

**INTERNSHIP ON BASIC HARDWARE OF NETWORKING AND MIKROTIK
ROUTER CONFIGURATION**

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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DHAKA, BANGLADESH
19 JANUARY 2023**

APPROVAL

This Internship titled “Basic Hardware and Networking, Mikrotik Router Configuration”, submitted by Shakibul Islam and ID No: 201-15-13807 to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment 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 19 January 2023.

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We hereby state that we working on this project under Syada Tasmia Alvi, Supervision as a Lecturer in the CSE Department at Daffodil International University. We hereby declare that no another institution has acquired this project or any part of it for the purposes of awarding a degree or diploma.

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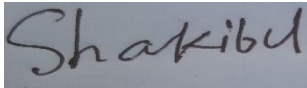
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ACKNOWLEDGEMENT

We first want to give God the highest for His beautiful gift, which allowed successfully complete the final year project and internship.

Our sincere appreciation and gratitude go to Syada Tasmia Alvi, Lecture, Department of CSE, Daffodil International university, Dhaka. Our supervisor is well-versed in the area of “Networking” and is very motivated to do this job. His unwavering tolerance, academic leadership, ongoing encouragement, continuous and energetic Supervision, Constructive criticism, helpful advice, and reading multiple poor drafts and refining them at any and every step made this endeavor possible.

We gratefully acknowledge Allah Ta’ala and the CSE Department Chair of Daffodil International university for their cooperation in carrying our suggestion to completion.

We’d like to thank everyone of our Daffodil International University classmates who took part in this conversation while were in class.

Ultimately, we must formally thank our parents for their enduring love and patience.

ABSTRACT

The discipline of computer networking and IT, in general, is expanding quickly. Computer networking positions frequently have a great upside in terms of job availability and income. Therefore, I choose a networking internship and this report is based on my four months of practical experience at Salam Online ISP Limited. This internship program assists me to gather a lot of information on networking. The most significant aspect of my internship program is that, during an internship, I learn about the practical aspects of networking to work in a real-world situation and gain experience as an employee. Through this internship, I also learn how to solve problems with the knowledge and skills I gain experience with ISP network conclude design overview and basic hardware Router wire, Router Os for Mikrotik, switch configuration, Routing, Static Configuration, Bridge Configuration, Wireless Router Configuration, DHCP Configuration, NAT Configuration, Bandwidth Control, PPPoE Setup, IP Addressing, Fiber Optic Cable, Local UTP cable and User home and Corporate office Router and switch Setup. The report concludes with some final thoughts and learnings from the experience.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

We almost hear the word network. But how much do we actually know about the term network? Through this network we continue to communicate with each other all over the world. This is the biggest era of Networking. From waking up in the morning to going to bed we stay connected to the network. Computer network plays a significant role during this digital era. So, all of the technology depends on network. So today I will discuss in detail about the network among you. The internet is the largest network within the World. And we ordinary people use the internet from a specific server. Networking is the common and often familiar Communication engineering to communicate. In the digital world Data are the foremost important and valuable things. Now people are so hungry in terms gathering information and communication.

1.2 Objectives

The objective of my internship is -

- To learn about technology every day and strive to get better & working Action analyzing from different aspects.
- To establish long-term, trustworthy partnership.
- To learn something new about the network.
- To learn different methods of routing.
- To work in a practical environment and gain knowledge, abilities and experience.

1.3 Motivation

One cannot imagine a moment in our daily life without network and internet. From morning till we go to sleep, we are immersed in the network and internet.

For my future job, I have chosen to undertake an internship. Students are prepared for careers in the IT sector by the CSE program. As working with networking devices seems to be easier for me, I am motivated to develop my skills in networking. Many IT sector jobs motivate me to be a Network Administrator in the future. So, I choose the networking sector. I have finally chosen an internship.

1.4 The Company's Introduction

One of the top internet service providers (ISPs) in our nation is Salam Online Ltd. They are the ICT Division's founding company. This business, which offers IT services, has had a permit since August 2007. This company uses the most up-to-date technologies and updates its services as needed. Long-standing concern with our customers, which is one of the areas in which this company specializes in information and communication technology, is their first employment description.

Now has about 2500 clients, Salam Online ISP has several services such as corporate internet, IP telephone, home internet and POP services.

1.5 Reports Layout

Chapter 1: In addition to outlining the chapter's goal and describing my inspirations, career goals, internship goals, and the creation of the internship firm, this section also includes an overview of my sources of inspiration.

Chapter 2: I've discussed the organization and company structure in this chapter, and I've also provided a brief overview of my former employer's IT company and its management.

Chapter 3: In this chapter, I've covered things like daily tasks and activities, events and activities, challenges and exercises, driver and router OS, and more.

Chapter 4: In my description of this chapter, I mostly mentioned smart strategies and practical skills.

Chapter 5: Regarding networking, MikroTik, Cisco Switch, and other topics, I have presented this chapter's conclusion and future career opportunities.

CHAPTER 02

INTERNSHIP ORGANIZATION

2.1 Introduction of Company

The Most significant internet service provider (ISP) in our nation that has received BTRC approval is Salam Online. In the ICT sector, they have been around the longest. The vision of Salam Online Limited is to be the main ICT arrangements supplier in the county that meets the developing Information and Communication Technology needs of Bangladesh and Global market and subsequently contributes decidedly towards country's general economy. The complete workforce of this organization has outstanding potential for professional skill. This company providers Linux training in addition to internet services, Mikrotik, and Cisco Switch.

2.2 Situation of Products & Market

I've worked with Mikrotik Router, Cisco, DHCP & DNS Server, AP Configuration Cloud, independent mode Network, etc. during a temporary job program.

I have found out about MikroTik directing and exchanging. Tis highly use for corporate office and Garments, Material, worldwide Organization, college, lodging, for network setup.

Salam Online Limited is one of the most incredible ISP in Bangladesh, Now has around 3000 clients, Salam Online is getting increasingly high with the progressions of days, Salam online is popular in corporate Sector.

Salam Online Limited's positions on the job market include the following IT

Service: -

- Network Administration
- System Administration
- Security Engineer

- System Network NOC Assistance Engineer
- Technical Support
- Senior Network Engineer
- Manager of Broadband Network (ISP)
- Call Center or Customer Support Engineer Etc.

2.3 Target Group

By first-changing over the world, each company and association need to increment PC and time ability to remain forceful and effective. Salam Online Limited has Worked out a unique blending of capacities sets that are mentioned generally in the present business market. To meet its objective Salam Online Limited pushing ahead with the right drives. Golden IT limited center business center or sections:

- Arrangement of Sales to Enterprise and Corporate gatherings.

2.4 Organization Structure

Salam Online Limited ISP Organizational Structure are given below.



Figure 2.1: Diagram of Salam Online Structure

CHAPTER 03

TASKS, PROJECTS AND ACTIVITIES

3.1 Daily work and Activities

I work hard and perform well every day as an intern. My internship company, Salam Online Limited, supplied me valuable knowledge that I have stored (ISP). With my team, I speak about technology every day

Month 1: - I finished the work listed below in the first month, and I learnt.

- Understanding the fundament hardware and network components
- How to Set Up Internet on a PC
- Network of Computers
- Device for Networking
- Support Technical Team
- Support Call Center
- Receive Client Problem the Create Complain Ticket

Month 2: - I learned and completed the following work in the second month.

- IP Addressing
- Cabling
- To Work Optical Fiber and UTP cable
- All Backbone Are Monitoring
- All Client Link are Monitoring
- Troubleshooting
- All Client Packet checking

- Numerous networking ideas are emerging as a result of this networking.
 - LAN
 - MAN
 - WAN

Month 3: - I learnt and accomplished the work listed below in the third month.

- Mail Checking
- Physical Support
- I have worked in account section in ISP.
- Mikrotik Router Operating System Configuration
- System for installation
- Configuration of Static Routing
- Configuration DHCP Routing
- Designs of Bridging system
- Bandwidth control administration PCQ
- NAT & Firewall
- PPPoE Configuration
- Mikrotik Router Complete Setup

Month 4: - I learned and finished the work listed below in the fourth months.

- Wireless Router Setup

- Client home Router setup and configuration
- LAN Side Survey
- Corporate office Support
- Fiber cable link Survey
- Server all components Survey
- Receive Client problem create complain ticket and solve this problem and close this Complain.
- Support System Network (NoC)

3.2 Definition of MikroTik Router

MikroTik is a marking switch. Creating gswitches and remote ISP systems was established in 1996.

It has every one of the fundamental elements for an ISP – directing, firewall, Transmission capacity the board, remote passageway, backhaul connect, area of interest door, VPN server and the sky is the limit from there. Speedy and straightforward establishment and a simple to utilize interface.

3.3 OS For Mikrotik Routers

In 1996, the MikroTik Latvia Institute received recognition. Switch and remote ISP frames are produced by this company. Currently, This Company Offers Hardware & Software in Different Countries for MikroTik Internet Connectivity.

3.3.1 Routers OS

The network administration software that is loaded on Mikrotik Router Board Routers is know as Router OS. It has Knowledge of PC setup, router setup through a firewall, and VPN server client access point setup. The gadget can serve as the interior of a wireless access system.

3.4 Many Features

The features that Router OS Supports are listed below...

- Hardware Support
- Firewall
- MPLS
- Wireless
- DHCP
- Hotspot
- QoS
- Proxy
- Protocol Like as (RSTP, STP), Firewall, Bridge, MAC etc.

3.5 MikroTik Router

MikroTik is a marking switch. Creating switches and remote ISP systems was established in 1996. Mikrotik is a Latvian Network equipment Manufacturer.

It has every one of the fundamental elements for an ISP-directing, firewall, transmission caoacity the board, remote passageway, backhaul connect, area of interest door, VPN server and the sky is the limit form there. Speedy and straightforward establishment and a simple to utilize interface



Figure 3.1: Mikrotik CCR Router

3.6 Mikrotik Router Login

To associate with the switch, enter IP or MAC address of the switch, indicate username and Secret phrase and tap on Connect button. You can likewise enter the port number after the IP address, isolating them with a colon, similar to this 192.168.88.1:9999. The port can be change in Router OS administrations menu.

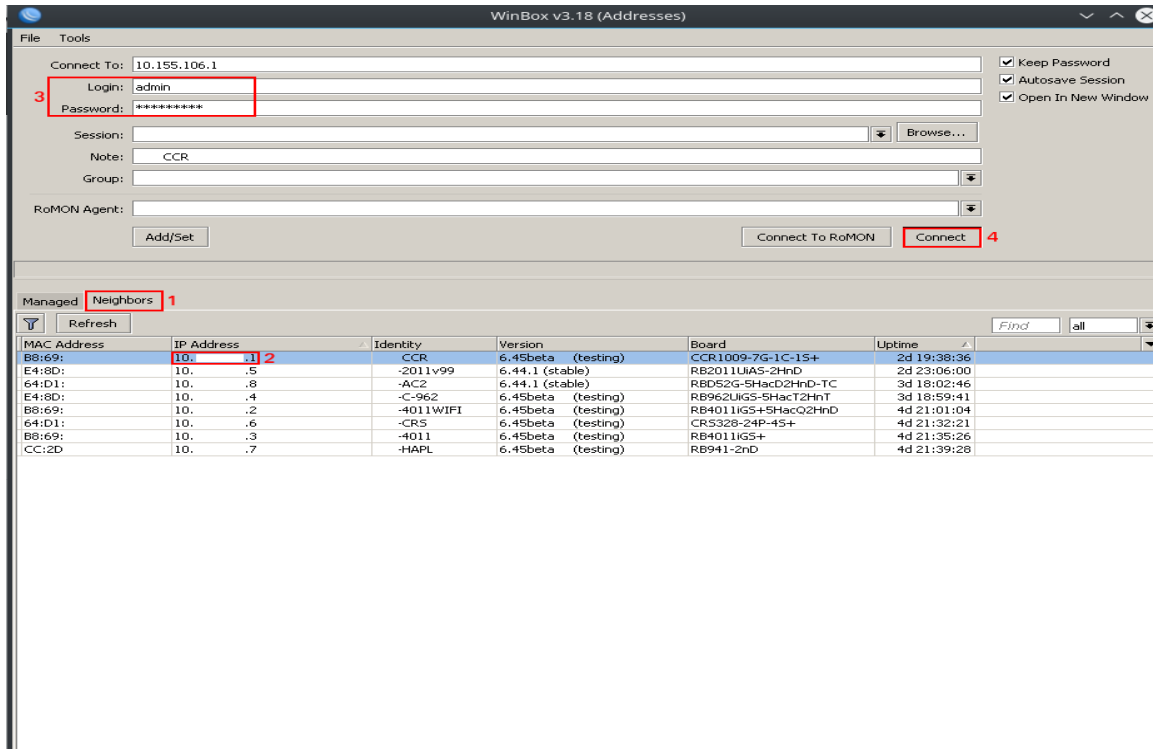


Figure 3.2: Mikrotik Router Login Interface

3.7 Propose ISP Network Diagram

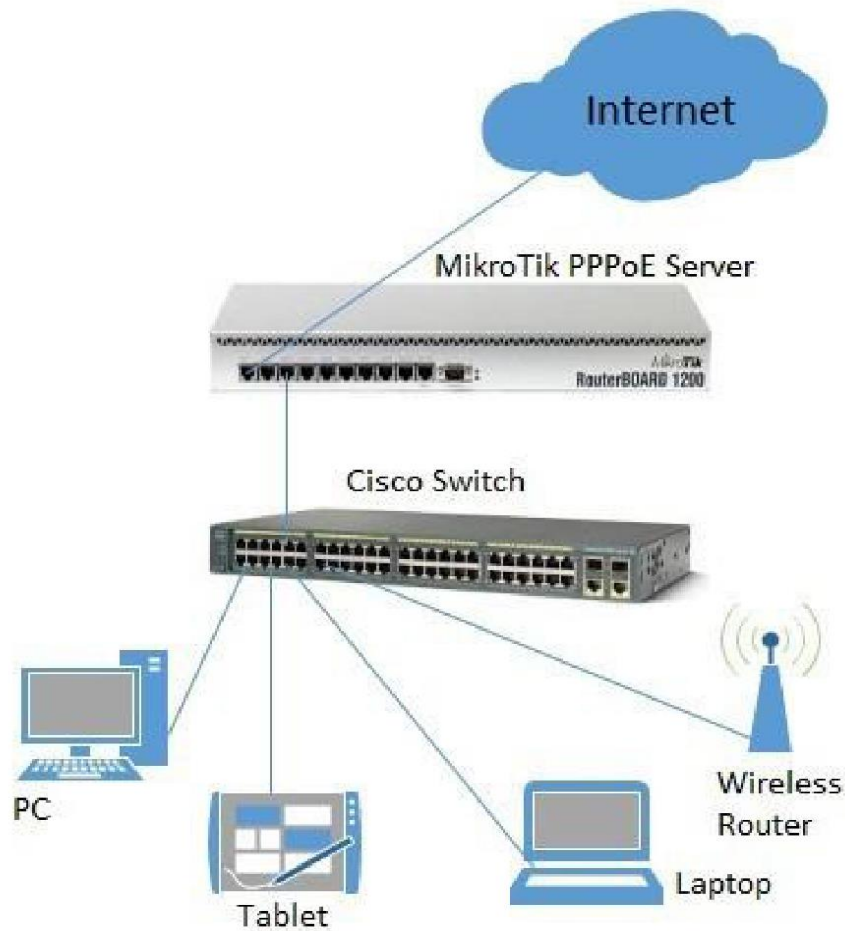


Figure 3.3: Network Diagram For ISP

3.8 Configure a Router

- Step 1: First, we must connect our laptop or desktop computer to the MikroTik Router. We just opened the Win Box program after that, switch to a different terminal, and carried on working.
- Step 2: New Terminal Alternative Reset this Router by clicking to display the Dialog Box. Display Figure 3.4 for the Reset System



Figure 3.4: System Reset

- Step 3: Firstly, click for IP >>> Address to Access the IP Address Assign System.
- Step 4: Click Add (+) to bring up the Add IP Address Window when it opens the Address dialogue box.

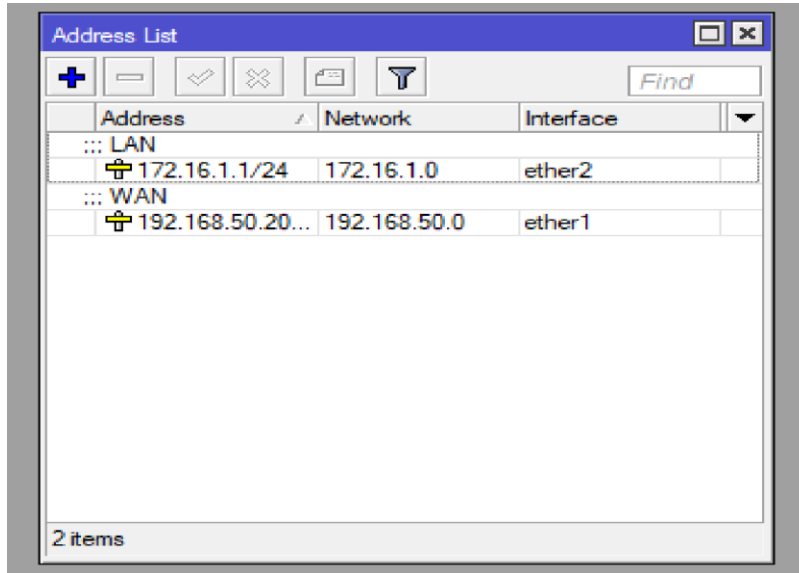


Figure 3.5: Allocate IP Address

- Step 5: After opening the box for a new IP address and entering the details, such as the address and the interface, Select OK.

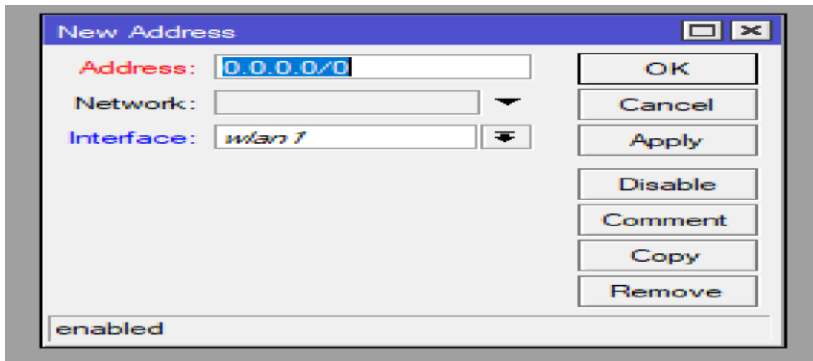


Figure 3.6: Enter the Address Information's

3.9 DHCP Server Configuration in Mikrotik Router

What DHCP Is Client -Server protocol know as DHCP stands for Dynamic Host Configuration Protocol. Additionally, it is a network management protocol that gives DHCP server access to IP addresses, additional subnets, gateways, and DNS Servers. Every Mikrotik router router perfectly executes DHCP.

3.9.1 Setup for DHCP

➤ Step 1: Methodology:

Firstly, Click IP, Follow by DHCP, Add (+), and Action. Following that, select the DHCP Server Interface Showing Figure below.

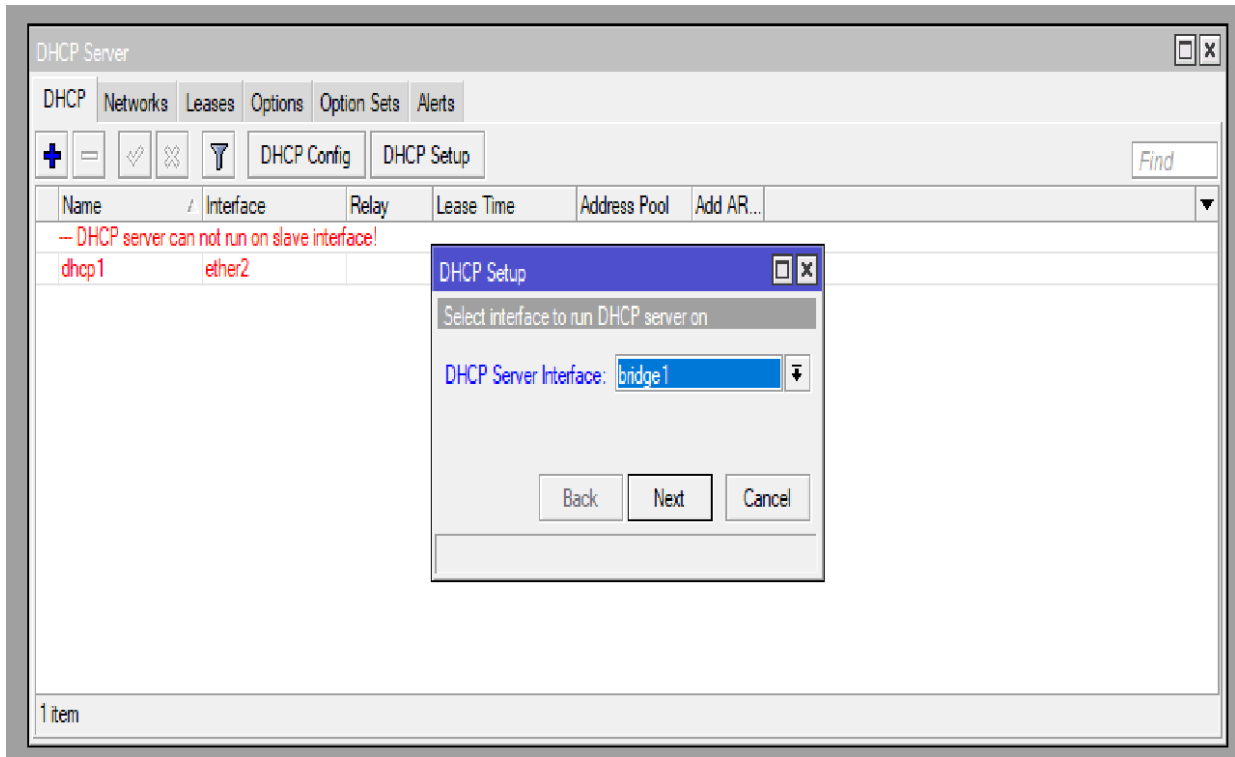


Figure 3.7: Server Interface for DHCP

➤ Step 2: Methodology

Then navigate to IP > DHCP > DHCP Configuration Next Click to assign a DHCP address.

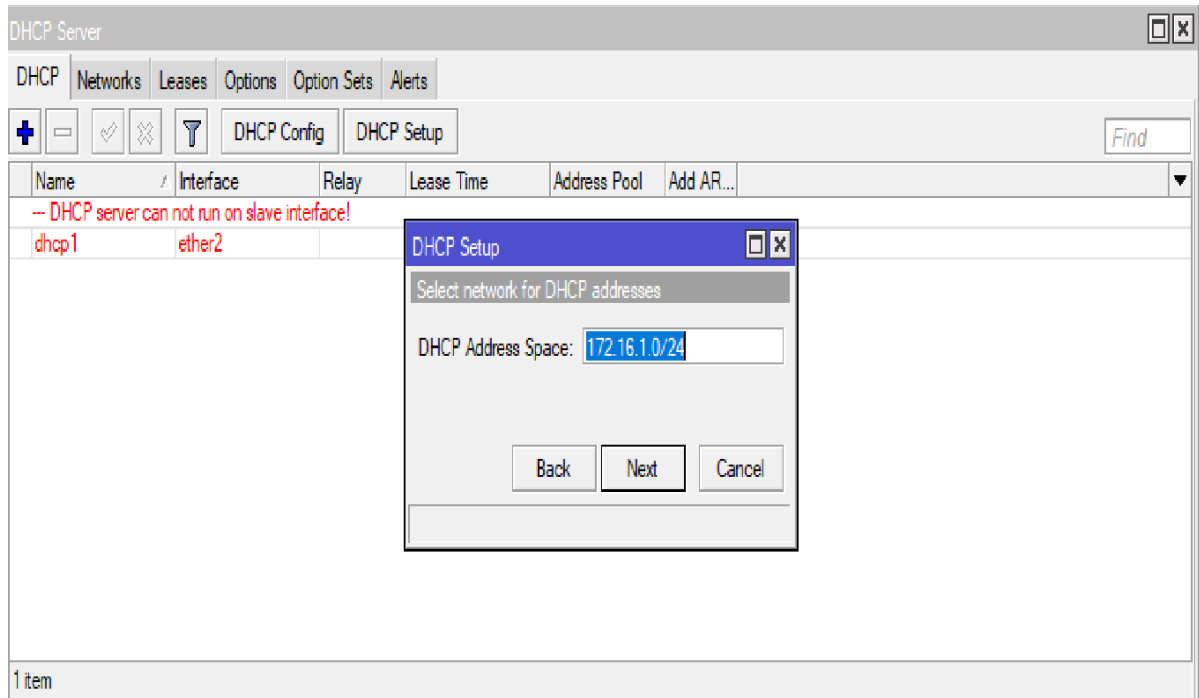


Figure 3.8: Setup DHCP To assign IP Addresses

➤ Step 3: Methodology

IP > Then DHCP > DHCP > Configuration Next, click the next Option button after selecting the Gateway for DHCP Network as 172.16.1.1

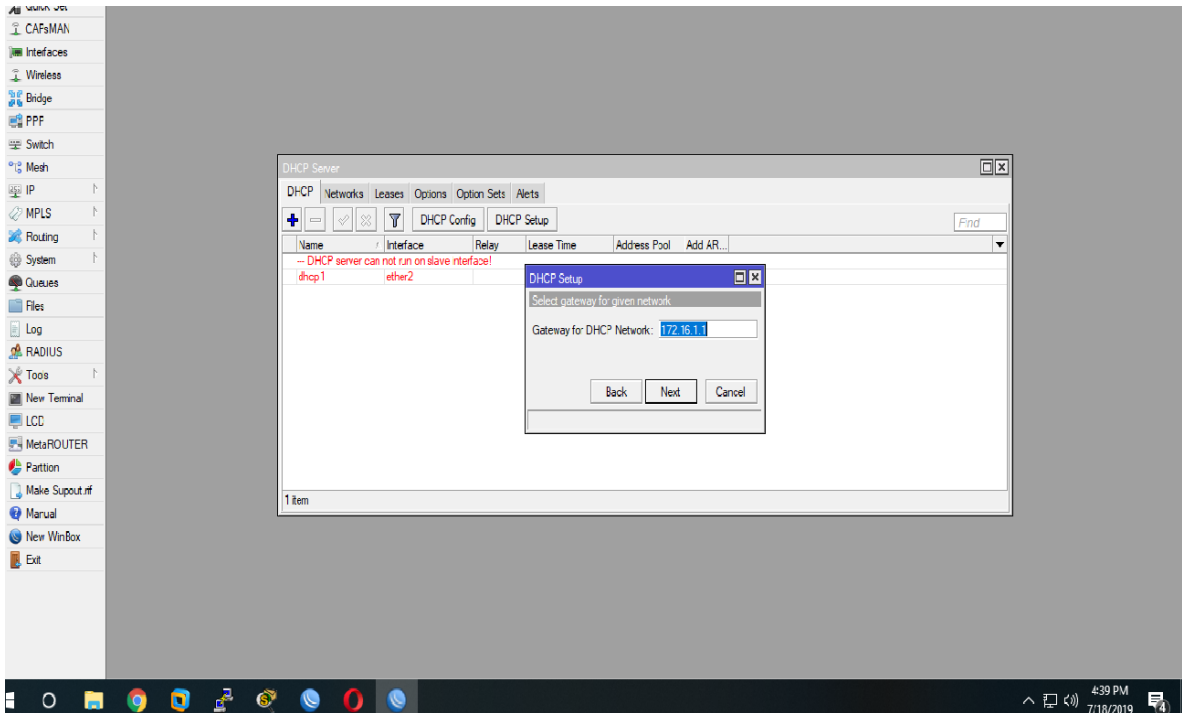


Figure 3.9: DHCP Gateway Network

➤ Step 4: Methodology

When the DHCP stage is complete, go to IP > Then DHCP > Next button. Setup of DNS show in figure

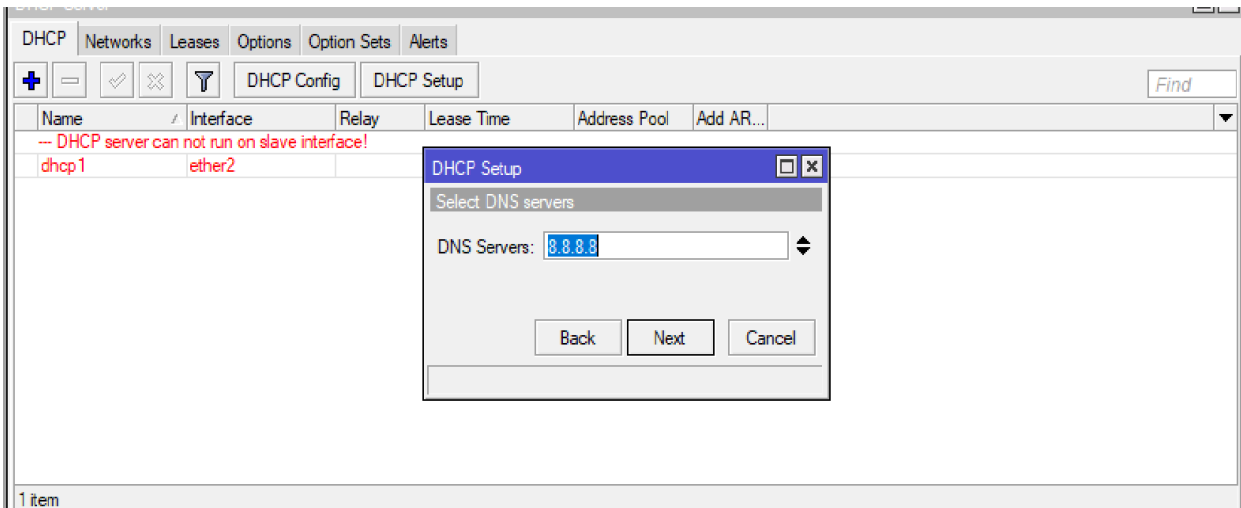


Figure 3.10: Setup of DNS

- Step 5: Fine DHCP Configuration is complete, as show in Figure 3.11

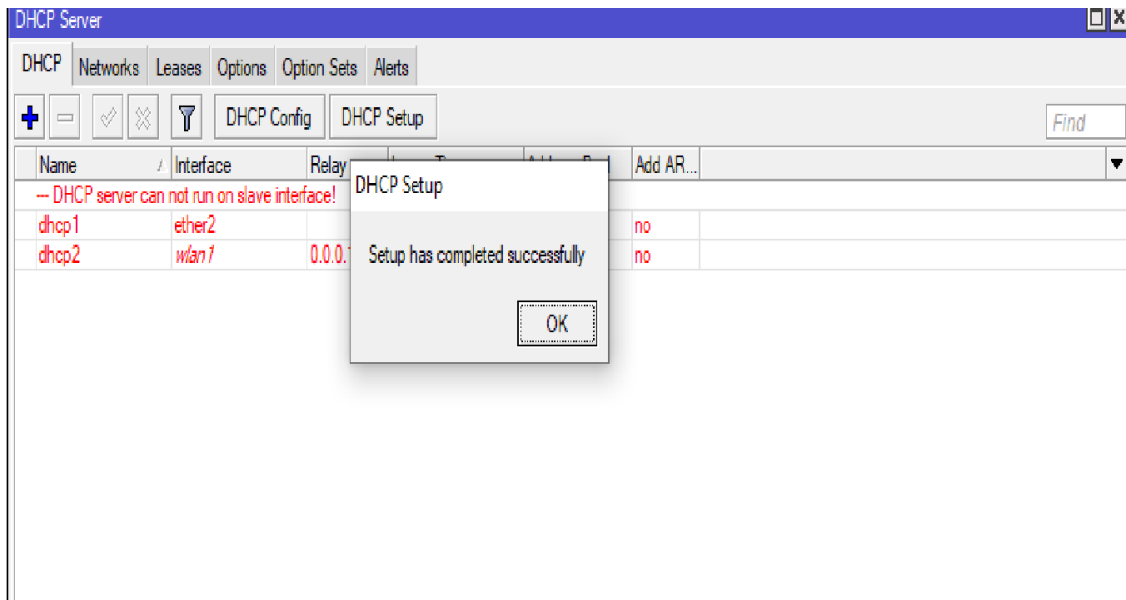


Figure 3.11: Completed DHCP Configuration

3.10 NAT Configuration

Address Translation for Network (NAT). That acts as the framework for transferring knowledge and data from local and private spaces to a public one before it. If you have to many devices to manage on a single IP address, use network address translation. The optimum switch for a building or a person can be the same.

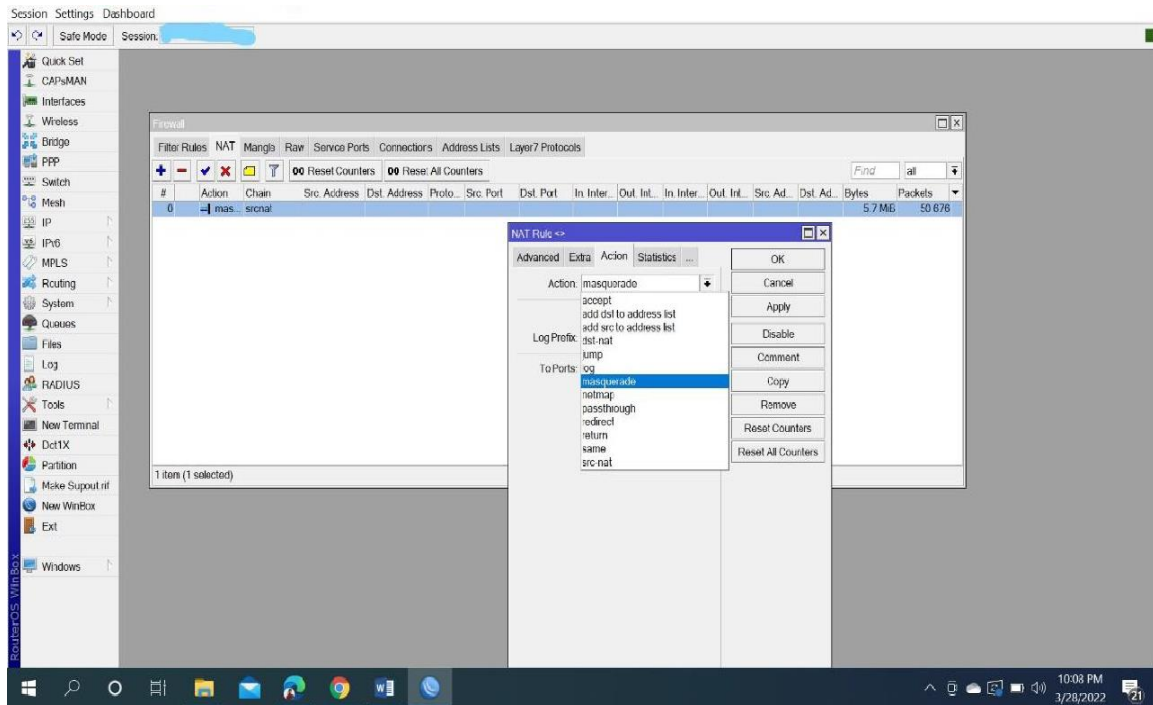


Figure 3.12: NAT Routing

3.11 Static Configuration

➤ Step 1: Method

Firstly, Go to IP > Route > Add (+) > Gateway

Then > Click OK Option

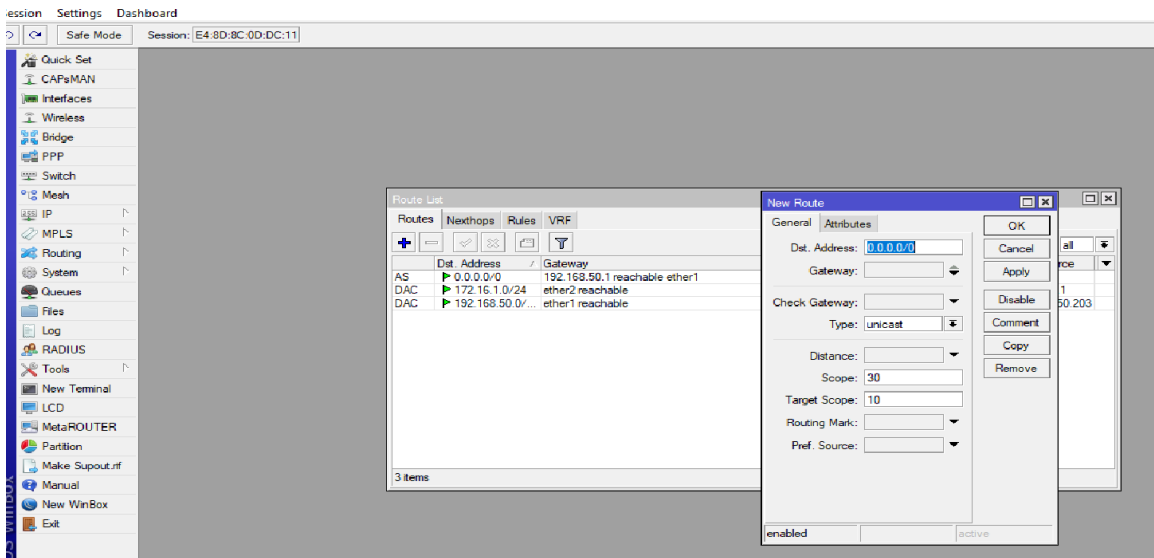


Figure 3.13: Setting up a Gateway

➤ Step 2: Method

Navigate to IP > DNS, Choose DNS, and then select the “OK” Option.

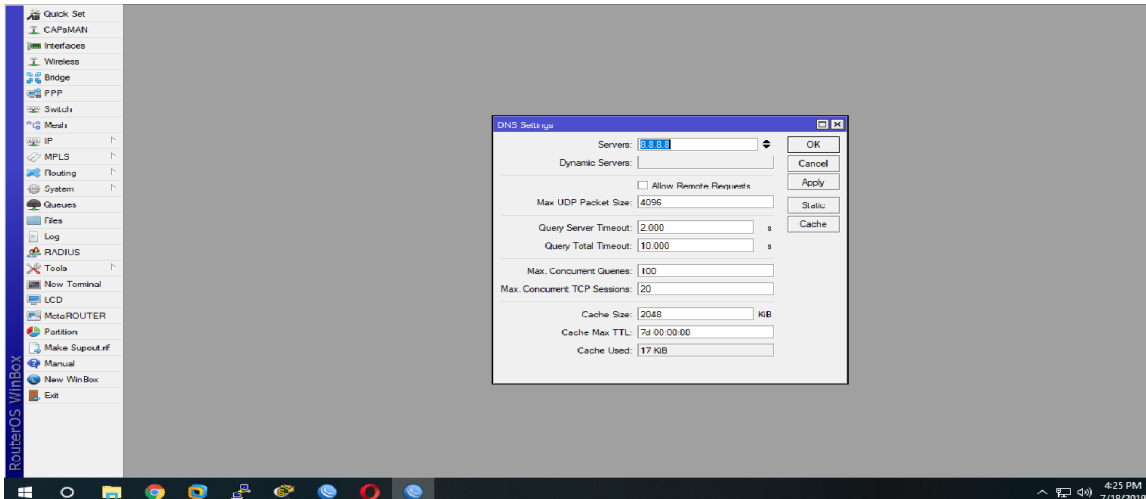


Figure 3.14: System setting for Domain Name

➤ Step 3: Method

Click Apply OK after navigating to IP > Firewall > Then NAT > Add > Action Masquerade.

Setup of the Network Address Translation Rule is Show in figure 3.15

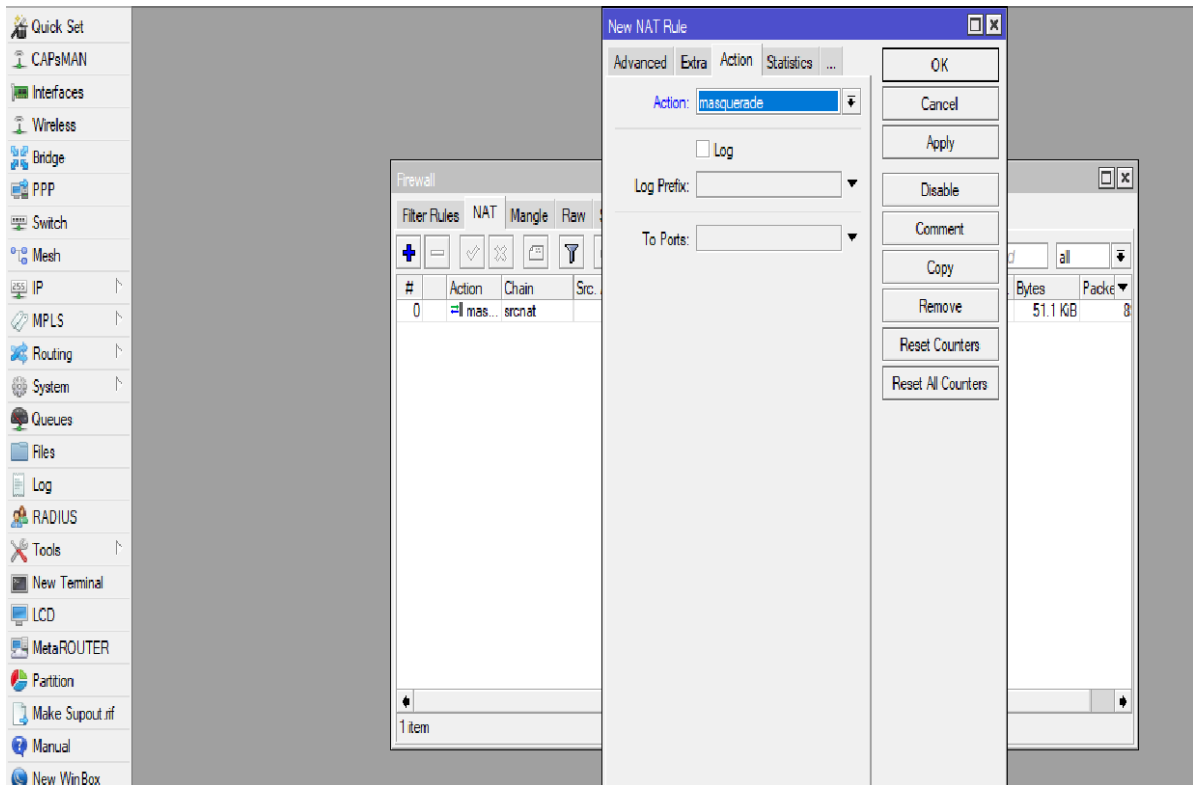


Figure 3.15: Network address translation rule

3.12 Bridge Interface

The screenshot shows the Mikrotik WinBox interface for configuring a bridge. The main window displays a table of bridge interfaces with the following data:

Name	Type	L2 MTU	Tx	Fx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx P...
R LAN	Bridge	1588	177.2 kbps	140.9 kbps	48	30	0 bps	139.9 kbps	0	

The 'New Interface' dialog box shows the following configuration:

- Name: bridge1
- Type: Bridge
- MTU: 1588
- Actual MTU: (empty)
- L2 MTU: (empty)
- MAC Address: (empty)
- ARP: enabled
- ARP Timeout: (empty)
- Admin MAC Address: (empty)
- Ageing Time: 00:05:00
- IGMP Snooping:
- DHCP Snooping:
- Fast Forward:

The 'Interface <LAN>' dialog box shows the following traffic statistics:

- Tx/Rx Rate: 177.2 kbps / 140.9 kbps
- Tx/Rx Packet Rate: 48 p/s / 30 p/s
- FP Tx/Rx Rate: 0 bps / 139.9 kbps
- FP Tx/Rx Packet Rate: 0 p/s / 29 p/s
- Tx/Rx Bytes: 10.1 GB / 857.8 MB
- Tx/Rx Packets: 9461814 / 2922365
- Tx/Rx Drops: 0 / 0
- Tx/Rx Errors: 0 / 0

Below the statistics are two traffic graphs. The top graph shows Tx and Rx rates, with Tx at 177.2 Mbps and Rx at 140.9 kbps. The bottom graph shows Tx and Rx packet rates, with Tx at 48 p/s and Rx at 30 p/s. Both graphs show a 'running' status.

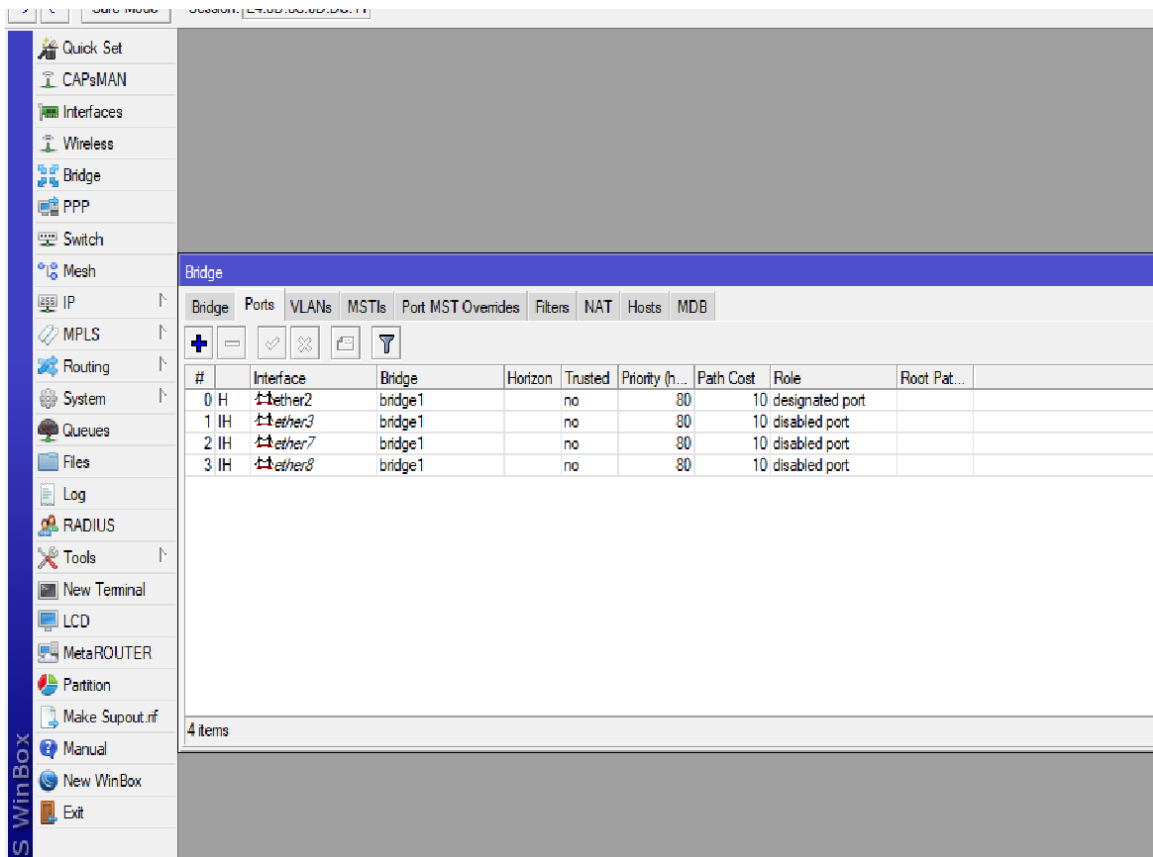
Figure 3.16: Bridge Interface

3.13 Bridge Configuration

- Step 1: First select The Bridge, Then click the Plus sign (+). Write the actions bridge name, then

Apply > Ok Choice

Displays The Bridge Path Figure 3.17



The screenshot shows the Mikrotik WinBox interface for configuring a bridge. The left sidebar contains various configuration categories, with 'Bridge' selected. The main window displays the 'Bridge' configuration page, specifically the 'Ports' tab. A table lists the ports assigned to the bridge, with the following data:

#	Interface	Bridge	Horizon	Trusted	Priority (h...	Path Cost	Role	Root Pat...
0	H ether2	bridge1		no	80	10	designated port	
1	H ether3	bridge1		no	80	10	disabled port	
2	H ether7	bridge1		no	80	10	disabled port	
3	H ether8	bridge1		no	80	10	disabled port	

At the bottom of the table, it indicates '4 items'.

Figure 3.17: Bridge port Allocation

- Step 2: The bridge Configurations IP address accuracy is show below this figure 3.18

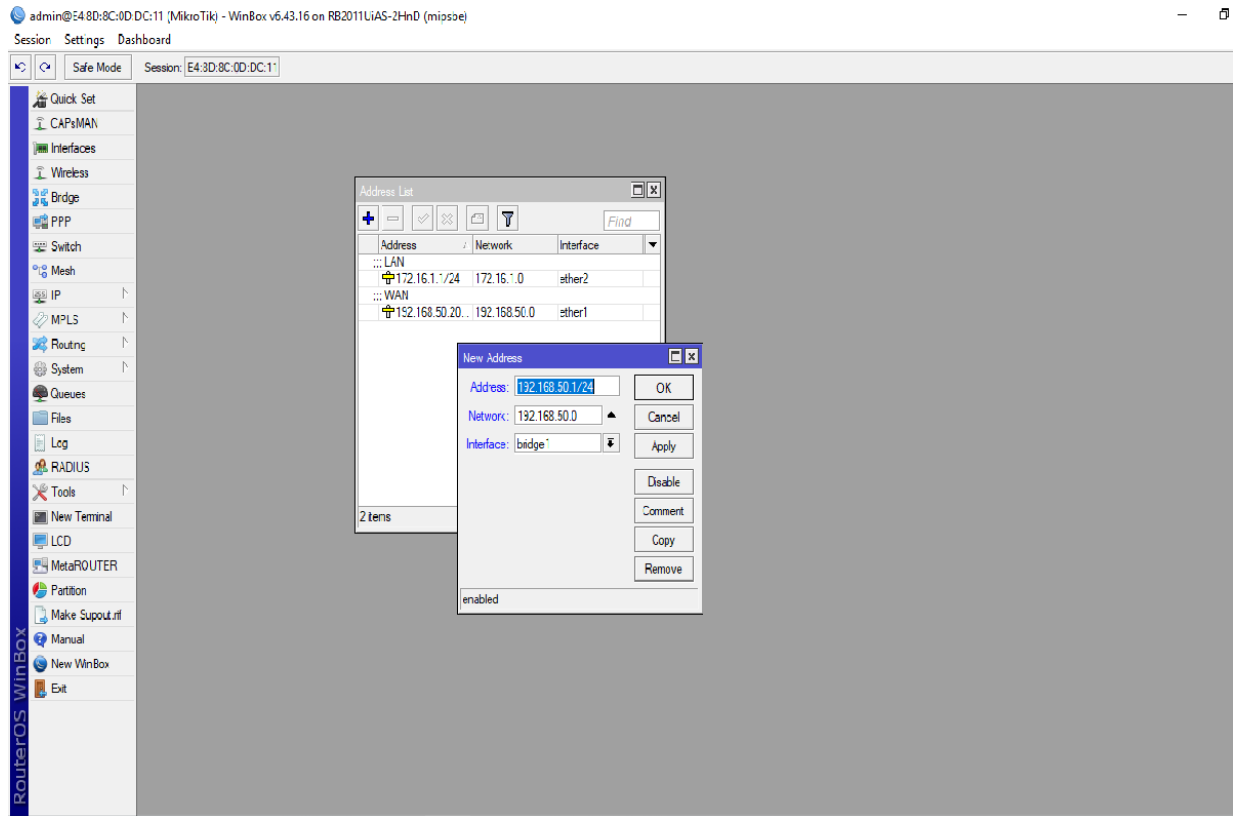


Figure 3.18: IP Allocate for Bridge

3.14 Bandwidth Control

Data transfer capacity Control represents Bandwidth Control (B/W). We realize that is a lot of a significant idiosyncrasy of the MikroTik switch. While giving the proper Bandwidth administration from ISP and dispersion Local Region Network (LAN) destinations. If we accept or give an ISP 100 Mbps bandwidth and I have 20 Computers, how can I subsequently provide bandwidth to every computer? As a result, keeping up with B /W technology is increasingly important, and there is a need for knowledge to spread throughout the computer.

Mikrotik switch string and astounding B/W observing gadget. Assuming we mull over that, there are enormous of laborers in an office and each individual need web Bandwidth yet some individual each time need bandwidth according to his authority work.

We can distribute 40 MB of bandwidth to 20 PCs by obtaining it from the ISP. Each computer outputs at 1024 kbps. Some of them are unable to use legal bandwidth. Even so, some clients do not completely understand why bandwidth restriction is necessary. Consequently, we will now detail the Mikrotik Switch Configuration.

MikroTik Configuration

➤ Step 1:

First, select “Queues” > “Simple Queues” > “Click Plus” on the Winbox software

Queue =name1 > 192.168.1.20 is the target address.

Target upload, Max Limit =5mbps > Apply > Okay

➤ Step 2:

Once more, under Winbox > Queues > Simple Queues > Click Plus>

Title =queue2 > 192.168.1.30 is the target address.

Max upload speed is set at 3 Mbps

Max Download Speed: 3 Mbps; Apply; okay

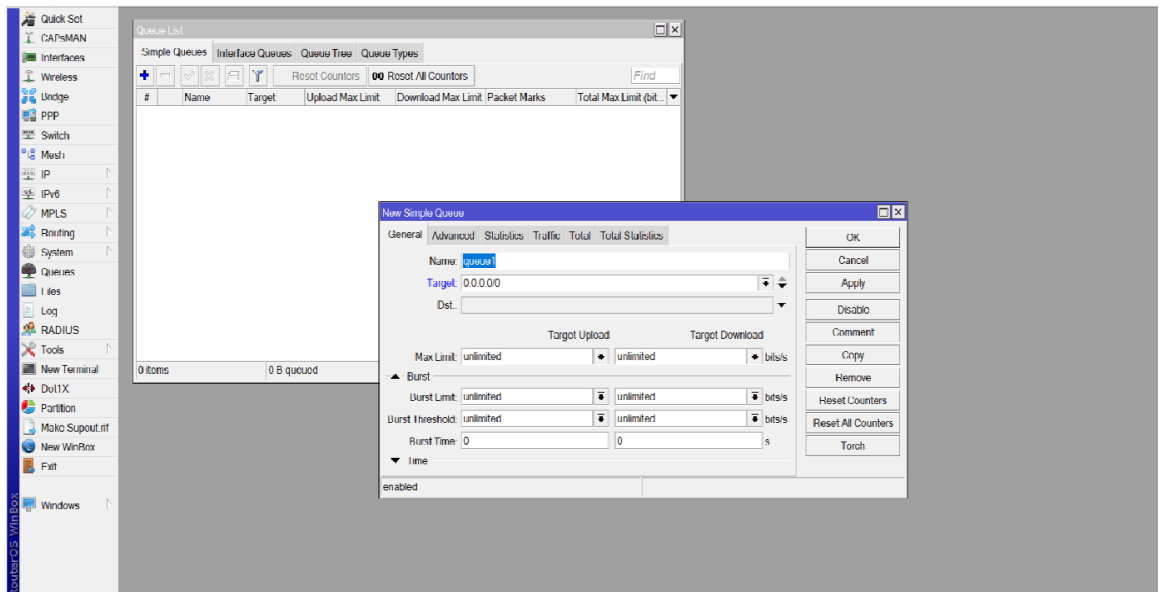


Figure 3.19: Bandwidth Control

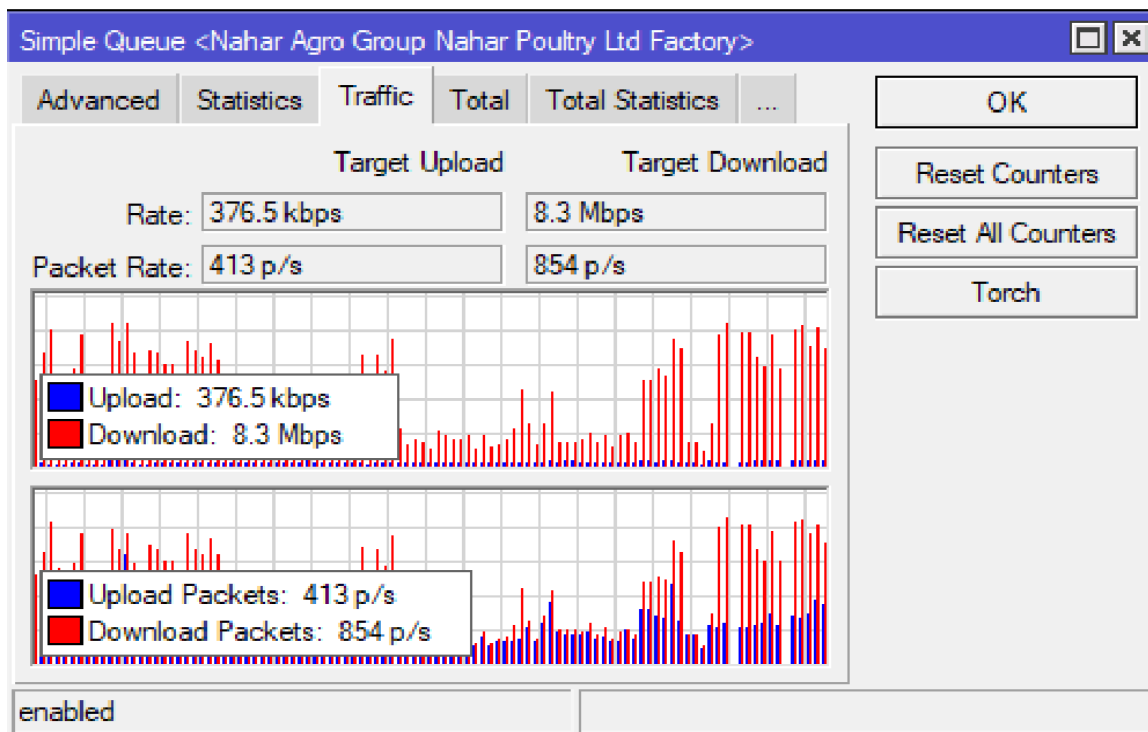


Figure 3.20: Current Bandwidth uses Traffic

3.15 How to Set Up a Wireless Router

In addition to acting as an access point for a local area network, a wireless router is a device that facilitates packet forwarding routing and routing over wireless networks.

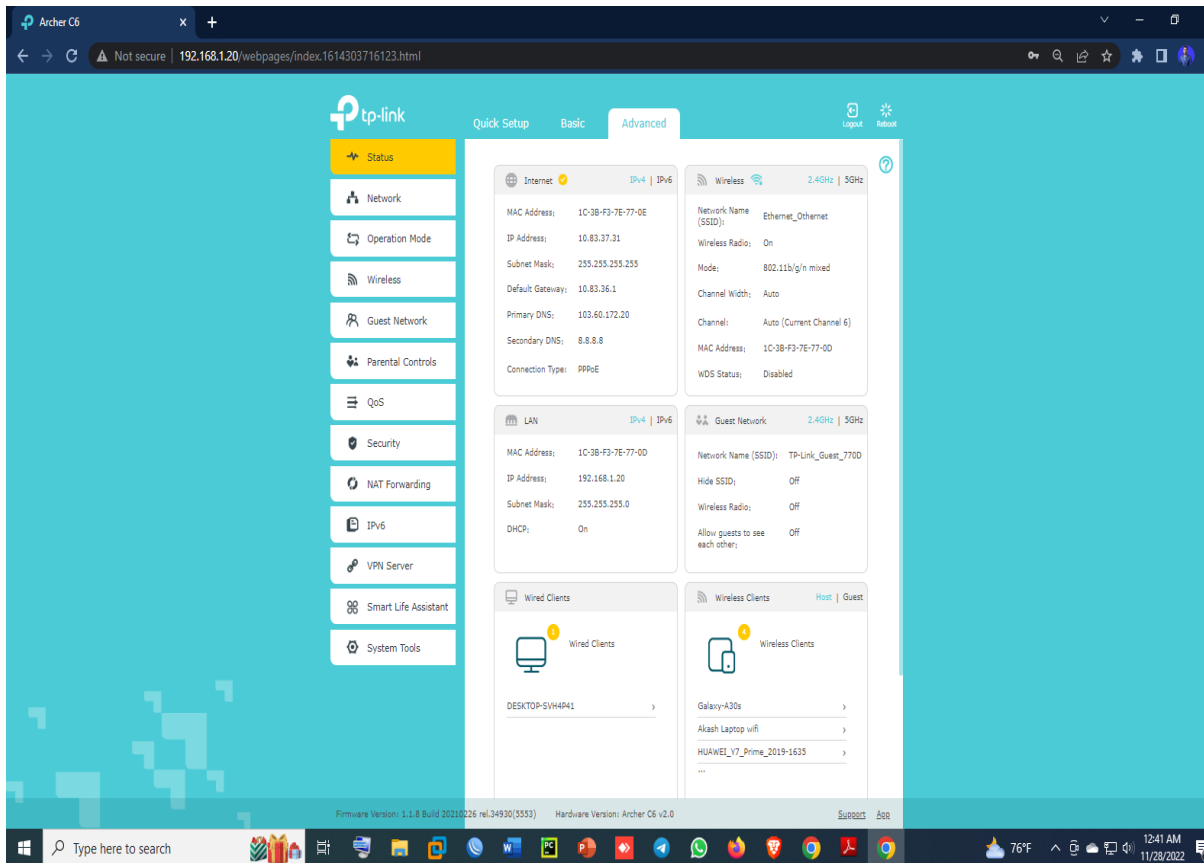


Figure 3.21: Configure Wireless Router

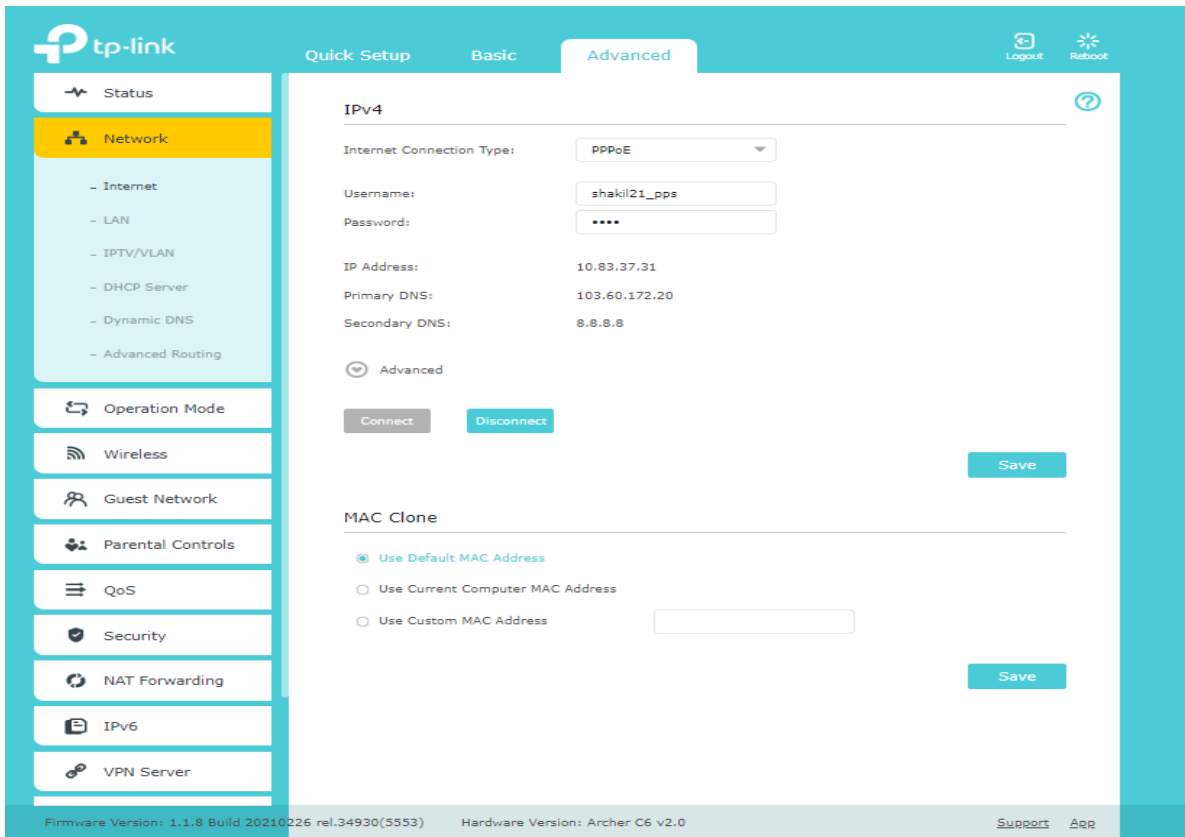


Figure 3.22: Configuration Wireless Router

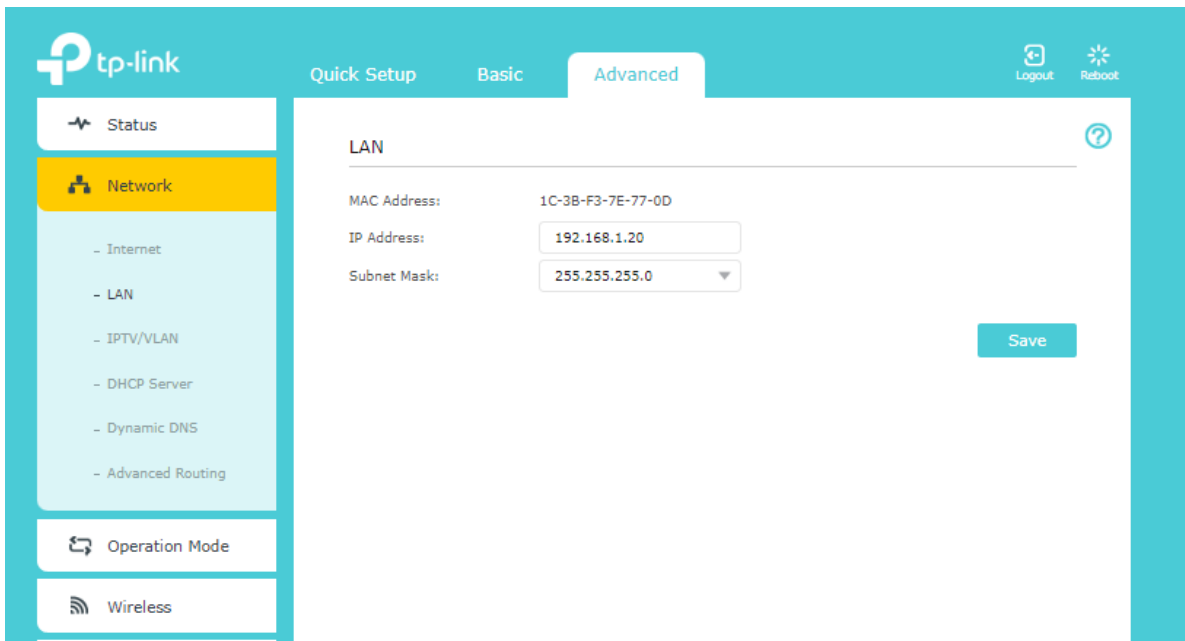


Figure 3.23: Wireless Router Configure

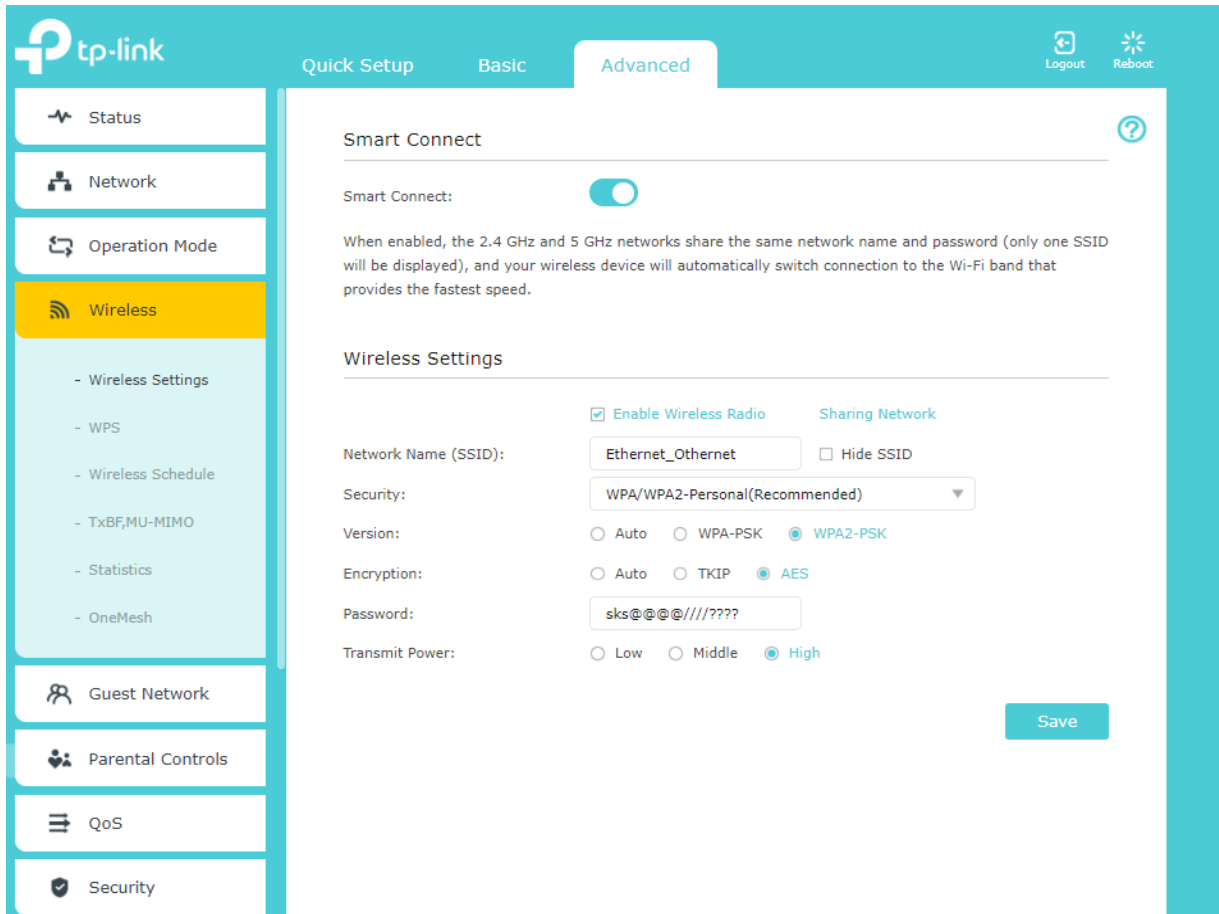


Figure 3.24: Configure Wireless Router

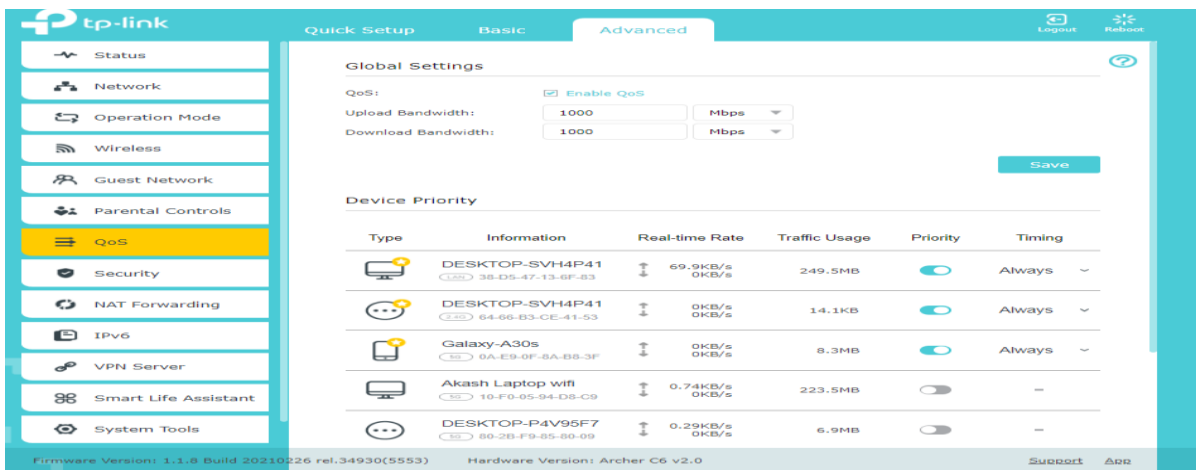


Figure 3.25: QoS Wireless Router Configure

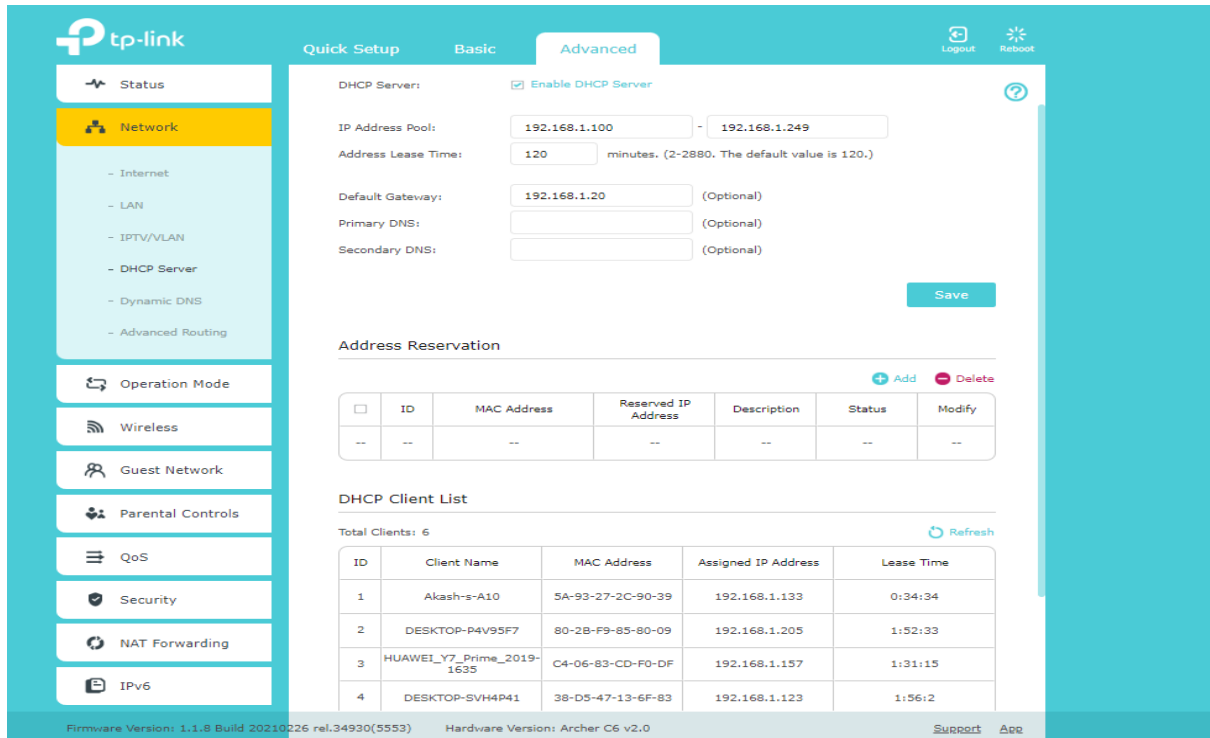


Figure 3.26: Wireless Router Configure

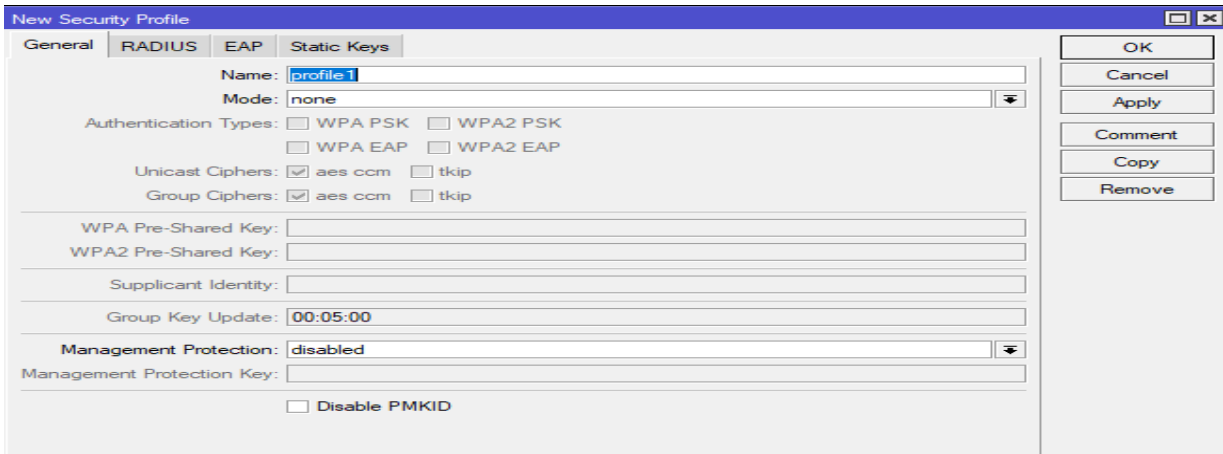


Figure 3.27: Mikrotik Wireless Router Configure

3.16 PPPoE Configure

➤ Step 1:

Go to the pool initially > (+) PPPoE

➤ Step 2: Process

Click PPP > PPPoE Server, Followed by Add (+)

Display the figure 3.28 Setting Up PPPoE

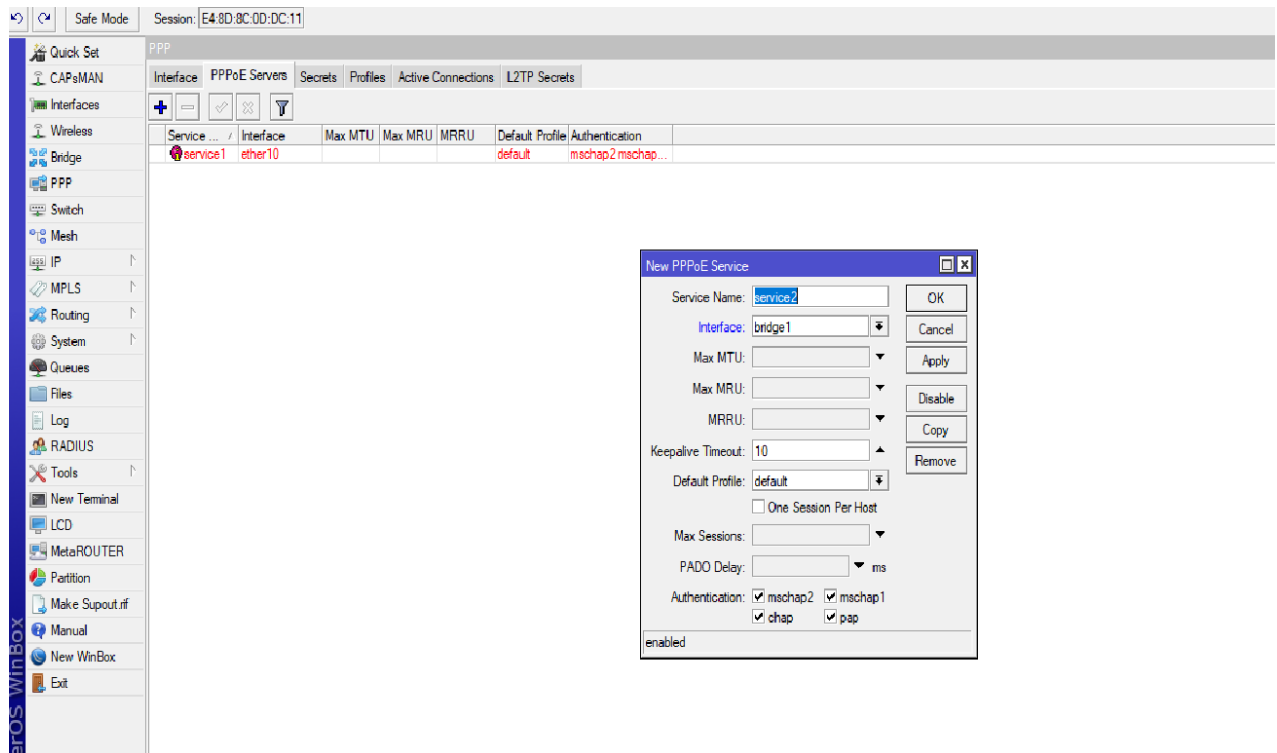


Figure 3.28: PPPoE Configuration

➤ Step 3: Process

To create a PPPoE profile, go to PPP > PPPoE profile Create > Action Name > Local Address > Remote Address, and Then Limit

Present the graph PPPoE Profile Created at Figure 3.29

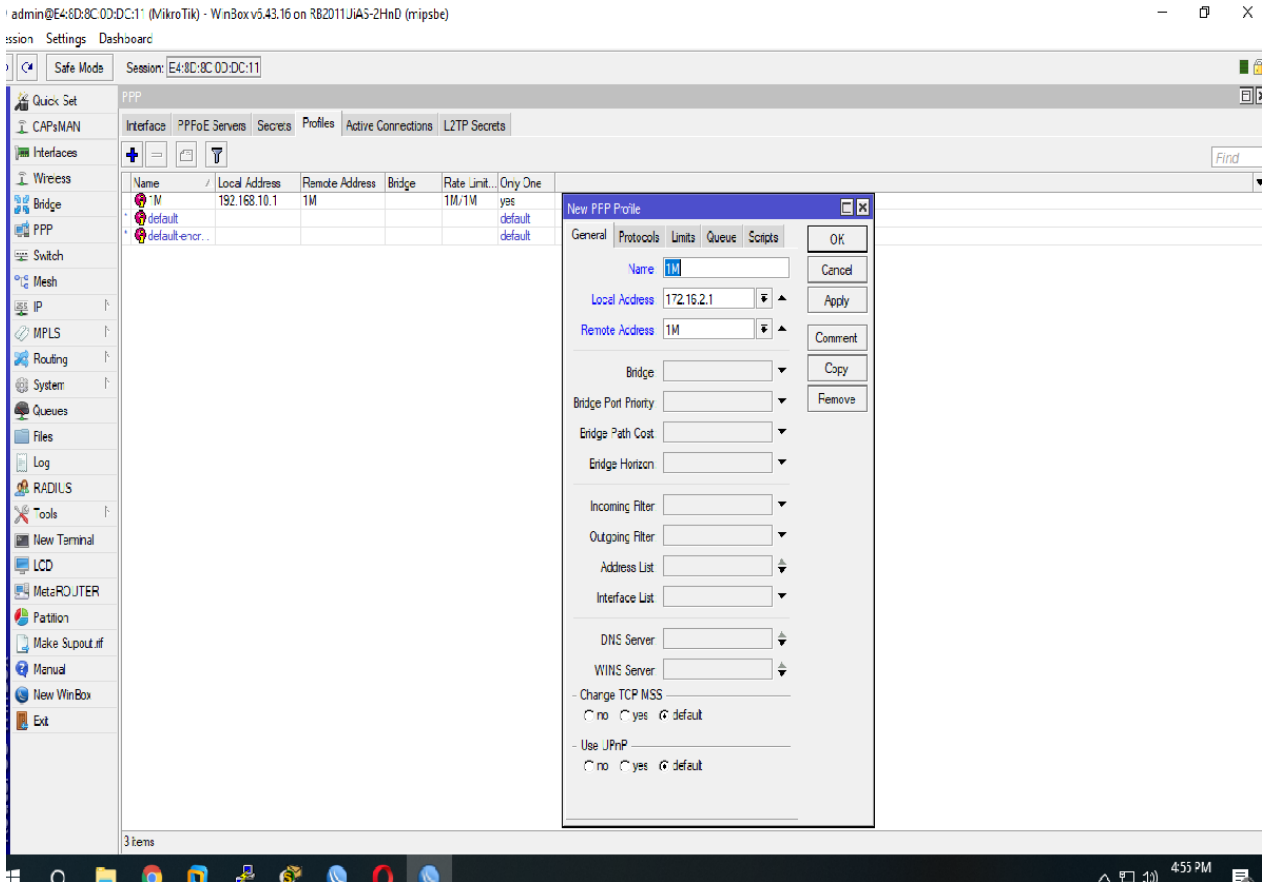


Figure 3.29: Create a PPPoE profile

3.17 Class and IP Addresses

We know many various Class of IP Address, Suppose as Class A, Class B Class C, and the classes D & E.

24 - bit host ID and 8 Bit network ID are included in class A Ip addresses

16 - bit host ID and 16 Bit network ID are included in class B IP Addresses

8 – bit host ID and 24 Bit network ID are included in class C IP addresses

Reservation of Class D & E for Multicasting & Research

3.1 Table: Category of IP addresses

Classes	Range of Decimal	High order bits in the first octet	Network & Host ID N=Means Network H= Means Host	Subnet Mask By Default	Amount of Network	Network hosts per
A	1 - 126	0	N.H.H.H	255.0.0.0	126	16777214
B	128 - 191	10	N.N.H.H	255.255.0.0	16382	65534
C	192 - 223	110	N.N.N.H	255.255.255.0	2097150	254
D	224 - 239	1110	Utilizes reserved multicasting			
D	240 - 254	1111	Applied research to			

Figure 3.30: IP Address

3.18 Optical Fiber Wire

When preparing fiber optic wire, there are two types of masking that are employed. One for the thickness of the interior, the other of the exterior. The size of the network determines how this wire forward signal is used by the laser lights. Fiber optic cable is incredibly dependable and secure in comparison to other media or connections Access to Fiber optic Cable at Affordable prices.



Figure 3.31: Optical fiber cable

3.19 Network Cable crossover

Starting on the right side. Demonstrate this process, color crossover connection for Rj45 connector.

3.2 Table: Network Cable Crossover


1	White/Orange		Transmit+
2	Orange		Transmit-
3	White/Green		Receive+
4	Blue		Unused
5	White/Blue		Unused
6	Green		Receive-
7	White/Brown		Unused
8	Brown		Unused

Figure 3.32: Crossover Network Cable

3.20 Challenges

If I don't work, there won't be any difficulties for me. I had a lot of difficulties to overcome throughout my internship, but I did so. Despite the extreme demands of my career, I continue to grow as a person every day in many ways. It was my first experience working with a large group of people. Using English to speak with everyone was pretty challenging. A thorough awareness of the workplace communicate with clients with understanding. Work at a new job. The most effective way to address client difficulties.

CHAPTER 04

COMPETENCES AND SMART PLAN

4.1 Earned Competencies

Right now, work market is overflowing with changes to acquire new abilities. This temporary position has shown me fundamental learning of my certificate – related themes and a few abilities required for my future vocation. It assists me with keeping a quiet psyche when the work pressure heaps on. In this entry – level position, I have figured out how to present and design switches and switches, arrange DHCP, NAT, VLAN.

- MikroTik Router Configure
- Troubleshooting system and network problems at clients end and diagnose and solve faults related to Wireless structure.
- Monitoring Backbone Network of the Company and Customer Network.
- Talking with clients via phone or face-to-face Communication to address concerns.
- Configuring Customer Router and Different Network Device.
- Installation and Configuration Customer any kind of Wi-Fi Routers.

4.2 Smart Plan

Doing this temporary job application has expanded my system administration knowledge how and I am becoming certain and confident that I could work in the field of the system administration. Later learning the fundamental thoughts of this courses will assist me with securing myself in the field of work. I learned before will assist me a great deal when I with looking further into organizing form now on. I picked organizing is on the grounds that is extremely popular all around the world including in Bangladesh. Later on, I will foster myself as an organizing engineer.

CHAPTER 05

CONCLUSION & FUTURE CAREER

5.1 Discussion and Conclusion

Following finishing my internship program, I learned about careers for IT engineers. I was able to gain more knowledge about what an IT professional performs during my internship and better prepare myself to work as a responsible and creative specialist in the future. We observed that during the training phase of my internship, I had developed remarkable competency in Mikrotik & Cisco switches and a substantial amount of experience. Since I have seen into the future, I can assist and work any ISP-based Company.

5.1 Opportunities for Further Career

These days, PC organizing is a district that is an excess of demandable for work arrangement. There are various zones of IT locales. An understandable idea of ISP is presented in these internships' objectives. A company office creates network diagrams and configure systems using the experience form this internship. Students that are interested in working in this profession have a wide range of alternatives in the IT sector. Given how little our country has advanced thus far, the significance of its quickly growing It sector is immeasurable. Because of this, our country is creating several high- tech parks and shared operational principles. The average number of graduates obtaining job before graduation was 25%; after an internship, that number rose to 75%. Thus, there are several technical employment available in our nation, Such as those at the ICT Division, ISB Base Company, Corporate Office, and Many Networking.

APPENDICES

Appendix A: Internship Reflection

I have learned how to give client support, how to talk to corporate clients, and how to deal with clients.

How to find the client's problem and how to solve it, and how to work with the team.

I know how to work in the corporate market, and also know how to configure any kind of Wi-Fi router MikroTik Router.

Appendix B: Company Detail



Salam Online ISP

Address: Mohakhali Wireless Gate,
31/4, 3rd Floor, Colombia Super Market,
Dhaka, 1212

Operating Hours: Saturday to Friday, from 9 Am to 11 pm

Call us 24/7

(+88) 09610049990

Phone: +8801906102645

Email: info@salamonline.com.bd

Website: <https://salamonline.com.bd>



BTRC Approve ISP

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