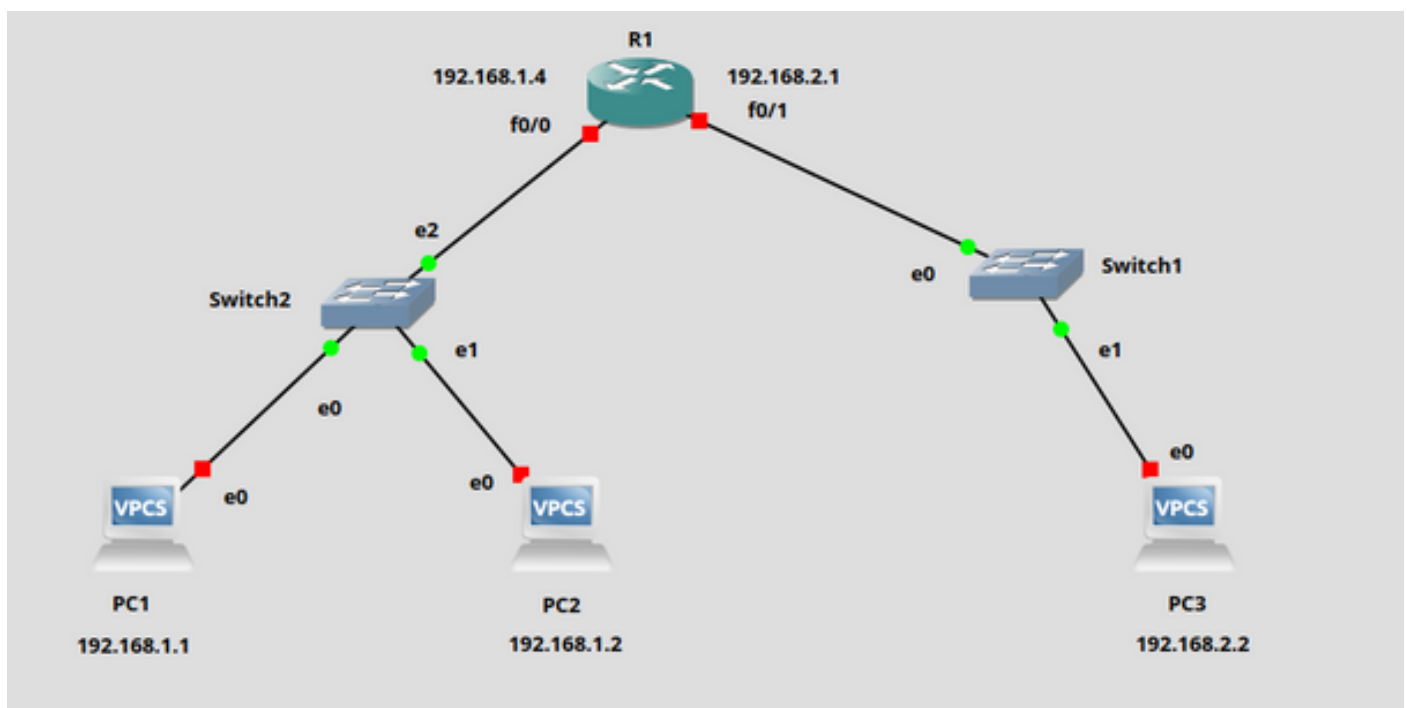


2. Basic Network Troubleshooting Module: Simulate common network issues and implement basic troubleshooting solutions (e.g., ping, traceroute).

Background Research for the problem statement:

- Subnetting and IP addressing.
- Configuration of VPCs with IP addresses and gateways
- Configuration of router and router commands along with different modes in the router.
- Configuration of router to route traffic between different VPCs.
- PING and TRACE commands for troubleshooting and verifying connectivity.



Configurations:

PC1:

IP/MASK: 192.168.1.1/24

Gateway: 192.168.1.1

MAC: 00:50:79:66:68:00

LPORT: 10014

RHOST:PORT: 127.0.0.1:10015

MTU: 1500

PC2:

IP/MASK: 192.168.1.2/24

Gateway: 192.168.1.1

MAC: 00:50:79:66:68:01

LPORT: 10016

RHOST:PORT: 127.0.0.1:10017

MTU: 1500

PC3:

IP/MASK: 192.168.2.3/24

Gateway: 192.168.2.1.

MAC: 00:50:79:66:68:02

LPORT: 10018

RHOST:PORT: 127.0.0.1:10019

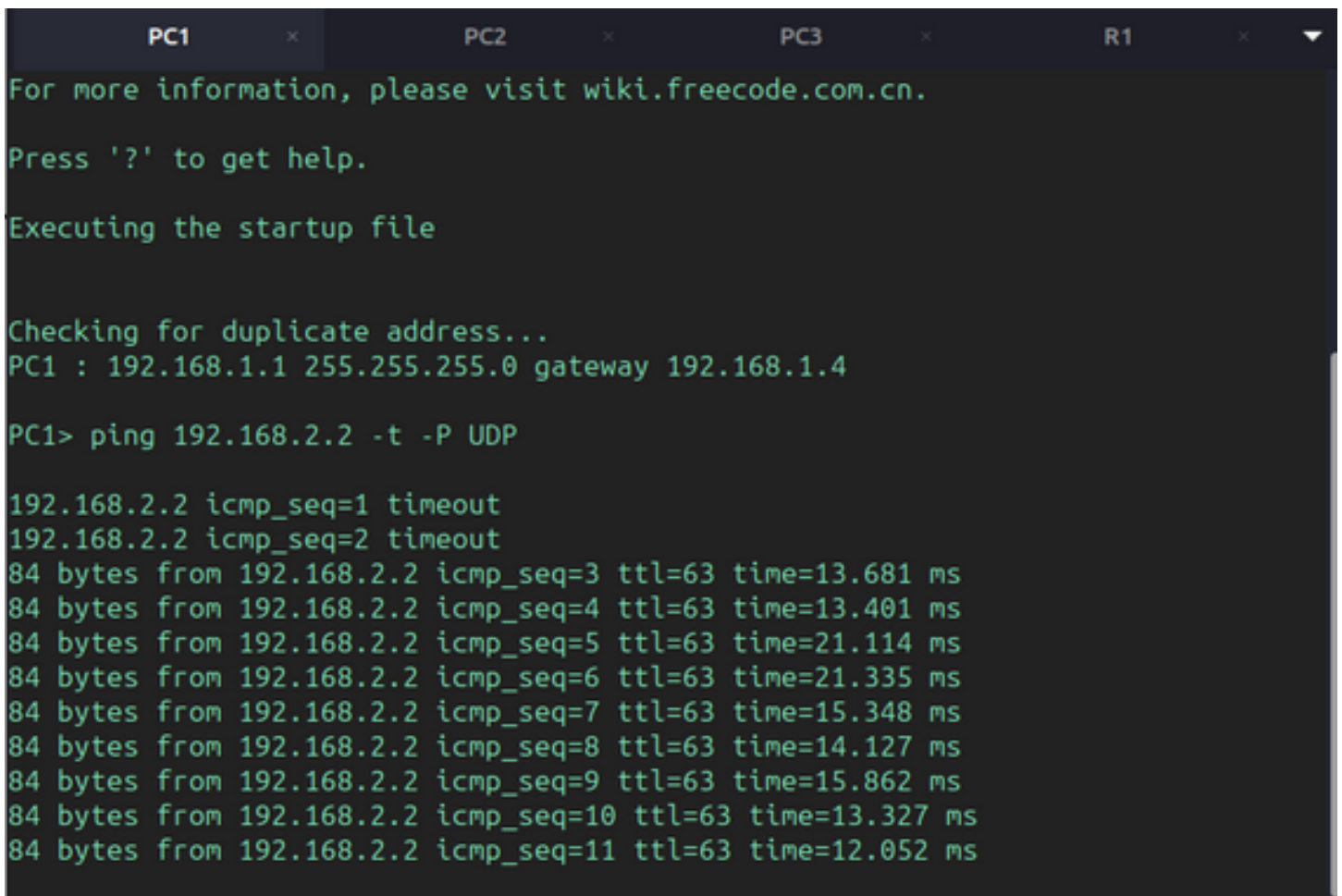
MTU: 1500

Router:

```
interface FastEthernet0/0
 ip address 192.168.1.4 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 192.168.2.1 255.255.255.0
 duplex auto
 speed auto
!
```

Observations:

- Ping:
 - Connectivity between devices.
 - Ping fails or high latency.
 - Analyzed to find out network delays.
 - Used different Protocols to send packets using the ping command.



The screenshot shows a terminal window with four tabs: PC1, PC2, PC3, and R1. The active tab is PC1. The terminal output is as follows:

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

Checking for duplicate address...
PC1 : 192.168.1.1 255.255.255.0 gateway 192.168.1.4

PC1> ping 192.168.2.2 -t -P UDP

192.168.2.2 icmp_seq=1 timeout
192.168.2.2 icmp_seq=2 timeout
84 bytes from 192.168.2.2 icmp_seq=3 ttl=63 time=13.681 ms
84 bytes from 192.168.2.2 icmp_seq=4 ttl=63 time=13.401 ms
84 bytes from 192.168.2.2 icmp_seq=5 ttl=63 time=21.114 ms
84 bytes from 192.168.2.2 icmp_seq=6 ttl=63 time=21.335 ms
84 bytes from 192.168.2.2 icmp_seq=7 ttl=63 time=15.348 ms
84 bytes from 192.168.2.2 icmp_seq=8 ttl=63 time=14.127 ms
84 bytes from 192.168.2.2 icmp_seq=9 ttl=63 time=15.862 ms
84 bytes from 192.168.2.2 icmp_seq=10 ttl=63 time=13.327 ms
84 bytes from 192.168.2.2 icmp_seq=11 ttl=63 time=12.052 ms
```

- Trace command:
 - It helped to find out path packets taken between source and destination.
 - The network route can be easily analyzed.

- Helps to find out routers or switches causing delays.

```
PC1> trace

trace HOST [OPTION ...]
Print the path packets take to the network HOST. HOST can be an ip address or
name.
Options:
  -P protocol    Use IP protocol in trace packets
                  1 - icmp, 17 - udp (default), 6 - tcp
  -m ttl         Maximum ttl, default 8

Notes: 1. Using names requires DNS to be set.
       2. Use Ctrl+C to stop the command.

PC1> trace 192.168.2.2 -P 1
trace to 192.168.2.2, 8 hops max (ICMP), press Ctrl+C to stop
 1  192.168.1.4    4.576 ms   9.192 ms   10.180 ms
 2  192.168.2.2   20.316 ms  19.541 ms  20.420 ms
```

- **IP addressing and Subnetting:**

- Ensured consistent IP addressing across devices.
- Subnetting helps to divide a network within.