

**INTERNSHIP ON
ROUTER CONFIGURATION: NETWORK SECURITY AND SERVICE
PROVIDING**

BY

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

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**DAFFODIL INTERNATIONAL UNIVERSITY
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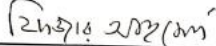
APPROVAL

This Project/internship titled “**Internship on Router Configuration : Network Security and Service Providing**”, submitted by Lamiya Fairouz , ID No: 193-15-13392 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfilment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 28 January .


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I hereby declare that this project has been done by us under the supervision of Md.Ismail Jabiullah , Professor, Department of CSE Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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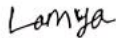


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Finally, I must acknowledge with due respect the constant support and patients of our parents.

ABSTRACT

The Primary purpose of a computer network is to share resources. A computer network is referred to as client/server if (at least) one of the computers is used to server other computers referred to as client. Besides the computers, other types of devices can be part of the network. In the early days of networking, there will be a central server that contains the data and all the clients can access this data through a Network Interface card. Later on client server architecture came into existence, where there is still a burden on the server machine. To avoid the disadvantages in distributed computing was introduced which reduces the burden on the server by providing work sharing capabilities. The Primary purpose of a computer network is to share resources. A computer network is referred to as client/server if (at least) one of the computers is used to server other computers referred to as client. Besides the computers, other types of devices can be part of the network. In the early days of networking, there was once a central server that contained the data and all the clients could access this data through a Network Interface card. Later on client server architecture came into existence, where there is still a burden there on the server machine. To avoid the disadvantages in distributed computing was introduced which reduces the burden on the server by providing work sharing capabilities.

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Chapter 1

Introduction

1.1 Introduction

Network security means technologies, devices and processes. In its simplest term, it is a set of rules and configurations designed to protect the integrity, confidentiality and accessibility of computer networks and data using both software and hardware technology.

1.2 Motivations

Networking is about Helping Others. Networking is building mutually beneficial relationships.

1.3 Internship Objective

The primary goals of network security are Confidentiality, Integrity, and Availability.

These three pillars of Network Security are often represented as CIA triangles.

Confidentiality – The function of confidentiality is to protect precious business data from unauthorized persons.

1.4 Introduction to The Company

The Name of the company is 1 umbrella. It is an Information Technology Company . Many IT courses are learned from this company. It provides workshops and seminars. It is one of the good companies among Bangladesh .It can give a good opportunity to get any job among other companies .

1.5 Report Layout

In chapter (1): I talked about the internship's goals, my motivation for taking the position, and a summary of the business.

In chapter (2): I've discussed the organization to which the internship was tied in order to carry out this program, along with the IT services they provided and the responsibilities of MikroTik and wireless router in the employment market.

In chapter (3): I've discussed the everyday responsibilities, events, and obstacles.

In chapter (4): I've talked about Reflections, Smart Plans, and Acquired Competencies.

In chapter (5): In addition to discussing the future potential of MikroTik, I have also discussed the conclusion and future hope.

.

Chapter 2

Organization

2.1 About The Company

One of the Biggest Information Technology Companies is 1 Umbrella. It is a Microsoft and CISCO Certified Company. RASA Technology, New Horizons are the proud partners of 1 Umbrella. Sharif Ahsan is the Consultant of Network and Security of 1 Umbrella and New Horizon.

Corporate Office

Name	1 Umbrella
Address	Kawran Bazar. Dhaka, Bangladesh
Phone Number	01680-054544
E-mail	sharifahsan.info@gmail.com
Facebook Page link	www.facebook.com/datacenterexpertbd/

2.2 Product and Market Situation

Since one umbrella is an information technology company. It consults many companies and offers many courses for learning.

Training and Workshop

1. CompTia A+
2. Network and Server Management
3. Network and Security System
4. Network Engineer
5. Server Administrator
6. Cyber Security Specialist
7. DATA Center Expert
8. ISP Setup with MikroTik

2.3 Target Group

To become the benchmark for a fair, ethical, prosperous, sustainable, and globally accepted quality service provider with world-class IT practices. To lead Bangladesh's private information technology sectors through innovation, diversification, and expansion.

2.4 SWOT Analysis

SWOT analysis is a planning technique for determining a person or organization's strengths, weaknesses, opportunities, and threats they may encounter when developing a business or project.

Strengths:

Communication Skills, good reputation in the marketplace, build up a business, collecting information

Weakness:

A certain type of thought can occasionally generate a disturbance. In order to achieve excessive efficacy occasionally, new strategies are fervently encouraged. Employers are accustomed to the aforementioned tactics, which can generate problems.

Opportunities:

Whenever rivals embrace new technologies slowly. Growing the business sector with a range of potential future opportunities. Supporting regional companies.

Threats:

Miscommunication and misunderstanding are the biggest threats .

2.5 Organizational Structure



Fig2.5 : Organizational Structure of 1 Umbrella

Chapter 3 Task , Project and Activities

3.1 Daily Task and Activities

Month 1: I gained knowledge of and carried out the following tasks in the first month.

- 1.Acquiring knowledge of the fundamental elements of networks
- 2.Acquiring knowledge the fundamentals of MikroTik routing
- 3.Acquiring knowledge of a WiFi router's principles

Month 2: I gained knowledge of and carried out the following tasks in the second month.

1. UTP cabling
2. Basic Networking Concepts
3. IPv4 Addressing (Basic Network Addressing)

Month 3: I gained knowledge of and carried out the following tasks in the third month.

- 1.MikroTik Router OS configuration
2. Installation
- 3.Static Configuration
- 4.Bridge Configuration
5. DHCP configuration

3.2 Events and Activities

- 1.Networks and computer systems are watched over and maintained.
2. Establishing passwords, permissions, and user accounts.
- 3.Troubleshooting servers and routers.
- 4.Troubleshooting network printer.
- 5.Troubleshooting Firewall.
- 6.Troubleshooting local area networks and switches.
- 7.Repairing network issues.
- 8.Support for network users' technical needs.
- 9.I suggest IT solutions to business problems.

3.3 MikroTik Router

MikroTik is a Latvian firm that was created in 1996 to create routers and wireless Internet service provider solutions. Today, it offers hardware and software for global internet connectivity. The company's goods are renowned for being inexpensive substitutes for costly routers and Ethernet radio relay links.

3.3.1 Router OS

MikroTik Router OS is the operating system of MikroTik router board hardware. It is a standalone operating system based on the Linux v2.6 kernel. It can also be installed on a pc and will turn it into a router with all the necessary features-firewall, routing, wireless access point, bandwidth management, VPN server and more .

3.3.2 Configuration

The router supports a variety of configuration techniques, including a serial console with terminal software, local access with a monitor and keyboard, a custom GUI configuration tool called win box, Secure SSH and Telnet access over networks, a straightforward web-based configuration interface, and an API programming interface for creating one's own control application. Mac-Telnet and win box tools are supported by Router OS, although there is a difficulty with IP level connections .

3.3.3 Features

The feature of Router OS supports are-

- Router OS can be used as a switch or bridge
- It provide DHCP server service
- Can be used as a router
- Provides BGP, OSPF, Multi protocol Label switching, etc.
- It provides firewall rules
- Easy management of bandwidth
- It supports both IPv4 and IPv6
- It also provides VPN virtual private Network
- Router OS provides a PPPoE client-server
- It provides a captive portal based Hotspot system and WiFi

3.4 Cloud Core Router

The cloud core router was made available by MikroTik in November 2012. It is an industrial-grade router with a cutting-edge 36-core CPU that provides unmatched power and performance. If we require a large number of millions of packets per second, the Cloud Core Router with 36 cores is the best option. It features four SFP

connectors, twelve Gigabit Ethernet connections, a serial console cable, and a USB port. Furthermore, it features two DDR3 SODIMM slots. RouterOS does not have a memory cap and ships by default with 4GB of RAM (will accept and utilize 16GB or more). CPU 36-core Tileria Tile-Gx36 CPU, Memory (1.2GHz per core)

Highest performance .

- 8 Mbps standard forwarding
- 24 Mbps fast-path forwarding (wire speed for all ports)
- Up to 16Gbit/s throughput



Figure 3.1: MikroTik Cloud Core Router 1036 series

3.5 MikroTik Configuration

Downloading the Win box is necessary before configuring MikroTik. It is the MikroTik Router OS graphical representation. Win box installation is not necessary after downloading. It can be immediately used.

3.6 Propose Network Diagram (MikroTik Configuration)

Network Diagram shows in fig 3.2:

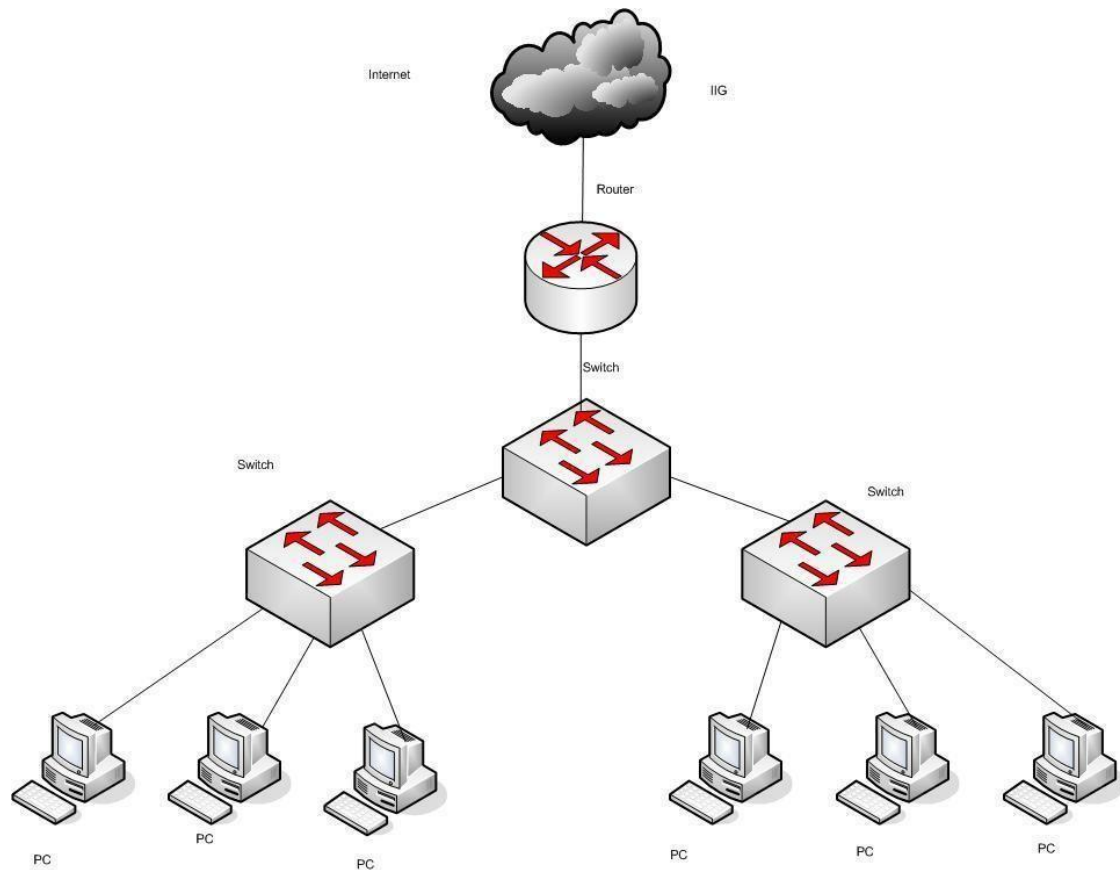


Fig 3.2: Network Diagram

3.6.1 Initial Set Up

The MikroTik Router should be powered on first.

After that, connect a UTP cable to the PC's other port and the MikroTik LAN port.

Open the winbox.

There is no need to provide a password when the IP and MAC addresses are displayed; instead, we must click on the MAC address and type "Admin" in the login box.

3.7 Configure a Router

Step 1: Click IP>>Address

Step 2: When it open the address list dialogue box click the plus button to open the add IP Address Window .

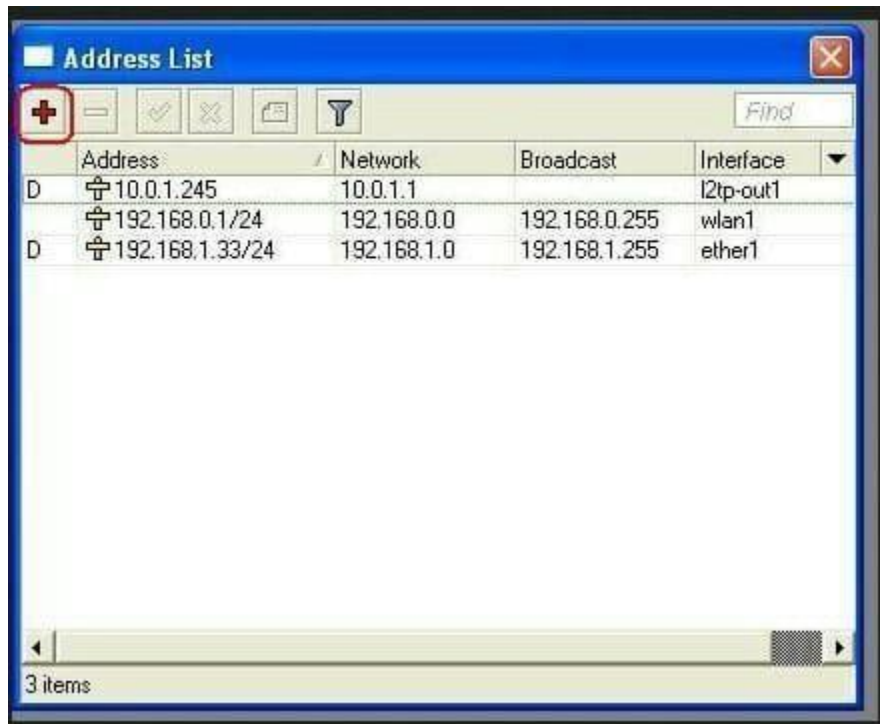


Fig 3.3 : Shows Assign IP Address

Step 3: After the New IP address dialog opens enter the address details select an interface to set the address on and press apply and OK button .

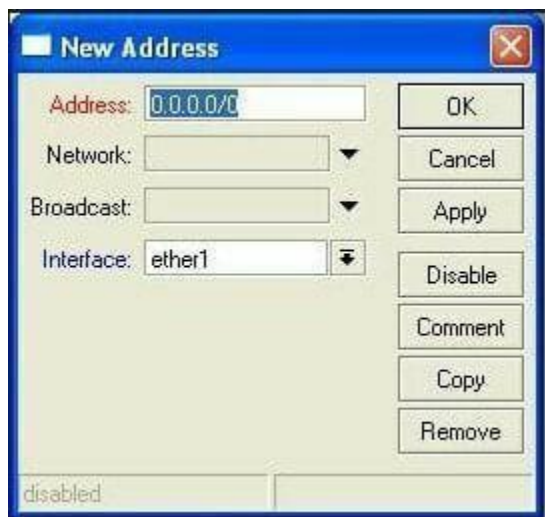


Fig 3.4 : Enter the address Details

3.8 Static Configuration

Step 1: MikroTik reset command

MikroTik reset command show in figure 3.5:

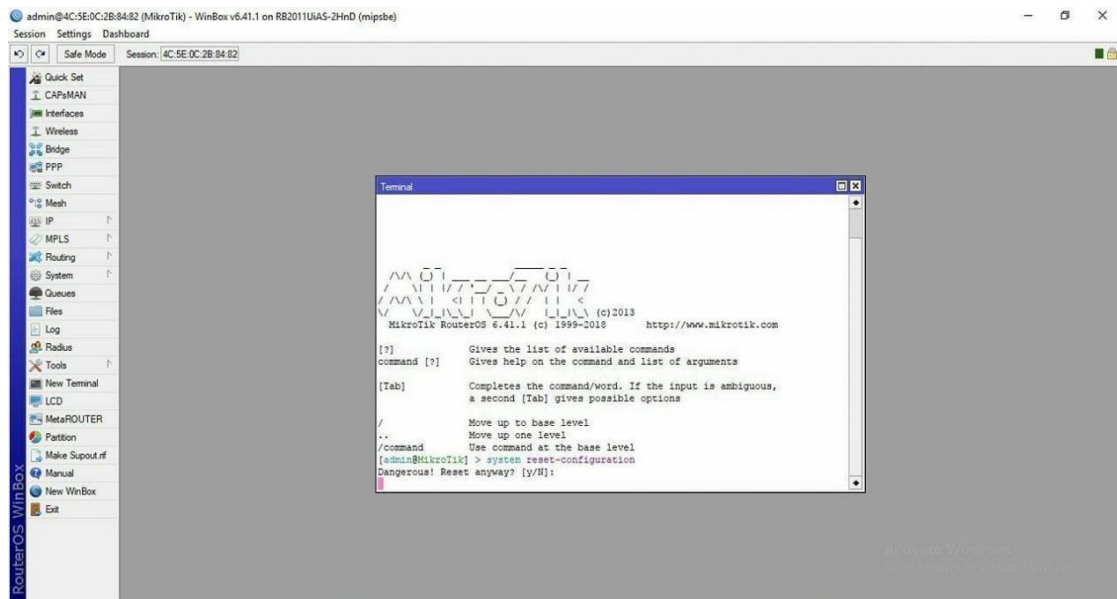


Fig3.5 : MikroTik Reset Configuration

Step 2:

Process:

Go to IP > Route > '+' > Gateway

Apply > Ok

Setup Gateway show in figure 3.6

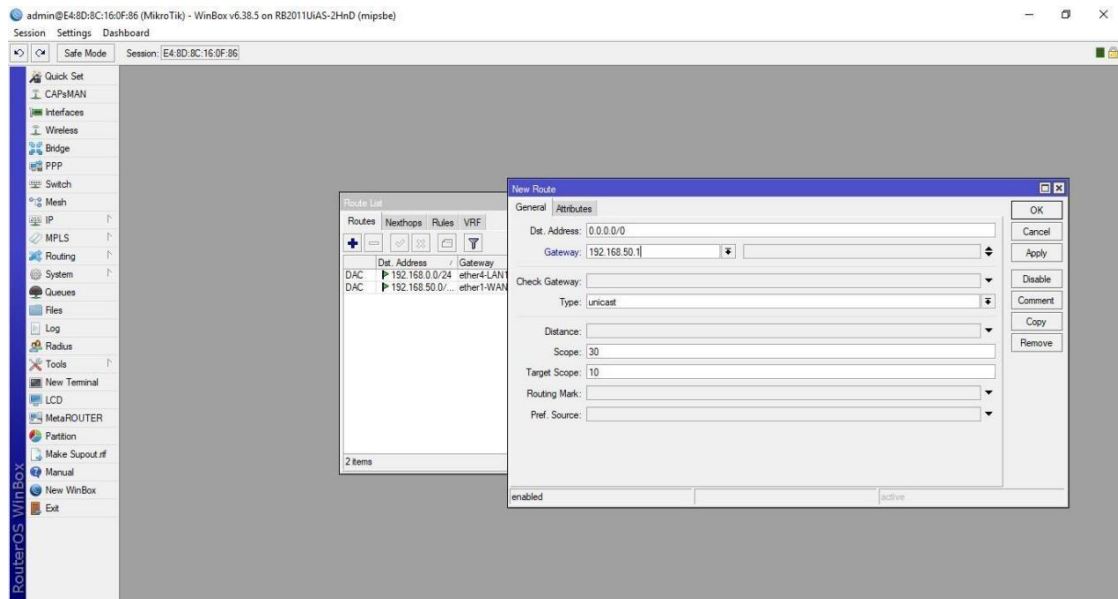


Fig 3.6 : Gateway Set up

Step 4:

Process:

Go to IP > Firewall > NAT > "+" Action:

Masquerade

Apply > OK

NAT rule setting show in figure 3.8:

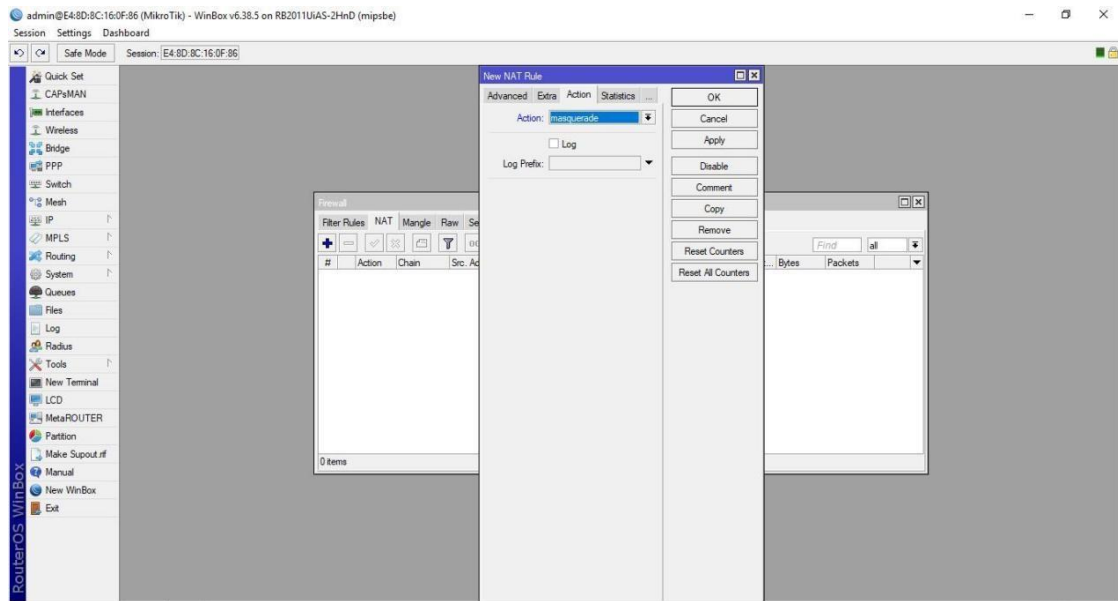


Fig 3.8 : NAT Rule

3.9 Bridge Configuration

Step 1:

Process:

Go to Bridge > "+" Write the name of bridge Action:

Apply > Ok

Bridge port assigning show in figure 3.9:

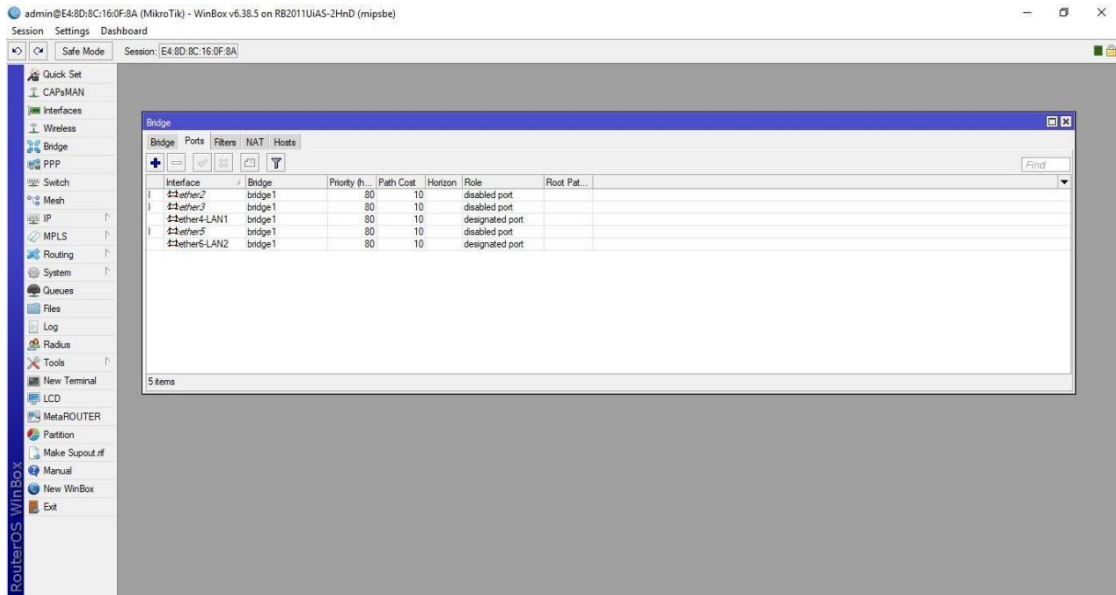


Fig 3.9 : Bridge Port Assign

IP address assign of bridge configuration show in figure 3.10:

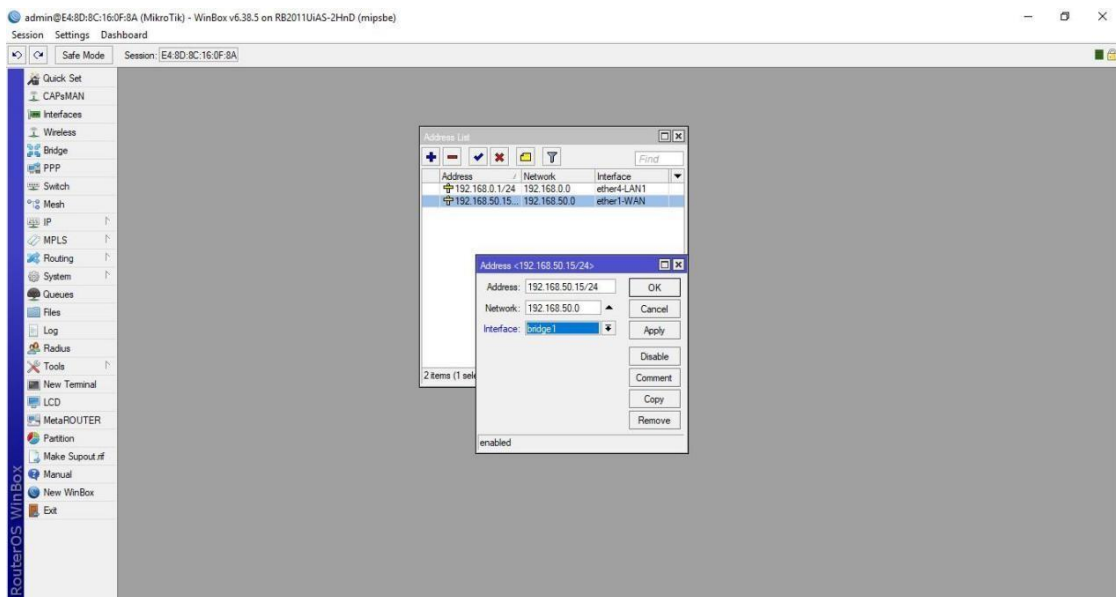


Fig 3.10 : IP Address assign of Bridge configuration

3.10 DHCP Configuration in Mikrotik Router

A Dynamic Host Configuration Protocol (DHCP) is a client/server protocol. It gives IP addresses and other related data, for example, subnet covers, default entryways, and DNS to the DHCP client. Each Mikrotik Router has a built-in DHCP benefit. As

a result, framework administrators can effortlessly transform MikroTik Router into a DHCP server, reducing his system administration tasks. The setup of DHCP in the MikroTik switch is given below with both a GUI and a command line interface .

3.10.1 DHCP setup

Step 1:

Process:

Go to IP > DHCP > "+" > Action:

Next

Selecting DHCP Server Interface show in figure 3.11:

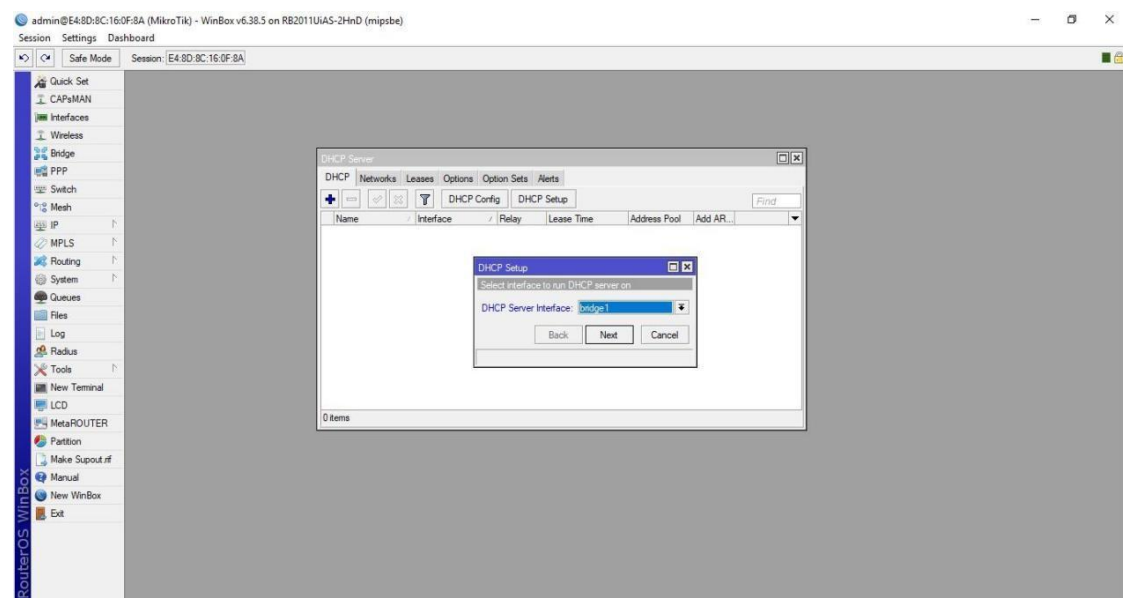


Fig 3.11 : DHCP Server Interface

Step 2:

Process:

Go to IP > DHCP

IP address assigning in DHCP setup show in figure 3.12:

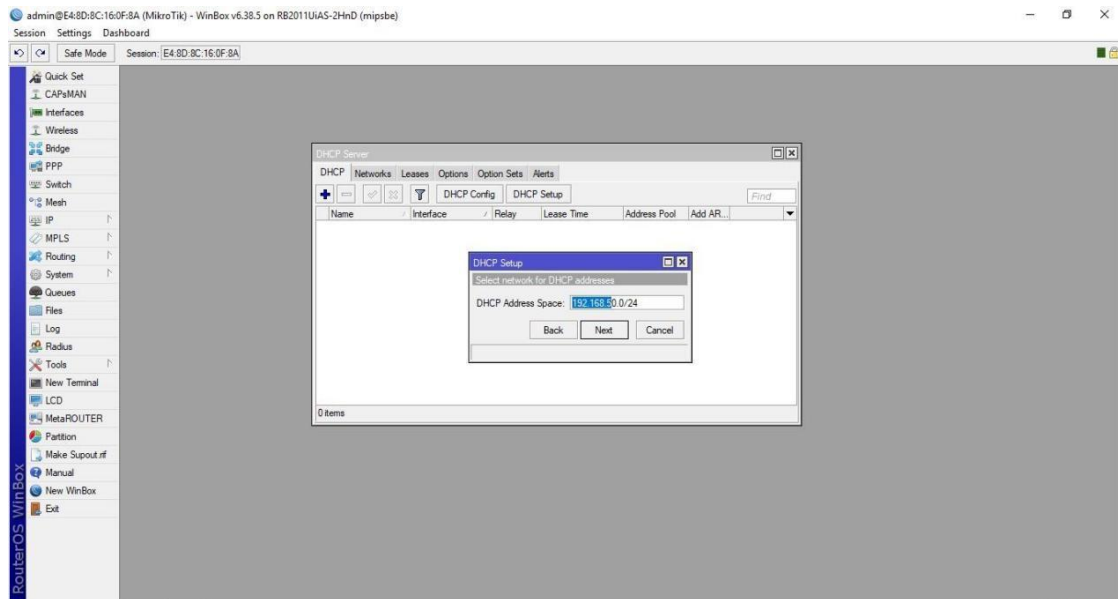


Fig 3.12 : IP Address assign in the DHCP setup

Step 3:

Process: IP > DHCP General:

Gateway for DHCP Network: 198.168.50.1 Action:

Next

Gateway setting for DHCP network show in figure 3.13:

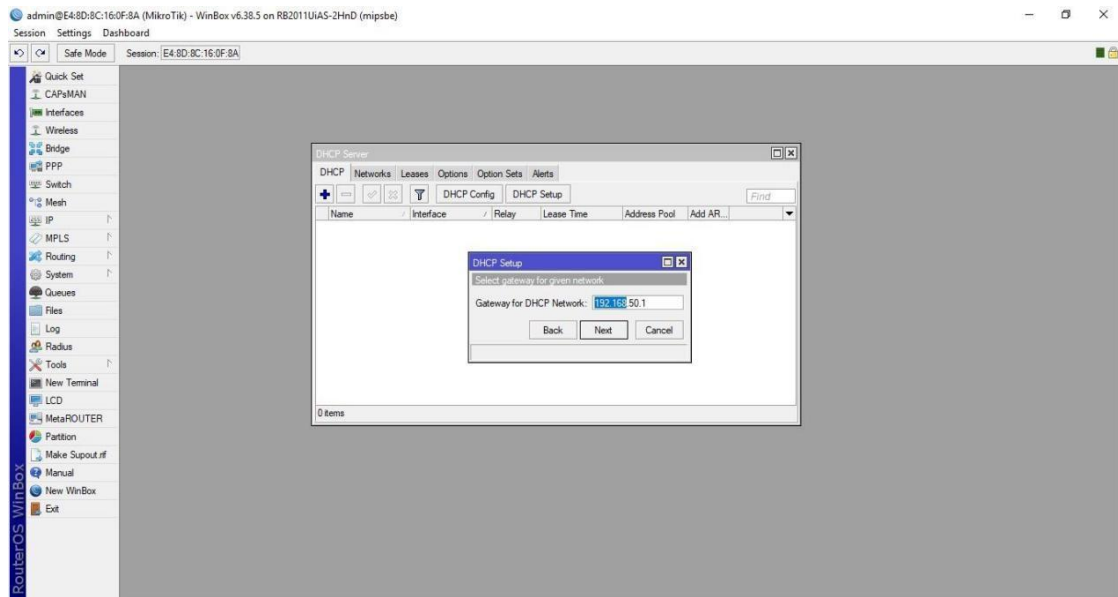


Fig 3.13 : Gateway for DHCP Network

Step 4:

Process:

IP > DHCP

DNS setup show in figure 3.14:

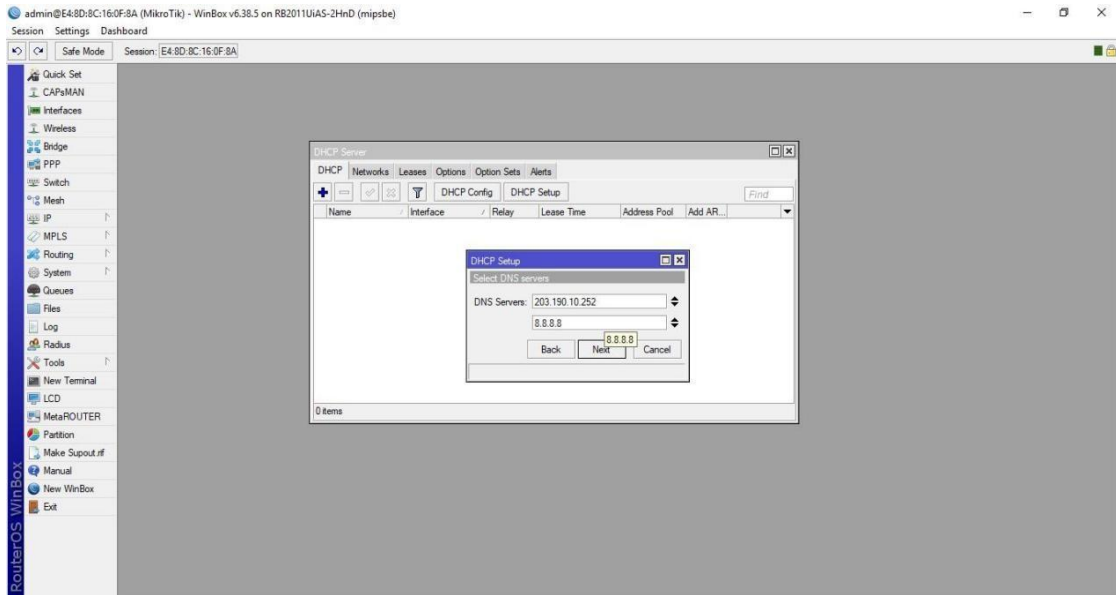


Fig 3.14 : DNS Set up

DHCP setup completed show in figure 3.15:

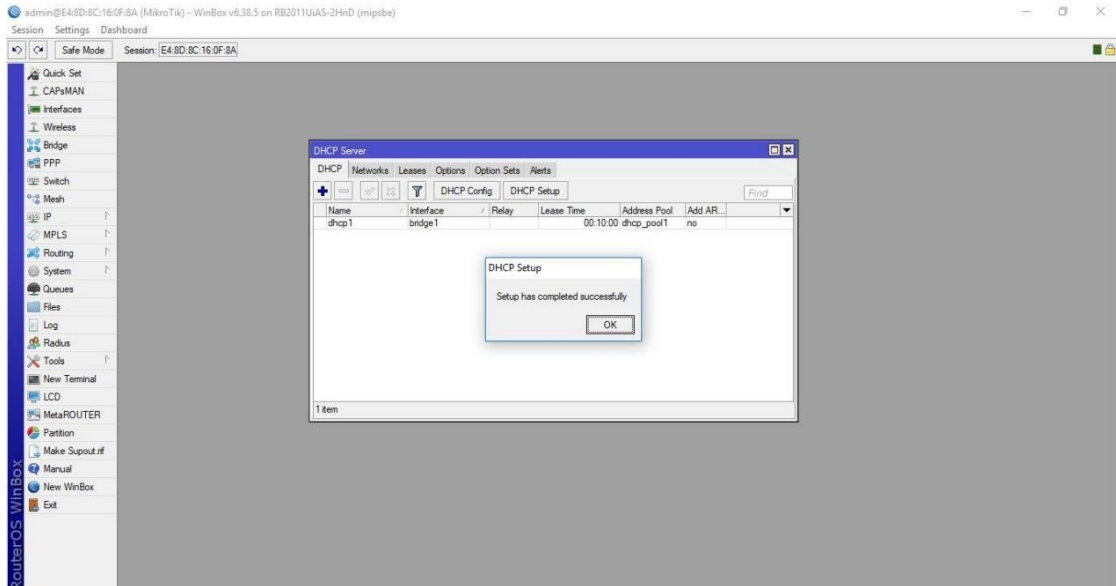


Fig 3.15 : DHCP Set Up

3.11 PCQ Bandwidth Management

Step 1:

Process:

Go to New terminal > Type import address.src Action:

Enter

Import address.src show in figure 3.16:

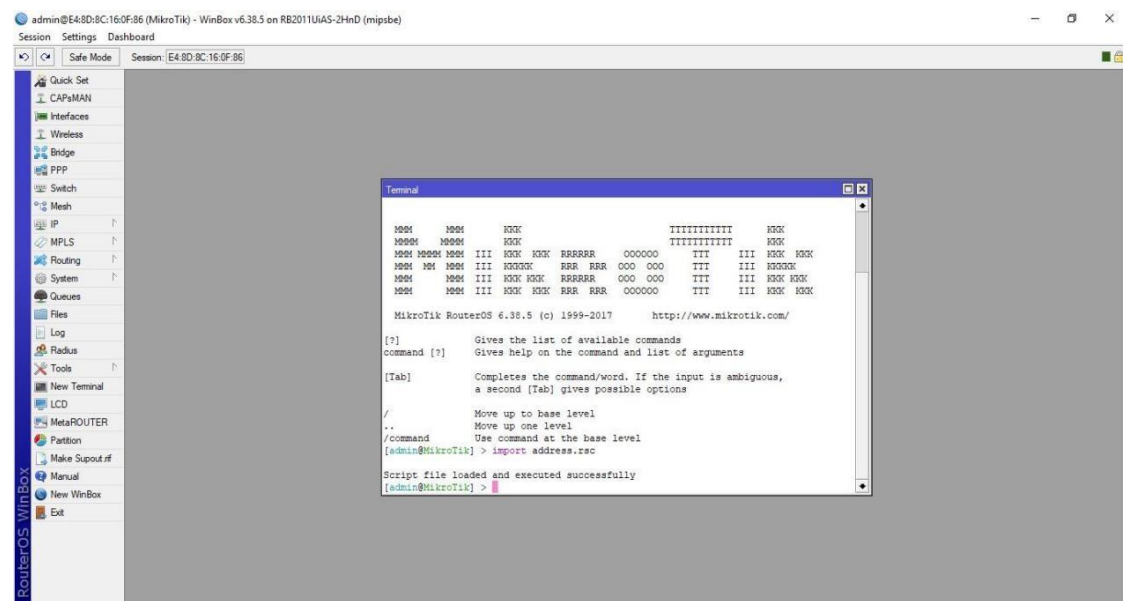


Fig 3.16 : import address.src

Step 2:

Process:

Go to IP > Firewall > Mangle > "+" > General: Chain: Prerouting Action:

Apply > Ok

Firewall Mangle Rule show in figure 3.17:

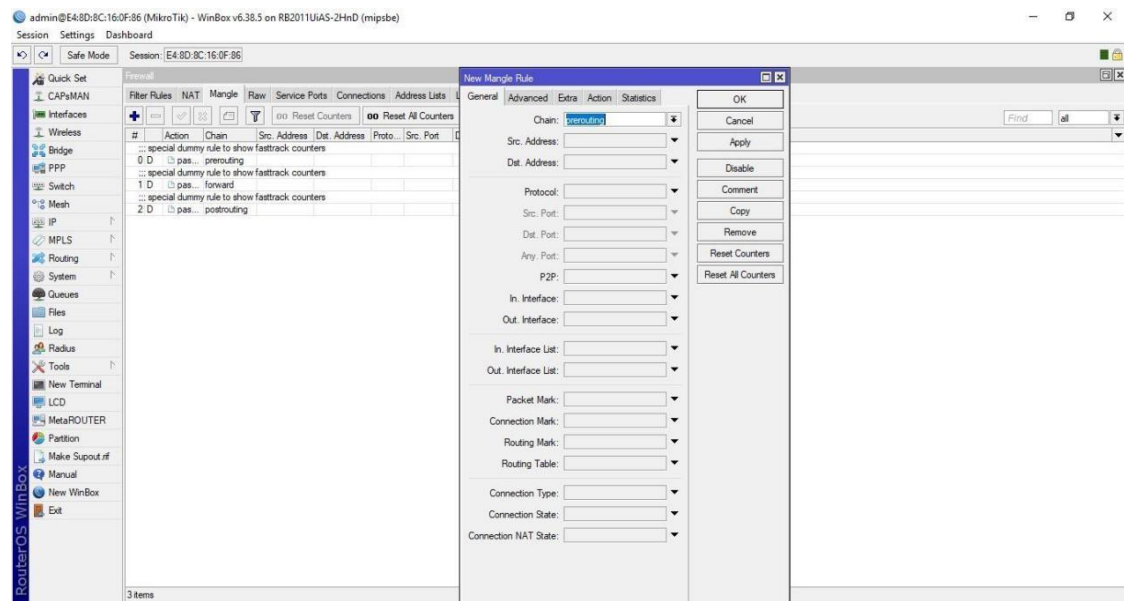


Fig 3.17 : Manage Rule

Step 3:

Process:

Go to IP > Firewall >Mangle >”+” > Advanced General:

Src.Address List: YouTube Action:

Apply > Ok

Mangle setting show in figure 3.18:

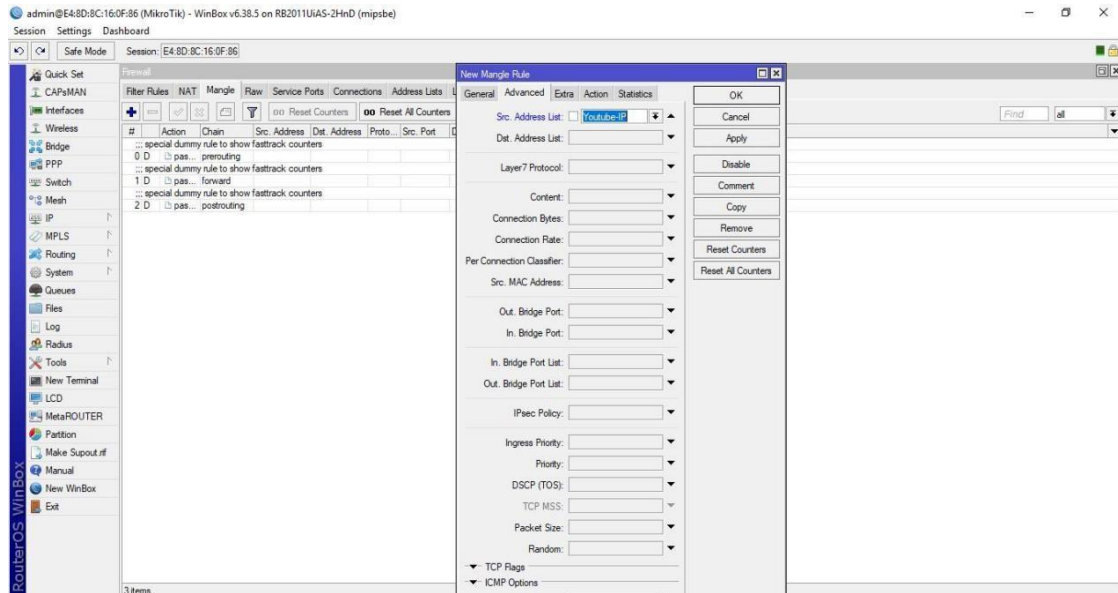


Fig 3.18 : Mangle Advanced Setting

Step 4:

Process:

Go to Queues >+> General: Name: Queue1 Action:

Apply > Ok

Creating Queue show in figure 3.19:

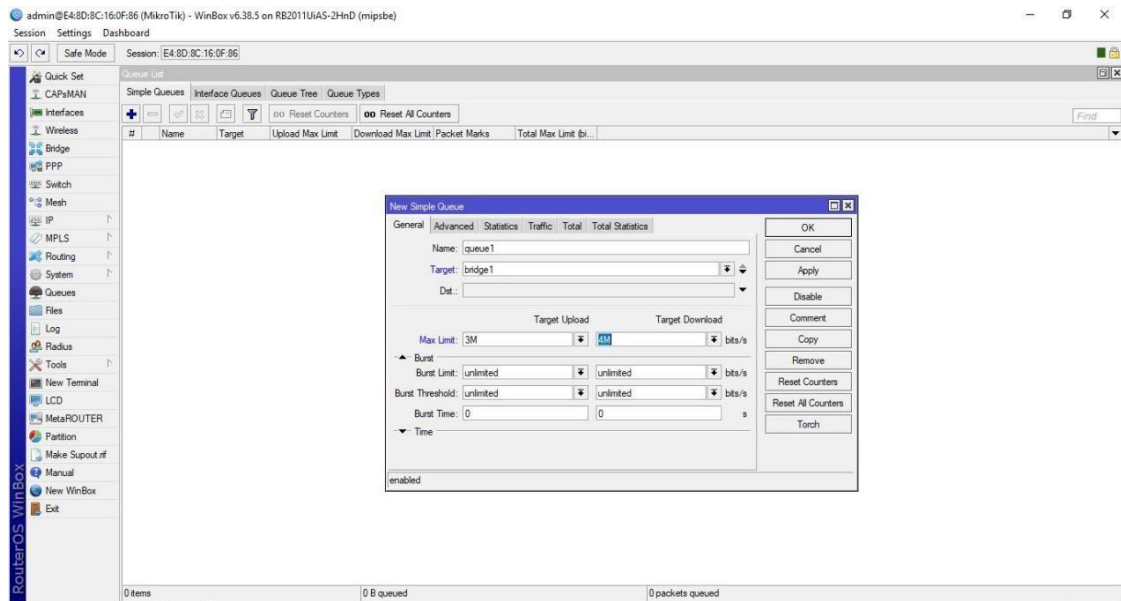


Fig 3.19 : Creating Queue

Step 5:

Process:

Go to Queues > Queue Type General: Kind: Pcq Setting:

Tick mark to dst.address Action:

Apply > Ok

Queue Types show in figure 3.20:

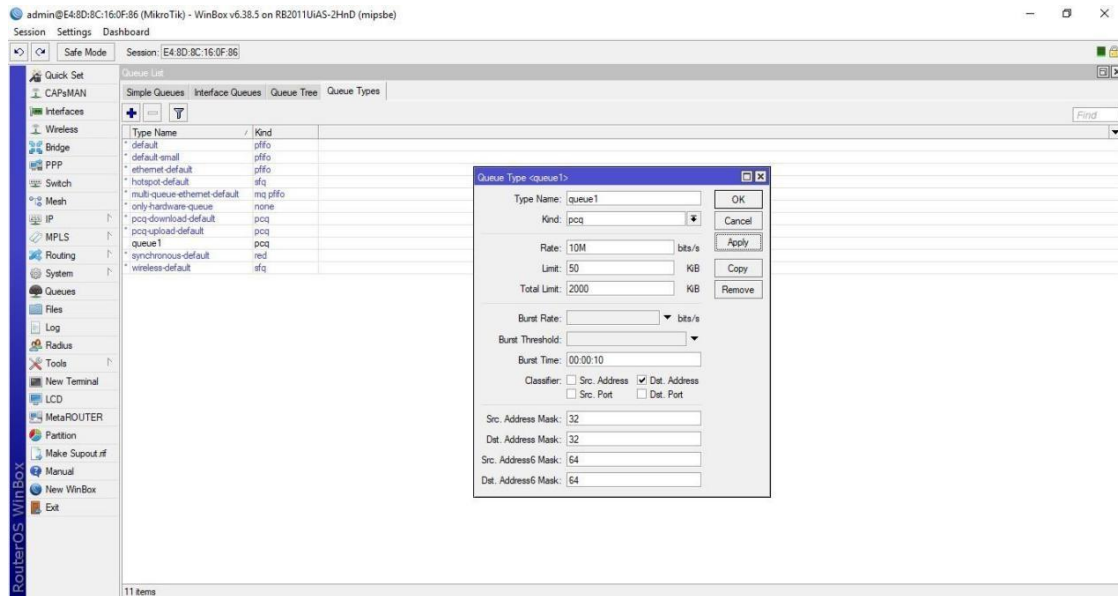


Fig 3.20 : Queue Types

3.16 IP Address

Internet Protocol is a series of numbers that identifies any device on a network.

Computers use IP addresses to communicate with each other both over the internet as well as on other networks.

There are two types of IP addresses: IPv4 and IPv6.

Features of IPv4:

- IPv4 is 32 bit long
- It parted into 4 octets
- It can make broadcasting, multicasting and unicasting It is in decimal form.
- It is divided into 5 classes A to E.

3.16.1 IP Address Classes

It has numerous classes such as Class A, B, C, D and class E.

Class A consists 8 bit network ID and 24 bit host ID

Class B consists 16 bit network ID and 16 bit host ID

Class C consists 24 bit network ID and 8 bit host ID

Table1: Address Classes

1st ID	Octet Hosts Number	1st per of High	Octet Class Decimal Default	Network Order Subnet Mask	Network/Host (N=Network, H=Host)	Bits Addresses
A	1 – 126*	0	N.H.H.H	255.0.0.0	126 ($2^7 - 2$)	16,777,214 ($2^{24} - 2$)
B	128 – 191	10	N.N.H.H	255.255.0.0	16,382 ($2^{14} - 2$)	65,534 ($2^{16} - 2$)
C	192 – 223	110	N.N.N.H	255.255.255.0	2,097,150 ($2^{21} - 2$)	254 ($2^8 - 2$)
D	224 – 239	1110	It reserved for Multicasting			
E	240 – 254	1111	used for research			

3.17 Assign IP address to a computer

A permanent IP address might be assigned or one that is only used temporarily. Dynamic and static addresses were separated.

3.17.1 Dynamic IP address

Dynamic IP addresses are given to computers when a temporary connection is required. The Dynamic Host Configuration Protocol is another name for it (DHCP).

3.17.2 Static IP address

When a link needs to last a long time, static IP addresses are assigned. It is merely temporary.

3.18 MAC addressing

The MAC address is a type of physical or hardware address that is built into NICs. An exclusive MAC address is given to each NIC by IEEE. The MAC address is a 12 digit, 48 bit hexadecimal number. It is composed of integers 0 to 9 and letters from A to F. Both of those formats can be used to write it.

3. 18.1 Identify the MAC address in computer

- Click windows>Run
- Write cmd
- Write ip config/all
- Click enter

MAC address of 12 digit will be shown like this 84-3A-4B-70-6B-EC

3.20 Challenges

No job is without obstacles, but after working at my internship for four months and sharing friends with them when I learned about the parties, I've learned that there are certain fundamental barriers to learning. I believe it is due to three factors: unpaid/underpaid, impermanence, and a race to gain insight.

Here and there, insufficient work the amount of work I have been given is insufficient. I'm drained, unused, tapping my fingers at my desk, and tempted to carefully consider Facebook Messenger. An abnormally large amount of work some employers may take advantage of young workers by making them do monotonous, boring work for long stretches of time because undergrads are just interested in getting their foot in the door .

CHAPTER 4

COMPETENCIES AND SMART PLAN

4.1 Competencies Earned

In order to resolve some of the following parts, an evidence change is provided that can be used to install and configure a fully functional DHCP server based on Windows Server 2003 on a server.

If a DHCP sponsor no longer has a configured IP agreement, the other employees will be unable to obtain an IP address. In most cases, it implies that a network issue or the DHCP server's unavailability is the reason why the other employees are unable to connect to a DHCP server. If the DHCP server begins and distinct other employees can obtain genuine addresses, ensure that all connected patronized hardware equipment (including cables and network adapters) are operational.

If a registered client is not provided by the DHCP server, the DHCP server is unavailable, although this is mostly because the DHCP carrier is not in this scenario, the server community may not be permitted to operate. Using the event viewer, search the device log for any advertisements that might offer an explanation if you were able to start a DHCP service but it failed due to the device shutting down.

4.2 Smart Plan

Every business needs a clever strategy if it wants to succeed. In essence, a smart plan can be created by combining several solid planning techniques. In actuality, it makes use of the speedy bandwidth of mile-router for quick network access. Smart bandwidth manipulation using the router operating system the sophisticated bandwidth control method used by Mikrotik. Due to the ease with which LAN, WAN, and DHCP servers may be configured. In actuality, if every business wants to offer an ISP or DHCP server, I'll use Mikrotik to manage bandwidth in the future .

4.3 Reflections

The genuine bandwidth of an office can be managed well using Mikrotik. Numerous places close by having a Mikrotik router in a suitable placement. Despite the fact that the network will divide bandwidth over the same time period, we will be able to connect to the computer using the WAN's first bandwidth off. By connecting to the MikroTik curricular router, no one in the neighborhood can prevent a network administrator from using their private PC. The MikroTik carrier makes it possible to use a bandwidth micro issuer for office bandwidth management.

CHAPTER 5

CONCLUSION AND FUTURE CAREER

5.1 Discussion and Conclusion

The majority of firms nowadays rely heavily on the Internet for work and service administration. The organization's objectives cannot be met without a properly designed network, however, and a fully functional network management system. Therefore, an understanding of network architecture should be present. MikroTik is a low-cost router that can be appropriate for small networks. Consequently, MikroTik Router OS is simple to manage. For adequate network security, MikroTik also included filter rules, layer 7 protocols, bandwidth shaping, etc. MikroTik can operate both a powerful wireless access point and a web proxy server. Therefore, the goal of our research is to gain knowledge of fundamental network architecture and, specifically, of the capabilities and configuration of MikroTik Router OS, which may allow us to use MikroTik Router to construct a network. The internship was a fantastic and fulfilling experience. I have seen the future, and I will benefit from the chance to network with many others who can attest to it by helping myself. This internship has taught me that one of the most important concerns is time management and self-motivation. When I first started, I believed sitting in an office for nine hours a day, five days a week, would be sufficient. I did not think that. I planned my day's activities after I realized what I had to complete so that my hours of overlapped work were not interrupted. After receiving a response arranged for questions that needed to be learned, it was the correct moment and I was organized. In order to motivate myself during this internship and the long hours spent at the office, I had to understand how to use the business. I'm still looking for ways to leverage the company to generate new ideas and proposals. My new chances are still open to me, but I'm still painting for the inside of the university world. I'm working in this profession. I put a lot of effort into obtaining this position, and I hope to learn more about this business and make new friends. It turned out to be an amazing experience, and I wanted another intermediary to fill it up.

5.2 Scope for Further Career

Utilizing the knowledge we had acquired in a practical setting was the major goal of our internship. Through this internship, I gained knowledge of many network design principles and models, which may be useful for designing a network in the future. Again, MikroTik Router OS has a wealth of functions that might be used to meet any network requirements. During my internship, I worked on the firewall features of the MikroTik and configured practically all of its features. We'll be able to use MikroTik hardware to create and appropriately administer a network as a result.

REFERENCES

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visit: <https://en.wikipedia.org/wiki/MikroTik>
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APPENDICES

Appendix A

Internship Reflection

My key goal for my internship in a professional atmosphere, which includes practical answers to real-world challenges, is to use classroom information. Learning to deal with new knowledge, abilities, and relationships in a professional setting, as well as developing the capacity to judge how to hone and build strategies Increase the size of your professional network by developing connections with other people's bosses. I work in an area where I am exposed to clients, business etiquette, and other employees. I use this exposure to both my advantage and theirs by observing other people's behavior and gaining insight into it. To fulfill the duties of my internship, I'm exercising proper business etiquette. How a professional organization's mission or vision is carried out; how to get in touch with others in the organization; how power is distributed; how it is organized; how decisions are made; how to comprehend the culture of a professional organization; and to what extent the organization is held accountable and given feedback; are all important topics for me. Professional judgment can be obtained through an evaluation of my internship experience conducted by my supervisor at the conclusion of each individual meeting. Possibilities for internships in preparation .

Appendix B
Company Detail



Corporate Office

Name	1 Umbrella
Address	<u>Kawranbazar.</u> Dhaka, Bangladesh
Phone Number	01680-054544
E-mail	sharifahsan.info@gmail.com
Facebook Page link	www.facebook.com/datacenterexpertbd/

Meet With Supervisor

No	Date	Topics of Discussion
01	31/9/21	Title Defense
02	8/8/22	Discussion on Pre Defence
03	10/8/22	Writing on Presentation slide and report

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