Network Monitoring and Bandwidth management of an ISP

SUBMITTED BY

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

SUPERVISED BY

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Associate Professor and Head

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DAFFODIL INTERNATIONAL UNIVERSITY DHAKA, BANGLADESH

To Whom It May Concern

This is to certify that Mr. MD Shoumik Ferdous has done his internship in Network Monitoring and Bandwidth Management at Millennium Computer, Dhaka from 30 September, 2018 to 30 December, 2018.

He has worked on project titled

"Network Monitoring and Bandwidth Management"

During the internship he demonstrated good skills with a self-motivated attitude to learn new things. His performance exceeded expectations and was able to complete the project successfully on time.

We wish him all the best for his future endeavors.

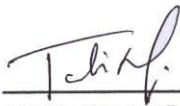Millennium Computer

MILLENNIUM COMPUTER

PROPRIETOR

Asif Chowdhury

APPROVAL

This Internship titled **"Network Monitoring and Bandwidth Management of an ISP"**, submitted by Md Shoumik Ferdous to the Department of Information and Communication Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Electronics and Telecommunication Engineering and approved as to its style and contents.

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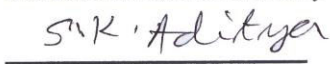Department of ICE
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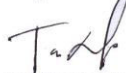
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DECLARATION

I hereby declare that, this internship report is completed by me, Md Shoumik Ferdous, ID No: 151-19-1680 to the department of Information and Communication Engineering, Daffodil International University has been done by me and under the supervision of Md Taslim Arefin, Associate Professor and Head, Department of ICE Daffodil International University.
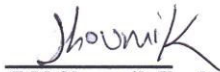
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ACKNOWLEDGEMENT

First I express my heartiest thanks and thankfulness to "Omnipotent Allah" for his awesome gift to let me makes conceivable to finish the last year temporary position effectively. I fell extremely appreciative and wish my significant my obligation to Md Taslim Arefin, Associate Professor and Head, Department of ICE Daffodil International University, and Dhaka. Profound Knowledge and distinct fascination of our administrator in the field of "Network Monitoring and Bandwidth Management of an ISP's Network Scenario and NOC ", to complete this entry level position. His perpetual persistence, insightful direction ceaseless consolation, steady and enthusiastic supervision; productive analysis, profitable guidance, perusing numerous substandard draft and adjusting them at all stage have made it conceivable to finish this temporary job. And furthermore to other employee and the staff of ICE depertment. I might want to thank my whole course mate in Daffodil International University, who participated in this talk about while finishing the course work

Finally, I must acknowledge with due respect the constant support, inspiration and patients of my parents.

ABSTRACT

This report focuses on "Network Monitoring and Bandwidth Management of an ISP". The first part of the internship report gives an overview of Mikrotik Operating System and server details. Second part discusses about the ISP NOC support technique and Network Monitoring tools. There is various type of work in the network that is why also different types of server have. For Example-FTP Server. Each of them works differently and without them it is impossible to maintain a network. If network is connected to the Internet and we want to secure your information they must setup server using Mikrotik Operating System. lastly I configuration to Mikrotik Router with a ISP line using WAN network and other configuration to LAN ports.

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CONTENTS   **PAGE**

Chapter-1

1.1 Introduction Part

This is the time of Information Technology. By and by multi day's incalculable wherever all through the world use web advancement and server is a vital part. Linux is maybe the most essential free programming achievement since the principal Space War, or, even more starting late. We can't doAnything relating to web correspondence without server. So DNS server is basic for web development. Transitory occupation is an old practice to impact understudies to fathom the certified working, condition and challenges of jobs. Restorative Science, Engineering and Accounts all branches have their own specific hugeness of impermanent employment before degree concede. Today each business and exchange is especially related to programming based correspondence and webdevelopment. This is called E-Commerce. Web Banking, SMS Alert Banking, Mobile Banking, EFT (Electronic Fund Transfer, etc are unrealistic without server. DNS (space name structure) is also amazingly profitable server and we can work unmistakable sorts of organizations by using this structure. Web development, E-mail, E-Business, Media transmission, Mobile development, etc are unfeasible without server and DNS is one of them. Today, saving money industry and distinctive business affiliation altogether depends on different sorts of Software and Online Technology and Server is astoundingly central.

1.2 Motivation

I am as of now seeking after my Bachelors in Electronics and Telecommunication Engineering at Daffodil International University, I comprehend the significance of increasing reasonable information which will supplement the reading material learning and help an understudy gain a more extensive point of view of the subjects.

Amid the entry level position I have discovered that I am consummately gifted in the subtleties of Linux system and mikrotik and Cisco. As a network access supplier I've expressing what is on my mind great, speaking with individuals, understanding their requirements and giving them better administration. My aptitudes lie in my capacity to completely peruse and comprehend the circumstance and act rapidly but then adroitly.

1.3 Internship Objective

The fundamental target of instruction is to accumulate learning. I pick a temporary position since I needed to pick up essentially encounter. So this is exceptionally successful of aptitudeimprovement. I might want to accumulate some uncommon quality to give myself as gifted one. Functioning as a Network Support Engineer performing obligations and exercises and investigating them from alternate points of view.

My dimension best to show my down to earth learning just as:

•To satisfy the prerequisite of the temporary job program under ICE program.

•To accomplish subtleties learning about ISP NOC bolster Technique and Network Monitoring.

1.4 Report Layout

In the chapter (1) I have depicted Introduction, Internship Objective, Motivation, Introduction to the organization and Report Layout.

In the chapter (2) I have composed the strategy of my entry level position. Furthermore, this section gives the data about where the entry level position has been consolidate to contain this program. Additionally grasp about how performed the entry level position functions, about the organization, what are the IT benefit offered in Millennium ISP and what are the jobs of in employments market of Linux and stage mikrotik.

In the part (3) I have delineated consistently task and activities, Events and Activities.

In the part (4) I have delineated is Problem and Solution, Learning Outcome, Challenges.

In the part (5) I have delineated is Discussion and Conclusion and Future Scope.

1.5 OSI MODEL

There seven layer of osi model I will describe osi model.

Application (Layer 7)

OSI Model, Layer 7, underpins application and end-client shapes. Correspondence collaborators are perceived, nature of association is seen, client endorsement and security are considered, and any requirements on information sentence structure are perceived. Everything at this layer is application-explicit. This layer gives application associations to record exchanges, email, and other system programming associations. Telnet and FTP are applications that exist totally in the application level. Layered application structures are a touch of this layer.

Presentation (Layer 6)

This layer gives self-sufficiency from complexities in data depiction by making an understanding of from application to sort out arrangement, and the a different way. The acquaintance layer endeavors with change data into the casing that the application layer can recognize. This layer structures and encodes data to be sent over a framework, giving open door from similitude issues. It is on occasion called the sentence structure layer.

Session (Layer 5)

This layer sets up, directs and closes relationship between applications. The session layer sets up, sorts out, and closes dialogs, exchanges, and talked between the applications at each end. It oversees session and affiliation coordination.

Transport (Layer 4)

OSI Model, Layer 4, gives clear trade of data between end structures, or has, and is accountable for start to finish botch recovery and stream control. It ensures complete data trade.

Network (Layer 3

Layer 3 gives trading and directing advances, making reasonable courses, known as virtual circuits, for transmitting data from center to center. Controlling and sending are components of this layer, and moreover tending to, internetworking, bungle managing, obstruct control and package sequencing.

Data Link (Layer 2)

At OSI Model, Layer 2, data packs are encoded and decoded into bits. It outfits transmission protocolknowledge and organization and handles botches in the physical layer, stream control and edge synchronization. The data associate layer is isolated into two sub

layers: The Media Access Control (MAC) layer and the Logical Link Control(LLC) layer. The MAC sub layer controls how a PC on the framework gets to the data and agree to transmit it. The LLC layer controls diagram synchronization, stream control and slip-up checking.

Physical (Layer 1)

OSI Model, Layer 1 passes on the bit stream - electrical drive, light or radio banner — through the framework at the electrical and mechanical dimension. It gives the hardware strategies for sending and getting data on a conveyor, including portraying connections, cards and physical perspectives. Fast Ethernet, RS232, and ATM are traditions with physical layer parts.

1.6 What is routing

In internetworking, the route toward moving a package of data from source to objective. Guiding is ordinarily performed by a committed contraption called a switch. Coordinating is a key segment of the Internetbecause it enables messages to run beginning with one PC then onto the following and over the long haul accomplish the goal machine. Each center individual PC performs guiding by coming the message to the accompanying PC. Some bit of this strategy incorporates looking at a directing tableto choose the most ideal way.

1.7 What is Switching

In trading packages are transfered from source to objective using MAC address. Trading is done inside the framework.

Chapter-2

Literature Review

I will inspect about the establishment research of our assignment. We will in like manner talk about different sorts of frameworks organization devices that are typically use in frameworks organization fragment. To design a business orchestrate what are the necessities and setup process that will be discussed here.

2.1 Background Research

In this bleeding edge age, Computer correspondence and information are the most fundamental and productive parts for frameworks organization and what's more on money related division. For the interconnection of people, to talk with one another and to meet the consistently essentials of step by step life, frameworks are ending up increasingly basic. The business frameworks must have be corresponding concerning time and should be continually under faultless upkeep and verified in the midst of the distinction in surge hour gridlock stack. Along these lines, fitting orchestrating is must to layout a business arrange before execution occurs. A better than average framework reliably has the lion's share of its documentation for future reference and particularly masterminded.
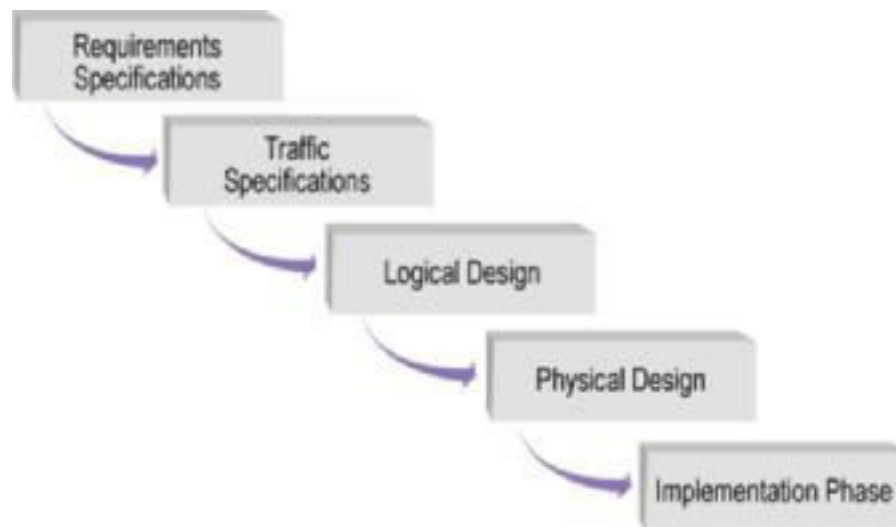

Figure 2.1: Network design steps**.**

2.2 Network Device

Switch: In frameworks organization part, Switch is a PC sorting out device that interfaces diverse devices together on a PC orchestrate, by using pack changing to get, process and forward data to the objective device.Multiple data joins are associated with a change to enable correspondence between different composed contraptions.
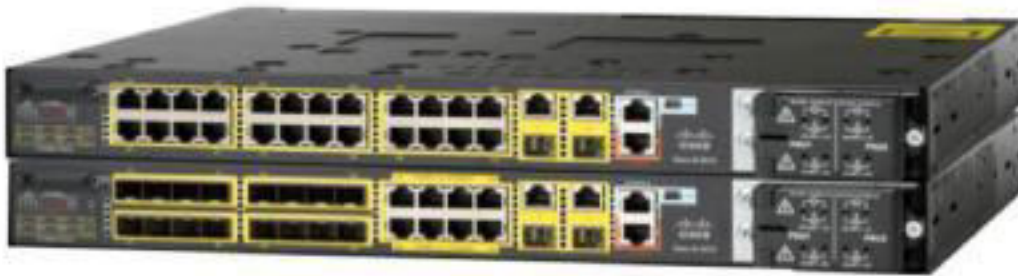

Figure 2.2: Switch

Router: In web or in a parcel exchanged systems, a switch is call a gadget or programming in a PC, which indicates the following free goal point on the system to which a bundle ought to be sent. In OSI (Open System Interconnection) display, a switch executes as Network Layer. Generally Cisco, Juniper, HP, Delink and Blink, Netgear, Nortel, Linksys ets.

Figure 2.3: Mikrotik Router

Figure 2.4: Router

Media Converter: Media Converters is such a sort of systems administration gadget which empower associations of UTP copper-based Ethernet gear over a fiber optic connect to exploit the advantages of fiber by expanding joins over more prominent separations utilizing fiber optic link, shielding information from commotion or any impedance and making advantage for expanding extra transmission capacity limit with regards to the future wide network.(Media converter hitter lazer - 7 to - 20 anoter lazer not bolster).

Figuer 2.5: Media Converter

DB Meter: In each commonsense sense each estimation in fiber optics suggests optical power surveyed in db. Power in a fiber optic structure looks like voltage in an electrical circuit. It's essential to have enough power, anyway not all that much. Too little power and the gatherer will more then likely be not capable see the flag from disarray; an extensive proportion of essentialness over-loads the beneficiary and causes messes up as well.

Figure 2.6:DB meter
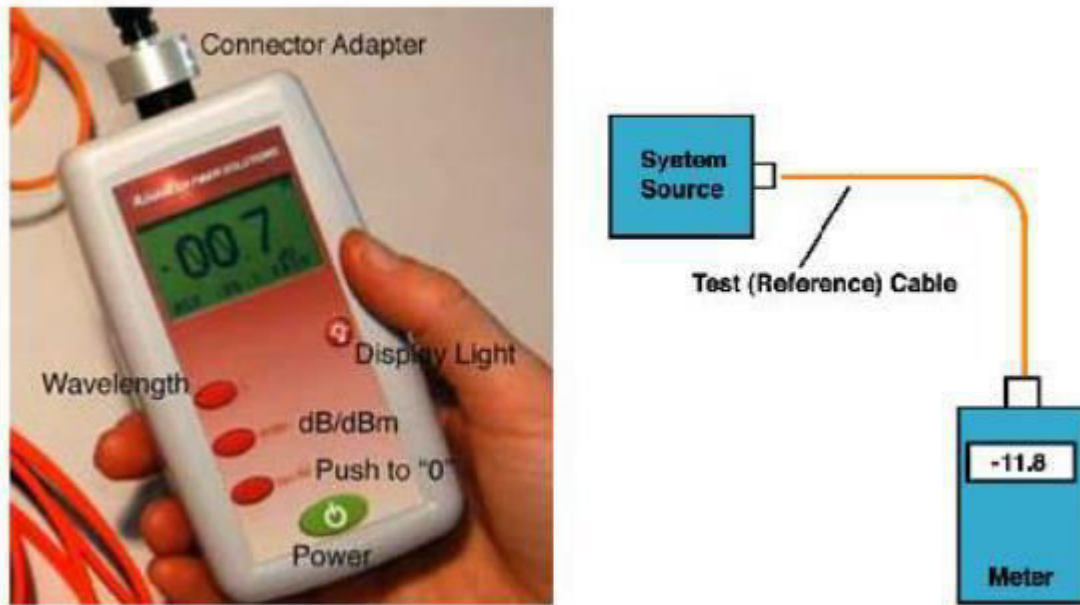
ONT

Figure 2.7:ONT

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Basic ONT/Modem Information and Troubleshooting. The ONT (furthermore called the modem) partners with the Termination Point (TP) with an optical fiber connect. It interfaces with your switch by methods for a LAN/ethernet connection and decodes light banners from the fiber optic line from your TP into electronic signs that your switch can peruse .

2.3 Cabling
Isp or network system mainly use many type of cabling system .I will describe for two type

Fiber Optic: An optical fiber is a versatile, direct fiber made by illustration glass (silica) or plastic to an estimation fairly thicker than a human hair. Optical fibers are used routinely as an approach to transmit light between the two completions of the fiber and find wide use in fiber-optic correspondences, where it permit transmission over longer divisions and at higher exchange speeds than wire joins.

Advantage of fiber optic:

1. Transmission of higher information transmission to longer division.

2. Information can be transmitted cautiously instead of analogically.

3. Costs less to keep up.

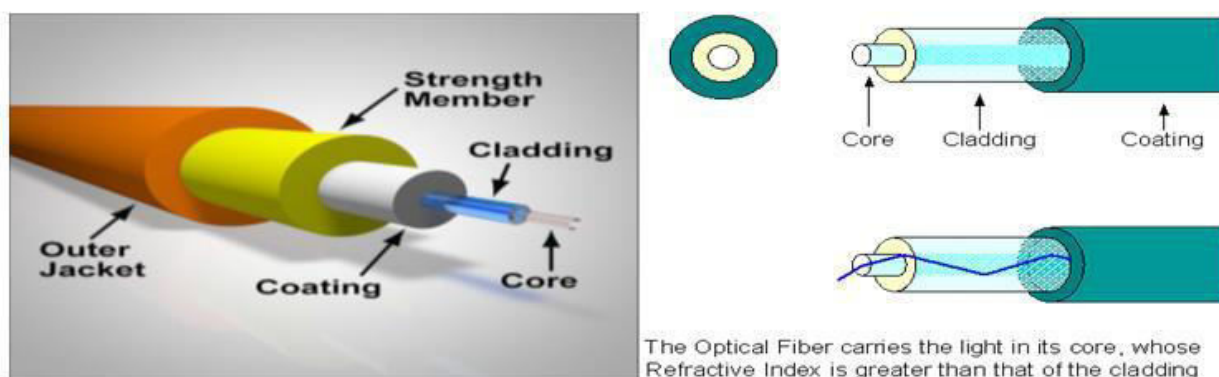4. Considerably lighter and more thin than various connections.
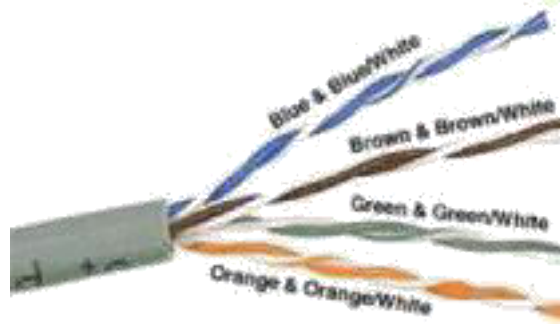

Figure 2.8: Fiber optical cable

Figure 2.9: Internal Cable Structure and Color Coding

We use UTP (Unshielded Twisted Pair) Ethernet connection of at any rate Category 5 (Cat 5). Cat 5 is required for key 10/100 helpfulness, you will require Cat 5e for gigabit (1000BaseT) movement and Cat 6 or higher gives a proportion of future fixing.

RJ45 Pin #	Wire Color (T568B)	Wire Diagram (T568B)	10Base-T Signal 100Base-TX Signal	1000Base-T Signal
1	White/Orange		Transmit+	BI_DA+
2	Orange		Transmit-	BI_DA-
3	White/Green		Receive+	BI_DB+
4	Blue		Unused	BI_DC+
5	White/Blue		Unused	BI_DC-
6	Green		Receive-	BI_DB-
7	White/Brown		Unused	BI_DD+
8	Brown		Unused	BI_DD-

Figure 2.10:Table of Color Coding

White-Orange\Orange\white-green\Blue\White-Blue\Green\White-brown\Brown

Chapter-3

Internship Activities

This report is about ISP arrange plan and support from Network Operation Center (NOC). The central works of NOC is to ensure the most ideal upkeep advantage, giving trustworthy relationship with the clients, ensure high security of the framework and giving required information related to the framework to client.

3.1 ISP NOC support technique: Checking of the entire system is the fundamental errand of NOC office. For checking purposes Prisma advanced NOC utilizes Network Performance Monitoring apparatuses like Wathermap,bandwath ,uplink and Downlink of optical fiber and Cacti.
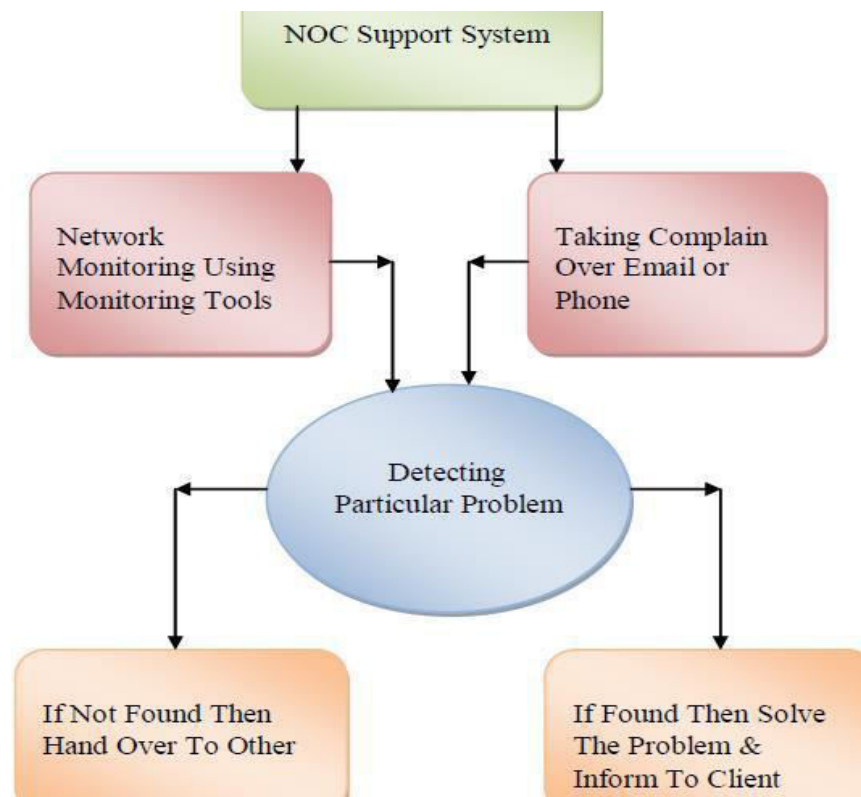

Figure 3.1: ISP NOC support technique

3.2 Network Monitoring Using Monitoring Tools: Firstly i will deceive network monitoring tools.

1.Cacti

2.Weathermap

3. MRTG

4. Winbox

Cacti: Desert plants is a whole framework graphing game plan planned to equip the vitality of RRDTool's data accumulating and diagramming handiness. Thorny plants give a fast poller, pushed chart tinplating, various data getting methodologies, and customer organization features. Most of this is enveloped by a fundamental and easy to use interface that looks good for LAN-examined foundations to complex frameworks with a few devices
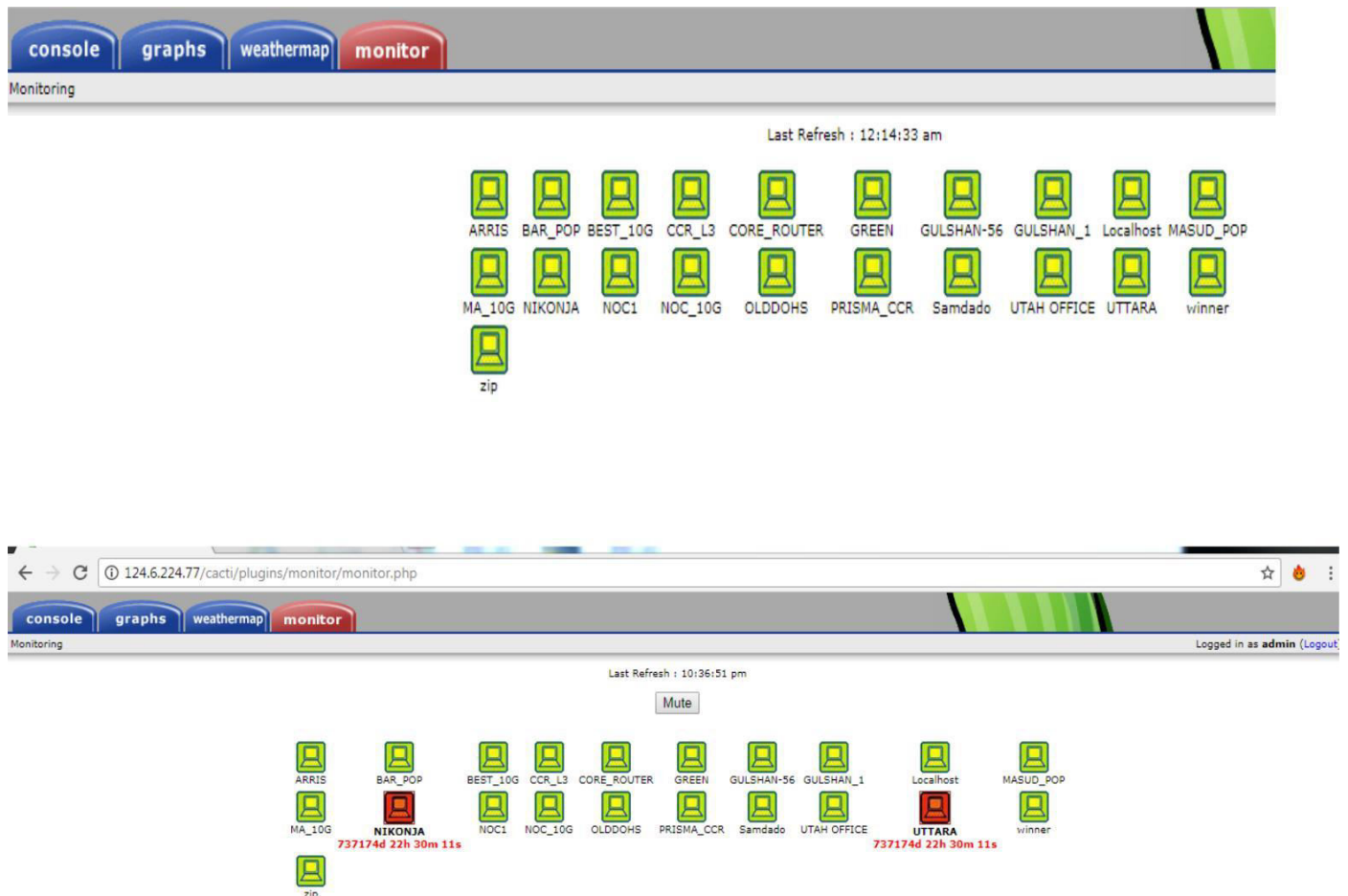

Figure 3.2: Cacti

Monitoring pop in cacti software . This software pop and down work.If pop is going down then maintenance work have to be down. POP down cacti software found red single pop up monitor found green single .

Weathermap: Weathermap is cabling observing software monitoring to see locales are going easily or not.Checking transmission capacity by wathermap .Also checking there is fiber cut or not by weathermap.
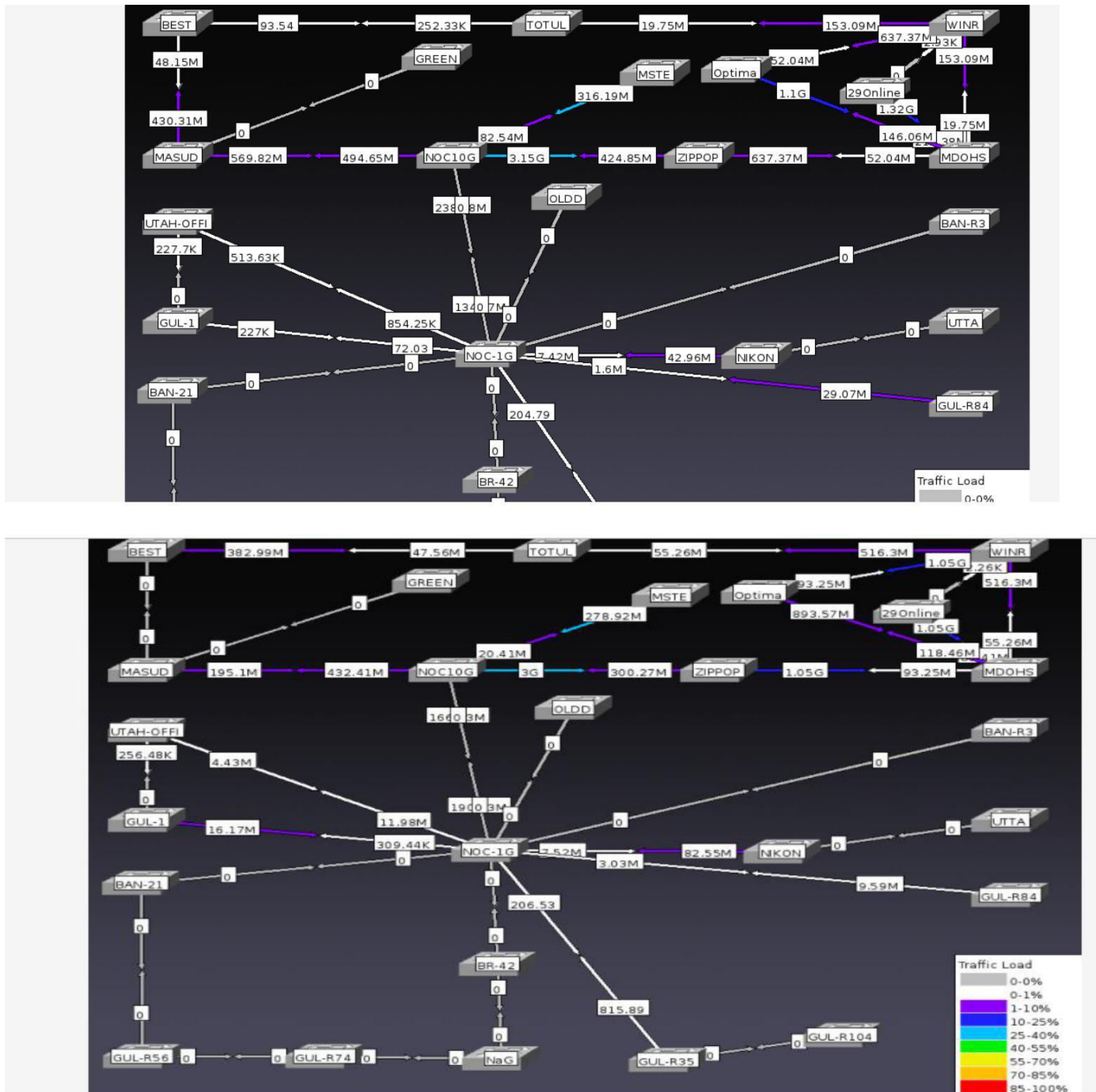

Figure 3.3: Weathermap

MRTG: MRTG stays for Multi Router Traffic Grapher, is an utility that is essentially works for heads and customers to screen the data trade occurring through a switch or other kind of contraption. The devices that assistance the Simple Network Management Protocol can be obligated to seeing through MRTG.
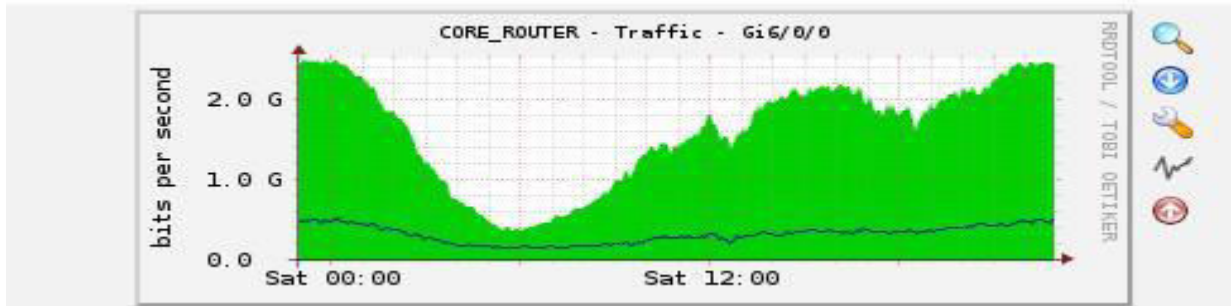

Figure 3.4:MRTG

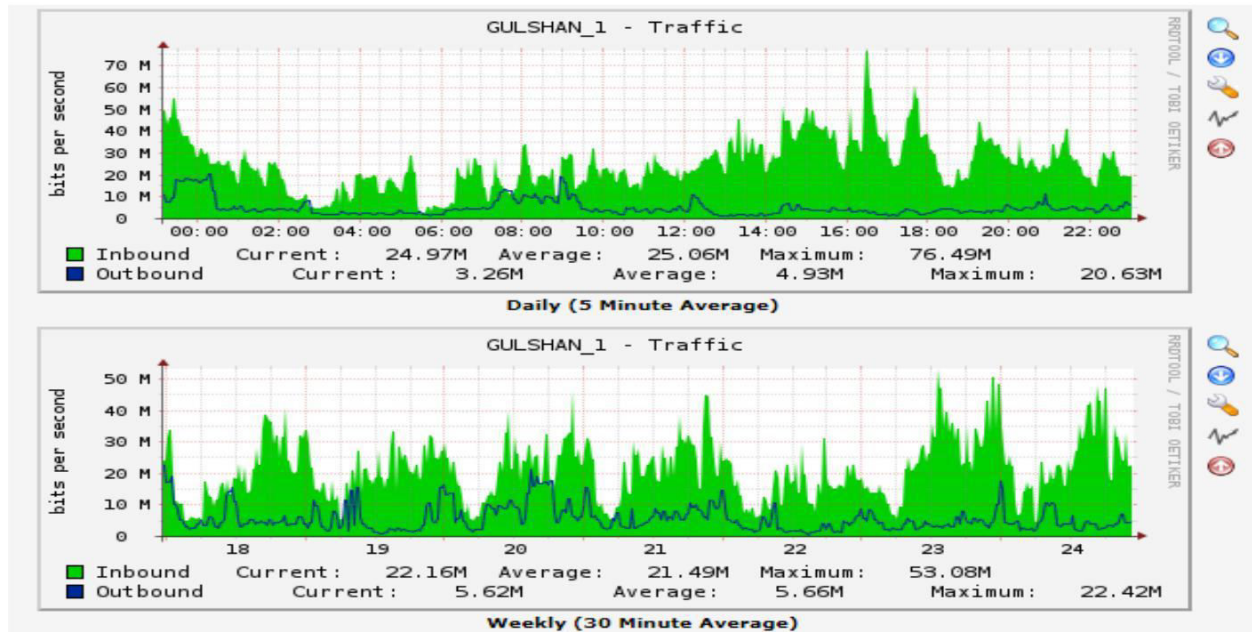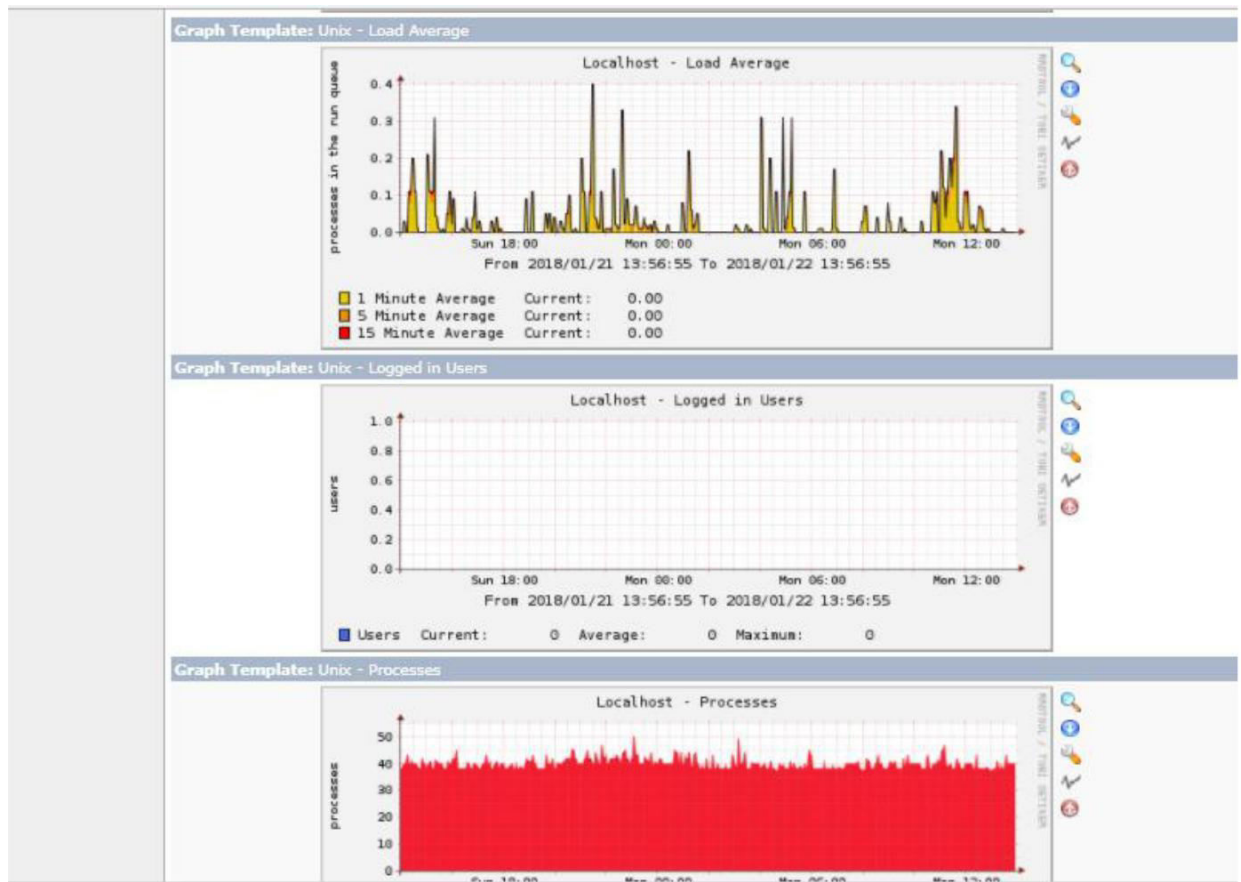**Figure 3.5:** Traffic analysis for individual link showing on MRTG

©Daffodil International University

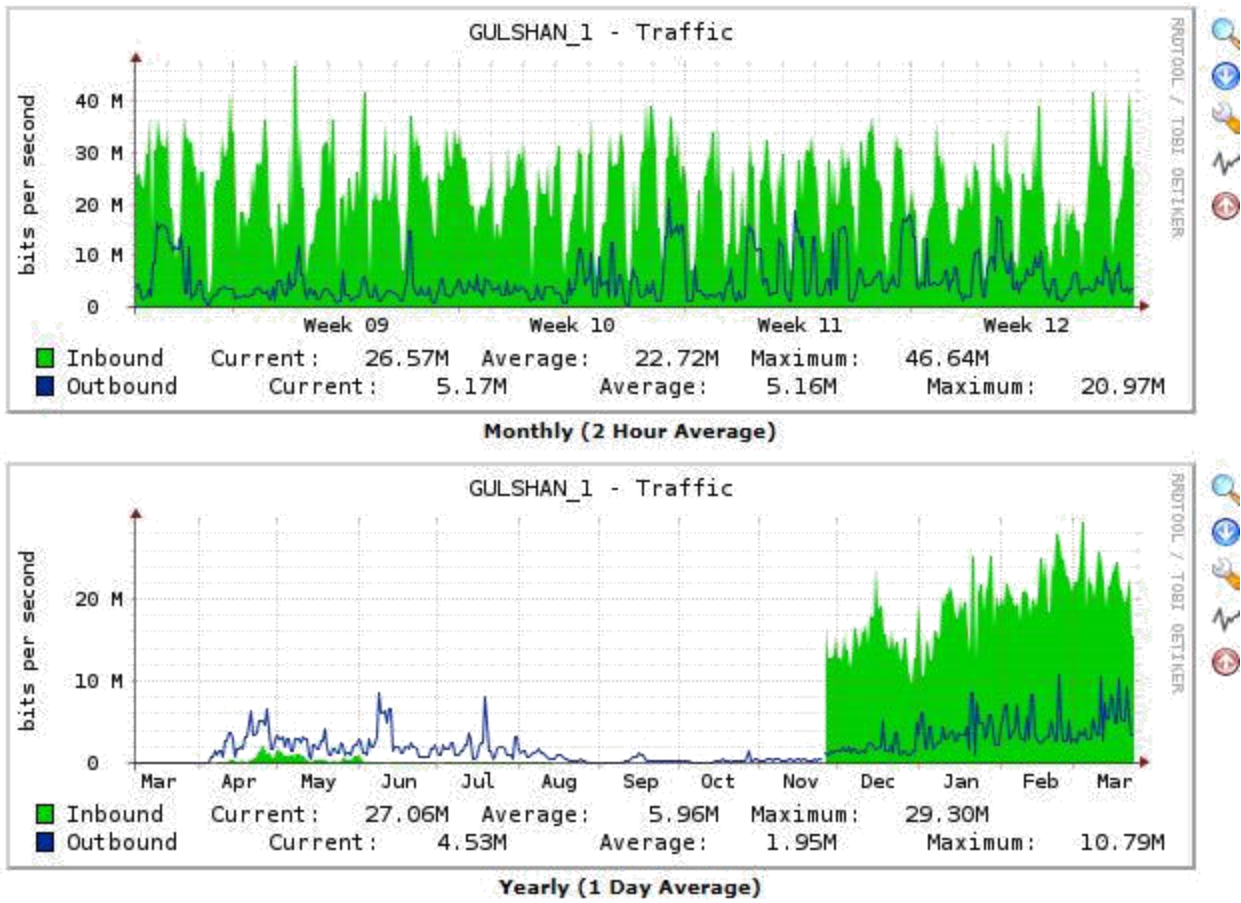**Figure 3.6:** MRTG INDEX PAGE (Traffic summery of diffrenent router and wathermap)

Figure 3.7: The image below is call customer manageable software .Through this image the customer can see how much bandwidth use is doing.

Winbox: Winbox is one of the interfaces to plan the Mikrotik Operating System switch which is starting at now a common running on the working structure Microsoft windows and MAC. It is progressively valuable for graphical UI and besides has comfort structure. Here are a couple of points of interest of Mikrotik switch using Winbox.
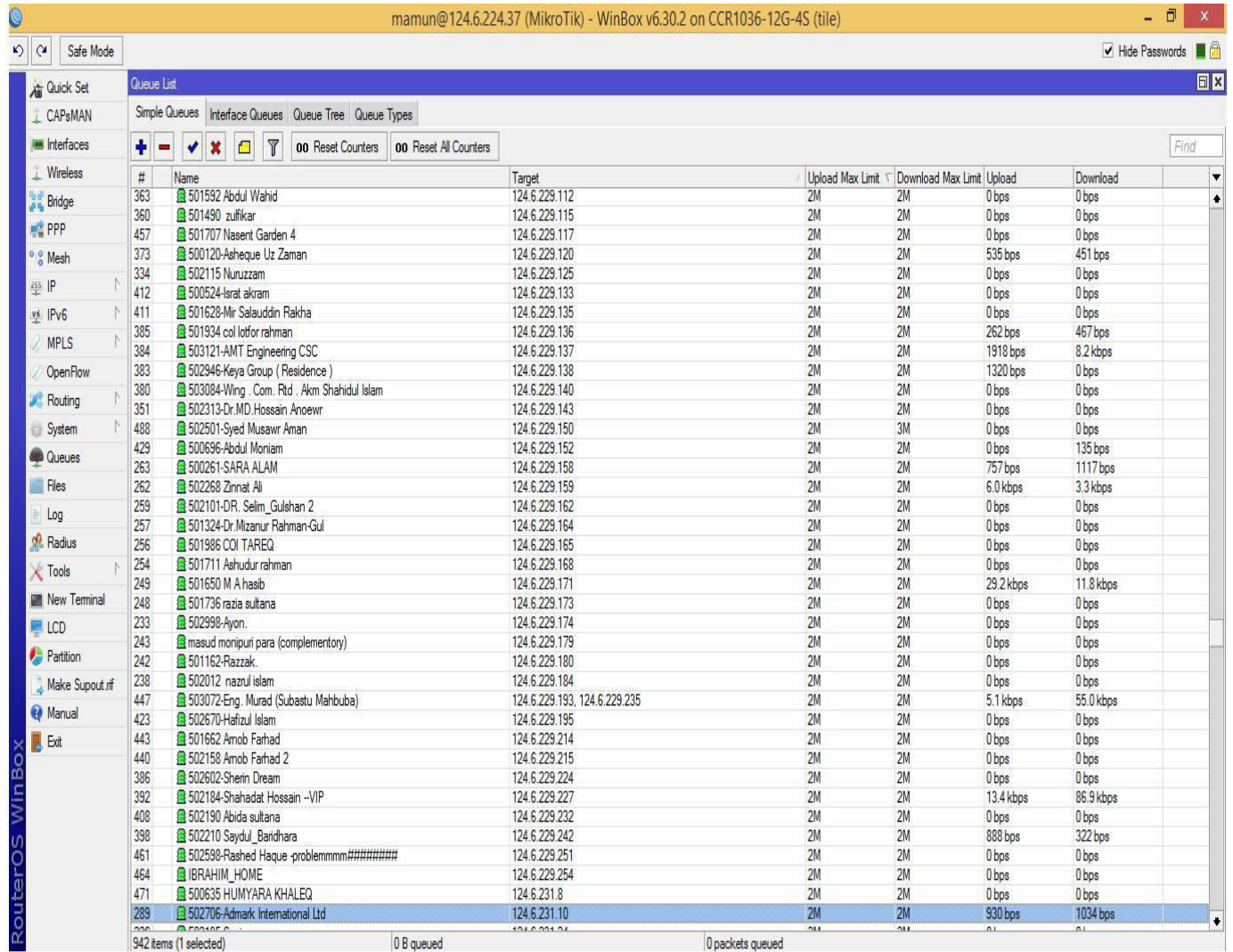

Figure 3.8: Winbox

Winbox Work to increase the bandwidth and reduce the customer MAC address.If we get customers message we understand that the internet is working and the internet dose not work if there is no MAC address.

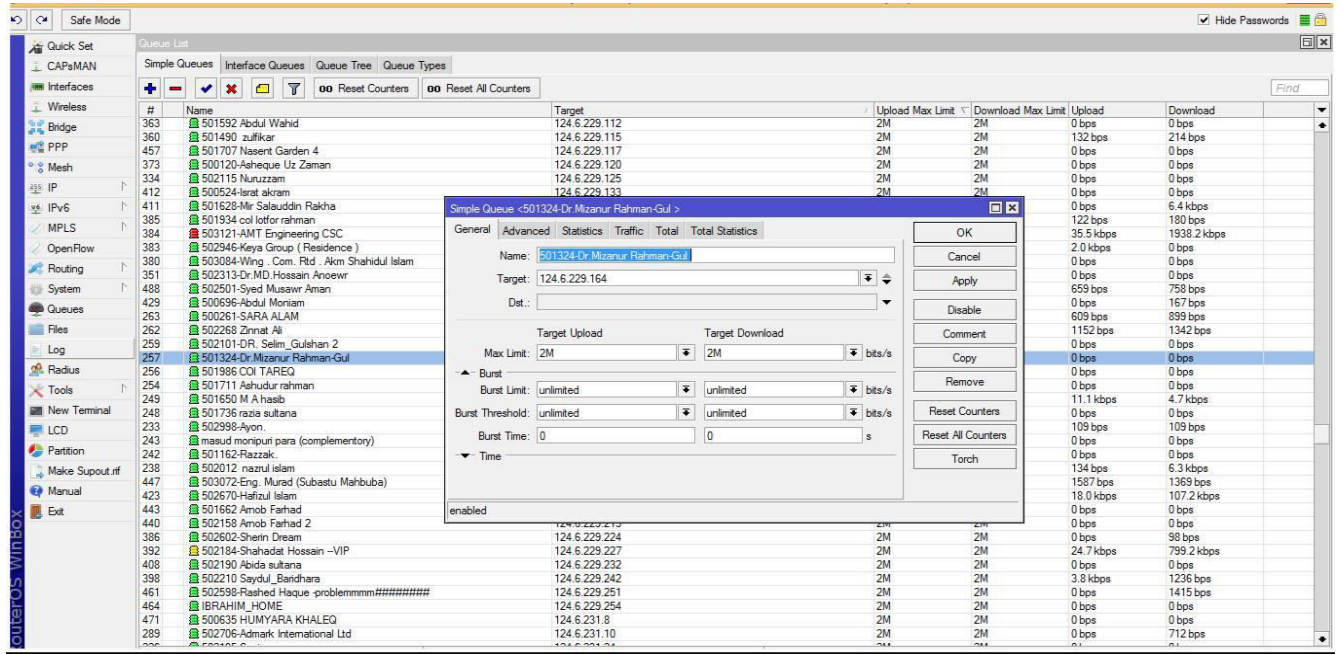©Daffodil International University

Figure 3.9: The picture below shows how bandwith is offered to customer.

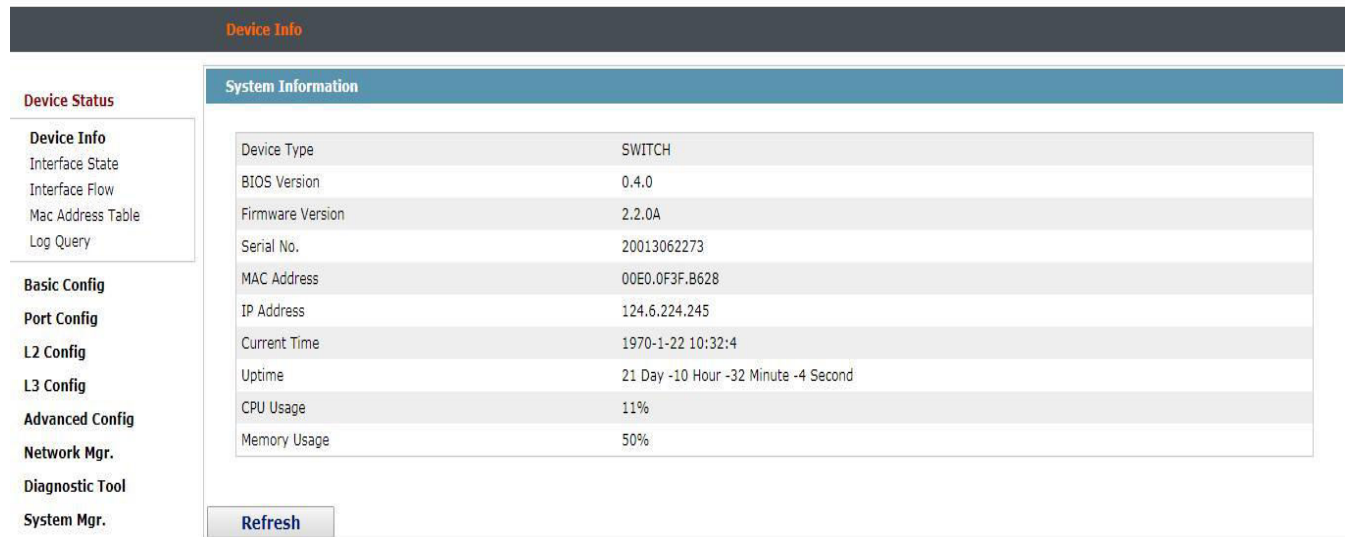**Switch port status:**Switch port status, transmit and receive alert for individual nodes.

Figure 3.10:switch device information

Here is the situation of various port status on an individual switch. On the left side, green shading comments the UP status of switch port, red shading comments the down status and red crossed image characterizes the shutdown status for the switch ports.
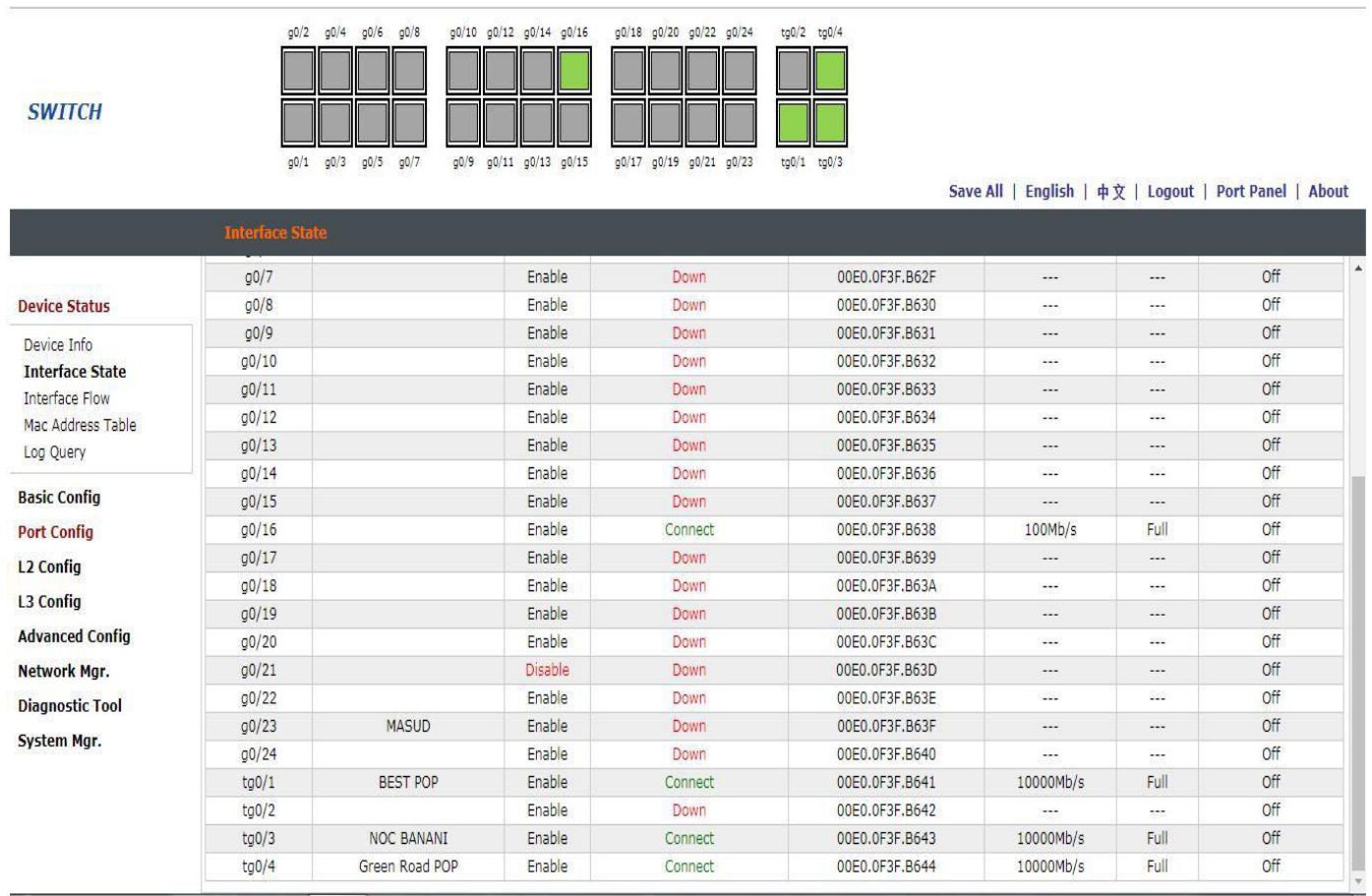

Figure 3.11: Switch port status for one node.

3.3 Taking Complain Over Email or Phone

When the customer is complien customer service Then call her ID number.(example :506178).Customer service compline send the customer Support is the first check customer complien.Then update the latter in taket box with problem And try to solve its problem.For example the picture below .

SEARCH 22-01-2018 PICK DATE
SEARCH 22-01-2018 PICK DATE

Opened Ticket

SL	::	Ticket ID (EDIT)	Client Name (Detail)	Complain/Problem	STATUS
1	☐	12242017-170947	Bio Dent.........503100	New Connection Form forward to Mr. Mamun and Ibrahim.....Hasan	PENDING
2	☐	01222018-115552	SAS Group-502482	No Connection	PENDING
3	☐	01222018-111241	MD. Azizur Rahman.....502985	T. D.C To Re Connection.................Form Forward to Mr. Zakir Ref: Siraj Biling	PENDING
4	☐	01222018-111130	DMD Mujibur Rahman	NO CONNACTION	PENDING
5	☐	01222018-105747	Roswitha Amels (German Emb)	T.D.C. From Forwarded To Mr.Zahidul . ...Rubel	PENDING
6	☐	01222018-105700	Mehrin-501877	No Connectivity	PENDING
7	☐	01222018-105248	Cor.Salam-502419	No Connectivity	PENDING
8	☐	01222018-105228	A B M Shajahan	D.C. From Forwarded To Mr.Zahidul . ...Rubel	PENDING
9	☐	01222018-083633	Col Salam ----- 502385	No Connectivity	PENDING
10	☐	01212018-210947	Sohel......500549	No Connectivity	PENDING
11	☐	01212018-203542	Shabir Hussain.....501003	No Connectivity	PENDING

▶ Ticket ID	:	12242017-170947
▶ Customer Name	:	Bio Dent.........503100
▶ Open Date	:	24-12-2017
▶ Open Time	:	05-09 pm
▶ Complain (Trouble)	:	New Connection Form forward to Mr. Mamun and Ibrahim.....Hasan
▶ Action (CS)	:	01811422217
▶ Action (Support)	:	[need to collect A Type MC for house from Zakir vhai] Talk with customer he will inform us after 18-01-18...........Zahedul.......15-01-18 Talk with customer he will inform us after 24-1-18......Shakil.........22-1-18
▶ Remark (If any)	:	[need to collect A Type MC for house from Zakir vhai]
▶ Set Ticket Status	:	SET - Problem Status ... ▼
▶ Probable Solve Date	:	25-01-2018
▶ Concern Department	:	02 - CUSTOMER_SUPPORT ▼
▶ Ticket Open By	:	rubel

Figure 3.12: Taking System

Chapter-4

Methodology

In this part, we will discuss the arrangement technique of a corporate framework, strategy of the downtime of framework and security of the framework.

4.1 Backbone Network Design: To structure a corporate system, we have to pursue a few decides that make a system progressively productive. A structured corporate system has a few objectives.

1. Scalability

2. Redundancy

3. Performance

4. Security

5. Manageability

6. Maintainability

4.2 Hierarchical network is mainly divided into three layers.

Core layer: The inside layer is a fast trading spine and should be planned to switch packages as speedy as could be normal considering the present situation. This layer basically interfaces the other movement layer contraptions. Focus Layer contains most noteworthy, speediest, and most expensive switches with the most bewildering model numbers and Core Layer is considered as the establishment of frameworks .

Distribution layer This layer interconnects the more diminutive close-by frameworks with focus layer. Spread Layer is arranged between the passageway and focus layers. Spread layer contraptions in like manner consistently direct particular branch-office WAN affiliations.

Access layer: This layer offers accessibility to organize has and inverse end contraptions. Access layer consolidates get to switches which are related with the end contraptions (Computers, Printers, and Servers, etc). Access layer switches ensures that packs are passed on to the end devices.
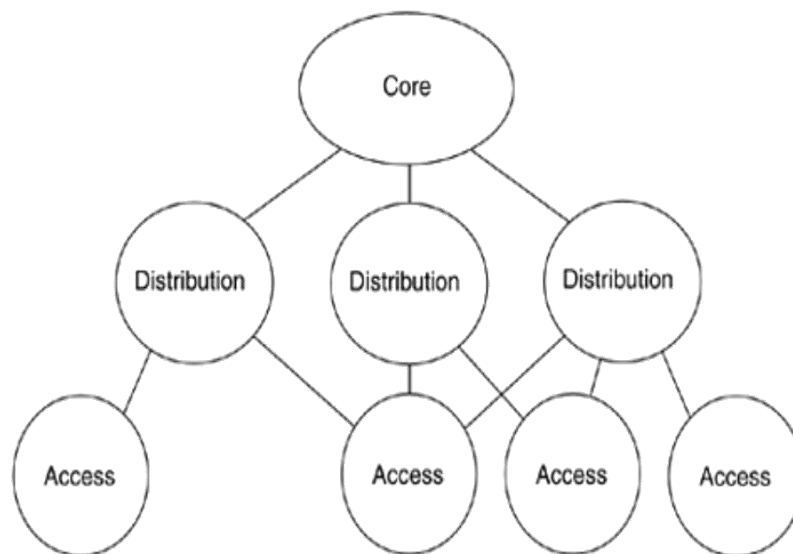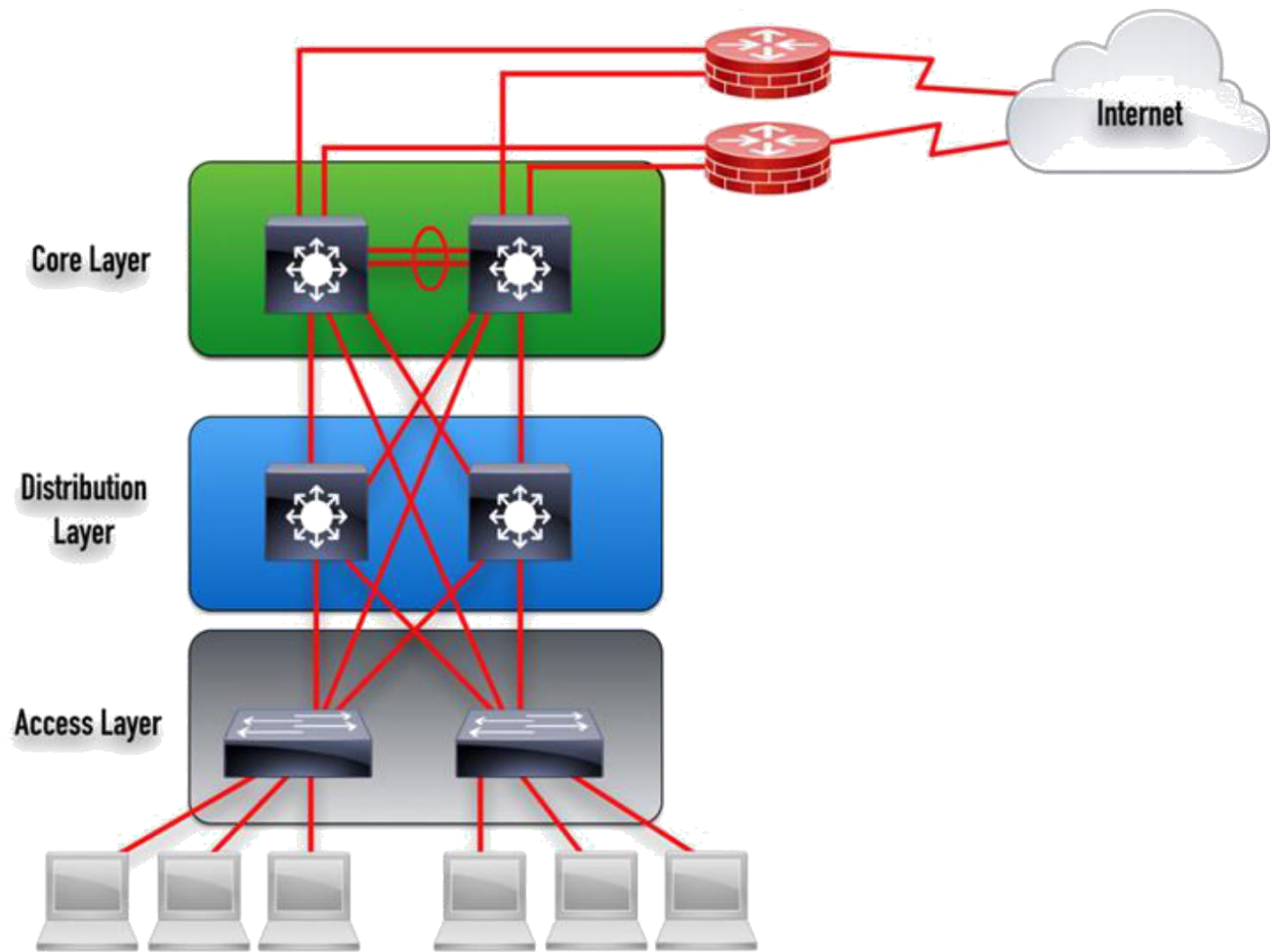
Figure 4.1: Hierarchical network layer.

Design of Core Layer

- **The key characteristics of core-layer are following:**

- Quick transport and huge measure of information

- Redundancy

- High dependability and accessibility

- Low inactivity and great sensibility

- Fault resistance

- Limited and reliable measurement

Devices of Core Layer

Top of the line switches and switches

• Layer-3 switches

• Gateways and media converters

• Soft Switches for IP phone

Design of Distribution Layer

key characteristics of distribution-layer are as following:

• Hiding inside system numbers by course separating

• Static steering

• QoS instruments, for example, need based lining

• Redundancy and load adjusting

• Aggregation of LAN wiring storerooms and WAN associations

• Security sifting

• Route rundown

• Routing between virtual LANs (VLAN)

• Redistribution between steering areas.

Devices Distribution Layer:

• LAN Router

• Layer 3 Switches

• Bridge

• Filter (Like Firewall)

• VPN Access Router

Design of Access Layer

key characteristics of access-layer are as following:

• High accessibility

• Layer 2 exchanging

• Port security

• Broadcast concealment

• Rate constraining/policing

• Address Resolution Protocol (ARP) investigation

• Spanning tree convention (STP)

• Power over Ethernet (PoE) and assistant VLANs for VoIP

Devices of Distribution Layer

• End Devices (Desktop, Laptop, IP Camera, Printer)

• WEB, FTP, Email Server

• Repeater

• Hub Database Server

• Video conferencing

• IP communication

CHAPTER-5

Conclusion and Future Scope

5.1 Conclusion and Discussion: In study this impermanent position has been an incredible and compensating foundation. I have had the ability to meet and framework with such an extensive number of people that I am sure will have the ability to assist me with conditions later on. One essential worry that I have learned through this impermanent activity is time organization capacities and moreover self-motivation. When I at first started I didn't envision that I would have been prepared to impact myself to sit in an office for eight hours of the day, five days seven days. When I comprehended what I expected to do I dealt with my day and work with the objective that I was not covering or wasting my hours. I found that I ought to have been created and have questions arranged for when it was the correct time to get analysis. From this impermanent position and time organization I expected to make sense of how to stir myself through being in the work environment for such gigantic quantities of hours. I prepared diverse recommendation and contemplations that the affiliation is up 'til now exploring using. Wherever on these, this section level position make me certain and excited to grow up my carrier with frameworks organization. I feel that every IT establishment understudy should go for some sensible planning or section level position that can develop his helpful data and more sharpened particular and regulatory expertise[3]

5.2 Future Scope

At showcase I am used of prisma electronic network.I am so far keeping my options open for new openings. I value this calling, anyway I don't realize whether there is adequate space to create through this affiliation. I will continue buckling down in my position and need to continue finding out about the division and meet new people. This was a radiant difficulty and I believe that diverse understudies got as much consequently as I did! There are a goliath number of Network associations in our country and they select significantly number of Network Professionals. Each immense association or Govt. Affiliation furthermore chooses different framework capable for keeping up their Enterprise Network System. Plan, Network Monitoring of an ISP's Network Scenario.So I think this transitory activity gives a promising future to me and help to headway my master carrier in future.

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