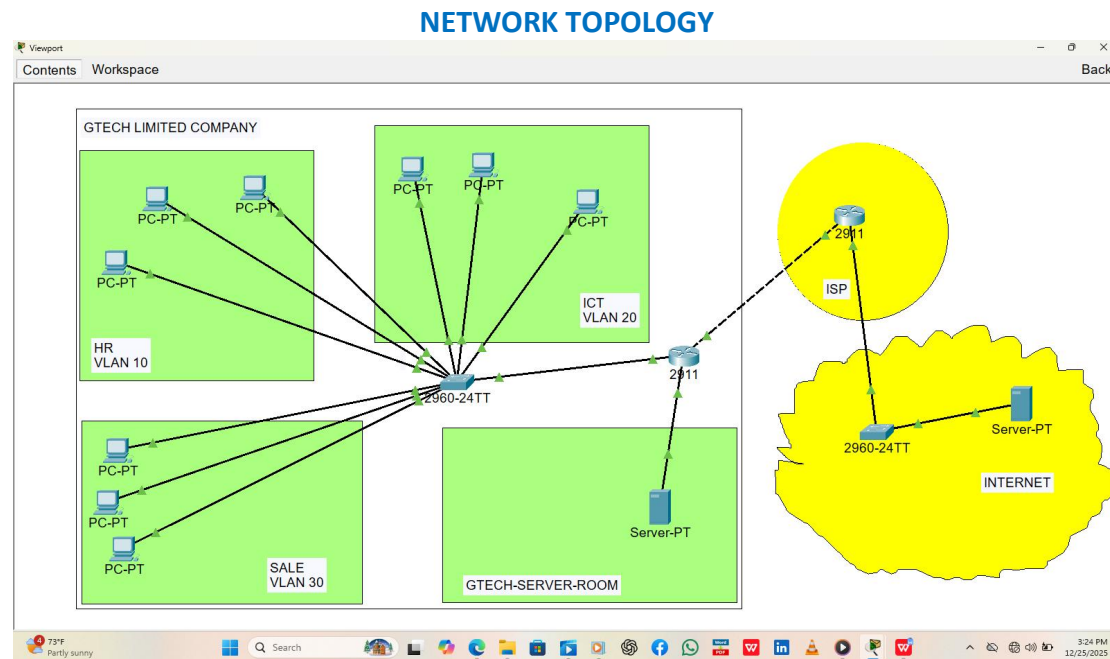


SMALL NETWORK DESIGN- EXPANDED

A week after we designed them this network, they did purchase the server so that it acts as a dhcp server. Point to point address between router and server is 10.0.0.0/30

New topology will be;



We already have the configurations, so the focus here will just be on pool creation on the server, removing the dhcp pools on the router and configuring the helper-address

OBJECTIVE

- Helper-address configuration
- Dhcp pool creation on the server
- Removing dhcp pools on the router

TECHNOLOGY USED

- Relay agent
- DHCP
- NAT(STATIC)

VERIFICATION

- Ensuring previous configurations are not affected.

REMOVING DHCP POOLS ON THE ROUTER

Commands

No ip dhcp pool HR

No ip dhcp pool ICT

No ip dhcp pool SALES

Do wr

On the server let us create the pools, but before that let us configure ip address on the router going to the server

Int gig0/2

Ip add 10.0.0.1 255.255.255.252

Ex

The server interface will have 10.0.0.2 255.255.255.252 as the ip address,now we have the server address let us configure the Relay Agent

RELAY AGENT

Int gig0/0.10

Ip helper-address 10.0.0.2

Ex

Int gig0/0.20

Ip helper-address 10.0.0.2

Ex

Int gig0/0.30

Ip helper-address 10.0.0.2

Ex

Do wr

POOL CONFIGURATION

Physical Config **SERVICES** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP
- PRP

DHCP

Interface: FastEthernet0 Service: On

Pool Name: HR

Default Gateway: 192.168.0.1

DNS Server: 8.8.8.8

Start IP Address: 192.168.0.14

Subnet Mask: 255.255.255.240

Maximum Number of Users: 14

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

Buttons: Add, Save, Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
SALES	192.168.0.33	8.8.8.8	192.168.0.34	255.255.255.240	14	0.0.0.0	0.0.0.0
ICT	192.168.0.17	8.8.8.8	192.168.0.18	255.255.255.240	14	0.0.0.0	0.0.0.0
HR	192.168.0.1	8.8.8.8	192.168.0.2	255.255.255.240	14	0.0.0.0	0.0.0.0
serverPool	0.0.0.0	0.0.0.0	10.0.0.0	255.255.255.252	512	0.0.0.0	0.0.0.0

Top

73°F Partly sunny 3:44 PM 12/25/2025

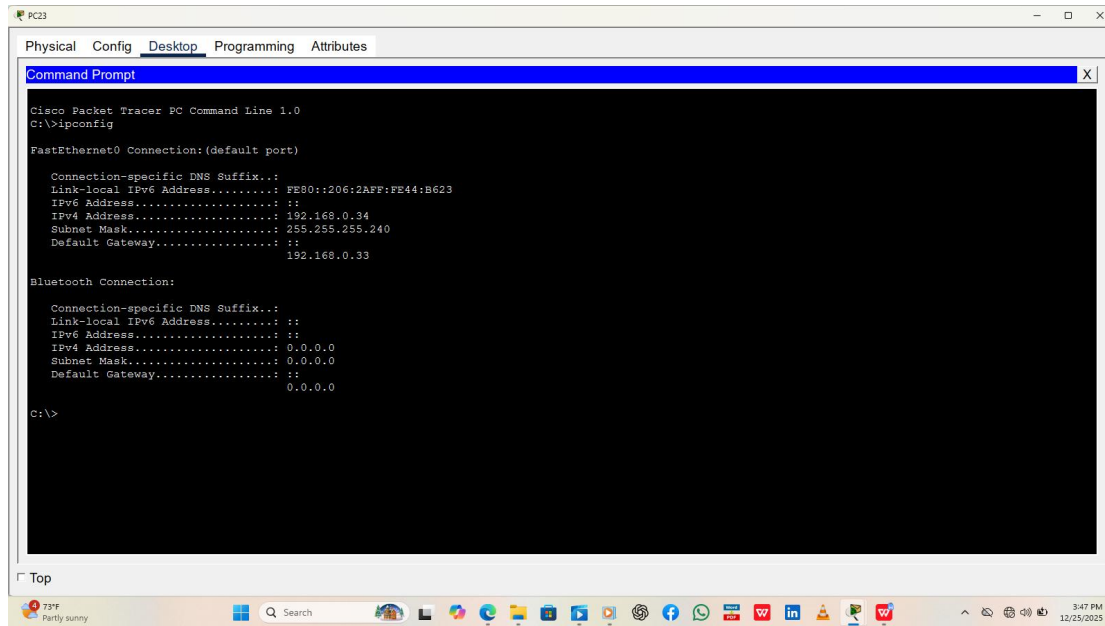
Let us go to our hosts and see if they got their ip address from our server

The command is

Ipconfig

OUTPUT

VLAN 30



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC23. The 'Desktop' tab is selected. The Command Prompt displays the output of the 'ipconfig' command. It shows details for the FastEthernet0 connection (default port) and the Bluetooth connection. The FastEthernet0 connection has a Link-local IPv6 Address of FE80::206:2AFF:FE44:B623, an IPv4 Address of 192.168.0.34, a Subnet Mask of 255.255.255.240, and a Default Gateway of 192.168.0.33. The Bluetooth connection has a Link-local IPv6 Address of FE80::2D0:D3FF:FE41:985, an IPv4 Address of 192.168.0.19, a Subnet Mask of 255.255.255.240, and a Default Gateway of 192.168.0.17. The Windows taskbar at the bottom shows the date and time as 3:47 PM on 12/25/2025.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

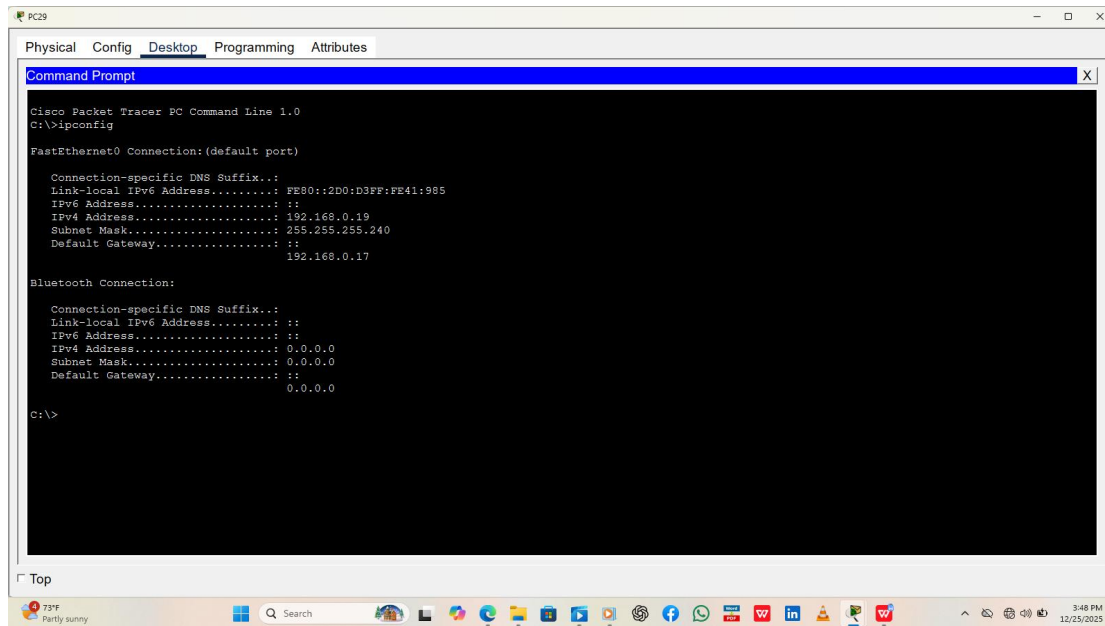
    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::206:2AFF:FE44:B623
    IPv6 Address . . . . . : 192.168.0.34
    Subnet Mask . . . . . : 255.255.255.240
    Default Gateway . . . . . : 192.168.0.33

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .:
    IPv6 Address . . . . . :
    IPv4 Address . . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Default Gateway . . . . . : 0.0.0.0

C:\>
```

VLAN 20



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC29. The 'Desktop' tab is selected. The Command Prompt displays the output of the 'ipconfig' command. It shows details for the FastEthernet0 connection (default port) and the Bluetooth connection. The FastEthernet0 connection has a Link-local IPv6 Address of FE80::2D0:D3FF:FE41:985, an IPv4 Address of 192.168.0.19, a Subnet Mask of 255.255.255.240, and a Default Gateway of 192.168.0.17. The Bluetooth connection has a Link-local IPv6 Address of FE80::2D0:D3FF:FE41:985, an IPv4 Address of 192.168.0.17, a Subnet Mask of 255.255.255.240, and a Default Gateway of 192.168.0.17. The Windows taskbar at the bottom shows the date and time as 3:48 PM on 12/25/2025.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

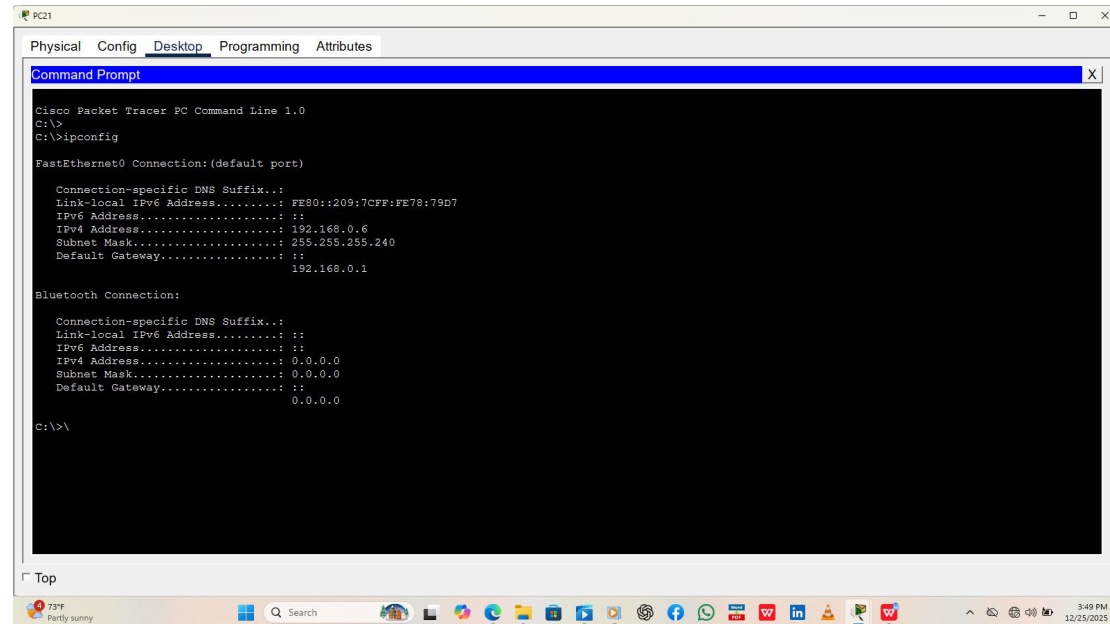
    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::2D0:D3FF:FE41:985
    IPv6 Address . . . . . : 192.168.0.19
    Subnet Mask . . . . . : 255.255.255.240
    Default Gateway . . . . . : 192.168.0.17

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .:
    IPv6 Address . . . . . :
    IPv4 Address . . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Default Gateway . . . . . : 0.0.0.0

C:\>
```

VLAN 10



```
PC21
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::209:7CFF:FE78:79D7
    IPv6 Address . . . . .:
    IPv4 Address . . . . .: 192.168.0.6
    Subnet Mask . . . . .: 255.255.255.240
    Default Gateway . . . . .:
                                192.168.0.1

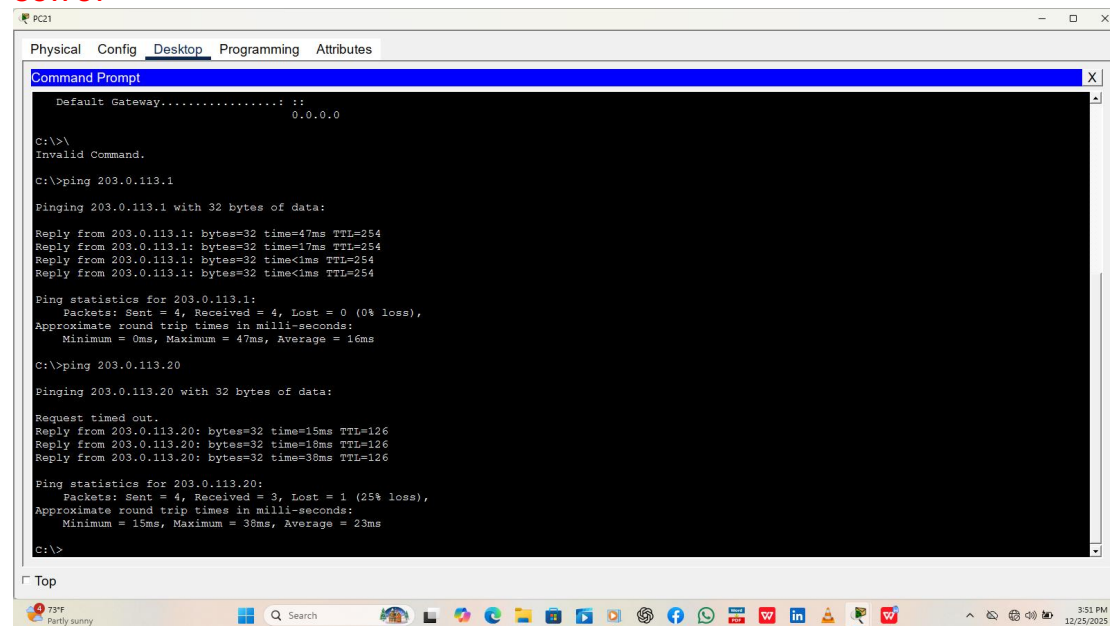
Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .:
    IPv6 Address . . . . .:
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .:
                                0.0.0.0

C:\>\
```

We can see everything is just fine,
Let us try to reach the ISP or the External server
From any pc
Ping 203.0.113.1

OUTPUT



```
PC21
Physical Config Desktop Programming Attributes
Command Prompt

    Default Gateway . . . . .:
                                0.0.0.0

C:\>\
Invalid Command.

C:\>ping 203.0.113.1

Pinging 203.0.113.1 with 32 bytes of data:

Reply from 203.0.113.1: bytes=32 time=47ms TTL=254
Reply from 203.0.113.1: bytes=32 time=17ms TTL=254
Reply from 203.0.113.1: bytes=32 time<1ms TTL=254
Reply from 203.0.113.1: bytes=32 time<1ms TTL=254

Ping statistics for 203.0.113.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 47ms, Average = 16ms

C:\>ping 203.0.113.20

Pinging 203.0.113.20 with 32 bytes of data:

Request timed out.
Reply from 203.0.113.20: bytes=32 time=15ms TTL=126
Reply from 203.0.113.20: bytes=32 time=18ms TTL=126
Reply from 203.0.113.20: bytes=32 time=38ms TTL=126

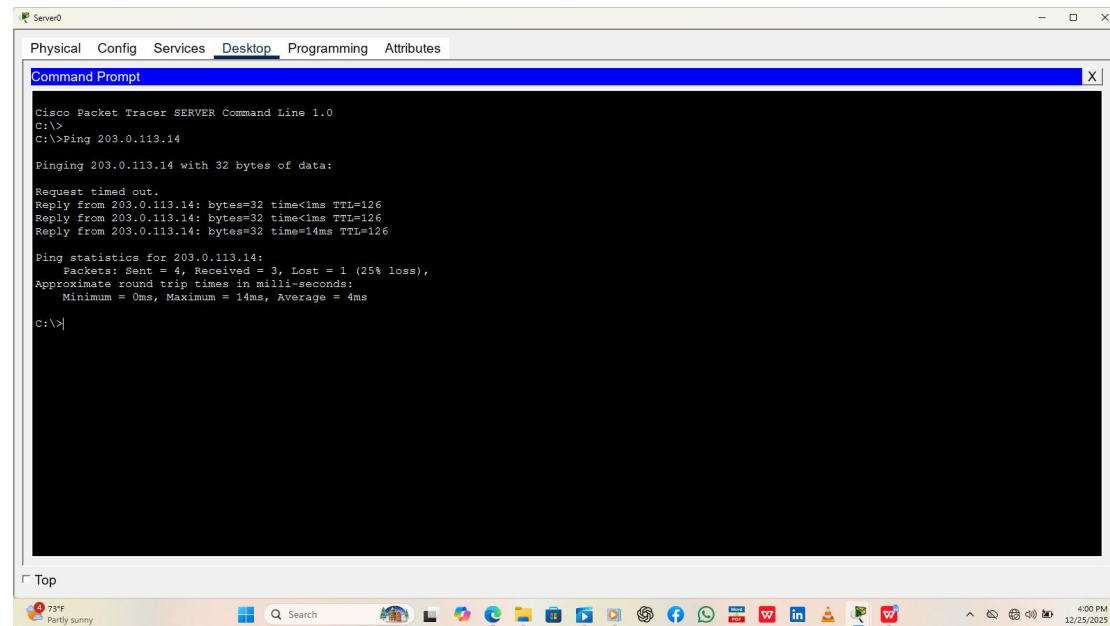
Ping statistics for 203.0.113.20:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 15ms, Maximum = 38ms, Average = 23ms

C:\>
```

We are still good. Now they want the internal server to be able to receive incoming connection from the outside, we configure static NAT
We go on our router to configure the static NAT
Int gig0/2
Ip nat inside
Ex
Ip nat inside source static 10.0.0.2 203.0.113.14

We have give the server to be using the last ip address in from our subnet 203.0.113.0/28
Let us try to see if the external server can reach our server
Ping 203.0.113.14

OUTPUT



```
Server0
Physical Config Services Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer SERVER Command Line 1.0
C:\>
C:\>ping 203.0.113.14

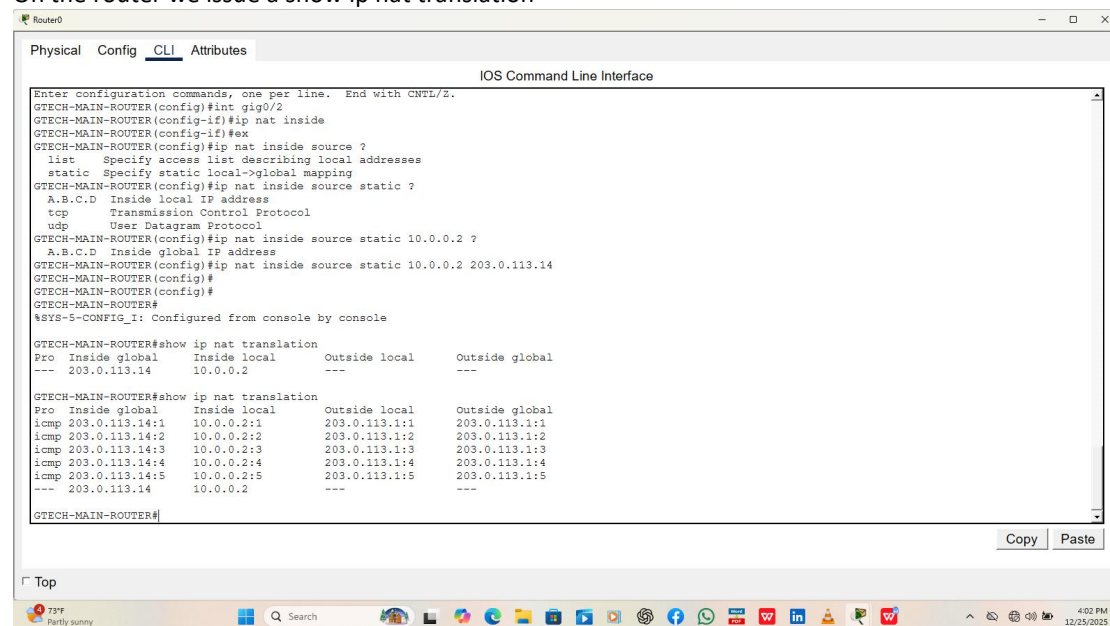
Pinging 203.0.113.14 with 32 bytes of data:

Request timed out.
Reply from 203.0.113.14: bytes=32 time<1ms TTL=126
Reply from 203.0.113.14: bytes=32 time<1ms TTL=126
Reply from 203.0.113.14: bytes=32 time=14ms TTL=126

Ping statistics for 203.0.113.14:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 14ms, Average = 4ms

C:\>|
```

Let us try to see if the ISP can reach our server
Ping 203.0.113.14
Let us verify our NAT
On the router we issue a show ip nat translation



```
Router0
Physical Config CLI Attributes
IOS Command Line Interface
Enter configuration commands, one per line. End with CNTL/Z.
GTECH-MAIN-ROUTER(config)#int gig0/2
GTECH-MAIN-ROUTER(config-if)#ip nat inside
GTECH-MAIN-ROUTER(config-if)#exit
GTECH-MAIN-ROUTER(config)#ip nat inside source ?
    list Specify access list describing local addresses
    static Specify static local->global mapping
GTECH-MAIN-ROUTER(config)#ip nat inside source static ?
    A.B.C.D Inside local IP address
    tcp Transmission Control Protocol
    udp User Datagram Protocol
GTECH-MAIN-ROUTER(config)#ip nat inside source static 10.0.0.2 ?
    A.B.C.D Inside global IP address
GTECH-MAIN-ROUTER(config)#ip nat inside source static 10.0.0.2 203.0.113.14
GTECH-MAIN-ROUTER(config)#
GTECH-MAIN-ROUTER(config)#
GTECH-MAIN-ROUTER#
%SYS-5-CONFIG_I: Configured from console by console

GTECH-MAIN-ROUTER#show ip nat translation
Pro Inside global Inside local Outside local Outside global
--- 203.0.113.14 10.0.0.2 ---
GTECH-MAIN-ROUTER#show ip nat translation
Pro Inside global Inside local Outside local Outside global
icmp 203.0.113.14:1 10.0.0.2:1 203.0.113.1:1 203.0.113.1:1
icmp 203.0.113.14:2 10.0.0.2:2 203.0.113.1:2 203.0.113.1:2
icmp 203.0.113.14:3 10.0.0.2:3 203.0.113.1:3 203.0.113.1:3
icmp 203.0.113.14:4 10.0.0.2:4 203.0.113.1:4 203.0.113.1:4
icmp 203.0.113.14:5 10.0.0.2:5 203.0.113.1:5 203.0.113.1:5
--- 203.0.113.14 10.0.0.2 ---
GTECH-MAIN-ROUTER#
```

We are good, this is all they wanted for now but again maybe in a month we will come to expand this further;thus putting each vlan in its own switch later redundancy.
For now we end it here.