INTERNSHIP ON COMPUTER NETWORKING SYSTEM

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

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APPROVAL

This Internship titled **"Computer Networking System"**, submitted by **Md. Fazle Rabbi, ID NO: 191-15-12157** 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 26 January, 2023.

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I hereby declare that, this report has been done by me under the supervision of **Fahad Faisal, Assistant Professor, Department of CSE** Daffodil International University. I also declare that neither this report nor any part of this report has been submitted elsewhere for award of any degree or diploma.

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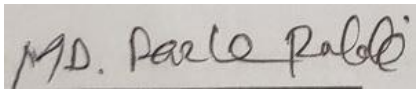

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I would like to express my heartiest gratitude to **Dr. Touhid Bhuiyan**, Professor and Head**,** Department of CSE, for his kind help to finish my internship and also to other faculty member and the staff of CSE department of Daffodil International University.

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

ABSTRACT

In my report, I'm attempting to highlight the things I've accomplished and the things I've learnt from having an internship. As a network engineer intern, my main goal was to advance my networking skills and knowledge of switching, IP addressing, various types of routing, and Isp Setup & Maintenance With Mikrotick. Mikrotik router layout is obtain the usage of Win box. After implementation of all service, this gadget is examined in distinctive degrees and it really works correctly as a model. Network Design, Analysis and Troubleshooting-Tunneling and Network Security, PPPoE, DHCP, Static routing, Firewall, DNS, NAT, ARP, Bridges and so forth are all of the remember a Mikrotik router in Win box. This guide may be designed with RB941 Wi-Fi get admission to factors and consumer consolation will increase at the same time as community management and preservation fees decrease. There are many network engineers working on new technology today. I'm also interested in learning the distinctions between the routing and switching protocols, as well as the reasons behind the development of IPv6 and the differences between IPv4 and IPv6. I also want to know how IPv4 and IPv6 interact with one another (ipv6). I would have to educate myself about real-world projects. I must acquire the skills necessary to handle a real project. Getting started as a network engineer is something I'm highly interested in doing. The internship as a "Network engineer" appealed to me for this reason. My future or upcoming careers have greatly benefited from my work at Dotnetbd. A crucial aspect of gaining experience was dealing with the client's actual difficulties. This report walks us through every aspect of a real project and the learnings that were made throughout this internship over the course of four months.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

Today Technology has changed the world. Technology makes people life very easy. You cannot service without Technology. Every technology dependent on networking. Many people global uses of the internet innovation and networking is a fundamental a part of that all technology depend on networking. you can not do whatever without the internet. Now a day each business, each office, bank, and exchange are predominantly primarily based totally on correspondence and networking. Networking is a critical for workplace of a company and all ISP agencies for preserving the is Internet. This report I Discussion many topics which are essential for networking.

1.2 Motivation

Internet access is currently available in everywhere. Day by day its use is increasing due to that fact it is prevalent everywhere in the network. Computer networks are so essential to our daily lives and our ability to function that it is helpful to understand how they operate. Computer networking is a crucial area of IT, and I need to understand it in order to construct myself.

1.3 Internship Objectives

To use the knowledge, we have acquired in real-world situations.
To comprehend the basic principles of networking technology, value, and protocols.
To get knowledge of various switching and routing techniques.
To become familiar with the various layers of the protocol stack and their interfaces.
To use the knowledge of Isp setup & maintaince with Mikrotik.

1.4 Introduction to the Company

DotNetBD is one of the premier information and technical service providers. We provide the best internet service at affordable prices. This company provides his IT services to

various private and governmental organizations in the country through qualified and experienced professional staff. Their work started with website development, software development, domain hosting and more. sales and service. Since then, they have worked on IT consulting, server installation, LAN and WAN networks, CCTV/IP cameras, IP cameras, IP PBX, and professional training at enterprise level. Dot Net BD deals with access control and security devices, intelligent office and home automation. Print barcodes and smart IDs. You've been dealing with archiving and digital archiving. They have a publication and publish various memorabilia from the organization.

1.5 Report Layout

I shall introduce my internship status, motivation, and aims in this report's first chapter. I'll go through the organization, services, mission, and organizational structure of my internship in the second chapter. I'll discuss regular task activities and networking resources, networking architecture program for managing security events and ISP setup & maintaince with Mikrotik in chapter 3. I'll talk about competencies and wise planning in this chapter 4. I'll talk about the ending in chapter 5, which is the last chapter.

CHAPTER 2

ORGANIZATION

2.1 Introduction

DotNetBD is one of the premier information and technical service providers. We provide the best internet service at affordable prices. This company provides his IT services to various private and governmental organizations in the country through qualified and experienced professional staff. Their work started with website development, software development, domain hosting and more. sales and service. Since then, they have worked on IT consulting, server installation, LAN and WAN networks, CCTV/IP cameras, IP cameras, IP PBX, and professional training at enterprise level. Dot Net BD deals with access control and security devices, intelligent office and home automation. Print barcodes and smart IDs. You've been dealing with archiving and digital archiving. They have a publication and publish various memorabilia from the organization.

2.2 Service

- Broadband Internet
- Corporate Internet
- Computer Sales and Services
- Network Security
- Server Hosting
- CCTV and IP PABX
- High Speed Internet Bandwidth
- Radio-Link and Wi-Fi Networking
- Computer Training in Hi-Tech LAB
- IP Camera Networking
- All Kind of IT Solutions

2.3 Product Ready to Serve Within Short Notice

- Web Portal
- News Portal
- Personal Portfolio Website
- Trading Company Website
- Nonprofit, Alumi, Club, Community, Social OM System
- Meber Registration System
- E-Commerce Website
- Microfinance Management

2.4 Job Placement

After the training complete every intern go for the job or freelancing. Dot net Bd give best possible way to find the job. Many trainee getting job from Dot net bd. Any one training from this it they will able to getting a new job or creating a self-business idea.

2.5 SWOT ANALYSIS

The SWOT analysis takes into account opportunities, threats, weaknesses, and strengths. The primary internal and external elements that are all factors are regarded to be crucial in reaching a goal are identified by the SWOT analysis in response.

2.5.1 STRENGTHS

- Thirst for learning and hard effort.
- Capacity for planning ahead.
- Problem-solver with creativity.
- And a commitment to excellence.

2.5.2 WEAKNESS

- Incapable of Articulation without Substance

- Poor command of the English language

2.5.3 OPPORTUNITIES

Dotnetbd Institute of Information Technology is the best IT-based business with Corporate IT training Solutions. Key areas of business include software development, outsourcing, and joint ventures. Additionally, data soft values this client. As a result, I frequently have the chance to work on various projects to further my knowledge.

2.5.4 THREATS

When a project or website is being developed, several issues arise, including the disclosure of sensitive data, debugging, code injection, flawed access controls, etc. I'll make every effort to prevail.

2.6 ORGANIZATIONAL STRUCTURE

The following figure 1 shows organization structure.

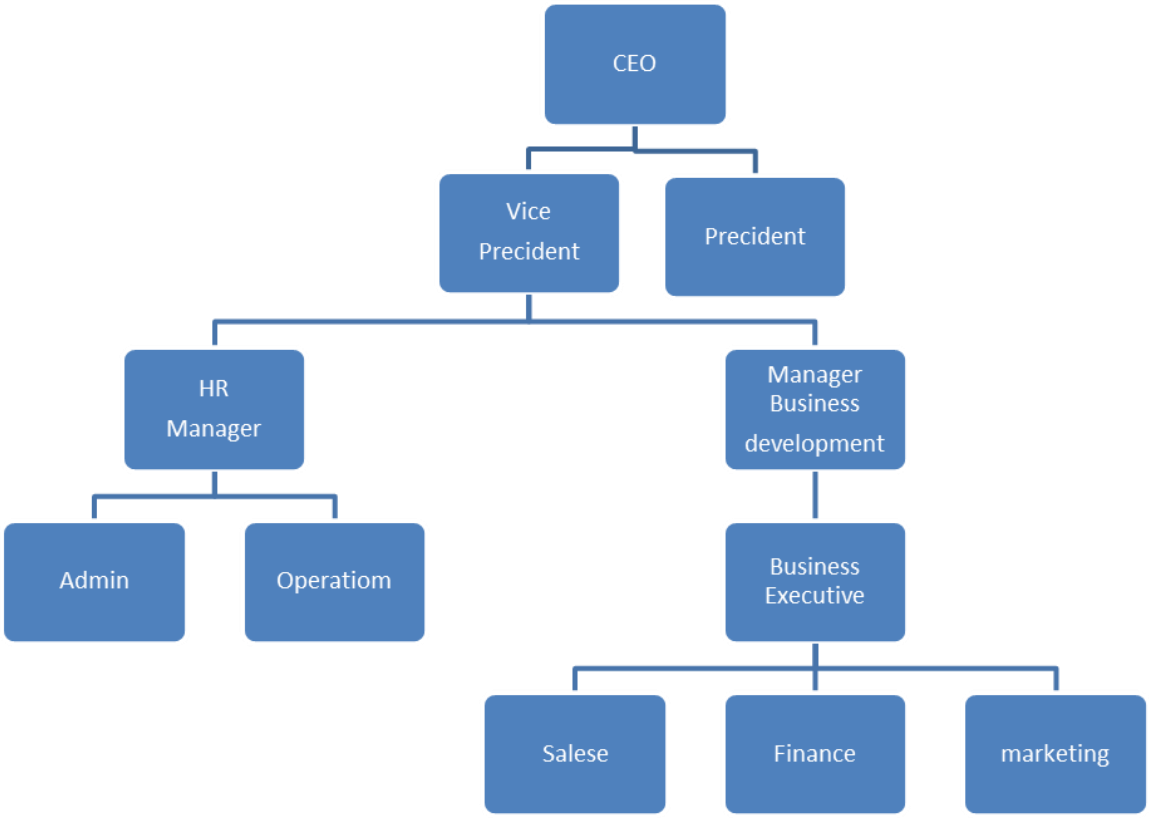


Figure 1: Organizational Structure of Dotnetbd Limited

CHAPTER 3

TASK, PROJECTS AND ACTIVITIES

3.1 Daily Task and Activities:

First month my internship at DOTNETBD IT Limited I have learned And performed blew Task

- IP Address
- IP Address class
- About hub
- Router
- VLAN
- CIDR

2nd Month I have Learned and performed below

- Sub netting
- DHCP Server
- Static IP address

3nd Month I have Learned and performed below

- Dynamic Routing
- Default Routing
- VALN
- NAT

4th Month I have Learned and performed below

- Last Month we learn the complete MikroTik configuration which is very important for MikroTik router management.
- Easy setup and installation of MikroTik OS on VMware
- VALNMikroTik OS installation
- IP Configuration
- Subnets

- Network Connection
- N PPPOE Last month we relearned the same topic for good preparation MikroTik Route Static and DHCP
- Bridge
- Bandwidth Management
- ARP/AP
- PPPoE
- Wireless Configuration

3.2 Internet Protocol (IP) Address

A protocol for the internet styles the IPv4 scientific discipline address composed of thirty two bits of figure. There are two section corridor one section is an IP address other section is a host address. The separation was called nominated subnet mask. We already described the subnet mask (/ number) like this IP address192.150.3.0/ 25 that is subnet mask processed is (/ 25). That classes of the number of subnet mask 10000000. The volume " 1 " s within the former illustration is 25. The network address on the web protocol IP is identified by the subnet mask, so address this procedure is know as an subnet mask. The network address contains two bits, one of which is"0"s and "1"s. The host bits and the network bits are separated by "o" s and "1"s respectively. because it is reserved for the network address ,the first bits "0"address is not used for the host address, and the last bit 255 is not utilized because it is the published address . Below I'll be suitable to describe Subnet.

3.3 IP Address Classes

The IP address method classified things into categories. Four octets are defined by the address. The first octet of an associate degree IP address specifies its type. The classes are displayed in the next table.

table1: Range of this class Address

Class	Range
Class A	0-126
Class B	128-191

Class C	192-223
Class D	224-239
Class E	240-255

N.B Since that 127 IP address the loopback address it is absent from the table. Check the native NIC card for the loopback address. In 1981, while the use of information science addressing was only being started, IANA created this loopback address. Unfortunately, the wasted loopback address on the network of 127 caused IAN's call to order class A to be placed in class A. However, it is::1 for the IPv6 loopback addressing, which was wasted entirely.

3.4 Subnetting

A subnet mask is typically a scope that separates the host address from the partner diploma science address as well as the network address. Additionally smaller community know as a subnet within a larger community that requires a subnet mask. A community can be divided into two or many subnets using the strategy known as sub netting. Its primary duty is to control how hundreds of inexpensive and secure internal communities route information. Additionally, sub netting aids in making better use of IPv4 addresses. The network will assign a device an IP address whenever you connect it to the network. The community component AND the host component make up the two portions of an IP address. The host component the device is identified by the science approach, whereas the community element identifies the community. Without a subnet mask, the network address, partner degree, and host address contained in an IP address are interchangeable. By dividing IP addresses into community and host addresses, the subnet masks allow community site visitors to be aware of IP addresses.

A subnet masking IP address for this network is 192.150.3.0/25.

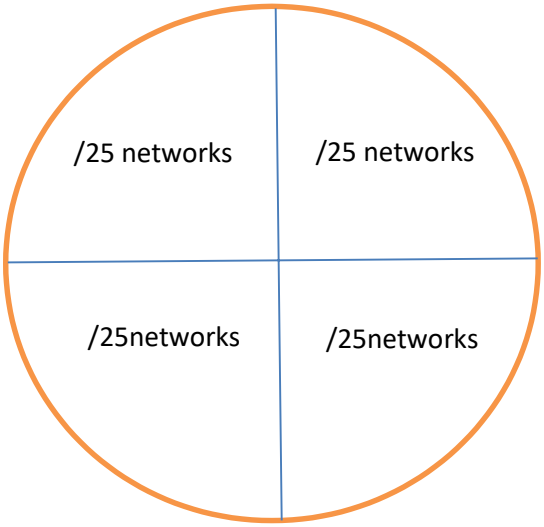


Figure 2: Subnet Masking Network

That IP address is of class C.

That subnet mask is 192, 1000000, or /25.

Here is 21 + 2 is the number of subnets (2 bits network)

In terms of hosts per bit, 128-2 equals 126. (Since 7 bits host)

3.5 Static IP Address Assign

The flowing way such us set an address on an information science computer, router, or other device is through static addressing. This particular IP address is fixed or static. That IP address is presumably specified the Administrator, according to this. The user has never changed because of this address. When a computer assigns a static IP address, that address is considered to be permanent. The IP address is not accessible if the computer is powered down or in sleep mode.

3.6 Implementation

The figure 3 shows basic configuration.

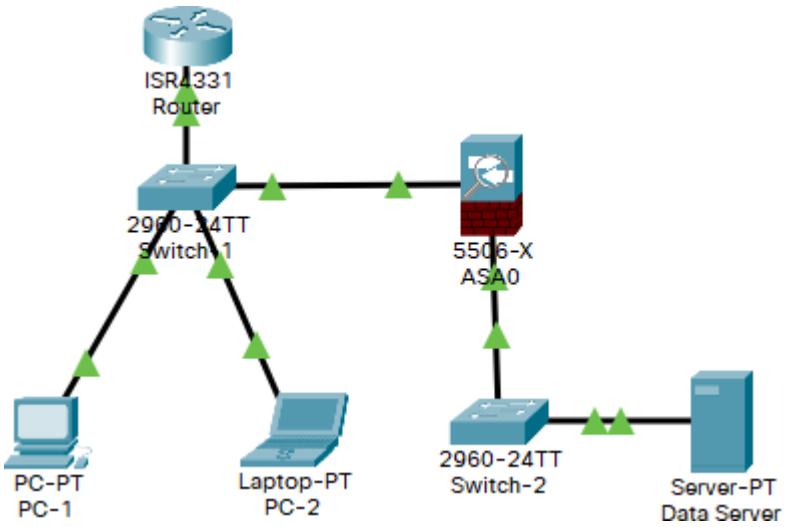


Figure 3: Basic Configuration of PC, Switch, Router, Firewall, Server

Personal Computer: The personal computer (PC) is a multipurpose computer that is practical for individual use due to its size, features, and associated cost. Personal computers are designed to be used directly by the end user rather than by an expert or technician, in contrast to the large, expensive minicomputers and mainframes that many of us once shared time

Switch: The switch is a device that connects various types of devices and controls node-to-node communication inside a network, making sure that data packets get to where they're going. A switch transmits information between nodes inside a single network, as opposed to a router, which delivers data between networks. When referring to personal computer networks, the term "switching" describes how data is moved between devices in a very tight network.

Router: The router is another tools for networking which distributes data packets among a group of numerous computers. In order to send data packets to their destination, the router logically selects the most efficient route. Consider a router as a police officer at a busy junction if you want to understand what a router is thinking. given its high standard for responsibility and technical assistance, Cisco24 is chosen as the most effective silent router

for this task. The traffic cop decides which vehicles can pass, which vehicles are not appear should become allowed on the path, and which destination the vehicles could travel to. The router can malfunction since the proposed network had to connect numerous computers to numerous switches.

Server: A server is a computer program or device that provides a service to another computer program and its user, also know as the Clint. in a data center the physical computer that a service program runs on is also frequently referred to as a server .That machine might be a dedicated server or it might be used for other purposed. A physically server is simply a computer that is used to run server software.

3.7 Basic IP Routing and Types

Routing types –

- Static routing
- Dynamic routing
- Default routing

3.8.1 Static Routing

Select greatest path by administrator

Advantages:

Administrator set greatest path manually

- Must need destination network id
- Quick and safe

Disadvantage:

- Everything is manually configured.
- There is just limited network usage.
- If any network changes, the entire network will be affected.

The figure 4 shows Static Router.

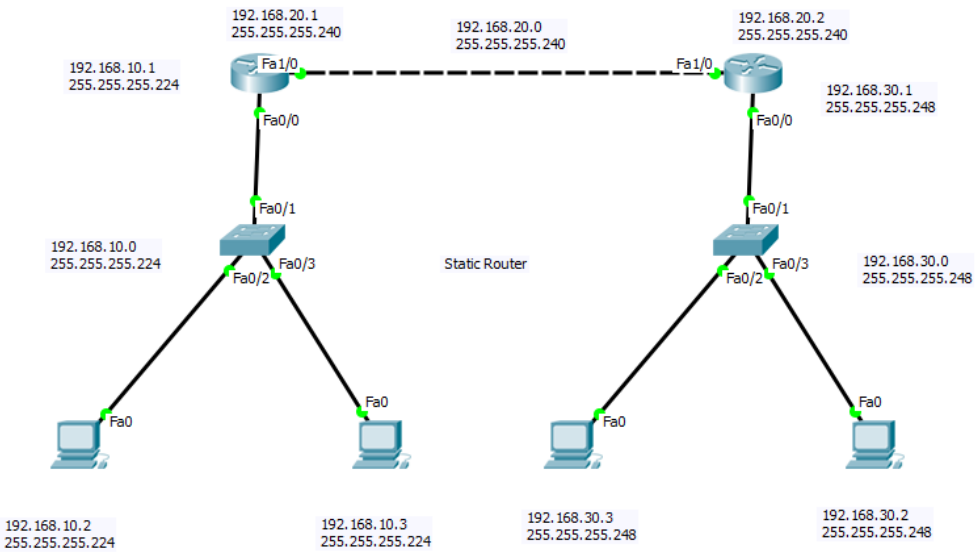


Figure 4: Static Router

3.8.2 Dynamic Routing

Dynamic routing types:

- RIP routing
- EIGRP routing
- OSPF routing

Advantage of dynamic routing:

- Not need to manual configuration
- Other network via advertisement Learn about
- Best path Automatically select
- No need to select destination network
- Large application for organization

Dynamic routing protocols:

- Distance vector protocol
- Link state protocols
- Hybrid protocols

The figure 5 shows dynamic routing

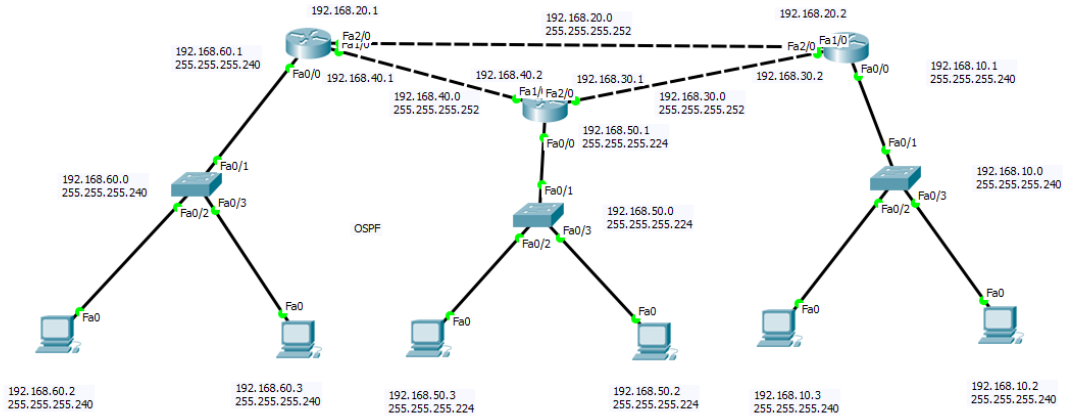


Figure 5: Dynamic Routing

3.8.3 Default Routing

- Used Traffic route for unknown destination
- Also use is end of the router
- That's helps to reduce routing table

The figure 6 shows default router.

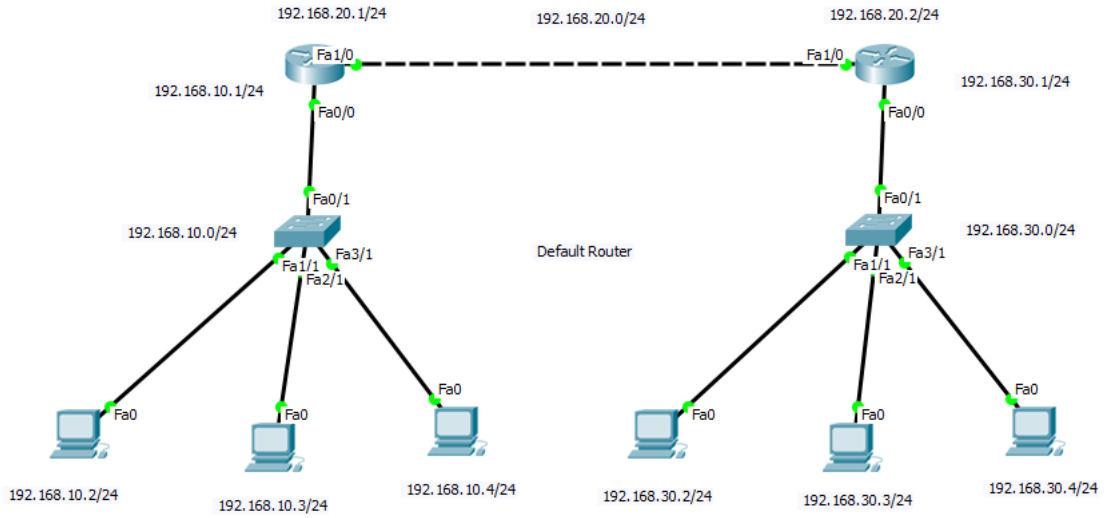


Figure 6: Fig Default Router

3.9 Virtual Local Area Network (VLAN)

- Divides single broadcast into multiple broadcast
- Layer 2 security
- VLAN 1 is the default VALN
- From 2-1001 we are able to build VLAN
- Based on port number It work

Trunk or inter VLAN: If general VLAN is configured, we are unable to link to other departments; therefore, inter VLAN configuration is required. Essentially, one wire connects the router to the switch physically, but it actually has several connections. layer three security is at work.

3.10 Access Control List (ACL)

The router's ACL is a set of rules that determines whether to let or prohibit a certain type of traffic. By using a router, you may regulate the traffic between networks.

Two types of ACL

- Standard ACL
- Extend ACL

Standard ACL: Can be name or number

- Access list number range is (1-99) and (1300-1699)
- Can be block a network, Host and subnet (Not a selected service)
- All services are suspended
- Only IP source address is used as the basis for the filter.

Extended ACL: Can be named or number

- Access list number range is (100-199) and (2000-2699)
- A network, host, Subnet, and service can be allowed or denied.
- Selected service blocked 29
- IP, destination IP, Protocols, and port number are used for filtering.

3.11 Network Address Translation (NAT)

Network address conversion. There is a mechanism for transferring data and information from a local and private map to a public one that has several addresses. Use Network Address Translation if you want multiple devices to share one IP address. Most routers are identical to those used at home or for personal use. Single-type devices are supported. like a router serving as a coordinator for the internet. The public network and the local network, on the other hand, are both networks. This indicates that only a single distinct IP address is needed to represent a group of computers for any form of external network.

3.12 OS of Mikrotik

MikroTik OS is an operating system. The operating system comes with different license levels ranging from 0 to 6, where 0 is a 24-hour trial version. In trial mode, you can test all features of Router OS free. We 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. Willingly, 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.

3.12.1 Mikrotik Router

There are many kinds of MikroTik Router. I will brief some MikroTik router in my internship paper.

HEX lite

HEX lite can be a tiny five port LAN router in the course of a pleasant plastic case. Its fee is below the Router OS license alone — there simply isn't any exceptional as soon as it joins handling your stressed-out domestic network, not simplest it‘s reasonably-priced, small, realistic attempting and easy to use.

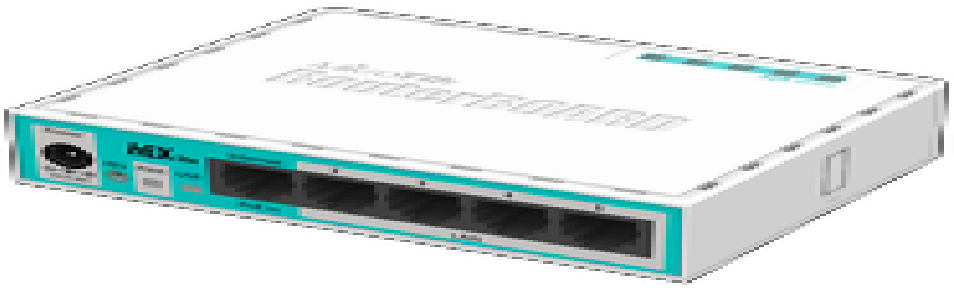


Fig 3.12.1: HEX lite

HEX PoE

Fig3.12.2: HEX PoE

3.12.2 Winbox setup VMware simulator

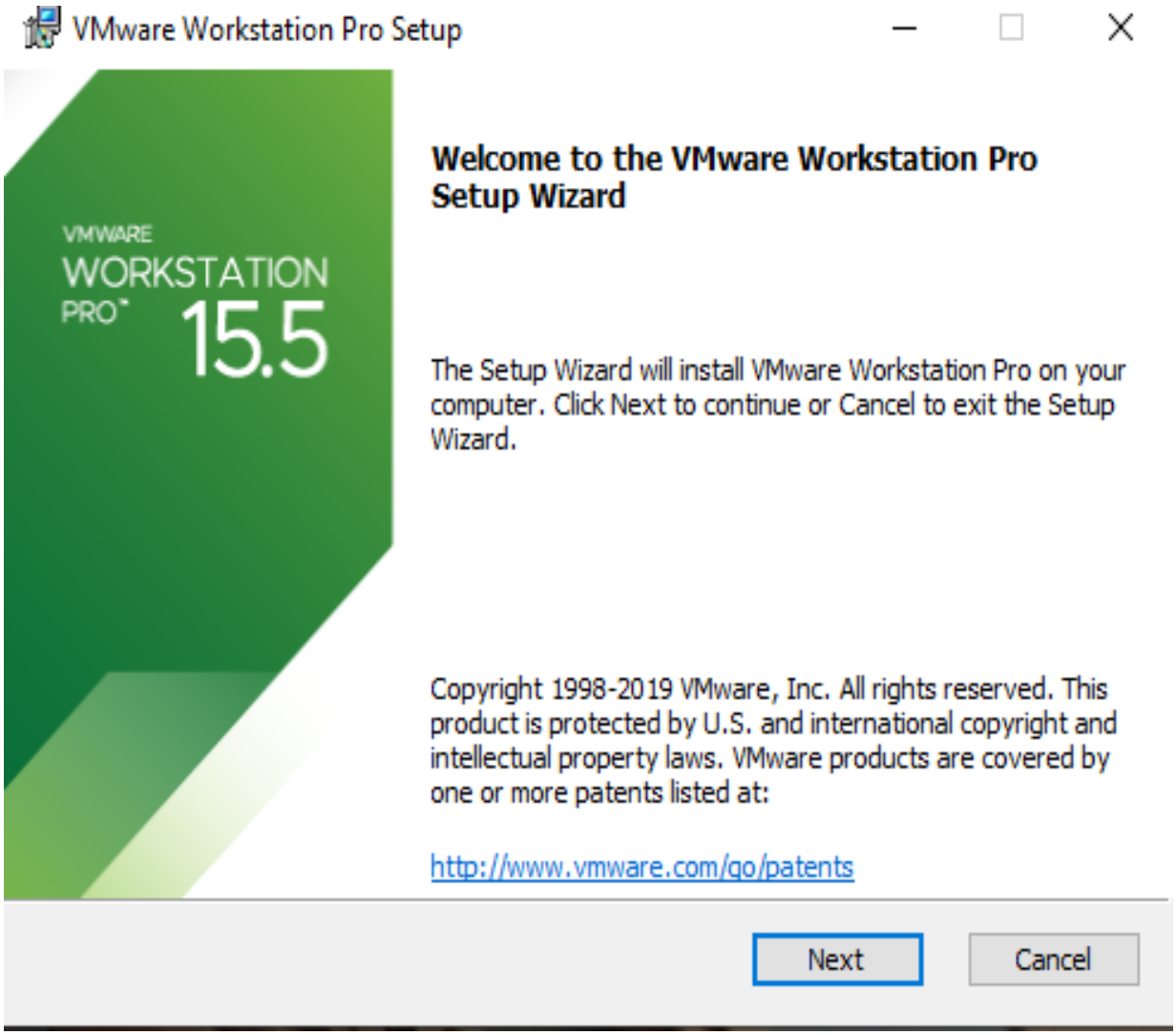
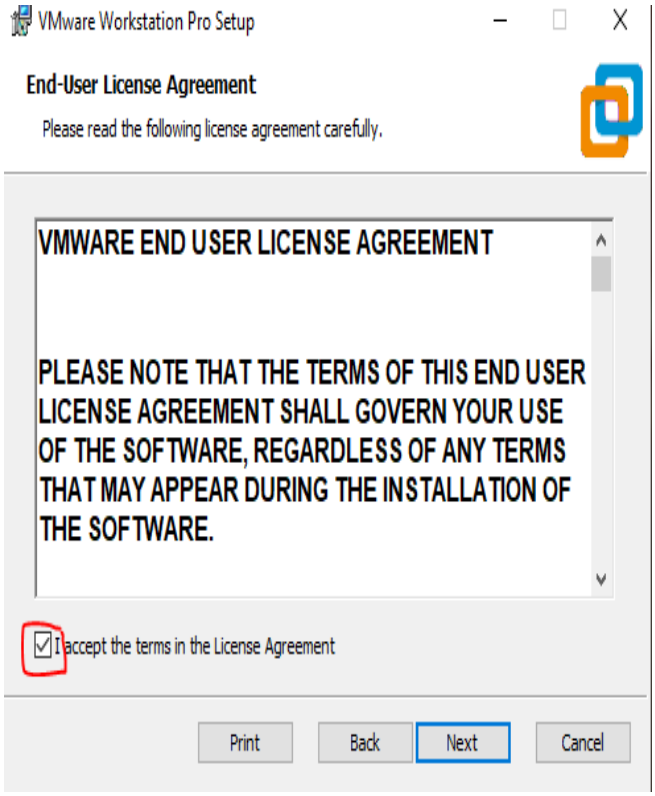
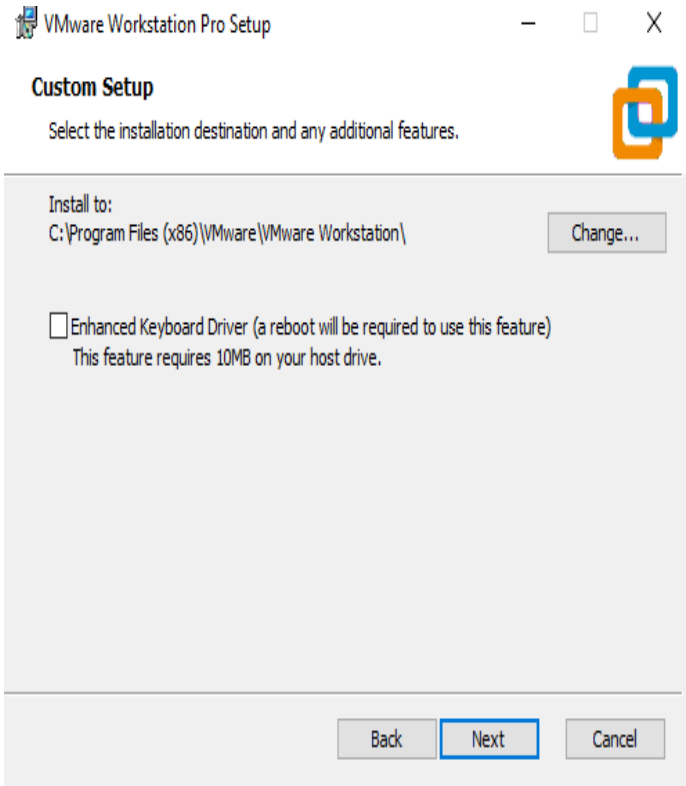


Fig 3.12.3: PC Based VMware Installation Process (1)


VMware Workstation Pro Setup
End-User License Agreement
Please read the following license agreement carefully.
VMWARE END USER LICENSE AGREEMENT
PLEASE NOTE THAT THE TERMS OF THIS END USER LICENSE AGREEMENT SHALL GOVERN YOUR USE OF THE SOFTWARE, REGARDLESS OF ANY TERMS THAT MAY APPEAR DURING THE INSTALLATION OF THE SOFTWARE.
I accept the terms in the License Agreement
Print
Back
Next
Cancel


VMware Workstation Pro Setup
Custom Setup
Select the installation destination and any additional features.
Install to:
C:\Program Files (x86)\VMware\VMware Workstation\
Change...
Enhanced Keyboard Driver (a reboot will be required to use this feature)
This feature requires 10MB on your host drive.
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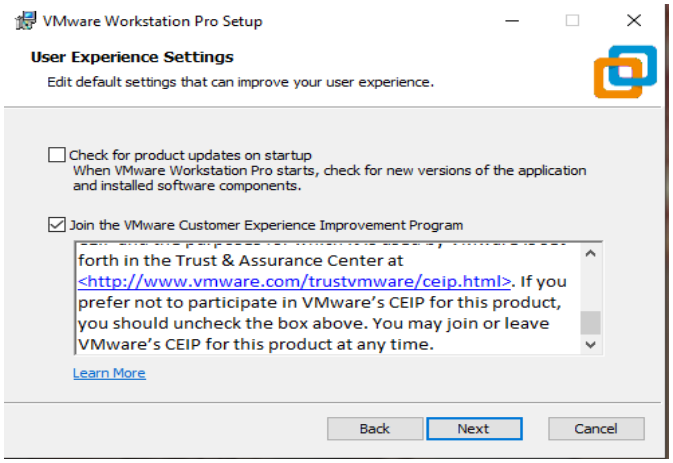
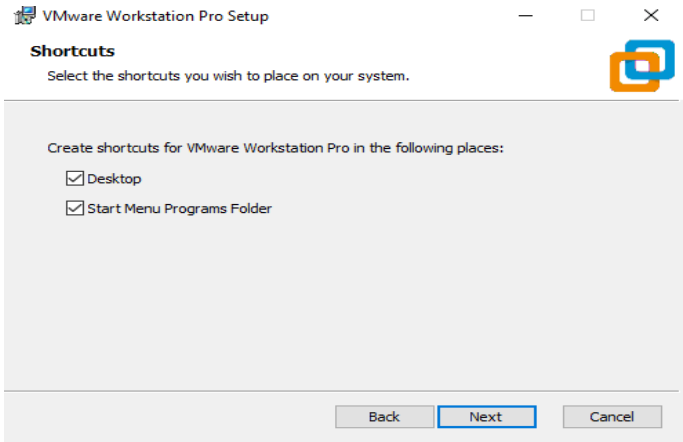
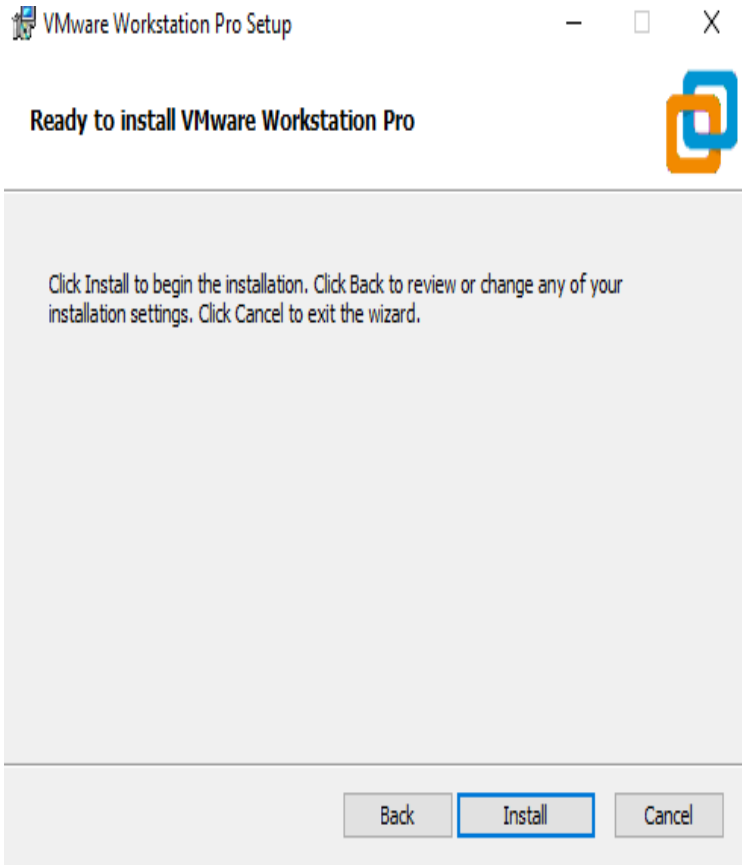


Fig 3.12.4: PC Based



VMware Installation Process (2)



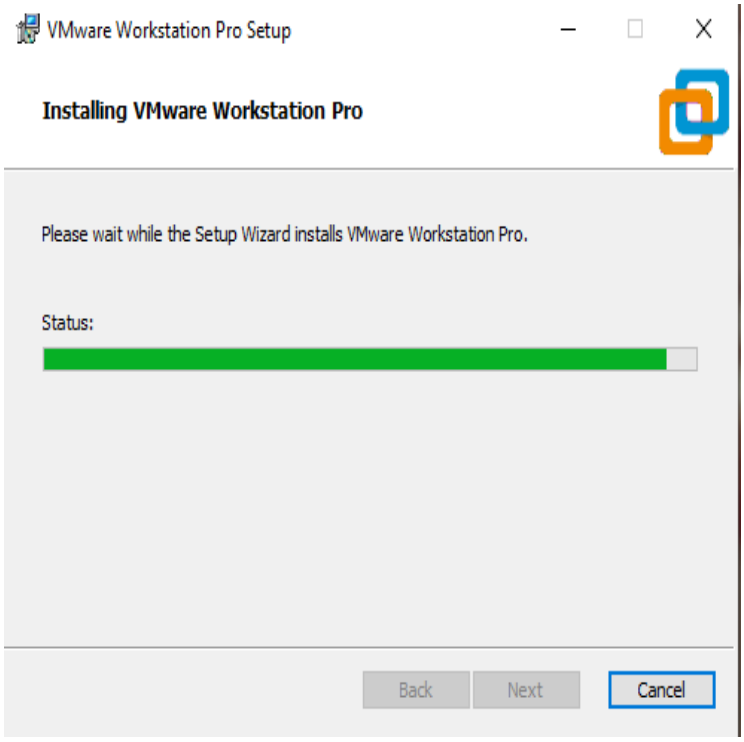


Fig 3.12.5: PC Based VMware Installation Process (3

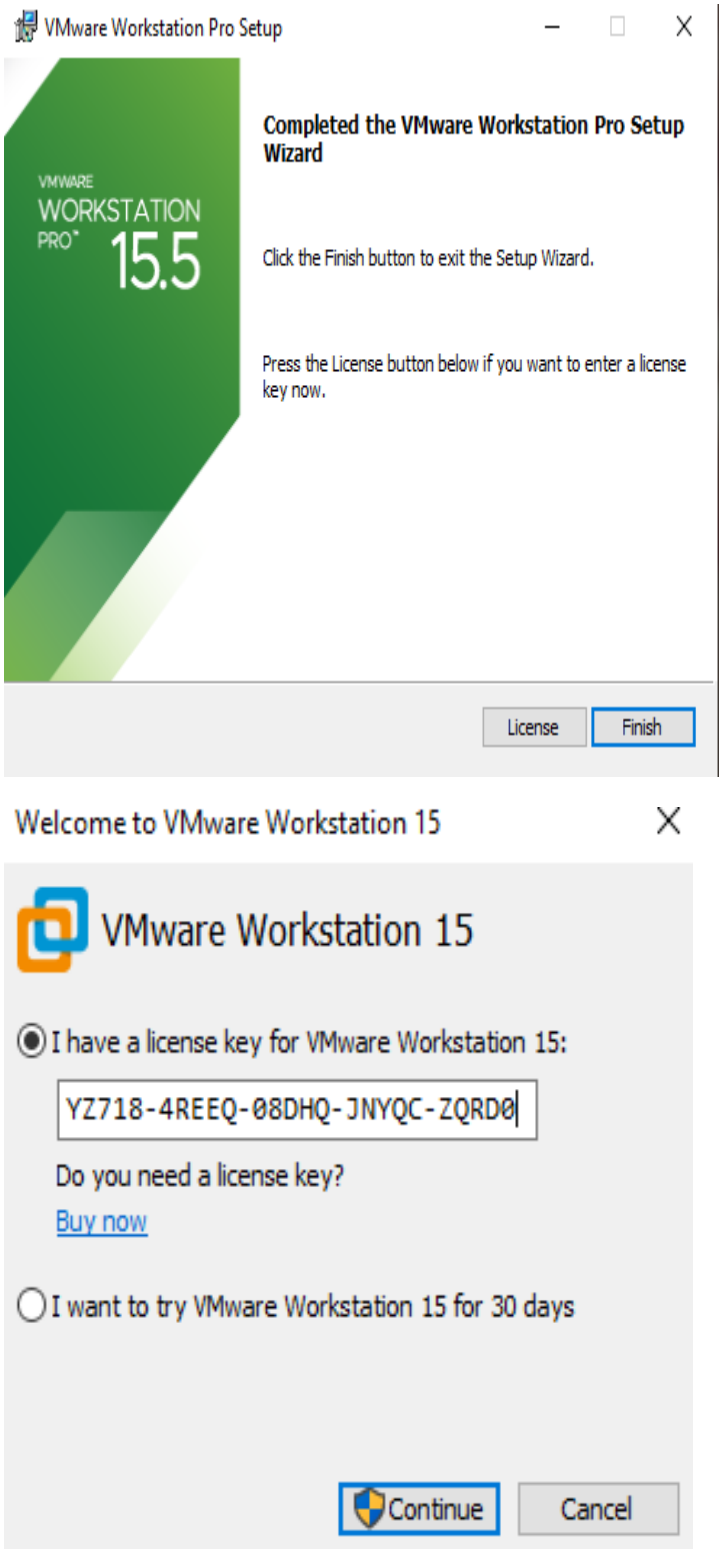


Fig 3.12.6: PC Based VMware Installation Process (4)

Welcome to VMware Workstation 15
VMware Workstation 15
Thank you for buying VMware Workstation 15!
VMware Workstation 15 is the most advanced virtualization software that supports the broadest number of operating systems and delivers the richest desktop user experience.
We believe that you will find VMware Workstation 15 to be an indispensable application that improves your productivity and becomes crucial to running your business.
Enjoy!
Finish
Cancel

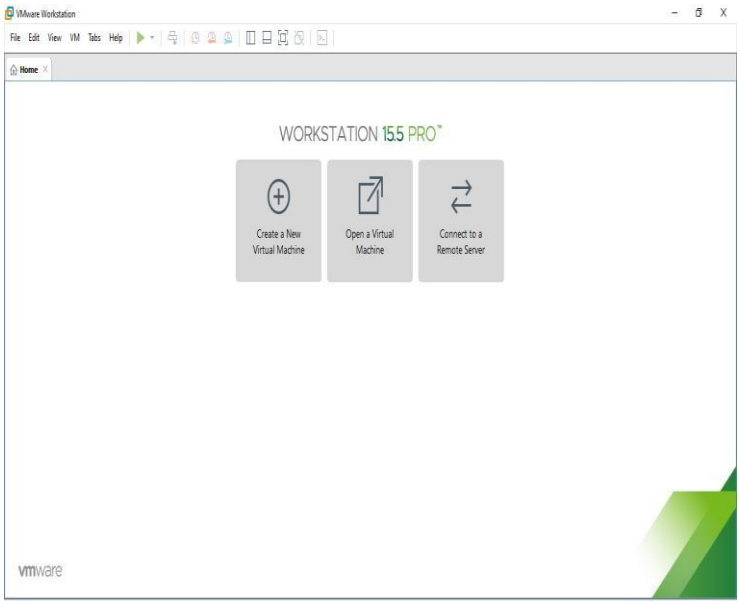

VMware Workstation
File Edit View VM Tabs Help
Home
WORKSTATION 15.5 PRO™
Create a New Virtual Machine
Open a Virtual Machine
Connect to a Remote Server
vmware

Fig 3.12.6: PC Based VMware Installation Process (5)

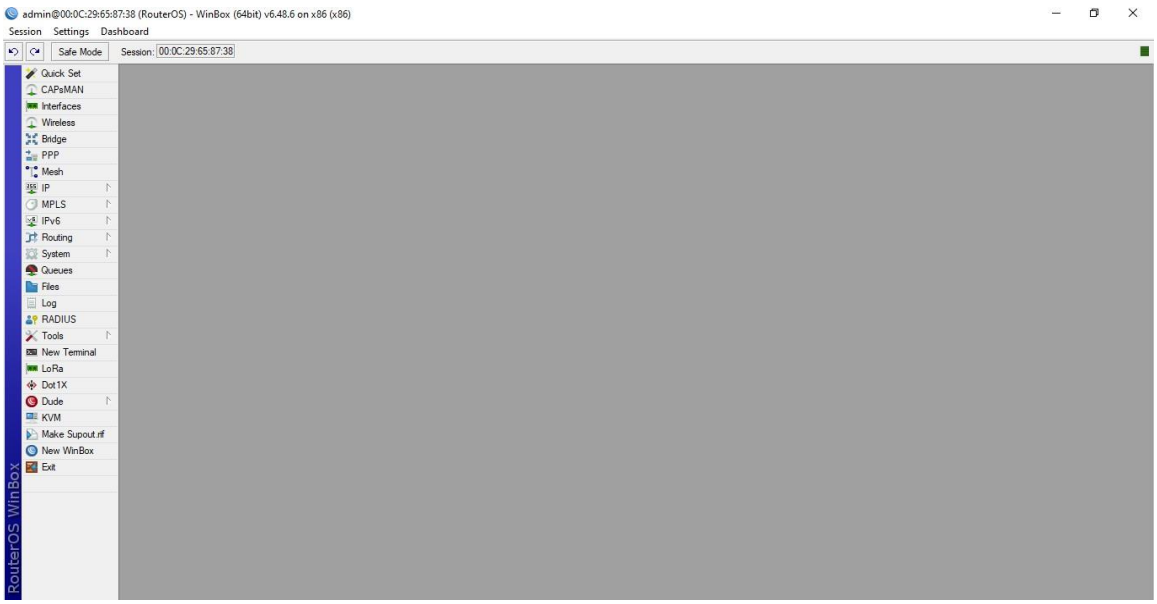


Fig 3.12.8: Interface of Router OS

3.12.3 Basic Mikrotik Configuration

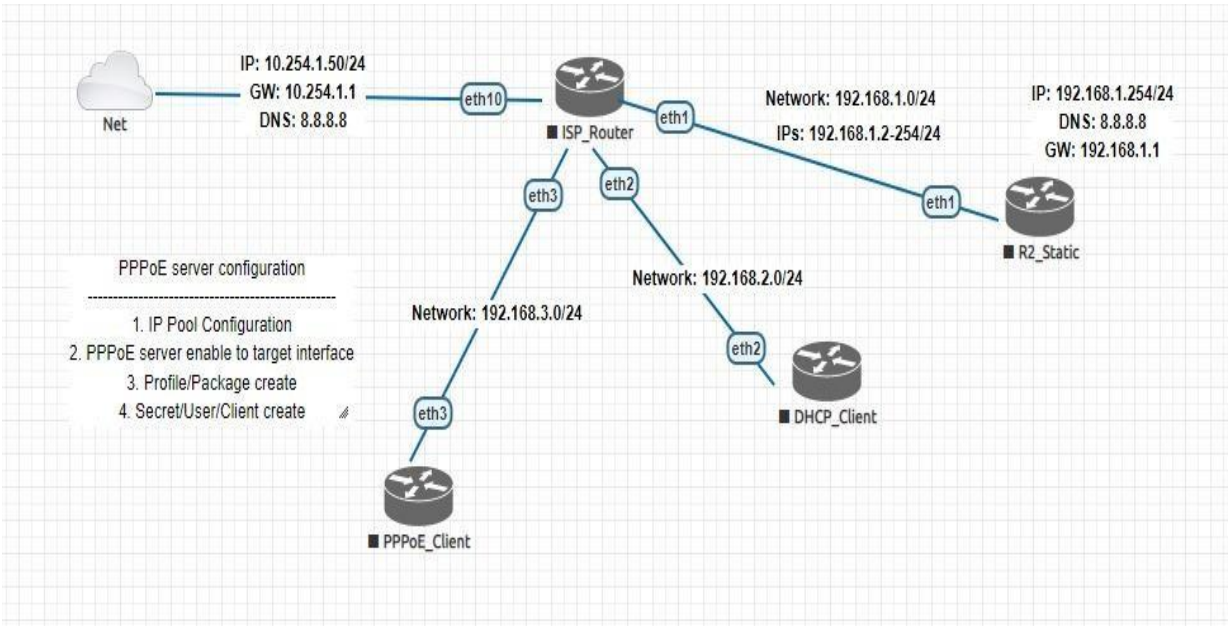


Fig 3.12.9: Basic Mikrotik Configuration

In Basic MikroTik Configuration step by step below,

- Router Identity.
- IP address assign.
- Gateway.
- DNS.
- Routes.

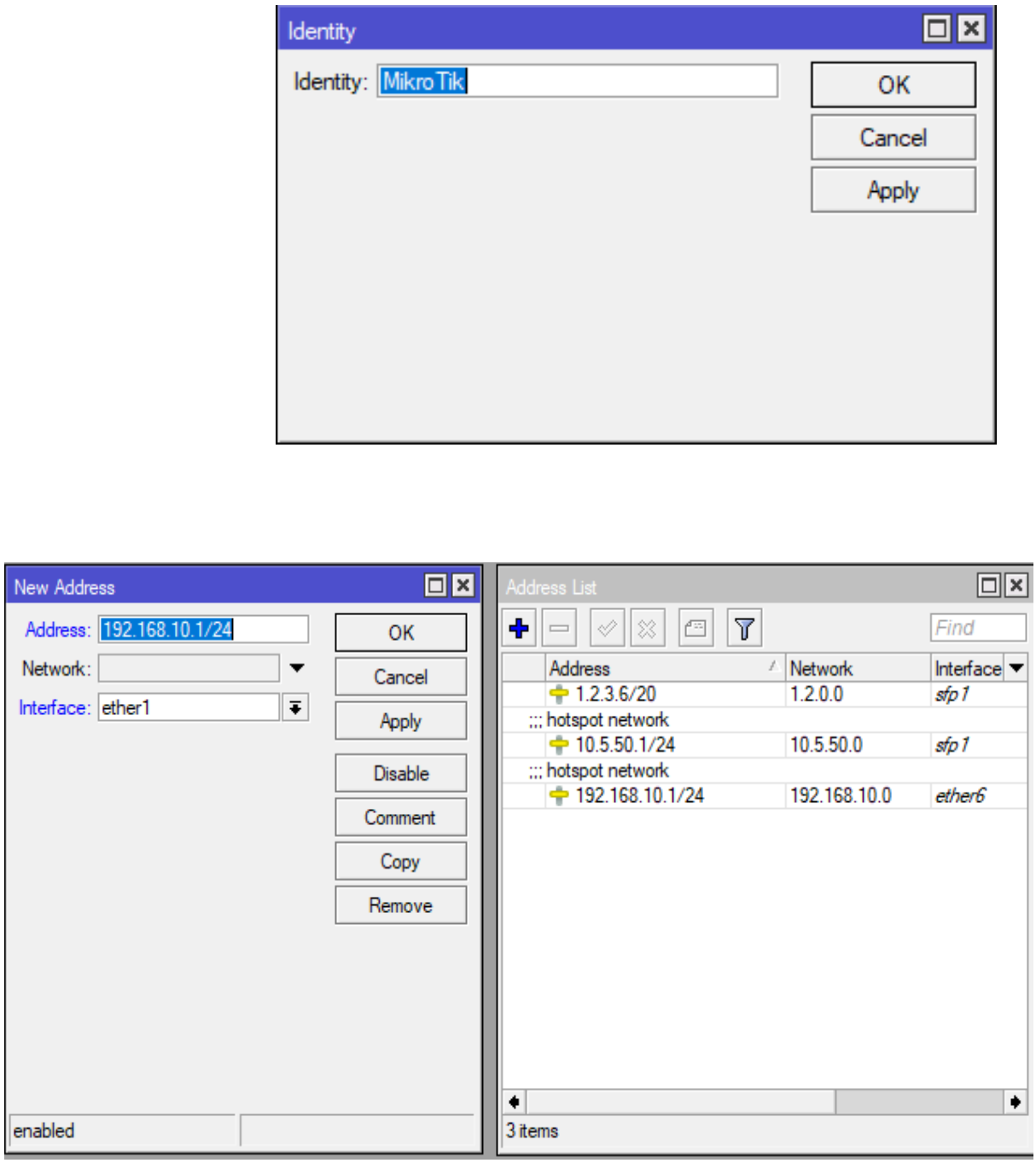


Fig 3.12.10 : Basic Mikrotik Configuration (1)

DNS

- By default, DHCP client asks for a DNS server IP address.
- It can also be entered manually if another DNS server is needed or DHCP is notused.

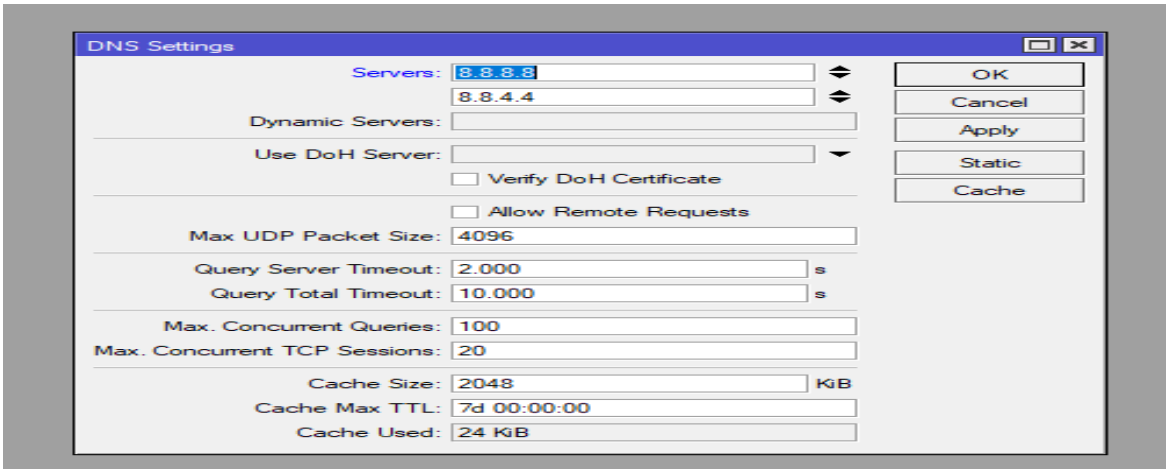


Fig 3.12.11 : Basic Mikrotik Configuration (2)

Routes

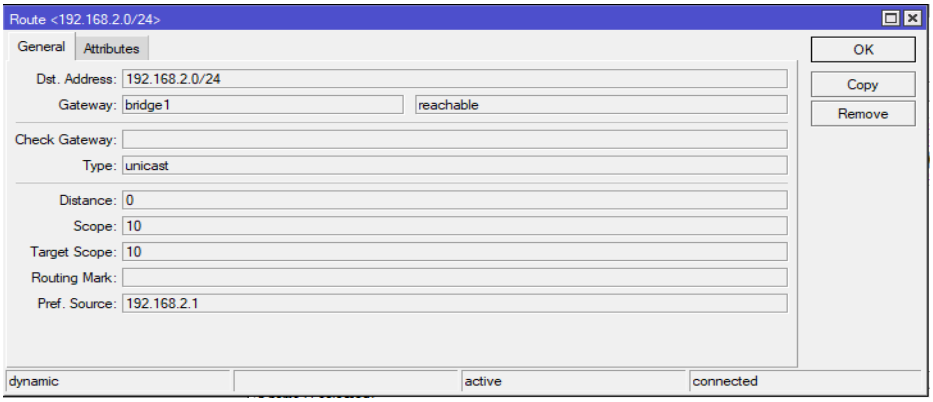


Fig 3.12.12 : Basic Mikrotik Configuration (3)

ISP Setup with MikroTik device:

ISP provides their services in three system. I will describe below now,

- Static Configuration.
- DHCP Server Configuration.
- PPPoE Server Configuration.

DHCP CONFIGURATION

The DHCP (Dynamic Host Configuration Protocol) is used for the smooth distribution of IP addresses in a network. The MikroTik Router OS implementation consists of each server and purchaser parts.

I will configure step by step below,

IP Address Asian WAN

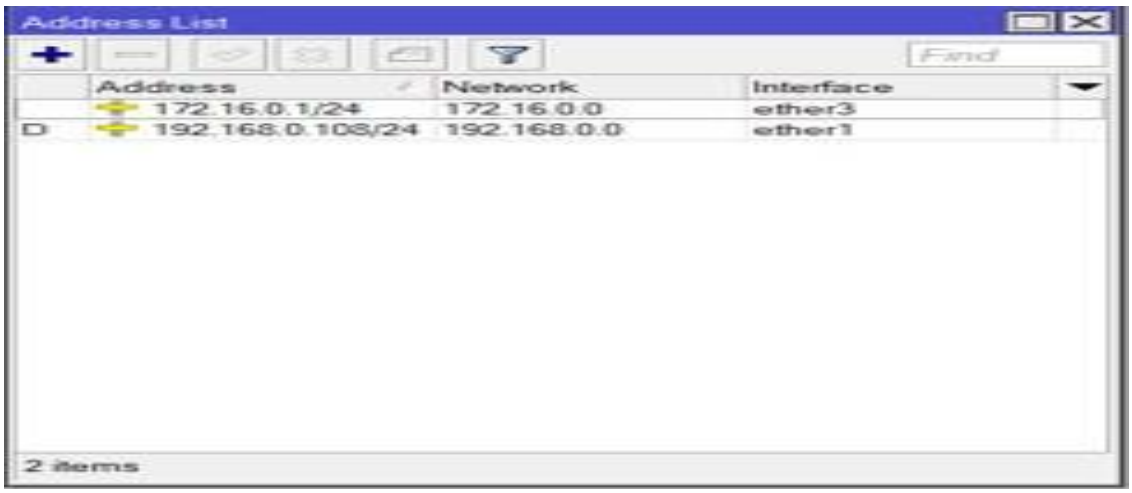
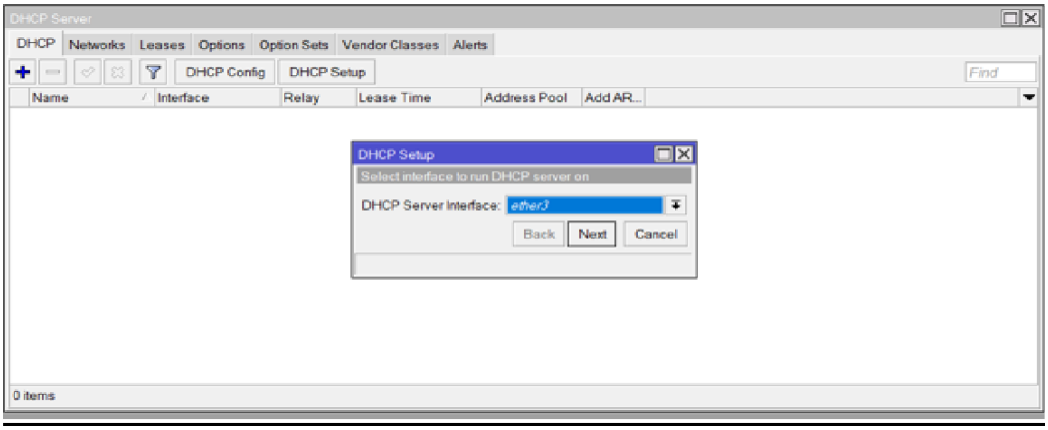


Fig 3.12.13 : DHCP Server Configuration (1)



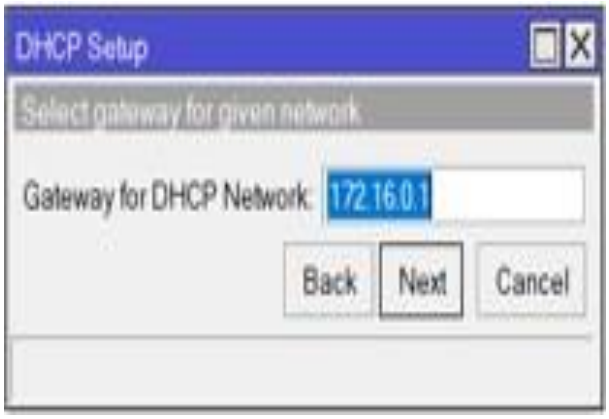
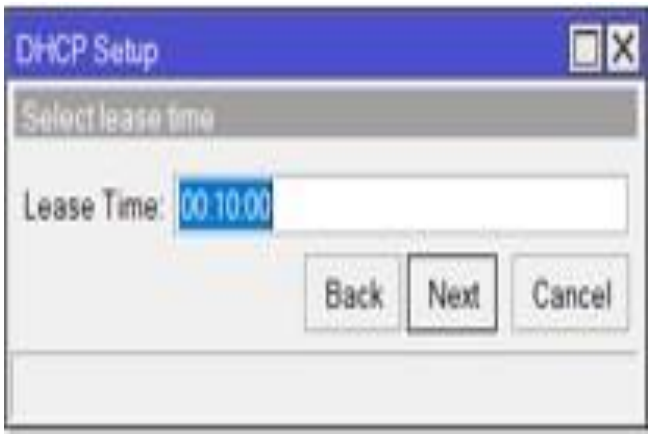


Fig 3.12.14 : DHCP Server
Configuration (2)



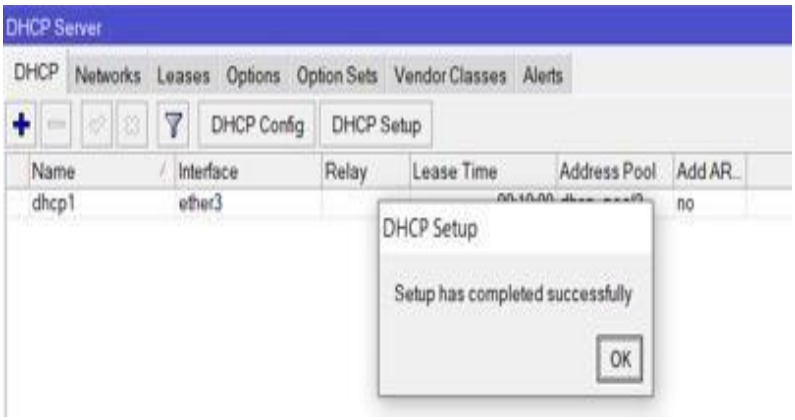


Fig 3.12.15 : DHCP Server Configuration (3)

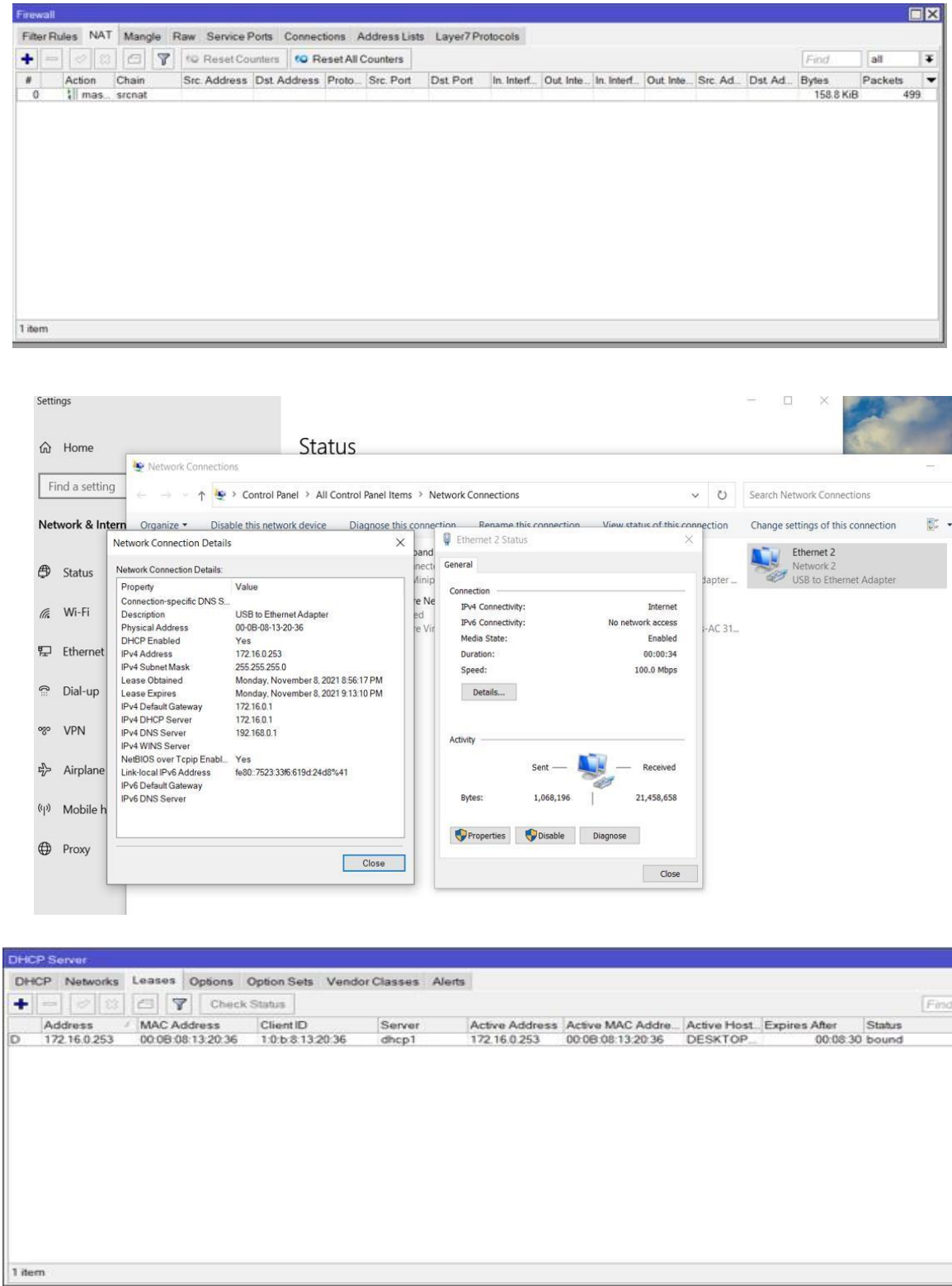


Fig 3.12.16 : Successfully Complete DHCP Server Configuration

3.12.4 PPPoE SERVER CONFIGURATION

In PPPoE server configuration ISP can provide User Name & Password in client. Clientcan use the user‘s name & password they can use internet.

I will show the PPPoE server Configuration Step by Step below now,

3.12.3.1 IP Pool Configuration.

3.12.3.2 PPPoE server setup.

3.12.3.3 PC internet setup in dialup option.

IP POOL CONFIGURATION

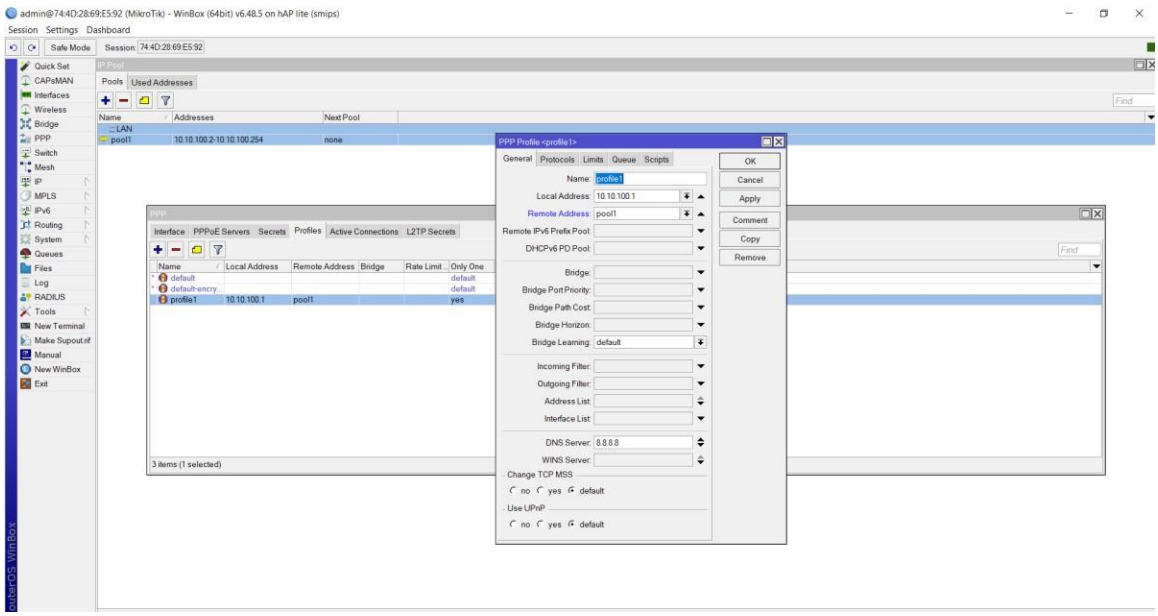


Fig 3.12.17 : PPPoE Server Configuration (1)

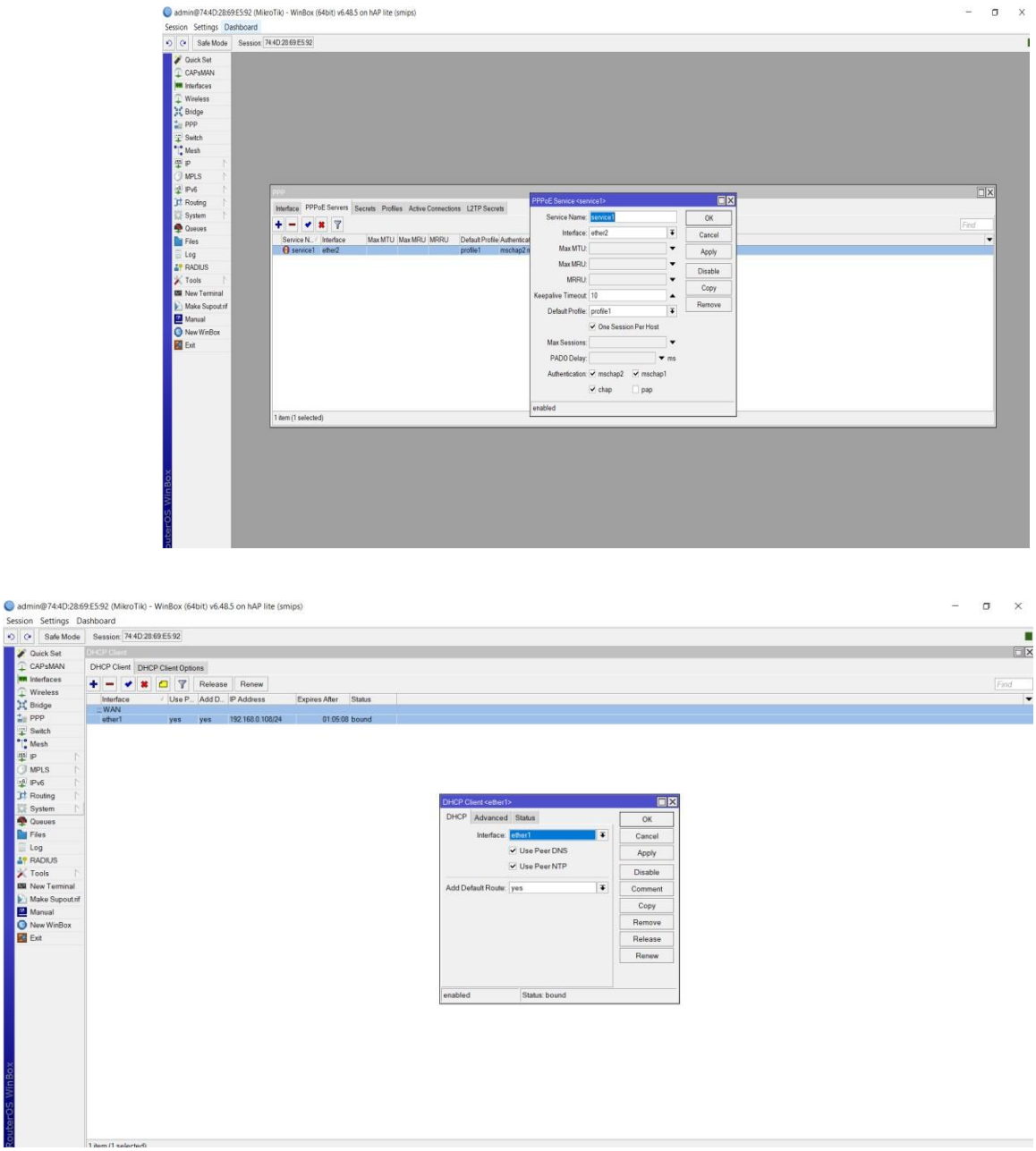
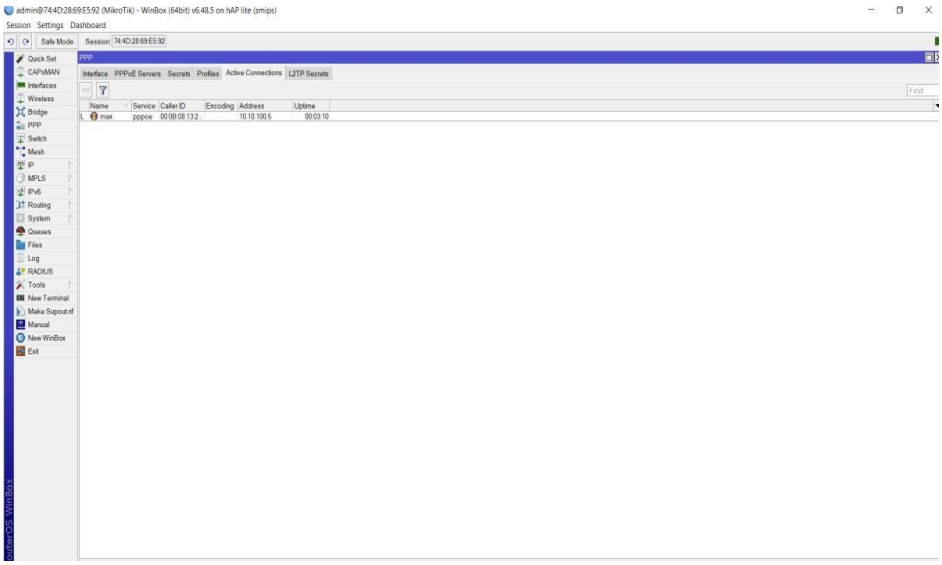
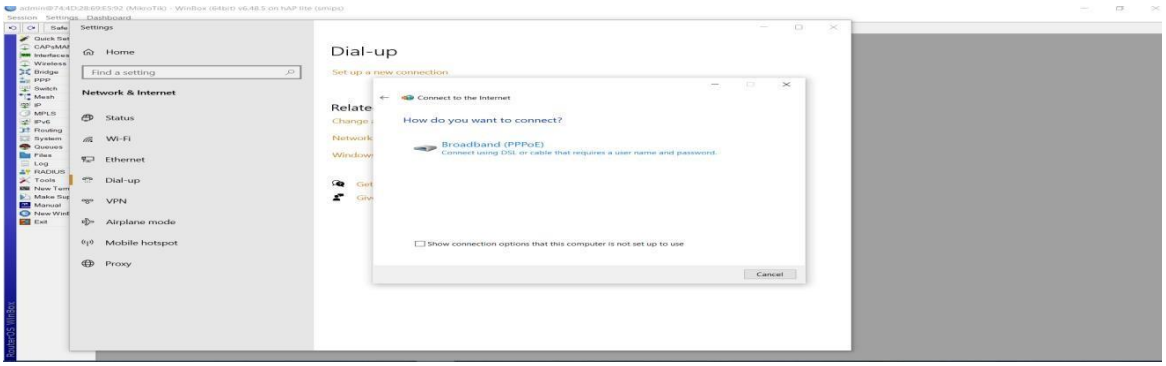


Fig 3.12.18 : PPPoE Server Configuration (2)





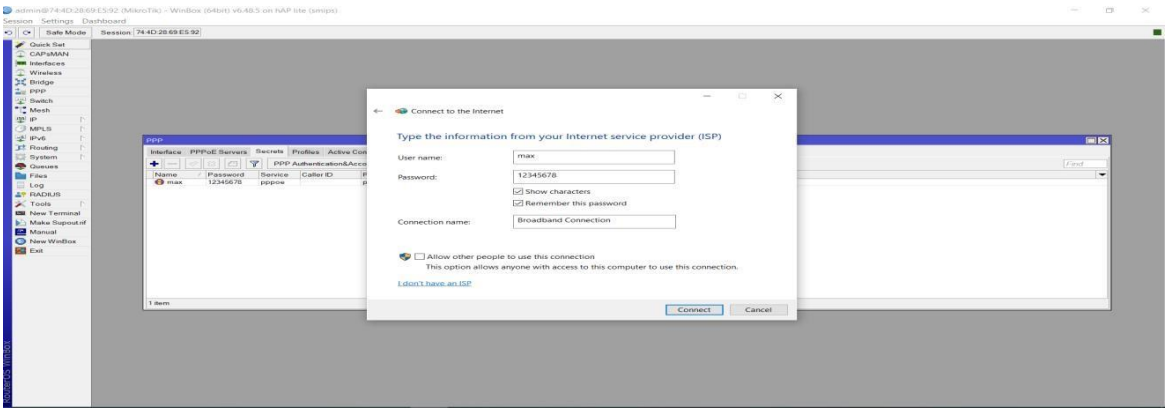
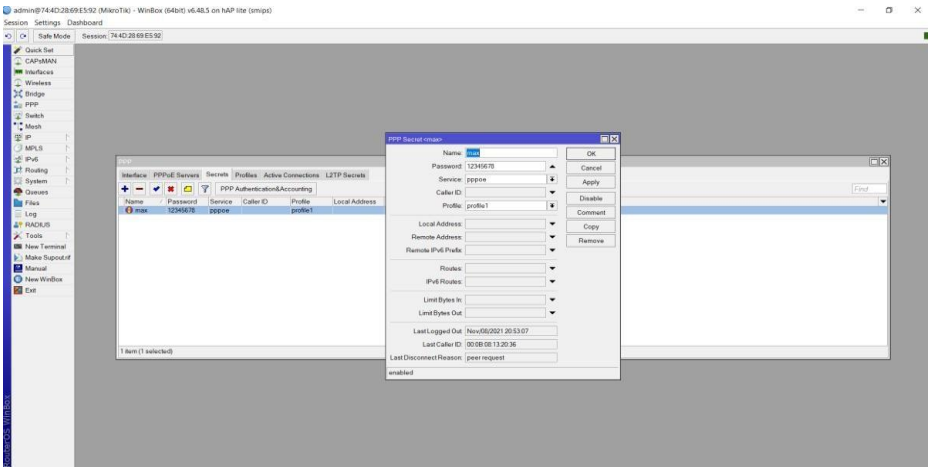
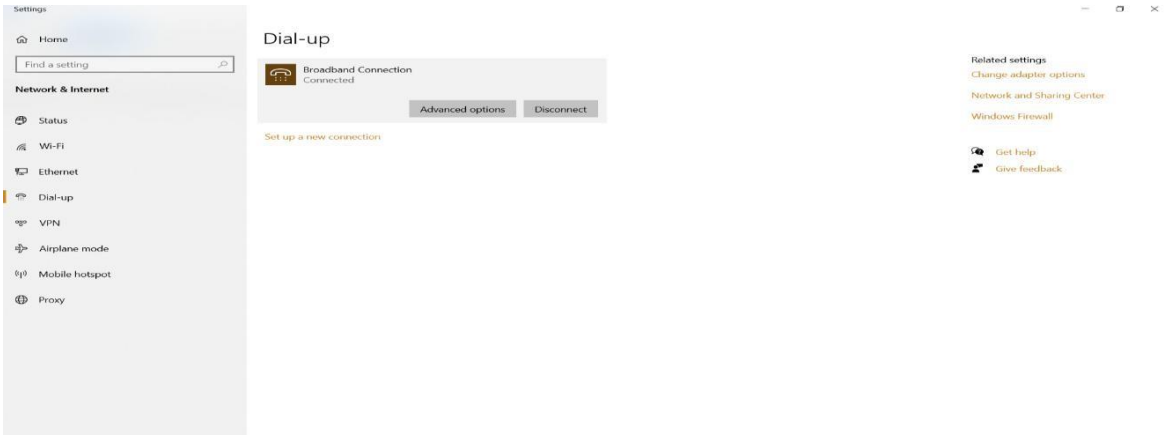


Fig 3.12 .19 : PPPoE Server Configuration (3)





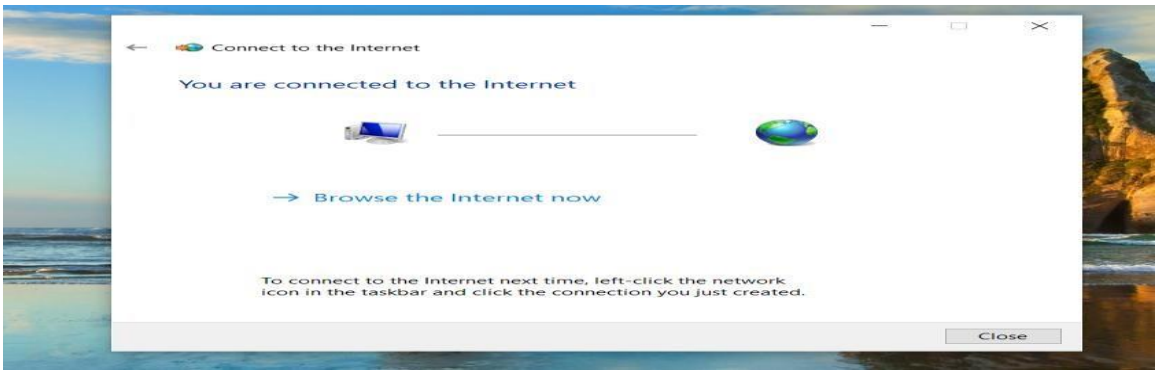


Fig 3.12.20 : PPPoE Server Configuration (4)

3.12.5 Bandwidth Management

Some theoretical concept of bandwidth management system.
I will be described belownow,

3.12.3.1 Bandwidth Management Concept.

3.12.3.2 Simple Queues.

3.12.3.3 PCQ Based Queues.

3.12.3.4 Dedicated & Shared.

3.12.3.5 Dst. Based Queue.

3.12.3.6 Burst Limit Details.

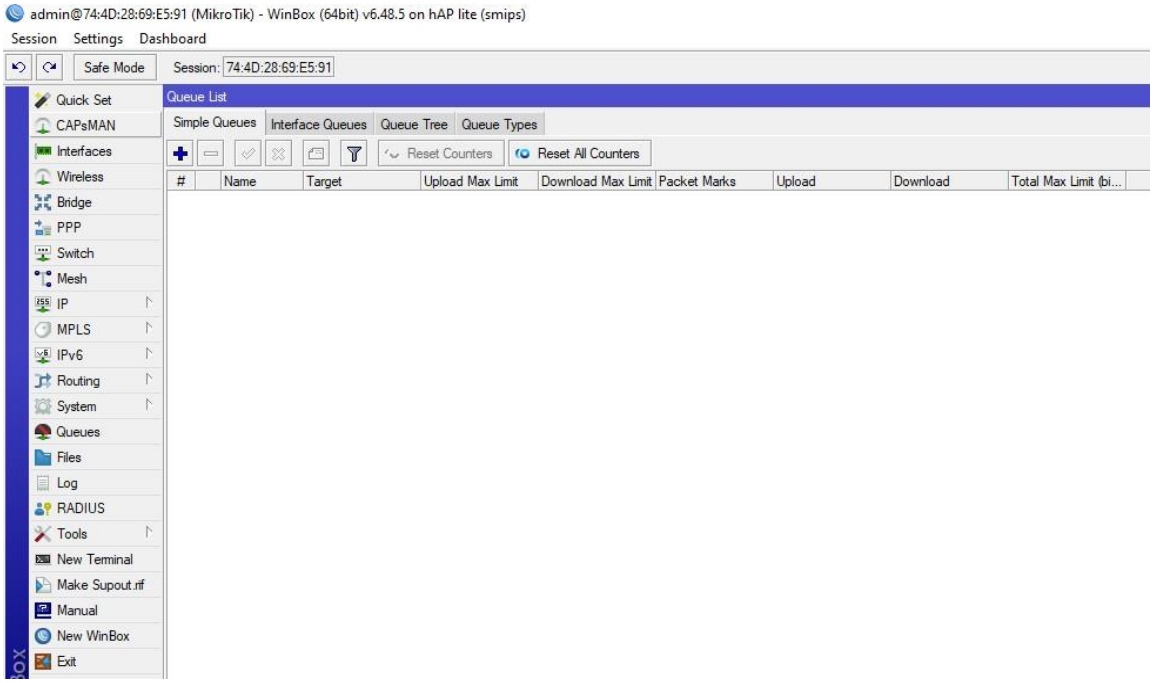


Fig 3.12.21 : Router Interface

Simple queue:

3.12.3.7 Can be used to easy limit the data rate of:

3.12.3.8 Client‘s download () speed.

3.12.3.9 Client‘s upload () speed.

3.12.3.10 Client‘s total speed (+).

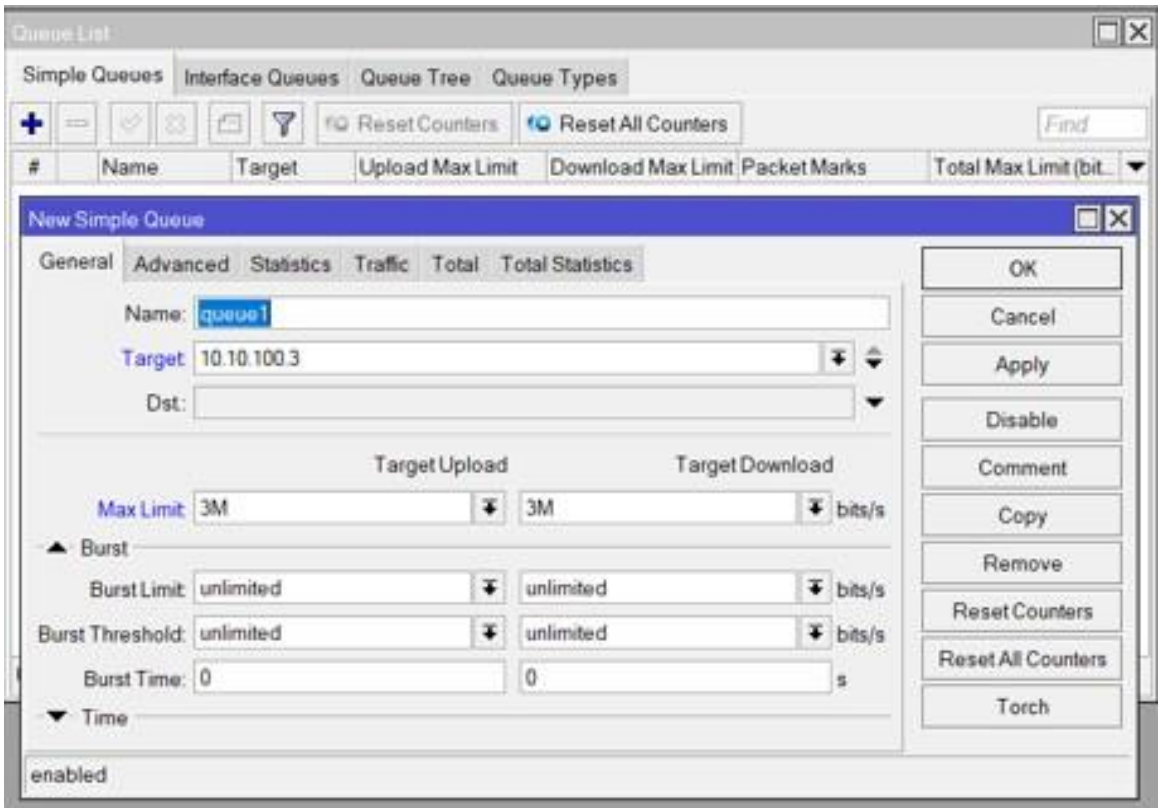


Fig 3.12.22 : Creating User

Per Connection Queue

3.12.3.11 Queue type foe optimizing large QoS deployments by limiting per _sub-stream‘

3.12.3.12 Substitute multiple queues with one.

3.12.3.13 Several classifiers can be used.

3.12.3.14 Source/destination IP address.

3.12.3.15 Source/destination port.

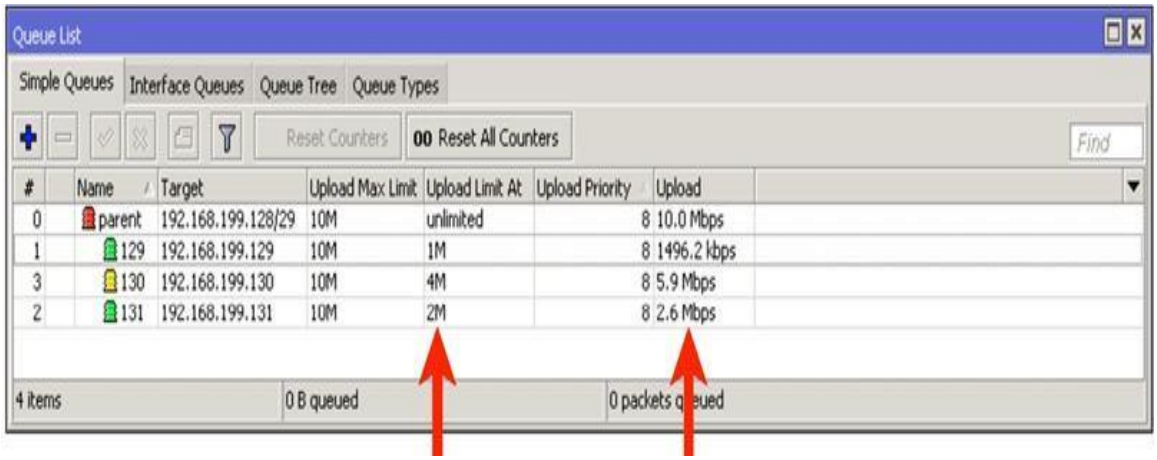


Fig 3.12.23 : Monitoring Connections

3.13 Challenges

The field of IT includes lots of real life problems therefore there are lots of challenges inthis field. Trouble shooting is one of way to identify what is going on. There might be software problem also hardware issues too. In the time of internship I had faced some problems as well, where my supervisor helped me to overcome these issues. I have learned how we can resolve an issue by trouble shooting.

CHAPTER 4
COMPETENCIES AND SMART PLAN

4.1 Competencies Earned

There are numerous opportunities to pick up new skills right now on the job market. I improved my ability to install and remove servers and devices from datacenters. I played a key role in router configuration and Isp setup & maintaince with Mikrotik. My experience working on difficult solutions during my internship has prepared me to approach large issues with composure. It is a noteworthy accomplishment for me from my internship. I have learned how to introduce and configure switches and routers, as well as how to set up VLAN, OSPF, EIGRP, and RIP configurations for corporate services.

4.2 Smart Plan

An organization can designate their senior management to build their plan tailored to the technology industry, ensuring success and being more revolutionary than the rival firms, in order to obtain a greater level of achievement. This internship will help me achieve success in both my career and personal life. A few opportunities are already waiting for me that will advance my career. Right now, the market is ideal for computer networking. I wish to advance my career in that field.

CHAPTER 5
CONCLUSION AND FUTURE CAREER

5.1 Discussion and Conclusion

My four-month internship program was essential to gaining practical business experience. I learned how to work three or four hours in an office throughout my internship. I've figured out how to operate efficiently and fix issues now. I put in 3–4 hours a day, three days a week. I have developed good work habits as a result of this internship. The primary difficulties are keeping one's own inspiration and drive for work. In this training period, I made an effort to uphold the idea that understanding time is essential for a professional career. My internship has provided me with crucial knowledge regarding subjects related to my degree as well as a number of abilities I'll need in the future. When the pressure at work increases, it aids in my mental stability. I now understand how to make my supervisor like me and gain a promotion using my abilities and character. Every school setting or industry recognizes the importance of the internship time for gaining practical experience and expertise.

5.2 Scope for Further Career

Computer networking is a field that is currently in high demand for employment. There are many other industry subfields, like Routing configure ISP setup & maintaince with Mikrotik. and Switching, Linux, Microtel routers, etc. Wireless networking, routers, switches, computer-to-computer networking, network system engineers, and administrators are among the different forms of networking available. Every bank, office, and business needs at least one IT specialist. This is good news for network engineers once again. Everywhere, a skilled worker is sought. A successful career will advance my position in life. I want to advance my career in that field and learn new techniques to do so.

APPENDICES

APPENDIX

Appendix A: Internship Reflection

It is simple for me to see the internship as a learning opportunity or the opposite. To pinpoint the advantages and disadvantages of the experience, further investigation will be required. Knowing what we prefer in our employment makes it clear what we want more of and what we want to avoid the next time, and it increases our chances of getting what we want. Breaking down an internship into its constituent parts is one method to assess it. Afterward, think about the value of each component.

Appendix B: Company Details

DotNETBD Limited.

Address: 214, Asamcolony, Sopura, Rajshahi,6203, Bangladesh
Phone: +88019-9368638

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References:

[1] Learn about Dotnetbd Limited, available at <<https://www.dotnetbd.com.bd/>>, last accessed on 22-06-2022 at 6:00 PM.

[2] Learn about Basic Computer Networking, available at << https://www.educba.com/introduction-to-computer-network/>>, last accessed on 24-06-2022 at 2:00 PM.

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