Incorporating Latent Constraints to Enhance Inference of Network Structure

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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
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APPOROVAL

"Project on Incorporating Latent Constraints to Enhance Inference of Network Structure", Submitted by *Md. Mostafizur Rahman, ID No: 181-15-10562* and *Md. Nazib Sharkar, ID: 181-15-10754* to the Department of Computer Science and Engineering, Daffodil International University, has been perceived as palatable for the lacking satisfaction of the necessities for the level of B.Sc. in Computer Science and Engineering and maintained concerning its initial feeling and importance. The show has been hung on *06 January 2022*.

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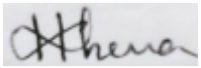

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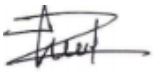

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DECLARATION

We thus seriously announce that the Research-Based Project named "Incorporating Latent Constraints to Enhance Inference of Network Structure, has been done by us under the supervisor Md. Abbas Ali Khan, Sr. Lecturer, Faculty of Science & Information Technology Daffodil International University and dynamic direction of Md. Teacher of the Department of Computer Science and Engineering, Daffodil International University of Bangladesh. 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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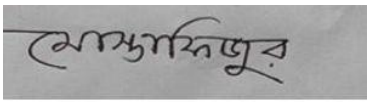

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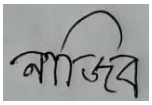

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Mr. Abbas Ali Khan, Sr. Instructor Department of CSE, Daffodil International University, Dhaka, has been a wonderful educator for me. My manager's keen interest in the topic of "Exploration Based Project on Incorporating Latent Constraints to Enhance Network Structure Inference" influenced me to complete this Internship. His unwavering patience, academic assistance, never-ending motivation, considerable guidance of several smaller plans, and revising them at all stages made it possible to complete this Internship.

I'd want to express my heartfelt gratitude to Professor Dr. Towhid Bhuiyan.

ABSTRACT

Expecting a social affair of no less than two devices is interconnected and exchanging information or data called an association. We really grateful and wish our profound our indebtedness to Mr. Abbas Ali Khan, Sr. Instructor Department of CSE in Daffodil International University, Dhaka. We want to construct the number of devices or PCs and proposition data or information beginning with one then onto the following giving various components we need extraordinary PCs are called server. There are different kinds of features in the association that in like manner have different sorts of servers. For example, Web Server, FTP Server, NFS Server, Samba Server, Proxy Server, Nagios Server, etc. Every one of them works freely and it is absurd without them to keep an association. A server ranch takes after the fundamental inventory for all PC hardware structures, including servers, accumulating subsystems, network gear switches, switches, firewalls, etc. servers using the Linux working system. Thus, I picked my "Frameworks organization and Linux Server System" report.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The guiding show dealing with the switch is responsible for the formation, backing, and reviving of the powerful controlling table in extraordinary coordinating. Since the last decade of the 1980s, networks have adopted dynamic control shows. Two sophisticated controlling shows were created to answer the prerequisites of increased associations: Open Shortest Path First and Intermediate System-to-Intermediate System.

1.2Routing Protocol Classification

With the appearance of various shopper gadgets utilizing IP, the IPv4 tending to space is almost depleted; consequently, IPv6 has arisen. To help the correspondence dependent on IPv6, more up-to-date forms of the IP steering convention have been created, as shown by the IPv6 line in RIP is the most straightforward of dynamic directing conventions and is utilized in this part to give a fundamental degree of directing convention understanding.

	Interior Gateway Protocol (IGP)		Exterior Gateway Protocols (EGP
IP Version	Distance vector	Hybrid	Link-State
IPv4	RIPV1, RIPv2	IGRP, EIGRP	OSPFv2, ISIS
IPv6	RIP ng	EIGRP for IPv6	OSPFv3, IS-IS for IPv6

Table 1: Routing protocol classification

1.3 Objective

- To focus on the Networking Environment and Routing Techniques of the world Network correspondence Center or Data Center site.
- To fitting traffic among different ways of doing whatever it takes not to make the obstructed area and further foster organization execution.
- To pick the best way through the associations from source subnets or host to the target subnets or have.

1.4 Justification of Study

The guiding show dealing with the switch is responsible for the formation, backing, and reviving of the powerful controlling table in extraordinary coordinating. Since the last decade of the 1980s, networks have adopted dynamic control shows. Two sophisticated controlling shows were created to answer the prerequisites of increased associations: Open Shortest Path First and Intermediate System-to-Intermediate System.

1.5 PC or Host

A network PC is a small, low-cost computer designed to be centrally managed and support businesses using network applications. In the mid-1990s, the Net PC competed with the former network computer standard. Net PCs are not equipped with disk drives, CD-ROM drives or expansion slots.

1.6 Internet

The Internet is a global network of billions of computers and other electronic devices. With the Internet, it's possible to access almost any information, communicate with anyone else in the world, and do much more. You can do all of this by connecting a computer to the Internet, which is also called going online.

1.7 Network Telecommunication Service

An organization's circulation framework, also known as a networking framework, refers to the electronic trading of data over long distances, and includes voice, information, and video transmission. This is a broad phrase that encompasses a wide range of data transmission improvements and communication frameworks, including wired telephones, cell phones, microwave correspondences, fiber optics, satellites, radio and television broadcasting, the web, and Datacenter.

1.8 Web Hosting

Web hosting is a service that enables you to upload your website files to the internet. Web servers are used by hosts to store data, which enables for easy maintenance and access by internet users. Different kinds of web hosting Bluehost is a web hosting provider that offers a choice of hosting options to fit your demands if you need to host a website for your small business. After you've decided on a provider, you'll need to set up a hosting account and figure out which form of hosting is ideal for your site.

CHAPTER 2

ALL USES DEVICES IN MY COMPUTER

2.1 Switch

Switches, on the whole, are more intelligent than center points. The switch keeps track of restricted directing information about hubs in the internal organization and allows connections to frameworks such as centers and switches. Switches can generally peruse the equipment and approach passwords.

Figure 2.1.1: Switch

2.2 Router

Cisco guiding provides WAN, LAN, and cloud systems administration based on plans. To deliver a total, coordinated security, our organization switches incorporate advanced examination, application development, computerized provisioning, and coordinated security..

Figure 2.2.1: Router

2.3 Layer-2 Switch

A layer 2 switch is a type of organization switch or device that eats away at the information connect layer, using the MAC Address to determine which path the edges should take. It interfaces with and communicates information in a neighborhood through equipment-based altering ways. A multiport span is another name for a layer 2 switch.

Figure 2.3.1: Layer- 2 Switch

2.4 Layer-3 Switch

A Layer 3 switch is a network device that combines the functions of a router and a switch into a single chassis. It functions in our network by allowing connected devices on the same subnet or virtual LAN to exchange data at lightning speed, just like a switch in the OSI model's data link layer, but it also has the IP routing intelligence of a router built in..

Figure 2.4.1: Layer- 2 Switch

2.5 Bridge

A bridge is a device that connects two or more hosts or network segments. Bridges' primary function in network architecture is to store and forward frames between the many segments that they connect. Bridges can forward data crossings by looking at the MAC addresses of the devices connected to each segment.

Figure 2.5.1: Bridge

2.6 Server

A server is a computer or system that across a network distributes resources, data, services, or programs to other computers known as clients. Cisco Systems released the Cisco Unified Computing System, a data center server computer product line that includes computing hardware, virtualization support, switching fabric, and management software, in 2009. Rack servers in the C series Cisco UCS C-Series Rack Servers are utilized to provide unified computing in an industry-standard format, lowering costs and increasing speed.

Figure 2.6.1: Server

2.7 Firewall

A firewall is a network security device that monitors incoming and outgoing network traffic and allows or disallows data packets according to a set of security rules. Its goal is to create a barrier between your internal network and incoming traffic from outside sources, preventing harmful traffic such as viruses and hackers from entering. Firewalls are significant in that they have had a significant impact on modern security measures and are still frequently utilized.

Figure 2.7.1: Firewall

2.8 ISDN

Services that are coordinated Data Center (Digital Network) offers some value-added services such as document and information transfer. Call notwithstanding, Abbreviated dialing, Call Conference, Call stopping, Wakeup call, Subscriber nonattendance message offices, Call set up offices to the occupied endorser, Hotline offices, Call Forwarding, Temporary detachment on demand, and so forth..

2.9 Web Hosting

I). Overall Registration

ii). Web Hosting

iii). DNS Parking

2.10 VPN

A Virtual Private Network (VPN) is a business innovation that creates a secure organization connection via a public network, such as the Internet, or a private network owned by a specialist cooperative. VPN

technology is used by large corporations, educational foundations, and government offices to enable remote clients to securely connect to a private organization.

2.11 Digital Data Network (DDN)

Headquarters through 71 nodes. Present capacity is more than 1000 high speed point to point leased line internet & corporate connectivity, 60% of which is in use.

2.12 Gateway

i)International Gateway (IGW)

ii)Inter Connection Exchange (ICX)

iii)International Internet Gateway (IIG)

2.13 Transmission

Transmission Bandwidth Tower Facility.

Co-location Facility IPLC local loop.

2.14 Port Blocking

In computer networking, the Network Transport Layer of the Internet Protocol Suite uses a numerical identifier for the data structures of the endpoints for host-to-host Network communications, most notably the Network Transmission Control Protocol and the Network User Datagram Protocol, but also other protocols. A port is a type of endpoint, and the port number is the identifier. The Internet Assigned Numbers Authority is in charge of maintaining official port number assignments for certain purposes.

2.15 Main Goal of my Project

There is just one thing for the operator to do: block the source and destination IP addresses and report the addresses to the regulator. From the standpoint of the regulator, the matter can be investigated even by physically deploying authorized staff, and legal action can be taken for violating the terms and conditions of the license for specified service. Other techniques may be useful in reducing unlawful voice communication via the Internet to some extent, but they may have a negative impact on genuine data traffic.

2.16 Internet Service Protocol

An Internet Service Provider (ISP) is a commercial term for a company that may provide you with Internet access, usually through a computer. At the end of the day, you can have a gleaming PC with an underlying modem and a switch for systems management, but you won't be able to connect to the Internet without an ISP subscription. An Internet service provider (ISP) is your gateway to the Internet and all of the other things you may do online.

2.17 Interconnection Exchange

A significant amount of unlawful traffic may be directed back to the legal channel with a concerted effort by law enforcement agencies, the new IGW and ICX operators, and the data supply center's guide lines. As one of Bangladesh's main telecommunications centers, we are responsible for: For both mobile and fixed lines, routing all international inbound calls received through the International Gateway and terminating up to the operator. Routing and terminating all international outbound calls received from the operator up to IGW.

2.18 WIMAX Operators

In February 2008, the Data Center granted three commercial businesses, Mir Telecom, Novotel, and Bangla Trace Communications, VoIP licenses allowing them to make international calls over the Internet. It was widely assumed that these businesses would be solely responsible for all international calls. Despite the presence of licensed VoIP providers in the market, illicit VoIP operations have thrived in the nation.

2.19 The overall organizational structure & workflow of my Project

The Din is responsible manly for sectioning the estimates of works the Director to monitor the progress of the development projects. The Planning and Development Region should have relevant offices necessary for the execution of the works under it. Infect, this is necessary for the execution of the planning and development activities properly.

2.20 How can I get in my Project

- Step-by-step directions for incorporating numerous organizations into an office to ensure efficient distribution and security.
- • Organizing a huge number of people into one organization and keeping track of them using an organizational structure.
- • Ensuring that information is not lost for any period of time.
- • Despite the fact that the suggested approach was tested on artificial organizations with no size and small global organizations, as well as two observational organizations with developmental organization structures,
- • To enable large-scale organization applications, however, we believe that a distributed rectification of the present code is a viable option.

2.21 Hierarchical Networking Design Overview

Figure 2.21.1: Hierarchical Networking Design overview

2.22 Security

With the advent of the Internet and new system administration innovation, the globe is becoming increasingly linked. In light of protected innovation that may be easily obtained over the internet, network

security is becoming increasingly important. The internetwork edge of an enterprise is a secure boundary that may include any or all of the firewalls, switches, ids, VPN, systems, DMZ, and screens.

2.23 ASA Firewall Placement

To safeguard any traffic flow between the server farms and the LAN users, the ASA firewall will be installed between the core/distribution switches and the redundant server farm switches.

2.24 Work Piece & Work Tasks I have been Executing

Work undertakings that I have been executing during my entry-level position period are fundamental Router arrangement RIP, EIGRP, OSPF, ACL, NAT design.

2.25 Version

- **RIP Version -1**

RFC 1058 describes the initial version of RIP, which was distributed in 1988 and used careful guiding. Due to a lack of support for variable length, the rare directed updates do not carry subnet data.

- **RIP Version -2**

RIP version 2 was designed in 1993[4] and standardized in 1998 as a result of faults in the first RIP specification. [4] It enabled Classless Inter-Domain Routing by permitting the transmission of subnet information. I can change because of interoperability.

Limitations

RIP version 2 was designed in 1993[4] and standardized in 1998 as a result of faults in the first RIP specification. [4] It enabled Classless Inter-Domain Routing by permitting the transmission of subnet information. I can change because of interoperability.

2.26 OSPF

The quickest and shortest way to open OSPF is an inside-door protocol for guiding Internet Protocol bundles solely within a single steering region, similar to a standalone architecture. It compiles connect state data from available switches and creates an organization-wide geography map.

2.27 Router Types

- **Area Border Router (ABR)**

A router that links one or more regions to the main backbone network is known as an area border router. It is considered a member of all the places to which it is linked. The link-state database is kept in memory by an ABR in several copies, one for each region to which the router is linked.

- **Backbone Router (BR)**

A backbone router has an interface to the backbone area. Backbone routers may also be area routers, but do not have to be.

- **Autonomous System boundary Router (ASBR)**

An autonomous system boundary routing information with routers autonomous systems.

2.28 Procedures I have been following while performing my tasks

Systems I have been utilizing during my examination base period chart period in, sub-office server farm per framing my errands are:

Figure 2.28.1: Routing protocol work procedure

CHAPTER-3

CONFIGURE AND TROUBBLESHOOTING IN COMPUTER

3.1 Network Configure

The process of assigning network configurations, policies, flows, and controls is known as network configuration. Because actual network equipment appliances are replaced by software in a virtual network, it's easier to make network configuration changes. This eliminates the need for significant manual configuration. The process of configuring a network's controls, flow, and operation to support an organization's and/or network owner's network communication.

3.2 Troubleshooting in Computer

The act of discovering, planning, and resolving a problem, mistake, or malfunction in a software or computer system is known as troubleshooting. When a computer or program becomes broken, unresponsive, or behaves abnormally, it can be repaired and restored. There are four steps to the troubleshooting process:

i)Awareness.

ii) Verification.

iii) Identifying yourself.

iv) Decision.

Troubleshooting in Computer

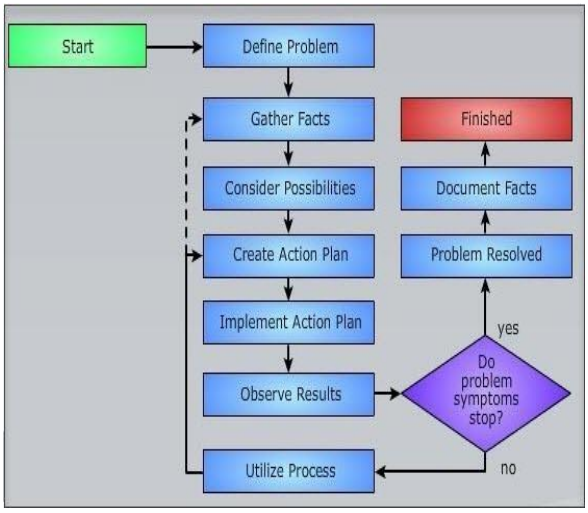

Table 2: Troubleshooting Table

3.3 Troubleshooting in a Router

There are a variety of reasons why a Cisco switch does not show a point of interaction. When a disappointment arises in the field with such a huge number of elements, it may be tedious and torturous. The issue might be caused by Layer 1 - SFP/links/connectors/fix board or Layer 2 - the port on the switch (either end or one finish of the connection). This section discusses a relatively basic way for overcoming the inability to choose between Layer 1 and Layer 2, as well as which endpoint device to use.

3.4 Troubleshooting in a Switch

VLAN-specific Issues. VLAN trancing issues. VLAN Trancing Protocol issues.

3.5 Troubleshooting in a Host

Reports on Troubleshooting in a Host Center Server

Host statuses in vSphere HA that indicate an incorrect condition.

Such problems might make it difficult for vSphere HA to adequately secure the virtual machines on the host and to restart them after a failure.

When this happens, you must figure out how to fix the problem so that vSphere HA can resume normal operations.

3.6 Router PC Interface Up

The port via which a switch communicates with a specific organization. A nearby switch interface is the port on the switch that is directly associated with a certain organization, whereas a distant switch interface is any port on the switch that is directly affiliated with a different organization. When the scenario with the display interfaces results in records down/down (shorthand for "both statuses esteem are "down"), the show interfaces status order ought to additionally contain a matching condition of "not associated."

3.7 DHCP

The port via which a router connects to a network in general. A local router interface is the port on the router that is directly linked to the network for a specific network, whereas a remote router interface is any port on the router that is connected to a separate network. When the status of the show interfaces output is listed as down/down (shorthand for both status values being "down"), the display interfaces status command should additionally offer "not connected" as a matching state.

3.8 Console Password

On a network where numerous persons need access to the router; a console password is important. As a result, it prohibits unauthorized users from gaining access to the router. CISCO router console password configuration: Enter the CISCO router's global configuration mode. Connect the router's command line terminal 0 to it.

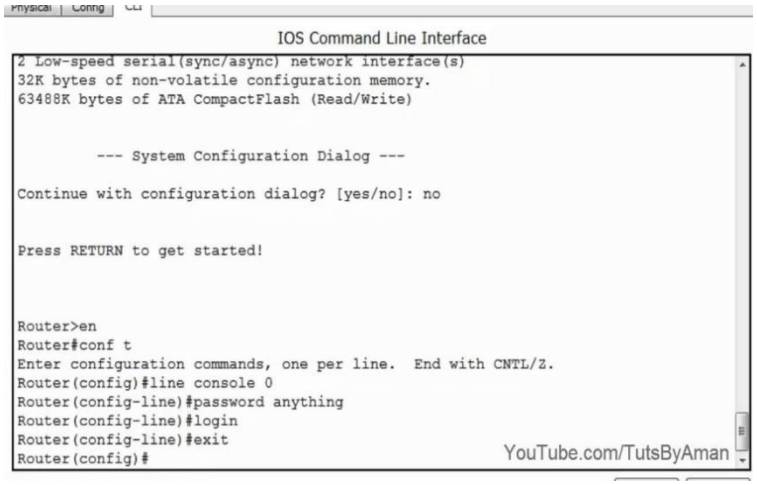

Figure 3.8.1: Console Password

3.9 Auxiliary Password

The Auxiliary secret word is used to create a secret phrase for the switch's assistance port, which is a real access port. Over a modem, an assistance port is used to connect to a switch. This port, however, is not present on any of the switches.

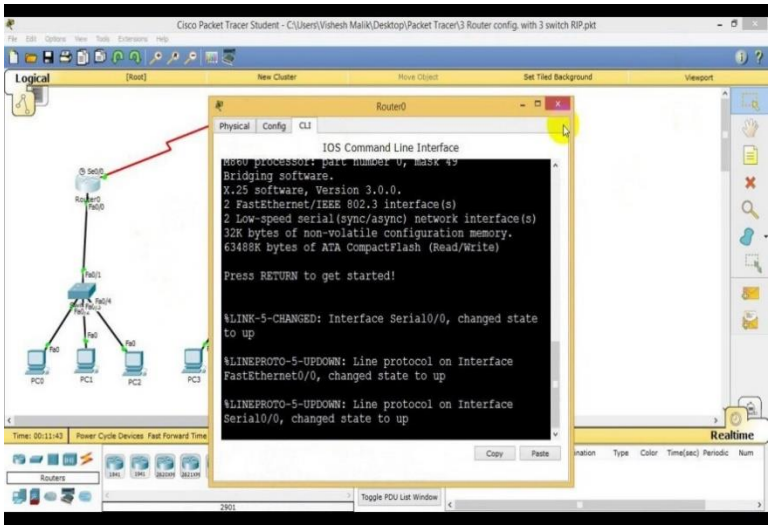

Figure3.9.1: Auxiliary Password

3.10 VTY Password

In a switch, VTY is used for Telnet or SSH meetings. The VTY secret word may be set up from the control center at the time of creating the switch. The customer has the ability to change these passwords at any time. There might be a single secret word for all VTSs or several passwords for each virtual terminal..

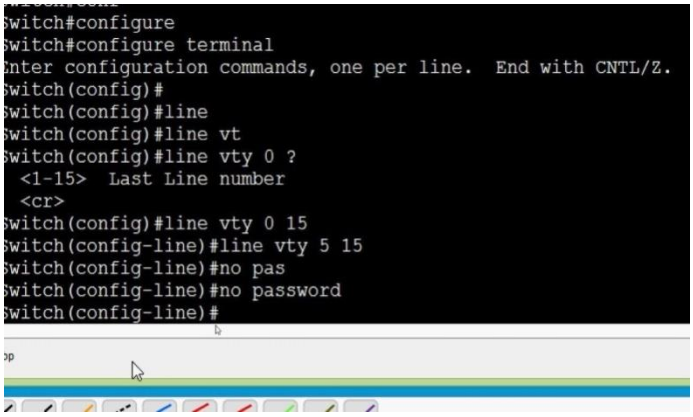

Figure 3.11.1: VTY Password

3.11 Enable Secret Password

It serves the same purpose as the empowered secret word, but the passwords are stored in a far more secure encoded format. It distributes single-direction encrypted secret passwords in form 10.3 and later versions.

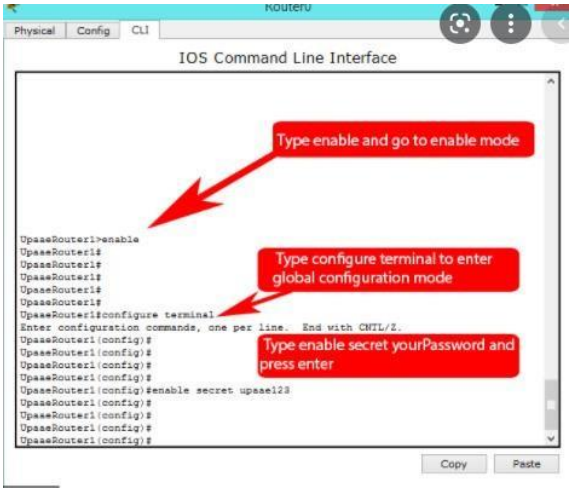

Figure 3.11.1: Enable Secret Password

3.12 Routing Protocol

A formula used by routers to determine the appropriate path onto which data should be forwarded. The routing protocol also specifies how routers report changes and share information with the other routers in

the network that they can reach. A routing protocol allows the network to dynamically adjust to changing conditions, otherwise, all routing decisions have to be predetermined and remain static.

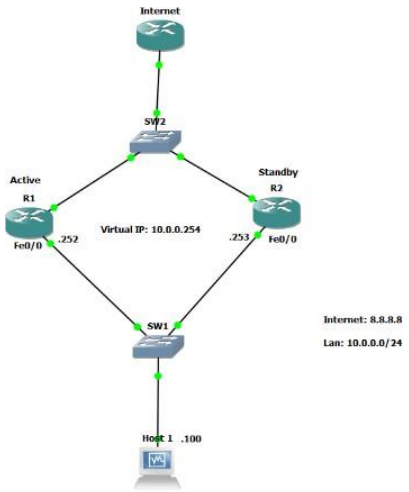

Figure 3.12.1: Routing Protocol

3.13 Telnet

Telnet is a network protocol for connecting to a computer and establishing a two-way, cooperative, text-based communication channel between two workstations. For making long-distance meetings, it uses a client-ordered Transmission Control Protocol/Internet Protocol organizational convention. On the web, Hypertext Transfer Protocol and File Transfer Protocol fundamentally allow clients to request specific documents from remote PCs, whereas Telnet allows clients to sign on as ordinary clients with access to the specific apps and information on that PC.

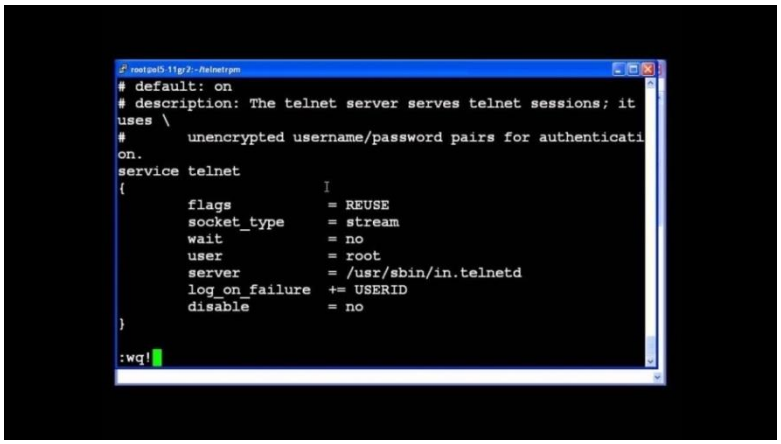

Figure 3.13.1: Telnet

3.14 Network Time Protocol (NTP)

Network Time Protocol (NTP) is a convention that permits the synchronization of framework clocks (from work areas to servers). Having synchronized clocks isn't just helpful however needed for some appropriated applications. Along these lines, the firewall strategy should permit the NTP administration assuming the opportunity arrives from an outside server.

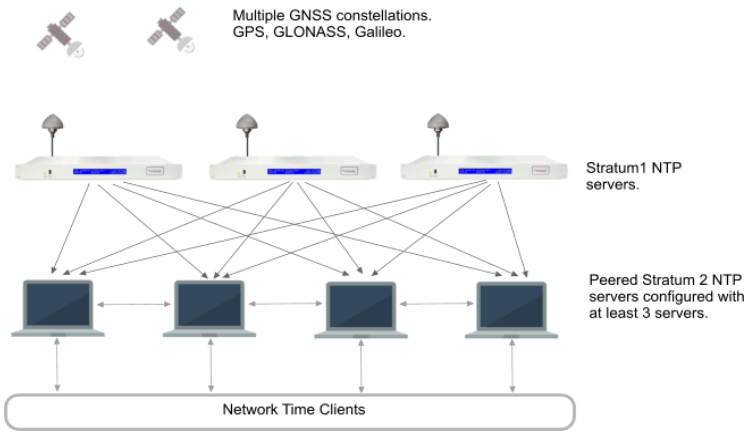

Figure 3.14.1: NTP

3.15 Virtual Local Area Network (VLAN)

A virtual local area network (VLAN) is a logical collection of workstations, servers, and network devices that appear to be connected to the same LAN despite their geographical separation. A VLAN allows a group of computers and users to connect in a virtual environment as if they were on the same LAN and sharing the same broadcast and multicast domain. VLANs are used to achieve scalability, security, and simplicity of network management, and they can swiftly adapt to changes in network needs and server node migration.

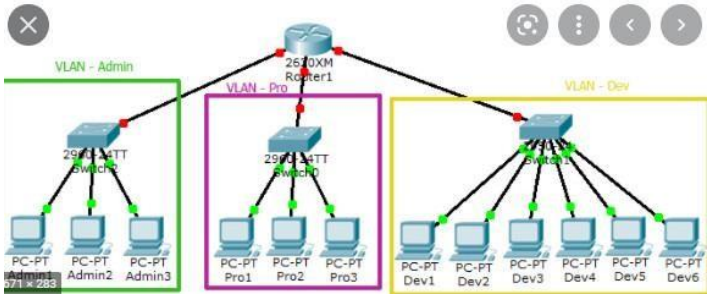

Figure 3.15.1: VLAN

3.16 Inter- Virtual Local Area Network (Inter-VLAN)

Means "Virtual Local Area Network," or "Virtual LAN." A VLAN is a custom organization made from at least one existing LANs. It empowers gatherings of gadgets from numerous organizations (both wired and remote) to be joined into a solitary intelligent organization.

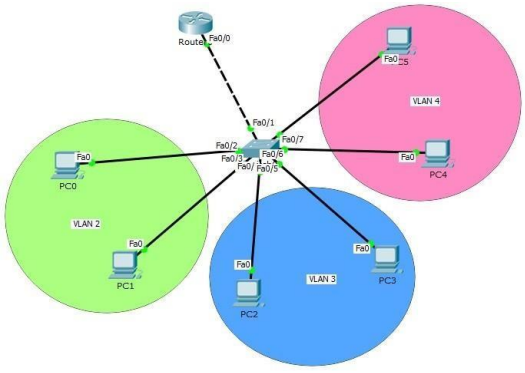

Figure-3.16.1: INTER- VLAN

3.17 Access Control List (ACL)

An entrance control list (ACL) contains decisions that award or deny admittance to specific computerized conditions. There are two sorts of ACLs: Filesystem USFilter admittance to documents or potentially indexes. Filesystem ACLs let working frameworks know which clients can get to the framework, and what honors the clients are permitted.

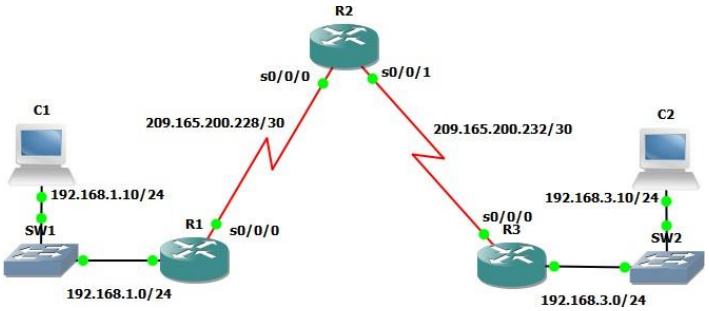

Figure 3.17.1 ACL

3.18 Virtual Private Network (VPN)

A virtual private organization, or VPN, is an encoded association over the Internet from a gadget to an organization. The encoded association guarantees that touchy information is securely communicated. VPN innovation is generally utilized in professional workplaces.

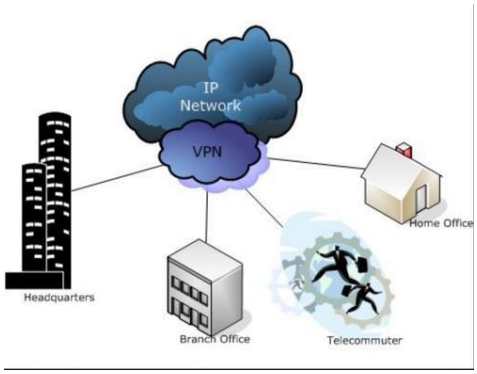

Figure 3.18.1-VPN

3.19 Port Security

Port Security gets the organization by keeping obscure gadgets from sending parcels. Parcels that have a matching MAC address are sent; any remaining bundles are limited. You can empower port security for every port premise.

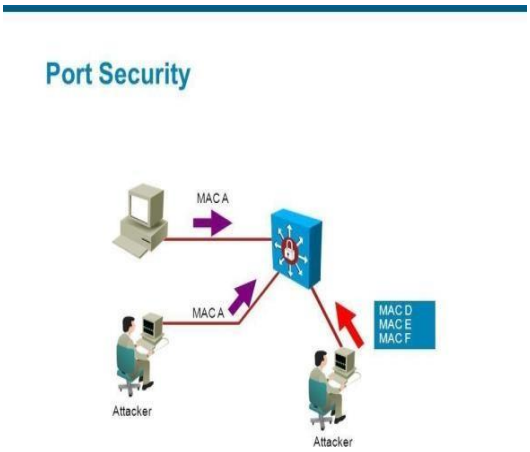

Figure 3.19.1: Port Security

3.20 Static Routing

Static directing is a kind of organization steering method. Static directing isn't a steering convention; all things considered, it is the manual arrangement and determination of an organization course, normally oversaw by the organization executive. Static steering is just ideal in a couple of circumstances.

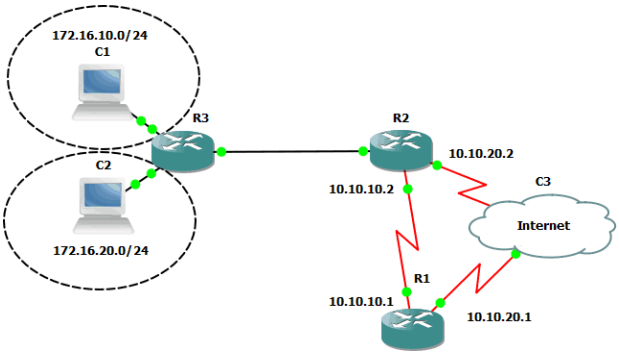

Figure 3.20.1: Static Routing

3.21 EIGRP

As an IGP, the EIGRP Protocol is one of the most widely used Dynamic Routing Protocols. EIGRP (Enhanced Interior Gateway Routing Protocol) is a Hybrid Routing Protocol that combines the features of both Distance Vector and Link-State Routing Protocols. It is a Cisco proprietary protocol that was designed as an upgrade to IGRP (Interior Gateway Routing Protocol) and is only available on Cisco devices.

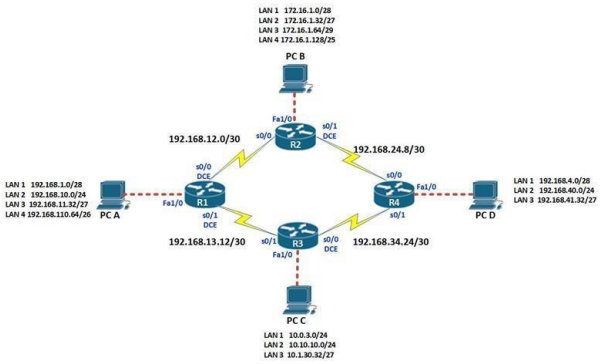

Figure 3.21.1 EIGRP

CHAPTER-4

RESULT ANALYSIS

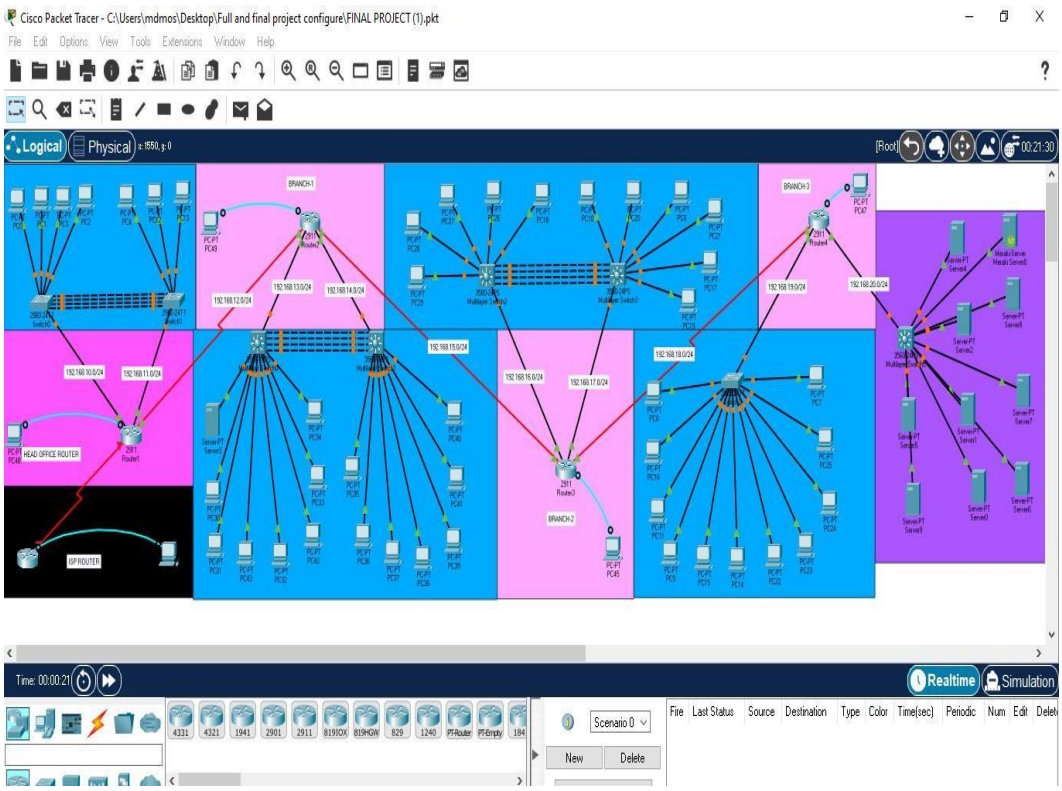

Figure-4.1.1: MY Project View

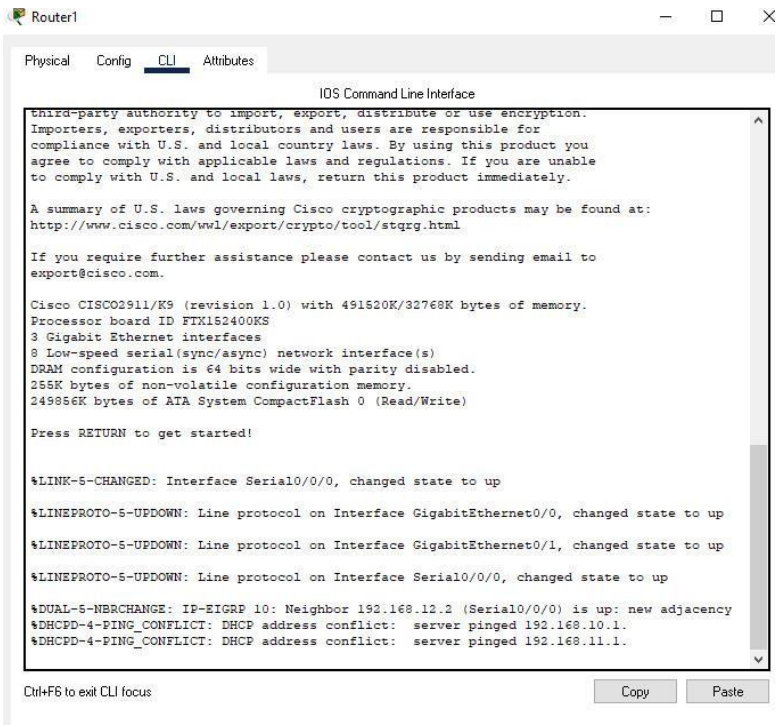

Figure-4.1.2: Head office Router Configure Command

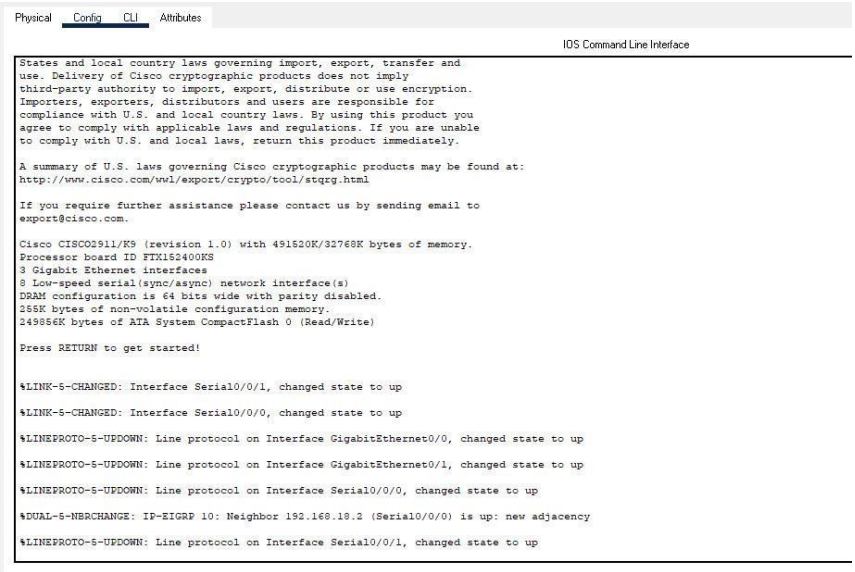

Figure-4.1.3: Branch-1 Router Configure Command

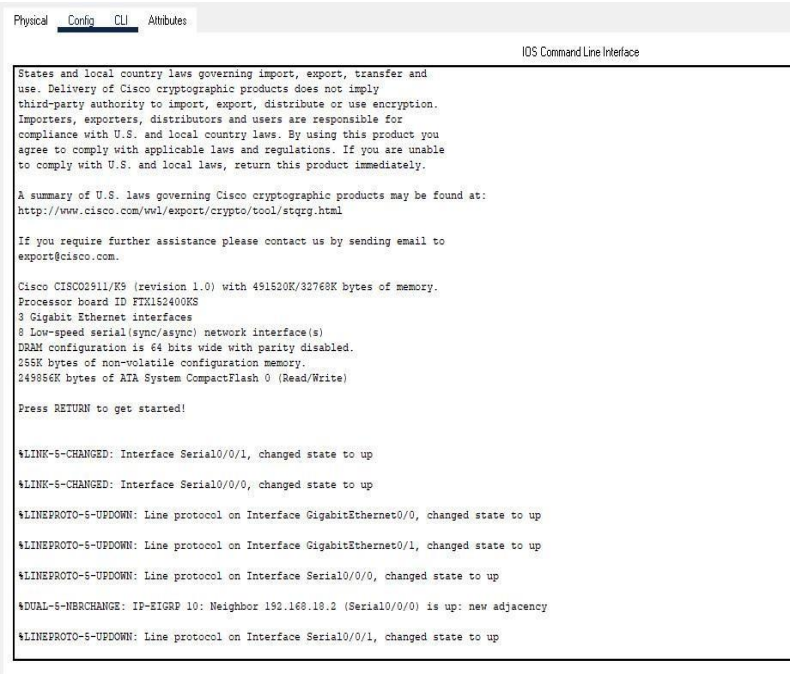

Figure-4.1.4: Branch-2 Router Configure Command

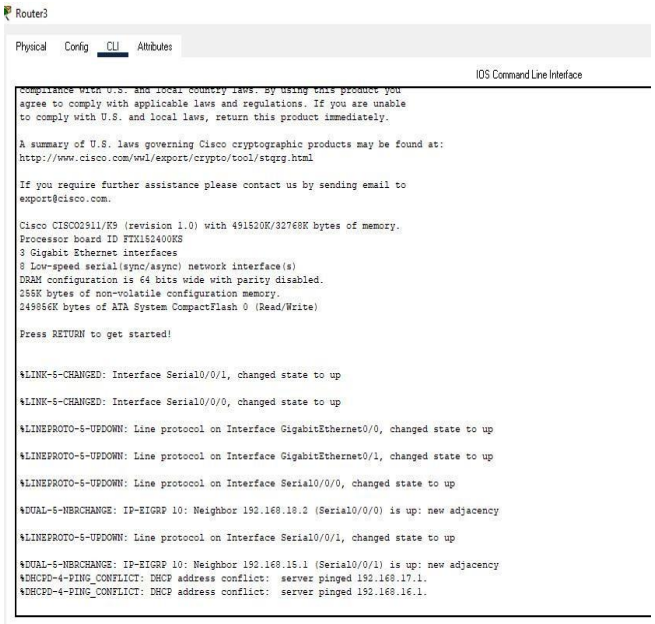

Figure-4.1.5: Branch-3 Router Configure Command

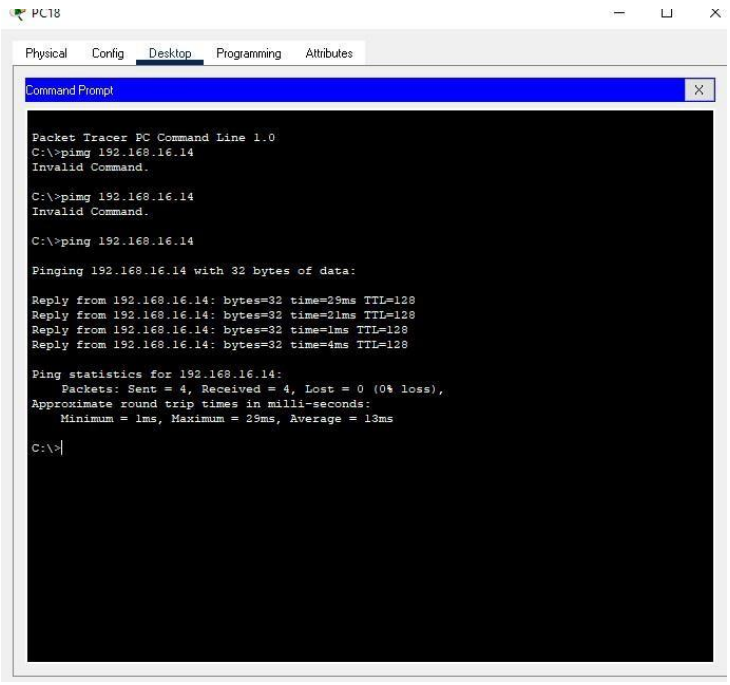

Figure-4.1.6: Head office PC connection Check

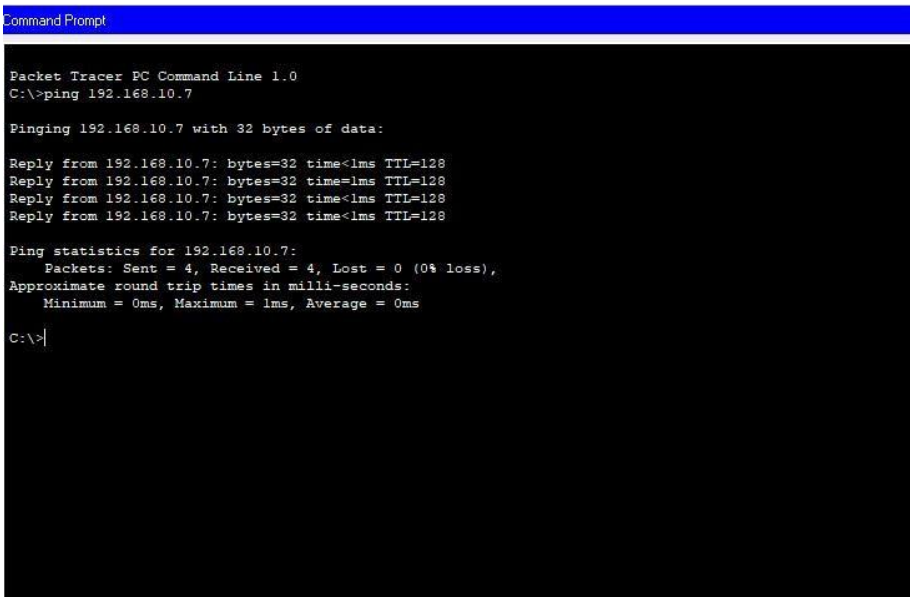

Figure-4.1.7: Branch-1 to Head office PC connection Check

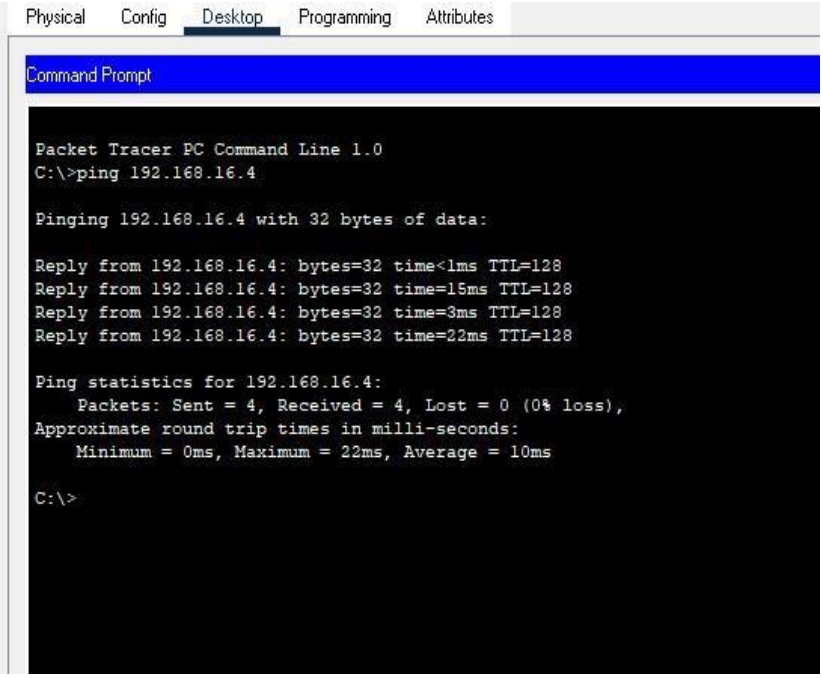

Figure 4.1.8: Branch-2 to Head office PC connection Check

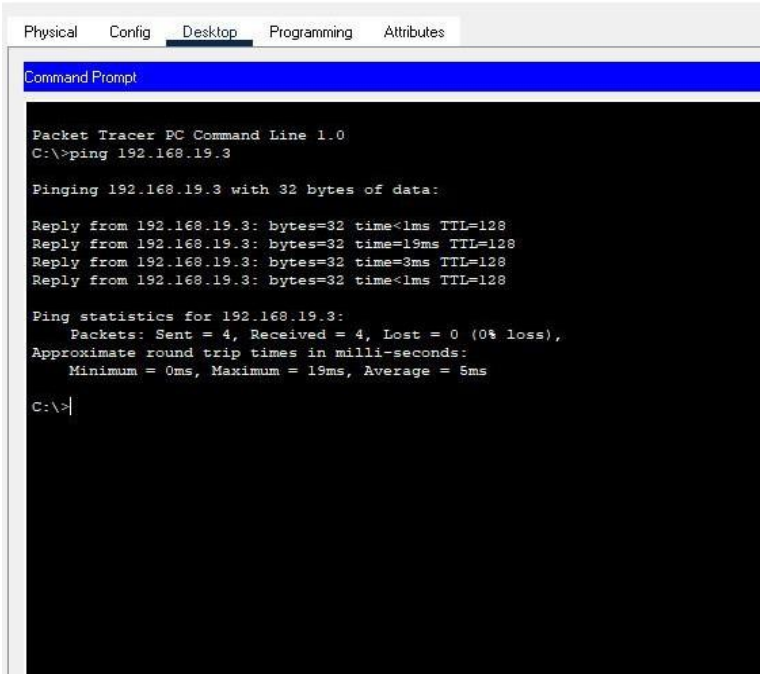

Figure-4.1.9: Branch-3 to Head office PC connection Check

Figure-4.1.10: Switch Configure

CHAPTER 5

CONCLUSION

5.1 Conclusion

One exceptional model is neuronal organizations in the mind, which show neuroplasticity Bellmore and Spurns [2009]. Learning elements of synaptic loads can reshape the profoundly intermittent organization into a useful feed-forward network structure Liu and Binomina [2009], Liu [2014]. Moreover, observational information recorded in neuronal frameworks is regularly exceptionally restricted due to the difficulty of performing exploratory estimations for an enormous scope neuronal organization Eichler.

5.2 Recommendations

• For improved performance, every branch of a company, bank, or office must enhance their routers.

• NGN must be included in every branch (next generation network).

• They must purchase a high-capacity generator and a high-voltage battery for backup purposes, as well as a new series router and switch.

• They must repair or purchase cable in order to improve their connection.

CHAPTER 6
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Incorporating Latent Constraints to Enhance Inference of Network Structure

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