IMPLEMENTATION OF STRONG VIRTUAL LOCAL AREA NETWORK FOR COMMERCIAL BANKS

Report submitted to the SASTRA Deemed to be University as the requirement for the course

CSE302: COMPUTER NETWORKS

Submitted by

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February 2021

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THANJAVUR -613401

BONAFIDE CERTIFICATE

This is to certify that the report titled "**IMPLEMENTATION OF STRONG VIRTUAL LOCAL AREA NETWORK FOR COMMERCIAL BANKS** " submitted as a requirement for the course, **CSE 302: COMPUTER NETWORKS** for B.Tech is a bonafide record of the work done by **Ms. VELAGAPUDI SWAPNA SINDHU (Reg.No.122004280)** during the academic year 2020-21, in the School of Electrical and Electronics Engineering.

Project Based Work *Viva voce* held on _____

Examiner –I **Examiner-II**

ACKNOWLEDGEMENTS

First of all, we express our gratitude to Prof. Dr S Vaidhyasubramaniam, Vice Chancellor, SASTRA Deemed University, who provided all facilities and constant encouragement during our study. We extend our sincere thanks to Prof. R. Chandra Mouli, Registrar, SASTRA Deemed University for providing the opportunity to pursue this project.

We owe a debt of most profound gratitude to our mentor Prof. A. Parvathy for her valuable inputs, able guidance, encouragement, wholehearted cooperation and constructive criticism throughout our project on the topic “IMPLEMENTATION OF STRONG VIRTUAL LOCAL AREA NETWORK FOR COMMERCIAL BANKS “.

We take this opportunity to thank all our lecturers who have directly or indirectly helped our project.

ABSTRACT

The banking industry continues to be strong in the fight against network security violations brought about by the red group (network sniffers and hackers) especially in Nigeria due to the adoption of network topology. Therefore, a virtual local area network (VLAN) can help reduce the threat posed by the red group. In this project, a powerful VLAN was developed with the help of VLAN technology for commercial banks. The performance indicators used to measure the performance of the proposed network are: security, network performance, flexibility, network costs and management. In order to overcome these performance indicators, it is very important to include an effective computer network approach such as the one used in this project. This project is being developed and validated using the network simulation tool Cisco packet tracer version 7.3.1. The results of the project showed that the proposed system has a loss of 0% at an average speed within 5-20 m/s. So, the banking industry can use this type of computer networking system more efficiently and securely.

Keywords: Cisco network stimulation, Packet tracer, Virtual local area network (VLAN).

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

VLAN	VIRTUAL LOCAL AREA NETWORK
GUI	GRAPHICAL USER INTERFACE
CLI	COMMAND LINE INTERFACE
DNS	DOMAIN NAME SYSTEM
DHCP	DYNAMIC HOST CONFIGURATION PROTOCOL

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OBJECTIVE

The goal is to implement a Strong Virtual Local Area Network utilizing the VLAN innovation for Commercial banks with 0% loss and average speed within the range of 5-20m/s. Also, to check that the proposed framework conquers six execution parameters which incorporate Security, Scalability, Network execution, Network cost and Network Management.

INTRODUCTION

Neighborhood (LAN) is known as a part of PC network which covers a little territory or area, for example, emergency clinics, homes or workplaces. It communicates higher information rate because of its region of inclusion and furthermore requires less media transmission offices. Then again, Virtual Local Area Network (VLAN) is the consistent gathering of assets and Network associated with an organization to sufficiently characterize the tasks of dynamic ports on a specific organization. VLAN is a switch network innovation that empowers workstations or gadgets from various LAN portions intelligently assembled paying little mind to their geological area. Neighborhood (LAN) are generally ease methods for sharing costly assets. LANs permits numerous clients in a moderately little geographic zone to trade records and messages and to get to shared assets, for example, documents administrations. LAN have quickly advanced into emotionally supportive networks that are basic to correspondence inside an association.

They are the major monetary delegates between the wellsprings of assets and the clients of assets, and with the end goal for them to do their jobs; they rely upon use of IT to all part of banking. In this manner, business banks in Nigeria have implanted the way of life of innovation for proficiency. Data and information move inside banks and their branches cross country is conceivable by the utilization of explicit IT application and organizations. A few utility regions of use have made LAN turned out to be progressively clogged and overburdened, because of a few variables, exchanging innovation advanced, which offers an answer for these difficulties. As opposed to the organizations of yesterday that depended on imploded spines, the present organization configuration is portrayed by a compliment engineering which was made conceivable by the utilization of switches. The expansion of changes to organizations can give a way to augment the speed and proficiency of LANs by lessening blockage and expanding transmission capacity and amplifies the general exhibition of the organization. Other than that, as a matter of fact, it changes the areas that have the effect of partitioning and not the transmission area (simply changing the transfer points that are naturally different) in these lines, in some cases the partitioning of unallocated Internet transfer sites. At the same time as we were creating VLANs, we were empowered to create modest transfer spaces within layer 2 that exchange online activities by providing various ports for transformation in various sub-organizations. A VLAN is treated as its subnet or broadcast space, which means that

the casings distributed in the organization are exchanged between ports regularly collected within the same VLAN, naturally a particular VLAN that can communicate with people from another VLAN. In line with these lines, if the bank requires a VLAN connection, a route will be required. Virtual LANs can be configured using a switch.

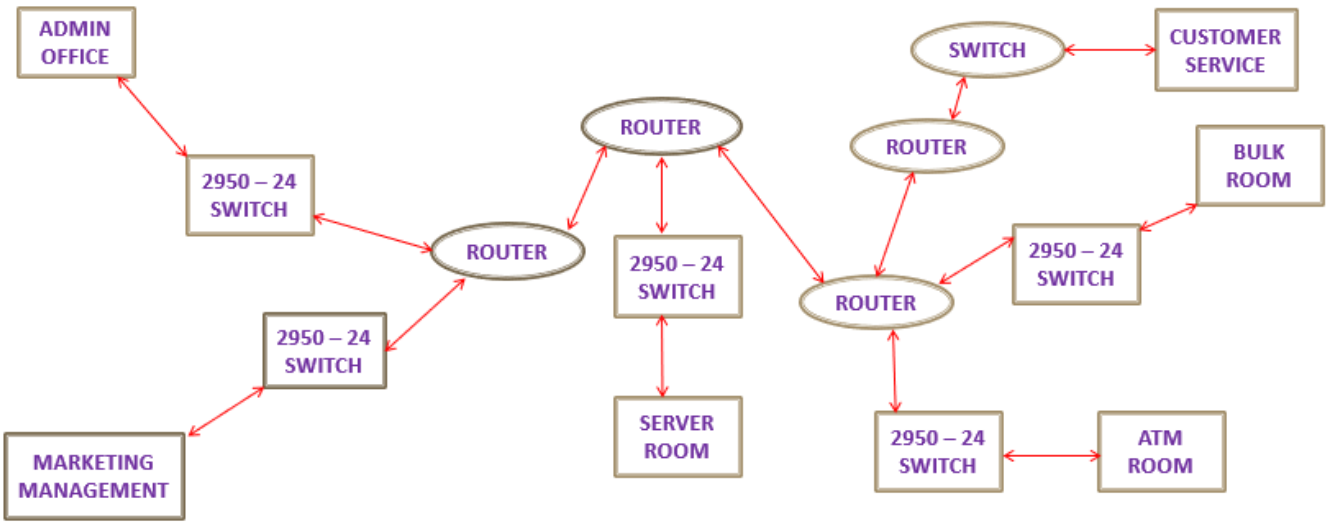
ANALYSIS AND DESIGN

In this work, performance information was collected from various commercial banks in Nigeria including Access Bank, Diamond Bank, Eco Bank, Guaranty Trust Bank, Sterling Bank, Union Bank, Wema Bank, Zenith Bank and City bank. These banks are mid-range PC network customers for business purposes. Based on the data collected, an evaluation of the existing system control matrix is evaluated which is used to determine the performance of existing systems.

Performance Indicator	Extremely Low	Low	Neutral	High	Very High	Rank
Likert scale Grade	**1**	**2**	**3**	**4**	**5**	
Security	5	62	37	11	9	**2**
Flexibility	9	58	26	18	13	**2**
Scalability	8	49	30	25	12	**2**
Network Performance	4	51	35	24	10	**2**
Network Cost	9	46	31	23	15	**2**
Network Management	5	60	28	20	11	**2**

Table 1 - Control matrix of existing system

From this assessment, the performance indicators such as security, flexibility, scalability, Network Performance, Network cost and Network Management are identified as weak. Hence, the proposed system is aimed at increasing the performance of existing system. The Data Flow Diagram of the proposed system for developing a strong VLAN is as follows:



METHODOLOGY

1. VLANs implementation
2. Inter-VLAN routing
3. IP configuration of end devices
4. Server configuration
5. Packet analysis

TOOL USED

This project is evaluated and stimulated using a network simulation tool Cisco Packet Tracer version 7.3.1

ARCHITECTURAL DIAGRAM OF PROPOSED SYSTEM

The proposed system has graphical user interface (GUI) which consist of input/output designs as well as the command line interface (CLI) in order to input the IP addresses on various network nodes and configuration of network utilities. The system architecture consists of five different VLANs namely, Administrative office, Marketing Management, ATM room, Bulk room, Customer

service. Administrative office belongs to Vlan-1 Marketing management belong to Vlan-2, Bulk room belong to Vlan-3, ATM room belong to Vlan-4 and customer service belong to Vlan-5.

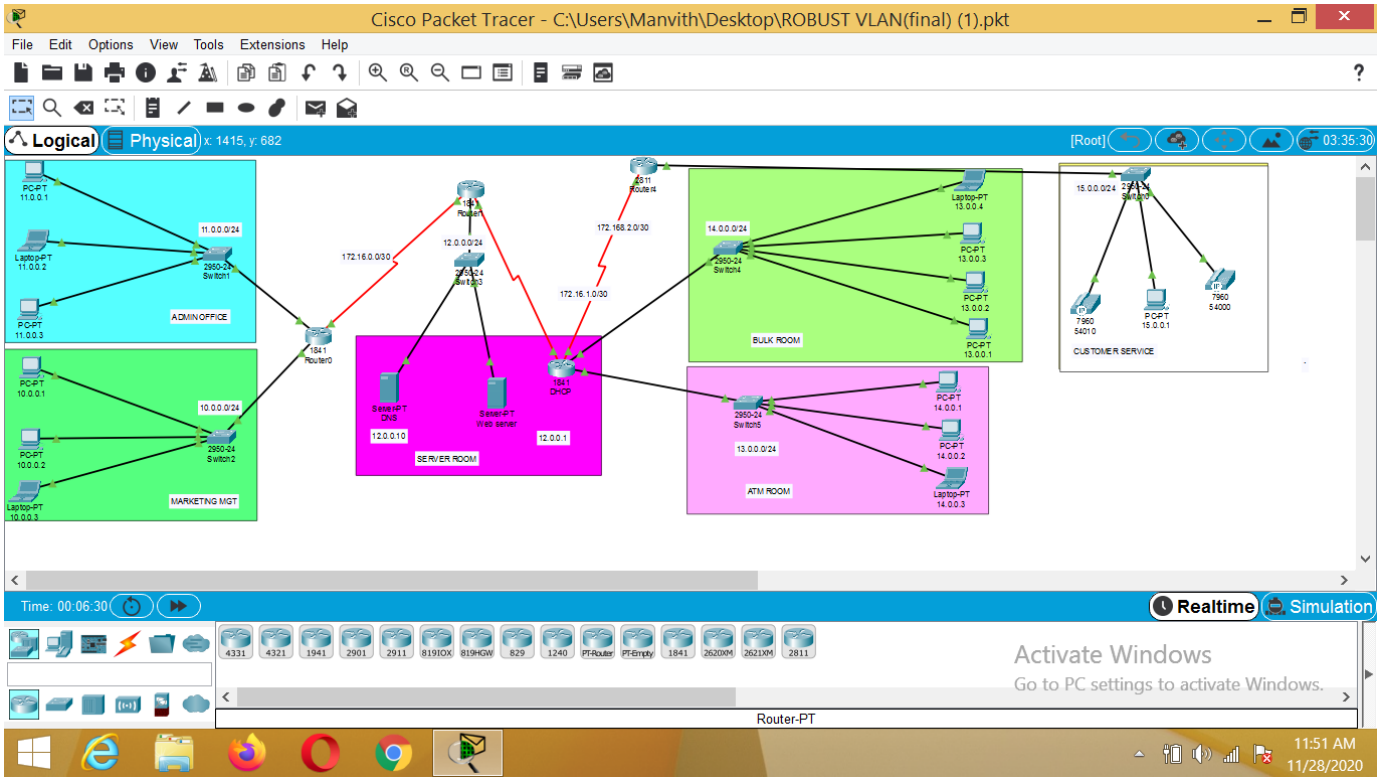


Fig 1.1 - architectural diagram of the proposed system

IP ADDRESSING SCHEME

Based on the total number of nodes for the departments, a Variable Length Subnet Mask is computed for each department.

Table 2 - IP addressing scheme

Category	No. of nodes	Subnet mask	Valid host range	Default gateway
Admin office	3	255.255.255.0	11.0.0.1 -11.0.0.3	11.0.0.254
Marketing management	3	255.255.255.0	10.0.0.1 – 10.0.0.3	10.0.0.254

Bulk room	4	255.255.255.0	13.0.0.1 – 13.0.0.4	13.0.0.254
ATM room	3	255.255.255.0	14.0.0.1 – 14.0.0.3	14.0.0.254
Customer service	3	255.255.255.0	15.0.0.3	15.0.0.254

INPUT SPECIFICATION OF THE PROPOSED SYSTEM

IP CONFIGURATION INTERFACE:

1) IP Configuration for Admin office:- The IP configuration is used to enter IP addresses for configuration of personal computers and laptops (PC0, L1 and PC1) which are included in Admin office section. The IP configuration interface of these systems are shown in figures 2.1, 2.2, 2.3 respectively.

Fig 2.1 - IP configuration interface of PC0

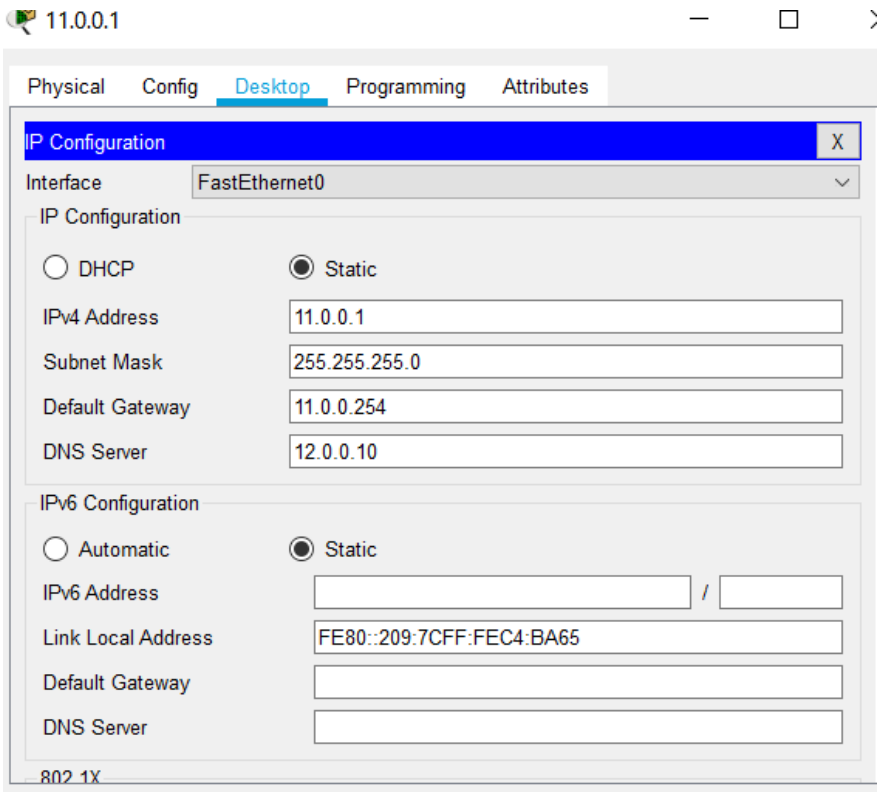


Fig 2.2 – IP configuration interface of PC0

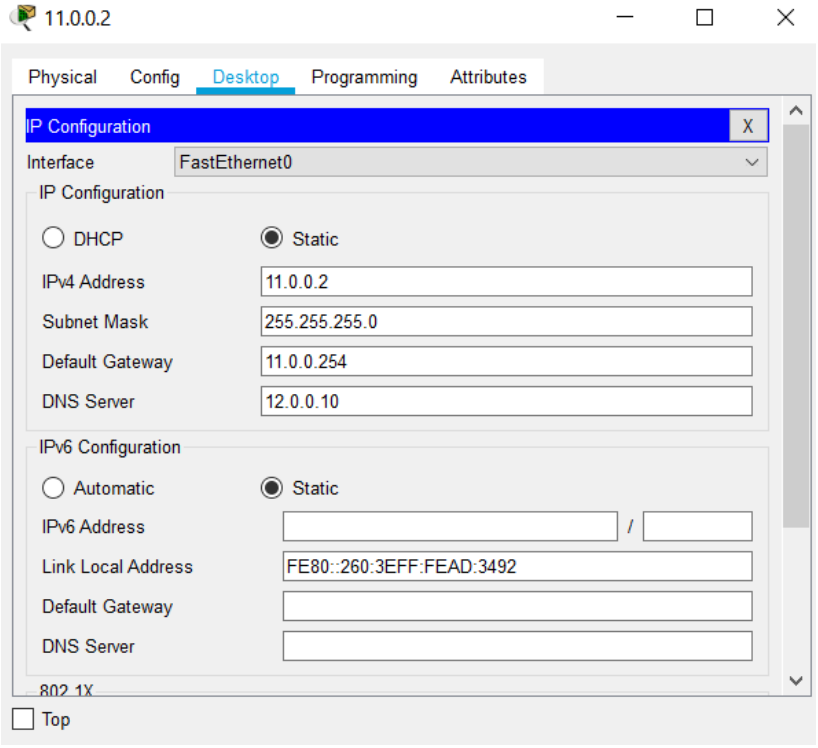
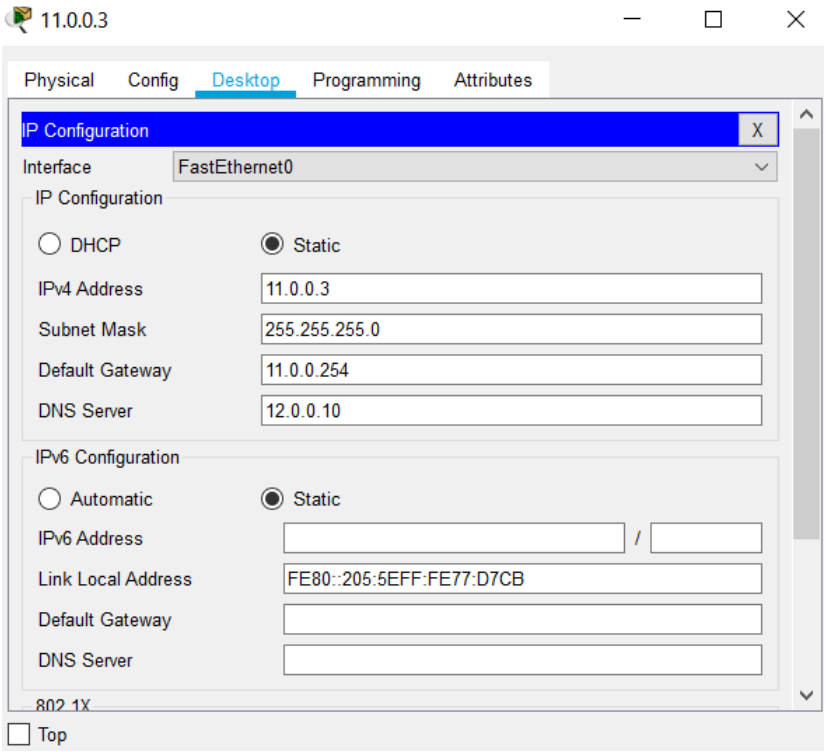


Fig 2.3 - IP configuration interface of PC1



2) IP Configuration for Marketing Management: The IP configuration is used to enter IP addresses for configuration of personal computers and laptops (PC2, PC3 and L2). The IP configuration interface of these systems are shown in figures 2.4 2.5, 2.6 respectively.

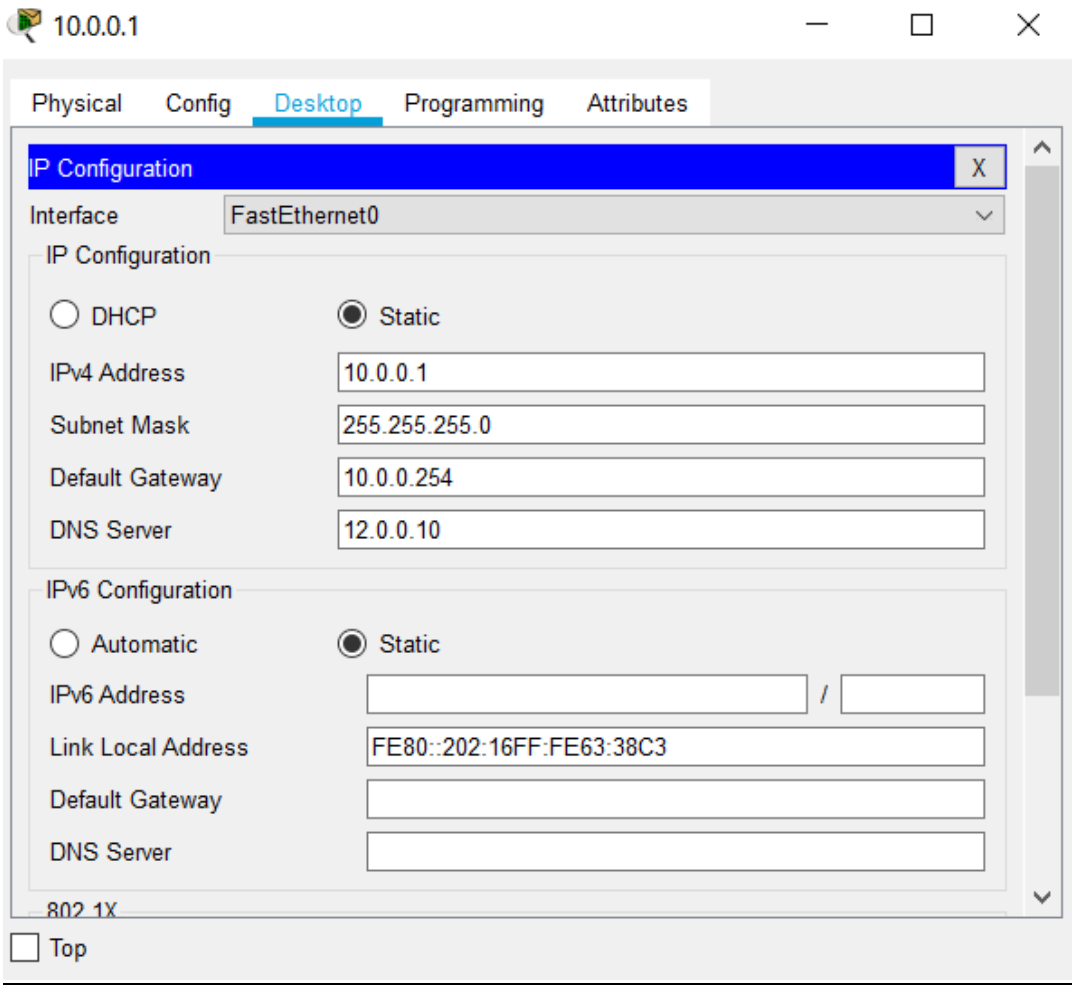


Fig 2.4 - IP configuration interface of PC2

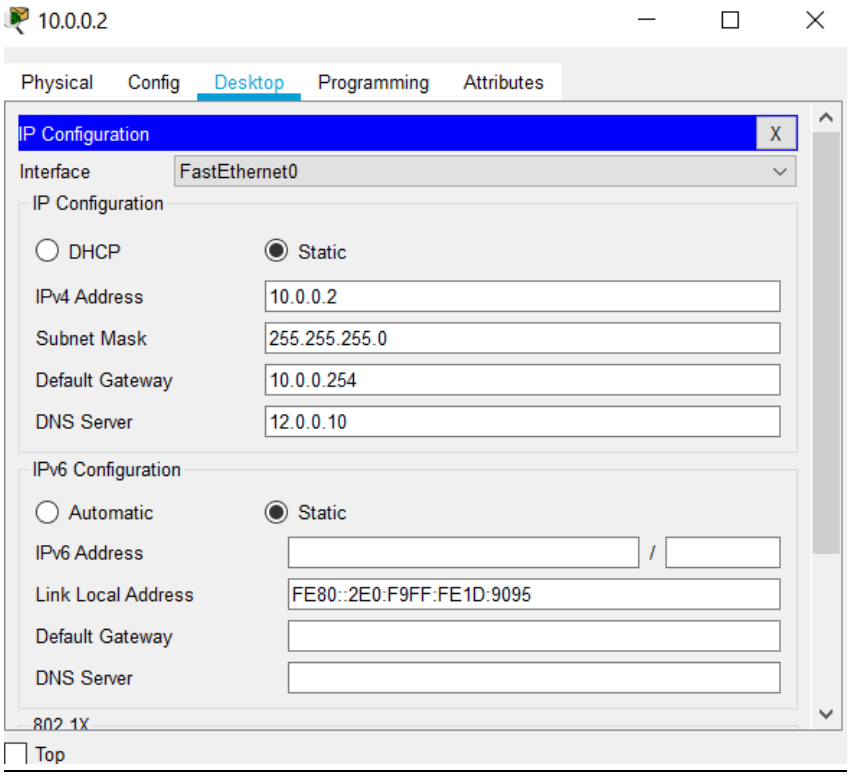
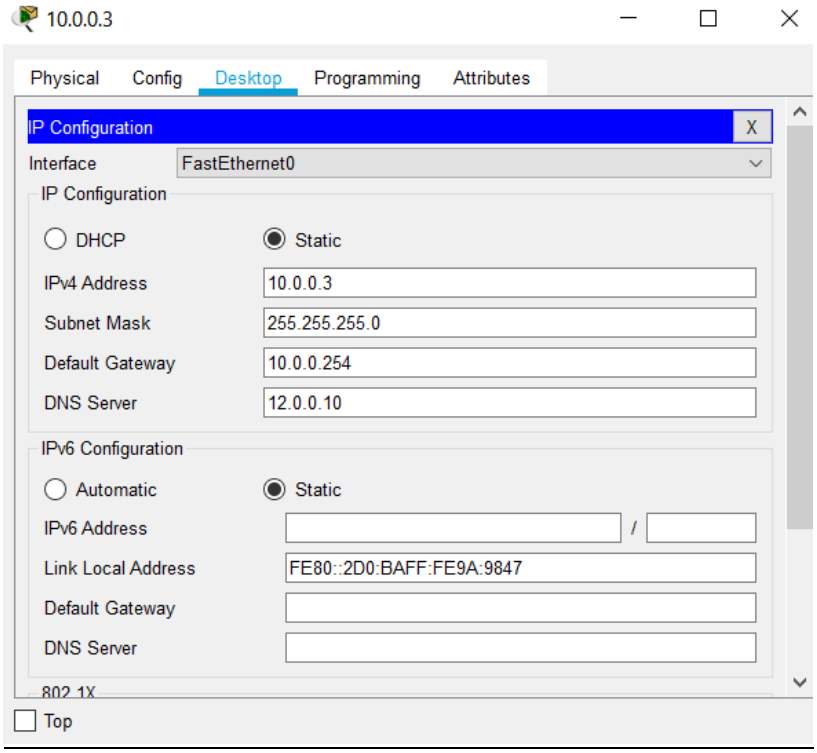


Fig 2.5 - IP configuration interface of PC3

Fig 2.6 - IP configuration interface of L2



3) IP Configuration for Bulk Room: The IP configuration is used to enter IP addresses for configuration of personal computers and laptops (PC4, PC5, PC6 and L3). The IP configuration interface of these systems are shown in figures2.7, 2.8, 2.9, 2.10 respectively.

Fig 2.7 IP configuration interface of PC4

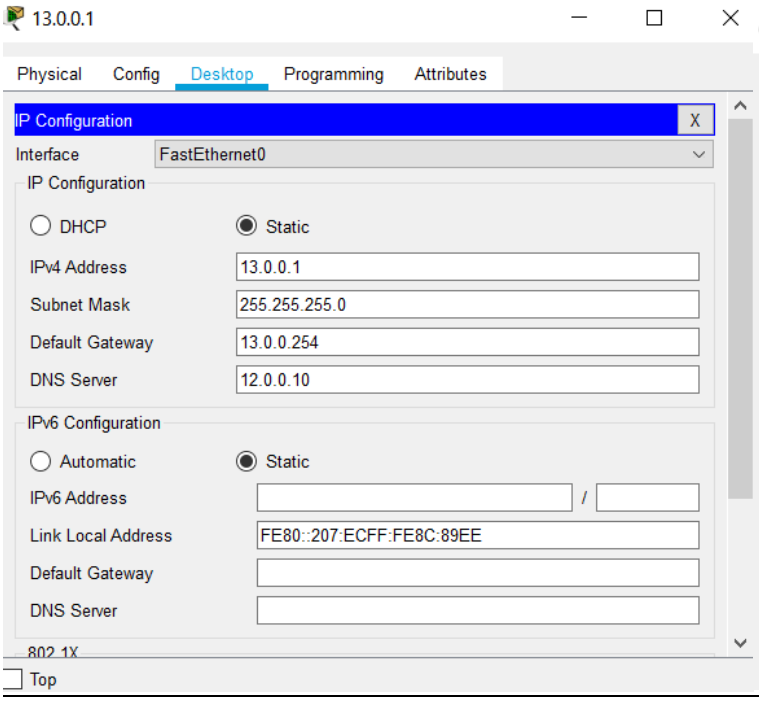


Fig 2.8 - IP configuration interface of PC5

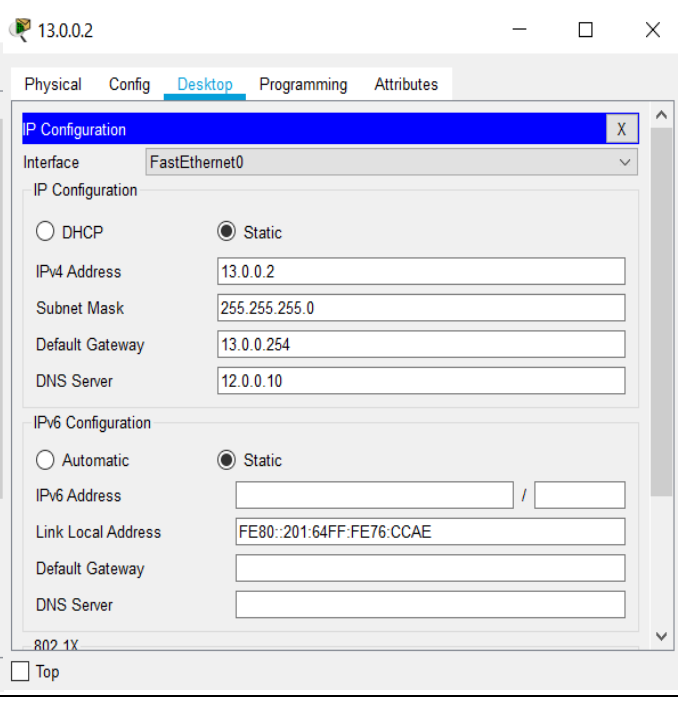


Fig 2.9 - IP configuration interface of PC6

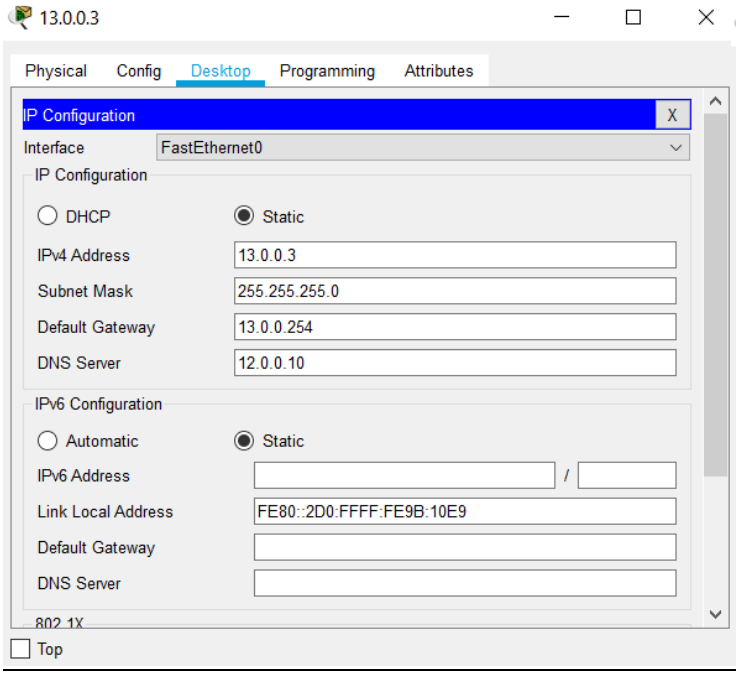
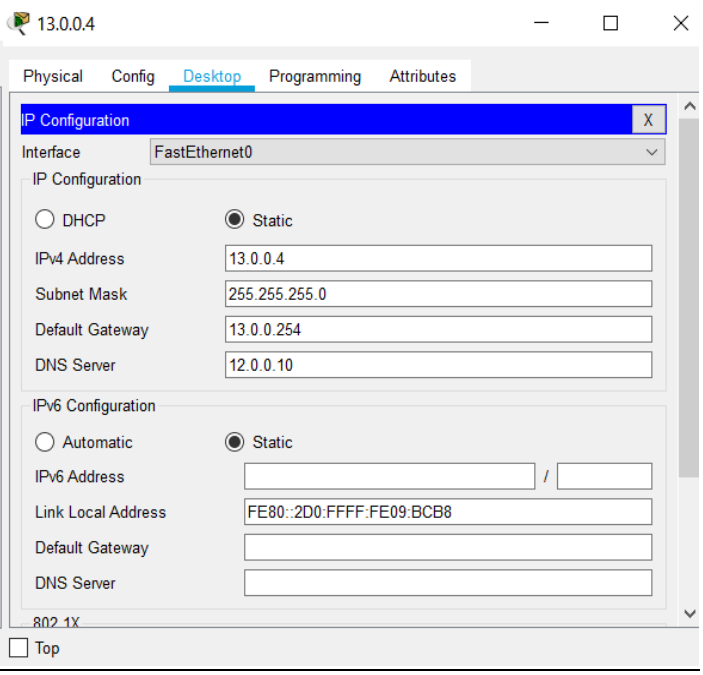


Fig 2.10 - IP configuration interface of L3



4) IP Configuration for ATM room: The IP configuration is used to enter IP addresses for configuration of personal computers and laptops (PC7, PC8 and L4).The IP configuration interface of these systems are shown in figures 2.11, 2.12, 2.13 respectively.

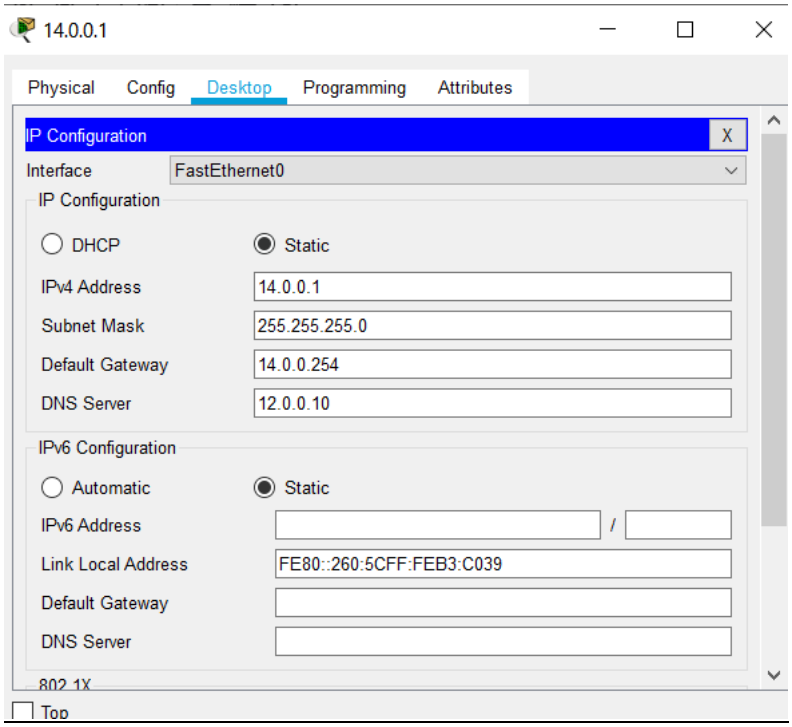


Fig 2.11 - IP configuration interface of PC7

Fig 2.12 - IP configuration interface of PC8

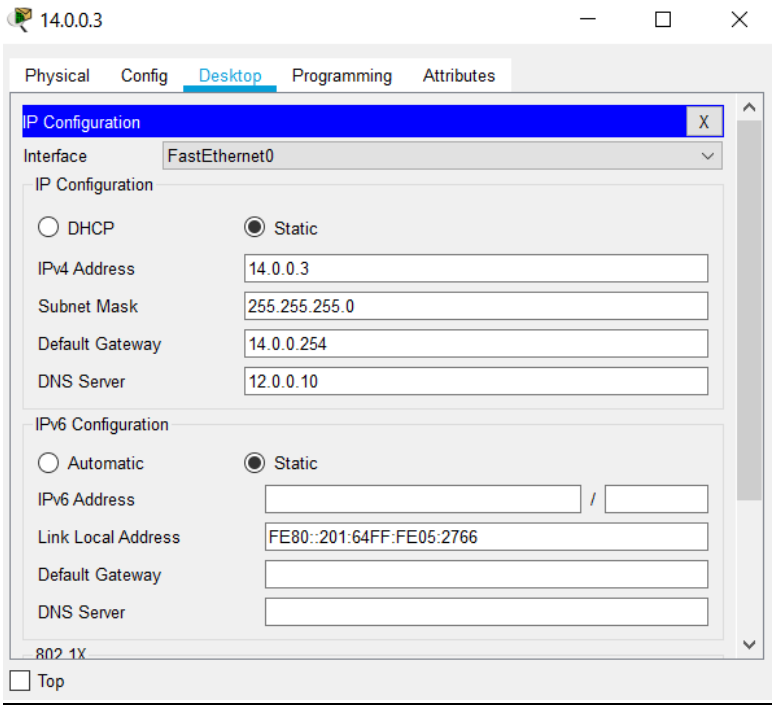
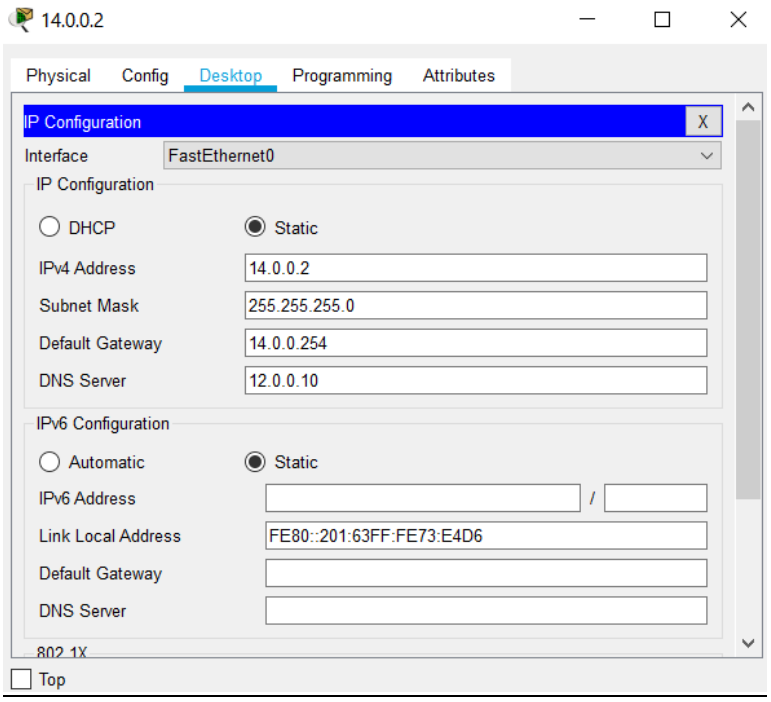
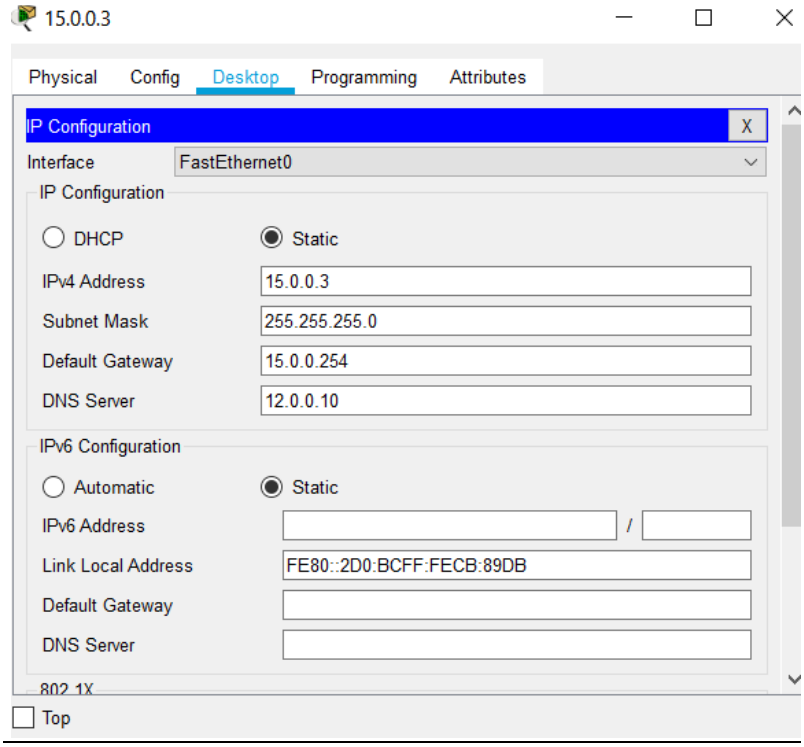


Fig 2.13 - IP configuration interface of L4



5) Input field for Customer Service: This input field is used to enter configuration settings for PC9, PHONE-1 and PHONE-2. The input field configuration of these systems are shown in figures 2.14, 2.15, 2.16 respectively.

Fig 2.15 - IP configuration interface of PC9



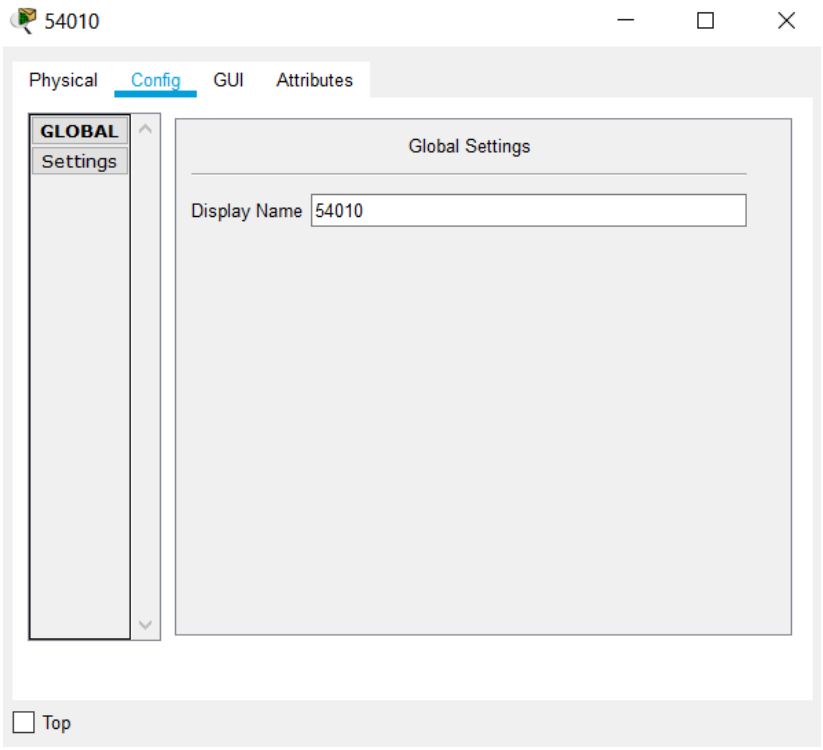
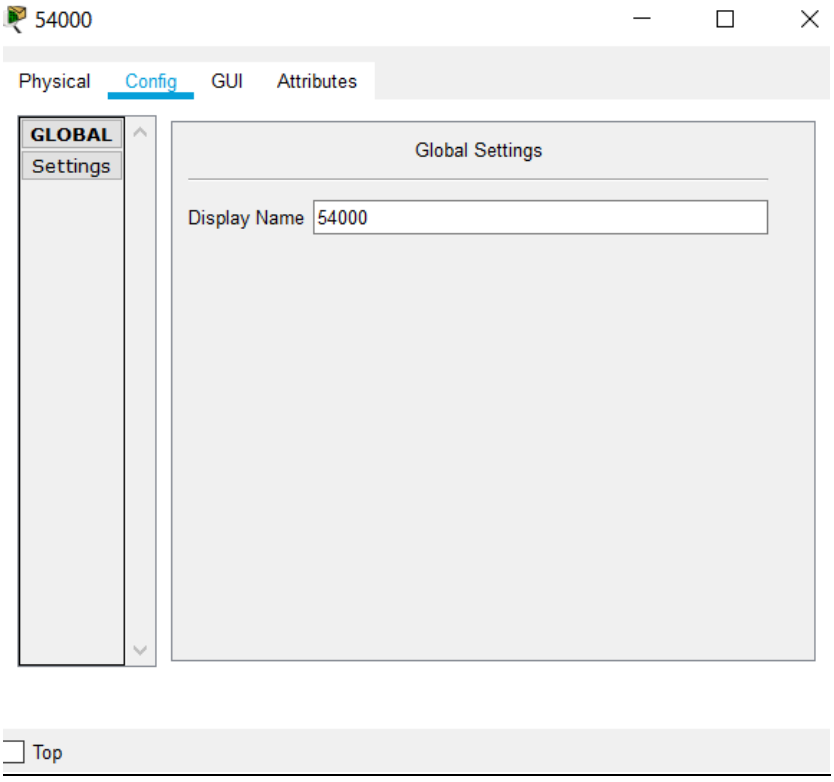


Fig 2.15 - IP configuration interface of phone 1

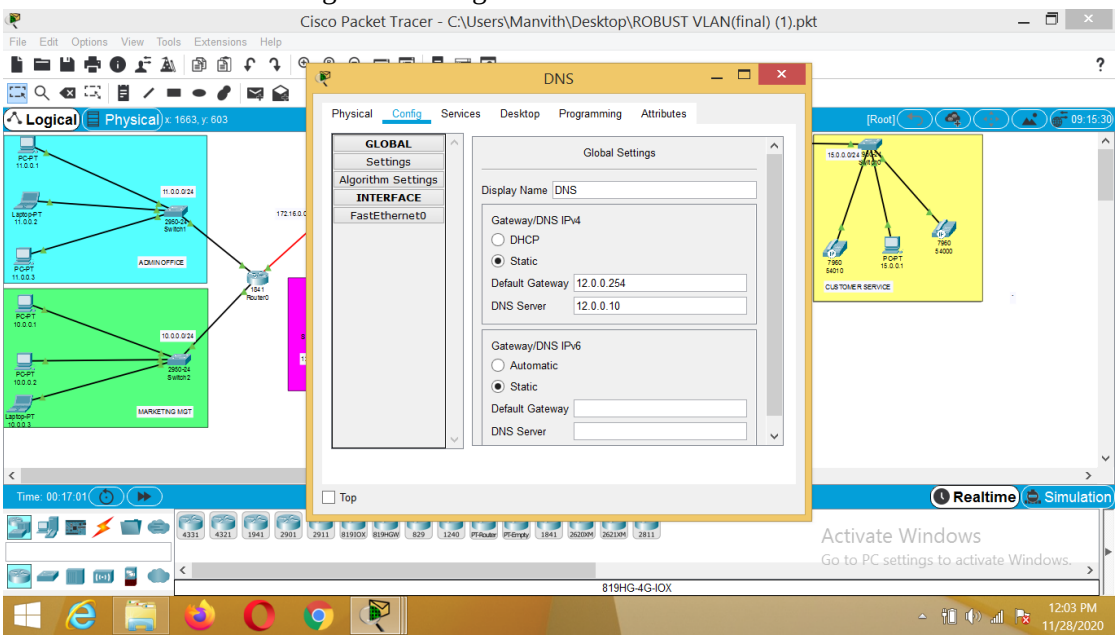
Fig 2.16 - IP configuration interface of Phone 2



SERVER CONFIGURATION

The DNS, Webserver and DHCP server configuration are shown in the figures 3.1, 3.2, 3.3 respectively.

Fig 3.1 - Configuration of DNS server



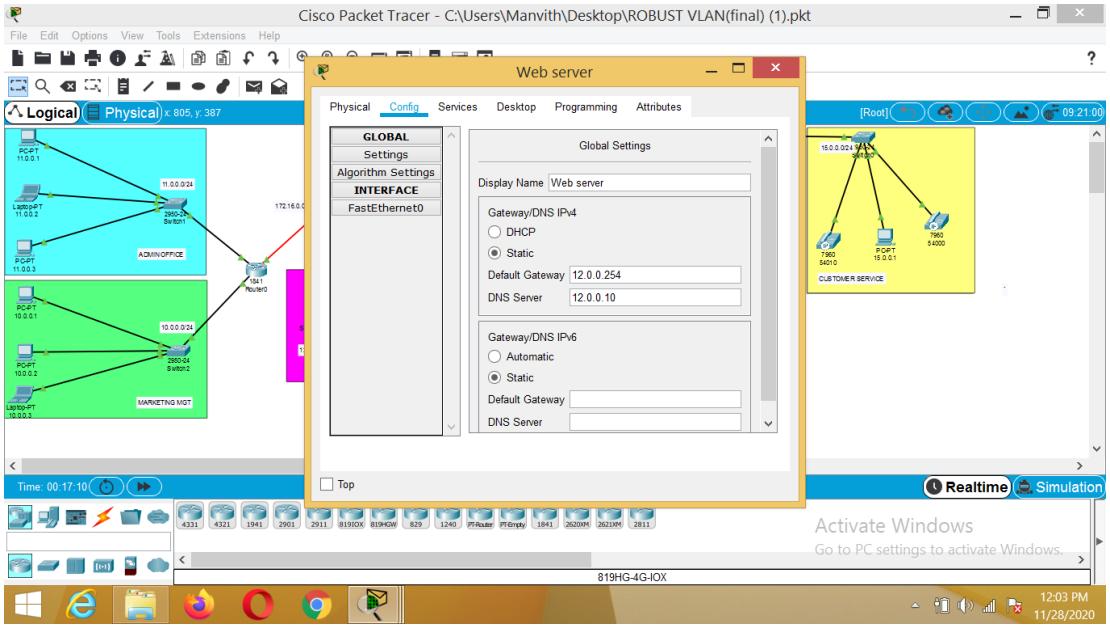


Fig 3.2 - Configuration of web server

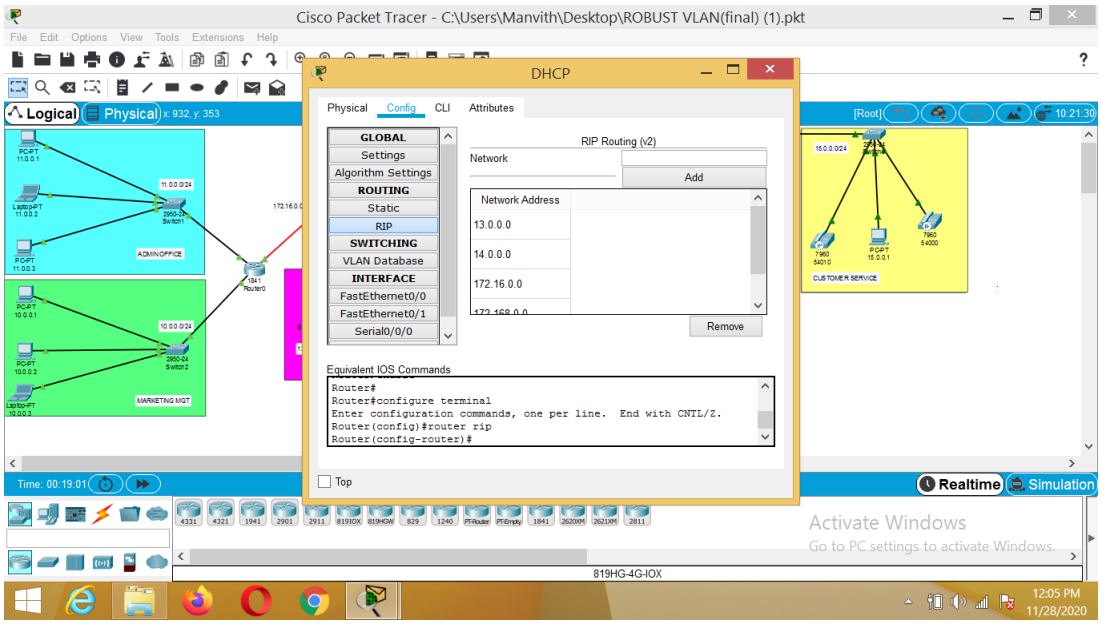


Fig 3.3 - Configuration of DHCP server

METRIC TO EVALUATE

The evaluation is done by analyzing the packet i.e.., a packet is sent from one end device to the other end device and parameters such as minimum time, maximum time, average time, Loss percentage values are collected for different end devices. Based on these values, the performance indicators such as security, scalability, network performance will be identified.

RESULT AND DISCUSSION

1) Unit testing: - The network nodes of each department in the bank are trying to ensure that it achieves the purpose of a fruitful organization network. A network node is said to fulfill an active network connection when receiving confirmation from a pinned network. A unit test o these modules was detected in the numbers of 4.1, 4.2, 4.3, 4.4 individually and all indicated verification from the various network locations they intended to speak to.

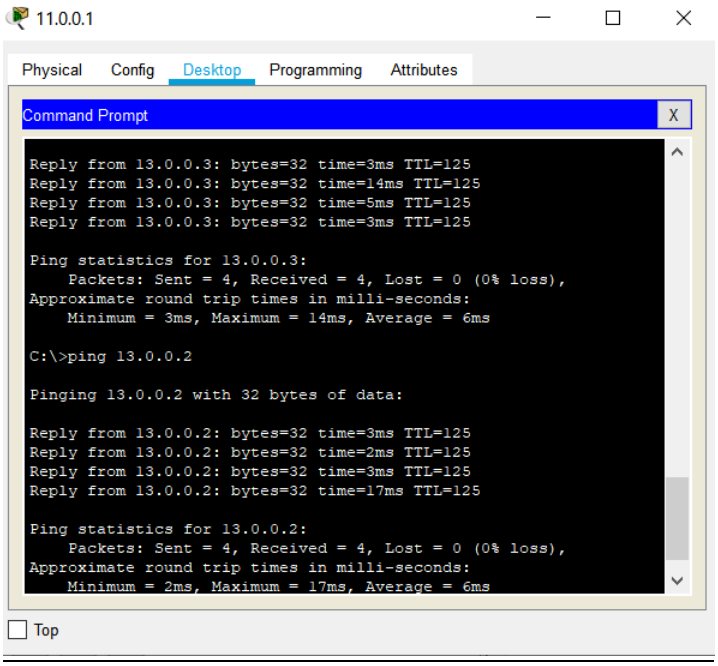
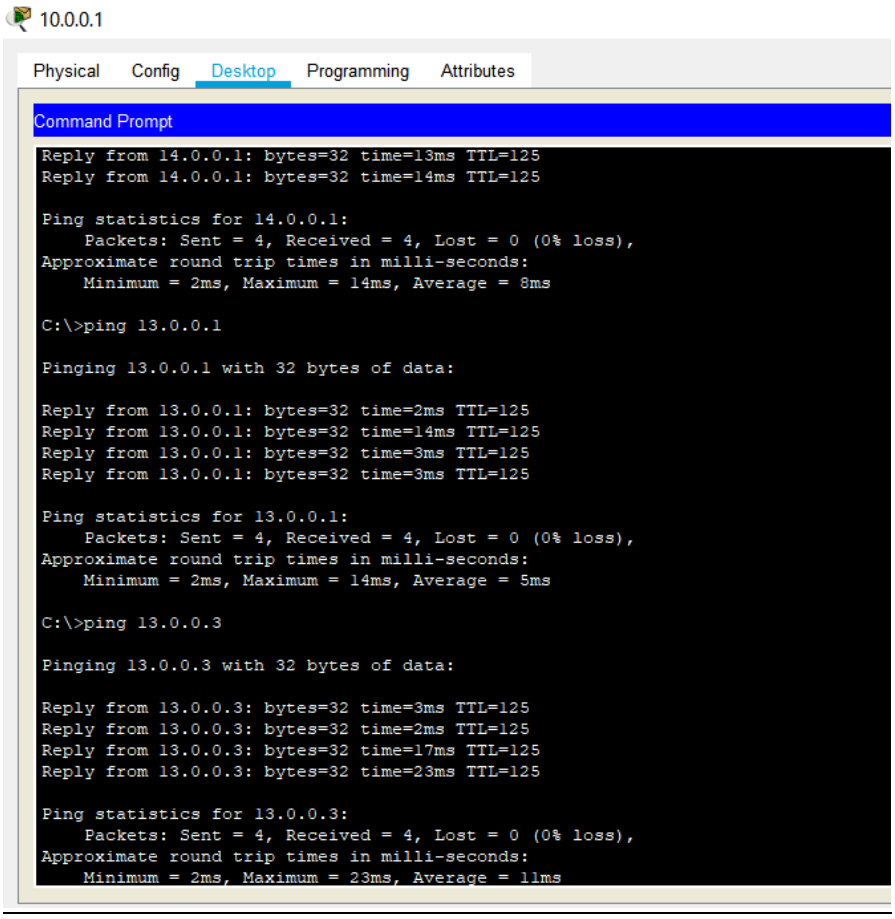


Fig 4.1- Ping statistics of pc6 and pc5

PC0 when tried to ping with PC6 having IP address 13.0.0.3, the ping statistics resulted in the loss of 0% which implies that all the sent packets are received and the approximated round-trip time in milliseconds is Minimum=3ms, Maximum=14ms, Average=6ms which indicates a good network performance.

Similarly, PC0 when tried to ping with PC5 having IP address 13.0.0.2, the ping statistics resulted in the loss of 0% which implies that all the sent packets are received and the approximated round-trip time in milliseconds is Minimum=2ms, Maximum=17ms, Average=6ms which indicates a good network performance.

Fig 4.2 – Ping statistic of pc7, pc2 and pc6

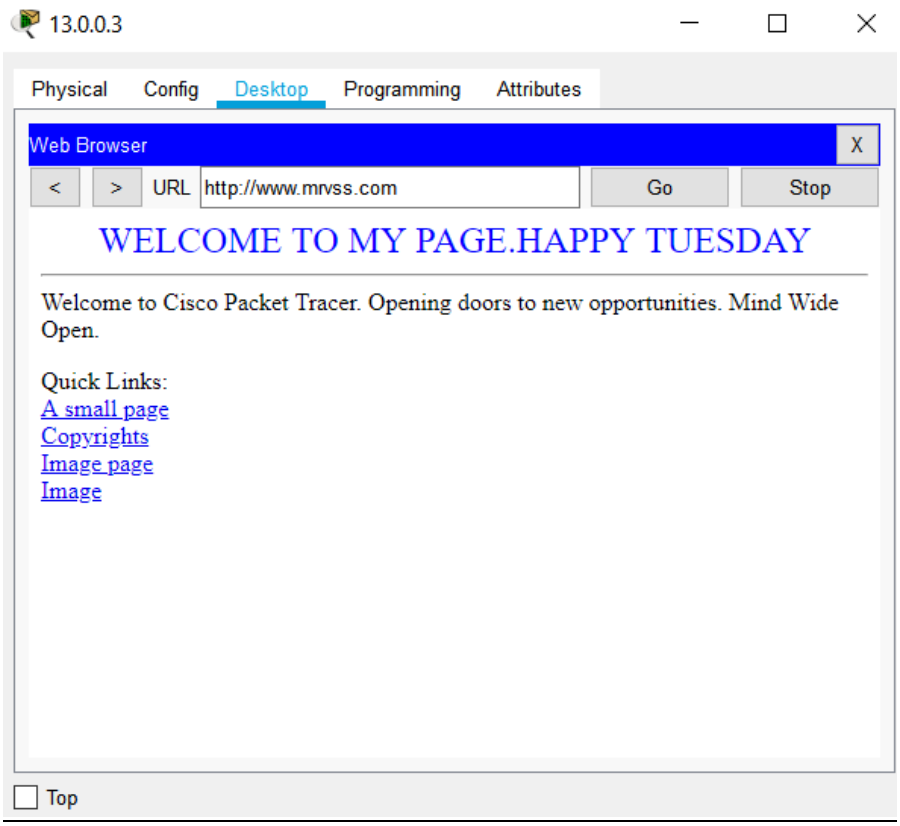


PC2 when tried to ping with PC7 having IP address 14.0.0.1, the ping statistics resulted in the loss of 0% which implies that all the sent packets are received and the approximated round-trip time in milliseconds is Minimum=2ms, Maximum=14ms, Average=8ms which indicates a good network performance.

Similarly, PC2 when tried to ping with PC4 having IP address 13.0.0.1, the ping statistics resulted in the loss of 0% which implies that all the sent packets are received and the approximated round-trip time in milliseconds is Minimum=2ms, Maximum=14ms, Average=5ms which indicates a good network performance.

And when PC2 tried to ping with PC6 having IP address 13.0.0.3, the ping statistics resulted in the loss of 0% which implies that all the sent packets are received and the approximated round-trip time in milliseconds is Minimum=2ms, Maximum=23ms, Average=11ms which indicates a good network performance.

Fig 4.3 - Displayed webpage



The above figure shows that PC6 when tried to access the link www.mrvss.com, the webpage is opened and the message welcome to my page. Happy Tuesday got displayed.

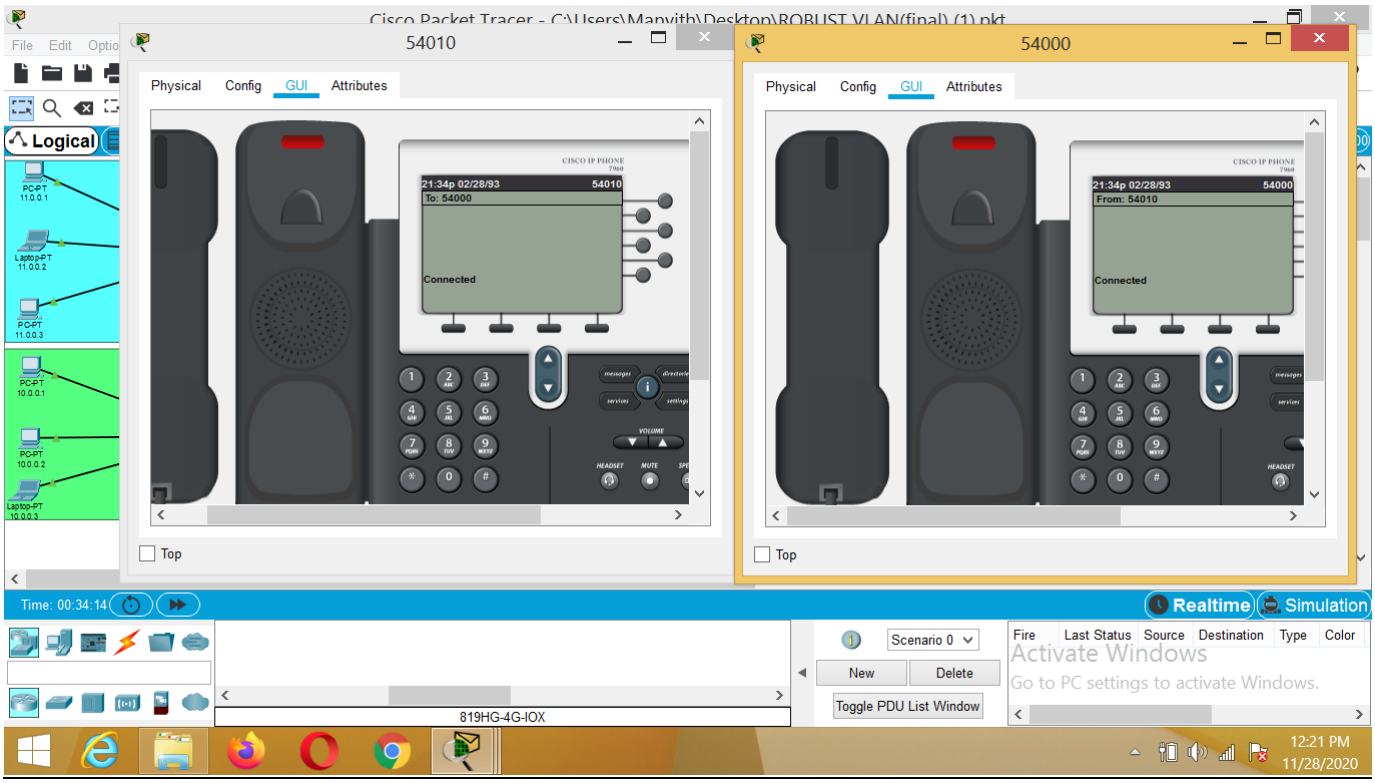


Fig 4.4 - Figure showing connection status of IP phones

2) Router testing :- The entire network has tried to ensure that the proposed network meets the expected expectations. The proposed network plan is said to have completed the framework test where it provides a faster network response without delay. Route testing appeared in figures.

Router-0 connecting to Admin office, marketing management, bulk room, ATM room is shown in the figure 4.5 below:

The router, which is the network access point, when tested shows an effective network ping with network locations in the admin office, marketing management, bulk room, ATM room.

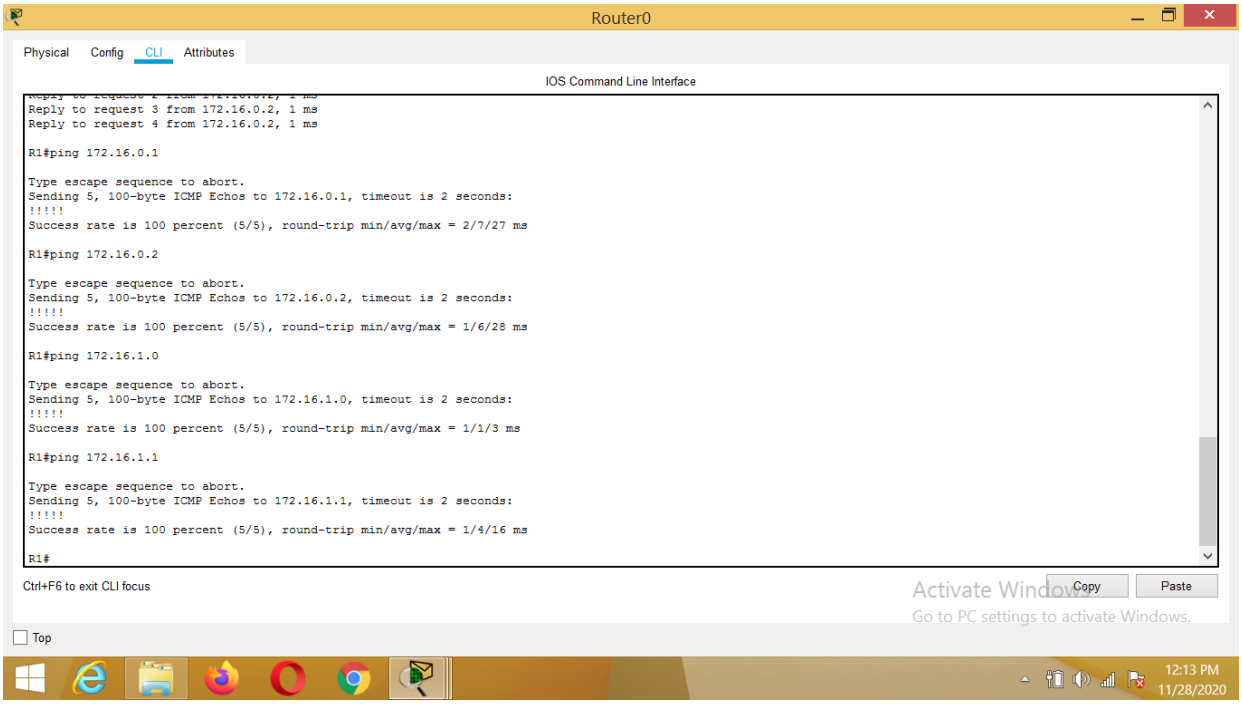
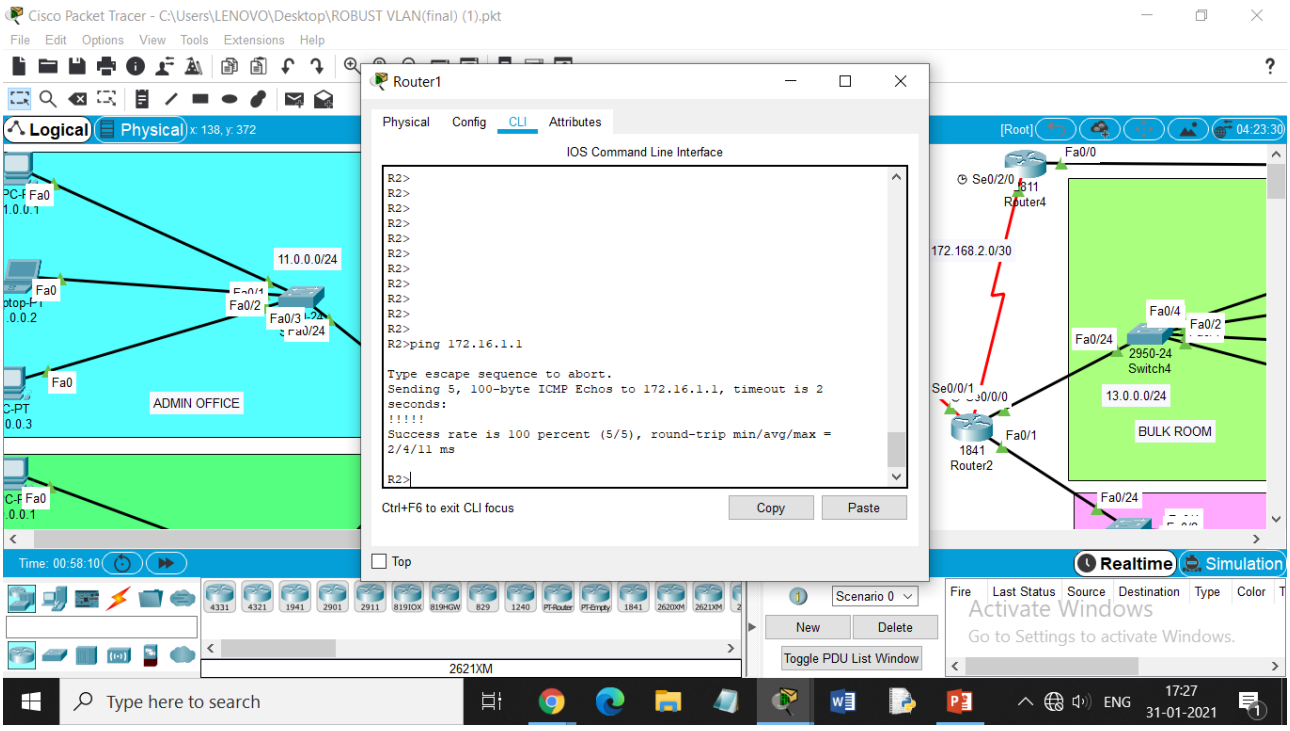


Fig 4.5 - Connection status of Router 0

Router-1 connecting to bulk room is shown in the figure 4.6 below:

The router which is the network access point, when tested shows an effective network ping with the network nodes in the bulk room.

Fig 4.6 - Connection status of Router 0



SIMULATION RESULT

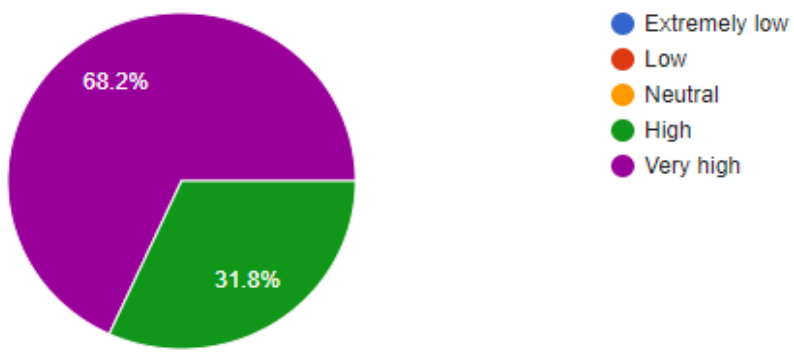
DEPTS	No. of nodes	Average speed	Time to live	Connectivity
Admin office	3	13 m/s	127 0% loss	Active
Marketing management	3	6 m/s	127 0% loss	Active
Bulk room	4	11 m/s	125 0% loss	Active
ATM room	3	10 m/s	125 0% loss	Active
Customer service	3	16 m/s	125 0% loss	Active

Table 3 - Simulation Result

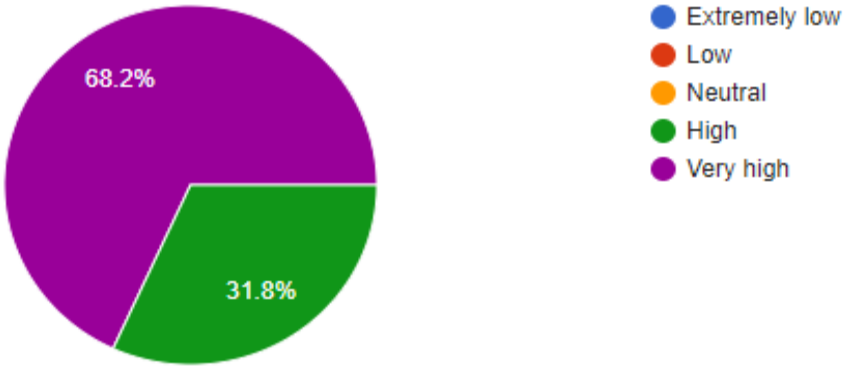
ASSESSMENT MEASUREMENT OF NEW SYSTEM

The proposed was assessed a lot and results from the trial of execution parameters are appeared as pie graph. With regard to the assessment and appraisal, a survey was created. The results are as follows,

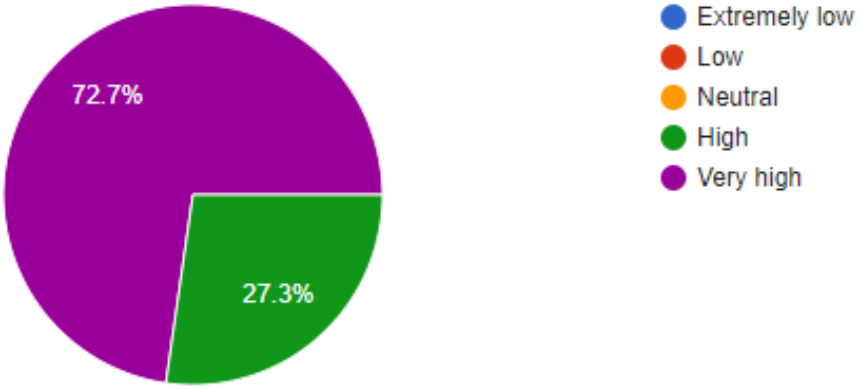
1) Security



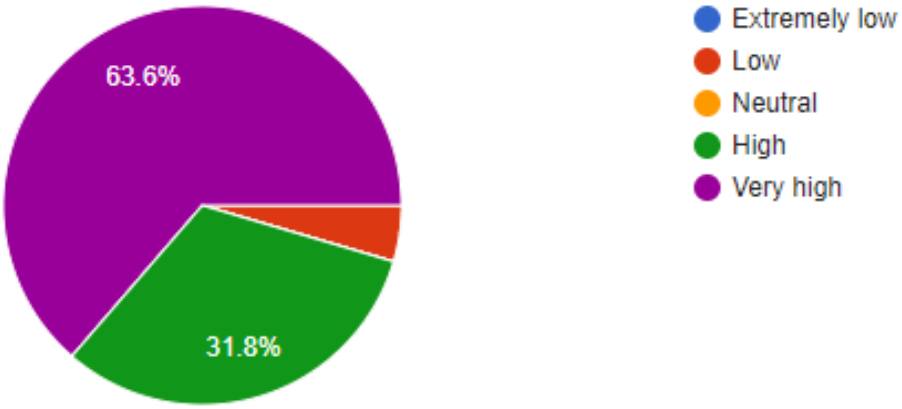
2) Flexibility



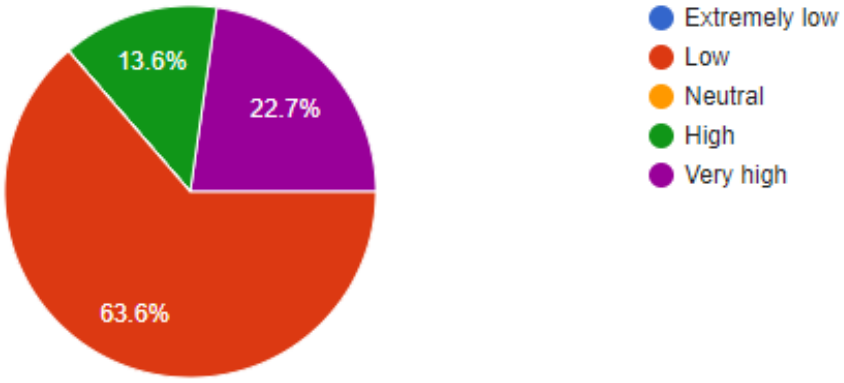
3) Scalability



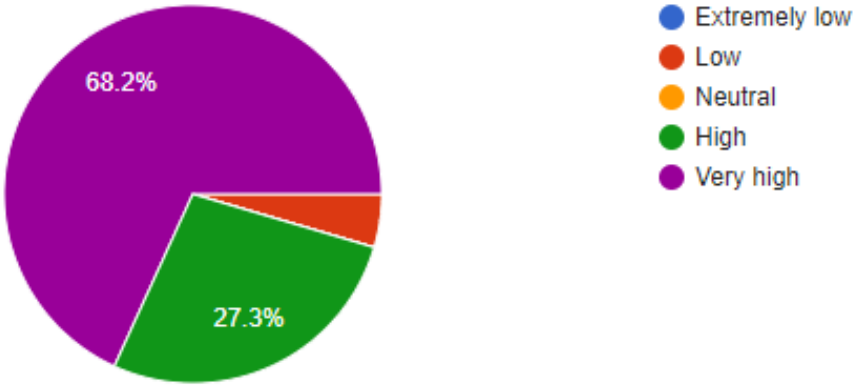
4) Network performance



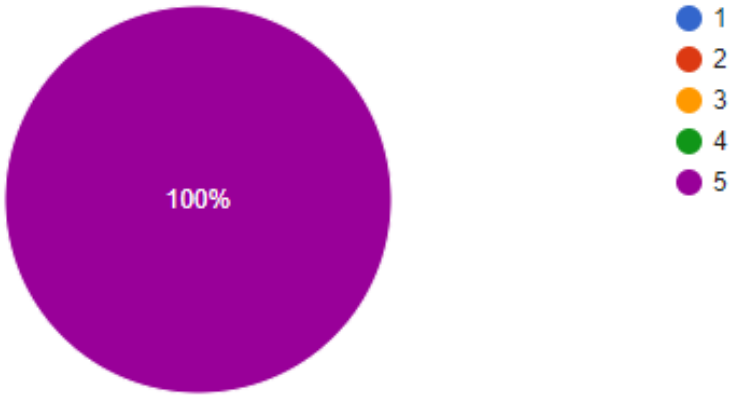
5) Network cost



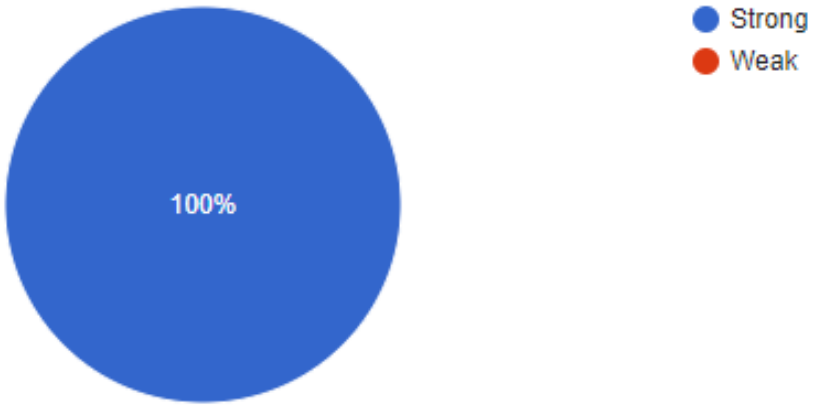
6) Network management



7) How much do you rate this project?



8) Overall judgement



The proposed network has been careful to take care of current network shortcomings. What comes next is the power of the proposed framework that is flawed in the current system. Includes:

I. Broadcast Control: Broadcast is essential for a PC organization to function properly. In any case, broadcast consumes additional organization data transfers. The proposed framework / system integrates large LANs into decent VLANs and thus reduces transmission congestion.

ii. Security: The proposed system provides improved organizational security. With a variety of referral posts, network administrators have authority over each port and client. A hostile client cannot, at this point simply insert his work station into any switch hole and sniff the organization traffic utilizing a packet sniffer.

iii. Diminished Costs: The proposed system incorporates a larger VLAN into more modest VLANs which are more expensive compared to the current system.

iv. Flexibility: The proposed system has improved flexibility compared to the current framework.

v. Development of virtual work group: With this proposed framework it is easy to bring people from the working group together. With the exception of VLANs, the only way in which this can be considered is to honestly remove all the people in the work group closer together and have that strategy implemented in the existing system.

CONCLUSION

The proposed system is evaluated in six performance indicators including security, flexibility, scalability, network performance, network costs and network management. This has led to the development of a strong virtual local area network of commercial banks. The result of the design of this network also showed that the proposed system has a loss of 0% at a average speed within a range of 5-20 m/s which indicates the efficiency of the network. Banking and financial industries can therefore accept this powerful VLAN implementation of a quality service and efficient computer network.

FUTURE DIRECTIONS

In future analysis, a robust VLAN with more better security and adaptability will be implemented in a variety of areas where Absolute prior security and efficiency of network is needed for example, Institutions and Government entities etc.

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