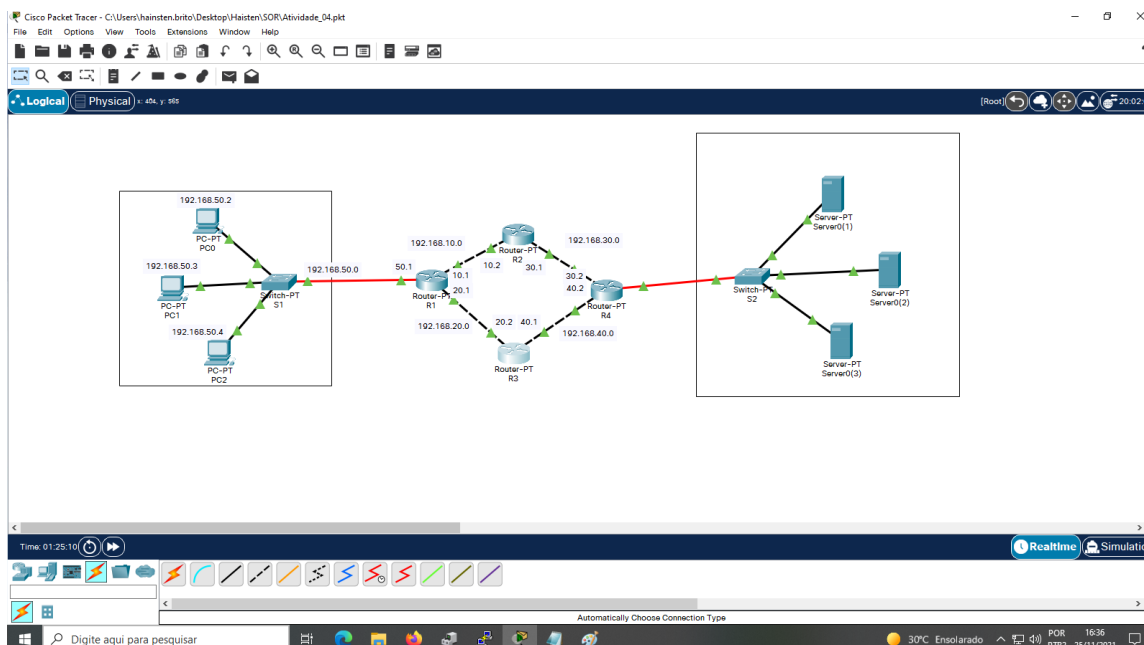


Sistemas Operacionais de Redes

Aluno: Haisten Farias de Brito

Atividade 04 - Nesse exercício serão apresentadas etapas de configuração onde duas redes locais interligadas por roteadores usarão serviços de rede como HTTP, FTP, DNS e DHCP.

Etapa 1: Planejamento das rotas e configuração das redes locais



Etapa 2: Configuração das interfaces dos roteadores

Configurando Roteador 1: R1

```
R1
Physical Config CLI Attributes
R1>enable
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#hostname R1
R1(config)#enable secret class
R1(config)#line console 0
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#line vty 0 4
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#end
R1#
$SYS-5-CONFIG_I: Configured from console by console

R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface fastEthernet 0/0
R1(config-if)#description Enlace R1-R2 190.168.10.0
R1(config-if)#ip address 192.168.10.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

R1(config-if)#exit
R1(config)#
R1(config)#
R1(config)#interface fastEthernet 1/0
R1(config-if)#description Enlace R1-R3 190.168.20.0
R1(config-if)#ip address 192.168.20.1 255.255.255.0
R1(config-if)#no shutdown

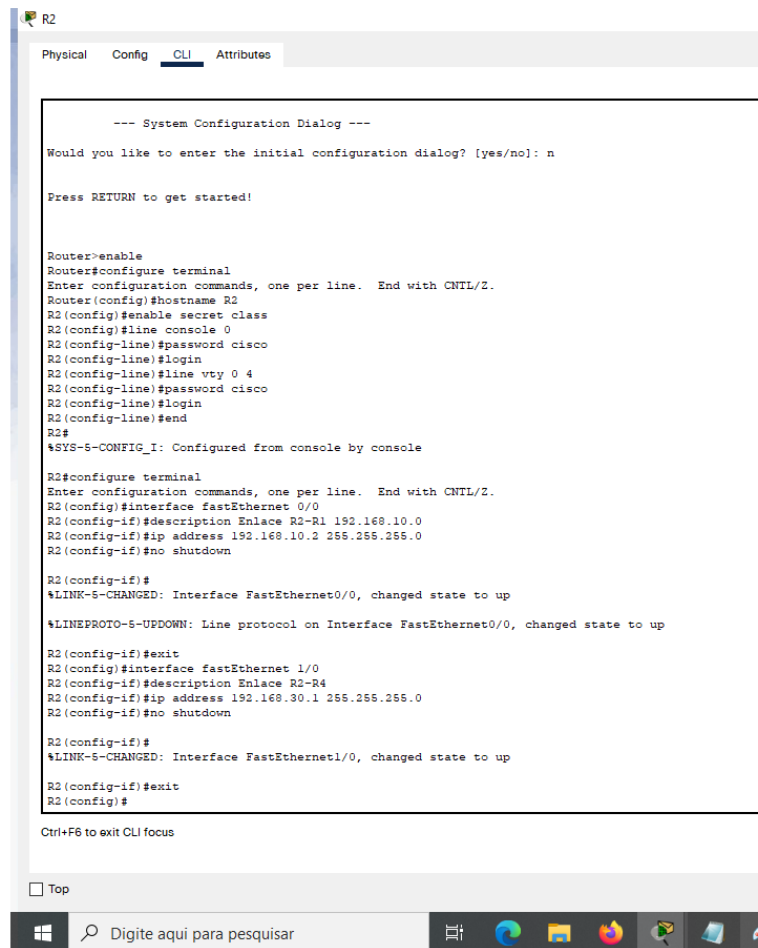
R1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

R1(config-if)#exit
R1(config)#
R1(config)#interface fastEthernet 6/0
%Invalid interface type and number
R1(config)#interface fastEthernet 3/0
%Invalid interface type and number
R1(config)#interface fastEthernet 4/0
R1(config-if)#description Enlace LAN 192.168.50.0
R1(config-if)#ip address 192.168.50.1 255.255.255.0
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet4/0, changed state to down

Ctrl+F6 to exit CLI focus
Top
```

Configurando Roteador 2: R2



The screenshot shows the configuration of Router R2 in a network simulator. The interface has tabs for Physical, Config, CLI, and Attributes, with CLI selected. The CLI window displays the following commands and their outputs:

```
--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#enable secret class
R2(config)#line console 0
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#line vty 0 4
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface fastEthernet 0/0
R2(config-if)#description Enlace R2-R1 192.168.10.0
R2(config-if)#ip address 192.168.10.2 255.255.255.0
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

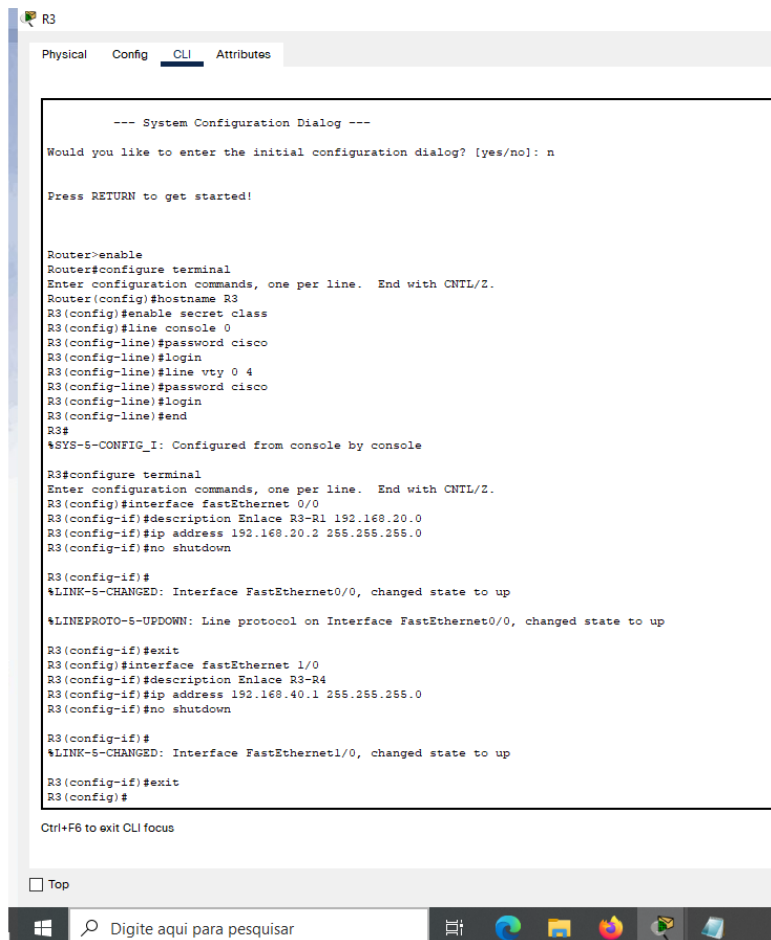
R2(config-if)#exit
R2(config)#interface fastEthernet 1/0
R2(config-if)#description Enlace R2-R4
R2(config-if)#ip address 192.168.30.1 255.255.255.0
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

R2(config-if)#exit
R2(config)#
```

At the bottom of the CLI window, it says "Ctrl+F6 to exit CLI focus". Below the CLI window is a "Top" button. The taskbar at the bottom shows the Windows Start button, a search bar with the text "Digite aqui para pesquisar", and several application icons.

Configurando Roteador 3: R3



The screenshot shows the configuration of Router R3 in a network simulator. The interface has tabs for Physical, Config, CLI, and Attributes, with CLI selected. The CLI window displays the following commands and their outputs:

```
--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R3
R3(config)#enable secret class
R3(config)#line console 0
R3(config-line)#password cisco
R3(config-line)#login
R3(config-line)#line vty 0 4
R3(config-line)#password cisco
R3(config-line)#login
R3(config-line)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface fastEthernet 0/0
R3(config-if)#description Enlace R3-R1 192.168.20.0
R3(config-if)#ip address 192.168.20.2 255.255.255.0
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

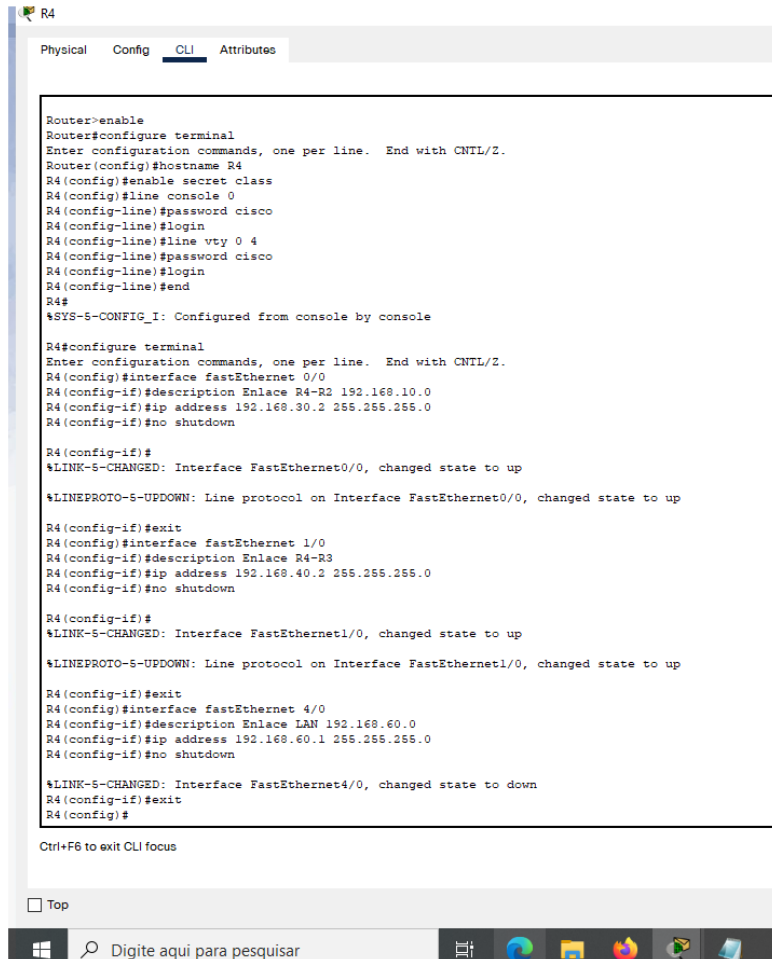
R3(config-if)#exit
R3(config)#interface fastEthernet 1/0
R3(config-if)#description Enlace R3-R4
R3(config-if)#ip address 192.168.40.1 255.255.255.0
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

R3(config-if)#exit
R3(config)#
```

At the bottom of the CLI window, it says "Ctrl+F6 to exit CLI focus". Below the CLI window is a "Top" button. The taskbar at the bottom shows the Windows Start button, a search bar with the text "Digite aqui para pesquisar", and several application icons.

Configurando Roteador 4: R4



The screenshot shows the configuration of router R4 in Cisco Packet Tracer. The CLI window displays the following commands and their outputs:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R4
R4(config)#enable secret class
R4(config)#line console 0
R4(config-line)#password cisco
R4(config-line)#login
R4(config-line)#line vty 0 4
R4(config-line)#password cisco
R4(config-line)#login
R4(config-line)#end
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#interface fastEthernet 0/0
R4(config-if)#description Enlace R4-R2 192.168.10.0
R4(config-if)#ip address 192.168.30.2 255.255.255.0
R4(config-if)#no shutdown

R4(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

R4(config-if)#exit
R4(config)#interface fastEthernet 1/0
R4(config-if)#description Enlace R4-R3
R4(config-if)#ip address 192.168.40.2 255.255.255.0
R4(config-if)#no shutdown

R4(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up

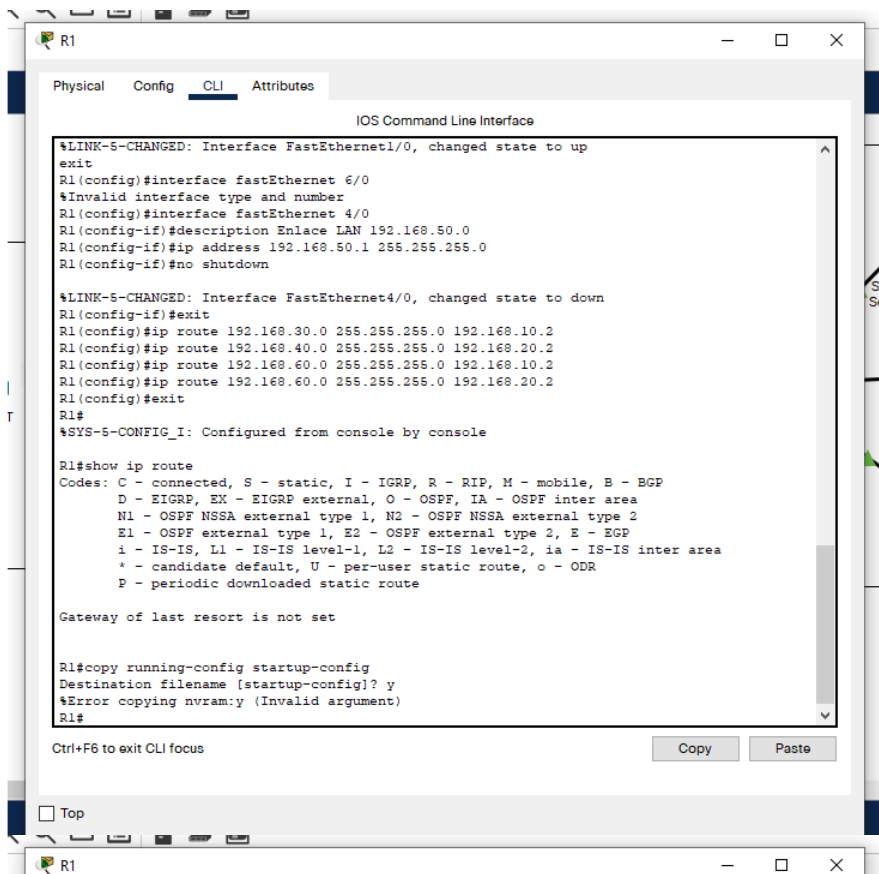
R4(config-if)#exit
R4(config)#interface fastEthernet 4/0
R4(config-if)#description Enlace LAN 192.168.60.0
R4(config-if)#ip address 192.168.60.1 255.255.255.0
R4(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet4/0, changed state to down
R4(config-if)#exit
R4(config)#
```

At the bottom of the CLI window, it says "Ctrl+F6 to exit CLI focus".

Etapas 3: configuração das rotas estáticas nos roteadores para viabilizar o encaminhamento de pacotes entre as duas redes locais.

IP Route R1:



The screenshot shows the configuration of router R1 in Cisco Packet Tracer. The CLI window displays the following commands and their outputs:

```
R1#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up
exit
R1(config)#interface fastEthernet 6/0
%Invalid interface type and number
R1(config)#interface fastEthernet 4/0
R1(config-if)#description Enlace LAN 192.168.50.0
R1(config-if)#ip address 192.168.50.1 255.255.255.0
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet4/0, changed state to down
R1(config-if)#exit
R1(config)#ip route 192.168.30.0 255.255.255.0 192.168.10.2
R1(config)#ip route 192.168.40.0 255.255.255.0 192.168.20.2
R1(config)#ip route 192.168.60.0 255.255.255.0 192.168.10.2
R1(config)#ip route 192.168.60.0 255.255.255.0 192.168.20.2
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

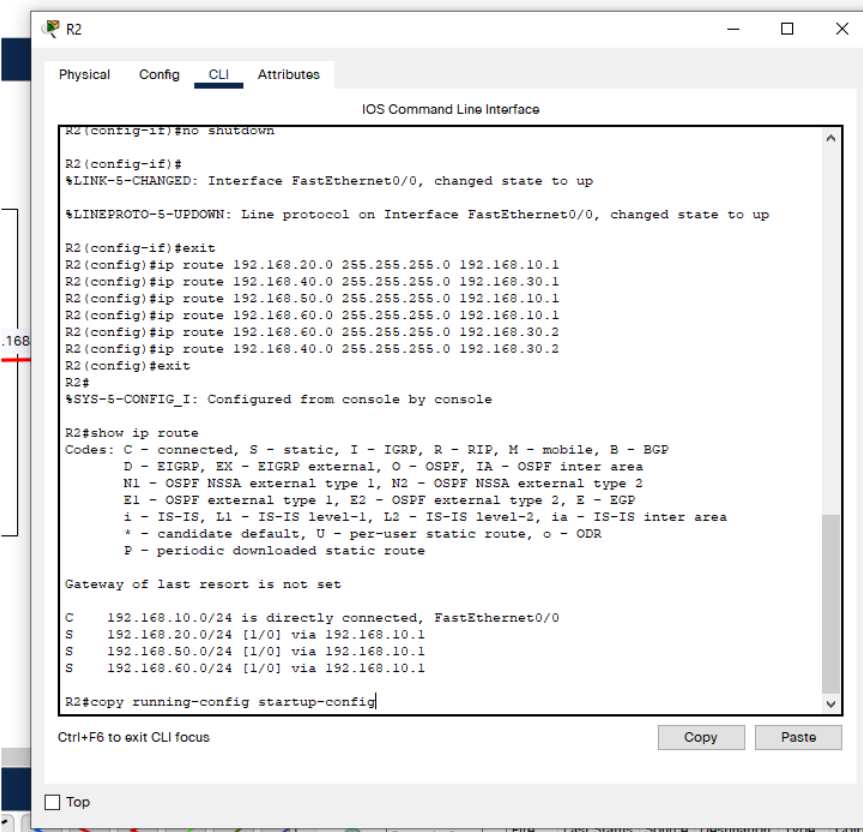
R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       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

R1#copy running-config startup-config
Destination filename [startup-config]? y
%Error copying nvram: y (Invalid argument)
R1#
```

At the bottom of the CLI window, it says "Ctrl+F6 to exit CLI focus".

IP Route R2:



The screenshot shows the CLI of router R2. The configuration includes enabling the interface, setting IP addresses, and configuring static routes. The routing table shows the configured static routes.

```
R2
Physical Config CLI Attributes
IOS Command Line Interface

R2(config-if)#no shutdown
R2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

R2(config-if)#exit
R2(config)#ip route 192.168.20.0 255.255.255.0 192.168.10.1
R2(config)#ip route 192.168.40.0 255.255.255.0 192.168.30.1
R2(config)#ip route 192.168.50.0 255.255.255.0 192.168.10.1
R2(config)#ip route 192.168.60.0 255.255.255.0 192.168.10.1
R2(config)#ip route 192.168.60.0 255.255.255.0 192.168.30.2
R2(config)#ip route 192.168.40.0 255.255.255.0 192.168.30.2
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

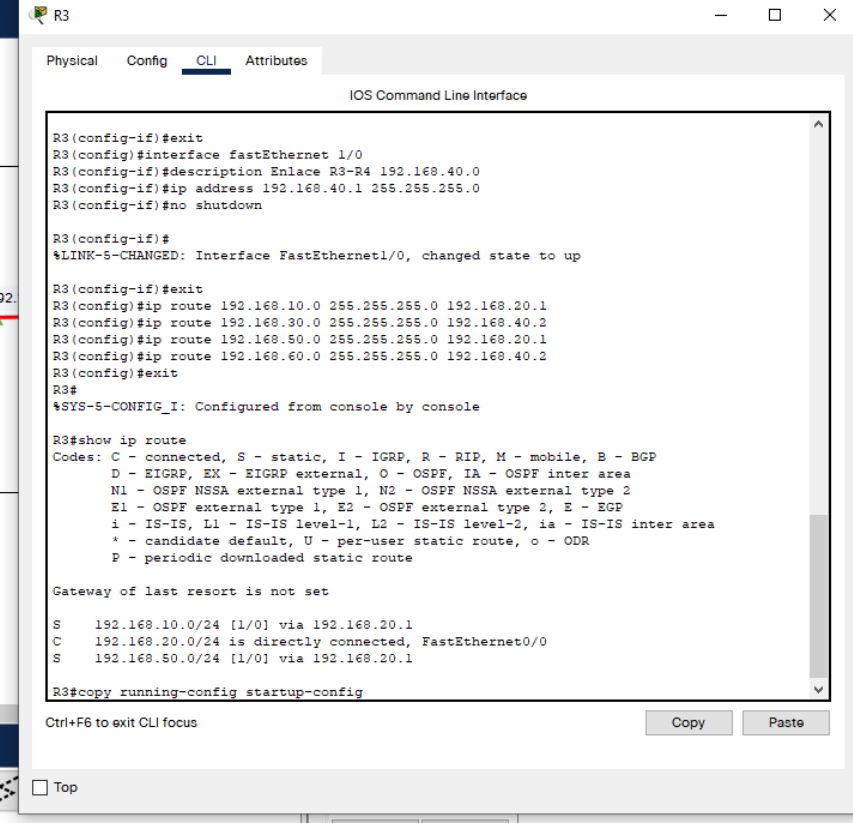
R2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        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

C    192.168.10.0/24 is directly connected, FastEthernet0/0
S    192.168.20.0/24 [1/0] via 192.168.10.1
S    192.168.50.0/24 [1/0] via 192.168.10.1
S    192.168.60.0/24 [1/0] via 192.168.10.1

R2#copy running-config startup-config
```

IP Route R3:



The screenshot shows the CLI of router R3. The configuration includes enabling the interface, setting IP addresses, and configuring static routes. The routing table shows the configured static routes.

```
R3
Physical Config CLI Attributes
IOS Command Line Interface

R3(config-if)#exit
R3(config)#interface fastEthernet 1/0
R3(config-if)#description Enlace R3-R4 192.168.40.0
R3(config-if)#ip address 192.168.40.1 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

R3(config-if)#exit
R3(config)#ip route 192.168.10.0 255.255.255.0 192.168.20.1
R3(config)#ip route 192.168.30.0 255.255.255.0 192.168.40.2
R3(config)#ip route 192.168.50.0 255.255.255.0 192.168.20.1
R3(config)#ip route 192.168.60.0 255.255.255.0 192.168.40.2
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

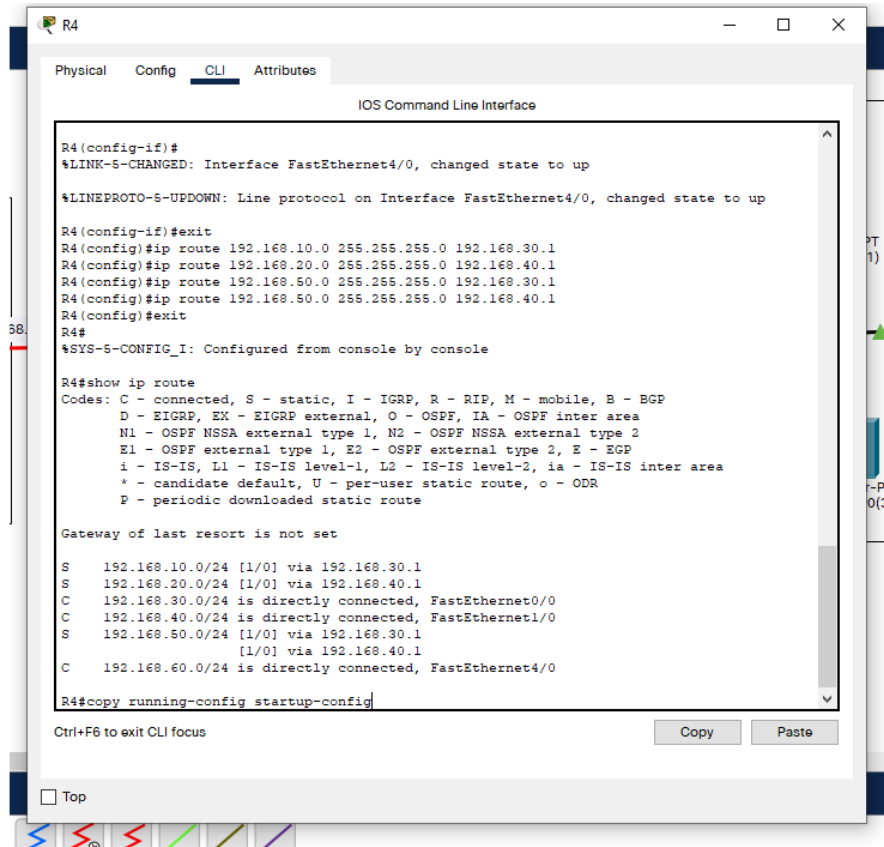
R3#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        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

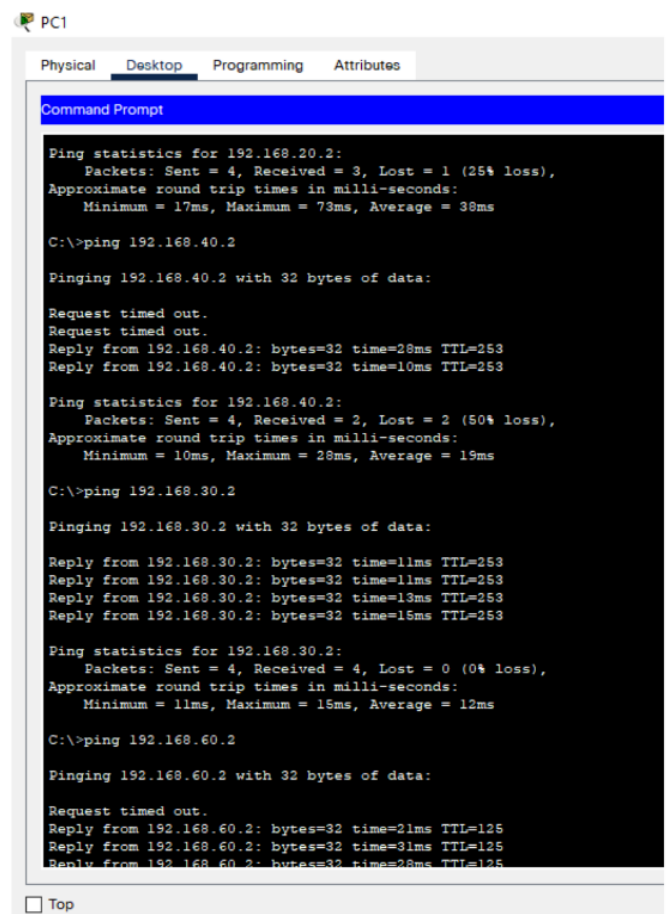
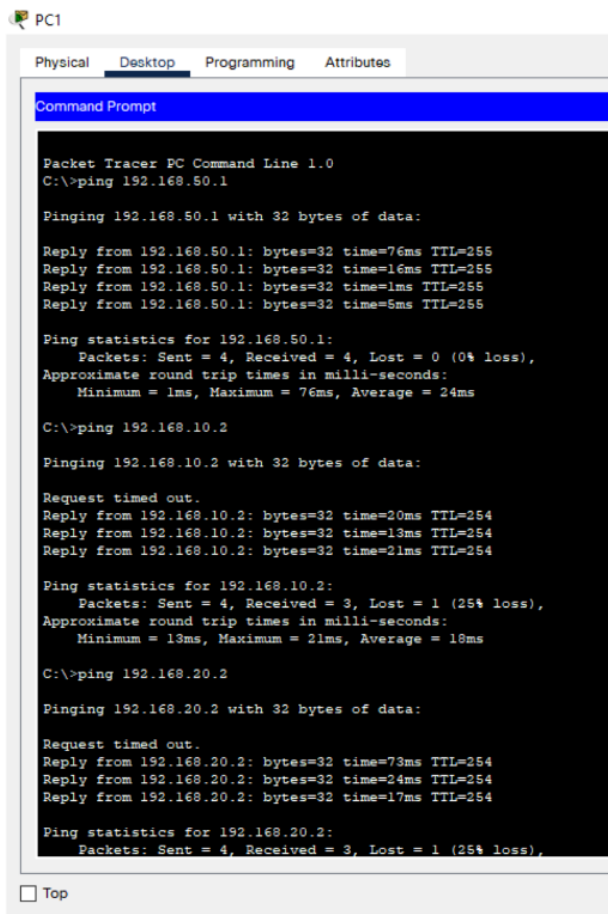
S    192.168.10.0/24 [1/0] via 192.168.20.1
C    192.168.20.0/24 is directly connected, FastEthernet0/0
S    192.168.50.0/24 [1/0] via 192.168.20.1

R3#copy running-config startup-config
```

IP Route R4:



Ping PC1 para testar conectividade:



PC1

Physical Desktop Programming Attributes

Command Prompt

```
Request timed out.
Reply from 192.168.60.2: bytes=32 time=21ms TTL=125
Reply from 192.168.60.2: bytes=32 time=31ms TTL=125
Reply from 192.168.60.2: bytes=32 time=28ms TTL=125

Ping statistics for 192.168.60.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 21ms, Maximum = 31ms, Average = 26ms

C:\>ping 192.168.60.3

Pinging 192.168.60.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.60.3: bytes=32 time=42ms TTL=125
Reply from 192.168.60.3: bytes=32 time=25ms TTL=125
Reply from 192.168.60.3: bytes=32 time=21ms TTL=125

Ping statistics for 192.168.60.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 21ms, Maximum = 42ms, Average = 29ms

C:\>ping 192.168.60.4

Pinging 192.168.60.4 with 32 bytes of data:

Request timed out.
Reply from 192.168.60.4: bytes=32 time=37ms TTL=125
Reply from 192.168.60.4: bytes=32 time=30ms TTL=125
Reply from 192.168.60.4: bytes=32 time=20ms TTL=125

Ping statistics for 192.168.60.4:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 20ms, Maximum = 37ms, Average = 29ms

C:\>ping 192.168.60.5

Pinging 192.168.60.5 with 32 bytes of data:
```

☐ Top

Desktop Programming Attributes

Command Prompt

```
ping 192.168.60.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.60.3: bytes=32 time=42ms TTL=125
Reply from 192.168.60.3: bytes=32 time=25ms TTL=125
Reply from 192.168.60.3: bytes=32 time=21ms TTL=125

Ping statistics for 192.168.60.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 21ms, Maximum = 42ms, Average = 29ms

ping 192.168.60.4

Pinging 192.168.60.4 with 32 bytes of data:

Request timed out.
Reply from 192.168.60.4: bytes=32 time=37ms TTL=125
Reply from 192.168.60.4: bytes=32 time=30ms TTL=125
Reply from 192.168.60.4: bytes=32 time=20ms TTL=125

Ping statistics for 192.168.60.4:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 20ms, Maximum = 37ms, Average = 29ms

ping 192.168.60.5

Pinging 192.168.60.5 with 32 bytes of data:

Request timed out.
Reply from 192.168.60.5: bytes=32 time=19ms TTL=125
Reply from 192.168.60.5: bytes=32 time=12ms TTL=125
Reply from 192.168.60.5: bytes=32 time=12ms TTL=125

Ping statistics for 192.168.60.5:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 19ms, Average = 14ms
```

Etapa 4: Configuração dos serviços HTTP, DHCP, FTP e DNS.

Teste de conectividade:

PC0

Physical Desktop Programming Attributes

Command Prompt

```
C:\>ping ftp.lambda.com

Pinging 192.168.60.4 with 32 bytes of data:

Request timed out.
Reply from 192.168.60.4: bytes=32 time=10ms TTL=125
Reply from 192.168.60.4: bytes=32 time=39ms TTL=125
Reply from 192.168.60.4: bytes=32 time=36ms TTL=125

Ping statistics for 192.168.60.4:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 39ms, Average = 28ms

C:\>ping dhcp.lambda.com

Pinging 192.168.60.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.60.3: bytes=32 time=26ms TTL=125
Reply from 192.168.60.3: bytes=32 time=28ms TTL=125
Reply from 192.168.60.3: bytes=32 time=18ms TTL=125

Ping statistics for 192.168.60.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 18ms, Maximum = 28ms, Average = 23ms

C:\>ping www.lambda.com

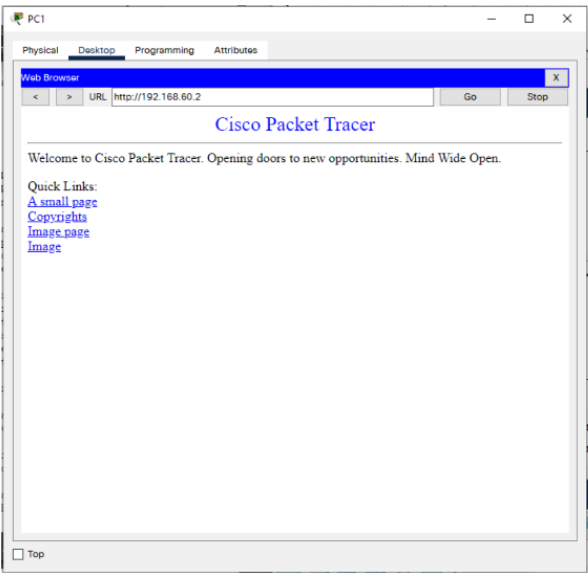
Pinging 192.168.60.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.60.2: bytes=32 time=28ms TTL=125
Reply from 192.168.60.2: bytes=32 time=24ms TTL=125
Reply from 192.168.60.2: bytes=32 time=16ms TTL=125

Ping statistics for 192.168.60.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 16ms, Maximum = 28ms, Average = 22ms
```

☐ Top

Teste HTTP:



Teste DHCP:

```
C:\>ping 192.168.60.2

Pinging 192.168.60.2 with 32 bytes of data:

Reply from 192.168.60.2: bytes=32 time=25ms TTL=125
Reply from 192.168.60.2: bytes=32 time=29ms TTL=125
Reply from 192.168.60.2: bytes=32 time=16ms TTL=125
Reply from 192.168.60.2: bytes=32 time=13ms TTL=125

Ping statistics for 192.168.60.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 13ms, Maximum = 29ms, Average = 20ms

C:\>
```

Teste FTP:

