**HOW TO MAKE USE GITHUB DESKTOP FOR DEVELOPING PROJECT**

This report was written to show the author responsibility while doing Field Work Practice program at

**PT. DUTA COMPUTER**

Period January 7th, 2019 until May 7th, 2019



**MUHAMMAD KHALIL ALFARIZI**

**NIS: 17.7724**

**Skill Program : Information and Communication**

**Skill Competency : Computer and Network Engineering**

**RIAU ISLAND EDUCATIONAL DEPARTMENT**

**VOCATIONAL HIGH SCHOOL 1 BATAM**

Jl. Prof. Dr. Hamka 1 Batu Aji – Batam. Phone (0778) 365903

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MOTTO

Hard work betrays none,but dreams betrays many.

# INDUSTRY APPROVAL PAGE

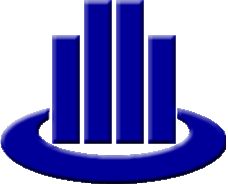
**HOW TO MAKE USE GITHUB DESKTOP FOR DEVELOPING PROJECT**

This report has approved and authorized as one of the field work practice programs at the 4th semester in **Vocational High School 1 Batam**

This approval sheet has been authorized in

**PT. DUTA COMPUTER**

On Tuesday, May 7th 2019 by:



|  |  |  |
| --- | --- | --- |
| **Industry Advisor,** |  | **Intern Coordinator,** |
| **RUSLAN**  Chief Technician | **DEKCY** Mentor |

**PT. DUTA COMPUTER**

# SCHOOL APPROVAL PAGE

**HOW TO MAKE USE GITHUB DESKTOP FOR DEVELOPING PROJECT**

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On Saturday May 7th 2019 by:

|  |  |  |
| --- | --- | --- |
| **Industrial Coordinator,** |  | **Counselor of Report,** |
| **Junaidi, S.Pd** NIP. 19820711 200903 1 003 | **Yarliasyah Agustian, S.ST**  NIP.19860802 200903 1 002 |

**Headmaster of Vocational High School 1 Batam**,

**Lea Lindrawijaya Suroso, M.Pd**

NIP. 19690124 199503 2 005

# PREFACE

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All praise and gratitude prayed to Allah SWT, because the blessings, mercy and grace The Author can resolve this report as one of the goals of the activities of Field Work Practice (PKL) which The Author do.

This report is based on data, knowledge and information that The Author get as long as do the Field Work Practice program at PT. Duta Computer. During The Author follow the learning in the industry, The Author gets a lot of knowledge that is very useful for Author. Author expects this report to be useful to the readers.

Therefore, on this occasion The Author is grateful profusely to my father, mother, and my beloved brothers who always provide both the moral and material support, as well as the industry that has given many contribute in the implementation of Industrial Work Practice, namely:

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3. Dekcy Syhaputra, Alvino Simalango, Riced Novrianus as Mentor’s Technician
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8. Mr.Yarliansyah Agustian, S.ST. as my report advisor.
9. Mrs. Putri Wulandari, S.S. as Industry Guidance.
10. Mrs.Mike Musna, S.Pd. as Author teacher room XI TKJ Axioo.
11. And for all friends, that have educated and taught The Author during the learning was beginning until finished this report.

The Author realize this report still has many lacks. Because of that, The Author need the critique and the constructive suggestion for fullness of this report. The Author also deeply apologize, if in this report readers find mistakes and words that unable to please. Hopefully this report could be useful for all of us.

Batam, 13th May 2019

**Author**

**Muhammad Khalil Alfarizi**

**NIS. 17.7724**

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# CHAPTER I INTRODUCTION

## Background Selection of Titles

Current Internet trends are improvements in connections that are always available, increased equipment using IP addresses, the need for public / global IP addresses, and reduced connection costs. This trend will lead to a crisis of IP addresses, which are then resolved with IPv6 technology.

In a business perspective, the implementation of IPv6 enables savings in network operating costs, such as automatic address configuration and unlimited IP addresses, and enables new sources of revenue from VoIP and P2P. This advantage is not without obstacles. IPv6 operations require changes to the device (hard and / or soft), additional training, and the obligation to continue operating the IPv4 network, because there are still many IPv6 services running on IPv4. Staying in operation on pure IPv4 technology will result in higher operating costs in the future. Old technology and the scarcity of addresses will create an opportunity cost that is increasingly greater than the cost of migration to IPv6.

The decision to migrate to IPv6 is still in a balanced position. Technically, IPv6 fixes many of the things currently faced. But on a business basis, it is still too early to estimate the cost of migration to achieve optimal levels of IPv6 usage. In the long run, IPv6 will replace IPv4 globally because of its superiority, and inevitably, we must begin to understand the technical and business consequences of this technology. Furthermore, as technology progresses and I choose title of my report is ”Internet Protocol Version 6 Network Address Translation”.

## The Purposes

The purpose of making this report are :

1. As readers can know what is internet protocol version 6.
2. As readers can know what is the MikroTik Configuration.
3. As readers can know what are items and tools requirement for internet protocol version 6 NAT configuration on MikroTik devices.
4. As readers can know how to configure the internet protocol version 6 NAT on MikroTik devices.
5. As readers can know what are problem on the Internet protocol version 6 NAT and the problem solving.

## The Issues

In this part I will explain about the issues when making this report. There are four main problems :

1. What is Internet Protocol Version 6 (IPv6)
2. Items and tools requirement for Configure IPv6 NAT on MikroTik
3. Configure IPv6 NAT on MikroTik
4. Problems on the IPv6 NAT and the problem solving

# CHAPTER II COMPANY OVERVIEW

## Background of the Company



Picture 2.1. PT. Graha Telekomunikasi Indonesia

PT. Graha Telekomunikasi Indonesia (GTI) was established in early 2007, focusing to operate and to maintain its services of internet and leased line in the high rise buildings in Jakarta , Batam, Bekasi and Bogor. Our initial project was the implementation telecommunication infrastructure and services in Permata Kuningan building Jakarta.

Here in after, GTI operates the services exclusively, such as closed group telephony services, internet access and point to point leased line. The users are variants of business offices, e.g. international transport carrier, heavy construction company, and medium offices. The state of the art and well-maintain services of GTI will be a value adding to the buildings, therefore increasing the property value.

In 2008, GTI has expanded its business in reselling the internet bandwidth capacity and leased line in Jakarta and Batam Island. In line with this expansion, GTI resells also the telecommunication equipment such as UPS, converter E1 to Ethernet, Interface G.702, BWA Microwave.

In 2009, Moratelindo has restructured its business, more in focusing being operating company on the area of telecommunication backbone and spin off its share in GTI. GTI is being an independent company. In line with this development, GTI expands its business in to IT services in closed cooperation with a number major telecommunication system manufacture e.g, Alcatel Lucent and ECI. GTI has been awarded to construct the DWDM system equipment as part of the Sumatera and Java backbone ofMoratelindo.

In 2015 we started new solution “**Fiberme**”, ICT solution with FTTH. Pure Fiber Internet for Residential and Business use.

## Vision and Mission

* + - 1. Vision

GTI has the vision to be the most creative and innovative company in contributing the development of infrastructure and services of telecommunication and information technology in Indonesia.

* + - 1. Mission

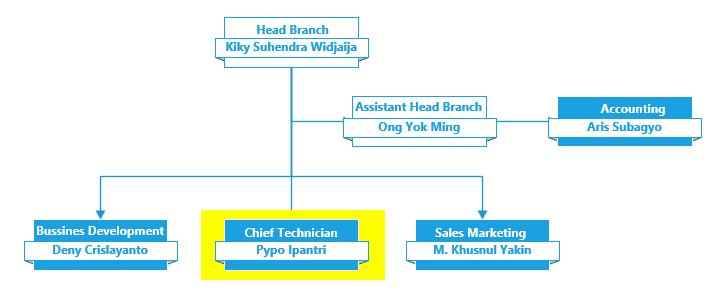
GTI is committed to providing a portfolio of modern, high quality telecommunications and information services to the customers. GTI wants to help our customers to achieve their goals.

## Field of Services

The company is involved in providing internet and tv network for home and business / office installations. types of services offered in the form of:

1. Data
2. Internet Connection (wired & wireless)
3. Internet Bandwidth Leased Line
4. Wifi Spot & Internet Data Center
5. server co-location
6. Web Hosting, email server
7. Fixed Telephony Infrastructure
8. Local, SLI, SLJJ services via PT. Telkom
9. Closed User Group (PABX System/IPPhone)
10. Mused Nortel Technology
11. Backbone
12. Leased Line
13. Fiber Optic
14. Radio Microwave
15. Multimedia & Digital Advertising
16. IP TV, Television
17. Text, Graphic/Animation Flash
18. Audio-Video
19. IBC ( In Building Cellular )
20. Indoor coverage cellular network (GSM/CDMA)
21. Multi Operator STBS
22. Security System
23. CCTV
24. Protection access, secure Integration system
25. Report & Recording

## Organizational Structure



Picture 2.2. Organization Chart of PT. Graha Telekomunikasi Indonesia Batam

## 2.5. Company Regulation

### The Code Of Conduct And Discipline Work Company

Every employee comes in on time on the schedule that has been awarded the finger scan at the time in or out of work.

Every technician must maintain the equipment has been loaned by the company and bringing it fully while working in the field.

Always give priority to safety and security in working

Courtesy of everyone including your boss, employees, guests, and even customers

### Company Procedures

1. Customers report problems or need them to on-call centers.
2. Admins who are in charge of receiving requests from customers by asking id or address customer then makes a work warrants.
3. Warrant the work submitted to the Chief Engineer for technicians who were in the field or the requested area customers.
4. The technician is working as a State field with emphasis on safety and security.
5. First, technicians check the readiness of the network to the customer's home. If there is a constraint when work engineer reporting to the Chief Engineer for the given direction.
6. Technicians ask confirmation to customers about the work that has been done and submitted to the admin to note and accounted

# CHAPTER III DISCUSSION

## General Theory

### 3.1.1 Internet Protocol Version 6

Internet Protocol version 6 (IPv6) is the most recent version of the Internet Protocol (IP), the communications protocol that provides an identification and location system for computers on networks and routes traffic across the Internet. IPv6 was developed by the Internet Engineering Task Force (IETF) to deal with the long-anticipated problem of IPv4 address exhaustion. IPv6 is intended to replace IPv4. In December 1998, IPv6 became a Draft Standard for the IETF, who subsequently ratified it as an Internet Standard on 14 July 2017.

Devices on the Internet are assigned a unique IP address for identification and location definition. With the rapid growth of the Internet after commercialization in the 1990s, it became evident that far more addresses would be needed to connect devices than the IPv4 address space had available. By 1998, the Internet Engineering Task Force (IETF) had formalized the successor protocol. IPv6 uses a 128-bit address, theoretically allowing 2128, or approximately 3.4×1038 addresses. The actual number is slightly smaller, as multiple ranges are reserved for special use or completely excluded from use. The total number of possible IPv6 addresses is more than 7.9×1028 times as many as IPv4, which uses 32-bit addresses and provides approximately 4.3 billion addresses. The two protocols are not designed to be interoperable, complicating the transition to IPv6. However, several IPv6 transition mechanisms have been devised to permit communication between IPv4 and IPv6 hosts.

IPv6 provides other technical benefits in addition to a larger addressing space. In particular, it permits hierarchical address allocation methods that facilitate route aggregation across the Internet, and thus limit the expansion of routing tables. The use of multicast addressing is expanded and simplified, and provides additional optimization for the delivery of services. Device mobility, security, and configuration aspects have been considered in the design of the protocol.

IPv6 addresses are represented as eight groups of four hexadecimal digits with the groups being separated by colons, for example 2001:0db8:0000:0042:0000:8a2e:0370:7334, but methods to abbreviate this full notation exist.

### 3.1.2 Advantages and Disadvantages of Using Internet Protocol Version 6

1. **Advantages**
   * + 1. New header format. The new IPv6 header is more efficient than IPv4 headers (because it has smaller overhead). This is obtained by removing some parts that are not important or obtained.
       2. A much larger number of addresses. With a bit specification for a standard 128-bit address it means that IPv6 will provide 2128 requesting unique addresses. All that will be allocated is not enough for future needs that require NAT technology on IPv4 no longer need to be used.
       3. Efficient and hierarchical routing and structuring of infrastructure. The hierarchical IPv6 addressing architecture makes routing infrastructure efficient and hierarchical as well. The existence of the skup concept also facilitates addressing management for various transmission technology modes.
       4. Plug-and-play capabilities through stateless and statefull address auto-configuration. In IPv6 technology, a node that requests an address can be automatically obtained (global address) from an IPv6 router or enough to talk about it yourself with a specific IPv6 address (local link address) without needing to consider a DHCP server like IPv4. This will also facilitate configuration. This is important for the success of future addressing technology because on the future of the Internet more and more nodes will be connected. Household appliances and even humans can have IP addresses. Of course this requires simplicity in its configuration. Automatic configuration of IPv6 will make it easier for each host to get an address, find neighbors and the default router uses more than one default router for efficient redundancy
       5. Security has become a standard built-in. If the IPv4 IPsec feature only applies to IPv6 IPsec features are standard specifications. IPv6 packages can be directly secured at the network layer.
       6. Better support for QoS. The presence of new sections in the IPv6 header for traffic approval (Flow Labels) and Traffic Classes for traffic priorities makes more secure QoS available, even compiling payloads from encrypted packages with IPSec and ESP.
2. **Disadvantages**
   * + 1. IPv6 operations require new (hard and / or soft) device changes that support it.
       2. There must be additional training, as well as the obligation to continue operating the IPv4 network, because there are still many IPv6 services running on IPv4.

## 3.2 Working Procedure

### Item and tool requirement for Monitoring Network

Before we start, we need to bring the items and tools as follows:

1. Items
   * + 1. MikroTik Device



Picture 3.1. MikroTik RB750Gr2

* + - 1. Laptop / PC



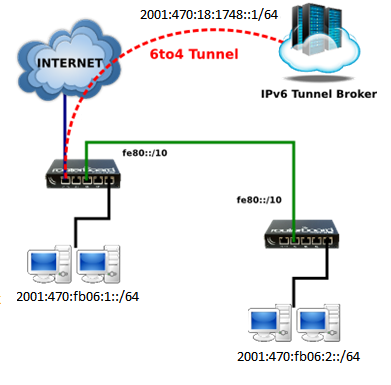
Picture 3.2. Laptop / PC

1. Softwares
   * + 1. Winbox



Picture 3.3. Winbox

* + 1. **Topology**

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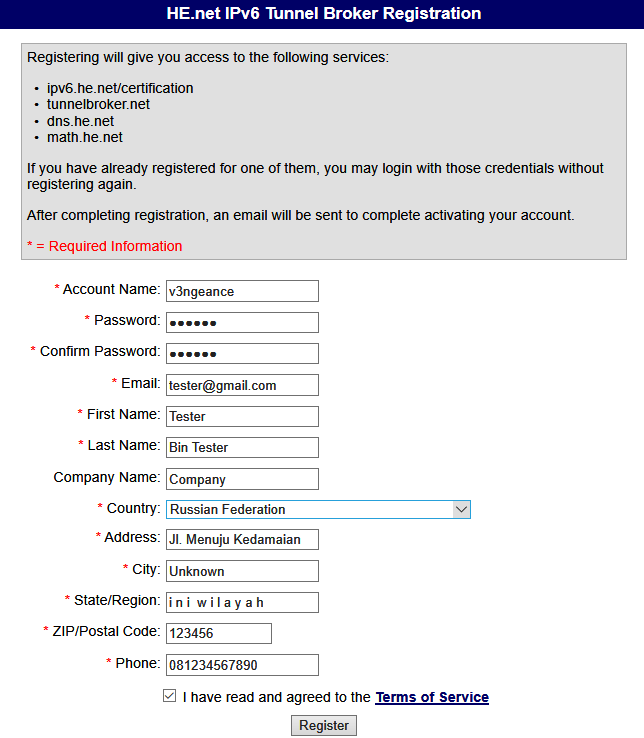
Picture 3.4. Network Topology

Here we use 2 routers, router1 to connect to the internet and a tunnel service,router2 and clients, router2 to forward the connection to the other clients.

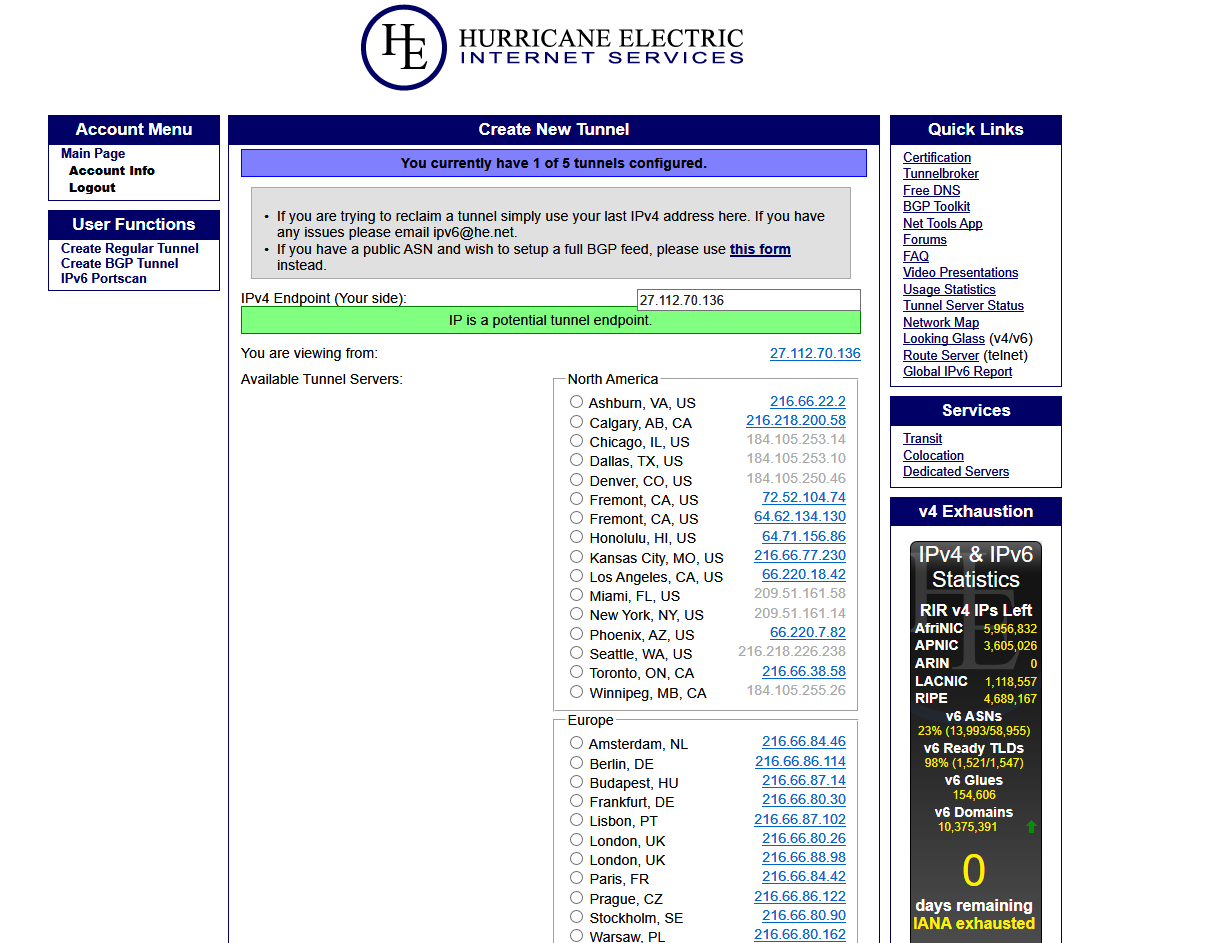
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* + 1. **IPv6 NAT Using MikroTik**

1. Making The Tunnel To IPv6 Using Tunnel Broker
2. Register to a Tunnel Broker service, such as Hurricane Electric (https://tunnelbroker.net).
3. Create a Regular Tunnel by registering our Public IPv4 address.
4. Select the nearest Tunnel Server location.

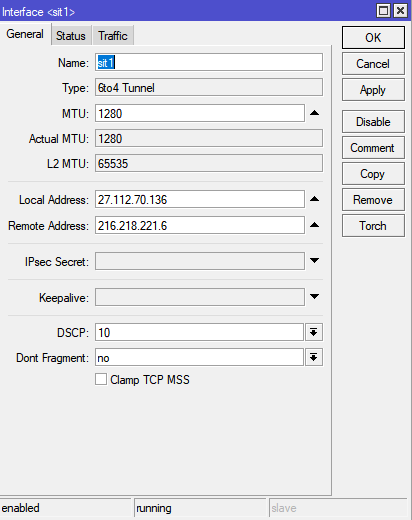


Picture 3.5. Tunnel Broker Service registration

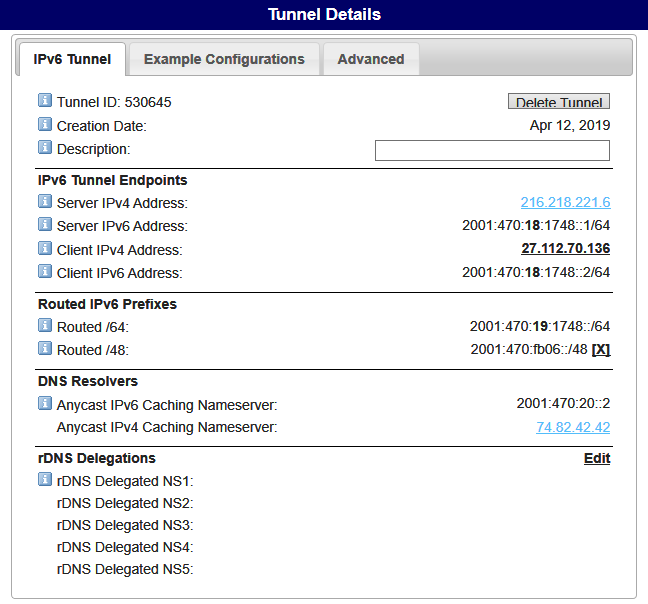


Picture 3.6. Creating a Regular Tunnel

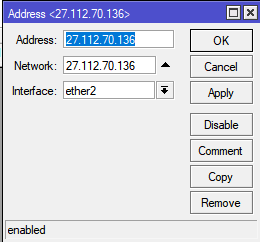
1. Configuring The 6to4 Interface in The first Router.
2. Add 6to4 tunnel interface.
3. In the 'Local Address' parameter, insert it with Public IPv4 address which we use to register into the Tunnel Broker.
4. In the 'Remote Address' parameter insert it with Public IPv4 address from the Tunnel Server, The alloction can be seen in the tunnel details.
5. Add our Public IPv4 in the Internet Resource Interface.



Picture 3.7. 6to4 Interface Configuration Details

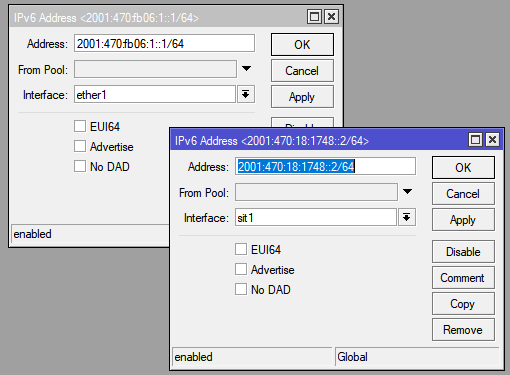


Picture 3.8. Address Allocation on the Tunnel Details

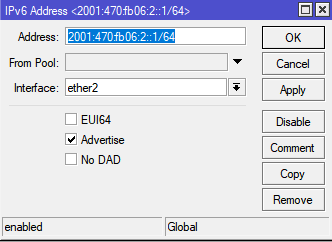


Picture 3.9. Add Public IPv4 Address in the Internet Interface

1. Add the IPv6 address in The Router
   1. Add the IPv6 address in the first router for The Tunnel (6to4) Interface according to the allocation in the Tunnel Details,and for Interface that connects to th Second Router.
   2. Add the IPv6 address in the second router for The Interface that connects to the first router,and For LAN (Client).

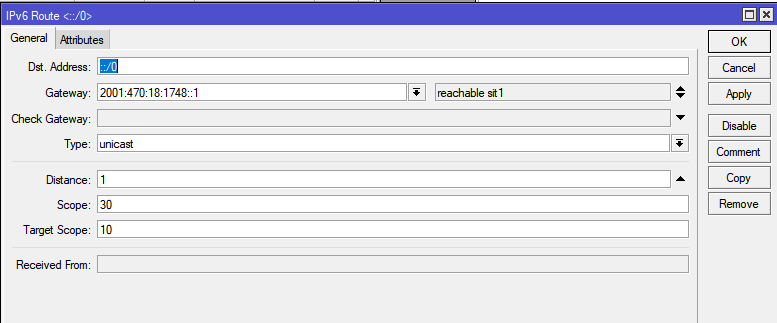


Picture 3.10. Router 1 Address Configuration,To router 2 (top),to the tunnel service (bottom)

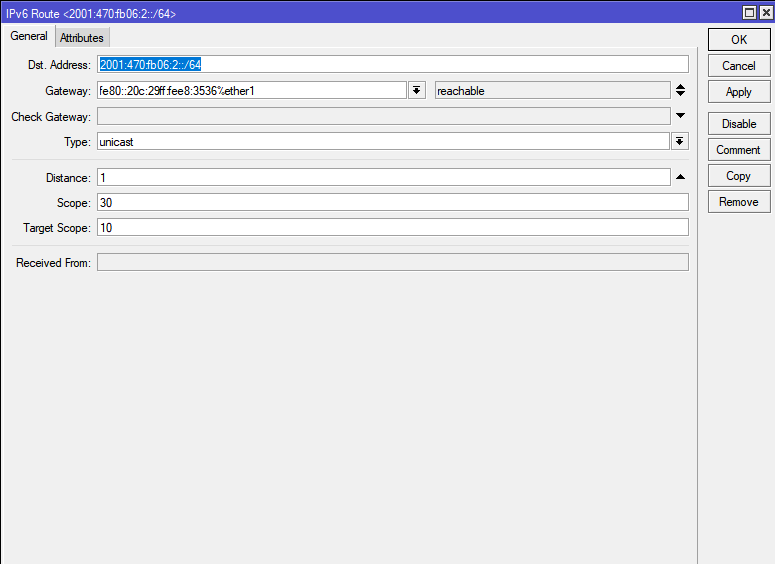


Picture 3.11. Router 2 Address Configuration,to Client

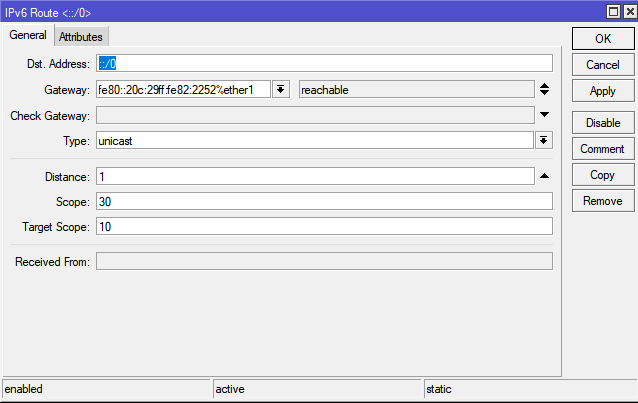
1. Add the Route rule
2. Route the first Router to the internet (::/0) with a tunnel server’s Address as a gateway.
3. Route the first Router to second router using destination’s link-local address%destination interface as a gateway, so does with the second router.



Picture 3.12. Route to the Internet



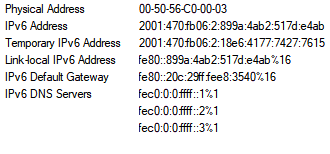
Picture 3.13. Route from the first Router to the second Router

****

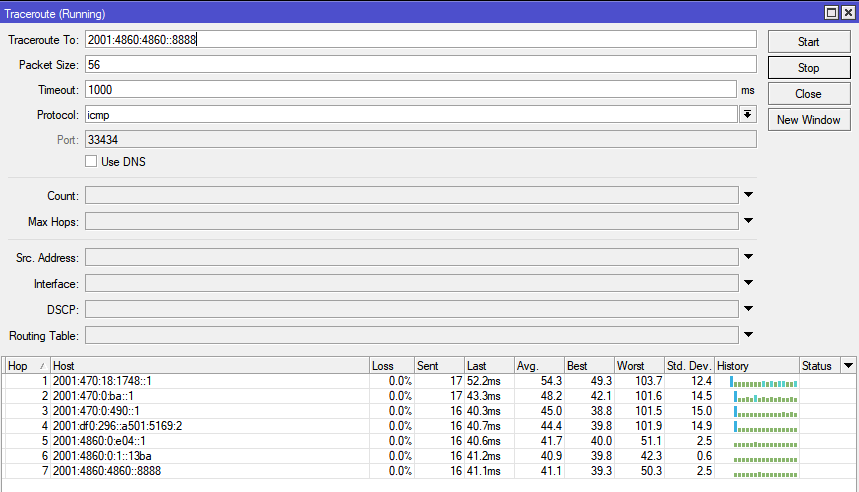
Picture 3.14. Route from the second Router to the First Router

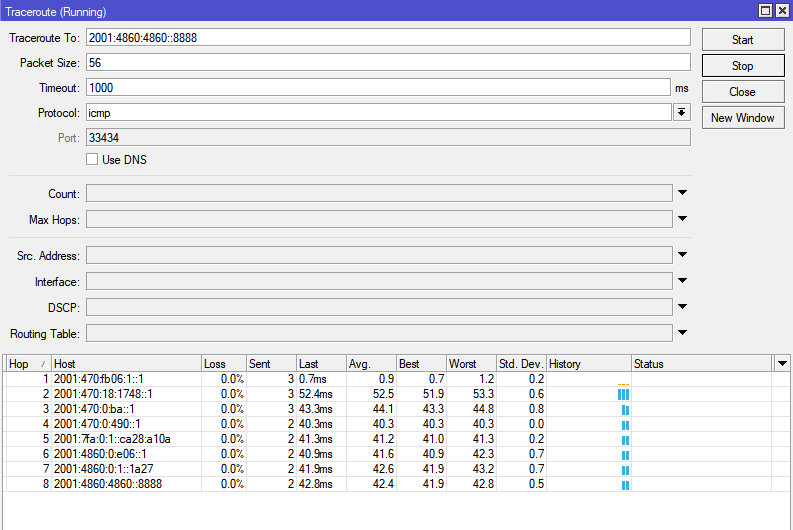
1. Client Configuration

For client configurations we can obtain for IPv6 allocations. The client will automatically get an allocation from the advertise router. In this step there is no need for a DHCP Server, because for IP Address allocation using Stateless Mechanism so that later PC / Laptop (client) will use EUI-64 as an Interface ID.

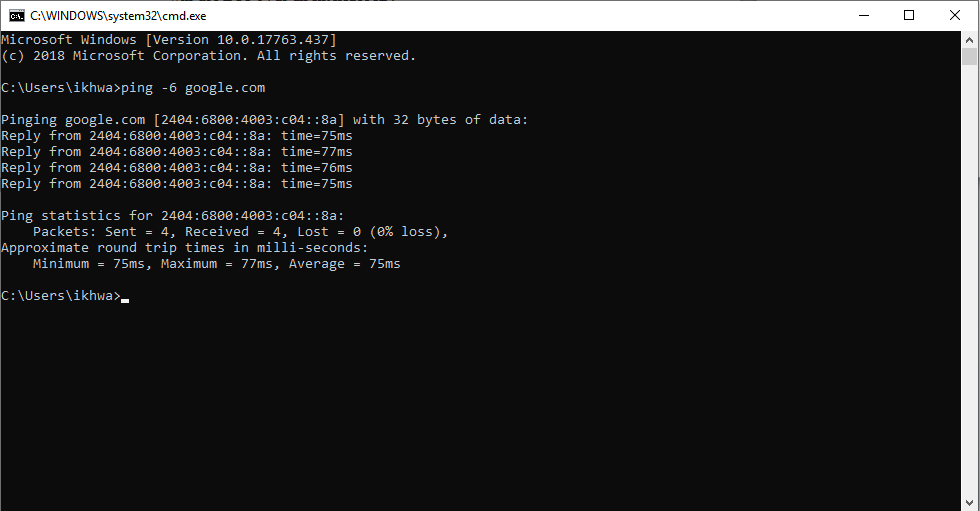
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Picture 3.15. Client Autoconfigured IPv6 Address

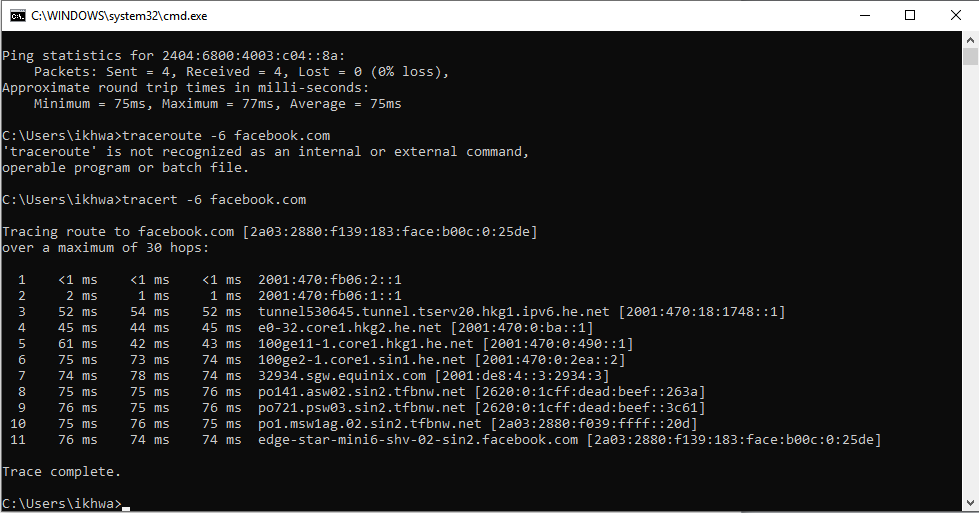
1. Final Configuration Test
2. We can do traceroute on both router to IPv6 address,example: Google IPv6 Public DNS [2001:4860:4860::8888].  
   

Picture 3.16. Router1 succeeded Traceroute testPicture 3.17. Router2 succeeded Traceroute test

1. We can also test it on the client via the command prompt with ping and traceroute command.



Picture 3.18. Succeeded Client IPv6 ping to Google via Command Prompt



Picture 3.19 Succeeded Client IPv6 Traceroute to Facebook via Command Prompt

# CHAPTER IV CLOSING

## Conclusion

In the last chapter of this report, the author has several conclusions that can be drawn from the author's report, namely:

1. IPv6 is the network implementation with 128-bit addressing.
2. IPv6 NAT will done automatically after route.
3. The development of internet technology cannot be separated from technological developments
4. Although the provision of internet networks still has drawbacks, these disadvantages can be covered with many advantages.
5. The order of the IPv6 NAT Setup steps is the preparation of items and tools, then we create the 6to4, then we will set up the configuration according to the procedure.
6. There are a number of problems in the ONU network that are twisted by several factors: the router or ONU is turned on for too long, error and accidental settings from the customer.

## Suggestions

1. IPv6 is now quite good for replace the IPv4 due to the Address Exhaustion.
2. Before setting up, check the tools and items first.
3. While in the field, do good and neat work, honest and prioritize safety.
4. Try not to be nervous when setting up and connecting to the internet for good results.

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