CONFIGURATION AND SIMULATION OF DEFAULT ROUTING USING PACKET TRACER

SUBMITTED BY

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

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APPROVAL

This internship, titled "**CONFIGURATION AND SIMULATION OF DEFAULT ROUTING USING PACKET TRACER**" was submitted to the Department of Computer Science and Engineering at Daffodil International University by Joyguru Kumar Sarker with ID number 213-15-4406; it has been approved as satisfactory for partially fulfilling the requirements for the B.Sc. in Computer Science and Engineering degree, as well as being approved in terms of style and content. A satisfactory assessment of the presentation made on July 16, 2024, has been given.

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DECLARATION

I hereby declare that the Department of Computer Science and Engineering at Daffodil International University has received this report, which I, **Joyguru Kumar Sarker**, ID NO: **213-15-4406**, completed. guided by **Mr. Narayan Ranjan Chakraborty**, **Associate Head** of the CSE Department of Daffodil International University and **Associate Professor**. I also declare that none of these parts of the report and this report has not been submitted for the acceptance of any degree or diploma in any institution.

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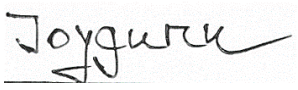

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First of all, I would like to show my appreciation to Almighty God for the wonderful devise that facilitates the process of finishing the internship in the last year at the university.

First of all, I would like to say many thanks and heartfelt thanks to **Mr. Narayan Ranjan Chakraborty**, Lecturer, CSE Department, Daffodil International University, Dhaka. He always provided me with advice on how to finish the internship successfully. Deep understanding and an undeniable attraction to administrators in the field of "**Cisco Certified Network Associate (CCNA)** internship at **Atova Technology**" are required for this entry-level profession. Completing this internship will require realizing his continuous time, perceptive instruction, persistent comfort, ongoing and active research, constructive comments, major direction, multiple substandard drafts, and improving them at every level.

Special thanks to our CSE Department Professor & Head, Professor **Dr. Sheak Rashed Haider Noori**, for providing me kind cooperation to complete my internship. I would also especially wish to thank my parents, friends and highly respected professors who encouraged me a lot at this stage.

Lastly but not the least, I would like to say thank you to my parents for the support you have always given to me.

ABSTRACT

The facts presented in the paper were based on my internship at **Atova Technology** in order to complete my practical for the BSc. degree in Computer Science and Engineering. CISCO Certified Network Associate (CCNA) expertise is something I learned. I gained knowledge of TCP/IP, operating systems, network basics, LAN switching, routing techniques, and WAN technologies that as well as services related to infrastructure, security of infrastructure, and handling infrastructure, thanks to **Atova Technology**. An extra Cisco certification will help my prospects when I'm looking to apply for a new job or to advance at a technology-focused company. A wonderful method for showing your IT knowledge is to earn a Cisco certification. Applying for any relevant employment will be made easier for me because I have a CCNA certification. They also benefit financially from hiring me when they find out about a new certification. Eventually, I was able to advance and land the next job in the same company because of this. With CCNA, I have the chance to advance and quicken my professional growth.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Networking is the connection of two or more computers electronically with aim of exchanging information. During the networking session it is possible to share various resources like files, printers, applications, and even software. The advantage of networking is often viewed in terms of security, productivity, controllability and cost-efficacy since it allows the customer to share information across all ranges. In other words, a community comprises physical entities like the computers, hubs, switches, routers and other units that compromise the community interface. These are equipment's that employs great science such as radio waves and wiring in the transference of recordings from one place to another. The most widespread networks in the networking industry are the WAN – Wide Area Network, and LAN – Local Area Network since there is a great variety kind of communities. Local Area Network or LAN on the other hand refers to a scenario where two or several computer systems connect with a short range easy to comprehend in a reception area or an office building or any other installation. There is this WAN that encompass a more expansive are of geography as that of LAN such as cities, foreign regions and even the global area. Many of the most utilized LANs are typically interconnected, to constitute a WAN jigsaw. Many devices are on the network, \(attached\), it becomes crucial to avoid data collision trough the facts channel since the connected units try to use the fact channel at the same time.

1.2 Motivation

My current academic pursuits involve obtaining a Bachelor of Science in Computer Science and Engineering from Daffodil International University. In order to advance my networking profession, I have worked on an internship program. Bangladesh has a sizable computer networking job industry. Employees that participate in the program are better able to discover fresh concepts and tactics that can propel any business forward. In addition to inspiring people to be excellent researchers and fit for a high-caliber position in a dynamic company, the networking CCNA can help a corporation engage with its surroundings. By carefully implementing these experiences, organizations might anticipate varying results. I gained knowledge on how to direct and produce original work. inspired me to pursue a profession in network engineering and expand my knowledge of the latest technologies.

1.3 Internship Objectives

The importance of internships for our futures and professional success cannot be understated. Since an outcome, I completed my internship with CCNA Switching and Routing support. The ultimate goal of my internship is to establish me as an authority on targeted activity advertising. Therefore, advancing experience can be very appealing. I picked up a lot of new skills throughout this internship that will be very useful for my future work. Internships in applied science and engineering aim to assist students develop their understanding of the working world, integrate work experience with classroom instruction, and ensure that their studies follow a logical path outside university.

1.4 Introduction to the Company

The Atova Technology Bangladesh is responsible for the complete educational program. Networking Academy Routing and Switching is a global program that builds IT careers and IT skills for individuals and educational organizations. The technical staff of Atova Technology Bangladesh is made up of skilled and knowledgeable individuals. When it comes to managing and providing for their clients, Atova Technology Bangladesh is extremely strict. You are going to be impressed how skilled our tech workers is. They have demonstrated prior experience in design, which is computer networking, installation, deployment, and maintenance. To keep the students informed about the most recent advancements, this organization offers them the newest networking internships.

1.5 Report Layout

This internship report contains five chapters. The layout of the report cuts down each chapter. I tried to condense every chapter. Below is a synopsis of the information:

In chapter one (1), I go over the purpose of the internship, its motivation, its goals, and an overview of the business.

I describe the organization I interned with in chapter two (2).

I discuss the timeframes, goals, difficulties, and daily chores in chapter three (3).

The competencies achieved, the smart plan, and reflections are presented in chapter four (4).

The conclusion and future scope is also discussed in chapter five (5). expectations for the future at work.

CHAPTER 2

ORGANIZATION

2.1 Introduction

"Atova Technology" is a leading company of Bangladesh that deals with improvement system and educational administrations. It is aimed at provide the possibilities for the Educative framework formation in the given Sphere of Educational needs in order to facilitate transference of the specialized Knowledge and Skills into the spheres of specialization Employment. Regardless of the general affiliation or inherent specialist goals and objectives, their learning programs support the closing of skill gaps and the development of a standard skill improvement order to benefit businesses. Bangladesh has an extensive workforce that can be enhanced by high standards and hands-on, career-focused training from professionals using real-world techniques. Foreign workers are the primary source of technical and mechanical publications as well as workplace advice for the current industry and companies. A network of experts working on everything matters these days. If our workforce is better skilled than that of other nations, it will draw in more capital and workers. When foreign capital is invested in producing high-quality goods, the trained team will grow the company. By completing an internship at Atova Technology, I gained practical experience in computer networking, which will be useful in my future career.

2.2 Product and Market Situation

Professional Training Services

- Cisco Certified Network Associate (CCNA)
- Mikro Tik
- Linux Server
- Email Server
- Network Security
- Introduction to networking for beginners

2.3 Target Group

In order to remain competitive and successful in the rapidly changing global landscape, all corporations and organizations must enhance their computer and technological capabilities. In response to current market demands, Atova Technology has developed a unique blend of skill sets. Atova Technology must take the appropriate steps going forward in order to achieve their goals.

2.4 SWOT Analysis

Figure 2.1: SWOT Analysis.

A SWOT analysis is a method for evaluating these four characteristics of your company, which stand for Strengths, Weaknesses, Opportunities, and Threats. SWOT analysis is a method that can assist you in identifying the current strengths of your business and creating a winning long-term plan.

CHAPTER 3

TASKS, EVENTS AND ACTIVITIES

3.1 Daily Tasks and Activities

Month - One: During my initial month of internship with Atova Technology, I have completely learned and practiced the following subjects:

• Basic Computer Networking

• OSI Model & TCP/IP Model

• Sub netting & IPv4 addressing

• Routing Protocol

Month - Two: During my second month of internship at Atova Technology, I have successfully completed the following tasks and done them correctly:

- Configure Static & Default Routing
- RIP Configuration
- EIGRP Configuration

Month - Three: During my third month of internship at Atova Technology, I have successfully completed the following tasks and done them correctly:

- Routing & Switching Introduction
- Wireless Communication
- Server Configuration

Since receiving my graduation, I have worked with hardware and networks. During my four months of study at your university, I also designed network topologies for a number of small and major businesses on the internet. I have put in place a number of routing and switching requirements and protocols. I have included the entire Cisco Certified Network Associate (CCNA) network course in this report.

3.2 Network

A group of computers sharing resources hosted on or supplied by network nodes is known as a computer network. Computers converse with one another via digital connections using standard communication protocols.

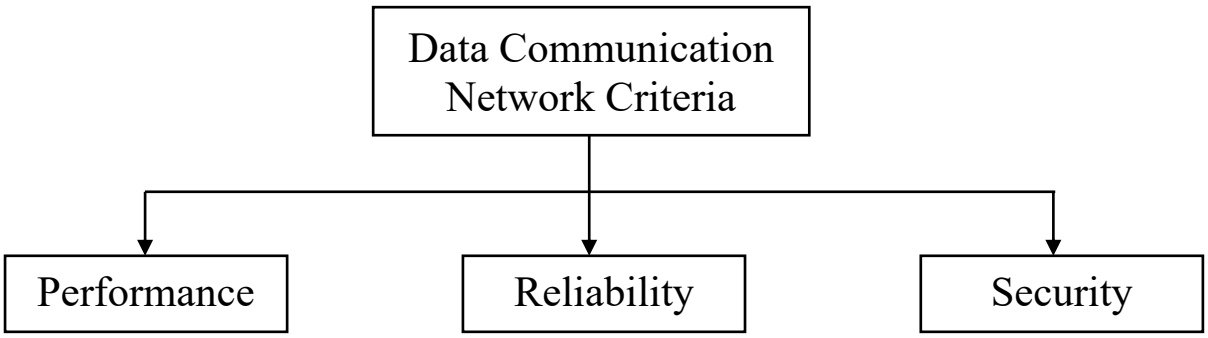

Figure 3.1: Network Criteria.

Why we need computer networks?

Now without internet the situation of the world cannot be thought. Computer networks enable data and communication to be exchanged across networks. Despite the fact that there are numerous advantages of computer networks then some general or vital advantages are mention below:

- File sharing
- Hardware sharing
- Application sharing
- User communication
- Access to Information
- Efficiency and Productivity
- Security

Network Types

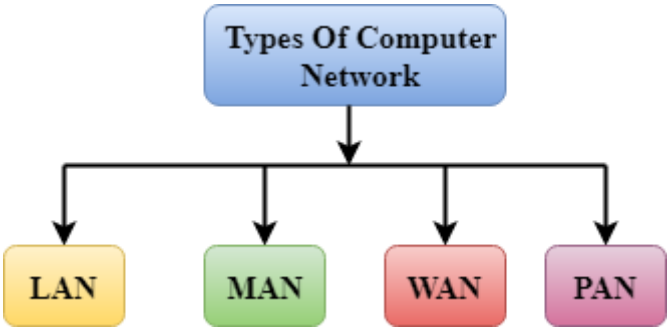

Figure 3.2: Types of Computer Network.

- Local Area Network: A LAN connects a small area like a 10meter room, a 100meter building or a campus to a big network area like a LAN.
- Metropolitan Area Network: A network that links users to a broad network, such a city, is a metropolitan area network.
- Wide Area Network: A single network that covers an entire nation, larger than a metropolitan area network. It may travel a continent of 1000 km or a country of 100 km.
- Personal Area Network: This type of network connects devices within a one-meter radius. such as tablets, PCs, and cell phones, among others.

Internetworking Devices

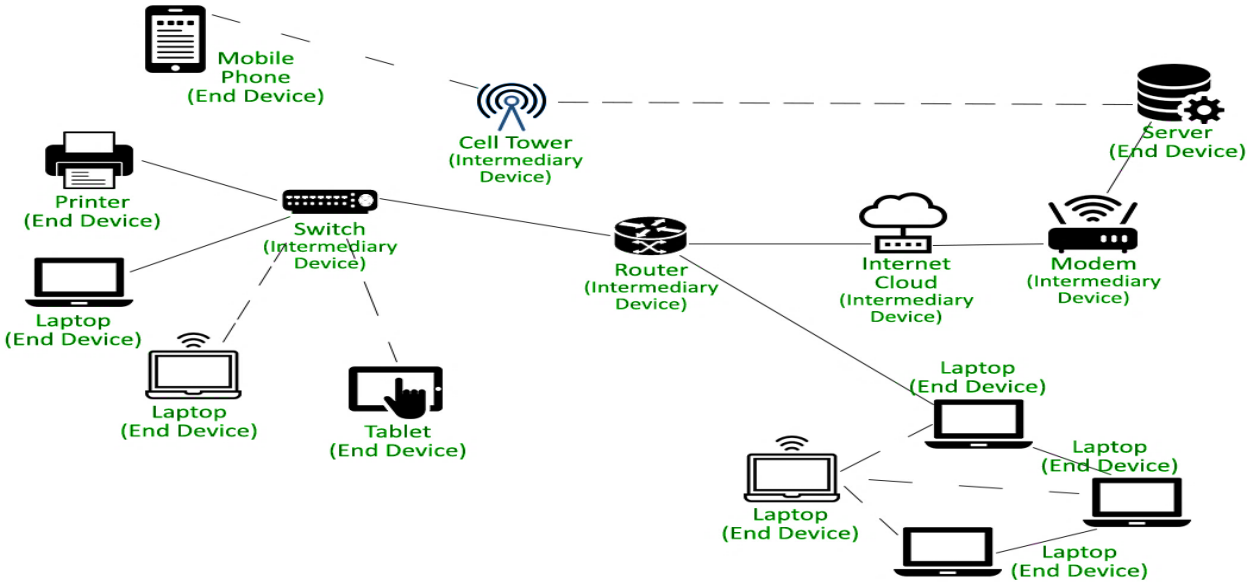

Figure 3.3: Internetworking.

CISCO Router

Sending data packets between networks is possible with a functional networking router. An internetwork is formed between two routers when a knowledge packet is transmitted from one to the other via the network and arrives at its destination.

Figure 3.4: CISCO Router.

A router is composed of a CPU, several categories of digital memory, and interfaces for input & output. Recorded in the router's storage is an operating system in software format. Some of the router manufacturers are Cisco Systems Inc. Juniper networks, Net Gear, D-Link and many more. When a router is turned on, the operating system is retrieved from storage first. Then, network interfaces and protocols are configured and the last configuration file is copied into the NVRAM. Name, network address and its subnet are kept by the router in its routing table for each interface. A router applies its routing table to confirm the destination address when it receives an information packet. The data packet is then forwarded by the router to the next router through the right interface and continues this process till it gets to the final destination.

Cisco Switch

A switch is a router for network communication that uses packet switching to link another router in a computer network so that data can be received, processed, and forwarded to its intended location. In the OSI reference model, a switch is a multiport network bridge that processes data packets at the data link layer by using physical addresses. A few switches have network-layer data processing capabilities. Switches control the network's data flow by delivering and receiving data. Various network switch models allow different numbers of ports for connecting routers. Eight or four connections are available for Ethernet routers on consumer-grade network switches, but corporate Switches may support 32–128 connections.

Daisy chaining is an extra way to connect a network switch. We are able to link a lot of routers to a network in this way.

Figure 3.5: CISCO Switch.

Cisco Hub

Infrastructure supporting networks is called a hub. It is employed in network device connectivity. Hubs that connect multiple devices that function as a single network segment might be referred to as repeater hubs, multiport repeaters, Ethernet hubs, active hubs, network hubs, or just hubs.

Figure 3.6: CISCO Hub.

Cables

A cable with one or more fibers designed to carry light is called an optical fiber cable. Glass and plastic are the two main materials used in optical fibers. Glass fiber is typically utilized in medium- and long-range telecommunication, while plastic fiber is typically employed in short-range communication. Fiber comes in two varieties: single-mode and multi-mode. A 50-kilometer fiber connection that can send one data bit per second was shown by NTT Japan.

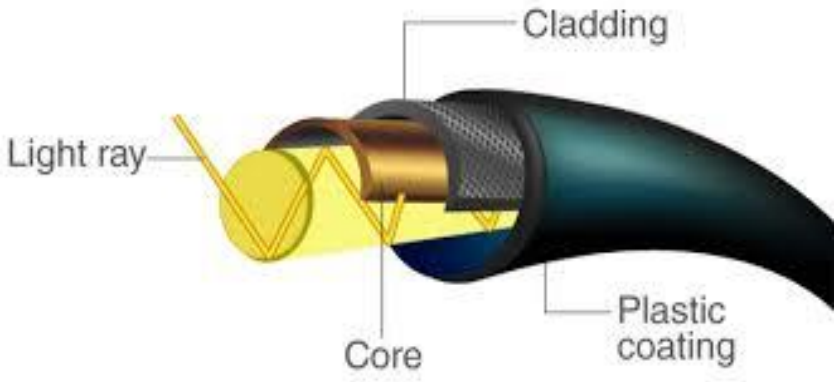

Figure 3.7: Optical Fiber Cable.

Twisted Pair Cable:

The primary uses of the twisted pair cables are in the transmission of different forms of information and communication. The two categories of twisted pair cables are unshielded twisted pair cables and shielded twisted pair cables. To minimize any emissions from other electrical devices, or to prevent them from interfering with the cables, UTP is applied mainly for the Ethernet while the STP is applied in almost all network systems.

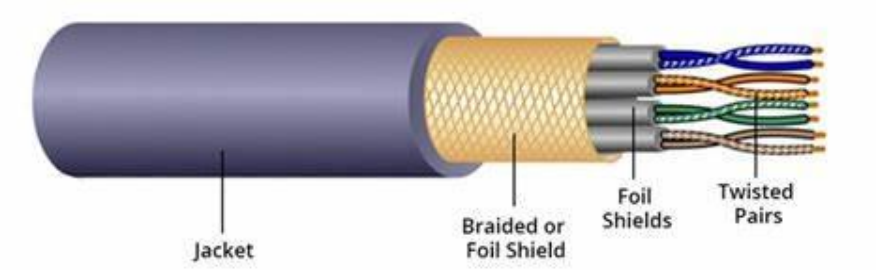

Figure 3.8: Twisted Pair Cable.

3.3 The OSI Model

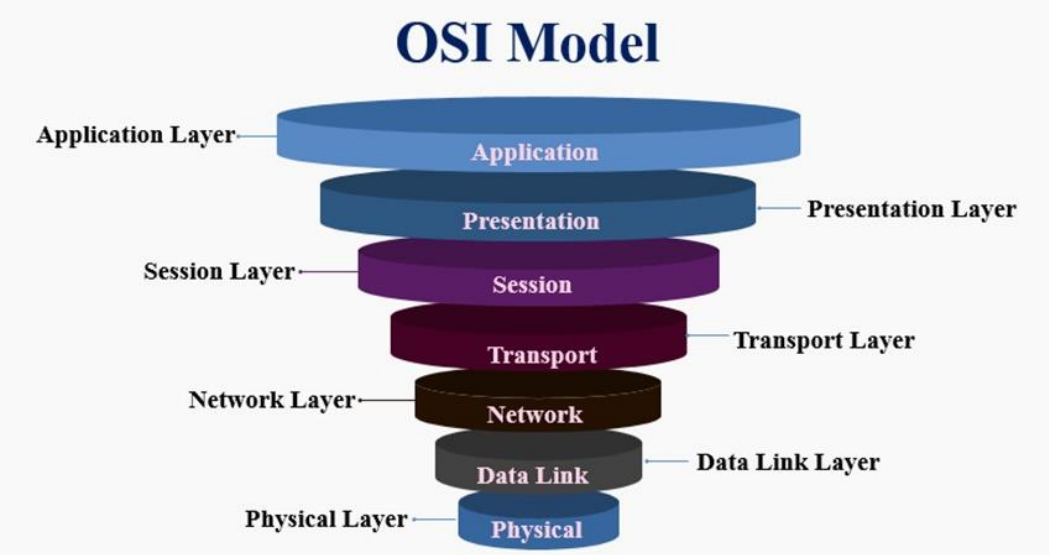

Figure 3.9: OSI Model.

The **OSI (Open Systems Interconnection)** model is a conceptual framework that standardizes the functions of a communication system into **seven distinct layers**. Each layer has specific responsibilities and interacts with adjacent layers to facilitate data exchange between devices. Let's delve into each layer:

1. **Physical Layer (Layer 1)**:

    - Deals with the actual physical transmission of data over a medium (e.g., copper wires, fiber optics, wireless signals).
    - Describes such attributes as voltage levels, the cable used and the connectors.
    - Devices: Highways, connecting devices, wires.

2. **Data Link Layer (Layer 2)**:

    - Ensures reliable communication between directly connected devices on the same network segment.
    - Responsible for framing data into frames, error detection, and flow control.
    - Devices: Network switches, Ethernet cards.

3. **Network Layer (Layer 3)**:

    - Handles routing and forwarding of data packets between different networks.
    - Uses logical addressing (IP addresses) to determine the best path for data transmission.
    - Devices: Routers, Layer 3 switches.

4. **Transport Layer (Layer 4)**:

    - Ensures reliable end-to-end communication.
    - Segments data into smaller units (segments) and manages flow control, error recovery, and retransmission.
    - Protocols: **TCP (Transmission Control Protocol)** for reliable communication, **UDP (User Datagram Protocol)** for faster transmission.

5. **Session Layer (Layer 5)**:

    - Provides the means of initiating, sustaining, and ending a connection between two application programs.
    - Manages the dialogues with regard to control, synchronization and checkpointing mechanisms.
    - Functions: Authentication, encryption, session management.

6. **Presentation Layer (Layer 6)**:
    - Translates, encrypts, and compresses data for application compatibility.
    - Tasks: Data encryption, data compression.

7. **Application Layer (Layer 7)**:

    - Provides network services directly to user applications.
    - Includes various application protocols (e.g., HTTP, FTP, SMTP).
    - Services: Web browsing, email, file transfer.

Just bear in mind that idealized OSI model is just a model and practical networking breaks it up into pieces combining or skipping some layers as needed. However, understanding these layers helps network engineers troubleshoot and design efficient communication systems.

TCP and UDP

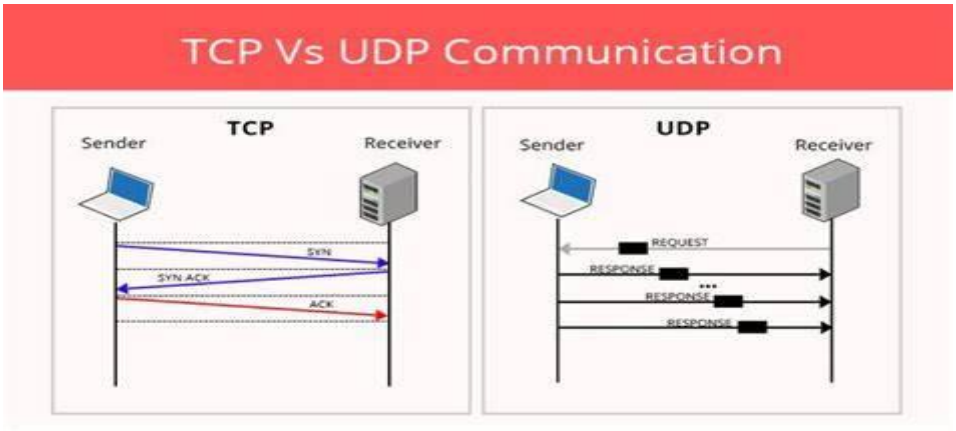

Figure 3.10: TCP & UDP.

One of the key protocols in the Internet protocol suite is TCP (Transmission Control Protocol). It is situated in between the network and application layers, which are utilized to supply trustworthy services. It is a connection-oriented communications protocol that facilitates message exchanges across a network between various devices. TCP is used by the Internet Protocol (IP), which defines the method for transferring data packets between computers.

User Datagram Protocol (UDP) is one Transport Layer protocol. The suite of Internet Protocols, occasionally referred to as the UDP/IP suite, includes UDP. It is an unstable, connectionless protocol in contrast to TCP. Therefore, establishing a connection is not necessary prior to data transfer. Low-latency and loss-tolerant connections are established over the network with the aid of UDP. Process-to-process communication is made possible via the UDP.

TCP and OSI Model

Transmission Control Protocol or Internet Protocol is also abbreviated as TCP/IP. Like OSI reference model, it is a conceptual model that defines the communication functions in an ADP or telecommunications system. The TCP/IP reference model is a kind of global language for computer networking. TCP/IP model is utilized in current telecommunication systems. The OSI has seven layers while TCP/IP model has only four layers. Unlike the OSI model, the presentation, session, and physical layers are reduced to a bare minimum in the TCP/IP model. Each layer communicates with the layers which are above it and below it as well as the other layers in order to execute certain responsibilities.

TCP/IP and OSI Model

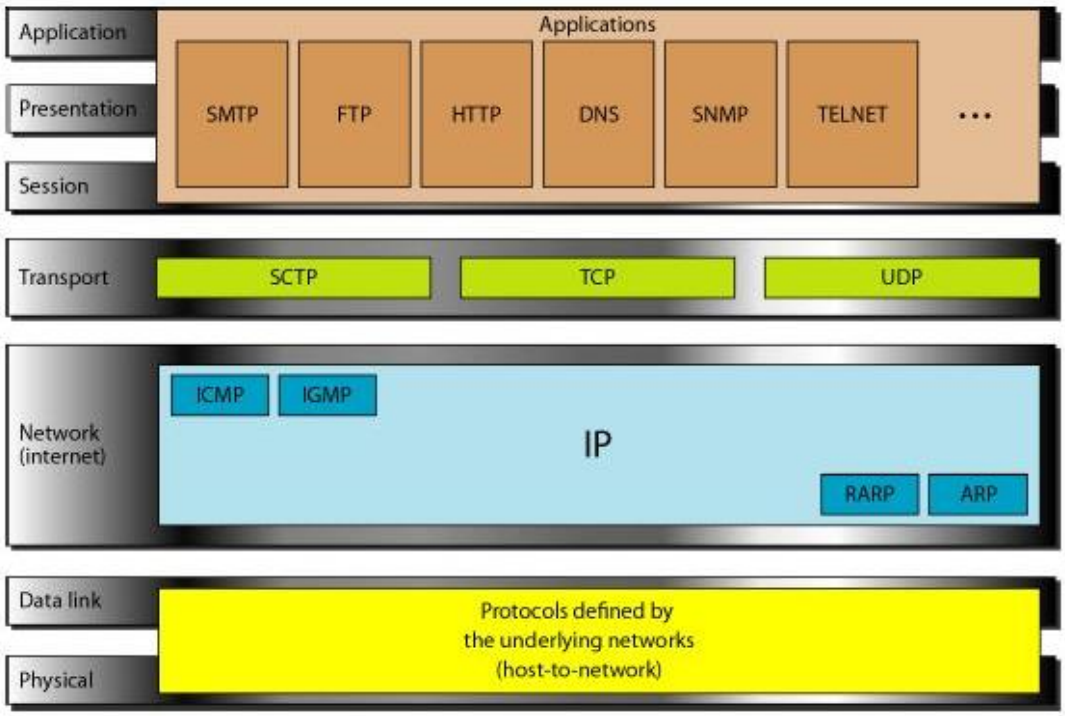

Figure 3.11: TCP/IP & OSI Model.

The primary difference between the OSI Model and TCP/IP. TCP/IP is a concept of practical values that employs standard procedures in addressing specific communication problems. On the other hand, we have the OSI whose work is a detailed protocol independent approach that can support various network communication methods.

3.4 IP Addressing

An IP address is therefore a unique number that is given to every single router in a segment of the network. This IP could be different for each of the routers that are connected to any given network.

An IP address consists of 32 bits. The address has been divided up into four sections of 8 bits each, separated by a period, to make it easier to read. So, each part has a length of one byte, or octet. Similarly, the binary numbers are translated to decimal to make them easier to see and understand.

Decimal Notation with Dots

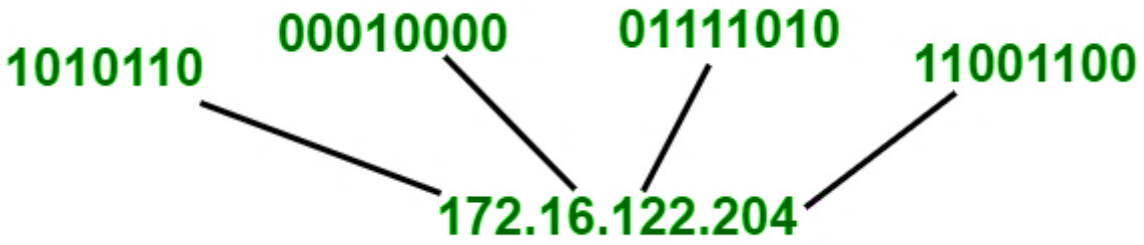

Figure 3.12: Decimal Notation with Dots.

Hexadecimal Notation

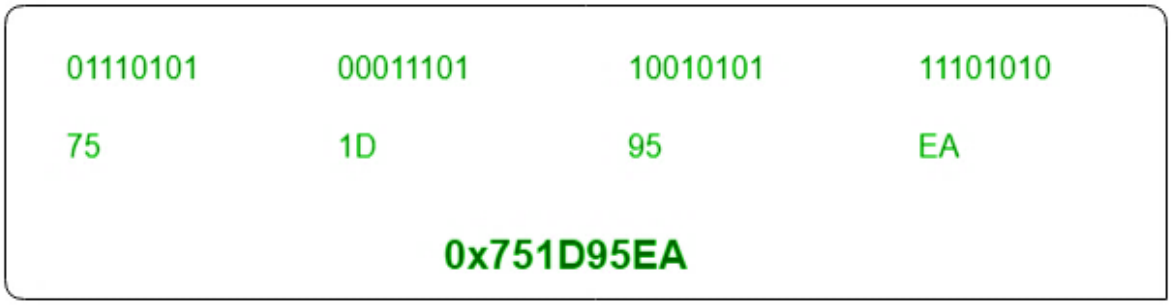

Figure 3.13: Hexadecimal Notation.

Classes of IP

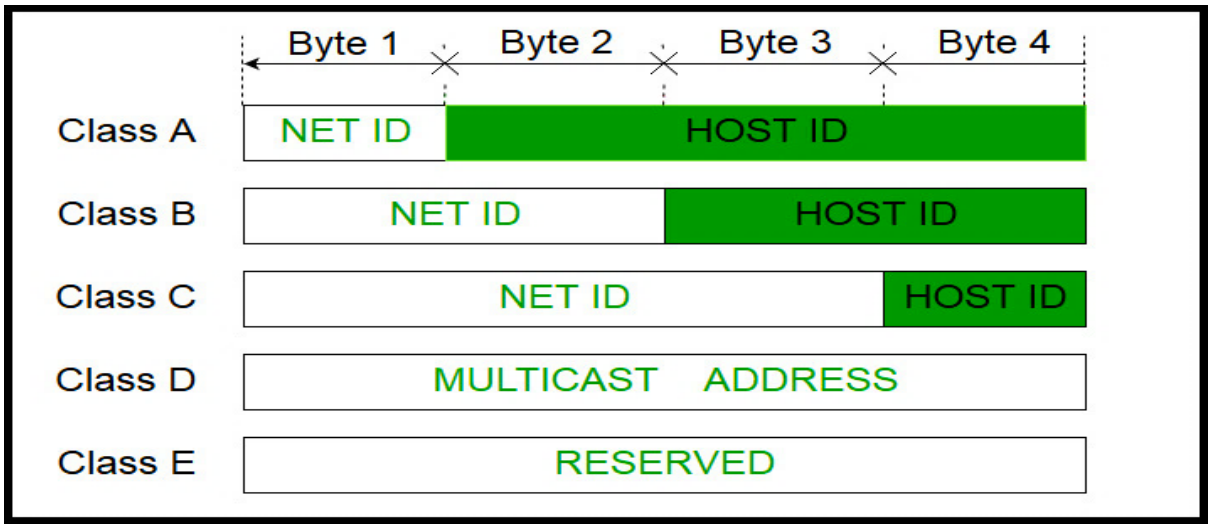

Figure 3.14: IP Allocations.

Bit Value

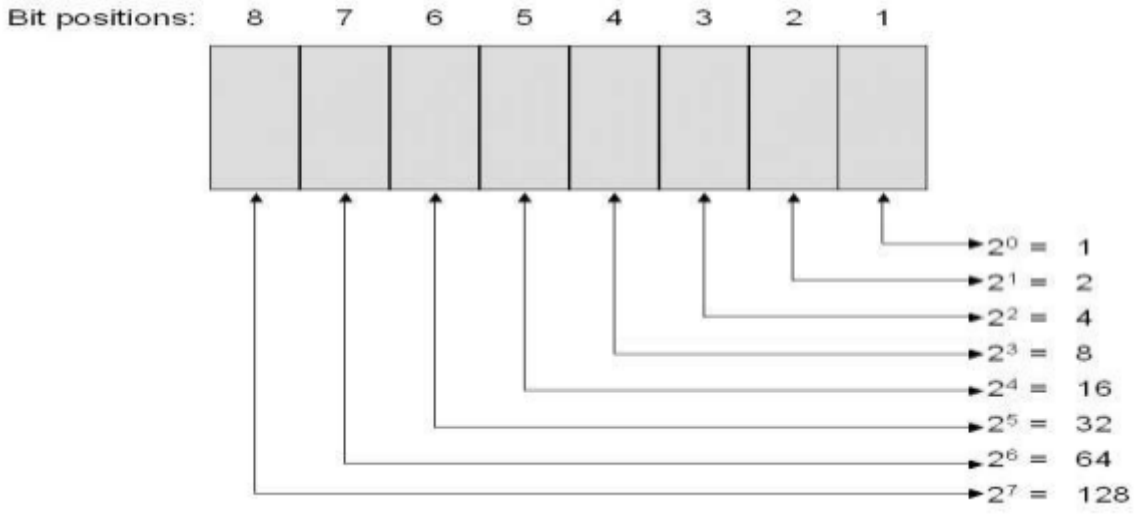

Figure 3.15: Bit Value.

Network Address Range

Table 3.1: Network Address Range.

Rule	Minimum And maximum	Decimal Range
Class A: First bit is 0.	00000000 = 0 01111111 = 127	1-126 *0 and 127 are reserved
Class B: First Two bit is 110.	10000000 =128 10111111 =191	128-191
Class C: First three bits 110.	11000000 = 192 11011111 =223	192-223
Class D: First four bit is 1110.	11100000 = 224 11101111 = 239	224 - 239

3.5 Sub netting

The subdivision of an IP networks is referred to as a subnet or a subnetwork. Subnetting is the division of a network into two or more networks. An IP address's shared, identical, most-significant bit group is used to identify computers that are part of a subnet.

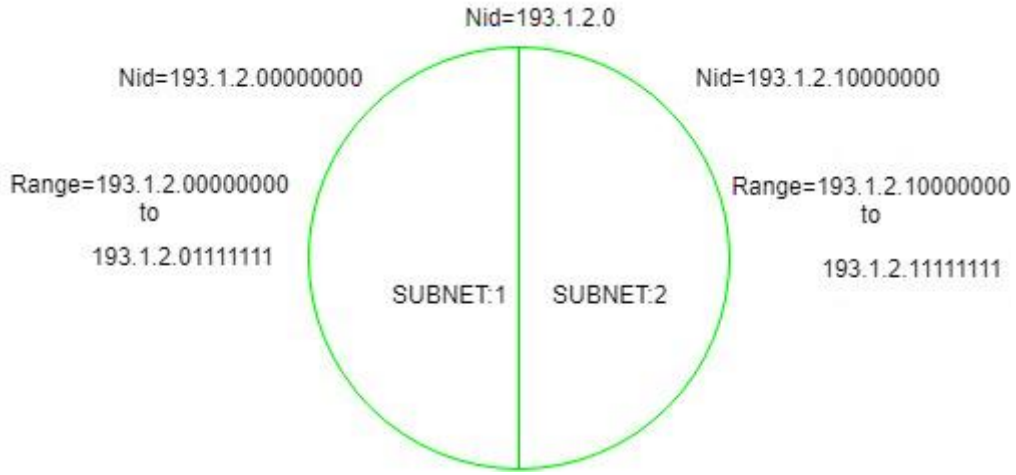

Figure 3.16: Sub netting.

VLSM

Based on the overall requirements of the network, a Variable Length Subnet Mask (VLSM) is a numerical masking sequence, or IP address subset. A network administrator can utilize short masks for networks with many hosts and long masks for networks with few hosts by using a VLSM.

10.1.1.0/24

10.1.2.0/25

10.1.2.128

Utilizing the VLSM Network

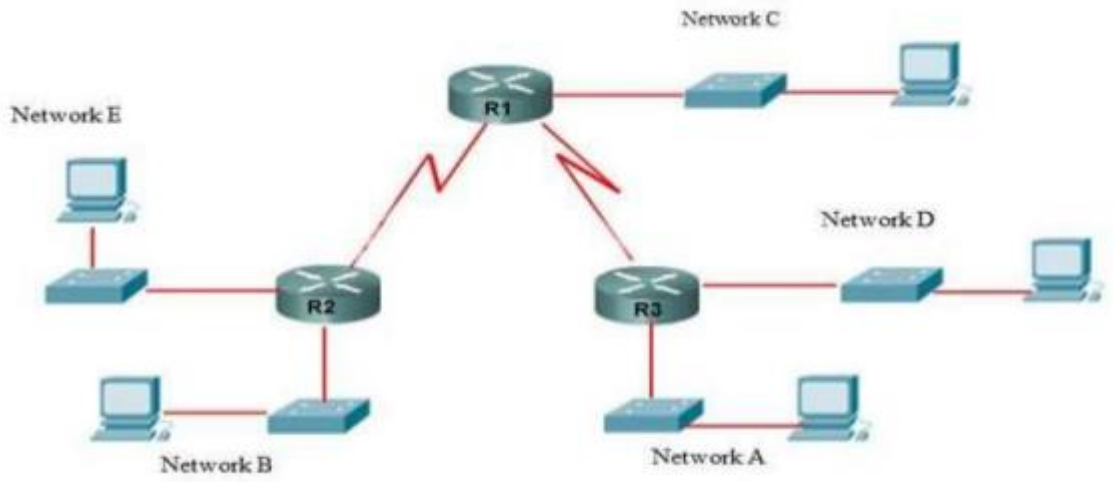

Figure 3.17: VLSM Network.

Assume an ISP assigns a class C network. 192.168.1.0/24 HQ = 50 host is the address. R1 is equivalent to 30 hosts. R2 is equal to ten hosts. Six LAN links

3.6 Routing Protocol Introduction

Routing is defined as the method of deciding the path that the traffic takes in a single network, or in many networks.

In the case that a packet was received from an interface of a certain router, the destination IP address is borrowed from the packet header and compared with the contents of the routing database. This routing table which is stored in the RAM of the computer indicates over which one of the available outgoing interfaces the packet will be forwarded to the target network.

On your router, you may manage routing choices in three different ways.

1. Static Router
2. Default Router
3. Dynamic Router

Static Routing

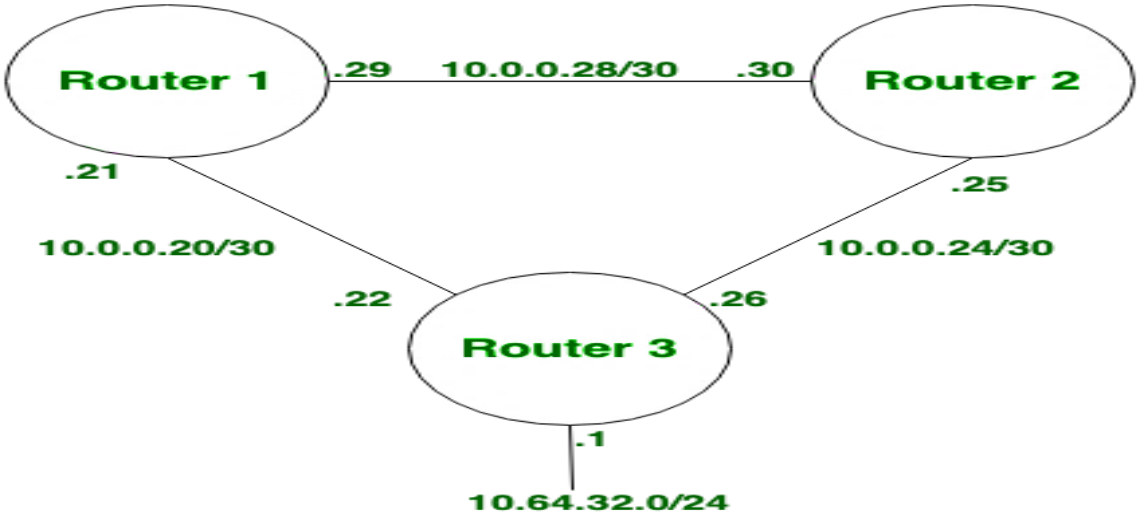

Figure 3.18: Static Routing.

- Specific route paths are planned and picked from the list by the administrator.
- The administrator must do some fine tuning.
- Small networks benefit from this.
- Scalability becomes more difficult to maintain and configure.
- Because only the administrator is aware of the routing paths.
- It is extremely secure and uses less resources (RAM and CPU).

Dynamic Routing

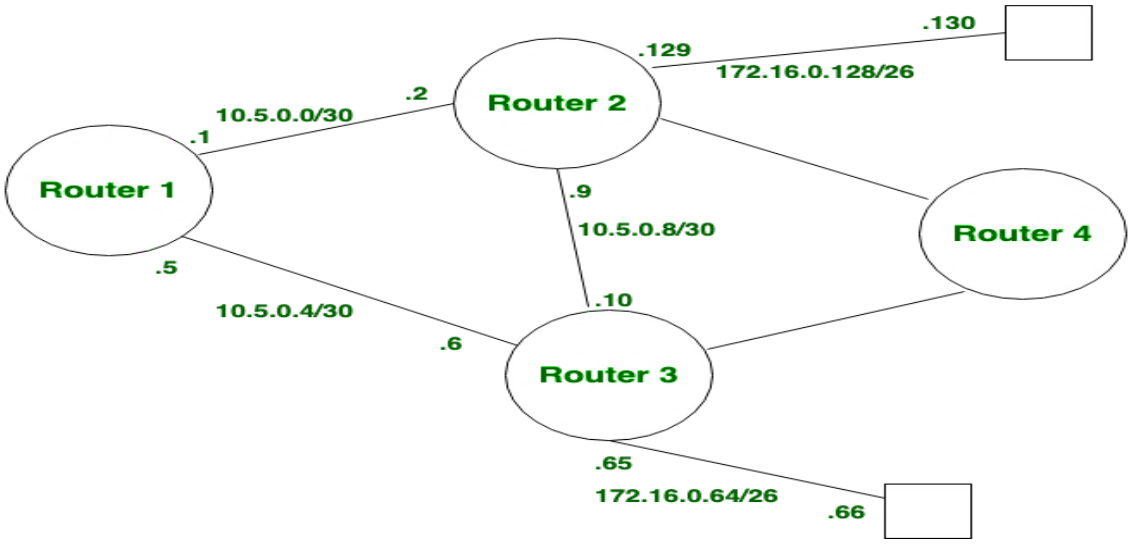

Figure 3.19: Dynamic Routing.

- Routers dynamically share routing information.
- Router picks up on changes dynamically.
- Able to operate on any network, small to large.
- Easy to configure and scalable. The router operates dynamically.
- Not as secure as static routing. still functions well with extensive network infrastructure.
- Because the router needs to operate dynamically, it uses additional resources (CPU, RAM).

Routing Concepts

Users can communicate, work together, and engage in other networking-related activities through networks. One method a packet could use to get from one scenario to another is routing.

Networks are commonly used for website access, IP phone communication, video conferences, online gaming, online shopping, online coursework completion, and other purposes.

Static Routing

Introduction: Upon adding a new router to a network, all of the routers are unaware of the network as a whole, so we must identify each network to each router. Static routing implies that the path revealing how the packets from the specific router are forwarded to the destined location must be configured. Static routing however has the disadvantage of the fact the router cannot modify the path that we suggest it; instead, it has to retain the path we suggest. This means that the router is unable to choose the optimal path on its own.

Configuring Static Route

A static router's basic syntax

```
Router>enable
Router# configure
Router(config)#hostname R1
R1(config)#int
R1(config)#interface gig0/0
R1(config-if)#ip add
```

R1(config-if)#ip address 192.168.100.62 255.255.255.192

R1(config-if)#no shutdown

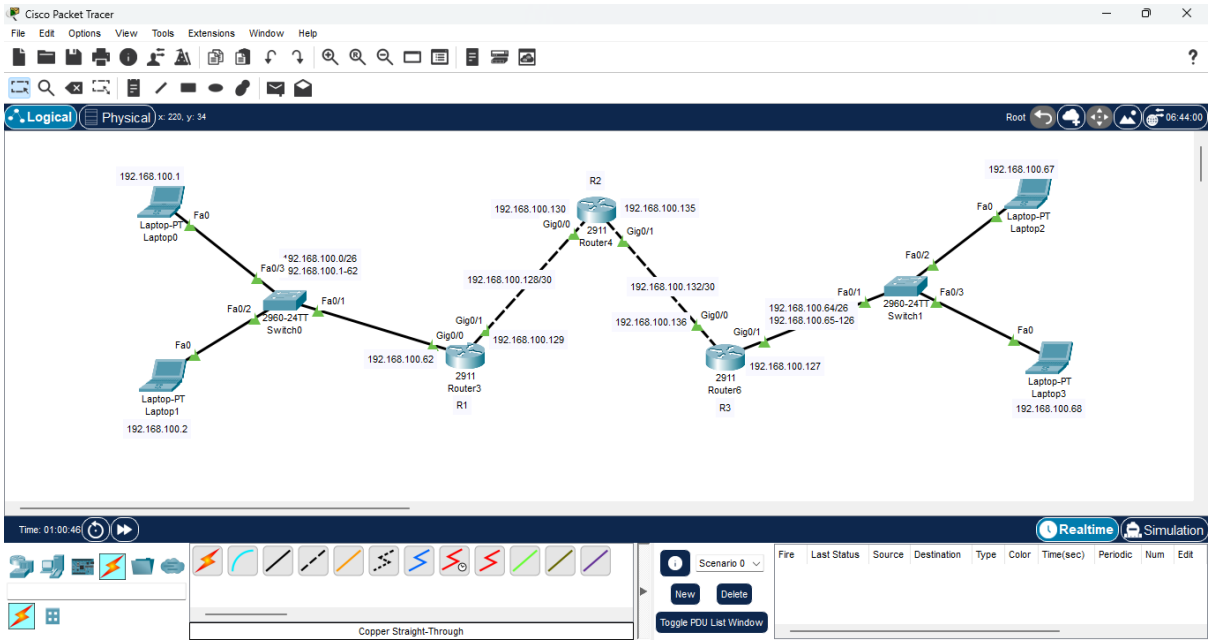

Figure 3.20: Static Routing.

When no other routes are required or accessible, an exit point from a router can be defined using static routing. We refer to this as the default route. Small networks with only one or two routes needed can use static routing.

Router: 1 Configure

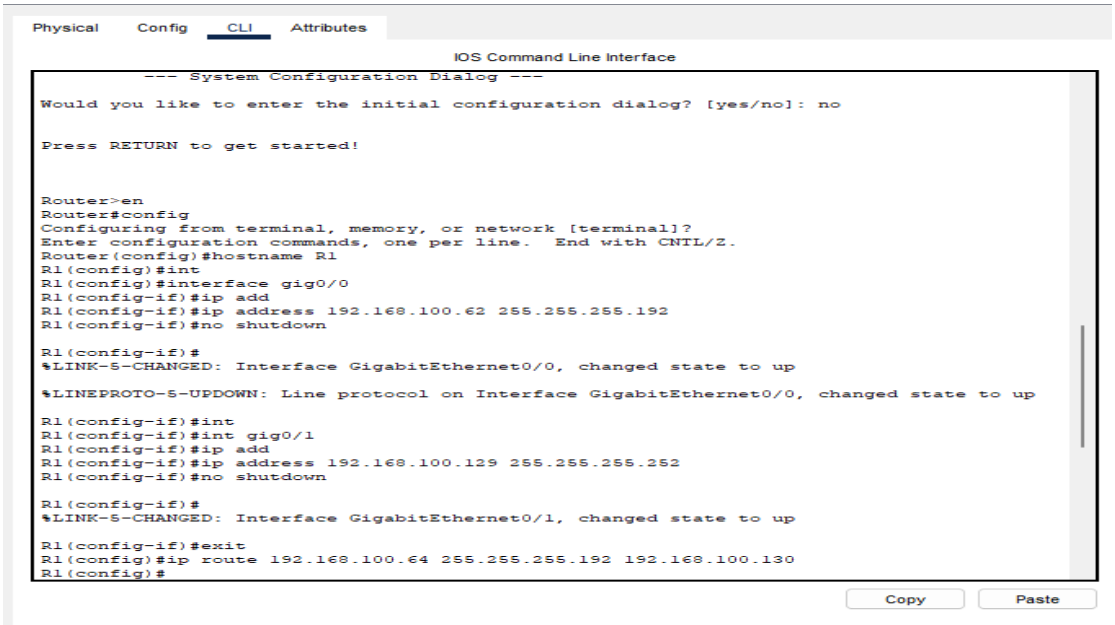

Figure 3.21: Router 1 Configuration of Static Routing.

First, we design a network consisting of three routers and two switches and four PCs. I will create this completed network using the static routing protocol for the said network. First configure router 1. The configuration codes for router 1 are shown in the above screenshot.

Router: 2 Configure

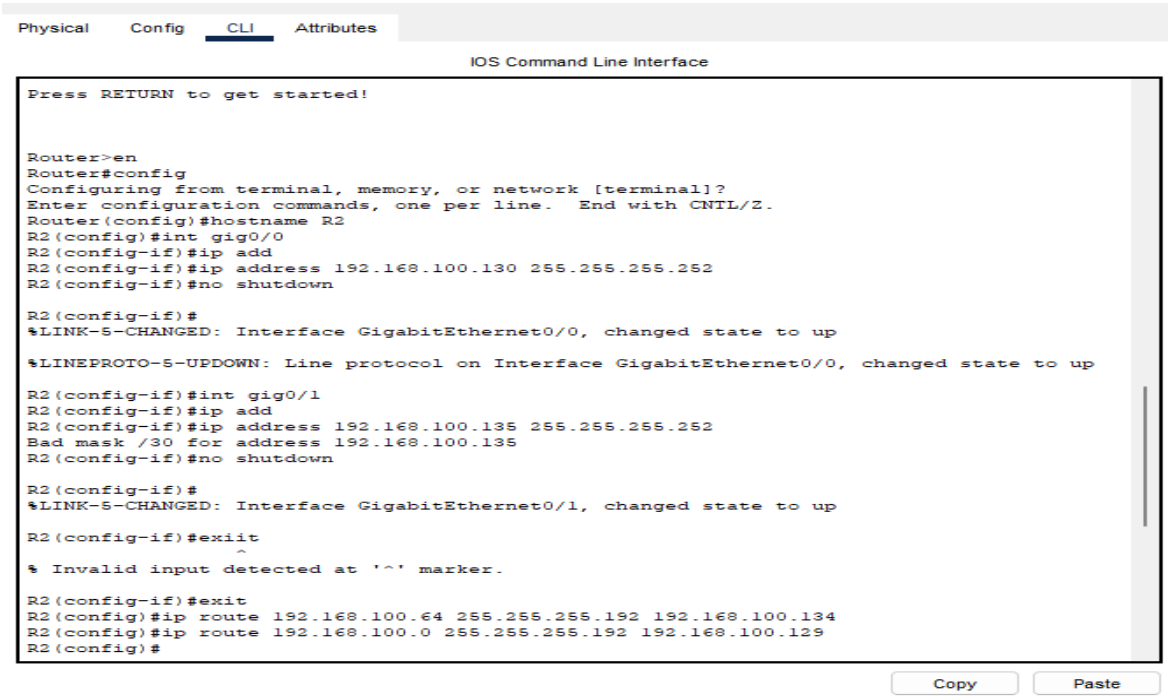

Figure 3.22: Router 2 Configuration of Static Routing.

First, let's design a network consisting of three routers and two switches and four PCs. I will create a complete network using static routing protocol for that network. After configuring router 1, configure router 2. The configuration codes for Router 2 are shown in the above screenshot.

Router : 3 Configure

Router>en
Router>enable
Router#config t
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R3
R3(config)#int gig0/0
R3(config-if)#ip add
R3(config-if)#ip address 192.168.100.136 255.255.255.252
Bad mask /30 for address 192.168.100.136
R3(config-if)#no shutdown
R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R3(config-if)#int gig0/1
R3(config-if)#ip add
R3(config-if)#ip address 192.168.100.127 255.255.255.252
Bad mask /30 for address 192.168.100.127
R3(config-if)#no shutdown
R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
R3(config-if)#exit
R3(config)#ip route 192.168.100.0 255.255.255.192 192.168.100.133
R3(config)#

Default Routing Configuration:

Default routing is a fundamental concept in computer networking. It enables routers to forward packets to their destination networks when no specific route is available. In other words, default routing provides a "last resort" route for packets that do not match any specific route in the routing table.

Here are some key points about default routing:

Purpose of Default Routing:

- A router falls back to using the default route when it receives a packet with a destination IP address that doesn't match any specific route in its routing table.
- The default route points to a default gateway or a router of last resort.

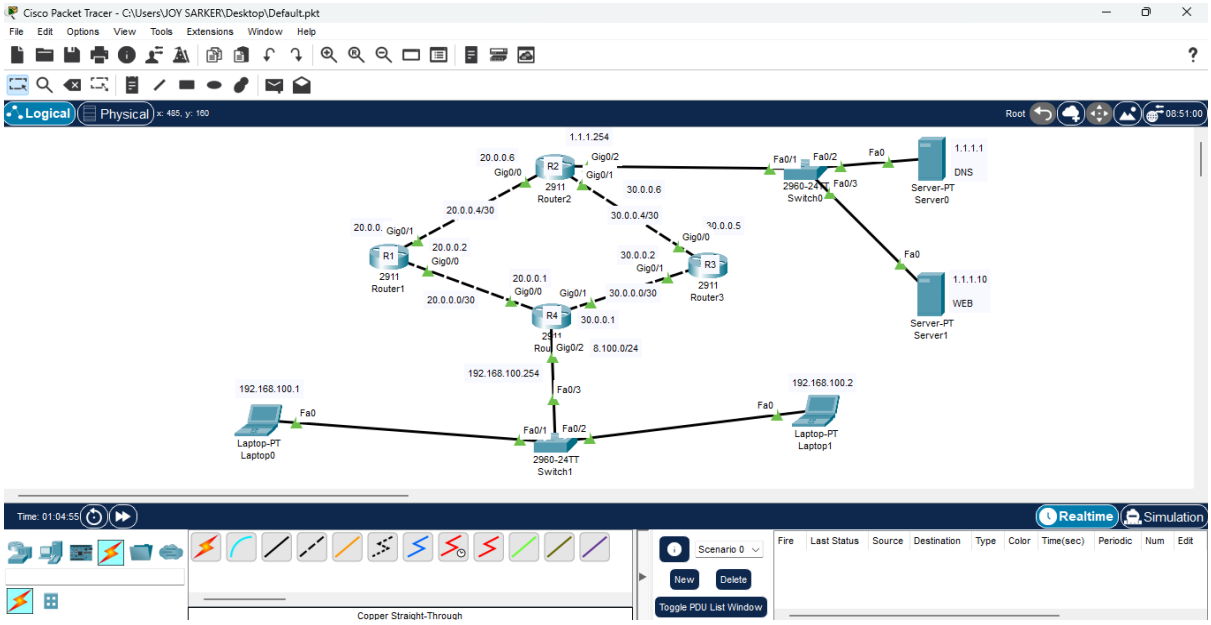

Figure 3.23: Default Routing.

The default route in computer networking is an Internet Protocol configuration that sets a forwarding rule for packets in situations where the routing table or other routing mechanisms are unable to provide a specific address of a next-hop host.

A default router's basic syntax

Router:1 Configuration

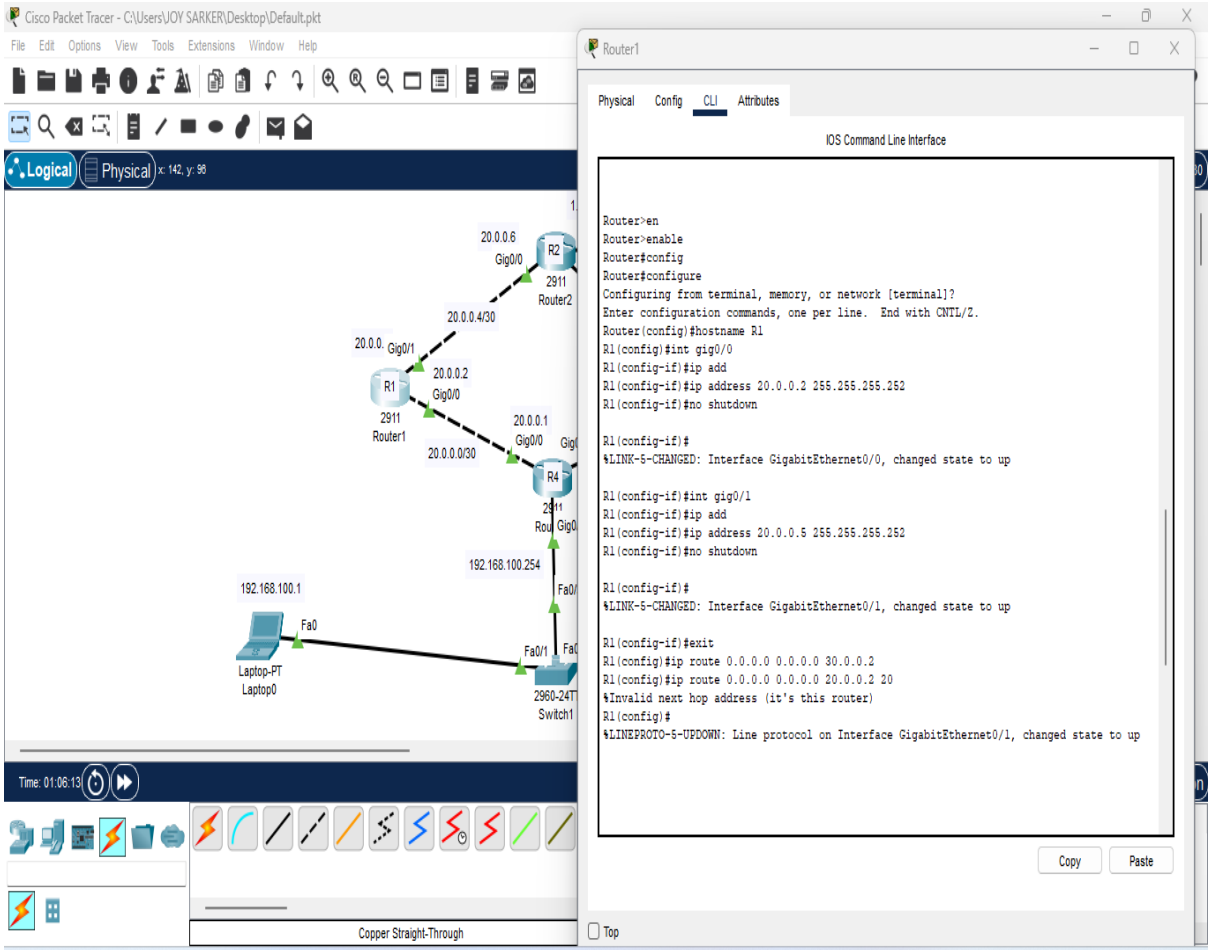

Figure 3.24: Router 1 Configuration of Default Routing.

We design a network using default routing protocols and create a default network with required devices and components. This network consists of four routers and two switches and two servers. The above screenshot shows the complete configuration of router one.

Router: 2 Configuration

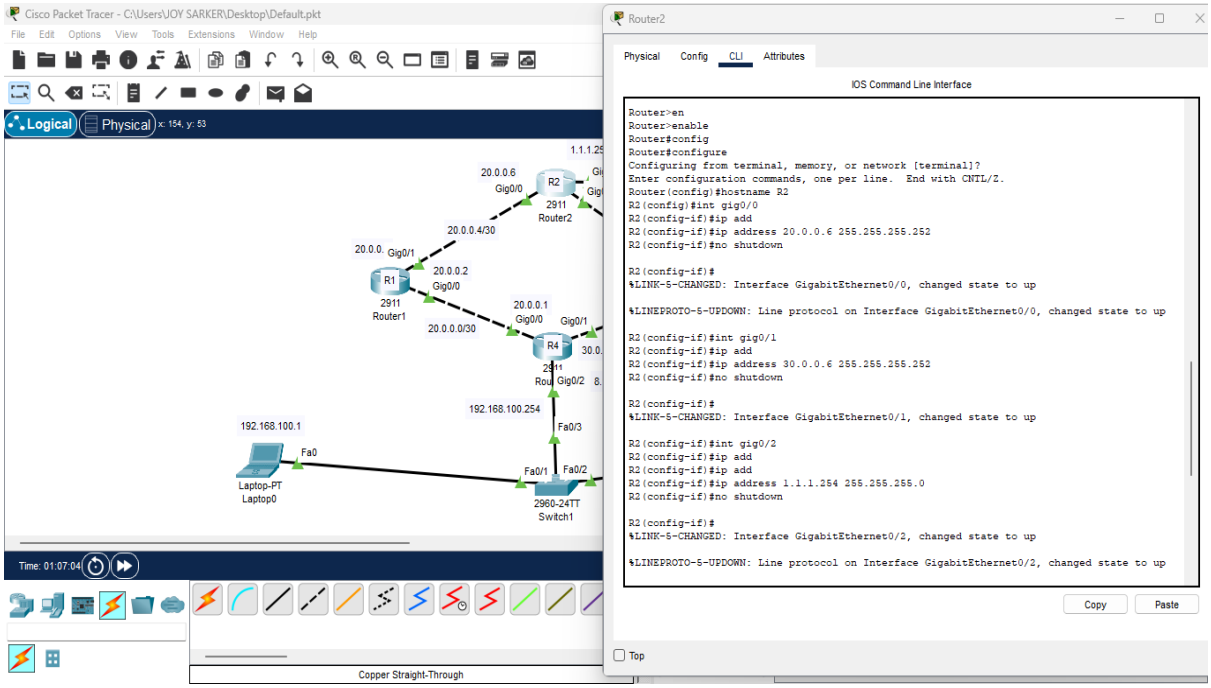

Figure 3.25: Router 2 Configuration of Default Routing.

After designing a default network using a default routing protocol, each router must be configured in turn. Each router's IP address must be different. The above screenshot shows the complete configuration code of router number two.

Router: 3 Configuration

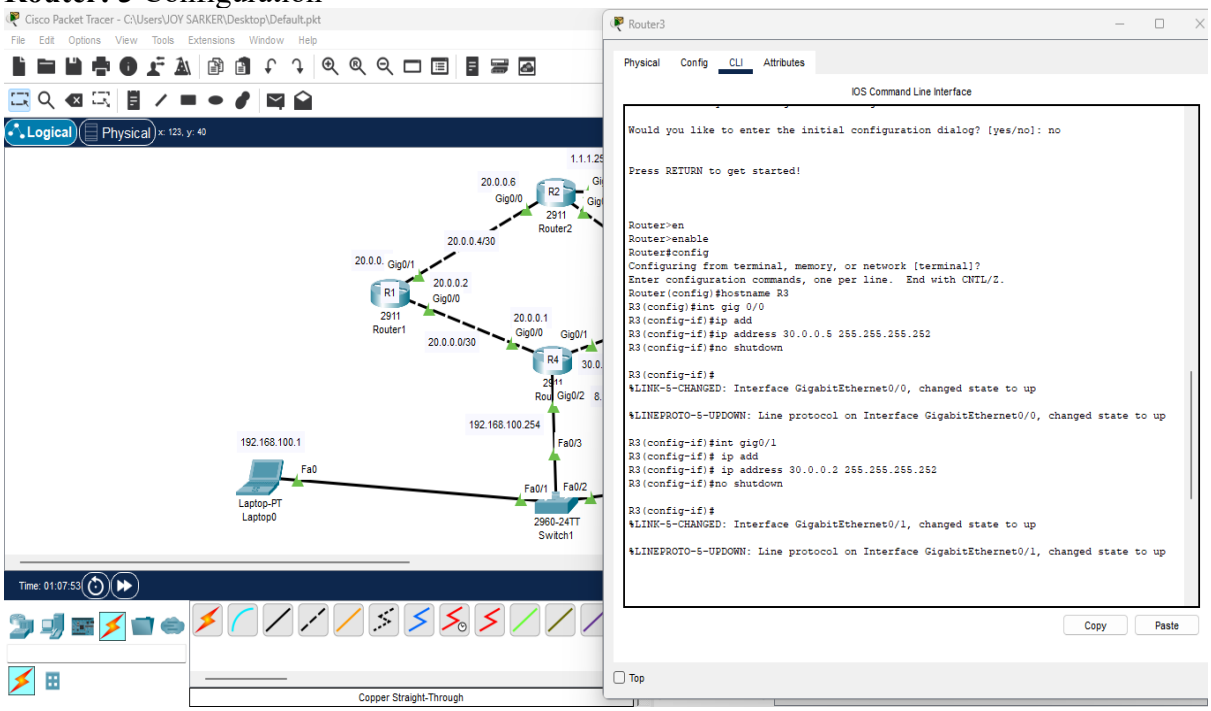

Figure 3.26: Router 3 Configuration of Default Routing.

Design a default network and create a realistic network. Four routers are selected for this network. A different IP address is used for each router. Router 1 to Router 4 should be configured sequentially. After already configuring two routers, now configure router number three, the above screenshot shows the complete configuration of router number three.

Router: 4 Configuration

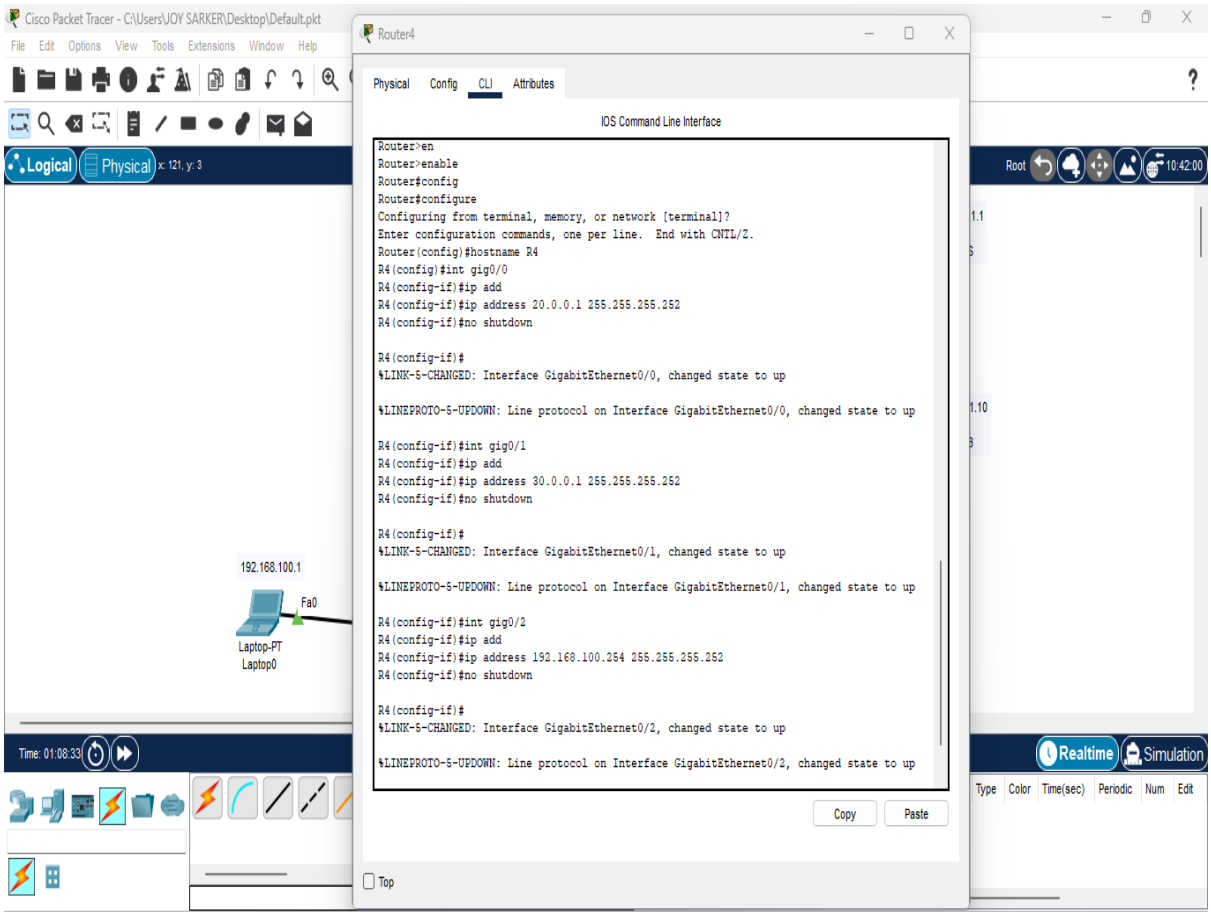

Figure 3.27: Router 4 Configuration of Default Routing.

To complete a default network design following a default routing protocol, each router in the network must be configured and each router's IP address must be unique. We have finished configuring our three routers. We have already configured the last or number four router. The above screenshot shows the complete configuration code of router number four.

Routing Information Protocol (RIP)

Routing Information Protocol (RIP) is a dynamic routing protocol used to exchange network topology information among routers. Here are the key details about RIP.

Protocol Overview:

- RIP is an interior gateway protocol (IGP) commonly used in small to medium-sized networks.
- It operates at the Network layer of the OSI model.
- RIP uses hop count as its routing metric to determine the best path between the source and destination networks.

Hop Count:

- The hop count represents the number of routers between the source and destination networks.
- RIP selects the route with the lowest hop count as the best route and places it in the routing table.
- The maximum hop count allowed in RIP is 15, and a hop count of 16 indicates network unreachability.

Features of RIP:

Periodic Updates: RIP routers exchange network updates periodically (every 30 seconds by default).

Broadcast Updates: Routing information is broadcast to adjacent routers.

Full Routing Tables: RIP sends complete routing tables in updates.

Trust-Based: Routers trust information received from neighboring routers (referred to as "Routing on rumors").

RIP Versions:

RIP Version 1 (RIPv1):

- Sends updates as broadcast.
- Doesn't include subnet mask information in routing updates (classful).

RIP Version 2 (RIPv2):

- Sends updates as multicast.
- Includes subnet mask information in routing updates (classless).
- Supports authentication for update messages.

RIP Configuration:

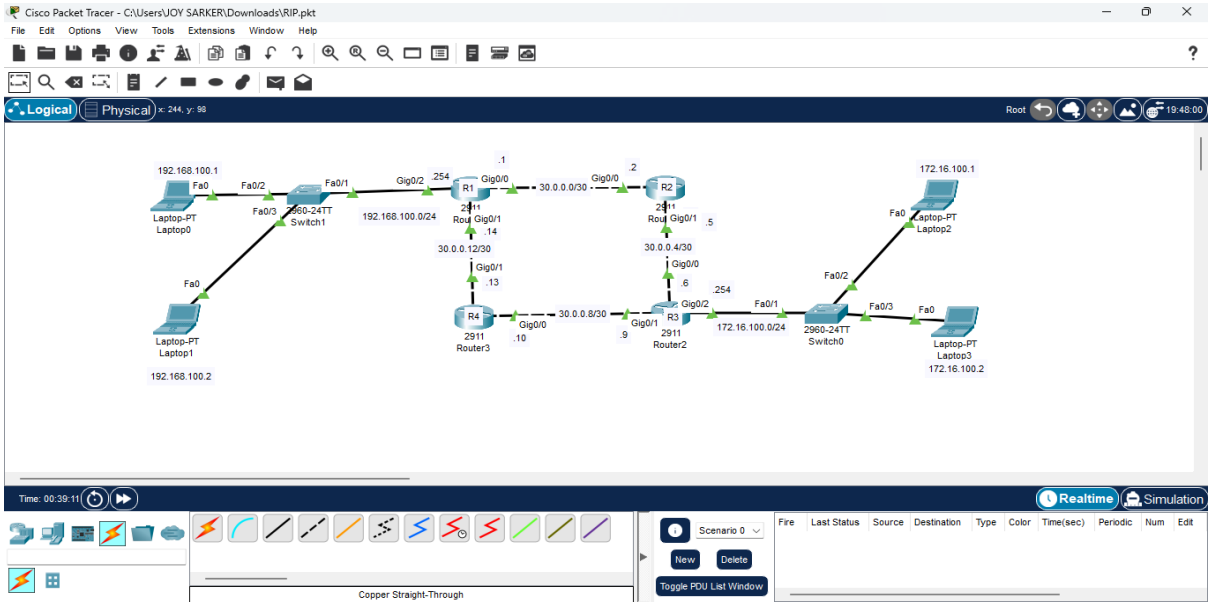

Figure 3.28: Routing Information Protocol (RIP).

A distance-vector routing protocol is called Routing Information Protocol (RIP). Distance-vector protocol routers communicate with other routers by sending routing-update messages that may contain full or part of their routing tables. To set up the hosts as a member of a RIP network, you can utilize RIP. Smaller networks and some situations still use RIP as a legacy protocol.

Router: 1 Configuration

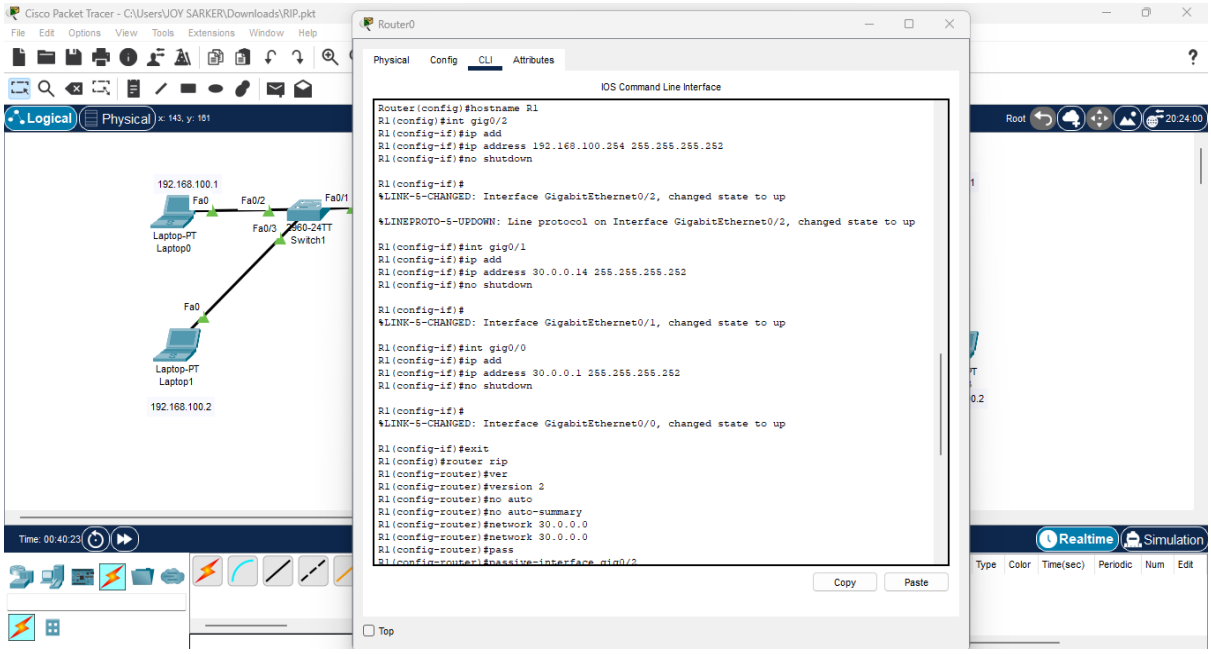

Figure 3.29: Router 1 Configuration of RIP.

First, we design a Routing Information Protocol (RIP) network. We use four routers and two switches and two PCs for the said network. Each router carries a different IP address. Four routers must be configured sequentially. The above screenshot shows the complete configuration code of router number one.

Router: 2 Configuration

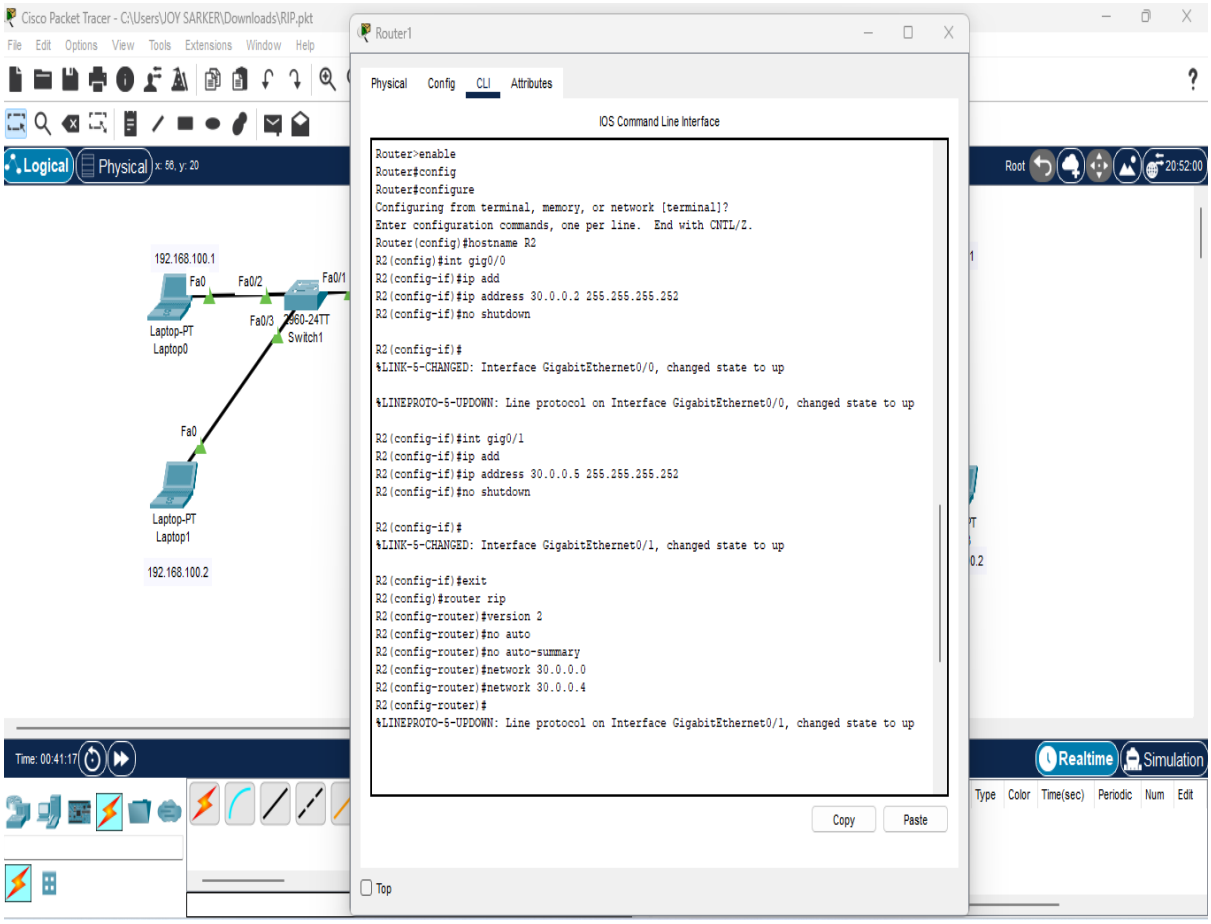

Figure 3.30: Router 2 Configuration of RIP.

Design a Rip network using Routing Information Protocol (RIP) and connect the required devices. Four routers are used in the network. A different IP address is used for each router. We will complete each router configuration in turn. The above screenshot shows the complete configuration code of router number two.

Router: 3 Configuration

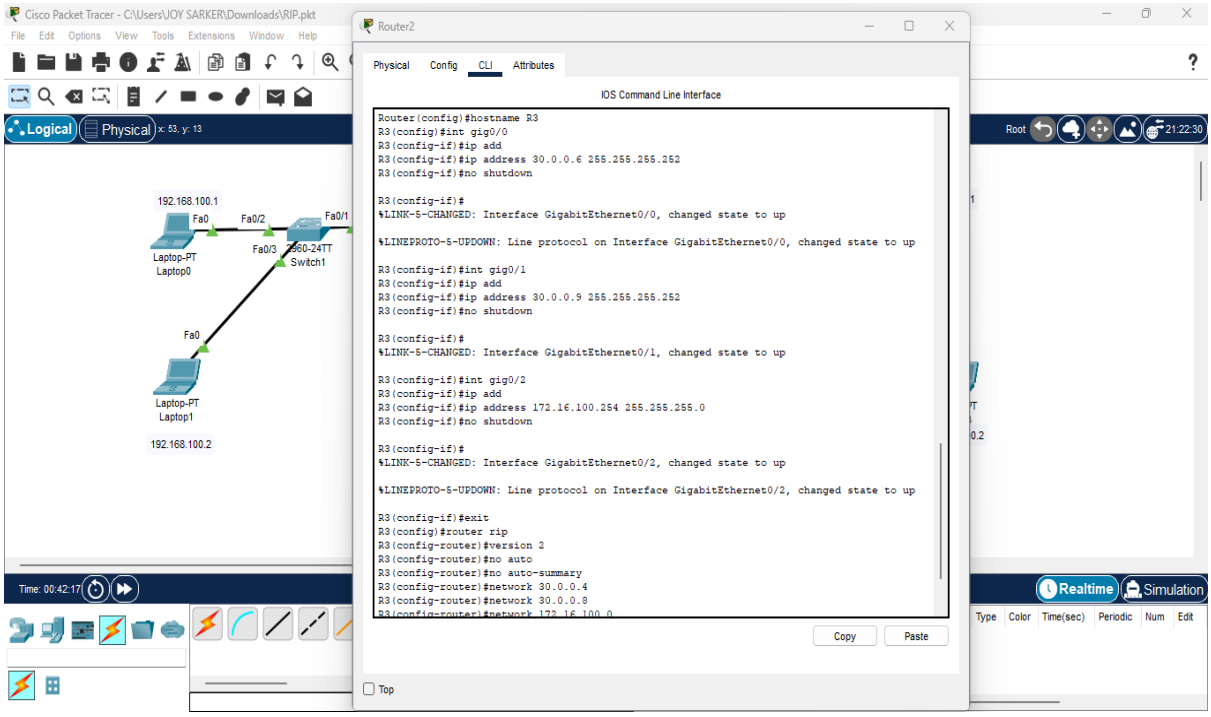

Figure 3.31: Router 3 Configuration of RIP.

After designing a Routing Information Protocol (RIP) network, each router used in the network must be configured sequentially. After configuring each router our designed network will be operational. At this stage we have completed the configuration of router number three. The above screenshot shows the complete configuration code of router number three.

Router: 4 Configuration

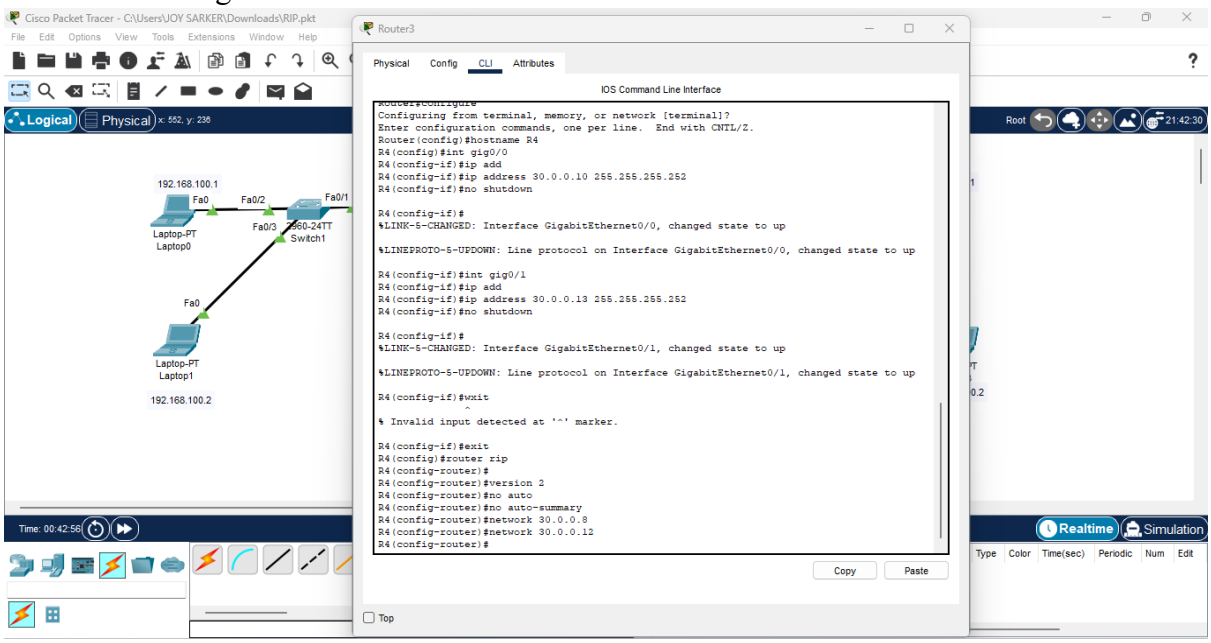

Figure 3.32: Router 4 Configuration of RIP.

To design a Routing Information Protocol Rip network, we create the Rip network using the necessary devices such as routers, switches and PCs. Each router in the network carries a different IP address. Completed each router configuration in turn. At this stage we have completed the configuration of router number four i.e. the last router. The above screenshot shows the complete configuration code of router number four.

3.7 Enhanced Interior Gateway Routing Protocol (EIGRP)

Enhanced Interior Gateway Routing Protocol (EIGRP) is an advanced distance-vector routing protocol used in computer networks to automate routing decisions and configuration. Here are the key points about EIGRP:

Protocol Overview:

- EIGRP is commonly found in enterprise networks.
- It is a derivative of the Interior Gateway Routing Protocol (IGRP) but includes additional features.
- EIGRP supports variable-length subnet masking (VLSM) and metrics capable of handling higher-speed interfaces.

Cisco Proprietary Protocol:

- EIGRP was designed by Cisco Systems and is available exclusively on Cisco routers.
- As a proprietary protocol, it is not interoperable with routers from other vendors.

Hybrid Protocol:

- EIGRP exhibits properties of both distance-vector and link-state routing protocols.
- It enhances the earlier IGRP by incorporating more sophisticated mechanisms.

Advantages of EIGRP:

- Efficient Resource Usage: EIGRP minimizes network resource usage during normal operation, transmitting only hello packets on a stable network.
- Selective Updates: The effect of the protocol on the network is reduced, because only updates of the routing table are sent whenever a change occurs.
- Rapid Convergence: EIGRP achieves quick convergence times for network topology changes.

EIGRP Configuration:

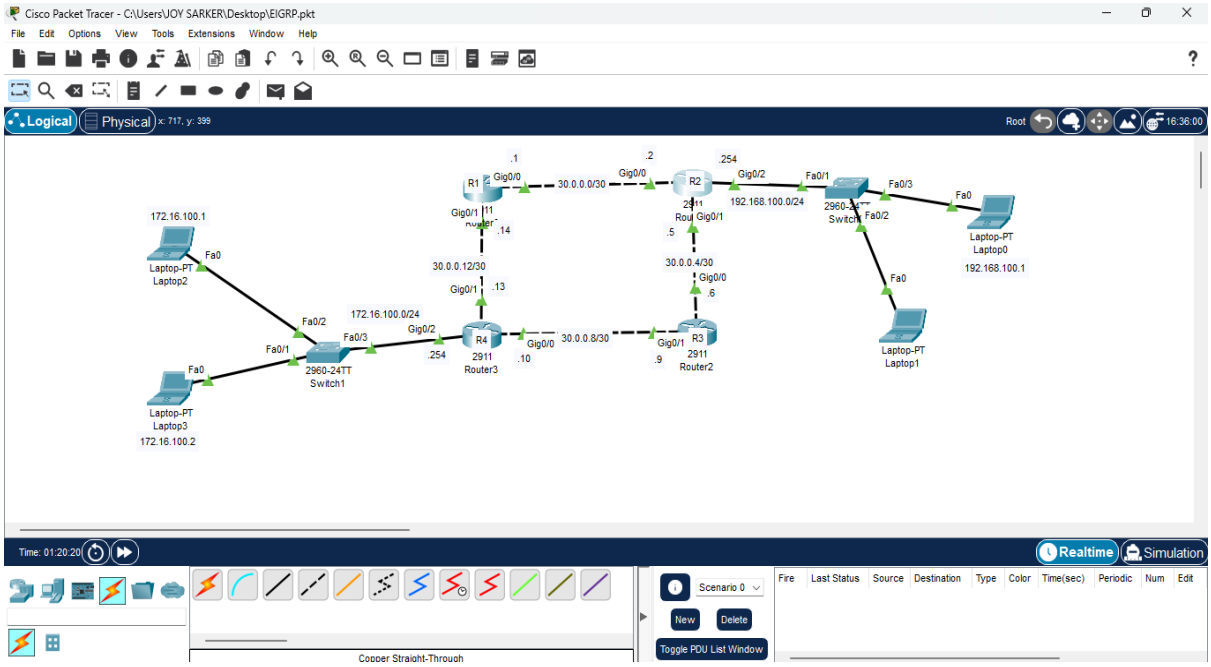

Figure 3.33: Enhanced Interior Gateway Routing Protocol (EIGRP).

Using EIGRP, a router will share route between other routers in a single autonomous system. EIGRP only transmits small updates, which minimizes the quantity of data that needs to be transmitted and increases the load on the router, compared to other well-known routing protocols like RIP.

Router: 1 Configuration

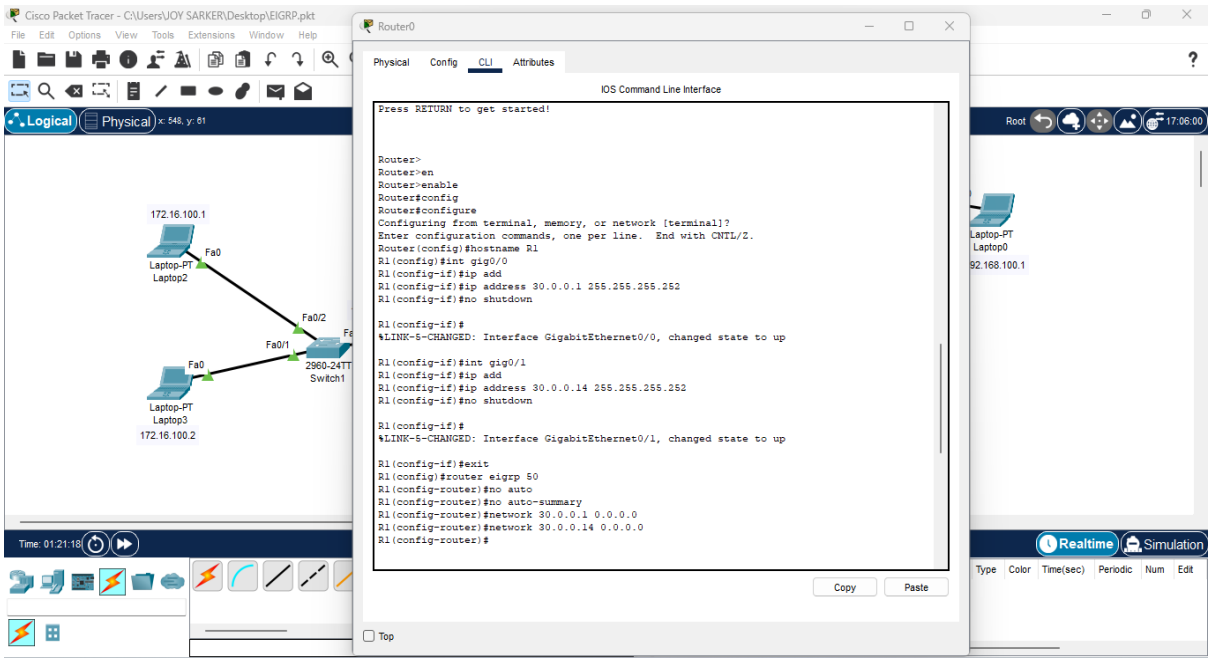

Figure 3.34: Router 1 Configuration of (EIGRP).

To create EIGRP network we used necessary devices like routers, switches and PCs. First, we have completed the configuration of router number one and successively we have to complete the configuration of each router. Each router carries a different IP address. The above screenshot shows the complete configuration code of router number one.

Router: 2 Configuration

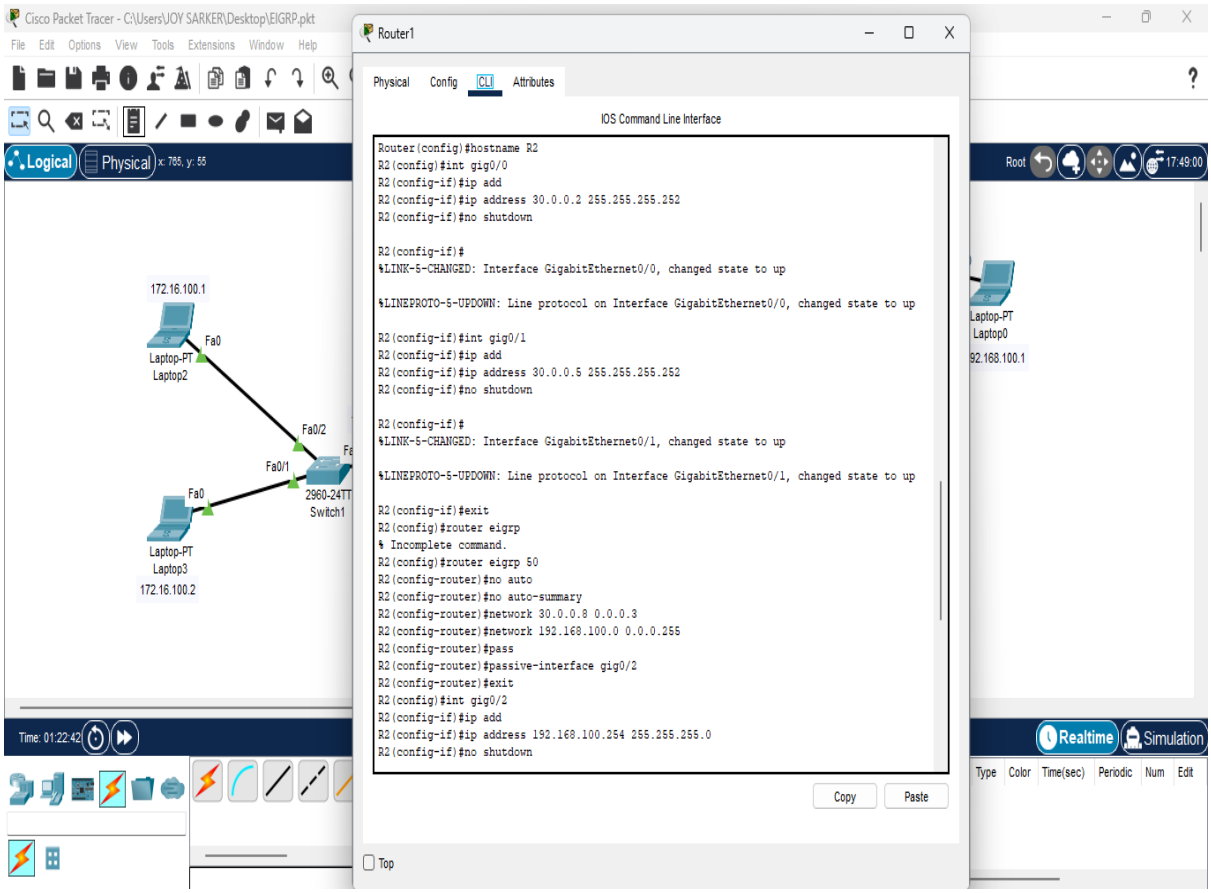

Figure 3.35: Router 2 Configuration of (EIGRP).

Creating a complete EIGRP network requires a network design. To design the network, the necessary devices must be connected. Each router included in the EIGRP network designed above must have a unique IP address. Each router needs to be configured one by one. I have completed the configuration of router number two. The above screenshot shows the complete configuration code of router number two.

Router: 3 Configuration

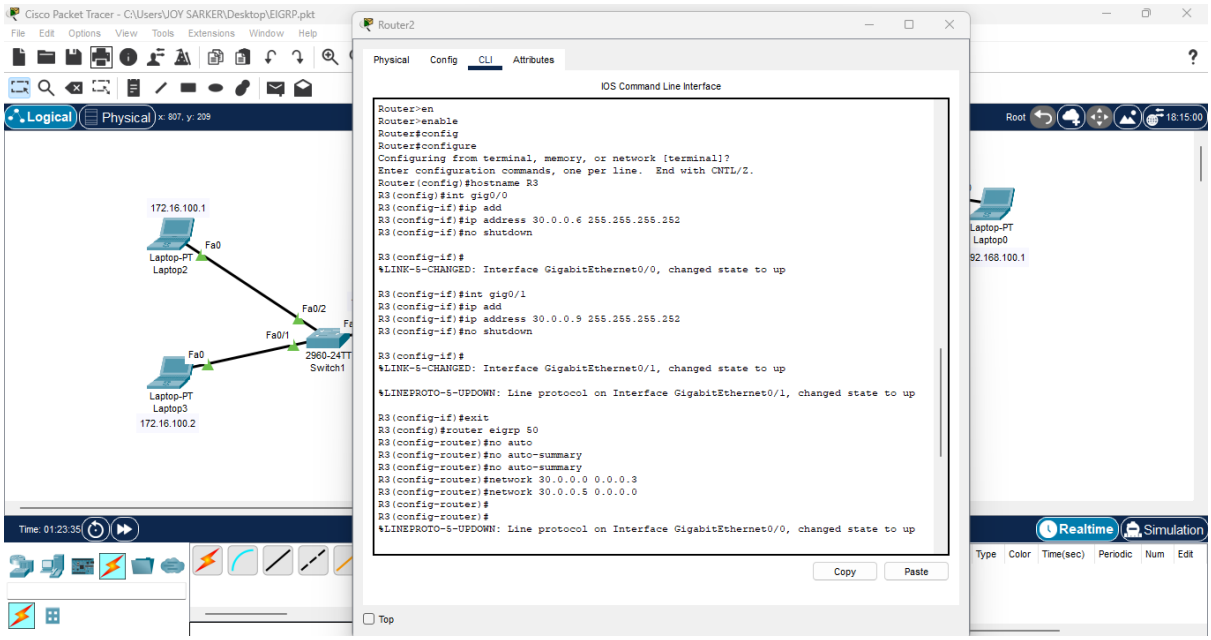

Figure 3.36: Router 3 Configuration of (EIGRP).

EIGRP is mandatory to configure on each router included in the network. Four routers are used for the designed network. Each router is assigned a different IP address. Each router connects to other routers using its own IP address. We have completed the configuration of router number three of our designed network. The above screenshot shows the complete configuration code of router number three.

Router: 4 Configuration

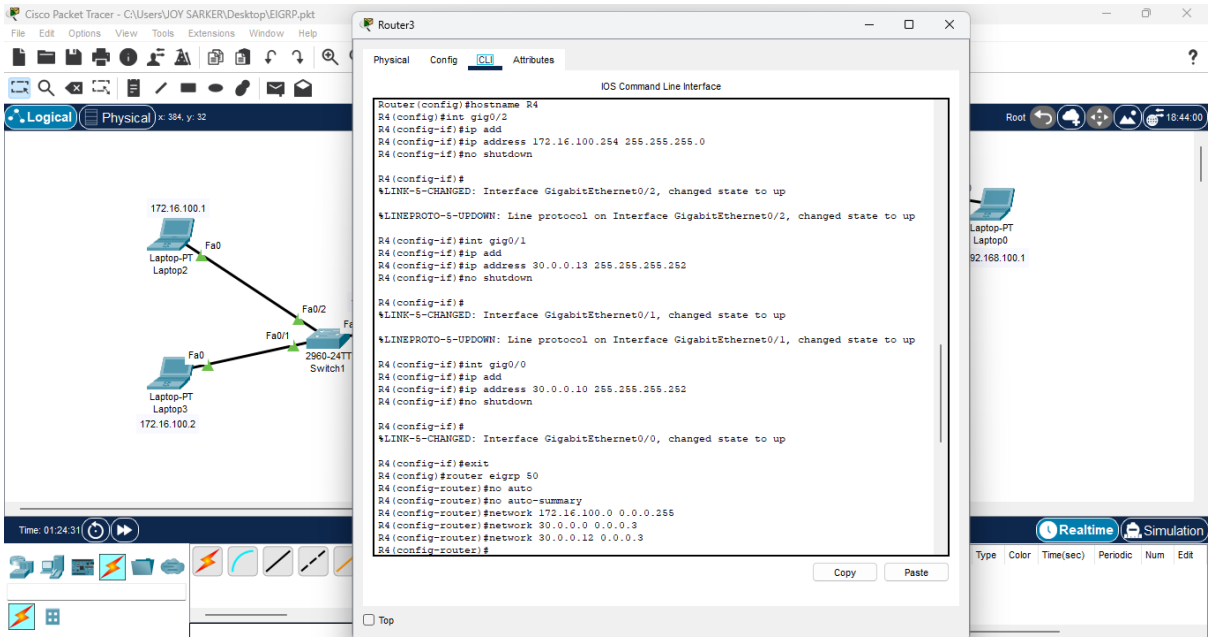

Figure 3.37: Router 4 Configuration of (EIGRP).

First, we design a complete EIGRP network and configure the necessary routers to operate the entire network using the designed EIGRP protocol. Each router is assigned a different IP address. We have completed configuring each router using the assigned IP address. The above screenshot shows the last router i.e. router number four with complete configuration code.

3.8 Challenges

Indeed, every workplace has so many challenges that anybody can think of. The costs of absence of challenges would be worst than if there were no work at all. Thus, we ought to approach our work with due diligence and seriousness. An internship lasting four months is a great way to learn new things and make friends who can help us identify our areas of weakness throughout training. As a result of this, every issue that needs a solution must be taught and understood along with unknown concepts.

There haven't been enough tasks for me to complete throughout my business training times. I send my firm supervisor's email with some of the work I do on my own initiative. Among the tasks completed are those by laborers, myself, and my supervisors. That's why I completed some of the training period labor as a youth worker.

I am aware of how to finish my work without being hurt. Therefore, I take extra precautions to prevent injury at the beginning of every task. To the best of my abilities, I make sure I read up and research as much as I want to know about all the subjects, I may not be an expert in all fields though. I also feel comfortable to work alone and ask any questions I may have.

Thank goodness, I had no issues finishing the internship periods in the contest. I was able to establish relationships with customers and collaborate with others throughout this time. I have learned quite a number of things from my prospective job regarding how to handle the many sets back in a proper and professional manner not forgetting the code of the organization.
When I shall have left this university, it will mark a new era of my life. Therefore, as a former student I will ensure to defend and uphold the reputation of our university through hard work and education. My internship is helping me break this habit as I will be starting a new job that will require me to work long hours from 9 am to 5 pm.

CHAPTER 4

COMPETENCIES AND SMART PLAN

4.1 Competencies Earned

It is only in the recent past that competencies have emerged in almost every ramification of life as well as in the market. We should so ensure that we have practical skill. Capacity An opinion of what the learner should know, understand or be able to do in terms of learning refers to capacity. My future well-earned position will include computer networking. Install and dismantle server and system hardware at two datacenters. Take the lead in configuring the router.

The duration of the internship I now know all the answers to problems, which will enable me in the future to keep huge problems under control. Thus, this internship has been a major accomplishment for me. In this internship, you will get to know how to introduce and configure switch and routers, how to enable the employer services, Static Routing, Default Routing, EIGRP, and RIP setups. In addition, onsite interns' supervisor shall make a presentation of the brief of competent policies and technological skills as per the learning outcomes of this.

4.2 Smart Plan

In an attempt of making more and better achievements an organization has its top label management to enhance the plan that has to be different, unique, and efficient from the other Organization. to create my prosperous life and successful career. For a wise plan, this internship is highly beneficial.

4.3 Reflections

Atova Technology provides its customers with extremely careful service. From the moment of launch, they have been highly concerned about delivering their service. Additionally, they take great care to retain their customers and keep them using their services. These are corporate network solution and telecommunications firms that offer their technical group access to their highly and most effectively designed network.

CHAPTER 5

CONCLUSION AND FUTURE CAREER

5.1 Discussion and Conclusion

My internship completed satisfactorily. Acquiring hands on experience in this internship is relevant. As for myself I have to confess that during this internship I am being introduced to the type of work that requires at least eight or nine hours spent at the office. and the motivation to complete tasks correctly and find solutions on your own. I also manage to do the internships by dedicating about eight or nine hours a day, five or six days a week.

I now know that the primary sources of motivation for time management are self-inspiration and internships. Time management is considered essential and practiced in corporate and business organizations, and the said training sessions help to retain it.

Thus, throughout the process of the internship, these and other essential sections of the course as well as the imperative and useful skills that are necessary for my further career path were studied. From the show, it assists me in knowing how to handle my temperance in the workplace when things become tough. I learned how to do this from my position and will continue to put in a lot of effort for my next job. I am aware of how to win over my managers and advance through my work and demeanor. I'm more sincere and motivated to work hard thanks to this internship. Ultimately, I simply want to emphasize that internships are crucial for gaining practical experience and knowledge in the workplace or in educational institutions.

5.2 Scope for Further Career

These days, jobs in the computer networking sector are widely sought after. The IT industry is split up into various areas. Jobs in Linux, CCNA Routing and Switching, and other IT-related fields are available. Also featured are number of computing and networking such as computer to computer networking, wireless networking, routers and switching and the engineers or better still the system administrators. An IT specialist or specialists are necessary in every bank, office, and business company. For the network engineer, there is therefore even more excellent news. I should initially choose a professional career that will advance me in life because competent workers are highly sought after everywhere.

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APPENDIX

Appendix: Internship Reflection

The significance of internships in today's corporate environment or in terms of knowledge acquisition cannot be overstated. Thus, the time spent in an internship is very beneficial to the development of our real-world skills.

I worked very attentively at every stage while I was receiving instruction from the company. During my internship, I learned how to manage projects, keep customers satisfied, and continue to address problems. During my internship, I collaborate with a seasoned worker who provides me with meticulous instruction. I am capable of managing challenging projects and finding simple solutions. I work for an association, which main mission is to realize its vision, or to understand how the control is divided, how to address partners, in which way to structure, how to make a proper decision and how to maintain associations between input and output.

My career strategy and plans for life and the global community are inspired by my internship. Regarding supervising personalities, my internship has shown how to address supervisors and several representatives received this lesson. Thus, my internship experience has helped me throughout the life by showing how to run a practical life, how to perform as a professional in the work place, and how to sustain power during pressure. Besides, it conveys a clearer notion of how to cope with the challenges of everyday existence and the ways to create a improved world. Meet professionals in their field and get the opportunity to work with them through internships. Knowing how they resolve several crucial tasks is critical.

Final Report_ID_213-15-4406

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