

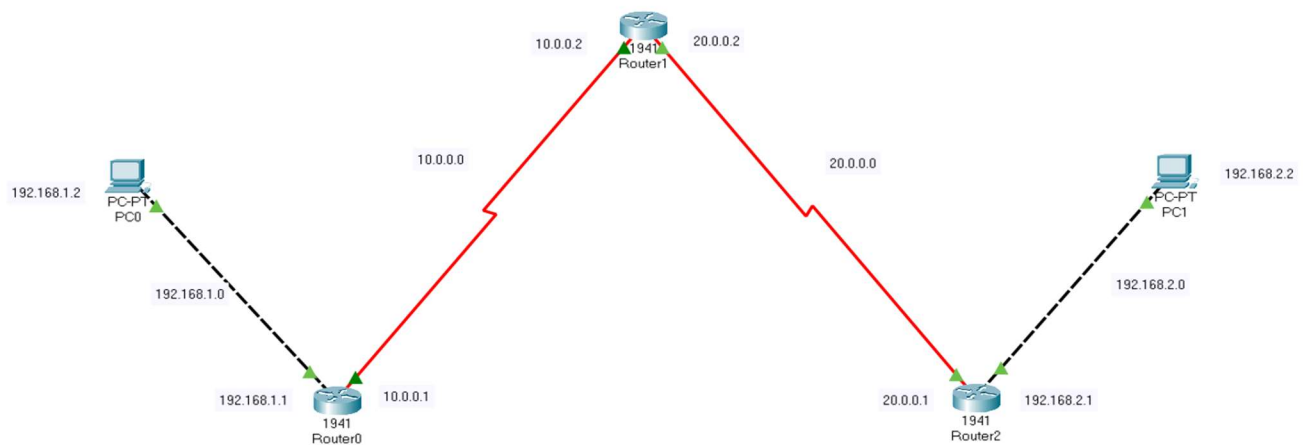
<b>Ex.No:13</b>	<b>IMPLEMENTATION OF VPN</b>
<b>Date:</b>	

### AIM :

To configure VPN using routers in Cisco Packet Tracer.

### PROCEDURE :

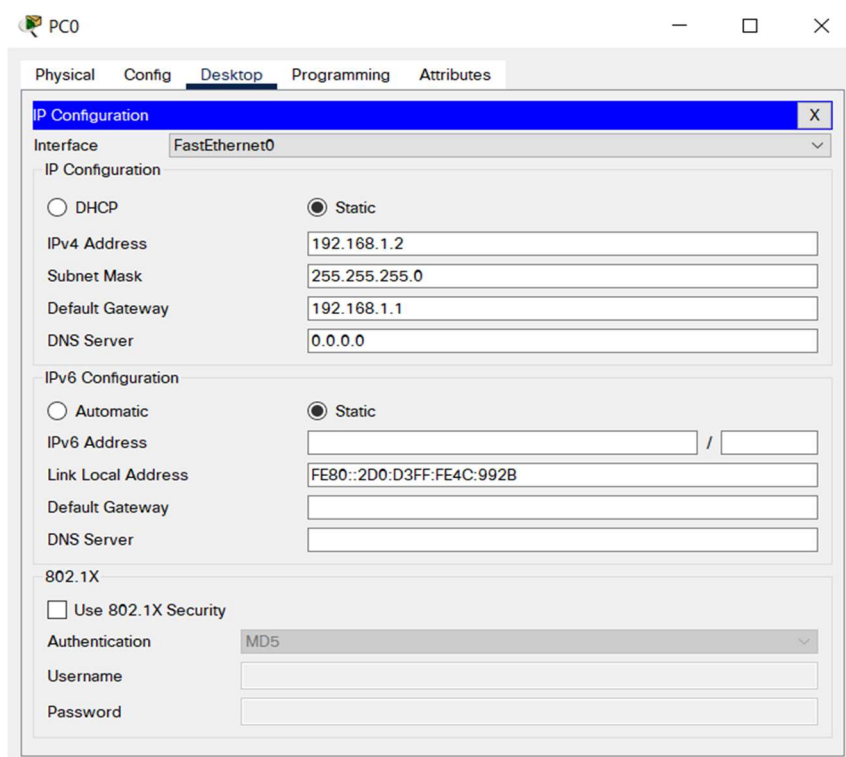
1 . Connect the devices as shown in the below figure.



2 . Initial IP configuration.

Device / Interface	IP Address	Connected with
PC0 / Fa0	192.168.1.2 /24	Router1 / Gig0/0
PC1 / Fa0	192.168.2.2 /24	Router2 / Gig0/0
Router1 / Se0/1/0	10.0.0.1 /8	Router 2 / Se0/1/0
Router2 / Se0/1/0	10.0.0.2 /8	Router 1 / Se0/1/0
Router2 / Se0/1/1	20.0.0.1 /8	Router3 / Se0/1/0
Router3 / Se0/1/0	20.0.0.2 /8	Router2 / Se0/1/1

3 .To assign IP address in Laptop click Laptop and click Desktop and IP configuration and Select Static and set IP address as given in above table.



Following the same way, configure the IP address in PC1.

4. We have to assign ip address on each and every interface of router

CONFIGURATION ON ROUTER1:

```
Router>enable
```

```
Router#config t
```

```
Router(config)#int gig0/0
```

```
Router(config-if)#ip add 192.168.1.1 255.255.255.0
```

```
Router(config-if)#no shut
```

```
Router(config-if)#exit
```

```
Router(config)#int se0/1/0
```

```
Router(config-if)#ip address 10.0.0.1 255.0.0.0
```

```
Router(config-if)#no shut
```

#### CONFIGURATION ON ROUTER2:

```
Router>enable
Router#config t
Router(config)#int se0/1/0
Router(config-if)#ip add 10.0.0.2 255.0.0.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int se0/1/1
Router(config-if)#ip add 20.0.0.1 255.0.0.0
Router(config-if)#no shut
```

#### CONFIGURATION ON ROUTER3:

```
Router>enable
Router#config t
Router(config)#int se0/1/0
Router(config-if)#ip add 20.0.0.2 255.0.0.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int gig0/0
Router(config-if)#ip add 192.168.2.1 255.255.255.0
Router(config-if)#no shut
```

5. Now it's time to do routing. Here we have to configure default routing.

#### DEFAULT ROUTING CONFIGURATION ON ROUTER1:

```
Router>enable
```

```
Router#config t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Router(config)#ip route 0.0.0.0 0.0.0.0 10.0.0.2
```

```
Router(config)#
```

#### DEFAULT ROUTING CONFIGURATION ON ROUTER3:

```
Router>enable
```

```
Router#config t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Router(config)#ip route 0.0.0.0 0.0.0.0 20.0.0.1
```

```
Router(config)#
```

#### 6. NOW CHECK THE CONNECTION BY PINGING EACH OTHER.

First we go to Router1 and ping with Router3:

```
Router#ping 20.0.0.2
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 20.0.0.2, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 26/28/33 ms

Now we go to Router3 and test the network by pinging Router1 interface.

```
Router#ping 10.0.0.1
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 25/28/32 ms

You can clearly see both routers pinging each other successfully.

7. NOW CREATE VPN TUNNEL between Router1 and Router3:

FIRST CREATE A VPN TUNNEL ON ROUTER1:

```
Router#config t
Router(config)#interface tunnel 200
Router(config-if)#ip address 172.18.1.1 255.255.0.0
Router(config-if)#tunnel source se0/1/0
Router(config-if)#tunnel destination 20.0.0.2
Router(config-if)#no shut
```

NOW CREATE A VPN TUNNEL ON ROUTER R3:

```
Router#config t
Router(config)#interface tunnel 400
Router(config-if)#ip address 172.18.1.2 255.255.0.0
Router(config-if)#tunnel source se0/1/0
Router(config-if)#tunnel destination 10.0.0.1
Router(config-if)#no shut
```

Router3

Physical Config CLI Attributes

IOS Command Line Interface

```
%SYS-5-CONFIG_I: Configured from console by console
Router#ping 172.20.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.20.1.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#int tunnel 400

Router(config-if)#
%LINK-5-CHANGED: Interface Tunnel400, changed state to up

Router(config-if)#ip address 172.18.1.2 255.255.0.0
Router(config-if)#tunnel source se0/1/0
Router(config-if)#tunnel destination 10.0.0.1
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel400, changed state to
up

Router(config-if)#no shut
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Ctrl+F6 to exit CLI focus

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Router1

Physical Config CLI Attributes

IOS Command Line Interface

```
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface tunnel 40

Router(config-if)#
%LINK-5-CHANGED: Interface Tunnel40, changed state to up

Router(config-if)#ip address 172.16.1.1 255.255.0.0
% 172.16.0.0 overlaps with Tunnel20
Router(config-if)#ip address 172.20.1.1 255.255.0.0
Router(config-if)#tunnel source gig0/0
Router(config-if)#tunnel destination 20.0.0.2
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel40, changed state to up

Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int tunnel 200

Router(config-if)#
%LINK-5-CHANGED: Interface Tunnel200, changed state to up

Router(config-if)#ip address 172.18.1.1 255.255.0.0
Router(config-if)#tunnel source se0/1/0
Router(config-if)#tunnel destination 20.0.0.2
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel200, changed state to
up

Router(config-if)#no shut
Router(config-if)#
Router(config-if)#exit
```

8. Now test communication between these two routers again by pinging each other:

Router1

```
Router#ping 172.18.1.2
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 172.18.1.2, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 30/32/36 ms

```
Router#
```

Router2

```
Router#ping 172.18.1.1
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 172.18.1.1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 33/45/83 ms

9. Now do routing for created VPN Tunnel on Both Router1 and Router3:

```
Router(config)#ip route 192.168.2.0 255.255.255.0 172.18.1.2
```

```
Router(config)#ip route 192.168.1.0 255.255.255.0 172.18.1.1
```

10. TEST VPN TUNNEL CONFIGURATION:

Now we have to test whether tunnel is created or not for Router1

```
Router#show interfaces Tunnel 200
```

Tunnel200 is up, line protocol is up (connected)

Hardware is Tunnel

Internet address is 172.18.1.1/16

MTU 17916 bytes, BW 100 Kbit/sec, DLY 50000 usec,  
reliability 255/255, txload 1/255, rxload 1/255  
Encapsulation TUNNEL, loopback not set  
Keepalive not set  
Tunnel source 10.0.0.1 (FastEthernet0/1), destination 20.0.0.2  
Tunnel protocol/transport GRE/IP  
Key disabled, sequencing disabled  
Checksumming of packets disabled  
Tunnel TTL 255  
Fast tunneling enabled  
Tunnel transport MTU 1476 bytes  
Tunnel transmit bandwidth 8000 (kbps)  
Tunnel receive bandwidth 8000 (kbps)  
Last input never, output never, output hang never  
Last clearing of "show interface" counters never  
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 1  
Queueing strategy: fifo  
Output queue: 0/0 (size/max)  
5 minute input rate 32 bits/sec, 0 packets/sec  
5 minute output rate 32 bits/sec, 0 packets/sec  
52 packets input, 3508 bytes, 0 no buffer  
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles  
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort  
0 input packets with dribble condition detected  
52 packets output, 3424 bytes, 0 underruns  
0 output errors, 0 collisions, 0 interface resets



0 unknown protocol drops

0 output buffer failures, 0 output buffers swapped out

Router1

Physical Config CLI Attributes

IOS Command Line Interface

```
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show interfaces tunnel 200
Tunnel200 is up, line protocol is up (connected)
  Hardware is Tunnel
  Internet address is 172.18.1.1/16
  MTU 17916 bytes, BW 100 Kbit/sec, DLY 50000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation TUNNEL, loopback not set
  Keepalive not set
  Tunnel source 10.0.0.1 (Serial0/1/0), destination 20.0.0.2
  Tunnel protocol/transport GRE/IP
    Key disabled, sequencing disabled
    Checksumming of packets disabled
  Tunnel TTL 255
  Fast tunneling enabled
  Tunnel transport MTU 1476 bytes
  Tunnel transmit bandwidth 8000 (kbps)
  Tunnel receive bandwidth 8000 (kbps)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 1
  Queueing strategy: fifo
  Output queue: 0/0 (size/max)
  5 minute input rate 8 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    5 packets input, 640 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
```

Ctrl+F6 to exit CLI focus

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Router3

Physical Config CLI Attributes

IOS Command Line Interface

```
%SYS-5-CONFIG_I: Configured from console by console

Router#show interfaces Tunnel 200
%Invalid interface type and number

Router#show interfaces Tunnel 400
Tunnel400 is up, line protocol is up (connected)
  Hardware is Tunnel
  Internet address is 172.18.1.2/16
  MTU 17916 bytes, BW 100 Kbit/sec, DLY 50000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation TUNNEL, loopback not set
  Keepalive not set
  Tunnel source 20.0.0.2 (Serial0/1/0), destination 10.0.0.1
  Tunnel protocol/transport GRE/IP
    Key disabled, sequencing disabled
    Checksumming of packets disabled
  Tunnel TTL 255
  Fast tunneling enabled
  Tunnel transport MTU 1476 bytes
  Tunnel transmit bandwidth 8000 (kbps)
  Tunnel receive bandwidth 8000 (kbps)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 1
  Queueing strategy: fifo
  Output queue: 0/0 (size/max)
  5 minute input rate 8 bits/sec, 0 packets/sec
--More--
```

Ctrl+F6 to exit CLI focus

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Now going to Router3 and test VPN Tunnel Creation:

```
Router #show interface Tunnel 400
```

Tunnel400 is up, line protocol is up (connected)

Hardware is Tunnel

Internet address is 172.18.1.2/16

MTU 17916 bytes, BW 100 Kbit/sec, DLY 50000 usec,

reliability 255/255, txload 1/255, rxload 1/255

Encapsulation TUNNEL, loopback not set

Keepalive not set

Tunnel source 20.0.0.2 (FastEthernet0/0), destination 10.0.0.1

Tunnel protocol/transport GRE/IP

Key disabled, sequencing disabled

Checksumming of packets disabled

Tunnel TTL 255

Fast tunneling enabled

Tunnel transport MTU 1476 bytes

Tunnel transmit bandwidth 8000 (kbps)

Tunnel receive bandwidth 8000 (kbps)

Last input never, output never, output hang never

Last clearing of "show interface" counters never

Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 1

Queueing strategy: fifo

Output queue: 0/0 (size/max)

5 minute input rate 32 bits/sec, 0 packets/sec

5 minute output rate 32 bits/sec, 0 packets/sec

52 packets input, 3424 bytes, 0 no buffer

Received 0 broadcasts, 0 runs, 0 giants, 0 throttles

0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort

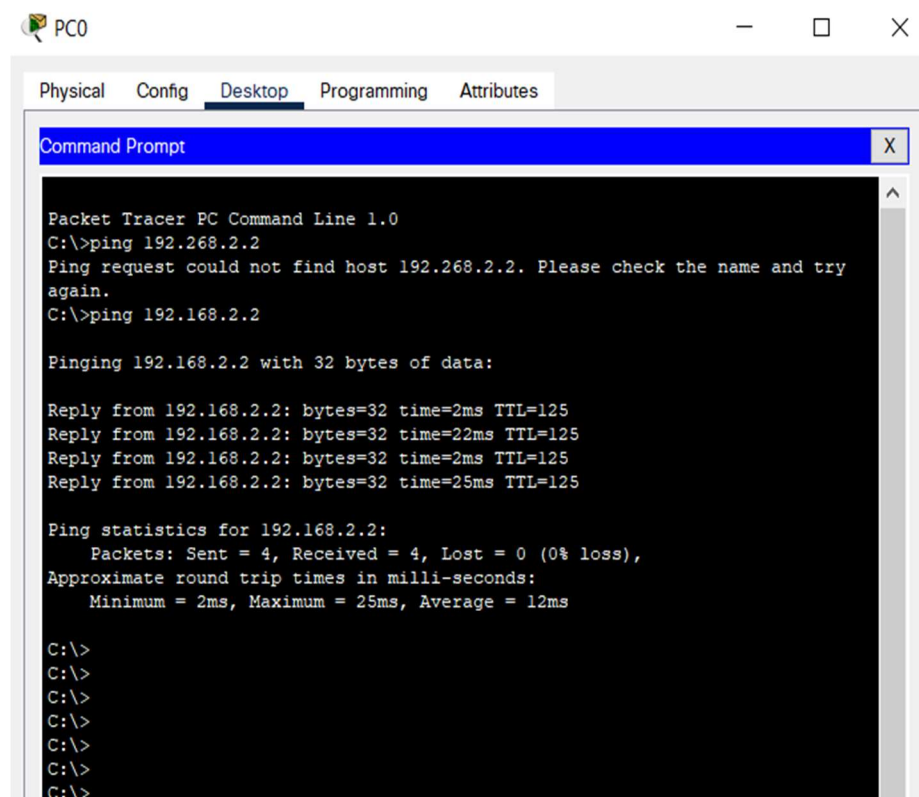
0 input packets with dribble condition detected

53 packets output, 3536 bytes, 0 underruns

0 output errors, 0 collisions, 0 interface resets

0 unknown protocol drops

11. Trace the VPN tunnel path.



The screenshot shows a Packet Tracer PC Command Prompt window for PC0. The window has tabs for Physical, Config, Desktop, Programming, and Attributes, with Desktop selected. The Command Prompt displays the following text:

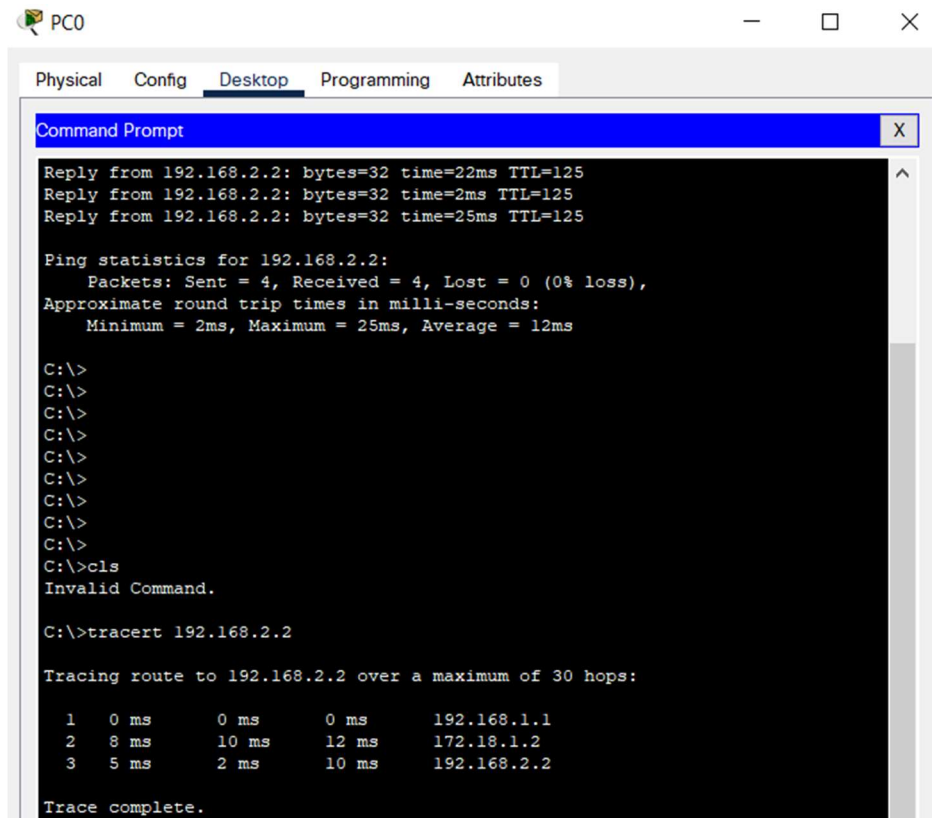
```
Packet Tracer PC Command Line 1.0
C:\>ping 192.268.2.2
Ping request could not find host 192.268.2.2. Please check the name and try again.
C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=2ms TTL=125
Reply from 192.168.2.2: bytes=32 time=22ms TTL=125
Reply from 192.168.2.2: bytes=32 time=2ms TTL=125
Reply from 192.168.2.2: bytes=32 time=25ms TTL=125

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 25ms, Average = 12ms

C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
```



The screenshot shows a Cisco Packet Tracer interface with a PC0 configuration window open. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The command prompt shows the results of a ping command to 192.168.2.2, followed by a 'cls' command, and then a 'tracert' command to the same IP address. The traceroute shows three hops: the first hop is 192.168.1.1 with 0 ms delay; the second hop is 172.18.1.2 with 8 ms, 10 ms, and 12 ms delays; and the third hop is 192.168.2.2 with 5 ms, 2 ms, and 10 ms delays. The trace is complete.

```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Reply from 192.168.2.2: bytes=32 time=22ms TTL=125
Reply from 192.168.2.2: bytes=32 time=2ms TTL=125
Reply from 192.168.2.2: bytes=32 time=25ms TTL=125

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 25ms, Average = 12ms

C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>cls
Invalid Command.

C:\>tracert 192.168.2.2

Tracing route to 192.168.2.2 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      192.168.1.1
  2  8 ms      10 ms     12 ms     172.18.1.2
  3  5 ms      2 ms      10 ms     192.168.2.2

Trace complete.
```

## RESULT:

Hence successfully, configured VPN using routers in Cisco Packet Tracer.