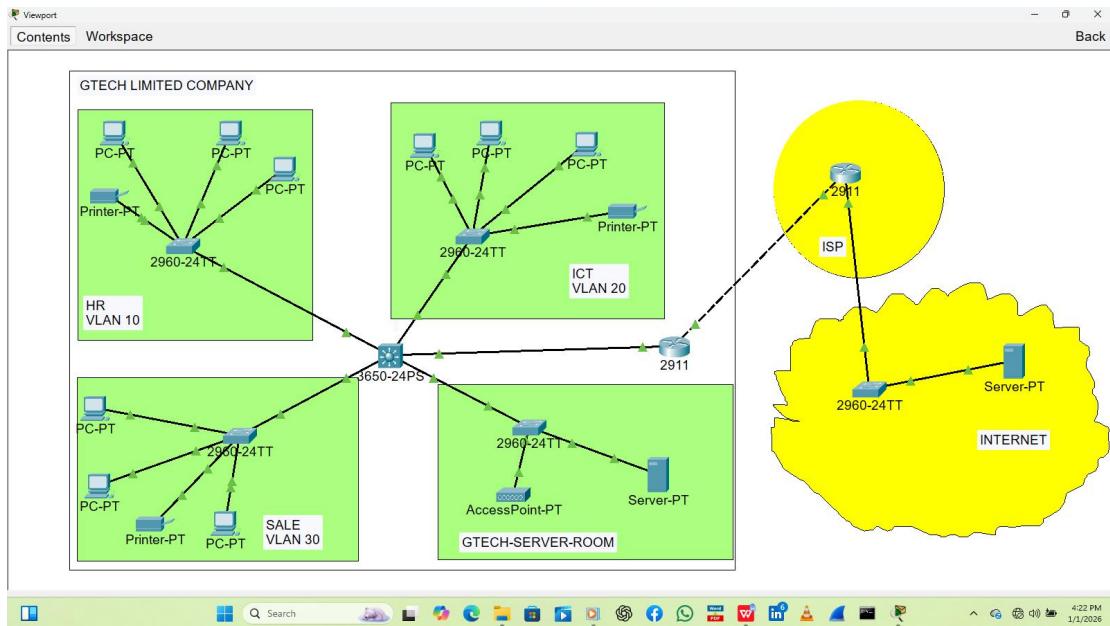


SMALL NETWORK DESIGN- EXPANDED

Two months after setting up a server, GTECH did manage to buy more switches, they want us to put each vlan on a separate switch, they have 4 layer2 switches and a multilayer switch to do the routing and a router to do the NAT.

NETWORK TOPOLOGY



LAYER TWO CONFIGURATIONS

```

Enable secret Admin
Username Admin Password Admin123
Line console 0
Login local
Exit
Line vty 0 15
Login local
Exit
Service password-encryption
Banner motd # ADMINS ONLY#
DO WR
!VLAN 10
Vlan 10
Name HR
Ex
Hostname HR-SW
Int range fa0/1-24
Switchport mode access
Switchport access vlan 10
Ex
Int gig0/1
Switchport mode trunk
Do wr
Ex

```

```
!VLAN 20
Vlan 20
Name ICT
Ex
Hostname ICT-SW
Int range fa0/1-24
Switchport mode access
Switchport access vlan20
Ex
Int gig0/1
Switchport mode trunk
Do wr
Ex

!VLAN 30
Vlan 30
Name SALES
Ex
Hostname SALES-SW
Int range fa0/1-24
Switchport mode access
Switchport access vlan 30
Ex
Int gig0/1
Switchport mode trunk
Do wr
Ex

!VLAN 40
Vlan 40
Name SERVER-ROOM
Ex
Hostname SERVER-ROOM-SW
Int range fa0/1-24
Switchport mode access
Switchport access vlan 40
Ex
Int gig0/1
Switchport mode trunk
Do wr
Ex
```

Let us verify our vlans

Vlan 10 TRUNK INTERFACE

```
Switch0
Physical Config CLI Attributes
IOS Command Line Interface

HR-SW(config)#
HR-SW#
%SYS-5-CONFIG_I: Configured from console by console
show vlan brief

VLAN Name          Status      Ports
-----  -----
1    default        active     Gig0/2
10   HR             active     Fa0/1, Fa0/2, Fa0/3, Fa0/4
                           Fa0/5, Fa0/6, Fa0/7, Fa0/8
                           Fa0/9, Fa0/10, Fa0/11, Fa0/12
                           Fa0/13, Fa0/14, Fa0/15, Fa0/16
                           Fa0/17, Fa0/18, Fa0/19, Fa0/20
                           Fa0/21, Fa0/22, Fa0/23, Fa0/24
1002 fddi-default  active
1003 token-ring-default  active
1004 fdtnet-default  active
1005 trnet-default  active
HR-SW#show int trunk
Port Mode       Encapsulation  Status      Native vlan
Gig0/1  on         802.1q        trunking   1

Port      Vlans allowed on trunk
Gig0/1    1-1005

Port      Vlans allowed and active in management domain
Gig0/1    1,10

Port      Vlans in spanning tree forwarding state and not pruned
Gig0/1    1,10

HR-SW#
```

VLAN 20 TRUNK INTERFACE

```
Switch1
Physical Config CLI Attributes
IOS Command Line Interface

ICT-SW(config)#
ICT-SW#
%SYS-5-CONFIG_I: Configured from console by console
show vlan brief

VLAN Name          Status      Ports
-----  -----
1    default        active     Fa0/1, Fa0/2, Fa0/3, Fa0/4
                           Fa0/5, Fa0/6, Fa0/7, Fa0/8
                           Fa0/9, Fa0/10, Fa0/11, Fa0/12
                           Fa0/13, Fa0/14, Fa0/15, Fa0/16
                           Fa0/17, Fa0/18, Fa0/19, Fa0/20
                           Fa0/21, Fa0/22, Fa0/23, Fa0/24
20   ICT            active
2002 fddi-default  active
1003 token-ring-default  active
1004 fdtnet-default  active
1005 trnet-default  active
ICT-SW#show int trunk
Port Mode       Encapsulation  Status      Native vlan
Gig0/1  on         802.1q        trunking   1

Port      Vlans allowed on trunk
Gig0/1    1-1005

Port      Vlans allowed and active in management domain
Gig0/1    1,20

Port      Vlans in spanning tree forwarding state and not pruned
Gig0/1    1,20

ICT-SW#
```

VLAN 30 TRUNK INTERFACE

```

Switch3
Physical Config CLI Attributes
IOS Command Line Interface

SALES-SW(config)#
%SYS-5-CONFIG_I: Configured from console by console
show vlan brief

VLAN Name          Status     Ports
----  -----
1   default        active     Gig0/2
30  SALES         active     Fa0/1, Fa0/2, Fa0/3, Fa0/4
                           Fa0/5, Fa0/6, Fa0/7, Fa0/8
                           Fa0/9, Fa0/10, Fa0/11, Fa0/12
                           Fa0/13, Fa0/14, Fa0/15, Fa0/16
                           Fa0/17, Fa0/18, Fa0/19, Fa0/20
                           Fa0/21, Fa0/22, Fa0/23, Fa0/24

1002 fddi-default    active
1003 token-ring-default active
1004 fddinet-default  active
1005 trnet-default   active

SALES-SW#show int trunk
Port      Mode       Encapsulation  Status      Native vlan
Gig0/1    on         802.1q        trunking   1

Port      Vlans allowed on trunk
Gig0/1    1-1005

Port      Vlans allowed and active in management domain
Gig0/1    1,30

Port      Vlans in spanning tree forwarding state and not pruned
Gig0/1    1,30

SALES-SW#

```

Copy | Paste

VLAN 40 AND TRUNK INTERFACE

```

Switch4
Physical Config CLI Attributes
IOS Command Line Interface

SERVER-ROOM-SW(config)#
SERVER-ROOM-SW#
%SYS-5-CONFIG_I: Configured from console by console
show vlan brief

VLAN Name          Status     Ports
----  -----
1   default        active     Gig0/2
40  SERVER-ROOM   active     Fa0/1, Fa0/2, Fa0/3, Fa0/4
                           Fa0/5, Fa0/6, Fa0/7, Fa0/8
                           Fa0/9, Fa0/10, Fa0/11, Fa0/12
                           Fa0/13, Fa0/14, Fa0/15, Fa0/16
                           Fa0/17, Fa0/18, Fa0/19, Fa0/20
                           Fa0/21, Fa0/22, Fa0/23, Fa0/24

1002 fddi-default    active
1003 token-ring-default active
1004 fddinet-default  active
1005 trnet-default   active

SERVER-ROOM-SW#show int trunk
Port      Mode       Encapsulation  Status      Native vlan
Gig0/1    on         802.1q        trunking   1

Port      Vlans allowed on trunk
Gig0/1    1-1005

Port      Vlans allowed and active in management domain
Gig0/1    1,40

Port      Vlans in spanning tree forwarding state and not pruned
Gig0/1    1,40

SERVER-ROOM-SW#

```

Copy | Paste

We are good with layer two configurations(access switches)

Next lets go to our MLS

MULTILAYER SWITCH CONFIGURATIONS

Hostname GTECH-MLS-SW

Enable secret Admin3

Username Admin Password Admin123

Line console 0

Login local

Exit

Line vty 0 15

Login local

Exit

```

Service password-encryption
Banner motd # ADMINS ONLY#
DO WR
Int range gig1/0/2-5
Switchport mode trunk
Ex
Vlan 10
Ex
Vlan 20
Ex
Vlan 30
Ex
Vlan 40
Ex
Int vlan 10
Ip add 192.168.0.1 255.255.255.240
No shut
Ex
Int vlan 20
Ip add 192.168.0.17 255.255.255.240
No shut
Ex
Int vlan 30
Ip add 192.168.0.33 255.255.255.240
No shut
Ex
Int vlan 40
Ip add 192.168.0.49 255.255.255.240
No shut
Ex
Do wr

```

Let us verify our configurations, vlans, interfaces and trunk ports
VLANS TRUNK PORTS

```

Multilayer Switch0
Physical Config CLI Attributes
IOS Command Line Interface

GTECH-MLS-SW# show vlan brief
$SYS-5-CONFIG_I: Configured from console by console

GTECH-MLS-SW# show vlan brief
VLAN Name          Status    Ports
---- -- -- --
1   default         active   Gig1/0/1, Gig1/0/6, Gig1/0/7, Gig1/0/8
                                Gig1/0/9, Gig1/0/10, Gig1/0/11, Gig1/0/12
                                Gig1/0/13, Gig1/0/14, Gig1/0/15, Gig1/0/16
                                Gig1/0/17, Gig1/0/18, Gig1/0/19, Gig1/0/20
                                Gig1/0/21, Gig1/0/22, Gig1/0/23, Gig1/0/24
                                Gig1/1/1, Gig1/1/2, Gig1/1/3, Gig1/1/4
10  VLAN0010        active
20  VLAN0020        active
30  VLAN0030        active
40  VLAN0040        active
1002 fddi-default   active
1003 token-ring-default active
1004 fddinet-default active
1005 trnet-default   active
GTECH-MLS-SW# show int trunk
Port      Mode     Encapsulation  Status      Native vlan
Gig1/0/2  on      802.1q        trunking   1
Gig1/0/3  on      802.1q        trunking   1
Gig1/0/4  on      802.1q        trunking   1
Gig1/0/5  on      802.1q        trunking   1
Port      Vlans allowed on trunk
Gig1/0/2  1-1005
Gig1/0/3  1-1005
Gig1/0/4  1-1005
Gig1/0/5  1-1005

```

CONTINUATION

```

IOS Command Line Interface
GTECH-MLS-SW#show int trunk
Port      Mode    Encapsulation  Status      Native vlan
Gig1/0/2  on     802.1q        trunking   1
Gig1/0/3  on     802.1q        trunking   1
Gig1/0/4  on     802.1q        trunking   1
Gig1/0/5  on     802.1q        trunking   1

Port      Vlans allowed on trunk
Gig1/0/2  1-1005
Gig1/0/3  1-1005
Gig1/0/4  1-1005
Gig1/0/5  1-1005

Port      Vlans allowed and active in management domain
Gig1/0/2  1,10,20,30,40
Gig1/0/3  1,10,20,30,40
Gig1/0/4  1,10,20,30,40
Gig1/0/5  1,10,20,30,40

Port      Vlans in spanning tree forwarding state and not pruned
Gig1/0/2  1,10,20,30,40
Gig1/0/3  1,10,20,30,40
Gig1/0/4  1,10,20,30,40
Gig1/0/5  1,10,20,30,40
GTECH-MLS-SW#

```

INTERFACES

```

IOS Command Line Interface
GigabitEthernet1/0/2  unassigned   YES unset  up          up
GigabitEthernet1/0/3  unassigned   YES unset  up          up
GigabitEthernet1/0/4  unassigned   YES unset  up          up
GigabitEthernet1/0/5  unassigned   YES unset  up          up
GigabitEthernet1/0/6  unassigned   YES unset  down        down
GigabitEthernet1/0/7  unassigned   YES unset  down        down
GigabitEthernet1/0/8  unassigned   YES unset  down        down
GigabitEthernet1/0/9  unassigned   YES unset  down        down
GigabitEthernet1/0/10 unassigned   YES unset  down        down
GigabitEthernet1/0/11 unassigned   YES unset  down        down
GigabitEthernet1/0/12 unassigned   YES unset  down        down
GigabitEthernet1/0/13 unassigned   YES unset  down        down
GigabitEthernet1/0/14 unassigned   YES unset  down        down
GigabitEthernet1/0/15 unassigned   YES unset  down        down
GigabitEthernet1/0/16 unassigned   YES unset  down        down
GigabitEthernet1/0/17 unassigned   YES unset  down        down
GigabitEthernet1/0/18 unassigned   YES unset  down        down
GigabitEthernet1/0/19 unassigned   YES unset  down        down
GigabitEthernet1/0/20 unassigned   YES unset  down        down
GigabitEthernet1/0/21 unassigned   YES unset  down        down
GigabitEthernet1/0/22 unassigned   YES unset  down        down
GigabitEthernet1/0/23 unassigned   YES unset  down        down
GigabitEthernet1/0/24 unassigned   YES unset  down        down
GigabitEthernet1/1/1  unassigned   YES unset  down        down
GigabitEthernet1/1/2  unassigned   YES unset  down        down
GigabitEthernet1/1/3  unassigned   YES unset  down        down
GigabitEthernet1/1/4  unassigned   YES unset  down        down
Vlan1    unassigned   YES unset  administratively down down
Vlan10   192.168.0.1  YES manual up          up
Vlan20   192.168.0.17 YES manual up          up
Vlan30   192.168.0.33 YES manual up          up
Vlan40   192.168.0.49 YES manual up          up
GTECH-MLS-SW#

```

We are good so far, next we configure dhcp

DHCP CONFIGURATIONS

```

Ip dhcp excluded-address 192.168.0.1 192.168.0.3
Ip dhcp pool HR-pool
Network 192.168.0.0 255.255.255.240
Default-router 192.168.0.1
Dns-server 8.8.8.8
Ex
Do wr
Ip dhcp excluded-address 192.168.0.17 192.168.0.19
Ip dhcp pool ICT-pool
Network 192.168.0.16 255.255.255.240
Default-router 192.168.0.17

```

Dns-server 8.8.8.8

Ex

Do wr

```
Ip dhcp excluded-address 192.168.0.33 192.168.0.35
```

```
Ip dhcp pool SALES-pool
```

```
Network 192.168.0.32 255.255.255.240
```

```
Default-router 192.168.0.33
```

Dns-server 8.8.8.8

Ex

```
Ip dhcp excluded-address 192.168.0.49 192.168.0.51
```

```
Ip dhcp pool SERVER-ROOM-pool
```

```
Network 192.168.0.48 255.255.255.240
```

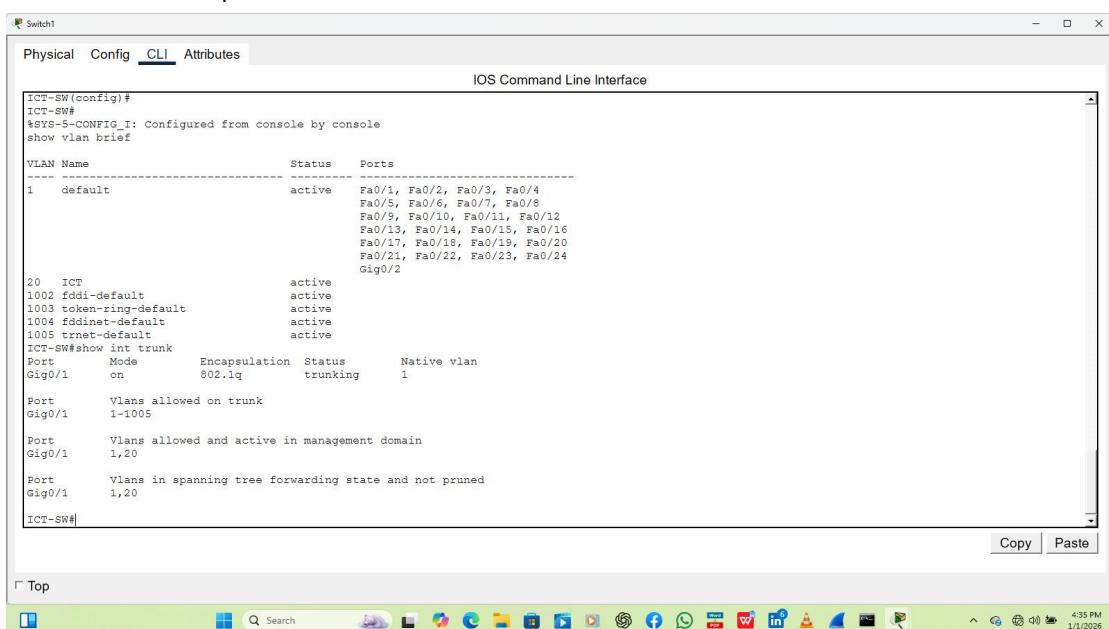
```
Default-router 192.168.0.49
```

Dns-server 8.8.8.8

Ex

We have a problem, vlan 20 Hosts are unable to get ip addresses despite the pool being well configured, lets us go and do a clear vlan verification on vlan 20

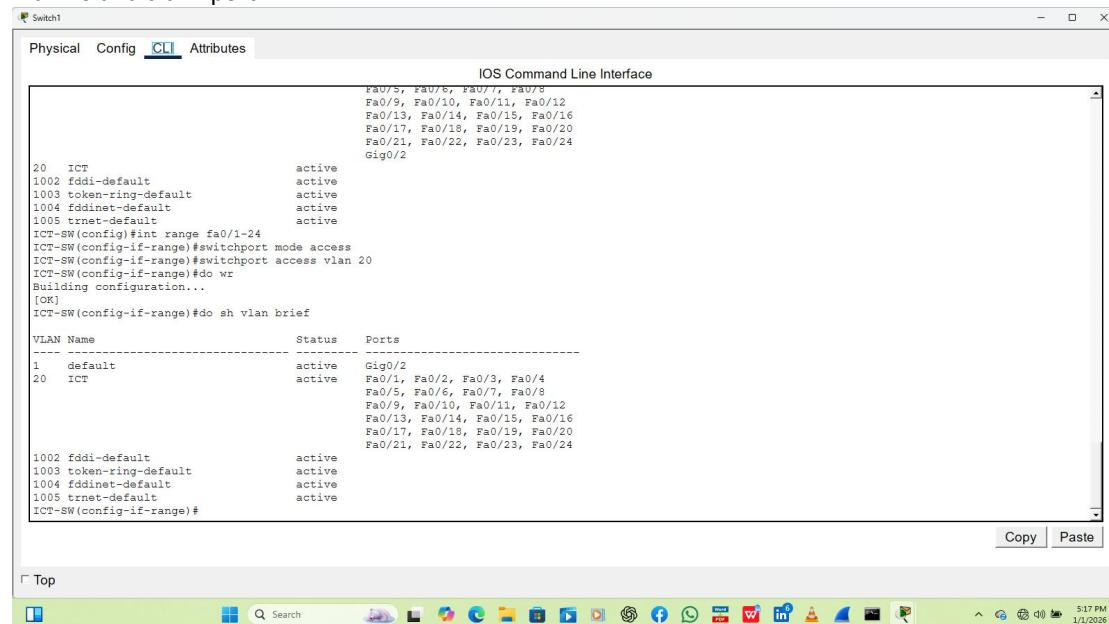
VLAN 20 and trunk port



```
ICT-SW(config)#  
ICT-SW#  
%SYS-5-CONFIG_I: Configured from console by console  
show vlan brief  
  
VLAN Name          Status     Ports  
-----  
1    default        active     Fa0/1, Fa0/2, Fa0/3, Fa0/4  
                               Fa0/5, Fa0/6, Fa0/7, Fa0/8  
                               Fa0/9, Fa0/10, Fa0/11, Fa0/12  
                               Fa0/13, Fa0/14, Fa0/15, Fa0/16  
                               Fa0/17, Fa0/18, Fa0/19, Fa0/20  
                               Fa0/21, Fa0/22, Fa0/23, Fa0/24  
                               Gig0/2  
20   ICT            active  
1002 fddi-default  active  
1003 token-ring-default  active  
1004 fddinet-default  active  
1005 trnet-default  active  
ICT-SW#show int trunk  
Port      Mode       Encapsulation  Status      Native vlan  
Gig0/1    on         802.1q        trunking    1  
  
Port      Vlans allowed on trunk  
Gig0/1    1-1005  
  
Port      Vlans allowed and active in management domain  
Gig0/1    1,20  
  
Port      Vlans in spanning tree forwarding state and not pruned  
Gig0/1    1,20  
  
ICT-SW#
```

We can see that the interfaces belong to the default vlan which is vlan 1, let us put all the interfaces into vlan 20

Vlan 20 and trunk port



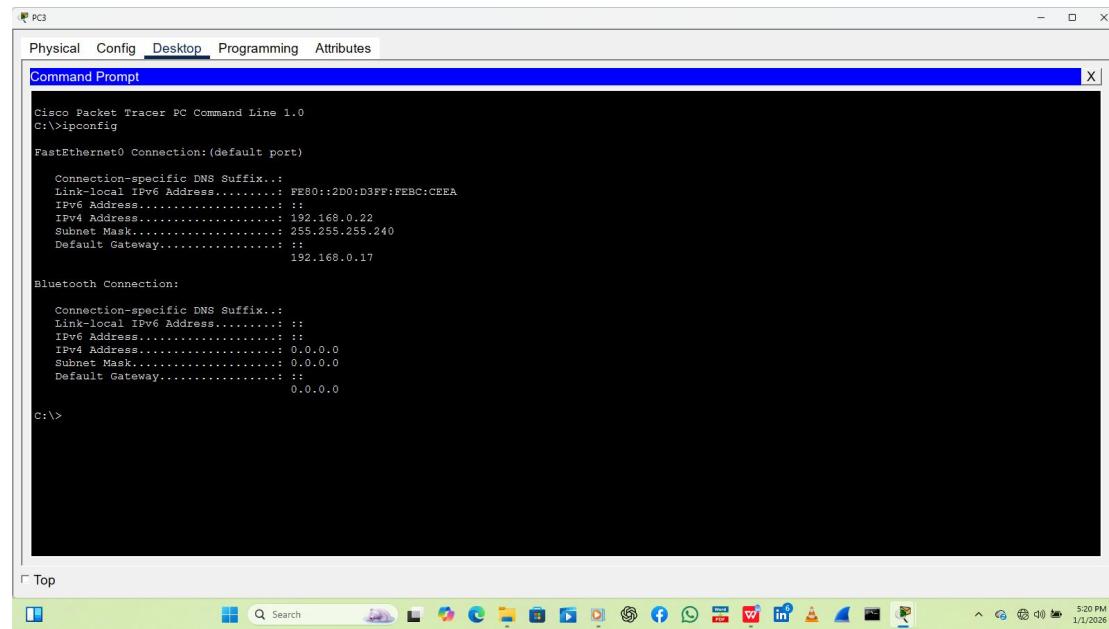
```
ICT-SW(config)#int range fa0/1-24  
ICT-SW(config-if-range)#switchport mode access  
ICT-SW(config-if-range)#switchport access vlan 20  
ICT-SW(config-if-range)#do wr  
Building configuration...  
[OK]  
ICT-SW(config-if-range)#do sh vlan brief  
  
VLAN Name          Status     Ports  
-----  
1    default        active     Gig0/2  
20   ICT            active     Fa0/1, Fa0/2, Fa0/3, Fa0/4  
                               Fa0/5, Fa0/6, Fa0/7, Fa0/8  
                               Fa0/9, Fa0/10, Fa0/11, Fa0/12  
                               Fa0/13, Fa0/14, Fa0/15, Fa0/16  
                               Fa0/17, Fa0/18, Fa0/19, Fa0/20  
                               Fa0/21, Fa0/22, Fa0/23, Fa0/24  
1002 fddi-default  active  
1003 token-ring-default  active  
1004 fddinet-default  active  
1005 trnet-default  active  
ICT-SW(config-if-range)#

```

Let us check if our PCs got ip addresses now

Command is ipconfig

PC-1



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:FEBC:CEEA
IPv6 Address.....: ::
IPv4 Address.....: 192.168.0.22
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

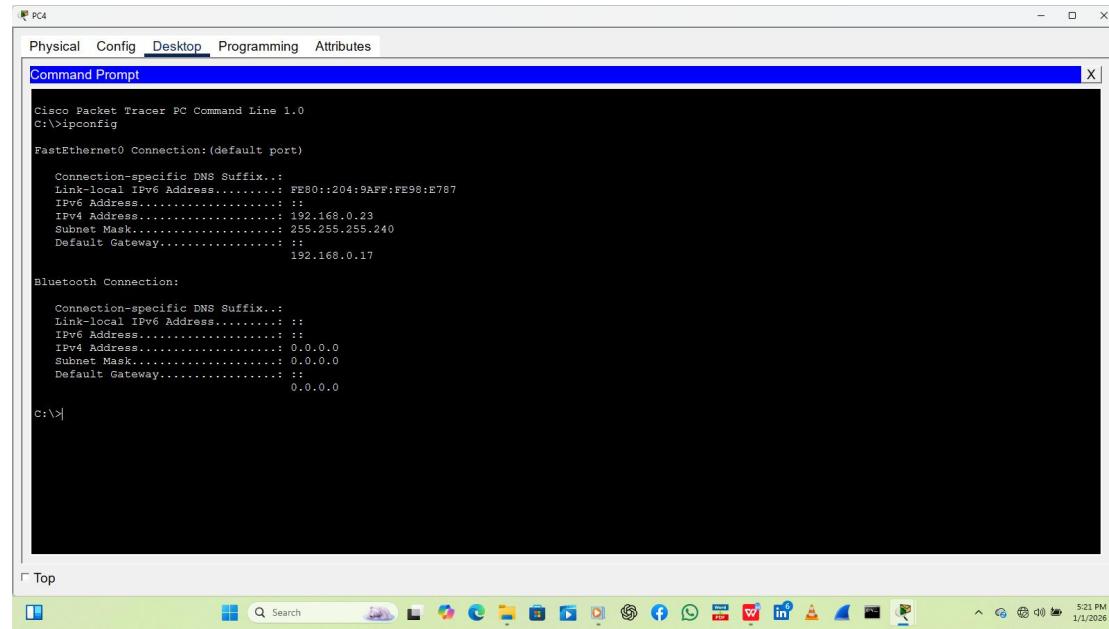
C:\>

Top

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Let us check the second pc

PC-2



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

FastEthernet0 Connection:(default port)

Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: FE80::204:9AFF:FE98:E787
IPv6 Address.....: ::
IPv4 Address.....: 192.168.0.23
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:\>

Top

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We could do PC by PC but to summarize this we issue the show ip dhcp pool for SALES and ICT

ICT POOL VERIFICATION

```

User Access Verification
Username: aDMIN
Password:

GTECH-MLS-SW>en
Password:
GTECH-MLS-SW#show ip dhcp pool ICT-pool
Pool ICT-pool :
Utilization mark (high/low) : 100 / 0
Subnet size (first/next) : 0 / 0
Total addresses : 14
Leased addresses : 2
Excluded addresses : 4
Pending event : none

1 subnet is currently in the pool
Current index IP address range Leased/Excluded/Total
192.168.0.17 192.168.0.17 - 192.168.0.30 2 / 4 / 14
GTECH-MLS-SW#show ip dhcp pool ICT-pool
Pool ICT-pool :
Utilization mark (high/low) : 100 / 0
Subnet size (first/next) : 0 / 0
Total addresses : 14
Leased addresses : 4
Excluded addresses : 4
Pending event : none

1 subnet is currently in the pool
Current index IP address range Leased/Excluded/Total
192.168.0.17 192.168.0.17 - 192.168.0.30 4 / 4 / 14
GTECH-MLS-SW#

```

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We can see that 4 ip addresses has been leased,that's for the 3 PCs and a printer
SALES POOL VERIFICATION

```

Physical Config CLI Attributes
IOS Command Line Interface

GTECH-MLS-SW(dhcp-config)#dns-server 8.8.8.8
GTECH-MLS-SW(dhcp-config)#ex
GTECH-MLS-SW(config)#ip dhcp excluded-address 192.168.0.49 192.168.0.51
GTECH-MLS-SW(config)#ip dhcp pool SERVER-ROOM-pool
GTECH-MLS-SW(dhcp-config)#network 192.168.0.48 255.255.255.240
GTECH-MLS-SW(dhcp-config)#default-router 192.168.0.49
GTECH-MLS-SW(dhcp-config)#dns-server 8.8.8.8
GTECH-MLS-SW(dhcp-config)#end wr
^
$ Invalid input detected at '^' marker.

GTECH-MLS-SW(dhcp-config)#do wr
GTECH-MLS-SW(dhcp-config)#exit
GTECH-MLS-SW(config)#do wr
Building configuration...
Compressed configuration from 7383 bytes to 3601 bytes[OK]
[OK]
GTECH-MLS-SW(config)#dns-server 8.8.8.8
GTECH-MLS-SW#
$SYS-5-CONFIG_I: Configured from console by console
show ip dhcp pool SALES-pool
Pool SALES-pool :
Utilization mark (high/low) : 100 / 0
Subnet size (first/next) : 0 / 0
Total addresses : 14
Leased addresses : 4
Excluded addresses : 4
Pending event : none

1 subnet is currently in the pool
Current index IP address range Leased/Excluded/Total
192.168.0.33 192.168.0.33 - 192.168.0.46 4 / 4 / 14
GTECH-MLS-SW#

```

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We are done with our dhcp pools

Next we configure the interface to the router and static route

Int gig1/0/1

No switchport

Ip add 10.0.0.1 255.255.255.252

Ex

Ip route 0.0.0.0 0.0.0.0 10.0.0.2

Let us verify the static route

Show ip route

```
Physical Config CLI Attributes
IOS Command Line Interface

Leased addresses : 4
Excluded addresses : 4
Pending event : none

1 subnet is currently in the pool
Current index IP address range Leased/Excluded/Total
192.168.0.33 192.168.0.33 - 192.168.0.46 4 / 4 / 14
GTECH-MLS-SW#conf t
Enter configuration commands, one per line. End with CNTL/Z.
GTECH-MLS-SW(config)#int gig1/0/1
GTECH-MLS-SW(config-if)#switchport
GTECH-MLS-SW(config-if)#ip add 10.0.0.1 255.255.255.252
GTECH-MLS-SW(config-if)#exit
GTECH-MLS-SW(config)#ip route 0.0.0.0 0.0.0.0 10.0.0.2
GTECH-MLS-SW(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/1, changed state to up
do wr
Building configuration...
Compressed configuration from 7383 bytes to 3601 bytes[OK]
[OK]
GTECH-MLS-SW(config)#
GTECH-MLS-SW#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Default gateway is not set

Host Gateway Last Use Total Uses Interface
ICMP redirect cache is empty

GTECH-MLS-SW#
```

We have to enable ip routing

Let us do that

Ip routing

```
Physical Config CLI Attributes
IOS Command Line Interface

GTECH-MLS-SW(config)#do wr
Building configuration...
Compressed configuration from 7383 bytes to 3601 bytes[OK]
[OK]
GTECH-MLS-SW(config)#
GTECH-MLS-SW#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 10.0.0.2 to network 0.0.0.0

      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.0.0.0/30 is directly connected, GigabitEthernet1/0/1
L        10.0.0.1/32 is directly connected, GigabitEthernet1/0/1
      192.168.0.0/24 is variably subnetted, 8 subnets, 2 masks
C          192.168.0.0/28 is directly connected, Vlan10
L          192.168.0.1/32 is directly connected, Vlan10
C          192.168.0.46/32 is directly connected, Vlan20
L          192.168.0.17/32 is directly connected, Vlan20
C          192.168.0.32/28 is directly connected, Vlan30
L          192.168.0.33/32 is directly connected, Vlan30
C          192.168.0.48/28 is directly connected, Vlan40
L          192.168.0.49/32 is directly connected, Vlan40
S*    0.0.0.0/0 [1/0] via 10.0.0.2

GTECH-MLS-SW#
```

We are good now, lets us finish up with our edge router

Let us try to ping the gateway to the edge router on our MLS and the edge router itself

Ping from any PC

Ping 10.0.0.1 and ping 10.0.0.2

```

Physical Config Desktop Programming Attributes
Command Prompt X
C:\>ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:
Reply from 10.0.0.1: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 2ms

C:\>ping 10.0.0.2
Pinging 10.0.0.2 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>

```

We are unable to ping the edge router, let us configure routing protocol in this case ospf
On both our MLS and edge router

MLS

Router ospf 1

Router-id 1.1.1.1

Network 10.0.0.0 0.0.0.3 area 0

Network 192.168.0.0 0.0.0.15 area 0

Network 192.168.0.16 0.0.0.15 area 0

Network 192.168.0.32 0.0.0.15 area 0

Network 192.168.0.48 0.0.0.15 area 0

Do wr

Let us try ro ping again

FROM ANY PC

```

Physical Config Desktop Programming Attributes
Command Prompt X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.2
Pinging 10.0.0.2 with 32 bytes of data:
Reply from 10.0.0.2: bytes=32 time=45ms TTL=254
Reply from 10.0.0.2: bytes=32 time=1ms TTL=254
Reply from 10.0.0.2: bytes=32 time=1ms TTL=254
Reply from 10.0.0.2: bytes=32 time=1ms TTL=254

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 45ms, Average = 12ms

C:\>ping 203.0.113.2
Pinging 203.0.113.2 with 32 bytes of data:
Reply from 203.0.113.2: bytes=32 time<1ms TTL=254
Reply from 203.0.113.2: bytes=32 time<1ms TTL=254
Reply from 203.0.113.2: bytes=32 time=1ms TTL=254
Reply from 203.0.113.2: bytes=32 time<1ms TTL=254

Ping statistics for 203.0.113.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>

```

We are now good to go, let us configure NAT

```

Int gig0/0
Ip nat inside
Ex
Int gig0/1
Ip nat outside
ex
Access-list 1 permit 192.168.0.0 0.0.0.15
Access-list 1 permit 192.168.0.16 0.0.0.15
Access-list 1 permit 192.168.0.32 0.0.0.15
Access-list 1 permit 192.168.0.48 0.0.0.15
Ip nat inside source list 1 int gig0/1 overload
Do wr

```

Before configuring NAT the PC was unable to ping the ISP, no that we have configured it lets try again

```

PC7
Physical Config Desktop Programming Attributes
Command Prompt
Request timed out.
Request timed out.

Ping statistics for 203.0.113.1:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 203.0.113.2

Pinging 203.0.113.2 with 32 bytes of data:

Reply from 203.0.113.2: 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 = 0ms, Average = 0ms

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=10ms TTL=253

Ping statistics for 203.0.113.1:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
  Minimum = 10ms, Maximum = 10ms, Average = 10ms
C:\>

```

We are good, now let us verify our NAT

Show ip nat translation

```

Router0
Physical Config CLI Attributes
IOS Command Line Interface
GTECH-MAIN-ROUTER(config)# do sh ip nat translation
GTECH-MAIN-ROUTER(config)#
GTECH-MAIN-ROUTER(config)#Int gig0/0
GTECH-MAIN-ROUTER(config-if)#Ip nat inside
GTECH-MAIN-ROUTER(config-if)#x
GTECH-MAIN-ROUTER(config)##Int gig0/1
GTECH-MAIN-ROUTER(config-if)#Ip nat outside
GTECH-MAIN-ROUTER(config-if)#x
GTECH-MAIN-ROUTER(config)##Access-list 1 permit 192.168.0.0 0.0.0.15
GTECH-MAIN-ROUTER(config)##Access-list 1 permit 192.168.0.16 0.0.0.15
GTECH-MAIN-ROUTER(config)##Access-list 1 permit 192.168.0.32 0.0.0.15
GTECH-MAIN-ROUTER(config)##Access-list 1 permit 192.168.0.48 0.0.0.15
GTECH-MAIN-ROUTER(config)#ip nat inside
  source static 192.168.0.1 203.0.113.1
  static 192.168.0.1 203.0.113.1
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 list 1 ?
  interface  Specify interface for global address
  pool  Name pool of global addresses
GTECH-MAIN-ROUTER(config)##ip nat inside source list 1 interface gig0/1 overload
GTECH-MAIN-ROUTER(config)##ip nat inside source list 1 interface gig0/1 overload
GTECH-MAIN-ROUTER#
SYS-5-CONFIG_I: Configured from console by console
show ip nat translation
GTECH-MAIN-ROUTER#show ip nat translation
Pro Inside global     Inside local      Outside local      Outside global
icmp 203.0.113.2:1   192.168.0.7:1   203.0.113.1:1   203.0.113.1:1
icmp 203.0.113.2:2   192.168.0.7:2   203.0.113.1:2   203.0.113.1:2
icmp 203.0.113.2:3   192.168.0.7:3   203.0.113.1:3   203.0.113.1:3
icmp 203.0.113.2:4   192.168.0.7:4   203.0.113.1:4   203.0.113.1:4
GTECH-MAIN-ROUTER#

```

To make this short I will not do the ping from all PCs in all vlans to the ISP, one is enough,
Now the server also must be able to receive the incoming traffic from the outside gtech network
Let us translate the server ip to public

Int gig0/0
Ip nat inside

Ex

Ip nat inside source static 192.168.0.52 203.0.113.14

Do wr

Let us try to ping our internal server from the external server

Ping 203.0.113.14

```
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=14ms TTL=125
Reply from 203.0.113.14: bytes=32 time=12ms TTL=125
Reply from 203.0.113.14: bytes=32 time=33ms TTL=125

Ping statistics for 203.0.113.14:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 12ms, Maximum = 33ms, Average = 19ms

C:\>
```

Next we try from the ISP

Ping 203.0.113.14 and issue the ip nat translation

```
* Ambiguous command: "con ft"
GTECH-MAIN-ROUTER#conf t
Enter configuration commands, one per line. End with CNTL/Z.
GTECH-MAIN-ROUTER(config)#Int gig0/0
GTECH-MAIN-ROUTER(config-if)#Ip nat inside
GTECH-MAIN-ROUTER(config-if)#x
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 192.168.0.52 ?
  A.B.C.D Inside global IP address
GTECH-MAIN-ROUTER(config)#Ip nat inside source static 192.168.0.52 203.0.113.14 ?
  A.B.C.D Inside global IP address
GTECH-MAIN-ROUTER(config)#Ip nat inside source static 192.168.0.52 203.0.113.14
GTECH-MAIN-ROUTER(config)#
GTECH-MAIN-ROUTER(config)#do wr
Building configuration...
[OK]
GTECH-MAIN-ROUTER(config)#ex
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
icmp 203.0.113.14:1   192.168.0.52:1   203.0.113.1:1   203.0.113.1:1
icmp 203.0.113.14:2   192.168.0.52:2   203.0.113.1:2   203.0.113.1:2
icmp 203.0.113.14:3   192.168.0.52:3   203.0.113.1:3   203.0.113.1:3
icmp 203.0.113.14:4   192.168.0.52:4   203.0.113.1:4   203.0.113.1:4
icmp 203.0.113.14:5   192.168.0.52:5   203.0.113.1:5   203.0.113.1:5
--- 203.0.113.14       192.168.0.52      ---          ---
```

We are done for now.

End of the project

VLAN 30