



Operating Systems and Networks

TA Finance Network Design



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Introduction

This report will explain and evaluate how Virtual LANs (VLAN)s can be used in this network topology. Moreover, this report will explain the benefits of using DHCP to allocate IP address. This report will also include screenshots of my configuration and the connectivity test.

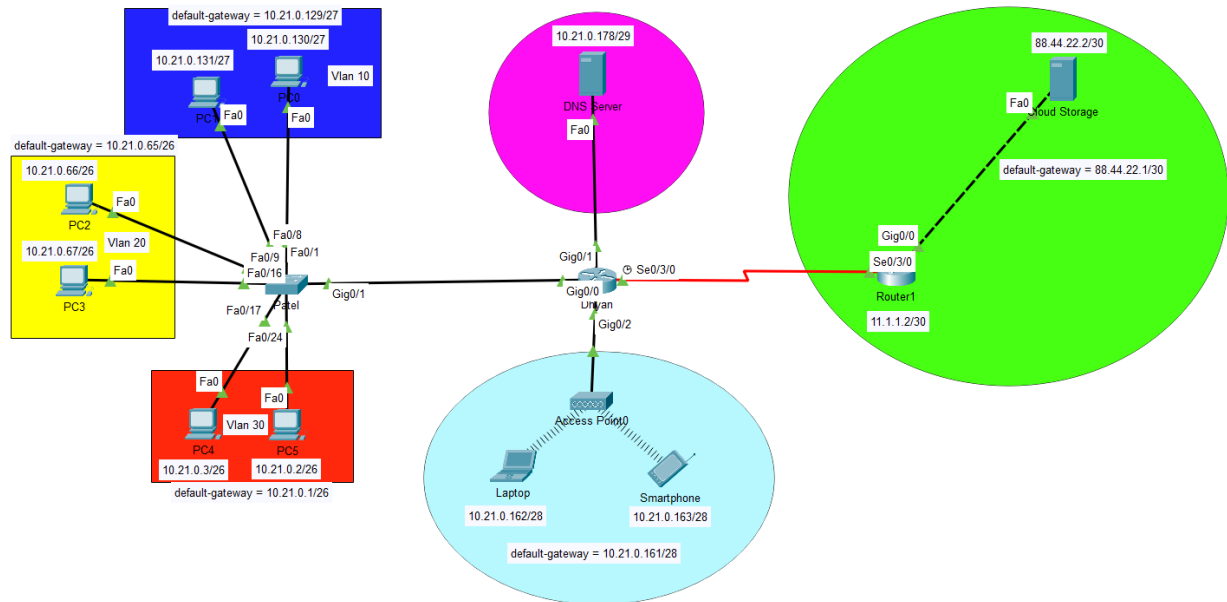


FIGURE 1

1. List the cables used in a table with their specifications.

Source	Destination	Cable used
Router (Dhyan)	Switch	Copper Straight-Through
Switch	All the PCs	Copper Straight-Through
Router (Dhyan)	DNS Server	Copper Straight-Through
Router (Dhyan)	ISP Router	Serial DTE
ISP Router	Cloud Storage	Copper Cross-Over

Table 1

2. Subnetting calculations

Given Ip address: 10.21.0.0/16.

There are Four Networks.

$$2^n = 4$$

$n = 2$, so we need to borrow 2 host bits from the host portion.

$$128 + 64 = 192$$

1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0
255 . 255 . 192 . 0

Total number of 1s = 18, so the subnet mask is 18.

Number of hosts = $2^{14} - 2 = 16,382$.

The Magic Number is 64.

Range	Network address	First address	Last address	Broadcast address
1	10.21.0.0	10.21.0.1	10.21.63.254	10.21.63.255
2	10.21.64.0	10.21.64.1	10.21.127.254	10.21.127.255
3	10.21.128.0	10.21.128.1	10.21.191.254	10.21.191.255
4	10.21.192.0	10.21.192.1	10.21.255.254	10.21.255.255

Table 2

- We are using range 1 and performing further subnetting in order not to waste any IP address.

LAN 1

For Sales = 60 hosts:

$$2^n - 2 = 60$$

$$2^n = 62$$

$n = 6$, so we leave 6 host bits

1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 0 0 0 0 0 0
255 . 255 . 255 . 192

Total number of 1s = 26, so the subnet mask is 26.

Number of hosts = $2^6 - 2 = 62$ hosts (Usable IP address).

The Magic Number is 64.

Range	Network address	First address	Last address	Broadcast address
1	10.21.0.0	10.21.0.1	10.21.0.62	10.21.0.63

For Accounting = 35 hosts:

$$2^n - 2 = 35$$

$$2^n = 37$$

n = 6, so we leave 6 host bits.

1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 0 0 0 0 0 0
255 . 255 . 255 . 192

Total number of 1s = 26, so the subnet mask is 26.

Number of hosts = $2^6 - 2 = 62$ hosts (Usable IP address).

The Magic Number is 64.

Range	Network address	First address	Last address	Broadcast address
1	10.21.0.64	10.21.0.65	10.21.0.126	10.21.0.127

For Admin = 20 hosts:

$$2^n - 2 = 20$$

$$2^n = 22$$

n = 5, so we leave 5 host bits.

1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 0 0 0 0 0
255 . 255 . 255 . 224

Total number of 1s = 27, so the subnet mask is 27.

Number of hosts = $2^5 - 2 = 30$ hosts (Usable IP address).

The Magic Number is 32.

Range	Network address	First address	Last address	Broadcast address
1	10.21.0.128	10.21.0.129	10.21.0.158	10.21.0.159

LAN 2

Assuming 14 host can join:

$$2^n - 2 = 14$$

$$2^n = 16$$

$n = 4$, so we leave 4 host bits.

1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 0 0 0 0
255 . 255 . 255 . 240

Total number of 1s = 28, so the subnet mask is 28.

Number of hosts = $2^4 - 2 = 14$ hosts (Usable IP address).

The Magic Number is 16.

Range	Network address	First address	Last address	Broadcast address
1	10.21.0.160	10.21.0.161	10.21.0.174	10.21.0.175

LAN3

Assuming 6 host can join:

$$2^n - 2 = 6$$

$$2^n = 8$$

$n = 3$, so we leave 3 host bits.

1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 0 0 0
255 . 255 . 255 . 248

Total number of 1s = 29, so the subnet mask is 29.

Number of hosts = $2^3 - 2 = 6$ hosts (Usable IP address).

The Magic Number is 8.

Range	Network address	First address	Last address	Broadcast address
1	10.21.0.176	10.21.0.177	10.21.0.182	10.21.0.183

LAN4

Given IP address 11.1.1.0/30.

Assuming 2 host can join:

$$2^n - 2 = 2$$

$$2^n = 4$$

n = 2, so we leave 2 host bits.

1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 0 0
255 . 255 . 255 . 252

Total number of 1s = 30, so the subnet mask is 30.

Number of hosts = $2^2 - 2 = 2$ hosts (Usable IP address).

The Magic Number is 4.

Range	Network address	First address	Last address	Broadcast address
1	11.1.1.0	11.1.1.1	11.1.1.2	11.1.1.3

LAN5

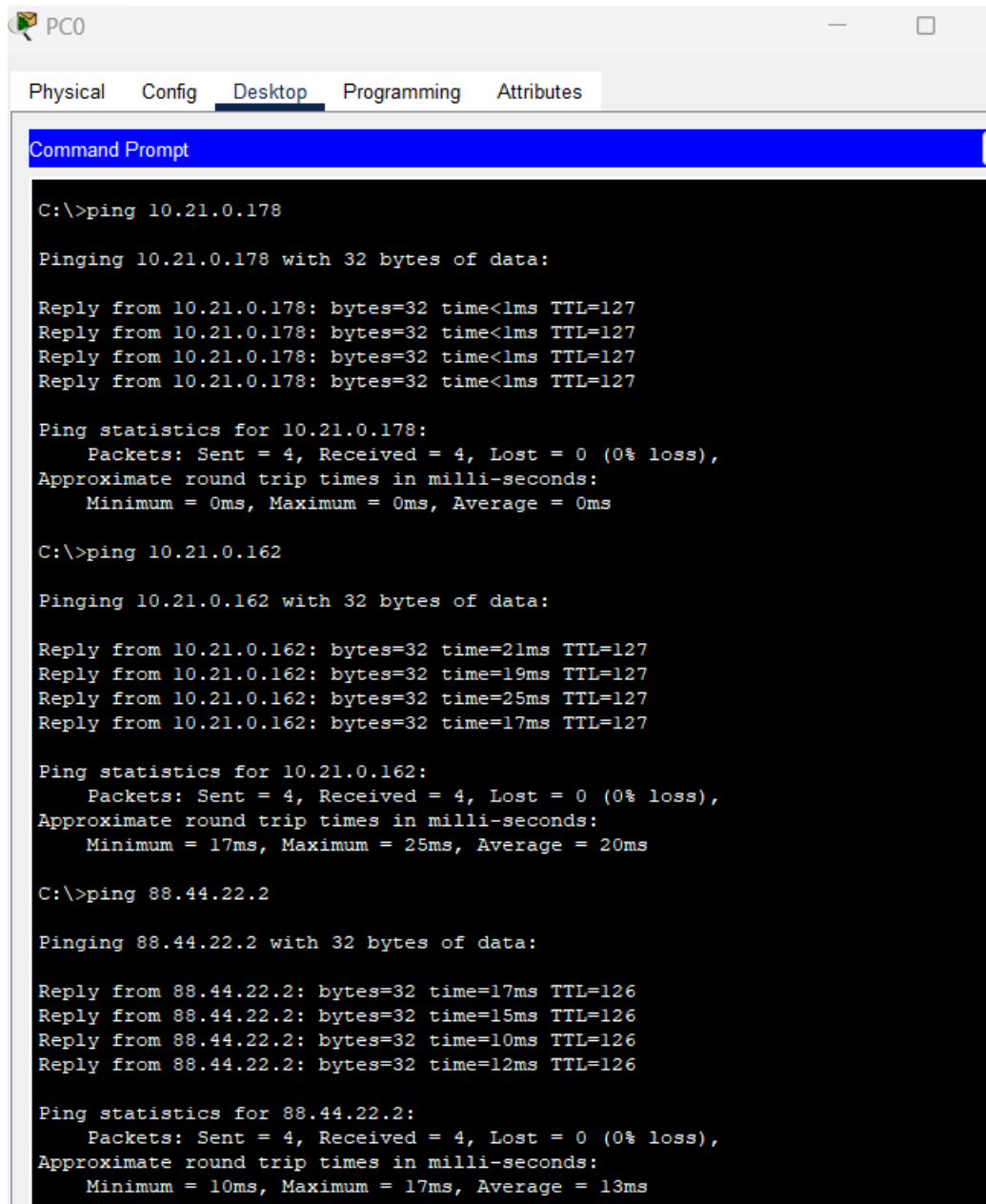
- Cloud Storage has been given an IP address of 88.44.22.2/30.
- ISP Router has an IP address of 88.44.22.1/30.

3. A Table with the IP addresses assigned to each device after subnetting.

Name of device	IP address	Subnet mask	Default Gateway
PC0 (Admin)	10.21.0.130	255.255.255.224	10.21.0.129
PC1 (Admin)	10.21.0.131	255.255.255.224	10.21.0.129
PC2 (Accounting)	10.21.0.66	255.255.255.192	10.21.0.65
PC3 (Accounting)	10.21.0.67	255.255.255.192	10.21.0.65
PC4 (Sales)	10.21.0.3	255.255.255.192	10.21.0.1
PC5 (Sales)	10.21.0.2	255.255.255.192	10.21.0.1
Interfaces of the Router (Dhyan):			
Router (Dhyan) (Gig0/1)	10.21.0.177	255.255.255.248	
Router (Dhyan) (Gig0/2)	10.21.0.161	255.255.255.240	
Router (Dhyan) (Se0/3/0)	11.1.1.1	255.255.255.252	
Router (Dhyan) (Gig0/0.1)	10.21.0.129	255.255.255.224	
Router (Dhyan) (Gig0/0.2)	10.21.0.65	255.255.255.192	
Router (Dhyan) (Gig0/0.3)	10.21.0.1	255.255.255.192	
Switch (Patel)			
DNS Server	10.21.0.178	255.255.255.248	10.21.0.177
Interfaces of the ISP Router:			
ISP Router (Se0/3/1)	11.1.1.2	255.255.255.252	
ISP Router (Gig0/0)	88.44.22.1	255.255.255.252	
Cloud Storage	88.44.22.2	255.255.255.252	88.44.22.1
Laptop	10.21.0.162	255.255.255.240	10.21.0.161
Smartphone	10.21.0.163	255.255.255.240	10.21.0.161

4. Screenshots of all my connectivity

- Figure 2 is pinging from PC0 (Admin) to DNS Server, Laptop and Cloud Storage



```
C:\>ping 10.21.0.178

Pinging 10.21.0.178 with 32 bytes of data:

Reply from 10.21.0.178: bytes=32 time<1ms TTL=127
Reply from 10.21.0.178: bytes=32 time<1ms TTL=127
Reply from 10.21.0.178: bytes=32 time<1ms TTL=127
Reply from 10.21.0.178: bytes=32 time<1ms TTL=127

Ping statistics for 10.21.0.178:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.21.0.162

Pinging 10.21.0.162 with 32 bytes of data:

Reply from 10.21.0.162: bytes=32 time=21ms TTL=127
Reply from 10.21.0.162: bytes=32 time=19ms TTL=127
Reply from 10.21.0.162: bytes=32 time=25ms TTL=127
Reply from 10.21.0.162: bytes=32 time=17ms TTL=127

Ping statistics for 10.21.0.162:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 17ms, Maximum = 25ms, Average = 20ms

C:\>ping 88.44.22.2

Pinging 88.44.22.2 with 32 bytes of data:

Reply from 88.44.22.2: bytes=32 time=17ms TTL=126
Reply from 88.44.22.2: bytes=32 time=15ms TTL=126
Reply from 88.44.22.2: bytes=32 time=10ms TTL=126
Reply from 88.44.22.2: bytes=32 time=12ms TTL=126

Ping statistics for 88.44.22.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 17ms, Average = 13ms
```

FIGURE 2

- Figure 3 is pinging from PC3 (Accounting) to DNS Server, Laptop and Cloud Storage

```
PC3
Physical Config Desktop Programming Attributes
Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.21.0.178

Pinging 10.21.0.178 with 32 bytes of data:

Reply from 10.21.0.178: bytes=32 time<1ms TTL=127
Reply from 10.21.0.178: bytes=32 time<1ms TTL=127
Reply from 10.21.0.178: bytes=32 time<1ms TTL=127
Reply from 10.21.0.178: bytes=32 time<1ms TTL=127

Ping statistics for 10.21.0.178:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.21.0.162

Pinging 10.21.0.162 with 32 bytes of data:

Reply from 10.21.0.162: bytes=32 time=38ms TTL=127
Reply from 10.21.0.162: bytes=32 time=19ms TTL=127
Reply from 10.21.0.162: bytes=32 time=23ms TTL=127
Reply from 10.21.0.162: bytes=32 time=24ms TTL=127

Ping statistics for 10.21.0.162:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 19ms, Maximum = 38ms, Average = 26ms

C:\>ping 88.44.22.2

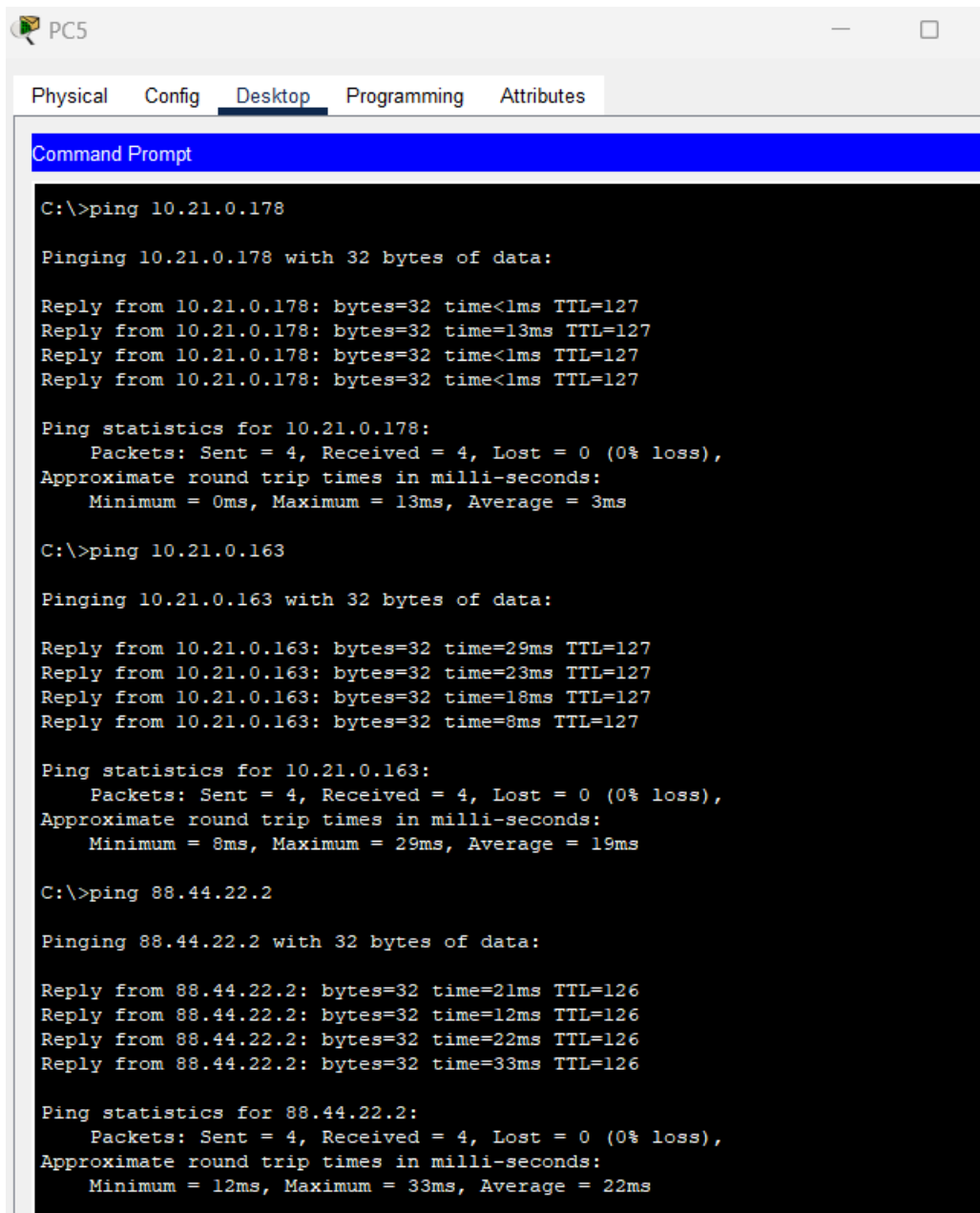
Pinging 88.44.22.2 with 32 bytes of data:

Reply from 88.44.22.2: bytes=32 time=17ms TTL=126
Reply from 88.44.22.2: bytes=32 time=1ms TTL=126
Reply from 88.44.22.2: bytes=32 time=10ms TTL=126
Reply from 88.44.22.2: bytes=32 time=10ms TTL=126

Ping statistics for 88.44.22.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 17ms, Average = 9ms
```

FIGURE 3

- Figure 4 is pinging from PC5 to DNS Server, Smartphone and Cloud Storage



The screenshot shows a Windows desktop environment for a PC named 'PC5'. The 'Desktop' tab is selected in the taskbar. A Command Prompt window is open, displaying the results of three ping commands. The first command is 'ping 10.21.0.178', which shows four successful replies with times less than 1ms and a TTL of 127. The second command is 'ping 10.21.0.163', showing four successful replies with times ranging from 8ms to 29ms and a TTL of 127. The third command is 'ping 88.44.22.2', showing four successful replies with times ranging from 12ms to 33ms and a TTL of 126. All three destinations show 0% packet loss.

```
C:\>ping 10.21.0.178

Pinging 10.21.0.178 with 32 bytes of data:

Reply from 10.21.0.178: bytes=32 time<1ms TTL=127
Reply from 10.21.0.178: bytes=32 time=13ms TTL=127
Reply from 10.21.0.178: bytes=32 time<1ms TTL=127
Reply from 10.21.0.178: bytes=32 time<1ms TTL=127

Ping statistics for 10.21.0.178:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 13ms, Average = 3ms

C:\>ping 10.21.0.163

Pinging 10.21.0.163 with 32 bytes of data:

Reply from 10.21.0.163: bytes=32 time=29ms TTL=127
Reply from 10.21.0.163: bytes=32 time=23ms TTL=127
Reply from 10.21.0.163: bytes=32 time=18ms TTL=127
Reply from 10.21.0.163: bytes=32 time=8ms TTL=127

Ping statistics for 10.21.0.163:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 29ms, Average = 19ms

C:\>ping 88.44.22.2

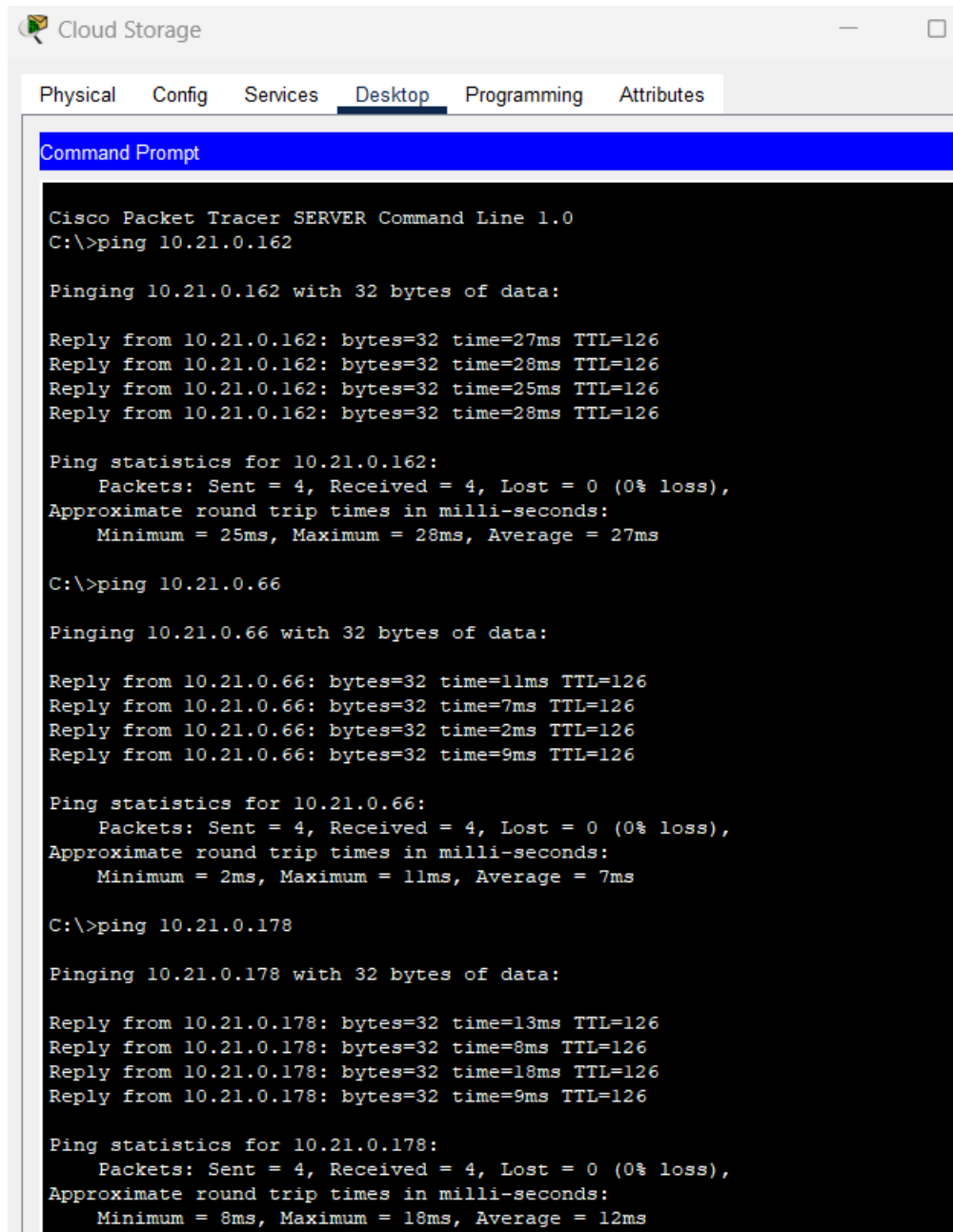
Pinging 88.44.22.2 with 32 bytes of data:

Reply from 88.44.22.2: bytes=32 time=21ms TTL=126
Reply from 88.44.22.2: bytes=32 time=12ms TTL=126
Reply from 88.44.22.2: bytes=32 time=22ms TTL=126
Reply from 88.44.22.2: bytes=32 time=33ms TTL=126

Ping statistics for 88.44.22.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 33ms, Average = 22ms
```

FIGURE 4

- Figure 5 is pinging from Cloud Storage to Laptop, PC2(Accounting) and DNS Server



The screenshot shows a Cisco Packet Tracer window titled "Cloud Storage". It has tabs for Physical, Config, Services, Desktop (selected), Programming, and Attributes. Inside the Desktop tab is a "Command Prompt" window. The Command Prompt displays the following text:

```
Cisco Packet Tracer SERVER Command Line 1.0
C:\>ping 10.21.0.162

Pinging 10.21.0.162 with 32 bytes of data:

Reply from 10.21.0.162: bytes=32 time=27ms TTL=126
Reply from 10.21.0.162: bytes=32 time=28ms TTL=126
Reply from 10.21.0.162: bytes=32 time=25ms TTL=126
Reply from 10.21.0.162: bytes=32 time=28ms TTL=126

Ping statistics for 10.21.0.162:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 25ms, Maximum = 28ms, Average = 27ms

C:\>ping 10.21.0.66

Pinging 10.21.0.66 with 32 bytes of data:

Reply from 10.21.0.66: bytes=32 time=11ms TTL=126
Reply from 10.21.0.66: bytes=32 time=7ms TTL=126
Reply from 10.21.0.66: bytes=32 time=2ms TTL=126
Reply from 10.21.0.66: bytes=32 time=9ms TTL=126

Ping statistics for 10.21.0.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 11ms, Average = 7ms

C:\>ping 10.21.0.178

Pinging 10.21.0.178 with 32 bytes of data:

Reply from 10.21.0.178: bytes=32 time=13ms TTL=126
Reply from 10.21.0.178: bytes=32 time=8ms TTL=126
Reply from 10.21.0.178: bytes=32 time=18ms TTL=126
Reply from 10.21.0.178: bytes=32 time=9ms TTL=126

Ping statistics for 10.21.0.178:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 18ms, Average = 12ms
```

FIGURE 5

- Figure 6 is pinging from ISP Router to Laptop, PC2(Accounting) and DNS Server

```

ISP Router
Physical Config CLI Attributes
IOS Command Line Interface

Router#ping 10.21.0.162

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.21.0.162, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 11/17/25 ms

Router#ping 10.21.0.66

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.21.0.66, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/5/8 ms

Router#ping 10.21.0.178

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.21.0.178, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/6/9 ms

```

FIGURE 6

5. Routing Protocols and Ip Interface

- Figure 7 shows Ip interface for Router(Dhyan)

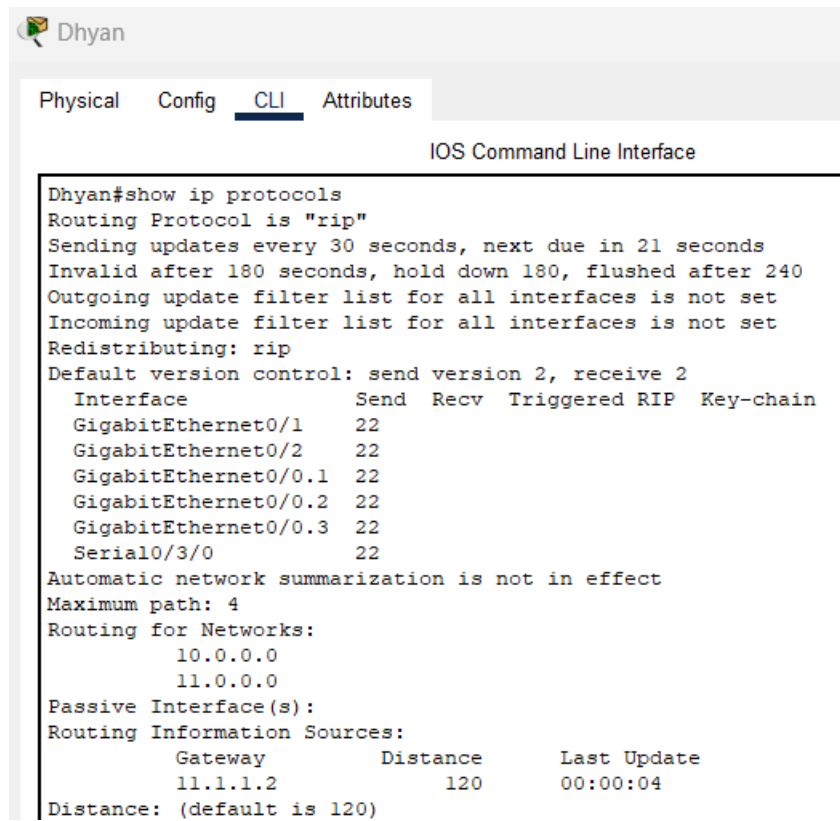
```

Dhyan#show ip interface brief
Interface          IP-Address      OK? Method Status
Protocol
GigabitEthernet0/0 unassigned     YES unset  up
GigabitEthernet0/0.1 10.21.0.129    YES manual up
GigabitEthernet0/0.2 10.21.0.65     YES manual up
GigabitEthernet0/0.3 10.21.0.1      YES manual up
GigabitEthernet0/1 10.21.0.177    YES manual up
GigabitEthernet0/2 10.21.0.161    YES manual up
Serial0/3/0         11.1.1.1       YES manual up
Serial0/3/1         unassigned     YES unset  administratively down
Vlan1               unassigned     YES unset  administratively down

```

FIGURE 7

- Figure 8 shows the routing protocol for Router(Dhyan)



```

Dhyan
Physical Config CLI Attributes
IOS Command Line Interface

Dhyan#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 21 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send Recv Triggered RIP Key-chain
GigabitEthernet0/1    22
GigabitEthernet0/2    22
GigabitEthernet0/0.1  22
GigabitEthernet0/0.2  22
GigabitEthernet0/0.3  22
Serial0/3/0           22
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  10.0.0.0
  11.0.0.0
Passive Interface(s):
Routing Information Sources:
  Gateway         Distance      Last Update
  11.1.1.2         120           00:00:04
Distance: (default is 120)

```

FIGURE 8

This paragraph explains how the RIP routing protocol works:

- In Figure 8, the routing protocols that is being used is RIP that allows routers in a network to exchange information about the best routes to reach different destinations. It works by periodically sending updates to neighboring routers, which contain information about the network topology and the number of hops needed to reach different destinations. Routers use this information to update their own routing tables and choose the most efficient path to send packets to their destinations.

6. DHCP (Dynamic Host Configuration Protocol)

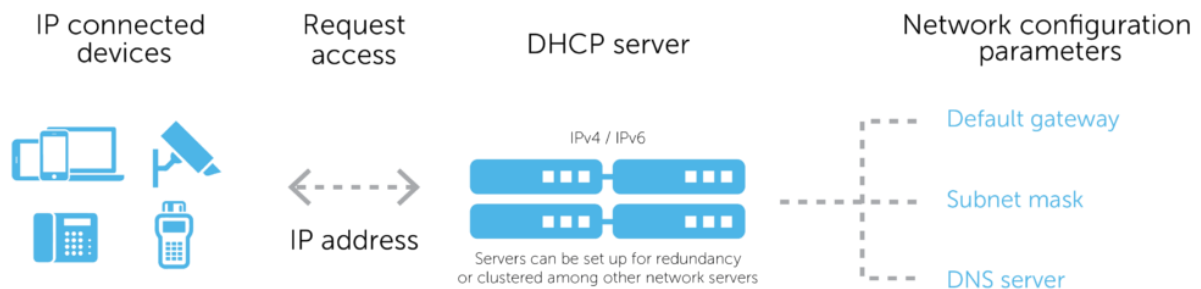
What is DHCP (Dynamic Host Configuration Protocol)?

- Dynamic Host Configuration Protocol (DHCP) is a network protocol that allows automatic configuration of IP addresses and other network settings for devices on a network. The protocol enables devices to obtain IP addresses and other network configuration information dynamically, without the need for manual configuration.

How does DHCP works in this network?

- DHCP is a network management protocol. A laptop, for example, enters a network and gets an IP address from a client device (or DHCP client). A DHCP server is contacted with the request.

How does DHCP work?



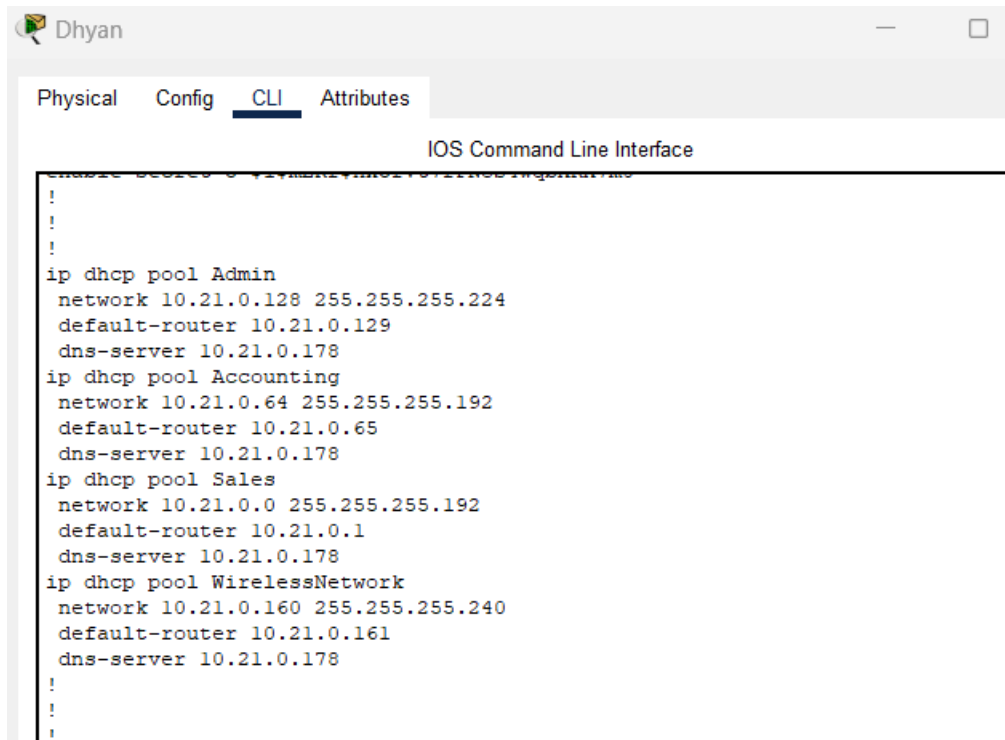
- A quick and automatic IP address assignment process is performed by the server, along with some associated network setup factors. The gadget can interact with both the internal network and the public internet once it has accepted the request.

Why is the use of DHCP beneficial in the network IP address allocation?

- DHCP makes it easy to configure new devices on a network. When a device is added to the network, it can instantly acquire an IP address and other required configuration settings from the DHCP server without the need for human intervention. This lessens the burden for network administrators and facilitates the management of vast networks.
- DHCP ensures that IP addresses are assigned to devices only when they are needed. DHCP can immediately release an IP address when a device no longer needs it, making it accessible for use by other devices. This guarantees effective IP address utilization and helps avoid IP address waste.
- DHCP reduces the likelihood of configuration errors because devices are automatically assigned the correct IP address and network configuration settings. This removes the need for manual setup, which can be laborious and error prone.

I've used DHCP to setup my network. I've included some images of my configuration below.

- In Figure 9, I have used DHCP pool to configure a range of IP addresses that can be automatically assigned to devices on a network.



```

Dhyan
Physical  Config  CLI  Attributes
IOS Command Line Interface
!
!
!
ip dhcp pool Admin
 network 10.21.0.128 255.255.255.224
 default-router 10.21.0.129
 dns-server 10.21.0.178
ip dhcp pool Accounting
 network 10.21.0.64 255.255.255.192
 default-router 10.21.0.65
 dns-server 10.21.0.178
ip dhcp pool Sales
 network 10.21.0.0 255.255.255.192
 default-router 10.21.0.1
 dns-server 10.21.0.178
ip dhcp pool WirelessNetwork
 network 10.21.0.160 255.255.255.240
 default-router 10.21.0.161
 dns-server 10.21.0.178
!
!
!
```

FIGURE 9

- The screenshot below is verifying the DHCP client configuration:

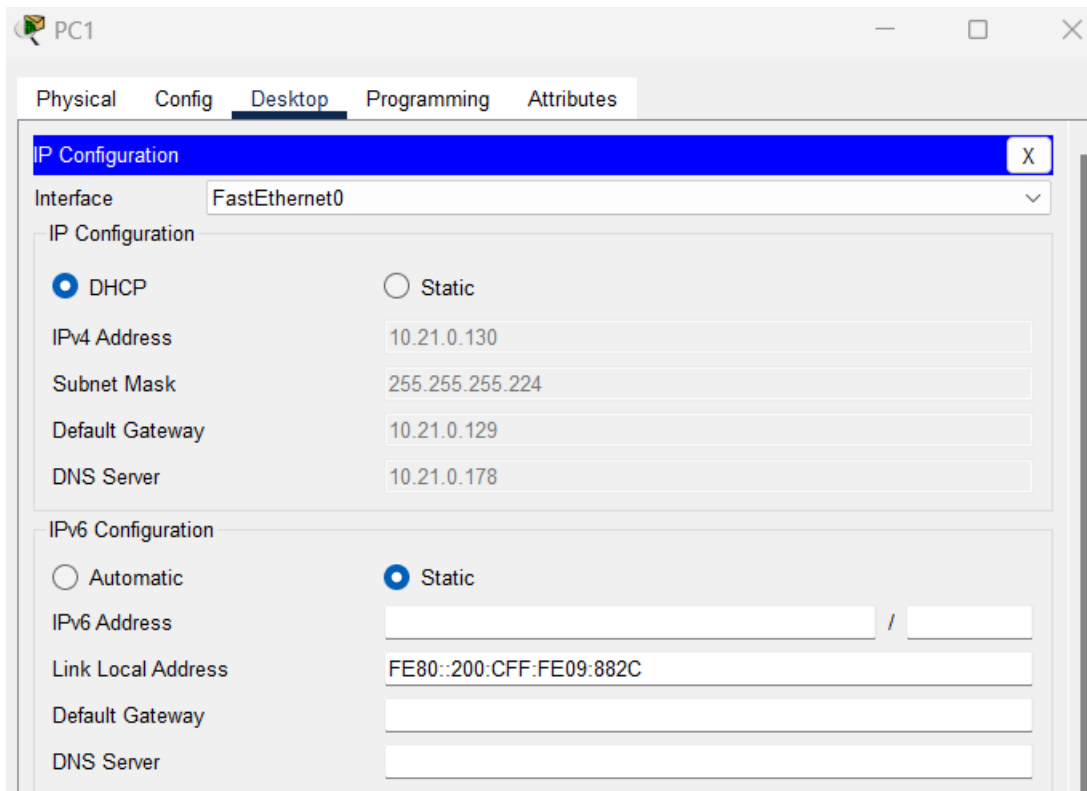


FIGURE 10

7. VLANs (Virtual Local Area Networks)

What are VLANs (Virtual Local Area Networks)?

- VLAN is a custom network which is created from one or more local area networks. It makes it possible to join a collection of devices that are spread across several virtual networks.

Explain how Virtual LANs can improve this network?

- Network administrators can implement security rules based on device or user function and create secure zones by grouping devices into various VLANs. VLANs can add an extra layer of security, decreasing the possibility of unapproved entry and lowering the scope of security breaches.
- VLANs give administrators the ability to group devices based on their purposes or geographic locations, making it simpler to control network resources. VLANs can facilitate the implementation of network rules and modifications as well as the investigation of network problems by organizing devices into logical segments.

What are the limitations of VLANs?

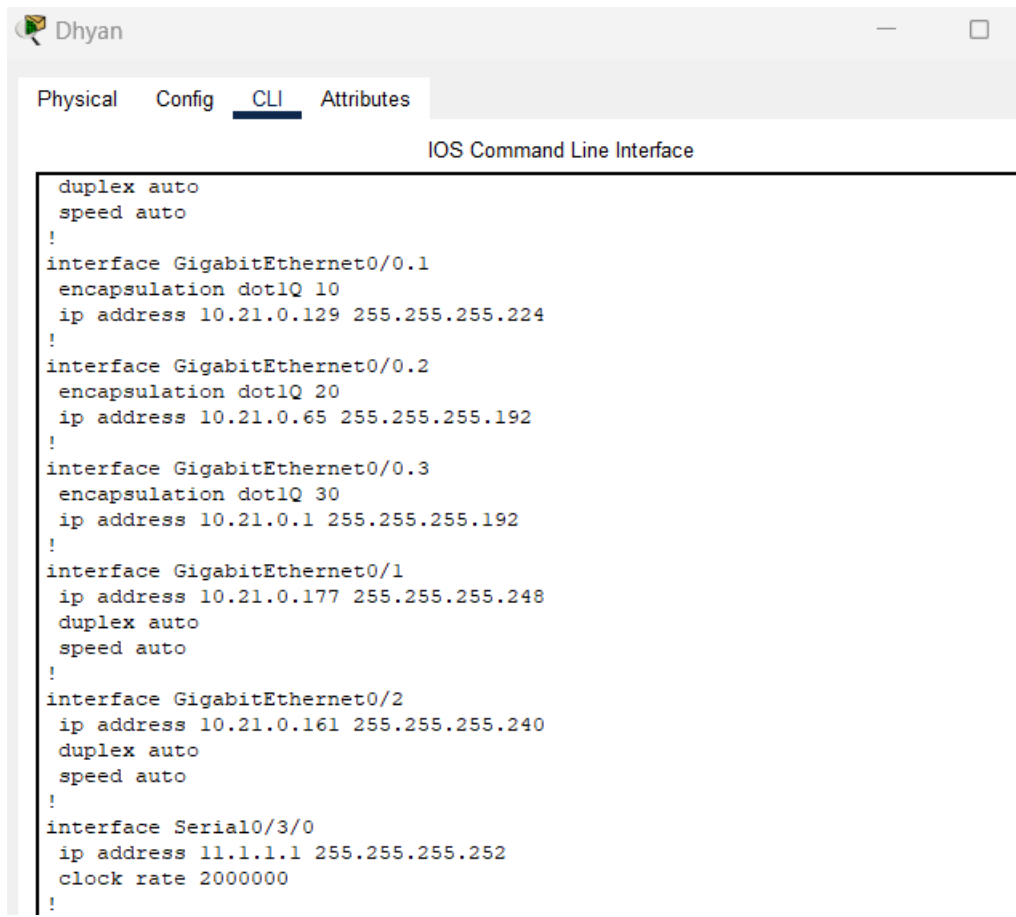
- VLANs can become complex to manage as the number of users and devices increases. The configuration and maintenance of VLANs become more challenging as their number increases.
- VLANs' utility in some circumstances may be constrained by interoperability problems they may have with other networking systems.

What are the benefits of VLANs?

- VLANs cut down on broadcast traffic by restricting the scope of broadcast packets to devices on the same VLAN. This contributes to a decrease in network overcrowding and improved network efficiency.
- Network administrators can organize users and devices based on their functional requirements using VLANs, regardless of where they are physical location. This makes network architecture more flexible and makes it simpler to handle network resources.

I've used VLANs to setup my network. I've included some images of my configuration below.

- In Figure 11, I have used encapsulation dot1Q to tag the VLAN ID to the data packet, enabling the switch to differentiate between packets belonging to different VLANs.



```
duplex auto
speed auto
!
interface GigabitEthernet0/0.1
encapsulation dot1Q 10
ip address 10.21.0.129 255.255.255.224
!
interface GigabitEthernet0/0.2
encapsulation dot1Q 20
ip address 10.21.0.65 255.255.255.192
!
interface GigabitEthernet0/0.3
encapsulation dot1Q 30
ip address 10.21.0.1 255.255.255.192
!
interface GigabitEthernet0/1
ip address 10.21.0.177 255.255.255.248
duplex auto
speed auto
!
interface GigabitEthernet0/2
ip address 10.21.0.161 255.255.255.240
duplex auto
speed auto
!
interface Serial0/3/0
ip address 11.1.1.1 255.255.255.252
clock rate 2000000
!
```

FIGURE 11

- In Figure 12, I have used 'show vlan brief' command to show the VLANs ID, VLANs Name and the Ports that they are using.



```
Patel#show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Gig0/2
10	Admin	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/6, Fa0/7, Fa0/8
20	Accounting	active	Fa0/9, Fa0/10, Fa0/11, Fa0/12 Fa0/13, Fa0/14, Fa0/15,
	Fa0/16		
30	Sales	active	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	

FIGURE 12

- In Figure 13, I have used ‘show run’ command in Switch(Patel).

```

User Access Verification
Password:
Patel>en
Password:
Patel#sh run
Building configuration...

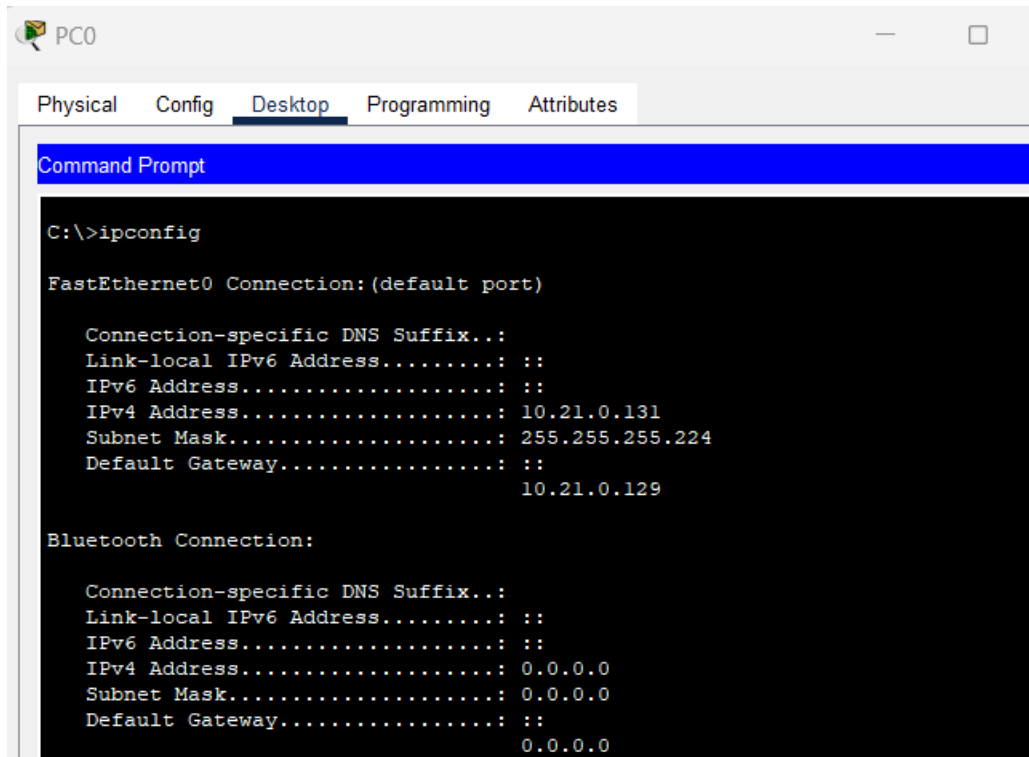
Current configuration : 2588 bytes
!
version 15.0
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Patel
!
enable secret 5 $1$mERz$hx5rVt7rPN054wqbXKK7m0
!
!
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/2
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/3
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/4
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/5
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/6
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/7
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/8
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/9
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/10
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/11
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/12
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/13
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/14
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/15
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/16
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/17
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/18
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/19
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/20
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/21
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/22
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/23
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/24
 switchport access vlan 30
 switchport mode access
!
interface GigabitEthernet0/1
 switchport mode trunk
!
interface GigabitEthernet0/2
!
interface Vlan1
 no ip address
!
banner motd ^C Authorized access only.Violaters will be prosecuted the the full extent of the law. ^C
!
!
!
line con 0
 password 7 08314D5D1A0E0A0516
 login
!
line vty 0 4
 password 7 08701E1D5D
 login
 transport input ssh
!
line vty 5 15
 password 7 08701E1D5D
 login
 transport input ssh
!
!
!
!
end

```

FIGURE 13

8. Final Test Screenshots

- In Figure 13, I have used ‘Ipconfig’ command in PC0(Admin).



The screenshot shows a Windows Command Prompt window titled 'PC0'. The 'Desktop' tab is selected in the top menu. The command prompt displays the output of the 'ipconfig' command. It shows details for 'FastEthernet0 Connection: (default port)' and 'Bluetooth Connection'. The FastEthernet0 connection has an IPv4 address of 10.21.0.131 and a default gateway of 10.21.0.129. The Bluetooth connection has an IPv4 address of 0.0.0.0 and a default gateway of 0.0.0.0.

```
C:\>ipconfig

FastEthernet0 Connection: (default port)

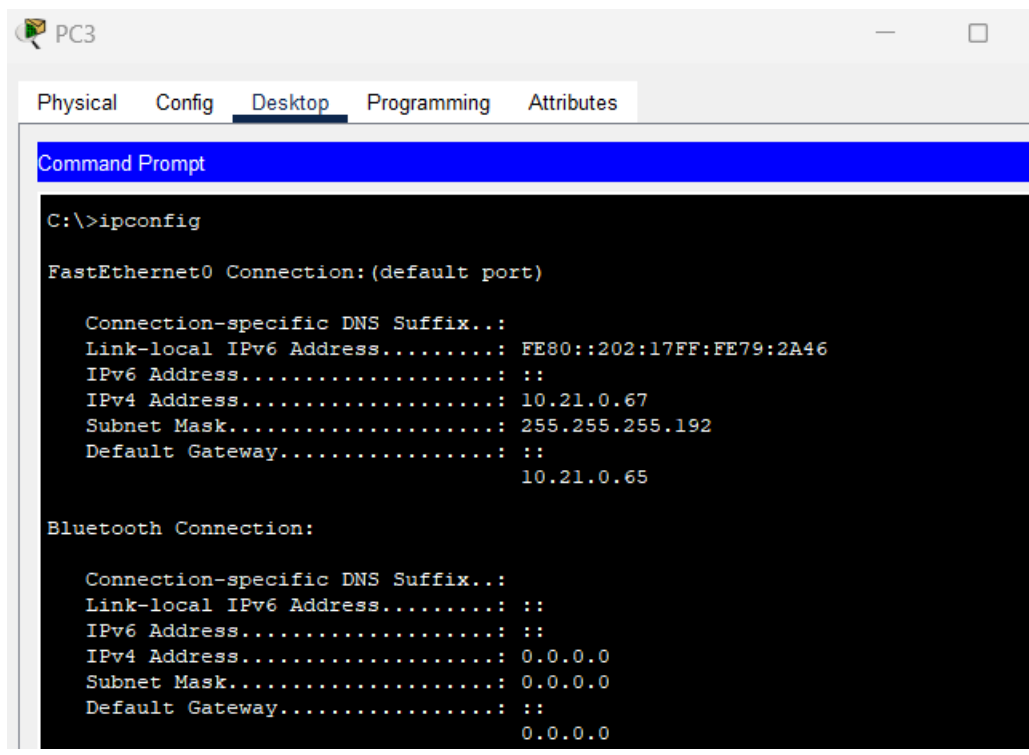
    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address. . . . .: 10.21.0.131
    Subnet Mask . . . . .: 255.255.255.224
    Default Gateway . . . . .: ::
                                   10.21.0.129

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
```

FIGURE 14

- In Figure 14, I have used 'Ipconfig' command in PC3(Accounting).



The screenshot shows a Windows Command Prompt window titled 'PC3'. The 'Desktop' tab is selected in the top menu. The command prompt displays the output of the 'ipconfig' command. It shows details for 'FastEthernet0 Connection: (default port)' and 'Bluetooth Connection'. The FastEthernet0 connection has an IPv4 address of 10.21.0.67 and a default gateway of 10.21.0.65. The Bluetooth connection has an IPv4 address of 0.0.0.0 and a default gateway of 0.0.0.0.

```
C:\>ipconfig

FastEthernet0 Connection: (default port)

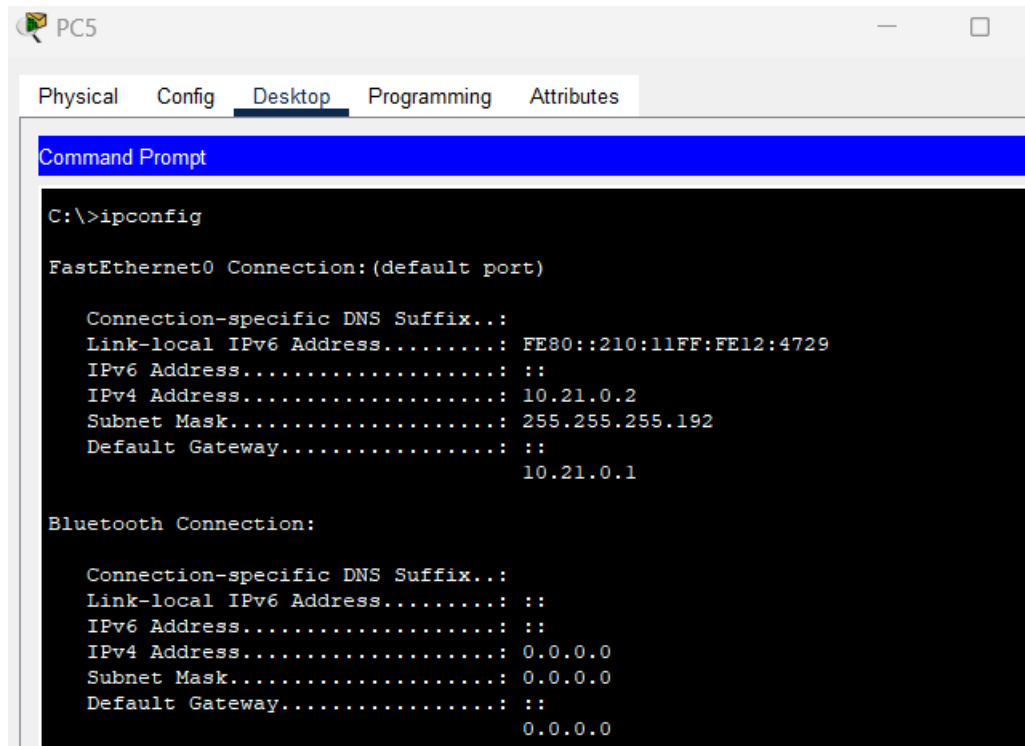
    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::202:17FF:FE79:2A46
    IPv6 Address . . . . .: ::
    IPv4 Address. . . . .: 10.21.0.67
    Subnet Mask . . . . .: 255.255.255.192
    Default Gateway . . . . .: ::
                                   10.21.0.65

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
```

FIGURE 15

- In Figure 15, I have used 'Ipconfig' command in PC5(Sales).



```

PC5
Physical  Config  Desktop  Programming  Attributes

Command Prompt

C:\>ipconfig

FastEthernet0 Connection: (default port)

Connection-specific DNS Suffix...:
Link-local IPv6 Address . . . . .: FE80::210:11FF:FE12:4729
IPv6 Address . . . . .: ::
IPv4 Address . . . . .: 10.21.0.2
Subnet Mask . . . . .: 255.255.255.192
Default Gateway . . . . .: ::
                             10.21.0.1

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

```

FIGURE 16

- In Figure 16, I have used 'show run' command in Router(Dhyan).

```

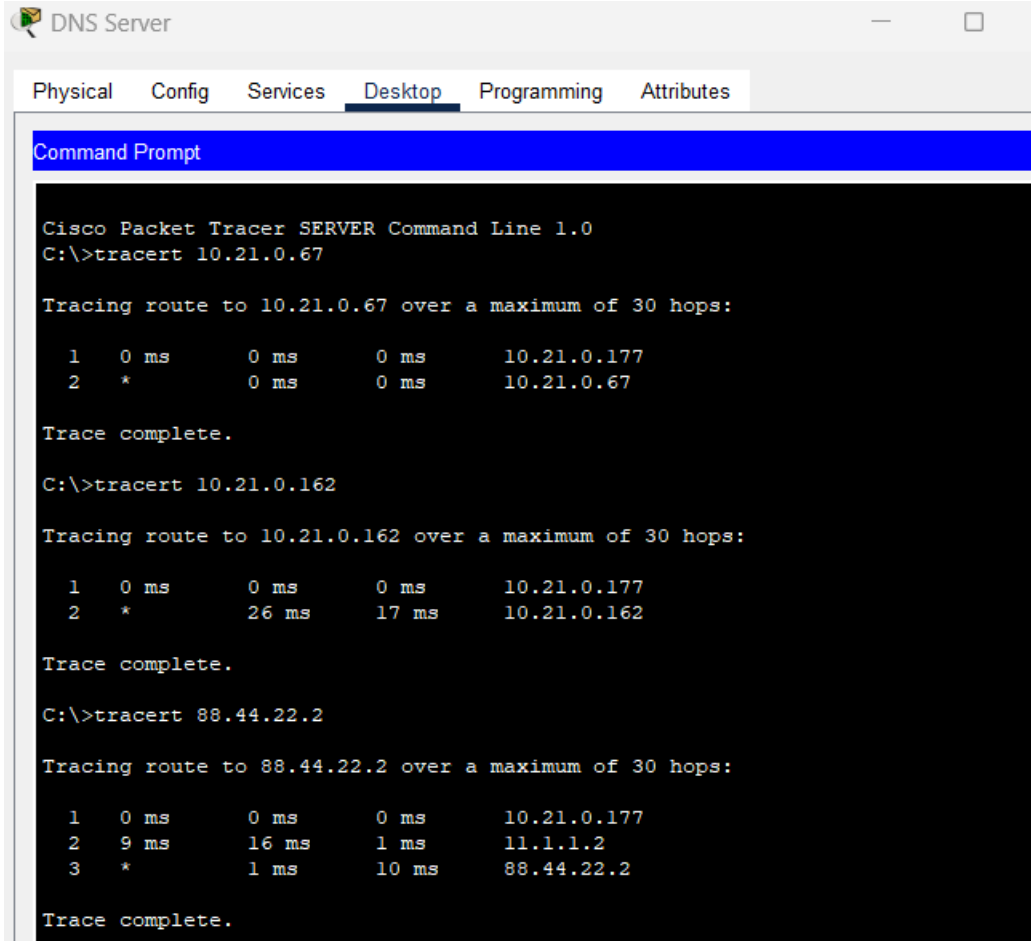
User Access Verification
!
Password:
Dhyan>en
Password:
Dhyan#sh run
Building configuration...

Current configuration : 2088 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Dhyan
!
!
enable secret 5 $10mERz$Hx5rVc7rPN0S4wqbXfX7m0
!
!
ip dhcp pool Admin
 network 10.21.0.128 255.255.255.224
 default-router 10.21.0.129
 dns-server 10.21.0.178
ip dhcp pool Accounting
 network 10.21.0.64 255.255.255.192
 default-router 10.21.0.65
 dns-server 10.21.0.178
ip dhcp pool Sales
 network 10.21.0.0 255.255.255.192
 default-router 10.21.0.1
 dns-server 10.21.0.178
ip dhcp pool WirelessNetwork
 network 10.21.0.160 255.255.255.240
 default-router 10.21.0.161
 dns-server 10.21.0.178
!
!
no ip cef
no ipv6 cef
!
!
username admin privilege 15 secret 5 $10mERz$9cTjUIEqN0urQ1fU.2eC1l
!
!
license udi pid CISCO2911/K9 sn FTX1524YDV0-
!
!
interface Serial10/3/0
 ip address 11.1.1.1 255.255.255.252
 clock rate 2000000
!
interface Serial10/3/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 10.0.0.0
 network 11.0.0.0
 no auto-summary
!
ip classless
!
ip flow-export version 9
!
!
banner motd ^C Authorized access only.Violaters will be prosecuted the the full extent of the law. ^C
!
!
line con 0
 password 7 08314D5D1A0E0A0516
 login
!
line aux 0
!
line vty 0 4
 password 7 08701E1D5D
 login local
 transport input ssh
!
line vty 5 15
 password 7 08701E1D5D
 login local
 transport input ssh
!
!
end

```

FIGURE 17

- In Figure 17, I have used 'tracert' command from DNS Server to PC3, Laptop and Cloud Storage.



The screenshot shows a Cisco Packet Tracer window titled "DNS Server" with tabs for Physical, Config, Services, Desktop, Programming, and Attributes. The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows the following output:

```
Cisco Packet Tracer SERVER Command Line 1.0
C:\>tracert 10.21.0.67

Tracing route to 10.21.0.67 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      10.21.0.177
  2  *          0 ms      0 ms      10.21.0.67

Trace complete.

C:\>tracert 10.21.0.162

Tracing route to 10.21.0.162 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      10.21.0.177
  2  *          26 ms     17 ms     10.21.0.162

Trace complete.

C:\>tracert 88.44.22.2

Tracing route to 88.44.22.2 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      10.21.0.177
  2  9 ms      16 ms     1 ms      11.1.1.2
  3  *          1 ms      10 ms     88.44.22.2

Trace complete.
```

FIGURE 18

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