

Empirical Study on Network Configuration Using MikroTik Router.

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This Report Presented in One-sided Achievement of the Requirements of the Degree of Bachelor of Science in Electronics and Telecommunication Engineering.

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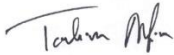
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DHAKA-1207, BANGLADESH

APPROVAL

This project titled “**Empirical Study on Network Configuration Using MikroTik Router**” submitted by Ekranul Tanvir to the Department of Electronics and Telecommunication Engineering (ETE), Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. Electronics and Telecommunication Engineering and approved as to its style and contents. The presentation will be held on August,2020.

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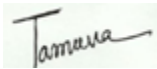
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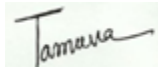
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DECLARATION

We hereby declare that this project is our own work and effort under the supervision of **Ms. Tasnuva Ali, Assistant Professor of the Department of Electronics and Telecommunication Engineering, Faculty of Engineering, Daffodil International University, Dhaka.** It has not been submitted anywhere for any award. Where other sources of information have been used, they have been acknowledged.

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ABSTRACT

At present network configuration and management is one of the significant terms for developing the country day by day. In our daily life internet connection became the fundamental requirement. Worldwide internet service provider (ISP) usually delivers the network connectivity to the home user. The router handle this network connectivity which is a special device. MikroTik router has been studied in this experimental report. Daffodil Online Ltd is (DOL) is one of the promoter ISP in Bangladesh. In order to optimize the network, the network configuration and management of Daffodil Online using MikroTik has been studied and sketch accordingly in this report.

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CHAPTER 1

Introduction

1.1 Introduction

Nowadays people can develop their activities by using information technology via internet. For doing loyal work internship is an important employment challenge for students so that people can appreciate to see their true work. It is seemed to me it is high time to extend my knowledge to do better in working model, deals and industrial behavior. Today each business and enterprise are connected to software communication and information technology. It is called E-Commerce. Most of the people can enhance their job quality via E-Commerce without wasting their time on smartphones. Domain name system (DNS) is one of the significant parts of the internet. It should be known by us how network downtime is reduced, how affordable and profitable network is developed and built.

1.2 Motivation

Motivation which is extensive power for everyone. If you want to do better in your life you should have a high motivational capacity. Now I am a student of ETE department in Daffodil International University. Collecting practical information help the students to gain a capacious view of the subject and the importance of it is very significant in practical life. During the internship I completed the detail of MikroTik Router. The internship motivates me to do better in future life hopefully.

1.3 Internship Objectives

As a qualified person, the target of my internship to train in a competitive job market. It is very necessary to build up skill. When I have outstanding qualities, it will make me a skillful person. The objective of the internship is to provide consciousness to improve work practically. For this objective self-dependent will be createt.

1.4 Report Layout

Chapter 1: Described Introduction, Objective and Motivation.

Chapter 2: Described the Networking, types of Networking which is using for MikroTik, Introduction of MikroTik and types of so many router.

Chapter 3: Displayed preparing went to, doled out obligations, Mikrotik fundamental charge and portrayed about various kind of steering setup (DHCP, PPPoE, ARP, Firewall) goal.

Chapter 4: Report decision and Future development.

CHAPTER 2

Introduction of MikroTik

2.1 Networking

In the present time networking is an important thing to communicate. From one place to another we cannot think of sharing data without networking. Now it is easy to us to exchange data from one place to another through networking. By distributing data between several computers we can build a network. MikroTik is a Latvian company that was based in 1996 to develop wireless and routers ISP system. Most of the countries around the world MikroTik provides software and hardware system for net property. The perception in victimization industry complete routing system and standard laptop hardware system allowed America in 1997 to make the Router OS computer code that gives intensive stability, controls for all types of knowledge routing and interfaces. We tend that we can set to create their own Router BOARD and also hardware. There are many resellers and customers in most elements each country on the globe. [1]

2.2 Types of Networking

There are different kind of networks.

2.2.1 LAN (Local Area Network)

In our daily routine we use the local area network whole day. Its main intention is working to little medium workplace such as courts, business commerce networks and small medium share info and resources and office lamps, print electronic equipment scanner etc. Native space Network are accustomed to emphasize computers substitute network devices and the devices can share the resources from one another computers. The computer network is concerned, the sole cable used here is restricted by the absolute distance and additional options of the computer network. [2]

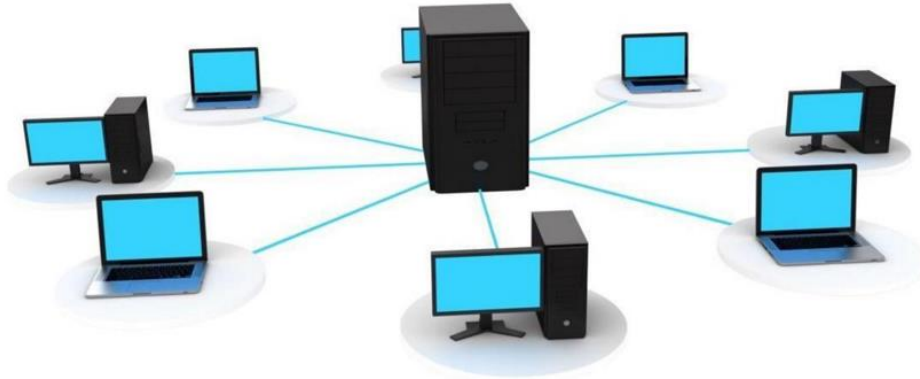


Figure 2.2.1: Local Area Network

2.2.2 MAN (Metropolitan Area Network)

MAN stands for Metropolitan area Networks which is a range of different types of networks. New class of a network can be relatively by an individual. MAN is larger than a LAN. MANs seldom enlarge on the so much facet – 100 km and repeatedly constitute an alternative of different kind of hardware and transmission media. The form of cable TV network is it's one network and so it's a technical term to connect a range of PC networks into an even larger network. Consequently, sharing PC networks to LAN except as device to device in resources area unit. Particularly it is a combination of the networks like Cable TV network, casing the whole city or a group of many endemic areas Networks. During this process sharing resource from network to network and laptop to laptop to move. MAN is commonly recognize by large organization to associate its several branches across the city. [2]

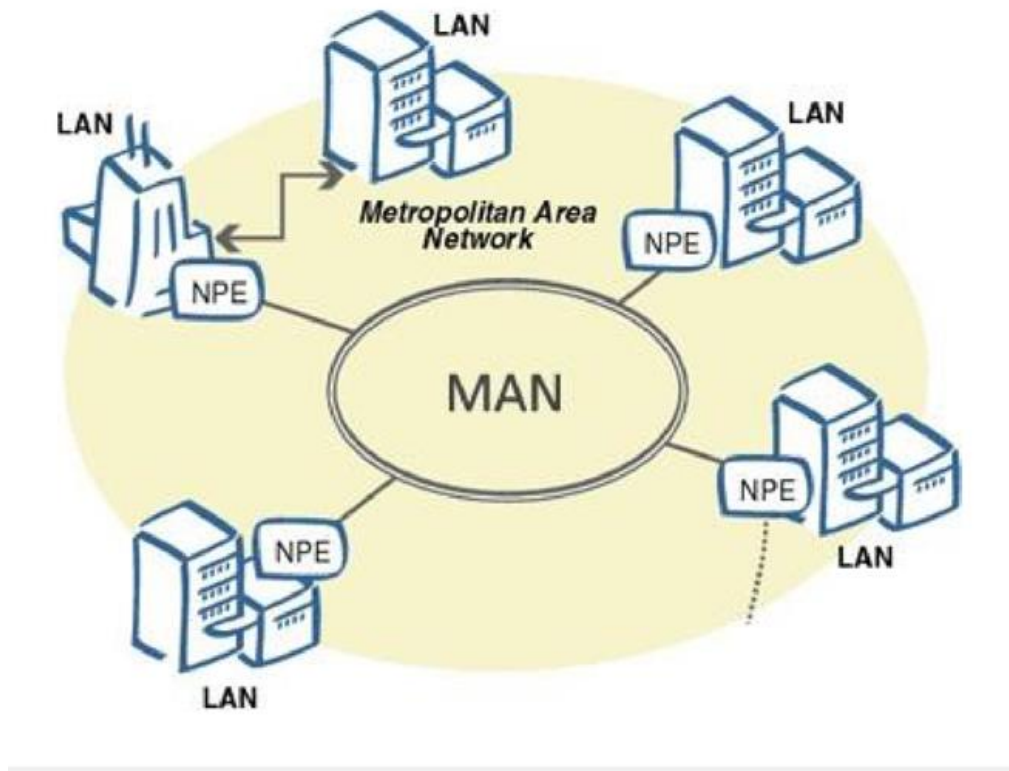


Figure 2.2.2 Metropolitan Area Network

2.2.3 WAN (Wide Area Network)

Wide Area Network is exhibited in a spacious geographical area with LAN and MAN. This kind of network was exhibited using the telephone company because of wide area network which is difficult to grow, technologies and special areas used for connecting to several LANs. WAN of the plans to construct more than the LAN is really difficult to operate because of the necessity for creating a LAN across the world, the satellite is used in many cases. Greater portion of wide area networks work at 1.544 Mbps at 56kbps speed. [2]



Figure 2.2.3 : Wide Area Network

2.3 Training Served

For my internship I choose Daffodil Online Ltd. The training time was about four months and there Cisco networking MicroTouch switch configuration MikroTik Router is done about. For training I was admitted DOL and started class. About Cisco networking we have no idea at first. First we will learn IP configuration. We find different information about IP subletting and conciliation then we started installing micro router. If MikroTik router can do a new configuration forward, it will have to reset the process to give it first. First we get an internet connection in the microcytic router to scan the IP in the interface and DNA and gateway is required to be given. The Mikrotik router we have no idea about different kind of configuration of the MikroTik router. Then we have the DHCP configuration Pppoe service which about we know all kinds of configuration and bandwidth management and also can share bandwidth. MkroTik router also know how to configure block the bandwidth of YouTube and Facebook. We could not complete four month course because epidemic of the CORONA Virus. For this reason I completed only MikroTik routing.

At the first step we learn about IP sub netting and networking properly and switch configuration VLAN and switch Management.

- ❖ Comprehension and learning about network components.
- ❖ Understand and studying basics of MikroTik.
- ❖ Basic centos commands.

At the second stage from training we learn MikroTik simple configuration and OS installation of MikroTik in VMware.

- ❖ Concept of IP Addressing
- ❖ OS installing of MikroTik
- ❖ Web site filtering

At the third stage we learn MikroTik hole configuration that is very important for Mikrotik router management.

- ❖ IP configuration
- ❖ Sub netting
- ❖ Networking binding
- ❖ Cisco
- ❖ VLAN
- ❖ PPPOE
- ❖ Static and DHCP
- ❖ Bridge
- ❖ Bandwidth management
- ❖ ARP/AP
- ❖ Wireless configuration
- ❖ Firewall
- ❖ Firewall security

2.4 OS of MikroTik

MikroTik OS is an operating system. The operating system comes with various license levels ranging from 0-6. Where 0 is 24 hour experiment version. In experiment mode we can test all outlook of router OS free. We can compare the different license level features. Router OS is very easy to installing. Either download ISO image or burn it to CD and boot from it. Net install write Router OS to any secondary drive which we have attached to our Windows PC. By moving the drive to our Router PC and boot it. About all the installation methods, upgrade files and more can be found here. [3]

2.5 MikroTik Ethernet Route

2.5.1 HEX lite

HEX lite is 5 port LAN router by a nice plastic case. Its grade is under the router OS license alone there absolutely is not any doubt once it entangle managing our wired home network. Not only it is inexpensive, small, discreet trying and simple to use. It is most perhaps the first cheap MPL capable router on the market, between option and values there are no more compromise. It's impenetrable style and pure look, it'll work any SOHO atmosphere. [5]

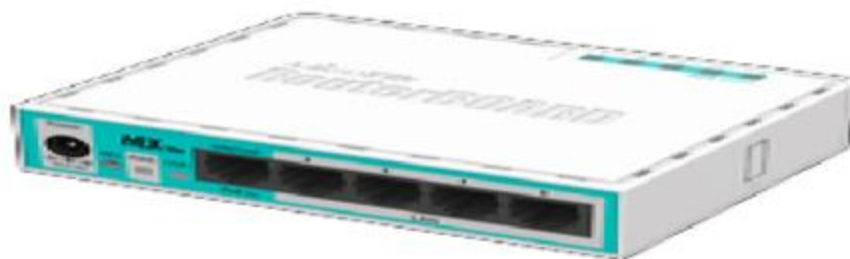


Figure 2.5.1: HEX lite

2.5.2 HEX PoE

Wireless connectivity is not necessary because HEX PoE is a five port Gigabit Ethernet router for location. For adding optical fiber connectivity the device has a USB 2.0 port and an SFP port. The ports 2to5 can power another PoE efficient devices with the equal voltage as applied to the unit. It is safe and spontaneous to use, in the meantime it's come with a very powerful 800MHz CPU, the supporting of Router OS is susceptible of all the advanced configuration. Less power adapters and cables are liable for anxiety about Max current is 1A/port, Ethernet ports are shielded. It is also supportive passive PoE input and passive or 802.3af/at PoE output. Ethernet ports 2to5 can efficient other PoE capable devices with the equivalent voltage as applied to the unit. [4]



Figure 2.5.2: HEX PoE

2.5.3 RB2011

The RB2011 is a low cost multiport device series. Designed for indoor use and attainable in many kinds of cases with a collection of options. The RB2011iL-IN is the most basic model, with 5 Ethernet ports, 5 Gigabit Ethernet ports, power jack and PoE support. The new Atheros next generation powered is 600MHz 74K MIPS network processor. There is a PoE output

function for port #10 – it can power other PoE capable devices with the same voltage as applied to the unit. The maximum load on the port is 500mA. [6]



Figure:2.5.3 RB2011

2.5.4 CC1036-8G-2S+

Now fastest router has become even better, the new CCR1036-8G-2S+ now has two SFP+ ports for 10G interface support (SFP+ module available separately). It also uses the same 36 core Tiller CPU as our other CCR1036 model and give the same performance, but 10 gigabit links are possible. The device comes in a 1U case, has 2 SEP+ ports, eight Gigabit Ethernet ports, a serial console cable, and a USB port. The CCR1036-8G-2S+ has 2 sodium slots, by default it is shifted with 4GB Ram, but Router OS has no memory limit. Also available now, the EM model with 16GB of RAM supports both SFP. [7]



Figure 2.5.4: CC1036-8G-2S

CHAPTER 3

Configuration of MikroTik

3.1 Win box Interface Menu

Win box is a compressed use that sanctions the administration of MikroTik Router OS utilizing an urgent. It is an endemic Win 32 binary. All of the Winbox interface functions are as immediate as possible reflect the quiet function, for this there is no Winbox sections in the manual. There are some advanced and system

- ✦ For key exchange and authentication Winbox uses ECSR
- ✦ By SIA MikroTik is issued the Winbox is signed with an extended validation certificate.
- ✦ Other side knows the password and both sides verify that.

Winbox uses AES128-CBC-SHA as an encryption algorithm

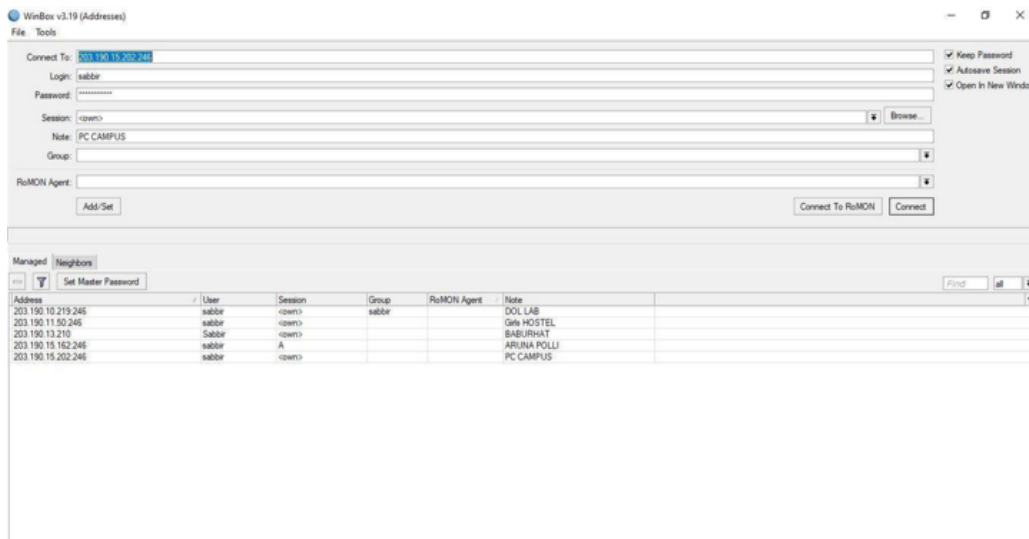


Figure 3.1: Winbox

3.2 Static Configuration

Routing decisions are required by the static routing in the routing table, only admin can update this manually. Her the route choice is limited but only one default route is available, static routes are usually completed. If we have few route setup devices and no future route change is needed, Static routing can also be used.

Step 1: Winbox open: Ip>Address 192.168.0.1/24>Interface=ether1>

Ip>Address 172.16.0.1/24>Interface=ether4>
 Apply>OK

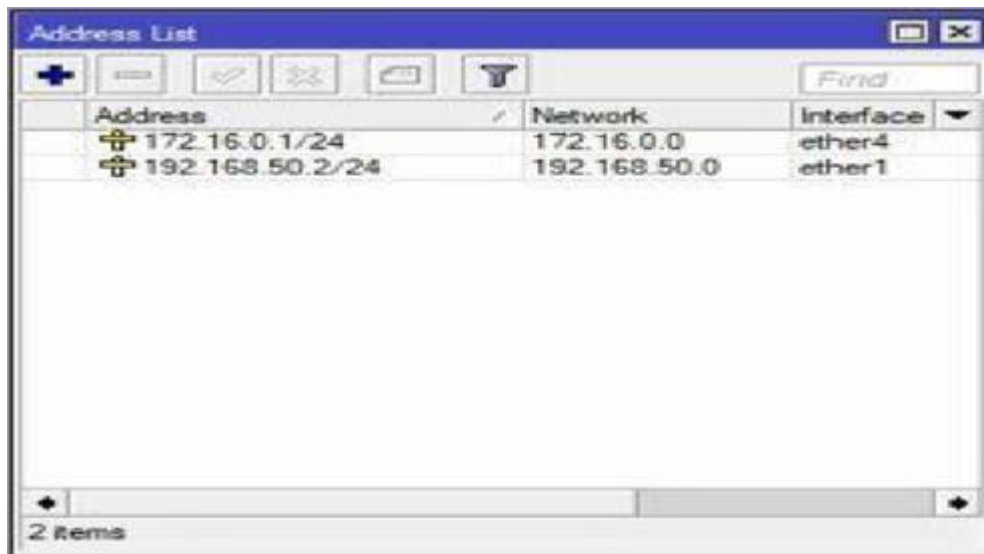


Figure 3.2: Add Network Address & select interface

Step 2: Ip>Routes>=192.168.50.1)>Apply>OK

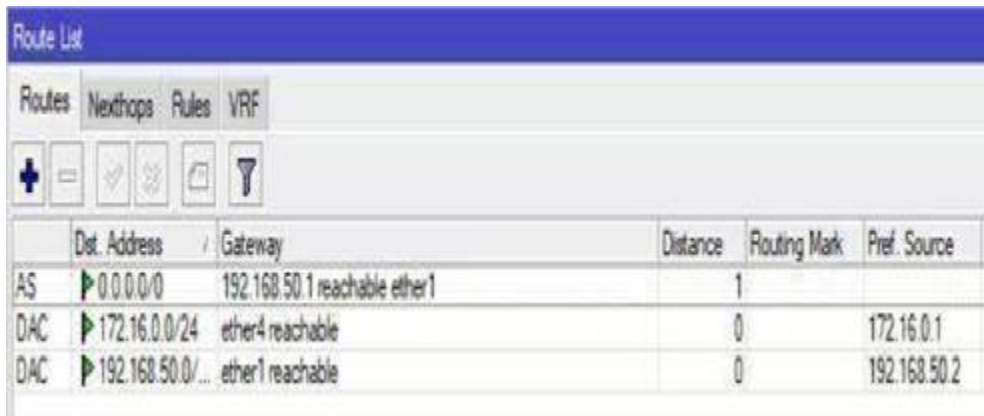


Figure 3.3: Add Route

Step 3: Ip>Firewall>NAT>+action>masquerade>Apply>OK

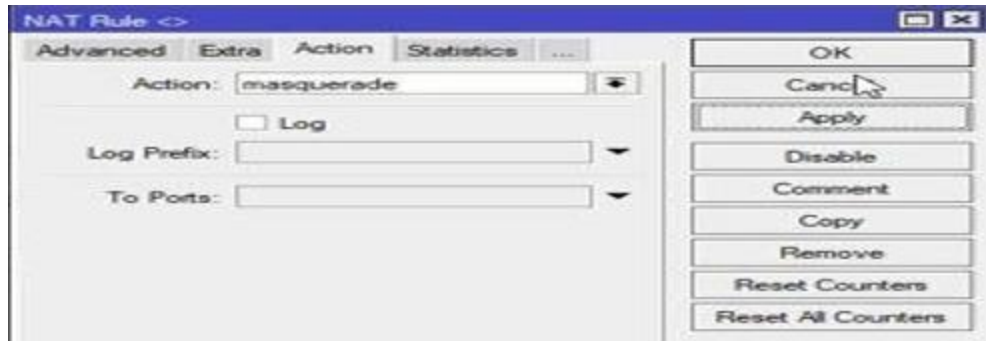


Figure 3.4: Set Firewall

Step 4: Ip>DNS>DNS Seeting>servers=203.190.10.252
 =230.190.10.253

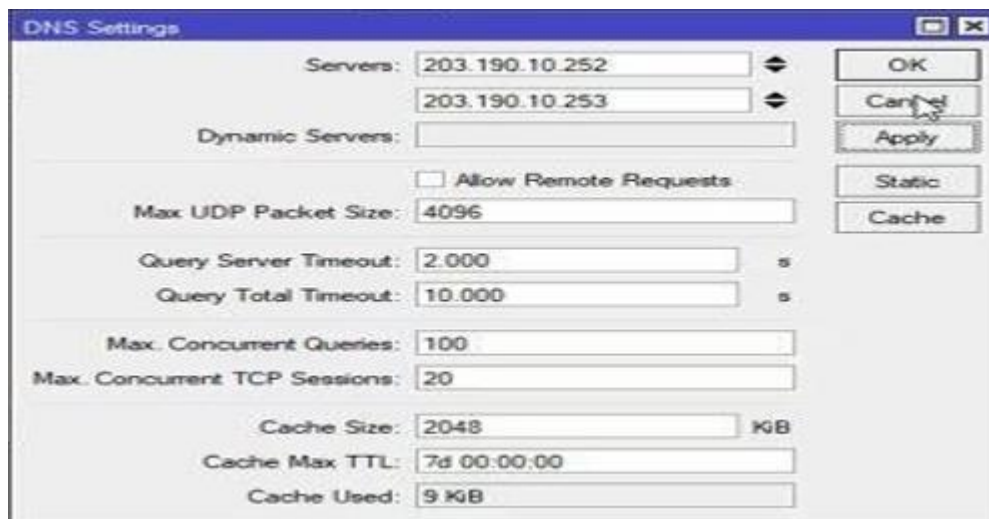


Figure 3.5: Add DNS

3.3 DHCP Configuration

DHCP is a network management protocol which is used to progressively assign the IP address and to any device or node on the network, it is allow to communicate via IP. It is a network management protocol. DHCP will run as well as on large enterprise networks and small local networks.

Step 1: Go to IP>DHCP server tab. The window of the DHCP server will apper.

Step 2: Click the DHCP setup button and select ether2 then click the next

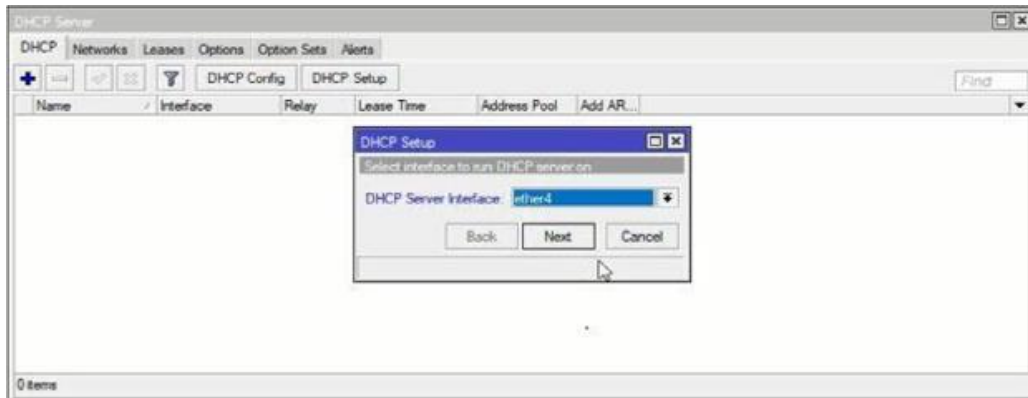


Figure 3.6: Select DHCP Server Interface

Step 3: Now DHCP address space input field, given LAN network block (172.16.0.1) and click next. LAN user will receive the IP from this network.



Figure 3.7: Select Network Block

Step 4: Select a gateway for the given DHCP network input box in the gateway and click next.

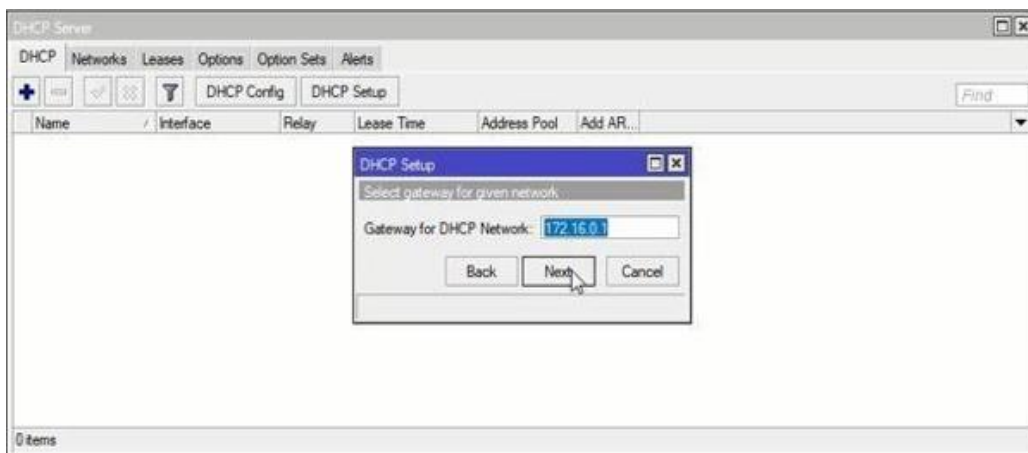


Figure 3.8: Select Gateway

Step 5: The IP address of DHCP client/LAN user provides the IP range will be entered and click next.

Step 6: Give DNS server IP and press next

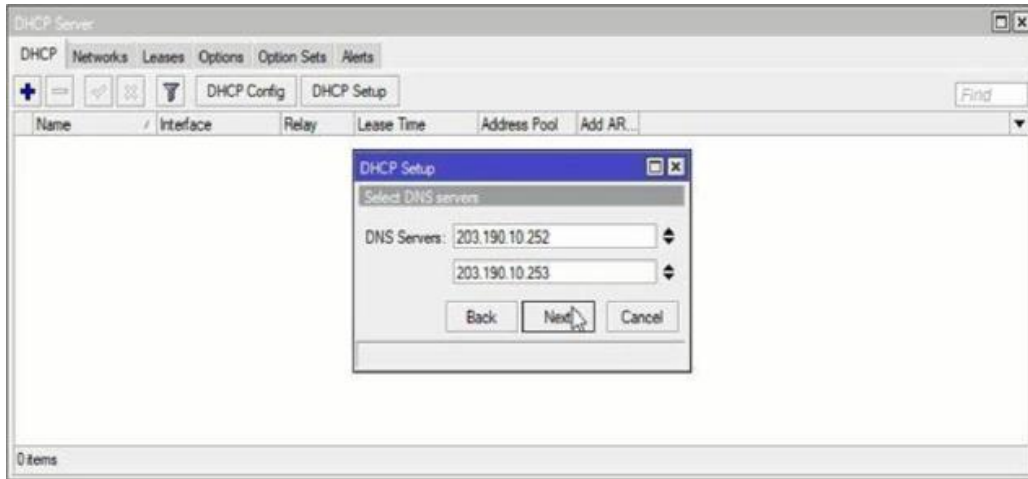


Figure 3.9: Select DNS Server

Step 7: Enter the IP lease time then press next.

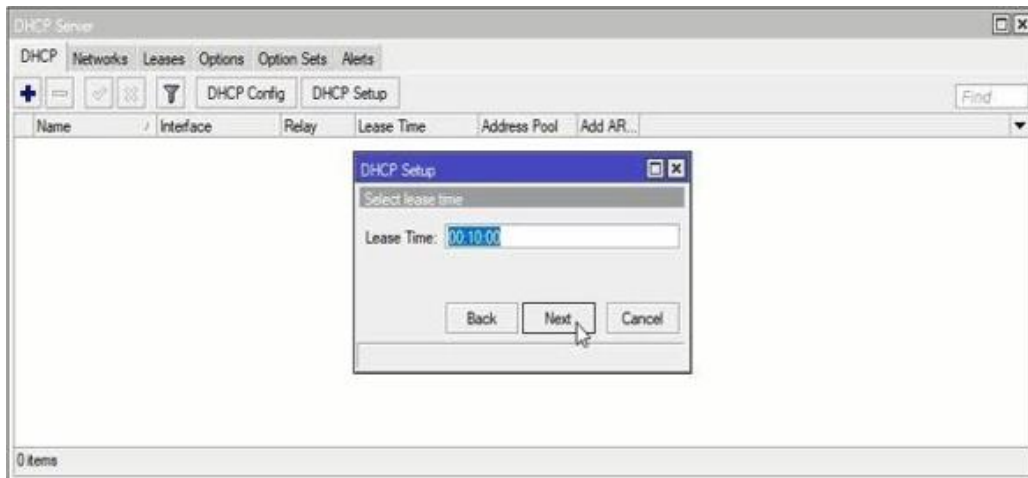


Figure 3.10: Set Lease Time

Step 8: Now DHCP is complete and successful message will be displayed.

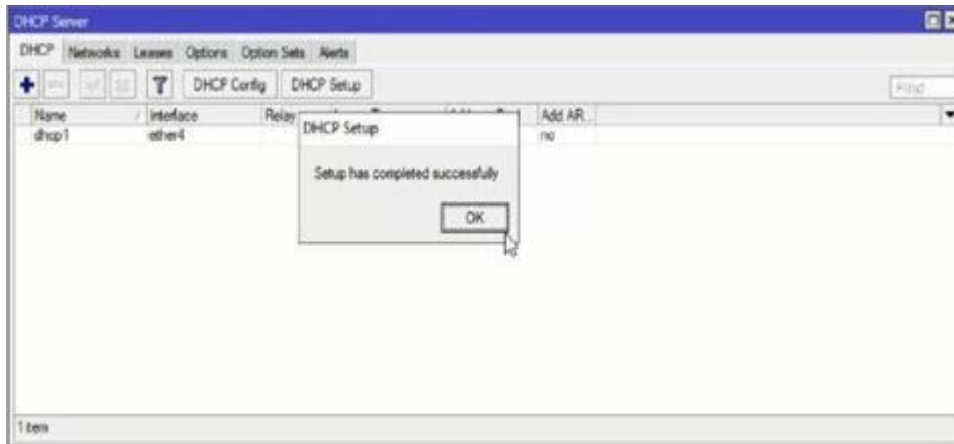


Figure 3.11: DHCP Setup Complete

Any IP device like desktop, laptop, mobile etc. now link to the network. For this device a MicroTik DHCP server IP is automatically allocated. Click leases to see the DHCP client's IP lease status.

3.4 Bandwidth Management

Bandwidth management have two ways.

- I. Add multiple queues.

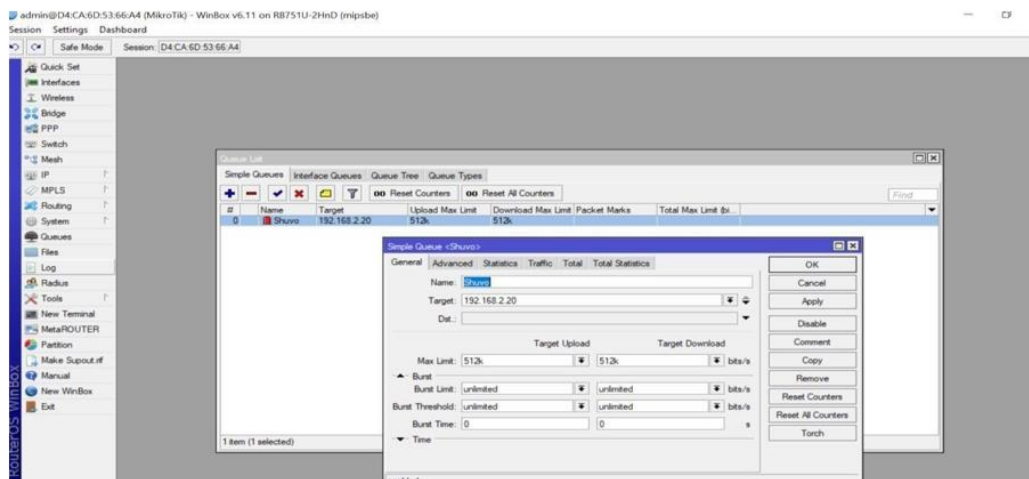


Figure 3.12 Bandwidth Management

- II. Define two PCQs queue types. (for 1 upload and 1 download)

Most of the time I use win box. So the exact CLI commands do not remember. In winbox go to Queues then types Add (+) give it name say. 10M-Download, kind=pcq, rate=10M, Classifier=Dst. Address for rest defaults are ok.

Another one is added:

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

3.5 PPPOE Configuration

PPPoE is a network protocol for encapsulating point to point protocol frames inside Ethernet frames, it stands for point to point protocol over Ethernet. It is also used mainly with DSL services. It is take advantage of mainly with DSL circumstance where separate users connect DSL modem over Ethernet. Ethernet networks have no receptivity for a connection and packet predicated. Even they lack rudimental security property to bulwark against IP and MAC friction and rogue DHCP servers. Individual users associate to a DSL modem over Ethernet. Ethernet networks have no receptivity for connection and it is packet based network.

Step 1: Creating PPPoE client, We guess that our WAN port is ether1. WAN cable plug into ether1- press PPP then press plus sign. Add +.Then choose and PPPoE client. After click general tab, we will see interface then choose an ether1. Go Dial out tab, after fill in User and Password then Click Apply. After that we see status connected on the bottom.

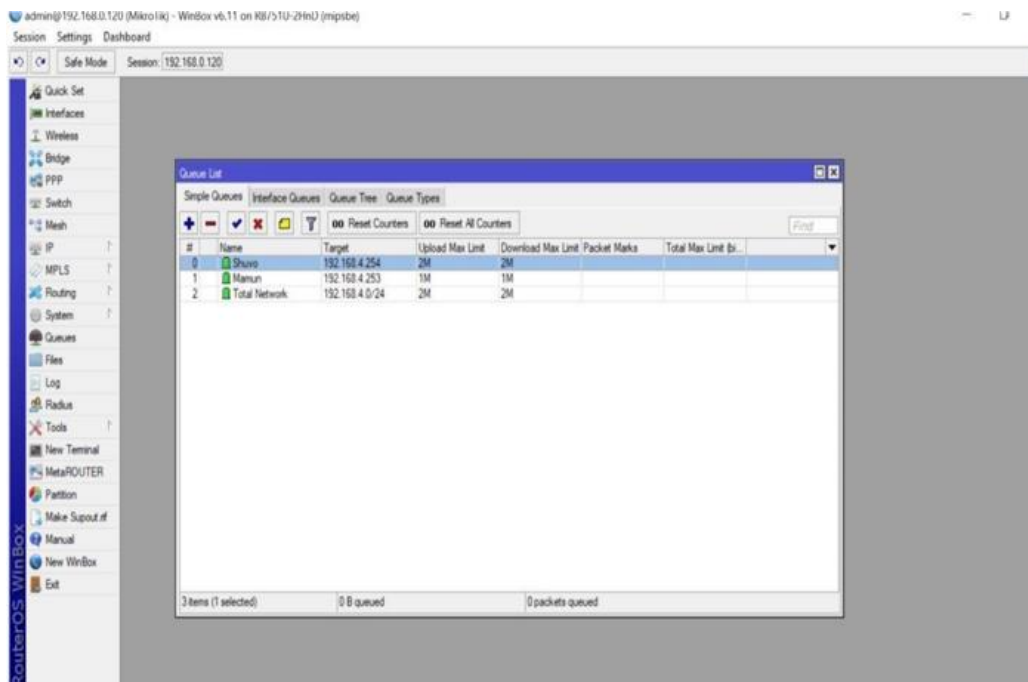


Figure 3.13 PPPoE Configuration

Step2: Set DNS, press IP then select DNS, fill in the DNS IP address.

Step3: After the Ports tab, press on add + add port into bridge, Select interface add into the bridge then choose bridge that created earlier and press ok.

Step4: For LAN add IP address, press IP then choose Address. Press add+ then add new IP address, after filling the IP address then choose the bridge name and create earlier.

Step5: Creating DHCP server, after setup then choose bridge and click next.

Step6: NAT LAN network, press IP and choose Firewall, in the general tab select scan and select PPPoE out1. Choose masquerade then ok.

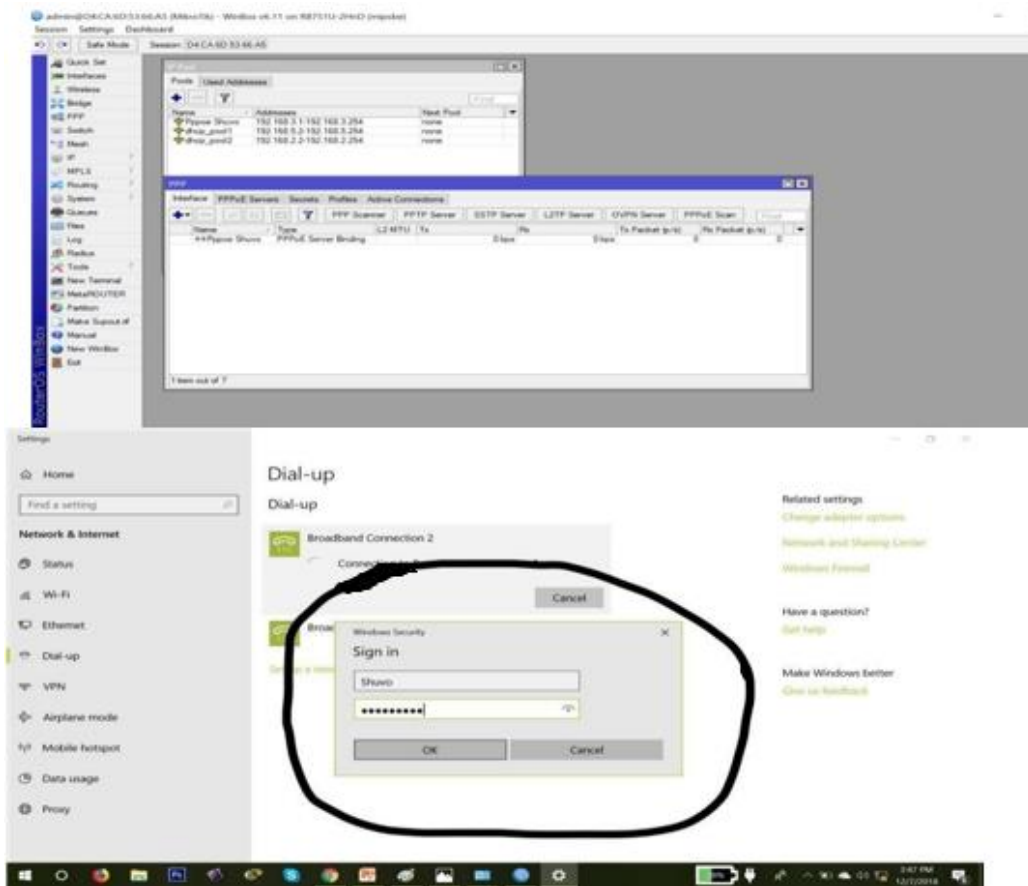


Figure 3.14: PPPoE Configuration



Figure 3.15: PPPoE Configuration

3.6: Wireless Connection

Wireless LAN uses radio waves to connect devices the internet and business network and application. After connect Wi-Fi hotspot at a hotel, café, airport lounge or other public place, connect to the business wireless network.

Step1: New security profile is create go to Wireless>Security Profiles then then add new profile. Virtual access point create go to Wireless>Interfaces then add virtual AP.

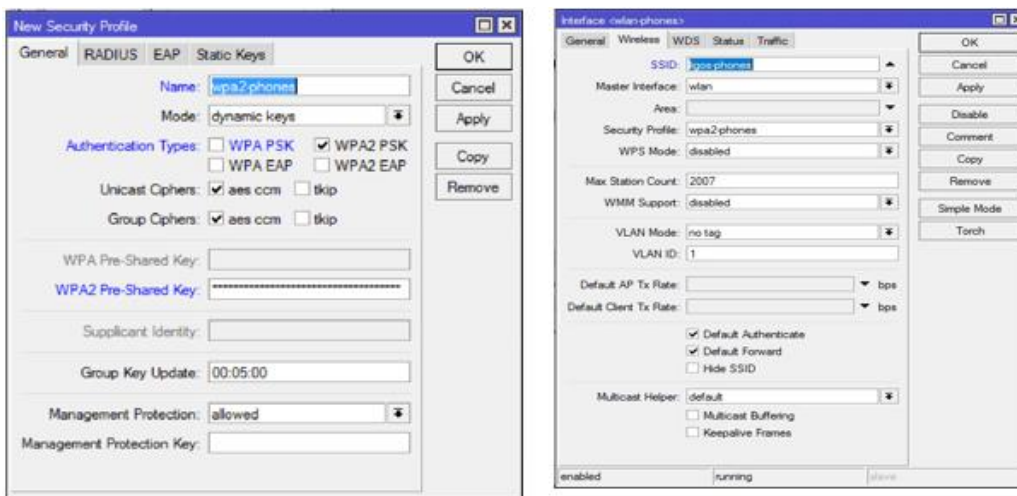


Figure 3.16: Wireless Connection

Step2: IP>Address then add new address. Go IP >Pool that add new pool.

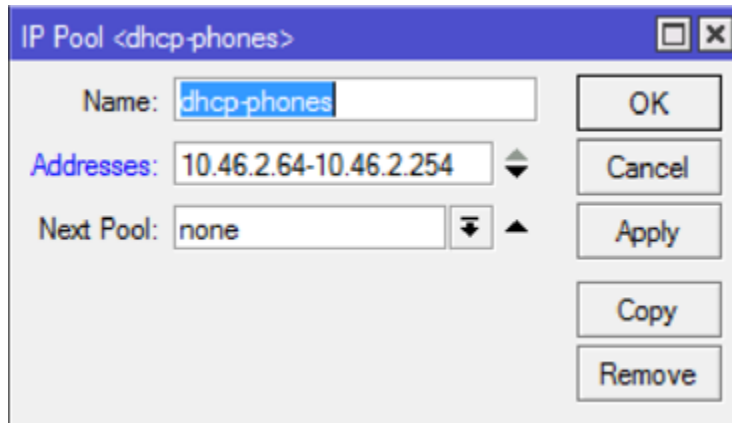


Figure 3.17 Wireless Configuration

Step3: For connect to the Wi Fi network DHCP is used to assign address to devices. If we create the pool they will use. Then assign a few other special addresses.

Go to IP>DHCP Server>DHCP tab>DHCP Server

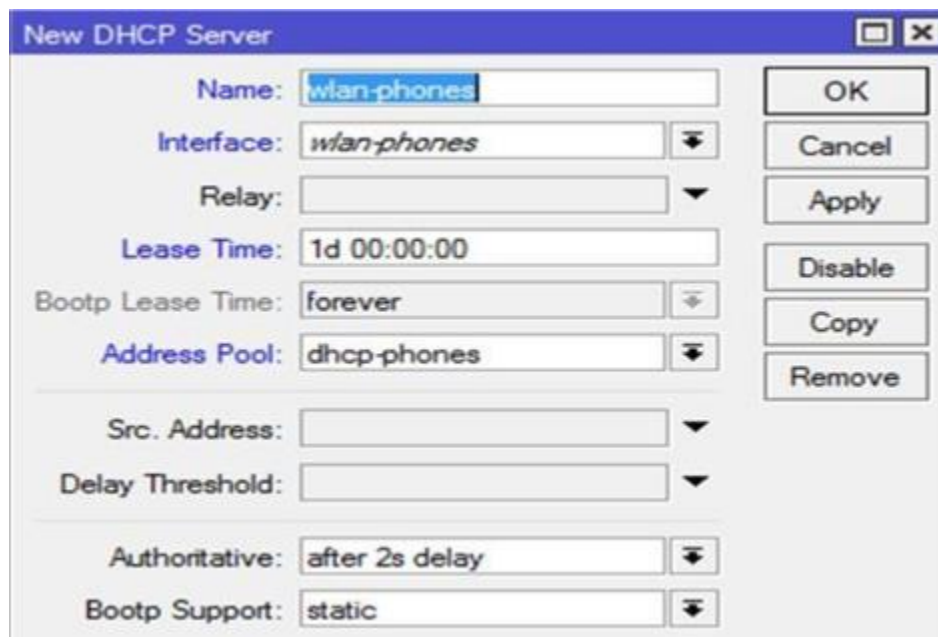


Figure 3.18: Wireless Configuration

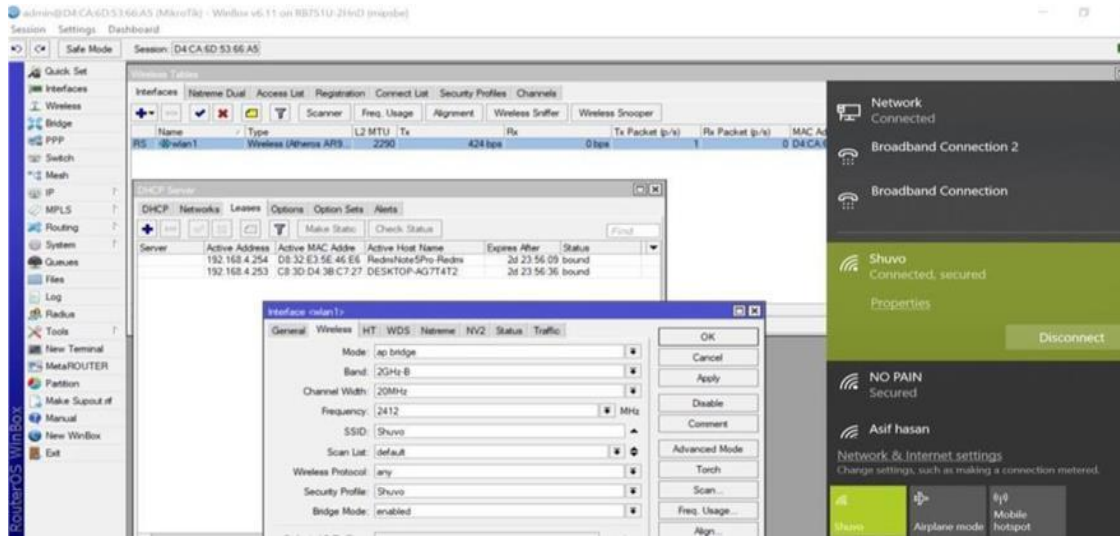


Figure 3.19: Wireless Configuration

3.7 ARP Configuration

A static IP is put by ARP binding to MAC address entry in a devices ARP table. DHCP conservations accommodate a device on the network to get the same IP assignment making DHCP requests. They are not related.

At first, select ARP IP then + sign, add information then press ok. Then select static IP address, MAC address. Interface: ether2, Same LAN steps need to repeat on DHCP server. Click IP and DHCP server.

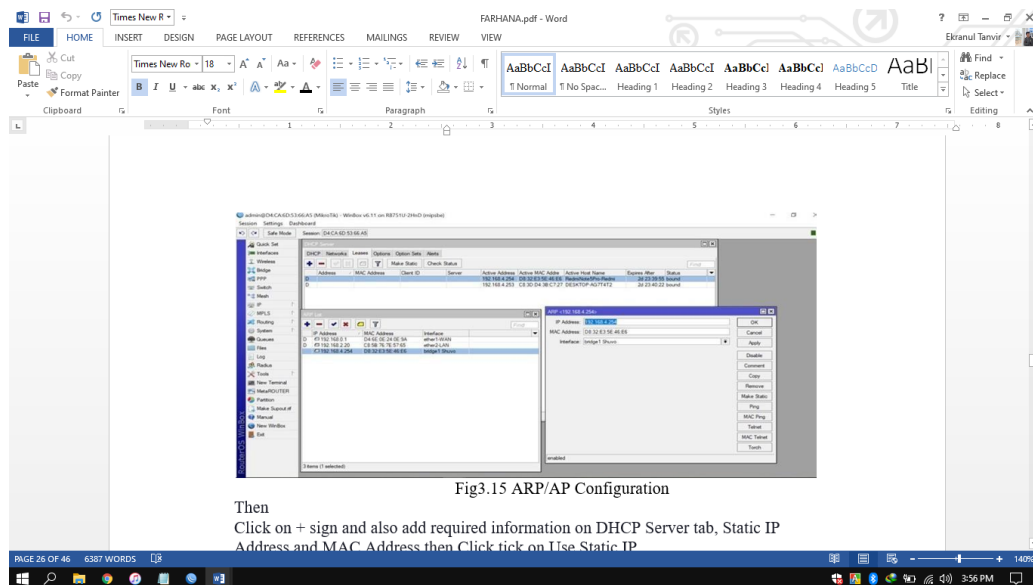


Fig3.15 ARP/AP Configuration

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

Figure 3.20: ARP Configuration

Then press on + sign, add required information on DHCP server, MAC address and static IP address, use static IP

Server dhcp1

3.8 Bridge Configuration

Step 1: Select Bridge menu



Figure 3.21: Select Bridge

Step 2: Go to bridge tab and click on (+)

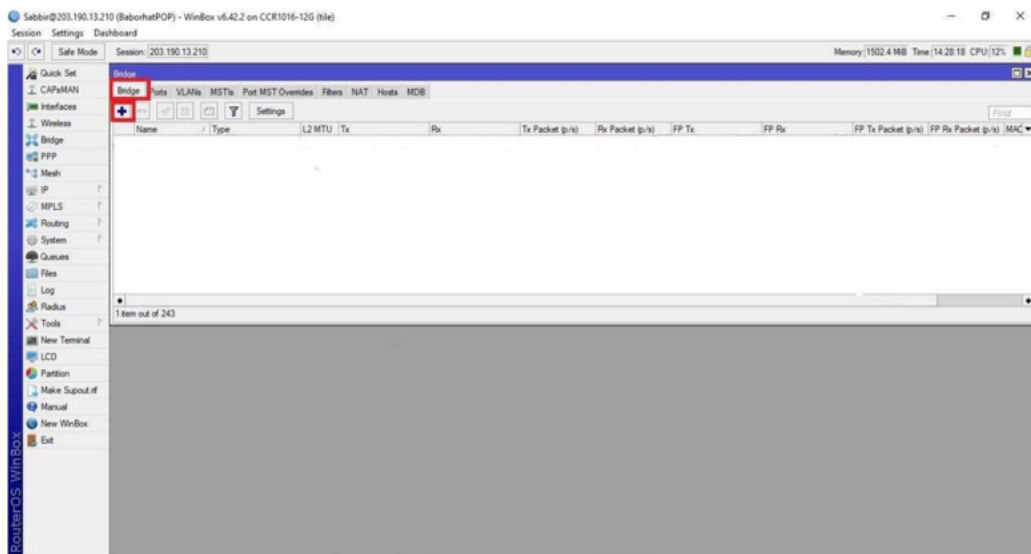


Figure 3.22: Click Bridge plus sign

Step 3: Give Interface name. Click apply then ok

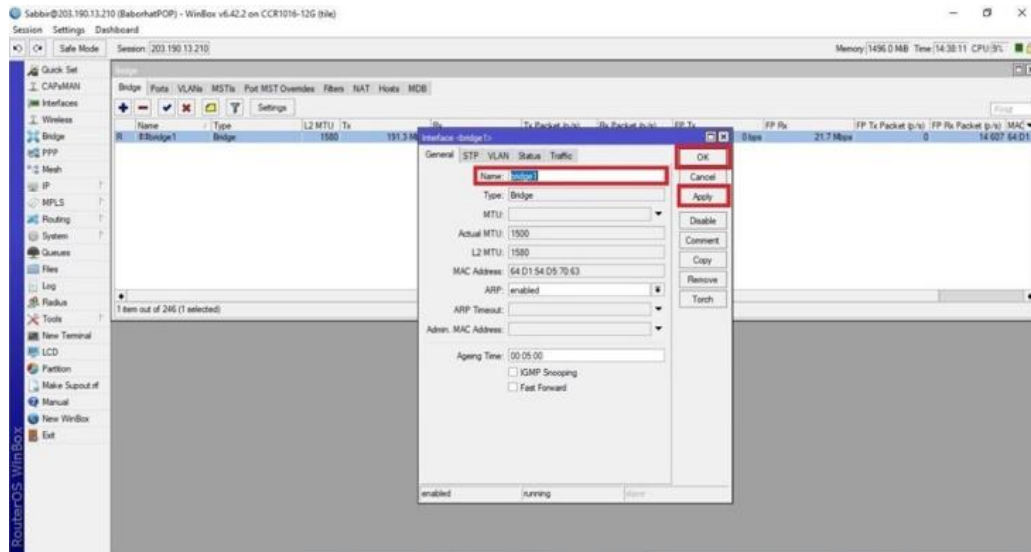


Figure 3.23: Add Bridge Name

Step 4: Then go to Ports and click (+)

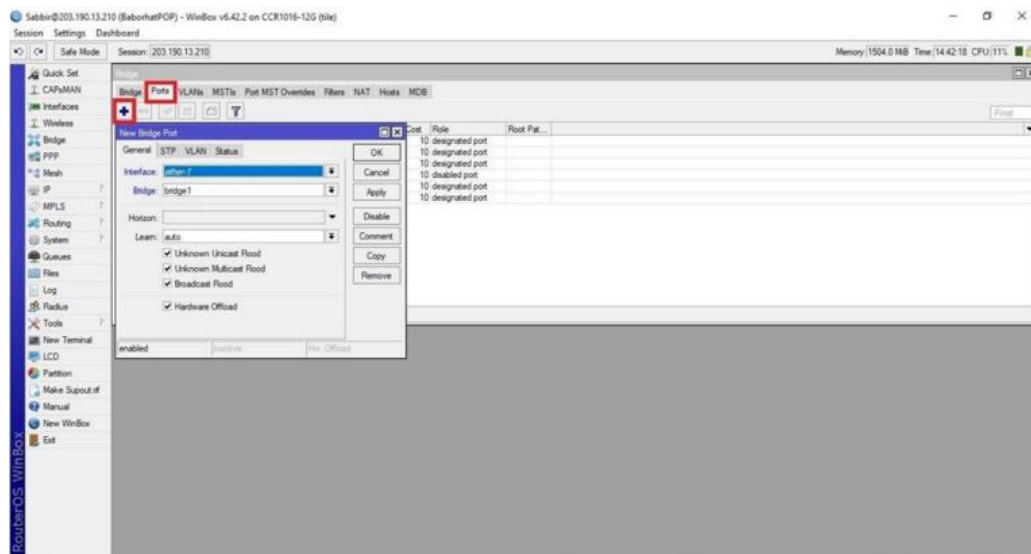


Figure 3.24: Add Port

Step 5: From dropdown menu choose physical interface.

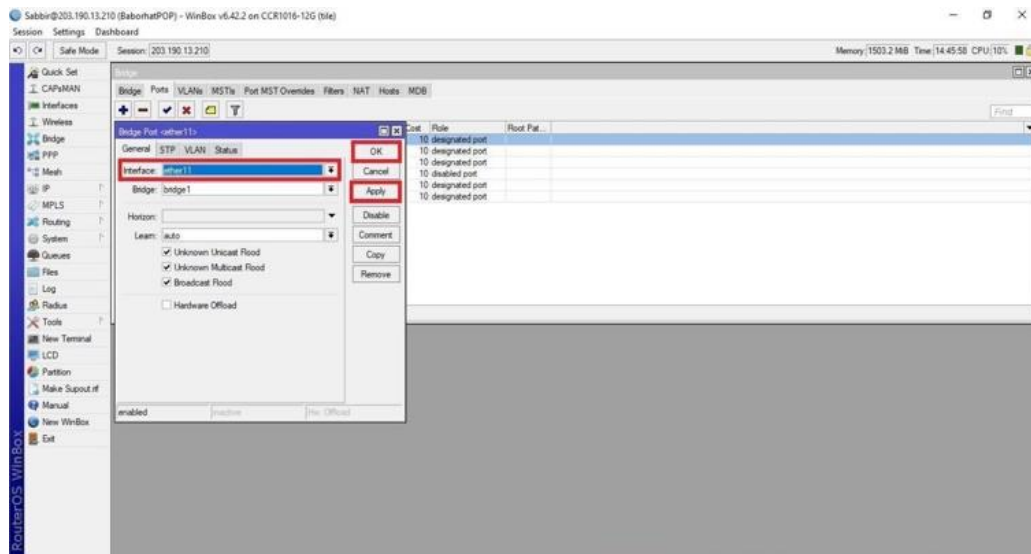


Figure 3.25: Select Interface & Bridge

3.9: IP Server

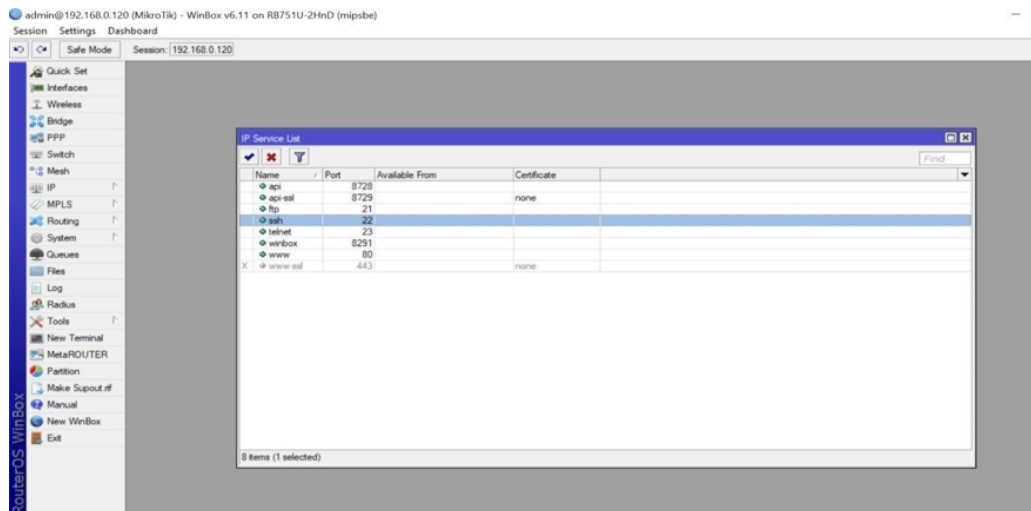


Figure 3.26: IP Service

3.10: User ID

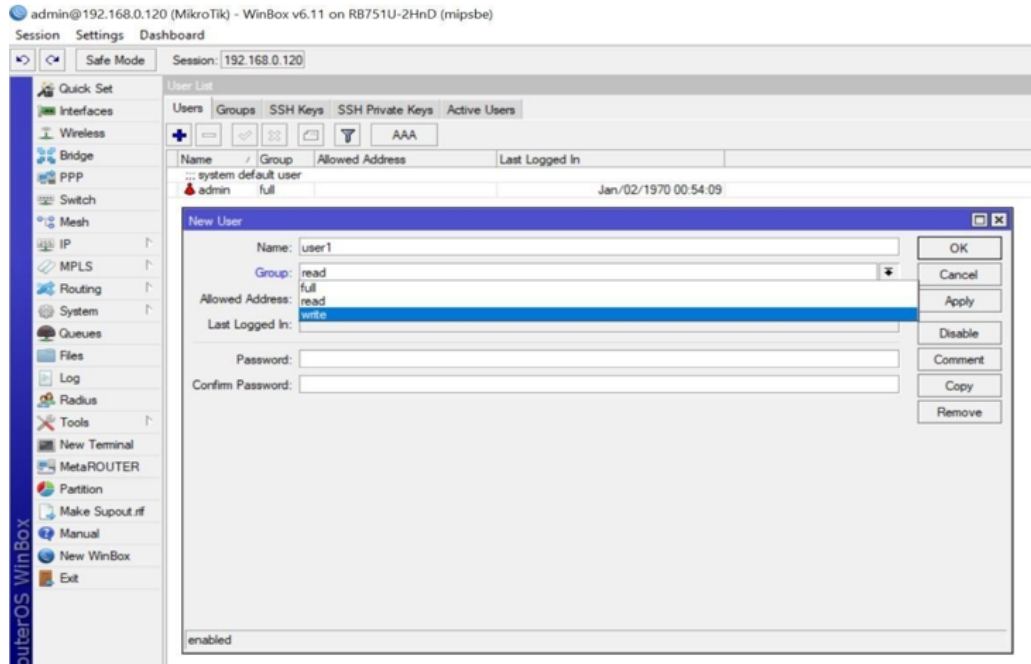


Figure 3.27: User ID

CHAPTER 4

Conclusion and Future Career Scope

4.1 Conclusion

The experience of the internship was excellent and teachable. When I complete my internship I realize that from Daffodil Online Ltd if anyone complete the training they can perfectly operate the MikroTik Router. I also able to operate MikroTik router. I also done configuration microcontroller routers very well. Now I can operate MikroTik router myself. In this session I also learned creating network institution via ISP. Hope the internship of mine will able to lead and serve the society successfully.

Future Career Scope

In networking sector there are a lot of opportunities available for job. In MikroTik Networking sector, there have many different field opportunities for career including CISCO, AWS, JNCP etc. As the technology and network communication advances, networks are interconnected progressively. Consequently, every person must live up to the latest network technological and communication aptitude. It helps every person to achieve depth wisdom to resolve many kinds of problems in future life.

Reference

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