F29DC 2024 Lab 3
Routing

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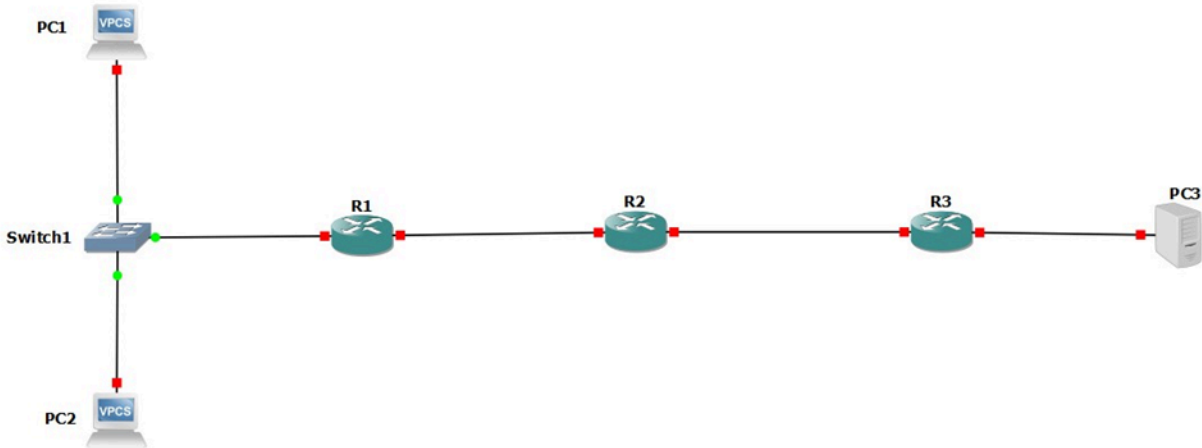# Part 1 - Topology Configuration

Image 1.1: Setting up the connection between PC1, PC2, PC3, R1, R2, R3 and with the Switch1.
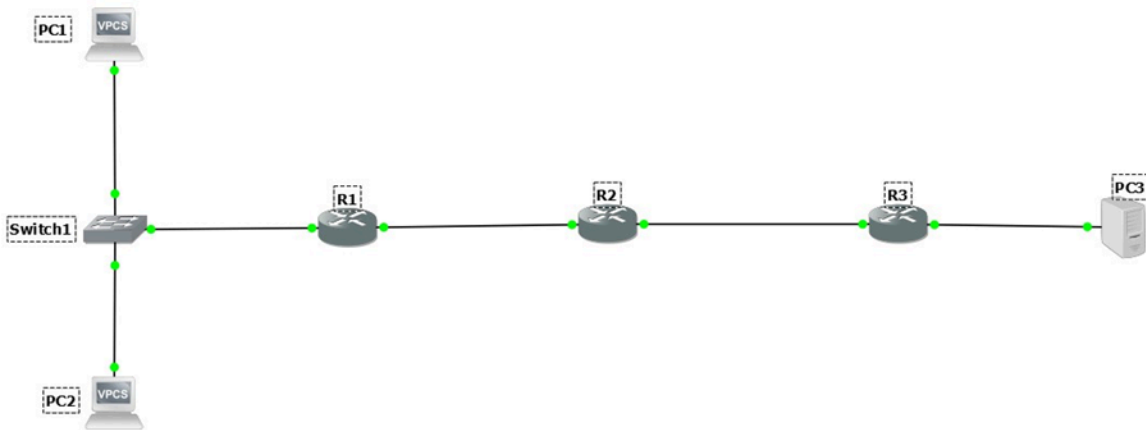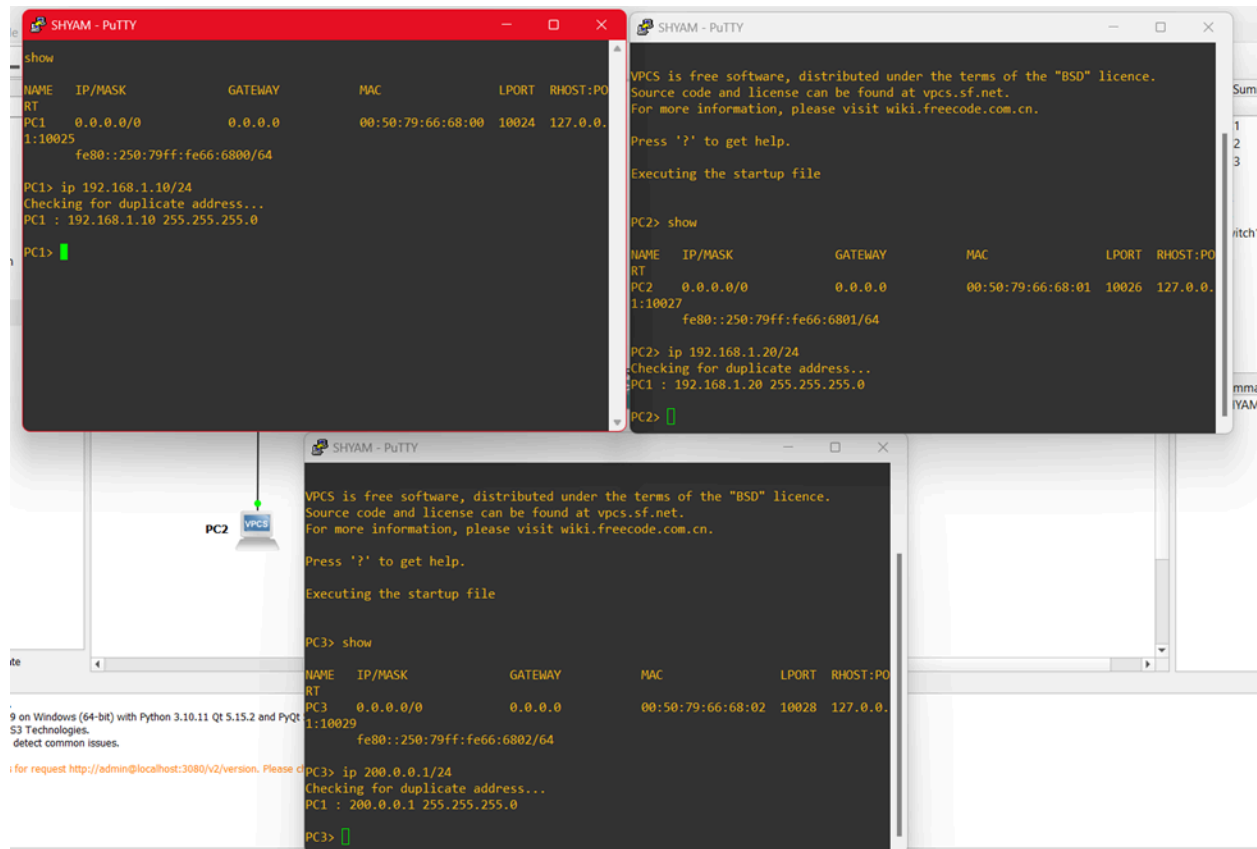

Image 1.2: Starting all the connections.

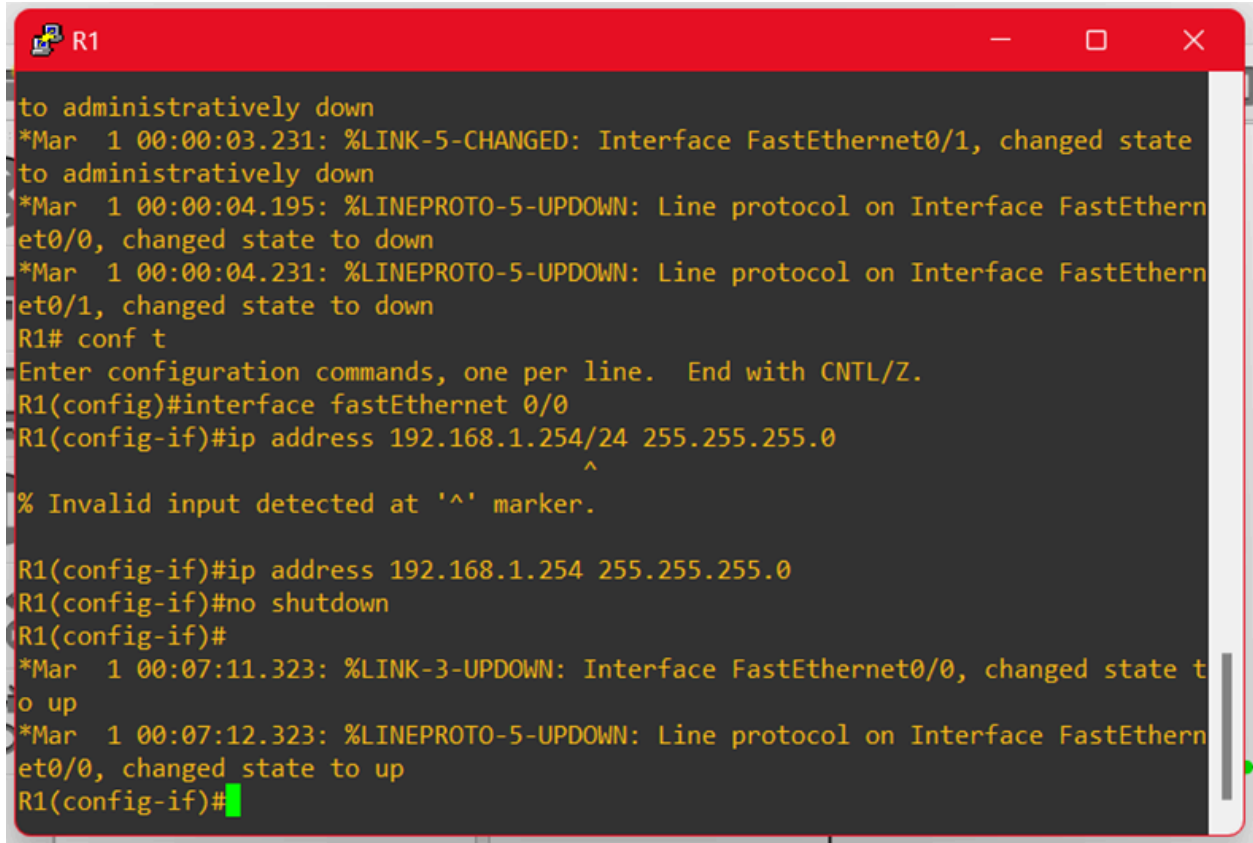**Image 1.3: Providing the IP addresses for all the VPC'S as follow ->**
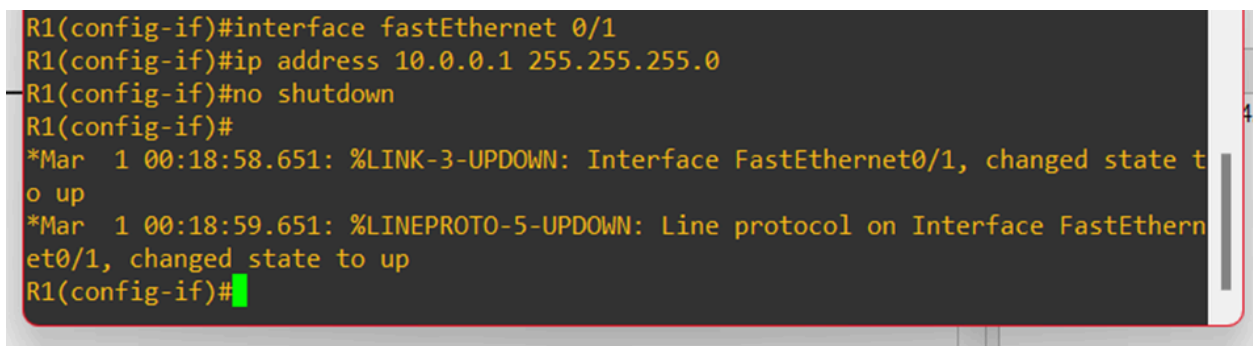PC1 = 192.168.1.10/24
PC2 = 192.168.1.20/24
PC3 = 200.0.0.1/24

Image 1.4: Setting up R1 with fast ethernet 0/0 with IP address 192.168.1.254 255.255.255.0 .

Image 1.5: Setting up R1 with fast ethernet 0/1 with IP address 10.0.0.1 255.255.255.0 .

```
R2# conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface fastEthernet 0/0
R2(config-if)#ip address 10.0.0.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
*Mar  1 00:11:59.771: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
o up
*Mar  1 00:12:00.771: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to up
R2(config-if)#
```

Image 1.6: Setting up R2 with fast ethernet 0/0 with IP address 10.0.0.2 255.255.255.0 .

```
R2(config-if)# interface fastEthernet 0/1
R2(config-if)#ip address 10.0.2.1 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
*Mar  1 00:14:11.103: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state t
o up
*Mar  1 00:14:12.103: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/1, changed state to up
R2(config-if)#
```

Image 1.7: Setting up R2 with fast ethernet 0/1 with IP address 10.0.2.1 255.255.255.0 .

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#interface fastEthernet 0/0
R3(config-if)#ip address 10.0.2.2 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#
*Mar  1 00:13:25.303: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
o up
*Mar  1 00:13:26.303: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to up
R3(config-if)#
```

Image 1.8: Setting up R3 with fast ethernet 0/0 with IP address 10.0.2.2 255.255.255.0 .

```
R3(config-if)#interface fastEthernet 0/1
R3(config-if)#ip address 200.0.0.254 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#
*Mar  1 00:15:00.979: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state t
o up
*Mar  1 00:15:01.979: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/1, changed state to up
R3(config-if)#
```

Image 1.9: Setting up R3 with fast ethernet 0/1 with IP address 200.0.0.254 255.255.255.0

```
R1#show ip interface brief
Interface                 IP-Address      OK? Method Status              Prot
ocol
FastEthernet0/0           192.168.1.254   YES manual up                  up

FastEthernet0/1           10.0.0.1        YES manual up                  up

R1#
```
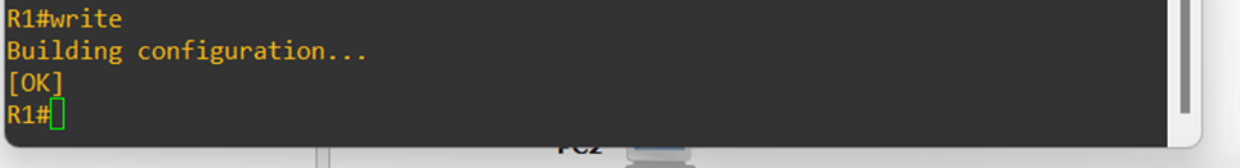
Image 1.10: Checking if we have provided the correct IP address for R1.

```
R2#show ip interface brief
Interface                 IP-Address      OK? Method Status              Protocol
FastEthernet0/0           10.0.0.2        YES manual up                  up
FastEthernet0/1           10.0.2.1        YES manual up                  up
R2#
```

Image 1.11: Checking if we have provided the correct IP address for R2.

```
R3#
*Mar  1 00:27:53.007: %SYS-5-CONFIG_I: Configured from console by console
R3#show ip interface brief
Interface                 IP-Address      OK? Method Status              Prot
ocol
FastEthernet0/0           10.0.2.2        YES manual up                  up

FastEthernet0/1           200.0.0.254     YES manual up                  up
```
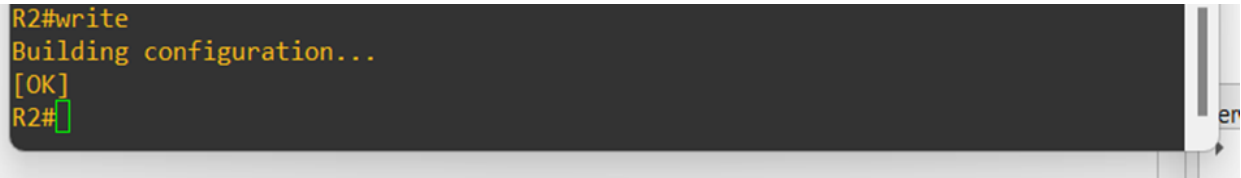
Image 1.12: Checking if we have provided the correct IP address for R3.

```
R1#write
Building configuration...
[OK]
R1#
```
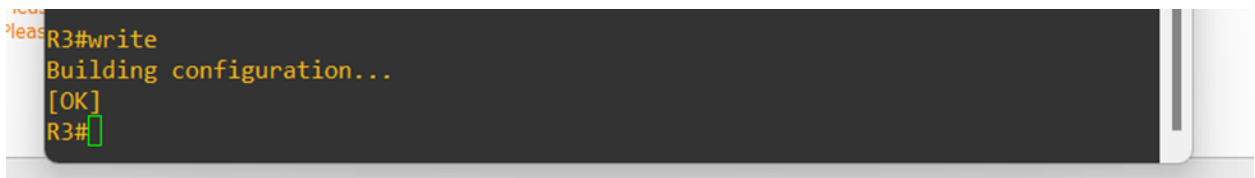
Image 1.13: Using write command to save IP addresses that have been provided to R1.

```
R2#write
Building configuration...
[OK]
R2#
```

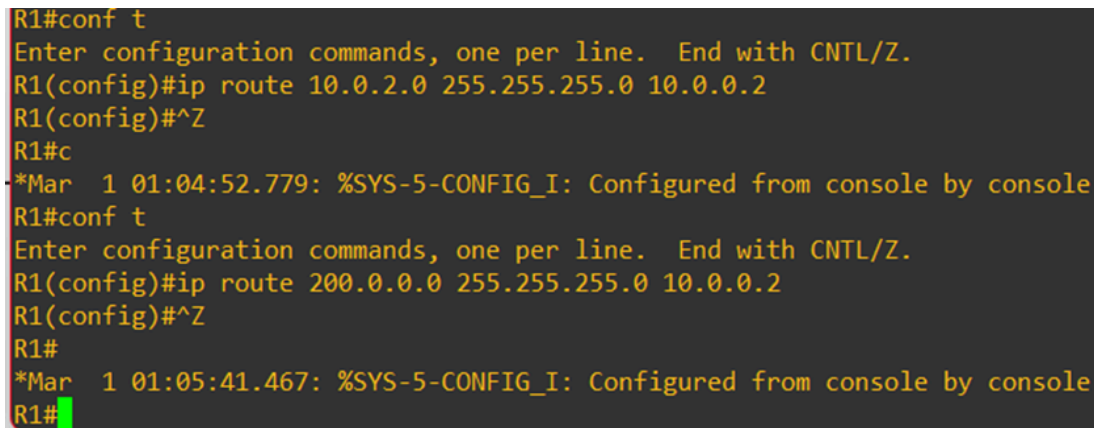**Image 1.14: Using write command to save IP addresses that have been provided to R2.**

```
Pleas R3#write
Building configuration...
[OK]
R3#
```
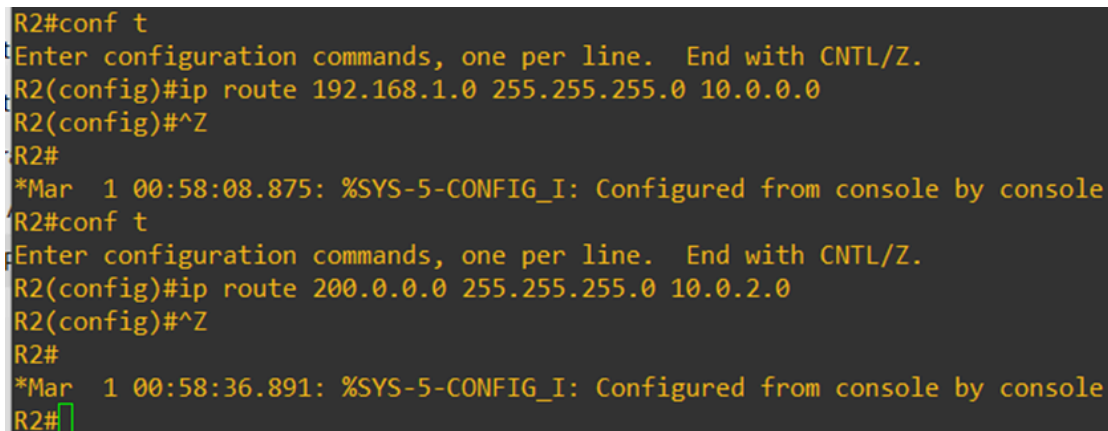
Image 1.15: Using write command to save IP addresses that have been provided to R3.

Part 2 - Static Routing


```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip route 10.0.2.0 255.255.255.0 10.0.0.2
R1(config)#^Z
R1#c
*Mar  1 01:04:52.779: %SYS-5-CONFIG_I: Configured from console by console
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip route 200.0.0.0 255.255.255.0 10.0.0.2
R1(config)#^Z
R1#
*Mar  1 01:05:41.467: %SYS-5-CONFIG_I: Configured from console by console
R1#
```
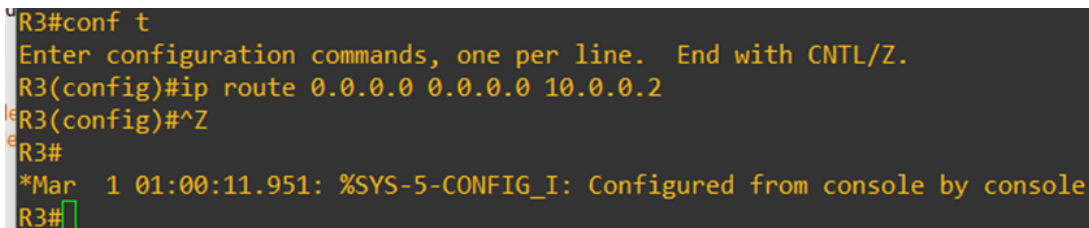
Image 2.1: Configuring the static routing for the R1 router.

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ip route 192.168.1.0 255.255.255.0 10.0.0.0
R2(config)#^Z
R2#
*Mar  1 00:58:08.875: %SYS-5-CONFIG_I: Configured from console by console
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ip route 200.0.0.0 255.255.255.0 10.0.2.0
R2(config)#^Z
R2#
*Mar  1 00:58:36.891: %SYS-5-CONFIG_I: Configured from console by console
R2#
```
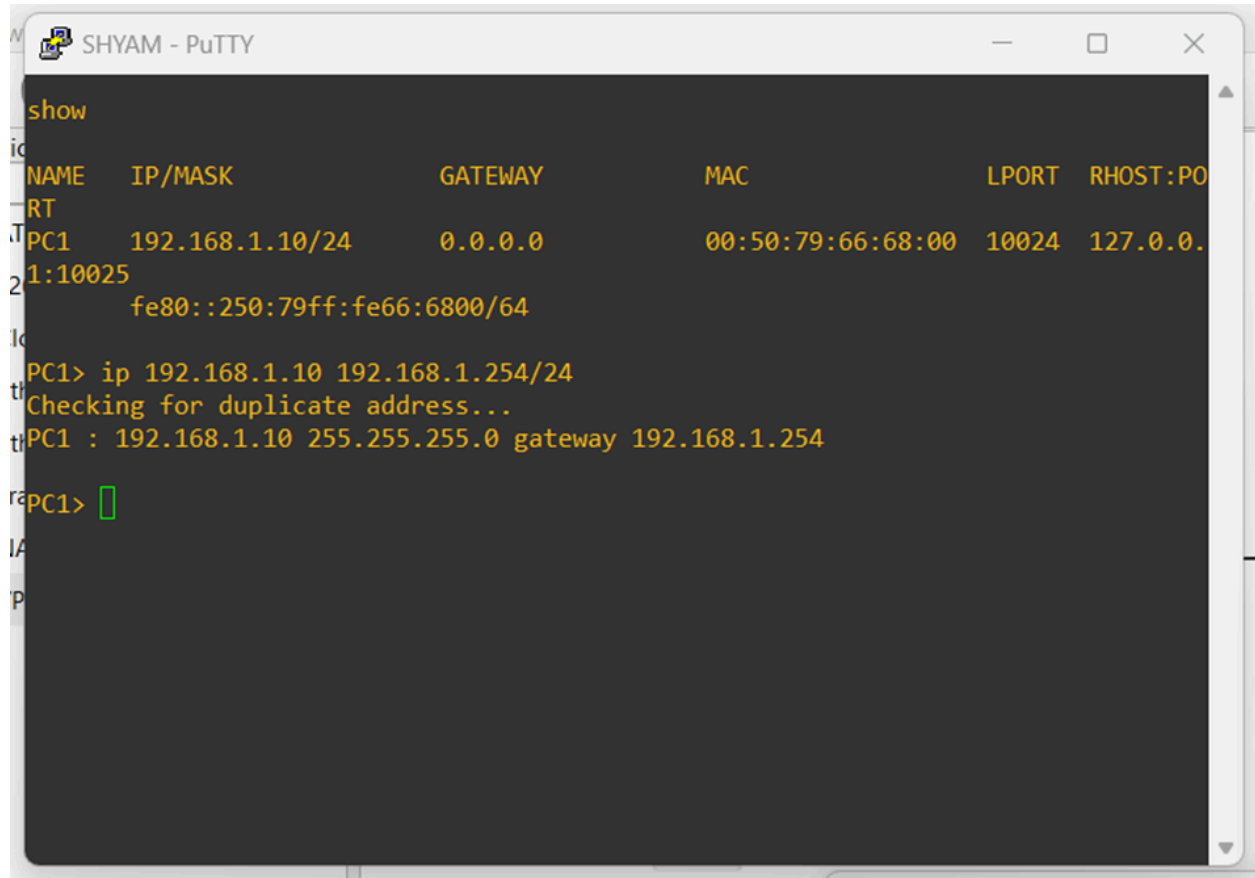
Image 2.2: Configuring the static routing for the R2 router.

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ip route 0.0.0.0 0.0.0.0 10.0.0.2
R3(config)#^Z
R3#
*Mar  1 01:00:11.951: %SYS-5-CONFIG_I: Configured from console by console
R3#
```
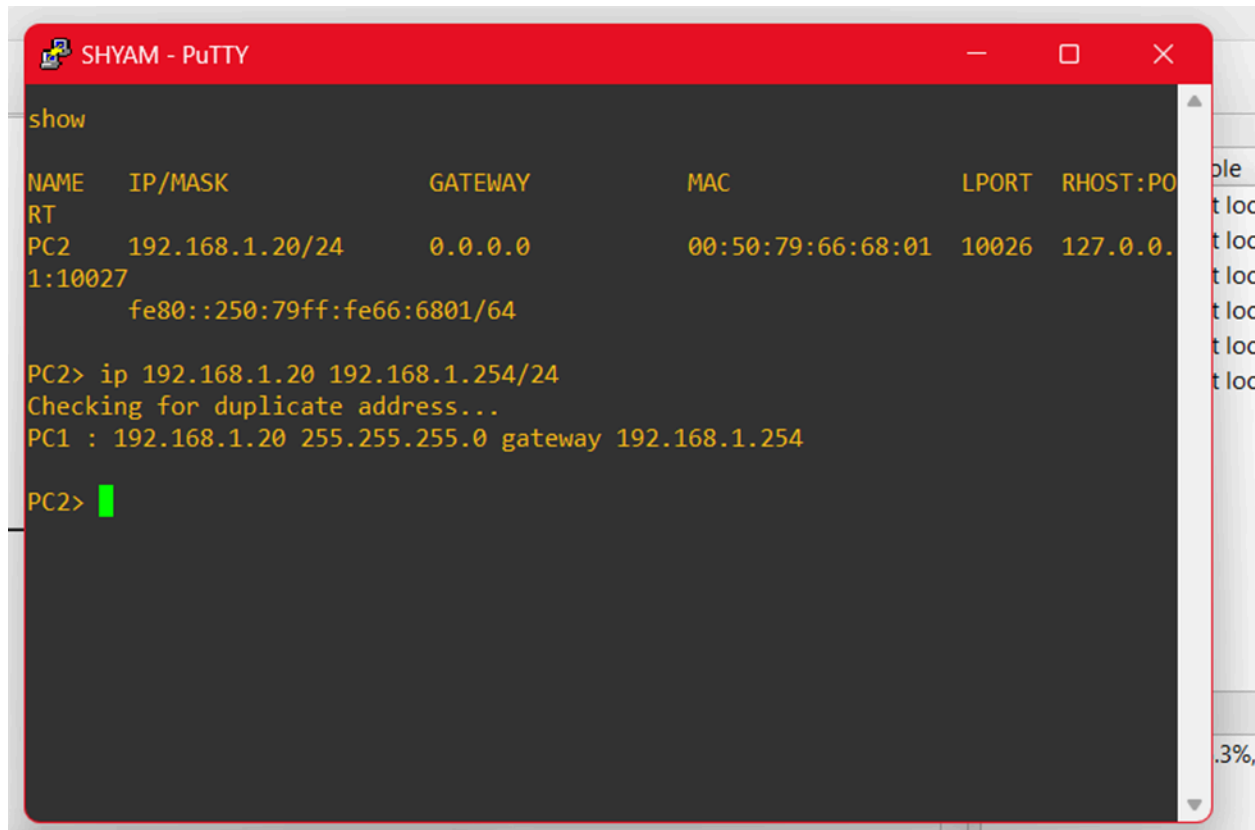
Image 2.3: Configuring the static routing for the R3 router.

When we try pinging from PC1 to R2, the connection won't work and returns as host not reachable, as the static router is connected in such a way that R1 pings from PC1 and reaches R2, but the reply from R2 to PC1 will not be sent back to PC1, thereby returning the error.

```
SHYAM - PuTTY                                           —    □    ✕

show

NAME    IP/MASK              GATEWAY           MAC              LPORT  RHOST:PO
RT
PC1     192.168.1.10/24      0.0.0.0           00:50:79:66:68:00  10024  127.0.0.
1:10025
        fe80::250:79ff:fe66:6800/64

PC1> ip 192.168.1.10 192.168.1.254/24
Checking for duplicate address...
PC1 : 192.168.1.10 255.255.255.0 gateway 192.168.1.254

PC1> █
```

Image 2.4: Pinging IP address 192.168.1.10 192.168.1.254/24 from PC1.

```
show

NAME    IP/MASK                 GATEWAY             MAC               LPORT  RHOST:PO
RT
PC2     192.168.1.20/24         0.0.0.0             00:50:79:66:68:01 10026  127.0.0.
1:10027
        fe80::250:79ff:fe66:6801/64

PC2> ip 192.168.1.20 192.168.1.254/24
Checking for duplicate address...
PC1 : 192.168.1.20 255.255.255.0 gateway 192.168.1.254

PC2>
```
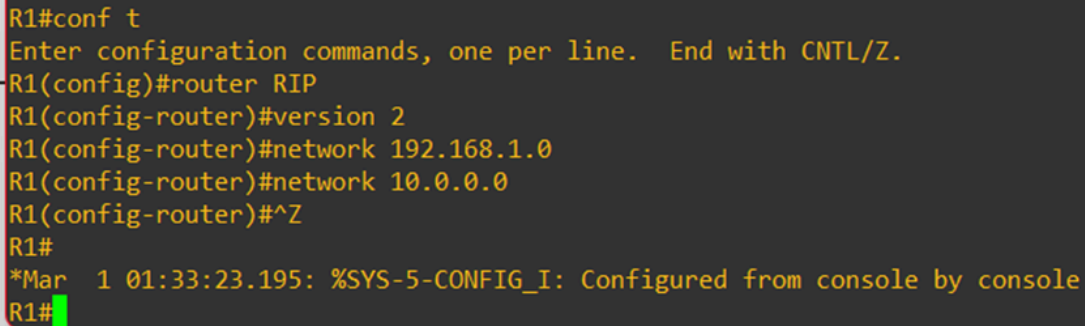
Image 2.5: Pinging IP address 192.168.1.20 192.168.1.254/24 from PC2.

Image 2.6: Pinging IP address 200.0.0.1 200.0.0.254/24 from PC3.

Part 3 - RIP


```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#router RIP
R1(config-router)#version 2
R1(config-router)#network 192.168.1.0
R1(config-router)#network 10.0.0.0
R1(config-router)#^Z
R1#
*Mar  1 01:33:23.195: %SYS-5-CONFIG_I: Configured from console by console
R1#
```

Image 3.1: Setting up the R1's RIP configuration according to the instructions provided
Network 192.168.1.0
Network 10.0.0.0


```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router RIP
R2(config-router)#version 2
R2(config-router)#network 10.0.0.0
R2(config-router)#network 10.0.2.0
R2(config-router)#^Z
R2#
*Mar  1 01:26:56.375: %SYS-5-CONFIG_I: Configured from console by console
R2#
```

Image 3.2: Setting up the R2's RIP configuration according to the instructions provided
Network 10.0.0.0
Network 10.0.2.0

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router RIP
R3(config-router)#version 2
R3(config-router)#network 10.0.2.0
R3(config-router)#network 192.168.1.0
R3(config-router)#^Z
R3#
*Mar  1 01:25:48.827: %SYS-5-CONFIG_I: Configured from console by console
R3#
```
9 on
S3 Technologies.

Image 3.3: Setting up the R3's RIP configuration according to the instructions provided
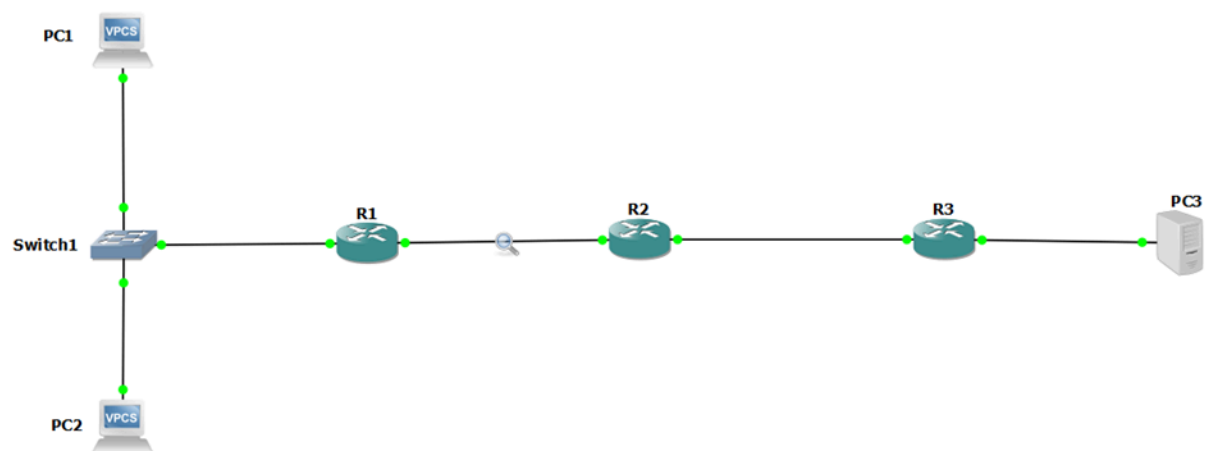**Network 10.0.2.0**
Network 192.168.1.0

Image 3.4: Checking the traffic with any connection between the routers
(R1 and R2 is being checked here)

Image 3.5: Observing the traffic on the link between R1 and R2 using Wireshark

Here , we can see that the RIP updates in RIPv2 use multicast with the IP address 224.0.0.9, instead of broadcasting to 255.255.255.255. This reduces network traffic because the updates are only sent to specific routers that need them, lowering overall network load.