Using MikroTik DHCP Server for Network Management

Engr. Norberto F. Inlayo III

MUM VIETNAM 2019
BULLET

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About MikroTik Academy

The MikroTik Academy Program is for educational institutions such as:

- Universities
- Technical Schools
- Colleges
- Vocational schools
- Other educational institutions.
About MikroTik Academy

Benefit for Students
Opportunity to acquire the basic knowledge in RouterOS and MTCNA certificate during academic studies.

Benefit for Educational Institutions
Opportunity to attract more students by offering MikroTik certification.
About MikroTik Academy

MikroTik offers
- Course outline
- Certification test
- Equipment (RouterBOARD routers) for the class
- Support and information
About MikroTik Academy

Requirements

- Motivation and resources
- Space and all the equipment needed for the labs
- Appropriate Internet access
- MikroTik Academy Trainer*
- Approved training materials
About MikroTik Academy

*Requirements for Academy Trainers

- Lecturer at the educational institution
- MTCNA certificate (score at least 75%)
- Any engineer level MikroTik certificate (score at least 75%).
About MikroTik Academy

Evaluation procedure
(performed by Appointed Coordinators or MikroTik)

- • Validation check of the educational institution
- • Verification of the Academy Trainer:
  — Status at the educational institution
  — Presence of required certifications
- • Verification of training materials
- • Verification of students
About MikroTik Academy

LUZON
Siena College of Taytay - Taytay, Rizal

VISAYAS
Foundation University - Dumaguete City, Negros Oriental

MINDANAO
Inquirini Computer Academy - Tagum Campus Tagum City
Iligan Medical Center College - Iligan City
Jose Rizal Memorial State University - Main Campus, Dapitan City
Jose Rizal Memorial State University - Sibuco, Zamboanga del Norte
Jose Rizal Memorial State University - Katipunan, Zamboanga del Norte
Jose Rizal Memorial State University - Siocon, Zamboanga del Norte
Jose Rizal Memorial State University - Dipolog City
Jose Rizal Memorial State University - Tamplisan, Zamboanga del Norte
Iligan Computer Institute - Bonifacio Avenue, Tibanga, 9200 Iligan City
Mindanao State University - Iligan Institute of Technology, Iligan City
Mindanao State University - Main Campus Marawi City, Lanao del Sur
Mindanao State University - Jolo, Sulu

As of October 2018
About MikroTik Academy
Government Funded Project

CURRICULUM ENHANCEMENT THROUGH ACADEMIC INDUSTRY PARTNERSHIP WITH MIKROTIK ACADEMY FOR INCREASED EMPLOYABILITY OF GRADUATES

Institutional Development and Innovation Grants (IDIG)
Concept Paper - Siena College of Taytay
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MUM VIETNAM 2019
Objectives

For the Network Administrator

- To be able to understand DHCP
- To be able to secure the DHCP network
- To be able to have an idea on how to use of RouterOS DHCP in managing and monitoring devices in the network
Reference:

- wiki.mikrotik.com
- forum.mikrotik.com
- www.iana.org

Disclaimer:

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What is DHCP?
What is DHCP?

Dynamic Host Configuration Protocol:
- For easy distribution of IP in a network
- IP Assignment
- Obtaining IP Settings/Options
- Client-Server Protocol

Must only be used in TRUSTED Networks!
Why is it Important?

☐ It let you manage the network in a central place.
DHCP Port

UDP Port:
- 67 for Server
- 68 for Client
DHCP: How does it work?

- DHCP Discover
- DHCP Offer
- DHCP Request
- DHCP Ack
DHCP: Discover

The client broadcasts a request for a DHCP server.

<Client: Src MAC Addr>
<Broadcast>

Src IP Addr:port
<0.0.0.0:68>

Dst IP addr:port
<255.255.255.255:67>

DHCP Servers

- Asia Hotel Bangkok
- Asia Airport Hotel
- Asia Pattaya Hotel
- Asia Cha Am Hotel
DHCP: Offer

DHCP Server Addr:port
<192.168.100.1:67>

<DHCP Server: Src MAC Addr>
<Broadcast>

Dst IP addr:port
<255.255.255.255:68>
DHCP: Request

The client broadcasts a request to lease an address from one of the offering DHCP servers.

Src IP Addr:port
<0.0.0.0:68>

<Client: Src MAC Addr>
<Broadcast>

Dst IP addr:port
<192.168.100.1:67>

Asia Airport Hotel
DHCP: ACK

DHCP Server Addr:port
<192.168.100.1:67>

<DHCP Server: Src MAC Addr>
<Broadcast>

Dst IP addr:port
<255.255.255.255:68>

The DHCP server that the client responds to acknowledges the client.
Securing the DHCP Network

❖ For Wireless Network:
   ❑ Setting a Strong WIFI Password
   ❑ Connect and Access List Registration

❖ For Wireless and Wired Network
   ❑ Setting the MikroTik Interface to ARP reply only
   ❑ Creating a Login Captive Portal through Hotspot
DHCP Settings For Network Management

❑ DHCP Server
❑ DHCP Network
❖ DHCP Lease

For this presentation we focus on DHCP Lease Submenu
DHCP Server

Can Assign/Modify:
- Name
- Interface
- Add Relay
- Lease Time
- Address Pool
- DHCP Option Set
- Src. Address
- Delay Threshold
- Authoritative
- Bootp Support
- Always Broadcast
- Insert Queue
- Add ARP for Leases
- Use Radius
- Lease Script
DHCP Network

Can Assign/Modify:
- Address
- Gateway
- Netmask
- No DNS
- DNS Servers
- Domain
- WINS Servers
- NTP Servers
- CAPS Managers
- Next Server
- Boot File Name
- DHCP Options
- DHCP Options Set
DHCP Options

• Parameters sent by DHCP Server to the Client
• Custom Options / Vendor Extension
• Parameters must be included in the Parameter-List Attribute found at
  https://www.iana.org/assignments/bootp-dhcp-parameters/bootp-dhcp-parameters.xhtml
## DHCP Options

<table>
<thead>
<tr>
<th>Tag</th>
<th>Name</th>
<th>Data</th>
<th>Meaning</th>
<th>Reference</th>
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<td></td>
<td></td>
<td>[RFC3679]</td>
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<td>N</td>
<td>URL</td>
<td>[RFC3679]</td>
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<tr>
<td>115</td>
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<td></td>
<td>[RFC3679]</td>
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<td>4 Subnet Selection Option</td>
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<td>DNS domain search list</td>
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<td>GeoConf Option</td>
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<tr>
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<td>V-I Vendor-Specific Information</td>
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<td>Vendor-Identifying Vendor-Specific Information</td>
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</table>
How to use DHCP Server Lease to monitor and managed your network

- LAB Pre-requisite
- DHCP Lease
- DHCP Options
- Dynamic to Static
- Adding Rate Limit
- Address Listing
- Extracting DHCP Lease Information thru SCRIPTING.
Activity Pre-requisite:

- DHCP Server should be configured.
- There should be an IP Pool.
- IPv4 for the devices should be set to obtain an IP address automatically.

Note: Devices with manually configured IP cannot be probed in the DHCP lease.
DHCP Configuration: Wizard Setup
DHCP Server – Setup Wizard
DHCP Server – Setup Wizard

4. Select interface to run DHCP server on: bridge1

5. Select network for DHCP addresses: 192.168.100.0/24

6. Select gateway for given network: 192.168.100.1

7. Select pool of IP addresses given out by DHCP server: 192.168.100.50-192.168.100.200
DHCP Server – Setup Wizard

Congrats!
You have setup a DHCP Server.
IP Address Pool

Used:
- To define IP address range.
- In DHCP Server and Point to Point Server.
- To group IP address for further usage.

192.168.100.51
192.168.100.52
192.168.100.53
192.168.100.54
192.168.100.55
Activity
Pre-requisite:

- IPv4 for the devices should be set to obtain an IP address automatically.

- For MikroTik Devices DHCP Client should be enabled.
DHCP Server Lease

- DHCP server lease submenu is used to monitor and manage server's leases.
DHCP Leases

DHCP Client

DHCP Server

DHCP Lease <192.168.100.200, 192.168.100.200>

General

Active

Address: 192.168.100.200
MAC Address: 1C:83:41:0a:89:a0
Client ID: 1:1c:83:41:a:89:a0
Server: dhcp1

Copy
Remove
Make Static
Check Status
DHCP Leases: How to Make Static?

Double click on any dynamically assigned IP to view the DHCP Lease options.
DHCP Leases: How to Make Static?

2. Click Make Static.

Close the DHCP Lease window and re-open it again.
DHCP Leases: Static

Type the IP address that will be assigned to the client.

Tick the box of Use Src. MAC Address to bind the IP to the MAC Address.
DHCP Leases

5. Server name which serves this client

6. Time that the client may use the address

7. Block access for this client
DHCP Leases

Upload/Download Limit
DHCP Leases: Rate Limit

- It will be automatically be added on the Queue List
DHCP Leases: Address List

- Type a name/group where the client device will be assigned.
DHCP Leases: Address List

- It will automatically be added in the Address list which can be used in creating filter rules.
DHCP Leases: Address List

- Create a Layer 7 Protocol
Create an Accept or Drop Filter Rule
SCRIPT: Extracting Leases

❑ This script will help you extract the necessary information form the lease that you want to include in your CSV file.

```
/ip dhcp-server lease
:foreach i in=[find] do={
:put ([get $i address]."","[get $i mac-address]."","[get $i client-id]."","[get $i server])
}
```

BIG THANKS to skot for this post contribution @ Mikrotik Forum
**SCRIPT: Extracting Leases**

```
/ip dhcp-server lease> :foreach i in=[find] do=( :put {
```

Note: Typing this script and pressing Tab will show the available options that you may include in the command.
SCRIPT: Extracting Leases

Here is the script if we want to extract the list of block-access client with client-id and dhcp-server included

```
:foreach i in=[find] do={ :put ([get $i block-access]."",".[get $i client-id]."",".[get $i server]) }```

SCRIPT: Extracting Leases

- Highlight the extracted information and copy paste it in a text file in your desktop.
SCRIPT: Extracting Leases

- Create a text file in your desktop.
- Copy paste the extracted fields from the terminal.
SCRIPT: Extracting Leases

- Change the Extension Name of the Text File to CSV File
- Open the CSV file.
- You successfully extracted the list in your desktop
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Nice Country
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To the Smaller and Bigger Group
Thank You!

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