

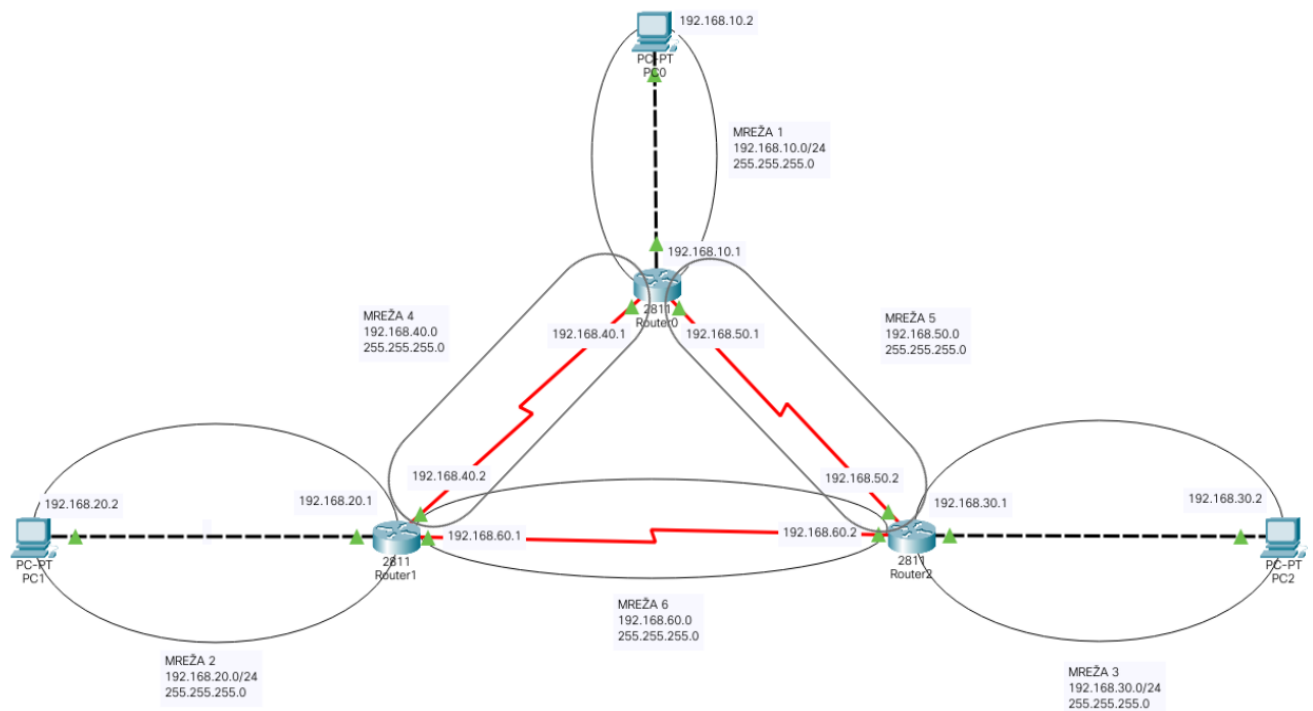
Univerzitet u Sarajevu
Elektrotehnički fakultet

ZADAĆA 1
iz predmeta Računarske mreže

Samra Mujčinović, 18187/1763

Sarajevo, mart 2021.

Za izradu ove zadaće bilo je potrebno uspostaviti mrežu datu na slici u postavci zadaće, što je učinjeno koristeći Cisco Packet Tracer. Konačna mreža definisana u ovom alatu prikazana je na slici Slika 1.



Slika 1. Tražena računarska mreža

Na slici Slika 1 možemo vidjeti da u mreži konfiguriraju tri PC-a: PC0, PC1 i PC2, te tri rutera: Router0, Router1 i Router2. Za povezivanje ovih uređaja u jednu mrežu definisano je 6 podmreža:

1. Mreža 1(PC0 - Router0)
Dodijeljeni subnet: 192.168.10.0/24
Adresa mreže: 192.168.10.0
Subnetmask: 255.255.255.0
IP adresa PC0: 192.168.10.2
Default gateway: 192.168.10.1
Broadcast: 192.168.10.255

PC0

Physical Config Desktop Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 192.168.10.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.10.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::260:47FF:FE3C:24AC

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

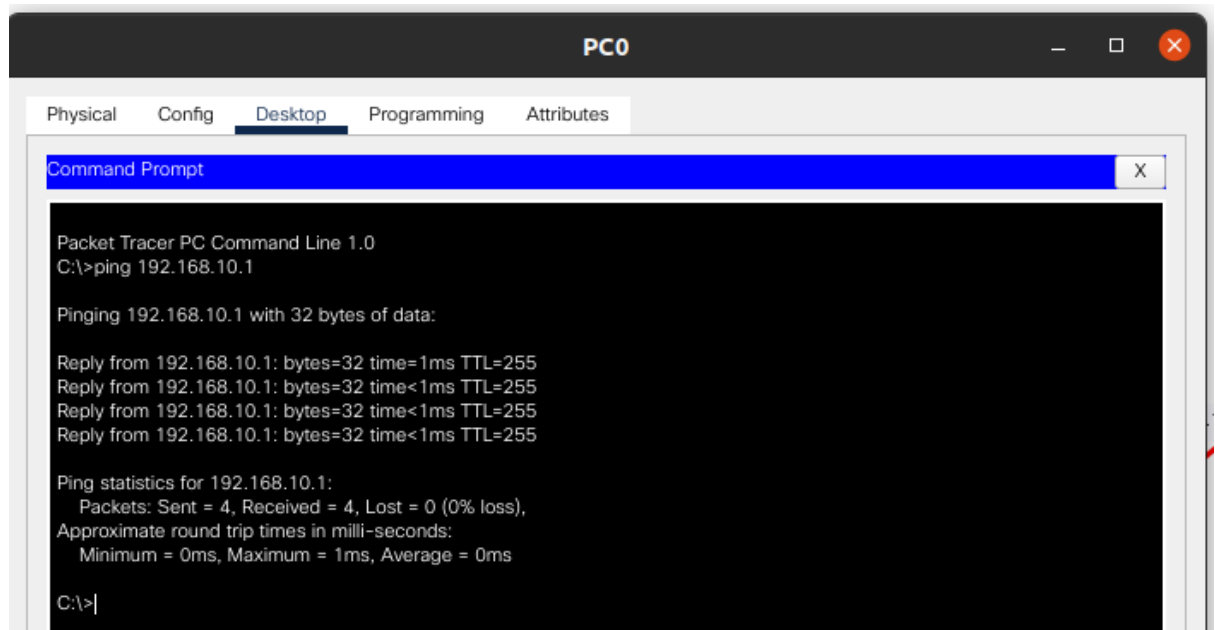
☐ Top

PC0 je spojen svojim Fa0 interfejsom(192.168.10.2)

Router0 je spojen svojim Fast Ethernet 0/0 interfejsom

```
!
interface FastEthernet0/0
ip address 192.168.10.1 255.255.255.0
duplex auto
speed auto
!
```

Provjera komunikacije u ovoj mreži:



2. Mreža 2(PC1 - Router1)

Dodijeljeni subnet: 192.168.20.0/24

Adresa mreže: 192.168.20.0

Subnetmask: 255.255.255.0

IP adresa PC1: 192.168.20.2

Default gateway: 192.168.20.1

Broadcast: 192.168.20.255

PC1

Physical Config Desktop Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.20.2

Subnet Mask 255.255.255.0

Default Gateway 192.168.20.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::20C:85FF:FE19:8E04

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

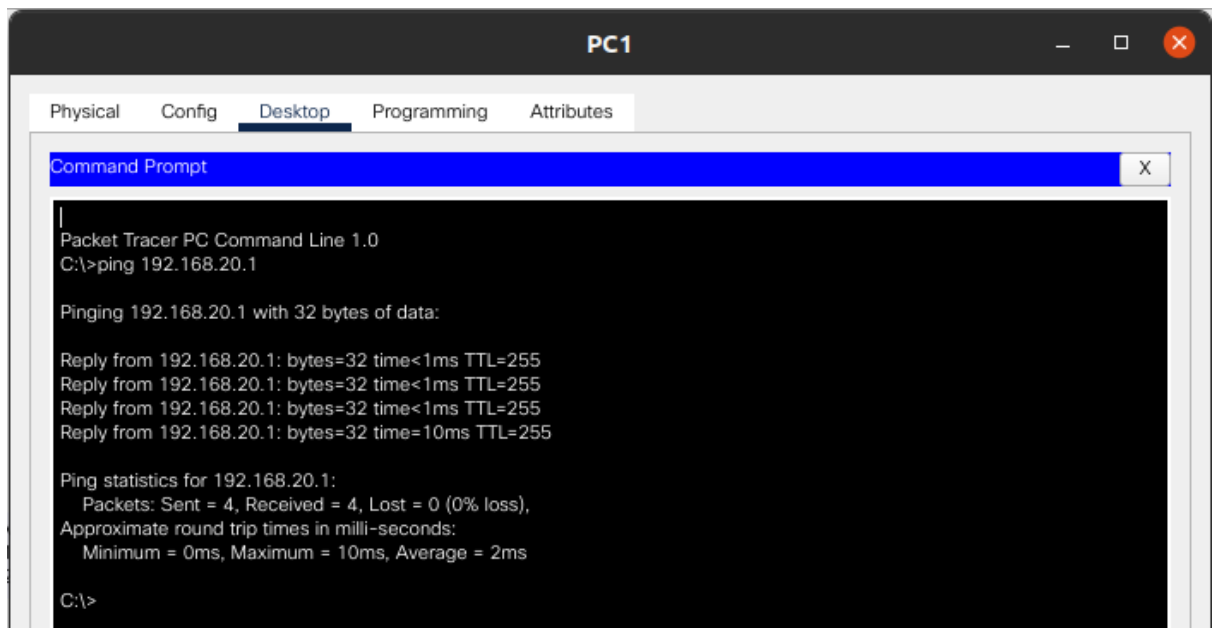
☐ Top

PC1 je spojen svojim Fa0 interfejsom(192.168.20.2)

Router1 je spojen svojim Fast Ethernet 0/0 interfejsom

```
interface FastEthernet0/0
ip address 192.168.20.1 255.255.255.0
duplex auto
speed auto
!
```

Provjera komunikacije u ovoj mreži:



3. Mreža 3(PC2 - Router2)

Dodijeljeni subnet: 192.168.30.0/24

Adresa mreže: 192.168.30.0

Subnetmask: 255.255.255.0

IP adresa PC2: 192.168.30.2

Default gateway: 192.168.30.1

Broadcast: 192.168.30.255

PC2

Physical Config Desktop Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 192.168.30.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.30.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::2D0:D3FF:FED4:4582

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

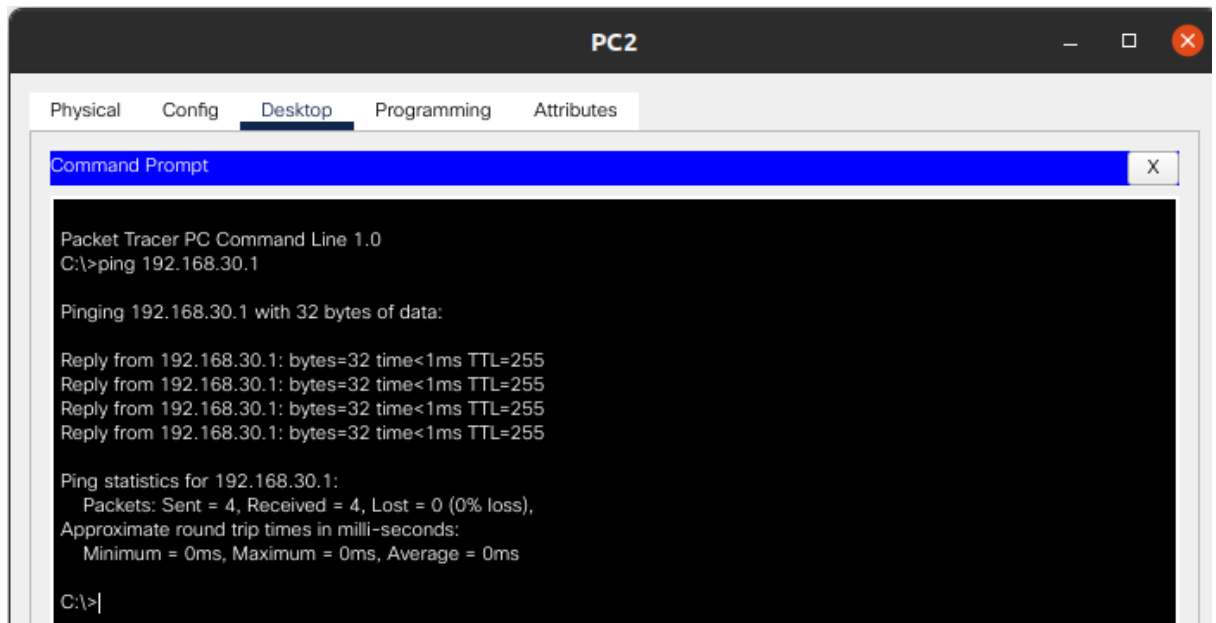
☐ Top

PC2 je spojen svojim Fa0 interfejsom(192.168.30.2)

Router2 je spojen svojim Fast Ethernet 0/0 interfejsom

```
interface FastEthernet0/0
ip address 192.168.30.1 255.255.255.0
duplex auto
speed auto
!
```

Provjera komunikacije u ovoj mreži:



4. Mreža 4(Router0 - Router1)

Dodijeljeni subnet: 192.168.40.0/24

Adresa mreže: 192.168.40.0

Subnetmask: 255.255.255.0

Default gateway: 192.168.40.1

Broadcast: 192.168.40.255

Router0 je spojen svojim Serial 0/0/0 interfejsom

```

interface Serial0/0/0
ip address 192.168.40.1 255.255.255.0
!
interface Serial0/0/1
no ip address
clock rate 2000000
!

```

Router1 je spojen svojim Serial 0/0/0 interfejsom

```

interface Serial0/0/0
ip address 192.168.40.2 255.255.255.0
clock rate 2000000
!
interface Serial0/0/1
no ip address
clock rate 2000000
!

```

5. Mreža 5(Router0 - Router2)

Dodijeljeni subnet: 192.168.50.0/24

Adresa mreže: 192.168.50.0

Subnetmask: 255.255.255.0

Default gateway: 192.168.50.1

Broadcast: 192.168.50.255

Router0 je spojen svojim Serial 0/1/0 interfejsom


```

interface Serial0/1/0
ip address 192.168.50.1 255.255.255.0
clock rate 2000000
!
interface Serial0/1/1
no ip address
clock rate 2000000
!

```

Router2 je spojen svojim Serial 0/1/0 interfejsom

```

interface Serial0/1/0
ip address 192.168.50.2 255.255.255.0
!
interface Serial0/1/1
no ip address
clock rate 2000000
!

```

6. Mreža 6(Router1 - Router2)

Dodijeljeni subnet: 192.168.60.0/24

Adresa mreže: 192.168.60.0

Subnetmask: 255.255.255.0

Default gateway: 192.168.60.1

Broadcast: 192.168.60.255

Router1 je spojen svojim Serial 0/1/0 interfejsom

```

interface Serial0/1/0
ip address 192.168.60.1 255.255.255.0
clock rate 2000000
!
interface Serial0/1/1
no ip address
clock rate 2000000
!

```

Router2 je spojen svojim Serial 0/0/0 interfejsom

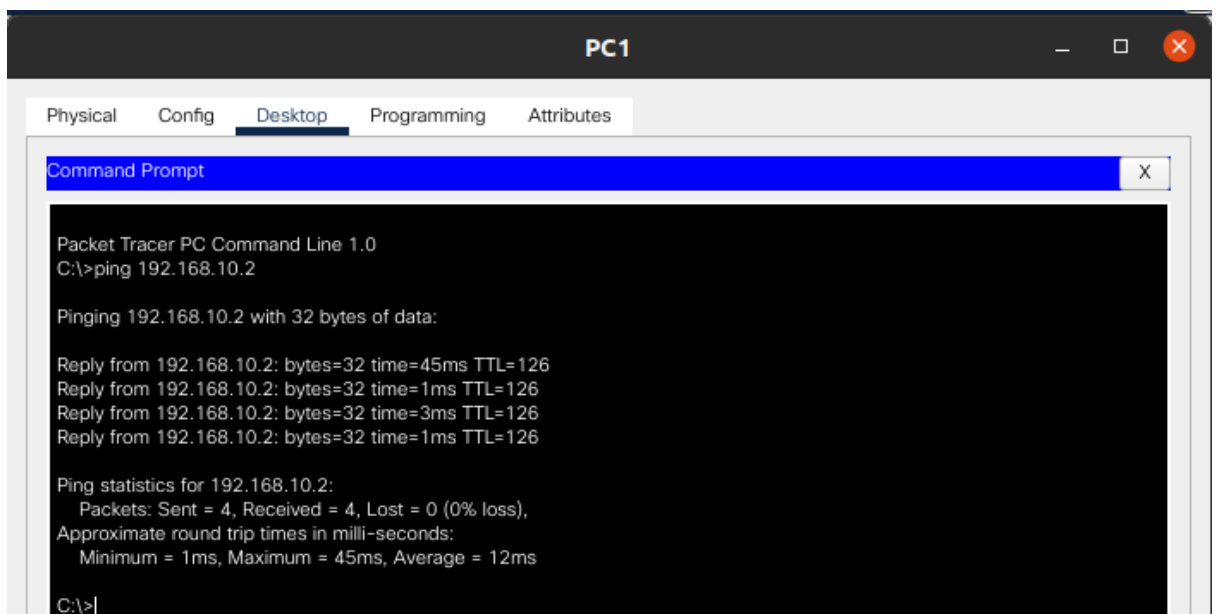
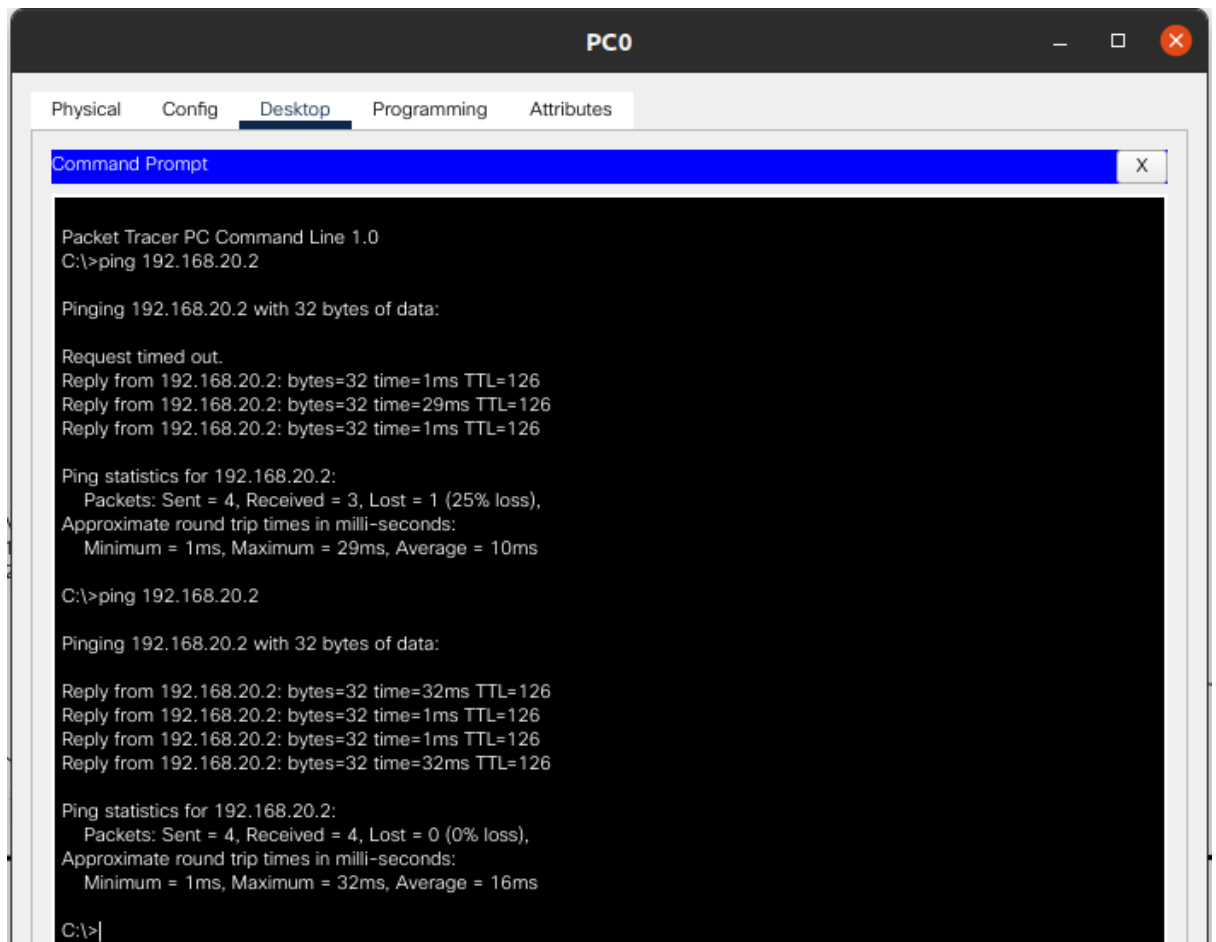
```

interface Serial0/0/0
ip address 192.168.60.2 255.255.255.0
!
interface Serial0/0/1
no ip address
clock rate 2000000
!

```

Provjera komunikacije svih PC-eva međusobno:

- PC0 i PC1



- PC0 i PC2

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.30.2: bytes=32 time=3ms TTL=126
Reply from 192.168.30.2: bytes=32 time=2ms TTL=126

Ping statistics for 192.168.30.2:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Reply from 192.168.30.2: bytes=32 time=53ms TTL=126
Reply from 192.168.30.2: bytes=32 time=2ms TTL=126
Reply from 192.168.30.2: bytes=32 time=1ms TTL=126
Reply from 192.168.30.2: bytes=32 time=25ms TTL=126

Ping statistics for 192.168.30.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 53ms, Average = 20ms

C:\>|
```

PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.2

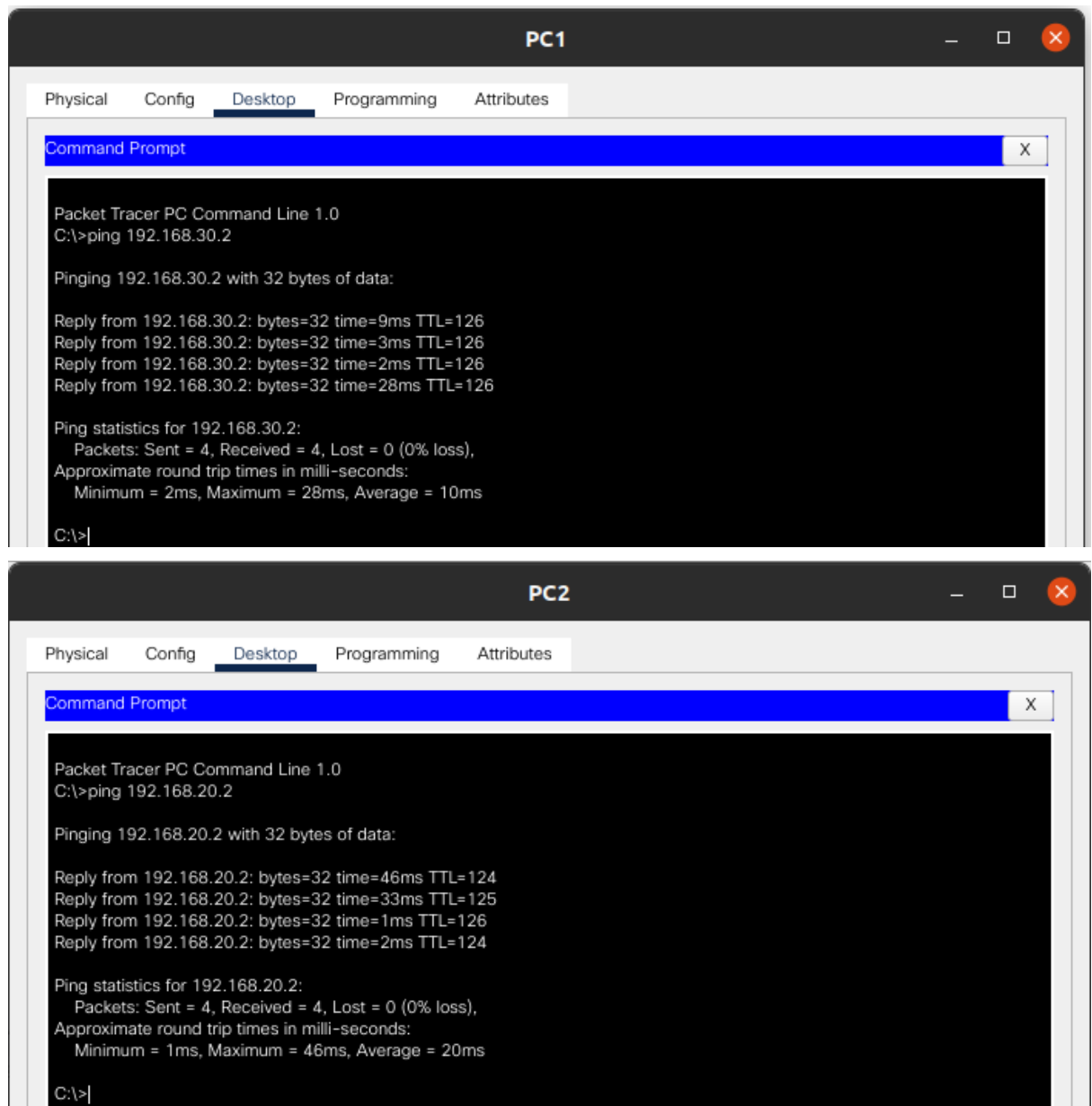
Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time=1ms TTL=126
Reply from 192.168.10.2: bytes=32 time=45ms TTL=124
Reply from 192.168.10.2: bytes=32 time=2ms TTL=125
Reply from 192.168.10.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 45ms, Average = 12ms

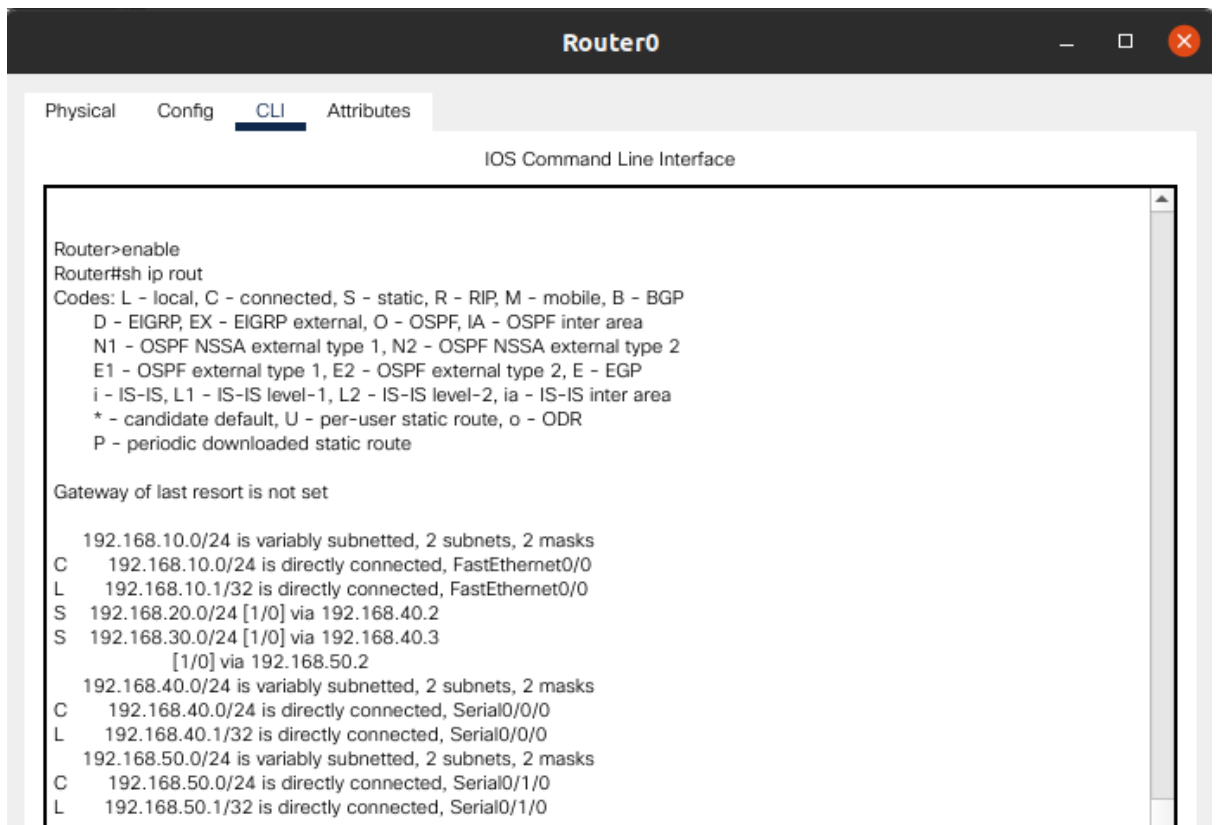
C:\>|
```

- PC1 i PC2



Na kraju ćemo prikazati tabele rutiranja za svaki od rutera koje i omogućavaju prethodno prikazanu komunikaciju(što je moguće očitati komandom `sh ip rout`):

- Router0



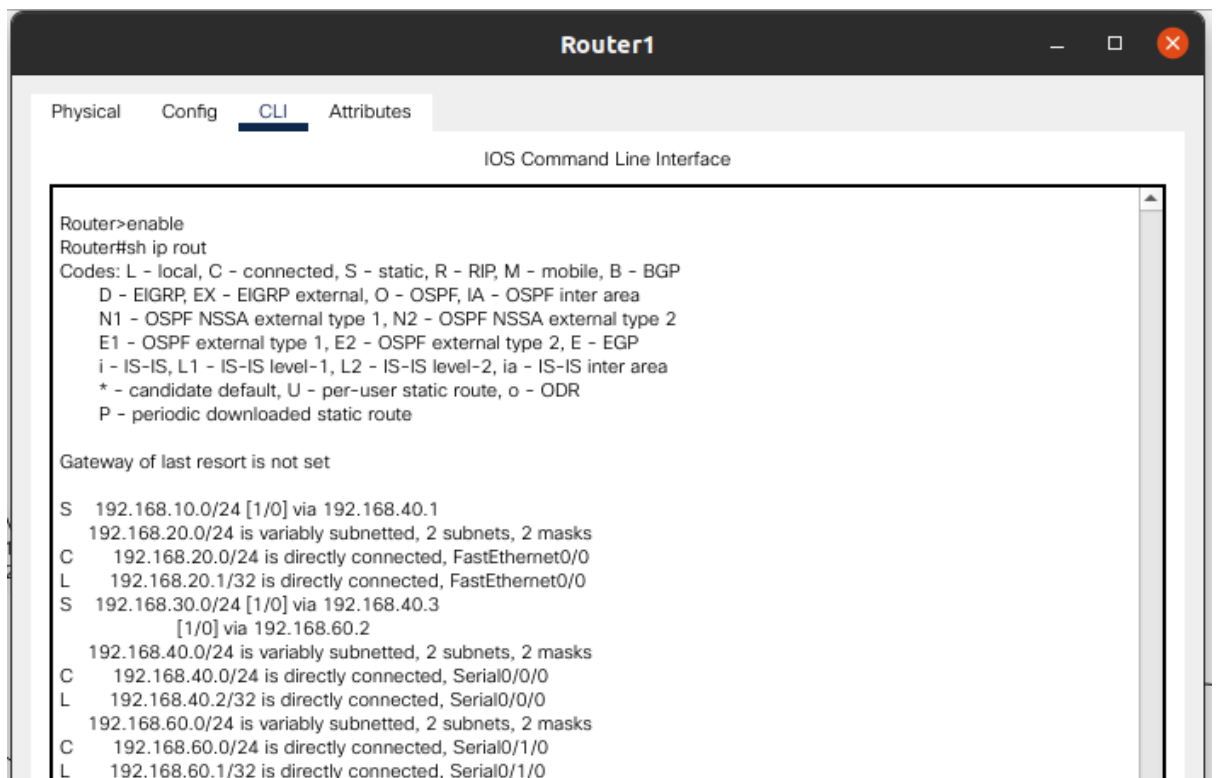
The screenshot shows the CLI of Router0. The 'CLI' tab is selected. The command 'Router>enable' has been entered, followed by 'Router#sh ip route'. The output displays the routing table with various codes and routes. The routes include 192.168.10.0/24, 192.168.20.0/24, 192.168.30.0/24, 192.168.40.0/24, 192.168.50.0/24, and 192.168.60.0/24, all of which are directly connected via FastEthernet0/0 or Serial0/0/0.

```
Router>enable
Router#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 not set

192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.10.0/24 is directly connected, FastEthernet0/0
L    192.168.10.1/32 is directly connected, FastEthernet0/0
S    192.168.20.0/24 [1/0] via 192.168.40.2
S    192.168.30.0/24 [1/0] via 192.168.40.3
     [1/0] via 192.168.50.2
192.168.40.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.40.0/24 is directly connected, Serial0/0/0
L    192.168.40.1/32 is directly connected, Serial0/0/0
192.168.50.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.50.0/24 is directly connected, Serial0/1/0
L    192.168.50.1/32 is directly connected, Serial0/1/0
```

- Router1



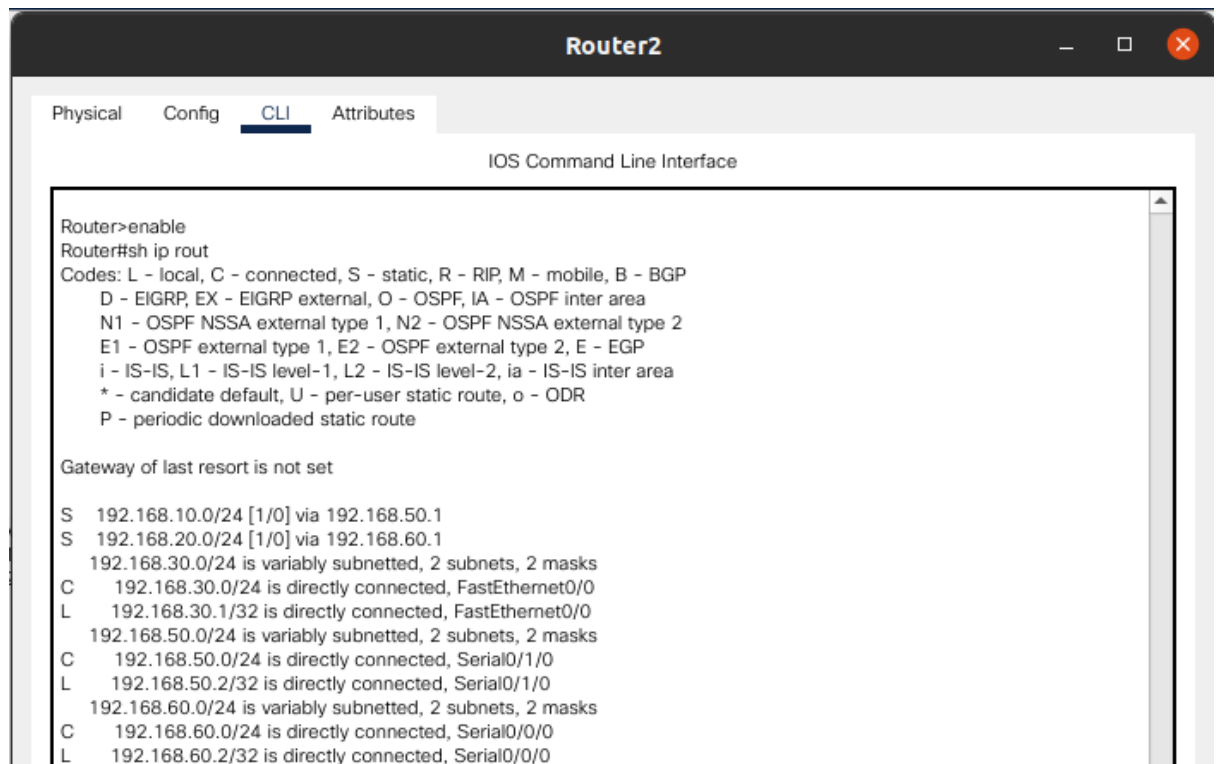
The screenshot shows the CLI of Router1. The 'CLI' tab is selected. The command 'Router>enable' has been entered, followed by 'Router#sh ip route'. The output displays the routing table with various codes and routes. The routes include 192.168.10.0/24, 192.168.20.0/24, 192.168.30.0/24, 192.168.40.0/24, 192.168.60.0/24, and 192.168.60.1/32, all of which are directly connected via FastEthernet0/0 or Serial0/0/0.

```
Router>enable
Router#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 not set

S    192.168.10.0/24 [1/0] via 192.168.40.1
192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.20.0/24 is directly connected, FastEthernet0/0
L    192.168.20.1/32 is directly connected, FastEthernet0/0
S    192.168.30.0/24 [1/0] via 192.168.40.3
     [1/0] via 192.168.60.2
192.168.40.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.40.0/24 is directly connected, Serial0/0/0
L    192.168.40.2/32 is directly connected, Serial0/0/0
192.168.60.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.60.0/24 is directly connected, Serial0/1/0
L    192.168.60.1/32 is directly connected, Serial0/1/0
```

- Router2



```
Router2
Physical Config CLI Attributes
IOS Command Line Interface

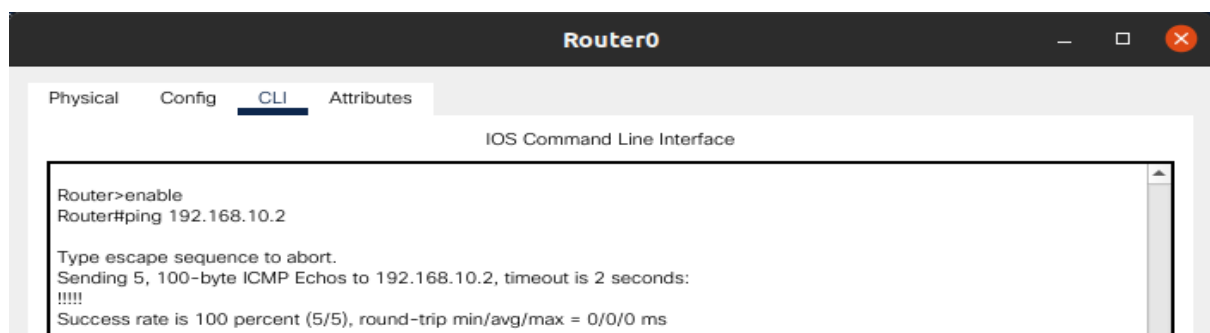
Router>enable
Router#sh ip rout
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external 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 not set

S 192.168.10.0/24 [1/0] via 192.168.50.1
S 192.168.20.0/24 [1/0] via 192.168.60.1
192.168.30.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.30.0/24 is directly connected, FastEthernet0/0
L 192.168.30.1/32 is directly connected, FastEthernet0/0
192.168.50.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.50.0/24 is directly connected, Serial0/1/0
L 192.168.50.2/32 is directly connected, Serial0/1/0
192.168.60.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.60.0/24 is directly connected, Serial0/0/0
L 192.168.60.2/32 is directly connected, Serial0/0/0
```

Zbog smanjenja opsega izvještaja u ovom dijelu ćemo prikazati samo jedan primjer provjere komunikacije sa rutera unutar lokalne i vanjske mreže. Kako je ranije već pokazano da PC-evi ispravno komuniciraju, ovdje ćemo za primjer uzeti ruter Router0, a analogno se pokazuje i za ostale.

Lokalna mreža

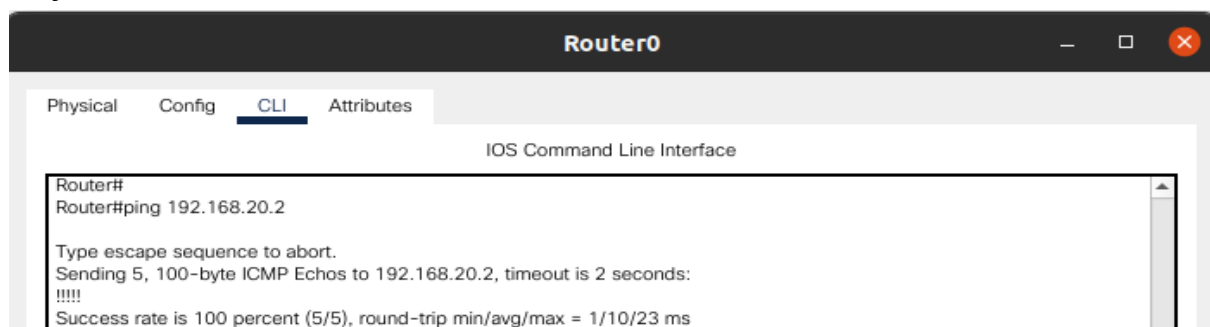


```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

Router>enable
Router#ping 192.168.10.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

Vanjska mreža



```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

Router#
Router#ping 192.168.20.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.20.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/10/23 ms
```