

SEC : A

CN LAB: 04

BATCH : A3

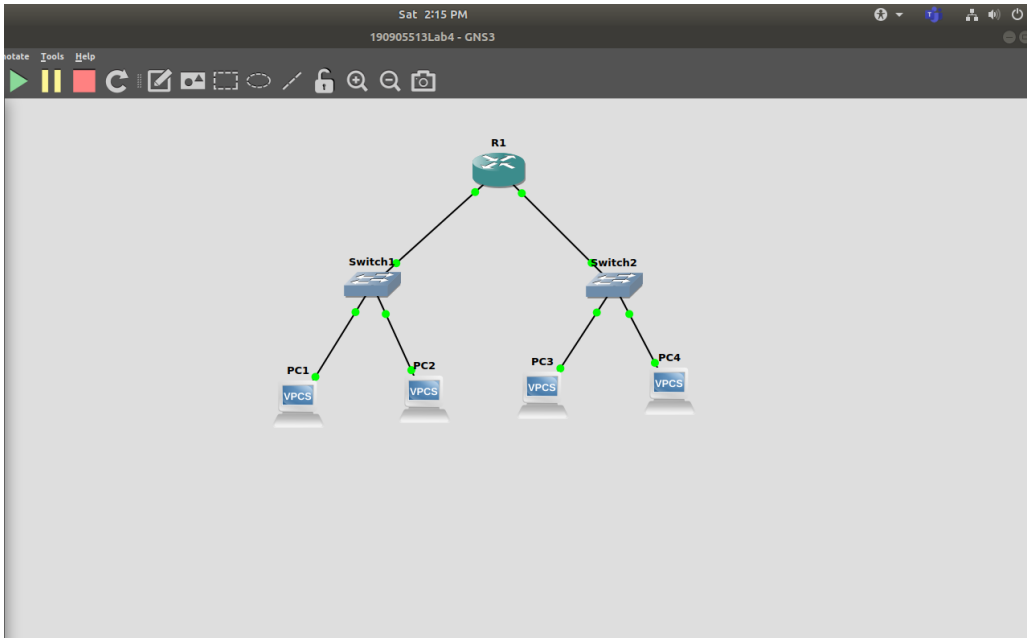
REG: 190905513

CSE 3113

NAME: MOHAMMAD DANISH EQBAL

EXPERIMENT 01

//Single Router Network



//Configuring PC1

```
File Edit View Search Terminal Help
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

PC1> ip 10.10.10.1/24 10.10.10.254/24
Checking for duplicate address...
saPC1 : 10.10.10.1 255.255.255.0 gateway 10.10.10.254

PC1> save
Saving startup configuration to startup.vpc
. done

PC1> 
```

//Configure PC2

```
File Edit View Search Terminal Help
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

PC2> ip 10.10.10.2/24 10.10.10.254/24
Checking for duplicate address...
PC2 : 10.10.10.2 255.255.255.0 gateway 10.10.10.254

PC2> save
Saving startup configuration to startup.vpc
. done

PC2> 
```

//Configuring PC3

```
File Edit View Search Terminal Help
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

PC3> ip 20.20.20.1/24 20.20.20.254/24
Checking for duplicate address...
PC3 : 20.20.20.1 255.255.255.0 gateway 20.20.20.254

PC3> save
Saving startup configuration to startup.vpc
. done

PC3> 
```

//Configure PC4

```
File Edit View Search Terminal Help
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

PC4> ip 20.20.20.2/24 20.20.20.254/24
Checking for duplicate address...
PC4 : 20.20.20.2 255.255.255.0 gateway 20.20.20.254

PC4> save
Saving startup configuration to startup.vpc
. done

PC4> 
```

//Configuring Router

```
File Edit View Search Terminal Help
R1
R1#config t
R1(config)terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int f0/0
R1(config-if)#ip add
R1(config-if)#ip address 10.10.10.254/24
^
% Invalid input detected at '^' marker.
R1(config-if)#ip address 10.10.10.254
^
% Incomplete command.
R1(config-if)#ip address 10.10.10.254/24
R1(config-if)#ip address 10.10.10.254/24
^
% Invalid input detected at '^' marker.
R1(config-if)#ip address 10.10.10.254/24 255.0.0.0
^
% Invalid input detected at '^' marker.
R1(config-if)#ip address 10.10.10.254 255.0.0.0
R1(config-if)#no shut
R1(config-if)#
*Mar 1 00:05:17.375: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Mar 1 00:05:18.375: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R1(config-if)#exit
R1(config)#exit
R1#
*Mar 1 00:05:50.463: %SYS-5-CONFIG_I: Configured from console by console
R1#config t
R1(config)terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int f0/1
R1(config-if)#ip add
R1(config-if)#ip address 20.20.20.254 255.0.0.0
R1(config-if)#no shut
R1(config-if)#exit
*Mar 1 00:06:46.799: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
*Mar 1 00:06:47.799: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
R1(config-if)#exit
R1(config)#exit
R1#
*Mar 1 00:06:52.863: %SYS-5-CONFIG_I: Configured from console by console
R1#
```

//Commands *show ip route* and *show interface*

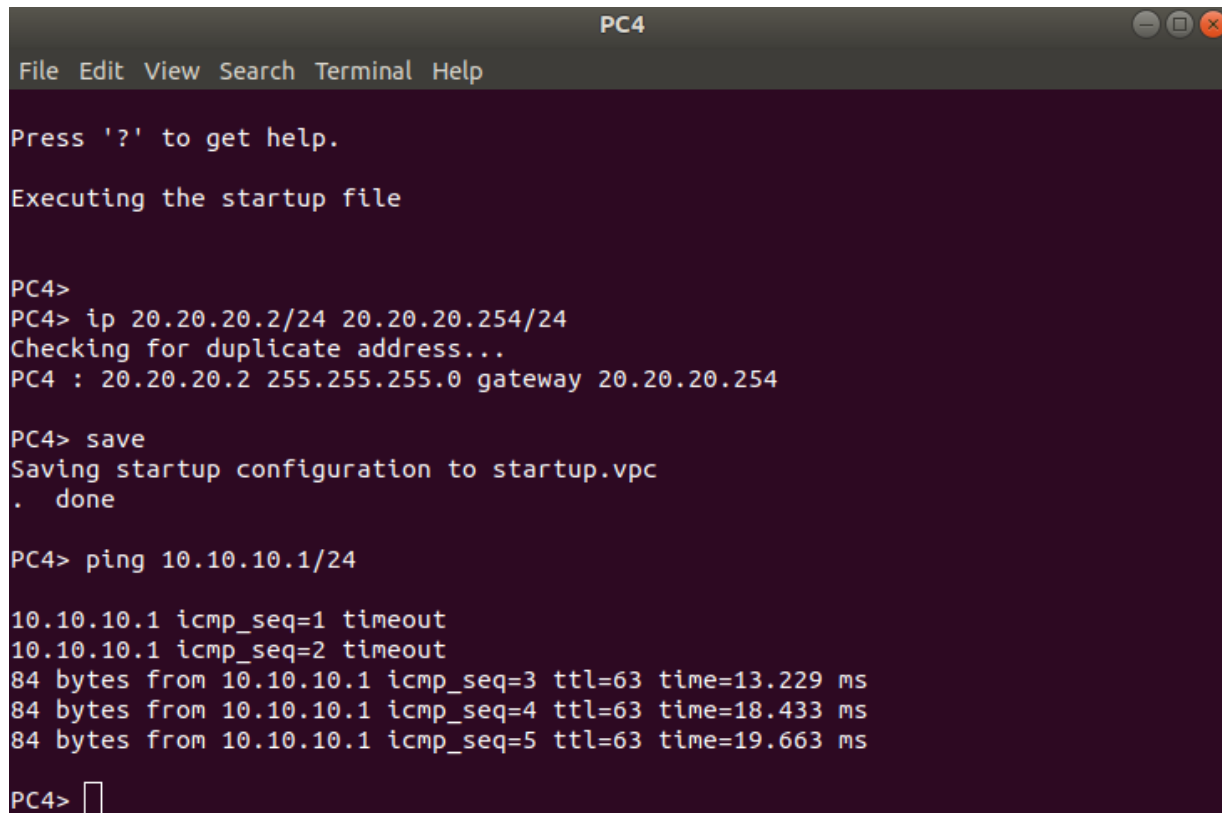
```
File Edit View Search Terminal Help
R1
R1(config-if)#exit
R1(config)#exit
R1#
*Mar 1 00:06:52.863: %SYS-5-CONFIG_I: Configured from console by console
R1#show interface
FastEthernet0/0 is up, line protocol is up
Hardware is Gt96k FE, address is c401.16a0.0000 (bia c401.16a0.0000)
Internet address is 10.10.10.254/8
MTU 1500 bytes, BW 10000 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
Half-duplex, 10Mb/s, 100BaseTX/FX
ARP type: ARPA, ARP Timeout 04:00:00
Last input never, output 00:00:03, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
Output queue: 0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes
Received 0 broadcasts, 0 runs, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
0 watchdog
0 input packets with dribble condition detected
22 packets output, 2799 bytes, 0 underruns
0 output errors, 0 collisions, 1 interface resets
0 unknown protocol drops
0 babbles, 0 late collision, 0 deferred

R1#show ip route
Codes: 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

Gateway of last resort is not set

C    20.0.0.0/8 is directly connected, FastEthernet0/1
C    10.0.0.0/8 is directly connected, FastEthernet0/0
R1#
```

//Trying to ping *PC1* from *PC4*



The image shows a terminal window titled "PC4" with a menu bar containing "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal output is as follows:

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

PC4>
PC4> ip 20.20.20.2/24 20.20.20.254/24
Checking for duplicate address...
PC4 : 20.20.20.2 255.255.255.0 gateway 20.20.20.254

PC4> save
Saving startup configuration to startup.vpc
. done

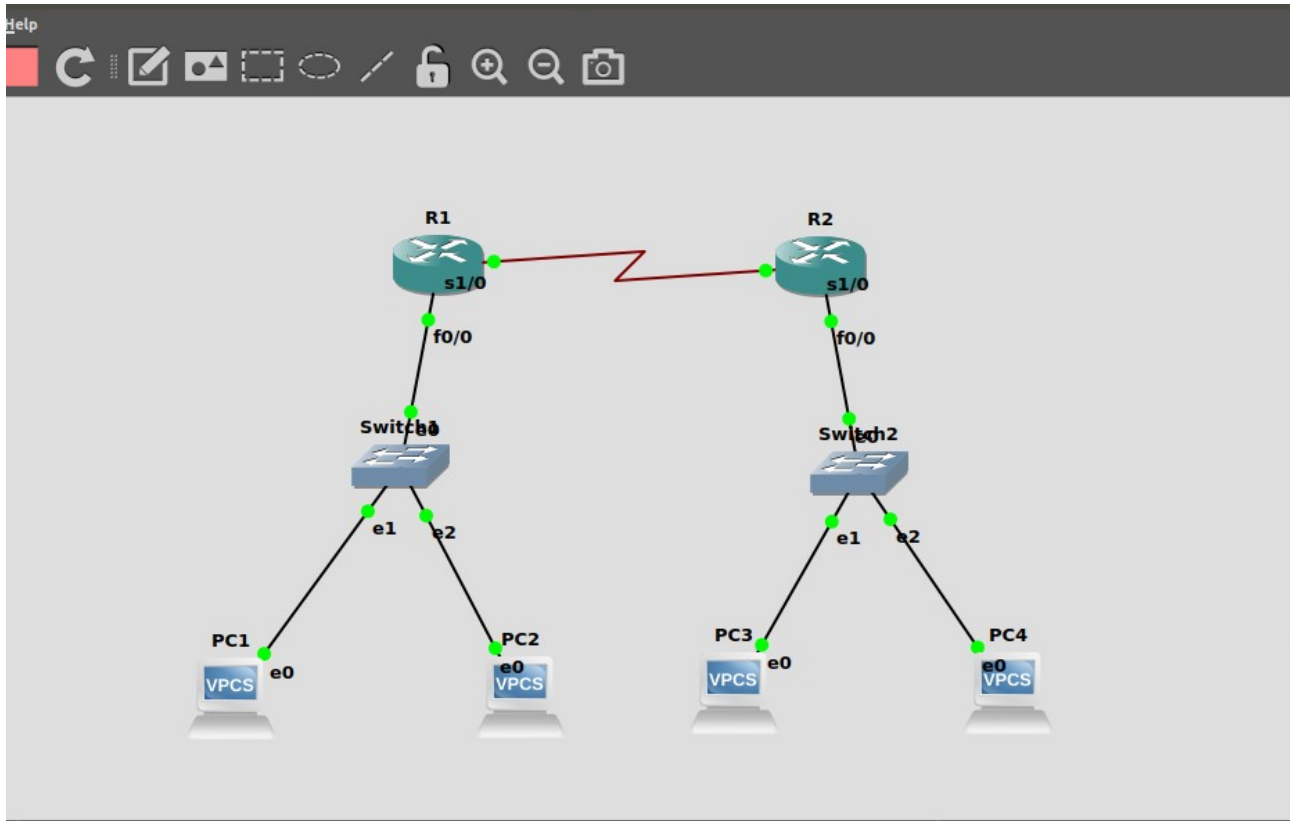
PC4> ping 10.10.10.1/24

10.10.10.1 icmp_seq=1 timeout
10.10.10.1 icmp_seq=2 timeout
84 bytes from 10.10.10.1 icmp_seq=3 ttl=63 time=13.229 ms
84 bytes from 10.10.10.1 icmp_seq=4 ttl=63 time=18.433 ms
84 bytes from 10.10.10.1 icmp_seq=5 ttl=63 time=19.663 ms

PC4> 
```

EXERCISE 02

//Two Router Network



//Configuring PC1

```
File Edit View Search Terminal Help
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

Invalid address

PC1> ip 10.0.0.2/8 10.0.0.1
Checking for duplicate address...
PC1 : 10.0.0.2 255.0.0.0 gateway 10.0.0.1

PC1> 
```

//Configuring PC2

```
File Edit View Search Terminal Help
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

Welcome to Virtual PC Simulator, version 0.8.2
Dedicated to Daling.
Build time: Aug 23 2021 11:15:00
Copyright (c) 2007-2015, 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

PC2> ip 10.0.0.2/8 10.0.0.1
Checking for duplicate address...
10.0.0.2 is being used by MAC 00:50:79:66:68:00
Address not changed

PC2> ip 10.0.0.3/8 10.0.0.1
Checking for duplicate address...
PC2 : 10.0.0.3 255.0.0.0 gateway 10.0.0.1
```

//Configuring Router R1

```
R1#enable
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip ad
R1(config)#inter f0/0
R1(config-if)#ip address 10.0.0.1 255.0.0.0
R1(config-if)#no shut
R1(config-if)#
*Oct 28 11:59:46.171: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R1(config-if)#
*Oct 28 11:59:46.171: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
*Oct 28 11:59:47.171: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R1(config-if)#exit
R1(config)#inter s1/0
R1(config-if)#ip address 20.0.0.1 255.0.0.0
R1(config-if)#no shut
R1(config-if)#exit
*Oct 28 12:00:36.691: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R1(config-if)#exit
*Oct 28 12:00:36.691: %ENTITY_ALARM-6-INFO: CLEAR INFO Se1/0 Physical Port Administrative State Down
R1(config-if)#exit
R1(config)#
*Oct 28 12:00:37.695: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R1(config)#exit
R1#
*Oct 28 12:00:43.055: %SYS-5-CONFIG_I: Configured from console by console
R1#
*Oct 28 12:01:06.223: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to down
R1#
*Oct 28 12:02:26.207: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip route 30.0.0.0 255.0.0.0 20.0.0.2
R1(config)#exit
R1#
```

//Configuring Router R2

```
R2#enable
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#inter f0/0
R2(config-if)#ip 30.0.0.1 255.0.0.0
      ^
% Invalid input detected at '^' marker.

R2(config-if)#ip address 30.0.0.1 255.0.0.0
R2(config-if)#no shut
R2(config-if)#
*Oct 28 12:00:19.963: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R2(config-if)#
*Oct 28 12:00:19.963: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
*Oct 28 12:00:20.963: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R2(config-if)#exit
R2(config)#inter s1/0
R2(config-if)#ip address 20.0.0.2 255.0.0.0
R2(config-if)#no shut
R2(config-if)#
*Oct 28 12:00:49.819: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R2(config-if)#
*Oct 28 12:00:49.819: %ENTITY_ALARM-6-INFO: CLEAR INFO Se1/0 Physical Port Administrative State Down
R2(config-if)#
*Oct 28 12:00:50.823: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R2(config-if)#exit
R2(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.1
R2(config)#exit
R2#
```

//Configuring PC2

```
es Terminal
File Edit View Search Terminal Help
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

Welcome to Virtual PC Simulator, version 0.8.2
Dedicated to Daling.
Build time: Aug 23 2021 11:15:00
Copyright (c) 2007-2015, 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

PC3> ip 30.0.0.2/8 30.0.0.1
Checking for duplicate address...
PC3 : 30.0.0.2 255.0.0.0 gateway 30.0.0.1

PC3> 
```

//Configuring PC4

```
es Terminal
File Edit View Search Terminal Help
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

Welcome to Virtual PC Simulator, version 0.8.2
Dedicated to Daling.
Build time: Aug 23 2021 11:15:00
Copyright (c) 2007-2015, 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

PC4> ip 30.0.0.3/8 30.0.0.1
Checking for duplicate address...
PC4 : 30.0.0.3 255.0.0.0 gateway 30.0.0.1

PC4> 
```

//Trying to ping PC1 from PC3

```
PC3> ping 10.0.0.2

84 bytes from 10.0.0.2 icmp_seq=1 ttl=62 time=28.042 ms
84 bytes from 10.0.0.2 icmp_seq=2 ttl=62 time=40.556 ms
84 bytes from 10.0.0.2 icmp_seq=3 ttl=62 time=29.649 ms
84 bytes from 10.0.0.2 icmp_seq=4 ttl=62 time=29.528 ms
84 bytes from 10.0.0.2 icmp_seq=5 ttl=62 time=29.472 ms

PC3> 
```

//Wireshark capture which shows ICMP messages.

The image shows a Wireshark packet capture window. The top menu bar includes File, Edit, View, Go, Capture, Analyze, Statistics, Telephony, Wireless, Tools, and Help. The toolbar contains various icons for file operations, capture control, and analysis. The main display area shows a list of 37 captured packets. The first 36 packets are CDP (Cisco Discovery Protocol) messages, and the 37th packet is an ICMP Echo (ping) request. The packet details pane on the right shows the selected packet (Frame 1) with its structure: Ethernet II, Internet Protocol Version 4, and ICMP Echo (ping) request. The packet bytes pane at the bottom shows the raw data of the selected packet.

No.	Time	Source	Destination	Protocol	Length	Info
18	415.677887	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
19	478.624400	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
20	541.613876	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
21	604.477768	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
22	667.183833	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
23	730.848725	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
24	792.974822	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
25	855.940886	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
26	868.954124	ca:01:11:f4:00:00	DEC-MOP-Remote-Cons...	0x6002	77	DEC DNA Remote Console
27	918.757842	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
28	981.827031	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
29	1044.754362	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
30	1107.769443	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
31	1170.549220	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
32	1233.503497	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
33	1296.368359	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
34	1359.099566	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
35	1421.740873	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
36	1484.610821	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0
37	1547.326357	ca:01:11:f4:00:00	CDP/VTP/DTP/PagP/UD...	CDP	347	Device ID: R1 Port ID: FastEthernet0/0

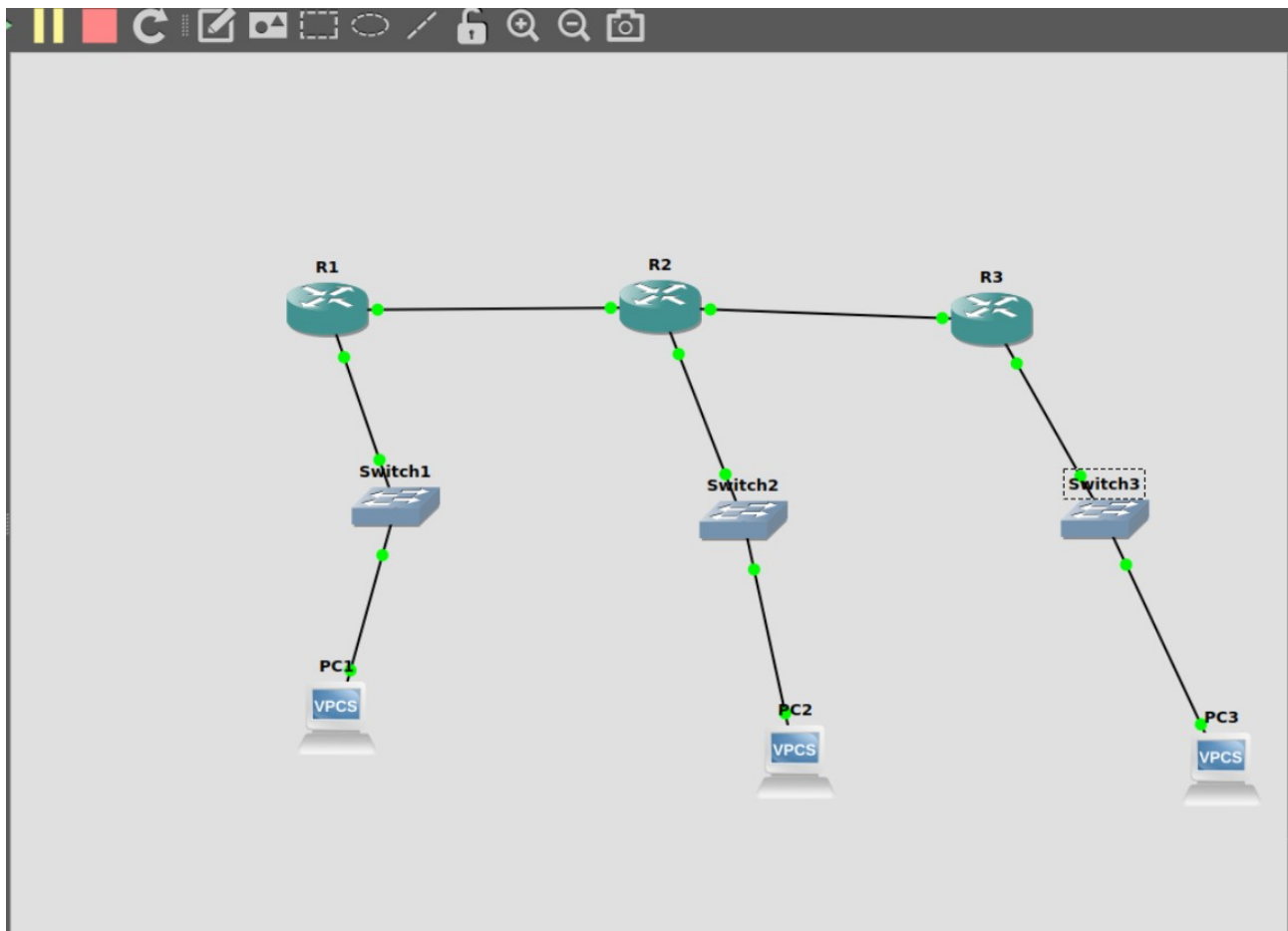
Frame 1: 64 bytes on wire (512 bits), 64 bytes captured (512 bits) on interface 0
Ethernet II, Src: Private_00:60:00 (00:60:00:00:00:00), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
Address Resolution Protocol (request)

Ready to load or capture Packets: 37 - Displayed: 37 (100.0%) Profile: Default

//This means that the communications between PC1 and PC3 is successful.

EXERCISE 03

//Three Router Network



//Configuring Router R2

```
R2
File Edit View Search Terminal Help
Translating "-2x5t6ecroml-o2r5pcolor"
% Unknown command or computer name, or unable to find computer address
R2#
R2#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface f1/0
      ^
% Invalid input detected at '^' marker.

R2(config)#interface f1/0
R2(config-if)#ip route 14.24.74.126 255.255.255.128 10.10.10.1
%Inconsistent address and mask
R2(config)#ip route 14.24.74.0 255.255.255.128 10.10.10.1
R2(config)#do wr
Building configuration...
[OK]
R2(config)#interface f0/1
R2(config-if)#ip route 14.24.74.192 255.255.255.240 20.20.20.2
R2(config)#do wr
Building configuration...
[OK]
R2(config)#exit
R2#s
*Mar  1 00:38:16.367: %SYS-5-CONFIG_I: Configured from console by console
R2#show ip route
Codes: 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

Gateway of last resort is not set

    20.0.0.0/24 is subnetted, 1 subnets
C       20.20.20.0 is directly connected, FastEthernet0/1
    10.0.0.0/24 is subnetted, 1 subnets
C       10.10.10.0 is directly connected, FastEthernet1/0
    14.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
S       14.24.74.0/25 [1/0] via 10.10.10.1
S       14.24.74.192/28 [1/0] via 20.20.20.2
C       14.24.74.128/26 is directly connected, FastEthernet0/0
R2#
```


//Configuring Router R3

```
R3
File Edit View Search Terminal Help
[OK]
R3(config)#exit
R3#
*Mar  1 00:35:12.939: %SYS-5-CONFIG_I: Configured from console by console
R3#show ip route
Codes: 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

Gateway of last resort is not set

    20.0.0.0/24 is subnetted, 1 subnets
C      20.20.20.0 is directly connected, FastEthernet0/1
    10.0.0.0/24 is subnetted, 1 subnets
S      10.10.10.0 [1/0] via 20.20.20.1
    14.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
S      14.24.74.0/25 [1/0] via 20.20.20.1
C      14.24.74.192/28 is directly connected, FastEthernet0/0
S      14.24.74.128/26 [1/0] via 20.20.20.1
R3#
```

//Trying to ping PC2 from PC3

```
PC3

File Edit View Search Terminal Help
NAME      : PC3[1]
IP/MASK    : 14.24.74.193/28
GATEWAY    : 14.24.74.206
DNS        :
MAC        : 00:50:79:66:68:02
LPORT     : 10034
RHOST:PORT : 127.0.0.1:10035
MTU:       : 1500

PC3> ping 14.24.74.129
14.24.74.129 icmp_seq=1 timeout
84 bytes from 14.24.74.129 icmp_seq=2 ttl=62 time=30.049 ms
84 bytes from 14.24.74.129 icmp_seq=3 ttl=62 time=24.721 ms
84 bytes from 14.24.74.129 icmp_seq=4 ttl=62 time=34.574 ms
84 bytes from 14.24.74.129 icmp_seq=5 ttl=62 time=25.071 ms

PC3> ping 14.24.74.129
84 bytes from 14.24.74.129 icmp_seq=1 ttl=62 time=24.235 ms
84 bytes from 14.24.74.129 icmp_seq=2 ttl=62 time=23.984 ms
84 bytes from 14.24.74.129 icmp_seq=3 ttl=62 time=24.698 ms
84 bytes from 14.24.74.129 icmp_seq=4 ttl=62 time=24.837 ms
84 bytes from 14.24.74.129 icmp_seq=5 ttl=62 time=25.013 ms

PC3> █
```

//Trying to ping PC2 from PC1

```
PC1

File Edit View Search Terminal Help
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

PC1> ping 14.24.74.193
84 bytes from 14.24.74.193 icmp_seq=1 ttl=61 time=31.874 ms
84 bytes from 14.24.74.193 icmp_seq=2 ttl=61 time=34.163 ms
84 bytes from 14.24.74.193 icmp_seq=3 ttl=61 time=34.785 ms
84 bytes from 14.24.74.193 icmp_seq=4 ttl=61 time=34.823 ms
84 bytes from 14.24.74.193 icmp_seq=5 ttl=61 time=35.429 ms

PC1> █
```