Empirical Study on Webserver, Webmail and Mikrotik Router and Firewall Configuration of Watermark Group

By

Abdullah-Al Mamun

ID 153-19-1822

This Internship report is submitted in some satisfaction of the prerequisites of the level of four-year education in Electronics and Telecommunication Engineering

Supervised by

Engr. Md. Zahirul Islam
Assistant Professor
Department of ETE
Daffodil International University

Daffodil International University

Dhaka-1207, Bangladesh

October-2019

Watermark

TO WHOM IT MAY CONCERN

This is to certify that **Md. Abdullah Al Mamun** son of Mr. Md Abdul Khalek and Mrs. Dil Akhter Banu, an undergraduate student of Daffodil International University under the Department of Electronics and Telecommunication Engineering, successfully completed his Four months (10th June'19 -2nd October'19) long Internship at this company.

His internship activity includes **understanding, implementational and operational maintenance of Mikrotik Router, Webserver and the Webmail Server** under the supervision of IT Department of Watermark Group.

During the period of his internship program with us, he displayed great enthusiasm and dedication.

We wish him every success in this life and career.

Samsul Bashar
Director : Human Resource
Watermark

Samsul Bashar
Director | HR & Admin
Watermark Group

APPROVAL

In this Internship Titled **"Empirical Study on Webserver, Webmail and Mikrotik Router and Firewall Configuration"** of **"Watermark Group"** under the supervision of **"Watermark IT Limited"** is submitted by **Md. Abdullah Al-Mamun** from the Department of **Electronics and Telecommunication Engineering** of **Daffodil International University** has been avowed as fit for the some satisfaction of the condition for the Degree of Electronics & Telecommunication Engineering and affirmed as to it is style and guts. The allowance will be hung over **October, 2019**

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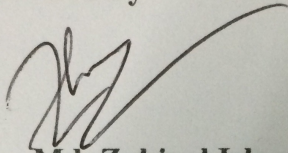Daffodil International University

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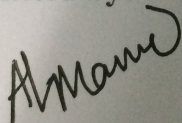University of Dhaka

External Examiner

DECLARATION

I thus claim that this internship report has been finished across me under the supervision of **Engr. Md. Zahirul Islam, Assistant Professor**, Department of **ETE, Daffodil International University**. I, additionally charge that neither this report nor any piece of it has been submitted away for honor of some degree or certificate.

Supervised by

Engr. Md. Zahirul Islam
Assistant Professor
Department of ETE
Daffodil International University

Submitted by:

Md. Abdullah Al Mamun
ID: 152-19-1822
Department of ETE
Daffodil International University

ACKNOWLEDGMENTS

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Abdullah-Al-Mamun

ABSTRACT

Network management is challenging. To operate, maintain, and secure a communication network, network operators must grapple with low-level vendor-specific configuration to implement complex high-level network policies. Despite many previous proposals to make networks easier to manage, many solutions to network management problems amount to stop gap solutions because of the difficulty of changing the underlying infrastructure. Watermark is a group of company relates its business with IT Components, Livestock's, Garments, Media consultant agency, and etc. In the field of engagement watermark IT is related to work in very common sector between other concerns as an IT Service Provider. Watermark is a very well-developed organization in trends of the 21st century. There is distinctive sort of service in the framework that is the reason in like means one of a kind sorts of server have. For Example - Firewall, Interfaces, Routes, DNS, DHCP, NAT, ARP and Bridge. In this report the network infrastructure, communication, support, maintenance, security and development of Watermark studied thoroughly. The existing network is well formed and up to date. But there are few limitations are there which may overcome which is also addressed in this report.

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CHAPTER 1
INTRODUCTION

1. Introduction

Internet is like a cloud of crore information and about tens of thousands of kilometres of fibre optic cable, hundreds of thousands to millions of kilometres of copper line connected each other by hardware and software in a redundant, fast, and self-sufficient network. In any case, not to stress, it's not much that horrible we only need to stress over a little part of the system. Nowadays This is the world's largest connecting spider webs which connect Billion of peoples in the same network.

1.1.   Company Profile

Watermark is a very well-developed organization in trends of the 21st century. After a start with the Consultancy services watermark increase its expertisement in a very specific way. In a very few years of being in the market, it increases its business to the livestock sector by name "Watermark livestock management services limited". As a consultancy startup, Watermark thought to expand its business to the Information and Communication sector. After the flow of the expandation Watermark opened a sister Concern named "Watermark IT Limited".

Watermark Group

House-6, Road-2, Block-B, Lalmatia, Mohammadpur, Dhaka-1207

02 810 06 06 **|** info@watermarkbd.com **|** www.Watermarkbd.com

1.2.   Objectives

In this modern arena, we are developing each and every day, we are developing ourselves through digital technology, we are following the digital trends to become a well establish and skilful caste. As our Prime Minister's vision, we are dreamt to be a developed country based on Information and communication technology were to become an ICT background student we are expecting a big marketplace to work, recourse to recharge, and more to be skilled with the latest technology. So, it is a great opportunity for me to be a part of the vision of our honorable Prime minister Sheikh Hasina. Watermark IT Limited is basically organized with the latest technology skilled person those who have a good idea and knowledge about the recent trends, recent market, and recent technology. So, from technology curiosity, I decided to intern here to get a new path for my career Journey. Here I can be familiar with the various device of the networking site, where the concepts about the MikroTik router is impressed me. Because of the very easy and effective opportunity for managing bandwidth Mikrotik Router is very necessary equipment for the data centre.

1.3.   Motivation

As an Electronics and Telecommunication students I am seeking for the suitable organizational intern position to learn, to develop, to enrich myself as preparation in a long journey of my career. Currently I am studying at Daffodil International University. In the midst of the ephemeral action I have uncovered that I am perfectly skilled in the modest mechanisms of MikroTik. As internship position owner, I've communicating what is at the forefront of my thoughts to a great degree well, talking with people, considerate their requirements and giving them the better organizational support. My motility gag in my capacity to widely inspect and cover this condition and law quickly yet then intensely.

1.4.   Internship Goals

As an Electronics and Telecommunication students I am seeking for the suitable organizational intern position to learn, to develop, to enrich myself as preparation in a long journey of my career. Currently I am studying at Daffodil International University.

In the midst of the ephemeral action, I have uncovered that I am perfectly skilled in the modest mechanisms of MikroTik. As internship position owner, I've communicated what is at the forefront of my thoughts to a great degree well, talking with people, considerate their requirements and giving them better organizational support. My motility gag in my capacity to widely inspect and cover this condition and law quickly yet then intensely.

1.5. Report Layout

In the First section Relate motivation of internship and inspiration and boundings.

In the Second section This section covered the Basic methodology of internship and company initiative.

In the Third section, I Displayed about preparing, responsibilities, fundamental charge and portrayed about various kind of steering setup like DHCP, ARP, Firewall etc.

In the Fourth section, I Represented results of internship program and analysis.

In the Fifth section, I Portray about my report decision and future scope of MikroTik.

In the Sixth section, I cover the whole report ending summary "Conclusion".

1.6. Summary of the Report

The main goal of my internship is to face a practical session on the Mikrotik router and web server maintenance and Webmail management to improve my ability and knowledge of what is being used in a corporate office. Here I improved my knowledge about fundamental of Mikrotik router and configuration of Mikrotik router and maintain of Mikrotik Router, Installation of the webserver and the maintain of Webmail server and about another official manner, project management. In the first chapter, I tried to cover the terms and objectives with background about my internship, and what I was learning and what I was instructed. I described background of Watermark and described its services and vision and other activities. Then in the Second Chapter, I mainly discussed internship initiatives. In the Third Chapter, I described Networking and in chapter four, I described rules, regulation and responsibility of Internship. In the end, two chapters number fifth and sixth I talked about Internship outcomes and conclusion. I think this will cover a summary of my internship report.

CHAPTER 2
INTERNSHIP INITIATIVE

2. About Watermark

Watermark is a group of company relates its business with Livestock's, IT Components, Garments, Media consultant agency, and etc. In the field of engagement watermark IT is related to work in very common sector between other concern as an IT Service Provider. Watermark is a very well-developed organization in trends of the 21st century. After a start with the Consultancy services watermark increase its expertisement in a very specific way. In a very few years of being in the market, it increases its business to the livestock sector by name "Watermark livestock management services limited". As a consultancy startup, Watermark thought to expand its business to the Information and Communication sector. After the flow of the expandation Watermark opened a sister Concern named "Watermark IT Limited".

2.1. Services of Watermark IT

Watermark IT Limited is a sister concern of Watermark Group which give services based on other concern's necessary. so, what Watermark IT provide is given below:

a)   The solution of the corporate internet Networking.

b)   The solution for Security.

c)   Domain Registration and web Hosting.

d)   The development of the website.

2.2. Preface of job Market

Bangladesh is now in a development era what requires to digitalise country within 2021 in a sustainable way. So, to be digitalized country it's a very high expectation to prepare a huge number of qualified IT specialist to develop the sector. There are huge company

those who are developing itself in digital trends. In this situation, our market increasing its capacity and demanding more IT Expert. Imagining a basic part in the action, it is very much necessary to find an organization those who work with this standard like.

• Internet Solution.

• Safety confirmation.

• Web Site Improvement.

• Marketing.

So, in the very expecting situation, I want to express myself with WIT what will promote me as a key part in the IT-based work promotes

CHAPTER 3

UNDERSTANDING OF NETWORKING

3. Networking

Networking is basically a communicational process where we can share our data and other things through a very easy and trusted way, it expresses itself by using some of the different strategy and method by observing the distance, file type and other. This is a very essential function for service providers, where businesses and consumers from worldwide to share their resources, share about the different offers to communicate with one another. So, Networking facilitates everything include telephone calls, text messaging, streaming video and much of the internet of things. Day by Day Networking technology is improving its quality to give comfortable services to the consumers.

3.1. Importance of Networking

In this modern edge, Networking is very much necessary and a part of our life. By every step of our life, we are engaged with different types of networks where we are sharing our thoughts to our network-based platform. Now a day's network can be vital for our professional success related to being a successful person. In this situation, we need a very strong and expansive network what gives insight into trends as well as the insider information on our job openings in a new company.

I remind, these days when the social media didn't make, this was difficult to maintain a network worldwide, that time we were only connected with our job-related people who was our colleague also. But this time we are connected with thousands of people from our job background and other backgrounds, we can search by a click to collect thousands of professionals from all over the worlds. This helps us to find new contacts over the world, introduce us to the new trends of the market, we can now let people know what's the recent market analysis. So, on this changing and motivated living based on networking this is very necessary to communicate with the network to grow up.

3.2.   Types of Networking

The Network is communicational connection consents computers to connect together via any medium. LAN, MAN and WAN are the three major type of network which designed to operate all over the area they are capable to cover. There are some basic similarities and dissimilarities what separated them from each other.

3.3.   LAN (Local Area Network)

Local area networks (LANs) have become ordinary in the information age. The starter of low-cost computers, along with the need to share info and hardware resources, in an office environment led the way to the growth of reasonable LAN technologies. Local Area Network is basically used to crank up computers and another networked device to share one another's resources. We use this local area network to complete our daily work related to our office, courts or business houses. The LaN is the most highly related, because the only cable used here is limited by the maximum distance and no needed features of the LAN due to the building. This maximum use of cables used to share our information and other resources between times and we can save it to print or in the modern scanner
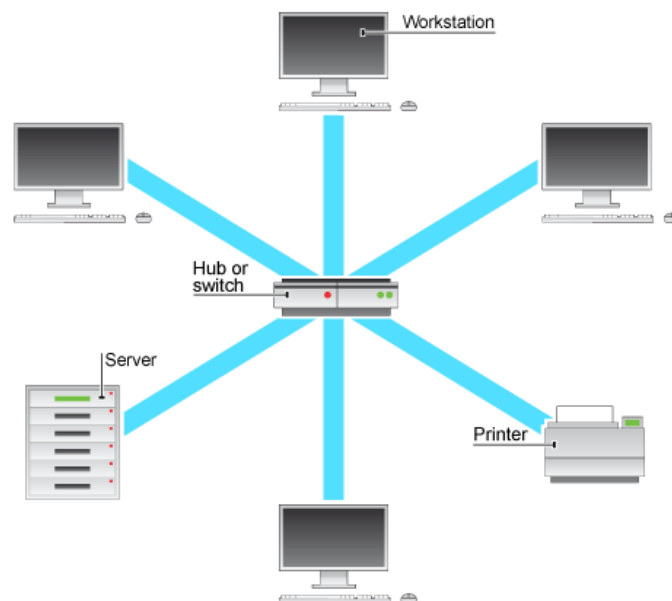
Fig 3.1 Local area network

3.4. Metropolitan Area Networks (MAN)

A network that usually covers an area larger than a local area network (LAN) and smaller than a wide area network (WAN), and interconnects two or more LANs, to covers an entire metropolitan area, such as a large city and its suburbs, to operates at higher data signaling rates than a WAN and uses multiple access methods MAN. A MAN is a relatively new class of network, covers the area of a single city. MANs rarely extend beyond 100 KM and frequently comprise a combination of different hardware and transmission media. It can be created as a single network such as Cable TV Network, covering the entire city or a group of several Local Area Networks. It this way resource can be shared from LAN to LAN and from computer to computer also. MAN is usually owned by large organizations to interconnect its various branches across a city.
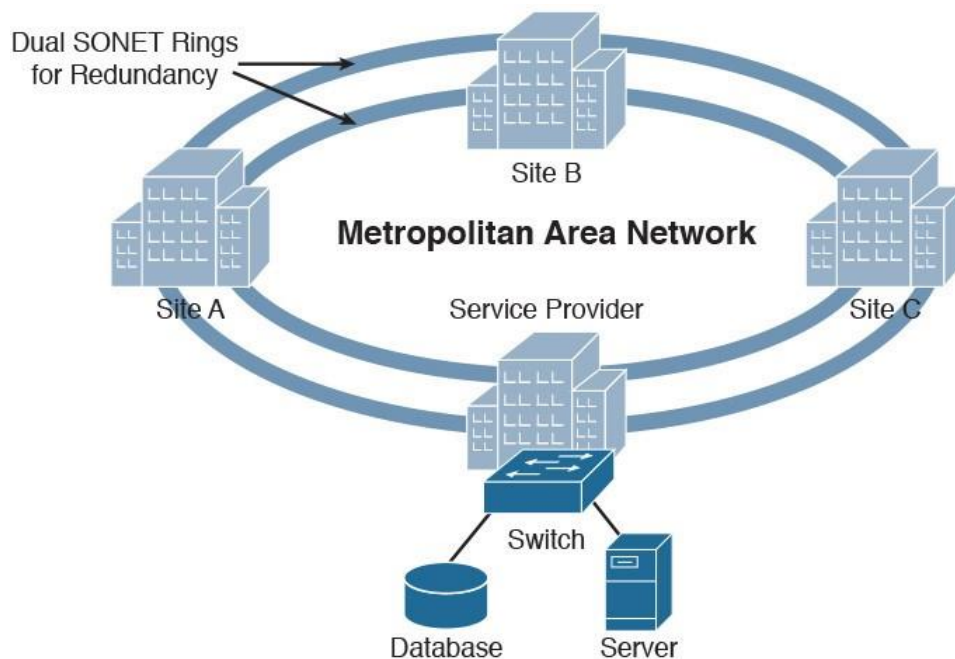
Fig 3.2 Metropolitan area network

3.5.   WAN (Wide Area Networks)

A wide area network (WAN) is a data network, usually used for connecting computers, that spans a wide geographical area. WANs can be used to connect cities, states, or even countries. WANs are often used by larger corporations or organizations to facilitate the exchange of data, and in a wide variety of industries corporations with facilities at multiple locations have embraced WANs. Increasingly, however, even small businesses are utilizing WANs as a way of increasing their communications capabilities. This type of network was developed using the telephone company only because of which the wide area network is difficult to grow, with special areas and technologies used to connect to different LAN. WAN of the plans to build more than the LAN is really hard to manage, because it is necessary to make a LAN across the globe, then in many cases the satellite is used. Most Wide Area networks work at 56kbps at 1.544 Mbps speed. The most basic uses of WANs are for electronic mail and file transfer, but WANs can also permit users at remote sites to access and enter data on a central site's database, such as instantaneously updating accounting records.

The features of Wide Area Network are

a. These networks can grow across a vast area and its expanses can be spread all over the world

b. slower than the local area network

c. It must use any internet wiring device such as router modem switches etc.

Fig3.3 wide area network

3.6. Networking Tropology

Network topology refers to the physical or logical layout of a network by expressing the way how different nodes are positioned and interrelated with each other. In turn, network topology describes how the data is transferred between these nodes.
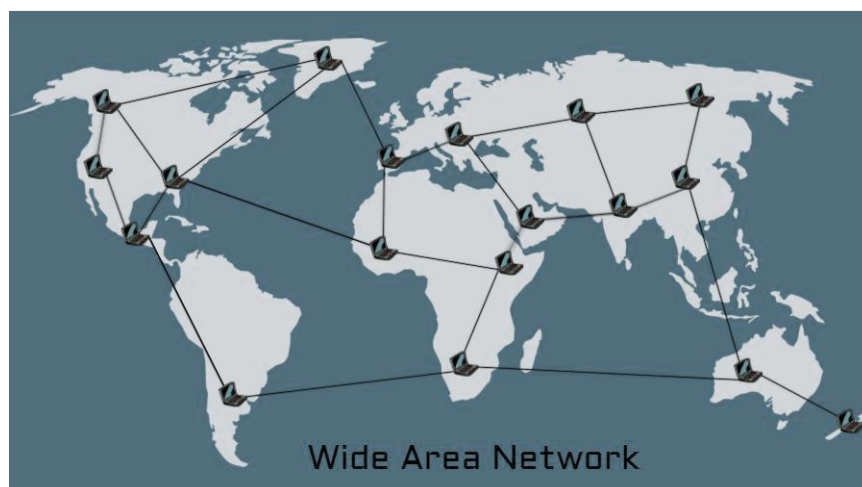
Network topologies express itself by two way: physical and logical. Physical topology emphasizes the physical layout of the connected devices and nodes, while the logical topology focuses on the pattern of data transfer between network nodes. In the case of network design, this tropology will play a special role, depending on the type of network that the network will use, the appropriate tropology must be selected. Network topology has some advantages and. Now we will discuss various network tropology and their advantages and disadvantages.

3.7. Bus Tropology

Bus topology is used simply to make bus poppies easy to be networked and expendable. A bus topology is a topology for a Local Area Network (LAN) in which all the nodes are connected to a single cable. The cable to which the nodes connect is called a "backbone". If the backbone is broken, the entire segment fails. Bus topologies are relatively easy to install and don't require much cabling compared to the alternatives.

All the devices/nodes are connected sequentially to the same backbone or transmission line. Thought This is a simple, low-cost topology, but its single point of failure presents a risk. A mistake in bus compliances goes straight and goes with each computer. This type of passive trolley is also called as the computer's signaling app can go directly to the computer, while the common bus network is used only with a type of electronic device such as a repeater or amplifier. It works well when you have a small network. But It can be difficult to identify the problems if the whole network goes down.
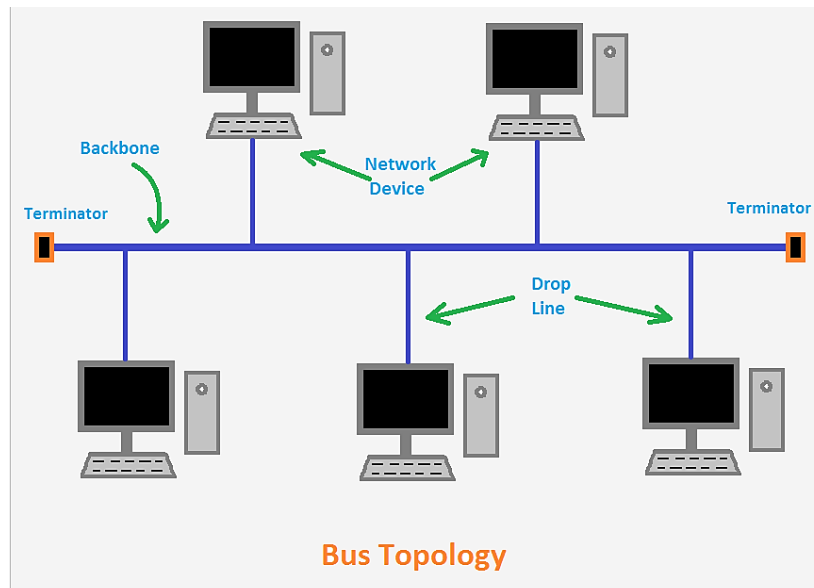
Fig3.4 Bus Topology

3.8. Star Tropology

A star topology is designed with each node (like workstations, printers, laptops, servers etc.) connected directly to a central device called as a network switch. Star Topology comes from all the computers and comes to a central place, a device located in central location called HUB. Its a common network setup where Each workstation has a cable that goes from its network card to a network switch. The central network device acts as a server and the peripheral devices act as clients. In the star topology, a coaxial cable or an RJ-45 network cable is used to connect computers together and Easy to add another computer to the network. Most popular and widely used LAN technology Ethernet currently operates in Star Topology.
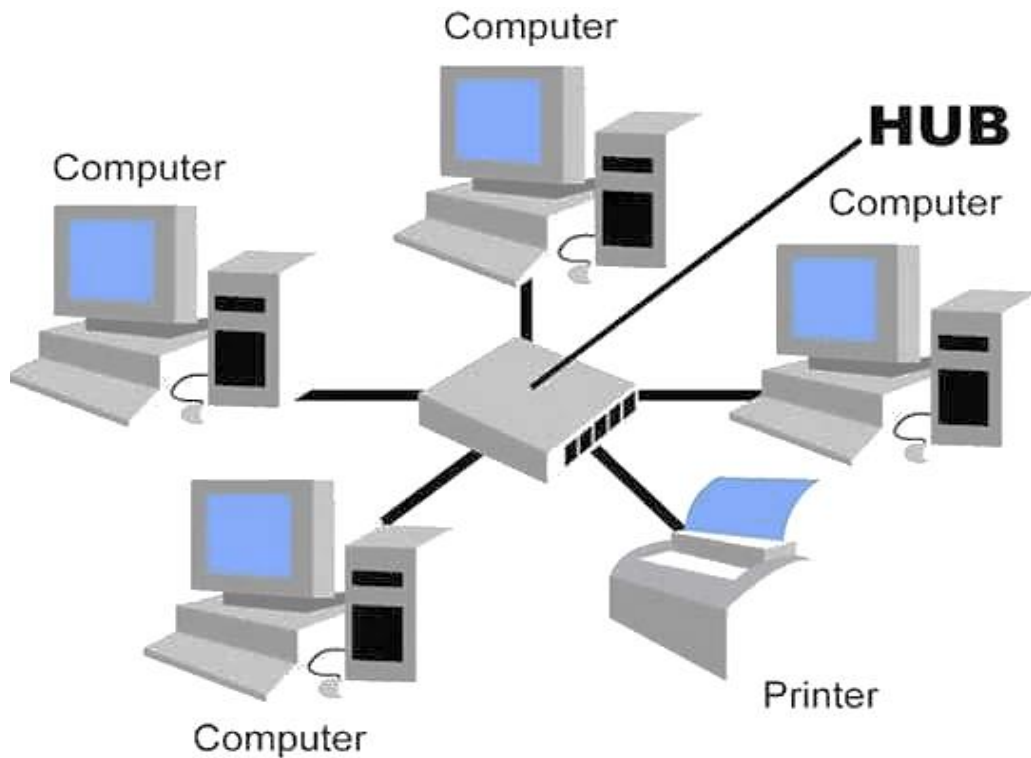
Fig 3.5 Star Tropology

3.9. Ring Topology

In Ring Topology, all the nodes are connected to each-other in such a way that they make a closed loop. Each workstation is connected to two other components on either side, and it communicates with these two adjacent neighbors. In this Topology first computer in the same way by creating a link or saying that every computer of this ball has equal access to data flow. This trolley is used to set up a high-powered network. The other compensations of this network is to allocate the qual network accessibility or privileges to every computer Data travels around the network, in one direction. Sending and receiving of data takes place by the help of TOKEN.
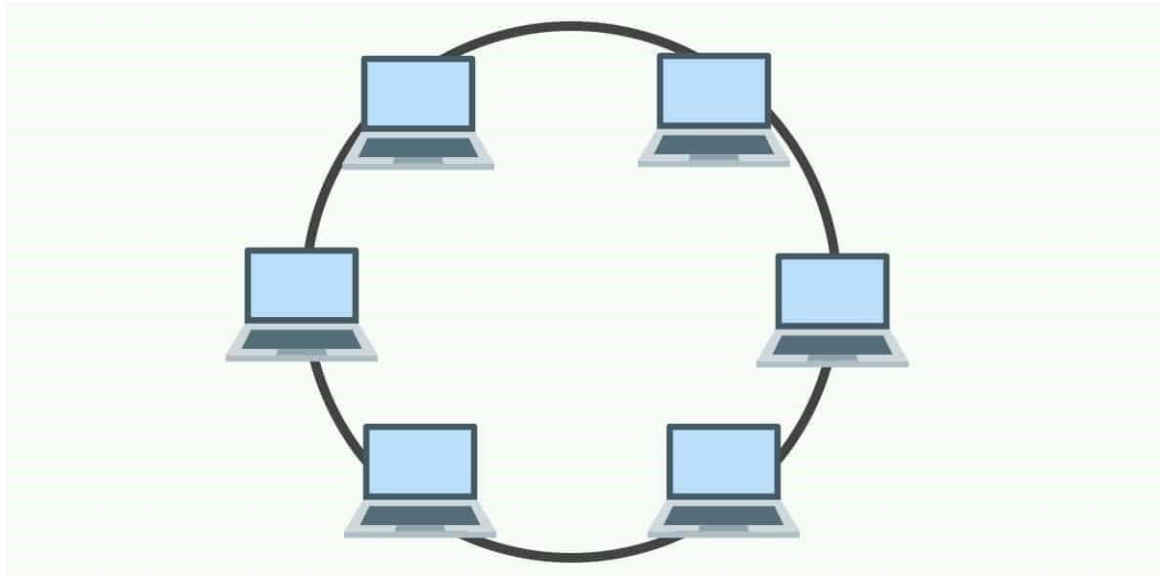
Fig3.6 Ring Tropology

3.10. Mesh Topology

Mesh topology is a type of networking where all nodes cooperate to distribute data amongst each other. This topology was originally developed 30+ years ago for military applications, but today, they are typically used for things like home automation, smart HVAC control, and smart buildings. Because the number of connections is high, the management of large networks in cloud topology is almost done so that most of the time. This is a reactive protocol using some characteristics of proactive routing—meaning the developer creates some of the routes and identifies nodes to play different roles, like an end node or repeater. As the best of mesh installs and a solid network device managed, a number of increases, such as if there are 5 devices on a network and want to bring them under the topology, then the connection must be 15.
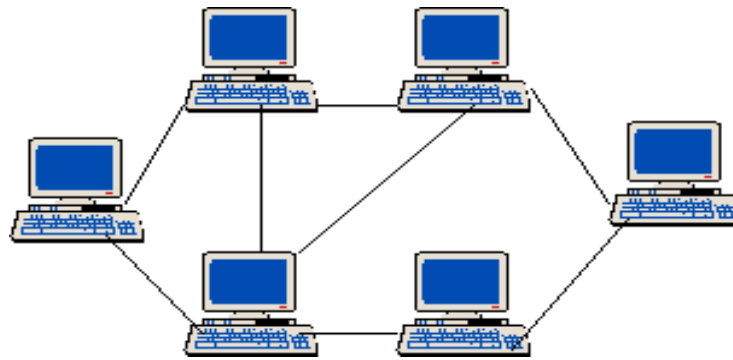
Fig3.7 Mesh Tropology

3.11. Tree Topology

This is a "hybrid" topology that combines characteristics of linear bus and star topologies. In a tree network, groups of star-configured networks are connected to a linear bus backbone cable. In the Tree Topology There are three connecting nodes Because any two nodes can have only one mutual connection, tree topologies from a natural parent and child ladder.
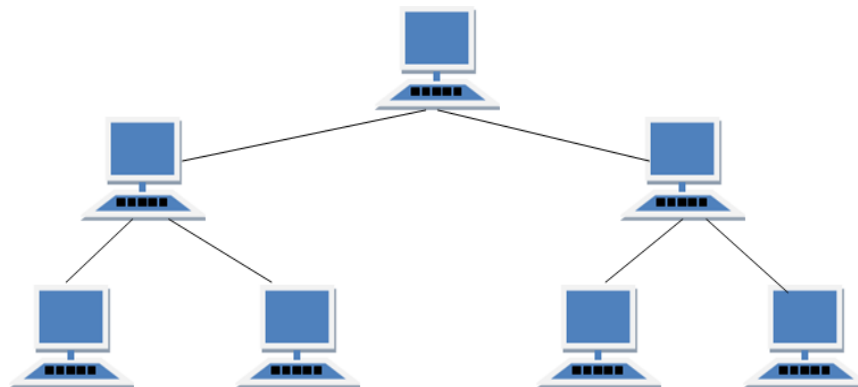
Fig3.8 Tree tropology

3.12. Networking device

Network Device is a set of multiple networking devices which connected for the data sharing. Networking device have the single purpose security transfer data as they can. So To achieve this goal every networking device has its own functionality.

3.13. Repeater

We know that due to the attenuation due to attenuation in different media the signal becomes increasingly weak, after its distance, its existence disappears, before the disappearance of the signal, the amplifier or more force can make it too far. It works in the OSI Reference Model's physical layer. Repeater Amplifiers and Signal Origination Employer amplify the whole signal. Amplifier Repeater will receive Emblem if this sign is unnecessary. There is a special rule about how many repeaters can be used on a network, called Five Four Three Rules.

Fig3.9 Repeter

3.14. Hub

Hub, which work as a Multiport Repeater, connects multiple wires coming from different branches. If the connector in star topology which connects different place. Hubs cannot filter data, that's why data packets are sent to all connected devices. Otherwise collision domain of all hosts connected through Hub remains one. Also, they do not have intelligence to find out best path for data packets which leads to inefficiencies and wastage.

Fig3.10 Hub

3.15. Bridge

A Bridge is a type of computer network device that provides interconnection with other bridge networks that use the same protocol mean Bridge is a device that can be combined with two network segments, Bridge devices work at the data link layer of the Open System Interconnect (OSI) model, connecting two different networks together and providing communication between them. Depending on the OSI address, it can decide which segments of the network to send that data packet. It is necessary to remember that the two circles of briar cannot be connected to Ethernet and token ring networks because hardware addressing is different from architecture.

Fig3.11 Bridge

3.16. Switch

Switch is actually a multi-port bridge. It is a small hardware device that centralizes communications among multiple connected devices in one local area network (LAN). It works on the data link layer of the OSI reference model. The price of many switches is equal to the price of the hub, because of its usage in the network. That's why the network administrator's decoded switch has become popular. Port in any switch supports multiple Mac addresses. The switch separates the signal from one of the signals to the other. High-performance network switches are still widely used in corporate networks and data centers. Network switches are sometimes referred to as switching hubs, bridging hubs or MAC bridges.

Fig3.12 Switch

3.17. Router

The procedure of transfer the data from one network to another network is known as the device named 'Router'. Means A router is a hardware device designed to receive, analyze and move incoming packets to another network. Basically, it used for routing and routing works on the network layer of an OSI reference model. This device is used to connect to a few different networks, it works on the local area network metropolitan area network and wide area networks.

A router has a lot more capabilities than other network devices, such as a hub or a switch that are only able to perform basic network functions. If you use it, you can connect to your network and resources outside of your network.

Fig3.13 router

3.18. Gateway

A gateway is a node (router) in a computer network, a key stopping point for data on its way to or from other networks. They fundamentally fill in as the errand person operators that take information from one framework, decipher it, and exchange it to another framework. Thanks to gateways, we are able to communicate and send data back and forth. Passages are likewise called convention converters and can work at any system layer. Gateway are commonly more mind boggling than switch or switch. For basic Internet connections at home, the gateway is the Internet Service Provider that gives you access to the entire Internet. In a workplace, the gateway is the computer that routes traffic from a workstation to the outside

Here are a few node notes:

• On the Internet, the node that's a stopping point can be a gateway or a host node.

• Computer that controls the traffic your Internet Service Provider (ISP) receives is a node.

3.19. Brouter

A network device that acts as both a bridge and a router by routing packets for known protocols and forwarding all others, as a bridge would. It is otherwise called connecting switch is a gadget which unites highlights of both extension and switch work either at

data connect layer or at system layer. Filling in as switch, it is fit for steering parcels sloping over systems and functioning as platform.
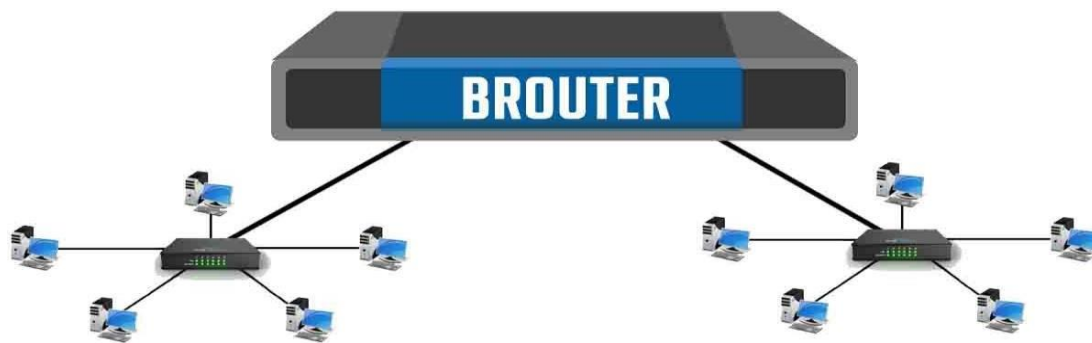

Fig3.14 Brouter-Network Device

3.20. Networking Cable

Network cables are used to connect and transfer data and information between computers, routers, switches and storage area networks. These cables are essentially the carrier or media through which data flows. The data streams through the media of this network, and network performance depends on much of it. There are several features in each network.

3.21. Coaxial cable

Coaxial cable is a two-conductor electrical cable consisting of a center conductor and an outer conductor with an insulating spacer between the two. It is primarily used by cable TV companies to connect their satellite antenna facilities to customer homes and businesses. Coaxial cables also sometimes used by telephone companies to connect central offices to telephone poles near customers. Home and office use coaxial cable too but its widespread use as an Ethernet connectivity medium in enterprises and data centers has been remove by the deployment of twisted pair cable.

Fig3.15 Coaxial Cable

3.22. Optical cable

Basically, Optical fiber cable is a networking cable that covers strands of glass fibers inside an insulated casing which designed for long remoteness and a very high-performance data networking for the telecommunication.
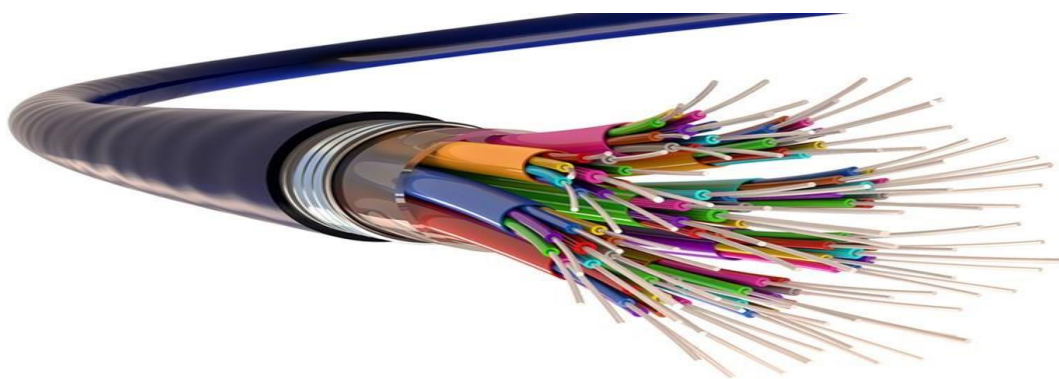

Fig3.16 optical Fiber Cable

3.23. Twisted pair cable

A twisted pair means that the cable is designed with two independent insulated wires wrapped around each other. This technique is used as a means to reduce interference from the electromagnetic spectrum, what allows the network devices to run smoother with less noise from outside sources (noise can come from multiple sources, such as power lines). There are two different types of twisted pair cables, shielded twisted pair (STP) and unshielded twisted pair (UTP)
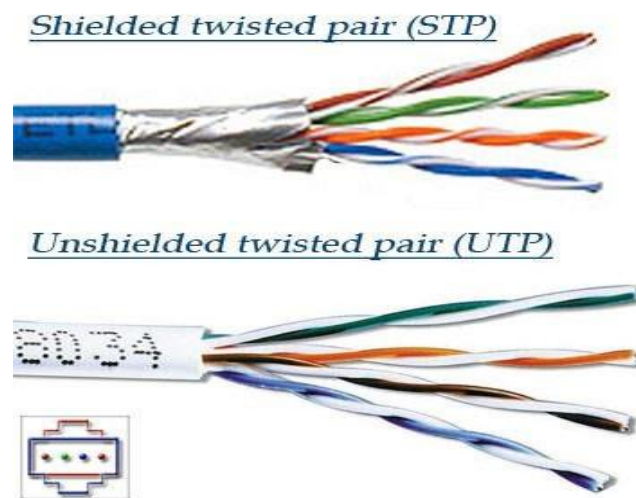
Fig3.17 STP&UDP Cable

3.24. Connector

When Your cable run needs to terminate into a connector, and that connector needs a jack to plug into. We've got just the things: RJ45 modular plugs and jacks for Cat5e and Cat6 cables, and single and multimode connectors for fiber optic cables.

Fig3.18 Connector

3.25. USB Connector

The USB connector was established to simplify the connection between computers and peripheral devices. Prior to the USB interface, peripheral devices had a multitude of connectors. The USB interface delivers various assistances, including plug-and-play, increased data transfer rate (DTR), reduced number of connectors, and addressing usability issues with existing interfaces.

Fig3.19 USB Connector

CHAPTER 4

INTERNSHIP ROELES AND RESPONSIBILITIES

4. Training Served

Watermark It Limited, where I joined as an intern executive for four months. In this four month of training period I learned about web servers, Webmail servers and mikrotik Router where the topics from MIkrotik Router was Micro Touch switch, mikrotik Router configuration and Linux Operating System. As a intern when I started my learning classes they introduced to me about Web server, Webmail and Cisco networking then I learned about IP configuration. In the IP Configuration section, they let me learn various type of information what I need in future to configure IP. As I had some informational knowledge about IP Subnetting & reconciliation, they clear my confusion. They used to start talking about Mikrotik router about, how to install, how to configure, how to maintain etc. After that I collect some more information about mikrotik router to understand easily for next classes. Then next few days I studied about mikrotik router web server to know the basics what I need to remember all the time. Then I worked with Microtik Router configuration where if a mikrotik router is able to do a new configuration forward then it needs to reset first. Then have some procedure like connect with an active internet connection, then ip scanning, DNS etc.so this time I got some good knowledge about this all. Then next day they I got a lecture session about various configuration of Mikrotik router, where i learned about DHCP configuration that services about bandwidth management. How to configure and block the bandwidth of Facebook and YouTube via Mikrotik router. so

In the microcytic router, first to get an Internet connection, to scan the IP in the interface and then the DNS and the gateway is required to be given. We have no idea about the various configurations of the mikrotik router, then we have the DHCP configuration Pppoe that service We know all types of configurations about bandwidth management and how we can select or share bandwidth. How to configure and block the bandwidth of Facebook and YouTube via Mikrotik router that does not know from our teacher. After

knowing all the types of configurations, we did not shake it again by testing. After completing a four-month course, we take a complete idea about the Mikrotik router. Then I learned about more tricks about configuration and about web server maintain, repair, and installation and more thing. At the last some days they taught me the network maintain of a big corporate house.

First month I learn about:

- ✓ Learning and understanding about Network Components.
- ✓ Understanding about Basics of Mikrotik.
- ✓ Basic of Centos Commands.
- ✓ Understanding of Webserver

Second month I learn about:

- ✓ OS installing of Mikrotik
- ✓ Web Sit Faltering
- ✓ Concept of IP Addressing.
- ✓ Web Server Installation components & Instalment
- ✓ Webmail maintains

Third month I learn about:

This time I complete the web server and Email server. But still I have more to know about Mikrotik Router that is Mikrotik hole configuration what are very important For Mikrotik router management.

- ✓ Ip Configuration
- ✓ Sub-netting
- ✓ Cisco

- ✓ Networking Binding

- ✓ VLAN

- ✓ Pppoe

Last month we learn about some new topics related to Mikrotik install configuration and maintain with the revision of old topics

- ✓ Static and DHCP

- ✓ Bridge

- ✓ Bandwidth Management

- ✓ ARP/AP

- ✓ Pppoe

- ✓ Wireless Configuration

- ✓ Firewall

- ✓ Firewall security

- ✓ User ID

4.1. Assigned Responsibilities

In the instructional part, as a very new in hand to hand education part I experienced with some knowledgeful, professional and skillful person who has a very good educational background and career. In such a way what defines the real manner of an IT engineer, they trained me that way that I can start my career in a very smooth way. Basically, I learned there that an organization will only let us know about the trends of very recent and upcoming technology, but I have to develop myself from my side. They taught me to keep in my mind to learn, to accept and to implement myself like a skillful IT engineer what will support my whole life to enrich myself in every moment. So, as a corporate organization and as an intern applicant I had to sit Interview to be selected. I Was assigned as the Mikrotic Maintainer assistant in the organization.

4.2.   Performed Tasks

To generate a new way of learning and to be learnt in that way this was a very comfortable experienced with watermark IT LTD where the environmental satisfaction is enough to create a mental curiosity to let an intern learn. The present ability and the senior's co-operative behavior helped to increase its amazingness of watermark. They create a very good working environment in the organization and they are welcoming a new Intern every year. I feel very much satisfied to be a part of Watermark. In this last 4 months what I observed and watched I think this is enough for a beginner level IT Intern.

4.3.   Webserver

A Web server is a program that uses HTTP (Hypertext Transfer Protocol) to serve the files that form Web pages to users, in response to their requests, which are forwarded by their computers' HTTP clients. It could be a computer that runs websites. The basic objective of the web server is to store, process and deliver web pages to the users. This intercommunication is done using Hypertext Transfer Protocol (HTTP). These web pages are mostly static content that includes HTML documents, images, style sheets, test etc. Apart from HTTP, a web server also supports SMTP (Simple Mail transfer Protocol) and FTP (File Transfer Protocol) protocol for emailing and for file transfer and storage.
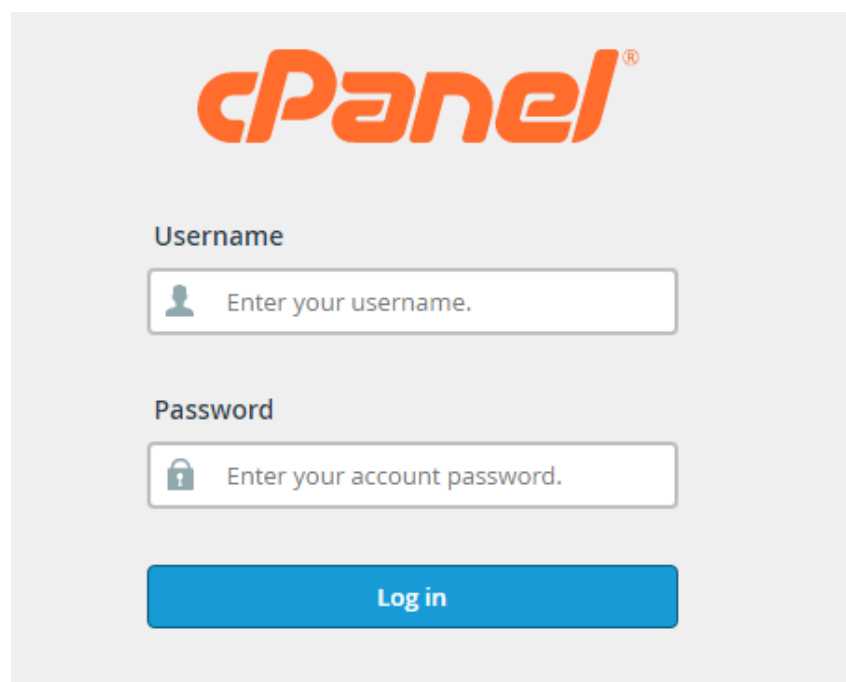
4.4.   Webserver Installation

1.   First have to Log on to the computer as an Administrator of the Administrator group on that computer.

2.   Then have to Run Setup.exe from the installation package from the computer then the installation wizard will open.

3.   On the welcome page, then select the I Agree check box and proceed to the next page.

4.   Then on the Choose the Installation Type page, click Install packages on this computer to proceed the next page.

5.   Then on the Select Packages page, select the Web Server check box to proceed to the next page.

6.   Then Follow the instructions in the installation wizard to proceed the next step.

4.5.   Webmail server Installation

Webmail server is a server which enclosed with the web server where we just need to set up a user interface to login with the control panel by using a master user id and password. Then it is a very simple way to maintain and recover the all webmail server. First, we need to make a backup server to back up every data for the accidental situation to recover. After then we can configure our mail server by using our local IP and others. Then we can create any user and provide mail services.
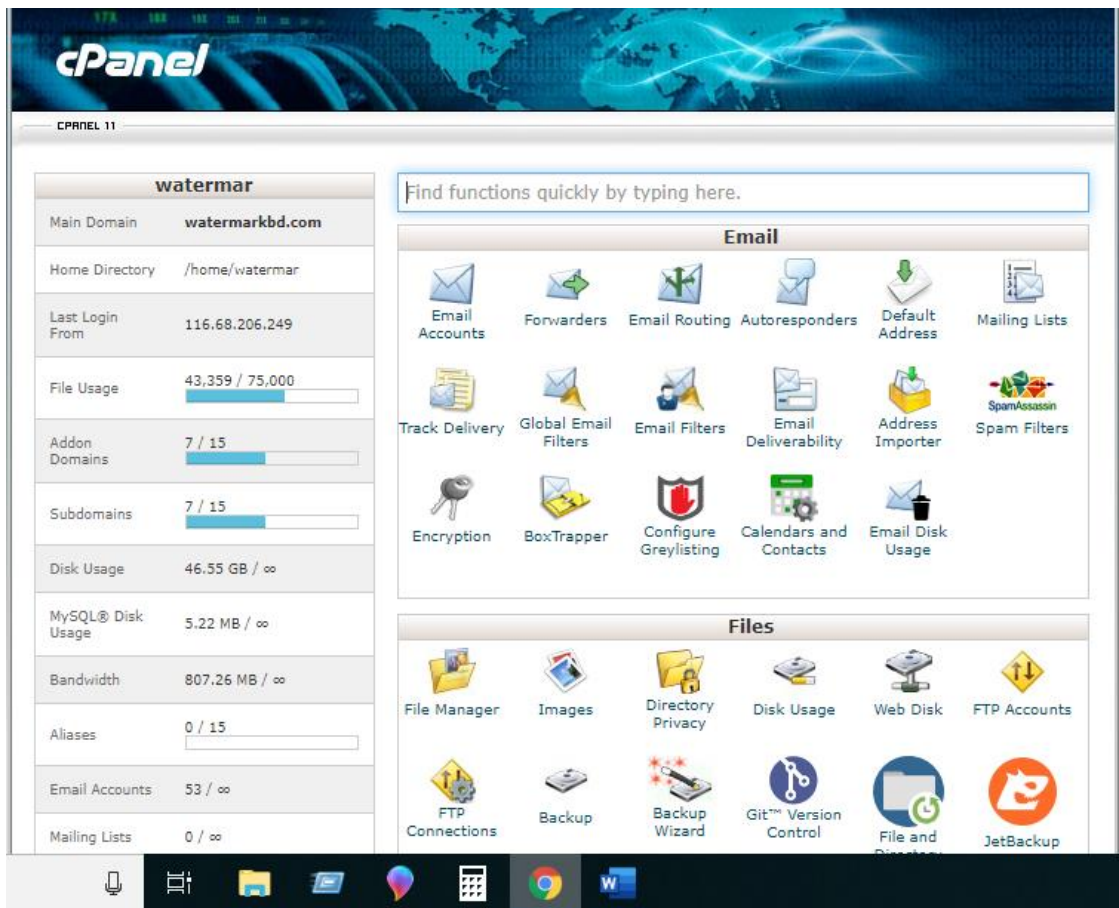
Fig4.1 Cpanel of WebMail

4.6. Mikrotik

Mikrotik is a Latvian company which was started in 1996 to develop routers and wireless ISP systems. Now it provides hardware and software for Internet connectivity in most of the countries around the world. They insight in using industry standard PC hardware and complete routing systems allowed us in 1997 to create the Router OS software system that provides extensive stability, controls for all kinds of data interfaces and routing. In 2002 we decided to make their own hardware, and the Router BOARD brand was born. There have resellers in most parts of the world, and customers in probably every country on the planet.

4.7. OS of Mikrotik

Mikrotik OS is an operating system which comes with different license levels reaching from 0 to 6, where 0 is a 24-hour trial version. In trial mode you can test all features of Router OS for free. You can compare the different license level features here. Installing Router OS is very easy. Either download the ISO image, burn it to CD and boot from it. Or Net install will write Router OS to any secondary drive you have attached to our Windows PC. Move the drive to our Router PC and boot it. Both installation methods, plus upgrade files and more can be found here.

4.8. Mikrotik Ethernet Route

4.8.1. hEX lite
hEX lite is a small five ported Ethernet router in a nice plastic case. Its price is lower than the Router OS license alone - there simply is no choice when it comes to managing your wired home network, Not only it's affordable, small, good looking and easy to use - It's probably the most affordable MPLS capable router on the market, Not more compromise between price and features - RB750r2 has both. With its compact design and clean looks, it will fit perfectly into any SOHO environment.
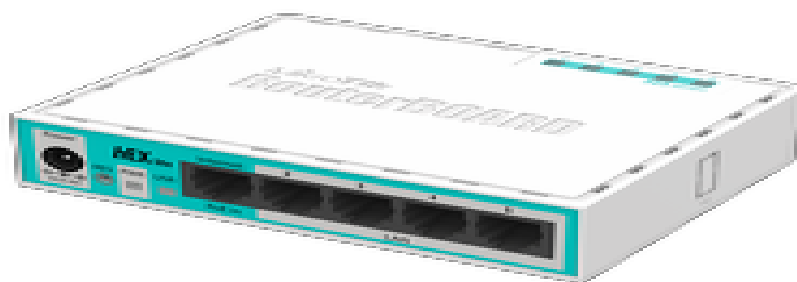

Fig4.2 hEX lite

4.8.2. hEX PoE

hEX PoE is a five port Gigabit Ethernet router for positions where wireless connectivity is not necessary. The device has a USB 2.0 port and a SFP port for adding optical fiber connectivity. The ports 2to5 can power other PoE capable devices with the same voltage as applied to the unit. It is affordable and easy to use, but at the same time comes with a very powerful 800MHz CPU, capable of all the advanced configurations that Router OS supports. Less power adapters and cables to worry about Max current is 1A per port, Ethernet ports are shielded. It also supports passive PoE input and passive or 802.3af/at PoE output. Ethernet ports 2-5 can power other PoE capable devices with the same voltage as applied to the unit.

Fig4.3 hEX Pro

4.8.3. CC1036-8G-2S

Our fastest router has now become even better - the new CCR1036-8G-2S+ now has two SFP+ ports for 10G interface support (SFP+ module available separately). It uses the same 36 core Tiller CPU as our other CCR1036 model, and delivers the same performance, but now ten gigabit links are probable. The device comes in a 1U rack mount case, has two SFP+ ports, eight Gigabit Ethernet ports, a serial console cable and a USB port. The CCR1036-8G-2S+ has two sodium slots, by default it is shipped with 4GB of RAM, but has no memory limit in Router OS (will accept and utilize 16GB or more). Also available now, the EM model with 16GB of RAM Supports both SFP (1.25G) and SFP+ (10G) modules

Fig4.4 CC1036-8G-2S

4.9. Mikrotik Small SOHO Switch

4.9.1. CRS112-8G-4S-IN

Cloud Router Switch 112-8G-4S-IN is a "small size low cost" member of our CRS series. It comes with eight Gigabit Ethernet ports and four SFP cages. This CRS series separate the best features of a fully functional router and a Layer 3 switch, is powered by the strange Router OS. All the specific Switch configuration options are available in a special Switch menu, but if we want ports can be removed from the switch configuration, and used for routing purposes.
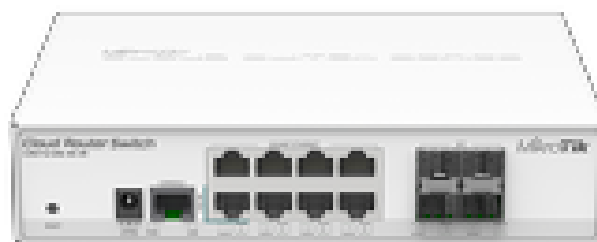

Fig4.5 CRS112-8G-4S-IN

4.9.2. CRS125-4G-1S-IN

Cloud Router Switch is a new Smart Switch arrangement. It consolidates the best highlights of a completely useful switch and a Layer 3 switch, is controlled by the natural Router OS. All the explicit Switch arrangement choices are accessible in an exceptional Switch menu, however on the off chance that we need, ports can be expelled from the switch setup, and utilized for steering lack of concern. Pick ports for Wire speed exchanging, or for steering purposes.

Fig4.6 CRS125-4G-1S-IN

4.9.3. CRS-1G-16S=RM

The new Cloud Router Switch 317-1G-16S+RM is a rack-mountable manageable switch with Layer3 features, it has 16 SFP+ ports for high performance 10GbE connectivity and a 1GbE copper port for management.CRS317-1G-16S+RM is powered by a next generation switching chip, giving we wire speed performance for all sixteen 10GbE ports with any Ethernet frame size. New features such as hardware-based Spanning Tree Protocol and Link defense (LACP) provide enhanced protection and true professional performance for our demanding network. The unit has dual redundant power supplies and passive cooling case, so it's completely silent - for hot environments two redundant fans will automatically keep the system cool if needed.

Fig4.7 CRS-1G-16S=RM

4.10. Mikrotik outdoor wireless system

4.10.1. LDF 5

an outdoor wireless system with a built-in antenna, meant to be installed on satellite offset dish antennas is called LDF 5. This dish will act as a reflector and amplify the signal. It means we will be able to use any available satellite TV dish with an offset rock to fast deploy powerful long-range wireless links. The offset mount is universal at 40mm diameter, and the LDF can easily be placed inside it. Since the LDF itself is a tiny little package, it makes sail and deployment simple and low cost. Using a dish of up to 100cm in diameter, it is possible to obtain antenna amplification of up to 33dBi. The device comes preinstalled with Router OS and is ready to use. - LDF 5 US (USA) is factory locked for 5170-5250MHz and 5725-5835MHz frequencies.

Fig4.8 LDF 5

4.10.2. Groove 52

It is a outdoor series model - a fully featured wireless Router board powered by Router OS. Weather proof, durable and ready to use. It has one 10/100 Ethernet port with PoE support and a built-in wireless radio. It has software selectable 2 or 5GHz wireless mode, and high output power With the Nv2 TDMA technology, up to 125Mbit count throughput is possible It has a

built-in N-male connector, and pole attachment points, so we can attach it to an antenna directly, or use a standard antenna cable. LED signal indicators make it easy to install. Box contains Groove unit, ground loops, PoE injector and power adapter.

-Groove 52-US (USA) is factory locked for 2412-2462MHz, 5170-5250MHz and 5725-5835MHz frequencies. This lock cannot be removed.

-Groove 52 (International) supports 2412-2484MHz and 5150MHz-5875MHz range (Specific frequency range can be limited by country regulations).

Fig4.9 Groove 52

4.10.3. LHG 5 ac

The LHG 5 ac is a compact and light 5GHz 802.11ac wireless device with an integrated dual polarization 24.5 dBI grid antenna at a revolutionary price. It is faithful for point to point links or for use as a CPE at longer distances and supports Nv2 TDMA protocol. The device includes one 10/100/1000 Mbit Ethernet port to fully utilize speeds that 802.11ac protocol give.

- LHG 5 ac-US (USA) is factory locked for 5170-5250MHz and 5725-5835MHz frequencies. This lock cannot be removed.

- LHG 5 ac (International) supports 5150MHz-5875MHz range (Specific frequency range can be limited by country regulations).

Fig4.10 LHG 5 ac

4.11. Wireless Wire Dish

The Wireless Wire Dish is a ground breaking solution which offers Fiber speed and quality on distances up to 1500 m for a fraction of the price. The amazingness of this kit makes a secure AES encrypted 60 GHz wireless link that is not affected by the crowded WiFi spectrum, offering a stable and fast link for distances of 1500 meters or more. Simply point the included devices at one another and power them on, they are already preconfigured to connect automatically and will make a 2 Gb/s aggregate link.

The box includes two LHGG-60ad devices that are already paired together, power supplies, PoE injectors and mounting kits for both devices. The RBLHGG-60ad has an extremely capable CPU, making it possible for wire speed throughput in nearly all packet sizes. The left image shows a sustained transmit of nearly 2 Gbps, the graph

Fig4.11 Wireless Wire Dish

4.12.   Winbox Interface Menu

Basically, Winbox console is used for accessing the MikroTik Router configuration and management the features using graphical user interface (GUI).

All the 000Winbox interface functions are as close as possible to Console functions: all Winbox functions are exactly in the same hierarchy in Terminal Console and vice versa (except functions that are not implemented in Winbox). That is why there are no Winbox sections in the manual.

4.13.   Winbox Interface Menu

Winbox is a small utility that allows administration of MikroTik Router OS using a fast. It is a native Win32 binary. All Winbox interface functions are as close as possible reflect the console functions, that is why there are no Winbox sections in the manual. Some of advanced and system critical configurations are not probable from winbox, like MAC address change on an interface Winbox change log From Winbox v3.14, the following security features are used.

•   Winbox is signed with an Extended Validation certificate, issued by SIA Mikrotīk is (MikroTik).

•   WinBox uses ECSRP for key exchange and authentication.

•   Both sides verify that other side knows password.

•   Winbox in RoMON mode requires that viceregent is the latest version to be able to connect to latest version routers.

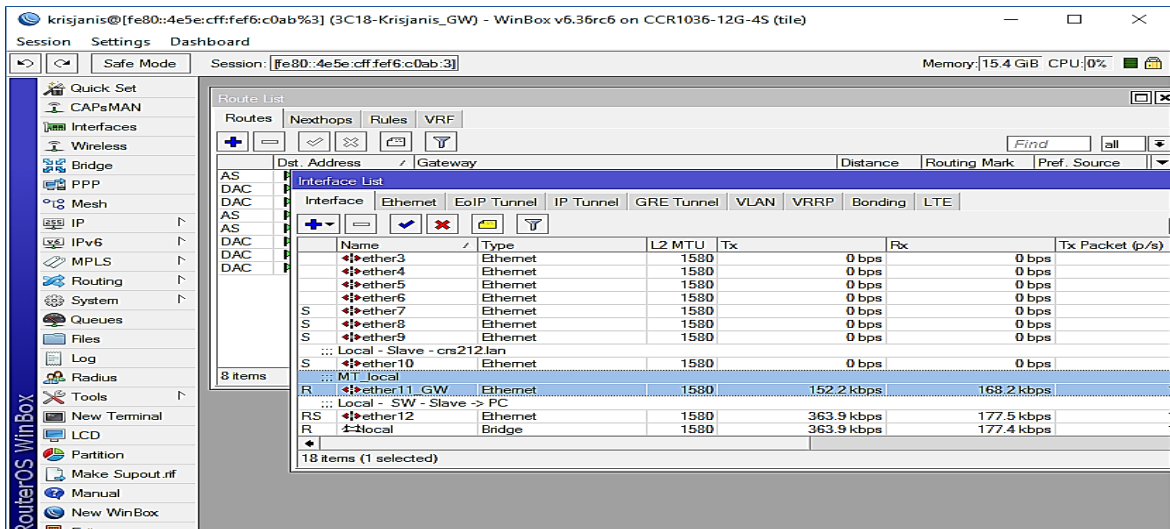•   Winbox uses AES128-CBC-SHA as encryption algorithm (requires winbox version 3.14 or above).

Fig4.12 Winbox Interface Menu

4.14. Basic Configuration of Mikrotik

For Basic Configuration in mikrotik router at first we going to mikrotik dashboard then we go to IP and from here to address.
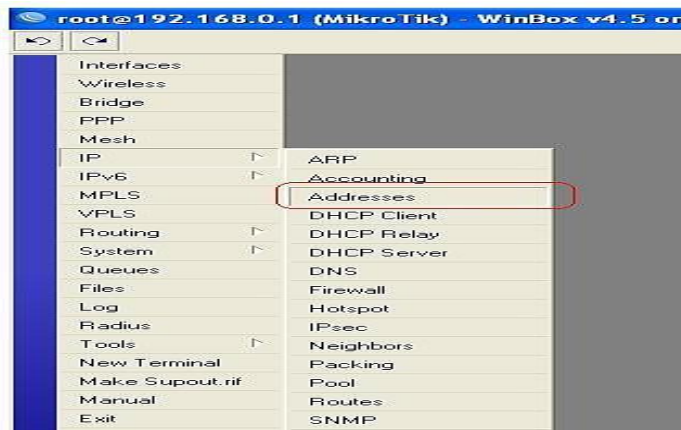

Fig4.12 Basic Configuration of Mikrotik

When open the address list dialog window then this window as seen given below then click on the place point for open the IP address window
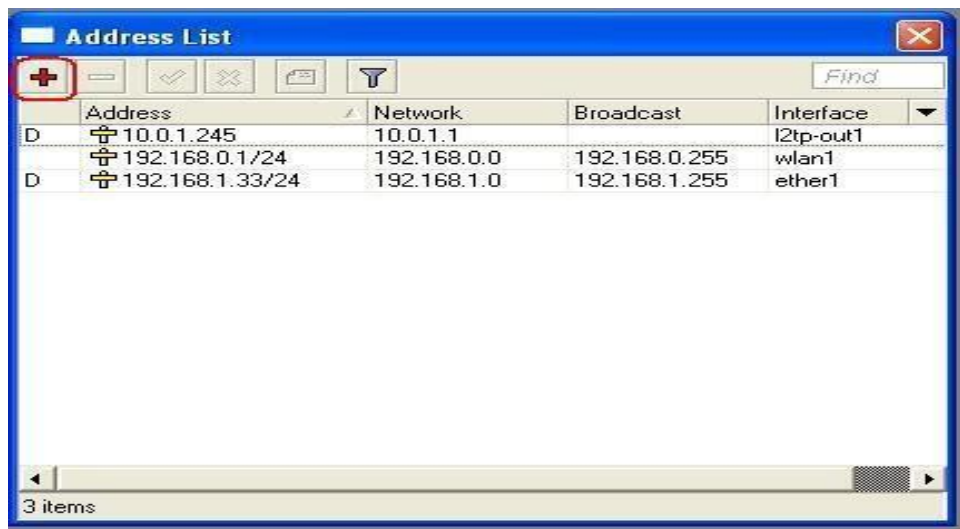
Fig4.13 Basic Configuration of Mikrotik

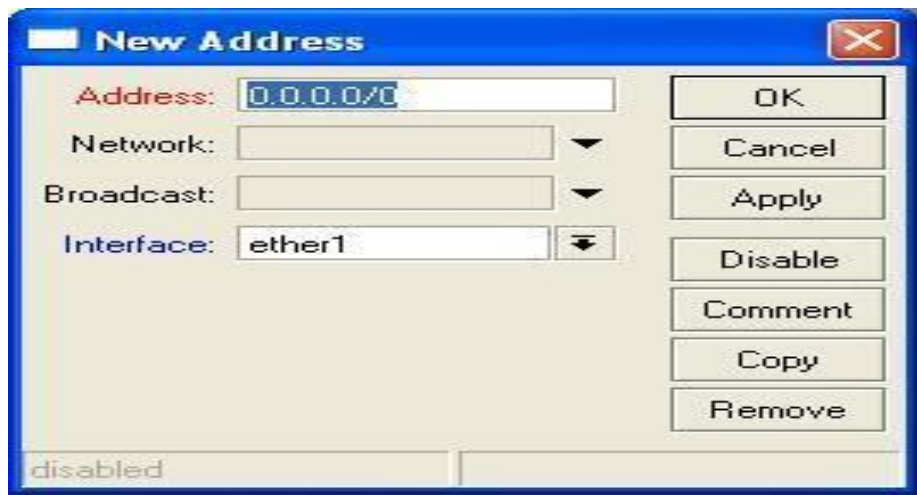When open the IP address dialog then enter the address details and then click ok

Fig4.14 Basic Configuration of Mikrotik

This tutorial demonstrates how to set the password of the current Mikrotik Winbox user.
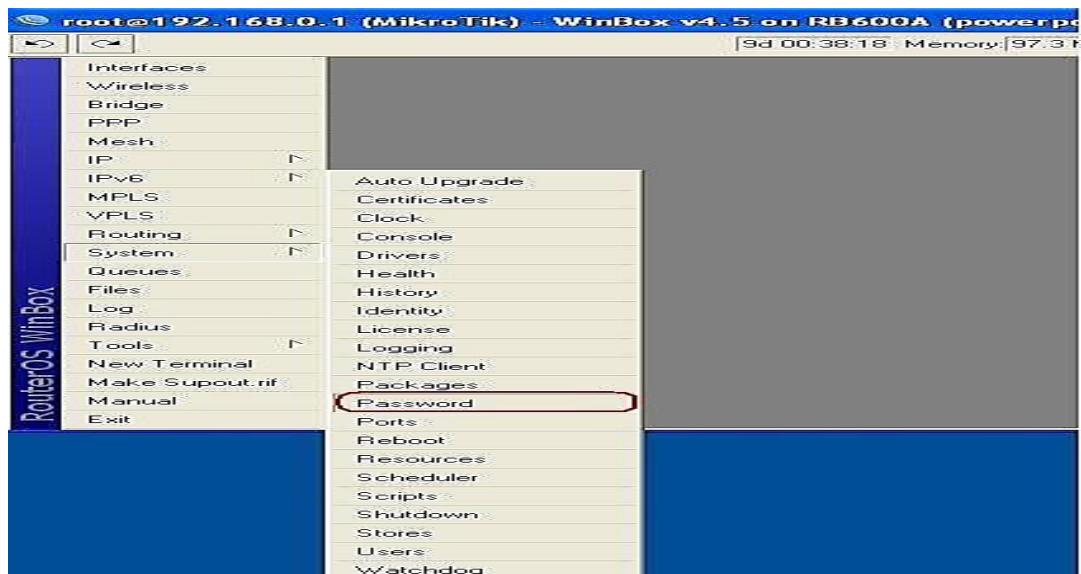Click on the menu item as shown below

Fig4.15 Basic Configuration of Mikrotik

Enter the old or current password followed by the new password that you wish to use.

4.15.   DHCP Configuration

Step 1: Login with Winbox software Step 2: Go to IP > DHCP Client Step 3 : we see a new window.

Step 4: Click in the + button to add a DHCP client

Step5: After clicking the red + button, another window will appear.

Step 6: Let's stop at the first setting (Interface). Example, Ethernet LAN port 1 is an interface. Our wireless Card that is connected to the board WAN is an interface. If our Mikrotik Ethernet port 1 is connected to our ADSL router with an Ethernet cable, then the Mikrotik Ethernet port 1 should be a DHCP client because this port will receive an IP address from the ADSL router.

Under Interface, select ether1 and press apply and ok.

Step 7: Now we see that your ether1 searching for an IP address. In the image below, ether2 is also used as a DHCP client, if the ADSL fails.4.12 Bandwidth bonding

Bandwidth Management is the process of measuring and controlling the communications (traffic, packets) one a network link, to avoid filling the link to capacity.

Step1: open winbox then Queues then simple Queues then click plus then Name= queue1 then Target Address=192.168.0.5(N.B: your LAN site IP if we want to control Bandwidth against of unique PC or unique IP). Target upload, Max Limit=512k, Target Download, Max Limit=512k next Apply at least ok.
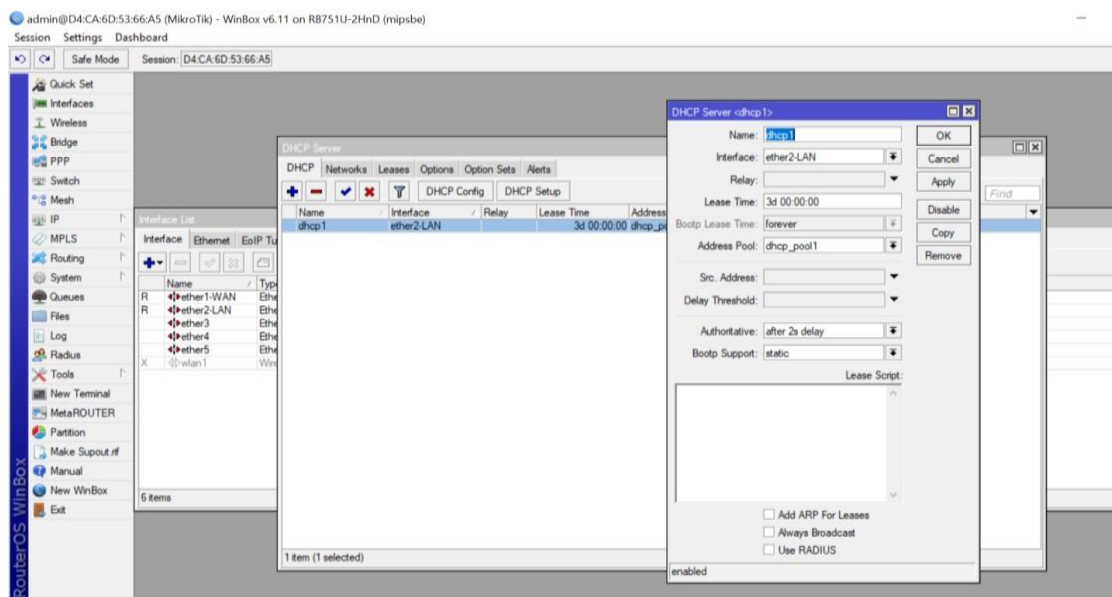

Fig4.17 DHCP Configuration

4.16. Bandwidth Management

There are basically two ways to manage your bandwidth

1) add multiple queues (1 per IP).

2) Defining two new PCQs queue types. (1 for download and 1 for upload)

I used winbox maximum of the times .

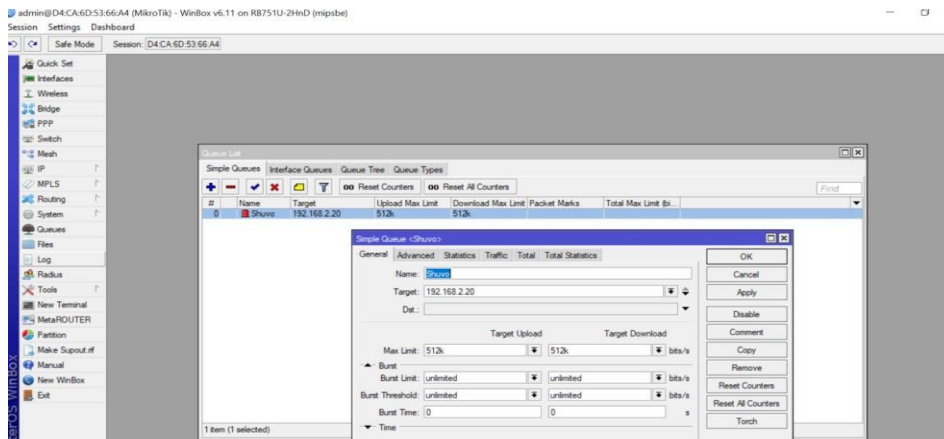We'll have to go to Queues then Queue Types then Add(+)

Fig4.17 Bandwidth Management

give it a name say. 10M-Download, kind=pcq, rate=10M, Classifier= Dst. Address for rest defaults are ok

add another one:

name = 10M-Upload, kind=pcq, rate=10M, Classifier=Src Address.

4.17.   Pppoe Configuration

Pppoe viewpoints for Point-to-Point Protocol over Ethernet, a network protocol for encapsulating Point-to-Point Protocol (PPP) frames inside Ethernet frames. It is used mainly with DSL services where separate users connect to a DSL modem over Ethernet. Ethernet networks are packet-based and have no capacity for a connection. They also lack basic security features to protect against IP and MAC conflicts and rogue DHCP servers.

Step1.
To Create PPPoE client We assume that our WAN port is ether1. Plug our WAN cable into ether1 – Click on ppp > Click on plus sign > Add +. > choose . Pppoe Client.

Next In .General tab, we will see Interface then have to choose it as ether1 Now have to go to Dial Out tab and then have to fill in User and Password then Click on Apply then we will see Status connected on the bottom.
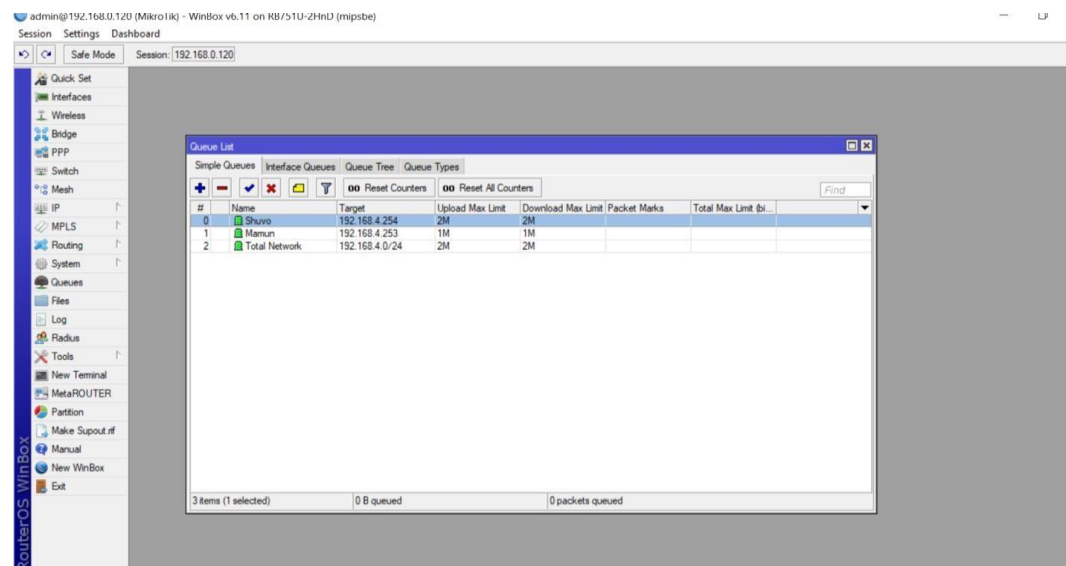

Fig4.18 Pppoe Configuration

Step2.

Set DNS > click on "IP" > choose "DNS" - Fill in the DNS IP addresses

Step3.

Set DNS > click on "IP" > choose DNS - Fill in the DNS IP addresses

Then In "Ports" tab, click on add "+" sign to add port into bridge - Select interface that we want to add into bridge (Ex: ether2, ether3, ether4, waln1) then choose bridge that we have created earlier and click ok.

Step4.

Add IP address for LAN - Click on "IP" then choose "Addresses"

Click on "add+" sign to add new IP address - Fill in the IP address and then choose the bridge name that we have created earlier.

Step5.

Now to Create DHCP Server – have to Click on "IP" then have to choose "DHCP Server" - Click on "DHCP Setup", then have choose bridge and then click next.

Step6.

Have to go NAT LAN network - Click on "IP" then have to choose "Firewall" - In the general tab, I have to select "scant" and choose pppoe-out1 (PPPoE name that we have created earlier) in "out interface". - In action tab, choose "masquerade" then have to click ok.
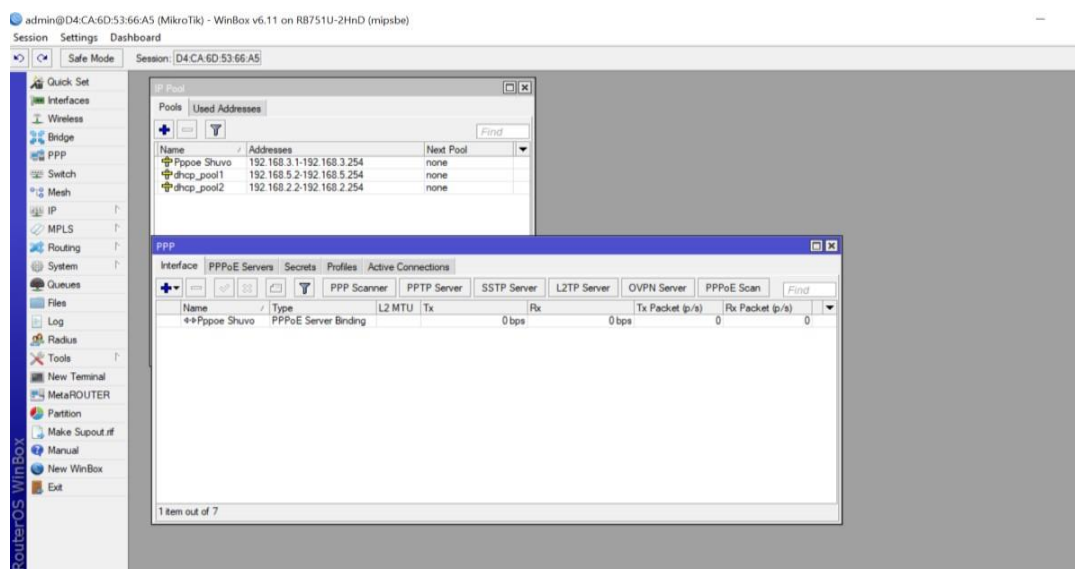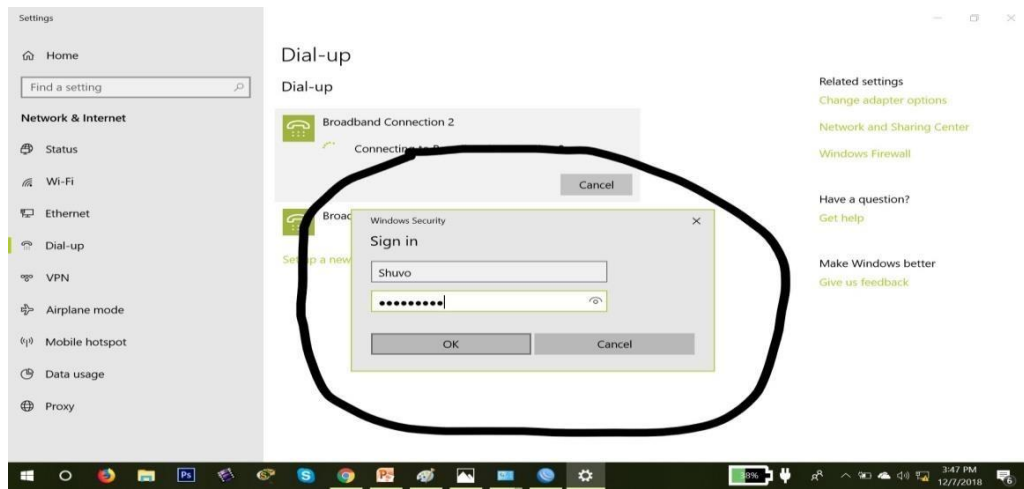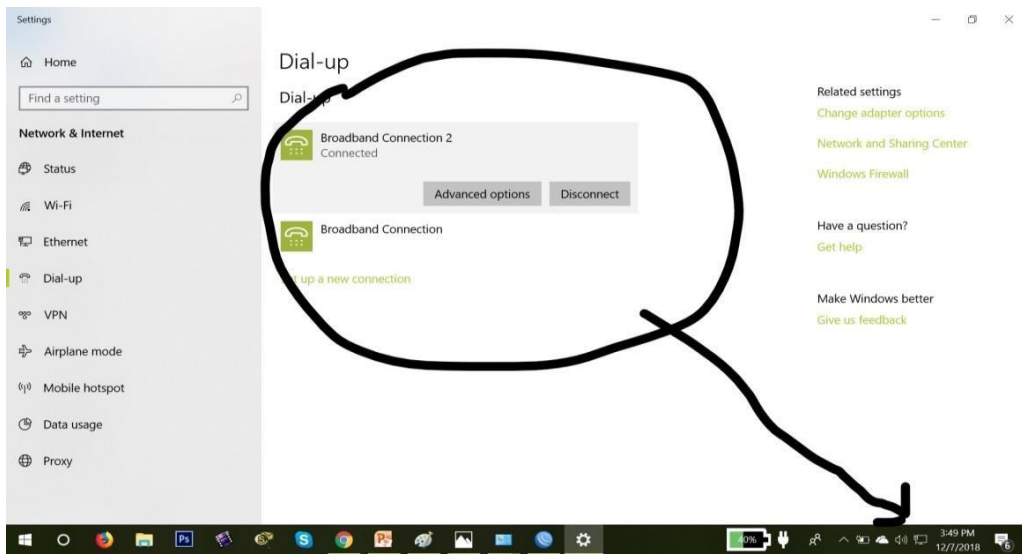
Fig4.19 Pppoe Configuration

Fig4.20 Pppoe Configuration

4.18. Wireless Configuration

A wireless local-area network (LAN) use to use a radio waves to connect any devices such as laptops and mobile phones to the Internet and also to business networks and its applications so on. So to connect to a Wi-Fi hotspot at a cafe, a hotel, in any another public place, its necessary to keep in mind that it's a business wireless network.

Step1

To create a new security profile I have to Go to Wireless -> Security Profiles and then have to add a new profile. Then have to create a virtual access point: Go to Wireless -> Interfaces and then have to add a Virtual AP.
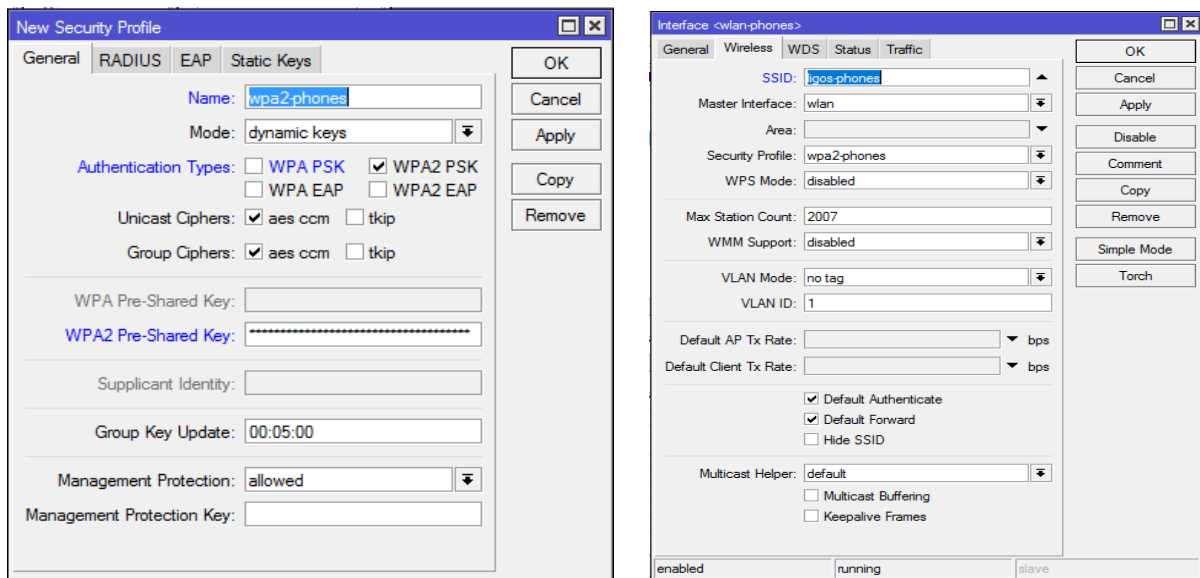

Fig4.21 Wireless Configuration

Step2

A network interface is much not use without of an IP address.

Have to Go to IP -> Address and then have to add a new address, then have to Go to IP -> Pool and then have to add a new pool.
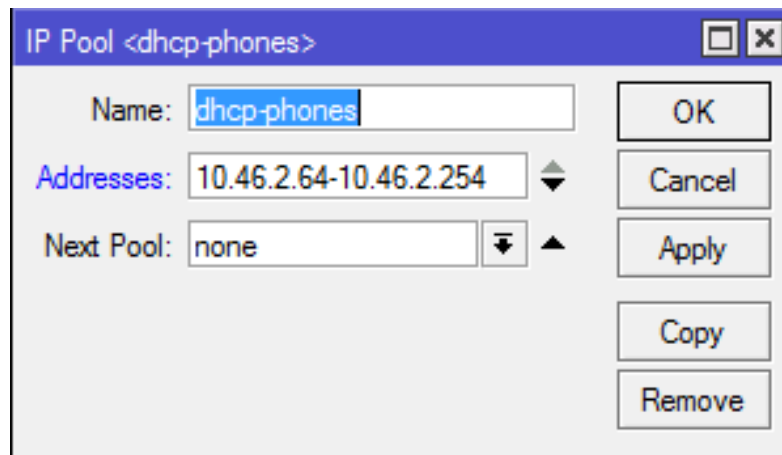

Fig4.22 Wireless Configuration

Step3

DHCP is accustomed assign addresses to devices as they connect to the Wi Fi network.so They will use the pool i just created before. And then I also assigned a few other special addresses. So then have to Go to IP -> DHCP Server - DHCP Tab and then have to add a new DCHP Server.
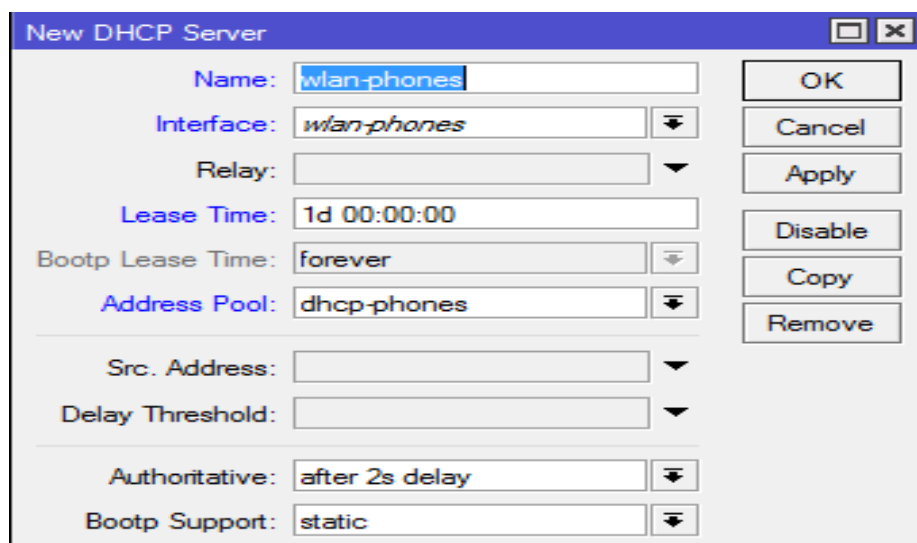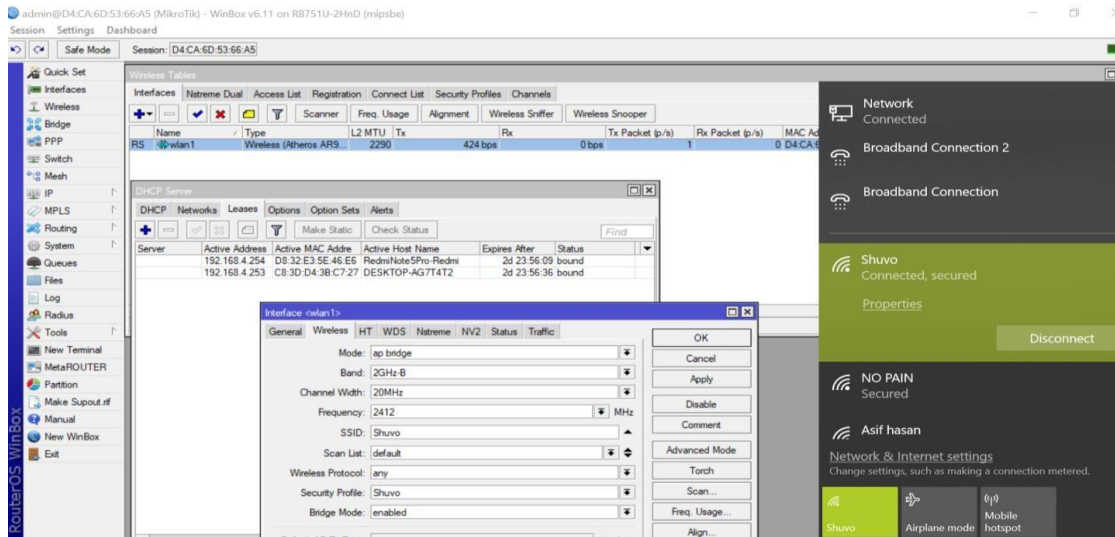

Fig4.23 Wireless Configuration

Fig4.24 Wireless Configuration

4.19. ARP/AP Configuration

In the ARP binding need to put a static IP to MAC address entry in a device's ARP table. DHCP misgivings allow a device on the network to always get the same IP assignment when making DHCP requests. So, they really not related.

Step: At first I go to the IP select of ARP then have to Click + sign and then have to add information as on screen and then have to press ok. Then I selected the Static IP Address and Device MAC Address (what need to bind) Interface: Ether2_LAN and then Same steps need to repeat on DHCP Server so click IP and then select DHCP Server
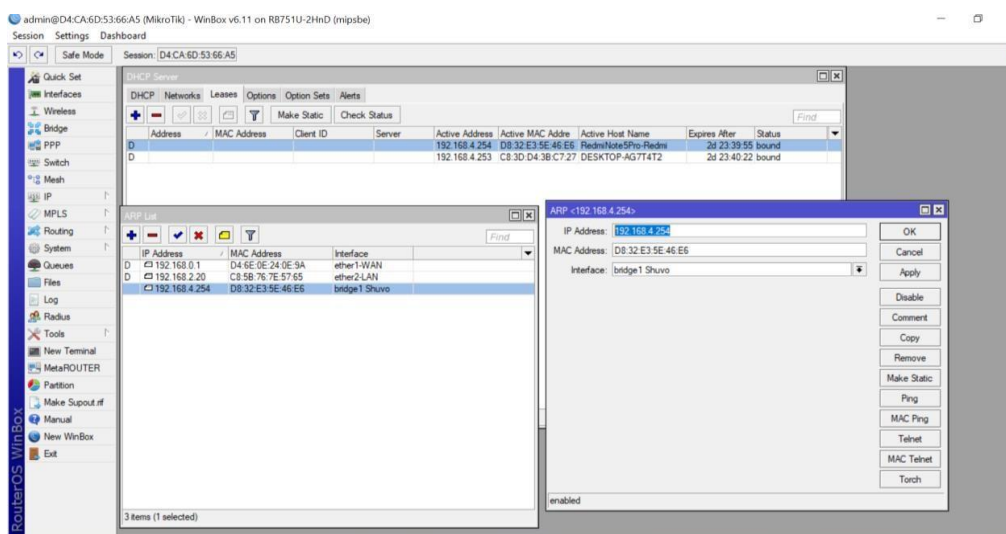

Fig4.25 ARP/AP Configuration

Then

Click on + sign and also add required information on DHCP Server tab, Static IP Address and

MAC Address then Click tick on Use Static IP Server: dhcp1

Comments: mention the username to identify

4.20. Firewall Configuration

This firewall apparatuses the packet filtering to provides security functions what are being used to manage data flow to and from through the router. This time Along with the Network Address Transformation of it, serves as a tool to prevent the unauthorized accessibility from the directly attached networks and the router itself as well as a filter for outgoing traffic.

Rule-A:

Chain: Input

My Src Address is : 203.99.15.100/30 (IP / IP Block on my WAN Side)

Then have to go to Action tab and have to select Accept and then have to click OK. Then This will create a rule in the filter rules section what will follow by using command. This rule will allow me to access my router with that IP or IP block.
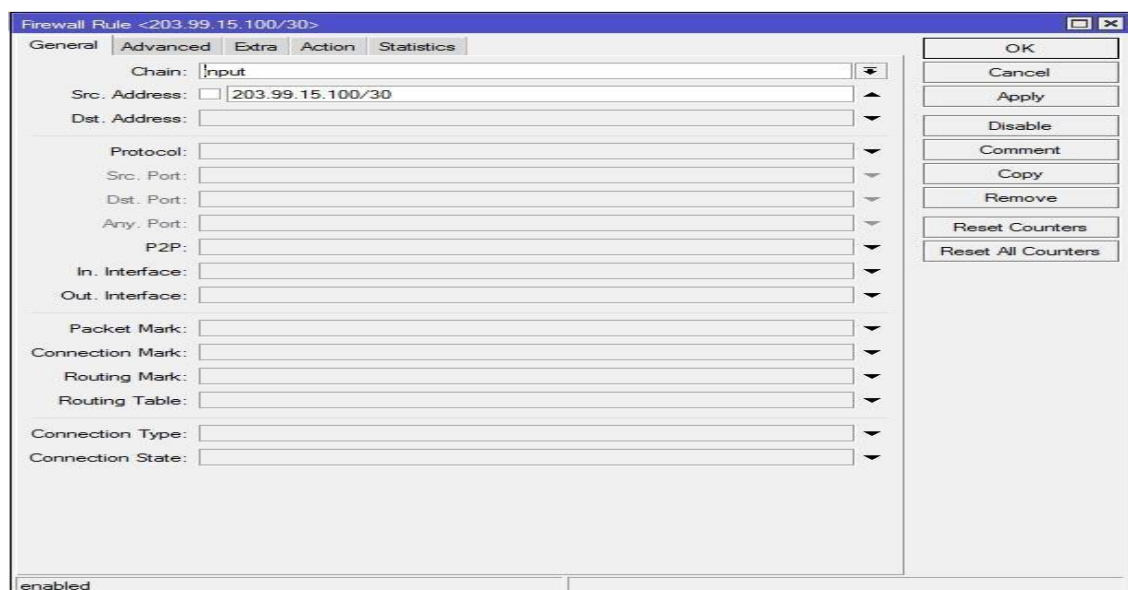

Fig4.26 Firewall Configuration

Rule-B:

Chain: Input

My Src Address is: 192.168.1.0/24 (IP block of my LAN)

Action: Accept then have to Apply> OK.

Now our router can be accessed from the IP / IP block of WAN Side and from the IP block of your LAN side. Apart from this, you can access anywhere through the Internet, but since our purpose is to prevent routers from unauthorized IP access, we have to create two rules as well as two rules. So that it cannot be accessed from router without any other IP block other than IP. Similarly, click Add (+) then,

Rule-C:

Chain: Input Src Address 203.99.15.100/30 Action: Drop ADs by Tec tunes Ads Apply> OK.

Rule-D:

Chain: I am Inputing Src Address 192.168.1.0/24 Action: Drop Apply> OK

So now our router will unable to access from other IP / IP blocks except 203.99.15.100/30 and 192.168.1.0/24 IP blocks. Now I can make more such type of filter rules such as brute force attack on my router, port block of different virus-spamming, special ports block of any specific network of networks. Below are the screen shots of some virus-spamming port blocks

Here the 192.168.1.0/24 3129 ports of this IP block have been blocked through rule-14. That means those 3131 ports cannot be used in the port. This is used in a proxy server. Many network administrators want to stop their users from using a proxy server, they are able to block the necessary ports in this way.
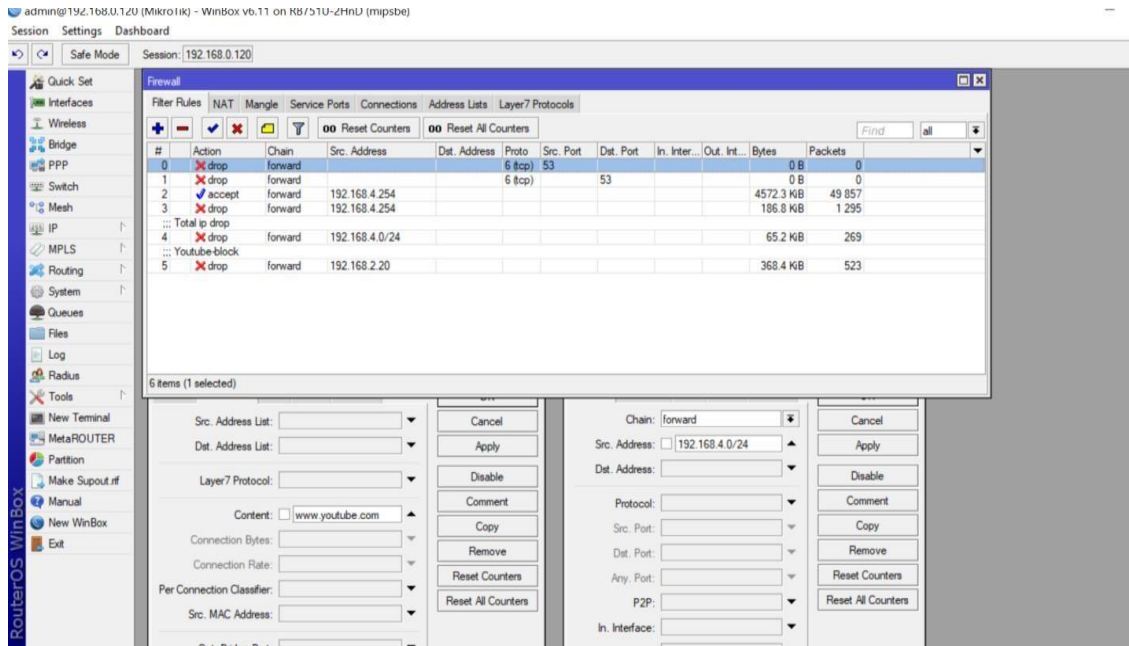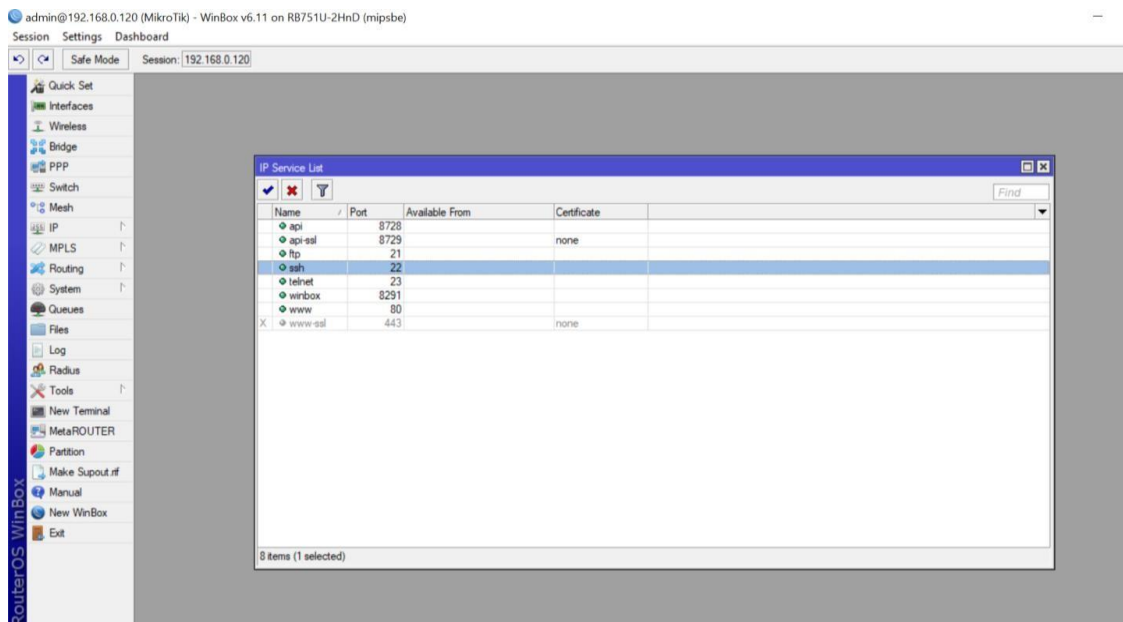
Fig4.27 Firewall Configuration

4.21. Ip service

Fig4.28 IP Service

4.22. User ID

Fig4.29 User ID

CHAPTER 5
INTERNSHIP CONSEQUENCES

5. Problems and Solution

As a beginner user of Mikrotik router, I faced various types of problems while configuring Mikrotik router. But as per discussion with my seniors I find the solutional way to solve it. The first thing that I had to check the Ip when Mikrotik router is deciding, then I had to DNS and other gateway IP and then I installed. This is very necessary to check because if any of the IP address gets misplaced then the configuration will not be complete. So, I work with the sincerity to configure it correctly. And then When to configure the firewall, we must be sure that the site is blocking it should be below all. This is to notify that to configure of SSID and password is the first task to keep in mind.there were more little concerns problem I faced but we have to keep in mind about the task process what we need to complete step by step. If then something got wrong to complete the configuration process then we have to check again to complete it.

5.1. Learning Outcomes

This is what I realized that Mikrotik router is a very necessary device for a data centre, To manage and distribute bandwidth in a manual way, Mikrotik router maintains a variety way of configuration. As an intern, I had collected all necessary information and elements to manually configure a Mikrotik router that will create confidence in me for next time when I will have to configure any Mikrotik router and I will be able to provide ISP services in one data centre.

5.2. Challenges

As an intern position owner, it was very much necessary to communicate in a good manner with the employee or my reporting persons those who have very established career there. I had to express my curious nature to create a weather of learning. As a first-

time field learner, I had to observe them and I had to make sense of learning. I learnt their way, I observe their official manner, their official process of a task, I completed my task given by my boss in time, I faced problems, sourced its solution, I maintain everything and this was fully a challenged. after all, I can say I learnt about to face problems and to observe and to solve it.

Some of my observation about challenge is Given underneath:

- Get in the working environment.
- Find out organizing limit.
- Understandings of official principles.
- Maintain a social approach with seniors.
- Develop Equivalent highest with different length of customers to maintain relations.

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Finally, I can say this was a new startup to find a line of being a specialist in my practical learning life.

CHAPTER 6
CONCLUSION

6. Conclusion

This section level resolves the basic of network and data communication what is related to Network Security and other Services. At the end of my internship, I realized that this training session is all about to create a path to enrich myself following this way. Now I can say I have a piece of fundamental knowledge about the Mikrotik router and webserver what I learned past 4 months changed my motivation of learning. This is very much necessary to develop me like a skillful person by following this way of learning. As a corporate based organization watermark has a maximum number of accessories related to the regular need of watermark group, But as an intern, it's a very necessary thing to a student that what situation he has, and what he has to learn by following a way , what will let him more knowledgeful and more expert. In starting of my internship once I summarized the learning part of mikrotik router what I need to learn in 4 months, Now I can say I can operate mikrotik router and configure it as well. As a well-grown organization, it prioritizes the running trend-based skills to develop. So, I learnt that way and I think it will help me to grow up with a curious mind to learn in a good manner.