

**REPORT ON COMPUTER NETWORKING FOR THE FINAL YEAR OF
INTERNSHIP**

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APPROVAL

This Project/internship titled “Networking”, submitted by Sheikh Shakkafi Rahman, ID No: 183-15-11838 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 6th January 2022.

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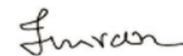
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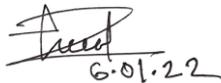
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DECLARATION

We hereby declare that, this project has been done by us under the supervision of Md. Jueal Mia, Networking, Department of CSE at Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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We would like to express our heartiest gratitude to the Almighty Allah and Head, Department of CSE, for his kind help to finish our project and also to other faculty member and the staff of CSE department of Daffodil International University.

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Finally, we must acknowledge with due respect the constant support and patients of our parents.

ABSTRACT

Computer networks have become an indispensable tool in a variety of areas, including human communication, information collection, trading, and sharing, distributed Access to remote assets (data and processing power) and work settings, to name a few. This presentation will begin with a historical review and then move on to the underlying ideas and technology. The second part will focus on the most widely used network technologies today (Ethernet and TCP/IP) and provide an overview of the communication techniques employed.

As a networking specialist, I will domesticate industry-supported abilities and qualifications that I will be able to transfer to future professional opportunities. I'll be able to exhibit and promote the fact that I have the necessary skills to do my job well with the CCNA certification, and you'll be certified by the industry leader in Network Technologies.

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CHAPTER 1

INTRODUCTION

1. 1 - The Basics of Networks

Networking defined the electrical connection of computer systems with the purpose of sharing information. During a networking session, resources such as files, applications, printers, and software programs are frequently exchanged. Because it allows customers to collaborate across a wide range, networking benefits are frequently evaluated seriously in terms of security, efficiency, manageability, and cost effectiveness. In general, the community infrastructure is formed by hardware components like computers, hubs, switches, routers, and other equipment. These are the devices that aid in the movement of data from one location to another through the use of cutting-edge technology such as radio waves and wires. Within the networking industry, there are many different types of communities, but the most prevalent are the Local Area Network (LAN) and Wide Area Network (WAN) are two types of networks (WAN). A LAN community consists of two or more computer systems linked across a small distance, such as in a reception area, an office building, or a school. A WAN network that covers a larger area than LAN, usually cities, foreign locations, and hence the entire planet. Several major LANs are frequently linked together to form a WAN. Because there are so many devices linked to the network, it's critical to avoid data collisions when these units try to utilize the facts channel at the same time. Carrier Sense Multiple Access / Collision detection is a set of policies that is known to become aware of and stop. Before you can learn how to use Cisco Internet, you must first understand what a network is and why networks are necessary. Simply described, a network is a collection of interconnected devices (such as computers, printers, and so on). Networking is also defined as the process of linking two or more computing devices in order to share data. Networks are built using computer hardware and software.

1. 2 - Types of Networking

A network, as you may know, is a group of gadgets that are linked together. Consider the following three types of network.

- LAN
- MAN
- WAN

(LAN) Local Area Network: Private PCs and workstations can exchange data, tools, and programs over the LAN (Local Area Network).A switch, or stack of switches, is used to link a set of computers and devices using the TCP/IP protocol's personal

addressing system. When compared to other computers on the same network, private addresses are one-of-a-kind. The LAN's edge is connected to the larger WAN through routers.

(MAN) Metropolitan Area Network: The Metropolitan Region Network (MAN) covers more ground than a LAN but not as much as a WAN. It connects two or more computer systems that are geographically separated and situated in the same or other cities. It should also serve as an Internet Service Provider (ISP) with a large geographic footprint (Internet Service Provider). Clients that want high-speed connectivity should use MAN. MAN tier speeds in megabits per second. A Metropolitan Area Network is challenging to develop and administer.

(WAN) Wide Area Network: A wide area networks, or WAN, is a computer networks that connects many locations across a large distance yet is contained inside a country's or nations' boundaries. A WAN must be a LAN connection that uses smart phone strains and radio waves to connect to other LANs, and it can be confined to a specific workplace (a company or organization) or open to the general public. Science moves at a breakneck rate and is prohibitively expensive.

1. 3 - Objectives of the Internship

In less than three months, I completed my internship. Due to the fact that I've already completed my internship,

My next objective is to advance in the field of "Networking." I began by enrolling in a CCNA course. The goal of my internship firm is to help me grow and learn so that I can fulfill the demands of the job market. There are several networking opportunities in today's Bangladesh. So, I can claim that I have a decent possibility of finding work both in Bangladesh and outside of Bangladesh. If I am able to deliver my three-month experience flawlessly, I will be able to get decent employment and achieve my life objectives. I aim to start my own business in Bangladesh in the future.

1. 4 - Company Overview

Momtaz Plaza Dhaka 1205, 3rd Floor, Road No 4, Dhaka office to New Horizons, an information technology (IT) institute. Because it is a training school, it offers courses in web design and development, web graphics, software development, web applications, database solutions, domain and hosting services, and other IT-related areas.

1.5 - Layout of the Report

In my report, I discussed some of the fundamental CCNA concepts that I learnt throughout the course of the three months. I describe the essentials of the internship, as well as my motivation and life goals, in "chapter 1." A brief description of the firm where I interned is also included. I give a quick outline of my internship IT business and their services in "chapter 2." I offer a brief overview of my work, positions, and activities throughout the internship term in "chapter 3." Every task I've done is documented, and I can show you an example.

CHAPTER 2

IP ADDRESSING AND SUBNETS

2.1 - IP (Internet Protocol) address

An IP address (Internet Protocol address) is a numerical identifier assigned to each machine connected to a computer network that communicates using the web Protocol. An IP address is a number that is used to identify a computer or a network interface, as well as to address a specific geographic location.

- Bit - a single digit touch with a cost of 0 or 1 is referred to as a bit.
- Byte - A byte is made up of eight bits.
- Octet - An octet is made up of eight bits as well. The terms byte and octet are used interchangeably throughout this chapter.
- Network Address - In terms of routing, this refers to a foreign network. This address encompasses all hosts in the remote community.

An IP address has a length of 32 bits. To make it easier to understand, the address is divided into four 8-bit portions, each separated by a period. As a consequence, each segment has a length of 1 byte (also known as an octet). To make the binary numbers simpler to view and remember, they are converted to decimal.

- Class A - the first byte (8 bits) represents the network component, while the next three bytes (24 bits) indicate the host component (network.host.host.host). This class is for an internetwork with a limited number of networks and a big number of hosts per network.
- Class B - the first two bytes (16 bits) are used by the network component, leaving the remaining three bytes for host components (network.network.host.host). This class bridges the gap between Class A and sophistication C by enabling a medium number of networks with a medium number of hosts.
- Class C - The network takes up the first three bytes (24 bits), while the host takes up the last byte (8 bits) (network.network.network.host). This class enables the creation of a vast number of networks, each with fewer hosts.
- Class D - Multicasting is done with Class D.
- Class E - Addresses that are not available to the general public.

2. 2 - IP addresses (private addresses and public addresses)

IP address that is public:

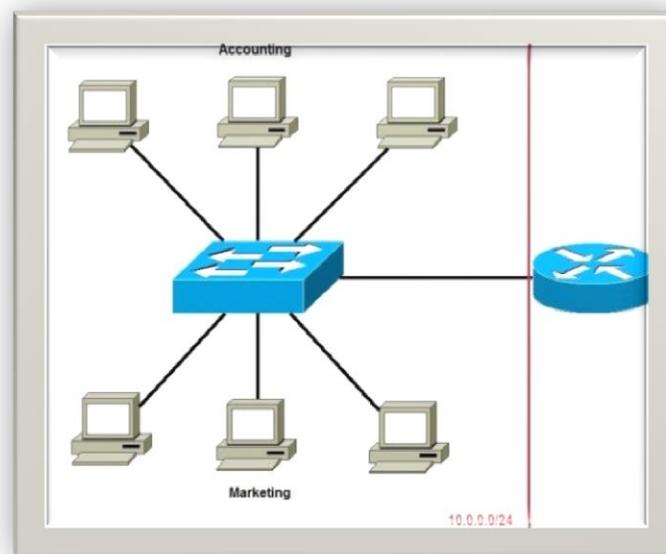
A public IP address is a computer system's address that allows it to connect to the internet directly. A public IP address can be assigned to an internet server, an electronic message server, or any other server system that is linked to the internet. A unique public IP address can only be issued to one device.

IP Address (Private):

A private IP address is an address space provided by Interknit to allow businesses to construct their own private network. Three IP blocks have been set aside for personal use (1 categorization A, 1 B, and 1 C). At the back of your house, you have computers, capsules, and smart phones, as well as computer systems in enterprises, are usually assigned private IP addresses. A personal address is given to a community printer in your house, allowing just your family to use it.

2. 3 – Subletting:

Subletting is the process of a network that is divided into two or more smaller networks. It improves network security and reduces the size of the advertised domain while increasing routing efficiency.



Figures 2.1: Explanation of subletting

We can observe a single huge network in the image above: 10.0.0.0/24. The network's hosts are all allocated to the same subnet, which has the following disadvantages:

Each host is part of a single broadcast domain. Any device on the network can send a broadcast, which is processed by all hosts, resulting in a massive volume of

unnecessary traffic. Network security - because any device on the network may connect with the opposite device, a security risk exists. For example, a server with sensitive data should not be on the same network as user PCs. Organizational issues- In big networks, separate departments are usually segregated onto various subnets. You'll be able to group all devices from the Accounting department into a single subnet and limit access to vital financial data to hosts on that subnet, for example. This is how the aforementioned network may be divided into subnets:

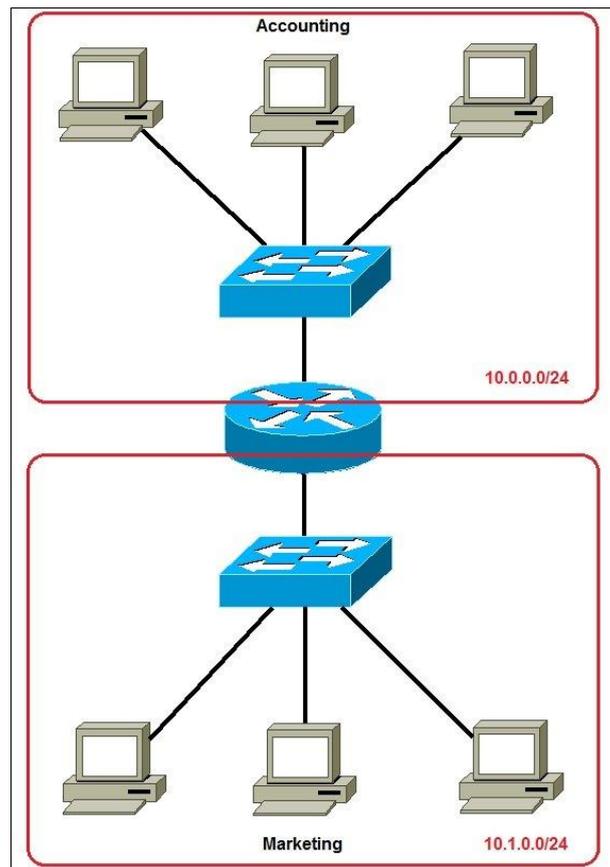


Figure 2.2: Exercising subletting

Two subnets have been built for separate departments: 10.0.0.0/24 for Accounting and 10.1.0.0/24 for Marketing. The devices on each subnet are now in their own broadcast domain. This might let us employ packet filtering on the router and the quantity of traffic on the network is reduced

2. 4 - (VLSM) Variable Length Subnet Masks

Variable Length Subnet Masking (VLSM), unlike traditional same-size subletting, may allow network managers to subdivide an IP address space into smaller subnets. A Variable Length Subnet Mask's is used when subletting a subnet (VLSM). For further simplicity, VLSM divides IP addresses into subnets (several levels) and assigns them

based on a network's specific requirements. It'll even be IP addressing without classes is what it's called. The ultimate rule, which has been demonstrated to result in IP address wasting, is class full addressing.

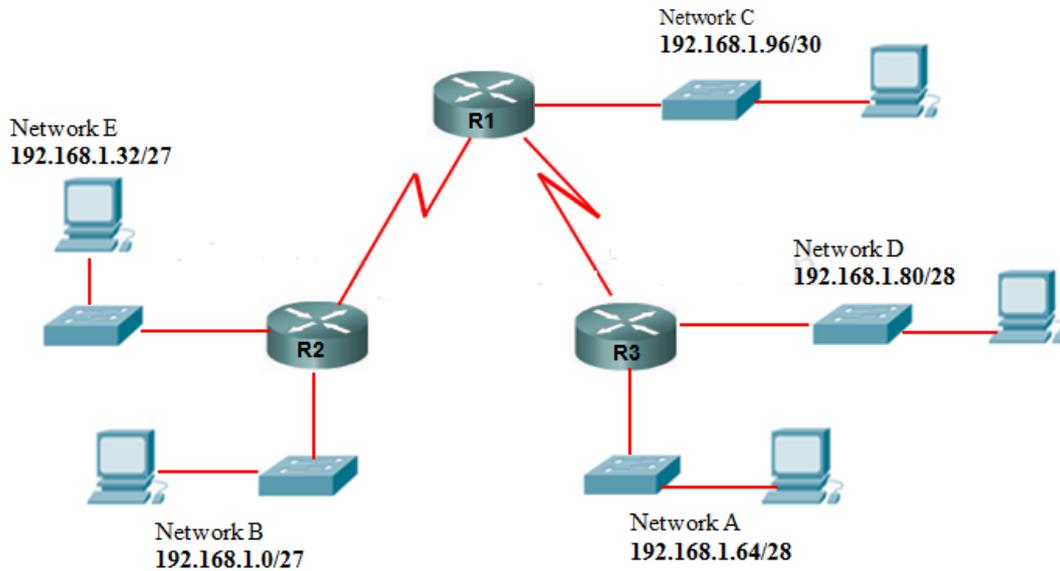


Figure 2.3: SubnetMasking with Variable Length

The number of subnets and hosts should be the first item to examine. 192.168.1.0/24 was allocated to this IP address by an ISP.

- 50 hosts in HQ
- 30 hosts for RO1
- 10 hosts for RO2

2 WAN connections we'll try to make this network more manageable by subnetting 192.168.1.0 /24, which give us a total of 254 hosts. I recommend getting to know the table below. I never leave the house without it!

Remember the cram table:-

Bit Value	128	64	32	16	8	4	2	1
Bits Borrowed	1	2	3	4	5	6	7	8
Subnet mask	128	192	224	240	248	252	254	255
Subnet Prefix /CIDR	/25	/26	/27	/28	/29	/30		

Table 2.4: Shows the table for extraction of subnets.

Let's start with HQ with 50 hosts, as seen in the graph:

We'll use two bits with a 64-bit value. This is typically the best we can do with 50 hosts.

HQ's network addresses is 192.168.1.0/26.

Gateway addresses = 192.168.1.1 HQ = 192.168.1.1 HQ = 192.168.1.1 HQ

192.168.1.2 is the first IP that may be used.

The final address that may be used is 192.168.1.62. The whole address space ranges from -192.168.1.2 to 192.168.1.62. 192.168.1.63 will be the displayed address. (Remember to arrange the Network and Broadcast's primary and last addresses)

HQ Network Mask 255.255.192 – we got the 192 by multiplying the amount we borrowed by the left-hand bit value = $128+64=192$ 192.168.1.0 /26 RO1 = 30 hosts will be shown as the HQ address.

Because that's the closest we'll get to the required host quantity, we'll borrow three bits with a value of 32.

192.168.1.64 - Network address will be the RO1 address.

We'll now add 64 to the 32 we had to borrow previously = $32+64 = 96$.

RO1 = 192.168.1.65 RO2 = 192.168.1.65 RO3 = 192.16 192.168.1.66 is the first IP address that may be used.

192.168.1.94 is the last IP address that may be used.

$128+64+32=224$ or 192.168.1.64/27 Broadcast address – entire address space – 192.168.1.66 –192.168.1.94 Network Mask 255.255.255.224 I.e. $128+64+32=224$ or 192.168.1.64/27

Network address RO2 = 192.168.1.96

We borrow four bits with a total value of sixteen. That's as near as we'll get.

$112 = 96 + 16$ So, 192.168.1.97 is the gateway address, 192.168.1.98 is the first useable address, and 192.168.1.110 is the last usable address.

Total host address space – 192.168.1.98 to 192.168.1.110 Network Mask 255.255.240 or 192.168.1.96 /28 WAN links = we're borrowing 6 bits with a value of $4=112 + 4 =116$ WAN links from HQ to RO1 Network address will be 192.168.1.112 /30:

HQ se0/0 = 192.168.1.113 HQ se0/0 = 192.168.1.113 HQ se0/0 =

RO1 se0/0= 192.168.1.114 Mask for both links= 255.255.255.252 (we obtained 252 by multiplying the bits we stole, i.e. $124 +64 +32 +16+ 8 +4=252$ WAN) WAN Link 2 = $112+4=116$ Network address = 192.168.1.116 /30 HQ = 192.168.1.117 subnet mask 255.255.255.252 Link from HQ to RO2

Subnet mask 255.255.255.252 RO2 = 192.168.1.118

CHAPTER 3

THE CISCO DEVICES INTRODUCTION

3.1 - Router and Switches: A Basic Overview

Cisco offers a variety of router series and models to cater to varied client kinds and requirements. Some only provide routing, Others, on the other hand, include Voice-over-IP, security, and wireless connection are all available. The ISR series routers from Cisco offer a wide range of capabilities. The Cisco 2500 and 2600 routers were the focus of previous CCNA tests, however the ISR 1800 and 2800/2900 series routers have since taken their position. Until the end of his life, he used Cisco's 2500 and 2600 routers, which are no longer available. A backplane component of a Cisco 1841 router is shown in Figure 3-1, along with crucial information features highlighted.

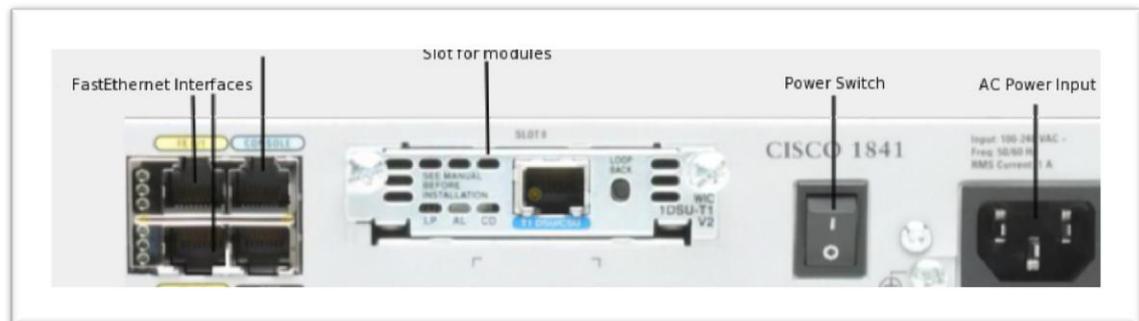


Figure 3.1: Depicts the router's front panel.

Switches from Cisco Catalyst Cisco's: Catalyst brand offers a reliable selection of switches. The Catalyst brand includes several switch series, each aimed towards a specific component or scale of a network. The Catalyst 2960 family of switches is the subject of the CCNA test. 2960 switches' are low-cost wire closet switches that are commonly used at the Access layer to give network access to hosts (remember the Cisco Hierarchical architecture).

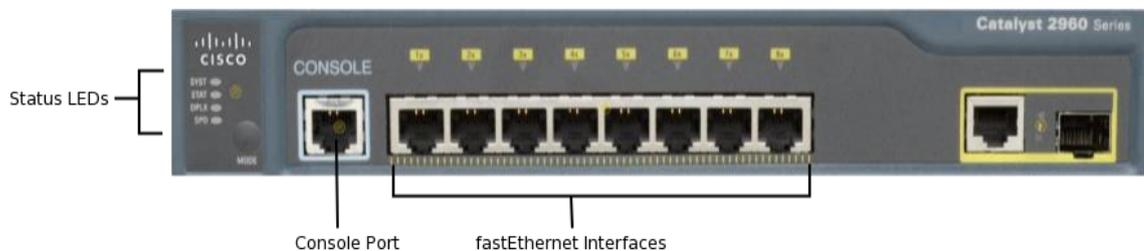


Figure 3.2: Depicts the switch's front panel.

3.2 - DNS and DHCP Configuration

DHCP Configuration: You can set up a DHCP server on a router as well as a generic server in Cisco Packet Tracer. As long as you have a rudimentary grasp of IP addressing, both scenarios are straightforward to configure. So let's get this party started! Using a router to set up a DHCP server Make a topology for your network:

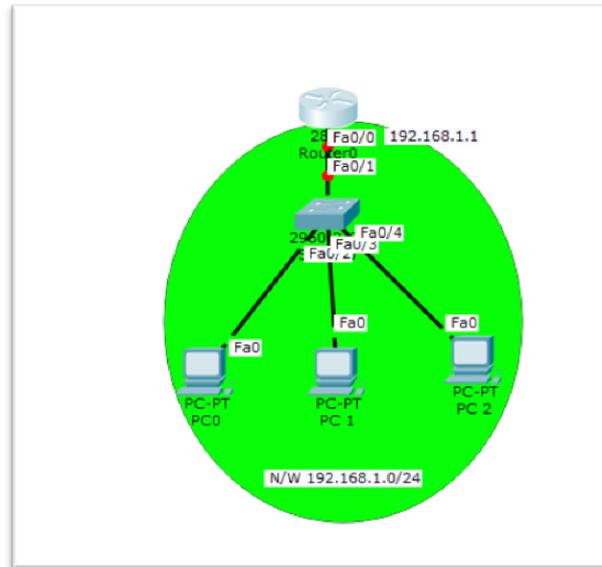


Figure 3.3: DHCP configuration's

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp excluded-address 192.168.1.0 192.168.1.10
Router(config)#ip dhcp pool Left_Network
Router(dhcp-config)#default-router 192.168.1.1
Router(dhcp-config)#dns-server 192.168.1.2
Router(dhcp-config)#option 150 ip 192.168.1.3
Router(dhcp-config)#network 192.168.1.0 255.255.255.0
Router(dhcp-config)#exit
Router(config)#ip dhcp excluded-address 192.168.2.0 192.168.2.10
Router(config)#ip dhcp pool Right_Network
Router(dhcp-config)#default-router 192.168.2.1
Router(dhcp-config)#dns-server 192.168.2.2
Router(dhcp-config)#option 150 ip 192.168.2.3
Router(dhcp-config)#network 192.168.2.0 255.255.255.0
Router(dhcp-config)#exit
Router(config)#
```

When the clients address 192.168.1.1 through the router is configured to exclude the router addresses, we can add an extended-address command to the IP DHCP configuration. The address command, with the exception of IP DHCP, cannot preserve permanently allocated addresses on important hosts.

On the IP Configuration tab of each PC, activate DHCP. Give each PC an IP address, default gateway, and DNS server in preparation for entrance. Enable DHCP by going to PC1-> Desktop-> IP Configuration's, then clicking Enable DHCP:

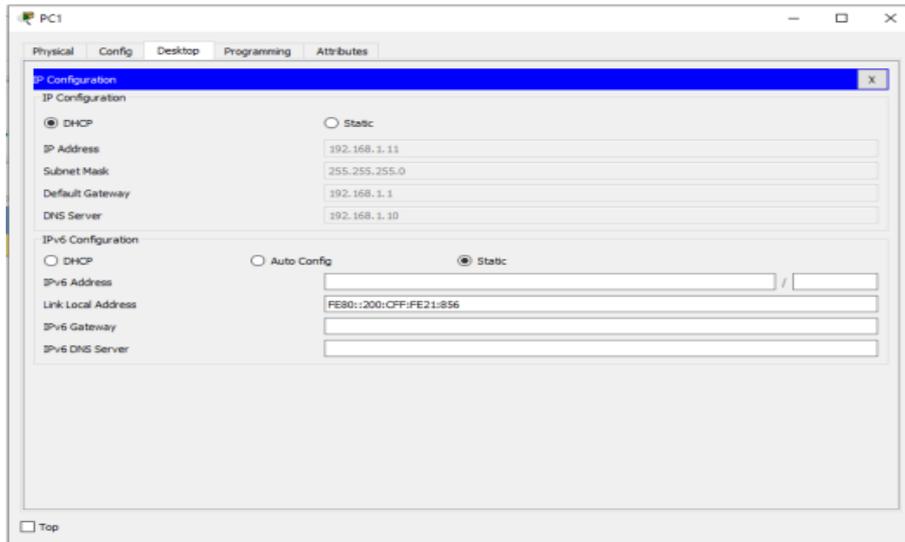
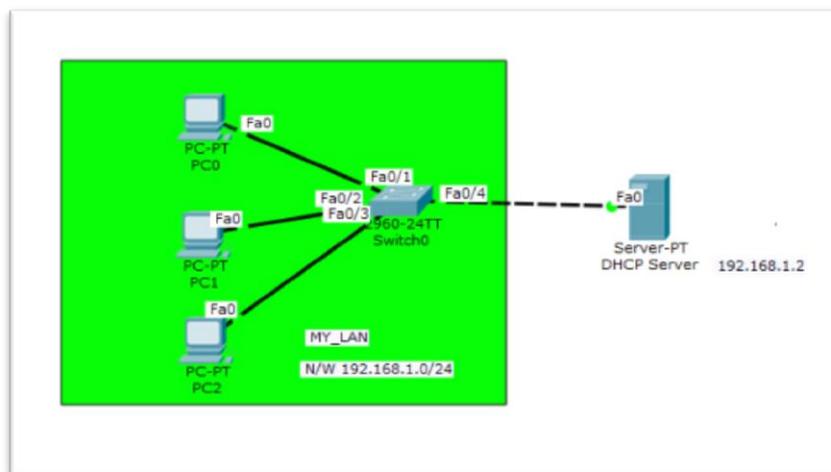


Figure 3.4: Router DHCP Configuration

Get it for your other computers. In the generic server, a router is now active, allowing items like as:

In packet tracer, create a network topology:



Set the fixed server address to EP (192.18.1.2/24).
Configure the DHCP Service on the generic server.

To do so, choose the server and then the Services tab. You may select dhcp from the menu. The DHCP Network parameters may then be specified as follows: Name of the pool: LAN

DNS Server: 192.168.1.2 Default Gateway: 192.168.1.1

192.168.1.0 is the starting IP addresses.

255.255.255.0 is the subnet mask's.

256 users is the maximum number of users that may be accommodated.

After that, click Add. The entry for dhcp has been added to the list.

The following items are included in the server configuration:

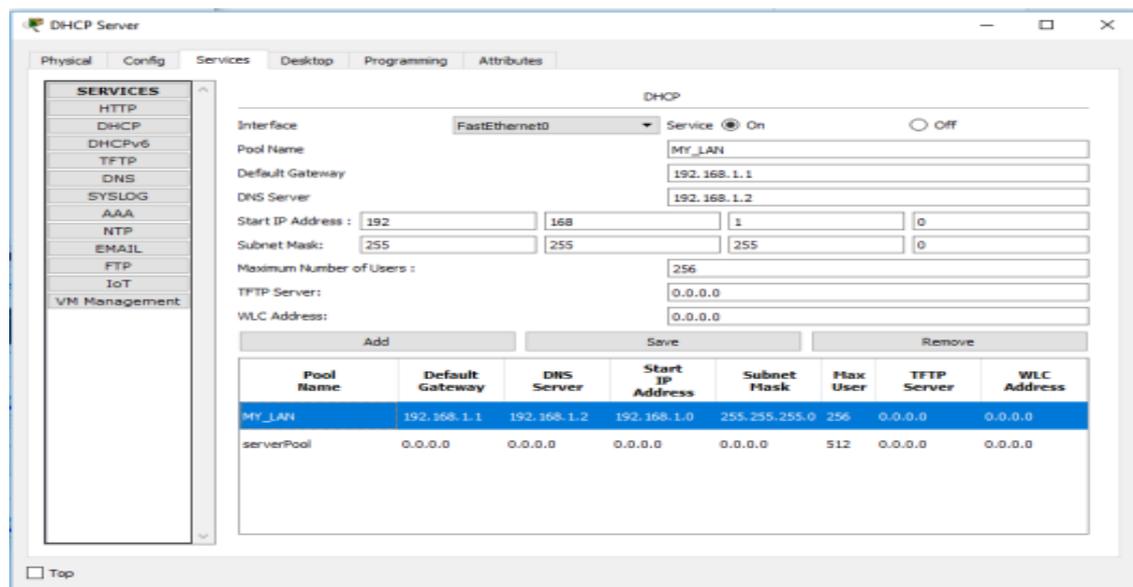


Figure 3.5: Server Setup.

DHCP service is at the bottom of the list.

Finally, enable each PC's dhcp configuration. The computer will be set up automatically.

The DHCP settings on PC1 are as follows:

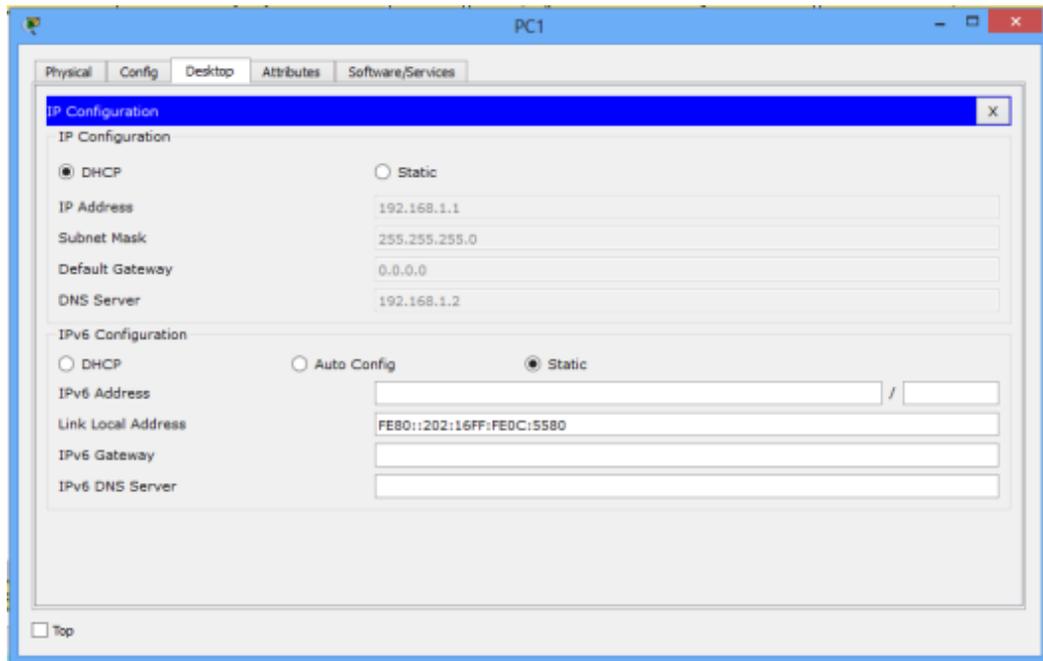
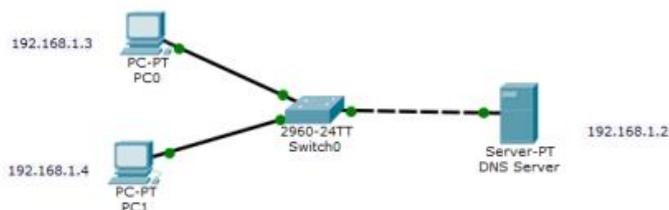


Figure 3.6: Desktop DHCP Configuration

Setting up DNS To convert host names to IP addresses, a DNS server is employed. Although we may connect to DNS allows us to utilize a network based on the host's IP address. easier-to-remember domain names. Typing `http://www.google.com` `http://208.117.229.214` is an example. You can go to the Google webpage in any case, which is much easier to remember. If a host previously utilized To use a DNS service, we'll need to first set up a DNS server. The IP address of the host `http://www.google.com` will be requested by the DNS server. If you put `http://www.google.com` into your browser. The IP address of the DNS server and the IP address of the host

Make a topology for the network:



The PC must be configured, and the server's IP addresses must be set.

The Internet Protocol address is 192.168.1.2. 255.255.255.0 is the IP address of a server in the United States (Subnet Mask) 192.168.1.2 is the DNS server. Default Gateway: 192.168.1.1 Default Gateway: 192.168.1.1 Default Gateway: 192.168.1.1 Default Gateway: 192

Server

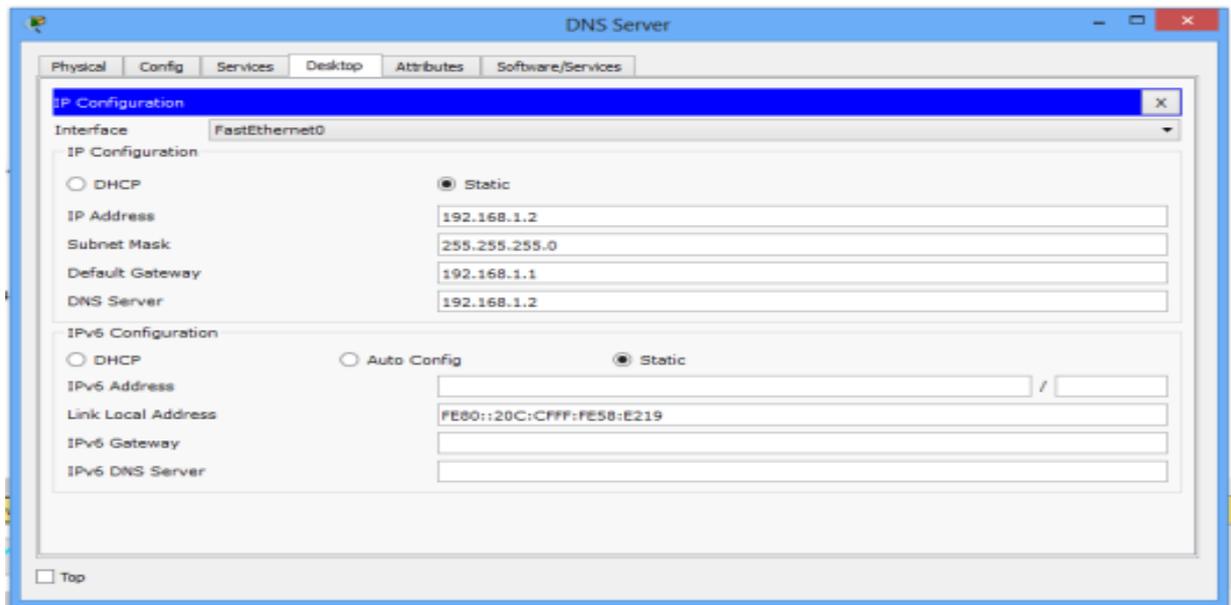


Figure 3.7: Shows how to set up a static IP address on your desktop.

192.168.1.3 is the IP address of **PC0**. 255.255.255.0 is the **subnet mask**.
DNS server: 192.168.1.2 **Default gateway:** 192.168.1.1

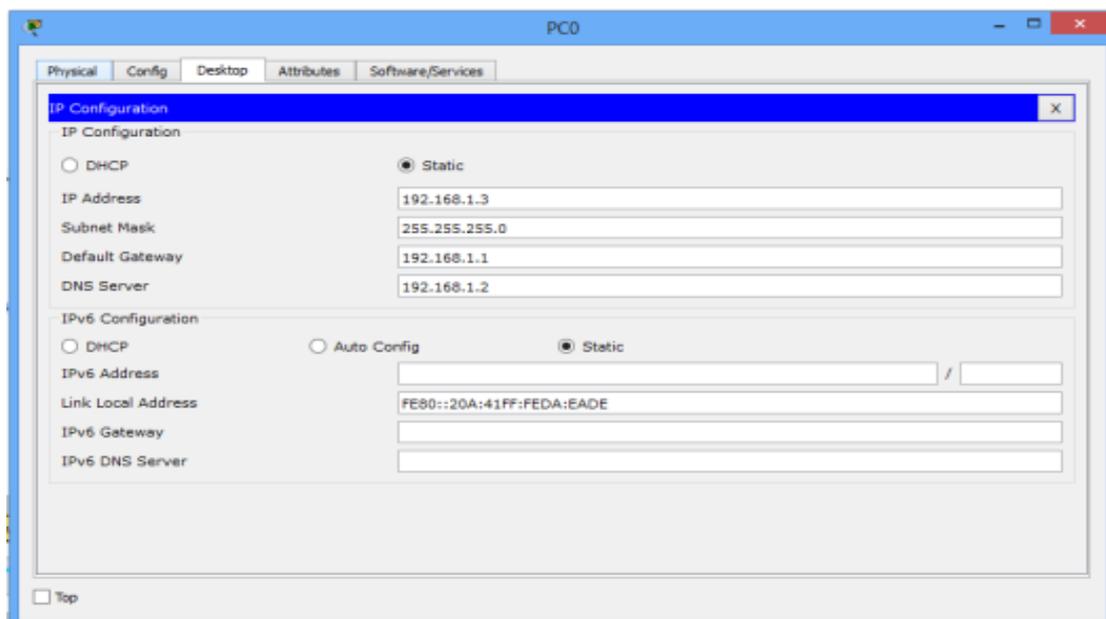


Figure 3.8: shows how to set up a static IP address on a desktop computer.

192.168.1.4 is the **IP address of PC1**. 255.255.255.0 is the **subnet mask**. **DNS Server: 192.168.1.2 Default Gateway: 192.168.1.1**

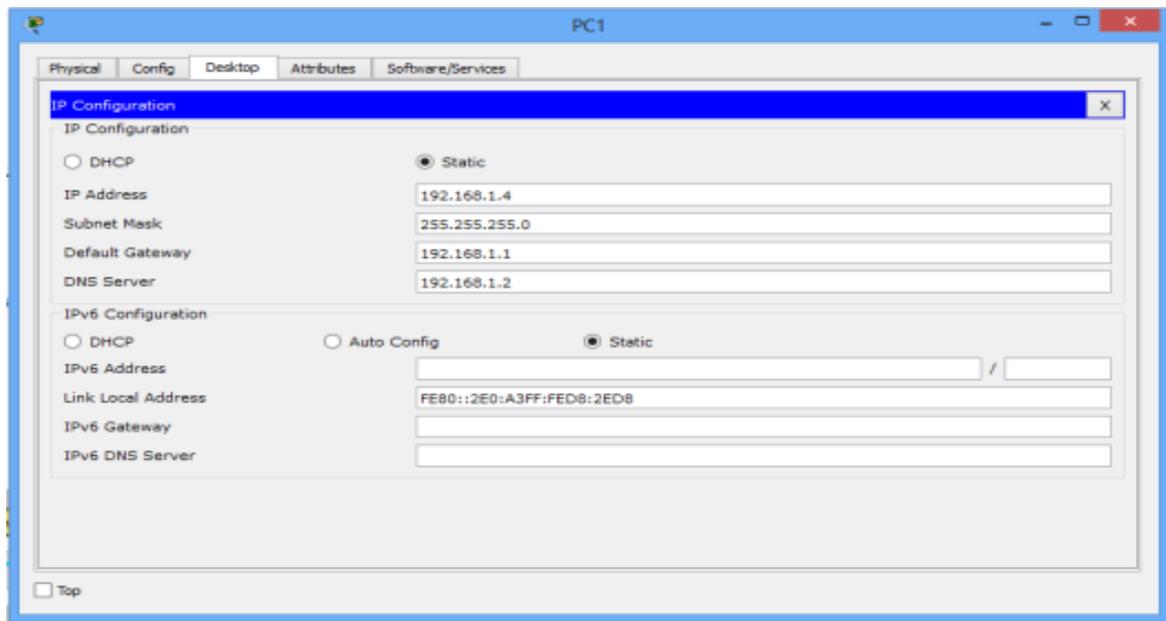


Figure 3.9: shows how to set up a static IP addresses on a desktop’s computer.

Configures the PC and the server's IP address.

192.168.1.2 is the **IP address**. 255.255.255.0 is the **subnet mask**.

192.168.1.1 is the **default gateway**. 192.168.1.2 is the **DNS server**.

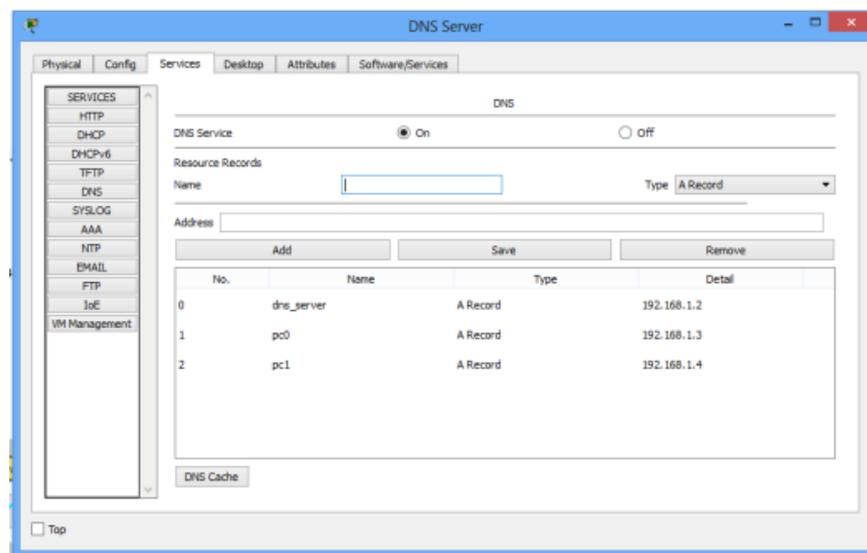
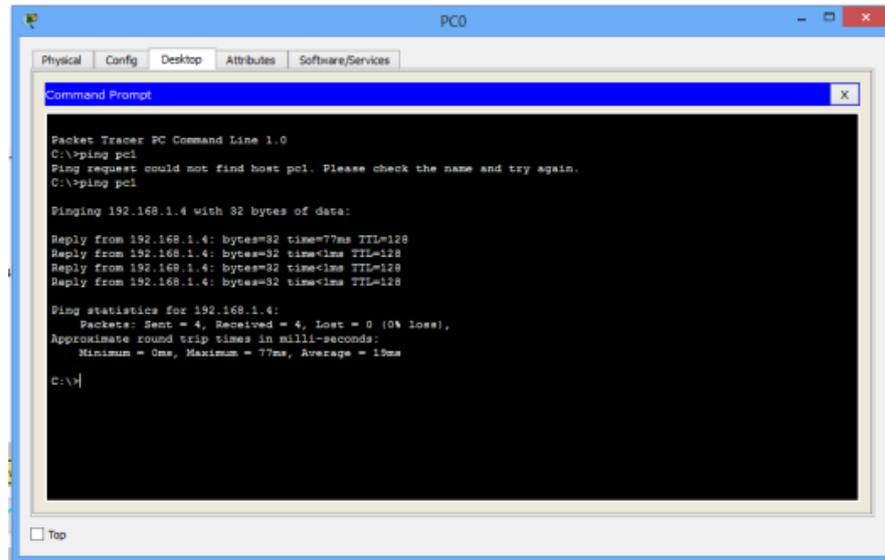


Figure 3.10: DNS server configuration

The experiment's title is IP resolution. Use the IP address of the host name instead of the IP address If the DNS service is operational and all IP configurations are valid, Ping should be performed. PC 1 is an example of a computer. The ability to acquire ping should be possible.



3.3 - Password Recovery

Passwords are frequently forgotten on iOS devices, and users are locked out of their own devices. The approach for recovering a password varies depending on the equipment, however the most common way for recovering a Cisco router password is. Because the passwords to be recovered on Cisco switches might be slightly different, and this is addressed on the CCNA, these categories demonstrate how to recover router passwords.

```
Cisco 1841 (revision 5.0) with 114688K/16384K bytes of memory.
Processor board ID FTX0947Z18E
M860 processor: part number 0, mask 49
2 FastEthernet/IEEE 802.3 interface(s)
191K bytes of NVRAM.
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1,
RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team
```

--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

```
Router>en
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#enab
Router(config)#enable se
Router(config)#enable secret GeeksForGeeks
```

CHAPTER 4

IP ROUTING INTRODUCTION

4.1 - Routing IP Addresses

In the last chapter, we learned how to connect because it can be handled remotely and for other purposes, a Cisco router is added to the network. It's finally time for routers to take on one of their most crucial tasks: IP routing. Routers track a packet's destination IP address and forward it to its intended destination, as you well know. The three types of IP routings are as follows.

- Static
- Dynamic
- Default

4.2 - Routing Protocols (Static and Dynamic)

For routes that are commonly designated as a fixed route, there are ratings and a forwarding table. These itineraries are seldom changed, and the itinerary usually only includes one or two destinations. You must specify the router as at least stabilized and with a hop address in order to add a static route to the routings table. Static routes forwarding table's formed if routing table can access the next-hop address. The next HAP address receives the whole transit traffic static route. After you've installed the routing table, you may define more information with parameters like the static route. On a case-by-case basis, all of the stable options are accessible.

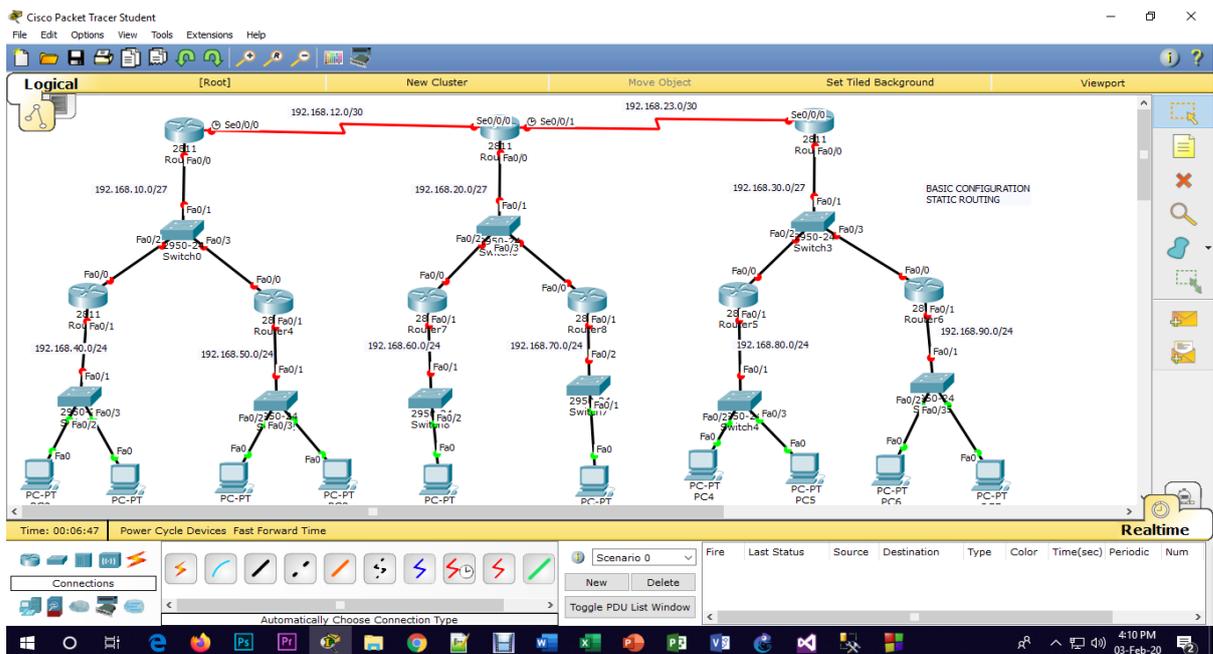


Figure 4.1: Static Routing Protocol Configuration

Protocols for Dynamic Routing:

Data may be routed dynamically via dynamic routing, which is a networking approach. Dynamic routing, as opposed to static routing, allows routers to pick a path that is consistent with real-time changes in the topology of the logical network. The router for the dynamic routing protocol is responsible of maintaining and updating the operating table in dynamic routing. In static routing, the supervisor does this manually. Dynamic routing makes use of a number of different methods and protocols. The Open Shortest Path First (OSPF) and Routing Information Protocol (RIP) are two of the most widely used routing protocols (OSPF).

Dynamic routing is the easiest and most straightforward way to build large networks, determine the shortest path, identify routes, and locate changes in remote networks. They opted to divide the routers because updating routing needs more bandwidth and the added RAM may cause the CPU routers and routing protocols to become overwhelmed. Static routing, on the other hand, is a bit more expensive than dynamic routing.

There are two types of dynamic routing protocols:

- IGP (Institute of Government Policy) (Interior's gateway Routing Protocols)
- EGP
- E.g., RIP, EIGRP, OSPF are all on the same domain (Exterior gateway Routing Protocols) BGP is an example of a different domain.

IGP (Institute of Governmental Planning) (Interior gateway Routing Protocols) There are three kinds of IGP Protocols:

- Link-state Routing Protocols Interface Bandwidth
- Protocol Hop Count for Distance Vector Routing Protocols (OSPF)
- Hybrid Advanced Distance Vector Routing Protocols/Routing Protocols

Interfaces:

- 1. Bandwidth
- 2. Load
- 3. Delays
- 4. Reliability
- 5 MTU

EIGRP

Here's where I'll build up Routing Information Protocols (RIP)

IGP (Interior Gateway Protocol) is an open standard protocol with the following characteristic:

RIP Version 2

- Metric Cost's = Hop Count's
- Information Sharing = Multicast's
- RIP Version 2 o (224.0.0.9)
- Version = RIP Version 1, RIP Version 2
- Convergence = Medium
- Classless & VLSM = Yes
- Version = RIP Version 1, RIP Version 2
- Authentication = NO
- Maximum Hop Count = 16 HOP
- 10.Protocol Number = 519
- Hello timer = 30 sec
- Hold timer = 180 sec
- Bellman ford Algorithm
- AD (Administrative Distance) Value = 120

Type of Convergence

- Very Fast
- Fast
- Medium
- Slow
- Very Slow

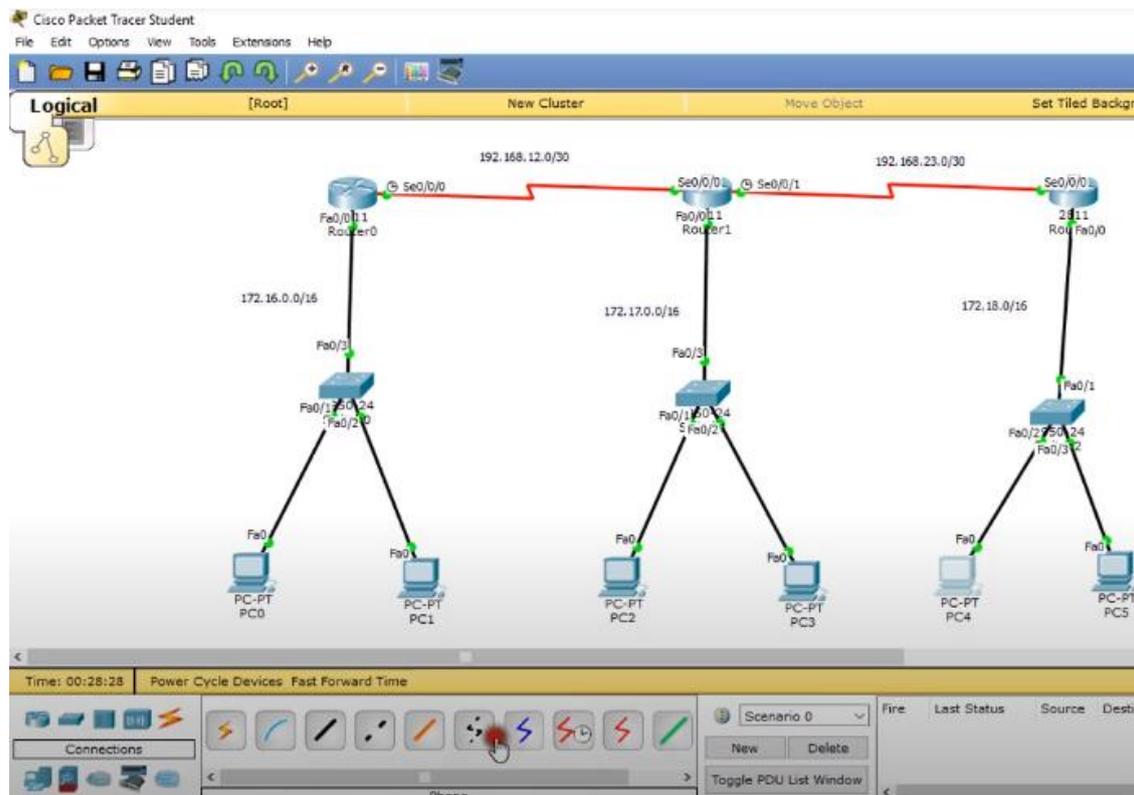


Figure 4.2: Dynamic Routing Protocol Configuration.

BGP's features include:

- Metric Cost o 11 Attributes (weights, local preference, locally injected route, AS path length, Origin, MED, IGP metrics, Neighbors Types, Oldest Neighbors, Highest Neighbors-ID, Highest Neighbors IP) Metric Cost o 11 Attributes (weights, local preference, locally injected route, AS path length, Origin, MED, IGP metrics, Neighbors Types, Oldest Neighbors, Highest Neighbors-ID, Highest Neighbors IP)
- Classless & VLSM = Yes
- Kinds = 2 types
- Information's Sharing = Unicast
- Convergence = Very Slow (1.Ibgp 2.Ebgp)
- Authentication = Yes
- Maximum Hop Count = UNLIMITED
- Keep Alive = 30 seconds
- Dead timer = 60 seconds
- 10.TCP/179 = Protocol Number (Administrative Distance) IBGP(200) EBGP EBGP EBGP EBGP EBGP EBGP (20)

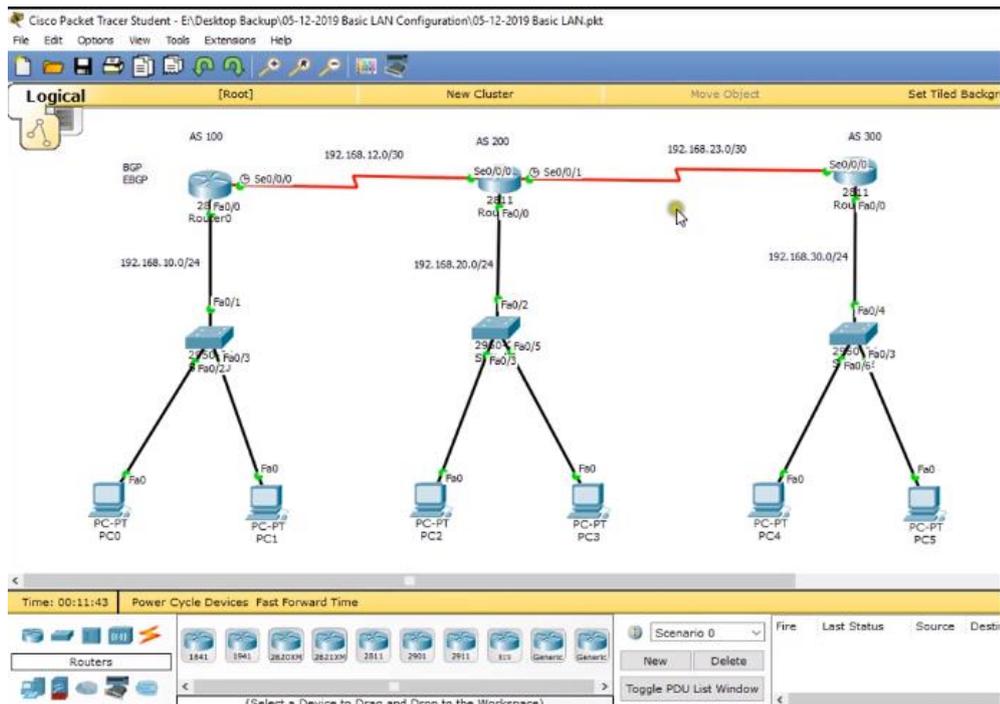


Figure 4.3: Border Gateway Protocol Configuration

4.3 - (Access Control Protocol) ACL

I'll construct a list for ACL here (Access Control List):

- The student department will not be able to access hr.
- All other types of traffic will be permitted.
- Interface with the destination gateway
- Implemented the destination's router
- Range (1-99)

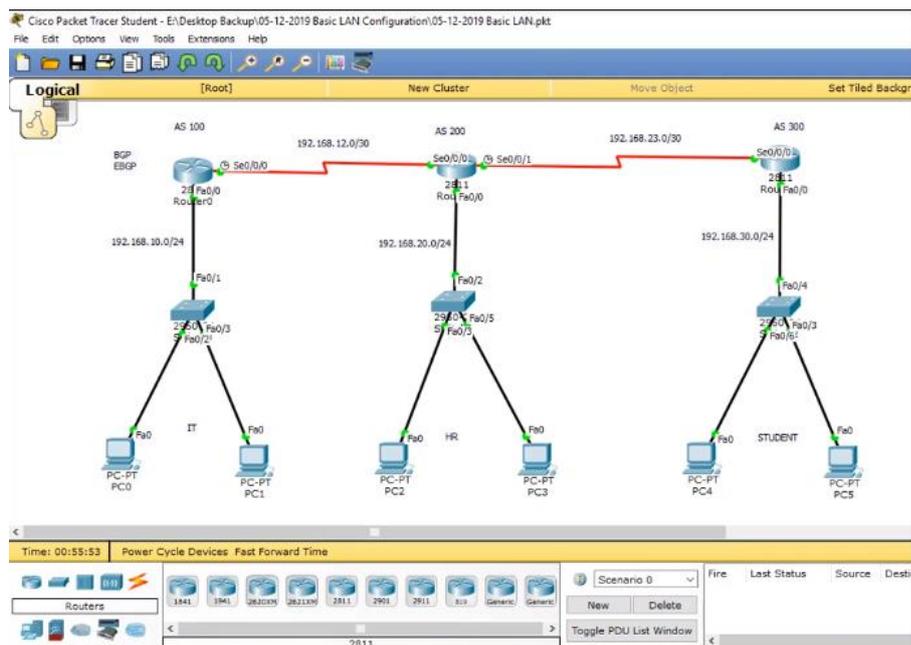


Figure 4.4: ACL Configuration Protocol

CHAPTER 5

PROTOCOL FOR SWITCHING AND SPANNING TREE

5.1 - Ether Channel

Switched Ethernet A higher realized bandwidth Ethernet switch may be thought of as a grouping of port connections or ether channel used in the operation. When coupled to switches, consolidation is often beneficial connectors for interfacing switches and other devices. Only one network adapter can connect to the server after a switch or switch connections of two distribution ether channels. When two Ethernet switches are linked together, a number of physical interfaces are employed to boost the ether channel's performance. Traditional Layer 2 loops limit the amount of needless spanning-tree protocol connection blocks, resulting in a drop in traffic using the balance on the balance; this aids bandwidth efficiency. switches-port was identified as a logical bundle ether channel spanning tree by altering the spanning tree, and bandwidth was raised to match the cost.

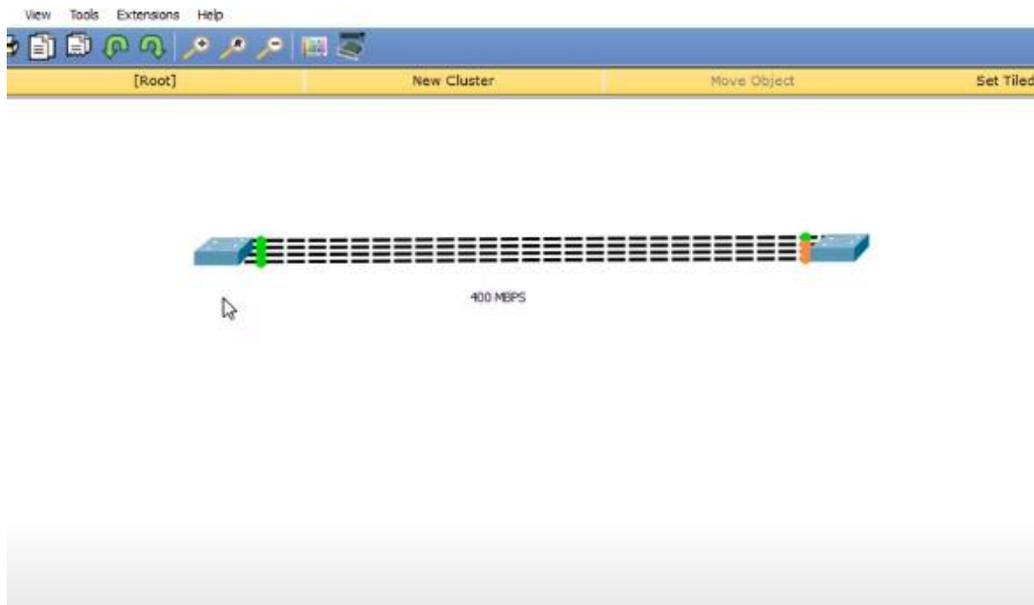


Figure 5.1: Link aggregation or Ether Channel

To avoid loops, spread trees block a superfluous pore connection.

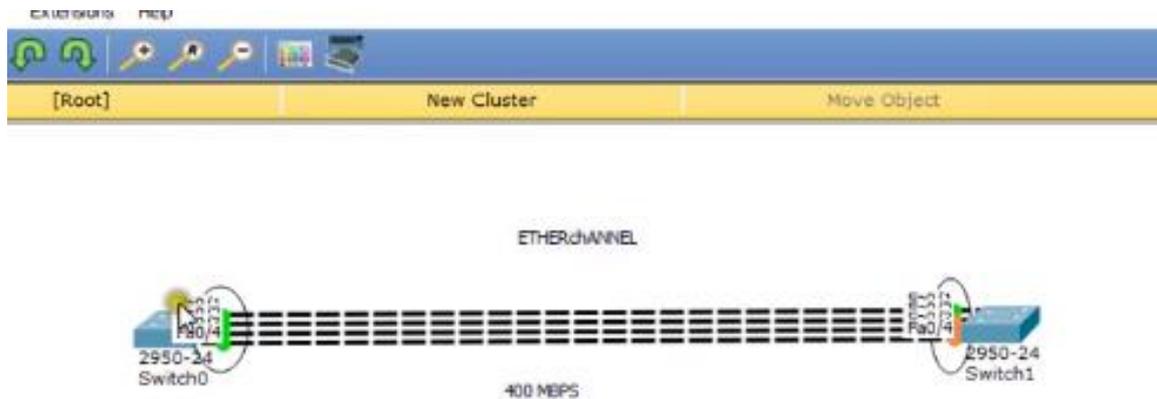


Figure 5.2: Ether Channel supports tree spanning.

The Ether Channel wide tree has two popular ports, both of which are tied to the physical storage mode, which you may manage.

How Does It Work?

If no physical links in an Ethernet channel group break, the Ethernet channel bandwidth just loses the connection that was supplied. When it comes to a replica of the genuine link, however, Ethernet will be inserted dynamically. The ether channel bundle spanning tree of a logical switch port emerges, and bandwidths are updated to match the cost by adjusting the spanning tree. Use the channel-group command, which is a logical interface that allows the port-channel, to bundle numerous physical Ethernet ports. A port-channel is a connection between a trunk and an access port. You may setup a Cisco Catalyst Switch with eight 10/100 ports and a total of eight port-channels if you can assemble eight Gigabit ports or bundles. A switch has several port channels.

Ether Channel Protocol is a protocol that allows you to send and receive data through

- The Protocol for Port Aggregation (PAgP)
- Link Aggregation Protocol (LAP), a Negotiation of the port channel protocol by Cisco (LACP 802.3ed)

It serves the same goal PAgP, except is only available to members of the public.

5.2 - Port Security

Port Security helps safeguard the network by preventing unknown devices from forwarding traffic. Any dynamically locked-down link addresses are released. The following are some of the benefits of using the Port Security feature:

- You may also specify a restriction on how many MAC addresses each port can have. All forward packets (protected packets) have the same MAC address; The number of other (unsecure) packets is restricted.
- On the port security page, you may enable each port.
- Traffic filtering for port security may be accomplished in two ways: dynamic and static locking via locking. These techniques can be combined in many ways.

Dynamic locking: Using dynamic locking, the maximum number of Mac addresses that may be learned in a port. The platform's maximum MAC address is listed in the software release notes. It doesn't appear to have learned any further MAC addresses once that limit was reached. Only frames with the permitted Mac address were sent out.

Note: Set dynamic entries to 0 and only accept packets from If you wish to establish a port at the MAC address lines, repair addresses in the list with just Mac to Mac. Stable locking addresses are built from dynamic locking addresses. If they are not met with another packet of old age, dynamically locked MAC addresses are used. Determine the value of the outing. You can study in a different port by utilizing dynamically locked MAC addresses. The Mac appears to be unsuitable for the age-appropriate addresses.

Mac stable. Static locking: Create a list of addresses to send to a port manually static locking. From dynamically locked addresses, stable locking addresses are generated.

5.3 - STP

The switch is built from the local area network (LAN), and the spanning Tree Protocol ensures a loop-free topology (STP). Because a network failure cannot impair regular operations, a significant number of redundant links should be set to the lowest quality possible. Physical switching loops, which have the potential to add duplicate lines at any time. STP loop and avoids faults related the body to make place for more work.

The Spanning Tree Protocol is defined by the IEEE 802.1D standard. In order to increase its quality, the Cisco STP, This was taken into consideration as the WP AP 802.1w Rapid Span Tree Protocol, was subjected to a variety of operations (RSTP).

In this chapter, we used the Cisco switch to implement Tree Protocol (STP) setup and verification instructions for specialization. Three Cisco Catalyst 3550 switches were employed in the topology, as shown in Figure 1.

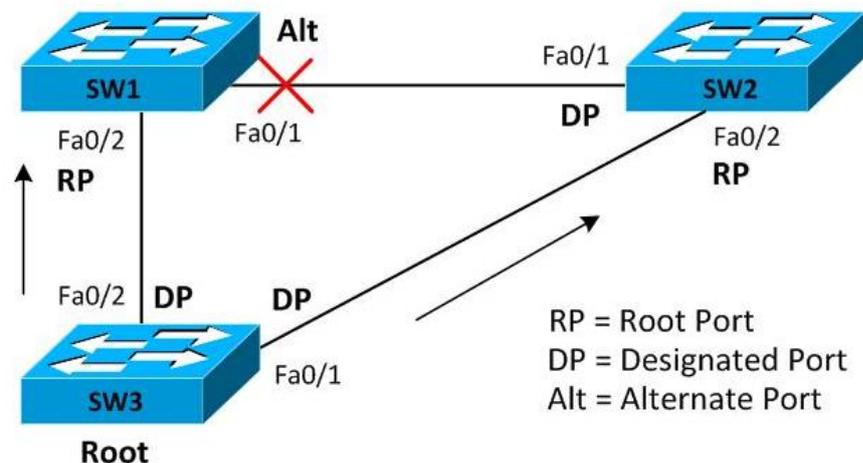


Figure 5.3: The spanning tree technique is depicted

Above, you'll find three trunk links:

- SW1 Fa0/1 – SW2 Fa0/1
- SW1 Fa0/1 – SW2 Fa0/1
- SW2 Fa0/2 – SW3 Fa0/1

This trunk dynamically discussed the Dynamic Trunks Protocol (DTP) with the extra configurations after being connected to three switches. Let's examine if the SW1 trunk has been properly established.

To test the trunk's successful deployment, use SW2 and SW3 in the same sequence. The Cisco switch will be set in three wide tree output modes, as shown in the output modes below.

The Cisco Catalyst 3550 was utilized to build this scenario by default. PVST's internal switch mode is a tree that has been ornamented. PVST is a cross-VLAN spanning tree protocol, and each VLAN's mode is IEEE 802.1 D STP.

The following command produces a spanning tree as a result on SW1 pvst operating mode.

The Foundation is extended and the tree's orientation is changed in the first phase. Rock Bottom Bridge won the elections thanks to an ID transfer. For a unique look at the Use the command show-spanning-tree bridge ID to display the standard bridge ID,

which is an 8-byte value byte priority 2 and 6 bytes for the Mac and is enabled by a unique address on a switch bridge ID.

Using the The cost of installing an ID switch on the bridge to win elections is relatively low. The bridge ID SW 3 is rather affordable in our opinion, hence it should be shifted to the Foundation. The priority that displays at the bottom of the Foundation switch can be changed. VLAN, but we assume Mr. ta has left it at the default.

The basic switch is activated if the spanning-tree root bridge ID matches the ID SW3. Please note that the following command was presented in the output priority as part of the bridge ID as a decimal value to 32769 hexadecimal is equivalent to 8001.

The next stage is for each convergence route to go to the STP port (RP), which is the only port where they may spend the least amount of time returning to their roots.

The cost of all outgoing interfaces based on a wide variety of switches is computed by adding the costs. This laid the stage for the default cost of 19 dollars for fast Ethernet ports.

The route is the switch's primary port; it has no basis; the root switch ports are allocated to the port. Because the primary port is FH / 2, SW1 is fixed with FH / 2, but SW2 is fixed with F / 2.

For each category specified port (DP) set, this is the final important stage. When several switches are linked to the same department, the interface may be switched to spend as little time as possible on the path section. As illustrated in the diagram, our scenario is divided into three parts, each with a single assigned port. These facts are confirmed by the on SW1, SW2, and SW3 show spanning-tree command.

CHAPTER 6

VLANs AND VTP

6.1 - Conclusion of Internship

Multiple IP networks collaborate and serve the same subnet-switched network, and Virtual Local Network (VLN) is a conceptually separate IP subnet. The term "virtual LAN" refers to a logical broadcast domain that can span several physical LAN segments. To improve the performance of virtual local-area networks, many network managers are reducing level 2 broadcast domains (VLANs). A network administrator can utilize VLAN to connect logical functions or applications to the proper stations, regardless of where the users are physically located.

Each VLAN is a separate LAN with one or more switches. As a result, the host device seems to be connected to the same network.

In a layer 3 device, VLANs are required to drive traffic (router). VLAN is used for three main purposes:

- Reduces the amount of broadcast domains
- Improves network speed
- Adds security

This is how it works.

Let's look at some examples from the actual world: You've had enough of the building, which comprises an office or department, and you're considering leaving. After in a few years, business has grown to three structures. Networks are unchanged; however the office and computers that can be seen across the structure are not.

The building, which is on the opposite side of the floor, is on the same floor as the HR offices and other departments. Network administrators, on the other hand, will want to ensure that every computer in the office has the same security and bandwidth restrictions.

Creating huge LAN and linking each department to collaborate on a large-scale project that everyone must be a part of network administration will not be easy.

This is where VLANs come into action when it comes to switching, companies of their offices and departments, independent of their consumption or special security concerns, and to effectively manage bandwidth. Choose a network administrator for a switched network. VLANs are logical network devices that allow a group of people to create their own distinct networks (VLANs) while sharing infrastructure. Users will be able to provide feedback. A VLAN define its function

when configuring it for the first time. For further details, see the diagram below:

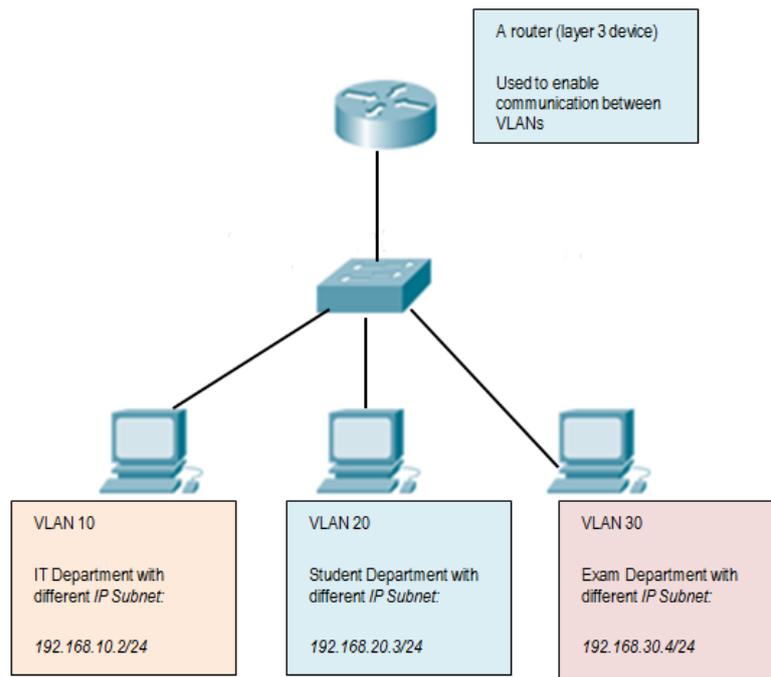
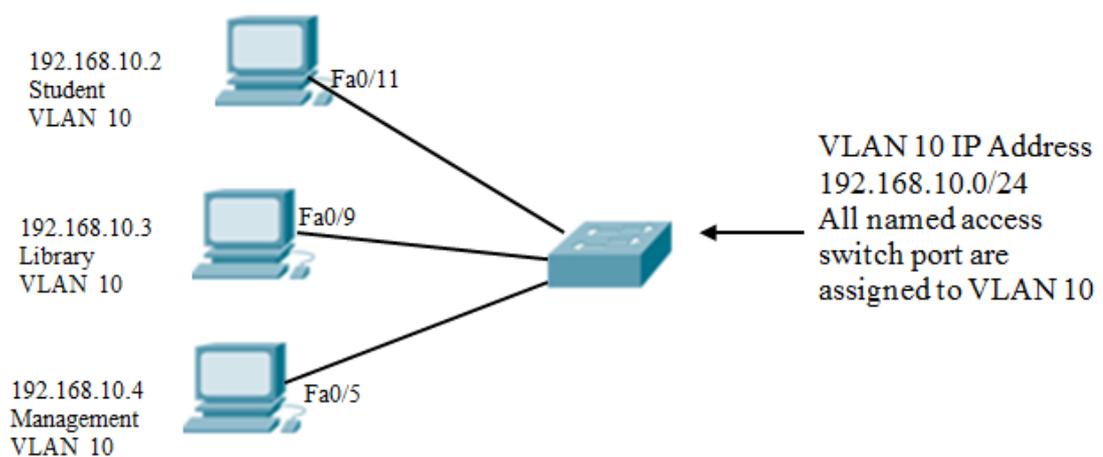


Figure 6.1: VLAN setup

In conclusion:

- A VLAN is a self-contained LAN network.
- VLAN code and allow separate school computers to share a common structure, despite the fact that they share a common structure.
- VLAN used for broad detection.



- For the PC, VLAN = 10.
- This PC firing's IP subnet address.

VLAN has the following advantages:

Cost savings because of the network, there is less of a need for expensive network upgrades.

6.2 - VLAN Trunking Protocol (VTP)

In VLAN networks were tough to set up in the early days of networking. Each VLAN's network switch was manually configured. This problem was developed to make VLAN trunking operations easier, and adopting a to handle a bigger switching network number of VLANs never solve the problem.

VTP Concept:

Cisco's VLAN Trunking Protocol (VTP) is designed to manage and configure VLANs across a switched network. VTP With promotion, switching to the other network configuration VLAN preserves continuity. The VTP VLAN messaging protocol has a domain feature that allows you to remove Layer 2 is used to alter the name of the trunk frame. It aids others by altering the network's focus switch. To set up the server role in your network configuration and administer your VLAN, you'll need a VTP switch. By switching networks, the server (s) will connect with different VLANs, which is, of course, the same as the domain name.

VLAN Trunking Protocol (VTP) from Cisco is a protocol for managing and configuring VLANs across a switched network. VTP Changing to a different network setup After promotion, VLAN maintains continuity. The VTP VLAN messaging protocol's domain feature allows you to delete and change the name of the trunk frame using layer 2. It helps others by changing the focus switch on the network. To set up the server role on your network, follow these steps and administer your VLAN, you'll need a VTP switch. By switching networks, the server (s) will connect with different VLANs, which is, of course, the same as the domain name.

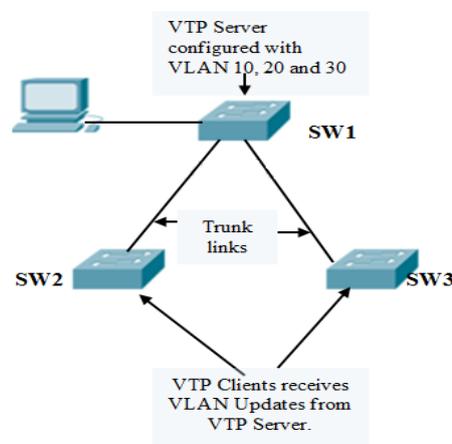


Figure 6.2: VTP server setup

VTP on a Cisco Switch: How to Set It Up:

To set up a switch (S1) as a VTP server, type in the following command:

```

                                VTP Configuration

Switch# configure terminal
Switch(config)# vtp mode [ server | client | transparent ]
Switch(config)# vtp domain domain-name
Switch(config)# vtp password
Switch(config)# vtp pruning
Switch(config)# exit

Switch(config)# vtp domain ICND
Changing VTP domain name to ICND
Switch(config)# vtp mode transparent
Setting device to VTP TRANSPARENT mode.
Switch(config)# exit

Switch#show vtp status
VTP Version                : 2
Configuration Revision     : 0
Maximum VLANs supported locally : 64
Number of existing VLANs   : 17
VTP Operating Mode         : Transparent
VTP Domain Name            : ICND
VTP Pruning Mode           : Disabled
VTP V2 Mode                : Disabled
VTP Traps Generation       : Disabled
MD5 digest                 : 0x7D 0x6E 0x5E 0x3D 0xAF 0xA0 0x2F
0xAA
Configuration last modified by 10.1.1.4 at 3-3-93 20:08:05
Switch#
```

The username and password for all clients should be the same. Make sure to change the parameters carefully. go into VTP mode.

6.3 - Inter-VLAN Routing

As mentioned that we have a router or layer 3 devices for inter-VLAN routing that network traffic should be sent to the process. On previous pages, we learnt how to set up a VLAN on a network switch. You must connect to a router to use a VLAN, which is a network of interconnected devices that allows you to interact. Machines on various VLANs have separate broadcast domains, as we know from each VLAN's unique broadcast domain. The capacity to communicate is assumed. Inter-VLAN routing is one of the many strategies for allowing the computer to interact. One alternative is to keep inter-VLAN routing architecture that connects the router switch. VLANs are IP subnets within a network. This is a multi-subnet routing configuration that supports several VLANs. To allow the recruiting router's interfaces are linked to a separate VLAN, allowing for inter-VLAN routing. VLANs use a router to communicate with one another.

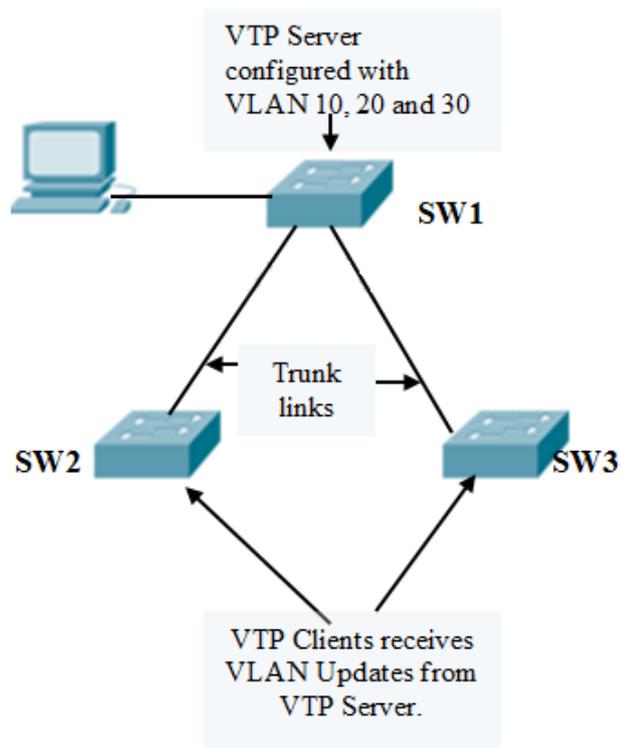


Figure 6.3: Routing between VLANs

1. To acquire traffic across the router R1 flows 20, use VLAN 10 on PC1 and PC3.
2. PC1 and PC3, as well as a range of VLAN subnet IP addresses
3. Configure the R1 router with a distinct interface for each VLAN.

The following is a list of the routing VLANs.

- Inter-VLAN routing is a method of appointing an external router to pass traffic between VLANs.
- Each VLAN sub-interface has an encapsulation 802.1Q trunk and a router setup.

CHAPTER 7

CONCLUSION & FUTURE OPPORTUNITIES

7.1 - Conclusion of Internship

Bangladesh is still a developing nation. Bangladesh's government said in 2011 that the country will be entirely digitized by 2021. For this reason, the government of Bangladesh is taking several initiatives to expand the information technology (IT) industry. **"Digital Bangladesh"** is the name of the concept.

Book knowledge is vital for computer science students, but actual knowledge provides us more confidence. **"New Horizons IT" played a significant part in the development of "Digital Bangladesh."** I am grateful to **"New Horizons"** for giving me the opportunity to work with them and for providing me with valuable networking experience. **After completing my internship, I was offered the opportunity to work for a cosmetics company in Bangladesh. Now I'm putting everything I learned during the internship into practice.**

In the future, In Bangladesh, I plan to build an IT business.

7.2 - Future Career Possibilities

I envision a great career ahead of me in the realm of networking. In our country, networking has a promising future as well. The demand grows each day, which is for networking services grows. Many companies in Bangladesh are looking for networking experts. India is currently the largest IT exporter in South Asia. Bangladesh is also interested in participating.

Contribute to these fields As a result, Bangladesh's government launched "Vision 2021" as a national strategy.

Bangladesh has gone digital. This industry of steadily expanding demand also comprises networking experts.

APPENDIX

Introduction

Studying and grasping the real action of words, as well as the application and execution of study theories, are all part of the internship. It's a place where university students may get a taste of what it's like to work in the real world before entering the workforce. This is an excellent chance for students to get experience in preparation for their future employment.

During the internship, what I learned

When I was practicing at New Horizons computer learning facility, I learned the following things.

Discipline

Throughout my internship, I discovered the importance of discipline. In the corporate world, I learnt to be disciplined. My employment taught me how to keep track of work hours and keep the office clean. It's critical that I've also experienced the discipline.

Team Work

For whatever type of job, teamwork is essential. There is no way to give a better service than by working together as a team. Knowing how to understand and follow team members for a better work environment is also part of improved synchronization.

Understanding Responsibilities

Responsibilities exist in all sorts of job and must be met. When confronted with a circumstance, use the talent to manage it. The team's elder members helped me comprehend.

I'm here to fulfill the job's obligations in this scenario. My senior's taught me a lot.

Being a Professional

Perfection must be at work in order to provide greater service. And having Perfection in work is impossible without a professional and proper attitude. The elders were the ones that taught us everything.

APPENDIX A

INFORMATION ABOUT THE COMPANY

Bangladesh's New Horizons Computer Learning Center is situated in Dhaka. They've been in the market for 35 years. Every year, the company expands. It also has the technological capability to offer innovative solutions. To your company's difficulties. New Horizons IT is a privately held corporation founded in 1994. For your business and industry, it provides a centralized automated solution. Depending on the size and breadth of the partners, various goods and services are available to satisfy your demands. New Horizons offers the most effective and personalized solutions for businesses. The New Horizons expert group offers a solution that allows the customer's environment to utilize it to its full potential.

HEAD OFFICE OF THE COMPANY

New Horizons Computer Training School, Dhaka
Momtaz Plaza Dhaka 1205, 3rd Floor, Road No 4
Cell number: 01814709530

REFERENCE

[1] Last accessed November 11, 2021 2.00 pm at url:/www.google.com.

[2] Bing is a search engine that can be found at url:/www.bing.com. Last visited October 21, 2021 11.00 am

Internship in networking

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