# A STUDY OF BASIC ISP NETWORKING WITH MIKROTIK ROUTER CONFIGURATION

BY

## MD. BABU MIAH ID: 172-15-10035

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

Supervised By

# Mr. Aniruddha Rakshit

Senior Lecturer Department of CSE Daffodil International University



DAFFODIL INTERNATIONAL UNIVERSITY DHAKA, BANGLADESH JANURY 2020

#### **APPROVAL**

This Internship report titled "A Study of Basic ISP Networking with Mikrotik Router Configuration" submitted by "Md. Babu Miah" 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 08 July, 2020

#### **BOARD OF EXAMINERS**

**Dr. Syed Akhter Hossain Professor and Head** Department of Computer Science and Engineering Faculty of Science & Information Technology Daffodil International University

ahir

Gazi Zahirul Islam Assistant Professor Department of Computer Science and Engineering Faculty of Science & Information Technology Daffodil International University

Vor

Abdus Sattar Assistant Professor Department of Computer Science and Engineering Faculty of Science & Information Technology Daffodil International University

Jaddam

**Dr. Md. Saddam Hossain** Assistant Professor Department of Computer Science and Engineering United International University Chairman

**Internal Examiner** 

**Internal Examiner** 

**External Examiner** 

### DECLARATION

I hereby declare that, this internship report is prepared by me under the supervision of my honorable **Mr. Aniruddha Rakshit, Senior Lecturer, Department of CSE**, Daffodil International University. I also declare that, I collect information from my internship organization Prisma Digital Network Limited, ISP based Corporation, Books, Internet and my friends also.

Supervised by:

Anine Odly Rekshit

Mr. Aniruddha Rakshit Senior Lecturer Department of CSE Daffodil International University

Submitted by:

**Md. Babu Miah** ID: 172-15-10035 Department of CSE Daffodil International University

#### ACKNOWLEDGEMENT

Firstly, I express my heartiest thanks and gratefulness to almighty Allah for His divine blessing make me possible to complete the final year internship successfully.

I am really grateful and wish profound indebtedness to **Mr. Aniruddha Rakshit, Senior Lecturer,** Department of CSE, Daffodil International University, Dhaka. Who has Deep Knowledge & keen interest of supervision in the field of "A Study of Basic ISP Networking with Mikrotik Router Configuration" to carry out this internship. Her endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior draft and correcting them at all stage have made it possible to complete this internship.

I would like to express heartiest gratitude to **Dr. Syed Akhter Hossain, 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.

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

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

#### ABSTRACT

This internship is on a study of basic ISP networking with Mikrotik Router configuration. Mainly I am working on Mikrotik OS based router configuration. Mikrotik has been established in 1996. This router is mainly easy to use for bandwidth management. Actually a Mikrotik Router is cost-efficient and easy access that can be used for small and big network management. Our Internet Service Provider (ISP) Company especially uses Mikrotik Router in this sector. These functions include IP addressing, IP distribution, Firewall, Nat, Routing, Bandwidth control, Point to Point Tunneling Protocol (PPTP), Domain Name System (DNS) server, Dynamic Host Configuration Protocol (DHCP) server, File Transfer Protocol (FTP) server, Point to Point Protocol Over Ethernet (PPPoE), Hotspot and many other features. In this sector we are using Cisco router, Cabling and Linux operating system etc. Nowadays, people of all over the world use the internet in daily life. A network provides the internet service from computer to computer and other networking devices. So, Networking is so much important fact right now. Nowadays internet is using on Software based application, E-Commerce website, Robotic, Internet of things (IoT). Its use is increasing day by day. They provide various advantages, For example- instant messaging, Parallel computing, Video conference, Interaction with other users using dynamic web pages, Sharing information by using the internet or web.

# TABLE OF CONTENTS

CONTENTS	PAGE NO
Board of examiners	i
Declaration	ii
Acknowledgements	111
Abstract	iv
Table of Contents	v-vi
List of Figures	vii-viii
CHAPTER 1: Introduction	1-2
1.1 Introductions	1
1.2 Motivation	1
1.3 Objectives	1-2
1.4 Introduction to the Company	2
1.5 Report Layout	2
CHAPTER 2: Organization	3-4
2.1 Introduction	3
2.2 Product for Marketing	3
2.3 Organizational Structure	4
CHAPTER 3: Internship Roles & Responsibilities	5-32
3.1 Daily Task and Activities	5
3.2 Events and Activities	6
3.3 Project Task and Activities	6
3.3.1 About IP Address	б
3.3.2 Introduction of Mikrotik	7

3.3.3 PC Based Installation of Mikrotik Router OS Using VMware	7-9
3.3.4 Mikrotik Router Configuration	9-13
3.3.5 Static-IP Configuration in Mikrotik Router	13-14
3.3.6 Queue Configuration	15-18
3.3.7 DHCP Server Configuration with Mikrotik Router:	18-20
3.3.8 Bridge Configuration with Mikrotik Router	20-22
3.3.9 Website Blocking Configuration	22-23
3.4.1 Hotspot Server Configuration	23-26
3.4.2 PPPoE Server Configuration in Mikrotik Router	27-31
3.4.3 Bind MAC Address	31-32
CHAPTER 4: Conclusion, Future Career & Opportunities	33
4.1 Conclusion and Discussion	33
4.2 Future Career & Opportunities	33
REFERENCES	34
APPENDICES	35

# LIST OF FIGURES

FIGURES	PAGE NO
Figure 2.3. 1: Organization of Prisma Digital Network Limited	4
Figure 3.3.3.1: Software Icon for VMware, Mikrotik ISO, Winbox	7
Figure 3.3.3.2: VMware Workstation	8
Figure 3.3.3.3: Mikrotik OS Command-line interface (CLI) Mode	9
Figure 3.3.4.1: Network Topology of Mikrotik	9
Figure 3.3.4.2: Mikrotik Router Interfaces	10
Figure 3.3.4.3: IP Addressing	10
Figure 3.3.4.4: Domain Name System (DNS) Server	11
Figure 3.3.4.5: Network Address Translation from the firewall	11
Figure 3.3.4.6: Firewall of Action	12
Figure 3.3.4.7: IP Routing	12
Figure 3.3.4.8: IP Ping to WinBox Terminal	13
Figure 3.3.5.1: IP Addressing for Static IP	13
Figure 3.3.5.2: TCP/IPv4 Configuration	14
Figure 3.3.5.3: CMD mode of the user's PC	14
Figure 3.3.6.1: Network Topology of Queue Configuration	15
Figure 3.3.6.2: Add IP Address	15
Figure 3.3.6.3: Simple Queues	16
Figure 3.3.6.4: Address Resolution Protocol (ARP)	16
Figure 3.3.6.5: Network Connection Details	17
Figure 3.3.6.6: Network Topology of Parent Concept	17
Figure 3.3.6.7: Simple Queues of Parent	18
Figure 3.3.7.1: DHCP Server Interface	19

Figure 3.3.7.2: ARP for DHCP Configuration	19
Figure 3.3.8.1: Interface List of Bridge	20
Figure 3.3.8.2: Create Bridge Name	20
Figure 3.3.8.3: LAN Configure of Bridge Port	21
Figure 3.3.8.4: Change Interface	21
Figure 3.3.9.1: Firewall L7 Protocol	22
Figure 3.3.9.2: Firewall Rule	22
Figure 3.4.1.1: IP Pool Configuration	23
Figure 3.4.1.2: Hotspot Interface	23
Figure 3.4.1.3: Hotspot User Profile	24
Figure 3.4.1.4: Add Hotspot Users	25
Figure 3.4.1.5: Hotspot Active User	25
Figure 3.4.1.6: Hotspot Log In Panel	26
Figure 3.4.1.7: Log in Success in Hotspot	26
Figure 3.4.2.1: Address List for PPPoE Server	27
Figure 3.4.2.2: PPPoE Server	27
Figure 3.4.2.3: IP Pool Configure for PPPoE Server	28
Figure 3.4.2.4: Point-to-Point Protocol (PPP) Profile	28
Figure 3.4.2.5: Point-to-Point Protocol (PPP) Secret	29
Figure 3.4.2.6: Queue Type for PPPoE Server	29
Figure 3.4.2.7: Simple Queue for PPPoE Server	30
Figure 3.4.2.8: Simple Queue of Advanced Option for PPPoE Server	31
Figure 3.4.3.1: Interface to General Setting	31
Figure 3.4.3.2: Add Media Access Control (MAC) Address	32

# CHAPTER 1 Introduction

#### **1.1 Introductions:**

Now this time you can search any Resource through the Internet all over the World. Nowadays a huge number of people use internet Resource and digital technology. We do nothing for internet communication servers. This is why Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) servers are very important for networking Technology. This day is currently working with Small or Large Organization, Bank services, etc. through the software to connect to the Internet. the internet huge use banking services on most of the internet such as Short message service (SMS), Banking online, Debit card service, Credit card Service, Online Transaction etc. When a Organization uses internet, you can easily Communicate and Maintain. This Report is about PC networking, server configuration, server Security, microtic OS based Routers, Firewalls, Bandwidth control, Backholes Links, Wireless access points, Hotspot gateways etc. We can learn to manage the network using simple microtic commands or Winbox graphically.

#### **1.2 Motivation:**

As a Mikrotik Routing system and network Administrator, there's a huge amount of Job post all over the world. I think, Mikrotik Operating system is very easy to use and when Internet Service provider (ISP) Organization use Mikrotik Operating system, then you can easily maintain user or Employ and control and share bandwidth. I think, I can successfully my experience on Mikrotik with the help of Prisma Digital Network Limited.

#### **1.3 Objectives:**

The main Objective of higher Education is to gain Knowledge. I choose an Internship on Networking on mikrotik Platform because Nowadays, a huge amount of job Opportunities all over the world and I gain practical experiences on prisma Digital Network Limited. I will try my level best to present my practical Knowledge Mikrotik Router plays a role in a Data center because in Mikrotik Router Management bandwidth control is very easy. That's why I select this topic for an Internship.

- Install Mikrotik operating system OS base (OS)
- Configure ISP server with Win dox
- Maintain Bandwidth with Win dox
- Maintain user or Employ with Win dox

#### **1.4 Introduction to the Company:**

Prisma Digital Network Limited is the largest Internet Service Provider (ISP) in Bangladesh. At 2005, our company started internet service. We provide internet fix for home and business users according to the need of customer's objective. We have 14 years of support in our country. We are always one step ahead than others in this competitive field and will strive to stay. Our ISP company gives 24/7 customer services and high speed internet service in Bangladesh. Our internet users are always happy to use our services. We work with a variety of national challenge and global association and picked up the stable stage.

#### **1.5 Report Layout:**

#### The report is as follows

Chapter:-1 I Discus the internship, the Inspiration for the internship and the Acquaintance with the organization. Chapter:-2 I Discus IT services and what role Mikrotik has played in the job Market. Chapter:-3 I Discus the day-to-day work and Activities, events and Challenges. Chapter:-4 I have Discus d in detail about Skills, Smart Planning and Reflection. Chapter:-5 I have Discus d the Conclusion and future Opportunities.

# **CHAPTER 2**

#### Organization

#### **2.1 Introduction:**

Prisma Digital Network Limited is one of the best, Largest and oldest ISP company in Bangladesh. The company provides internet service and solution since 2005. Our company uses fiber optic and wireless communication infrastructure and also using highly efficient networking device and technology. Our service team is highly trained and our users are always happy to use our service. Prisma Digital Network Ltd. has very strong security. Professional engineering and management teams are certified and associated. CISCO, JUNIPER, Mikrotik, BDCOM, FREEBSD. Prisma Digital Network Ltd. promotes 2 major platforms internship for education purpose and networking sector.

#### 2.2 Product for Marketing:

Prisma Digital Network Limited is the largest internet service provider (ISP) in Bangladesh. This Organization is one of the most respected Organizations for internship, providing Broadband connections, Information Technology (IT), Relative services and solutions since 2005. The Prisma Digital Network Ltd. 24 hour's service and high-speed data service through the internet. Mostly it offers high-speed internet service to Residential and Corporate customer.

- 1. Network Installation.
- 2. Protected Ring Network.
- 3. Manage Hosting.
- 4. Multiple Upstream.
- 5. ISP Support.
- 6. Corporate level Internet Solution.



# 2.3 Organizational Structure of Prisma Digital Network Limited:

Figure 2.3.1: Organization of Prisma Digital Network Limited

# **CHAPTER 3**

## **Internship Roles & Responsibilities**

#### **3.1 Daily Task and Activities:**

•Month - 1: In the first month of my internship at Prisma Digital Network Limited I have learned and performed the following tasks:

- □ About IP addresses
- $\hfill\square$  Introduction to Mikrotik OS
- □ Mikrotik Router OS using VMware.
- □ Mikrotik router configuration
- $\Box$  How to configure ISP link
- □ How to configure your LAN Network
- •Month 2: In this month I have learned and performed the following tasks:
  - □ Firewall and NAT Configuration
  - □ Static-IP Configuration
  - □ Queue Configuration
- ●Month 3: In this month of I have learned and performed the following tasks:
  - □ DHCP Server Configuration
  - $\square$  Bridge Mode Configuration
  - □ Website Blocking Configuration
- ●Month 4: In this month of I have learned and performed the following tasks:
  - □ HotsPot Configuration
  - □ PPPoE Server Configuration
  - Bind MAC Address

### **3.2 Events and Activities:**

The main goal is to prepare for the temporary position, when some problems are encountered in the entry-level position; At this point, it is imperative to prepare to solve the problem. Identifying this problem and activators can address it. I have practically learned this internship program from Prism Digital Network Limited and have performed in real-life in the following tasks. □ About IP addresses for all class of IP with Subnet

□ Mikrotik Router and Configuration

□ Learning & understanding about Network Components

#### **3.3 Project Task and Activities:**

 $\Box$  About IP Address

□ Introduction of Mikrotik

#### **3.3.1 About IP Address**

IP means internet protocol. The network defines an IP address in two elements: Part of the community and host range. The IP address contains 4 octets and each octet is eightbit, it means the IP address's total bit is 32. For A class IP, the first octet is a network and the last 3 octets are the host. For 'B' class, the first 2 octets are network and the last 2 octets are hosts, and for 'C' class, first 3 octets are the network and the last octet is the host and D, E classes are multicast.

Class	Range	Private IP	Public IP
Α	0-126	10.0.0.0 to 10.255.255.255	1.0.0.0 to 9.255.255.255 11.0.0.0 to 126.255.255.255
В	128-191	172.16.0.0 to 172.31.255.255	128.0.0.0 to 171.255.255.255 172.0.0.0 to 172.15.255.255 173.0.0.0 to 191.255.255.255
С	192-223	192.168.0.0 to 192.168.255.255	192.0.0.0 to 192.167.255.255 192.169.0.0 to 192.169.255.255
D	224-239	N	Iulticast Address
E	240-255		Restricted

# **3.3.2 Introduction of Mikrotik**

Mikrotik is a Latvian company founded in 1996 to develop routers and wireless ISP systems. Mikrotik now provides hardware and software for Internet connection in most countries of the world.

#### 3.3.3 PC Based Installation of Mikrotik Router OS Using VMware

Requirement Software:

- VMware Workstation Application
- MikroTikOS ISO File
- WinBox

Mainly, this software is used for Mikrotik Router management and maintenance.



Figure 3.3.3.1: Software Icon for VMware, Mikrotik ISO, Winbox

Here, I am showing the installationguideline step by step:

**Step 1:** First we need to install VMware> open it, then click File> New Virtual Machine> Next> Next> OK.

Step 2:Create a new virtual machine.



Figure 3.3.3.2: VMware Workstation

Open VMware Workstation and click file option and select a new virtual machine and apply.

**Step 3:**Select virtual machine hardware compatibility and next.**Step 4:**Guest operating system installation>Select, I will install the operating system later>Next.Step 5:Select a guest operating system>Select, Other>Version>other>next. Step 6:Give me a name for the virtual machine and select the file location.>Write a virtual machine name: Example Mikrotik>Location: Example of: C:\Users\MD BABU\Documents\Virtual of: Machines\Mikrotik>Next. Step 7:Select the processor's configuration as needed>Write a Number of processor: Example of: 1>Number of cores per processor: Example of: 1>Next.Step 8:Let's select the range of memory for the virtual machine >Write a Memory for this virtual machine: Example of: 1024 MB>Next. Step 9:Let's select the range of disk capacity for the virtual machine>Write a Maximum disk size (GB): Example of: 10> select split virtual disk into multiple files>Next. Step 10:Specify disk file location>Write a disk file: Example of: Mikrotik.vmdk>Next.Step 11:Ready to create a virtual machine>If I verify the information, click on the Next option.Step 12:Select Virtual Machine settings>Double click, "Edit Virtual Machine settings".Step 13:Edit Virtual Machine settings.>Click on, Add and ok.Step 14:Add hardware wizard>Click on, "Network Adapter>Finish>Ok".Step 15:Now select ISO file and > virtual machine name and also choose a location, where the machine will be installed >. Hardware requirement >Select all with, "press 'a'>press 'n'>press 'y'>Enter".

Step 15:Install successful Mikrotik OS.



Figure 3.3.3.3: Mikrotik OS Command-line interface (CLI) Mode

#### 3.3.4 Mikrotik Router Configuration:



Figure 3.3.4.1: Network Topology of Mikrotik

First open the Winbox software, type the username "admin" and enter without any password.

Step 1: First, let's specify the name of the port of the Mikrotik router.

Figure 3.3.4.2: Mikrotik Router Interfaces

First we define the name of each interface. I type in the way the name is given in the picture above.

**Step 2:** To configure the Mikrotik Router, apply the IP address provided by the ISP cutter to the specified Ethernet port and apply IPs for the local area network and the metropolitan area network.

0	admin@00:0C:29:	:A0:	5E:B3 (MikroTik) - WinBox ∨6.46.2 on	x86 (x86)							
Se	ssion Settings	Das	nboard								
ø	C* Safe Mode	е	Session: 00:0C:29:A0:5E:B3								🔳 🛅
	🔏 Quick Set		Address List		-			Address <1	72.16.15.16/24>		
	CAPsMAN		+ - < x 🗂 🖷			[	Find	Addresse	172 16 15 16/2		OK
	Interfaces		Address	ode I		face		nuareaa.	172.10.13.10/2-	_	
	Wireless		P192.168.2.1/24 192.1	68.2.0 e	the	met-3 (MAN)		Network:	172.16.15.0	<b></b>	Cancel
	🕌 🚆 Bridge		192.168.1.1/24	68.1.0 e	the	met-1 (LAN)		Interface:	ethemet-2 (WAN	I) Ŧ	Apply
	📑 PPP			6.10.U E	tne	met-2 (WAN)					Disable
	°t¦8 Mesh					Address <1	92.168.2.1/2	•>			0.000.0
	255 IP	$[ \  \  ]$				Address	102 100 2 1	/2/			Comment
	MPLS	$\uparrow$				Address.	132.100.2.1.				Сору
	≝ IPv6	$\[ \]$				Network:	192.168.2.0	<b>^</b>	Cancel		Remove
	😹 Routing	$\[ \]$	Address <192.168.1.1/24>		1	Interface:	ethemet-3 (N	IAN) 🔻	Apply		
	System	1	Address: 192 168 1 1/24	OK	1				Disable		
	🙊 Queues		7001033. 132.100.1.1724		L				Comment		
	Files		Network: 192.168.1.0	Cancel	H	-			Commeric		
	📄 Log		Interface: ethemet-1 (LAN) 🔻	Apply	Ŀ				Сору		
	🥵 RADIUS			Disable	L				Remove		
	💥 Tools	$[ \ ]$		0.000.0	L	enabled					
	📰 New Teminal			Comment	L	·					
×	Jama LoRa			Сору	L						
B	<b>∢</b> Dot1X			Remove	1						
Vin	🕓 Dude	$\[ \]$	enabled		1						
>	🖳 KVM		L.		1						

Figure 3.3.4.3: IP Addressing

To create an IP address, first you have to go from IP to Address, then click on the Add button, input the data as shown in the picture above, and click OK.

Step 3: Let's connect Domain Name System (DNS) server.

📎 admin@00:0C:29:A0:5E:B3 (MikroTik) - WinBox v6.46.2 on x86 (x86)										
Session Settings Das	ARP									
Safe Mode	Accounting	3		<b>a</b>						
🔏 Quick Set	Addresses	DNS Settings								
CAP\$MAN	DHCP Client	Severa	8 8 8 8	OK						
🕅 Interfaces	DHCP Relay		•••••							
Wireless	DHCP Server	Dynamic Servers:		Cancel						
📲 🖁 Bridge	DNS		Allow Remote Requests	Apply						
E PPP	Firewall	Max UDP Packet Size:	4096	Static						
°t¦8 Mesh	Hotspot	Query Server Timeout:	2.000 s	Cache						
말 P P	IPsec	Ourse Tatal Transiti	10.000							
MPLS N	Kid Control	Query Total Timeout:	10.000 s							
ve IPv6 ►	Neighbors	Max. Concurrent Queries:	100							
🔀 Routing 🗅	Packing	Max Concurrent TCP Sessions:	20							
💮 System 🗅	Pool		20							
Queues	Routes	Cache Size:	2048 KiB							
Files	SMB	Cache Max TTL:	7d 00:00:00							
E Log	SNMP	Cache Used:	19 KiB							
A RADIUS	Services									
📉 📉 Tools	Settings									
📰 New Terminal	Socks									
🔀 🔚 LoRa	TFTP									
💑 🚸 Dot1X	Traffic Flow									
🗧 🕲 Dude 🛛 🗅	UPnP									
KVM	Web Proxy									

Figure 3.3.4.4: Domain Name System (DNS) Server

From IP to DNS, click on add button from here and click OK with the required server IP.

Step 4: Let's configure the Network Address Translation (NAT) from the firewall.

Sadmin@00:0C:29:A0:5	E:B3 (MikroTik) - WinBo	: v6.46.2 on x86 (x86)
Session Settings Das	ARP	
ら 🖓 Safe Mode	Accounting	83 🗖 📾
🔏 Quick Set	Addresses	Firewall
CAPsMAN	DHCP Client	Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols
im Interfaces	DHCP Relay	+ - V X C V OO Reset Counters OO Reset All Counters
🚊 Wireless	DHCP Server	# Action Chain Src. Address Dst. Address Proto Src. Port Dst. Port
📲 📲 Bridge	DNS	0 ≓ll masquerade srcnat
eta PPP	Firewall	
°t\$ Mesh	Hotspot	General Advanced Extra Action Statistics
255 IP 1	IPsec	Concrete Advanced Extra Action statistics OK
🧷 MPLS 🗈 🗅	Kid Control	Chain: srcnat  Cancel
v IPv6 ►	Neighbors	Src. Address: Apply
🔀 Routing 🛛 🗅	Packing	Dst. Address:
Ostem ►	Pool	
Queues	Routes	Protocol:
Files	SMB	Src. Port: Copy
E Log	SNMP	1 item (1 sele Dst. Port: The Remove
A RADIUS	Services	Any. Port:
🄀 Tools 🗈	Settings	In Interface:
New Terminal	Socks	
🔀 🏣 LoRa	TFTP	Out. Interrace: etnemet-2 (WAN)
🞽 🕪 Dot 1X	Traffic Flow	In. Interface List:
🗧 🔘 Dude 🛛 🗎	UPnP	
📻 🔜 KVM	Web Proxy	

Figure 3.3.4.5: Network Address Translation from the firewall

To configure Nat, first go to IP, firewall, click on next Nat, select chain in general options, select source net and out interface wan, click apply, click OK.

Step 5:Here the masquerade selected from the action options.



Figure 3.3.4.6: Firewall of Action

Next, click on, "Action>Select=masquerade>Apply>Ok".

Step 6:Let's configure the IP address to routes.

admin@00:0C:29:A0:5	iE:B3 (MikroTik) - WinBo	x v6.46.2 on x86 (x86)		
Session Settings Das	ARP			
Safe Mode	Accounting	83	📕 🔂	ì
🔏 Quick Set	Addresses	Route List		
CAPsMAN	DHCP Client	Routes Nexthops Rules VRF		
Interfaces	DHCP Relay			
🔔 Wireless	DHCP Server	Dst. Address / Gateway	Distance R	Roi
📲 🖁 Bridge	DNS	AS 0.0.0.0/0 172.16.15.1 reachable ethemet-2 (WAN)	1	_
E PPP	Firewall	DAC  172.16.15.0/24 ethemet-2 (WAN) reachable DAC  192.168.1.0/24 ethemet-1 (LAN) reachable	0	
°t <mark>8</mark> Mesh	Hotspot	DAC > 192.168.2.0/24 ethemet-3 (MAN) reachable	0	
IP N	IPsec	Rente (0.0.0.0/0)		
🥔 MPLS 🗈 🗅	Kid Control	General Attributes		
VE IPv6	Neighbors	Athones		
😹 Routing 🗈 🗈	Packing	Dst. Address: 0.0.0.0/0		_
∰ System ト	Pool	Gateway: 172.16.15.1 ▼ reachable ethemet-2 (WAN)		
🙊 Queues	Routes	Charle Colouren		_
Files	SMB	Check Gateway:		
E Log	SNMP	Type: unicast		_
A RADIUS	Services	Distance: 1		_
🄀 Tools 🗈 🗎	Settings	Scope: 30		_
📰 New Terminal	Socks			_
🔀 🛲 LoRa	TFTP	Target Scope: 10		_
Dot 1X	Traffic Flow	Routing Mark:		_
🗧 🎯 Dude 🛛 🗅	UPnP	Pref. Source:		
🔁 🔜 кум	Web Proxy			

Figure 3.3.4.7: IP Routing

Now, click on, "IP>Routes>Routes>Add>General>Gateway: Example of: 172.16.15.1>Apply>Ok".

**Step 7:**Check whether the router has internet or Command-line interface (CLI) appliance on the terminal option of the router.

0	Seadmin@00:0C:29:A0:5E:B3 (MikroTik) - WinBox v6.46.2 on x86 (x86)										
Ses	Session Settings Dashboard										
Ю	C* Safe Mod	е	Session: 00:0C:29:A0:5E:B3	<b>—</b> 🗎							
	🔏 Quick Set		Terminal								
	CAPsMAN			•							
	Interfaces		MMM MMM KKK TITITITIT KKK								
	Wireless		NDUM NUMM KKK TITITITITI KKK								
	Bridge		MMM MMMM MMM III KKK KKK RRRRR 0000000 TTT III KKK KKK								
	PPP		MMM MMM III KKK KKK RRRRRR 000 000 TTT III KKK KKK								
	°T <sup>°</sup> Mesh		MMM MMM III KKK KKK RRR RRR 000000 TIT III KKK KKK								
	255 IP	Þ	MikroTik RouterOS 6.46.2 (c) 1999-2020 http://www.mikrotik.com/								
			ROUTER HAS NO SOFTWARE KEY								
		1 b									
	24 Routing	1.	You have 4h9m to configure the router to be remotely accessible,								
	System	P	and to enter the key by pasting it in a Telnet window or in Winbox.								
	🗬 Queues		See www.mikrotik.com/key for more details.								
	Files										
	E Log		Current installation "software ID": T101-KB79								
	🧟 RADIUS		ricade prebb inder do donornae.								
	💥 Tools	$\land$	[admin@MikroTik] >								
	New Terminal		[admin@MikroTik] >								
$\sim$	lenn LoRa		[admin@MikroTik] > ping 172.16.15.1								
2	eta Dot1X		SEQ HOST SIZE TTL TIME STATUS								
in	Dude	1	1 172.16.15.1 56 64 3ms								
$\geq$			2 172.16.15.1 56 64 3ms								
in				•							

Figure 3.3.4.8: IP Ping to WinBox Terminal

Microtic Router Configuration Completed Now an IP Pink Marriage will see if the configuration is OK. First we have to go to the new terminal. Now type and enter as in the picture above.

## **3.3.5 Static-IP Configuration in Mikrotik Router:**

**Step 1:** The LAN IP address is assigned first.

0	admin@00:0C:29	9:A0:	5E:B3 (MikroTik) - WinBox v6.46.2 or	n x86 (x86)							
Se	ssion Settings	Das	hboard								
ю	Call Safe Mod	le	Session: 00:0C:29:A0:5E:B3								<b>a</b>
	Ruick Set		Address List					Address <1	72.16.15.16/24>		
	CAPSMAN		+ X 🗆 🍸			[	Find	Address:	172.16.15.16/2	4	ОК
	Interfaces		Address V Netw	vork In	erf	face	<b>_</b>		170 10 15 0		
	Wireless		192.168.2.1/24	168.2.0 et	her	met-3 (MAN)		Network:	172.16.15.0		Cancel
	📲 🖁 Bridge			168.1.0 et	her	met-1 (LAN)		Interface:	ethemet-2 (WAI	¥) ∓	Apply
	📑 PPP		TT 1/2.16.15.16/24 1/2.	16.15.U et	ner	met-2 (WAN)					Diaphla
	°t¦8 Mesh					Address <1	92 168 2 1/2	4>			Disable
	255 IP	$\land$									Comment
	MPLS	1				Address:	192.168.2.1	/24	ОК		Сору
	yé IPv6	1				Network:	192.168.2.0	<b>•</b>	Cancel		Remove
	🔀 Routing	1	Address <192.168.1.1/24>		1	Interface:	ethemet-3 (I	MAN) ₹	Apply		
	System	1	Addmas: 192 168 1 1/24	OK	L				Disable		
	🙊 Queues		Address. 132.105.1.1724		L				Comment		
	Files		Network: 192.168.1.0	Cancel	L				Comment		
	E Log		Interface: ethemet-1 (LAN) <b>F</b>	Apply	L				Сору		
	🧟 RADIUS			Dieable					Remove		
	💥 Tools	$\land$		Disable		enabled					
	New Terminal			Comment		·					
×	Jam LoRa			Сору							
B	♦ Dot 1X			Remove							
Vin	🕲 Dude	1	enabled								
>	🛃 KVM		1 <u>.</u>		1						

Figure 3.3.5.1: IP Addressingfor Static IP

To create an IP address, first you have to go from IP to Address, then click on the Add button, input the data as shown in the picture above, and click OK.

Step 2: Apply to a static IP user's personal computer.

		Local Area Connection Properties
🔾 🗢 🛒 🕨 Control Panel	<ul> <li>Network and Internet</li> </ul>	ork Conr Networking
Organize 🔻 Disable this net	vork device Diagnose this con	nnection Connect using:
Bluetooth Network Con Disabled Bluetooth Device (Perso	nection Local Are onal Area Ketwork Realtek P	28 Conne Peter Pule GBE Family Controller Configure Configure Configure
Internet Protocol Version 4 (TCP/ General You can get IP settings assigned this capability. Otherwise, you m for the appropriate IP settings. Obtain an IP address autom Obtain an IP address autom UP address: Subnet mask: Default gateway:	Pv4) Properties         Pv4           automatically if your network supports do ask your network administrator         atcally           it         192, 168, 1, 50           255, 255, 255, 0         192, 168, 1, 1	Centre of the second s
Obtain DNS server address     Obtain DNS server address     O     Use the following DNS server	automatically r addresses:	OK Cancel
Preferred DNS server: Alternate DNS server:	124.6.224.4 8.8.8.8	
Validate settings upon exit	Advanced	

Figure 3.3.5.2: TCP/IPv4 Configuration

To configure the static IP, first go to PC Settings Next Network Next Change Address Setting Next Local Area Connection Next Properties Next Double click on IPv4 and input data as shown above and click Apply OK.

**Step 2:** Let's check the user's Internet through the command prompt(Executable name: **cmd**.exe).

C:\Windows\system32\cmd.exe - ping 192.168.1.1 -t	
Microsoft Windows [Version 6.1.7601] Copyright (c) 2009 Microsoft Corporation. All rights reserved.	<u>_</u>
C:\Users\MD BABU>ping 192.168.1.1 -t	
Pinging 192.168.1.1 with 32 bytes of data: Reply from 192.168.1.1: bytes=32 time<1ms TTL=64 Reply from 192.168.1.1: bytes=32 time<1ms TTL=64	

Figure 3.3.5.3: CMD mode of the user's PC

Press the PC start button> search> CMD and inter>ping 192.168.1.1 –t inter. **3.3.6 Queue Configuration:** 

The best way to manage the bandwidth of all types of IP allocation systemis to configure a queue.



Figure 3.3.6.1: Network Topology of Queue Configuration

User1: 5MB Upload and 5MB Download

User2: 8MB Upload and 8MB Download

Step 1: Add IP address for Local Area Network (LAN).

Address List			×
+- 🖌 🗶 🍸		Find	
Address /	Network	Interfac	e 🔻
中10.10.10.10/24	10.10.10.0	FTP Ser	rber
⊕ 192 168 1 2/24	192 168 1 0	WAN	
Address <172.16.10.1/24>	•		
Address: 172.16.10.1/2	4	ок	
Network: 172.16.10.0	▲	Cancel	
Interface: LAN	₹	Apply	
		Disable	
		Comment	_
♦ 3 items		Сору	+
		Remove	
enabled			

Figure 3.3.6.2: Add IP Address

To create an IP address, first you have to go from IP to Address, then click on the Add button, input the data as shown in the picture above, and click OK.

Queue List		
Simple Queues Interfa	face Queues Queue Tree Queue Types	
+ - <b>*</b> ×	OO Reset Counters     OO Reset All Counters     Find	1
# Name 0	Target       Upload Max Limit       Download Max Limit       Packet Marks       Upload Queued B       Download Queued B         172.16.10.50       5M       5M       5M       SM         172.16.10.50       8M       8M       Image: Simple Queue <ulser()< td="">       Image: Simple Queue <ulser()< td="">         General       Advanced       Statistics       Traffic       Total       Statistics       OK         Name:       User()       Image: Simple Queue <ulser()< td="">       Image: Simple Queue <ulser()< td="">       OK         Target:       172.16.10.50       Image: Simple Queue <ulser()< td="">       OK       Cancel         Target:       172.16.10.50       Image: Simple Queue <ulser()< td="">       Image: Simple Queue <ulser()< td="">       Cancel         Target:       172.16.10.50       Image: Simple Queue <ulser()< td="">       Image: Simple Queue <ulser()< li="">       Image: Simple Queue <ul>       Image: Simple Queue <ul> <t< th=""><th>•</th></t<></ul></ul></ul></ul></ul></ul></ul></ul></ul></ul></ul></ul></ul></ul></ul></ulser()<></ulser()<></ulser()<></ulser()<></ulser()<></ulser()<></ulser()<></ulser()<></ulser()<></ulser()<></ulser()<></ulser()<></ulser()<>	•
	enabled	

Step 2: Create a user and set the bandwidth limitation.

Figure 3.3.6.3: Simple Queues

To create a new user, first go to the Queue option. From Queue to Simple Queue then click on Add from General Options as required name target IP and target upload, target download bandwidth select and click OK

Step 3: Let's see the MAC address "User1"

	Queue List									
	Simple Queues	Interface Queues Q	ueue Tree Queue	Types						
	+ - 🖉	× 🖻 🍸 🛛	00 Reset Counters	00 Reset All Counters						Find
	# Name	Target	Upload N	Nax Limit Download Ma	ax Limit	Packet Marks	Upload Queued B	Download Queue	. Total Max Lin	nit (bi 🔻
	0 🚊 Use	r1 172.16.10.50	5M	5M						
Π	1 🚊 Use	r2 172.16.10.60	8M	8M						
					ARP	List				4
					+	- / * 6	- <b>T</b>		Find	
						IP Address	A MAC Address	Interfac	e 🔻	·
l					D	172.16.10.50	40:8D:5C:1D:E	8:4D LAN		
l					DC	192.168.1.1	14:59:C0:C7:13	3:03 WAN		
H					DC	192.168.1.6	40:8D:5C:1D:E	8:4D WAN		
L										
l										
l										
l										
	2 items		0 B queued							

Figure 3.3.6.4: Address Resolution Protocol (ARP)

**Step 4:**Let's check the user's internet through the command mode.

Blacksoch Netwy Nucl connection Discionanted Blacksoch Devision       Ethernet Status       Ethernet Status       Ethernet Status         Blacksoch Devision       General       Network Connection Details       Network Connection Details       Network Connection Details         Britschool Devision       Pix-4 Cornect Pro-6 Cornection General       Network Connection Details       Cornection Pix-4 Cornect Pix-6 Cornect Devision       Network Connection Details       Cornection Queckson Details         Devision       Pix-4 Cornect Pix-6 Cornect Docotion       Network Connection Queckson Details       Cornection Queckson Details       Cornection Queckson Details         Devision       Pix-6 Cornect Pix-6 Cornect Docotion       Network Cornection Queckson Details       Cives Science Pix-000 Cornection All rights reserved.         Databased Duration:       Decotption       Network Cornection Queckson Details       Cives Science Pix-000 Cornection All rights reserved.         Databased Duration:       Decotption       Network Cornection Queckson Pix-000 Cornection All rights reserved.       C: \USers\failed Diversion 10.0.0.18362.0.5C7] (c) 2019 Microsoft Corneration All rights reserved.         Databased Duration:       Dives Science       252.55.25.0       Pix-0 failed Diversion 10.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.	se 🔻 Disable thi	s network device	Diagnose this connecti	on Rename this conn	ection V	iew status of this connection	Change settings of this connec	ction 👫 🔹	•	0	
Ethernet 2 NETRIGRAFS7-56 Killer E2400 Gips       Henrodi Commetion Datais:         Methodi Commetion Datais:       Henrodi Commetion Datais:         Physical Address       Walke         Duration:       Specific         Duration:       Specific         Details:       Walke         Details:       No         PV4 Address       172.15.10.50         PV4 Address       172.15.10.50         PV4 Address       172.15.10.50         PV4 Address       172.15.10.50         PV4 Address       172.15.10.10         PV4 Address       172.15.10.10         PV4 Address       172.15.10.11         PV4 Address Address       172.16.10.11: bytes=32 time<1ms TIL=64	Bluetooth Netwo Not connected Bluetooth Device	Ethernet Statu	s	×	Broad Discor	band Connection 2 mected finiport (PPPOE)	Ethernet Network Killer E2400 Gigabit Eth	iernet Cont			
PH-ERRAP/36       Connection       Metrodic Connection Lutani:       Physical Address         Physical Address       Physical Address       Value       Connection specific DN         Deviction address       Address       Address       Value       Connection specific DN         Deviction address       Address       Address       Address       Value       Connection specific DN         Deviction address       Address       Address       Address       Value       Connection specific DN         Deviction address       Address       Address       Address       Value       Connection specific DN         Deviction address       T215 10.50       Phy 4 Address       T215 10.50       Physical Address       Property         PV4 Address       T215 10.50       Physical Address       T216 10.11       bytes=32 time<1ms TTL=64	Ethernet 2	General	Network Connection Deta	IIS		C\WINDOWS\system3	2\cmd.exe - ping 172.16.10.1 -t				
	Killer E2400 Giga	IPv4 Connec IPv6 Connec Media State: Duration: Speed: Details Activity Bytes: Properties	Property Connection-specific DN Description Physical Address DHCP Enabled IPv4 Address IPv4 Subnet Mask IPv4 Default Gateway IPv4 DNS Server IPv4 UNS Server IPv4 DNS Server IPv4 DNS Server IPv6 Default Gateway IPv6 DNS Server	Value Killer E2400 Gigubit Etheme 40 80 5-0:10-E8-40 No 17.2 16 10 50 255 255 255 0 17.2 16 10.1 8.8.8 8 Yes 1e80: 2c7975a3.dt85.627%	t Controller	Microsoft Windows [ (c) 2019 Microsoft C:\Users\fa2ly>ping Pinging 172.16.18.1 Reply from 172.16.1 Reply from 172.16.1	<pre>(Version 10.0.18362.657) Corporation. All right; g 172.16.10.1 -t l with 32 bytes of data: l0.1: bytes=32 timeclms l0.1: bytes=32 timeclms</pre>	) 5 reserved TTL=64 TTL=64 TTL=64 TTL=64 TTL=64 TTL=64 TTL=64 TTL=64 TTL=64 TTL=64 TTL=64 TTL=64 TTL=64 TTL=64			

Figure 3.3.6.5: Network Connection Details

Press the PC start button> search>CMD and inter>ping 192.168.1.1 -t inter.

## **Queues of Parent Concept:**

Step 1: Creates a parent concept's blog diagram



Figure 3.3.6.6: Network Topology of Parent Concept

Step 2: First we create two user blogs and create separate users under each block.

Queue List																				
Simple Que	ues	nterfa	ce Queue	s Queu	e Tree	Queue	Types													
+ -	•	ĸ	- 7	00 1	Reset Co	ounters	oo Rese	et All Counte	ers							E	ind			
# Na	ame		1	Target			Upload	Max Limit	Dow	nload Ma	x Limit	Packet Marks	;	U	pload Queued	B D	lownloa 🔻			
4 🚨	Mana	gemer	nt Blog	10.20.2	0.0/24		5M		5M											
0	🔒 Us	er1	-	10.20.2	0.2		2M		2M											
3	🔒 Us	er2		10.20.2	0.3		1M		1M											
5 🚊	Worke	er Blog	9	10.30.3	0.0/24		4M		4M											
1	🔒 Us	er3		10.30.3	0.2		4M		5M											
2	🚊 Us	er4		10.30.3	0.3		3M		3M											
Simple Queu	ue <us< th=""><th>er1&gt;</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>×</th><th>Add</th><th>ress List</th><th></th><th></th><th></th><th></th><th></th></us<>	er1>											×	Add	ress List					
General /	Advanc	ed	Statistics	Traffic	Total	Total St	atistics					ОК		÷	- /	8	- 7	]	ŀ	ind
Packet Ma	arks:									] ♠		Cancel	1		Address			Network	In	terface 🔻
	<u> </u>												41		÷ 10.10.10.1	0/24		10.10.10.0	F	TP Serber
				Target	Upload		Т	arget Downl	load			Apply			+ 10.20.20.1	/24		10.20.20.0	L	AN
Limit	it At·	nlimite	ed		Ŧ	unlimite	ed		∓b	its/s		Disable	1		+ 172.16.10	.1/24		172.16.10.0	L	AN
Drie	oritur [g	,				0						Comment	=		<b>+</b> 192.168.1	.2/24		192.168.1.0	N	/AN
		)				•			_			Comment	- 1							
Bucket S	Size: 0	.100				0.100			ſ	ratio		Сору								
Queue Ty	ype: d	efault	-small		₹	default	-small		Ŧ			Remove								
Par	rent: 1	lanag	jement Blo	g						Ŧ	Res	set Counters								
											Rese	t All Counters								
												Torch		•						•
														5 ite	ms					
																	_			
enabled													-1							

Figure 3.3.6.7: Simple Queues of Parent

**At first Click on,** "Queues>Simple Queues>General>Name: Example of: Management Blog>Target: Example of:10.20.20.0/24>Apply>Ok".

In the same way, we create the next blog and create a user of management blog.

**Next Click on,** "Queues>Simple Queues>General>Name: Example of: User1>Target: Example of: 10.20.20.2>Advanced >Parent: select management blog>Apply>Ok".

#### **3.3.7 DHCP Server Configuration with Mikrotik Router:**

**Step 1:** Select the interface for the Dynamic Host Configuration Protocol(DHCP) server configuration.

admin@00:0C:29:A0	:5E:B3 (MikroTik) - WinBox v6.46.2 on x86 (x86)
Session Settings Da	shboard
Safe Mode	Session: 00.0C:29:A0:5E:B3
🔏 Quick Set	DHCP Server
CAPsMAN	DHCP Networks Leases Options Option Sets Vendor Classes Alerts
Interfaces	+ - V X T DHCP Config DHCP Setup
🚊 Wireless	Name / Interface Relay Lease Time Address Pool Add AR
📓 🚆 Bridge	
📑 PPP	
°t <mark>8</mark> Mesh	
IP N	
🧷 MPLS 🗈 🗅	
🛒 IPv6 🗈	
🔀 Routing 🗈 🗎	
🚯 System 🗅	Select interface to run DHCP server on
Queues	DHCP Server Interface: ethemet-1 (LAN)
Files	Back ethemet-2 (WAN)
Eog	ethemet-3 (MAN)
A RADIUS	

Figure 3.3.7.1: DHCP Server Interface

**Click on,** IP>DHCP Server>DHCP>DHCP Setup>DHCP Server Interface: Select interface>**Step 2:** Input a DHCP address space for the Dynamic Host Configuration Protocol(DHCP) server.> DHCP Address Space: Example of 192.168.10.0/24>**Step 3:** Input a gateway for Dynamic Host Configuration Protocol(DHCP) network.> Gateway for DHCP Network: 192.168.10.1>**Step 4:** Input an address to give out for the Dynamic Host Configuration Protocol(DHCP) server.>Addresses to Give Out: 192.168.10.100-192.168.10.254>**Step 5:** Input a Domain Name System (DNS) server for the Dynamic Host Configuration Protocol(DHCP) Setup.> DNS Servers: Example of 8.8.8.8 and 124.6.224.4>**Step 6:** Input a lease time for the Dynamic Host Configuration Protocol(DHCP) Setup.>Lease Time: Example of 00:10:00>

**Step 7:**Let's see, if the Address Resolution Protocol (ARP) matches the user'sMedia Access Control (MAC) address.

				ARP	List			×
🚱 🔍 🗣 🕅 🕻 Control Panel 🔸 I	Network and Internet  Network C	onnections 🕨	- 4 Search Net 🔎	÷	- / × 6	7	Find	
Organize   Disable this netwo	Local Area Connection Status	1	x ) * 🗧 🖬 🔞		IP Address	MAC Address	Interface	-
Bluetoath Network Conn Disabled Whware Network Adapte Whware Virtual Ethernet.	general       Connection       IP-4 Connectivity:       IP-4 Connectivity:   <	Network Connection Details Network Connection Details Property Connection specific DN Decotoon Physical Address DHCP Enabled InVA Address InVA Subnet Nisak Lease Obtaind Lease Expires InVA Default Caseway InVA DHCP Server NeBIOS over Topp En Linkkoos IPKA Address InVA Default Caseway	Advance 10 Advanc		In Address           IT22 16.15.183           IT22 16.15.185           IT22 16.15.185           IT22 16.15.185           IT22 16.15.186           IT22 16.15.187           IT22 16.15.189           IT22 16.15.189           IT22 16.15.191           IT22 16.15.193           IT22 16.15.193           IT22 16.15.193           IT22 16.15.193           IT22 16.15.194           IT22 16.15.197           IT22 16.15.198           IT22 16.15.198           IT22 16.15.201           IT22 16.15.206           IT22 16.15.207	Mic. Address F4F2:60:28 E4:E7 E3:DE 27:50:07:18 18:A6:F7:63:E4:85 0C:80:63:98:B2:10 0C:80:63:98:B2:10 0C:80:63:98:B2:10 0C:80:63:98:B2:17 0C:45:55:C4:17 F8:14:67:36:A9:85 C2:08:68:F6:89:91 10:62:E8:14:00:55 D4:66:02:E6:C0:19 18:D6:C7:ED:88:CD D8:00:17:23:02:28 0C:80:63:76:16:38 C4:30:C7:70:40:8F F4:F2:60:D6:8F:17 B0:C5:54:33:84:69	Interface LAN LAN LAN LAN LAN LAN LAN LAN LAN LAN	
			Close	D	172.16.15.209 172.16.15.211 172.16.15.215	C8:3A:35:2A:C2:88 18:D6:C7:D7:4F:CD 18:D6:C7:54:EA:1F	LAN LAN LAN	-

Figure 3.3.7.2: ARP for DHCP Configuration

From PC setting click on network and go to local area connection from change adapter setting >Disable and enable>Double Click on Local Area Connection>Details>Show all information.

# 3.3.8 Bridge Configuration with Mikrotik Router:

Step 1: Ethernet ports of Mikrotik Router:

Interf	ace List										
Inte	face Interface List	Ethemet	EoIP Tunnel	IP Tunnel	GRE	Tunnel	VLAN	VRRP	Bonding	LTE	
<b>+</b>		- 7	Detect Inte	met						Fin	d
	Name	∇ Type		Actual N	UTN	L2 MTU	Tx			Rx	-
R	ethemet-3 (MAN)	Etheme	ŧ		1500				0 bps		12
R	ethemet-2 (WAN)	Etheme	t		1500				0 bps		12
R	ethemet-1 (LAN)	Etheme	t		1500				0 bps		12
R	♦ether7	Etheme	t		1500				0 bps		12
R	♦ether6	Etheme	t		1500				0 bps		12
R	♦ether5	Etheme	t		1500				0 bps		12
R	♦ether4	Etheme	t		1500				0 bps		12

Figure 3.3.8.1: Interface List of Bridge

Click on, Interfaces and show all Ethernet ports.

**Step 2:** Set up a bridge configuration.

Bridge	New Interface	
Bridge Ports VLANs	General STP VLAN Status Traffic	ок
+- ~ ~	Name: bridge 1	Cancel
Name	Type: Bridge	Apply
	MTU:	Disable
	Actual MTU:	Comment
	L2 MTU:	
	MAC Address:	Сору
		Remove
	ARP: enabled	Torch
	ARP Timeout:	
	Admin. MAC Address:	
•	Ageing Time: 00:05:00	
0 items out of 7	GMP Snooping	
	DHCP Snooping	
	✓ Fast Forward	

Figure 3.3.8.2: Create Bridge Name

To create a bridge, first you have to go to the bridge, click on the add button, go to the general option, give the bridge a name as required and select the bridge by type, then click OK.

Bridge										[	□ ×
Bridge	Ports VLANs	MSTIs	Port MST Override	es Filter	s NAT	Hosts	MDE	в			
+ -	• • ×	- 7	]							Find	
#	Interface	Bri	dge	Horizon	Trusted	Priority (	h P	Path Cost	Role	Root Pat	-
0	4=4LAN	bri	dge1		no		80	10	designated po	ort	
1	4=tether3	bri	dge1		no		80	10	backup port	10	
2	1-tether4	bri	dge1		no		80	10	backup port	10	
3	1=1ether5	bri	dge1		no		80	10	backup port	10	
4	4=tether6	bri	dge1		no		80	10	backup port	10	
5	1=1ether7	bri	dge1		no		80	10	backup port	10	
6	1⊐tether8	brid	dge1		no		80	10	backup port	10	
7 items (	1 selected)	Bridge Po General Interface Bridge Horizor Lean	It <ether8> STP VLAN S Ether8 Ether8</ether8>	itatus nicast Flo ulticast Fl ood	od				OK Cancel Apply Disable comment Copy emove		

Step 3: Let's add ports of bridge connection.

Figure 3.3.8.3: LAN Configure of Bridge Port

**Now click,** "Bridge>Ports>Add>General>Interface: Select interface>Bridge: bridge 1>Apply>Ok".

Step 4: Finally, apply bridge configuration for address lists.

Address List			×
+ ×	- 7	Find	
Address 🛆	Network	Interface	-
<b>+</b> 172.16.15.16/	172.16.15.0	ethemet-2 (WAN)	
🕆 192.168.1.1/24	192.168.1.0	bridge1	
🕆 192.168.2.1/24	192.168.2.0	bridge1	
· 192.168.10.1/	192.168.10.0	bridge1	
Address <192.16	8.10.1/24>		
Address: 192.	168.10.1/24	ОК	
Network: 192.	168.10.0	Cancel	
Interface: bridg	e1 Ŧ	Apply	
		Disable	
		Comment	
4 items		Сору	
		Remove	
enabled			

Figure 3.3.8.4: Change Interface

Final step, "Address list to select interface and apply> Ok"

#### **3.3.9** Website Blocking Configuration:

Step 1: Create layer 7 protocols to block the website.

Firewall				
Filter Rules NAT Mangle Raw Service Ports	Connections	Address Lists	Layer7 Protocols	
+ 7				Find
Name / Regexp				-
<ul> <li>YouTube ^.+(youtube.com).*\$</li> </ul>				
facebook ".+(facebook.com).*\$				
Firewall L7 Protocol <youtube></youtube>				
Name: YouTube		ок		
	Regexp:	Cancel		
^.+(youtube.com).*\$	* [	Apply		
		Comment		
		Сору		
		Remove		
2 items (1 se	-			

Figure 3.3.9.1: Firewall L7 Protocol

To create Layer Seven protocol, first go to IP from the firewall and then click on Layer Seven protocol. Now click on the plus username and input the data in the same way as given in the picture. Click on Apply.

Step 2: Create a filter rules to block the website.

Firewall									
Filter Rules NAT M	Mangle Raw	Service Ports Con	nections Addre	ss Lists	Layer7 Proto	cols			
+ - 🗸 🗙	- 7	00 Reset Counters	oo Reset Al	Counter	5		Find	all	Ŧ
#     Action     Cł       0     X drop     fo       1     X drop     fo       2     X drop     fo	nain Src rward 192 rward 192 rward 192	. Address 2.168.16.50 2.168.16.50 2.168.16.50	Dst. Address	Proto	Src. Port I	Dst. Port	In. Inter	Out. Int	ln. ▼
	Firewall Rule <	<192.168.16.50>				×			
	General Ad	vanced Extra Ac	tion Statistics		ок				
		Chain: forward	Ŧ		Cancel				
	Src	. Address: 🗌 192.	168.16.50 🔺		Apply				
	Dst	t. Address:			Disable				
		Protocol:			Comment				
<ul> <li>3 items (1 selected)</li> </ul>		Src. Port:			Сору				+
		Dst. Port:			Remove				
		Any. Port:			Reset Counter	s			
	In.	Interface:		R	eset All Counte	ens			
	Out	Interface:							
	In. Inte	erface List:							

Figure 3.3.9.2: Firewall Rule

Let's make a filter rolls. First let's click on firewall from IP. Click Add from Filter Rules. Now select Forward to Chain from General Options and type the source address and click Apply.

## **3.4.1Hotspot Server Configuration:**

Step 1: Create an IP pool for hotspot server.

IP Pool			
Pools Used Addre	esses		
+	$\overline{\mathbf{v}}$		Find
Name	Addresses	Next Pool	
🕆 HotsPot_Pool	192.168.15.2-192.168.15.254	none	
	IP Pool <hotspot_pool></hotspot_pool>		
	Name: HotsPot_Pool	ОК	
	Addresses: 192.168.15.2-192. 🗘	Cancel	
	Next Pool: none 🛛 🔻 🔺	Apply	
		Comment	
		Сору	
		Remove	
1 item (1 selected)			

Figure 3.4.1.1: IP Pool Configuration

Let's create a pool for the hotspot server. First we have to go from IP to pools and click on add as required.

Step 2: Select the interface for the hotspot server.

н	otspot						
5	Servers	Server Profil	es Users	User Profiles	Active	Hosts	IP Bindings
	+ -	X	TR	eset HTML	Hotspot	Setup	
	Name	e	∠ Interf	ace	Address	Pool	Profile
	Hotspo	t Setup					
	Select	interface to r	un HotSpot	on			
	Hot Sp	ot Interface:	HotsPot				₹
				Back	Next	(	Cancel

Figure 3.4.1.2: Hotspot Interface

To create a hotspot server, first click on hotspot from IP option and then click on hotspot setup from servers and select hotspot interface (LAN)>**Step 3:** Input a local address of the network.>Local Address of Network: Example: 192.168.15.1/24>**Step 4:** Input an

address pool of the network.> Address Pool of Network: Example: 192.168.15.2-192.168.15.254>**Step 5:** Select a Hotspot Secure Sockets Layer (SSL) certificate.> Select Certificate: none>**Step 6:** Select a Simple Mail Transfer Protocol (SMTP) server.> IP Address of SMTP Server: Example of 0.0.0.0>**Step 7:** Setup a Domain Name System (DNS) configuration for the Hotspot server.> DNS Servers: Example of 8.8.8.8>**Step 8:** Input a Domain Name System (DNS) name of the local hotspot server.>DNS Name: Example of mdbabu.com>Ok.

Step 9: Create a user profile for hotspot server.

Hotspot				
Users User Profiles	Active Hosts IP Bind	ings Service Ports	Walled Garden	
+ - 7				Find
Name /	Session Time Idle Time	eout Shared U	Rate Limit (rx/tx)	
R HotsPot_5MB		none 1		
* 😨 default		none 1		
	Hotspot User Profile <hot< th=""><th>sPot_5MB&gt;</th><th></th><th></th></hot<>	sPot_5MB>		
	General Queue Adve	ertise Scripts		ок
	Name:	HotsPot_5MB		Cancel
	Address Pool:	HotsPot_Pool	₹	Apply
	Session Timeout:		•	Сору
2 items (1 selected)	Idle Timeout:	none	₹ ▲	Remove
	Keepalive Timeout:	00:02:00	<b>▲</b>	
	Status Autorefresh:	00:01:00		
	Shared Users:	1		
	Rate Limit (rx/tx):		•	
		Add MAC Cookie		

Figure 3.4.1.3: Hotspot User Profile

Let's create a profile for the hotspot server. First we have to go from IP to Hotspot then click on add button in user profile. Select the name and address pool as required and click OK

Step 10: Create a hotspot user.

Hotspot				
Server Profiles U	Jsers User F	Profiles Active Hosts IP Bin	dings Service	Ports
+	× 🗖	00 Reset Counters 0	o Reset All Cour	nters Find
Server	∧ Name	Address	MAC Address	Profile 🔻
;;; counters and	limits for trial	Hotspot User <babu></babu>		
🧑 all	admin	General Limits Statistics		ОК
hotspot 1	pronob	Server: hotspot1	∓	Cancel
R hotspot 1	hasan	Name: babu		Apply
		Password:		Disable
		Address:	<b></b>	Comment
tems (1 selected)	)	MAC Address:	<b>-</b>	Сору
<u> </u>		Profile: HotsPot_5M	B ₹	Remove
		Routes:	<b>•</b>	Reset Counters
		Email:	<b>-</b>	Reset All Counters
		enabled		

Figure 3.4.1.4: Add Hotspot Users

To create a hotspot user, first go from IP to hotspot and then click on user, select server from general options, select name, password, and profile as required, click on Apply.

Step 11: Active user's details in hotspot connection

Hotspot									[	IX
User Profiles	Active	Hosts	IP Bindings	Service P	orts	Walled	Garden			
- 7									Find	
Server	🗠 Us	er	Domain	Addre	ss		Uptime		Idle Time	-
A hotspot	1 bal	bu		192.1	68.15	.90	00:0	07:14	00:00	:01
			Hotspot A	ctive User «	(babu	1>				×
			General	Statistics	Traf	fic			OK	
				Server:	hots	pot1			Bemove	
				User:	babu	J				- []
				Domain:						
•			_	Address:	192.	168.15.	90			-
1 item (1 selec	ted)		MAG	C Address:	2C:6	0:0C:64	:A4:16			
				Login By:	http-	chap				
				Uptime:	00:0	7:14				- 11
				Idle Time:	00:0	0:01				- 11
			Session	Time Left:						
			Idle	e Timeout:						- 11
			Keepalive	e Timeout:	00.0	2.00				- 11

Figure 3.4.1.5: Show Hotspot User

**Next on,** "IP>Hotspot>Actives> Double-click on any one of the user's list and check this user information>Ok".

Step 12: Connect user through hotspot.

login
password
OK
Hotspot gateway
powered by MikroTik

Powered by MikroTik RouterOS

Figure 3.4.1.6: Hotspot Log In Panel

Let's click OK with the username and password created in the Hotspot login panel Step 13: Hotspot connects successfully.

🖉 mikrotik hotspo	ot > status	× +		<u> </u>
$\leftrightarrow \rightarrow C$ (	D Not secure   1	mdbabu.com/status	☆ =J Md	:
🚺 Apps M Gm	ail 🕒 YouTube	💡 Maps 🏾 🧥 Inter	net Speed	**
	Welco	me babu!		<b>^</b>
	IP address:	192.168.15.90		
	bytes up/down:	125.4 KiB / 5.3 MiB		
	connected:	19s		
	status refresh:	1m		
	Ic	og off		-

Figure 3.4.1.7: Log in Success in Hotspot

# **3.4.2 PPPoE Server Configuration in Mikrotik Router:**

**Step 1:** Let's create an address list for Point-to-Point Protocol over Ethernet (PPPoE) server.

Address List		
+ - 🖌 🗶 🗂	T	Find
Address 🗸	Network	Interface 💌
172.16.15.16/24	172.16.15.0	WAN
🕆 192.168.100.1/24	192.168.100.0	LAN
2 items (1 selected)		

Figure 3.4.2.1: Address List for PPPoE Server

To create an address list, you must first go from IP to Address. Then click on add, address, network, interface as required and then click OK.

**Step 2:** Let's create a Point-to-Point Protocol over Ethernet (PPPoE) server.

🛇 admin@00:0C:29:49:5D:8B (MikroTik) - WinBox v6.46.2 on x86 (x86)	
Session Settings Dashboard	
Image: Safe Mode         Session:         00:0C:29:49:5D:8B	<b>a</b>
A Quick Set	
CAPSMAN Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets	
Interfaces	
Wireless     Service / Interface Max MTU Max MRU Default Profile Authentication	
28 Bridge	
New PPPoE Service	
°t <sup>o</sup> Mesh Service Name: PPPoE Server OK	
Interface: LAN 🐨 Cancel	
IVE IPv6 C Apply	
🚜 Routing 🗅 Max MRU: 📉 🗸 Disable	
@i System      NRRU:      Copy	
P Queues Keepalive Timeout: 10	
☐ Files Default Profile: default ₹	
E Log Diems One Session Per Host	
A RADIUS	
X Tools	
New Terminal     PADO Delay:     The second se	
X 🚛 LoRa Authentication: 🗹 mschap1	
the Dot1X	
E ODude N enabled	

Figure 3.4.2.2: PPPoE Server

To create a PPPoE server, first click on PPP to PPPoE server, then click on plus, then click OK with server name interface and authentication as required.

**Step 3:** Here the IP pool is created in Point-to-Point Protocol over Ethernet (PPPoE) server.

🛇 admin@00:0C:29:49:5D:8B (MikroTik) - WinBox v6.46.2 on x86 (x86)							f x
Session Settings Das App							
ю	0	Safe Mod	е	Accounting	E	B	<b>i</b>
	溢	Quick Set		Addresses			
	Î	CAPsMAN		DHCP Client	- 1		
	<b>]-88</b>	Interfaces		DHCP Relay	- 1		
	î	Wireless		DHCP Server	- 1	IP Pool	
	38	Bridge		DNS	- 1	Pools Used Addresses	
		PPP		Firewall			
	°t8	Mesh		Hotspot	- 1	Name / Addresses Next Pool	
	255	IP	1	IPsec	- 1		
	0	MPLS	$\[ \]$	Kid Control	- 1	New IP Pool	
	¥6	IPv6	$\[ \]$	Neighbors	- 1	Name: 5_MB_P OK	
	23	Routing	$\land$	Packing	- 1	Addresses: 192,168,100,2-192,168,100,254	
	-	System	$\uparrow$	Pool			
	9	Queues		Routes	- 1	Apply	
		Files		SMB		Comment	
		Log		SNMP		Сору	
	A	RADIUS		Services		Remove	
	×	Tools	$\[ \]$	Settings	- 1		
	2	New Terminal		Socks		0 items	
×	<b>]</b>	LoRa		TFTP			
B	<b>«¦&gt;</b>	Dot1X		Traffic Flow			
/in	0	Dude	$\land$	UPnP			
5	23	KVM		Web Proxy	- 1		

Figure 3.4.2.3: Pool Configure for a PPPoE Server

To create an IP pool, first you have to go from IP to Pool, then click on plus, then click Apply with the name and address as required.

**Step 4:** Here the profile is created in Point-to-Point Protocol over Ethernet (PPPoE) method.

PPP	New PPP Profile	
Interface PPPoE Servers Secrets Profiles A	General Protocols Limits Queue Scripts	ок
+ 7	Name: 5_MB	Cancel
Name / Local Address Remote Ad	Local Address: 192.168.100.1 🔻 🔺	Apply
* Gerauit-encr	Remote Address: 5_MB_P	Comment
	Remote IPv6 Prefix Pool:	Сору
	DHCPv6 PD Pool:	Remove
	Bridge:	
	Bridge Port Priority:	
	Bridge Path Cost:	
	Bridge Horizon:	
2 items		
	Interface List:	
	DNS Server: 8.8.8.8	
	124.6.224.4 🗢	
	WINS Server:	

Figure 3.4.2.4: Point-to-Point Protocol (PPP) Profile

To create a profile, first click on profile, then from General Options, name, local address, remote address and DNS server as required and click Apply.

Step 5: Here, a user is created in Point-to-Point Protocol over Ethernet (PPPoE) method.

PPP				
Interface PPPoE Servers Secr	rets Profiles Active C	Connections L2TP Secret	s	
+- ~ ~ 🕾 🍸	PPP Authentication	n&Accounting		
Name / Password Se	rvice Caller ID	Profile Local Add	dress Remote Addre	ess Last Logged Out
	New PPP Secret			
	Name:	MdBabu	ОК	
	Password:	•••••	▲ Cancel	
	Service:	рррое	Apply	
	Caller ID:		Disable	
	Profile:	5_MB	₹ Comment	
	Local Address:		- Сору	
	Remote Address:		▼ Remove	
0 items	Remote IPv6 Prefix:		-	
	Routes:		-	
	Limit Bytes In:		-	
	Limit Bytes Out:		•	

Figure 3.4.2.5: Point-to-Point Protocol (PPP) Secret

To create a user, click on secrets from ppp. Select the name, password, service and profile as required. Click on Apply.

**Step 6:** Here is the queue types created.

Queue List				
Simple Queues Interface Queu	ues Queue Tree	Queue Types		
+ - 7				Find
Type Name /	Kind	Queue Type <5_MB_0	Q_UP>	
5_MB_Q_Down	pcq	Type Name:	5 MB O LIP	OK
5_MB_Q_UP	pcq	Type Name.		
- default	ptito	Kind:	pcq Ŧ	Cancel
derauit-small	ptiro			
* betenet default	ртго	Rate:	5M bits/s	Apply
* multi-queue-ethemet-default	siq ma ofifo			
* only-hardware-queue	none	Queue Size:	50 KiB	Сору
* pcg-download-default	DCG	Total Queue Size:	2000 KiB	Bemove
* pcg-upload-default	pcq	10101 00000 0120.	2000	- Helliove
* synchronous-default	red	Durat Datas	<b>—</b> has /s	
* wireless-default	sfq	Burst Hate:	Dits/s	
		Burst Threshold:	· · · · · · · · · · · · · · · · · · ·	
		Burst Time:	00:00:10	
12 items (1 selected)		Classifier:	Src. Address Dst. Address	
			Src. Port Dst. Port	l l
		Src. Address Mask:	32	
		Dst. Address Mask:	32	
		Src. Address6 Mask:	64	
		Dst. Address6 Mask:	64	

Figure 3.4.2.6: Queue Type for a PPPoE Server

First someone clicks on the type plus plus a name in the type name, select PCQ in kind and select source address in classifier then apply OK

Let's create another queue type in the same way, select the destination address and click OK.

📎 admin@00:0C:29:49:5D:8B (MikroTik) - WinBox v6.46.2 on x86 (x86)						
Session Settings Dashboard						
<ul> <li>Safe Mode</li> <li>Session: 00:00:29:49:5D:8B</li> </ul>						
Auick Set Queue List						
CAPsMAN Simple Queues	Interface Queues Queue Tree Queue Types					
🔚 Interfaces	🖄 🖅 🛐 00 Reset Counters 00 Reset All Counters	Find				
Wireless      Wireless      H	Tarret Unload Max Limit Download Max Lim	it Packet Marke Total Max Lin 💌				
Bridge	Target Opload Max Linit Download Max Linit					
PPP New Simple	Queie					
°t% Mesh	Advanced Civilation Traffic Tatal Tatal Civilation					
ESE IP N	Advanced Statistics Trainic Total Total Statistics	OK				
Ø MPLS N	Name: 5_MB	Cancel				
IPv6 N	Target: 192.168.100.0/24	∓				
🚧 Routing	Dst.:					
∰ System ►	Tarrat Upland Tarrat Dawn	and Comment				
🖤 Queues						
Files Max	: Limit: Unlimited	■ bits/s     Copy				
Elog -A-Burst		Remove				
ARADIUS	Lumit: unlimited	bits/s     Reset Counters				
🔀 Tools 🗈 Burst Thre	shold: unlimited	bits/s     Reset All Counters				
New Terminal Burst	Time: 0 0	s Tarah				
🔀 🏣 LoRa 🛛 🔫 – Time						
🔏 🚸 Dot 1X						
🚝 🎯 Dude 🗈 📄						
KVM enabled						

Step 7: Here, the name and the specific IP range are inputted.

Figure 3.4.2.7: Simple Queue for a PPPoE Server

Clock the, "Queues>Simple Queues>General>'+'>Name: Example: Five\_MB>Target: Example:192.168.100.0/25>Next step

Step 8: Some of the required "Queue Types" have been selected.

Simple Queue <5_MB>					
General Advanced Statistics Traffic Total		OK			
Packet Marks:	•	Cancel			
Target Upload Target Download	ł	Apply			
Limit At: unlimited 🔻 unlimited 🔻	bits/s	Disable			
Priority: 8	]	Comment			
Bucket Size: 0.100 0.100	ratio	Сору			
Queue Type: 5_MB_Q_UP ₹ 5_MB_Q_Dow ₹	]	Remove			
Parent: none	₹	Reset Counters			
		Reset All Counters			
		Torch			
enabled					

Figure 3.4.2.8: Simple Queue of Advanced Option for PPPoE Server

Next, "Queues>Simple Queues>Advanced>Queue Type: Five\_MB\_Q\_UPl/ Five\_MB\_Q\_Dow >Apply>Ok".

# 3.4.3 Bind MAC Address:

Step 1: Select the 'reply-only' option for MAC binding.

Interface List	Interface <ether2></ether2>		
Interface Interface List Ethemet Eol	General Ethemet Loop Protect Status Traffic	OK	
+ * * - 7 0	Name: ether2	Cancel	Find
Name / Type	Type: Ethemet	Apply	′s) Rx Packet (p/s) FP 1 ▼
R Area Ethemet	MTU: 1500		0 9
;;; LAN R stether? Ethemet	Actual MTU: 1500	Disable	13 9
::: FTP Server	L2 MTU: 0	Comment	
R <>ether3 Ethemet	MAC Address: 00:0C:29:F4:11:00	Torch	0 9
	ARP: reply-only	Cable Test	
	disabled ARP Timeout: enabled	Blink	
	local-proxy-ap	Reset MAC Address	
	reply-only		
•			•
3 items (1 selected)			

Figure 3.4.3.1: Interface to General Setting

**Click on,** "Interfaces>Select ether2 (LAN) and (Double click>General>ARP: reply-only>Apply>Ok".

**Step 2:** Enter Media Access Control (MAC) address in Address Resolution Protocol (ARP).



Figure 3.4.3.2: Add Media Access Control (MAC) Address

**Click the,** "IP>ARP> + >IP Address: 192.168.16.50> MAC Address: EC-A8-6B-70-0A-5D>Interface: LAN Example: ether2>Apply>Ok".

# **CHAPTER 4**

### **Conclusion and Future Career & Opportunities**

#### 4.1 Conclusion and Discussion:

I have learned every configuration of a microtic router to properly provide internet service to every employee of a company and wanted to know how to build this network. I have been IP class. The main learning of this project is that the link can be configured in any way, it includes bay bandwidth control, Network address (NAT) configuring, networks guide my internship all control work control system and improved my position for efficient calendar home. There are many types of information in this internship that will help me to move forward. Improving the security system to keep the server secure and controlling the quality tests with Chaitali Update Programming. The method of the microtic operating system has been kept steady, confident and in a wide range of patients. Now, depending on the Internet network of several organizations it exists as a regular network design for an organization to talk about, Cannot manage Total Network.

#### 4.2 Future Career & Opportunities:

Jobs are available in our country without skills. The reason why an internship can make a big difference in my life is that here I can develop my scale so I chose the internship. So, this internship includes some of my previous experiences:

- ➢ IT Support Specialist
- IT Networking Specialist
- Cyber security Specialist
- Software & Web Developers
- Data Specialist

# REFERENCES

- [1] IP Subnetting, available at <<https://www.cloudflare.com/learning/networklayer/what-is-a-subnet/>>, Access on 3 January'2020 at 09:25pm.
- [2] About Prisma Digital Network Limited, available at <<http://www.prisma.net.bd/>> Access on 15 January'2020 at 08:55pm.
- [3] IP Addressing, available at <<https://www.geeksforgeeks.org/introduction-ofclassful-ip-addressing/>> Access on 20 January'2020 at 01:39pm.
- [4] High CPU usage, available at << https://forum.mikrotik.com/viewtopic.php?t=132839>> Access on 25 January'2020 at 09:38pm.
- [5] Dynamic Host Configuration Protocol Configuration, available at <<https://www.ccnablog.com/dhcp-dynamic-host-configuration-protocol/>>, access on 07 February'2020 at 01:23pm.
- [6] Static-IP Configuration, available at <<https://docs.novatel.com/OEM7/Content/Ethernet\_Configuration/Static\_IP\_Address \_Config.htm/>> Access on 11 February'2020 at 06:50pm.
- [7] Bandwidth Management, available at <<https://www.miro.co.za/how-to-setupbandwidth-limitation-by-using-mikrotik-router-board/>> Access on 16 February'2020 at 10:20pm.
- [8] PPPoE Server Configuration, available at <<https://itmikrotik.blogspot.com/2016/07/blog-post.html >> Access on 21 February'2020 at 08:29pm.
- [9] ISP Bandwidth Management, available at <<https://systemzone.net/ispbandwidth-management-with-Mikrotik-pcq/>> Access on 19 February'2020 at 11:53pm.

# **APPENDICES**

# Appendix:Company Information



Head Office

Name	Prisma Digital Network Limited
Address	34, Kemal Ataturk Avenue, Awal Center Level-3,Banani, Dhaka-1213
Telephone	02-9857808, 9857811
Fax	8900780
Website	www.prisma.net.bd
Type of Organization	Nationwide Internet Service Provider (ISP)

Netv	work manag	ement using Mik	rotik		
ORIGIN	ALITY REPORT				
2 SIMIL/	8% ARITY INDEX	% INTERNET SOURCES	% PUBLICATIONS	28% STUDENT	PAPERS
PRIMAR	Y SOURCES				
1	Submitter Student Paper	d to Daffodil Inte	rnational Univer	rsity	23%
2	Submitted University Student Paper	d to American In / Online	tercontinental		1%
3	Submitted Student Paper	d to University of	f Central Lancas	shire	1%
4	Submittee Student Paper	d to New Lanark	shire College		<1%
5	Submittee Student Paper	d to QA Learning	)		<1%
6	Submitter Student Paper	d to Southeast T	echnical Institut	e	<1%
7	Submittee Student Paper	d to Study Group	Australia		<1%
8	Submittee Student Paper	d to IPMC Labor	ne		<1%

Submitted to Kaplan University

9

-					
-	<b>ba</b> 1.00	- m - m	6 E		 
-				- 34	
-					

	Student Paper	<1%
10	Submitted to Middlesex University Student Paper	<1%
11	Submitted to University of East London Student Paper	<1%
12	Submitted to Gateway College Student Paper	<1%
13	Submitted to University of Maryland, University College Student Paper	<1%
14	Submitted to Croydon College Student Paper	<1%
15	Submitted to NCC Education Student Paper	<1%

Exclude quotes Off Exclude bibliography Off Exclude matches

Off