

Workshop IPv6 - APJII Pengurus Wilayah Jawa Barat

MikroTik RouterOS Contoh Implementasi IPv6

Faisal Reza





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 <u>www.2x.com</u>
- ZTE-NextGen Network dari ZTE Coorporation
- Microsoft MTA

MikroTik



Microsoft

FAISAL REZA IT Professional since 2009 (8+ years experience) Certified MikroTik Trainer #TR0244

https://jagonetwork.id/Instructor2

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	Sekolah Tinggi Peperbangan Indonesia	- Configure Juniper SRX 240 for internet and Server farm firewall		
2010	(STPI) – for Planet Solusi	- 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 Mizubo Indonesia – for PT	- Install, configure, Cisco Router ASR 1001-X Series for Overlay Transport Virtualization (OTV) technology		
	NTT Indonesia	- 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	- Install & configure radius server		
	PT. Logikreasi	 Integrate Wifi hotspot management system using API with existing VHP (Visual Hotel Pro) Hotel system 		

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- **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



http://jagonetwork.id

certification training with bootcamp

22-27 Oktober 2017 Sebelum MUM 2017

Waktu & Lokasi

Rumah SAARAH Caturtunggal, Kec. Depok, Kab. Sleman, DI Yogyakarta

check-in 14.00 & check-out 11.00

Detail mengenai lokasi silahkan kunjungi http://s.id/EVE



LIMITED 10 SEAT

Before MikroTik User Meeting 2017 Yogyakarta

NEXT TRAINING EVENT -> MTCINE

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

MikroTik MTCINE

MTCINE OUTLINE

- Border Gateway Protocol (BGP) Service Provider BGP Design Multiprotocol Label Switching (MPLS) MPLS VPN Layer 3 & 2 Traffic Engineering (TE)

Fasilitas:

- :: Mikrotik Certified Instructor
- :: Modul Pelatihan (Soft Copy)
- :: Perangkat Router Dipinjamkan Saat Training & Lab
- :: Snack (Pagi & Sore), Makan Siang
- :: Soft Drink & Air Mineral
- :: Penginapan 4 malam
- :: MTCINE Exam dari Mikrotik Latvia
- :: (*) Bagi Score MTCINE 80% Free MTCIPv6E Exam
- :: Mendapatkan License Level 4 dan Sertifikat International MTCINE & MTCIPv6E (*) Jika Lulus Ujian
- :: Voucher MUM 2017 dan tambahan License Level 4



INFORMASI DETAIL DAN PENDAFTARAN: http://training.jagonetwork.id

PLUS.

IPv6 La

Free MTCIPv6E Exan

NFORMASI LEBIH LANJUT: VA/Telegram +628123003336 pik@jagonetwork.id

MikroTik MTCNA, MTCRE, MTCWE, MTCTCE MTCUME, MTCINE, MTCIPVEE Trainer # TR0251

Certifications

Cisco CCIE # 47682 (Service Provider) Juniper:

JNCIA-Junos, JNCIS-SP, JNCDA VMware:

VCA-NV APNIC Community Trainer

Trainer from Cambodia

Supported by:

Lay Minh

(Makito)

steering ahead



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

ow 5 \$ entries					My search:	
ull Name	Register 17	Last Login	Social	Gender 11	Nas II	Actions
947834885337144 Jabar Unyu Unyu	20 Apr 2016 12:09:38 2 hours ago	20 Apr 2016 12:09:38 2 hours ago	f	*	192.168.254.100 trial1	/ 0 0
526820684186885 Ade Cicit Wangsa Praya adethea574@gmail.com	20 Apr 2016 12:09:38 4 hours ago	20 Apr 2016 12:09:38 4 hours ago	f	*	192.168.254.100 triat1	/ 0
1083939668314622 Ajiter S	20 Apr 2016 12:09:38 9 hours ago	20 Apr 2016 12:09:38 9 hours ago	f	*	192.168.254.100 trial1	/ 0 0
10153625961361313 Shinta Larasati Supadi shinta.larasati.supadi@gmail.com	20 Apr 2016 12:09:38 <i>19 hours ago</i>	20 Apr 2016 12:09:38 <i>19 hours ago</i>	f	*	192.168.254.100 trial1	200
10206293673397544 Firmansyah firmansyach.rusman@gmail.com	20 Apr 2016 12:09:38 a day ato	20 Apr 2016 12:09:38 a day ago	f	*	192.168.254.100 trial1	/ 0 0

пцр.//јауопескогк.ти

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

Check For Updates	Enable	Disable	Uninstall	Unschedule	Downgrade	Check Installation	Fin
Name	Version	Build	Time	Scheduled			
🗃 advanced-tools	6.40.3	Sep/	01/2017 07:40:2	5			
🗃 calea	6.40.3	Sep/	01/2017 07:40:2	5			
🗃 dhcp	6.40.3	Sep/	01/2017 07:40:2	5			
🗃 gps	6.40.3	Sep/	01/2017 07:40:20	5			
🗃 hotspot	6.40.3	Sep/	01/2017 07:40:2	5			
🔁 ipv6	6.40.3	Sep/	01/2017 07:40:2	5			
🔁 lcd	6.40.3	Sep/	01/2017 07:40:2	5			0.0.0.
🗃 lte	6.40.3	Sep/	01/2017 07:40:2	5			
🗃 mpis	6.40.3	Sep/	01/2017 07:40:2	5			
🗃 multicast	6.40.3	Sep/	01/2017 07:40:2	5			
🗃 ntp	6.40.3	Sep/	01/2017 07:40:2	5			
e openflow	6.40.3	Sep/	01/2017 07:40:2	5			
😂 ррр	6.40.3	Sep/	01/2017 07:40:2	5			
🗃 routing	6.40.3	Sep/	01/2017 07:40:2	5			
security	6.40.3	Sep/	01/2017 07:40:20	5			

Akses via Winbox

Mengakses IPv6 di MikroTik menggunakan tanda []

		WinBox v3.11 (Addresse	s)			
File Tools						
Connect To:	[fe80::4e5e:cff:feda:46e0%	.2]				
Login:	Login: reza					
Password:	*****					
Managed Neig	hbors					
Y Refresh		-		1		
MAC Address	IP Address	⊥ Identity	Version	Board		
4C:5E:0C:DA:46:E	0 192.168.45.1	APJ II-Event	6.40.3 (s	RB450G		
4C-5E-0C-DA-46-E	fe80-4e5e.cff.feda-4	6a0 ADITLEvent	6 40 2 /c			

Basic Operation

(1) Ping

EQ	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
Se	ent=4 received=4 packet-loss=0%	min-rtt=27ms av	7g-ri	tt=30m	ns max-rtt=36

(2) Ping, resolve domain

EQ	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

.. 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:clf0:bd9::1	0%	9	21.1ms	18.9	8.5	45.3	112
2	2401:10c0:b::1	0%	9	8.lms	10.8	8.1	13.8	10
3	2401:10c0:a::2	0%	9	16.8ms	18.6	12.3	29.8	42
4	2401:10c0:1dc::clf1	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	225
6	2404:fd00:1:1:0:dbb6::	0%	9	28.6ms	33.5	27.9	40.9	43
7	2001:4860:0:f88::1	0%	9	51.7ms	43.2	29.6	69.9	133
8	2001:4860:0:1::ddd	0%	8	39.8ms	34.3	28.2	39.8	3
9	2001:4860:4860::8888	0%	8	27.2ms	31.9	27	36.8	30
-	[Q quit D dump C-z pause right]							

.. Basic Operation

(4) IP > DNS, aktifkan dual stack DNS

DNS Settings		
Servers:	103.14.20.20	\$ ОК
	103.14.21.21	\$ Cancel
	2401:10c0:c1f0::2020	\$ Apply
	2401:10c0:c1f0::2121	\$ Static
Dynamic Servers		Cache

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



http://jagonetwork.id

VBox Config (VM)

	Oracle VM VirtualBox Manager	— — X
lew Settings Discard Start		<u> Details</u> <u>Snapshots</u>
RouterOS 6.38.7	General Name	CHR 6.40-3 - Settings
Win7-Lite-x64	Opera General	General
CHR 6.40-3 Powered Off	Base M Boot C Display	Basic Advanced Description Encryption
	Accele 😡 Storage	N <u>a</u> me: CHR 6.40-3
	Audio	<u>Type:</u> Linux
	D Network	Version: Other Linux (64-bit)
	Video Remot Video Video USB	

.. VBox Config Network

		CHR 6.40-3 - Settings
General	Network	
System	Adapter <u>1</u> Adapter <u>2</u> A	.dapter <u>3</u> Adapter <u>4</u>
Storage	Enable Network Adap	Bridged Adapter
Audio	<u>N</u> ame:	wlp2s0
Serial Ports	✓ Advanced Adapter Type:	Intel PRO/1000 MT Deskton (82540EM)
SB USB	Promiscuous Mode:	Allow All
Shared Folders	MAC Address:	080027111057
		Cable Connected

... VBox Config Network

		CHR 6.40-3 - Settings	
General	Network		
System	Adapter 1 Adapter 2	Adapter 3 Adapter 4	
Display			
Storage		pter:	
Audio	Attached to:	Host-only Adapter V	
P Network	Name:	VDOXNELU	V
🔉 Serial Ports	Adapter Type:	Intel PRO/1000 MT Desktop (82540EM)	×
🎐 USB	Promiscuous Mode:	Allow All	~
Shared Folders	– MAC Address:	080027D1CE7F	6
User Interface	_	Cable Connected	
		Port Forwarding	
		X Cancel	« OK

.... VM Interface

[reza0]	AB-IPv6-APJII-JABAR1 > interface	print	
Flags:	D - dynamic, X - disabled, R - ru	unning, S - s	slave
#	NAME	TYPE	ACTUAL-MTU L2MTU
Ø R	ether1-wan	ether	1500
1 R	ether2-lan	ether	1500
[reza0]	AB-IPv6-APJII-JABAR] > interface	set name=et}	ier1-wan numbers=0
[reza@]	AB-IPv6-APJII-JABAR1 > interface	set name=et}	ner2-host-only numbers=1
[reza@]	AB-IPv6-APJII-JABAR1 > interface	print	
Flags:	D - dynamic, X - disabled, R - ru	unning, S - 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

http://jagonetwork.id

ipv6-test.com



Step-by-stem MikroTik IPv6 BGP Peer

Topology Diagram: Troubleshooting IPv6 BGP Peer Establishment



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

IPv6 Chart

SIPE NCC

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			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

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TELEGRAM GROUP IPv6 UNIVERSITY





reza@jagonetwork.id









Thank you



