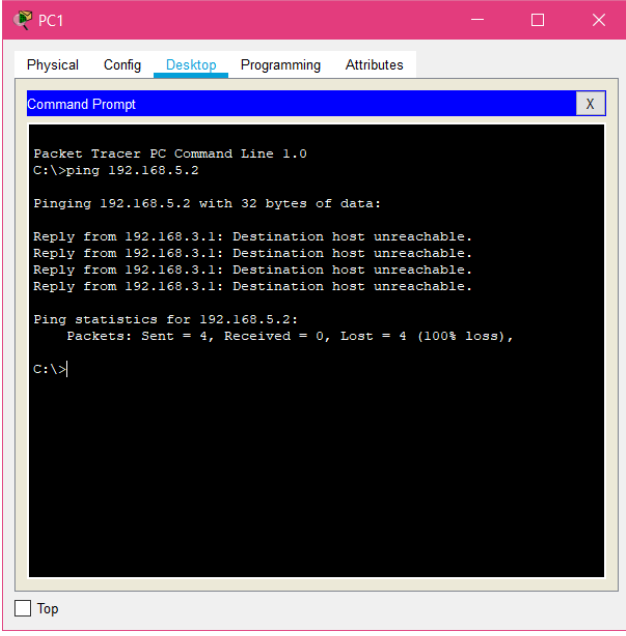


« به نام خدا »

بخش اول)

همانطور که مشخص است، چون فعلا route ای برای router ها set نکرده ایم، عملیات ping در شبکه مان جواب نمی دهد:



```
PC1
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.5.2

Pinging 192.168.5.2 with 32 bytes of data:

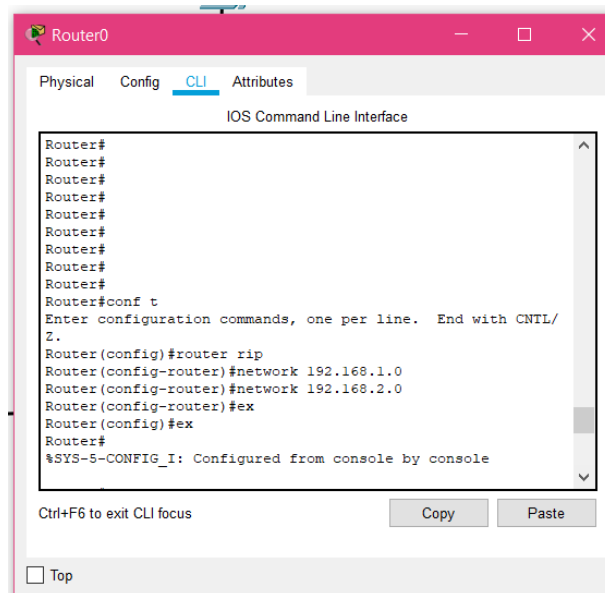
Reply from 192.168.3.1: Destination host unreachable.
Reply from 192.168.3.1: Destination host unreachable.
Reply from 192.168.3.1: Destination host unreachable.
Reply from 192.168.3.1: Destination host unreachable.

Ping statistics for 192.168.5.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

بنابراین؛ RIP را در router ها فعال می کنیم:

در router0 :

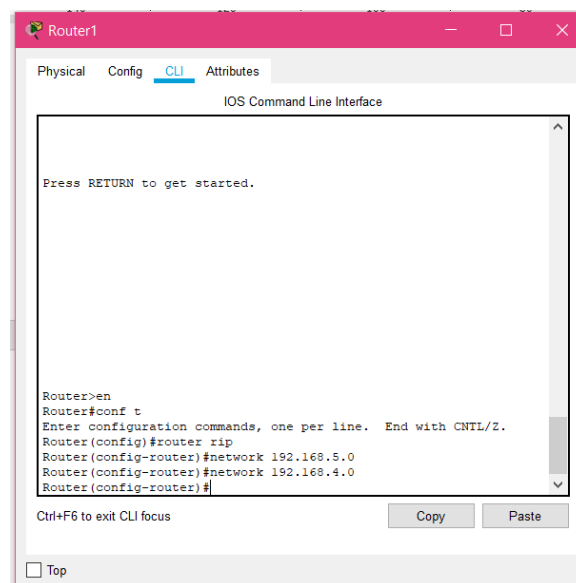


The screenshot shows the Router0 CLI interface with the following commands entered:

```
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 192.168.1.0
Router(config-router)#network 192.168.2.0
Router(config-router)#ex
Router(config)#ex
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Below the command window, there are buttons for "Copy" and "Paste", and a checkbox labeled "Top".

در router1 :

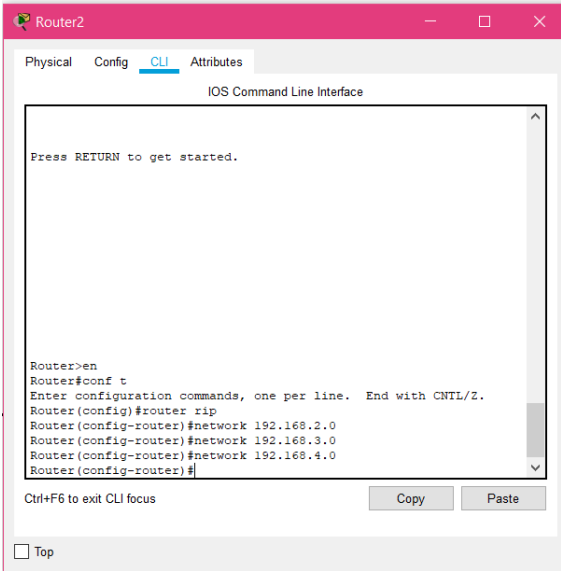


The screenshot shows the Router1 CLI interface with the following commands entered:

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 192.168.5.0
Router(config-router)#network 192.168.4.0
Router(config-router)#
```

Below the command window, there are buttons for "Copy" and "Paste", and a checkbox labeled "Top".

در router2 :



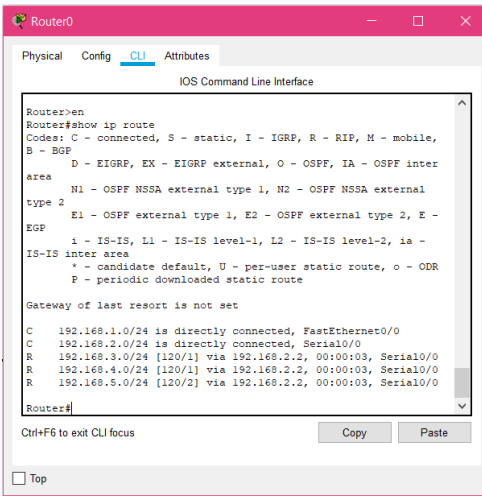
```
Router2
Physical Config CLI Attributes
IOS Command Line Interface

Press RETURN to get started.

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 192.168.2.0
Router(config-router)#network 192.168.3.0
Router(config-router)#network 192.168.4.0
Router(config-router)#
```

حالا جدول routing را در هر router چک میکنیم:

در router0 :



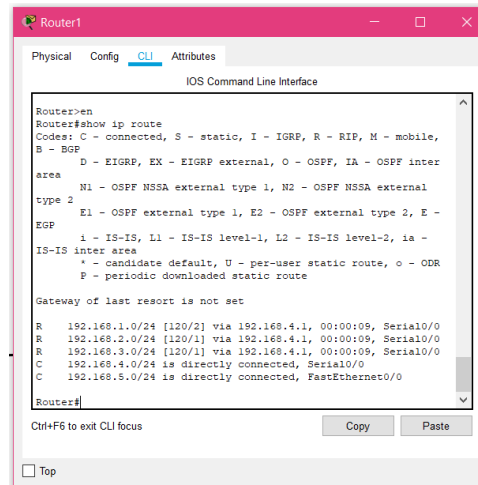
```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

Router>en
Router#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    192.168.1.0/24 is directly connected, FastEthernet0/0
C    192.168.2.0/24 is directly connected, Serial0/0
R    192.168.3.0/24 [120/1] via 192.168.2.2, 00:00:03, Serial0/0
R    192.168.4.0/24 [120/1] via 192.168.2.2, 00:00:03, Serial0/0
R    192.168.5.0/24 [120/2] via 192.168.2.2, 00:00:03, Serial0/0
Router#
```

در router1 :



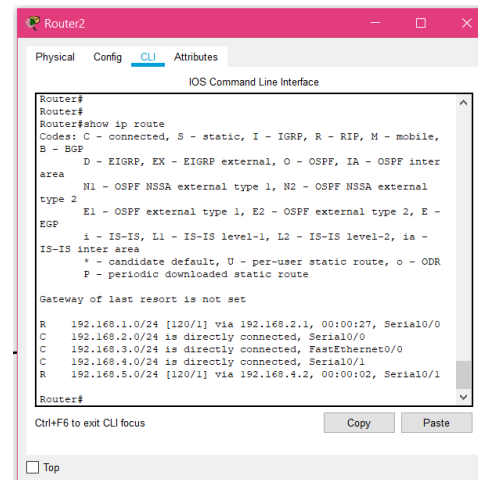
```
Router1
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,
B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
       area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external
       type 2
       E1 - OSPF external type 1, E2 - OSPF 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

R    192.168.1.0/24 [120/2] via 192.168.4.1, 00:00:09, Serial0/0
R    192.168.2.0/24 [120/1] via 192.168.4.1, 00:00:09, Serial0/0
R    192.168.3.0/24 [120/1] via 192.168.4.1, 00:00:09, Serial0/0
C    192.168.4.0/24 is directly connected, Serial0/0
C    192.168.5.0/24 is directly connected, FastEthernet0/0

Router#
```

در router2 :



```
Router2
Router#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

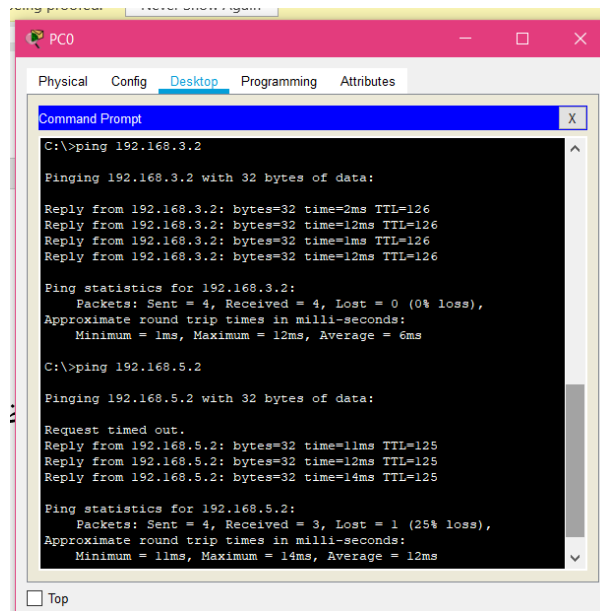
R    192.168.1.0/24 [120/1] via 192.168.2.1, 00:00:27, Serial0/0
C    192.168.2.0/24 is directly connected, Serial0/0
C    192.168.3.0/24 is directly connected, FastEthernet0/0
C    192.168.4.0/24 is directly connected, Serial0/1
R    192.168.5.0/24 [120/1] via 192.168.4.2, 00:00:02, Serial0/1

Router#
```

همانطور که در جداول routing این router ها دیدیم، خط هایی به آنها اضافه شده که نشان دهنده ی route از نوع rip است. و برای شبکه هایی مسیر یابی کرده است که به router متصل نیستند.

حالا دوباره ping میزنیم:

از pc0 به 1 و 2 :



PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=2ms TTL=126
Reply from 192.168.3.2: bytes=32 time=12ms TTL=126
Reply from 192.168.3.2: bytes=32 time=1ms TTL=126
Reply from 192.168.3.2: bytes=32 time=12ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 12ms, Average = 6ms

C:\>ping 192.168.5.2

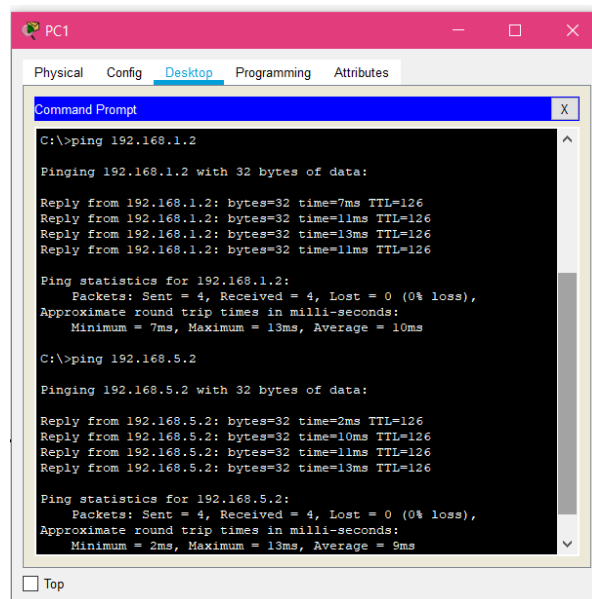
Pinging 192.168.5.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.5.2: bytes=32 time=11ms TTL=125
Reply from 192.168.5.2: bytes=32 time=12ms TTL=125
Reply from 192.168.5.2: bytes=32 time=14ms TTL=125

Ping statistics for 192.168.5.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 14ms, Average = 12ms
```

☐ Top

از pc1 به 0 و 2 :



PC1

Physical Config Desktop Programming Attributes

Command Prompt

```
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=7ms TTL=126
Reply from 192.168.1.2: bytes=32 time=11ms TTL=126
Reply from 192.168.1.2: bytes=32 time=13ms TTL=126
Reply from 192.168.1.2: bytes=32 time=11ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 7ms, Maximum = 13ms, Average = 10ms

C:\>ping 192.168.5.2

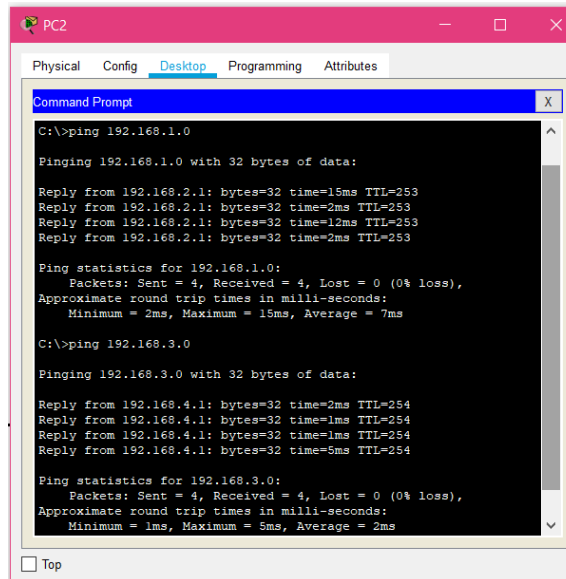
Pinging 192.168.5.2 with 32 bytes of data:

Reply from 192.168.5.2: bytes=32 time=2ms TTL=126
Reply from 192.168.5.2: bytes=32 time=10ms TTL=126
Reply from 192.168.5.2: bytes=32 time=11ms TTL=126
Reply from 192.168.5.2: bytes=32 time=13ms TTL=126

Ping statistics for 192.168.5.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 13ms, Average = 9ms
```

☐ Top

از pc2 به 0 و 1 :



The screenshot shows a window titled 'PC2' 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 two ping commands. The first command is 'ping 192.168.1.0', which results in four successful replies from 192.168.2.1 with varying times (15ms, 2ms, 12ms, 2ms) and TTL=253. The statistics show 4 packets sent, 4 received, 0% loss, with an average round trip time of 7ms. The second command is 'ping 192.168.3.0', which results in four successful replies from 192.168.4.1 with varying times (2ms, 1ms, 1ms, 5ms) and TTL=254. The statistics show 4 packets sent, 4 received, 0% loss, with an average round trip time of 2ms.

```
C:\>ping 192.168.1.0

Pinging 192.168.1.0 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time=15ms TTL=253
Reply from 192.168.2.1: bytes=32 time=2ms TTL=253
Reply from 192.168.2.1: bytes=32 time=12ms TTL=253
Reply from 192.168.2.1: bytes=32 time=2ms TTL=253

Ping statistics for 192.168.1.0:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 15ms, Average = 7ms

C:\>ping 192.168.3.0

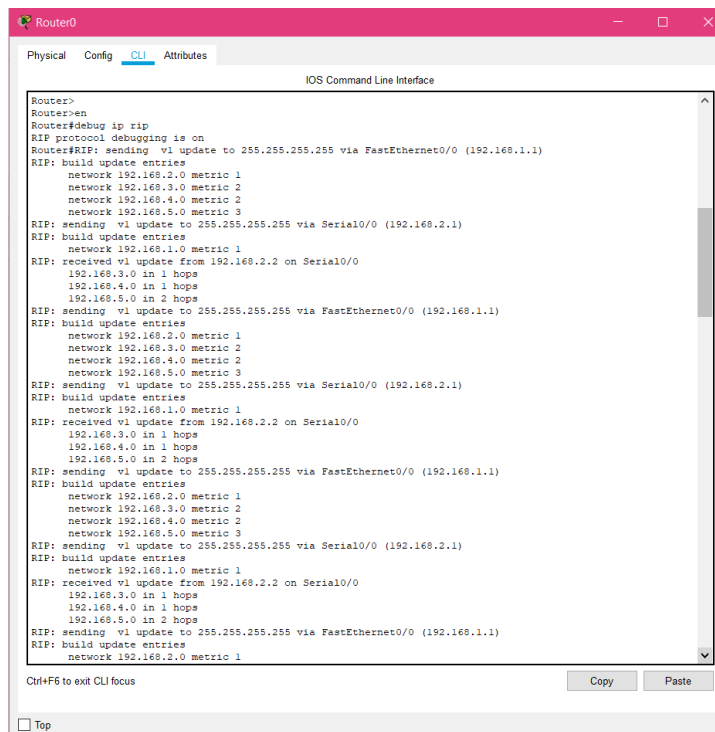
Pinging 192.168.3.0 with 32 bytes of data:

Reply from 192.168.4.1: bytes=32 time=2ms TTL=254
Reply from 192.168.4.1: bytes=32 time=1ms TTL=254
Reply from 192.168.4.1: bytes=32 time=1ms TTL=254
Reply from 192.168.4.1: bytes=32 time=5ms TTL=254

Ping statistics for 192.168.3.0:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 5ms, Average = 2ms
```

همانطور که مشخص است، در تمام شبکه امکان ping کردن داریم.

حالا پیام های رد و بدلی را مشاهده میکنیم:



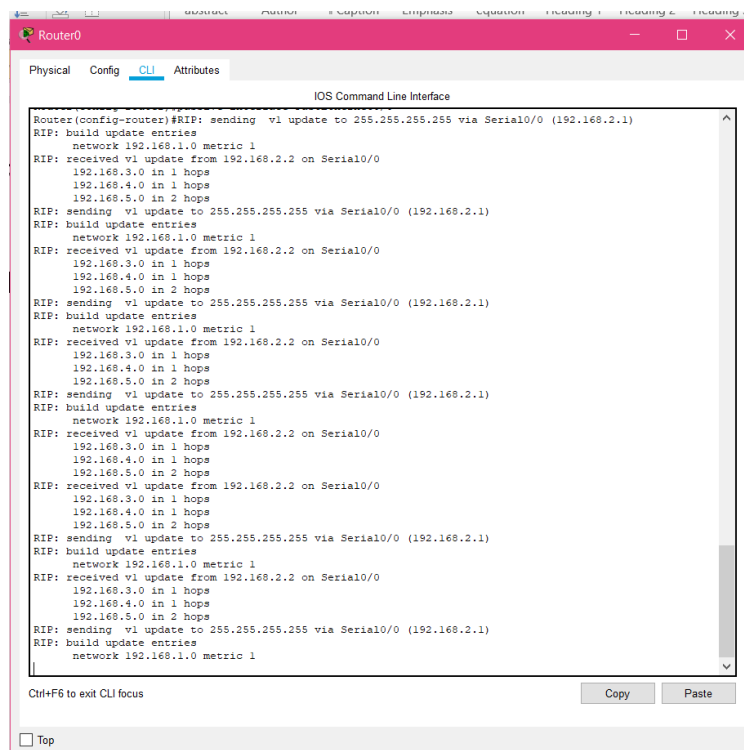
The screenshot shows a window titled 'Router0' with tabs for Physical, Config, CLI, and Attributes. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The output shows the configuration of RIP and the resulting debug messages. The configuration includes 'debug ip rip' and 'RIP protocol debugging is on'. The debug messages show the sending and receiving of updates between the router and the connected networks (192.168.1.0, 192.168.2.0, 192.168.3.0, 192.168.4.0, 192.168.5.0) via the FastEthernet0/0 and Serial0/0 interfaces. The messages include the metric and hop count for each network.

```
Router>
Router#en
Router#debug ip rip
RIP protocol debugging is on
Router#RIP: sending v1 update to 255.255.255.255 via FastEthernet0/0 (192.168.1.1)
RIP: build update entries
    network 192.168.2.0 metric 1
    network 192.168.3.0 metric 2
    network 192.168.4.0 metric 2
    network 192.168.5.0 metric 3
RIP: sending v1 update to 255.255.255.255 via Serial0/0 (192.168.2.1)
RIP: build update entries
    network 192.168.1.0 metric 1
RIP: received v1 update from 192.168.2.2 on Serial0/0
    192.168.3.0 in 1 hops
    192.168.4.0 in 1 hops
    192.168.5.0 in 2 hops
RIP: sending v1 update to 255.255.255.255 via FastEthernet0/0 (192.168.1.1)
RIP: build update entries
    network 192.168.2.0 metric 1
    network 192.168.3.0 metric 2
    network 192.168.4.0 metric 2
    network 192.168.5.0 metric 3
RIP: sending v1 update to 255.255.255.255 via Serial0/0 (192.168.2.1)
RIP: build update entries
    network 192.168.1.0 metric 1
RIP: received v1 update from 192.168.2.2 on Serial0/0
    192.168.3.0 in 1 hops
    192.168.4.0 in 1 hops
    192.168.5.0 in 2 hops
RIP: sending v1 update to 255.255.255.255 via FastEthernet0/0 (192.168.1.1)
RIP: build update entries
    network 192.168.2.0 metric 1
RIP: sending v1 update to 255.255.255.255 via Serial0/0 (192.168.2.1)
RIP: build update entries
    network 192.168.1.0 metric 1
RIP: received v1 update from 192.168.2.2 on Serial0/0
    192.168.3.0 in 1 hops
    192.168.4.0 in 1 hops
    192.168.5.0 in 2 hops
RIP: sending v1 update to 255.255.255.255 via FastEthernet0/0 (192.168.1.1)
RIP: build update entries
    network 192.168.2.0 metric 1
```

همانطور که مشخص است، این پیام ها هر 30 ثانیه یکبار، با توجه به rip بودن پروتکل، روی همه ی لینک ها ارسال میشود. در صورتیکه فقط باید روی لینک های سریال که سر دیگرشان هم router هست ارسال بشوند، و لزومی به ارسال روی لینک های دیگر از جمله اترنت نیست.

در نتیجه با استفاده از دستور زیر روی همه ی روتر ها، ارسال روی لینک های اترنت را از بین میبریم:

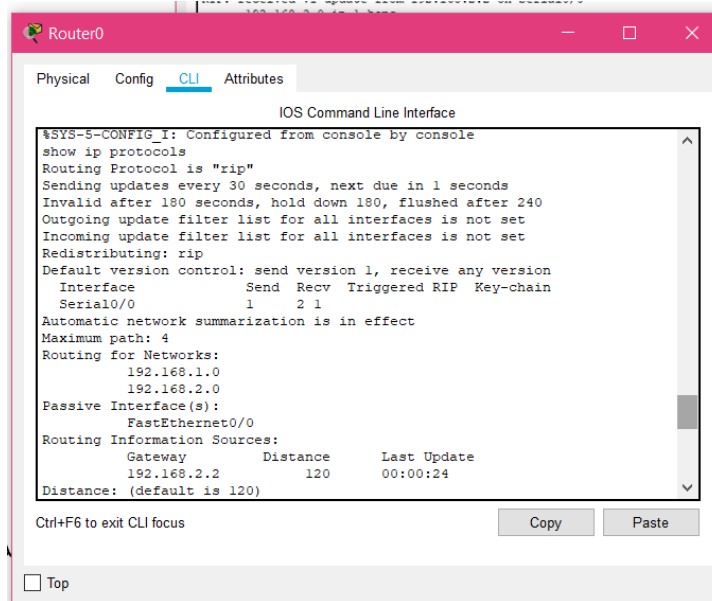
```
router rip
passive-interface FastEthernet0/0
```



The screenshot shows a Cisco Packet Tracer console window for Router0. The window title is "Router0" and it has tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, showing the "IOS Command Line Interface". The console output displays a series of RIP protocol messages between Router0 (192.168.2.1) and another router (255.255.255.255) via Serial0/0. The messages include "RIP: sending v1 update to 255.255.255.255 via Serial0/0 (192.168.2.1)", "RIP: build update entries", "RIP: received v1 update from 192.168.2.2 on Serial0/0", and "RIP: sending v1 update to 192.168.2.2 on Serial0/0". The updates contain network information for 192.168.1.0/24, 192.168.3.0/24, 192.168.4.0/24, and 192.168.5.0/24 with their respective hop counts. At the bottom of the console window, there are buttons for "Copy" and "Paste", and a "Top" button.

همانطور که در عکس بالا مشاهده میشود، حالا پیام ها فقط بر روی لینک های سریال ارسال میشوند.

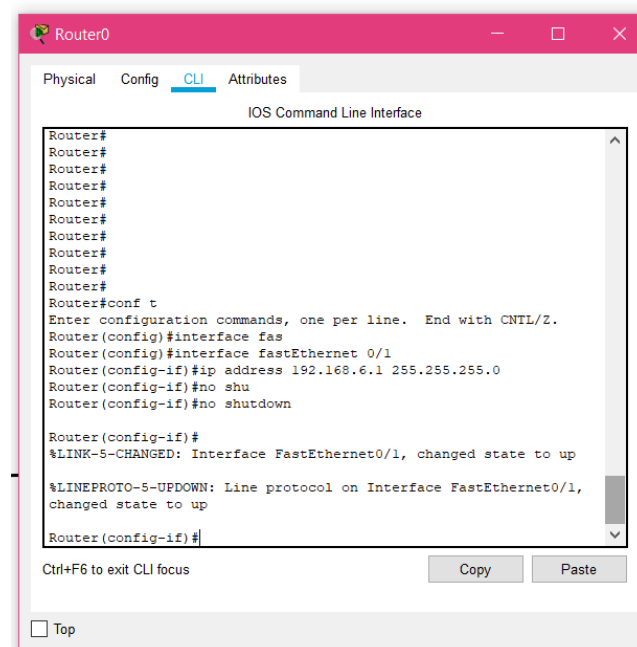
این تغییر، با دستور زیر قابل مشاهده است:

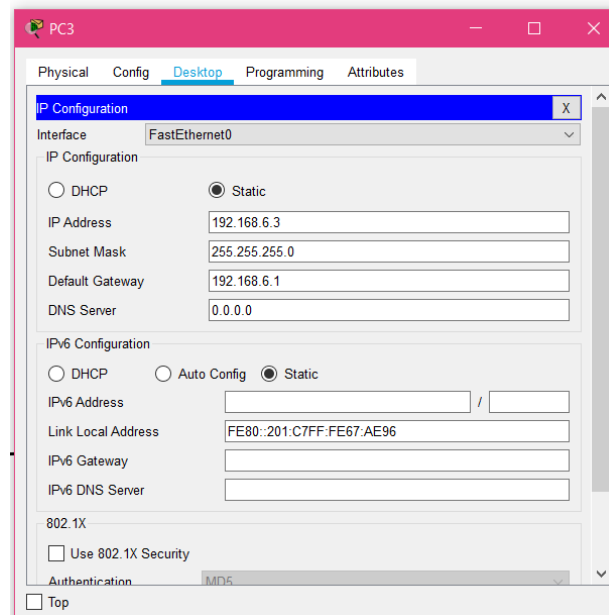
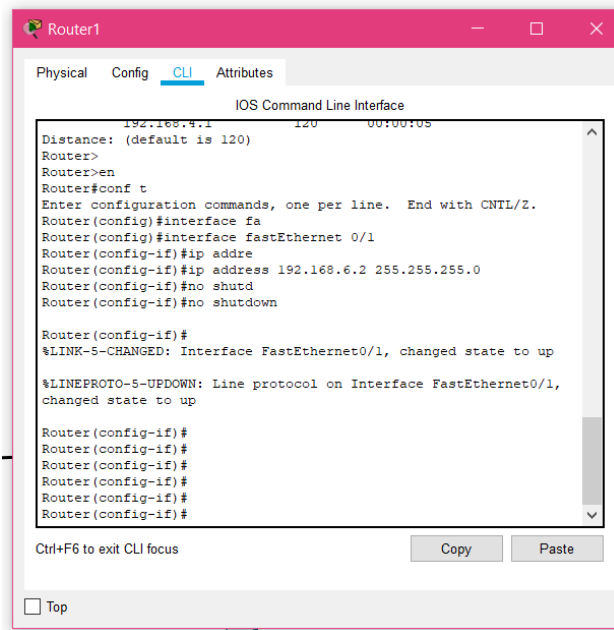


این کار را برای همه ی router ها انجام دادم.

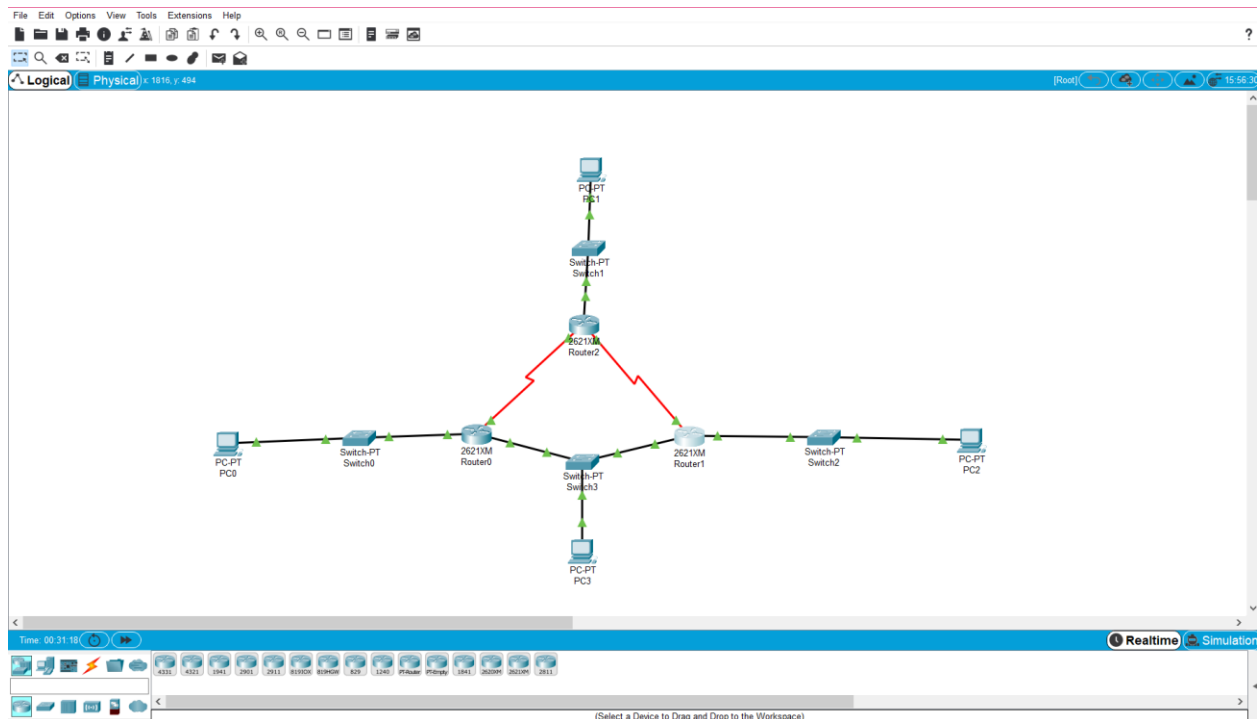
بخش دوم)

این قسمت از شبکه را مشابه دستوراتی که در جلسه ی پیش داشتیم، انجام دادم:





به این ترتیب، شبکه به شکل زیر درآمد: (که فایل آن ضمیمه شده است)



حالا بعد از config کردن تنظیمات router ها و pc3 ؛

route ها را برای دو router متصل به این قسمت انجام دادم:

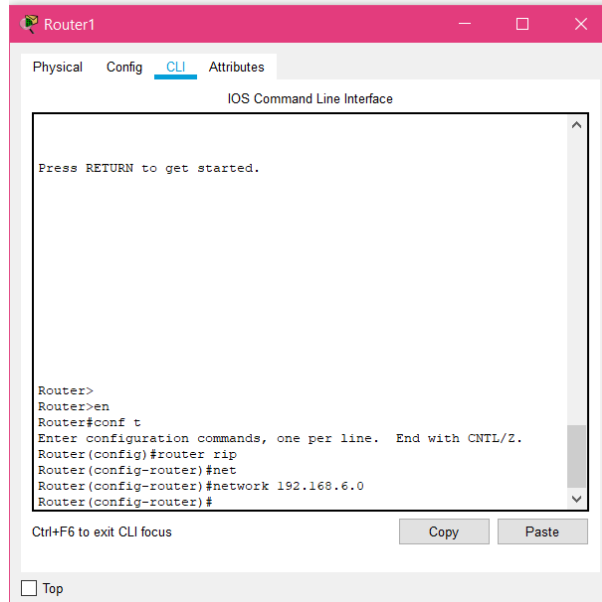
```

Router0
Physical Config CLI Attributes
IOS Command Line Interface

Router>
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#net
Router(config-router)#network 192.168.6.0
Router(config-router)#ex
Router(config)#ex
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#

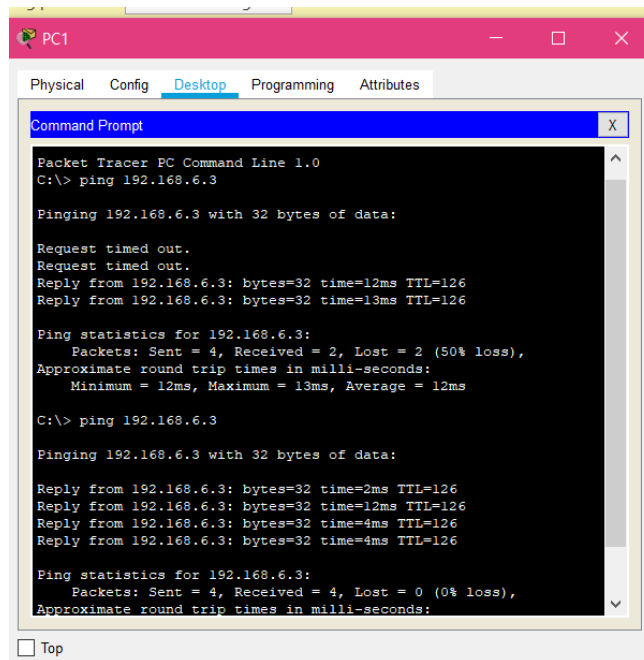
Ctrl+F6 to exit CLI focus
Copy Paste
Top

```



به این ترتیب، این قسمت را هم به عنوان سابنت متصل به این دو router تنظیم کردم.

حالا از pc1 به pc3 عملیات ping انجام میدهم:



همانطور که از تصویر بالا مشخص است، ping به درستی انجام شد.

حالا جدول route مربوط به router2 را چک میکنم:

```

Router2
Physical Config CLI Attributes
IOS Command Line Interface
Router#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

R    192.168.1.0/24 [120/1] via 192.168.2.1, 00:00:00, Serial0/0
C    192.168.2.0/24 is directly connected, Serial0/0
C    192.168.3.0/24 is directly connected, FastEthernet0/0
C    192.168.4.0/24 is directly connected, Serial0/1
R    192.168.5.0/24 [120/1] via 192.168.4.2, 00:00:21, Serial0/1
R    192.168.6.0/24 [120/1] via 192.168.2.1, 00:00:00, Serial0/0
                                   [120/1] via 192.168.4.2, 00:00:21, Serial0/1
Router#
Ctrl+F6 to exit CLI focus
Copy Paste
☐ Top

```

واضحاً این router از طریق هر دو لینک سریال خود، به سابنت جدید دسترسی دارد.

در واقع چون pc1 برای رسیدن به pc3، از طریق هر کدام از router0 و router1، 1 hop سر راهش هست، برایش تفاوتی نمی کند که از کدام مسیر بسته ارسال کند. در نتیجه، هر دو route را در جدول route اش ذخیره میکند.

و اگر ما چیز اضافه ای برای این دو مسیر تنظیم نکنیم، به صورت رندوم از یکی از این دو مسیر بسته اش را عبور خواهد داد.

(شماره ی router هایی که من در سناریو ام دارم، با سناریوی دستورکار متفاوت است. و در شکل بالاتر و در فایل ضمیمه مشخص است.)