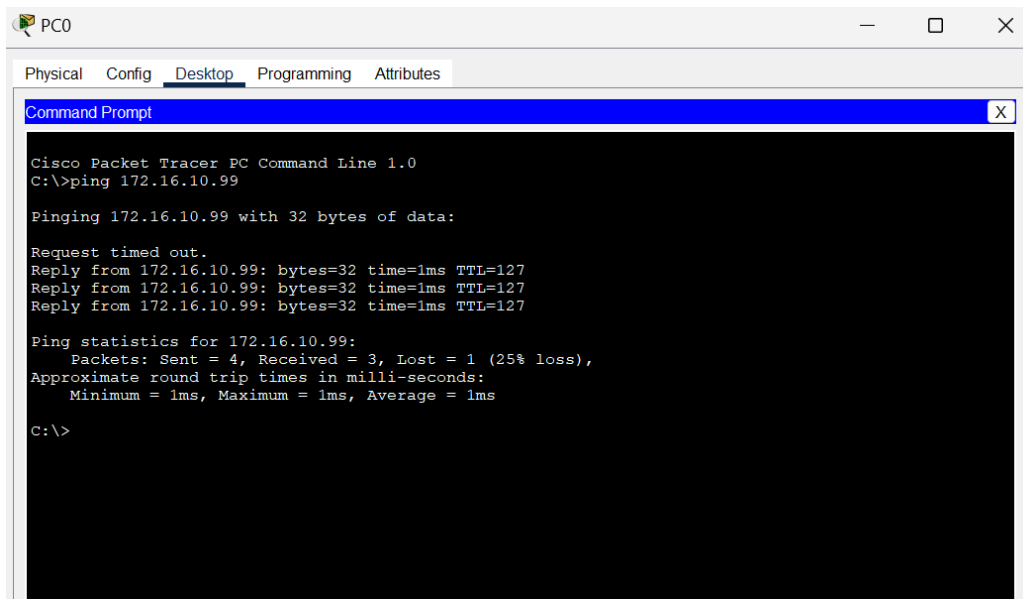
Password

- DHCP pool on R1 covers **172.16.10.0/26** with excluded addresses 172.16.10.1–172.16.10.6 (first usable DHCP will be 172.16.10.7).

```
R1(config-router)#hostname R1
R1(config)#
R1(config)#! ----- DHCP -----
R1(config)#ip dhcp excluded-address 172.16.10.1 172.16.10.6
R1(config)#ip dhcp pool MAIN_LAN
R1(dhcp-config)# network 172.16.10.0 255.255.255.192
R1(dhcp-config)# default-router 172.16.10.1
R1(dhcp-config)# dns-server 8.8.8.8
```

## 2. Verification Screenshots

a. Successful ping from HQ PC to Database Server.



```

PC0
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.16.10.99

Pinging 172.16.10.99 with 32 bytes of data:

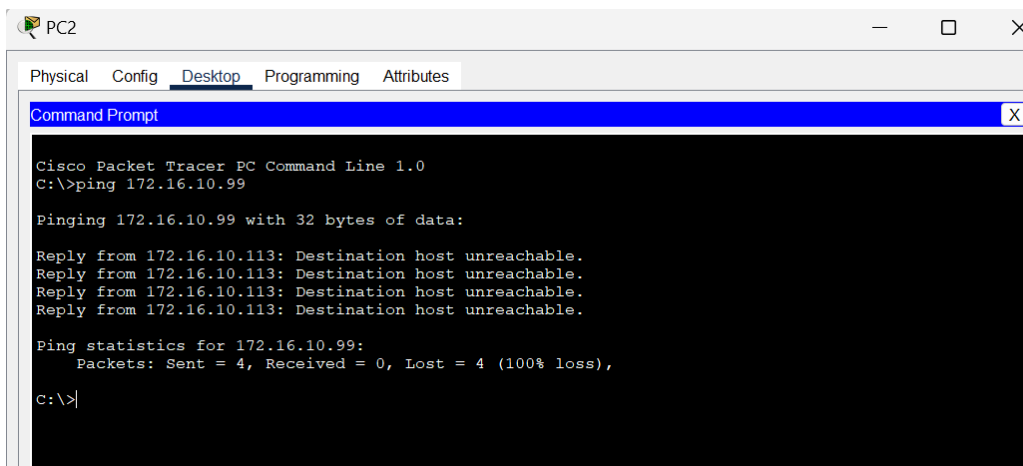
Request timed out.
Reply from 172.16.10.99: bytes=32 time=1ms TTL=127
Reply from 172.16.10.99: bytes=32 time=1ms TTL=127
Reply from 172.16.10.99: bytes=32 time=1ms TTL=127

Ping statistics for 172.16.10.99:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>

```

b. Failed ping from Branch PC to Database Server.



```

PC2
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.16.10.99

Pinging 172.16.10.99 with 32 bytes of data:

Reply from 172.16.10.113: Destination host unreachable.
Reply from 172.16.10.113: Destination host unreachable.
Reply from 172.16.10.113: Destination host unreachable.
Reply from 172.16.10.113: Destination host unreachable.

Ping statistics for 172.16.10.99:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>

```

c. Successful ping from HQ PC to web Server.

```

C:\>ping 172.16.10.98

Pinging 172.16.10.98 with 32 bytes of data:

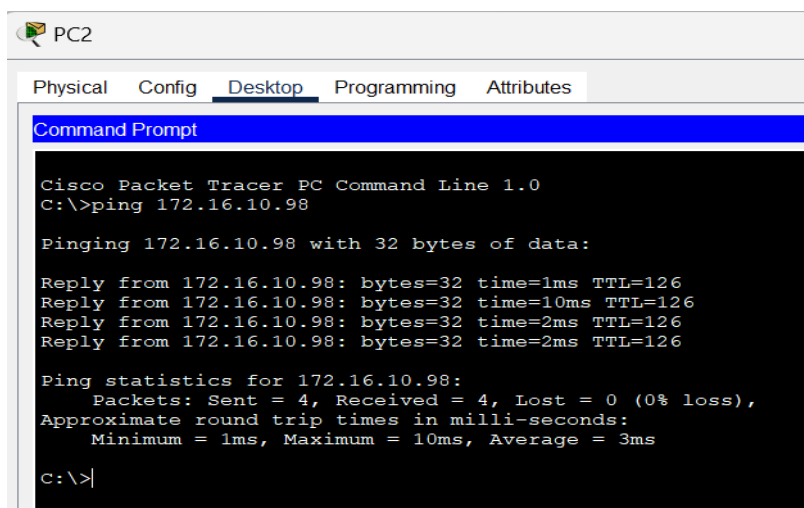
Request timed out.
Reply from 172.16.10.98: bytes=32 time=1ms TTL=127
Reply from 172.16.10.98: bytes=32 time<1ms TTL=127
Reply from 172.16.10.98: bytes=32 time=1ms TTL=127

Ping statistics for 172.16.10.98:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>

```

d. Successful ping from branch PC to web Server.



```

PC2
Physical Config Desktop Programming Attributes
Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.16.10.98

Pinging 172.16.10.98 with 32 bytes of data:

Reply from 172.16.10.98: bytes=32 time=1ms TTL=126
Reply from 172.16.10.98: bytes=32 time=10ms TTL=126
Reply from 172.16.10.98: bytes=32 time=2ms TTL=126
Reply from 172.16.10.98: bytes=32 time=2ms TTL=126

Ping statistics for 172.16.10.98:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 10ms, Average = 3ms

C:\>

```

e. Output of show ip route from R1 and R2.

R1:

```

R1(dhcp-config)#! ----- RIP v2 -----
R1(dhcp-config)#router rip
R1(config-router)# version 2
R1(config-router)# no auto-summary
R1(config-router)# network 172.16.10.0
R1(config-router)# network 172.16.10.64
R1(config-router)# network 172.16.10.112
R1(config-router)#
R1(config-router)#! ----- Static Route to DMZ -----
R1(config-router)#ip route 172.16.10.96 255.255.240 172.16.10.97
%Invalid next hop address (it's this router)

```

R2:

```

R2(config)#hostname R2
R2(config)#
R2(config)#! ----- RIP v2 -----
R2(config)#router rip
R2(config-router)# version 2
R2(config-router)# no auto-summary
R2(config-router)# network 172.16.10.64
R2(config-router)# network 172.16.10.112
R2(config-router)#
R2(config-router)#! ----- Default Route -----
R2(config-router)#ip route 0.0.0.0 0.0.0.0 172.16.10.113
R2(config)#

```

F. Output of show access-lists from R1.

```

%Invalid next hop address (it's this router),
R1(config)#
R1(config)#! ----- ACL Rules -----
R1(config)#ip access-list extended SECURE_DMZ
R1(config-ext-nacl)# permit tcp any host 172.16.10.98 eq 80
R1(config-ext-nacl)# permit tcp any host 172.16.10.98 eq 443
R1(config-ext-nacl)# permit ip 172.16.10.0 0.0.0.63 host 172.16.10.99
R1(config-ext-nacl)# deny ip 172.16.10.64 0.0.0.31 host 172.16.10.99
R1(config-ext-nacl)# permit ip any any
R1(config-ext-nacl)#
R1(config-ext-nacl)#! ----- Apply ACL -----
R1(config-ext-nacl)#interface Serial2/0
R1(config-if)# ip access-group SECURE_DMZin
% Incomplete command.
R1(config-if)#
R1(config-if)#end
R1#write

```



#### **4. Routing Explanation Briefly explain why you chose RIP for one segment and a Static**

##### **Route for the DMZ (50 words max).**

RIP v2 was used for the HQ and Branch LANs because these networks need automatic route exchange and easy scalability. The DMZ uses a static route because it is a small, security-sensitive network that should not be dynamically advertised. This ensures controlled access and reduces unnecessary routing updates.

**THE END**