

How to simulated Mikrotik by using GNS3 for study and design your networks

MUM Thailand in Sep 5, 2016

Presented By :

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Mikrotikthai Co.,Ltd

OBJECTIVE

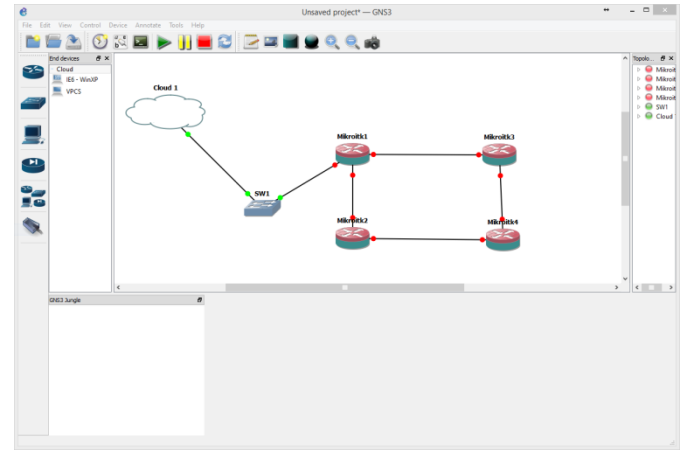
□ Network simulation

เพื่อจำลองการทำงานของระบบ
เครือข่าย ทดสอบการทำงาน
ต่างๆ ก่อนที่จะ ติดตั้งบน
เครือข่ายจริง

□ Learning

สำหรับการเรียนรู้ฟีเจอร์ของ
Mikrotik ใช้ในการเรียนการสอนให้

Concept



Simulation Tools



□ GNS3

- Real-time network simulation
- Multi platform and Multi vendors devices
- Create dynamic network maps for troubleshooting and proof of concept
- Connect GNS3 to any real network
- Free (Open Source)

Simulation Tools(ต่อ)



- QEMU
 - Known as Quick EMUlator
 - Multi platform
 - Open source software

Simulation Tools(ต่อ)



□ RouterOS (Cloud Hosted Router)

- intended for running as a virtual machine
- supports the x86 64-bit architecture
- As alternative VMWare, Hyper-V, VirtualBox, KVM and others
- CHR has full RouterOS features enabled by default

Simulation Tools(ต่อ)



□ RouterOS (Cloud Hosted Router) (ต่อ)

- The CHR has 4 license levels:

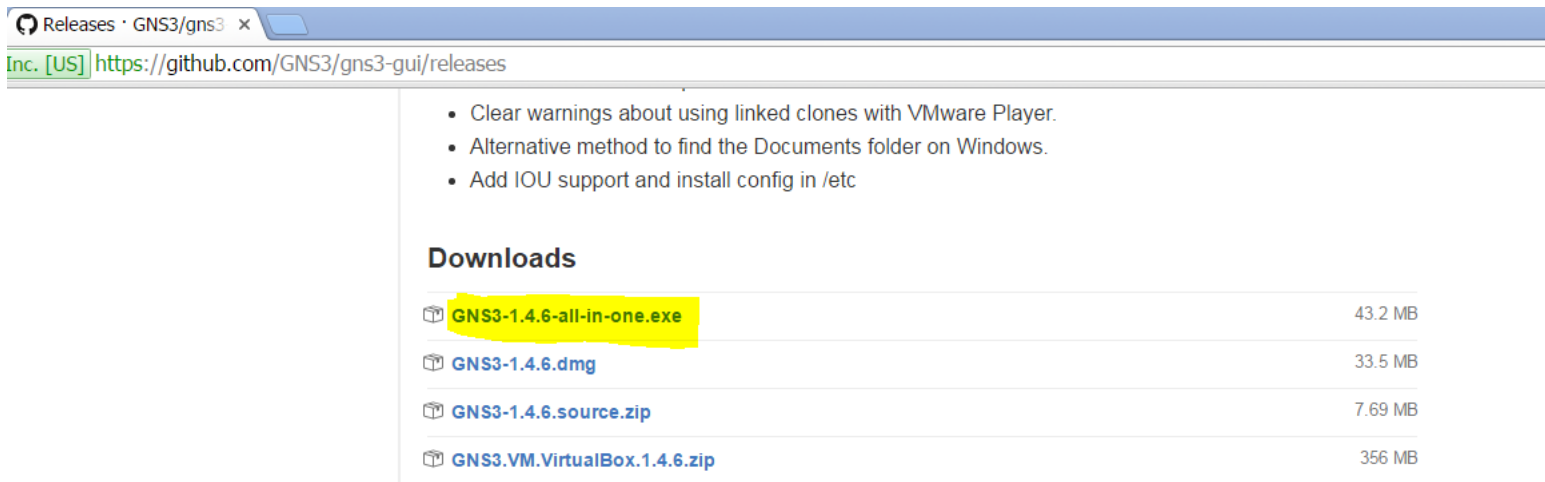
License	Speed limit	Price
Free	1Mbit	FREE
P1	1Gbit	\$45
P10	10Gbit	\$95
P-Unlimited	Unlimited	\$250

HOW TO



1. Download GNS3

- ไปที่ <https://github.com/GNS3/gns3-gui/releases>
- ดาวน์โหลด [GNS3-x.x.x-all-in-one.exe](#)







Releases · GNS3/gns3

<https://github.com/GNS3/gns3-gui/releases>

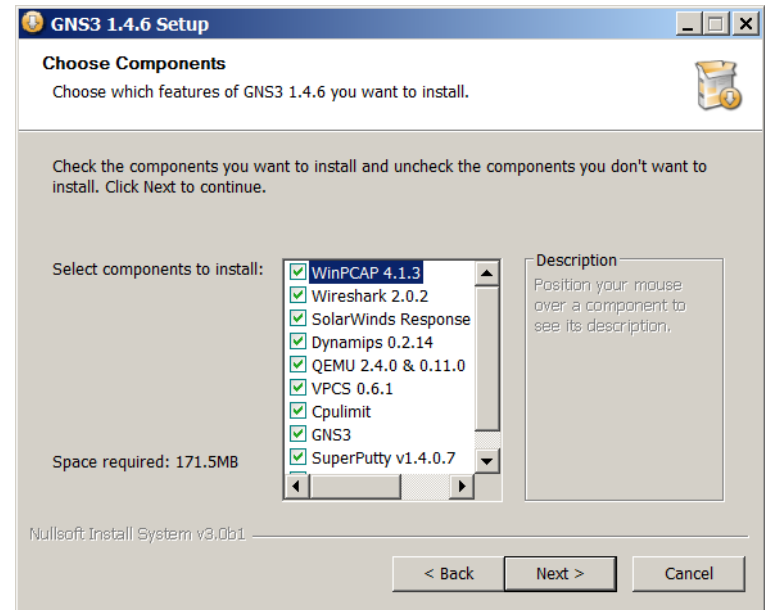
- Clear warnings about using linked clones with VMware Player.
- Alternative method to find the Documents folder on Windows.
- Add IOU support and install config in /etc

Downloads

 GNS3-1.4.6-all-in-one.exe	43.2 MB
 GNS3-1.4.6.dmg	33.5 MB
 GNS3-1.4.6.source.zip	7.69 MB
 GNS3.VM.VirtualBox.1.4.6.zip	356 MB

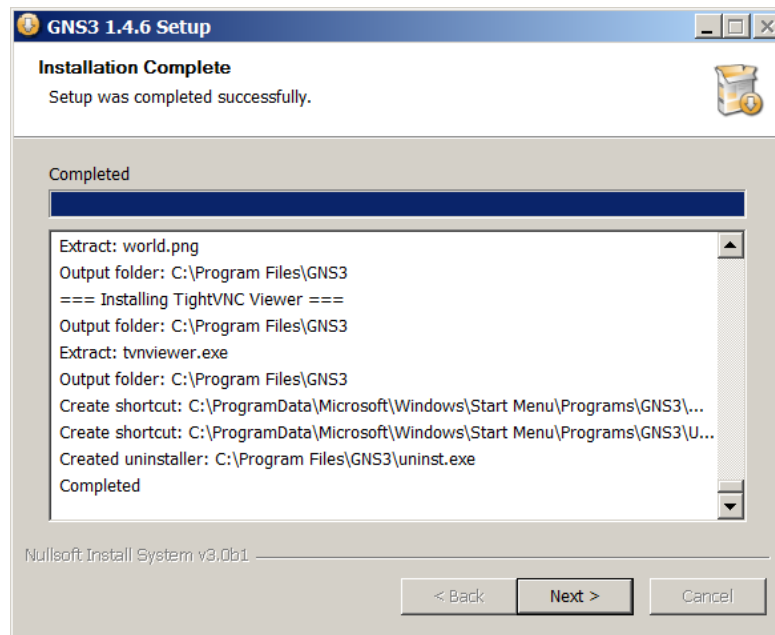
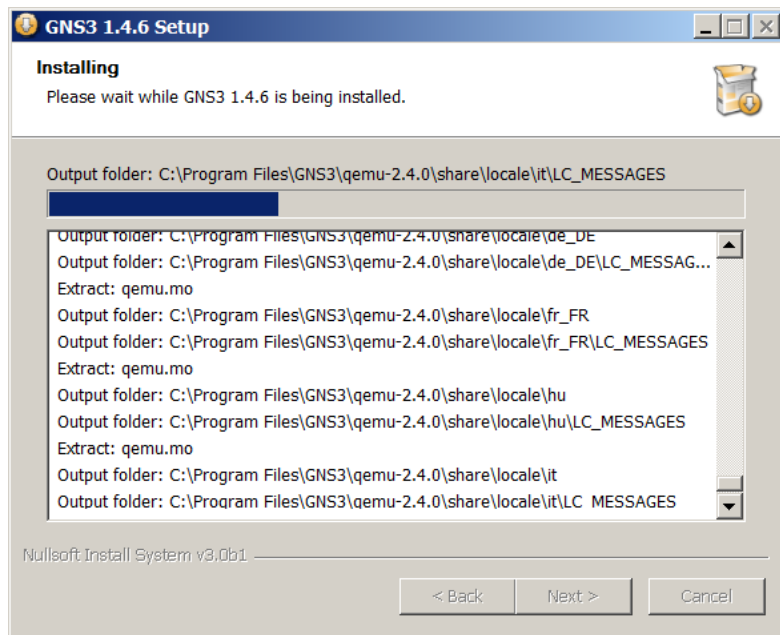
2.Install GNS3

- ❑ ติดตั้งไฟล์ที่ดาวน์โหลดมา(ติดตั้งแบบ **default** โดยไม่ต้องปรับค่า)



2.Install GNS3(ต่อ)

□ รอจนเสร็จ



3.Download CHR Image

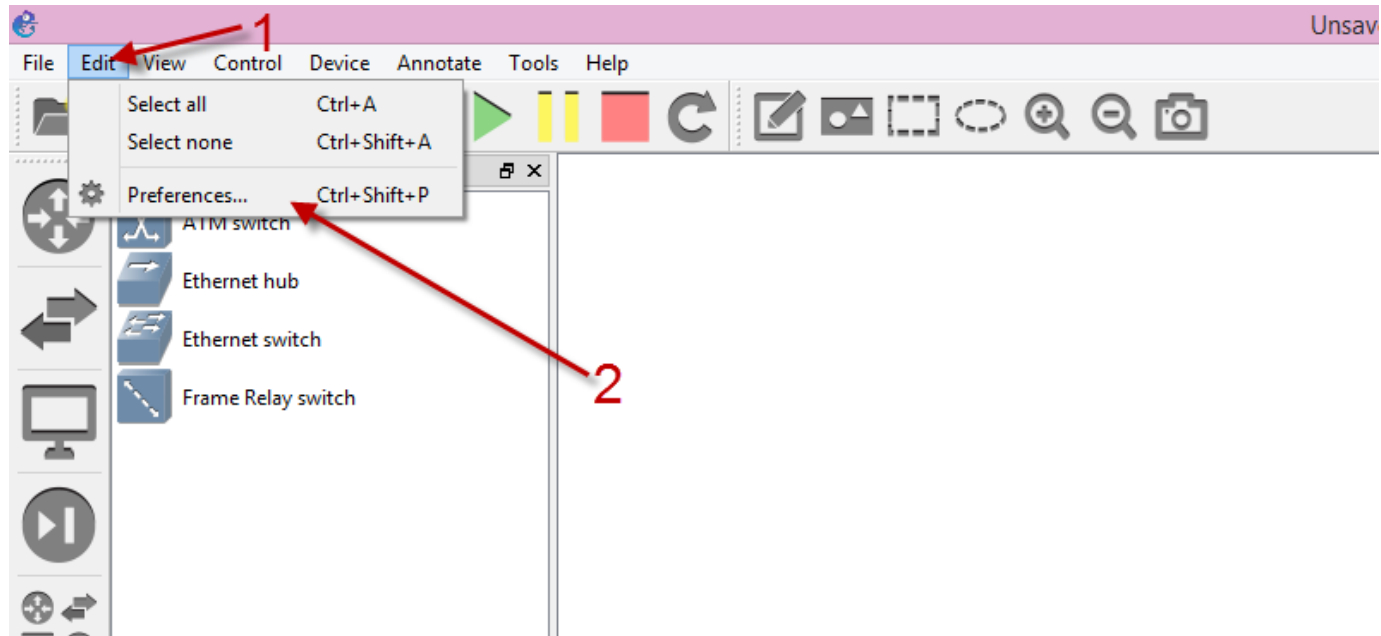
- ไปที่ <http://www.mikrotik.com/download>
- ดาวน์โหลด CHR แบบ Raw disk image และแตก zip

Cloud Hosted Router

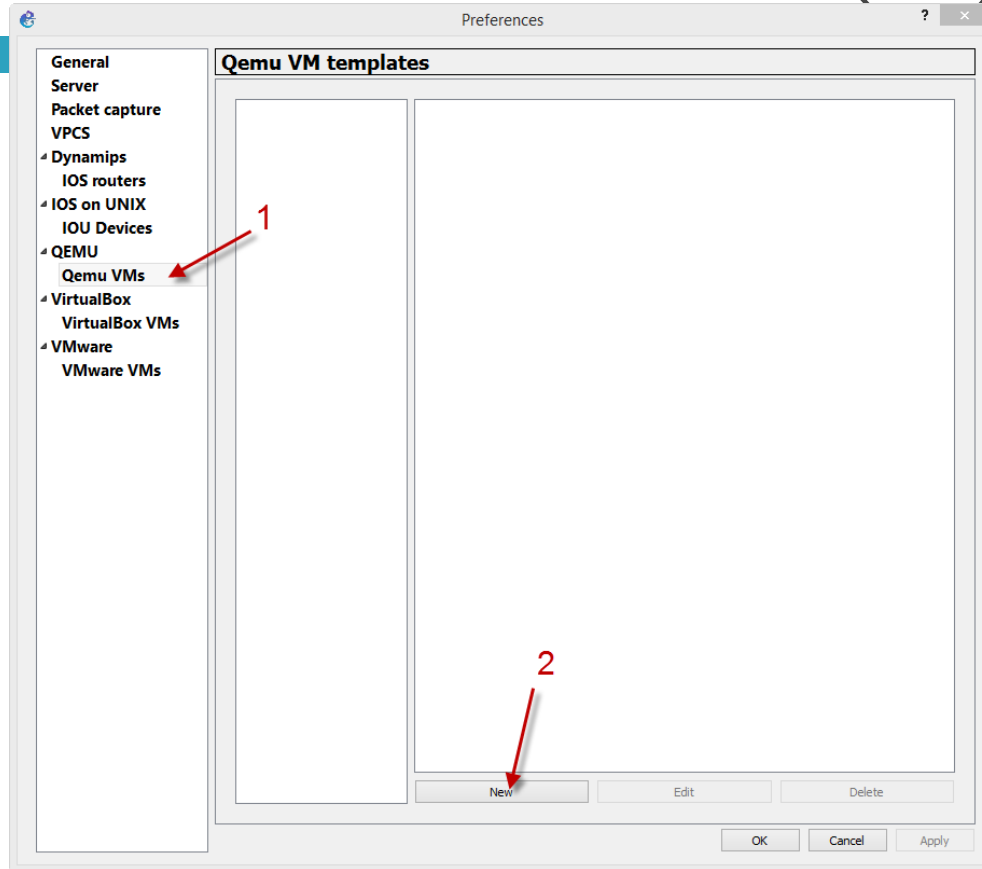
	6.32.4 (Bugfix only)	6.35.2 (Current)	5.26 (Legacy)	6.36rc16 (Release candidate)
images	img, vmdk, vhd, vhdx, vdi			
The Dude server	-	↓	-	↓
VMDK image	-	↓	-	↓
VHDX image	-	↓	-	↓
VDI image	-	↓	-	↓
Raw disk image	-	↓	-	↓
Extra packages	-	↓	-	↓
The Dude client	-	↓	-	-
Changelog	-	📄	-	📄
MD5	-	Σ	-	Σ

4. Add Mikrotik to GNS3

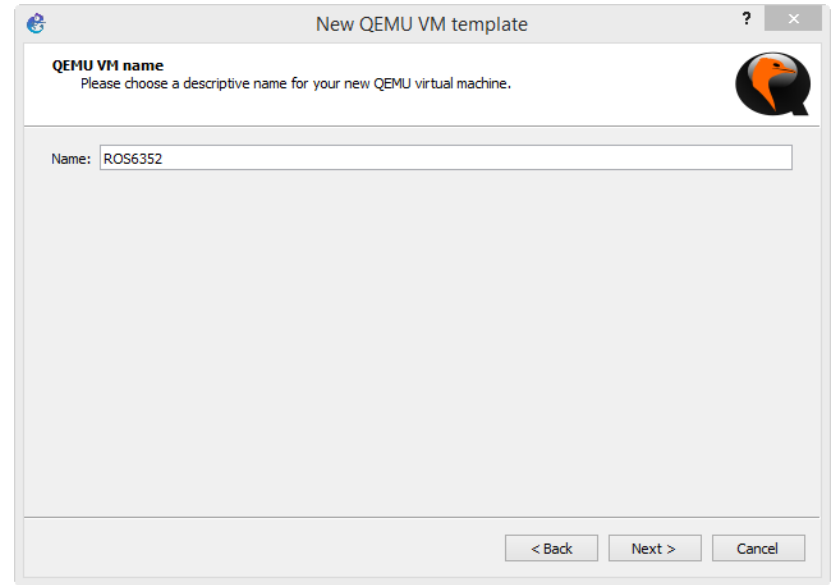
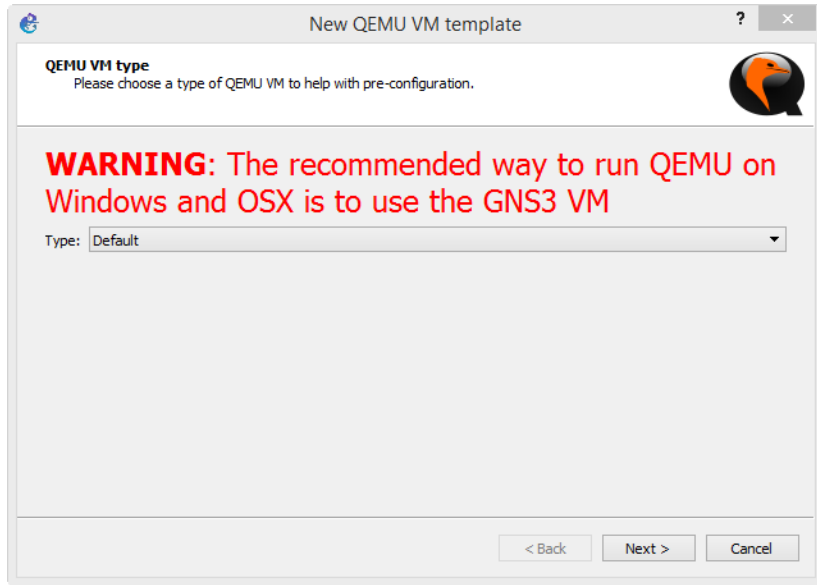
- เปิด GNS3 แล้วไปที่ edit > preferences



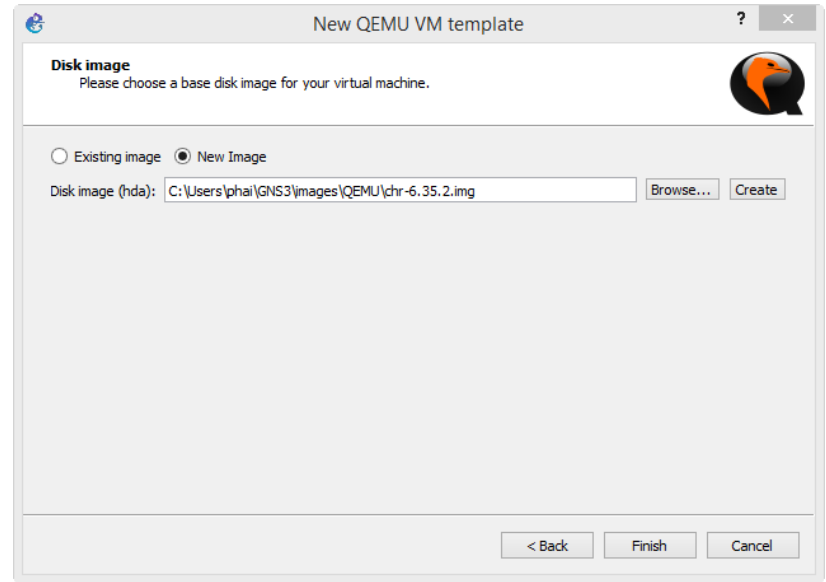
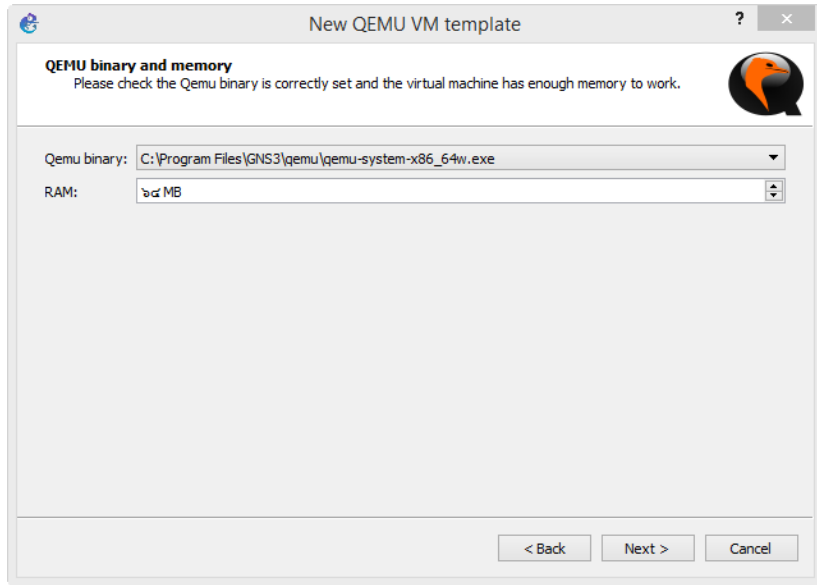
4.Add Mikrotik to GNS3(ต่อ)



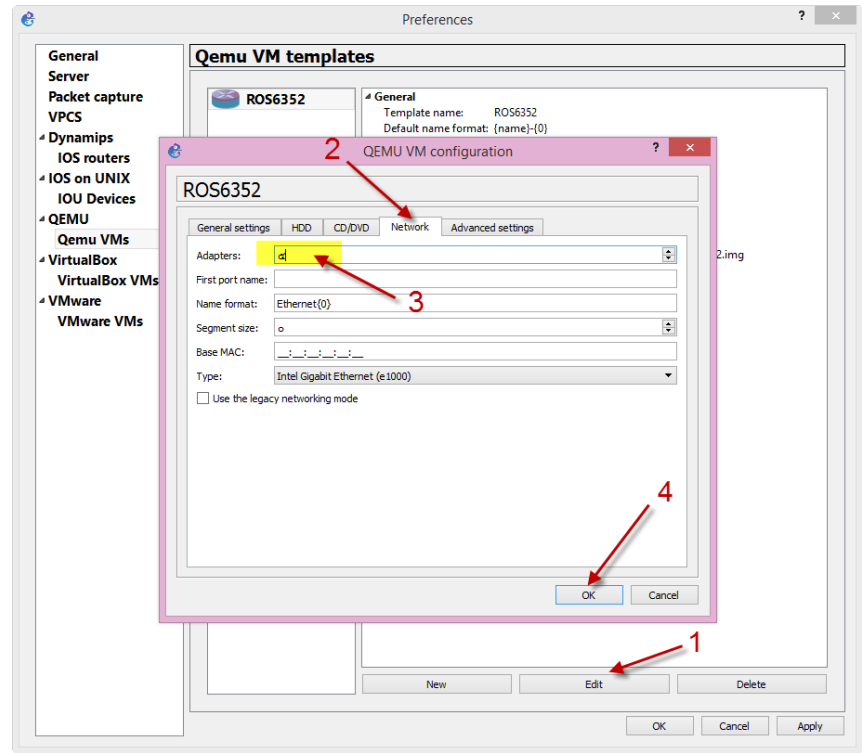
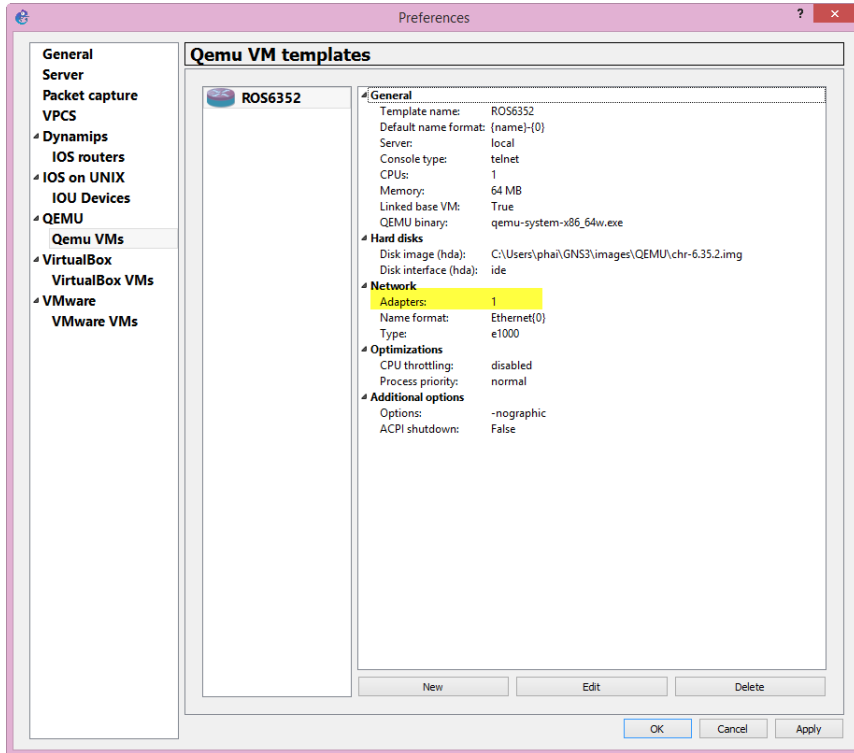
4. Add Mikrotik to GNS3(ต่อ)



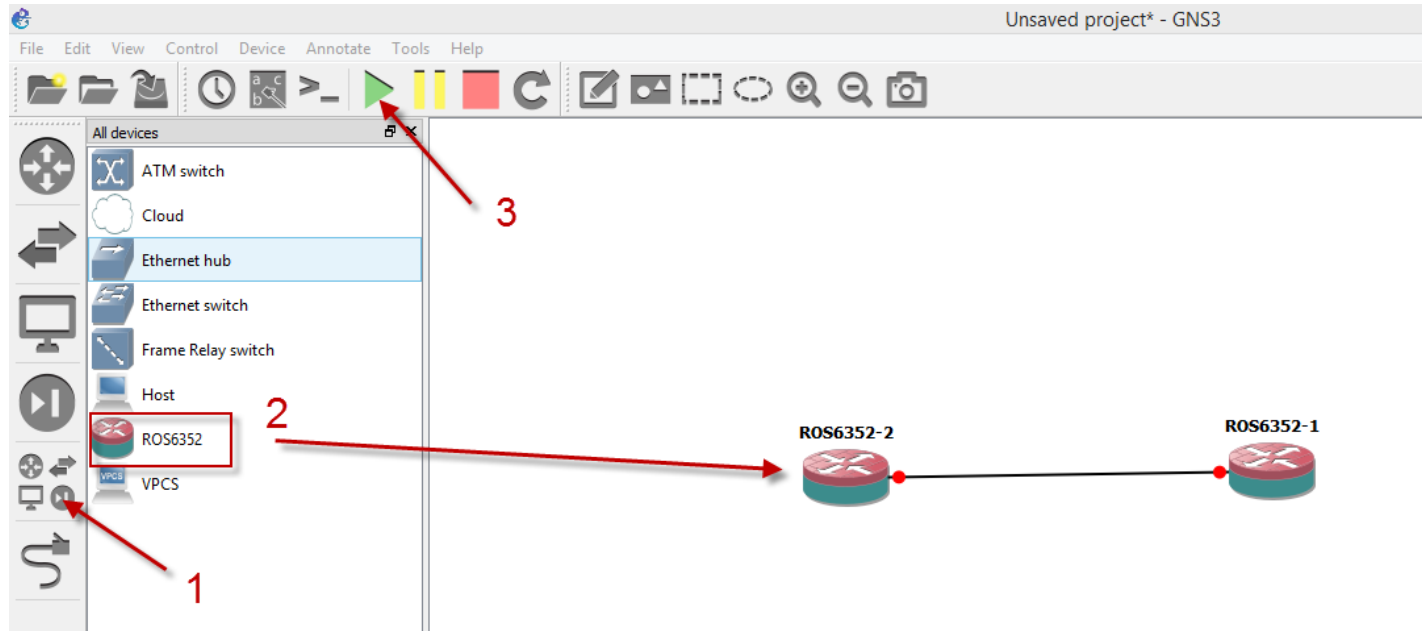
4.Add Mikrotik to GNS3(ต่อ)



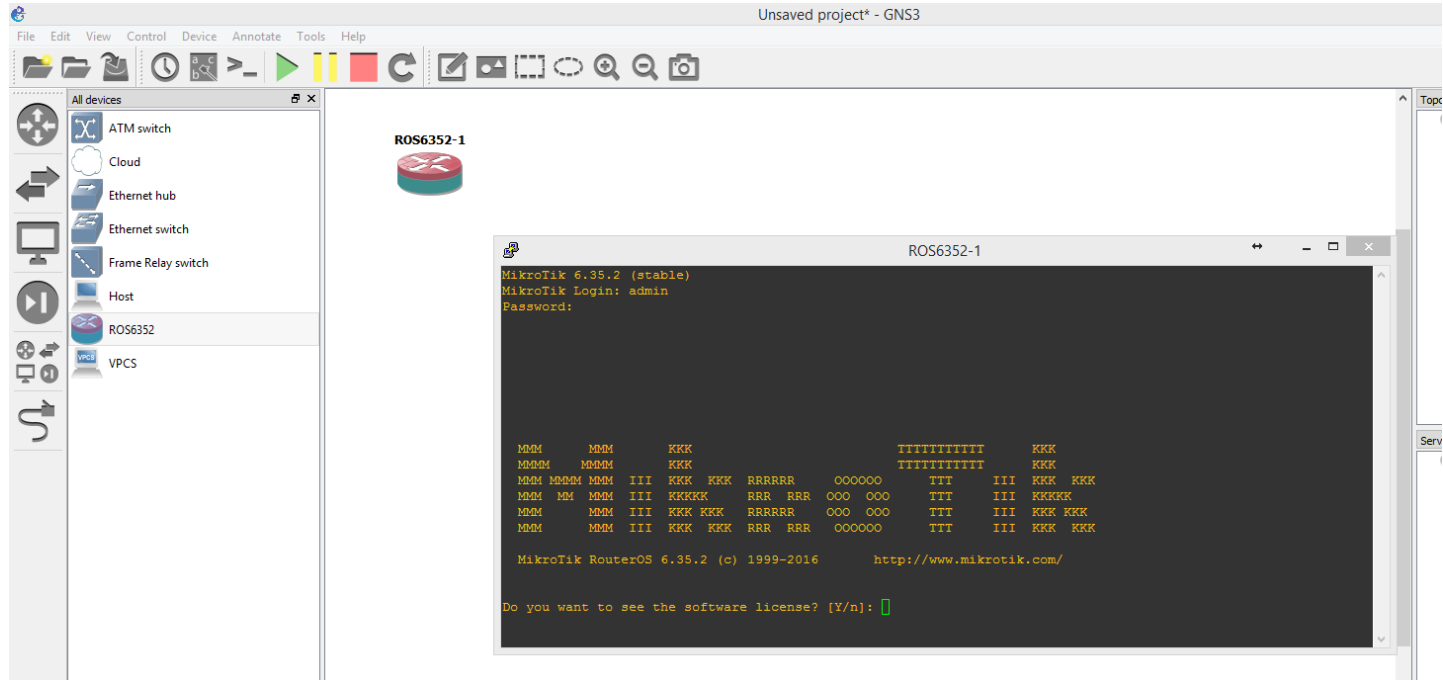
4. Add Mikrotik to GNS3(ต่อ)



5. Mikrotik device is ready to use!!



5. Mikrotik device is ready to use!!

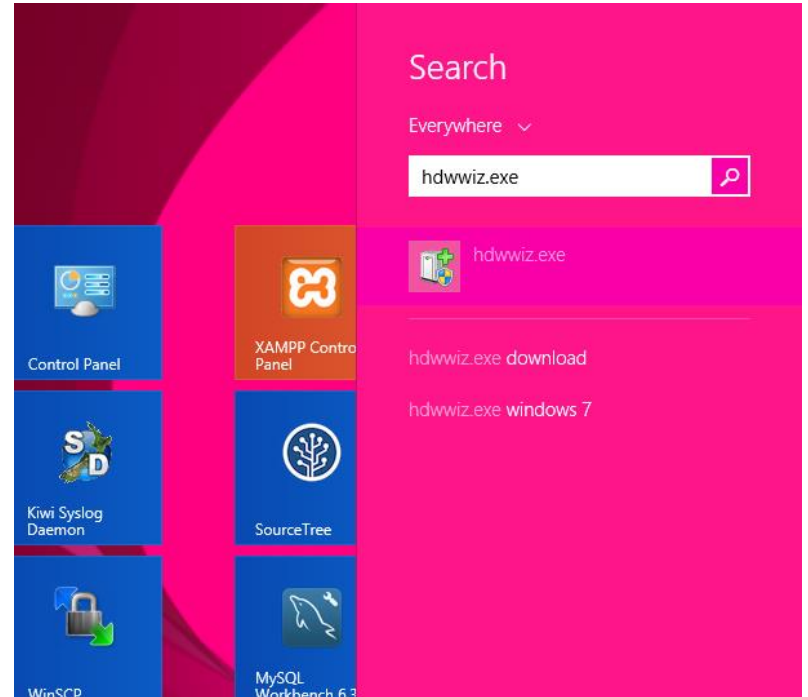


MANAGE OUR VIRTUAL ROUTER VIA WINBOX

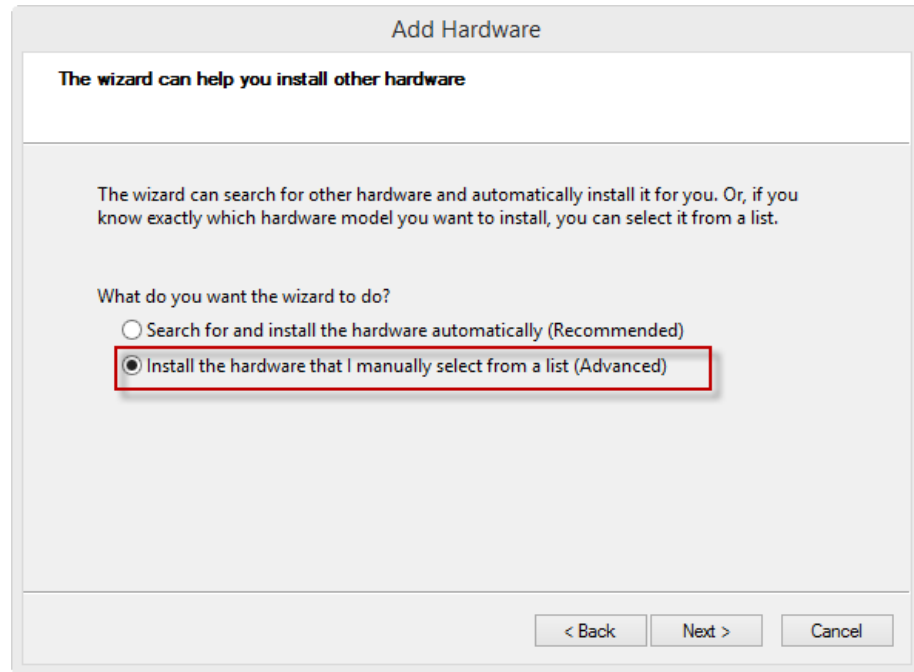
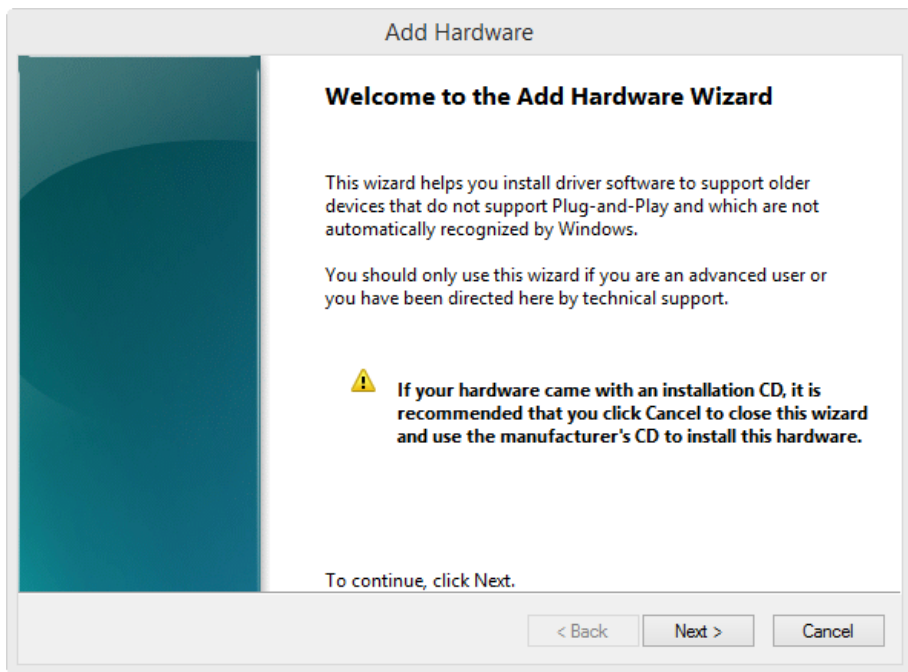


Create loopback interface

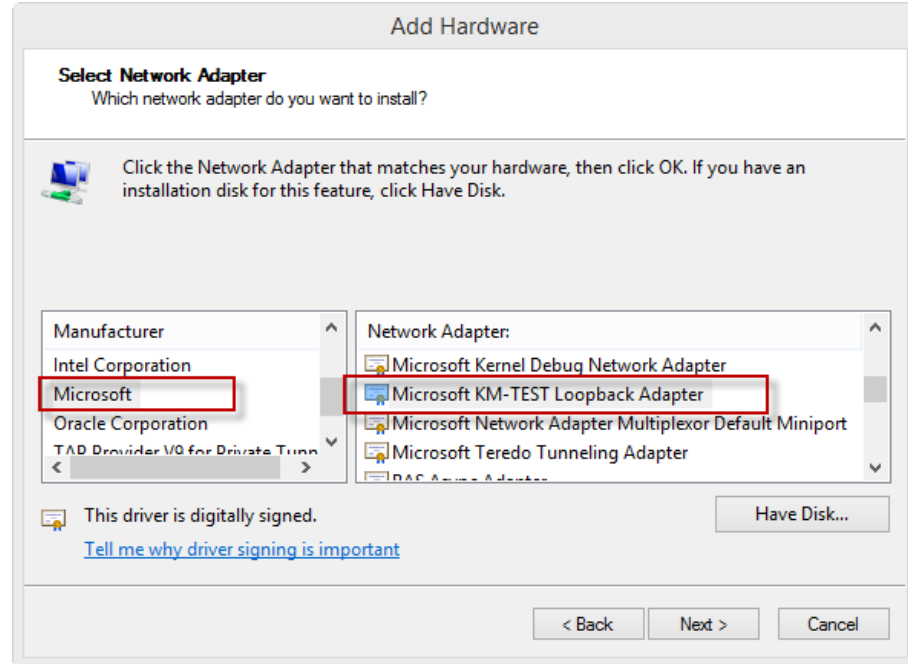
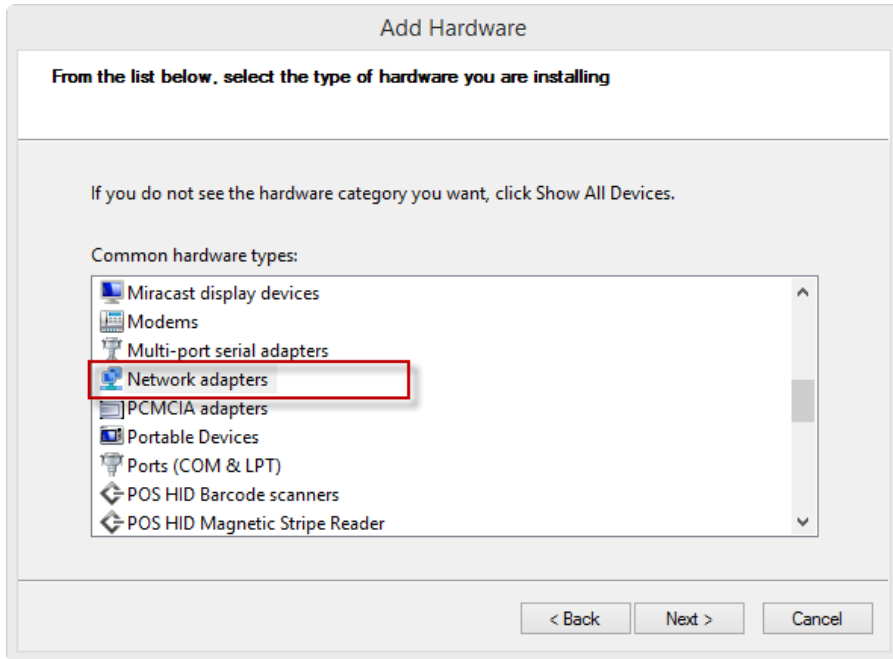
- กด start menu
- พิมพ์ `hdwwiz.exe` แล้ว `enter`



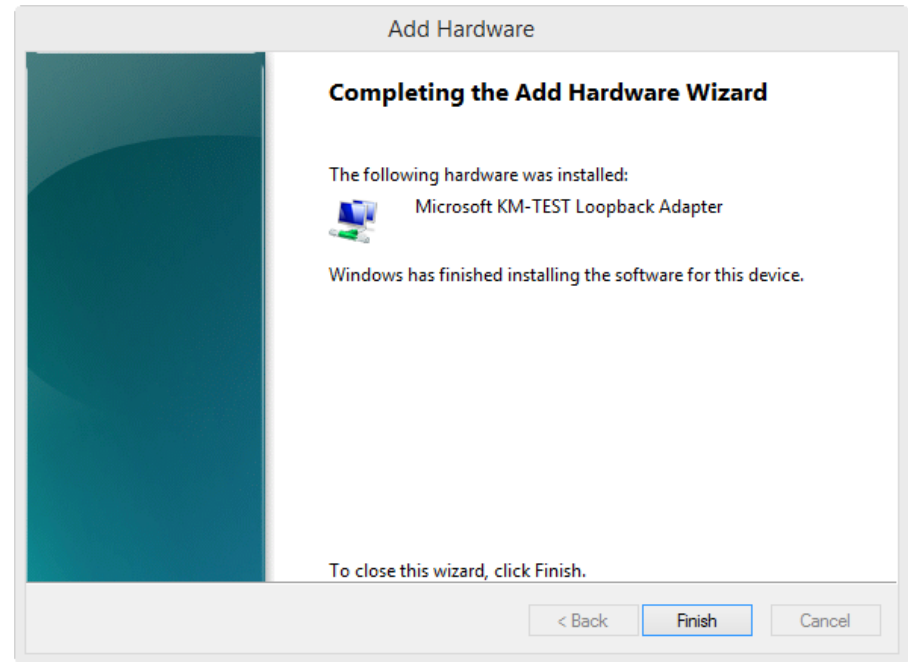
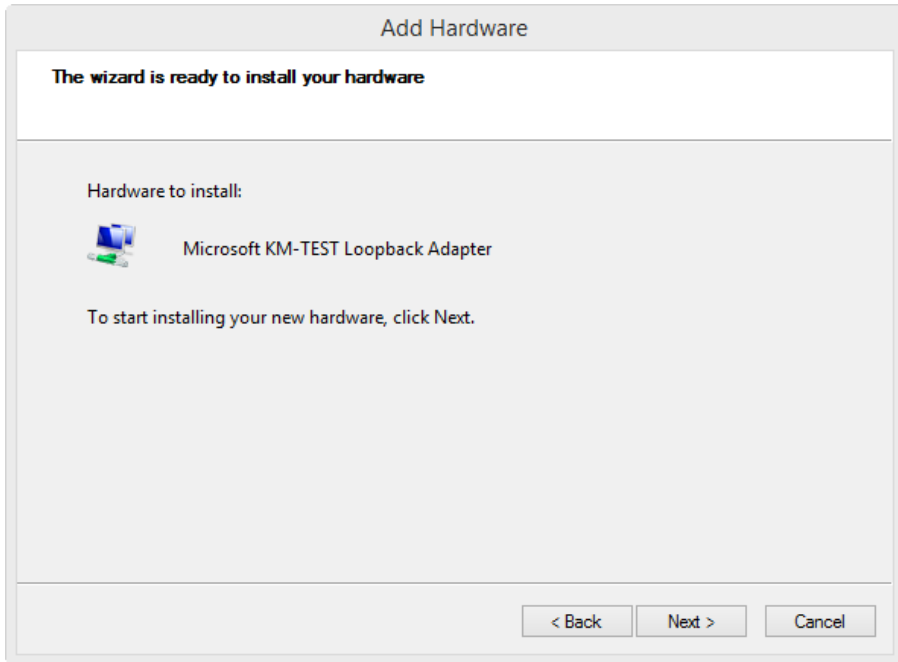
Create loopback interface



Create loopback interface



Create loopback interface



Configure Cloud

The image shows the GNS3 interface with a 'Node properties' dialog box open for 'Cloud 1 configuration'. The 'All devices' panel on the left has a red box around the 'Cloud' icon, with a red arrow pointing to a cloud icon in the workspace. A context menu is open over the cloud icon, with 'Configure' selected. The 'Node properties' dialog has tabs for 'Ethernet', 'NAT', 'UDP', 'TAP', 'UNIX', 'VDE', 'NULL', and 'Misc.'. The 'Generic Ethernet NIO' section has a dropdown menu with 'loopback' selected, a red box around it, and an 'Add' button with a red arrow pointing to it. Below this, 'nio_gen_eth:loopback' is listed in a yellow-highlighted box. The 'Linux Ethernet NIO (Linux only)' section has a dropdown menu with 'internet' selected and an 'Add' button. At the bottom of the dialog, the 'OK' button has a red arrow pointing to it.

Unsavad project* - GNS3

Node properties

Cloud 1 configuration

Ethernet NAT UDP TAP UNIX VDE NULL Misc.

Generic Ethernet NIO

loopback

loopback Add Delete

nio_gen_eth:loopback

Linux Ethernet NIO (Linux only)

internet

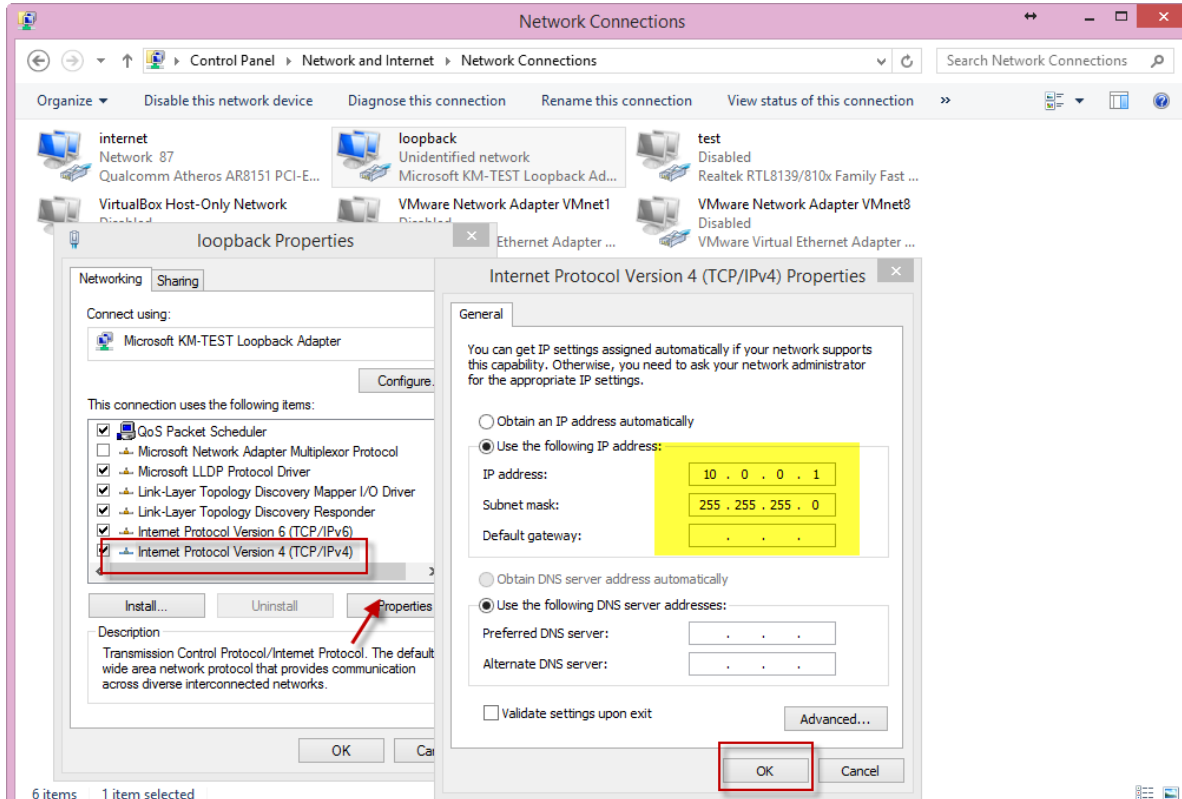
internet Add Delete

Reset OK Cancel Apply

Connect cloud to our network

The screenshot displays the GNS3 software interface. The title bar reads "Unsaved project* - GNS3". The menu bar includes "File", "Edit", "View", "Control", "Device", "Annotate", "Tools", and "Help". The toolbar contains various icons, with a green play button (start) highlighted by a red square and a red arrow pointing to it from the word "start" written in red text. The left sidebar, titled "All devices", lists the following components: ATM switch, Cloud, Ethernet hub, Ethernet switch, Frame Relay switch, Host, ROS6352, and VPCS. The main workspace shows a network diagram with the following elements: a cloud labeled "Cloud 1" connected to a switch labeled "SW1", which is connected to a router labeled "ROS6352-1", which is in turn connected to another router labeled "ROS6352-2".

Configure ip address



Configure ip address

- `/ip address add address=10.0.0.2/24 interface=ether1`

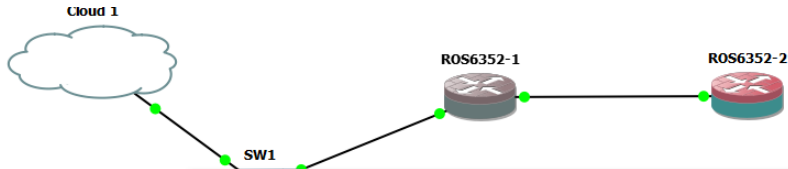
witch

et hub

et switch

Relay switch

52



```
ROS6352-1
MMMM  MMM  KKK  TTTTTTTTTT  KKK

MMM  MMM  III  KKK  KKK  RRR  RRR  OOOOOO  TTT  III  KKK  KKK

MikroTik RouterOS 6.35.2 (c) 1999-2016      http://www.mikrotik.com/

Do you want to see the software license? [Y/n]: n
[?]          Gives the list of available commands
command [?]  Gives help on the command and list of arguments

[Tab]       Completes the command/word. If the input is ambiguous,
            a second [Tab] gives possible options

/           Move up to base level
..         Move up one level
/command   Use command at the base level
may/25/2016 06:13:54 system,error,critical router was rebooted without proper shu
tdown

[admin@MikroTik] > /ip address add address=10.0.0.2/24 interface=ether1
[admin@MikroTik] >
```

Connect to router

The image shows two overlapping windows from the Mikrotik WinBox interface. The background window is titled "WinBox v3.4 (Addresses)" and displays a configuration form for connecting to a device. The "Connect To:" field is set to "10.0.0.2", "Login:" is "admin", and "Session:" is "<own>". The "Note:" field contains "Radius". Below the form is an "Add/Set" button and a "Managed Neighbors" section with a "Set Master Password" button and a table with columns "Address" and "User".

The foreground window is titled "admin@10.0.0.2 (MikroTik) - WinBox v6.35.2 on CHR (x86_64)". It shows a terminal session with the following content:

```
Session Settings Dashboard
Safe Mode Session: 10.0.0.2

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Make Supout.rif
Manual
New WinBox

Terminal

MMM   MMM   KKK               TTTTTTTTTT   KKK
MMMM  MMMM  KKK               TTTTTTTTTT   KKK
MMM MMMM MMM III KKK KKK RRRRRR   000000   TTT   III KKK KKK
MMM MM  MMM III KKKKK   RRR RRR   000 000   TTT   III KKKKK
MMM   MMM III KKK KKK RRRRRR   000 000   TTT   III KKK KKK
MMM   MMM III KKK KKK RRR RRR   000000   TTT   III KKK KKK

MikroTik RouterOS 6.35.2 (c) 1999-2016      http://www.mikrotik.com/

[?]          Gives the list of available commands
command [?]  Gives help on the command and list of arguments

[Tab]        Completes the command/word. If the input is ambiguous,
              a second [Tab] gives possible options

/            Move up to base level
..           Move up one level
/command     Use command at the base level
[admin@MikroTik] >
```

SUGGESTION



Connect cloud to our network

The screenshot displays the GNS3 software interface. The title bar reads "Unsaved project* - GNS3". The menu bar includes "File", "Edit", "View", "Control", "Device", "Annotate", "Tools", and "Help". The toolbar contains various icons, with a green play button (start) highlighted by a red box and a red arrow pointing to it from the word "start" written in red text. The left sidebar, titled "All devices", lists the following components: ATM switch, Cloud, Ethernet hub, Ethernet switch, Frame Relay switch, Host, ROS6352, and VPCS. The main workspace shows a network diagram with the following elements: "Cloud 1" (a cloud icon), "SW1" (a blue switch icon), "ROS6352-1" (a red and blue router icon), and "ROS6352-2" (another red and blue router icon). The connections are as follows: "Cloud 1" is connected to "SW1"; "SW1" is connected to "ROS6352-1"; and "ROS6352-1" is connected to "ROS6352-2".

RoMON

RoMON คืออะไร

RoMON feature in RouterOS. RoMON stands for "Router Management Overlay Network". RoMON works by establishing independent MAC layer peer discovery and data forwarding network. RoMON network operates independently from L2 or L3 forwarding configuration.

Each router on RoMON network is assigned its RoMON ID. RoMON ID can be selected from port MAC address or specified by user.

RoMON protocol does not provide encryption services. Encryption is provided at "application" level, by e.g. using ssh or by using secure winbox

RoMON feature

- ❑ Built In RouterOS
- ❑ Peer discovery
- ❑ specific port
- ❑ Secrets
- ❑ Applications (ping,ssh)

Configuration

- เข้าไป **enable romon** ใน **router** ทุกตัว โดยใช้คำสั่ง

```
/tool romon set enabled=yes
```

```
MMM      MMM  III  KKK  KKK  RRRRRR  OOO  OOO  TTT  I
MMM      MMM  III  KKK  KKK  RRR  RRR  OOOOOO  TTT  I

MikroTik RouterOS 6.35.2 (c) 1999-2016      http://www.mikro

[?]          Gives the list of available commands
command [?]  Gives help on the command and list of arguments

[Tab]        Completes the command/word. If the input is amb
              a second [Tab] gives possible options

/            Move up to base level
..          Move up one level
/command    Use command at the base level

[admin@r1] > /tool romon set enabled=yes
[admin@r1] > [ ]
```

Connect to RoMON

WinBox v3.4 (Addresses) [-] [□] [×]

File Tools

Connect To: 10.0.0.2

Login: admin

Password:

Add/Set

Connect To RoMON

Managed Neighbors

[-] [Y] Set Master Password

Address	User
ntcourt.dyndns.org	admin
amarate.dyndns.org	mikrotikthai

WinBox v3.4 (Addresses) [-] [□] [×]

File Tools

Connect To: 10.0.0.2 Keep Password

Login: admin Open In New W

Password:

RoMON Agent: 10.0.0.2

Add/Set

Disconnect From RoMON

Connect

Managed RoMON Neighbors

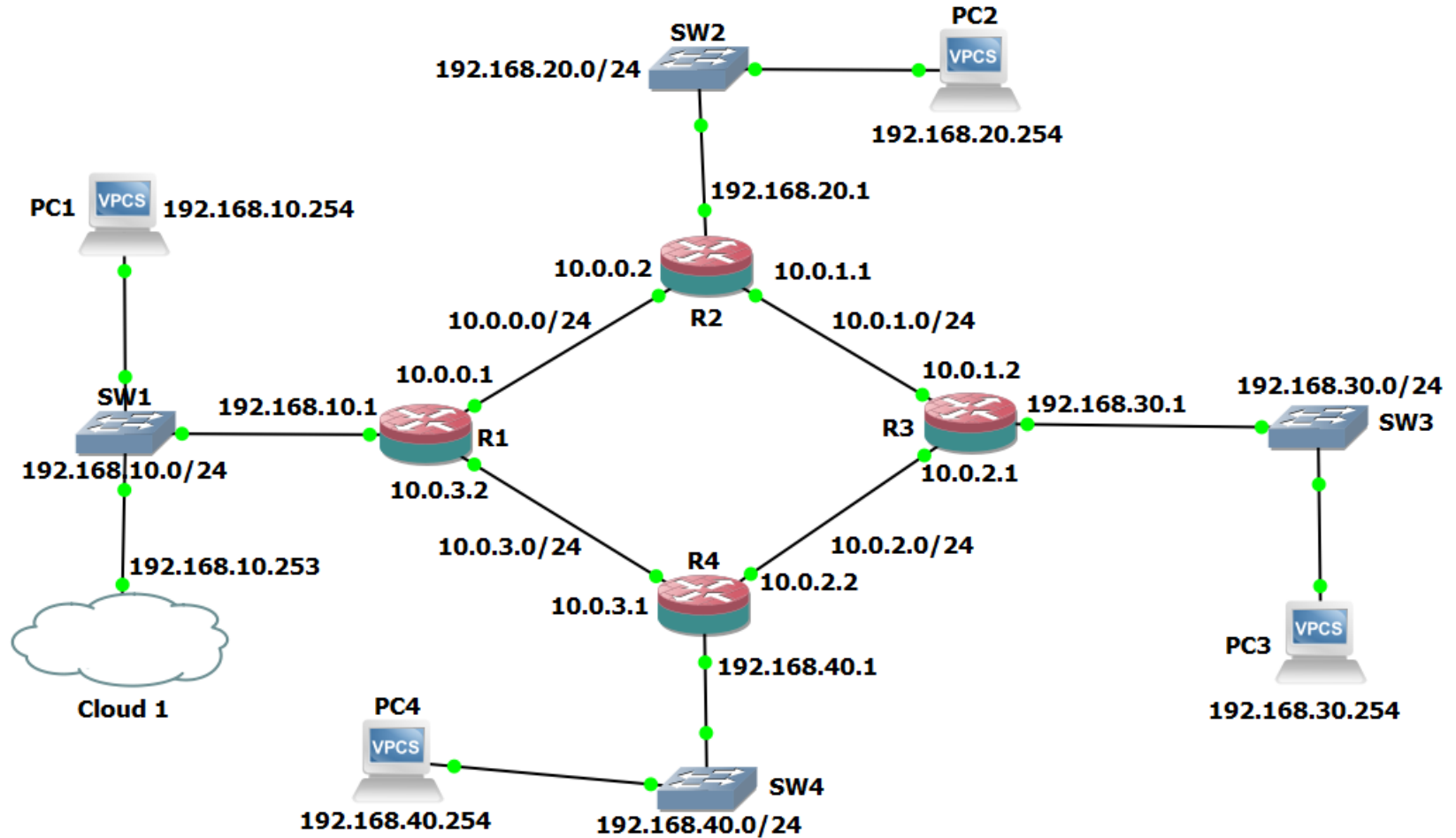
[Y] Refresh

Address	Cost	Hops	Path	L2MTU	Identity	Version	Board
00:00:AB:A4:91:04	200	1	00:00:AB:A4:91:04	1500	r2	6.35.2	CHR

LIVE DEMO



Static Route



Static Route

□ R1

/ip address

add address=192.168.10.1/24 interface=ether3 network=192.168.10.0

add address=10.0.0.1/24 interface=ether1 network=10.0.0.0

add address=10.0.3.2/24 interface=ether2 network=10.0.3.0

/ip route

add distance=1 dst-address=192.168.20.0/24 gateway=10.0.0.2

add distance=1 dst-address=192.168.30.0/24 gateway=10.0.0.2

add distance=1 dst-address=192.168.40.0/24 gateway=10.0.3.1

Static Route

□ R2

/ip address

add address=192.168.20.1/24 interface=ether3 network=192.168.20.0

add address=10.0.1.1/24 interface=ether1 network=10.0.1.0

add address=10.0.0.2/24 interface=ether2 network=10.0.0.0

/ip route

add distance=1 dst-address=192.168.10.0/24 gateway=10.0.0.1

add distance=1 dst-address=192.168.30.0/24 gateway=10.0.1.2

add distance=1 dst-address=192.168.40.0/24 gateway=10.0.1.2

Static Route

□ R3

/ip address

add address=192.168.30.1/24 interface=ether3 network=192.168.30.0

add address=10.0.1.2/24 interface=ether2 network=10.0.1.0

add address=10.0.2.1/24 interface=ether1 network=10.0.2.0

/ip route

add distance=1 dst-address=192.168.10.0/24 gateway=10.0.1.1

add distance=1 dst-address=192.168.20.0/24 gateway=10.0.1.1

add distance=1 dst-address=192.168.40.0/24 gateway=10.0.2.2

Static Route

□ R4

/ip address

add address=192.168.40.1/24 interface=ether3 network=192.168.40.0

add address=10.0.2.2/24 interface=ether2 network=10.0.2.0

add address=10.0.3.1/24 interface=ether1 network=10.0.3.0

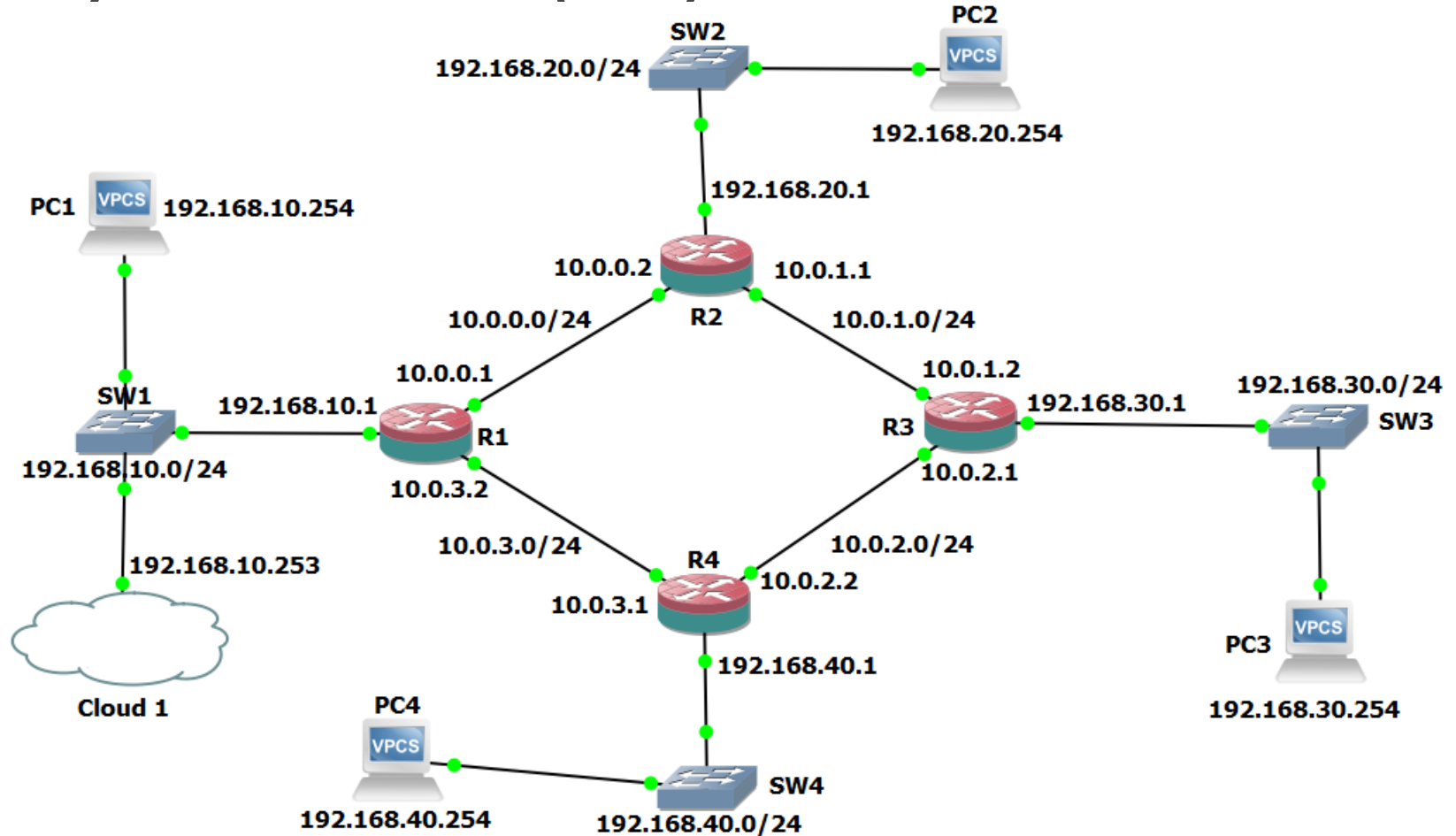
/ip route

add distance=1 dst-address=192.168.10.0/24 gateway=10.0.3.2

add distance=1 dst-address=192.168.20.0/24 gateway=10.0.3.2

add distance=1 dst-address=192.168.30.0/24 gateway=10.0.2.1

Dynamic Route(RIP)



Dynamic Route(RIP)

□ R1

```
/ip address
```

```
add address=192.168.10.1/24 interface=ether3 network=192.168.10.0
```

```
add address=10.0.0.1/24 interface=ether1 network=10.0.0.0
```

```
add address=10.0.3.2/24 interface=ether2 network=10.0.3.0
```

```
/routing rip interface
```

```
add send=v1-2
```

```
/routing rip network
```

```
add network=10.0.0.0/24
```

```
add network=10.0.3.0/24
```

```
add network=192.168.10.0/24
```

Dynamic Route(RIP)

□ R2

```
/ip address
```

```
add address=192.168.20.1/24 interface=ether3 network=192.168.20.0
```

```
add address=10.0.1.1/24 interface=ether1 network=10.0.1.0
```

```
add address=10.0.0.2/24 interface=ether2 network=10.0.0.0
```

```
/routing rip interface
```

```
add send=v1-2
```

```
/routing rip network
```

```
add network=192.168.20.0/24
```

```
add network=10.0.0.0/24
```

```
add network=10.0.1.0/24
```

Dynamic Route(RIP)

□ R3

```
/ip address
```

```
add address=192.168.30.1/24 interface=ether3 network=192.168.30.0
```

```
add address=10.0.1.2/24 interface=ether2 network=10.0.1.0
```

```
add address=10.0.2.1/24 interface=ether1 network=10.0.2.0
```

```
/routing rip interface
```

```
add send=v1-2
```

```
/routing rip network
```

```
add network=192.168.30.0/24
```

```
add network=10.0.1.0/24
```

```
add network=10.0.2.0/24
```

Dynamic Route(RIP)

□ R4

/ip address

add address=192.168.40.1/24 interface=ether3 network=192.168.40.0

add address=10.0.2.2/24 interface=ether2 network=10.0.2.0

add address=10.0.3.1/24 interface=ether1 network=10.0.3.0

/routing rip interface

add send=v1-2

/routing rip network

add network=192.168.40.0/24

add network=10.0.2.0/24

add network=10.0.3.0/24

VPC

- PC1

ip 192.168.10.254/24 192.168.10.1

- PC2

ip 192.168.20.254/24 192.168.20.1

- PC3

ip 192.168.30.254/24 192.168.30.1

- PC4

ip 192.168.40.254/24 192.168.40.1

THANK YOU



Reference:

- ❑ <https://github.com/GNS3/gns3-gui/releases>
- ❑ <http://mum.mikrotik.com/presentations/ID13/rofiq.pdf>
- ❑ <http://wiki.mikrotik.com/wiki/Manual:CHR>
- ❑ <http://wiki.mikrotik.com/wiki/Manual:RoMON>
- ❑ [http://wiki.mikrotik.com/wiki/Simple Static Routes Example](http://wiki.mikrotik.com/wiki/Simple_Static_Routes_Example)
- ❑ <http://wiki.mikrotik.com/wiki/Manual:Routing/RIP>

About ME



- ❑ Witsanu Boonmakam(MTCNA)
- ❑ Mikrotikthai Co.,Ltd (Chiangmai ,Thailand)
- ❑ Email : mikrotikthai@gmail.com
- ❑ Tel : (+66)818837333
- ❑ Website : <http://www.mikrotikthai.com>
- ❑ Line : @mikrotikthai
- ❑ Facebook Group : <http://goo.gl/7ohPRT>

- สถาบันที่ได้การแต่งตั้งให้เป็นศูนย์อบรมของไมโครติกแห่งแรกของเมืองไทย
- สอนด้วยอาจารย์ระดับมหาวิทยาลัยและทีมงานผู้ชำนาญงานพิเศษระดับ 8 และมีประสบการณ์มากกว่า 20 ปี
- อบรมตามมาตรฐานของไมโครติกพร้อมสอบใบประกาศ
- สามารถเรียนซ้ำได้ไม่จำกัดจำนวนครั้ง
- มีที่ฝึกงานหลังจากเรียนจบพร้อมฝึกงานชำนาญ