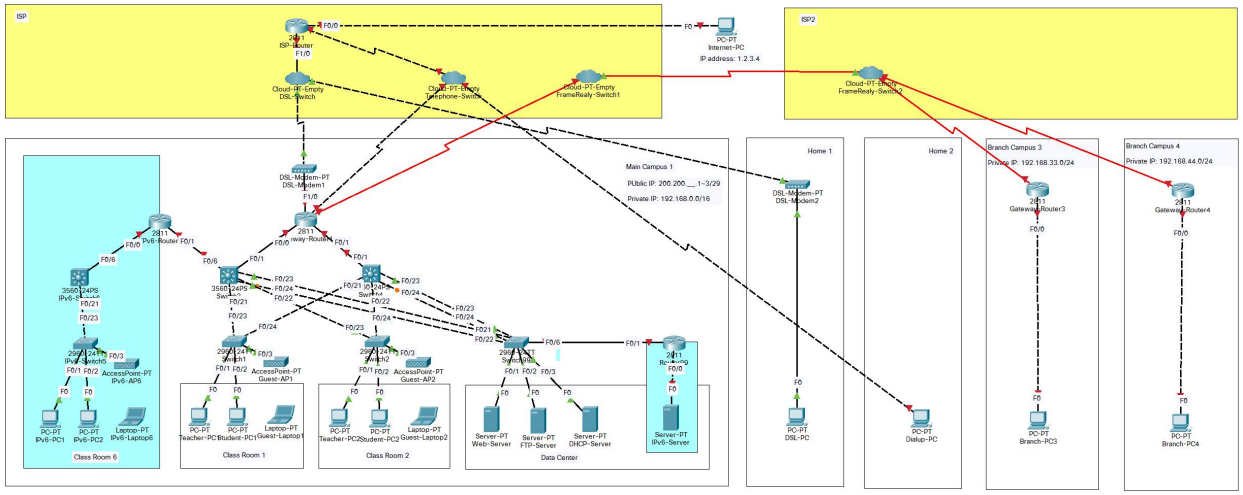
Lab 3.WANs Technology

SILAN HU | 2009853P-I011-0015

Objective

- Understand the WANs Technologies, including dedicated, circuit-switched and packet-switched networks.

Topology



Address Scheme

Inside:

Host name	Interface	IPv4/IPv6 address	Memo
Switch1	F0/1	N/A	VLAN ID = 11
	F0/2	N/A	VLAN ID = 22
	F0/3	N/A	VLAN ID = 88
	F0/23~24	N/A	VLAN ID = All VLANs (trunk)
Switch2	F0/1	N/A	VLAN ID = 11
	F0/2	N/A	VLAN ID = 22
	F0/3	N/A	VLAN ID = 88
	F0/23~24	N/A	VLAN ID = All VLANs (trunk)
Switch3	F0/1	N/A	VLAN ID = 101
	F0/6	N/A	VLAN ID = 66
	F0/21~24	N/A	VLAN ID = All VLANs (trunk)
	Vlan 11	IPv4: 192.168.11.1/24	SVI
	Vlan 22	IPv4: 192.168.22.1/24	SVI
	Vlan 66	IPv4: 192.168.66.1/24	SVI
	Vlan 88	IPv4: 192.168.88.1/24	SVI
	Vlan 99	IPv4: 192.168.99.2/24	SVI
	Vlan 101	IPv4: 192.168.101.2/24	SVI
Switch4	F0/1	N/A	VLAN ID = 102
	F0/21~24	N/A	VLAN ID = All VLANs (trunk)
	Vlan 11	IPv4: 192.168.11.2/24	SVI
	Vlan 22	IPv4: 192.168.22.2/24	SVI
	Vlan 88	IPv4: 192.168.88.2/24	SVI
	Vlan 99	IPv4: 192.168.99.2/24	SVI
	Vlan 102	IPv4: 192.168.102.2/24	SVI
Switch99	F0/1	N/A	VLAN ID = 99
	F0/2	N/A	VLAN ID = 99
	F0/3	N/A	VLAN ID = 99
	F0/6	N/A	VLAN ID = 99
	F0/21~24	N/A	VLAN ID = All VLANs (trunk)
Gateway-Router1	F0/0	IPv4: 192.168.101.1/24	N/A
	F0/1	IPv4: 192.168.102.1/24	N/A
	F1/0 (PPPoE)	IPv4: 201.201.201.2/24 (Static)	N/A
	Modem0/0/0	IPv4: 172.16.1.1/24	Phone no. = 85322222222
	S1/0/0 (FrameRelay)	IPv4: 172.16.2.1/24	DLCI = 103, 104
IPv6-Router	F0/0	IPv6: 2001:2345:6789:66::6/64	N/A
	F0/1	IPv4: 192.168.66.6/24	N/A
Router99	F0/0	IPv6: 2001:2345:6789:99::6/64	
	F0/1	IPv4: 192.168.99.6/24	
Gateway-Router3	F0/0	IPv4: 192.168.33.1/24	
	S1/0/0 (FrameRelay)	IPv4: 172.16.2.3/24	DLCI = 301
Gateway-Router4	F0/0	IPv4: 192.168.44.1/24	
	S1/0/0 (FrameRelay)	IPv4: 172.16.2.4/24	DLCI = 401
Teacher-PC1~2	F0	IPv4: 192.168.11.101~199/24	N/A
Student-PC1~2	F0	IPv4: 192.168.22.101~199/24	N/A
Guest-Laptop1~2	F0	IPv4: 192.168.88.101~199/24	N/A
IPv6-PC1~2		IPv6: 2001:2345:6789:66::?:?:?:?/64	

IPv6-Laptop			
DSL-PC	F0	IPv4: 201.201.201.101~199/24 (DHCP via ISP)	
Dialup-PC	Modem0	IPv4: 202.202.202.101~199/24 (DHCP via ISP) Or IPv4: 172. 16. 1.101~199/24 (DHCP via Gateway-Router1)	Phone no. = 85333333333
Branch-PC3	F0	IPv4: 192.168. 33.101~199/24 (DHCP via Gateway-Router1)	
Branch-PC4	F0	IPv4: 192.168. 44.101~199/24 (DHCP via Gateway-Router1)	
Web-Server FTP Server DHCP-Server IPv6-Server	F0 F0 F0 F0	IPv4: 192.168. 99.101/24 IPv4: 192.168. 99.102/24 IPv4: 192.168. 99.103/24 IPv6: 2001:2345:6789. 99::106/64	N/A

Outside:

ISP-Router	F0/0	IPv4: 1. 1. 1. 1/8	N/A
	F1/0 (PPPoE)	IPv4: 201.201.201. 1/24	N/A
	Modem0/0/0	IPv4: 202.202.202. 1/24	Phone no. = 85311111111
Internet-PC	F0/0	IPv4: 1. 2. 3. 4/8	N/A

Translation:

Addressing Scheme for NAT		
	Public IPv4 addresses	Private IPv4 addresses
Teacher-PC1~2 Student-PC1~2 Guest-PC1~2 Branch-PC3 Branch-PC4	200.200.123.1/29	192.168. 11. 0/24 192.168. 22. 0/24 192.168. 88. 0/24 192.168. 33. 0/24 192.168. 44. 0/24
Web-Server FTP Server	200.200.123.2 200.200.123.3	192.168. 99.101/24 192.168. 99.102/24

Part 1 – Dedicated Network.

> Requirement:
>
> - 1.1 Gateway-Router -> Internet-PC using Enterprise DSL
> - 1.2 DSL-PC -> Internet-PC using Personal DSL

Step 1 – Enterprise DSL

1. configure the DSL on the provider's site (e.g. ISP-Router)

Reference 5.Q5

```
ISP-Router(config)#interface FastEthernet 1/0
ISP-Router(config-if)#ip address 201.201.201.1 255.255.255.0
ISP-Router(config-if)#pppoe enable
ISP-Router(config-if)#no shutdown

ISP-Router(config-if)#no ip route 200.200.123.0 255.255.255.248 200.200.200.2
ISP-Router(config)#ip route 200.200.123.0 255.255.255.248 201.201.201.2
%LINK-5-CHANGED: Interface Virtual-Access1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access1, changed state to up
```

```
Device Name: ISP-Router
Device Model: 2811
Hostname: ISP-Router

Port              Link   VLAN   IP Address         IPv6 Address                              MAC Address
FastEthernet0/0   Up     --     1.1.1.1/8          <not set>                                 0001.C789.5AB3
FastEthernet0/1   Down   --     <not set>          <not set>                                 0030.F2B8.DE7A
Modem0/0/0        Down   --     <not set>          <not set>                                 <not set>
Modem0/0/1        Down   --     <not set>          <not set>                                 <not set>
FastEthernet1/0   Up     --     201.201.201.1/24   <not set>                                 00D0.58E8.DD95
Serial1/0/0       Down   --     <not set>          <not set>                                 <not set>
Serial1/0/1       Down   --     <not set>          <not set>                                 <not set>
Virtual-Access1   Up     --     <not set>          <not set>                                 00E0.A3C4.91EA
Vlan1             Down   1      <not set>          <not set>                                 0001.6337.D93C
```

2. configure the DSL on the subscriber's site. (e.g. Gateway-Router1)

Reference 5.Q13

```
Gateway-Router1(config)#interface FastEthernet 1/0
Gateway-Router1(config-if)#ip address 201.201.201.2 255.255.255.0
Gateway-Router1(config-if)#pppoe enable
Gateway-Router1(config-if)#no shutdown

Gateway-Router1(config-if)#no ip route 0.0.0.0 0.0.0.0 200.200.200.1
Gateway-Router1(config)#ip route 0.0.0.0 0.0.0.0 201.201.201.1
%LINK-5-CHANGED: Interface Virtual-Access1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access1, changed state to up
```

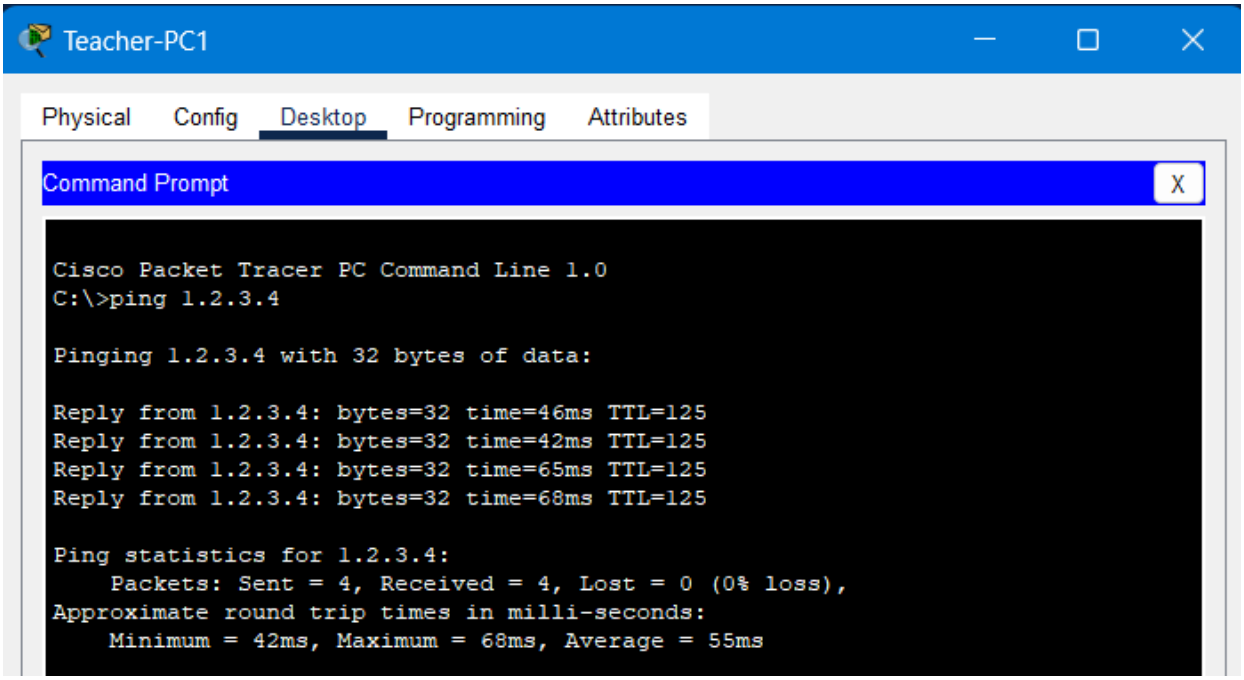
```
Device Name: Gateway-Router1
Device Model: 2811
Hostname: Gateway-Router1

Port              Link   VLAN   IP Address         IPv6 Address                              MAC Address
FastEthernet0/0   Up     --     192.168.101.1/24   <not set>                                 0004.9A24.6B91
FastEthernet0/1   Up     --     192.168.102.1/24   <not set>                                 000A.41E0.D395
Modem0/0/0        Down   --     <not set>          <not set>                                 <not set>
Modem0/0/1        Down   --     <not set>          <not set>                                 <not set>
FastEthernet1/0   Up     --     201.201.201.2/24   <not set>                                 000C.CF39.4B69
Serial1/0/0       Down   --     <not set>          <not set>                                 <not set>
Serial1/0/1       Down   --     <not set>          <not set>                                 <not set>
```

3. test the connectivity of the DSL connection.

- From **Gateway-Router1** to **Internet-PC**

```
Gateway-Router1#ping 1.2.3.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.2.3.4, timeout is 2 seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 42/49/60 ms
```

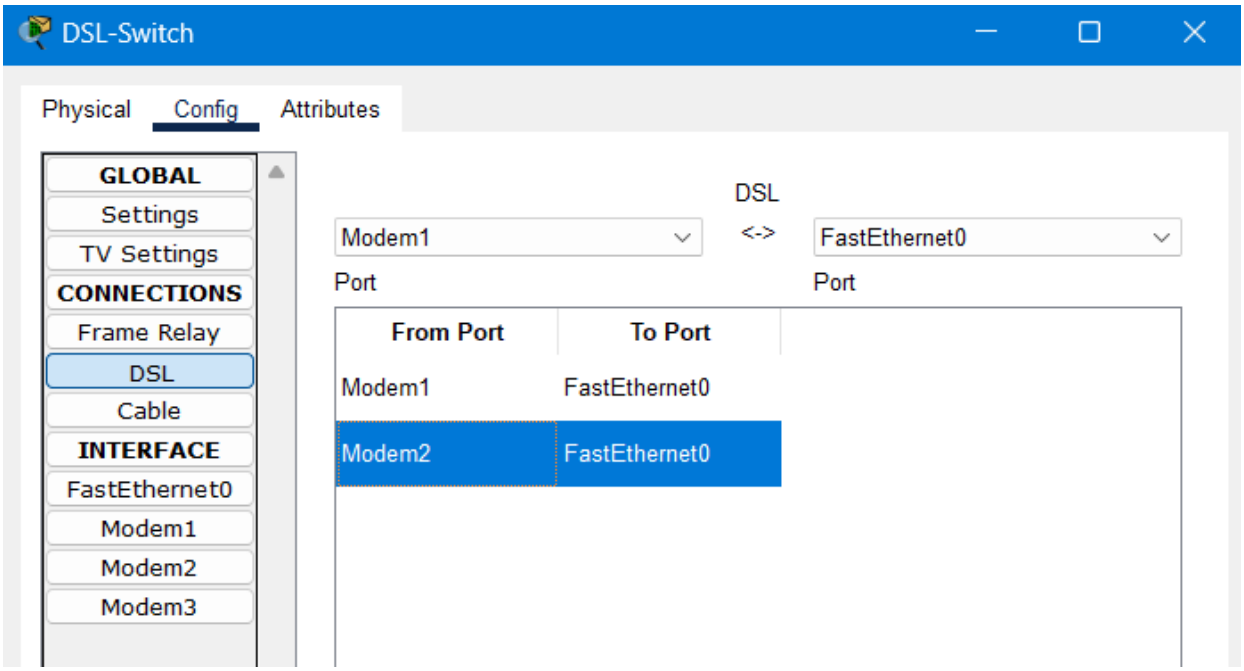
- From **Teacher-PC1** to **Internet-PC**



Step 2 – Personal DSL

4. configure the DSL on the provider's site (e.g. ISP-Router)

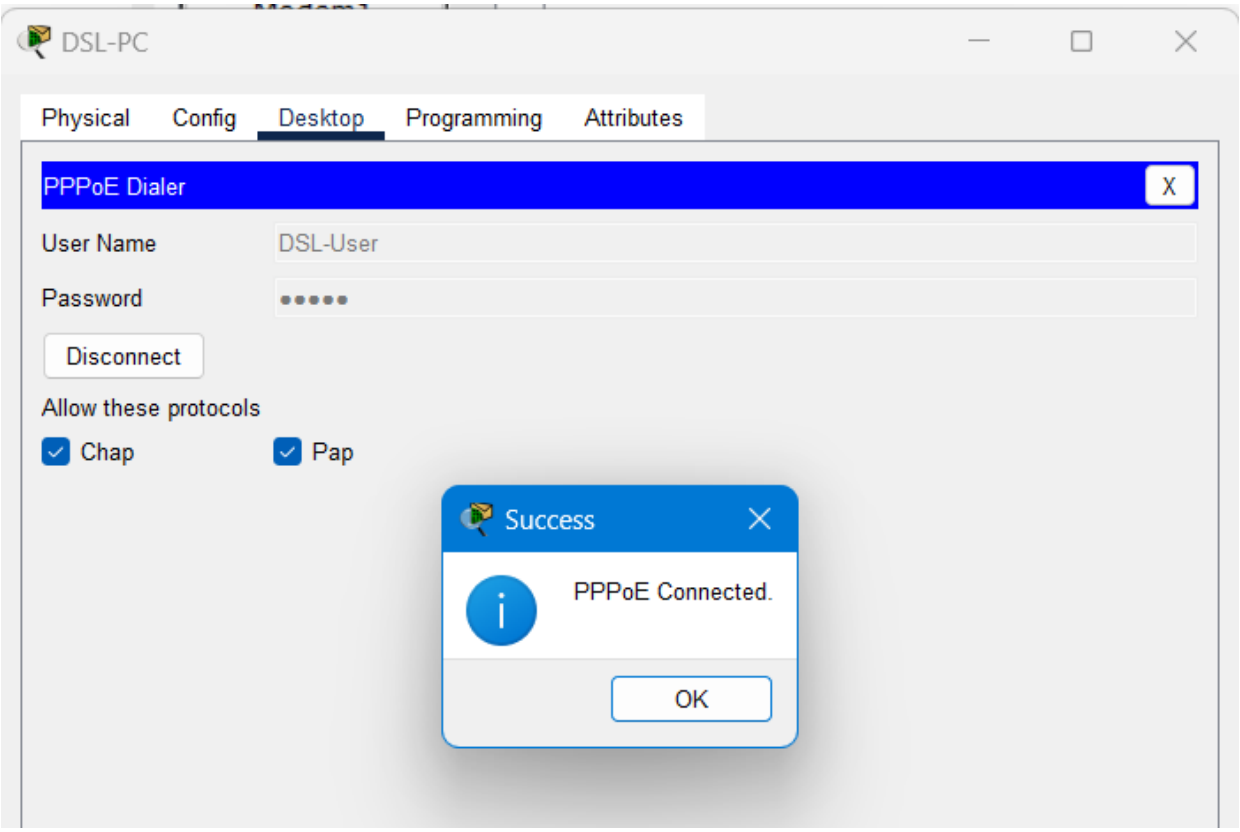
Reference 5.Q1~5




```
ISP-Router(config)#ip local pool Personal-PPPoEPool 201.201.201.101 201.201.201.199

ISP-Router(config)#interface Virtual-Template 1
ISP-Router(config-if)#ip unnumbered FastEthernet 1/0
ISP-Router(config-if)#peer default ip address pool Personal-PPPoEPool

ISP-Router(config-if)#ppp authentication chap callin
AAA: Warning, authentication list callin is not defined for PPP.
ISP-Router(config-if)#exit

ISP-Router(config)#username DSL-User password Hello

ISP-Router(config)#bba-group pppoe MyGroup
ISP-Router(config-bba)#virtual-template 1

ISP-Router(config-bba)#interface FastEthernet 1/0
ISP-Router(config-if)#pppoe enable group MyGroup
```

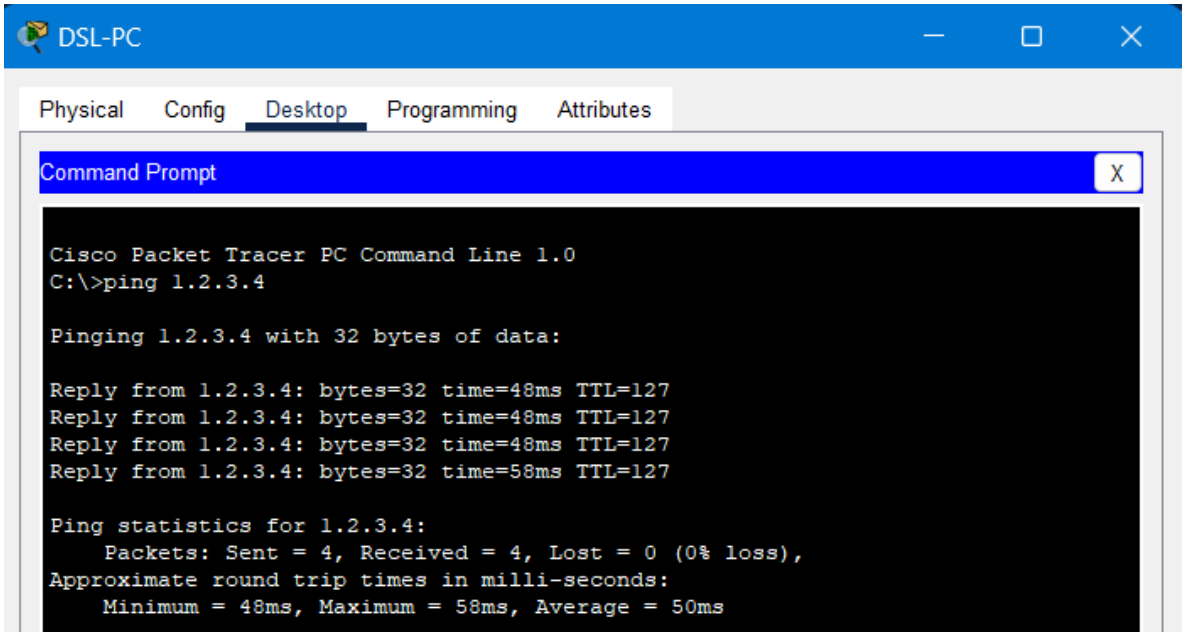
5. configure the DSL on the subscriber's site. (e.g. DSL-PC)

Reference 5.Q7~11



6. test the connectivity of the DSL connection.

- From **DSL-PC** to **Internet-PC**



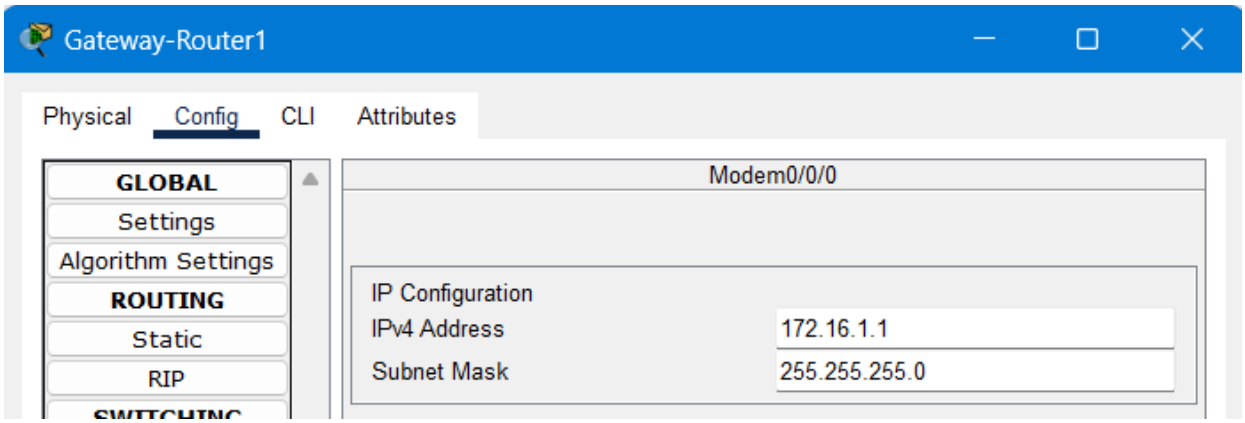
Part 2 – Circuit-switched Network.

> Requirement:
> 2.1 Dialup-PC -> Internet-PC using analog dialup
> 2.2 Dialup-PC -> Teacher-PC/Student-PC/Servers using analog dialup

Step 3 – Analog dialup

7. configure analog dialup on the provider's site (e.g. ISP-Router)

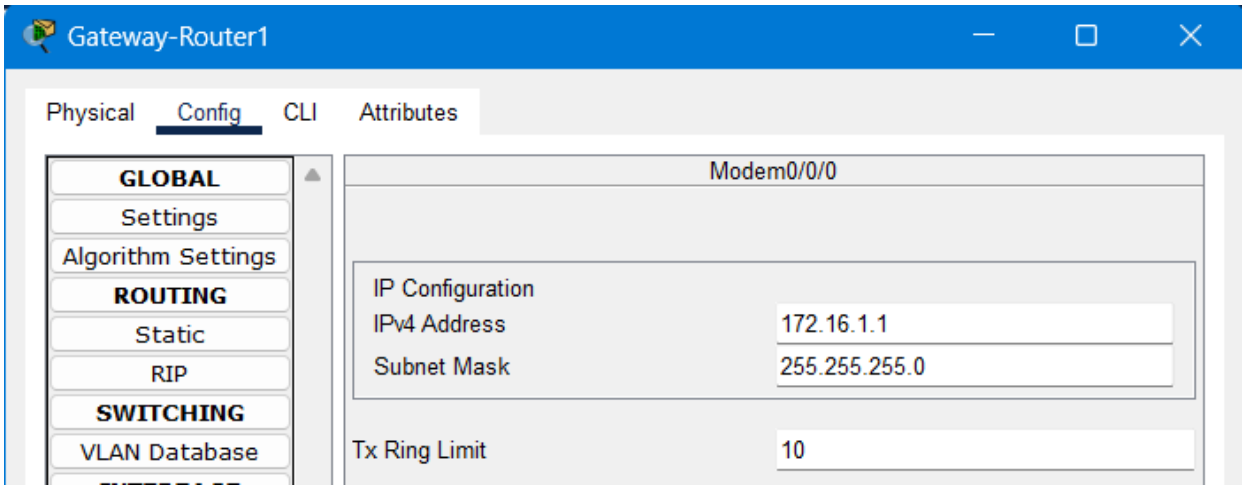
Reference 6.Q1~3




```
ISP-Router(config)#username Dialup-User password Hello

ISP-Router(config)#ip dhcp excluded-address 202.202.202.1 202.202.202.100
ISP-Router(config)#ip dhcp excluded-address 202.202.202.200 202.202.202.255
ISP-Router(config)#ip dhcp pool Dialup-DHCPPool
ISP-Router(dhcp-config)#network 202.202.202.0 255.255.255.0
ISP-Router(dhcp-config)#default-router 202.202.202.1
```

8. configure analog dialup on the campus's site (e.g. Gateway-Router1)

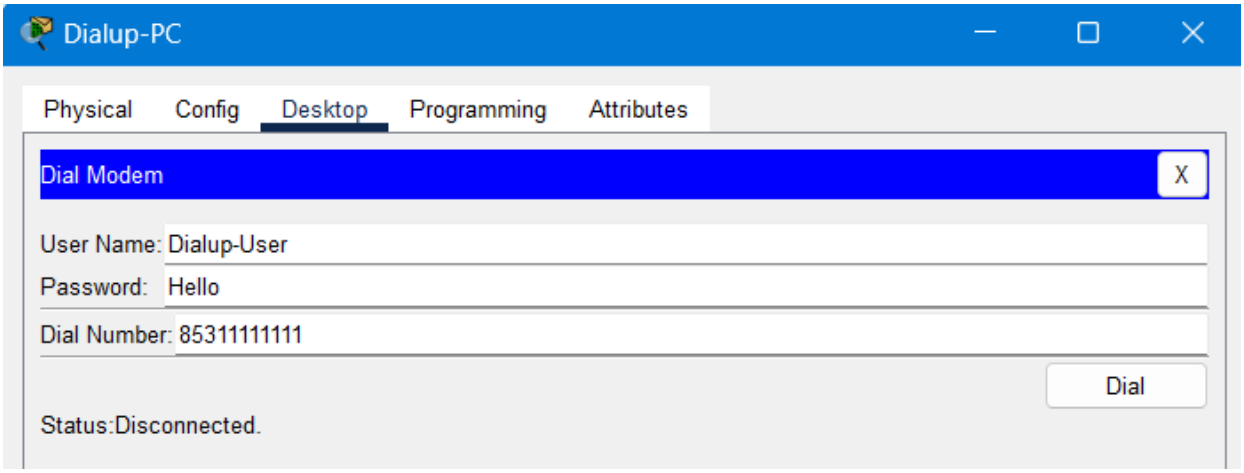
Reference 6.Q10~12

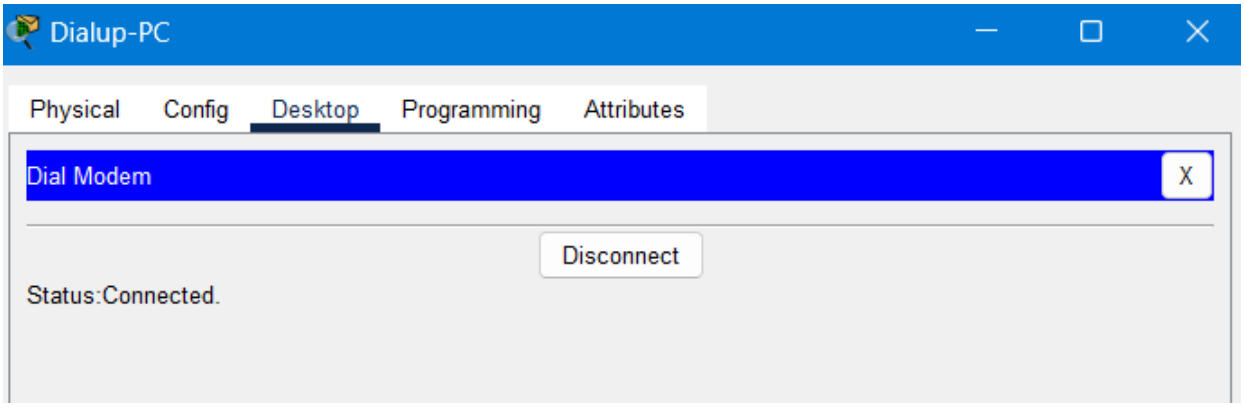


```
Gateway-Router1(config)#username Campus-User password Hello
Gateway-Router1(config)#ip dhcp pool Dialup-DHCPPool
Gateway-Router1(dhcp-config)#network 172.16.1.0 255.255.255.0
Gateway-Router1(dhcp-config)#default-router 172.16.1.1
Gateway-Router1(dhcp-config)#ip dhcp excluded-address 172.16.1.1 172.16.1.100
Gateway-Router1(config)#ip dhcp excluded-address 172.16.1.200 172.16.1.255
Gateway-Router1(config)#ip dhcp pool Dialup-DHCPPool
Gateway-Router1(dhcp-config)#network 172.16.1.0 255.255.255.0
Gateway-Router1(dhcp-config)#default-router 172.16.1.1
```

9. configure analog dialup on the subscriber' site (e.g. Dialup-PC)

Reference 6.Q5~9; Q14~18



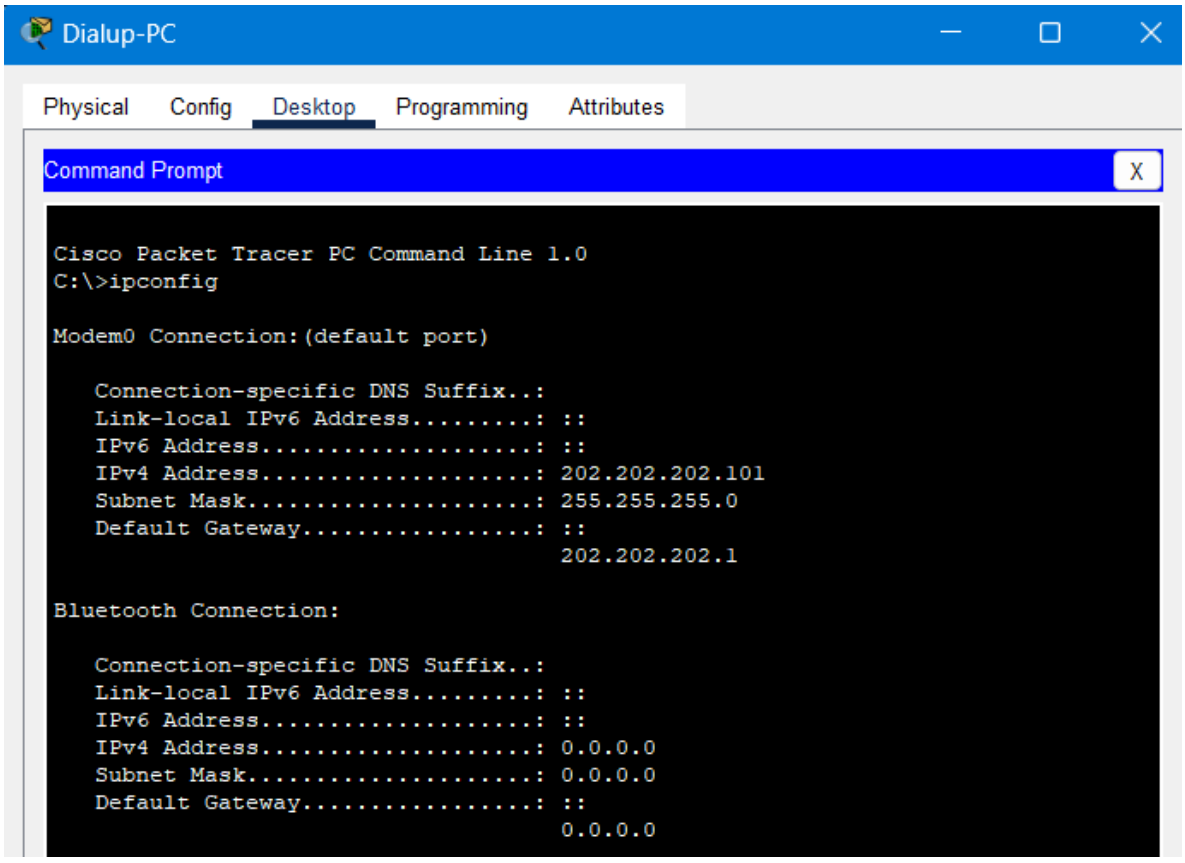


- ISP-Router

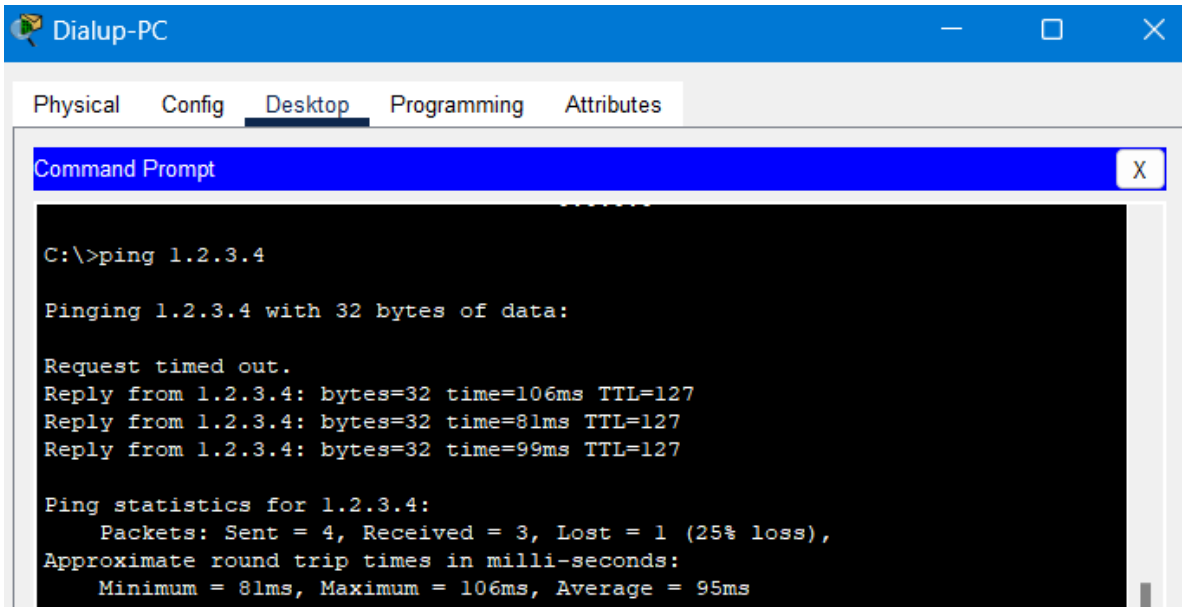
```
ISP-Router#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        1.1.1.1         YES NVRAM  up                    up
FastEthernet0/1        unassigned      YES NVRAM  administratively down down
Modem0/0/0             202.202.202.1   YES unset  up                    up
Modem0/0/1             unassigned      YES unset  down                  down
FastEthernet1/0        201.201.201.1   YES manual up                    up
Serial1/0/0            unassigned      YES NVRAM  administratively down down
Serial1/0/1            unassigned      YES NVRAM  administratively down down
Virtual-Template1      201.201.201.1   YES unset  down                  down
Virtual-Access1        unassigned      YES unset  up                    up
Virtual-Access2        unassigned      YES unset  down                  down
Vlan1                  unassigned      YES unset  administratively down down
```

> Modem0/0/0 202.202.202.1 YES unset up up

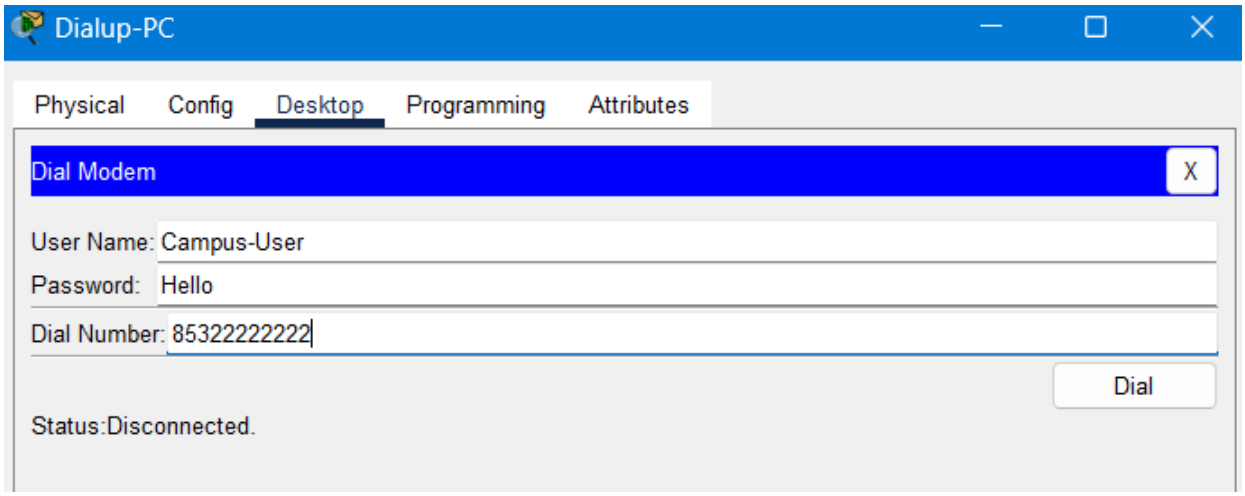
- Dialup-PC

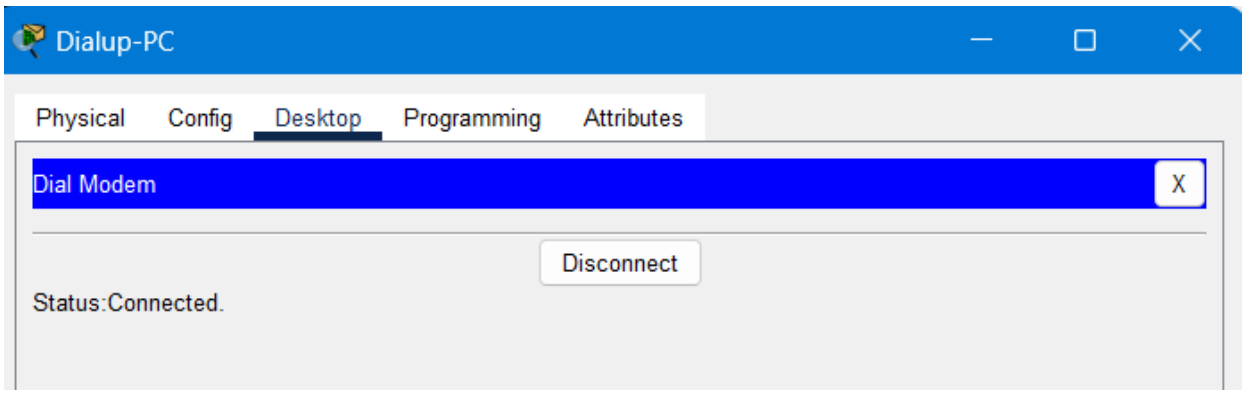


> ip address: 202.202.202.101



10. test the connectivity of the analog dialup connection.

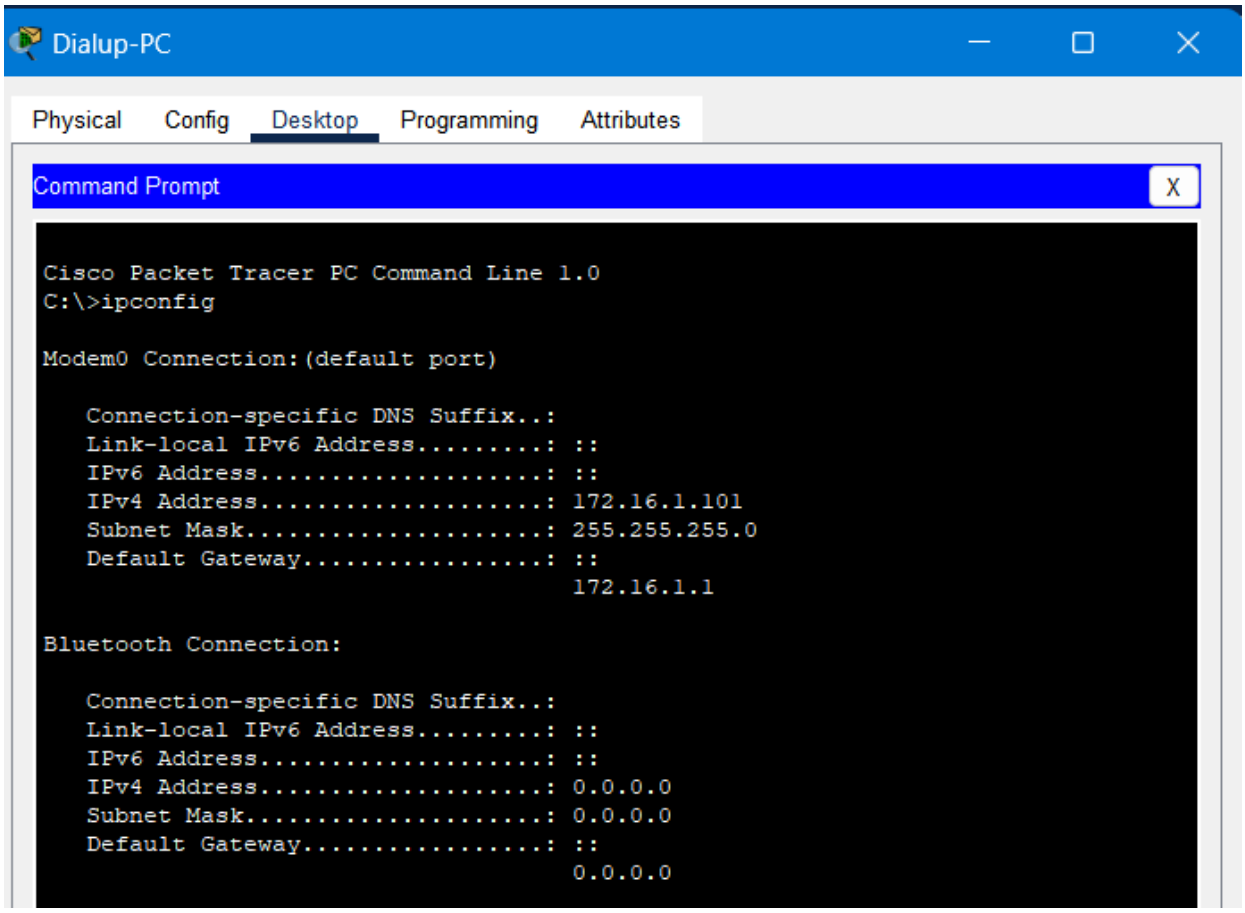




- ISP-Router

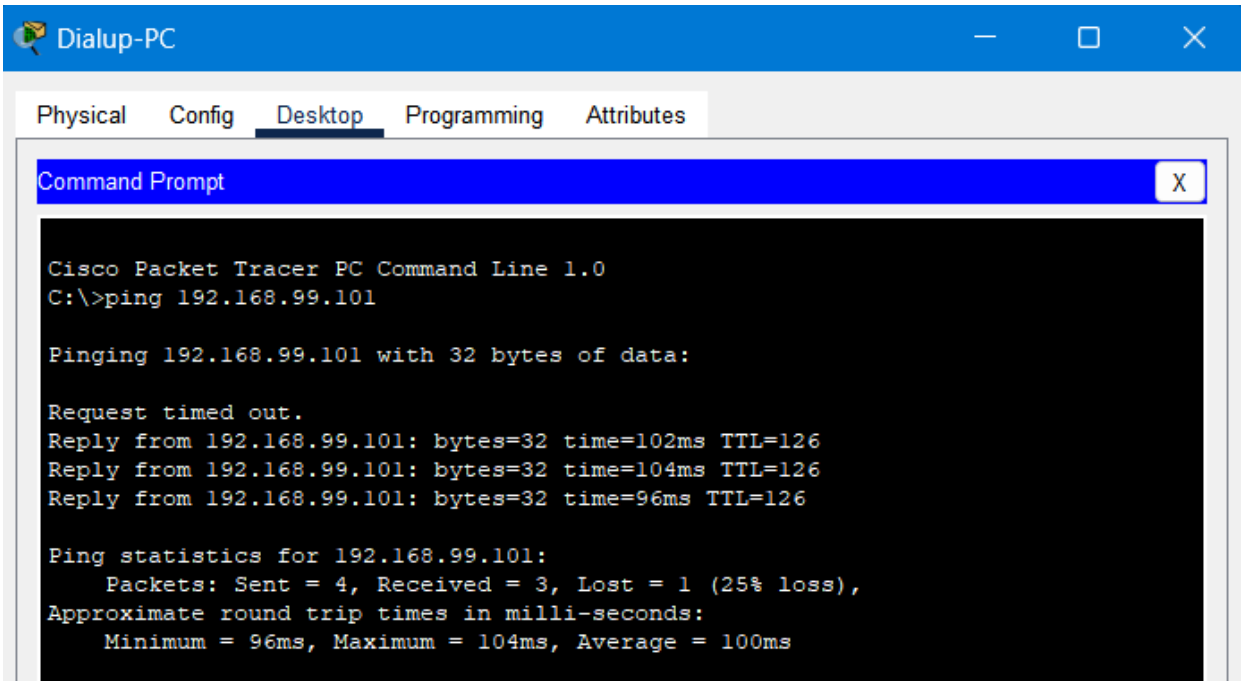
```
Gateway-Router1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        192.168.101.1   YES NVRAM  up                    up
FastEthernet0/1        192.168.102.1   YES NVRAM  up                    up
Modem0/0/0             172.16.1.1      YES unset  up                    up
Modem0/0/1             unassigned      YES unset  down                  down
FastEthernet1/0        201.201.201.2   YES manual up                    up
Serial1/0/0            unassigned      YES NVRAM  administratively down down
Serial1/0/1            unassigned      YES NVRAM  administratively down down
Virtual-Access1        unassigned      YES unset  up                    up
Vlan1                  unassigned      YES unset  administratively down down
```

- Dialup-PC



> ip address:172.16.1.101

- **From:Dialup-PC to Web-Server**



Part 3 – Packet-switched Network.

> Requirement:
> 3.1 Branch-PC -> Teacher-PC/Student-PC/Servers using Frame Relay
> 3.2 Branch-PC -> Internet-PC

Step 4 – Frame Relay

11. configure frame relay on all site (including Gateway-Router1$_3$4)

Reference 7.Q1,2,5,6,12~14

- Gateway-Router1

```
Gateway-Router1(config)#interface serial 1/0/0
Gateway-Router1(config-if)#encapsulation frame-relay
Gateway-Router1(config-if)#no ip address
Gateway-Router1(config-if)#no shutdown
Gateway-Router1(config-if)#
%LINK-5-CHANGED: Interface Serial1/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0/0, changed state to up
```

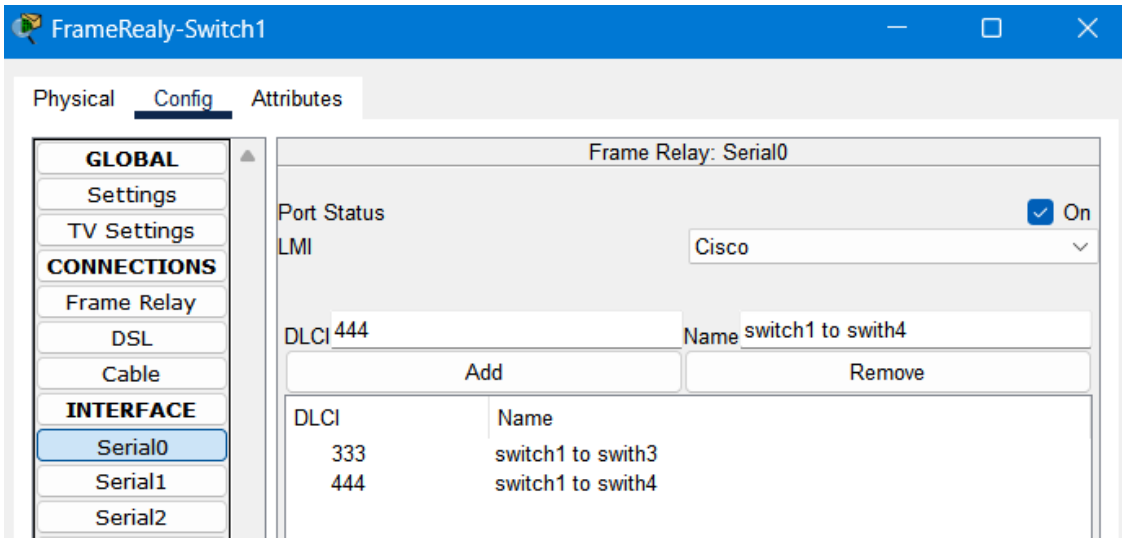
- Gateway-Router3

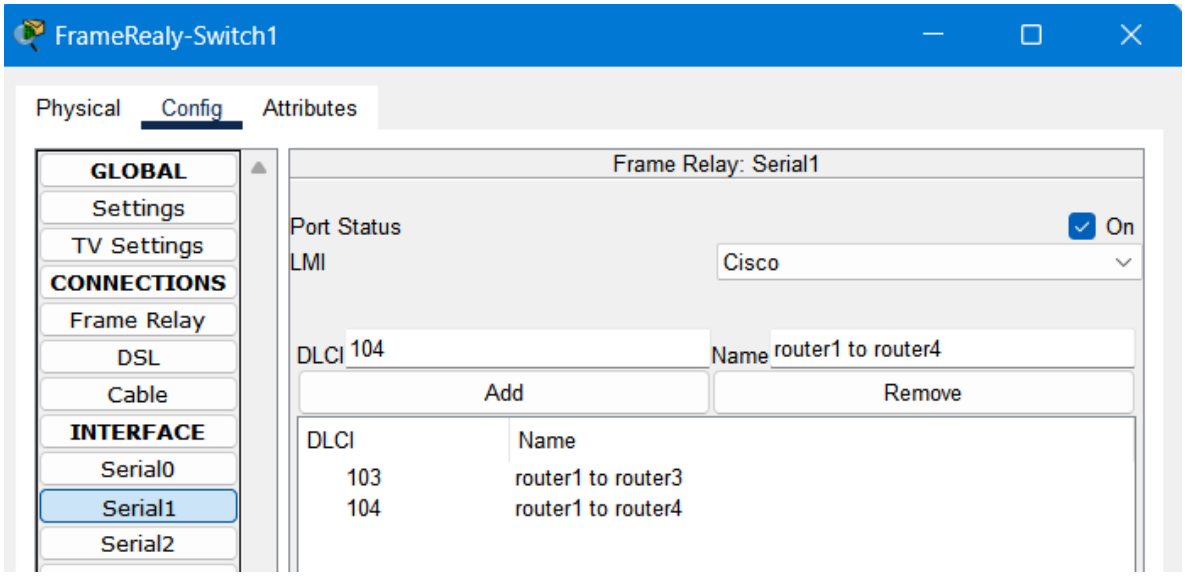
```
Gateway-Router3(config)#interface serial 1/0/0
Gateway-Router3(config-if)#encapsulation frame-relay
Gateway-Router3(config-if)#no ip address
Gateway-Router3(config-if)#no shutdown
Gateway-Router3(config-if)#
%LINK-5-CHANGED: Interface Serial1/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0/0, changed state to up
```

- Gateway-Router4

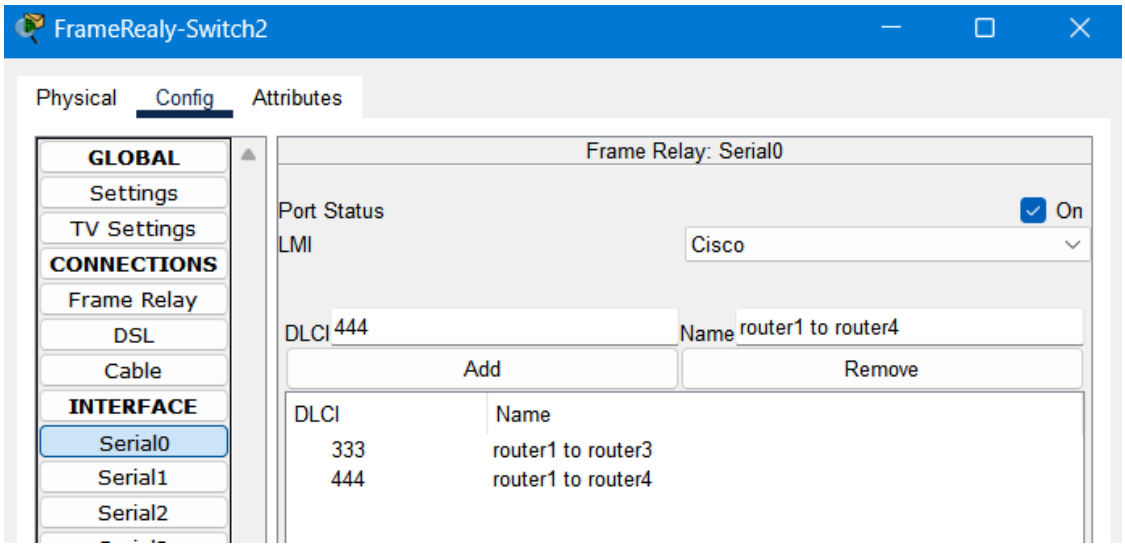
```
Gateway-Router4(config)#interface Serial 1/0/0
Gateway-Router4(config-if)#encapsulation frame-relay
Gateway-Router4(config-if)#no ip address
Gateway-Router4(config-if)#no shutdown
Gateway-Router4(config-if)#
%LINK-5-CHANGED: Interface Serial1/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0/0, changed state to up
```

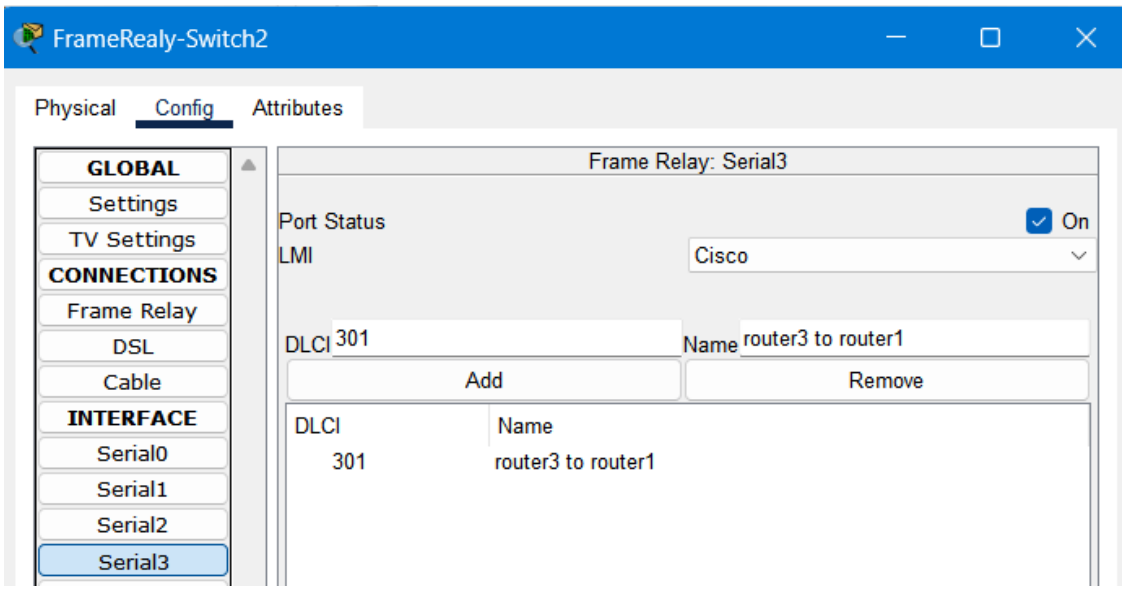
- Adding switching tables
  - FrameRealy-Switch1

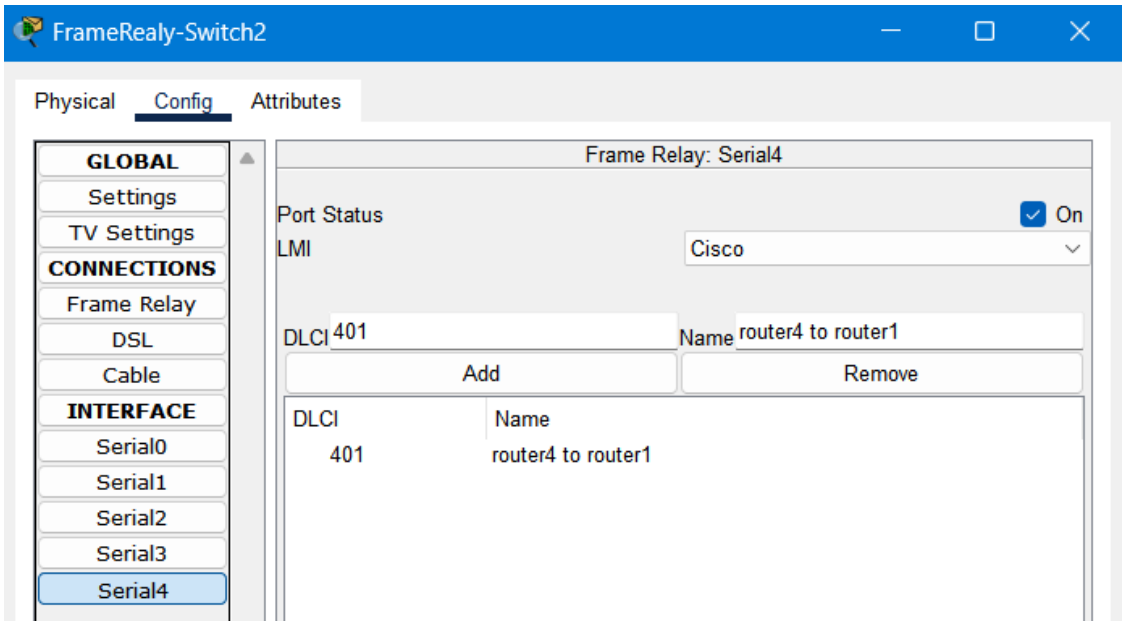




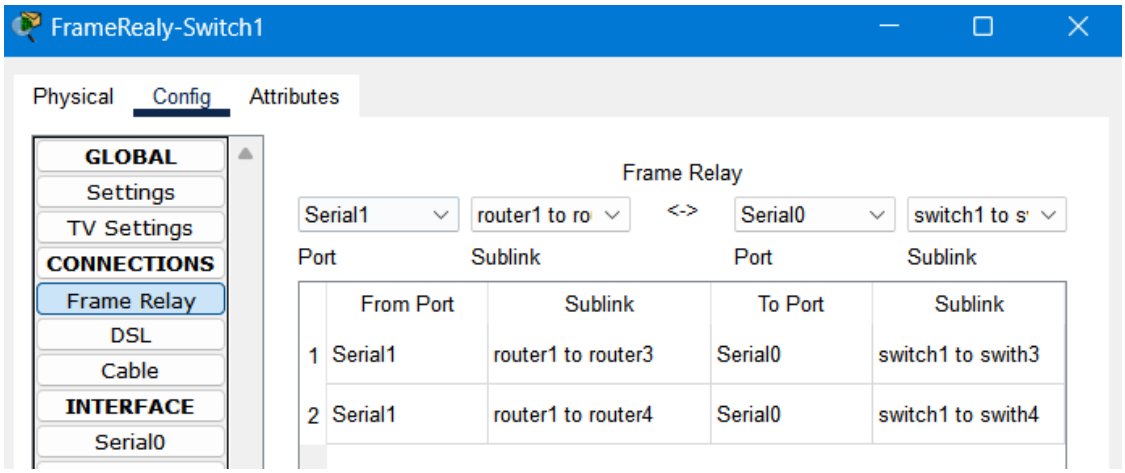
  - FrameRealy-Switch2



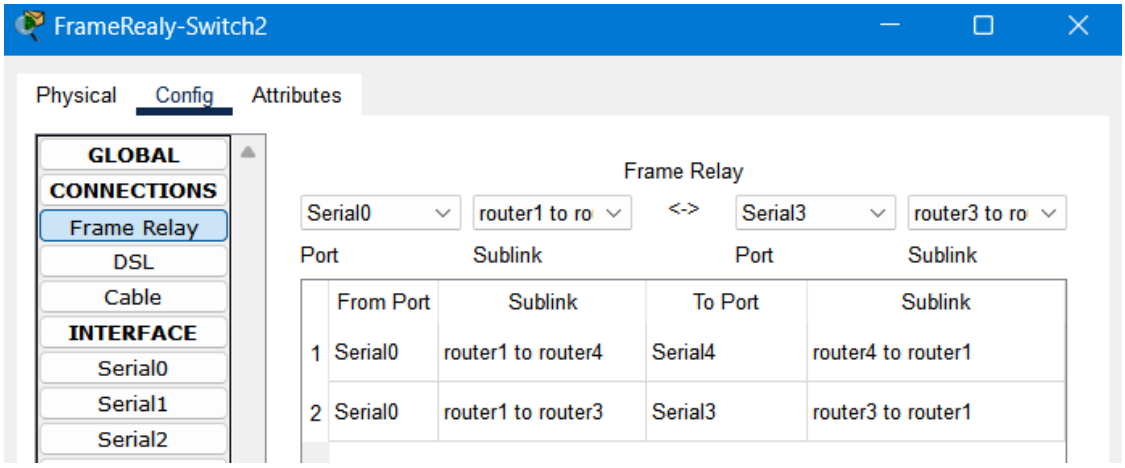




- Setting Frame Relay
    - FrameRealy-Switch1



- FrameRealy-Switch2



- Check whether DLCI is configured successfully for each router
  - **Gateway-Router1**

```
Gateway-Router1#show frame-relay pvc

PVC Statistics for interface Serial1/0/0 (Frame Relay DTE)
DLCI = 103, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial1/0/0

input pkts 14055       output pkts 32795        in bytes 1096228
out bytes 6216155      dropped pkts 0           in FECN pkts 0
in BECN pkts 0         out FECN pkts 0          out BECN pkts 0
in DE pkts 0           out DE pkts 0
out bcast pkts 32795   out bcast bytes 6216155

DLCI = 104, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial1/0/0

input pkts 14055       output pkts 32795        in bytes 1096228
out bytes 6216155      dropped pkts 0           in FECN pkts 0
in BECN pkts 0         out FECN pkts 0          out BECN pkts 0
in DE pkts 0           out DE pkts 0
out bcast pkts 32795   out bcast bytes 6216155
```

  - **Gateway-Router3**

```
Gateway-Router3#show frame-relay pvc

PVC Statistics for interface Serial1/0/0 (Frame Relay DTE)
DLCI = 301, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial1/0/0

input pkts 14055       output pkts 32795        in bytes 1096228
out bytes 6216155      dropped pkts 0           in FECN pkts 0
in BECN pkts 0         out FECN pkts 0          out BECN pkts 0
in DE pkts 0           out DE pkts 0
out bcast pkts 32795   out bcast bytes 6216155
```

- **Gateway-Router4**

```
Gateway-Router4#show frame-relay pvc

PVC Statistics for interface Serial1/0/0 (Frame Relay DTE)
DLCI = 401, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial1/0/0

input pkts 14055       output pkts 32795        in bytes 1096228
out bytes 6216155      dropped pkts 0           in FECN pkts 0
in BECN pkts 0         out FECN pkts 0          out BECN pkts 0
in DE pkts 0           out DE pkts 0
out bcast pkts 32795   out bcast bytes 6216155
```

- **Corresponding Gateway Router** Setting
  - **Gateway-Router1**

```
Gateway-Router1(config)#interface serial 1/0/0.1 multipoint
Gateway-Router1(config-subif)#frame-relay interface-dlci 103
Gateway-Router1(config-subif)#frame-relay interface-dlci 104
Gateway-Router1(config-subif)#ip address 172.16.2.1 255.255.255.0
%LINK-5-CHANGED: Interface Serial1/0/0.1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0/0.1, changed state
to up

Gateway-Router1#show frame-relay map
Serial1/0/0.1 (up): ip 172.16.2.4 dlci 104, dynamic,
              broadcast,
              CISCO, status defined, active
Serial1/0/0.1 (up): ip 172.16.2.3 dlci 103, dynamic,
              broadcast,
              CISCO, status defined, active
```

  - **Gateway-Router3**

```
Gateway-Router3(config)#interface serial 1/0/0.3 multipoint
Gateway-Router3(config-subif)#frame-relay interface-dlci 301
Gateway-Router3(config-subif)#ip address 172.16.2.3 255.255.255.0
%LINK-5-CHANGED: Interface Serial1/0/0.3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0/0.3, changed state
to up

Gateway-Router3#show frame-relay map
Serial1/0/0.3 (up): ip 172.16.2.1 dlci 301, dynamic,
              broadcast,
              CISCO, status defined, active
```

- **Gateway-Router4**

```
Gateway-Router4(config)#interface serial 1/0/0.4 multipoint
Gateway-Router4(config-subif)#frame-relay interface-dlci 401
Gateway-Router4(config-subif)#ip address 172.16.2.4 255.255.255.0
%LINK-5-CHANGED: Interface Serial1/0/0.4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0/0.4, changed state
to up

Gateway-Router4#show frame-relay map
Serial1/0/0.4 (up): ip 172.16.2.1 dlci 401, dynamic,
              broadcast,
              CISCO, status defined, active
```

- Testing
  - **Gateway-Router1** to **Gateway-Router3**

```
Gateway-Router1#ping 172.16.2.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.2.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 6/6/8 ms
```

  - **Gateway-Router1** to **Gateway-Router4**

```
Gateway-Router1#ping 172.16.2.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.2.4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 6/6/7 ms
```

  - **Gateway-Router3** to **Gateway-Router1**

```
Gateway-Router3#ping 172.16.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/22/34 ms
```

- **Gateway-Router4** to **Gateway-Router1**

```
Gateway-Router4#ping 172.16.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 16/25/33 ms
```

Step 5 – Routing

12. configure the routing information, dhcp, and nat, so that all PCs can ping each other.

```
Gateway-Router1(config)#ip dhcp excluded-address 192.168.33.1 192.168.33.100
Gateway-Router1(config)#ip dhcp excluded-address 192.168.33.200 192.168.33.255
Gateway-Router1(config)#ip dhcp excluded-address 192.168.44.1 192.168.44.100
Gateway-Router1(config)#ip dhcp excluded-address 192.168.44.200 192.168.44.255
Gateway-Router1(config)#ip dhcp pool Branch3-DHCPPool
Gateway-Router1(dhcp-config)#network 192.168.33.0 255.255.255.0
Gateway-Router1(dhcp-config)#default-router 192.168.33.1
Gateway-Router1(dhcp-config)#exit
Gateway-Router1(config)#ip dhcp pool Branch4-DHCPPool
Gateway-Router1(dhcp-config)#network 192.168.44.0 255.255.255.0
Gateway-Router1(dhcp-config)#default-router 192.168.44.1
Gateway-Router1(dhcp-config)#exit

Gateway-Router1(config)#ip route 192.168.33.0 255.255.255.0 172.16.2.3
Gateway-Router1(config)#ip route 192.168.44.0 255.255.255.0 172.16.2.4
```

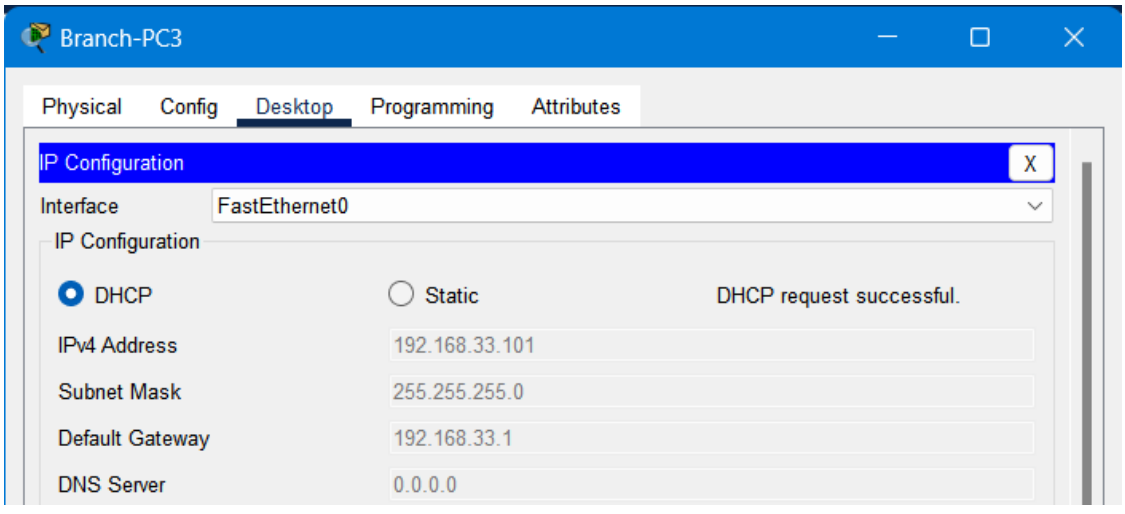
```
Gateway-Router3(config)#interface fastEthernet 0/0
Gateway-Router3(config-if)#ip address 192.168.33.1 255.255.255.0
Gateway-Router3(config-if)#no shutdown

Gateway-Router3(config-if)#ip helper-address 192.168.101.1
Gateway-Router3(config-if)#exit
Gateway-Router3(config)#ip route 192.168.0.0 255.255.0.0 172.16.2.1
Gateway-Router3(config)#ip route 192.168.44.0 255.255.255.0 172.16.2.4
Gateway-Router3(config)#ip route 0.0.0.0 0.0.0.0 172.16.2.1
```

```
Gateway-Router4(config)#interface fastEthernet 0/0
Gateway-Router4(config-if)#ip address 192.168.44.1 255.255.255.0
Gateway-Router4(config-if)#no shutdown

Gateway-Router4(config-if)#ip helper-address 192.168.101.1
Gateway-Router4(config-if)#exit

Gateway-Router4(config)#ip route 192.168.0.0 255.255.0.0 172.16.2.1
Gateway-Router4(config)#ip route 192.168.33.0 255.255.255.0 172.16.2.3
Gateway-Router4(config)#ip route 0.0.0.0 0.0.0.0 172.16.2.1
```

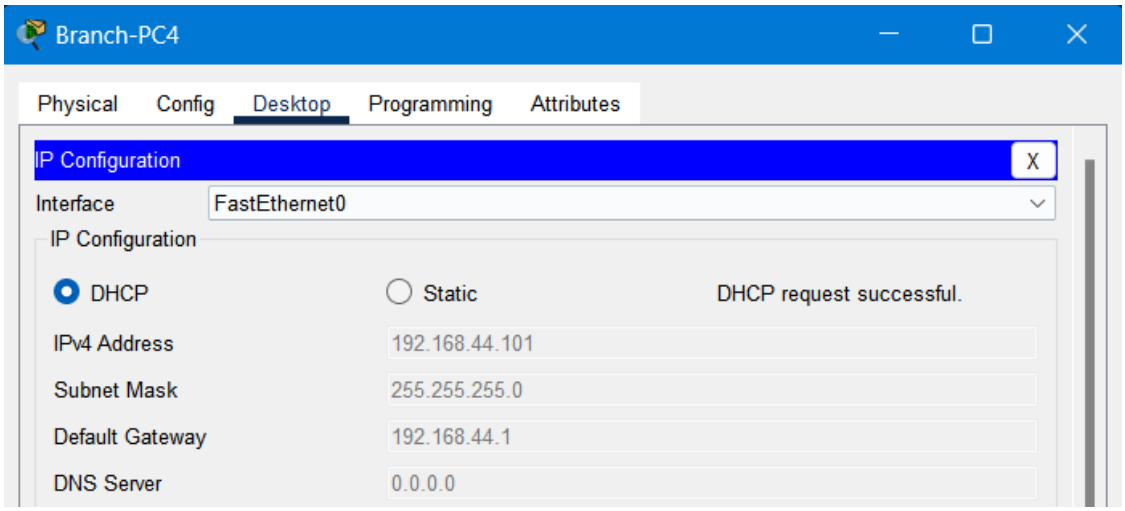
```
Gateway-Router1(config)#interface serial 1/0/0.1 multipoint

Gateway-Router1(config-subif)#ip nat inside

Gateway-Router1(config-subif)#no ip access-list standard NAT-List

Gateway-Router1(config)#ip access-list standard NAT-List

Gateway-Router1(config-std-nacl)#permit 192.168.11.0 0.0.0.255

Gateway-Router1(config-std-nacl)#permit 192.168.22.0 0.0.0.255
Gateway-Router1(config-std-nacl)#permit 192.168.88.0 0.0.0.255
Gateway-Router1(config-std-nacl)#permit 192.168.33.0 0.0.0.255
Gateway-Router1(config-std-nacl)#permit 192.168.44.0 0.0.0.255
```

13. test the connectivity of the frame relay connection.

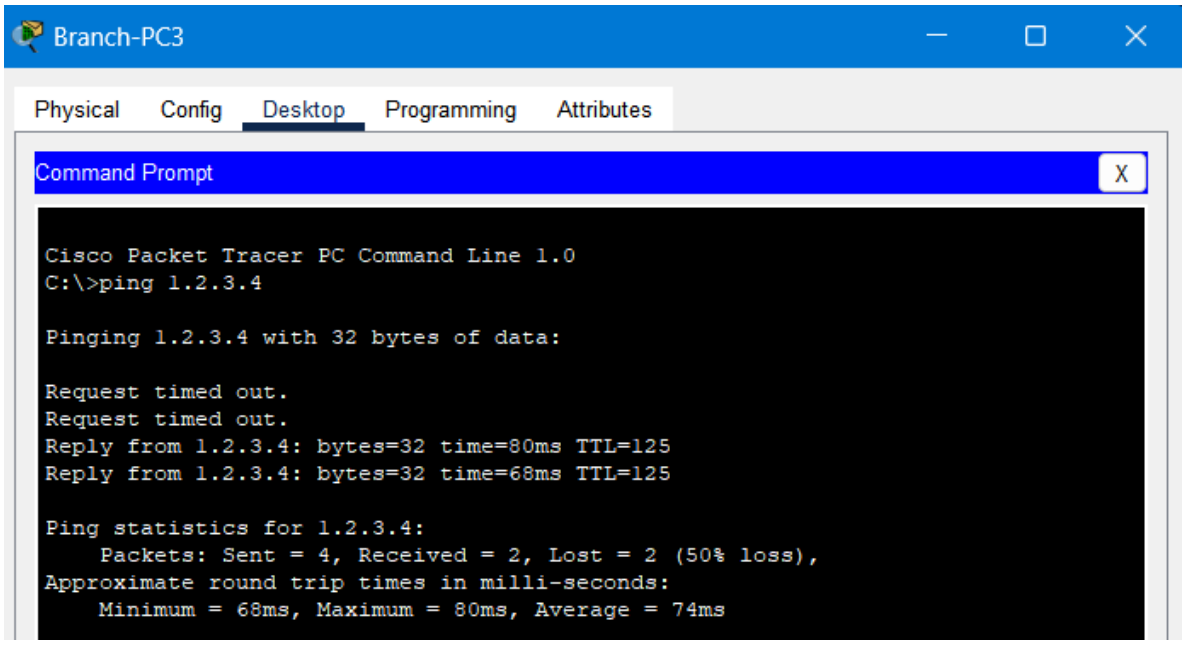
- request DHCP with Branch PC
  - Branch-PC3



- Branch-PC4



- **Branch-PC3** to **Internet-PC**



- **Branch-PC4** to **Internet-PC**