

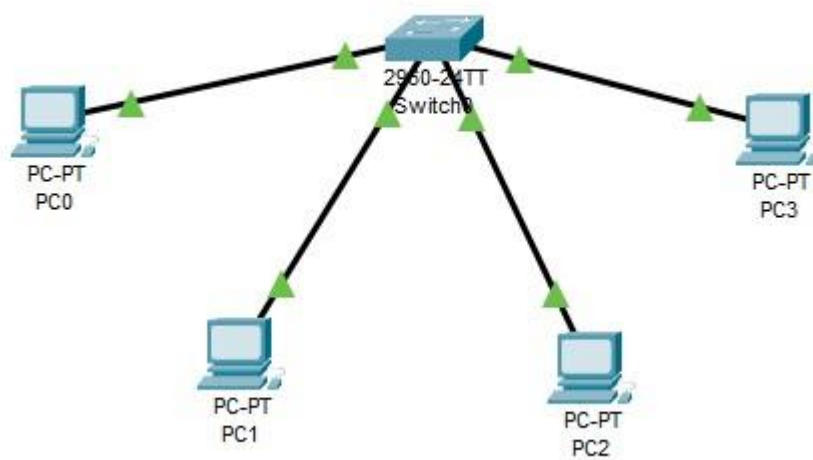
## Objetivo

Criar uma rede com 4 PCs e 1 switch, dividir a rede 192.168.10.0/24 em 4 sub-redes (/26), atribuir IPs manualmente a cada PC e testar conectividade entre dispositivos, com e sem roteador.

## Topologia da Rede

Dispositivos utilizados:

- 4 PCs (PC0, PC1, PC2 e PC3)
- 1 Switch



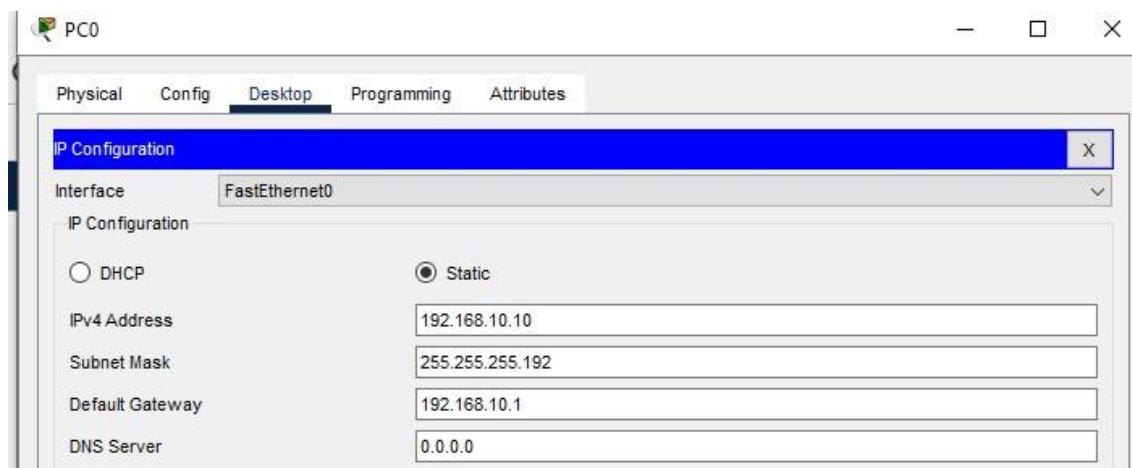
## Divisão em Sub-redes

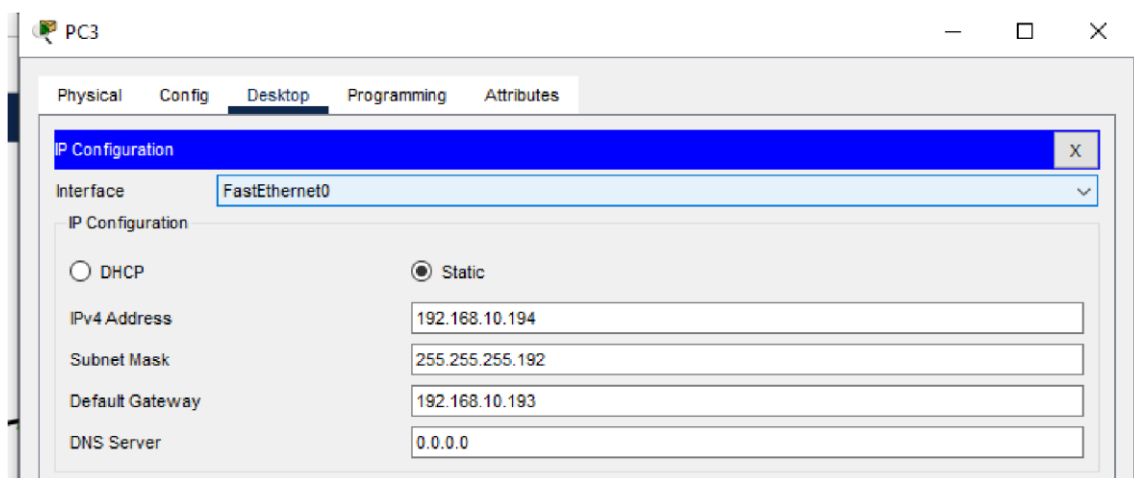
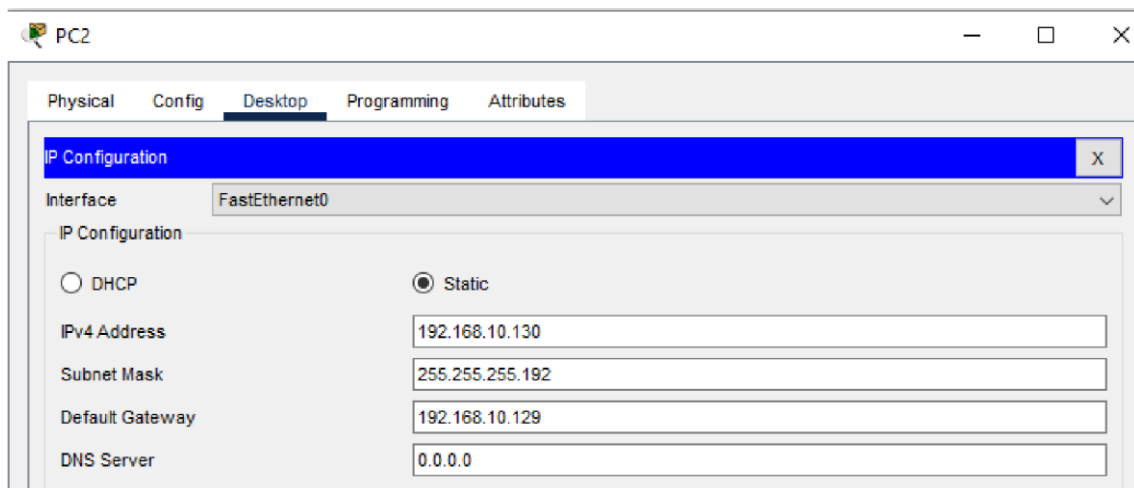
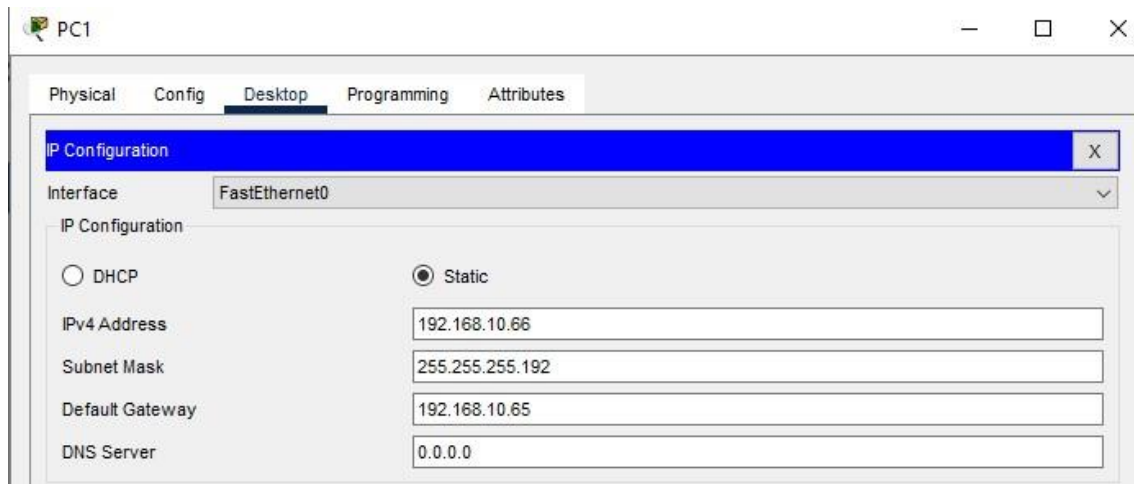
A rede 192.168.10.0/24 foi dividida em 4 sub-redes com máscara /26 (255.255.255.192), resultando em:

Sub-rede	Intervalo de IPs válidos	Broadcast
1	192.168.10.1 – 192.168.10.62	192.168.10.63
2	192.168.10.65 – 192.168.10.126	192.168.10.127
3	192.168.10.129 – 192.168.10.190	192.168.10.191
4	192.168.10.193 – 192.168.10.254	192.168.10.255

## Endereçamento IP

Cada PC foi atribuído manualmente a uma das sub-redes:



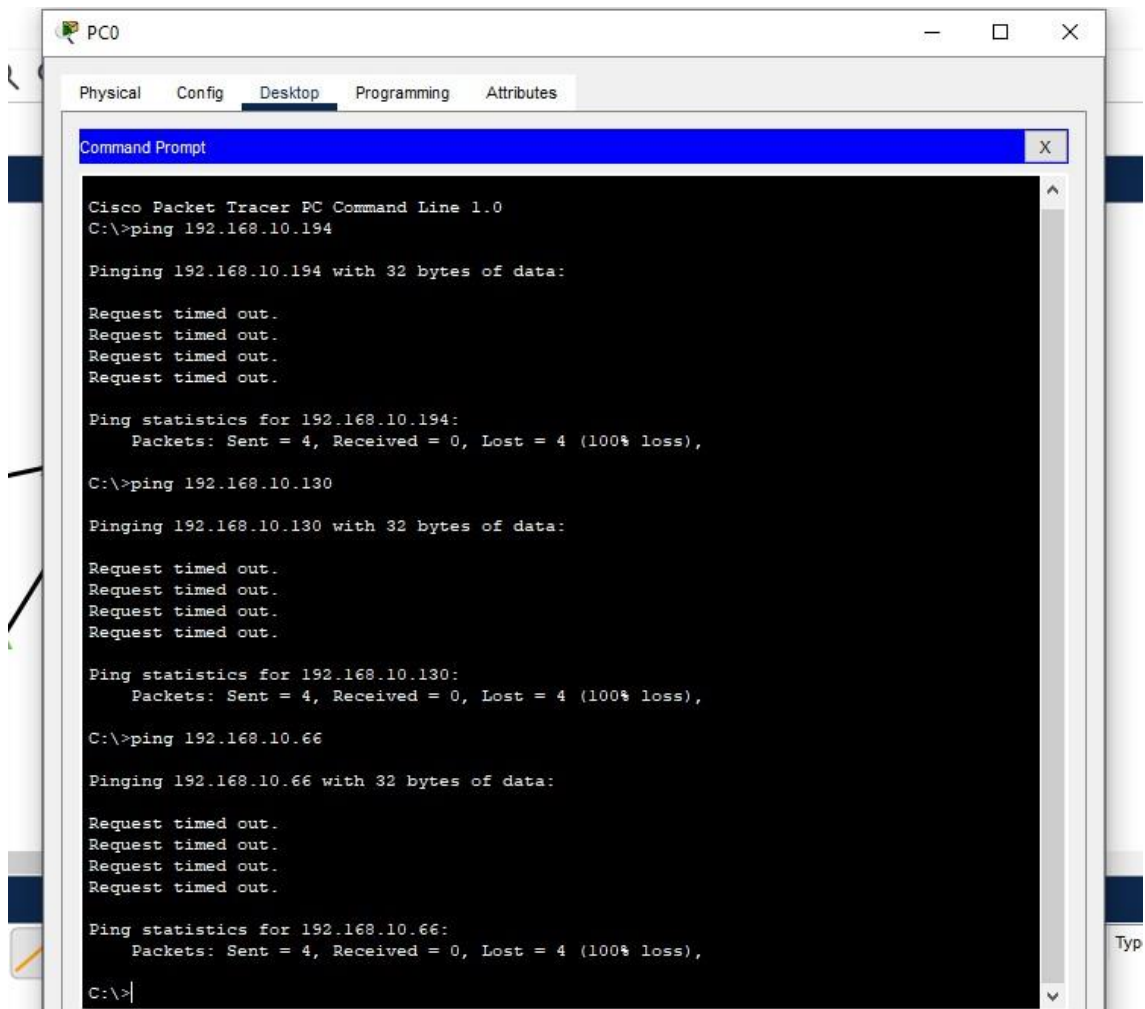


### Teste de Conectividade – Sem Roteador

Foi realizado o teste de ping entre os PCs usando o Command Prompt.

Resultados:

- Pings entre PCs de sub-redes diferentes falharam (pois não há roteador).
- PCs não se comunicam entre si apesar de conectados ao mesmo switch.



The screenshot shows a 'PC0' window in Cisco Packet Tracer with the 'Desktop' tab selected. Inside is a 'Command Prompt' window titled 'Cisco Packet Tracer PC Command Line 1.0'. The user has executed three ping commands from the C:\ prompt: ping 192.168.10.194, ping 192.168.10.130, and ping 192.168.10.66. Each command results in four 'Request timed out.' messages and a summary showing 'Packets: Sent = 4, Received = 0, Lost = 4 (100% loss)'.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.194

Pinging 192.168.10.194 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.10.194:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.10.130

Pinging 192.168.10.130 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.10.130:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.10.66

Pinging 192.168.10.66 with 32 bytes of data:

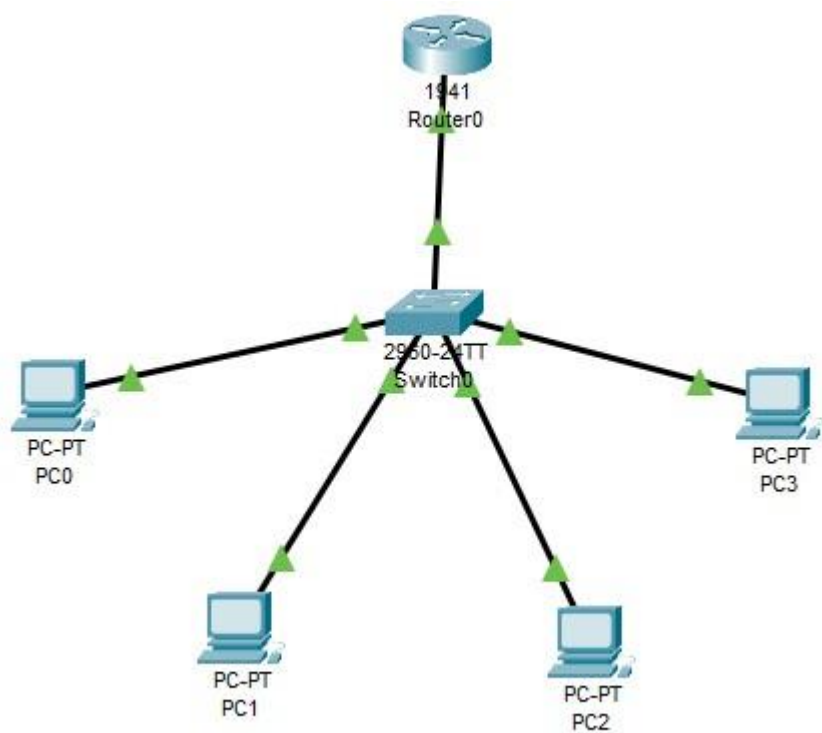
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.10.66:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

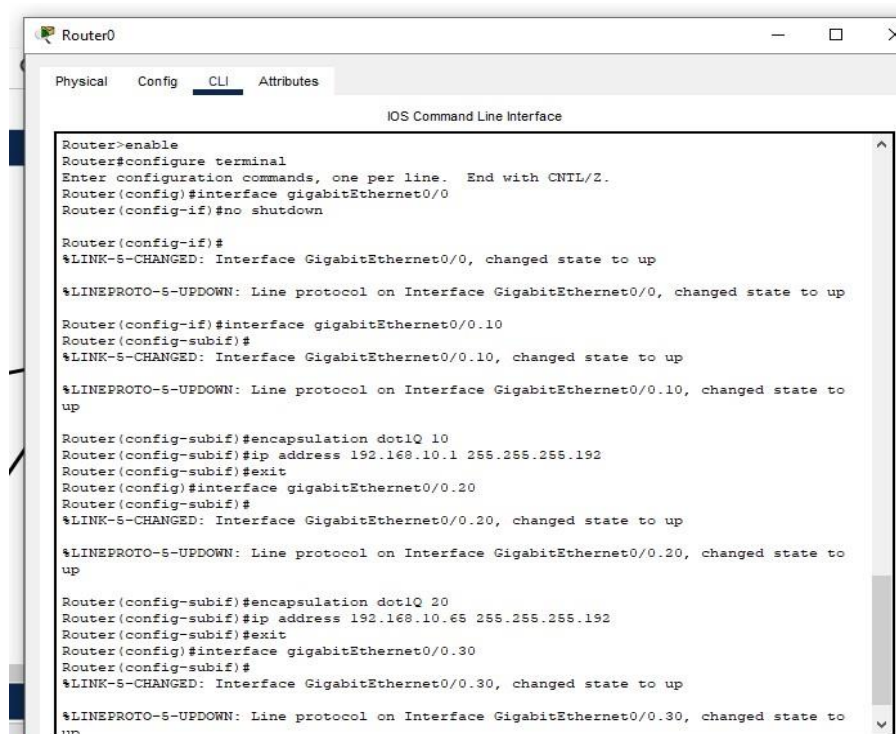
C:\>|
```

### Adição de Roteador

Para permitir comunicação entre sub-redes, foi adicionado um roteador com subinterfaces configuradas (Router-on-a-Stick):



**Configuração do Router0**



Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

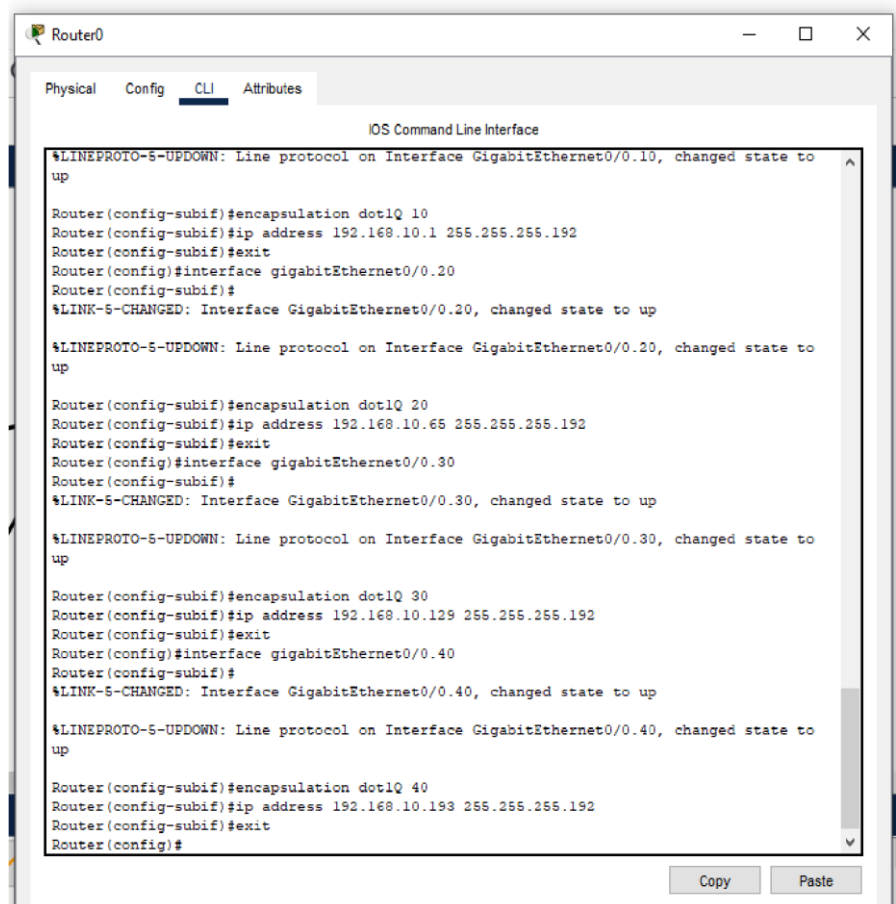
```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface gigabitEthernet0/0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#interface gigabitEthernet0/0.10
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.10, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.10, changed state to up

Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 192.168.10.1 255.255.255.192
Router(config-subif)#exit
Router(config)#interface gigabitEthernet0/0.20
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.20, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.20, changed state to up

Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 192.168.10.65 255.255.255.192
Router(config-subif)#exit
Router(config)#interface gigabitEthernet0/0.30
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30, changed state to up
```



Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.10, changed state to up

Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 192.168.10.1 255.255.255.192
Router(config-subif)#exit
Router(config)#interface gigabitEthernet0/0.20
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.20, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.20, changed state to up

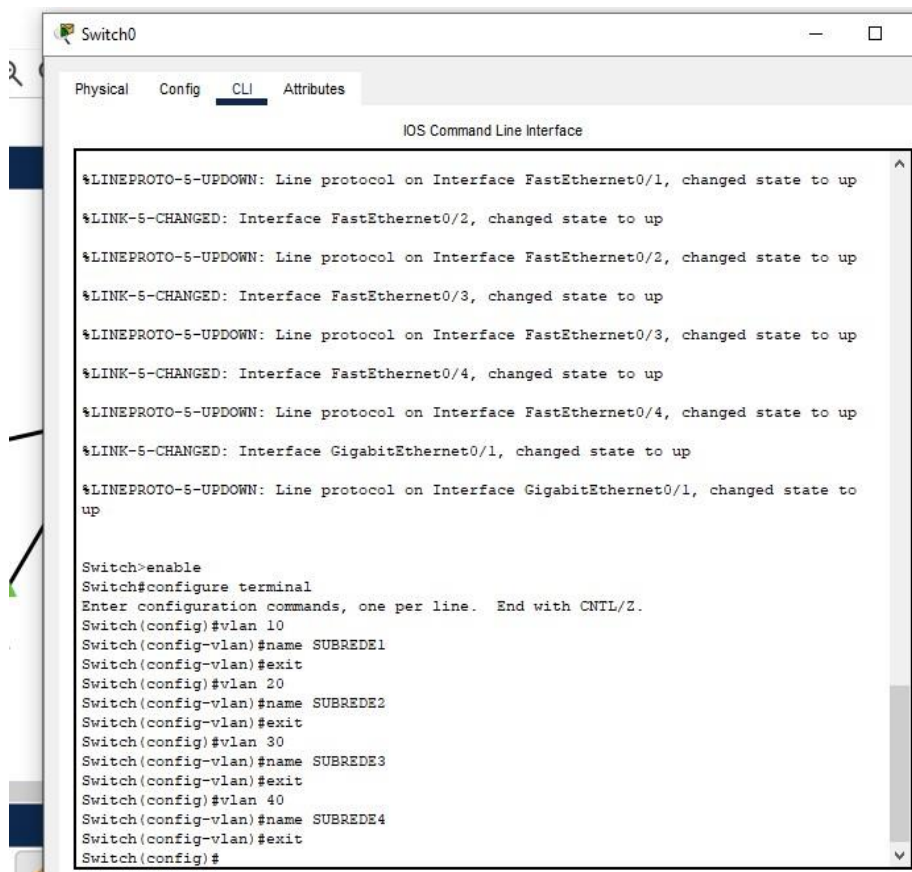
Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 192.168.10.65 255.255.255.192
Router(config-subif)#exit
Router(config)#interface gigabitEthernet0/0.30
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30, changed state to up

Router(config-subif)#encapsulation dot1Q 30
Router(config-subif)#ip address 192.168.10.129 255.255.255.192
Router(config-subif)#exit
Router(config)#interface gigabitEthernet0/0.40
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.40, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.40, changed state to up

Router(config-subif)#encapsulation dot1Q 40
Router(config-subif)#ip address 192.168.10.193 255.255.255.192
Router(config-subif)#exit
Router(config)#
```

Copy Paste

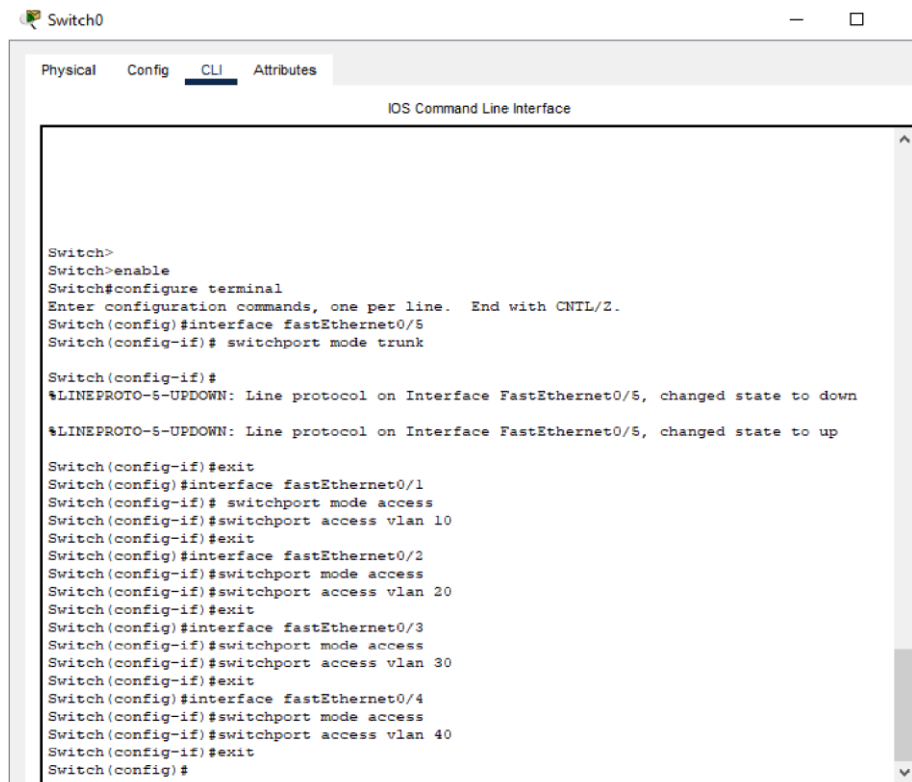
## Configuração do Switch0



```
Switch0
Physical Config CLI Attributes
IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name SUBREDE1
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name SUBREDE2
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name SUBREDE3
Switch(config-vlan)#exit
Switch(config)#vlan 40
Switch(config-vlan)#name SUBREDE4
Switch(config-vlan)#exit
Switch(config)#
```



```
Switch0
Physical Config CLI Attributes
IOS Command Line Interface

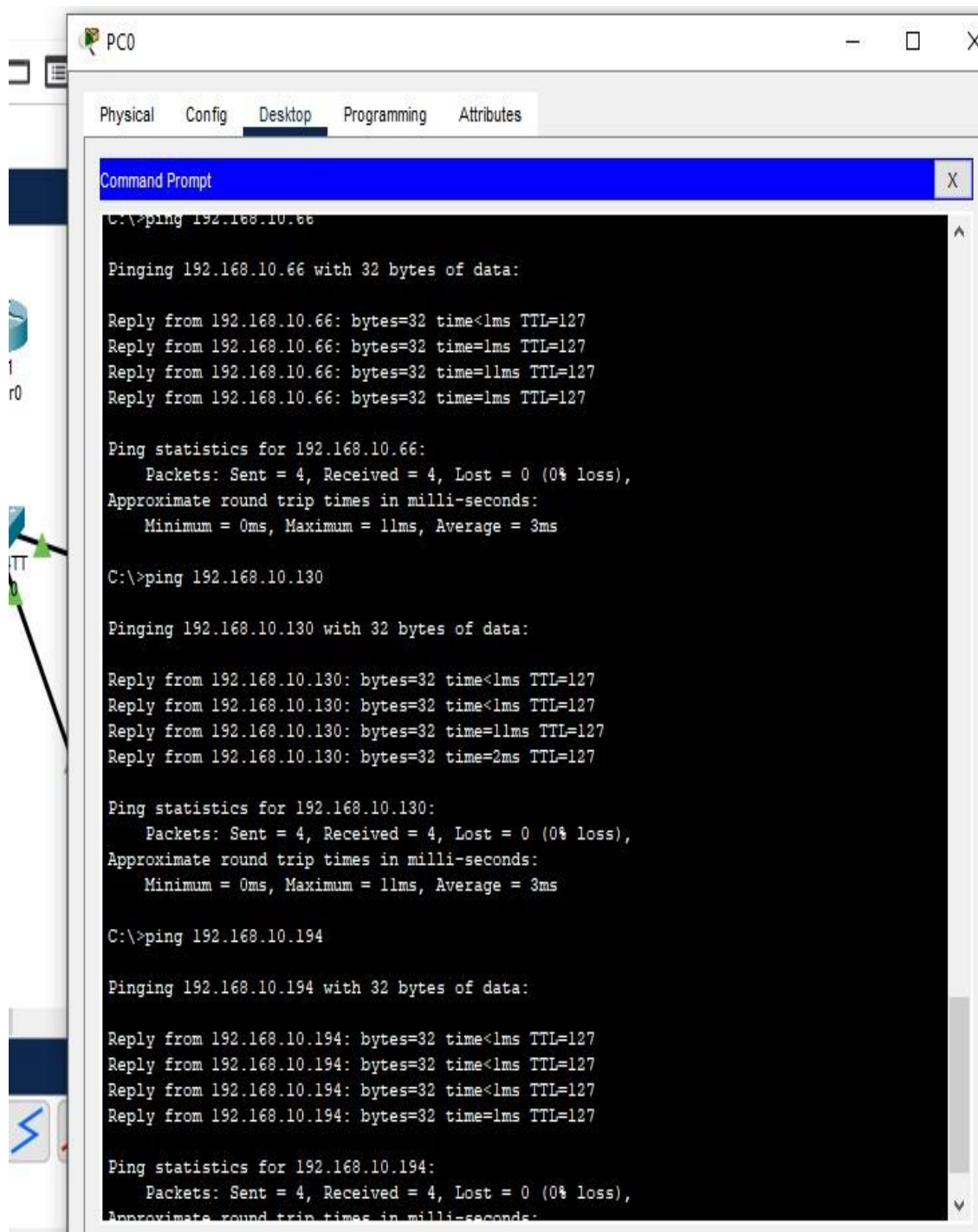
Switch>
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/5
Switch(config-if)# switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up

Switch(config-if)#exit
Switch(config)#interface fastEthernet0/1
Switch(config-if)# switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#interface fastEthernet0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#interface fastEthernet0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#exit
Switch(config)#interface fastEthernet0/4
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 40
Switch(config-if)#exit
Switch(config)#
```

**Teste de Conectividade – Com Roteador**

Após a configuração correta do roteador e do switch, os PCs conseguiram se comunicar entre si normalmente, demonstrando o roteamento entre sub-redes.



The screenshot shows a window titled "PC0" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows the execution of three ping commands from the C:\ directory. Each command is followed by four replies and a summary of ping statistics. All three destinations (192.168.10.66, 192.168.10.130, and 192.168.10.194) show 0% loss and a 3ms average round trip time.

```
C:\>ping 192.168.10.66

Pinging 192.168.10.66 with 32 bytes of data:

Reply from 192.168.10.66: bytes=32 time<1ms TTL=127
Reply from 192.168.10.66: bytes=32 time<1ms TTL=127
Reply from 192.168.10.66: bytes=32 time=11ms TTL=127
Reply from 192.168.10.66: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.10.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 3ms

C:\>ping 192.168.10.130

Pinging 192.168.10.130 with 32 bytes of data:

Reply from 192.168.10.130: bytes=32 time<1ms TTL=127
Reply from 192.168.10.130: bytes=32 time<1ms TTL=127
Reply from 192.168.10.130: bytes=32 time=11ms TTL=127
Reply from 192.168.10.130: bytes=32 time=2ms TTL=127

Ping statistics for 192.168.10.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 3ms

C:\>ping 192.168.10.194

Pinging 192.168.10.194 with 32 bytes of data:

Reply from 192.168.10.194: bytes=32 time<1ms TTL=127
Reply from 192.168.10.194: bytes=32 time<1ms TTL=127
Reply from 192.168.10.194: bytes=32 time<1ms TTL=127
Reply from 192.168.10.194: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.10.194:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
```



PC1

Physical Config Desktop Programming Attributes

Command Prompt

```
C:\>ping 192.168.10.10

Pinging 192.168.10.10 with 32 bytes of data:

Reply from 192.168.10.10: bytes=32 time<1ms TTL=127
Reply from 192.168.10.10: bytes=32 time<1ms TTL=127
Reply from 192.168.10.10: bytes=32 time=1ms TTL=127
Reply from 192.168.10.10: bytes=32 time=14ms TTL=127

Ping statistics for 192.168.10.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 14ms, Average = 3ms

C:\>ping 192.168.10.130

Pinging 192.168.10.130 with 32 bytes of data:

Reply from 192.168.10.130: bytes=32 time<1ms TTL=127
Reply from 192.168.10.130: bytes=32 time<1ms TTL=127
Reply from 192.168.10.130: bytes=32 time=11ms TTL=127
Reply from 192.168.10.130: bytes=32 time=3ms TTL=127

Ping statistics for 192.168.10.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 3ms

C:\>ping 192.168.10.194

Pinging 192.168.10.194 with 32 bytes of data:

Reply from 192.168.10.194: bytes=32 time<1ms TTL=127
Reply from 192.168.10.194: bytes=32 time<1ms TTL=127
Reply from 192.168.10.194: bytes=32 time<1ms TTL=127
Reply from 192.168.10.194: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.10.194:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
C:\>ping 192.168.10.66

Pinging 192.168.10.66 with 32 bytes of data:

Reply from 192.168.10.66: bytes=32 time<1ms TTL=127
Reply from 192.168.10.66: bytes=32 time<1ms TTL=127
Reply from 192.168.10.66: bytes=32 time=10ms TTL=127
Reply from 192.168.10.66: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.10.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 2ms

C:\>ping 192.168.10.10

Pinging 192.168.10.10 with 32 bytes of data:

Reply from 192.168.10.10: bytes=32 time<1ms TTL=127
Reply from 192.168.10.10: bytes=32 time<1ms TTL=127
Reply from 192.168.10.10: bytes=32 time=2ms TTL=127
Reply from 192.168.10.10: bytes=32 time=1ms TTL=127

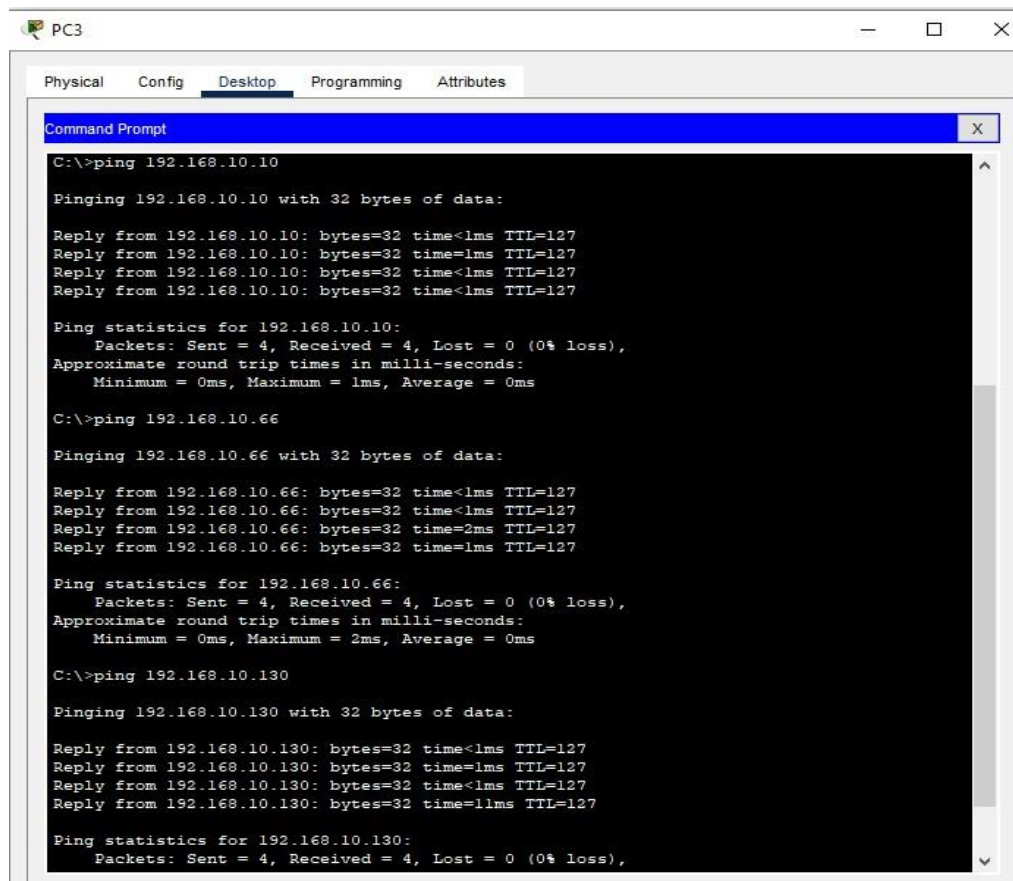
Ping statistics for 192.168.10.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>ping 192.168.10.194

Pinging 192.168.10.194 with 32 bytes of data:

Reply from 192.168.10.194: bytes=32 time<1ms TTL=127
Reply from 192.168.10.194: bytes=32 time<1ms TTL=127
Reply from 192.168.10.194: bytes=32 time=1ms TTL=127
Reply from 192.168.10.194: bytes=32 time=1ms TTL=127

Ping statistics for 192.168.10.194:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```



```
C:\>ping 192.168.10.10

Pinging 192.168.10.10 with 32 bytes of data:

Reply from 192.168.10.10: bytes=32 time<1ms TTL=127
Reply from 192.168.10.10: bytes=32 time=1ms TTL=127
Reply from 192.168.10.10: bytes=32 time<1ms TTL=127
Reply from 192.168.10.10: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.10.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.10.66

Pinging 192.168.10.66 with 32 bytes of data:

Reply from 192.168.10.66: bytes=32 time<1ms TTL=127
Reply from 192.168.10.66: bytes=32 time<1ms TTL=127
Reply from 192.168.10.66: bytes=32 time=2ms TTL=127
Reply from 192.168.10.66: bytes=32 time=1ms TTL=127

Ping statistics for 192.168.10.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>ping 192.168.10.130

Pinging 192.168.10.130 with 32 bytes of data:

Reply from 192.168.10.130: bytes=32 time<1ms TTL=127
Reply from 192.168.10.130: bytes=32 time=1ms TTL=127
Reply from 192.168.10.130: bytes=32 time<1ms TTL=127
Reply from 192.168.10.130: bytes=32 time=11ms TTL=127

Ping statistics for 192.168.10.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

## Conclusão

A prática permitiu compreender, na prática, o funcionamento do roteamento entre sub-redes utilizando a técnica de Router-on-a-Stick. Foi feita a divisão da rede 192.168.10.0/24 em quatro sub-redes utilizando máscara /26, atribuindo IPs manuais para cada PC em uma sub-rede distinta. Inicialmente, sem a presença de um roteador, os dispositivos não se comunicavam entre sub-redes, mesmo conectados ao mesmo switch, pois o switch atua apenas na camada 2 (enlace) do modelo OSI. Com a adição do roteador e a configuração de subinterfaces na porta G0/0 (uma para cada VLAN), juntamente com a configuração adequada de trunk na porta do switch e modo access nas portas dos PCs, foi possível interligar as sub-redes. As VLANs foram corretamente separadas e associadas às portas específicas, e os gateways configurados permitiram o tráfego entre as sub-redes.

Após a conclusão da configuração, os testes de ping entre todos os PCs foram bem-sucedidos, comprovando que o roteamento entre VLANs estava funcionando corretamente. Assim, a prática demonstrou com clareza o papel de cada camada da rede e consolidou o entendimento de segmentação lógica, VLANs, e interconexão entre sub-redes.