A STUDY OF BASIC NETWORKING & MIKROTIK ROUTER CONFIGURATION

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APPROVAL

The Internship report titled **"A Study of Basic Networking & Mikrotik Router Configuration",** Submitted by **"Moynul Islam"** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted me satisfactory for the partial fulfillment of the requirement 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 6 May, 2018.

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DECLARATION

I do, hereby, declare that the work presented in this internship project report is done by me under the supervision of **Dr. Fernaz Narin Nur, Assistant Professor, Department of Computer Science and Engineering**, Daffodil International University, Also declare that neither this report nor any part of this internship report has been submitted elsewhere for the award of any degree of diploma.

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I would like to thank entire course mate in Daffodil International University, who took part in this discuss while completing the course work.

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ABSTRACT

MikroTik is a very low cost and easy access Router that can be used for small and big network management. Especially this networking device suits for small network from every aspect like client management and security. MikroTik RouterOS is the operating system of MikroTik RouterBoard which may also install in a standard PC and the PC will turns into a MikroTik Router. The aim of this project is to create virtually a MikroTik Router to manage a small network. For this we studied on different MikroTik RouterOS features- routing (both IPv4 & IPv6), firewall, IP and bandwidth management, wireless access point, bridge, hotspot gateway, VLAN, NAT, Pool, DHCP and more. But we did not have to apply all of those features to manage our considerable network. We do some basic configuration like Interfaces, Routes, DNS, Bridge, DHCP Server, PPPoE Server and Hotspot Server. Finally, to manage and provide security in our network we use some special features of MikroTik RouterOS like NAT, Filter Rules and Queue Management etc.

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CHAPTER 1

Introduction

1.1 Motivation

I am currently pursuing my Bachelors in Computer Science Engineering at Daffodil International University, I understand the importance of gaining practical knowledge which will complement the textbook knowledge and help a student gain a wider perspective of the subjects. During the internship I have found that I am perfectly skilled in the details of basic networking and MikroTik. As an internet service provider I've getting my point across very well, communicating with people, understanding their needs and providing them better service. My skills lie in my ability to comprehensively read and understand the situation and act quickly and yet smartly. In future, I build up my carrier as a network Engineer.

1.2 Objectives

The main objective of the study is to understand overall system of ISP networking, to know about basic networking system and basic configuration of mikrotik router. I choose an internship because I wanted to benefit from the experience. I am Internship a ISP company their name is TRST Network.

1.3 Internship Goal

My main goal for this internship is simply to learn. To learn about Intuit as a company, the people who work here, how I can contribute, and what will lead to my professional goals and long-term personal satisfaction. I will likely only have the opportunity to work a great company, TRST Network. In future I want to work Network support engineer.

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1.4 Report Layout

First Chapter contains the Objectives, Motivation and goals of my internship. Then Internship Enterprise describes the details about my internship organization in Chapter 2. After that the concept of Networking, Which is Router, Cable and connector, Switch, NIC card etc in Chapter 3. And then we discuss about MikroTik routerOS and MikriTik router basic configuration in Chapter 4. Then problem and solution part describes the different problems and their solution in my internship. Internship Outcomes contains the description of my experience in Chapter 5. Discussion and conclusion is the summarization of my report and explain the future scope by this Internship in Chapter 6.

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CHAPTER 2

Organization

2.1 About the Company

TRST Network is an IT Support team where you will find complete IT solutions or Wire & WiFi Networking Solution, Domain Web Hosting, MikroTik Configure, Cisco R & S Configure, FTP/File/Media/Apache Server Configure, Graphic Design. TRST Network also providing you Bandwidth & System Configuration Service in your area. If you start ISP Business don't worry TRST Network here to provide Bandwidth & System Configuration. Available in all kinds of information on no information charge.

2.1.1 Branches

Now TRST Network has two branches. TRST Network-Dhaka: 12/c (2nd Floor), 3rd colony, Bashupara, Lalkuti, MIrpur-1, Dhaka-1216, Bangladesh.

TRST Network- Sylhet: 5762/8 Forayzi Villa, 3300 Habiganj, Sylhet, Bangladesh.

2.1.2 Company Profile

Register Head Office

TRST Network

400 Rella Blvd, Suite 165, Suffern, New York-10901, United States Mobile: +1 (518) 460-6563 E-mail: info@trstnetwork.com Website: www.trstnetwork.com

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2.2 Services

TRST Network provides different types of services. Such as:

- Office area networking with both wired & wireless in local zone.
- Setup or configure anywhere in Bangladesh local & zonal ISP. We provide best service or solution for ISP Wireless Internet Service Provider.
- Point to Point connectivity with unlimited traffic.
- Configure web & ftp server in any server operating system. Provide OS & web page also.
- Website Builder packages provide domain quality web hosting with unlimited resources.
- Fiber Optic Cable (Primary & Secondary link)
- Radio Link Connectivity
- MKT Router, Switch, MC and OLT etc.

2.3 Summary

In this chapter I have discussed about TRST Network. Where I have completed my internship.is the level one networking and Internet Service Provider (ISP) company in Bangladesh. There are many service provide by TRST Network. I have got a great opportunity to work some of the regions and offices as an intern and gain lot of experiences.

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CHAPTER 3

Networking & Networking Device

3.1 Introduction to Networking

A computer network or data network is a telecommunications network that allows computers to exchange data. In computer networks, networked computing devices pass data to each other along data connections. Data is transferred in the form of packets. The connections (network links) between nodes are established using either cable media or wireless media. The best-known computer network is the Internet.

3.2 Categories of Network

- LAN (Local area network)
- MAN (Metropolitan area network)
- WAN (Wide area network)

3.2.1 Local Area Networking

In the same building situated of different types of computer with the consisted of network is called LAN. It's data transfers speed 10 MBPS. In this network the used of device are Repeater, Hub, Network Interface etc. The following figure 3.1 showing a LAN [1].

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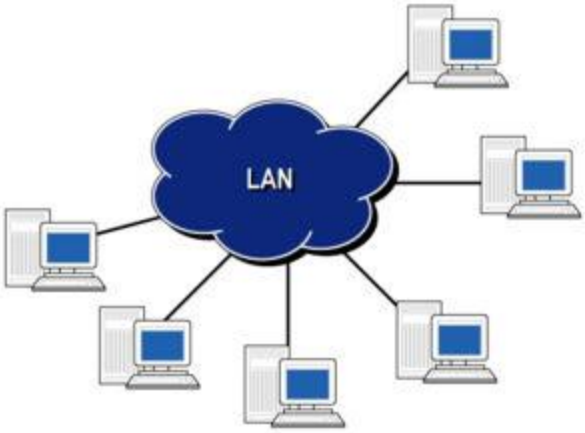

Figure 3.1: Local area Network

3.2.2 Metropolitan Area Network

In the same town situated of formed of combination of the same LAN's interface is called MAN. This type of network can be spread to 50-75 miles. The data transfer speed of this network is Gbps. In this type of network the used of device are Router, Switch, Microwave-antenna etc. The following figure 3.2 showing a MAN [1].

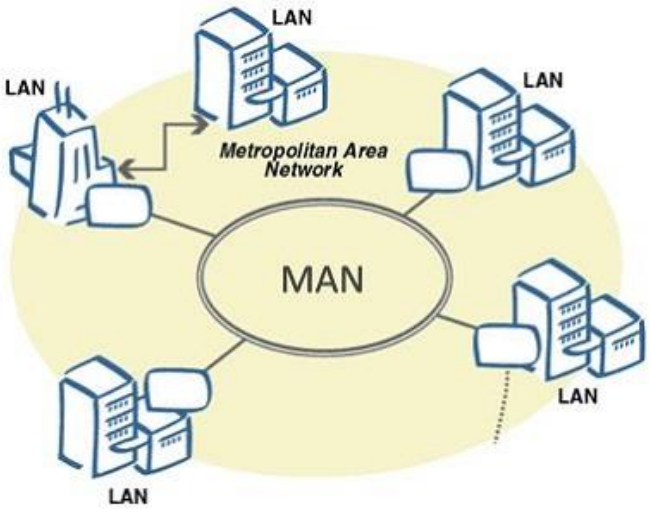

Figure 3.2: Metropolitan Area Network

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3.2.3 Wide Area Network

A wide area network, or WAN, occupies a very large area, such as an entire country or the entire world. A WAN can contain multiple smaller networks, such as LANs or MANs. The Internet is the best-known example of a public WAN. The speed of data transfer of this network is 56 kbps to 1.544 mbps. In this type of network the used device are Router, Modem, WAN switch etc. The following figure 3.3 showing a WAN [1].

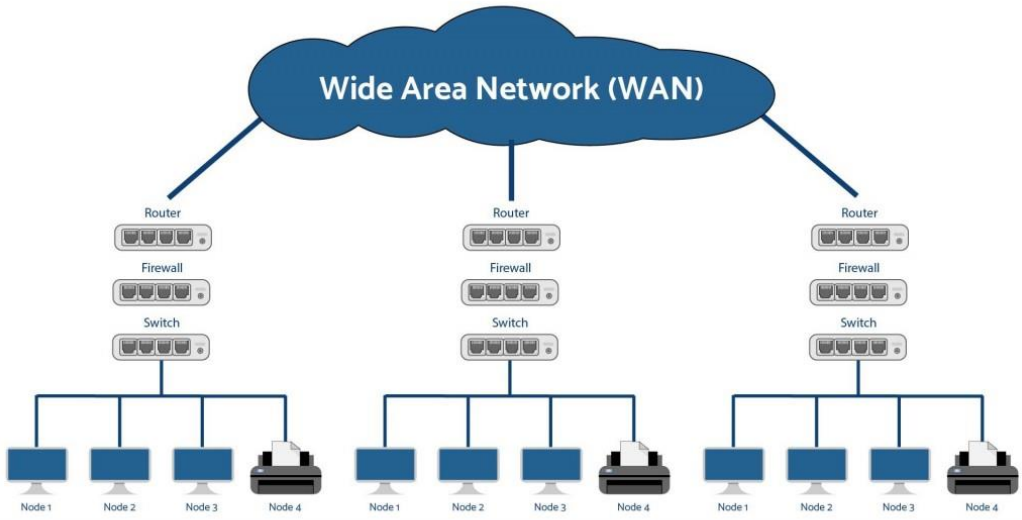

Figure 3.3: Wide Area Network

WANs operate using routers, which can "choose" the most appropriate path for data to take to reach a network node.

3.3 Networking Device

Device that are used to connect, control, and communicate on a network are called network devices. There are many types of network device.

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3.3.1 NIC Card

An NIC is a network interface controller, or network interface card, that is built into the computer in order for the computer to access networking and data. Using NIC, computers are able to connect to a network for data communication purpose. The following figure 3.4 showing a NIC (Network Interface Card) [2].

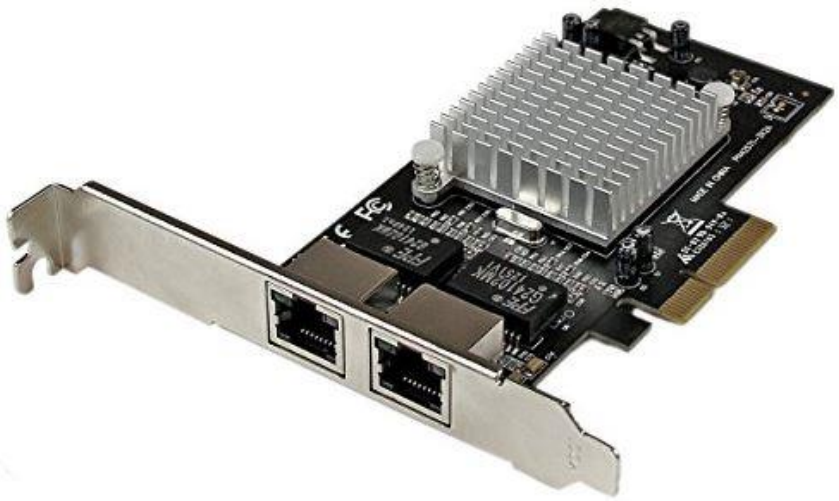

Figure 3.4: NIC Card

3.3.2 Fiber optic Cable

Fiber optic cables are bundles of filament, surrounded by rated shielding, that can transmit digital signals at almost the speed of light. Often composed of glass or plastic that is semi-rigid and transmits the light internally, fiber optic cables are used globally in communication technologies. Millions of miles of cable have been laid all around the world, even across the ocean floors connecting the continents. There are two major types of optical fiber cables: short-range multi-mode fiber and long-range single-mode fiber. The following figure 3.5 showing a Fiber Optic Cable [3].

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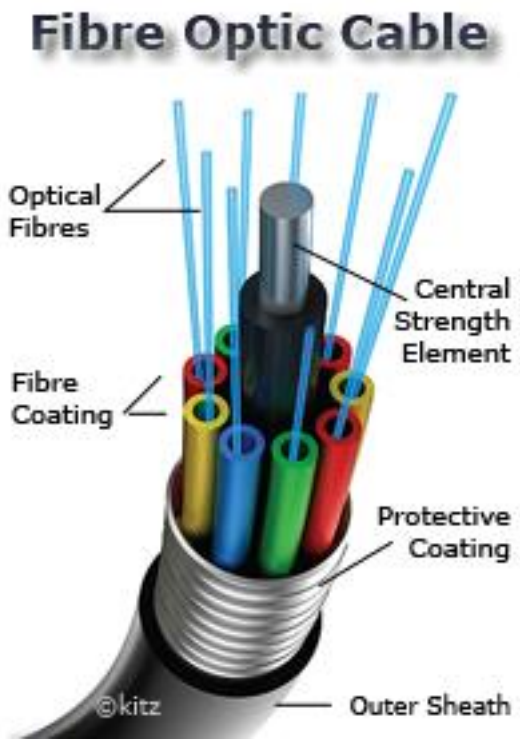

Figure 3.5: Fiber optic Cable

3.3.3 STP Cable & UTP Cable

Shielded Twisted Pair cable (STP). Susceptible to raid and electric frequency interference. This can be overcome with additional shielding however this can be bulky.

Unshielded Twisted Pair cable (UTP). These cables are smaller, more flexible and less expensive than Shielded Twisted Pair. The following figure 3.6 showing UTP & STP Cable [4].

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Figure 3.6: STP & UTP Cable

3.3.4 RJ45 Connector

RJ stands for Registered Jack and RJ45 is used for connecting network cables particularly CAT 3, 5, 5e, and 6 cables to mounted face plate containing the modular jack of corresponding size. The following figure 3.7 showing RJ45 Connector [5].

Figure 3.7: RJ45 Connector

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3.3.5 Switch

A kind of network device that is used to forward data packets from one network segment to another segment. Switch is like a bridge but operates at higher speed than a typical bridge. That is why, a switch is also known as Multi-Port Bridge. Switches increases the number of collision domain but does not increase its size. The following figure 3.8 showing a switch networking device [6].

Figure 3.8: Switch Networking Device

3.3.6 Router

A router is a device that works like a traffic cop, deciding when and where data travels. It serves to guide and transmit information between multiple computers or networks. It can regenerate signals, concentrate multiple connections, covert data transmission formats, and manage data transfers. It is a device that passes data packets between networks based on IP addresses contained within the data packets. The following figure 3.9 showing a Router [6].

Figure 3.9: Router Networking Device

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CHAPTER 4

MikroTik Router Basic Configuration

4.1 Introduction

In this chapter we describe RouterOS features and some basic configuration for example: Routes, DNS, DHCP, Hotspot server, PPPoE server etc. of MikroTik RouterOS and reasons of that function to configure to run a network. This chapter is very important because everything's include here is directly connected to the project.

4.2 MikroTik RouterOS

MikroTik RouterOS is the main operating system of MikroTik Routerboard hardware. RouterOS is a stand-alone operating system based on the Linux v3.3.5 kernel. If anyone install RouterOS on standard x86-based PC it turn the PC into a MikroTik Router with all its feature routing, firewall, bandwidth management, backhaul link, wireless access point, hotspot gateway, VPN server and more. The good thing is MikroTik provides free trial version of MikroTik RouterOS with its entire feature without any limitation. Just need to go to MikroTik official website www.mikrotik.com and download the installation CD image. But if someone wants to use licensed version it's very easy to license the using product. Again if update version of RouterOS is available users may able to upgrade their product easily. The following figure 4.1 showing a MikroTik Router [7].

Figure 4.1: MikroTik Router

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4.3 Mikrotik's History

- Established in 1995
- 1997: RouterOS software for x86 (PC)
- RouterBOARD is born in 2002
- 2006: First MUM

4.4 Basic Configuration of Mikrotik Router

4.4.1 Introduction

Give Power to the MikroTik Router. Plug in a UTP cable in mikroTik LAN port and the other port to the PC. Open the winbox software. Now Click to Mac address then write 'admin' in login box and don't need to give Password and click to the connect and then will open MikroTik homepage. Finally the MikroTik is ready to configure using Winbox. The following figure 4.2 showing a MikroTik Homepage.

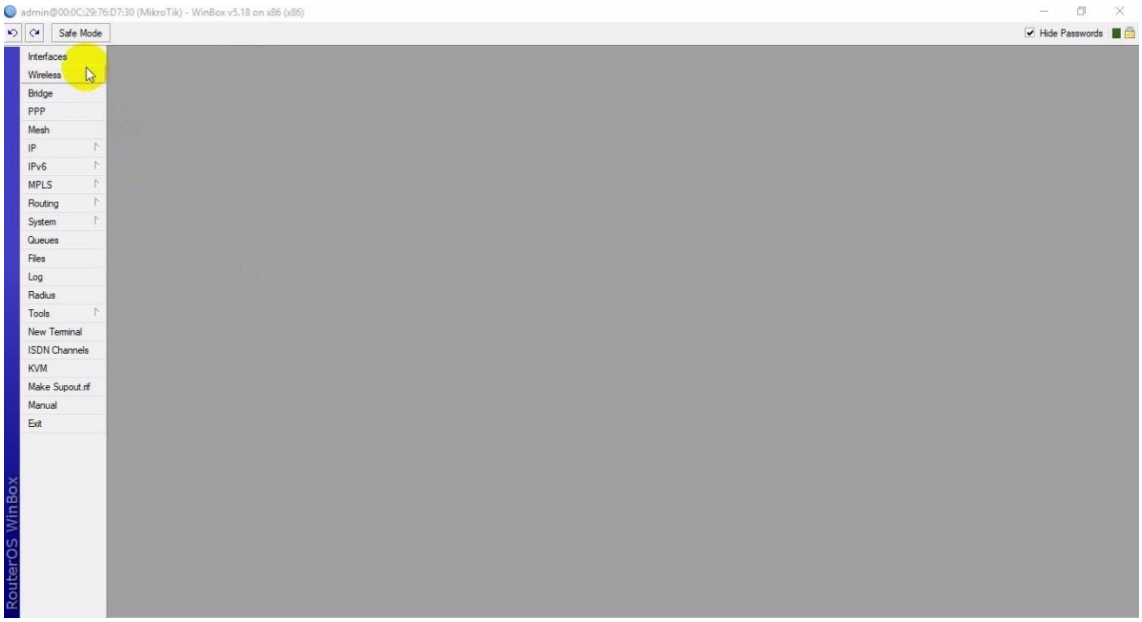

Figure 4.2: Shows Screen Print Mikrotik Homepage

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4.4.2 Interface Overview

For interface overview, click on “Interface” tab will open “Interface List” window. Following figure 4.3 will give a clear understanding.

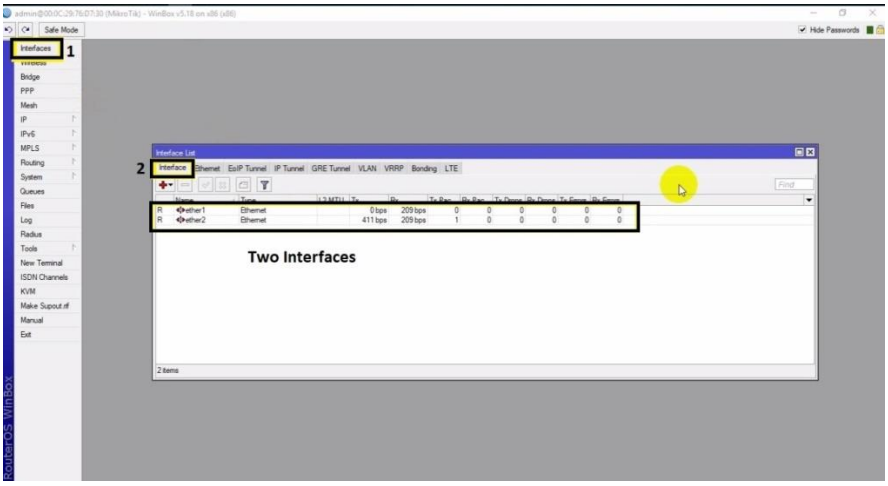
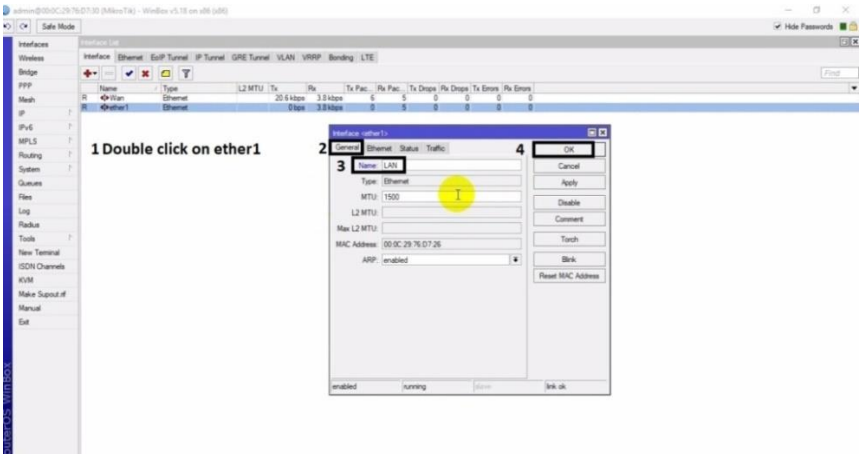


Figure 4.3: Shows Screen Print Interface Overview

4.4.3 Rename Interfaces

For rename interfaces, click on “Interface” tab will open “Interface List” window. Now double click on that Ethernet want to rename will open “Interface <ether>” window then choose name in the “Name” field and click ok. Following figure 4.4 will give a clear understanding.



(a): Shows Screen Print Rename Interface

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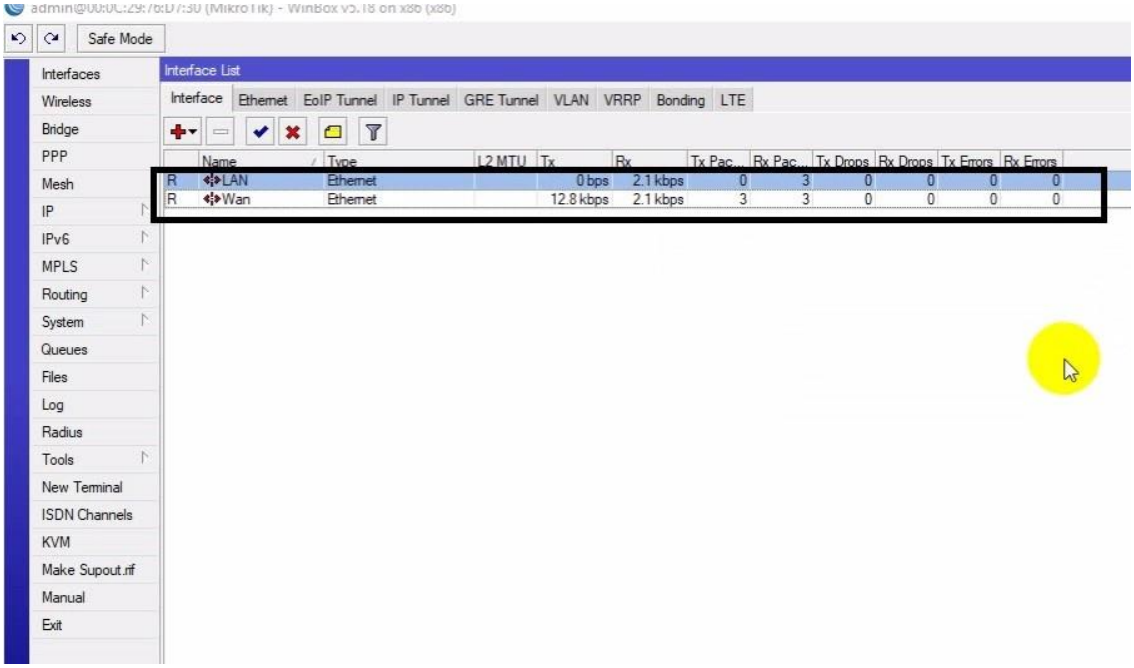
Here showing renaming the Interfaces is done:



(b): Shows Screen Print Rename Interface done

Figure 4.4: Shows Screen Print Rename Interface

4.4.4 Assign IP Address on an Interface

For IP address assign, we go IP -> Address -> will open “Address List” window and click on “+” sign will open “New Address” window. Provide IP address with subnet mask in address field (Example 192.168.214.129/24), its network in network field (Exam. 192.168.214.0) and need to show the interface for the network. Following figure 4.5 will give a clear understanding.

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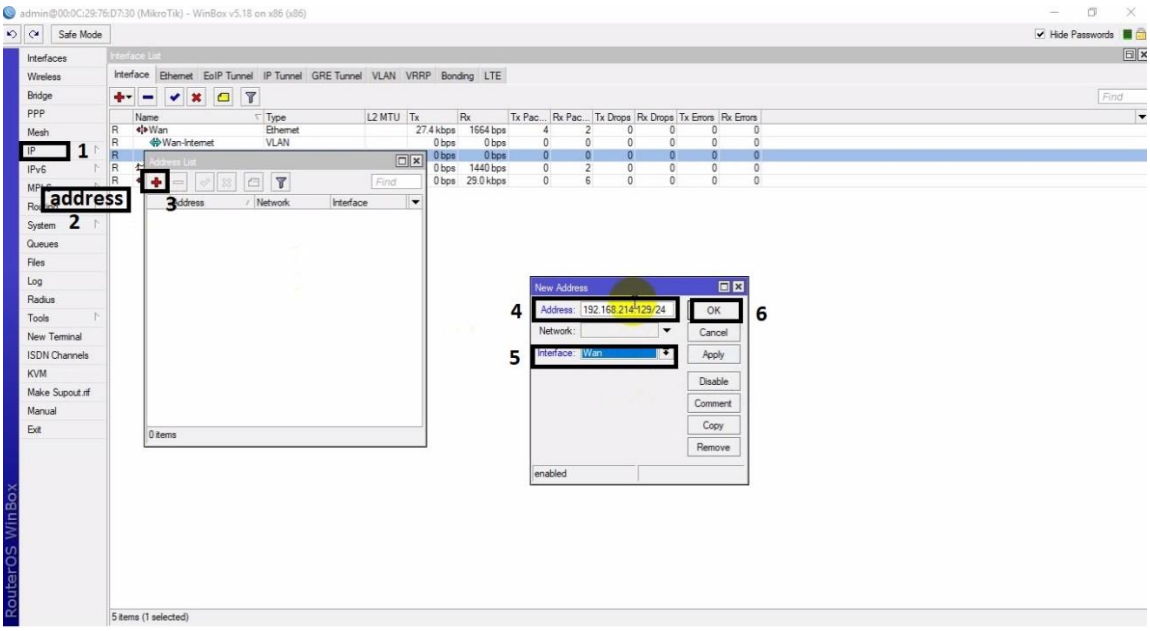

(a): Shows Screen Print Assign IP Address on interface

Assigning Ip addresses to the WAN Interfaces is done:

(b): Shows Screen Print Assign IP Address on interface is done

Figure 4.5: Shows Screen Print Assign IP Address on interface

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4.4.5 Bridge Configuration

This bridge interface enables to combine two or more physical interfaces or combine between physical and logical interfaces. To create bridge connection click on "Bridge". Then click on bridge tab and click on "+" sign will open “New Interface” Window. Give a name for the new interface and click ok. So this will create a new bridge interface with the given name. Following figure 4.6 will give a clear understanding.

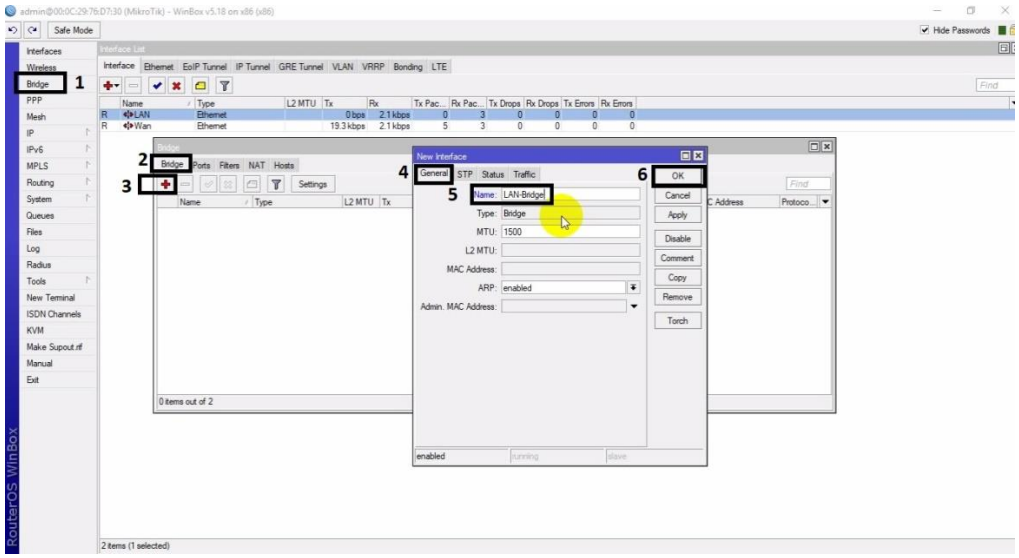

Figure 4.6: Shows Screen Print create new bridge

Now we need to add interfaces under this bridge interface. For this, click on "Port" tab and click on "+" sign will open “New Bridge Port” window, where select the interface we need to add under bridge interface in 'Interface' field and then select the bridge interface in 'Bridge' field. Here we can add as many as physical or logical interface we want to add under the bridge interface.

Now an IP address is need to add to the bridge interface. To do that we have to go to IP> Address> click on '+' sign and add the IP address as we done previously. Following this way we can configure bridge connection.

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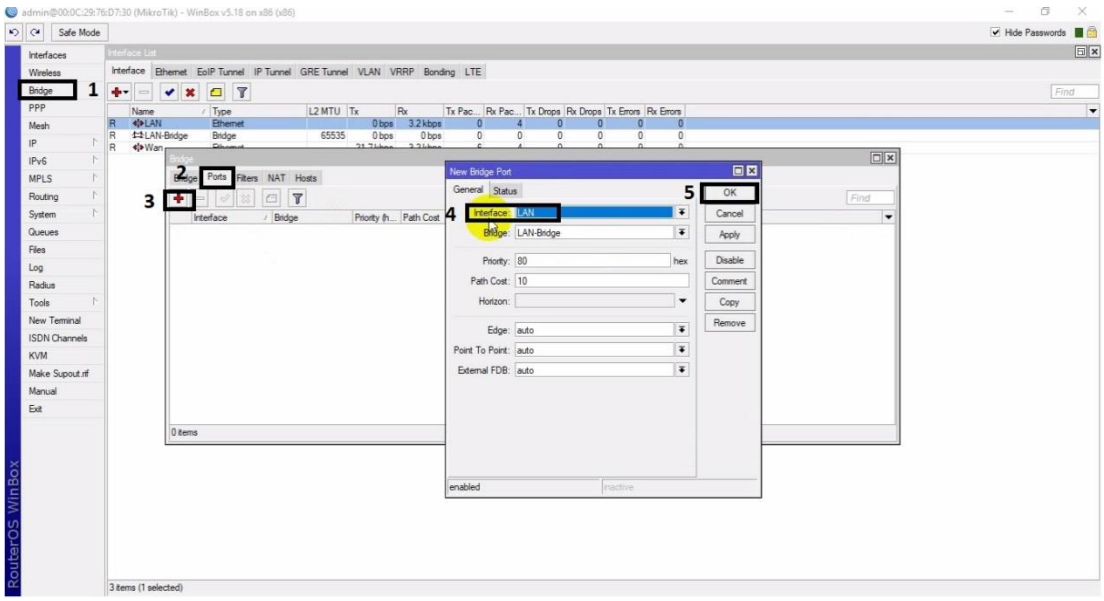

Figure 4.7: Shows Screen Print Add interface for new bridge

4.4.6 Add Default Route

Next thing is need to do is to configure routes for internet connection. So that LAN user can have access over internet. In MikroTik we can RIP, OSPF or others but here we have done default routing. For this in winbox go to IP-> Routes a new window will open name "Route List". Click on '+' button to add a route another window will open name "New Route". Keep Dst. address 0.0.0.0/0 and default gateway address will be 192.168.214.2. We do not need to do anything here, click Ok. A new Route will add to Route List. Figure 4.8 will show process to create new route. The following Figure 4.8 showing add default route.

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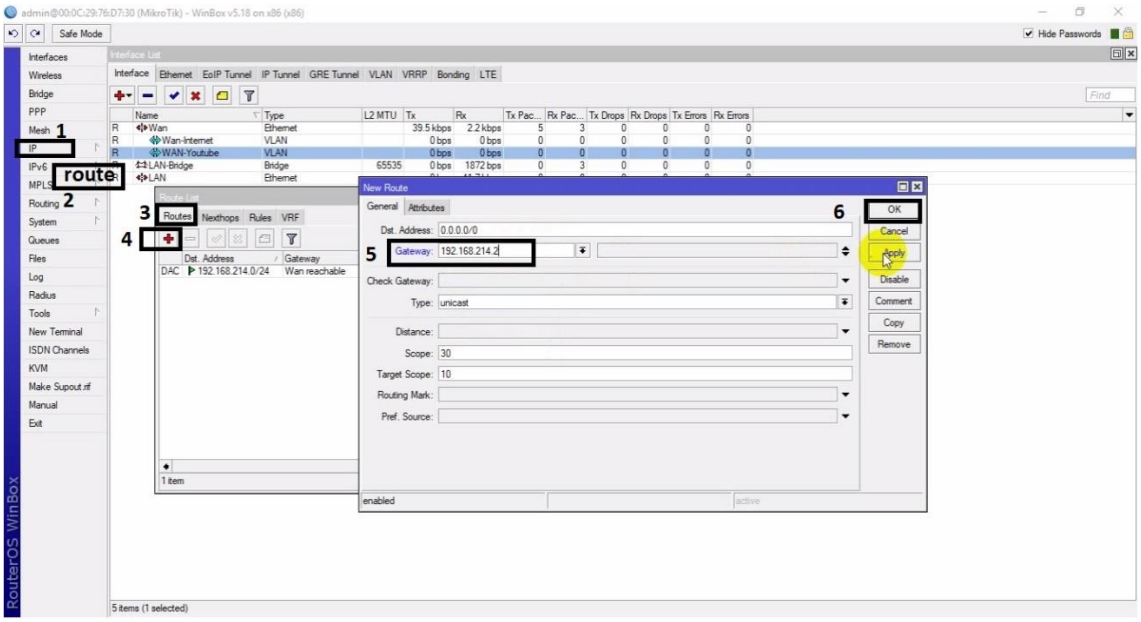

Figure 4.8: Shows Screen Print Add default route

4.4.7 Configure DNS

To set up DNS server we need to go IP-> DNS-> Click on 'Setting' as a result a DNS setting window will open. The following Figure 4.9 showing DNS Setup process.

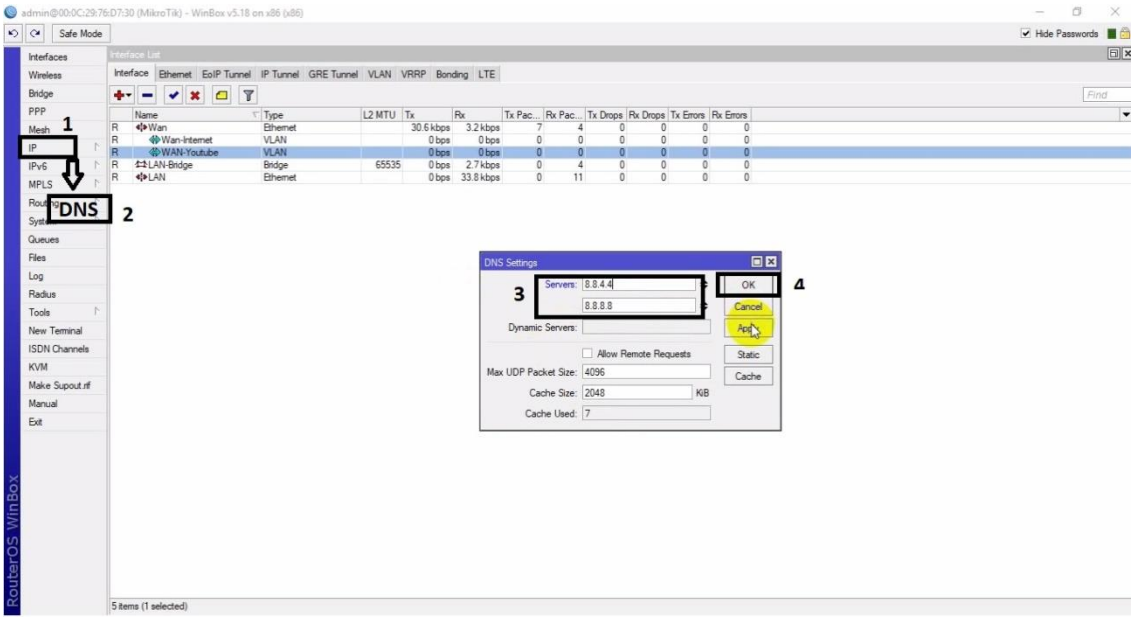

Figure 4.9: Shows Screen Print Configure DNS

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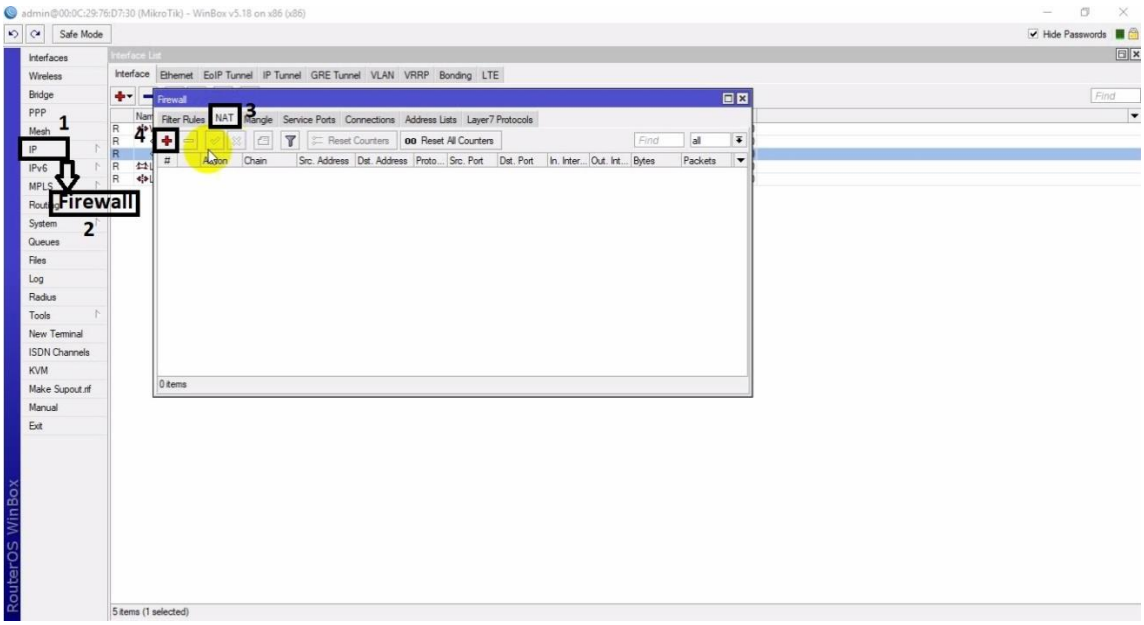
4.4.8 Configure SRC-NAT

NAT or Network address translator is also featured by MikroTik RouterOS. We can use it for network security to hide our private IP address from outside internet. It is very easy to configure NAT in MikroTik. To configure NAT go to IP> Firewall and click on NAT tab in Firewall window. Then click on "+" sign a new "A New NAT Rule" window will open where in 'General' tab select chain as "srcnat" and give source network address in 'Src. Address' field. After then click on 'Action' tab and select action as "masquerade". Click Ok and NAT is configured. The following figure 4.10 showing SRC-NAT Configuration.



(a): Shows Screen Print Configure SRC-NAT

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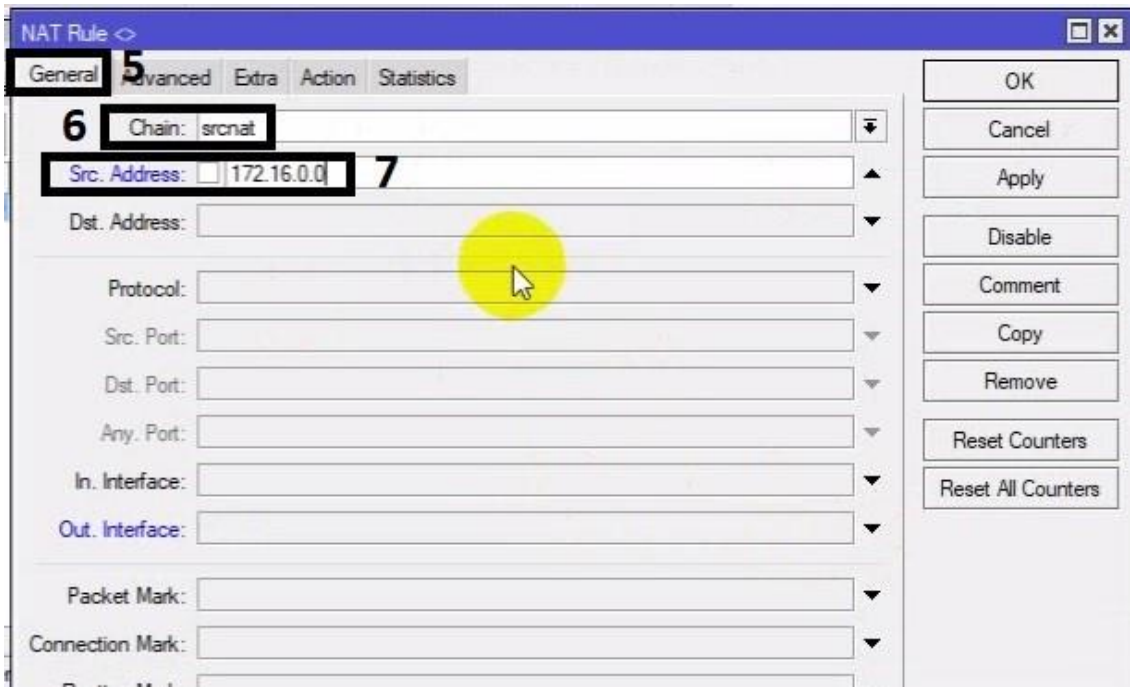

(b): Shows Screen Print Configure SRC-NAT

(c): Shows Screen Print Configure SRC-NAT

Figure 4.10: Shows Screen Print Configure SRC-NAT

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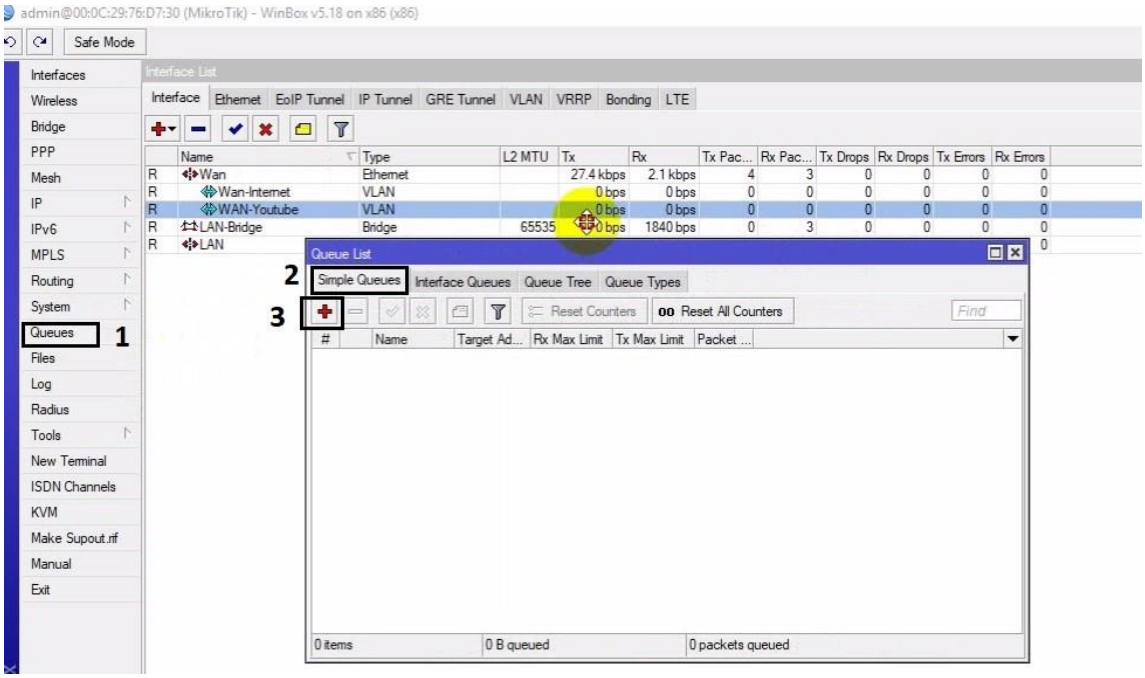
4.4.9 Queue Management

Queue is considered as the most powerful feature of MikroTik RouterOS. It enables a network administrator to manage individual IP address by shaping their bandwidth and other features. We can easily create queue using winbox. Just clink on '+' sign in queue window. Then give queue name in name field, IP address on address field and fix the upload and download speed. Following Figure 4.11 presents a queue management.



(a): Shows Screen Print Queue Management

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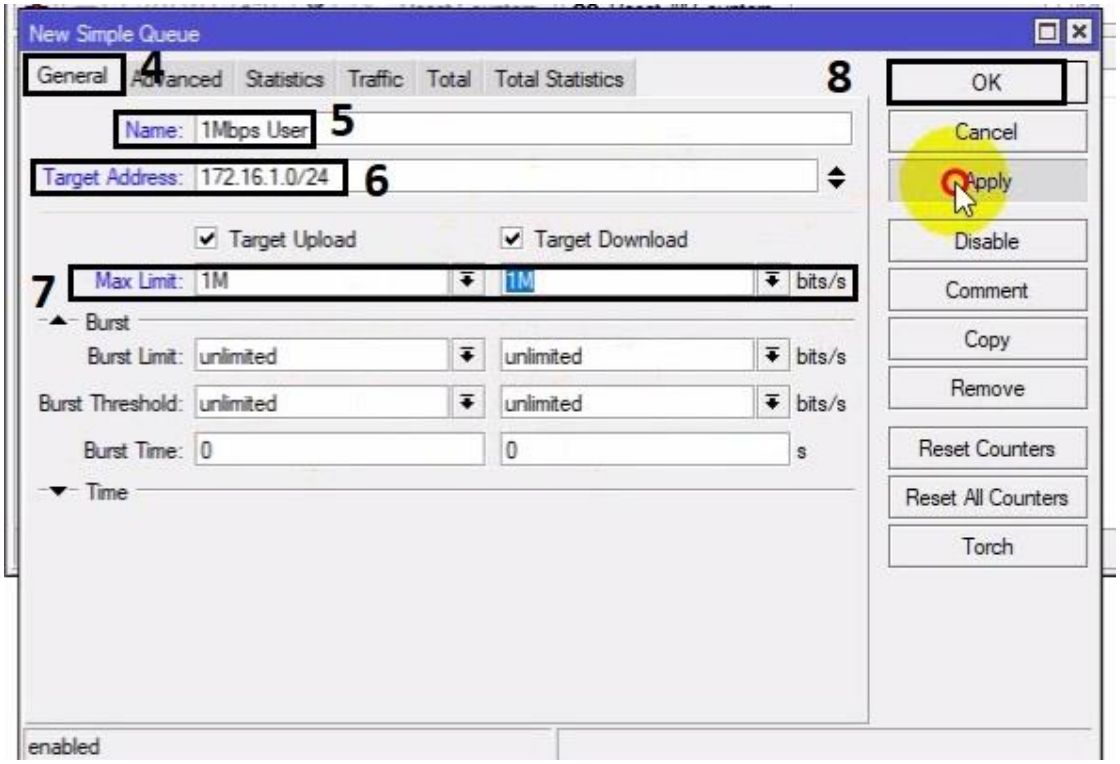

(b): Shows Screen Print Queue Management

Figure 4.11: Shows Screen Print Queue Management

4.4.10 DHCP Server Configuration

Dynamic Host Configuration Protocol (DHCP) is also featured by MikroTik. It enables MikroTik Router to easy distribution of IP address in a network. The MikroTik RouterOS DHCP provides IP address/Mask to requested client, default gateway, domain name and DNS server. In MikroTik DHCP implementation includes both server and client part. Following figure 4.12 provide a quick view of DHCP configuration.

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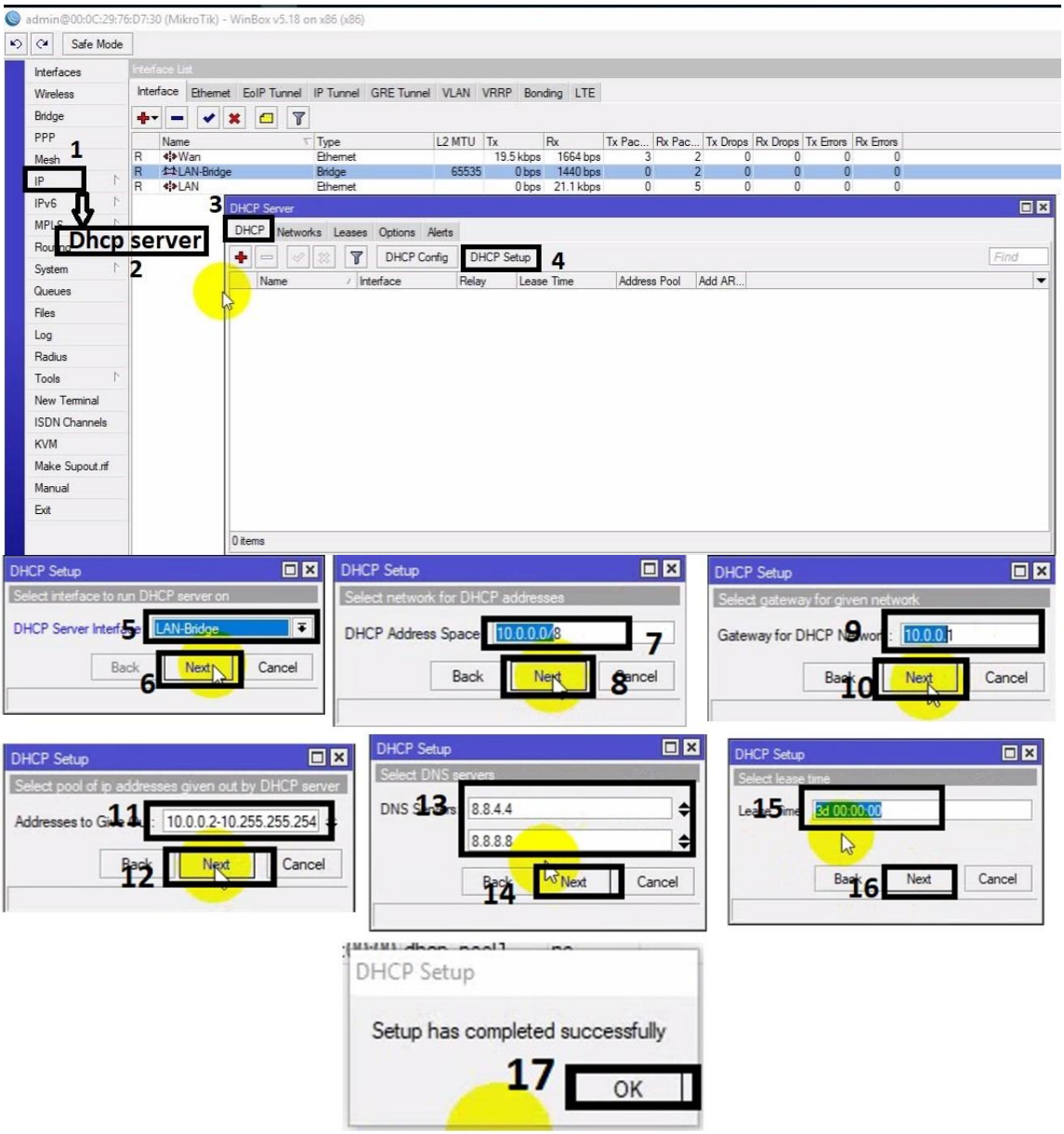

Figure 4.12: Shows Screen Print DHCP Server Configuration

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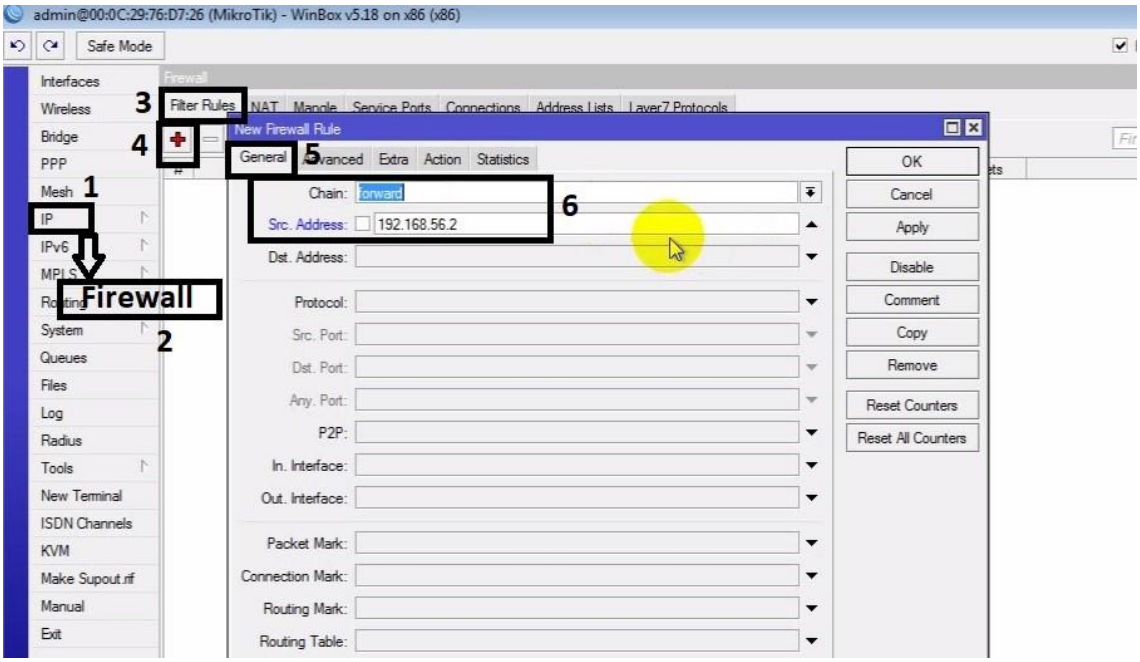
4.4.11 Firewall

A system designed to prevent unauthorized access to or from a private network. Firewalls can be implemented in both hardware and software, or a combination of both. Firewalls are frequently used to prevent unauthorized Internet users from accessing private networks connected to the Internet, especially intranets. All messages entering or leaving the intranet pass through the firewall, which examines each message and blocks those that do not meet the specified security criteria.

I want to Block only these IP addresses 192.168.56.2 do not access to the internet and others source IPs are allow access to the internet from this subnet. Following figure 4.13 will help us for better understand.



(a): Shows Screen Print Specific IP Block

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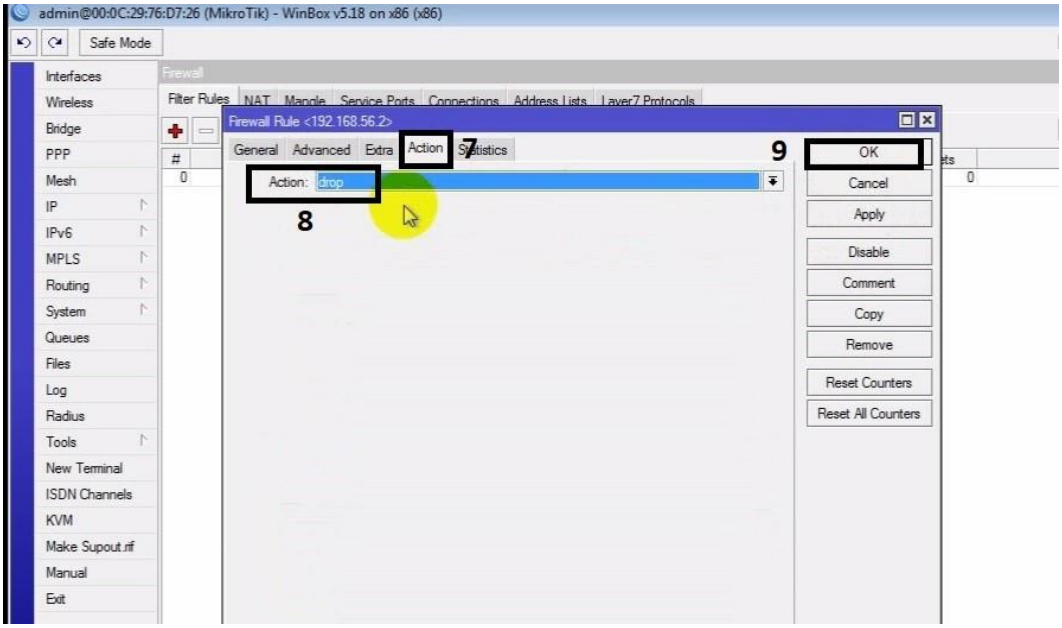

(b): Shows Screen Print Specific IP Block

Figure 4.13: Shows Screen Print Specific IP Block

Now I want to block this website (Facebook.com). For this go to IP> Firewall. Click on "+" sign will open new filter rule window. Following figure 4.14 will help us for better understand.

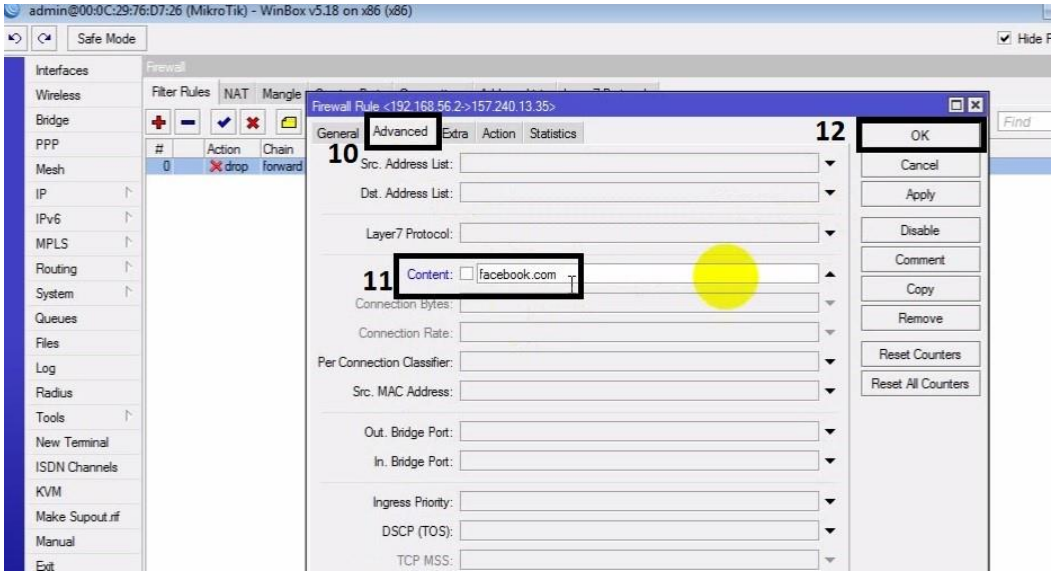

Figure 4.14: Shows Screen Print Specific Website Block

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4.4.12 Port Forwarding (Destination-NAT)

This type of NAT is performed on packets that are destined to the natted network. It is most comonly used to make hosts on a private network to be acceesible from the Internet. A NAT router performing dstnat replaces the destination IP address of an IP packet as it travel through the router towards a private network. Following figure 4.15 will help us for better understand.

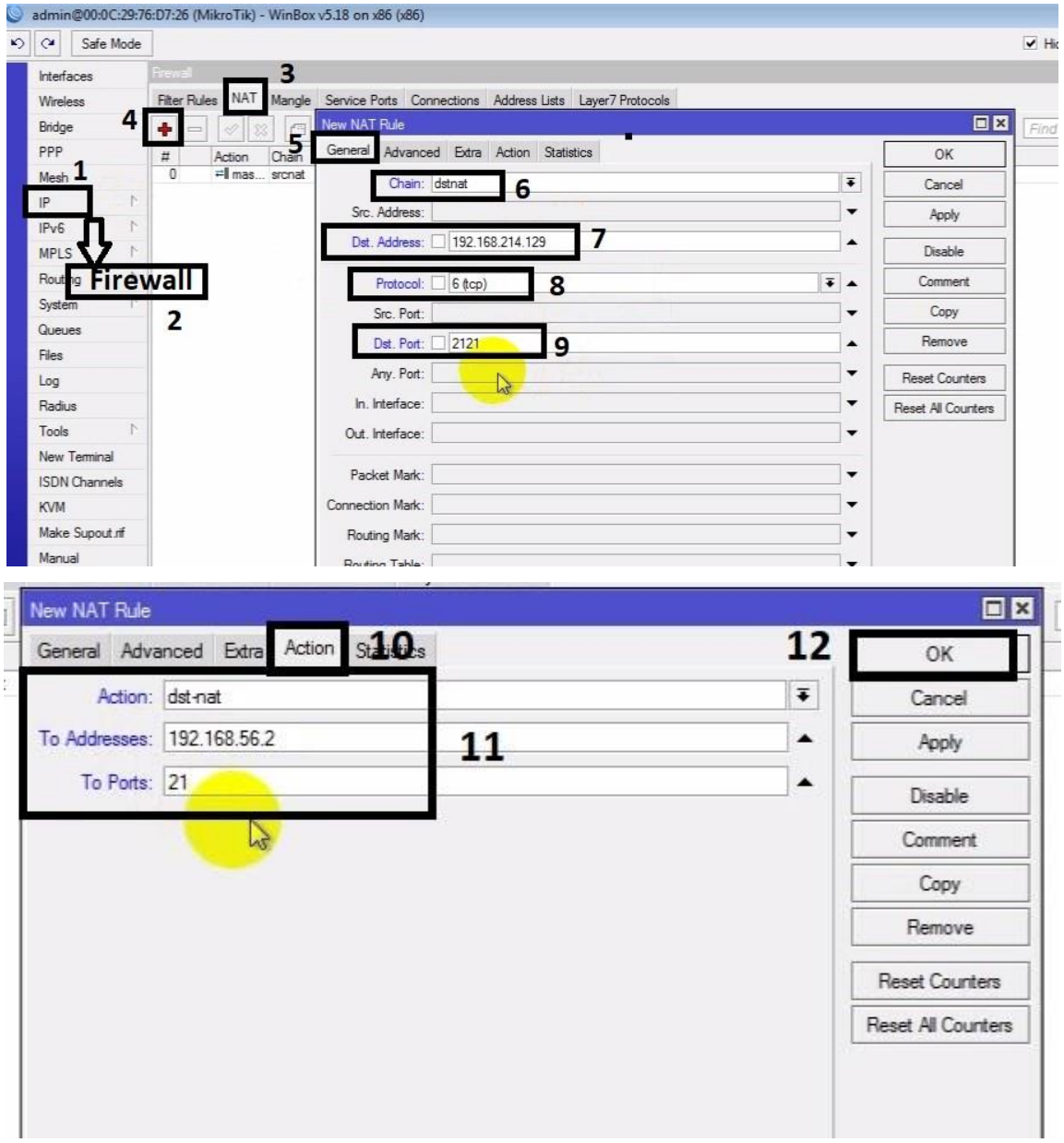

Figure 4.15: Shows Screen Print Port Forwarding (Dst-NAT)

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4.4.13 PPPoE Server Setup

PPPoE is most popular user and BW management on MikroTik. Many ISP Company in Bangladesh manage their BW by PPPOE BW manager. PPPoE combines the PPP, and Ethernet. PPPoE commonly used in dialup connections user management and BW management, PPPoE supports multiple users in a local area network.

We need to first creating an IP pool for PPPoE Server Setup. IP Pool provide range of IP address for the mikroTik router to hand out to users. Following figure 4.16 will help us for better understand.

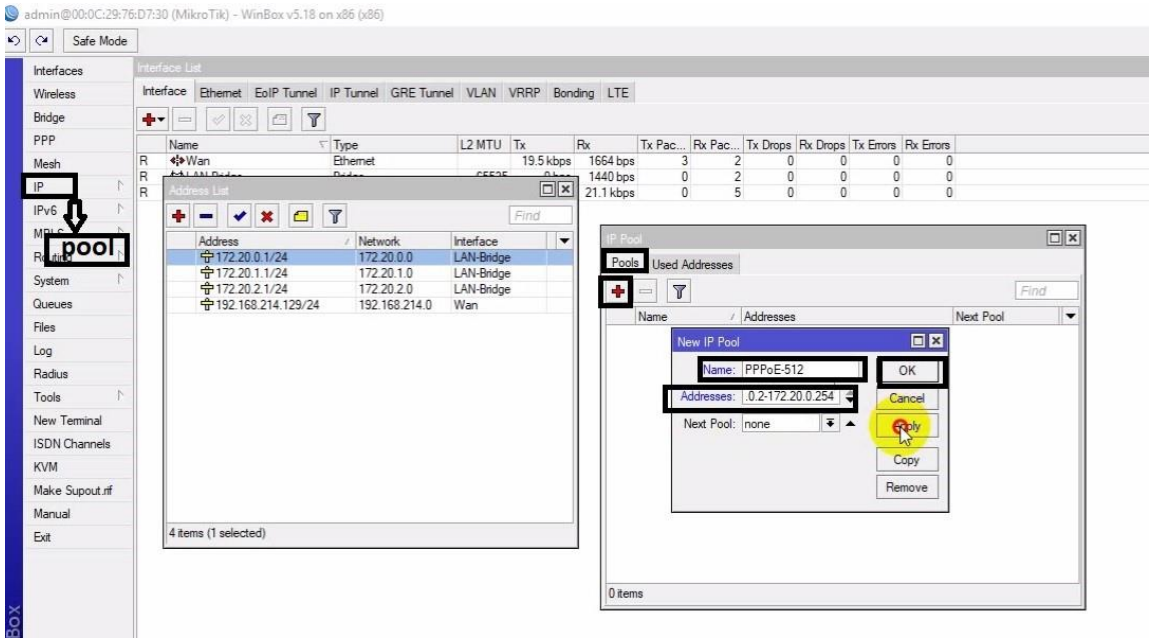

Figure 4.16: Shows Screen Print create IP pool

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We completely done create IP pool. Now we need to creating the PPPoE Server. Following figure 4.17 will help us for better understand.

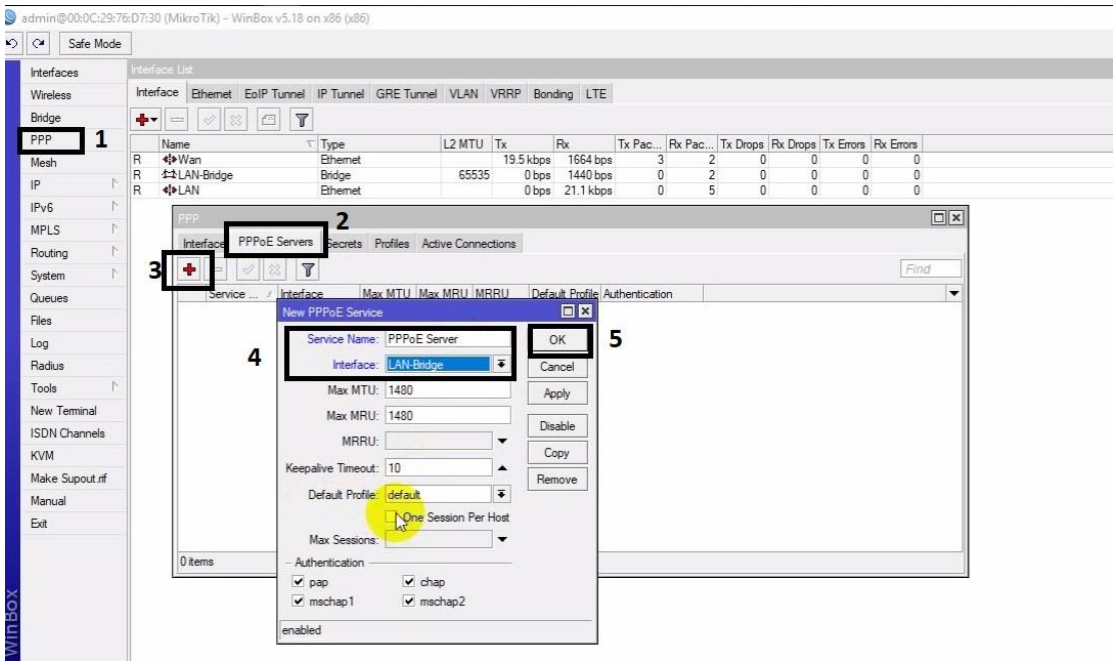
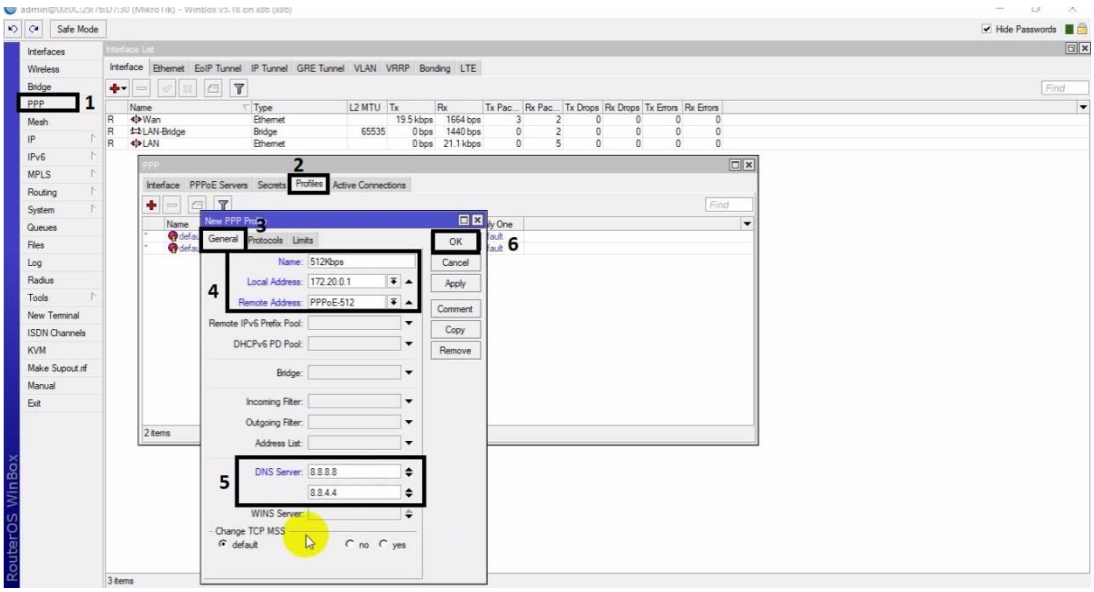


Figure 4.17: Shows Screen Print create PPPoE Server

Creating the PPPoE Server is done. Now we need to create a Profile for PPPoE Server to use. We can create many profiles with different bandwidth for many users.



(a): Shows Screen Print create profile for PPPoE Server

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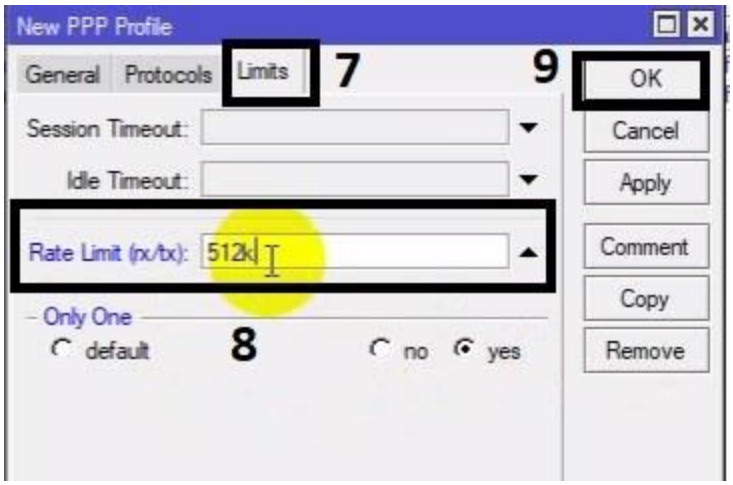

(b): Shows Screen Print create profile for PPPoE Server

Figure 4.18: Shows Screen Print create profile for PPPoE Server

Creating the profile is done. Now we need to create some user. For creating the user click on “PPP” tab will open “PPP” window and then click on “secret” tab and click “+” sign will open “new ppp secret” window. Choose the User name and Password that you dedicate to your client. Select profile and click ok.

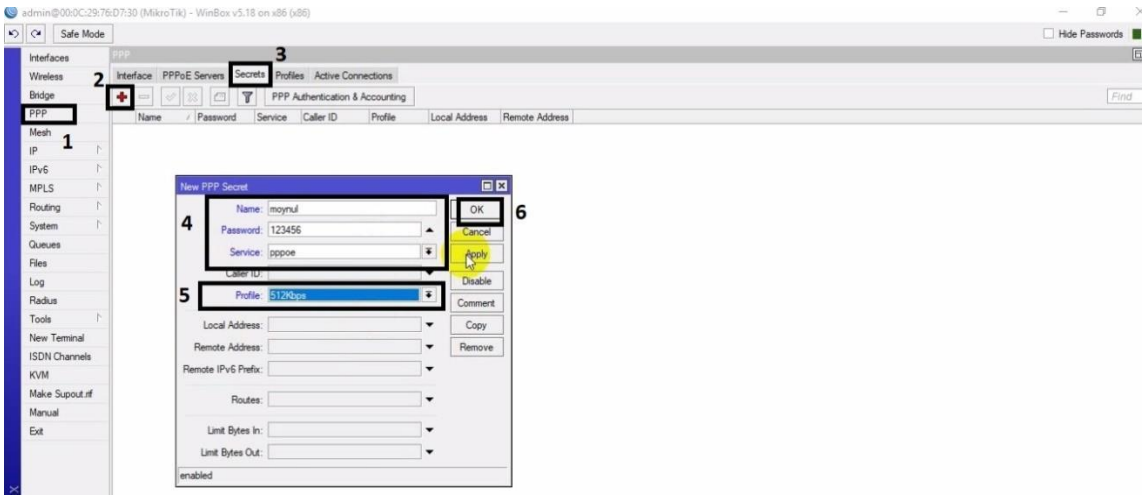

Figure 4.19: Shows Screen Print create user for PPPoE Server

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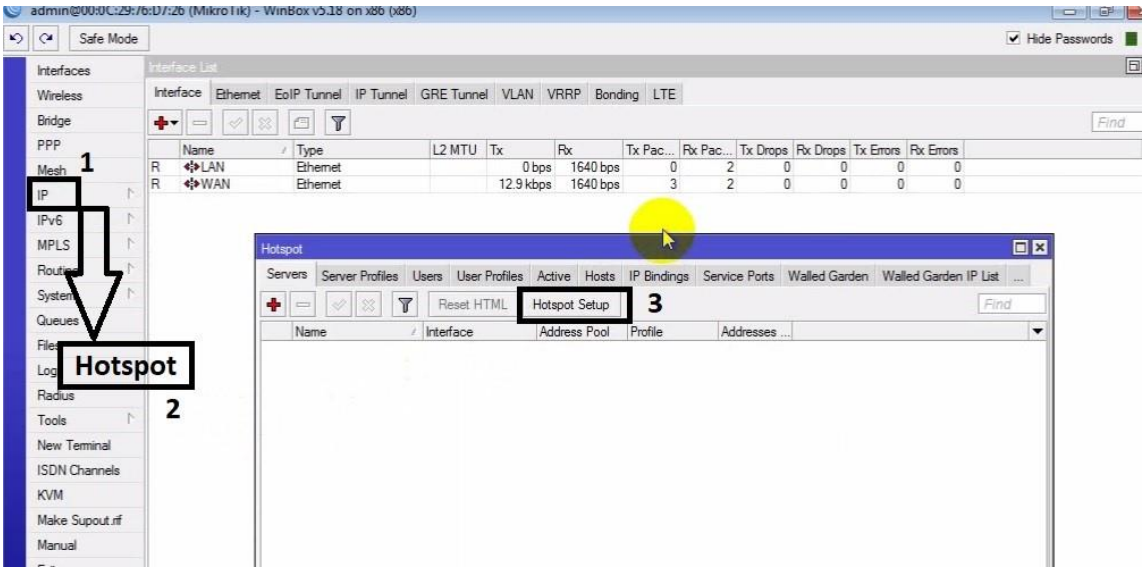
4.4.14 Hotspot Server Setup

The MikroTik Hotspot Gateway enables providing of public network access for clients using wireless or wired network connections. The user will be presented a login screen when first opening his web browser. Once a login and password is provided, the user will be allowed internet access. This is ideal for hotel, school, airport, internet cafe or any other public place where administration doesn't have control over the user computer. No software installation or network configuration is needed; hotspot will direct any connection request to the login form. Extensive user management is possible by making different user profiles, each of which can allow certain uptime, upload and download speed limitation, transfer amount limitation and more.

For hotspot setup we go IP > Hotspot will open "Hotspot" window and then click on "Hotspot Setup" tab.



(a): Shows Screen Print Hotspot Setup

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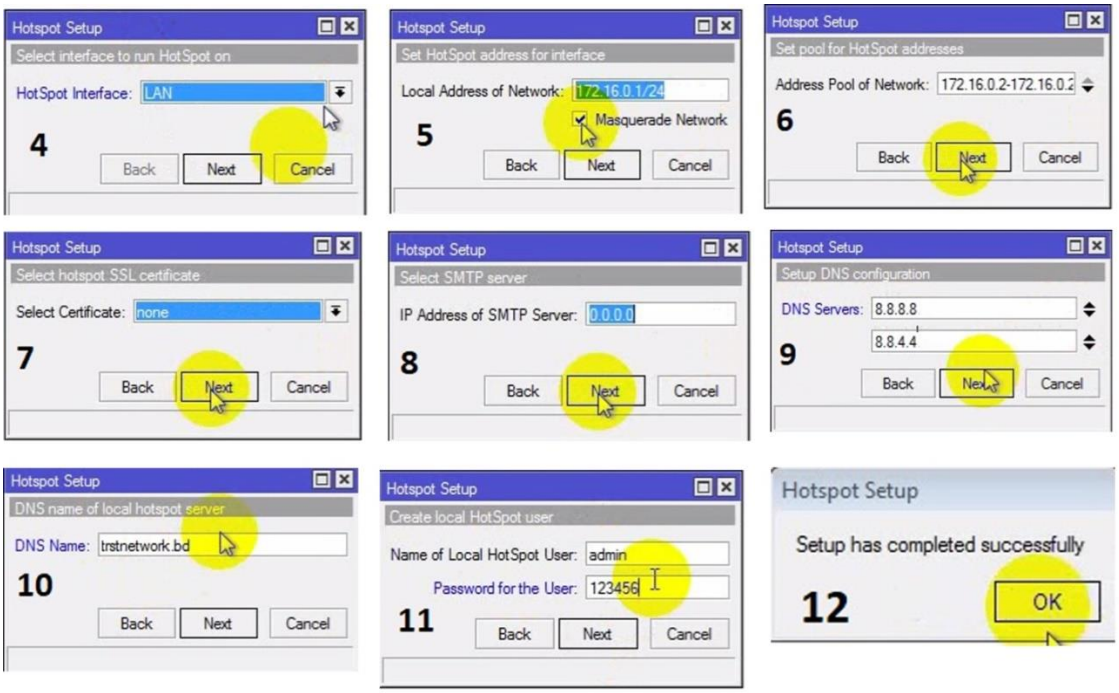
Now set hotspot interface and then click next. Set local address of network and then click next. Set address pool of network and then click next. For SSL certificate, select none. Then click next. Because we don't have SMTP server, enter 0.0.0.0. Click Next. Set primary and secondary DNS and then click next. Set DNS name and then click next. Create users, and password, and then click next. Setup has completed successfully. Following figure 4.20 will help us for better understand.



(b): Shows Screen Print Hotspot Setup

Figure 4.20: Shows Screen Print Hotspot Setup

Now back to the "Hotspot" window. Click on "server profile" tab and then double click to hfprof1 (Following figure 4.21 will help us for better understand) and will open "Hotspot Server Profile" window. Now click on "login" tab and uncheck cookie and click ok.

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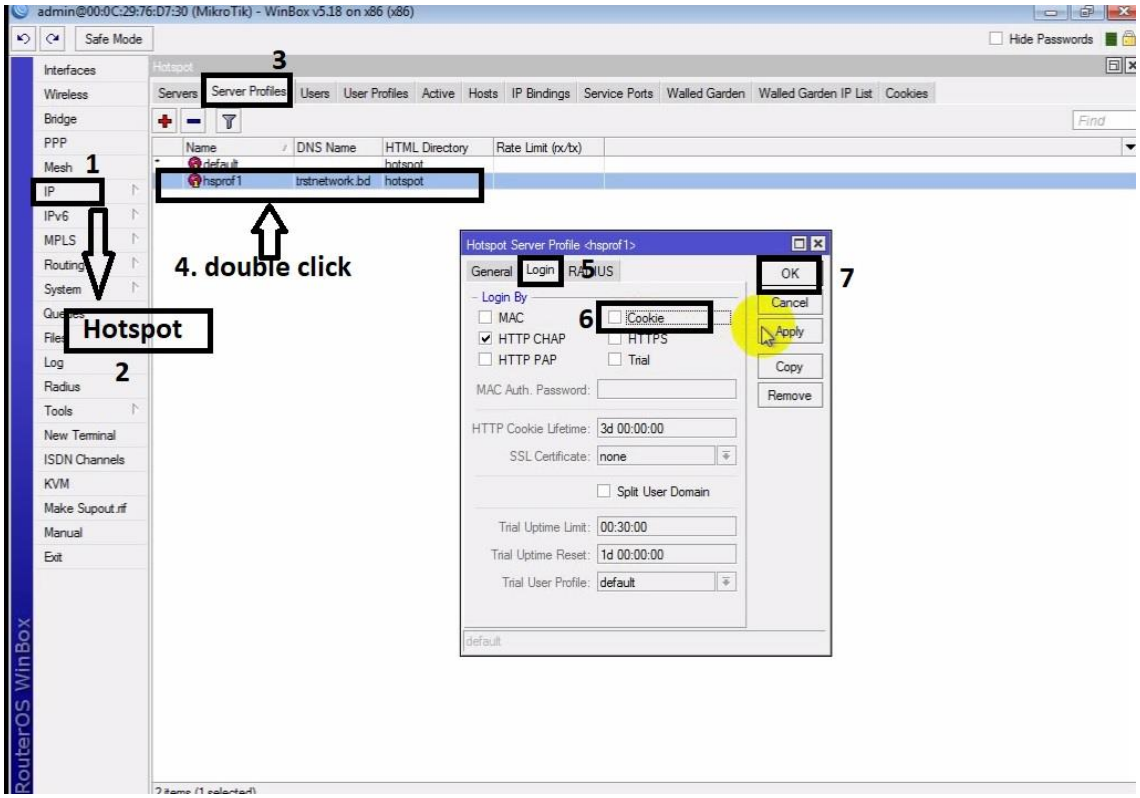

Figure 4.21: Shows Screen Print Hotspot Server Profile

Now we need to create user. For create user we go IP > Hotspot and will open “Hotspot” window. Click on “user” tab and click on “+” sign will open “New Hotspot User” window. Choose the Server name, User name and Password and then click ok. Following figure 4.22 will help us for better understand.

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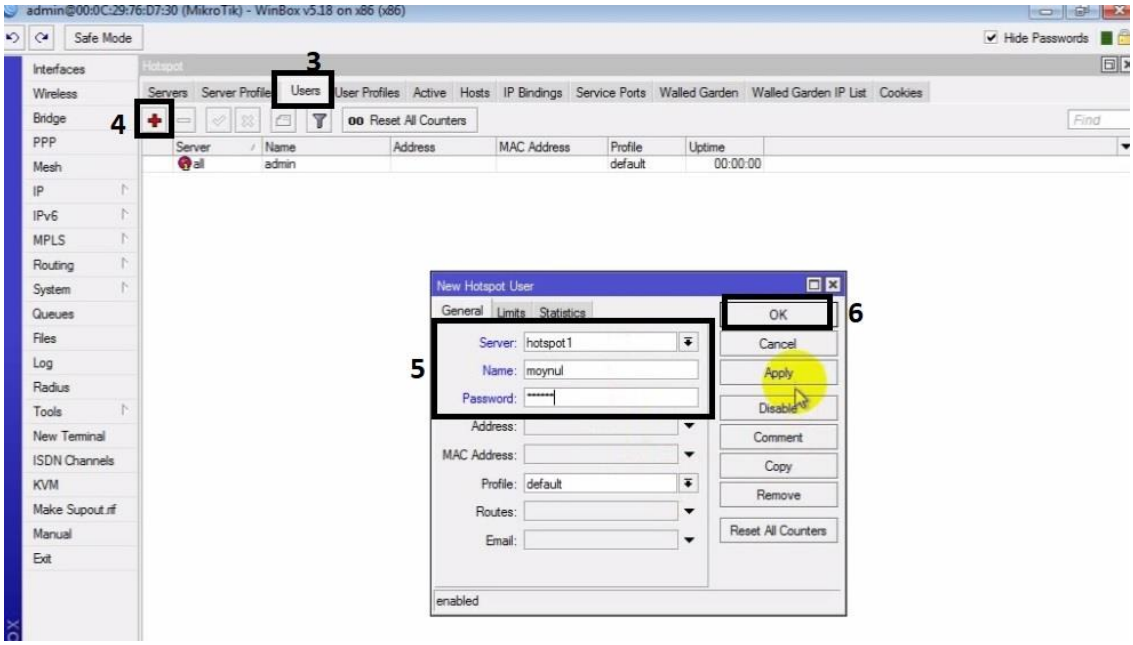

Figure 4.22: Shows Screen Print Create User for Hotspot Server

For browsing any site, we must input username and password in login page.

Figure 4.23: Shows Screen Print Login Page for User

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The following figure 4.24 showing login successfully page.

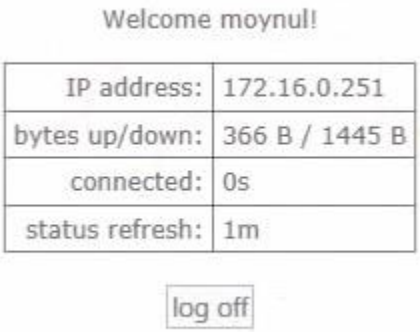

Figure 4.24: Shows Screen Print Login Successfully

Now we need to create user profile for users. For user profile create we back to "hotspot" window. Click on "User Profiles" tab and click "+" sign will open "New Hotspot User Profile" window. Click on "general" tab and choose name and address pool. Assign bandwidth in rate limit box and click ok. Following figure 4.25 will help us for better understand.

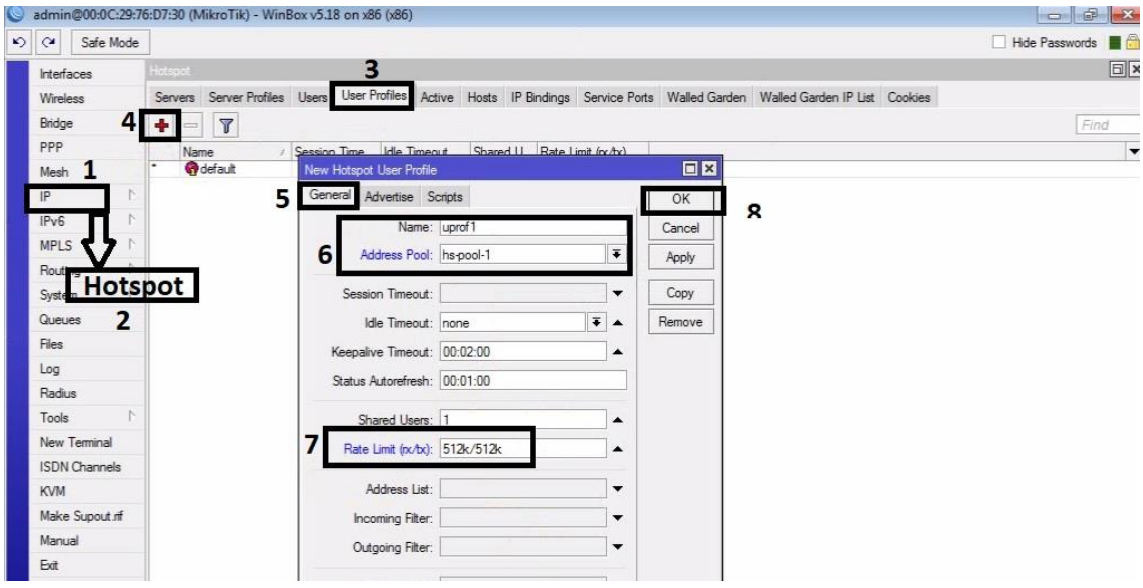

Figure 4.25: Shows Screen Print Create User Profile for Users

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CHAPTER 5

Internship Outcomes

5.1 Problem and Solution

In an enterprise network system, there might be a lot of problem. I have faced some type of problems like clients no connectivity, limited connectivity, Internet browsing problem, Different type of software problem, operating system failure and Hardware problem etc. These types of problems are basically user end problem. I have also face some Router ends problem like ARP not response, Bandwidth utilization, Unexpected Error etc.

A Common problem for a network infrastructure is no connectivity or limited connectivity. This type of problem occurred when data packet are unable to communicate with destination host or server. There are different reasons behind it. Sometimes physical connection are interrupted or damaged, sometime connecting device like switch or hub are not working. This type of problem can be occurred from end user site also. Connection problem, NIC card problem and Virus are the most effective reason for that situation.

In my internship I also have faced different type of software problem. Sometimes operating system damages by malware or virus. I tried to solve every problem to fulfill the organization requirement and ensure the maximum performance of Network and IT related services.

5.2 Learning Outcomes

An internship provides the opportunity to gain hands on work experience that we just can’t get in the classroom. Employers are usually more concerned with my work experience than my qualifications and internships are often the only way to get the work experience we need to secure a job, so they're a vital part of our resume. Many employers prefer or require applicants who have done an internship or relevant work experience and

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in many of the more competitive job markets it is essential to set my apart from the others.

At this prospect, I have learned a lot of things from my internship. I also have the technical skill improvement from there. I have learned the shortest way to solve any sensitive problem, how to manage others and increase work performance. I have also learned to work practically with senior officials and manage the critical problems.

Technically, this internship give me a basic knowledge of networking in a mid-level network infrastructure. I hope this internship can be more effective in my professional carrier.

5.3 Challenges

In an internship there must be some challenges have to be faced. Organization always wants to speed up the working performance. There is no soft or consideration point here form in intern. So at the beginning, an intern has to survive a lot to work there. The working procedure and environment are totally unknown to him. So it's taking a little bit of time to adjust with this environment.

I also have some challenges to adjust with my internship place environment. There are a lot of higher officials working there. Every task is emergency and important there. So it is really difficult to fulfill the demands of everyone at a time. But I have to manage it properly.

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CHAPTER 6

Conclusion and Future Work

6.1 Discussion and Conclusion

I would like to thank Daffodil International University and my advisor Dr. Fernaz Narin Nur and my Internship company TRST Network all technical person.During this internship, I have learned a great deal about how to operate a big ISP company and so many networking work information, monitoring and support. The whole experience of working at TRST Network was great. This organization has a super work culture, great mind and top quality of work. I have practical knowledge, skills and met many new environment of networking level. I achieved several of my learning goals. I have got professional practice and learned the different facets of working within ISP Company. This internship has been a worthwhile opportunity in that it allowed the intern to gain industry experience in the field of networking and good to find out what my strengths and weaknesses are. This helped me to define what skills and knowledge I have to improve in the coming time. I could perform certain tasks in ISP company of TRST Network. It would be better for me if I can present and express myself more confidently. The project work assigned to the intern was both challenging and applicable to the field of networking sector. Also learn from this opportunity, have been valuable time management skills and training opportunity that have enhanced my skills set better preparing for a career in ISP sector. After all this internship has given me new insights and motivation to pursue a career in Internet Service Provider Company.

6.2 Future Work

Our main objective of this project was to use our gathered knowledge in real field. In this project we learn about network design's different concept and model which may help to design a network later. Again, MikroTik RouterOS offers lots of features which may suitable to fulfill any network requirements. Here in this project we configure almost every feature and worked on MikroTik firewall features also. As a result we will able to design a network using MikroTik device and can manage that network properly.

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APPENDIX

DNS	Domain Name System
DHCP	Dynamic Host Configuration Protocol
IP	Internet Protocol
ISP	Internet Service Provider
LAN	Local Area Network
MAN	Metropolitan Area Network
MAC	Media Access Control
NAT	Network Address Translator
NIC	Network Interface Card
RJ	Registered Jack
STP	Shielded Twisted Pair
UTP	Unshielded Twisted Pair
WAN	Wide Area Network

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REFERENCES

[1] LAN, MAN, WAN Diagram, << https://goo.gl/2gfTov>> last accessed on 27/02/18.

[2] NIC Card, << https://goo.gl/S3R5rx>> last accessed on 01/03/2018.

[3] Fiber Optic Cable, <<https://goo.gl/HD5yNp>> last accessed on 04/03/2018.

[4] STP & UTP Cable, <<https://goo.gl/j6hE13>> last accessed on 07/03/2018

[5] RJ45 Connector, << https://goo.gl/xPmwBJ>> last accessed on 10/03/2018

[6] Switch and Router, << https://goo.gl/iZ5dKn>> last accessed on 13/03/2018

[7] Mikrotik Router, << https://goo.gl/awrRrv>> last accessed on 17/03/2018

[8] MikroTik Feature, <<https://wiki.mikrotik.com/wiki/Manual:RouterOS_features>> last accessed on 21/03/2018

[9] MikriTik RouterOS Configuration, <<https://goo.gl/t6kx3z>> last accessed on 25/03/2018

[10] DHCP Server Configure, << https://goo.gl/v13GQz>> last accessed on 30/03/2018

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