

بسم خدا

شبکه های کامپیوتری

گزارش پروژه دوم

علی ممتحن ۸۱۰۱۰۰۲۱۳

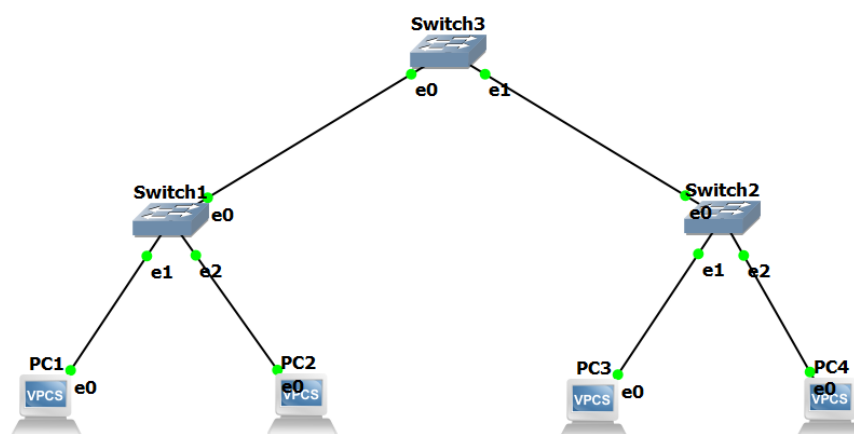
امیرحسین راحتی ۸۱۰۱۰۰۱۴۴

مقدمه

در این تمرین قصد داریم شبیه سازی چند شبکه کامپیوتری ساده را که دارای چندین نود است را شبیه سازی کنیم و جزئیات این شبکه هارا بررسی کنیم

بخش اول

در این بخش ابتدا توپولوژی شبکه را به صورت زیر پیاده سازی میکنیم :



در این پیاده سازی ، سویچ های ۱ تا ۳ به هم متصل هستند و دو روتر ۱ و ۲ هر کدام به دو pc وصل میشوند .

در این وضعیت باید بتوانیم بوسیله سویچ ها پکیج هایی از هریک از دو pc به دیگری ارسال کنیم . سپس با اجرای آن ، باید به هر کدام از pc ها ip بدهیم . این کار به کمک دستور ip انجام میگردد:

`ip <ip_address> <default_gateway>`

همچنین برای تست ارتباط بین pc ها ، از دستور **ping** به صورت زیر استفاده میکنیم .

Ping <destination_ip>

این دستور **packet** هایی را به سمت مقصد ارسال میکند و نتیجه زمانی آن را محاسبه میکند.

در این بخش مشاهده میشود که pc هایی که توسط یک روتر به هم دیگر متصل اند ، مثلا شماره ۱ و ۲ ، پینگ کمتری نسب به حالتی که چند روتر در مسیر وجود دارد خواهد داشت .

نتیجه این تست ها به صورت زیر قابل مشاهده است :

```
PC1 - PuTTY
Press '?' to get help.
Executing the startup file

PC1> ip 192.168.1.1
Checking for duplicate address...
PC1 : 192.168.1.1 255.255.255.0

PC1> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=2.332 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=2.227 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=2.005 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=1.696 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=1.528 ms

PC1> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=1.689 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=1.167 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=1.197 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=1.061 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=1.157 ms

PC1>

PC2 - PuTTY
Press '?' to get help.
Executing the startup file

PC2> ip 192.168.1.2
Checking for duplicate address...
PC1 : 192.168.1.2 255.255.255.0

PC2> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=0.762 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=1.449 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=1.617 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=1.541 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=1.563 ms

PC2> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=1.328 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=0.983 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=0.982 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=0.835 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=1.066 ms

PC2>

PC3 - PuTTY
Press '?' to get help.
Executing the startup file

PC3> ip 192.168.1.3
Checking for duplicate address...
PC1 : 192.168.1.3 255.255.255.0

PC3> ping 192.168.1.4
84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=1.476 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=1.182 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=1.293 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=1.060 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=0.955 ms

PC3> ping 192.168.1.1
No gateway found

PC3> ping 192.168.1.
No gateway found
Cannot resolve 192.168.1.

PC3>

PC4 - PuTTY
Press '?' to get help.
Executing the startup file

PC4> ip 192.168.1.4
Checking for duplicate address...
PC1 : 192.168.1.4 255.255.255.0

PC4> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=2.434 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=1.506 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=1.471 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=1.499 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=1.563 ms

PC4> ping 192.168.1.4
192.168.1.4 icmp_seq=1 ttl=64 time=0.001 ms
192.168.1.4 icmp_seq=2 ttl=64 time=0.001 ms
192.168.1.4 icmp_seq=3 ttl=64 time=0.001 ms
192.168.1.4 icmp_seq=4 ttl=64 time=0.001 ms
192.168.1.4 icmp_seq=5 ttl=64 time=0.001 ms

PC4>
```

همچنین نتیجه جداول آی پی ها هم به صورت زیر خواهد بود:

```
PC1 - PuTTY
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=2.227 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=2.005 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=1.696 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=1.528 ms

PC1> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=1.689 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=1.167 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=1.197 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=1.061 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=1.157 ms

PC1> show ip
NAME          : PC1[1]
IP/MASK       : 192.168.1.1/24
GATEWAY       : 0.0.0.0
DNS           :
MAC           : 00:50:79:66:68:00
LPORT        : 20012
RHOST:PORT    : 127.0.0.1:20013
MTU           : 1500

PC1>

PC2 - PuTTY
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=1.449 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=1.617 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=1.541 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=1.563 ms

PC2> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=1.328 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=0.983 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=0.982 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=0.835 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=1.066 ms

PC2> show ip
NAME          : PC2[1]
IP/MASK       : 192.168.1.2/24
GATEWAY       : 0.0.0.0
DNS           :
MAC           : 00:50:79:66:68:01
LPORT        : 20014
RHOST:PORT    : 127.0.0.1:20015
MTU           : 1500

PC2>

PC3 - PuTTY
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=1.182 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=1.293 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=1.060 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=0.955 ms

PC3> ping 192.168.1.1
No gateway found

PC3> ping 192.168.1.
No gateway found
Cannot resolve 192.168.1.

PC3> show ip
NAME          : PC3[1]
IP/MASK       : 192.168.1.3/24
GATEWAY       : 0.0.0.0
DNS           :
MAC           : 00:50:79:66:68:02
LPORT        : 20016
RHOST:PORT    : 127.0.0.1:20017
MTU           : 1500

PC3>

PC4 - PuTTY
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=1.506 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=1.471 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=1.499 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=1.563 ms

PC4> ping 192.168.1.4
192.168.1.4 icmp_seq=1 ttl=64 time=0.001 ms
192.168.1.4 icmp_seq=2 ttl=64 time=0.001 ms
192.168.1.4 icmp_seq=3 ttl=64 time=0.001 ms
192.168.1.4 icmp_seq=4 ttl=64 time=0.001 ms
192.168.1.4 icmp_seq=5 ttl=64 time=0.001 ms

PC4> show ip
NAME          : PC4[1]
IP/MASK       : 192.168.1.4/24
GATEWAY       : 0.0.0.0
DNS           :
MAC           : 00:50:79:66:68:03
LPORT        : 20018
RHOST:PORT    : 127.0.0.1:20019
MTU           : 1500

PC4>
```

بخش دوم

در این قسمت از فناوری VLAN استفاده میشود . VLAN ها می توانند عملکردهای شبکه را با وجود وصل بودن به همان شبکه فیزیکی واحد (یعنی سوئیچ) به صورت جدا از هم نگه دارند و نیاز به چندین دستگاه و کابل کشی اضافی را برطرف نمایند.

با ایجاد توپولوژی داده شده و برقراری ارتباط ها بین pc ها و سوئیچ و روتر ، اقدام به ایجاد VLAN در سوئیچ میکنیم که به صورت زیر پیاده سازی میشود

Node properties

Switch1 configuration

General

Name: Switch1

Console type: none

Settings

Port: 5

VLAN: 1

Type: access

QinQ EtherType: 0x8100

Ports

Port	VLAN	Type	EtherType
0	1	dot1q	
1	10	dot1q	
2	10	dot1q	
3	20	dot1q	
4	20	dot1q	

Buttons: Add, Delete, Reset, OK, Cancel, Apply

سپس روتر را هم به صورت زیر کانفیگ میکنیم.

```
R1
et2/0, changed state to down
Router>X+X/X4X0YX+

% Bad IP address or host name% Unknown command or computer name, or unable to fi
nd computer address
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#!
Router(config-if)#interface FastEthernet0/0.10
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 192.168.10.1 255.255.255.0
Router(config-subif)#!
Router(config-subif)#interface FastEthernet0/0.20
Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 192.168.20.1 255.255.255.0
Router(config-subif)#!
Router(config-subif)#no shutdown
Router(config-subif)#!
Router(config-subif)#end
Router#
*Apr 30 11:34:32.103: %SYS-5-CONFIG I: Configured from console by console
```

نتیجه این کانفیگ بوسیله دستورات زیر قابل مشاهده است

```
R1
Router#show 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
       i - IS-IS, su - IS-IS summary, 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, + - replicated 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, FastEthernet0/0.10
L       192.168.10.1/32 is directly connected, FastEthernet0/0.10
    192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.20.0/24 is directly connected, FastEthernet0/0.20
L       192.168.20.1/32 is directly connected, FastEthernet0/0.20
Router#show ip int br

```

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	unassigned	YES	NVRAM	up	up
FastEthernet0/0.10	192.168.10.1	YES	NVRAM	up	up
FastEthernet0/0.20	192.168.20.1	YES	NVRAM	up	up
FastEthernet1/0	unassigned	YES	unset	administratively down	down
FastEthernet2/0	unassigned	YES	unset	administratively down	down

```
Router#
```

سپس مشابه بخش اول ، به pc ها IP اختصاص میدهیم . با این تفاوت که باید از subnet معادل با VLAN ای که سیستم در آن قرار دارد استفاده کنیم . این کار به صورت زیر انجام میشود. حالا بوسیله روتر میتوان بین VLAN ها ارتباط برقرار کرد .

```
PC1 - PuTTY
For more information, please visit wiki.freecode.com.cn.
Press '?' to get help.
Executing the startup file

PC1> ip 192.168.10.5 192.168.10.1
Checking for duplicate address...
PC1 : 192.168.10.5 255.255.255.0 gateway 192.168.10.1

PC1> show ip
NAME       : PC1[1]
IP/MASK    : 192.168.10.5/24
GATEWAY    : 192.168.10.1
DNS        :
MAC        : 00:50:79:66:68:03
LPORT      : 20012
RHOST:PORT : 127.0.0.1:20013
MTU        : 1500
PC1>

PC2 - PuTTY
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.
Press '?' to get help.
Executing the startup file

PC2> ip 192.168.10.6 192.168.10.1
Checking for duplicate address...
PC2 : 192.168.10.6 255.255.255.0 gateway 192.168.10.1

PC2> show ip
NAME       : PC2[1]
IP/MASK    : 192.168.10.6/24
GATEWAY    : 192.168.10.1
DNS        :
MAC        : 00:50:79:66:68:02
LPORT      : 20014
RHOST:PORT : 127.0.0.1:20015
MTU        : 1500
PC2>

PC3 - PuTTY
Executing the startup file

PC3> ip 192.168.20.5
Checking for duplicate address...
PC3 : 192.168.20.5 255.255.255.0

PC3> ip 192.168.20.5 192.168.20.1
Checking for duplicate address...
PC3 : 192.168.20.5 255.255.255.0 gateway 192.168.20.1

PC3> show ip
NAME       : PC3[1]
IP/MASK    : 192.168.20.5/24
GATEWAY    : 192.168.20.1
DNS        :
MAC        : 00:50:79:66:68:01
LPORT      : 20016
RHOST:PORT : 127.0.0.1:20017
MTU        : 1500
PC3>

PC4 - PuTTY
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.
Press '?' to get help.
Executing the startup file

PC4> ip 192.168.20.6 192.168.20.1
Checking for duplicate address...
PC4 : 192.168.20.6 255.255.255.0 gateway 192.168.20.1

PC4> show ip
NAME       : PC4[1]
IP/MASK    : 192.168.20.6/24
GATEWAY    : 192.168.20.1
DNS        :
MAC        : 00:50:79:66:68:00
LPORT      : 20018
RHOST:PORT : 127.0.0.1:20019
MTU        : 1500
PC4>
```

نهایتا در شکل زیر میتوان ارتباط بین دو Node در دو VLAN متفاوت را مشاهده کرد:

```
PC1 - PuTTY
Copyright (c) 2007-2014, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.
Executing the startup file

PC1> ip 192.168.10.5 192.168.10.1
Checking for duplicate address...
PC1 : 192.168.10.5 255.255.255.0 gateway 192.168.10.1

PC1> ping 192.168.20.5
84 bytes from 192.168.20.5 icmp_seq=1 ttl=63 time=90.284 ms
84 bytes from 192.168.20.5 icmp_seq=2 ttl=63 time=45.244 ms
84 bytes from 192.168.20.5 icmp_seq=3 ttl=63 time=60.186 ms
84 bytes from 192.168.20.5 icmp_seq=4 ttl=63 time=60.160 ms
84 bytes from 192.168.20.5 icmp_seq=5 ttl=63 time=60.103 ms
```

بخش امتیازی

در این قسمت سیم روتر را بوسیله نرم افزار Wireshark کپچر میکنیم و packet میفرستیم تا حین کپچر مشاهده شود.

Capturing from - [Switch1 Ethernet0 to R1 FastEthernet0/0]

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

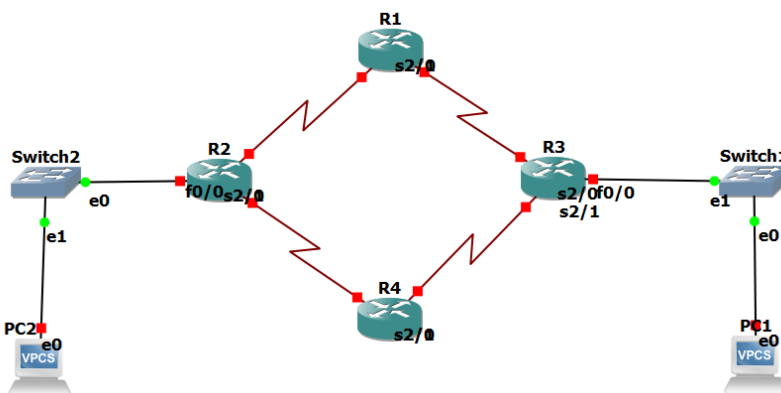
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	ca:01:46:3c:00:00	ca:01:46:3c:00:00	LOOP	64	Reply
2	5.056097	00:50:79:66:68:00	Broadcast	ARP	68	Who has 192.168.10.1? Tell 192.168.10.2
3	5.086043	ca:01:46:3c:00:00	00:50:79:66:68:00	ARP	64	192.168.10.1 is at ca:01:46:3c:00:00
4	5.101047	192.168.10.2	192.168.20.2	ICMP	102	Echo (ping) request id=0xb5b5, seq=1/256, ttl=64 (no response found!)
5	5.131047	192.168.10.2	192.168.20.2	ICMP	102	Echo (ping) request id=0xb5b5, seq=1/256, ttl=63 (reply in 14)
6	5.131047	00:50:79:66:68:02	Broadcast	ARP	68	Who has 192.168.20.1? Tell 192.168.20.2
7	5.161046	ca:01:46:3c:00:00	00:50:79:66:68:02	ARP	64	192.168.20.1 is at ca:01:46:3c:00:00
8	6.136042	00:50:79:66:68:02	Broadcast	ARP	68	Who has 192.168.20.1? Tell 192.168.20.2
9	6.166042	ca:01:46:3c:00:00	00:50:79:66:68:02	ARP	64	192.168.20.1 is at ca:01:46:3c:00:00
10	7.111044	192.168.10.2	192.168.20.2	ICMP	102	Echo (ping) request id=0xb7b5, seq=2/512, ttl=64 (no response found!)
11	7.141044	00:50:79:66:68:02	Broadcast	ARP	68	Who has 192.168.20.1? Tell 192.168.20.2
12	7.141044	192.168.10.2	192.168.20.2	ICMP	102	Echo (ping) request id=0xb7b5, seq=2/512, ttl=63 (reply in 15)
13	7.171040	ca:01:46:3c:00:00	00:50:79:66:68:02	ARP	64	192.168.20.1 is at ca:01:46:3c:00:00
14	8.146042	192.168.20.2	192.168.10.2	ICMP	102	Echo (ping) reply id=0xb5b5, seq=1/256, ttl=64 (request in 5)
15	8.146042	192.168.20.2	192.168.10.2	ICMP	102	Echo (ping) reply id=0xb7b5, seq=2/512, ttl=64 (request in 12)
16	8.176039	192.168.20.2	192.168.10.2	ICMP	102	Echo (ping) reply id=0xb5b5, seq=1/256, ttl=63
17	8.176039	192.168.20.2	192.168.10.2	ICMP	102	Echo (ping) reply id=0xb7b5, seq=2/512, ttl=63
18	9.121041	192.168.10.2	192.168.20.2	ICMP	102	Echo (ping) request id=0xb9b5, seq=3/768, ttl=64 (no response found!)
19	9.151041	192.168.10.2	192.168.20.2	ICMP	102	Echo (ping) request id=0xb9b5, seq=3/768, ttl=63 (reply in 20)
20	9.151041	192.168.20.2	192.168.10.2	ICMP	102	Echo (ping) reply id=0xb9b5, seq=3/768, ttl=64 (request in 19)
21	9.166041	192.168.20.2	192.168.10.2	ICMP	102	Echo (ping) reply id=0xb9b5, seq=3/768, ttl=63
22	10.006040	ca:01:46:3c:00:00	ca:01:46:3c:00:00	LOOP	64	Reply
23	10.186036	192.168.10.2	192.168.20.2	ICMP	102	Echo (ping) request id=0xbab5, seq=4/1024, ttl=64 (no response found!)
24	10.216036	192.168.10.2	192.168.20.2	ICMP	102	Echo (ping) request id=0xbab5, seq=4/1024, ttl=63 (reply in 25)
25	10.216036	192.168.20.2	192.168.10.2	ICMP	102	Echo (ping) reply id=0xbab5, seq=4/1024, ttl=64 (request in 24)
26	10.246040	192.168.20.2	192.168.10.2	ICMP	102	Echo (ping) reply id=0xbab5, seq=4/1024, ttl=63
27	11.266038	192.168.10.2	192.168.20.2	ICMP	102	Echo (ping) request id=0xbbb5, seq=5/1280, ttl=64 (no response found!)
28	11.296038	192.168.10.2	192.168.20.2	ICMP	102	Echo (ping) request id=0xbbb5, seq=5/1280, ttl=63 (reply in 29)
29	11.296038	192.168.20.2	192.168.10.2	ICMP	102	Echo (ping) reply id=0xbbb5, seq=5/1280, ttl=64 (request in 28)
30	11.326038	192.168.20.2	192.168.10.2	ICMP	102	Echo (ping) reply id=0xbbb5, seq=5/1280, ttl=63
31	15.061033	ca:01:46:3c:00:00	CDP/VTP/DTP/PAgP/UD...	CDP	387	Device ID: Router Port ID: FastEthernet0/0
32	19.996276	ca:01:46:3c:00:00	ca:01:46:3c:00:00	LOOP	64	Reply
33	30.001709	ca:01:46:3c:00:00	ca:01:46:3c:00:00	LOOP	64	Reply

این کار نشان میدهد که بین دو VLAN ، پکت ها ابتدا به روتر میروند (broadcast میشوند) و در مقصد دریافت میشود . هر پکت با ادرس مبدا و مقصد آن مشخص میشود که در نرم افزار مشخص میشود . پاسخ هم در پکت هایی که مبدا و مقصد متفاوت دارند قابل مشاهده است .

بخش سوم

در این بخش جدول forward برای هر روتر باید به صورت جداگانه تنظیم شود .

توپولوژی شبکه را به صورت زیر ایجاد میکنیم .



هر pc به یک سوئیچ متصل است و هر سوئیچ به شبکه ای از روترها متصل است که بصورت سریال به هم وصل شده اند.

هر روتر را به صورت زیر کانفیگ میکنیم . در این کانفیگ ها مشخص میشود که اگر درخواستی از یک پورت سریال برای فرستادن به pc دیگر آمد ، آنرا به کدام پورت ارسال کند .

Part3 - GNS3

File Edit View Control Node Annotate Tools Help

R2

```

Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z
R2(config)#do show ip rou
Codes: L - local, C - connected, S - static, R - RIP, M - m
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF i
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA extern
E1 - OSPF external type 1, E2 - OSPF external type 2
I - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 -
ia - IS-IS inter area, * - candidate default, U - per
o - ODR, P - periodic downloaded static route, + - re
Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C    10.10.7.0/24 is directly connected, Serial2/3
L    10.10.7.232/32 is directly connected, Serial2/3
C    10.10.8.0/24 is directly connected, Serial2/0
L    10.10.8.202/32 is directly connected, Serial2/0
S    192.168.1.0/24 is directly connected, Serial2/3
S    192.168.4.0/24 is directly connected, Serial2/0
R2(config)#
  
```

Part3 - GNS3

File Edit View Control Node Annotate Tools Help

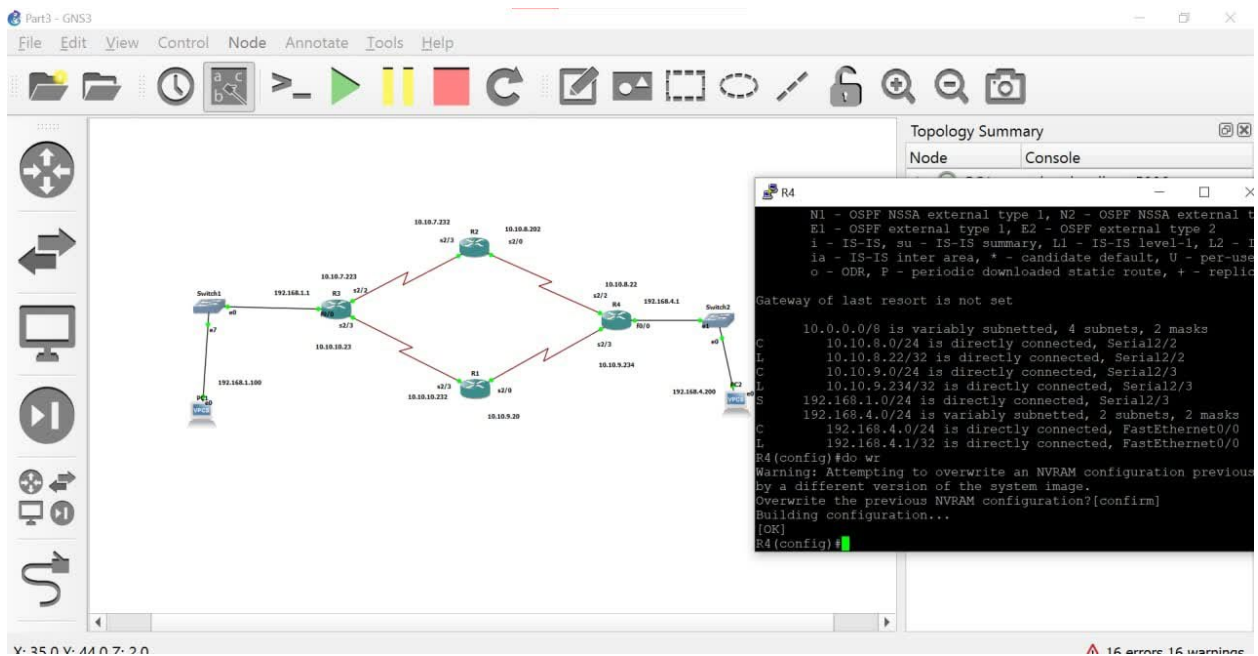
Topology Summary

R3

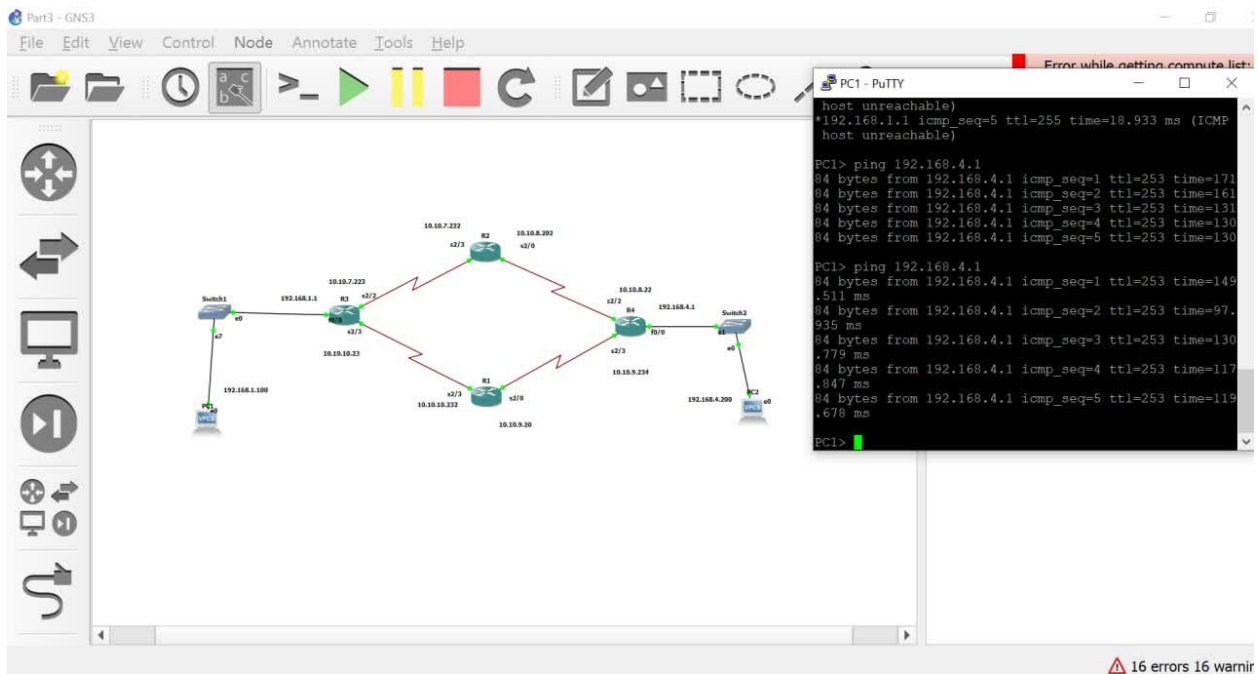
```

Codes: L - local, C - connected, S - static, R - RIP, M - mobil
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF int
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external
E1 - OSPF external type 1, E2 - OSPF external type 2
I - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 -
ia - IS-IS inter area, * - candidate default, U - per-u
o - ODR, P - periodic downloaded static route, + - repl
Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C    10.10.7.0/24 is directly connected, Serial2/2
L    10.10.7.232/32 is directly connected, Serial2/2
C    10.10.8.0/24 is directly connected, Serial2/3
L    10.10.8.202/32 is directly connected, Serial2/3
C    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
L    192.168.1.0/24 is directly connected, FastEthernet0/0
L    192.168.1.1/32 is directly connected, FastEthernet0/0
S    192.168.4.0/24 is directly connected, Serial2/3
S    192.168.4.0/24 is directly connected, Serial2/3
R3(config)#do wr
Building configuration...
[OK]
R3(config)#
  
```

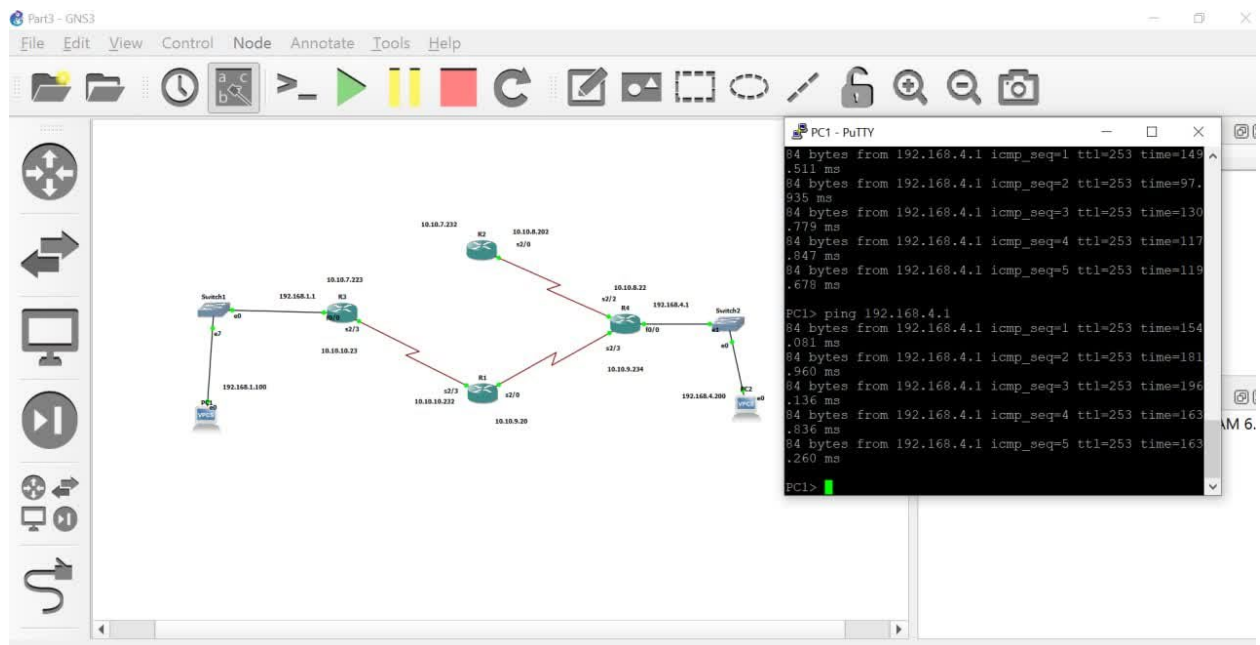


با استفاده از دستور ping ارتباط بین دو pc را بررسی میکنیم



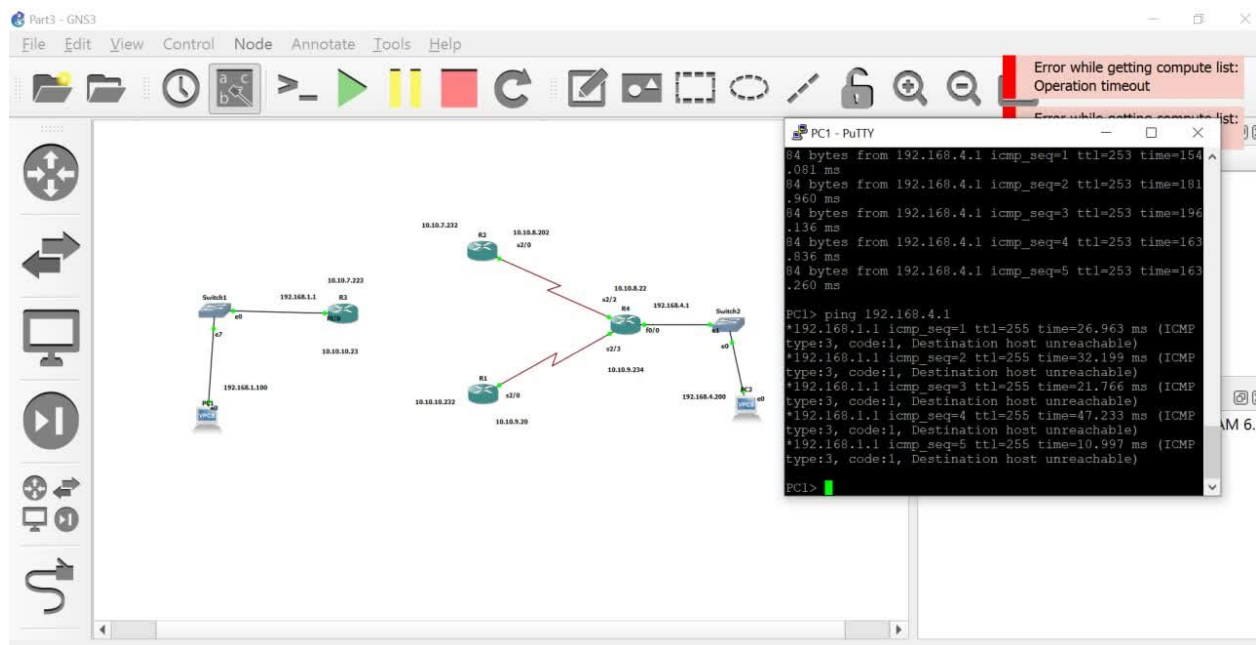
مشاهده میشود که ارتباط بین دو pc برقرار است و بسته ها ارسال میشوند.

سپس ابتدا یکی از مسیر ها را قطع میکنیم و مجددا بررسی میکنیم که آیا ارتباط برقرار میشود و مسیر یابی انجام میشود یا خیر.



مشاهده میشود که ارتباط برقرار است.

سپس هر دو مسیر را قطع میکنیم و دوباره امتحان میکنیم . مشاهده میشود که ارتباط قطع میشود.



بخش امتیازی

در این بخش دو سیم ethernet و یکی از سیم های سریال بین دو را capture میکنیم . در دو تصویر زیر قابل مشاهده است

Capturing from - [Switch1 Ethernet0 to R3 FastEthernet0/0]

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	ca:03:3a:10:00:00	ca:03:3a:10:00:00	LOOP	60	Reply
2	9.966736	ca:03:3a:10:00:00	ca:03:3a:10:00:00	LOOP	60	Reply
3	15.115019	ca:03:3a:10:00:00	ca:03:3a:10:00:00	CDP	383	Device ID: R3 Port ID: FastEthernet0/0
4	16.079021	192.168.4.200	192.168.1.100	ICMP	98	Echo (ping) request id=0xbcc, seq=1/256, ttl=61 (reply in 5)
5	16.079521	192.168.1.100	192.168.4.200	ICMP	98	Echo (ping) reply id=0xbcc, seq=1/256, ttl=64 (request in 4)
6	17.236864	192.168.4.200	192.168.1.100	ICMP	98	Echo (ping) request id=0xccc, seq=2/512, ttl=61 (reply in 7)
7	17.237364	192.168.1.100	192.168.4.200	ICMP	98	Echo (ping) reply id=0xccc, seq=2/512, ttl=64 (request in 6)
8	18.458257	192.168.4.200	192.168.1.100	ICMP	98	Echo (ping) request id=0xecc, seq=3/768, ttl=61 (reply in 9)
9	18.458257	192.168.1.100	192.168.4.200	ICMP	98	Echo (ping) reply id=0xecc, seq=3/768, ttl=64 (request in 8)
10	19.646576	192.168.4.200	192.168.1.100	ICMP	98	Echo (ping) request id=0xfc, seq=4/1024, ttl=61 (reply in 11)
11	19.646576	192.168.1.100	192.168.4.200	ICMP	98	Echo (ping) reply id=0xfc, seq=4/1024, ttl=64 (request in 10)
12	19.994451	ca:03:3a:10:00:00	ca:03:3a:10:00:00	LOOP	60	Reply
13	20.840863	192.168.4.200	192.168.1.100	ICMP	98	Echo (ping) request id=0x10cc, seq=5/1280, ttl=61 (reply in 14)
14	20.840863	192.168.1.100	192.168.4.200	ICMP	98	Echo (ping) reply id=0x10cc, seq=5/1280, ttl=64 (request in 13)

Capturing from - [R1 Serial2/3 to R3 Serial2/3]

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

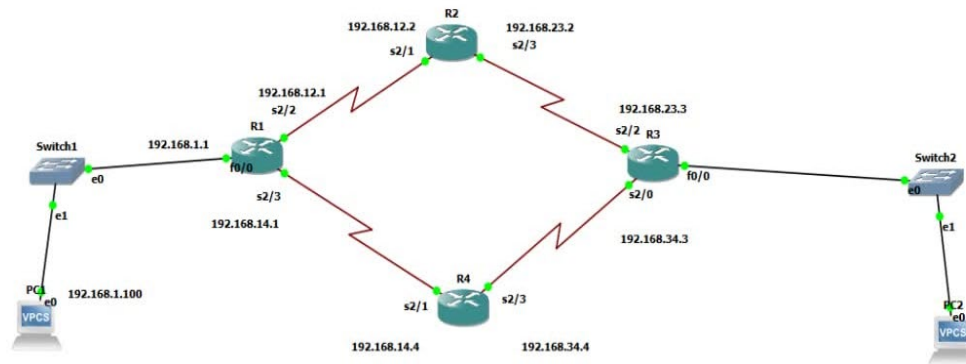
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 18, returned sequence 17
2	0.062938	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 18, returned sequence 18
3	4.825289	N/A	N/A	CDP	349	Device ID: R1 Port ID: Serial2/3
4	4.924550	N/A	N/A	CDP	354	Device ID: R3 Port ID: Serial2/3
5	10.002703	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 19, returned sequence 18
6	10.053013	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 19, returned sequence 19
7	16.889141	192.168.1.100	192.168.4.200	ICMP	88	Echo (ping) request id=0x52cc, seq=1/256, ttl=63 (reply in 8)
8	16.974950	192.168.4.200	192.168.1.100	ICMP	88	Echo (ping) reply id=0x52cc, seq=1/256, ttl=62 (request in 7)
9	18.046815	192.168.1.100	192.168.4.200	ICMP	88	Echo (ping) request id=0x53cc, seq=2/512, ttl=63 (reply in 10)
10	18.166537	192.168.4.200	192.168.1.100	ICMP	88	Echo (ping) reply id=0x53cc, seq=2/512, ttl=62 (request in 9)
11	19.234487	192.168.1.100	192.168.4.200	ICMP	88	Echo (ping) request id=0x55cc, seq=3/768, ttl=63 (reply in 12)
12	19.325310	192.168.4.200	192.168.1.100	ICMP	88	Echo (ping) reply id=0x55cc, seq=3/768, ttl=62 (request in 11)
13	20.039779	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 20, returned sequence 19
14	20.073485	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 20, returned sequence 20
15	20.431144	192.168.1.100	192.168.4.200	ICMP	88	Echo (ping) request id=0x56cc, seq=4/1024, ttl=63 (reply in 16)
16	20.563464	192.168.4.200	192.168.1.100	ICMP	88	Echo (ping) reply id=0x56cc, seq=4/1024, ttl=62 (request in 15)
17	21.651257	192.168.1.100	192.168.4.200	ICMP	88	Echo (ping) request id=0x57cc, seq=5/1280, ttl=63 (reply in 18)
18	21.772983	192.168.4.200	192.168.1.100	ICMP	88	Echo (ping) reply id=0x57cc, seq=5/1280, ttl=62 (request in 17)

> Frame 1: 24 bytes on wire (192 bits), 24 bytes captured (192 bits) on interface -, : ^ 8000 8f 00 80 35 00 00 00 02 00 00 00 12 00 00 00 11
 > Cisco HDLC 0010 ff ff 01 22 3c a8 00 00

هر پکت با ادرس مبدا و مقصد آن مشخص میشود که در نرم افزار مشخص میشود. پاسخ هم در پکت هایی که مبدا و مقصد متفاوت دارند قابل مشاهده است و جای این دو آدرس عوض شده است.

بخش چهارم

در این قسمت مشابه بخش قبل ابتدا در هر روتر آی پی ها را ست میکنیم تا هر روتر بداند به چه مسیر هایی متصل است :



سپس روتر ها را بر اساس آی پی های داده شده کانفیگ میکنیم تا هر کدام پورت مربوط به خود را بشناسند .

```
R2
changed state to down
*Apr 30 11:00:35.615: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/3,
changed state to down
*Apr 30 11:00:36.531: %LINK-5-CHANGED: Interface Serial2/1, changed state to adm
inistratively down
R2#
R2#
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#int s2/1
R2(config-if)#ip add 192.168.12.2 255.255.255.0
R2(config-if)#exit
R2(config)#int s2/3
R2(config-if)#ip add 192.168.23.2 255.255.255.0
R2(config-if)#exit
R2(config)#do show ip int br
Interface                IP-Address      OK? Method Status          Protocol
FastEthernet0/0          unassigned      YES unset    administratively down down
FastEthernet1/0          unassigned      YES unset    administratively down down
Serial2/0                 unassigned      YES unset    administratively down down
Serial2/1                 192.168.12.2    YES manual    administratively down down
Serial2/2                 unassigned      YES unset    administratively down down
Serial2/3                 192.168.23.2    YES manual    administratively down down
R2(config)#
```

```

R4
*Apr 30 11:00:35.527: %LINEPROTO-5-UPDOWN: Line protocol on I
changed state to down
*Apr 30 11:00:35.591: %LINEPROTO-5-UPDOWN: Line protocol on I
changed state to down
*Apr 30 11:00:36.451: %LINK-5-CHANGED: Interface Serial2/0, c
inistratively down
R4#
R4#
R4#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#int s2/3
R4(config-if)#ip add 192.168.34.4 255.255.255.0
R4(config-if)#exit
R4(config)#int s2/1
R4(config-if)#ip add 192.168.14.4 255.255.255.0
R4(config-if)#do show ip int br
Interface          IP-Address      OK? Method Status
FastEthernet0/0    unassigned      YES unset  administrat
FastEthernet1/0    unassigned      YES unset  administrat
Serial2/0           unassigned      YES unset  administrat
Serial2/1           192.168.14.4    YES manual administrat
Serial2/2           unassigned      YES unset  administrat
Serial2/3           192.168.34.4    YES manual administrat
R4(config-if)#

```

```

R3
*Apr 30 11:00:36.567: %LINK-5-CHANGED: Interface FastEthernet1/0, changed state
to administratively down
R3#
R3#
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#int f0/0
R3(config-if)#ip add 192.168.3.1 255.255.255.0
R3(config-if)#exit
R3(config)#int s2/2
R3(config-if)#ip add 192.168.23.3 255.255.255.0
R3(config-if)#exit
R3(config)#int s2/0
R3(config-if)#ip add 192.168.34.3 255.255.255.0
R3(config-if)#exit
R3(config)#do show ip int br
Interface          IP-Address      OK? Method Status      Protocol
FastEthernet0/0    192.168.3.1     YES manual administratively down down
FastEthernet1/0    unassigned      YES unset  administratively down down
Serial2/0           192.168.34.3    YES manual administratively down down
Serial2/1           unassigned      YES unset  administratively down down
Serial2/2           192.168.23.3    YES manual administratively down down
Serial2/3           unassigned      YES unset  administratively down down
R3(config)#

```

سپس برای روترها مشخص میکنیم از چه پروتکلی برای مسیریابی استفاده کنند :

```

FastEthernet1/0    unassigned      YES unset  administratively down down
Serial2/0           unassigned      YES unset  administratively down down
Serial2/1           unassigned      YES unset  administratively down down
Serial2/2           192.168.12.1    YES manual administratively down down
Serial2/3           192.168.14.1    YES manual administratively down down
R1(config-if)#do wr
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R1(config-if)#exit
R1(config)#router ospf 1
R1(config-router)#
*Apr 30 11:14:18.411: %OSPF-4-NORTRID: OSPF process 1 failed to allocate uniq
router-id and cannot start
R1(config-router)#network 192.168.12.1 255.255.255.0 area 0
R1(config-router)#network 192.168.14.1 255.255.255.0 area 0
R1(config-router)#network 192.168.1.1 255.255.255.0 area 0
R1(config-router)#exit
R1(config)#do wr
Building configuration...
[OK]

```

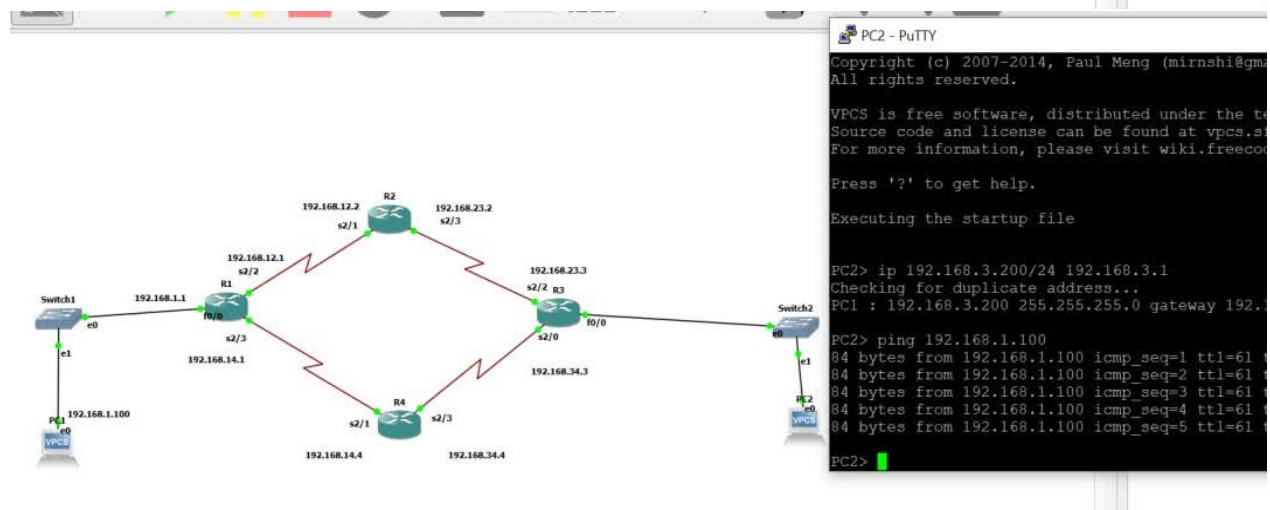
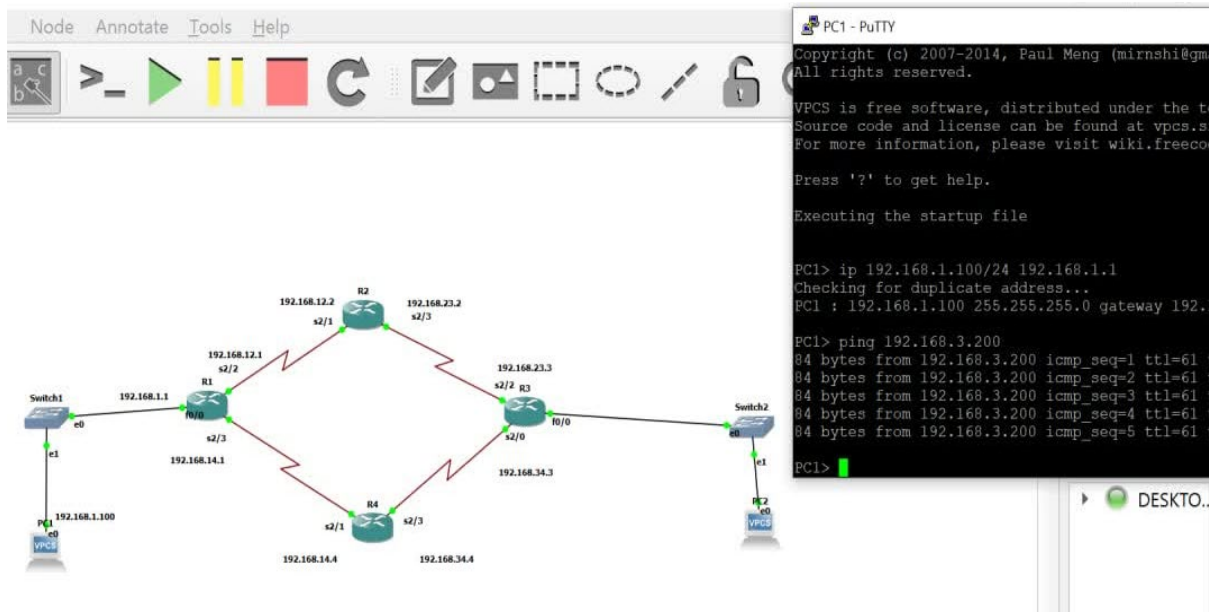
```
R2
Serial2/0      unassigned      YES unset  administratively down down
Serial2/1      192.168.12.2      YES manual administratively down down
Serial2/2      unassigned      YES unset  administratively down down
Serial2/3      192.168.23.2    YES manual administratively down down
R2(config)#do wr
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R2(config)#router ospf 2
R2(config-router)#
*Apr 30 11:16:51.755: %OSPF-4-NORTRID: OSPF process 2 failed to allocate unique
router-id and cannot start
R2(config-router)#network 192.168.12.2 255.255.255.0 area 0
R2(config-router)#network 192.168.23.2 255.255.255.0 area 0
R2(config-router)#do wr
Building configuration...
[OK]
R2(config-router)#exit
R2(config)#int 2/3
^
% Invalid input detected at '^' marker.

R3(config)#do wr
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R3(config)#rout ospf 3
% Ambiguous command: "rout ospf 3"
R3(config)#router ospf 3
R3(config-router)#
*Apr 30 11:18:19.995: %OSPF-4-NORTRID: OSPF process 3 failed to allocate unique
router-id and cannot start
R3(config-router)#network 192.168.23.3 255.255.255.0 area 0
R3(config-router)#network 192.168.34.3 255.255.255.0 area 0
R3(config-router)#network 192.168.3.1 255.255.255.0 area 0
R3(config-router)#
R3(config-router)#do wr
Building configuration...
[OK]
R3(config-router)#exit
R3(config)#show ip rou
^
% Invalid input detected at '^' marker.

84 bytes from 192.168.1.100 icmp_seq=5 ttl=61 time=193.893 ms
```

```
R4
R4(config)#router ospf 4
R4(config-router)#
*Apr 30 11:19:37.851: %OSPF-4-NORTRID: OSPF process 4 failed to allocate unique
router-id and cannot start
R4(config-router)#network 192.168.14.4 255.255.255.0 area 0
R4(config-router)#network 192.168.34.4 255.255.255.0 area 0
R4(config-router)#
R4(config-router)#do wr
Building configuration...
[OK]
R4(config-router)#exit
R4(config)#int s2/1
R4(config-if)#no shut
R4(config-if)#exit
R4(config)#
```

سپس بین دو PC درخواست پینگ میزنیم تا ارتباط را بررسی کنیم : همانطور که در تصویر مشخص است ، ارسال بسته های به درستی در حال اجرا است :



جدول routing table مربوط به pc ها ، جدول همسایگی پورت های روتر ها و جدول ospf به صورت زیر است :

The image shows two PuTTY terminal windows. The left window, titled 'PC2 - PuTTY', displays the output of the 'show ip' command on PC2, showing its IP as 192.168.3.200/24 and gateway as 192.168.3.1. The right window, titled 'PC1 - PuTTY', shows the output of a 'ping' command from PC1 to PC2, which results in five timeouts, and then the output of the 'show ip' command on PC1, showing its IP as 192.168.1.100/24 and gateway as 192.168.1.1.

```

PC2 - PuTTY
84 bytes from 192.168.1.100 icmp_seq=1 ttl=64 time=0.000 ms
PC2> show ip
NAME       : PC2[1]
IP/MASK    : 192.168.3.200/24
GATEWAY    : 192.168.3.1
DNS        :
MAC        : 00:50:79:66:68:01
LPORT      : 10038
RHOST:PORT : 127.0.0.1:10039
MTU:       : 1500
PC2>

PC1 - PuTTY
84 bytes from 192.168.3.200 icmp_seq=2 ttl=64 time=0.000 ms
84 bytes from 192.168.3.200 icmp_seq=3 ttl=64 time=0.000 ms
84 bytes from 192.168.3.200 icmp_seq=4 ttl=64 time=0.000 ms
84 bytes from 192.168.3.200 icmp_seq=5 ttl=64 time=0.000 ms
PC1> ping 192.168.3.200
192.168.3.200 icmp_seq=1 timeout
192.168.3.200 icmp_seq=2 timeout
192.168.3.200 icmp_seq=3 timeout
192.168.3.200 icmp_seq=4 timeout
192.168.3.200 icmp_seq=5 timeout
PC1> show ip
NAME       : PC1[1]
IP/MASK    : 192.168.1.100/24
GATEWAY    : 192.168.1.1
DNS        :
MAC        : 00:50:79:66:68:00
LPORT      : 10036
RHOST:PORT : 127.0.0.1:10037
MTU:       : 1500
PC1>

```

برای مشاهده جدول همسایگی و ospf از دستورات زیر استفاده میکنیم که در ترمینال هر روتر وارد میکنیم:

show ip ospf rout

show ip ospf neighbor

The image shows a terminal window on a router (R1) displaying the output of 'show ip ospf rout' and 'show ip ospf neighbor'. The OSPF configuration shows a single area (BACKBONE) with several connected networks. The neighbor status table shows two neighbors: 192.168.34.4 and 192.168.23.2, both in a FULL state.

```

R1#show ip ospf rout
OSPF Router with ID (192.168.14.1) (Process ID 1)

Base Topology (MTID 0)

Area BACKBONE (0)
Intra-area Route List
* 192.168.1.0/24, Intra, cost 1, area 0, Connected
  via 192.168.1.1, FastEthernet0/0
*> 192.168.3.0/24, Intra, cost 129, area 0
  via 192.168.14.4, Serial2/3
  via 192.168.12.2, Serial2/2
* 192.168.12.0/24, Intra, cost 64, area 0, Connected
  via 192.168.12.1, Serial2/2
* 192.168.14.0/24, Intra, cost 64, area 0, Connected
  via 192.168.14.1, Serial2/3
*> 192.168.23.0/24, Intra, cost 128, area 0
  via 192.168.12.2, Serial2/2
*> 192.168.34.0/24, Intra, cost 128, area 0
  via 192.168.14.4, Serial2/3
R1#show ip ospf neabeor
^
% Invalid input detected at '^' marker.
R1#show ip ospf neighbor

Neighbor ID    Pri   State           Dead Time   Address        Interface
192.168.34.4    0     FULL/  -        00:00:38    192.168.14.4   Serial2/3
192.168.23.2    0     FULL/  -        00:00:36    192.168.12.2   Serial2/2
R1#

```

روتر ۱

OSPF Router with ID (192.168.23.2) (Process ID 2)

Base Topology (MTID 0)

Area BACKBONE(0)

Intra-area Route List

```
*> 192.168.1.0/24, Intra, cost 65, area 0
    via 192.168.12.1, Serial2/1
*> 192.168.3.0/24, Intra, cost 65, area 0
    via 192.168.23.3, Serial2/3
* 192.168.12.0/24, Intra, cost 64, area 0, Connected
    via 192.168.12.2, Serial2/1
*> 192.168.14.0/24, Intra, cost 128, area 0
    via 192.168.12.1, Serial2/1
* 192.168.23.0/24, Intra, cost 64, area 0, Connected
    via 192.168.23.2, Serial2/3
*> 192.168.34.0/24, Intra, cost 128, area 0
    via 192.168.23.3, Serial2/3
```

R2#show ip osp

R2#show ip ospf n

R2#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.34.3	0	FULL/ -	00:00:36	192.168.23.3	Serial2/3
192.168.14.1	0	FULL/ -	00:00:36	192.168.12.1	Serial2/1

R2#

روتر ۲

Area BACKBONE(0)

Intra-area Route List

```
*> 192.168.1.0/24, Intra, cost 129, area 0
    via 192.168.34.4, Serial2/0
    via 192.168.23.2, Serial2/2
* 192.168.3.0/24, Intra, cost 1, area 0, Connected
    via 192.168.3.1, FastEthernet0/0
*> 192.168.12.0/24, Intra, cost 128, area 0
    via 192.168.23.2, Serial2/2
*> 192.168.14.0/24, Intra, cost 128, area 0
    via 192.168.34.4, Serial2/0
* 192.168.23.0/24, Intra, cost 64, area 0, Connected
    via 192.168.23.3, Serial2/2
* 192.168.34.0/24, Intra, cost 64, area 0, Connected
    via 192.168.34.3, Serial2/0
```

R3#show ip osp

R3#show ip ospf n

R3#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.34.4	0	FULL/ -	00:00:33	192.168.34.4	Serial2/0
192.168.23.2	0	FULL/ -	00:00:36	192.168.23.2	Serial2/2

R3#

روتر ۳

```

Area BACKBONE (0)

Intra-area Route List
*> 192.168.1.0/24, Intra, cost 65, area 0
    via 192.168.14.1, Serial2/1
*> 192.168.3.0/24, Intra, cost 65, area 0
    via 192.168.34.3, Serial2/3
*> 192.168.12.0/24, Intra, cost 128, area 0
    via 192.168.14.1, Serial2/1
* 192.168.14.0/24, Intra, cost 64, area 0, Connected
    via 192.168.14.4, Serial2/1
*> 192.168.23.0/24, Intra, cost 128, area 0
    via 192.168.34.3, Serial2/3
* 192.168.34.0/24, Intra, cost 64, area 0, Connected
    via 192.168.34.4, Serial2/3
R4#show ip ospf n
R4#show ip ospf neighbor

Neighbor ID      Pri   State           Dead Time   Address        Interface
192.168.34.3     0     FULL/ -         00:00:31    192.168.34.3   Serial2/3
192.168.14.1     0     FULL/ -         00:00:35    192.168.14.1   Serial2/1
R4#

```

روتر ۴

بخش امتیازی

Capturing from - [R3 Serial2/2 to R2 Serial2/3]

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
2	0.030146	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 96, returned sequence 96
3	1.837881	192.168.23.2	224.0.0.5	OSPF	84	Hello Packet
4	1.949517	192.168.23.3	224.0.0.5	OSPF	84	Hello Packet
5	4.837061	N/A	N/A	CDP	340	Device ID: R2 Port ID: Serial2/3
6	4.901242	N/A	N/A	CDP	340	Device ID: R3 Port ID: Serial2/2
7	9.963872	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 97, returned sequence 96
8	10.029565	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 97, returned sequence 97
9	11.124965	192.168.23.3	224.0.0.5	OSPF	84	Hello Packet
10	11.125465	192.168.23.2	224.0.0.5	OSPF	84	Hello Packet
11	19.880643	192.168.1.100	192.168.3.200	ICMP	88	Echo (ping) request id=0xe6ca, seq=1/256, ttl=62 (no response found!)
12	19.947975	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 98, returned sequence 97
13	20.015129	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 98, returned sequence 98
14	20.486524	192.168.23.3	224.0.0.5	OSPF	84	Hello Packet
15	20.583396	192.168.23.2	224.0.0.5	OSPF	84	Hello Packet
16	21.936559	192.168.1.100	192.168.3.200	ICMP	88	Echo (ping) request id=0xe8ca, seq=2/512, ttl=62 (no response found!)
17	23.971948	192.168.1.100	192.168.3.200	ICMP	88	Echo (ping) request id=0xeaca, seq=3/768, ttl=62 (no response found!)
18	25.228443	192.168.1.100	192.168.3.200	ICMP	88	Echo (ping) request id=0xecca, seq=4/1024, ttl=62 (no response found!)
19	26.441959	192.168.1.100	192.168.3.200	ICMP	88	Echo (ping) request id=0xedca, seq=5/1280, ttl=62 (no response found!)
20	29.956138	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 99, returned sequence 98
21	30.022320	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 99, returned sequence 99
22	30.250490	192.168.23.2	224.0.0.5	OSPF	84	Hello Packet
23	30.250490	192.168.23.3	224.0.0.5	OSPF	84	Hello Packet
24	39.464206	192.168.23.3	224.0.0.5	OSPF	84	Hello Packet
25	39.964203	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 100, returned sequence 99
26	40.031052	N/A	N/A	SLARP	24	Line keepalive, outgoing sequence 100, returned sequence 100
27	40.128896	192.168.23.2	224.0.0.5	OSPF	84	Hello Packet

> Frame 1: 24 bytes on wire (192 bits), 24 bytes captured (192 bits) on interface ...
 > Cisco HDLC
 0000 8f 00 00 35 00 00 00 02 00 00 00 60 00 00 00 5f ...5....
 0010 ff ff 03 21 04 00 00 05 ...|....

در این قسمت ، یکی از سیم های سریال بین دو روتر را **capture** می کنیم . این کار باعث میشود بسته هایی که روی این مسیر منتقل میشوند را مشاهده میکنیم . با زدن دستور **ping** ، پکت هایی (به رنگ صورتی) در **Wireshark** می آید که مبدا و مقصد آن همان دو **pc** مجازی در شبکه ماست . مسیر دهی بین دو **pc** هم توسط **OSPF** انجام شده که در بین **packet** ها در بخش پروتکل مشخص شده است .