Workshop IPv6 - APJII Pengurus Wilayah Jawa Barat

MikroTik RouterOS
Contoh Implementasi IPv6

Faisal Reza

jagonetwork.id

MikroTik SUPPORT

About Speaker

Daily Activity :

- Konsultan IT untuk Networking dan Sistem sejak 2009
- Founder **jagonetwork.id**
- Co-founder ***giveme.online*** – wifi marketing software
- Technical Expertise di beberapa Perusahaan IT

Sertifikasi Professional :

- *MTC [NA, RE, TCE, WE, IPv6E, INE]*
- VCA-Cloud dari VMware
- 2Xpert Certified dari www.2x.com
- ZTE-NextGen Network dari ZTE Coorporation
- Microsoft MTA

FAISAL REZA

IT Professional since 2009

(8+ years experience)

Certified MikroTik Trainer

#TR0244

https://jagonetwork.id/Instructor

Project Experience

Year	Project Title	Detail Activity
November 2016	Indigo Hotel Seminyak Bali (Intercontinental Group) – for Jaya Teknik Indonesia	- Network Integration Platform Engineer for Cisco, Juniper, HPEnterprise, MikroTik, VMware, Ruckus Wireless & Calix GPON - Configure OSPF Dynamic Routing between core-switch, setup Active-Standby VRRP for Juniper Device - VLAN trunking integration for Wifi (Ruckus) PABX (Alcatel) and IPTV Services (Televes)
October 2016	Sekolah Tinggi Penerbangan Indonesia (STPI) – for Planet Solusi	- Configure Juniper SRX 240 for internet and Server farm firewall - Configure Linux Server (LAMP), Zimbra Mail Server, DNS (bind) - Configure Network Monitoring System - Deploy MikroTik Hotspot Captive portal solution
October 2016	Indosat Ooredoo UDC1 Migration @ Teknopark BSD – for Sisindokom	- Install, configure Spine & Leaf Switch, Datacenter Networking using Cisco Nexus 7k and Nexus 5k. Deployong eVPN, VXLAN technology - Provision 40 Gbps Fiber Backbone - Configure BGP and OSPF dynamic routing protocol for underlay network
Aug – Oct 2016	Datacenter Network Installation PT. Bank Mizuho Indonesia – for PT. NTT Indonesia	- Install, configure, Cisco Router ASR 1001-X Series for Overlay Transport Virtualization (OTV) technology - Configure Nexus 5k series for vPC (virtual Port Channel) - Network integration of multiple site (DC, DRC, Head Office, Businiess Continuity Plan Site) - Setup Dynamic Routing protocol EIGRP for redundancy & communiation between sites
Jun 2016	PT. Kaltim Parna Industri WAN Optimalization	- Redesign Network Redundancy for communication between Jakarta and Bontang - Configure Cisco Router & Core Switch using OSPF and integrate with existing network device - Configure Network Monitoring System using TheDude and PRTG
Sep 2015	Wifi Management Solution Hotel Adi Mulia Medan – PT. Logikreasi	- Install & configure radius server - Integrate Wifi hotspot management system using API with existing VHP (Visual Hotel Pro) Hotel system

- **Training** (Public and In-house class for companies) – *working with several partners to organize the events*
- **Network Integration & Implementation Services**
- Covers end-to-end solution from
  (1) Consulting -> (2) Network design -> (3) Implementation ->
  (4) Operation & Monitoring -> (5) Knowlegde Transfer


NEXT TRAINING EVENT -> MTCINE

Before MikroTik User Meeting 2017 Yogyakarta

https://mum.mikrotik.com/2017/ID/info/EN

- Cocok Untuk ISP & Coorporate Multicabang
- Penginapan Include
- Bonus Materi dan Exam IPv6 *
- Trainer Expert Multivendor di Track Service Provider
- Hangout di MUM ID 2017

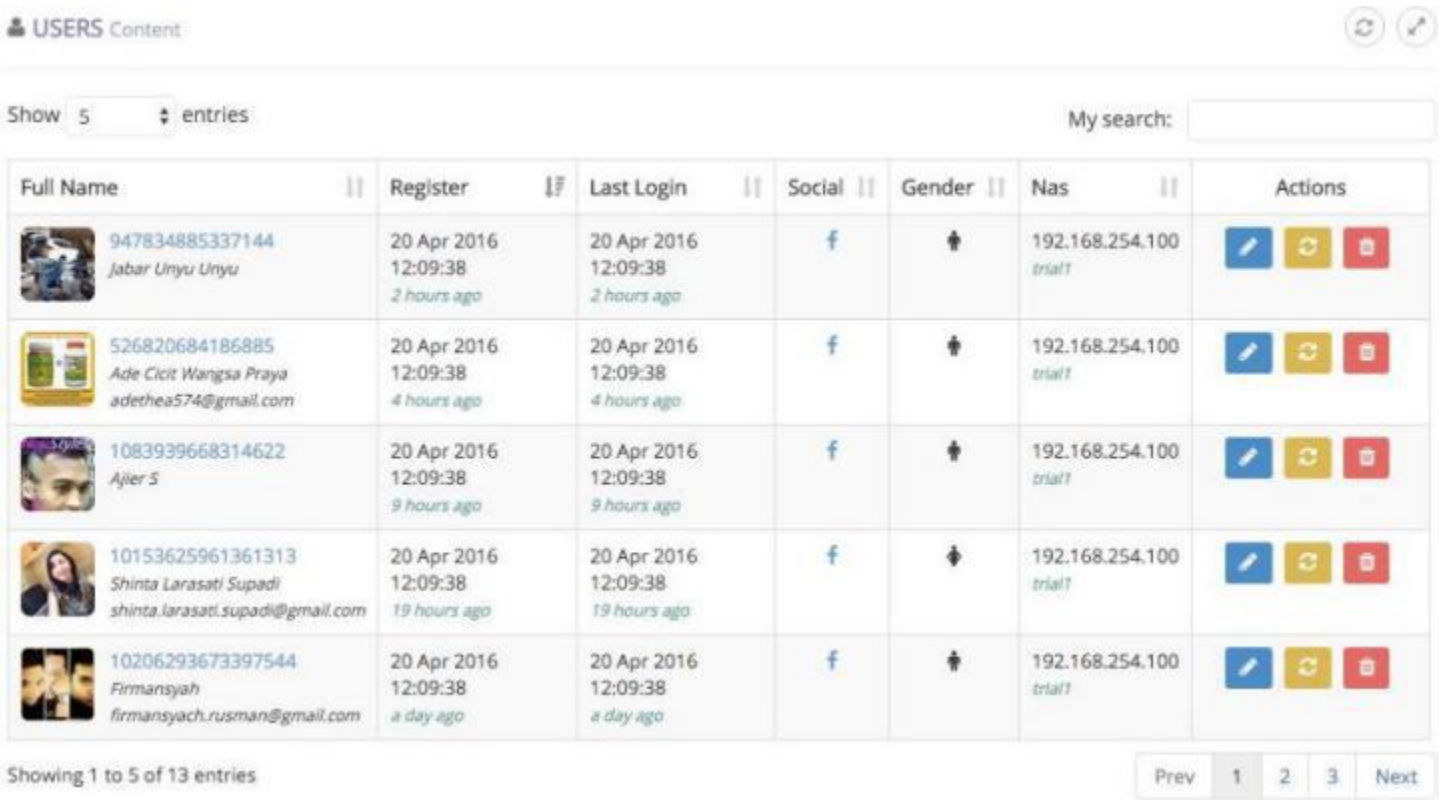
Saya Ingin DAFTAR :

http://training.jagonetwork.id

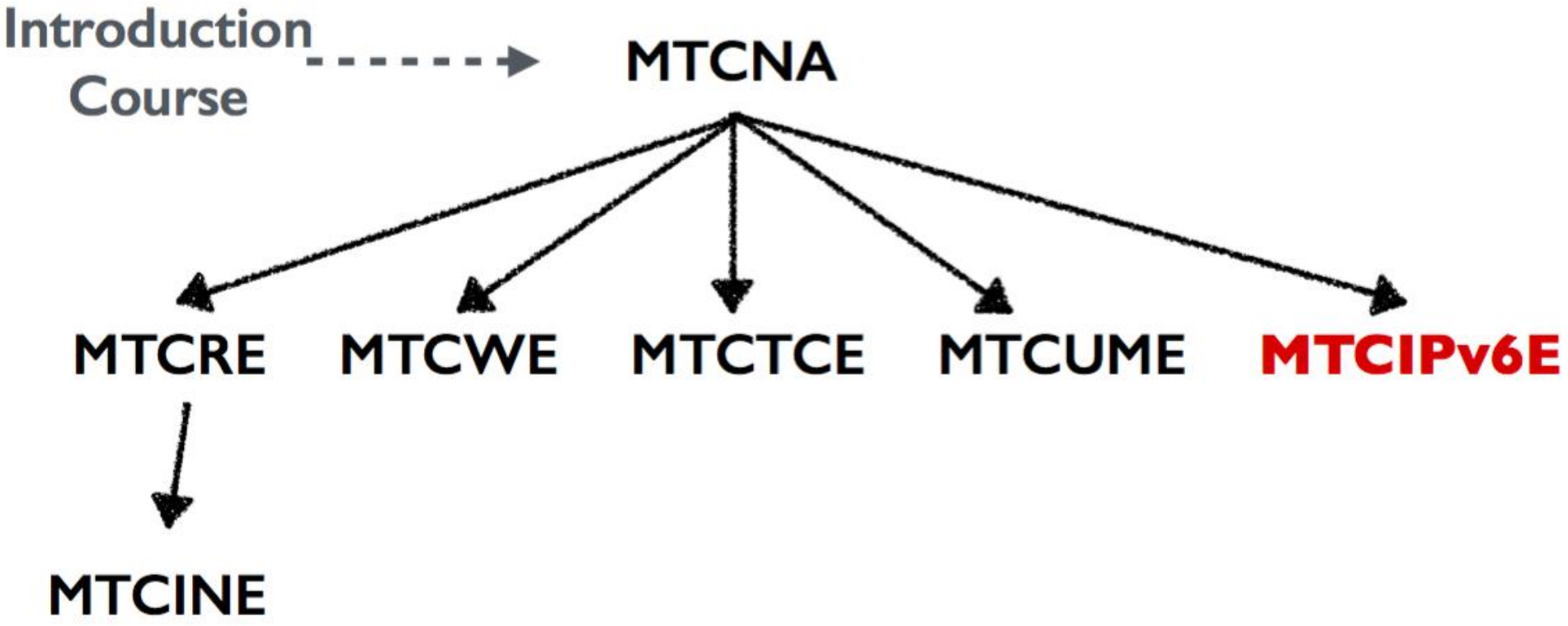
https://giveme.online

compatible with MikroTik

- **Social Media Based Captive Portal** (Facebook, twitter, instagram)
- **Login using social media** to connect to internet services
- can be applied almost everywhere (eg **Airports, Restaurant/Cafe, Hotels, Hospital, School**... *many possibilities*)
- **Provides user analitics** & **usage statistics** for your network



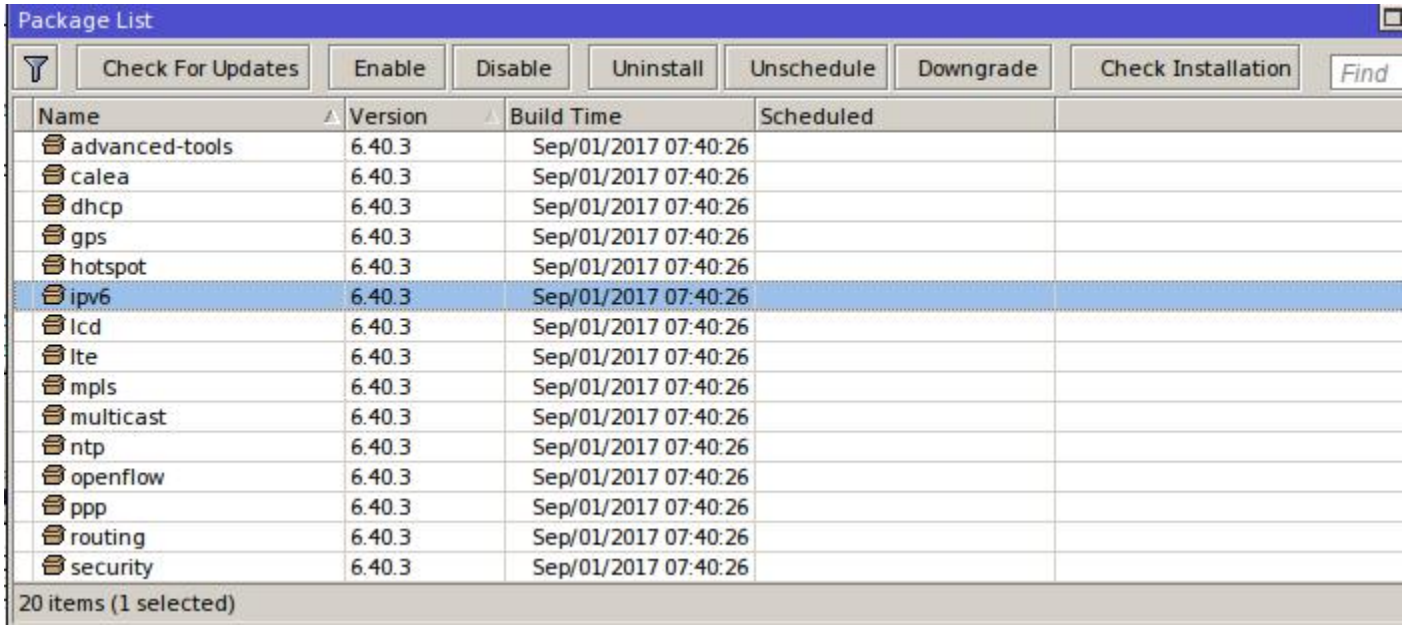
Jenjang Sertifikasi MikroTik



Sertifikat Valid selama jangka waktu 3 tahun

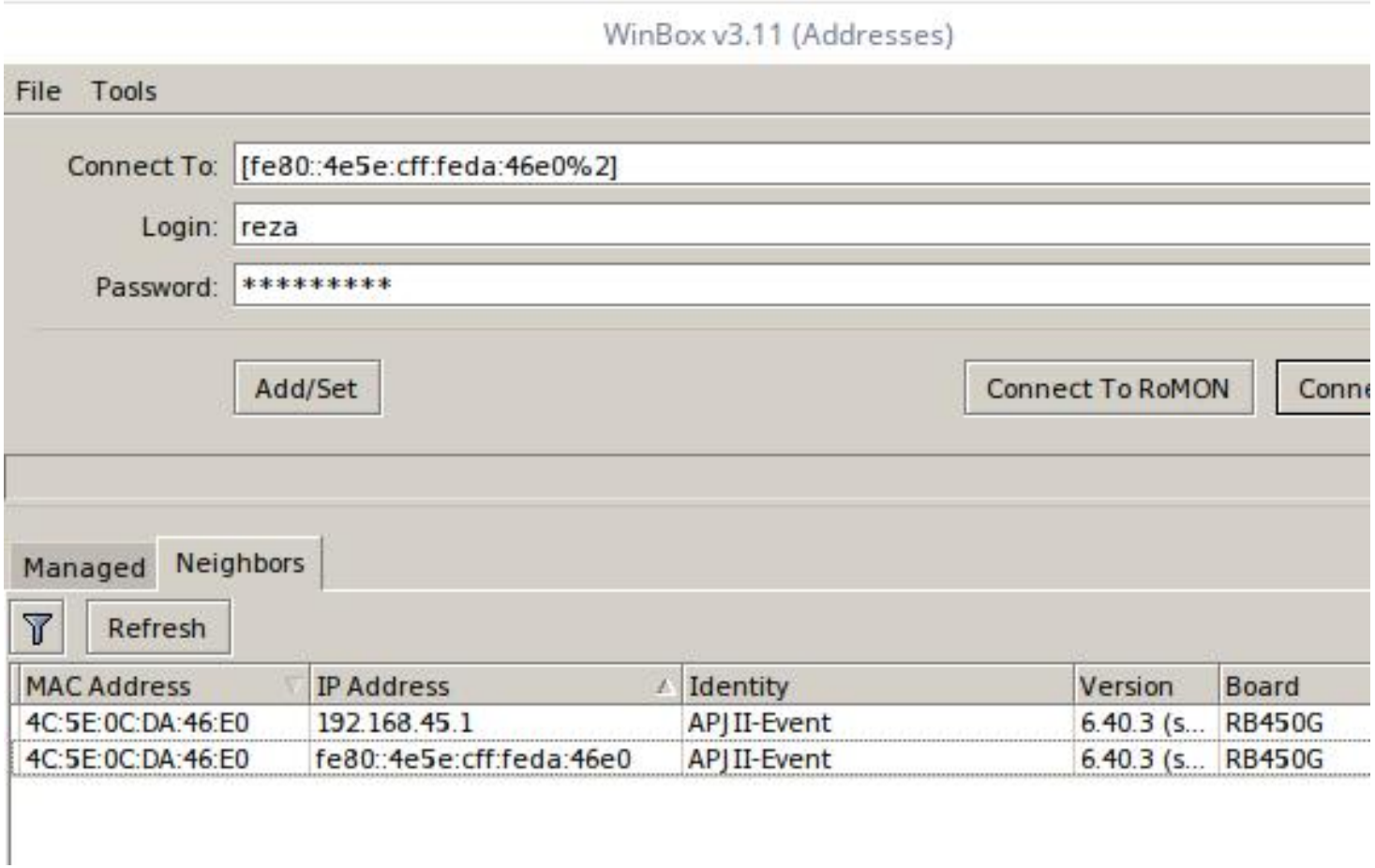
Aplikasi IPv6 di MikroTik

kondisi default, IPv6 non-aktif
(1) Enable Package IPv6 di /system package
(2) Restart router



Akses via Winbox

Mengakses IPv6 di MikroTik menggunakan tanda [ ]



Basic Operation

(1) Ping

```
[reza@APJII-Event] > ping 2001:4860:4860::8888
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 2001:4860:4860::8888                       56  57 28ms  echo reply
    1 2001:4860:4860::8888                       56  57 36ms  echo reply
    2 2001:4860:4860::8888                       56  57 30ms  echo reply
    3 2001:4860:4860::8888                       56  57 27ms  echo reply
    sent=4 received=4 packet-loss=0% min-rtt=27ms avg-rtt=30ms max-rtt=36ms

[reza@APJII-Event] >
```

(2) Ping, resolve domain

```
[reza@APJII-Event] > ping [:resolv www.v6.facebook.com]
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 2a03:2880:20:cf04:face:b00c:0:12c          56  39 225ms echo reply
    1 2a03:2880:20:cf04:face:b00c:0:12c          56  39 251ms echo reply
    2 2a03:2880:20:cf04:face:b00c:0:12c          56  39 220ms echo reply
    3 2a03:2880:20:cf04:face:b00c:0:12c          56  39 226ms echo reply
    4 2a03:2880:20:cf04:face:b00c:0:12c          56  39 224ms echo reply
    sent=5 received=5 packet-loss=0% min-rtt=220ms avg-rtt=229ms max-rtt=251ms
```

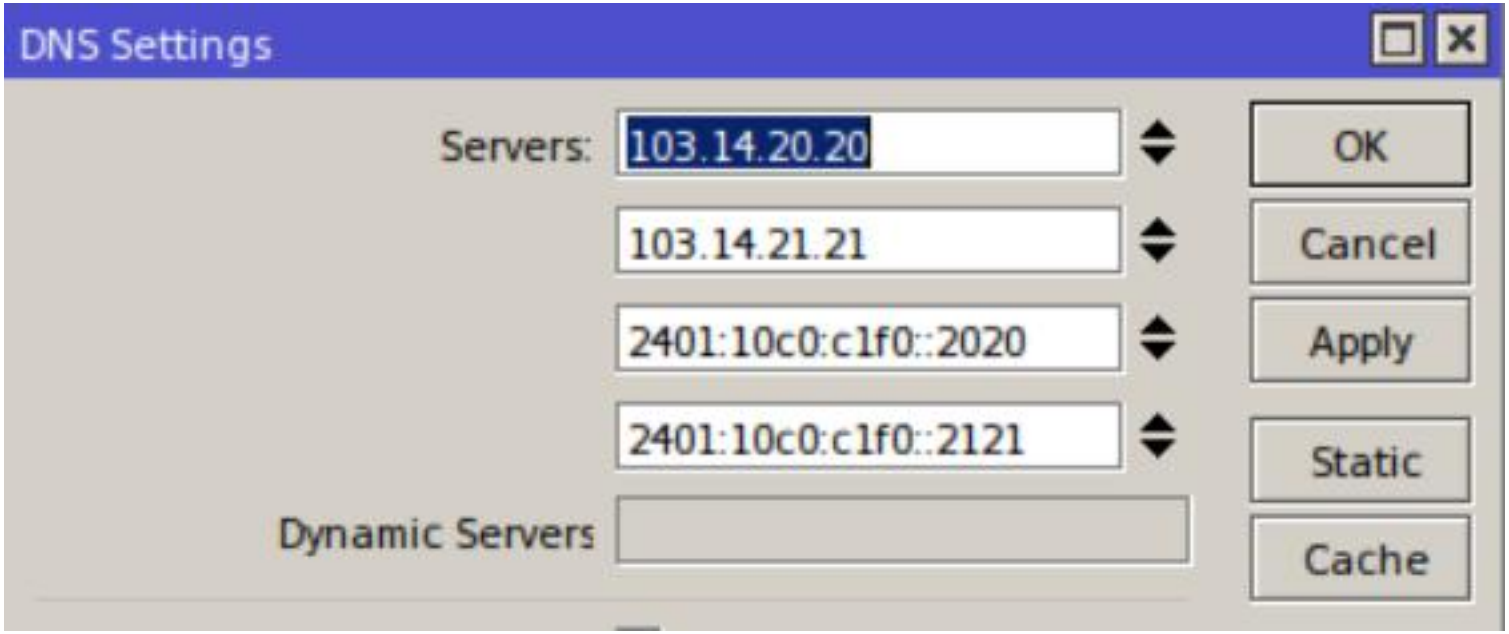
.. Basic Operation

(3) Traceroute

```
[reza@APJII-Event] > /tool traceroute 2001:4860:4860::8888
 # ADDRESS                                LOSS SENT    LAST     AVG    BEST   WORST STD-D
 1 2401:10c0:c1f0:bd9::1                    0%    9  21.1ms    18.9     8.5    45.3    11
 2 2401:10c0:b::1                           0%    9   8.1ms    10.8     8.1    13.8     1
 3 2401:10c0:a::2                           0%    9  16.8ms    18.6    12.3    29.8     4
 4 2401:10c0:1dc::c1f1                      0%    9  21.6ms    24.5    12.4    40.3     8
 5 2404:fd00:c:5882:5855:2:0:6              0%    9  20.8ms    29.1      11    88.8    22
 6 2404:fd00:1:1:0:dbb6::                   0%    9  28.6ms    33.5    27.9    40.9     4
 7 2001:4860:0:f88::1                       0%    9  51.7ms    43.2    29.6    69.9    13
 8 2001:4860:0:1::ddd                       0%    8  39.8ms    34.3    28.2    39.8
 9 2001:4860:4860::8888                     0%    8  27.2ms    31.9      27    36.8     3
-- [Q quit|D dump|C-z pause|right]
```

.. Basic Operation

(4) IP > DNS, aktifkan dual stack DNS



IPv6 Simple LAB

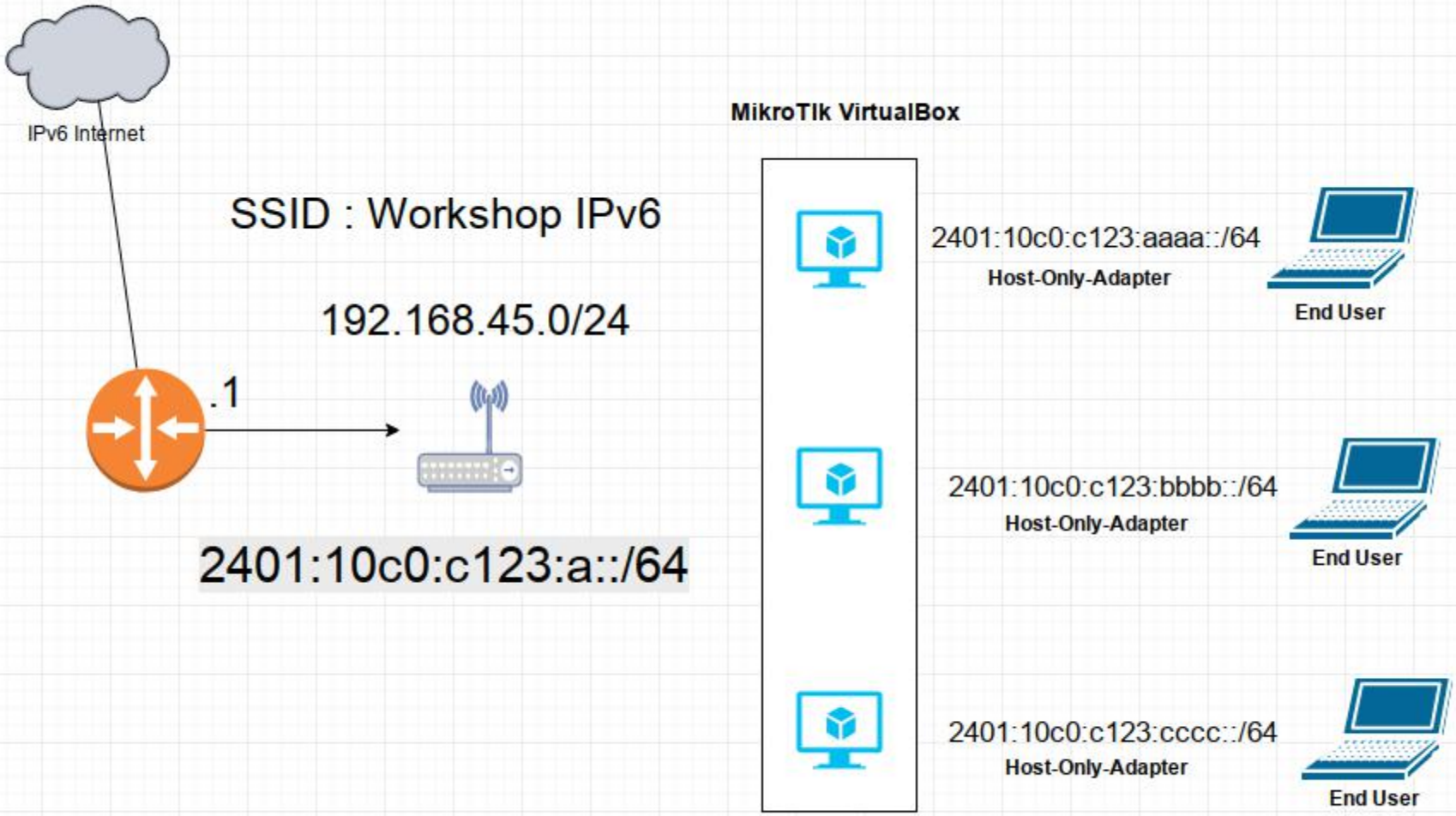
Goal :
Set IPv6 di MikroTik router, dan sharing internet native IPv6 ke Laptop / PC

Perlengkapan :
1. Laptop / PC terkoneksi ke SSID : **Workshop IPv6**
2. VirtualBox / VMware terinstall
3. MikroTik RouterOS CHR (Cloud Hosted Router)

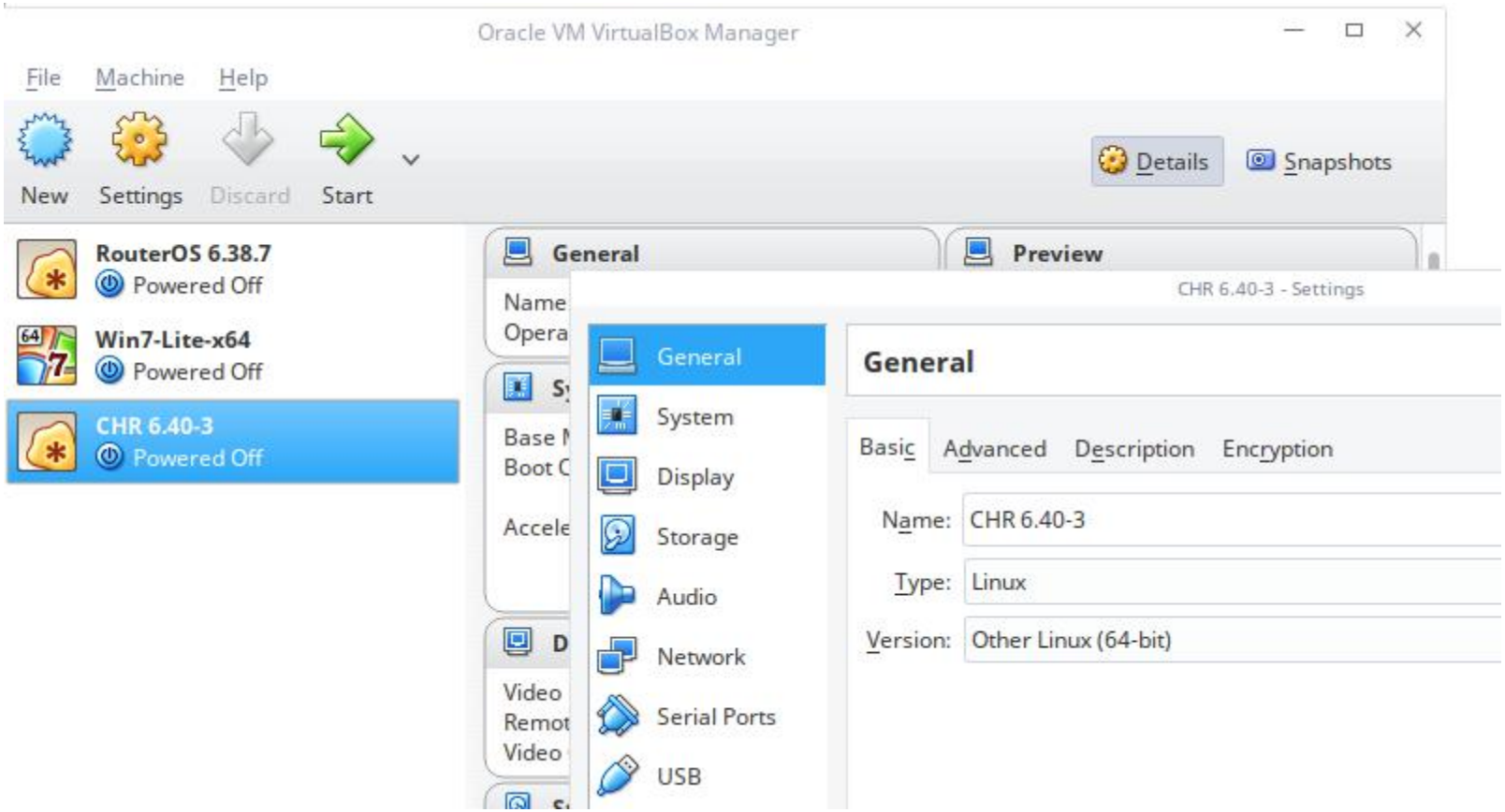
vbox image
https://download2.mikrotik.com/routeros/6.40.3/chr-6.40.3.vdi

vmware image
https://download2.mikrotik.com/routeros/6.40.3/chr-6.40.3.vmdk

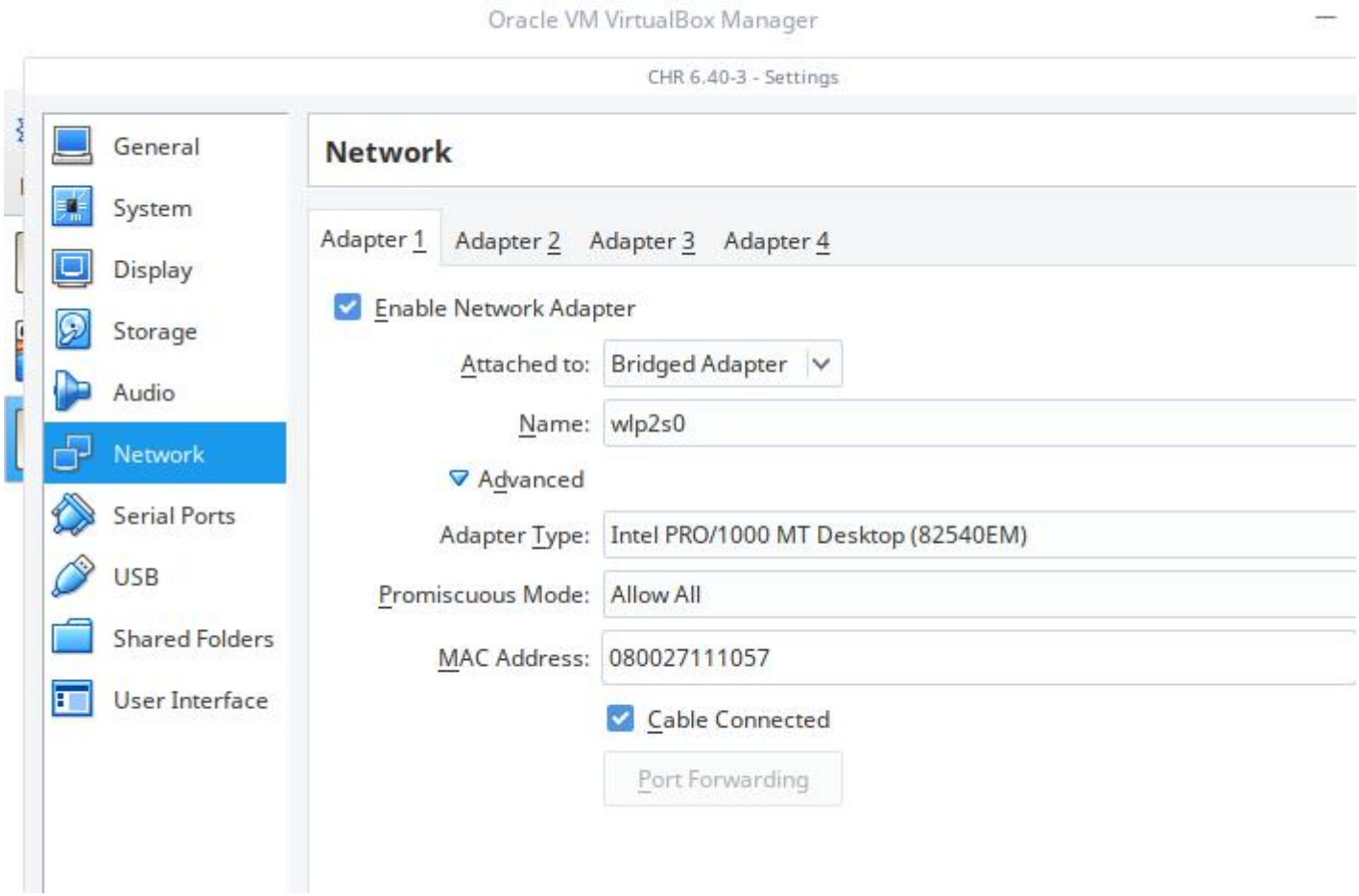
IPv6 Simple Lab Topology



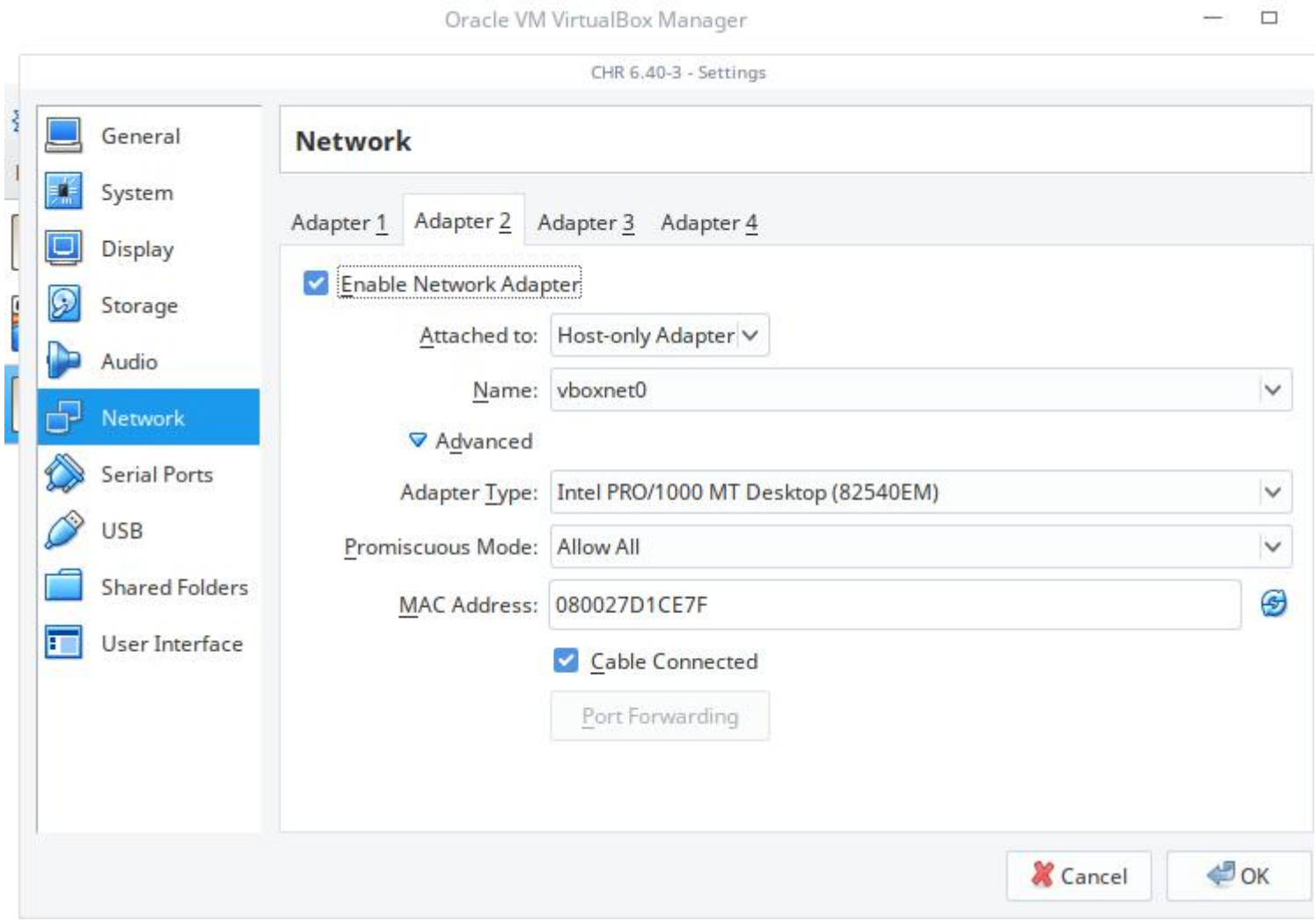
VBox Config (VM)



.. VBox Config Network



... VBox Config Network



.... VM Interface

```
[reza@LAB-IPv6-APJII-JABAR] > interface print
Flags: D - dynamic, X - disabled, R - running, S - slave
 #     NAME                                TYPE       ACTUAL-MTU L2MTU
 0  R  ether1-wan                          ether            1500
 1  R  ether2-lan                          ether            1500
[reza@LAB-IPv6-APJII-JABAR] > interface set name=ether1-wan numbers=0
[reza@LAB-IPv6-APJII-JABAR] > interface set name=ether2-host-only numbers=1
[reza@LAB-IPv6-APJII-JABAR] > interface print
Flags: D - dynamic, X - disabled, R - running, S - slave
 #     NAME                                TYPE       ACTUAL-MTU L2MTU
 0  R  ether1-wan                          ether            1500
 1  R  ether2-host-only                    ether            1500
line 2 of 2>
```

Disable dhcp-client

/ip dhcp-client print

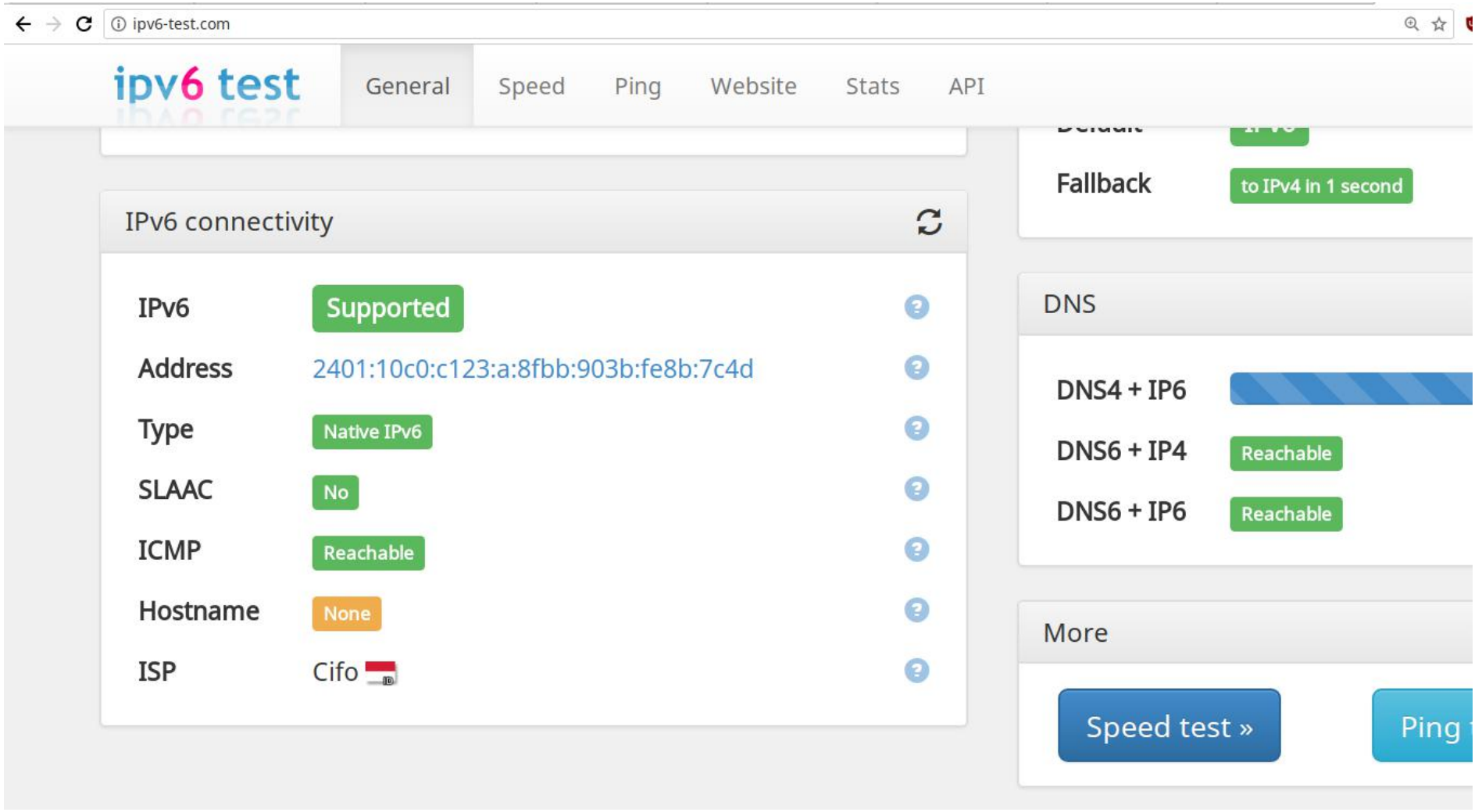
/ip dhcp-client disable number=1

Test Ping Ke Internet

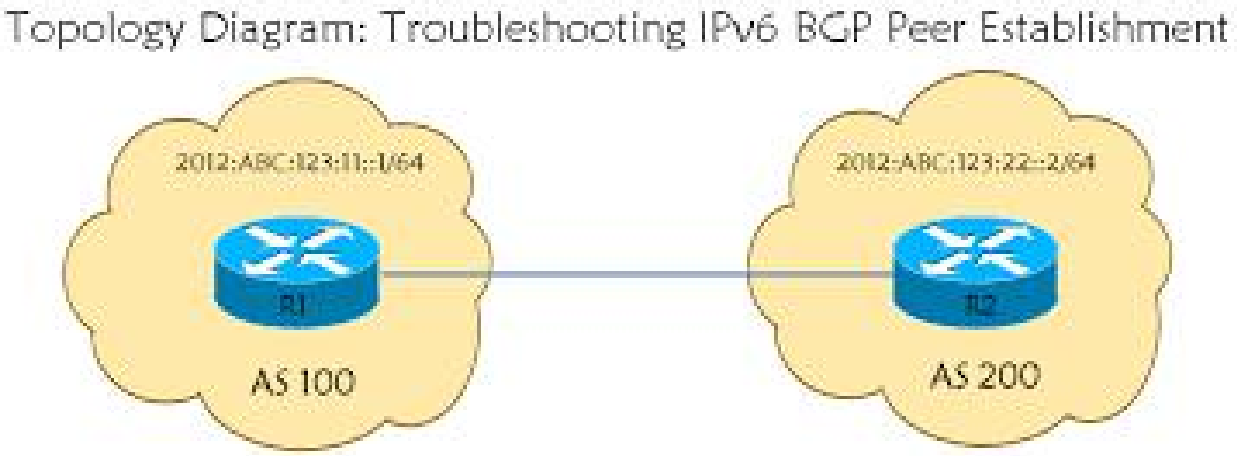
ping 8.8.8.8

LAB DEMO

ipv6-test.com



Step-by-stem
MikroTik IPv6 BGP Peer



1. Tambahkan IP Address Point-to-Point Dengan Upstream

/ipv6 address
add address=2405:eb80:8000::1:8351:22/126 advertise=no interface=ether1-ISP1

add address=2403:2e00::2e/126 advertise=no interface=ether2-ISP2

add address=2401:1fc0:5915:803::2/126 advertise=no interface=ether3-EXCHANGE

.. MikroTik IPv6 BGP Peer

2. Set BGP Instances di router kita

```
/routing bgp instance
set default as=136052 client-to-client-reflection=no
```

3. Advertised Prefix Kita di BGP Network

```
/routing bgp network
add network=2001:df7:7400::/48 synchronize=no
```

... MikroTik IPv6 BGP Peer

5. Bangun Komunikasi dengan Peer
***set chain untuk aplikasi routing filter IN dan OUT**

```
/routing bgp peer
add address-families=ipv6 in-filter=from-v6-ISP1-inter name=\
    peer7-v6-ISP1 out-filter=to-v6-ISP1 remote-address=\
    2405:eb80:8000::1:8351:21 remote-as=18351 ttl=default update-source=\
    ether1-ISP1

add address-families=ipv6 in-filter=from-v6-ISP2 name=\
    peer12-v6-ISP2 out-filter=to-v6-ISP2 remote-address=\
    2401:1fc0:5915:802::1 remote-as=59155 ttl=default
```

.... MikroTik IPv6 BGP Peer

4. Aplikasikan ROUTING FILTER

- Allow HANYA Prefix kita ke upstream **(OUT)**
- Discard Prefix Lainnya yang berasal dari router kita **(OUT)**
- Allow Semua Prefix yang berasal dari Upstream **(IN)**

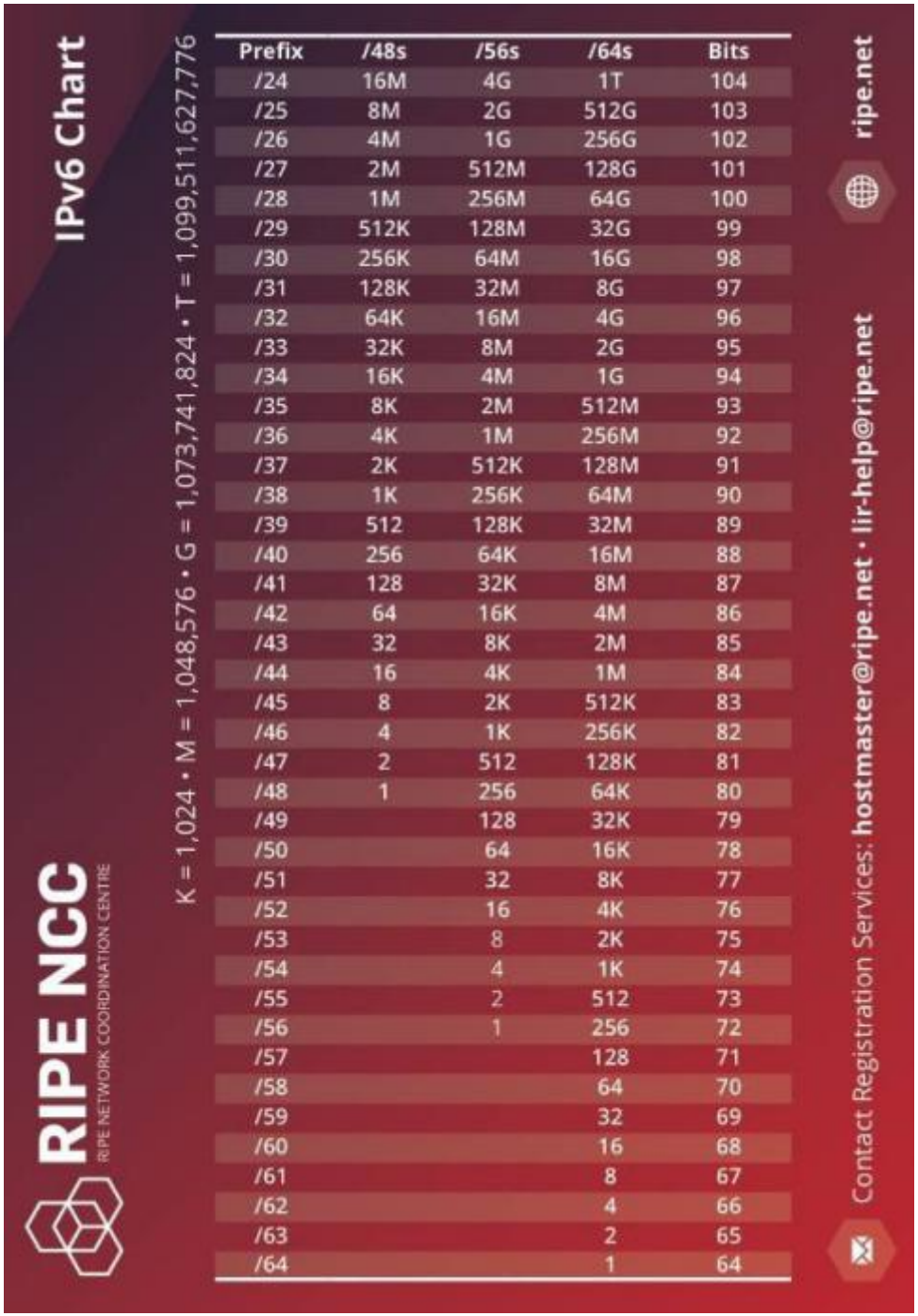
Jika hanya terdapat satu instance BGP, maka router akan melakukan kalulasi routing berdasarkan best-path sesuai dengan AS-PATH nya

/routing filter
add action=accept chain=**to**-v6-ISP1 prefix=2001:df7:7400::/48
add action=discard chain=**to**-v6-ISP1

add action=accept chain=**from**-v6-ISP1

5. Jangan lupa request ke upstream untuk allow prefix kita

IPv6 Subnet Cheat sheet



Prefix	/48s	/56s	/64s	Bits
/24	16M	4G	1T	104
/25	8M	2G	512G	103
/26	4M	1G	256G	102
/27	2M	512M	128G	101
/28	1M	256M	64G	100
/29	512K	128M	32G	99
/30	256K	64M	16G	98
/31	128K	32M	8G	97
/32	64K	16M	4G	96
/33	32K	8M	2G	95
/34	16K	4M	1G	94
/35	8K	2M	512M	93
/36	4K	1M	256M	92
/37	2K	512K	128M	91
/38	1K	256K	64M	90
/39	512	128K	32M	89
/40	256	64K	16M	88
/41	128	32K	8M	87
/42	64	16K	4M	86
/43	32	8K	2M	85
/44	16	4K	1M	84
/45	8	2K	512K	83
/46	4	1K	256K	82
/47	2	512	128K	81
/48	1	256	64K	80
/49		128	32K	79
/50		64	16K	78
/51		32	8K	77
/52		16	4K	76
/53		8	2K	75
/54		4	1K	74
/55		2	512	73
/56		1	256	72
/57			128	71
/58			64	70
/59			32	69
/60			16	68
/61			8	67
/62			4	66
/63			2	65
/64			1	64

TELEGRAM GROUP IPv6 UNIVERSITY

s.id/FE5

i  discussion

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MikroTik SUPPORT

Thank you

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