Mikrotik Router Configuration using IPv6

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ABSTRACT: The Internet is a computer network that millions of people use every day. Understand the design strategies used to solve computer networking problems while you learn Network works. Computer networking has changed the life style of world. People can work from home while they keep an eye on their children. Companies can con- duct video conferences and share software. Information on just about any conceivable subject is available at the click of a mouse. For this project a new typeof hardware complier is created. This hardware complier will simple topology for physically design a suitable network in- tended for specific communication. With this new technology,itis possible to design any thingfromasmall network to amore complex network.

KEYWORDS: Mikrotik, Router Board, VPN, Router OS, FTP.

I. INTRODUCTION

The main product of MikroTik is an operating system based on the Linux kernel, known as the MikroTik RouterOS. Installed on the company's proprietary hardware (Router BOARD series), or on standard x86-based computers, it turns a computer into a network router and implements various additional features, such as firewalling, virtual private network (VPN) service and client, bandwidth shaping and quality of service, wireless access point functions and other commonly used features when interconnecting networks. The system is also able to serve as a captive-portal-based hotspot system.

The operating system is licensed in increasing service levels, each releasing more of the available Router OS features. A MS Windows application called Win box provides a graphical user interface for the Router OS configuration and monitoring, but Router OS also allows access via FTP, telnet, and secure shell (SSH). An application programming interface is available for direct access from applications for management and monitoring. Router OS supports many applications used by Internet service providers, for example OSPF, BGP, Multiprotocol Label Switching (VPLS/MPLS), Open Flow. The product is supported by Mikrotik through a forum and a wiki, providing assorted and thematic examples of configurations. Router OS supports Internet Protocol Version 4 (IPv4) as well as Internet Protocol Version 6 (IPv6). The software provides support for virtually all network interfaces that the Linux kernel 3.3.5 supports [1], except wireless, where the Atheros chipsets are the only supported hardware, as of Router OS version 6.33. The company manufactures a series of integrated circuit boards, marketed under the name Router BOARD, as well as accessory components which implement a complete hardware operating platform for Router OS.

The Router BOARD line, combined with Router OS, is marketed at small- to medium-sized wireless Internet service providers, typically providing broadband wireless access in remote areas. Products include pre-assembled small office/home office (SOHO) routers, wireless 802.11a/b/g/n/ac MIMO and TDMA devices for indoor and outdoor use, and also bare routers in form of printed circuit boards (PCBs) for integration into custom solutions. Also, the Router BOARD line includes a series of Mini PCI and Mini PCI Express wireless adapters, supporting a range of IEEE 802.11 protocols [2], and designed to be used together with the router board's lineup.

II. RELATED WORK

In 2004, a project began to build low-cost Internet infrastructure in rural Mali. MikroTik routers and their operating system were chosen because of their low cost, flexibility, the fact that the system already had "a substantial user base in

Mali", and had a user interface deemed "superior to other products". MikroTik routers were also preferred for a WLAN project in Burkina Faso, and MikroTik's proprietary Nostrum protocol performed better than IEEE 802.11 under the project's conditions.Protocol by implementing a balanced energy consumption idea into route discovery process. In 2008, the Municipality of Piripiri, Piauí State, Brazil, decided to use MikroTik routers exclusively to build the infrastructure for providing free Internet access. MikroTik routers are also popular in the Czech Republic and Hungary, where they enjoy a good reputation. Under OLPC program, Uruguay deployed a nationwide wireless network in schools. Probably the largest Mikrotik deployment in a country with a total population of 3 million Approximately 200,000 students received a small laptop which connected to Mikrotik access points. In November 2012, MikroTik released the Cloud Core Router integrated unit which is based on the Tilera CPU supporting nine to 72 CPU cores, 8 SFP+ (Minibus) interfaces, as well as "fast-path" packet forwarding between interfaces (with independently tested 119 million packets and 80 Gbit/s forwarding rate). This unit targets the medium-sized network providers as well as try to be a well-priced alternative to the other more well-known brands.

The MUM is a conference and exhibition about networking, more targeted at MikroTik device users. Started as a regular gathering of forum users in January 2006, the events are now taking place every few weeks around the world, gathering hundreds of people at every event. The biggest event As of November 2015 was in Yogyakarta, Indonesia, gathering 2650 people [3].
Release history
- RouterOS version 6: May 2013
- RouterOS version 5: March 2010
- RouterOS version 4: October 2009
- RouterOS version 3: January 2008

III. WIN BOX

Win box is configuration utility that can connect to therouter via MAC Ad- dress or IP Address. You can downloadWinbox from www.mikrotik.com or connectingLaptop/PC with ether2of a Factory Default MikroTik then set- up IPAddress 192.168.88.2into your Laptop/PC and after that you have to put 192.168.88.1in your Browser. Then thedefaultpageof a MikroTik Router willopen and hereyou willfinda link to download Winbox.Login MikroTikvia MAC Address by clicking Connect Button. Then you willfind ascreen justlikethis.You haveto start your configure- from Left mostMenu Bar.

Property	Description
address (IP address/netmask | IPv6/0..128; Default:)	List of IP/IPv6 prefixes from which the service is accessible.
certificate (name; Default: **none**)	The name of the certificate used by particular service. Applicable only for services that depends on certificates (www-ssl, api-ssl)
name (name; Default: **none**)	Service name
port (integer: 1..65535; Default:)	The port particular service listens on

Example

```
[admin@dzeltenais_burkaans] /ip service> set api address=10.5.101.0/24,2001:db8:fade::/64
[admin@dzeltenais_burkaans] /ip service> print
Flags: X - disabled, I - invalid
#  NAME    PORT  ADDRESS CERTIFICATE
0  telnet  23
1  ftp     21
2  www     80
3  ssh     22
4 X www-ssl  443            none
```

5 api   8728 10.5.101.0/24
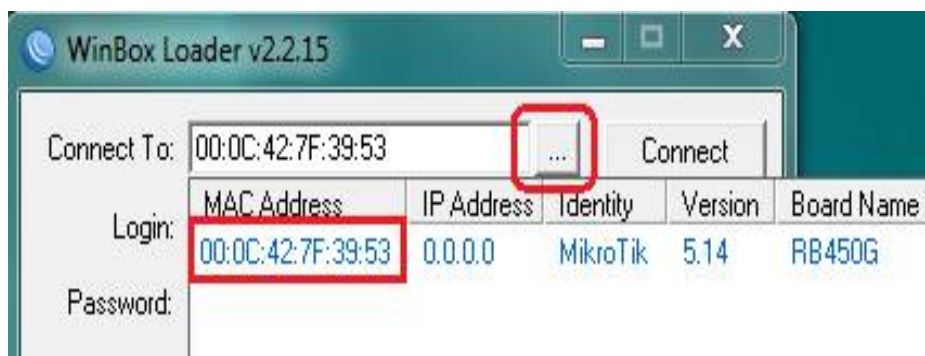2001:db8:fade::/64
6 winbox 8291

IV. WIN BOX SETUP

STEP: 1

Fig: Login MikroTikviaMACAddressbyclickingConnectButton.

HOTSPOT is way to provide internet access to subscribers by means of an easy to use login interface as it does not require any client software/driver/dialer at user end. To log in, users may use almost any web browser, so they are not required to install additional software. It is also possible to allow users to access some web pages without authentication using Walled Garden feature.In my personnel opinion, Hotspot is best suited for ad hoc situations, where you cannot control how the client has their machines configured. This is generally useful in Conference Rooms, Hotels, Cafe's, Restaurants and likewise since people will come and go and you have few permanent users.
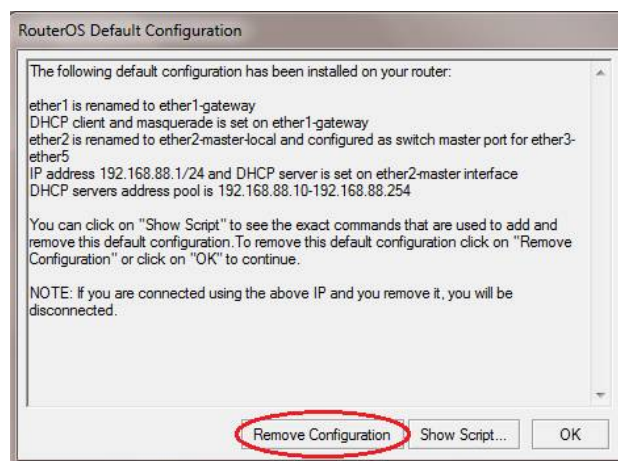
Step 2:

Fig:Then you will find ascreen just likethis. You havetostart your configuration fromLeft most Menu Bar.

V. CONFIGURATION

Initial configuration has DHCP client on WAN interface (ether1), rest of the ports are considered your local network with DHCP server configured for automatic address configuration on client devices. To connect to the router you have

to set your computer to accept DHCP settings and plug in the ethernet cable in one of the LAN ports (please check routerboard.com for port numbering of the product you own, or check front panel of the router).

IPAddressing

Herewehavetodeterminetwo IPAddresses whichwill indicatetheOutside Global (WAN) andInside Local (LAN).

1.Outside Global (WAN)-Public IPprovidedby ISP.

2.Inside Local (LAN) -PrivateIPassignedbytheAdministratorwhich will actasLo- cal Gateway.

IPAddressing for Outside Global (WAN)

We havetosetup WAN IPAddressfrom LeftmostMenu Barwhich isshown in be- low.

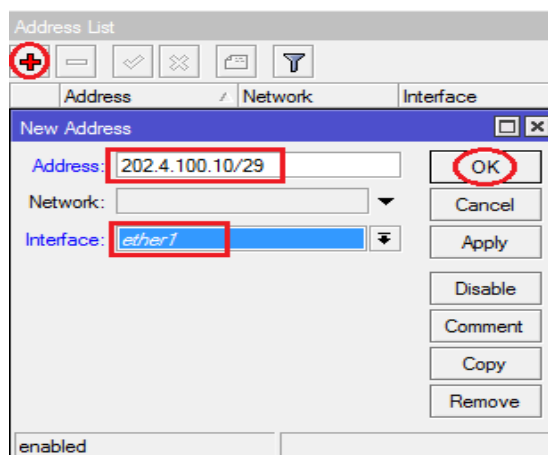Fig 3: Addressing list

Ifyou wanttoconfigureitin**CLI**mode:
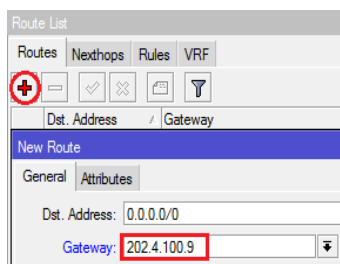[admin@MikroTik]>ipaddressaddaddress=202.4.100.10net-mask=255.255.255.248interface=ether1

Figure 4: Route List

AfteraddingDefaultRoutewecanchecktheRouteListfromIP□□Routes.YoucanalsoseeRouteListin CLImodebythis followingCommand: [admin@MikroTik]>iprouteprint Here,AS = ActiveStaticand DAC =DynamicActive
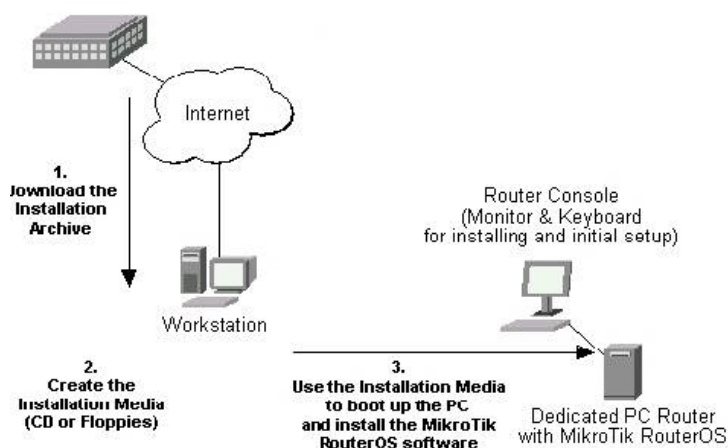
Figure 5: MikroTik RouterOS™ is described

1. Download the basic installation achieve file. Depending on the desired media to be used for installing the MikroTik RouterOS™ please chose one of the following archive types for downloading:
   o ISO image - of the installation CD, if you have a CD writer for creating CDs. The ISO image is in the MTcdimage_v2-9-x_dd-mmm-yyyy_ (build_z).zip archive file containing a bootable CD image. The CD will be used for booting up the dedicated PC and installing the MikroTik RouterOS™ on its hard-drive or flash-drive [4].
   o Net install - if you want to install RouterOS over a LAN with one floppy boot disk, or alternatively using PXE or Ether Boot option supported by some network interface cards, that allows truly networked installation. Net install program works on Windows 95/98/NT4/2K/XP.
   o MikroTik Disk Maker - if you want to create 3.5" installation floppies. The Disk Maker is a self-extracting archive DiskMaker_v2-9-x_dd-mmm-yyyy_(build_z).exe file, which should be run on your Windows 95/98/NT4/2K/XP workstation to create the installation floppies. The installation floppies will be used for booting up the dedicated PC and installing the MikroTik RouterOS™ on its hard-drive or flash-drive.
2. Create the installation media.
   Use the appropriate installation archive to create the Installation CD or floppies.
   o For the CD, write the ISO image onto a blank CD.
   o For the floppies, run the Disk Maker on your Windows workstation to create the installation floppies. Follow the instructions and insert the floppies in your FDD as requested, label them as Disk 1, 2,3, etc.
3. Install the MikroTik RouterOS™ software.
   Your dedicated PC router hardware should have:
   o CPU and motherboard - advanced 4th generation (core frequency 100MHz or more), 5th generation (Intel Pentium, Cyrix 6X86, AMD K5 or comparable) or newer uniprocessor Intel IA-32 (i386) compatible (multiple processors are not supported)
   o RAM - minimum 64 MiB, maximum 1 GiB; 64 MiB or more recommended
   o Hard Drive/Flash - standard ATA interface controller and drive (SCSI and USB controllers and drives are not supported; RAID controllers that require additional drivers are not supported) with minimum of 64 Mb space
   Depending on installation method chosen the router must have the following hardware:
   o Floppy-based installation - standard AT floppy controller and 3.5" disk drive connected as the first floppy disk drive (A); AT, PS/2 or USB keyboard; VGA-compatible video controller card and monitor

- CD-based installation - standard ATA/ATAPI interface controller and CD drive supporting "El Torito" bootable CDs (you might need also to check if the router's BIOS supports booting from this type of media; if El Torito is not supported by the BIOS, you can still boot up from the CD using Smart Boot Manager Floppy); AT, PS/2 or USB keyboard; VGA-compatible video controller card and monitor [5].
- Floppy-based network installation - standard AT floppy controller and 3.5" disk drive connected as the first floppy disk drive (A); PCI Ethernet network interface card supported by MikroTik RouterOS (see the Device Driver List for the list)
- Full network-based installation - PCI Ethernet network interface card supported by MikroTik RouterOS (see the Device Driver List for the list) with PXE or Ether Boot extension booting ROM (you might need also to check if the router's BIOS supports booting from network)

4. License the software.
   When booted, the software allows you to use all its features for 24 hours (note that you can pause the countdown by shutting down the router). If the license key will not be entered during this period of time, the router will become unusable, and will need a complete reinstallation.RouterOS licensing scheme is based on software IDs. To license the software, you must know the software ID. It is shown during installation procedures, and also you can get it from system console or Winbox. To get the software ID from system console, type: /system license print (note that you must first log in the router; by default there is user admin with no password (just press [Enter] key when prompted for password)). See sections below on basic configuration of your router

   - You should have an account on our account server. If you do not have an account at www.mikrotik.com, just press the 'New' button on the upper right-hand corner of the MikroTik's web page to create your account
   - Choose the appropriate licence level that meets your needs. Please see the License Manual or the Wiki. Note that there is a free license with restricted features (no time limitation)
   - There are different methods how to get a license from the account server:
     1. Enter the software ID in the account server, and get the license key by e-mail. You can upload the file received on the router's FTP server, or drag-and-drop it into opened Winbox window
     2. You can open the file with a text editor, and copy the contents. Then paste the text into system console (in any menu - you just should be logged in), or into System->License window of Winbox [6].

VI. CONCLUSION

The aim of the thesis was to study network science from a Computer net- working. Computer networking has changed the lifestyle of world. People can work from home while they keep an eye on their children. Companies can conduct video conferences and share software. Information on just about any conceivable subject is available at the click of a mouse. Local Area Networks pose a different problem since several devices share the same transmission channel. In this case, a Medium Access Control algorithm is necessary to regulate the access to the transmission channel because when- evert wo devices transmit at the same time a collision occurs and none of these frames can be decoded by their recipients. There are two families of MAC algorithms. The statistical or optimistic MAC algorithms reduce the probability of collisions but do not completely prevent them. With such algorithms, when a collision occurs, the collided frames mustbe retransmitted. We have described the operation of the ALOHA, CSMA, CSMA/CD and CSMA/CAMAC algorithms. Deterministic or pessimistic MAC algorithms avoid all collisions. We have described the Token Ring MAC where stations exchange a to ken to regulatethe accesstothe transmissionchannel. For this project an ew type of hardware complier is created. This hardware complier will simple topology for physically design a suitable network in- tended for specific communication. With this new technology, it is possible to design anything

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BIOGRAPHY

Protap Mollick has completed B.Sc. in Computer Science and Engineering (CSE) from American International University-Bangladesh (AIUB). After that he is working on different research paper. He has published many research papers in many renowned journals. His research interest is Artificial Intelligence, Networking, and Software Engineering & Microwave.

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Amitabh Halder has received his B.Sc. degree in Electrical and Electronics Engineering (EEE) from American International University-Bangladesh (AIUB) and the M.Sc degree in Computer Science and Engineering (CSE) from Jahangirnagar University, Bangladesh. Since then he is working on different research paper works. He published many research papers in many renowned journals. His main areas of research interests are Artificial Intelligence, Networking, and Software Engineering., Microwave, Telecommunication & Power.

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