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UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN



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Universidad Autónoma de Nuevo León

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Transmisión y Comunicación de Datos

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1 Introducción

En el siguiente PIA se ve un compilado de todo lo aprendido en el transcurso de la clase de *Transmisión y Comunicación de Datos*, el cual contenido se encuentra en [1].

En la siguiente imagen, veremos la estructuración de la topología:

Nota: Recuerda ver las contraseñas en el apéndice (A)

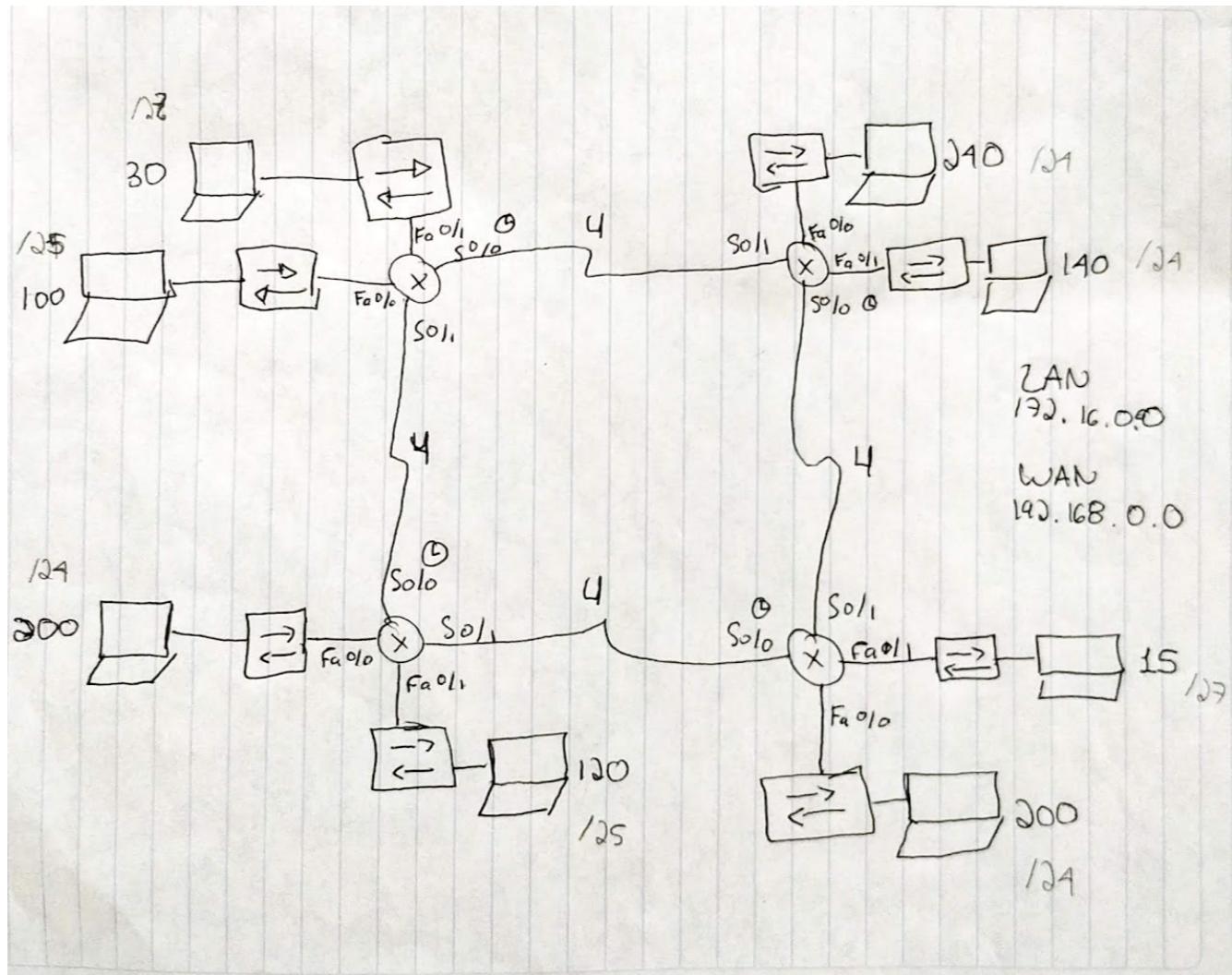


Figure 1: Topología escrita

El acuerdo que se tenía es que se iba a dejar de lado la ip 192.168.0.0, así que para este proyecto solo utilizaremos la ip 172.16.0.0e

2 Calculando las IPs

Para calcular las ips, primero necesitamos saber en cuantas partes dividiremos las subredes. Para eso podemos obtenerla contandolas desde nuestro diagrama:

2.1 Dividiendo la red

La manera más rápida que he encontrado para hacer las divisiones es encontrar cada área de red y pensarla como una topología física. En este caso, sabemos que cada router tiene 2 subredes, por lo que nos quedan 8 redes externas.

También podemos reconocer las subredes internas, en las cuales participan los routers en sus conexiones. Podemos ver en las conexiones que se hace de router a router, obtenemos 4 subredes, dando como un total de 12 subredes (utilizables) a calcular.

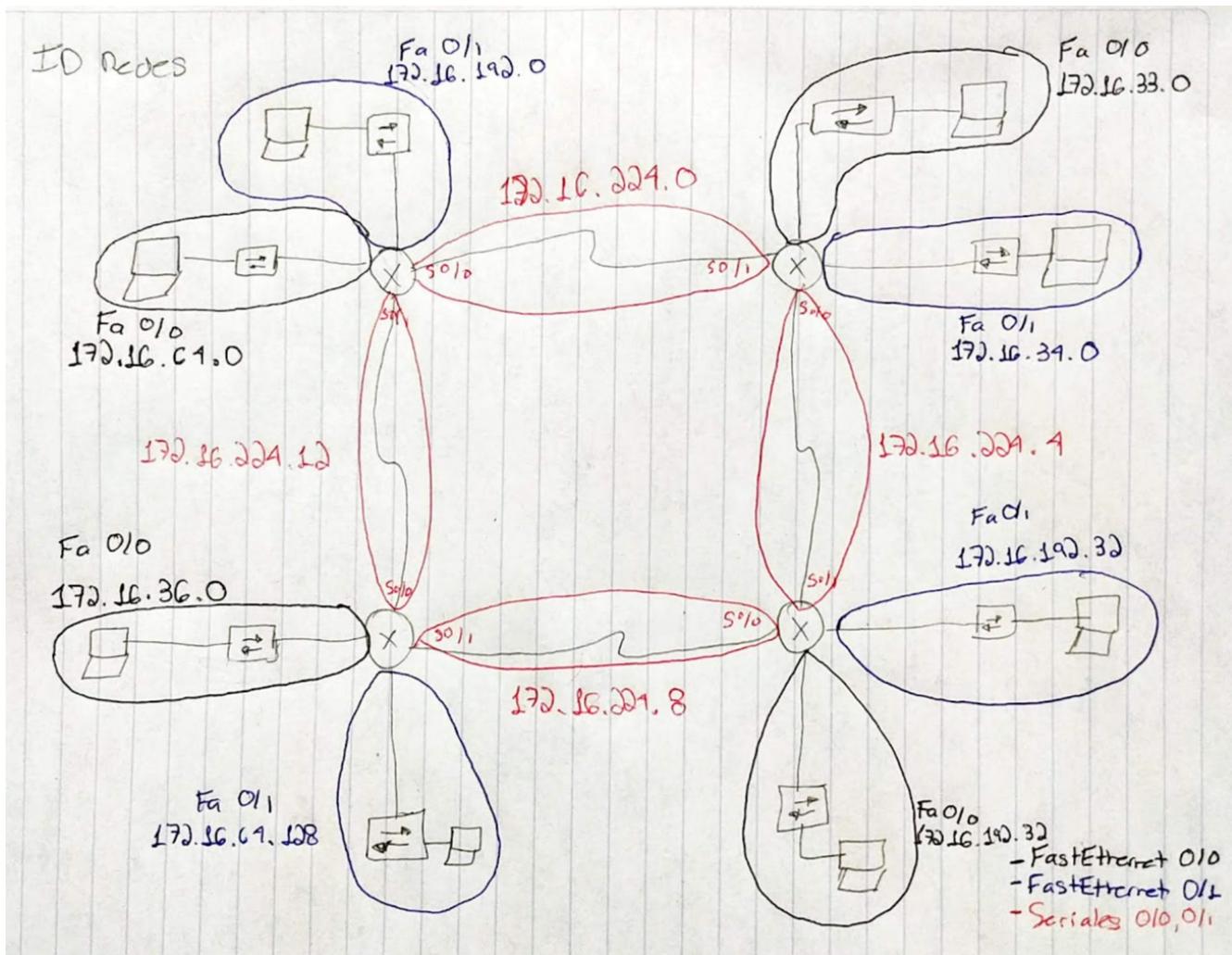


Figure 2: Subredes

2.2 Cálculos para obtener las redes que podemos utilizar

Utilizaremos el método VLSM para volver a subdividir las redes y así no tener muchas ips que no se usarían. De este modo tendremos una mayor flexibilidad a la hora de añadir subredes en el crecimiento de nuestra topología.

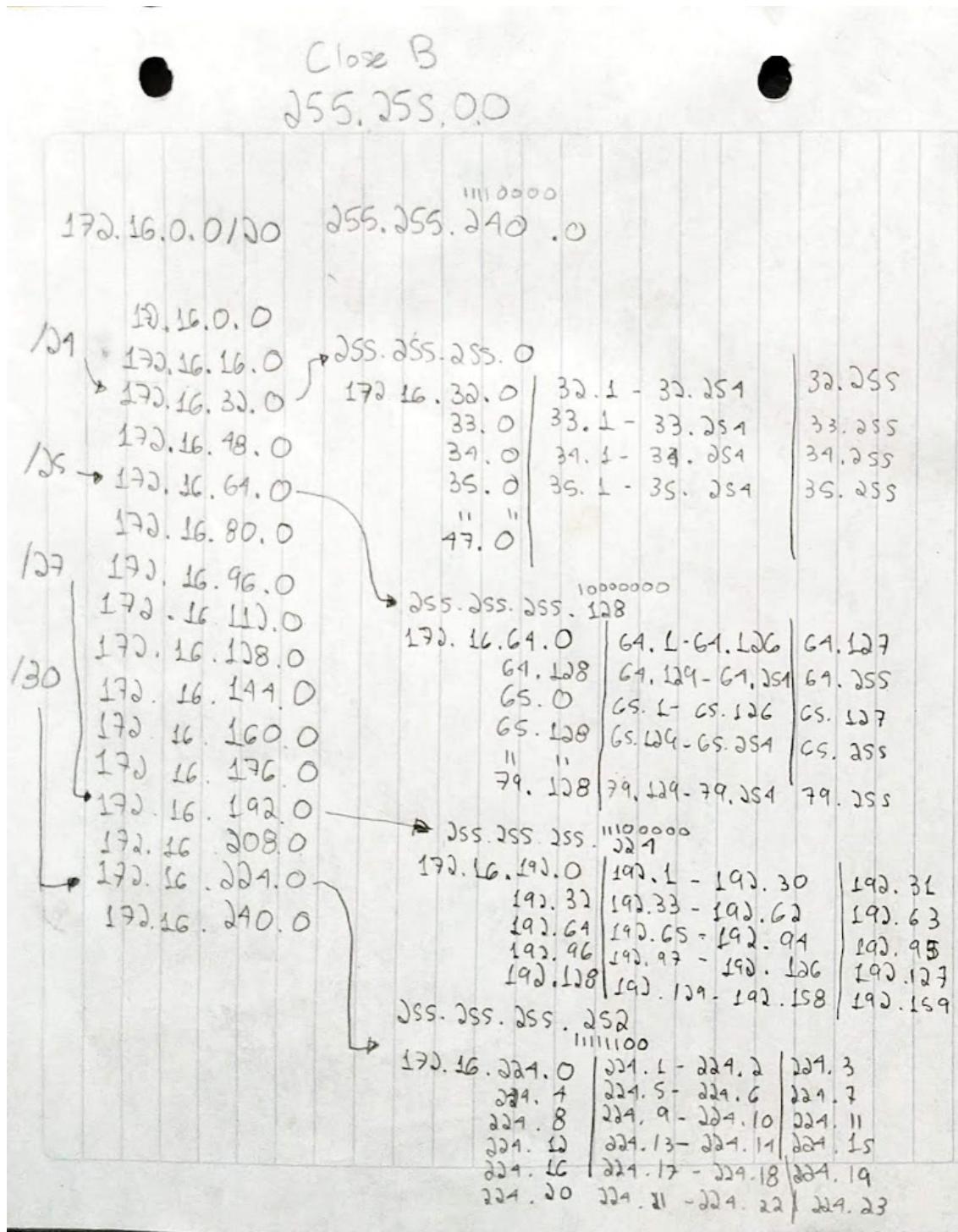


Figure 3: Cálculos para subnetear

3 Tabla de Enrutamiento de IPs

Dispositivo	Interfaz	Dirección IPV4	Máscara de Subred	Gateway
RTMTY	Serial 0/0	172.16.224.1	255.255.255.252	N/A
	Serial 0/1	172.16.224.14	255.255.255.252	N/A
	FastEthernet 0/0	172.16.64.1	255.255.255.128	N/A
	FastEthernet 0/1	172.16.192.1	255.255.255.224	N/A
RTNAY	Serial 0/0	172.16.224.5	255.255.255.252	N/A
	Serial 0/1	172.16.224.2	255.255.255.252	N/A
	FastEthernet 0/0	172.16.33.1	255.255.255.0	N/A
	FastEthernet 0/1	172.16.34.1	255.255.255.0	N/A
RTCDMX	Serial 0/0	172.16.224.9	255.255.255.252	N/A
	Serial 0/1	172.16.224.6	255.255.255.252	N/A
	FastEthernet 0/0	172.16.35.1	255.255.255.0	N/A
	FastEthernet 0/1	172.16.192.33	255.255.255.224	N/A
RTAGS	Serial 0/0	172.16.224.13	255.255.255.252	N/A
	Serial 0/1	172.16.224.10	255.255.255.252	N/A
	FastEthernet 0/0	172.16.36.1	255.255.255.0	N/A
	FastEthernet 0/1	172.16.64.129	255.255.255.128	N/A
PC MTY 1	Ethernet	172.16.64.2	255.255.255.128	172.16.64.1
PC MTY 2	Ethernet	172.16.192.2	255.255.255.224	172.16.192.1
PC NAY 1	Ethernet	172.16.33.2	255.255.255.0	172.16.33.1
PC NAY 2	Ethernet	172.16.34.2	255.255.255.0	172.16.34.1
PC CDMX 1	Ethernet	172.16.35.2	255.255.255.0	172.16.35.1
PC CDMX 2	Ethernet	172.16.192.34	255.255.255.224	172.16.192.33
PC AGS 1	Ethernet	172.16.36.2	255.255.255.0	172.16.36.1
PC AGS 2	Ethernet	172.16.64.130	255.255.255.128	172.16.64.129

Table 1: Asignación de IPs

4 Topología en CISCO Packet Tracer

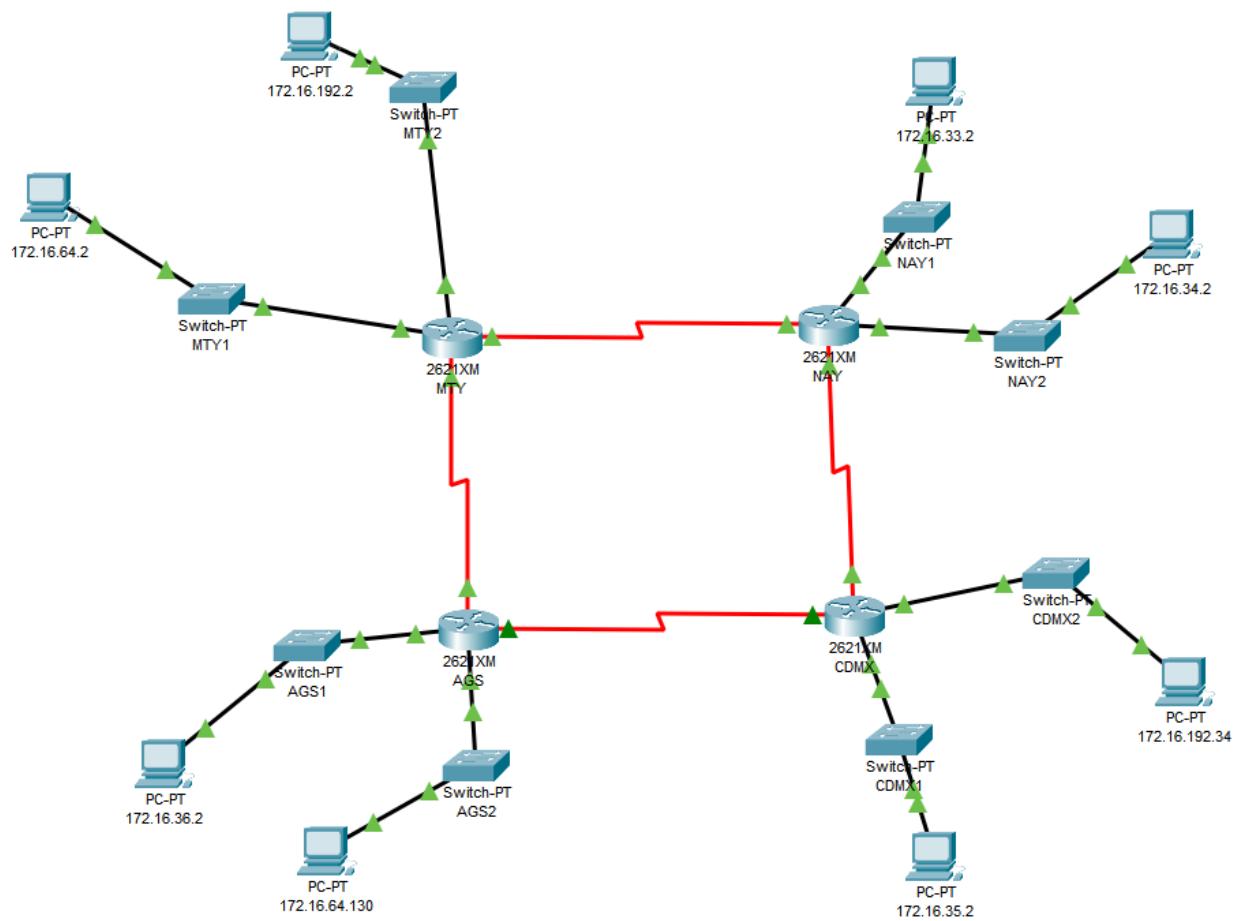


Figure 4: Topología en CISCO Packet Tracer

4.1 Configuración de Routers y Switches

Se utilizaron los comandos de CISCO IOS para la configuración de hostname, contraseñas y también las configuraciones de las ips.

Nota: Recuerda ver el apartado de contraseñas para modificar los dispositivos en el apéndice (A)

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#enable secret cisco1
Router(config)#line vty 0 15
Router(config-line)#password class1
Router(config-line)#login
Router(config-line)#exit
Router(config)#line console 10
^
* Invalid input detected at '^' marker.

Router(config)#line console 0
Router(config-line)#password console1
Router(config-line)#login
Router(config-line)#exit
Router(config)#banner motd $Solo Personal Autorizado$
Router(config)#hostname RTNAY
RTNAY(config)#service pas
RTNAY(config)#service password-encryption
RTNAY(config)#exit
RTNAY#
*SYS-5-CONFIG_I: Configured from console by console
```

```
RTNAY(config)#in
RTNAY(config)#interface s0/1
RTNAY(config-if)#ip address 172.16.224.2
* Incomplete command.
RTNAY(config-if)#ip address 172.16.224.2 255.255.255.252
RTNAY(config-if)#no shutdown

RTNAY(config-if)#
*LINK-5-CHANGED: Interface Serial0/1, changed state to up

RTNAY(config-if)#exit
RTNAY(config)#
RTNAY(config)#
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed state to up

RTNAY(config)#in fa0/0
RTNAY(config-if)#ip address 172.16.33.1 255.255.255.0
RTNAY(config-if)#no shutdown

RTNAY(config-if)#
*LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

RTNAY(config-if)#exit
RTNAY(config)#in fa0/1
RTNAY(config-if)#ip address 172.16.34.1 255.255.255.0
RTNAY(config-if)#no shutdown

RTNAY(config-if)#
*LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
```

4.2 Routing

Para conectar los Routers, utilizamos el comando ip route el cual le decimos en qué interfaz buscar la red.

```
RTMTY(config)#ip route 172.16.33.0 255.255.255.0 s0/0
RTMTY(config)#ip route 172.16.34.0 255.255.255.0 s0/0
RTMTY(config)#ip route 172.16.35.0 255.255.255.0 s0/0
RTMTY(config)#ip route 172.16.192.32 255.255.255.224 s0/0
RTMTY(config)#ip route 172.16.36.0 255.255.255.0 s0/0
RTMTY(config)#ip route 172.16.64.128 255.255.255.128 s0/0
```

```
RTNAY(config)#ip route 172.16.192.32 255.255.255.224 s0/0
RTNAY(config)#ip route 172.16.35.0 255.255.255.0 s0/0
RTNAY(config)#ip route 172.16.36.0 255.255.255.0 s0/0
RTNAY(config)#ip route 172.16.64.128 255.255.255.128 s0/0
RTNAY(config)#ip route 172.16.64.0 255.255.255.128 s0/0
RTNAY(config)#ip route 172.16.192.0 255.255.255.224 s0/0
```

```
RTCDMX(config)#ip route 172.16.36.0 255.255.255.0 s0/0
RTCDMX(config)#ip route 172.16.64.128 255.255.255.128 s0/0
RTCDMX(config)#ip route 172.16.64.0 255.255.255.128 s0/0
RTCDMX(config)#ip route 172.16.192.0 255.255.255.224 s0/0
RTCDMX(config)#ip route 172.16.33.0 255.255.255.0 s0/0
RTCDMX(config)#ip route 172.16.34.0 255.255.255.0 s0/0
```

```
RTAGS(config)#ip route 172.16.64.0 255.255.255.128 s0/0
RTAGS(config)#ip route 172.16.192.0 255.255.255.224 s0/0
RTAGS(config)#ip route 172.16.33.0 255.255.255.0 s0/0
RTAGS(config)#ip route 172.16.34.0 255.255.255.0 s0/0
RTAGS(config)#ip route 172.16.35.0 255.255.255.0 s0/0
RTAGS(config)#ip route 172.16.192.32 255.255.255.224 s0/0
RTAGS(config)#!
```

5 Configuraciones show running-config

5.1 Router MTY

```
Building configuration...

Current configuration : 1170 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname RTMTY
!
!
!
enable secret 5 $1$mERr$q.MA2tj.WFptzbifq/1i.
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
!
!
!
!
!
```

```
!
!
!
!
!
interface FastEthernet0/0
 ip address 172.16.64.1 255.255.255.128
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 172.16.192.1 255.255.255.224
 duplex auto
 speed auto
!
interface Serial0/0
 ip address 172.16.224.1 255.255.255.252
 clock rate 56000
!
interface Serial0/1
 ip address 172.16.224.14 255.255.255.252
!
ip classless
ip route 172.16.33.0 255.255.255.0 Serial0/0
ip route 172.16.34.0 255.255.255.0 Serial0/0
ip route 172.16.35.0 255.255.255.0 Serial0/0
ip route 172.16.192.32 255.255.255.224 Serial0/0
ip route 172.16.36.0 255.255.255.0 Serial0/0
ip route 172.16.64.128 255.255.255.128 Serial0/0
!
ip flow-export version 9
!
!
!
banner motd ^CSolo Personal Autorizado^C
!
```

```
!
!
!
line con 0
password 7 082243401A16091243
login
!
line aux 0
!
line vty 0 4
password 7 0822404F1A0A54
login
line vty 5 15
password 7 0822404F1A0A54
login
!
!
!
```

5.2 Router NAY

```
Building configuration...

Current configuration : 1216 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname RTNAY
!
!
!
enable secret 5 $1$mERr$q.MA2tj.WFptzbifq/1i.
!
!
```

```
!
!
!
!
no ip cef
no ipv6 cef
!
!
!
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```

```
interface FastEthernet0/0
  ip address 172.16.33.1 255.255.255.0
  duplex auto
  speed auto
!
interface FastEthernet0/1
  ip address 172.16.34.1 255.255.255.0
  duplex auto
  speed auto
!
interface Serial0/0
  ip address 172.16.224.5 255.255.255.252
  clock rate 56000
!
```

```
interface Serial0/1
  ip address 172.16.224.2 255.255.255.252
!
ip classless
ip route 172.16.0.0 255.255.0.0 255.255.240.0
ip route 172.16.192.32 255.255.255.224 Serial0/0
ip route 172.16.35.0 255.255.255.0 Serial0/0
ip route 172.16.36.0 255.255.255.0 Serial0/0
ip route 172.16.64.128 255.255.255.128 Serial0/0
ip route 172.16.64.0 255.255.255.128 Serial0/0
ip route 172.16.192.0 255.255.255.224 Serial0/0
!
ip flow-export version 9
!
!
!
!
banner motd ^CSolo Personal Autorizado^C
!
!
!
!
!
line con 0
password 7 082243401A16091243
login
!
line aux 0
!
line vty 0 4
password 7 0822404F1A0A54
login
line vty 5 15
password 7 0822404F1A0A54
login
!
```

```
end
```

5.3 Router CDMX

```
Building configuration...

Current configuration : 1167 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname RTCDMX
!
!
!
enable secret 5 $1$mERr$q.MA2tj.WFptzbifq/1i.
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
!
!
!
```

```
!
!
!
!
!
interface FastEthernet0/0
 ip address 172.16.35.1 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 172.16.192.33 255.255.255.224
 duplex auto
 speed auto
!
interface Serial0/0
 ip address 172.16.224.9 255.255.255.252
 clock rate 56000
!
interface Serial0/1
 ip address 172.16.224.6 255.255.255.252
!
ip classless
ip route 172.16.36.0 255.255.255.0 Serial0/0
ip route 172.16.64.128 255.255.255.128 Serial0/0
ip route 172.16.64.0 255.255.255.128 Serial0/0
ip route 172.16.192.0 255.255.255.224 Serial0/0
ip route 172.16.33.0 255.255.255.0 Serial0/0
ip route 172.16.34.0 255.255.255.0 Serial0/0
!
ip flow-export version 9
!
!
!
banner motd ^CSolo Personal Autorizado^C
!
```

```
!
!
!
line con 0
password 7 082243401A16091243
login
!
line aux 0
!
line vty 0 4
password 7 0822404F1A0A54
login
line vty 5 15
password 7 0822404F1A0A54
login
!
!
!
```

5.4 Router AGS

```
Building configuration...
```

```
Current configuration : 1168 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname RTAGS
!
!
!
enable secret 5 $1$mERr$q.MA2tj.WFptzbifq/1i.
!
!
```

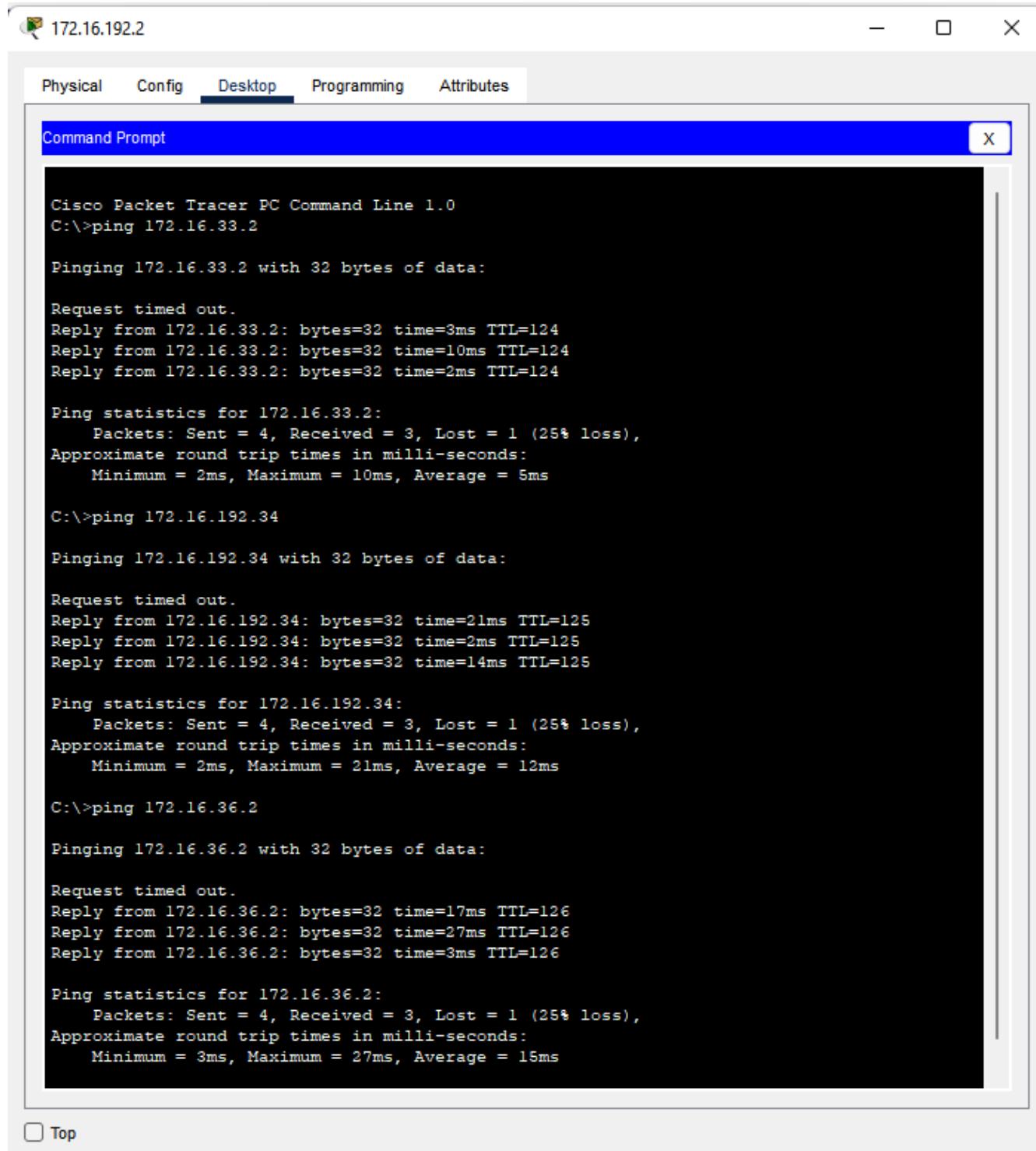
```
!  
!  
!  
!  
ip cef  
no ipv6 cef  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
interface FastEthernet0/0  
 ip address 172.16.36.1 255.255.255.0  
 duplex auto  
 speed auto  
!  
interface FastEthernet0/1  
 ip address 172.16.64.129 255.255.255.128  
 duplex auto  
 speed auto  
!  
interface Serial0/0  
 ip address 172.16.224.13 255.255.255.252  
 clock rate 56000  
!
```

```
interface Serial0/1
  ip address 172.16.224.10 255.255.255.252
!
ip classless
ip route 172.16.64.0 255.255.255.128 Serial0/0
ip route 172.16.192.0 255.255.255.224 Serial0/0
ip route 172.16.33.0 255.255.255.0 Serial0/0
ip route 172.16.34.0 255.255.255.0 Serial0/0
ip route 172.16.35.0 255.255.255.0 Serial0/0
ip route 172.16.192.32 255.255.255.224 Serial0/0
!
ip flow-export version 9
!
!
!
!
banner motd ^CSolo Personal Autorizado^C
!
!
!
!
!
line con 0
  password 7 082243401A16091243
  login
!
line aux 0
!
line vty 0 4
  password 7 0822404F1A0A54
  login
line vty 5 15
  password 7 0822404F1A0A54
  login
!
!
!
```

```
end
```

6 Verificación de la topología

6.1 Ping



The screenshot shows a Windows-style application window titled "172.16.192.2". Inside, a tab bar has "Desktop" selected. A "Command Prompt" window is open, showing the output of several ping commands. The output is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.16.33.2

Pinging 172.16.33.2 with 32 bytes of data:

Request timed out.
Reply from 172.16.33.2: bytes=32 time=3ms TTL=124
Reply from 172.16.33.2: bytes=32 time=10ms TTL=124
Reply from 172.16.33.2: bytes=32 time=2ms TTL=124

Ping statistics for 172.16.33.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 10ms, Average = 5ms

C:\>ping 172.16.192.34

Pinging 172.16.192.34 with 32 bytes of data:

Request timed out.
Reply from 172.16.192.34: bytes=32 time=21ms TTL=125
Reply from 172.16.192.34: bytes=32 time=2ms TTL=125
Reply from 172.16.192.34: bytes=32 time=14ms TTL=125

Ping statistics for 172.16.192.34:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 21ms, Average = 12ms

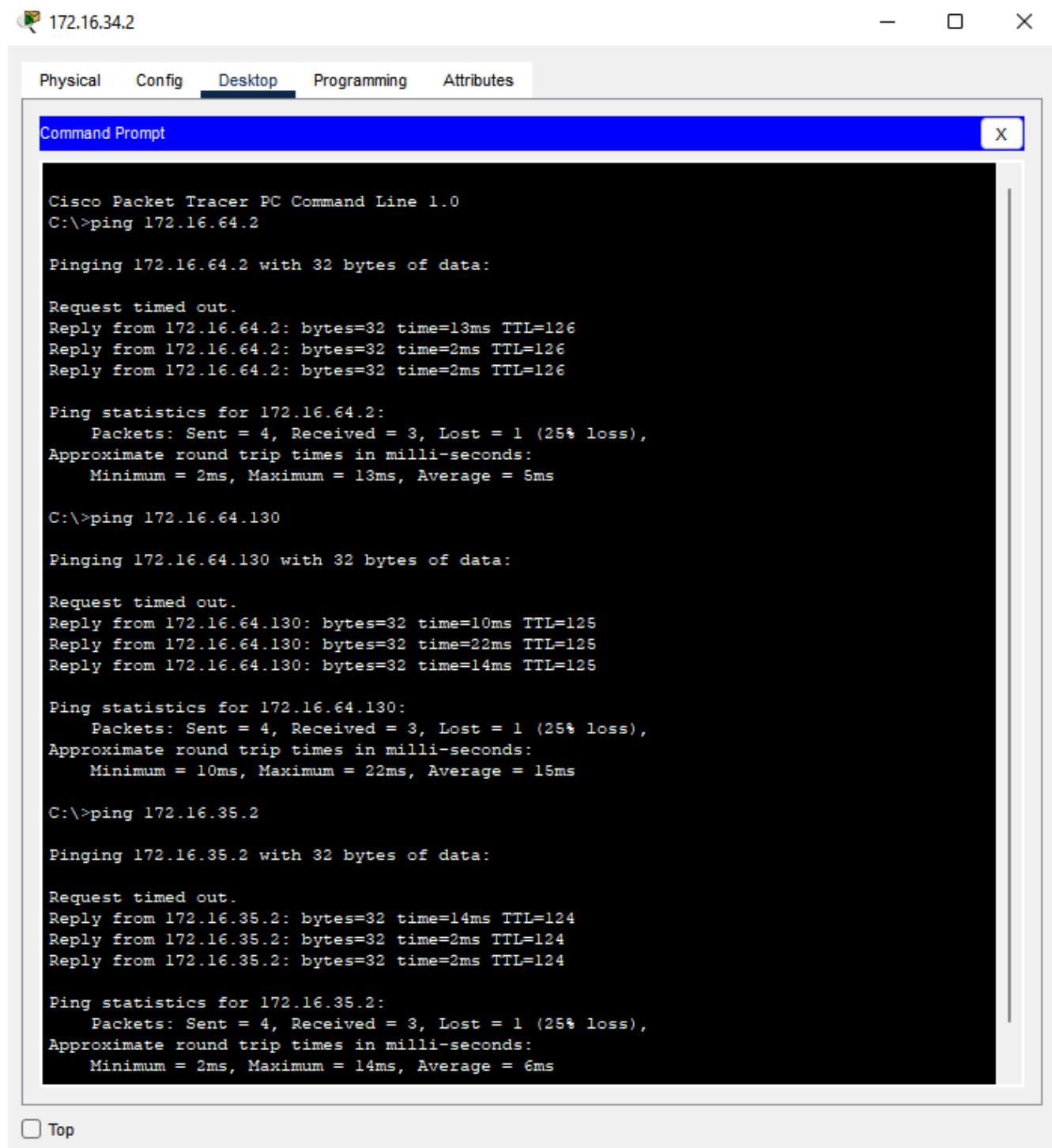
C:\>ping 172.16.36.2

Pinging 172.16.36.2 with 32 bytes of data:

Request timed out.
Reply from 172.16.36.2: bytes=32 time=17ms TTL=126
Reply from 172.16.36.2: bytes=32 time=27ms TTL=126
Reply from 172.16.36.2: bytes=32 time=3ms TTL=126

Ping statistics for 172.16.36.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 27ms, Average = 15ms
```

Top



The screenshot shows a terminal window titled "172.16.34.2". The window has tabs: Physical, Config, Desktop (which is selected), Programming, and Attributes. The main area is a "Command Prompt" window with the title "Cisco Packet Tracer PC Command Line 1.0". The terminal displays the following ping results:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.16.64.2

Pinging 172.16.64.2 with 32 bytes of data:

Request timed out.
Reply from 172.16.64.2: bytes=32 time=13ms TTL=126
Reply from 172.16.64.2: bytes=32 time=2ms TTL=126
Reply from 172.16.64.2: bytes=32 time=2ms TTL=126

Ping statistics for 172.16.64.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 13ms, Average = 5ms

C:\>ping 172.16.64.130

Pinging 172.16.64.130 with 32 bytes of data:

Request timed out.
Reply from 172.16.64.130: bytes=32 time=10ms TTL=125
Reply from 172.16.64.130: bytes=32 time=22ms TTL=125
Reply from 172.16.64.130: bytes=32 time=14ms TTL=125

Ping statistics for 172.16.64.130:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 22ms, Average = 15ms

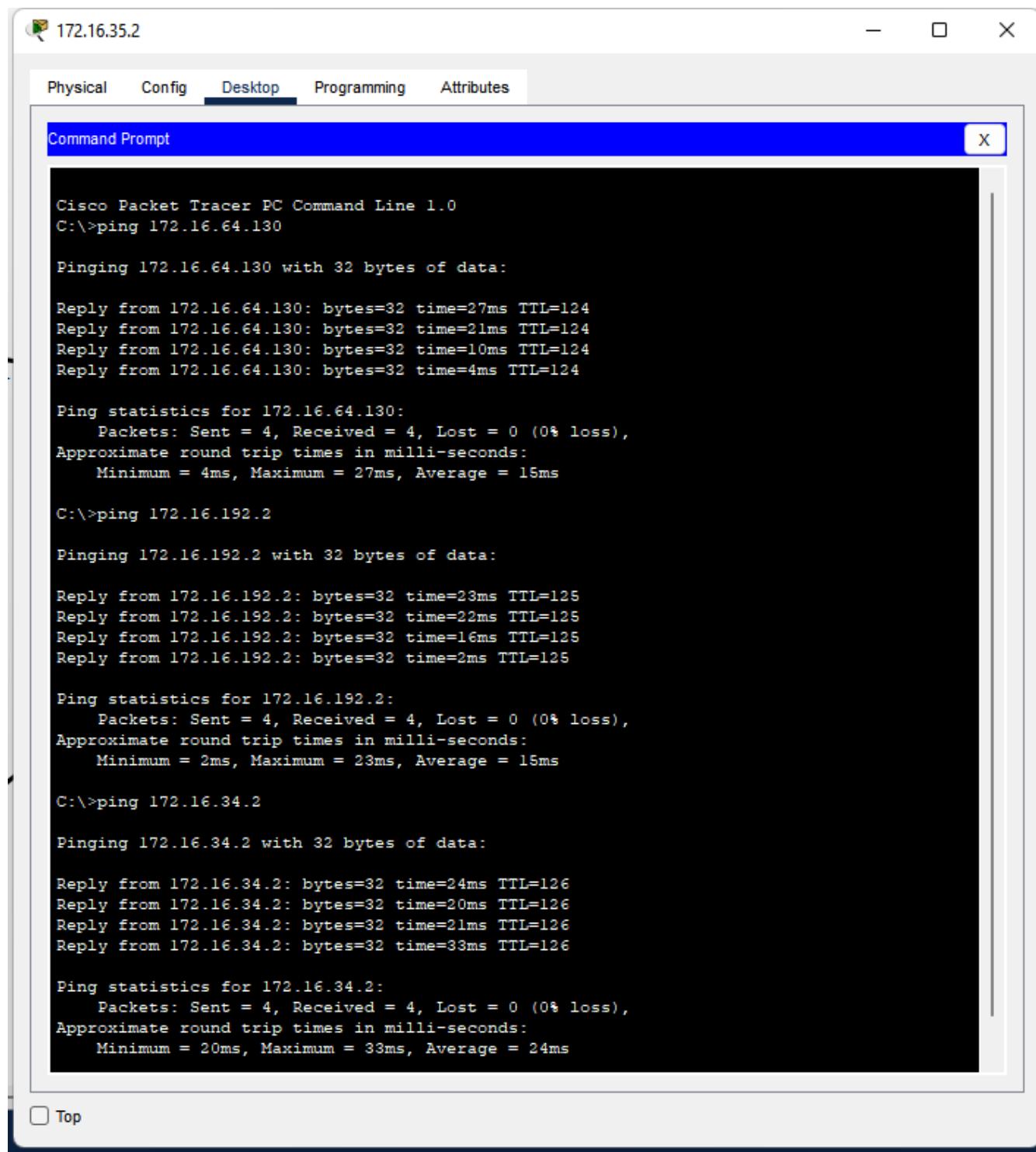
C:\>ping 172.16.35.2

Pinging 172.16.35.2 with 32 bytes of data:

Request timed out.
Reply from 172.16.35.2: bytes=32 time=14ms TTL=124
Reply from 172.16.35.2: bytes=32 time=2ms TTL=124
Reply from 172.16.35.2: bytes=32 time=2ms TTL=124

Ping statistics for 172.16.35.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 14ms, Average = 6ms
```

 Top



The screenshot shows a Cisco Packet Tracer interface with a "Command Prompt" window open. The window title is "Command Prompt". The content of the window is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.16.64.130

Pinging 172.16.64.130 with 32 bytes of data:

Reply from 172.16.64.130: bytes=32 time=27ms TTL=124
Reply from 172.16.64.130: bytes=32 time=21ms TTL=124
Reply from 172.16.64.130: bytes=32 time=10ms TTL=124
Reply from 172.16.64.130: bytes=32 time=4ms TTL=124

Ping statistics for 172.16.64.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 27ms, Average = 15ms

C:\>ping 172.16.192.2

Pinging 172.16.192.2 with 32 bytes of data:

Reply from 172.16.192.2: bytes=32 time=23ms TTL=125
Reply from 172.16.192.2: bytes=32 time=22ms TTL=125
Reply from 172.16.192.2: bytes=32 time=16ms TTL=125
Reply from 172.16.192.2: bytes=32 time=2ms TTL=125

Ping statistics for 172.16.192.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 23ms, Average = 15ms

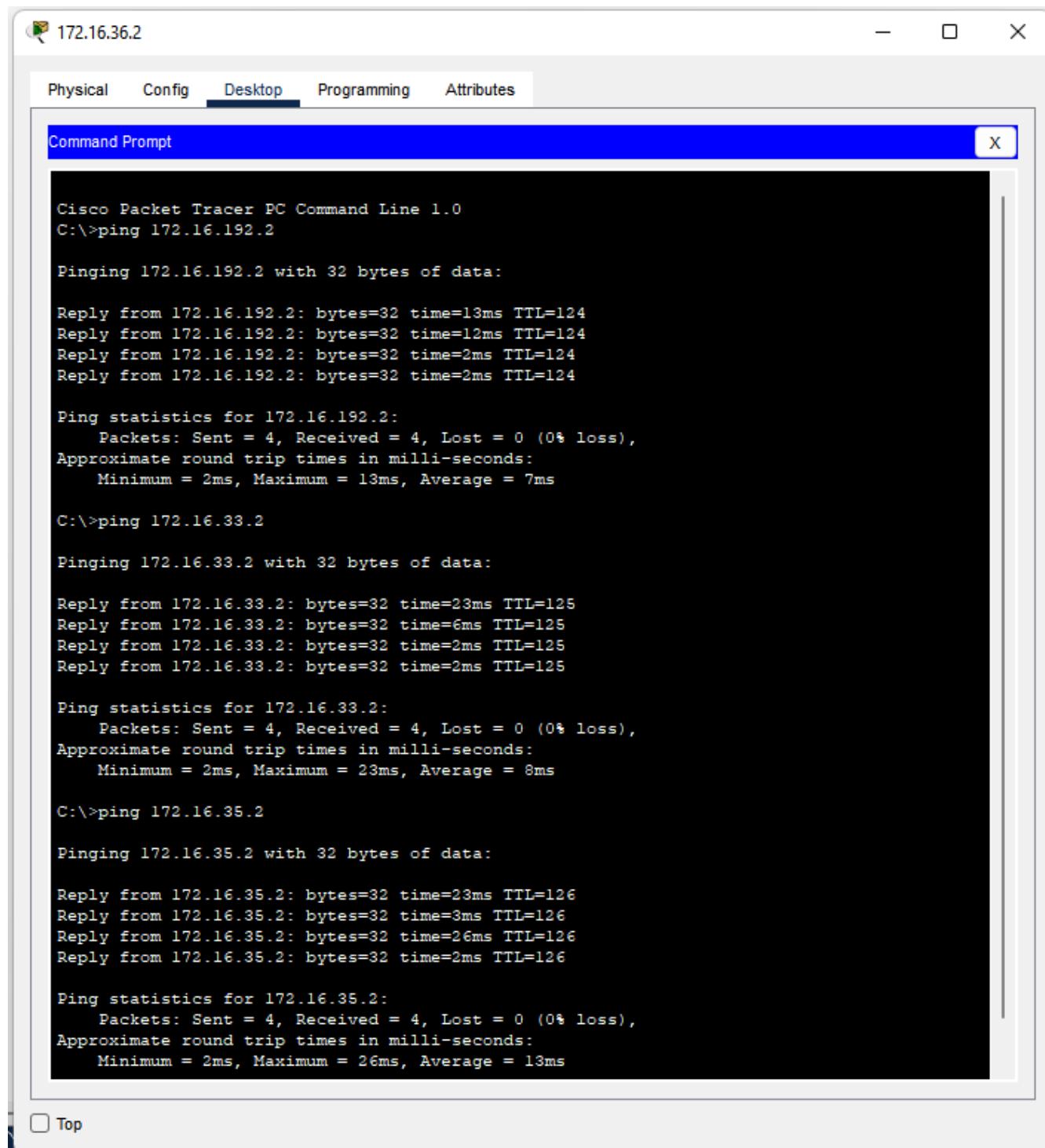
C:\>ping 172.16.34.2

Pinging 172.16.34.2 with 32 bytes of data:

Reply from 172.16.34.2: bytes=32 time=24ms TTL=126
Reply from 172.16.34.2: bytes=32 time=20ms TTL=126
Reply from 172.16.34.2: bytes=32 time=21ms TTL=126
Reply from 172.16.34.2: bytes=32 time=33ms TTL=126

Ping statistics for 172.16.34.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 20ms, Maximum = 33ms, Average = 24ms
```

Top



The screenshot shows a Windows-style application window titled "172.16.36.2". The window has tabs at the top: Physical, Config, Desktop (which is selected), Programming, and Attributes. Below the tabs is a title bar for "Command Prompt" with a close button. The main area of the window displays the output of several ping commands:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.16.192.2

Pinging 172.16.192.2 with 32 bytes of data:

Reply from 172.16.192.2: bytes=32 time=13ms TTL=124
Reply from 172.16.192.2: bytes=32 time=12ms TTL=124
Reply from 172.16.192.2: bytes=32 time=2ms TTL=124
Reply from 172.16.192.2: bytes=32 time=2ms TTL=124

Ping statistics for 172.16.192.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 13ms, Average = 7ms

C:\>ping 172.16.33.2

Pinging 172.16.33.2 with 32 bytes of data:

Reply from 172.16.33.2: bytes=32 time=23ms TTL=125
Reply from 172.16.33.2: bytes=32 time=6ms TTL=125
Reply from 172.16.33.2: bytes=32 time=2ms TTL=125
Reply from 172.16.33.2: bytes=32 time=2ms TTL=125

Ping statistics for 172.16.33.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 23ms, Average = 8ms

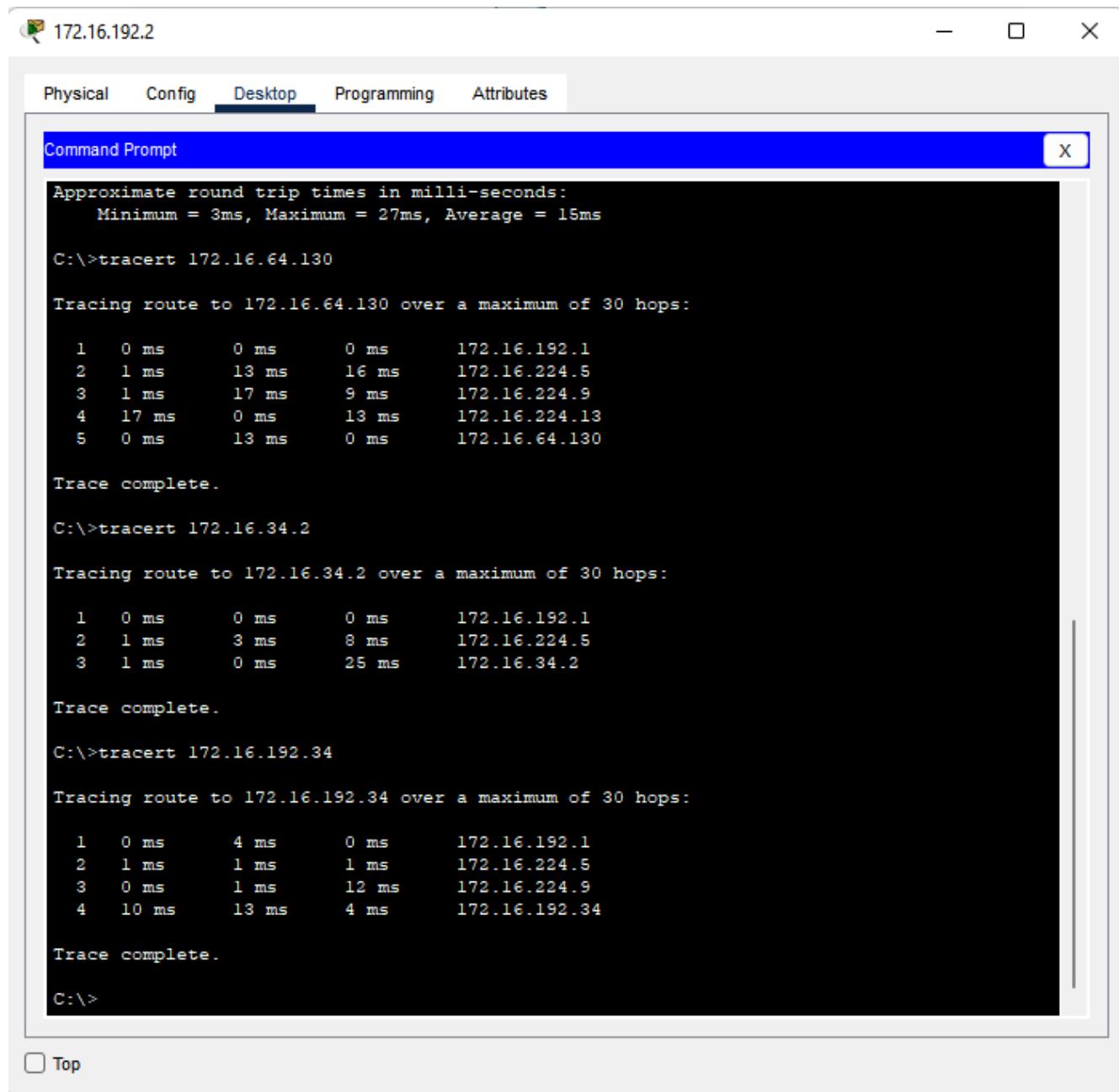
C:\>ping 172.16.35.2

Pinging 172.16.35.2 with 32 bytes of data:

Reply from 172.16.35.2: bytes=32 time=23ms TTL=126
Reply from 172.16.35.2: bytes=32 time=3ms TTL=126
Reply from 172.16.35.2: bytes=32 time=26ms TTL=126
Reply from 172.16.35.2: bytes=32 time=2ms TTL=126

Ping statistics for 172.16.35.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 26ms, Average = 13ms
```

6.2 Traceroute



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window has a blue header bar with tabs: Physical, Config, Desktop (which is selected), Programming, and Attributes. The main area of the window displays the output of several traceroute commands.

```
Approximate round trip times in milli-seconds:  
    Minimum = 3ms, Maximum = 27ms, Average = 15ms  
  
C:\>tracert 172.16.64.130  
  
Tracing route to 172.16.64.130 over a maximum of 30 hops:  
  
 1  0 ms      0 ms      0 ms      172.16.192.1  
 2  1 ms      13 ms     16 ms     172.16.224.5  
 3  1 ms      17 ms      9 ms     172.16.224.9  
 4  17 ms     0 ms     13 ms     172.16.224.13  
 5  0 ms      13 ms      0 ms     172.16.64.130  
  
Trace complete.  
  
C:\>tracert 172.16.34.2  
  
Tracing route to 172.16.34.2 over a maximum of 30 hops:  
  
 1  0 ms      0 ms      0 ms      172.16.192.1  
 2  1 ms      3 ms      8 ms     172.16.224.5  
 3  1 ms      0 ms     25 ms     172.16.34.2  
  
Trace complete.  
  
C:\>tracert 172.16.192.34  
  
Tracing route to 172.16.192.34 over a maximum of 30 hops:  
  
 1  0 ms      4 ms      0 ms      172.16.192.1  
 2  1 ms      1 ms      1 ms     172.16.224.5  
 3  0 ms      1 ms     12 ms     172.16.224.9  
 4  10 ms     13 ms      4 ms     172.16.192.34  
  
Trace complete.  
  
C:\>
```

Top

The screenshot shows a software interface for managing network devices. At the top, there are tabs: Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is currently selected. Below the tabs is a title bar labeled "Command Prompt" with a close button (X). The main area contains a command-line history and output:

```
C:\>tracert 172.16.192.34
Invalid Command.

C:\>tracert 172.16.192.34

Tracing route to 172.16.192.34 over a maximum of 30 hops:
  1  0 ms      4 ms      0 ms      172.16.33.1
  2  1 ms      1 ms      0 ms      172.16.224.9
  3  0 ms      1 ms      0 ms      172.16.192.34

Trace complete.

C:\>tracert 172.16.36.2

Tracing route to 172.16.36.2 over a maximum of 30 hops:
  1  0 ms      0 ms      0 ms      172.16.33.1
  2  1 ms      13 ms     9 ms      172.16.224.9
  3  9 ms      9 ms      0 ms      172.16.224.13
  4  1 ms      0 ms      1 ms      172.16.36.2

Trace complete.

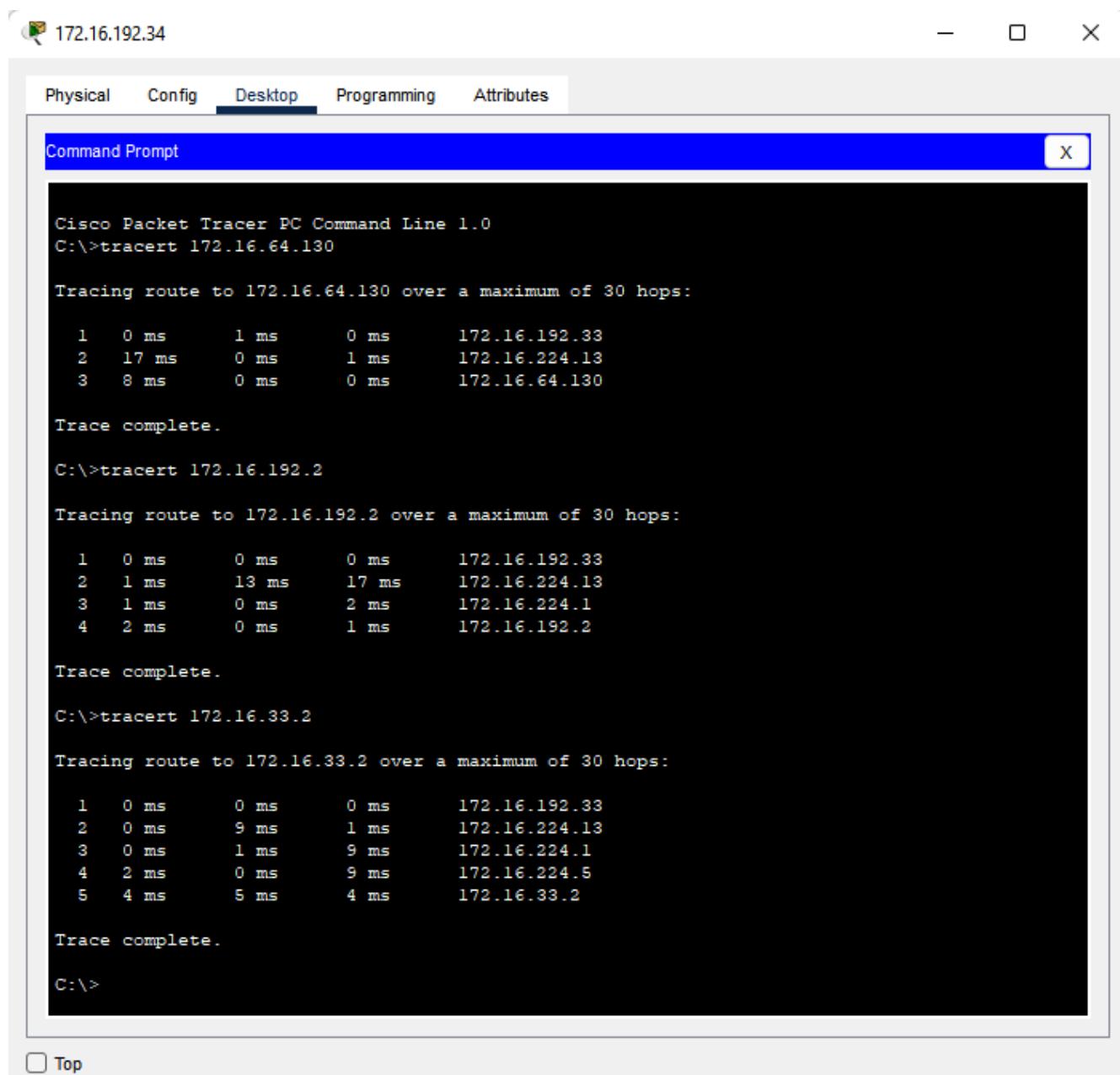
C:\>tracert 172.16.64.2

Tracing route to 172.16.64.2 over a maximum of 30 hops:
  1  0 ms      0 ms      0 ms      172.16.33.1
  2  1 ms      0 ms      9 ms      172.16.224.9
  3  9 ms      14 ms     1 ms      172.16.224.13
  4  1 ms      1 ms      5 ms      172.16.224.1
  5  4 ms      1 ms      1 ms      172.16.64.2

Trace complete.

C:\>
```

At the bottom left of the main window, there is a checkbox labeled "Top".



The screenshot shows a window titled "172.16.192.34" containing a "Command Prompt" interface. The window has tabs: Physical, Config, Desktop (which is selected), Programming, and Attributes. The Command Prompt window title is "Command Prompt". The content of the window is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>tracert 172.16.64.130

Tracing route to 172.16.64.130 over a maximum of 30 hops:
 1  0 ms      1 ms      0 ms      172.16.192.33
 2  17 ms     0 ms      1 ms      172.16.224.13
 3  8 ms      0 ms      0 ms      172.16.64.130

Trace complete.

C:\>tracert 172.16.192.2

Tracing route to 172.16.192.2 over a maximum of 30 hops:
 1  0 ms      0 ms      0 ms      172.16.192.33
 2  1 ms      13 ms     17 ms     172.16.224.13
 3  1 ms      0 ms      2 ms      172.16.224.1
 4  2 ms      0 ms      1 ms      172.16.192.2

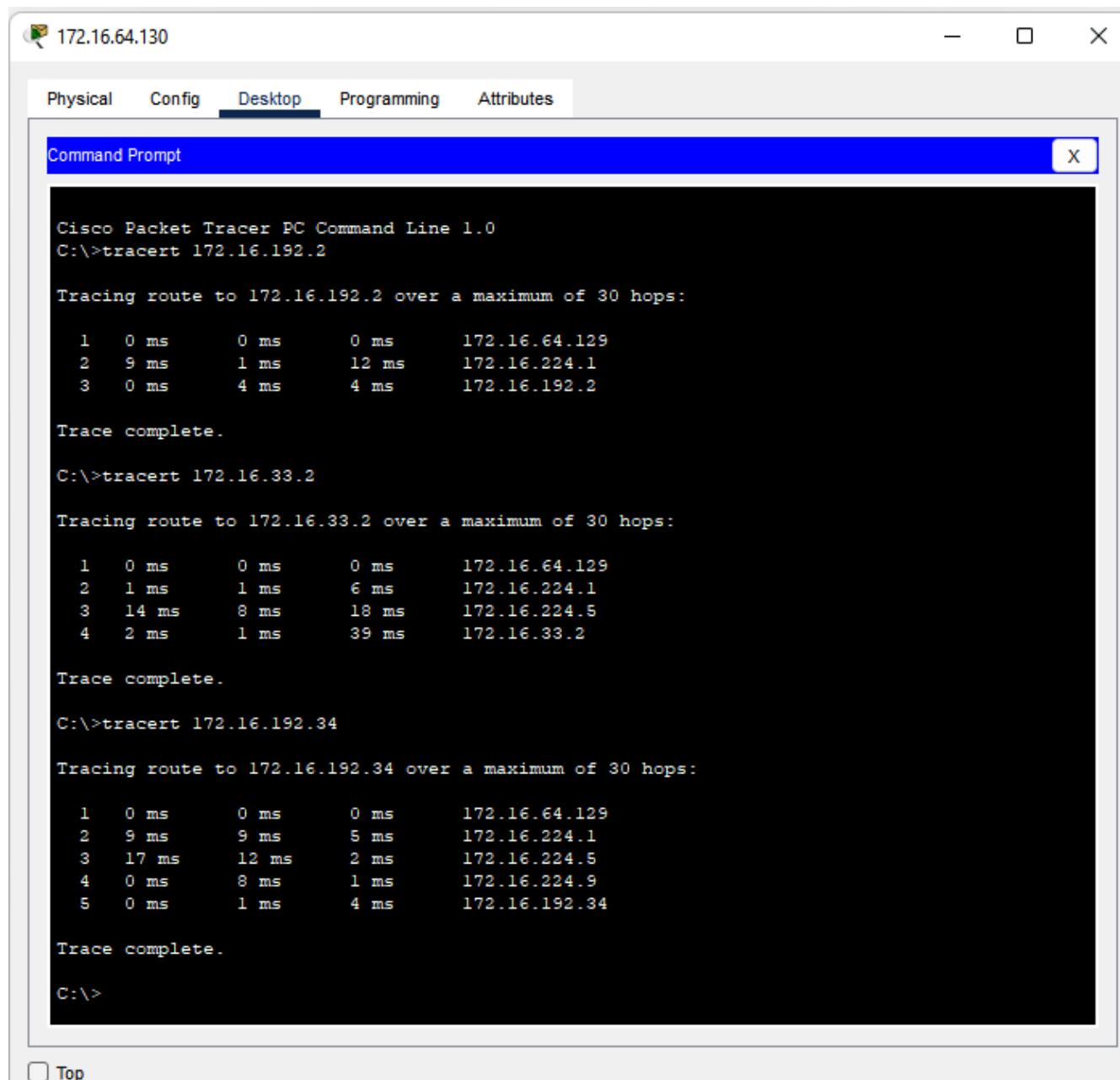
Trace complete.

C:\>tracert 172.16.33.2

Tracing route to 172.16.33.2 over a maximum of 30 hops:
 1  0 ms      0 ms      0 ms      172.16.192.33
 2  0 ms      9 ms      1 ms      172.16.224.13
 3  0 ms      1 ms      9 ms      172.16.224.1
 4  2 ms      0 ms      9 ms      172.16.224.5
 5  4 ms      5 ms      4 ms      172.16.33.2

Trace complete.

C:\>
```



The screenshot shows a window titled "Command Prompt" within the Cisco Packet Tracer interface. The window title bar says "172.16.64.130". The menu bar includes "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". The command prompt area displays three separate traceroute commands and their results:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>tracert 172.16.192.2

Tracing route to 172.16.192.2 over a maximum of 30 hops:
  1  0 ms      0 ms      0 ms      172.16.64.129
  2  9 ms      1 ms     12 ms      172.16.224.1
  3  0 ms      4 ms      4 ms      172.16.192.2

Trace complete.

C:\>tracert 172.16.33.2

Tracing route to 172.16.33.2 over a maximum of 30 hops:
  1  0 ms      0 ms      0 ms      172.16.64.129
  2  1 ms      1 ms      6 ms      172.16.224.1
  3  14 ms     8 ms     18 ms      172.16.224.5
  4  2 ms      1 ms     39 ms      172.16.33.2

Trace complete.

C:\>tracert 172.16.192.34

Tracing route to 172.16.192.34 over a maximum of 30 hops:
  1  0 ms      0 ms      0 ms      172.16.64.129
  2  9 ms      9 ms      5 ms      172.16.224.1
  3  17 ms     12 ms     2 ms      172.16.224.5
  4  0 ms      8 ms      1 ms      172.16.224.9
  5  0 ms      1 ms      4 ms      172.16.192.34

Trace complete.

C:\>
```

6.3 Show ip route

The screenshot shows a terminal window titled "MTY". The tab bar at the top has four tabs: "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is selected, and the window title "IOS Command Line Interface" is centered above the main area. The terminal output is as follows:

```
Solo Personal Autorizado
User Access Verification
Password:
RTMTY>show 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    172.16.33.0/24 is directly connected, Serial0/0
S    172.16.34.0/24 is directly connected, Serial0/0
S    172.16.35.0/24 is directly connected, Serial0/0
S    172.16.36.0/24 is directly connected, Serial0/0
C    172.16.64.0/25 is directly connected, FastEthernet0/0
S    172.16.64.128/25 is directly connected, Serial0/0
C    172.16.192.0/27 is directly connected, FastEthernet0/1
S    172.16.192.32/27 is directly connected, Serial0/0
C    172.16.224.0/30 is directly connected, Serial0/0
C    172.16.224.12/30 is directly connected, Serial0/1

RTMTY>
```

At the bottom left, it says "Ctrl+F6 to exit CLI focus". At the bottom right, there are "Copy" and "Paste" buttons.

NAY

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Solo Personal Autorizado

User Access Verification

Password:

RTNAY>show 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
C        172.16.33.0/24 is directly connected, FastEthernet0/0
C        172.16.34.0/24 is directly connected, FastEthernet0/1
S        172.16.35.0/24 is directly connected, Serial0/0
S        172.16.36.0/24 is directly connected, Serial0/0
S        172.16.64.0/25 is directly connected, Serial0/0
S        172.16.64.128/25 is directly connected, Serial0/0
S        172.16.192.0/27 is directly connected, Serial0/0
S        172.16.192.32/27 is directly connected, Serial0/0
C        172.16.224.0/30 is directly connected, Serial0/1
C        172.16.224.4/30 is directly connected, Serial0/0

RTNAY>
```

Ctrl+F6 to exit CLI focus

The screenshot shows a window titled "CDMX" with a tab bar containing "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is the text "IOS Command Line Interface". The main content area displays the following CLI session:

```
Solo Personal Autorizado
User Access Verification
Password:
RTCDMX>show 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        172.16.33.0/24 is directly connected, Serial0/0
S        172.16.34.0/24 is directly connected, Serial0/0
C        172.16.35.0/24 is directly connected, FastEthernet0/0
S        172.16.36.0/24 is directly connected, Serial0/0
S        172.16.64.0/25 is directly connected, Serial0/0
S        172.16.64.128/25 is directly connected, Serial0/0
S        172.16.192.0/27 is directly connected, Serial0/0
C        172.16.192.32/27 is directly connected, FastEthernet0/1
C        172.16.224.4/30 is directly connected, Serial0/1
C        172.16.224.8/30 is directly connected, Serial0/0

RTCDMX>
```

At the bottom left, it says "Ctrl+F6 to exit CLI focus". At the bottom right are "Copy" and "Paste" buttons.

The screenshot shows the Cisco AGS (Advanced General Switch) CLI interface. The title bar says "AGS" and the tab bar has "Physical", "Config", "CLI" (which is selected), and "Attributes". The main window title is "IOS Command Line Interface". The output of the "show ip route" command is displayed:

```
Solo Personal Autorizado
User Access Verification
Password:
RTAGS>show 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    172.16.33.0/24 is directly connected, Serial0/0
S    172.16.34.0/24 is directly connected, Serial0/0
S    172.16.35.0/24 is directly connected, Serial0/0
C    172.16.36.0/24 is directly connected, FastEthernet0/0
S    172.16.64.0/25 is directly connected, Serial0/0
C    172.16.64.128/25 is directly connected, FastEthernet0/1
S    172.16.192.0/27 is directly connected, Serial0/0
S    172.16.192.32/27 is directly connected, Serial0/0
C    172.16.224.8/30 is directly connected, Serial0/1
C    172.16.224.12/30 is directly connected, Serial0/0

RTAGS>
```

At the bottom left is the text "Ctrl+F6 to exit CLI focus". At the bottom right are "Copy" and "Paste" buttons.

References

- [1] CISCO Networking Academy. *Introduction to Networks v7.02 (ITN)*. URL: <https://www.netacad.com/>. (accessed: 01.05.2022).

A Contraseñas

- **Secret:** cisco1
- **vty lines:** class1
- **console:** console1