V-Lab MikroTik Academy

Muhti Subiyantoro

About Me

- Spectrum Indonesia
- MikroTik Trainer
  - MTCNA
  - MTCTCE
  - MTCWE
  - MTCUME

About Spectrum Network Infrastructure Unit

- MikroTik Reseller

  www.spectrumindo.com
- MikroTik Consultant
- MikroTik Certified Training Partner

  www.trainingmikrotik.co.id
- MikroTik Academy Coordinator

MikroTik Academy

- Program Training untuk Institusi Pendidikan
  - Kurikulum
  - Praktikum Lab
  - Ekstra Training Skill
- Menggunakan MikroTik RouterOS sebagai sarana pelatihan
- Sertifikasi sebagai MTCNA Academy

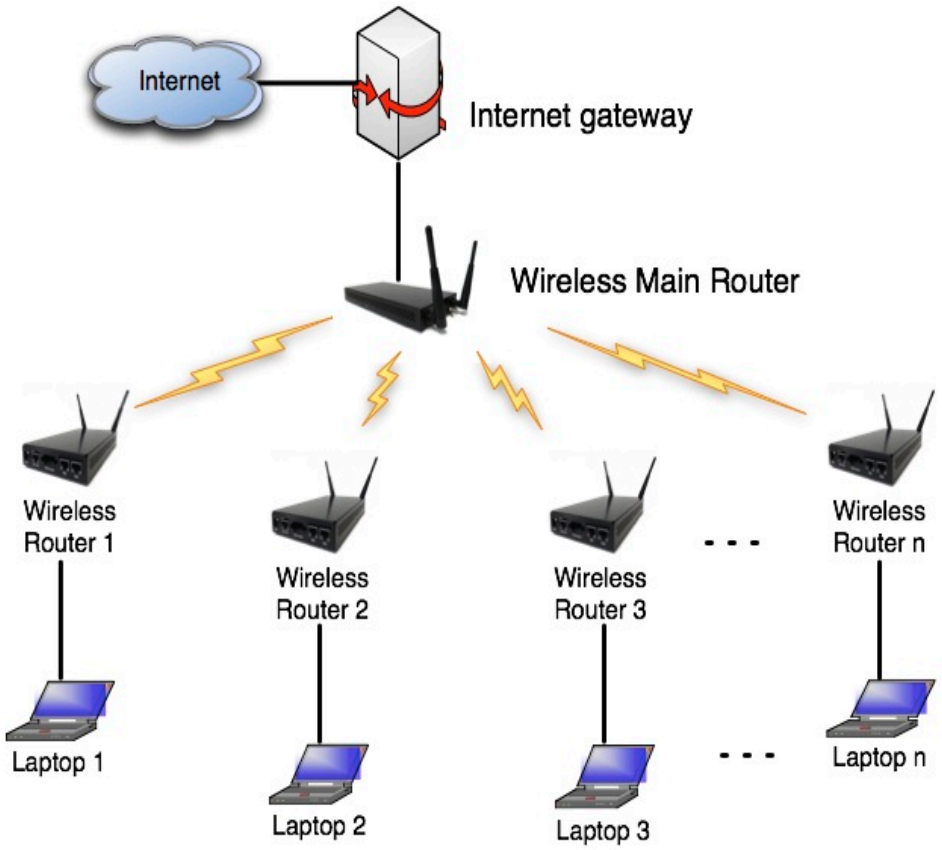
Sarana Pendukung Utama

- Ruang
- Peralatan Laboratorium
- Motivasi dan SDM
- Trainer Academy
- Modul

Laboratorium

- Topologi Laboratorium
- Budget
- Jumlah perangkat
- Spesifikasi
- Type perangkat

Topologi 1 [Wireless]



Keuntungan dan Kekurangan

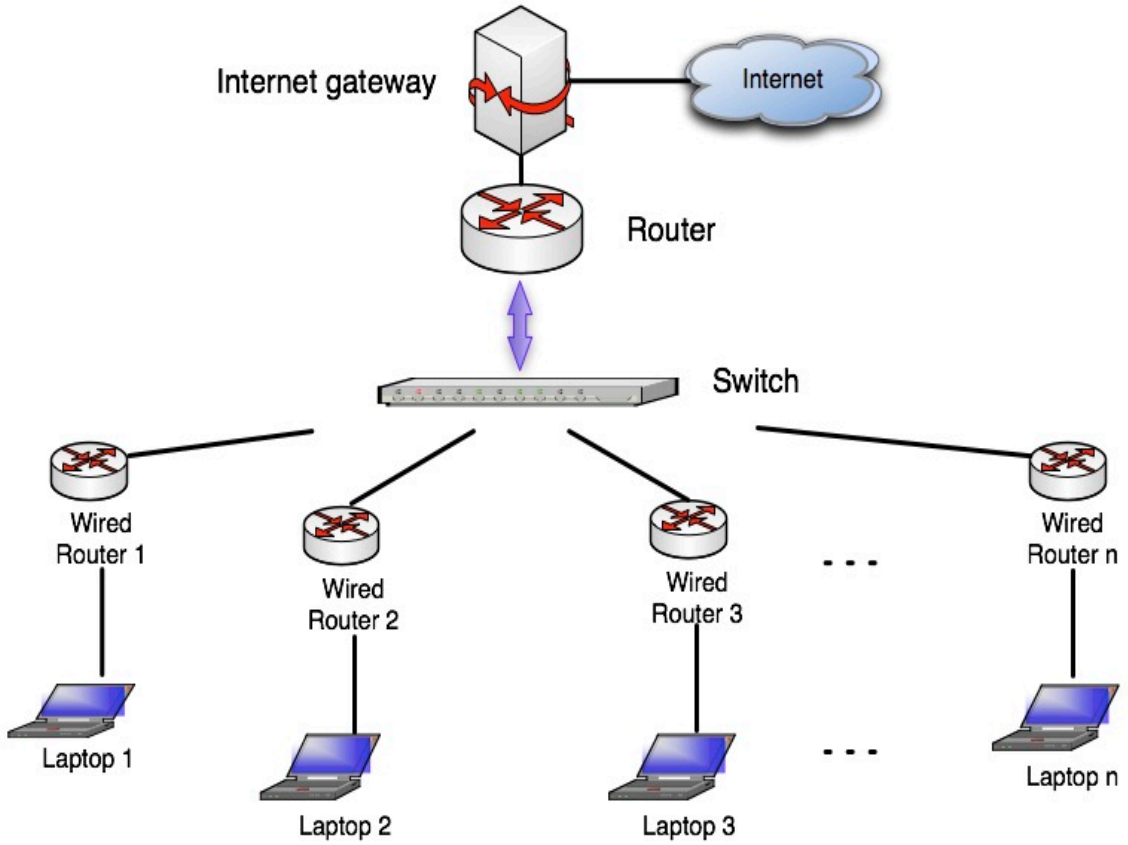
Keuntungan

- Bisa mengakses fisik Router
- Praktek seting wireless
- Praktek netinstall yes
- Reset secara HW dan SW
- Instalasi simple
- Praktek Wireless yes

Kekurangan

- Biaya investasi tinggi
- Maintenance ekstra
- Biaya maintenance ekstra
- Interferensi koneksi

Topologi 2 [Wired]



Keuntungan dan Kekurangan

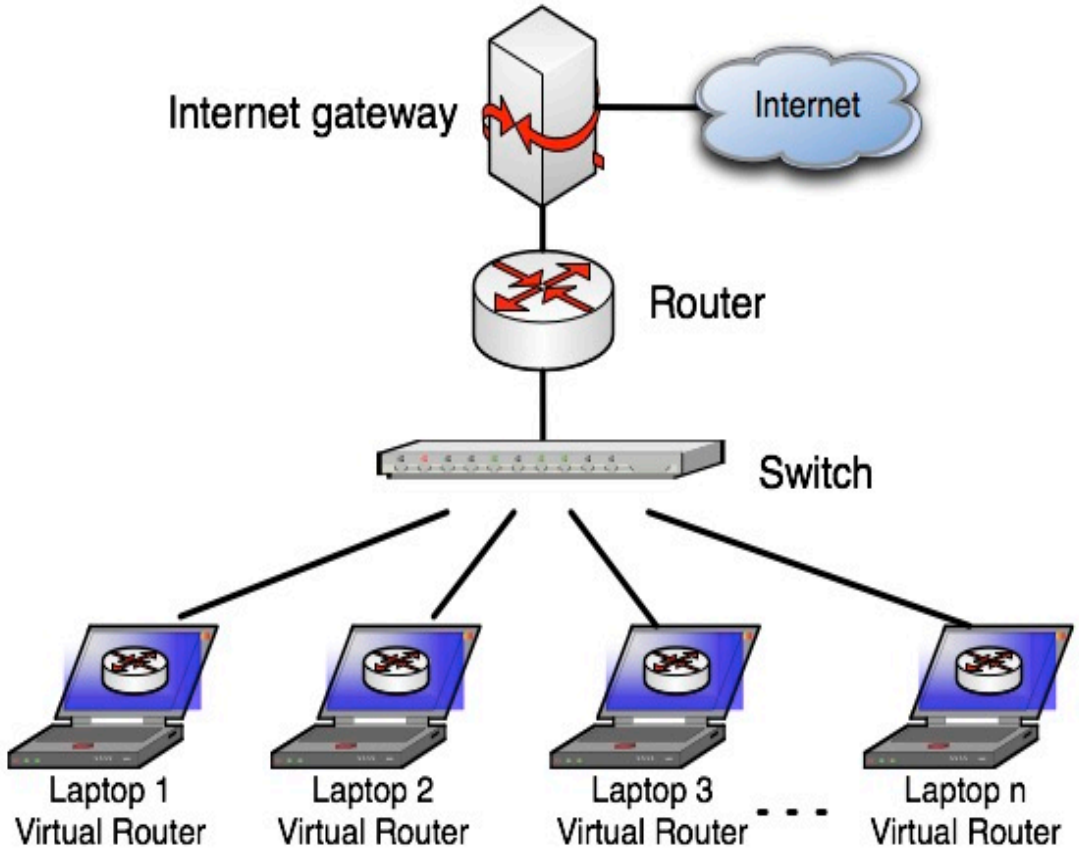
Keuntungan

- Bisa mengakses fisik Router
- Reset secara HW
- Tidak ada interferensi koneksi
- Netinstall yes

Kekurangan

- Biaya investasi tinggi
- Maintenance ekstra
- Biaya maintenance ekstra
- Instalasi kabel data
- Membutuhkan Switch
- Praktek wireless no

Topologi 3 [Virtual Machine]



Keuntungan dan Kekurangan

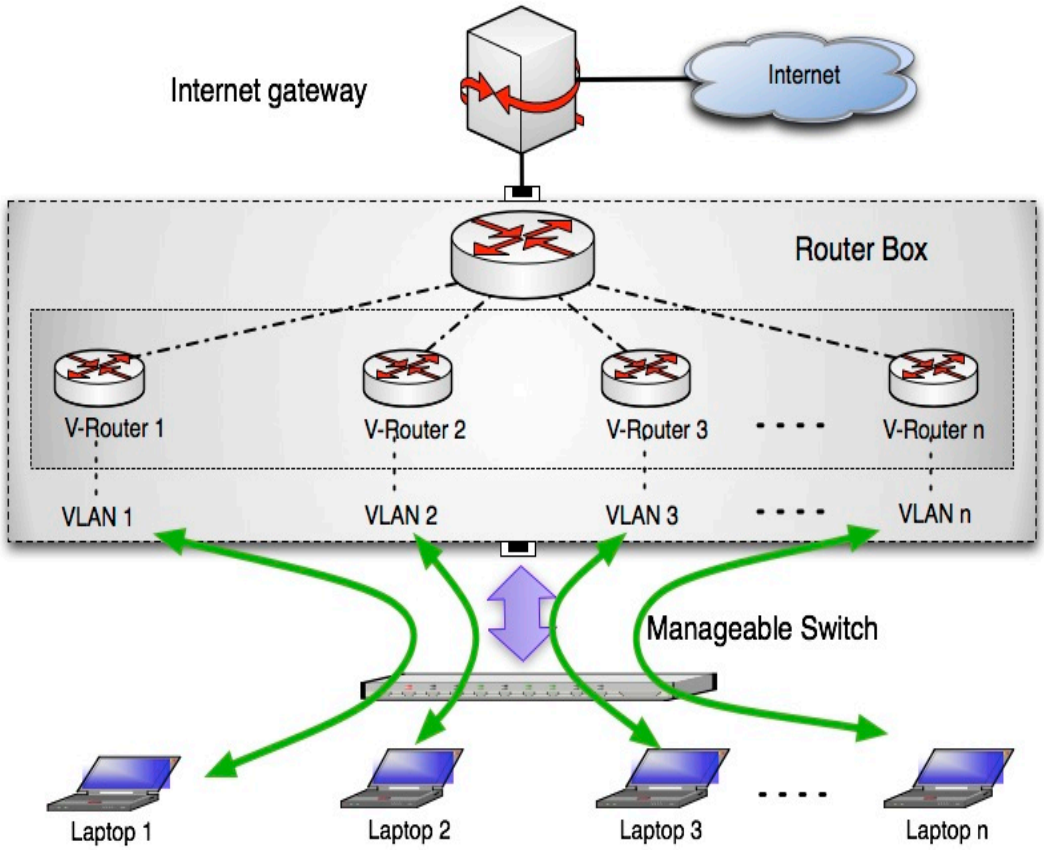
Keuntungan

- Tidak perlu investasi unit router
- Tidak ada maintenance unit router
- Tidak ada interferensi koneksi
- MikroTik disiapkan peserta

Kekurangan

- Perlu lisensi per peserta
- Instalasi kabel data
- Memerlukan Switch
- Perlu Software Virtualisasi
- Praktek wireless no
- Reset HW no

Topologi 4 [VLAN]



Keuntungan dan Kekurangan

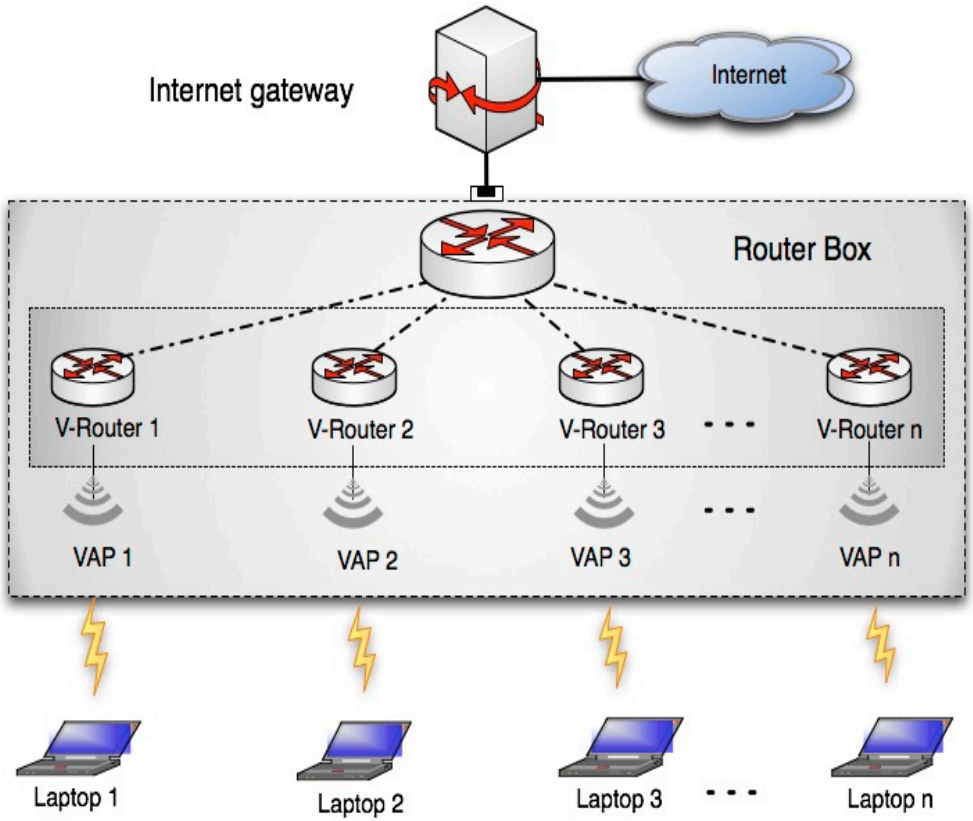
Keuntungan

- Tidak perlu investasi unit router
- Tidak ada maintenance unit router
- Tidak ada interferensi koneksi
- 1 lisensi Router Box

Kekurangan

- Maintenance Router Box
- Reset HW no
- Instalasi kabel data
- Memerlukan Manageable Switch
- Wireless no
- Netinstall no

Topologi 5 [Virtual AP]



Keuntungan dan Kekurangan

Keuntungan

- Tidak perlu investasi unit router
- Tidak ada maintenance unit router
- Tidak ada interferensi koneksi
- 1 lisensi Router Box
- Tidak perlu Switch
- Instalasi simple

Kekurangan

- Maintenance Router Box
- Reset HW no
- Praktek wireless no
- Netinstall no

Virtualisasi

- Metarouter
- Xen
- KVM

Metarouter

- RB 4xx (mibsbe) dan RB 1000 (powerpc)
- Memory terbatas
- HDD terbatas
- Speed Prosessor relatif kecil
- Virtual router tidak bisa banyak

Xen & KVM

Xen

- Linux Xen Virtual Machine Project
- RouterOS X86 system (PC)
- Diskontinyu mulai v 4.4

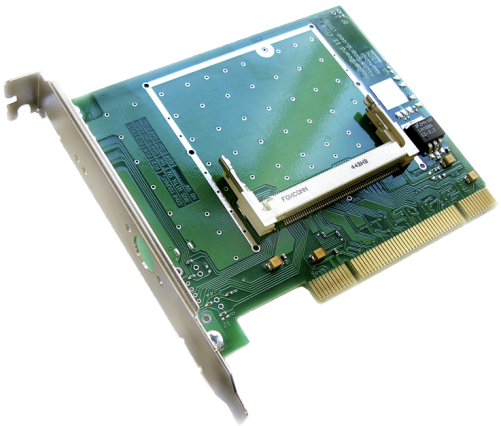
KVM

- Kernel-based Virtual Machine
- Linux Virtualization Software
- X86 system
- Intel VT-x or AMD-V CPU virtualization support

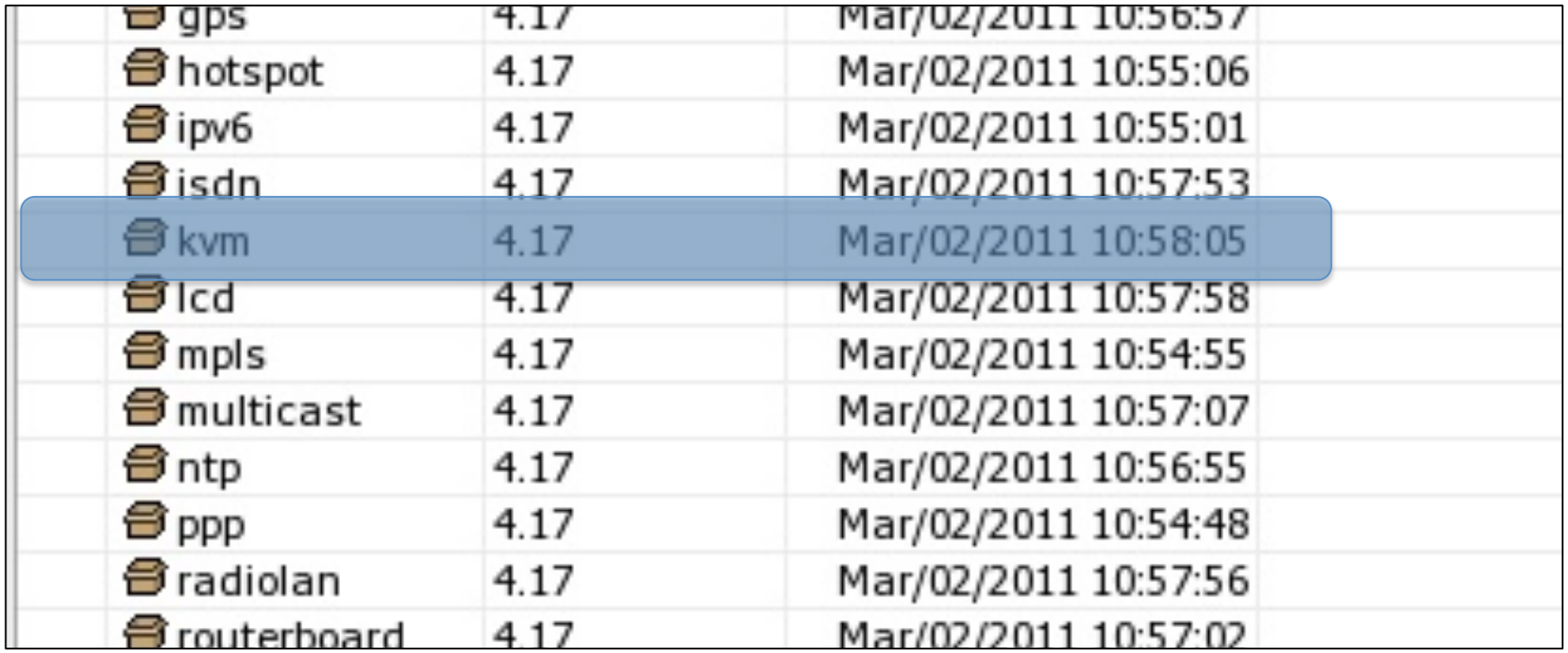
Metarouter/Xen/KVM…?

- Up to date
- Custom:
  - HDD & Memory
  - Network Device
- Pilihan: KVM

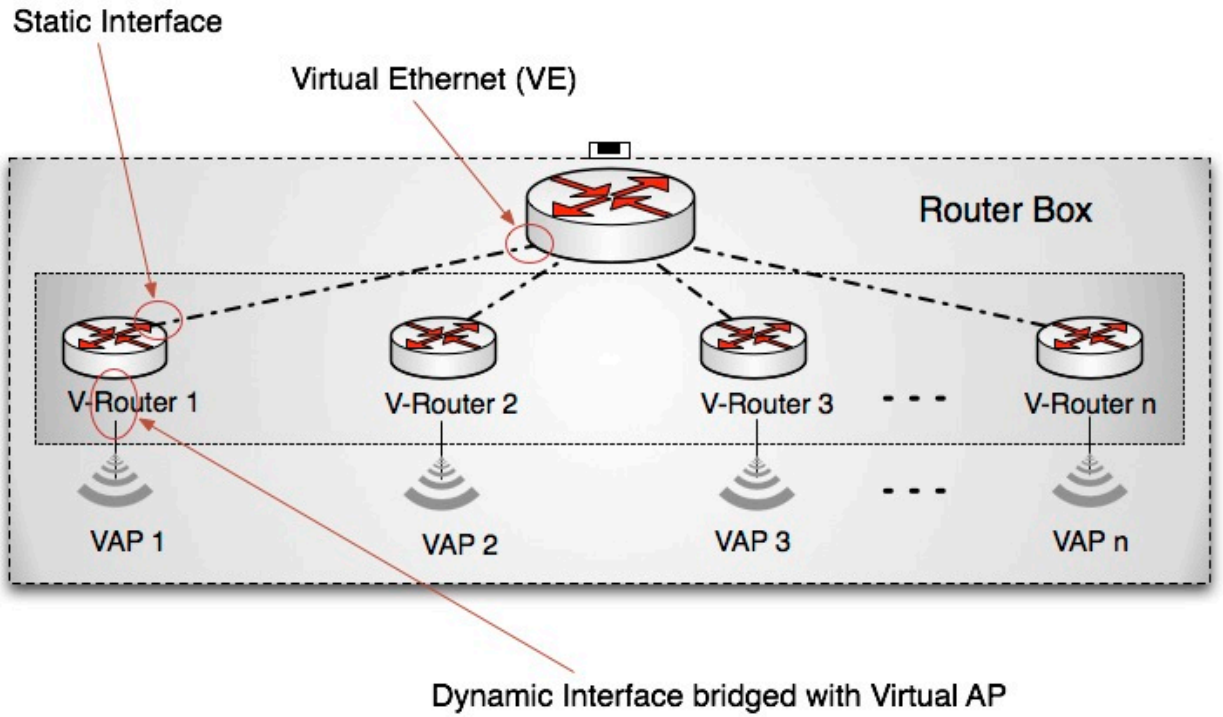
Peralatan yang diperlukan



KVM Package


gps 4.17 Mar/02/2011 10:56:57
hotspot 4.17 Mar/02/2011 10:55:06
ipv6 4.17 Mar/02/2011 10:55:01
isdn 4.17 Mar/02/2011 10:57:53
kvm 4.17 Mar/02/2011 10:58:05
lcd 4.17 Mar/02/2011 10:57:58
mpls 4.17 Mar/02/2011 10:54:55
multicast 4.17 Mar/02/2011 10:57:07
ntp 4.17 Mar/02/2011 10:56:55
ppp 4.17 Mar/02/2011 10:54:48
radiolan 4.17 Mar/02/2011 10:57:56
routerboard 4.17 Mar/02/2011 10:57:02

Virtual Router Interface

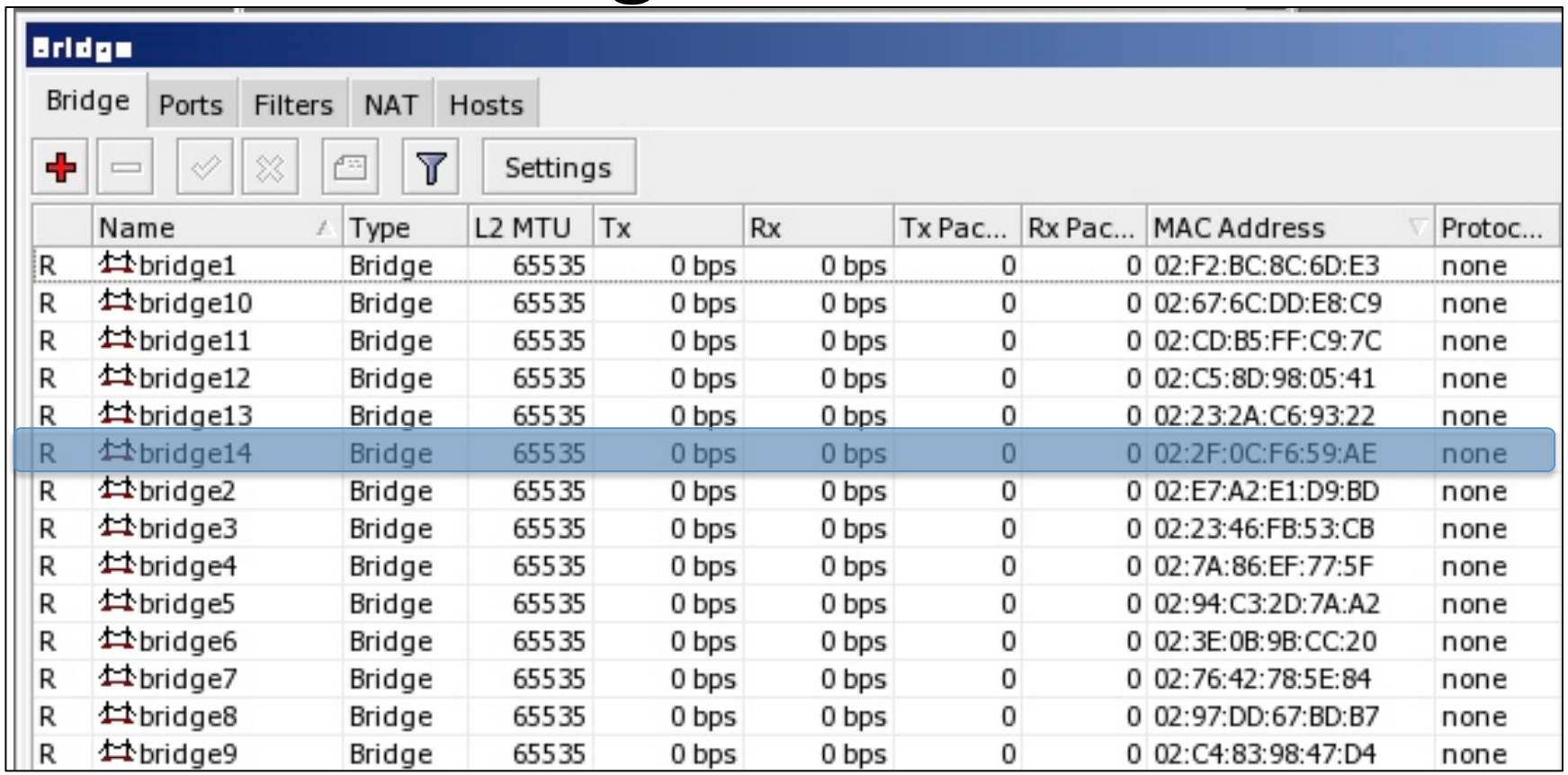


Interface Virtual Ethernet

```
[admin@MikroTik] > interface virtual-ethernet add name=VE14
[admin@MikroTik] >
```

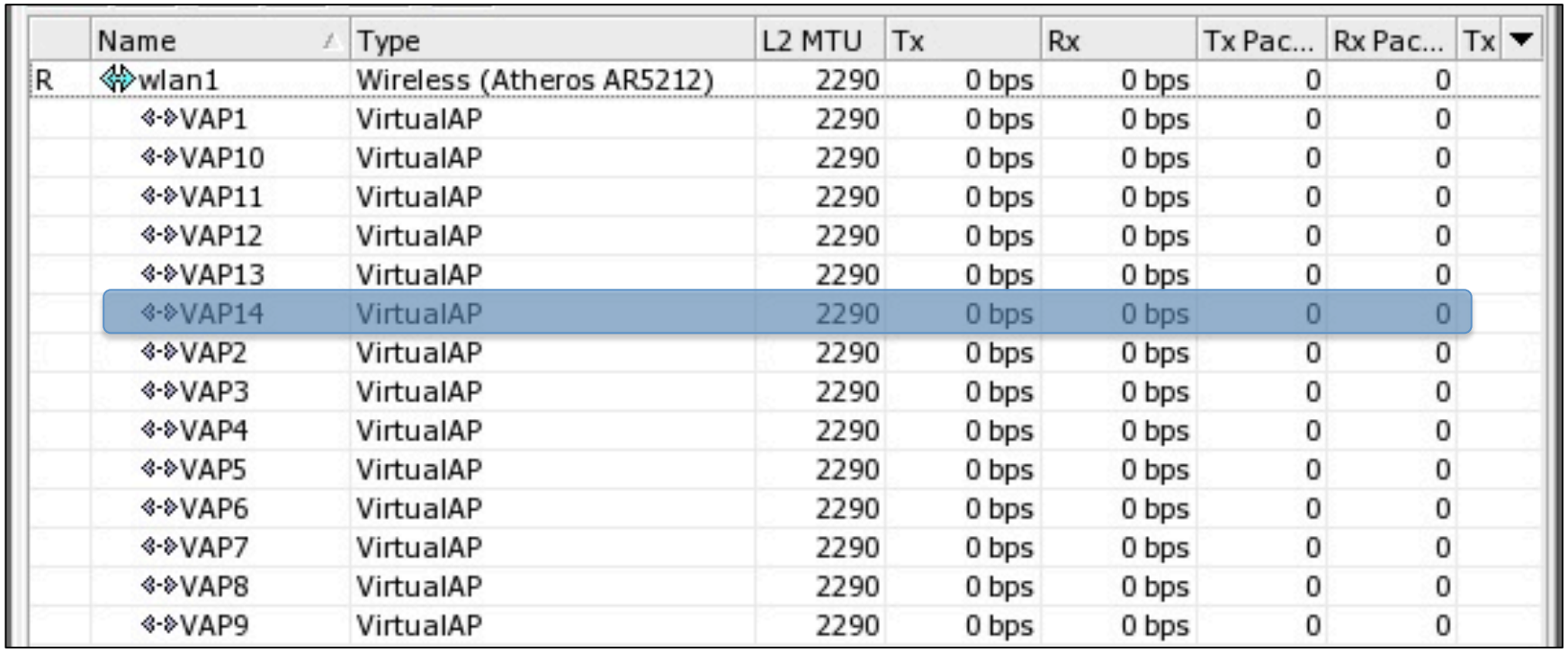
R	VE1	Interface		0 bps	0 bps
R	VE10	Interface		0 bps	0 bps
R	VE11	Interface		0 bps	0 bps
R	VE12	Interface		0 bps	0 bps
R	VE13	Interface		0 bps	0 bps
R	VE14	Interface		0 bps	0 bps
R	VE2	Interface		0 bps	0 bps
R	VE3	Interface		0 bps	0 bps
R	VE4	Interface		0 bps	0 bps
R	VE5	Interface		0 bps	0 bps
R	VE6	Interface		0 bps	0 bps
R	VE7	Interface		0 bps	0 bps
R	VE8	Interface		0 bps	0 bps
R	VE9	Interface		0 bps	0 bps

Interface Bridge



	Name	Type	L2 MTU	Tx	Rx	Tx Pac...	Rx Pac...	MAC Address	Protoc...
R	bridge1	Bridge	65535	0 bps	0 bps	0	0	02:F2:BC:8C:6D:E3	none
R	bridge10	Bridge	65535	0 bps	0 bps	0	0	02:67:6C:DD:E8:C9	none
R	bridge11	Bridge	65535	0 bps	0 bps	0	0	02:CD:B5:FF:C9:7C	none
R	bridge12	Bridge	65535	0 bps	0 bps	0	0	02:C5:8D:98:05:41	none
R	bridge13	Bridge	65535	0 bps	0 bps	0	0	02:23:2A:C6:93:22	none
R	bridge14	Bridge	65535	0 bps	0 bps	0	0	02:2F:0C:F6:59:AE	none
R	bridge2	Bridge	65535	0 bps	0 bps	0	0	02:E7:A2:E1:D9:BD	none
R	bridge3	Bridge	65535	0 bps	0 bps	0	0	02:23:46:FB:53:CB	none
R	bridge4	Bridge	65535	0 bps	0 bps	0	0	02:7A:86:EF:77:5F	none
R	bridge5	Bridge	65535	0 bps	0 bps	0	0	02:94:C3:2D:7A:A2	none
R	bridge6	Bridge	65535	0 bps	0 bps	0	0	02:3E:0B:9B:CC:20	none
R	bridge7	Bridge	65535	0 bps	0 bps	0	0	02:76:42:78:5E:84	none
R	bridge8	Bridge	65535	0 bps	0 bps	0	0	02:97:DD:67:BD:B7	none
R	bridge9	Bridge	65535	0 bps	0 bps	0	0	02:C4:83:98:47:D4	none

Virtual AP



	Name	Type	L2 MTU	Tx	Rx	Tx Pac...	Rx Pac...	Tx
R	wlan1	Wireless (Atheros AR5212)	2290	0 bps	0 bps	0	0	
	VAP1	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP10	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP11	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP12	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP13	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP14	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP2	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP3	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP4	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP5	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP6	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP7	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP8	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP9	VirtualAP	2290	0 bps	0 bps	0	0	

ROS Image

```
[admin@MikroTik] /kvm> make-routeros-image file-name=ros14.img
append    configuration-script  file      once             file-size
as-value  do                    interval  without-paging
[admin@MikroTik] /kvm> make-routeros-image file-name=ros14.img file-size=256M

  status: finished

[admin@MikroTik] /kvm>
```

ros1.img	.img file	256.0 MiB	Oct/09/2012 20:41:41
ros10.img	.img file	256.0 MiB	Oct/09/2012 20:32:31
ros11.img	.img file	256.0 MiB	Oct/09/2012 20:28:25
ros12.img	.img file	256.0 MiB	Oct/09/2012 20:26:23
ros13.img	.img file	256.0 MiB	Oct/09/2012 20:40:45
ros14.img	.img file	256.0 MiB	Oct/09/2012 20:37:19
ros2.img	.img file	256.0 MiB	Oct/09/2012 20:34:03

Virtual Router & Interface

```
[admin@MikroTik] > kvm
[admin@MikroTik] /kvm> add name=rl4 disk-images=hda:ros14.img memory=128
```

```
[admin@MikroTik] /kvm interface> add interface=VE14 type=static
virtual-machine: rl4
[admin@MikroTik] /kvm interface>
```

```
[admin@MikroTik] /kvm interface> add virtual-machine=rl4 type=dynamic dynamic-bridge=bridge14
[admin@MikroTik] /kvm interface>
```

Console Router 14-1

```
[admin@MikroTik] > interface print
Flags: D - dynamic, X - disabled, R - running, S - slave
 #     NAME                                TYPE                MTU   L2MTU
 0  R  1_Public                            ether               1500
 1  R  2_Local                             ether               1500
[admin@MikroTik] > ip address print
Flags: X - disabled, I - invalid, D - dynamic
 #   ADDRESS             NETWORK         BROADCAST        INTE...
 0   10.10.14.2/30       10.10.14.0      10.10.14.3       1_Pu...
 1   192.168.14.1/24     192.168.14.0    192.168.14.255   2_Local
```

Console Router 14-2

```
[admin@MikroTik] > ip route print
Flags: X - disabled, A - active, D - dynamic,
C - connect, S - static, r - rip, b - bgp, o - ospf, m - mme,
B - blackhole, U - unreachable, P - prohibit
 #      DST-ADDRESS        PREF-SRC        GATEWAY
 0 A S  0.0.0.0/0                          10.10.14.1
 1 ADC  10.10.14.0/30      10.10.14.2      1_Public
 2 ADC  192.168.14.0/24    192.168.14.1    2_Local
[admin@MikroTik] > ip dns print
                  servers: 10.10.14.1
  allow-remote-requests: yes
    max-udp-packet-size: 512
              cache-size: 2048KiB
          cache-max-ttl: 1w
             cache-used: 5KiB
```

Console Router 14-3

```
[admin@MikroTik] > ip firewall nat print
Flags: X - disabled, I - invalid, D - dynamic
 0    chain=srcnat action=masquerade
[admin@MikroTik] > ip dhcp-server print
Flags: X - disabled, I - invalid
 #    NAME    IN.. RELAY           ADDRESS-POOL     LEASE-TIME ADD
 0    dhcp1   2_..                 dhcp_pool1       3d
[admin@MikroTik] >
```

Resource Virtual Router

```
[admin@MikroTik] > ip address print
Flags: X - disabled, I - invalid, D - dynamic
 #   ADDRESS            NETWORK         BROADCAST       INTE...
 0   10.10.14.2/30      10.10.14.0      10.10.14.3      1_Pu...
 1   192.168.14.1/24    192.168.14.0    192.168.14.255  2_Local
[admin@MikroTik] > system resource print
                   uptime: 12h1m34s
                  version: "4.17"
             free-memory: 112848kB
            total-memory: 126572kB
                      cpu: "QEMU"
                cpu-count: 2
            cpu-frequency: 2009MHz
                 cpu-load: 1
           free-hdd-space: 214844kB
          total-hdd-space: 253867kB
  write-sect-since-reboot: 850
         write-sect-total: 850
       architecture-name: "x86"
                board-name: "x86"
                  platform: "MikroTik"
```

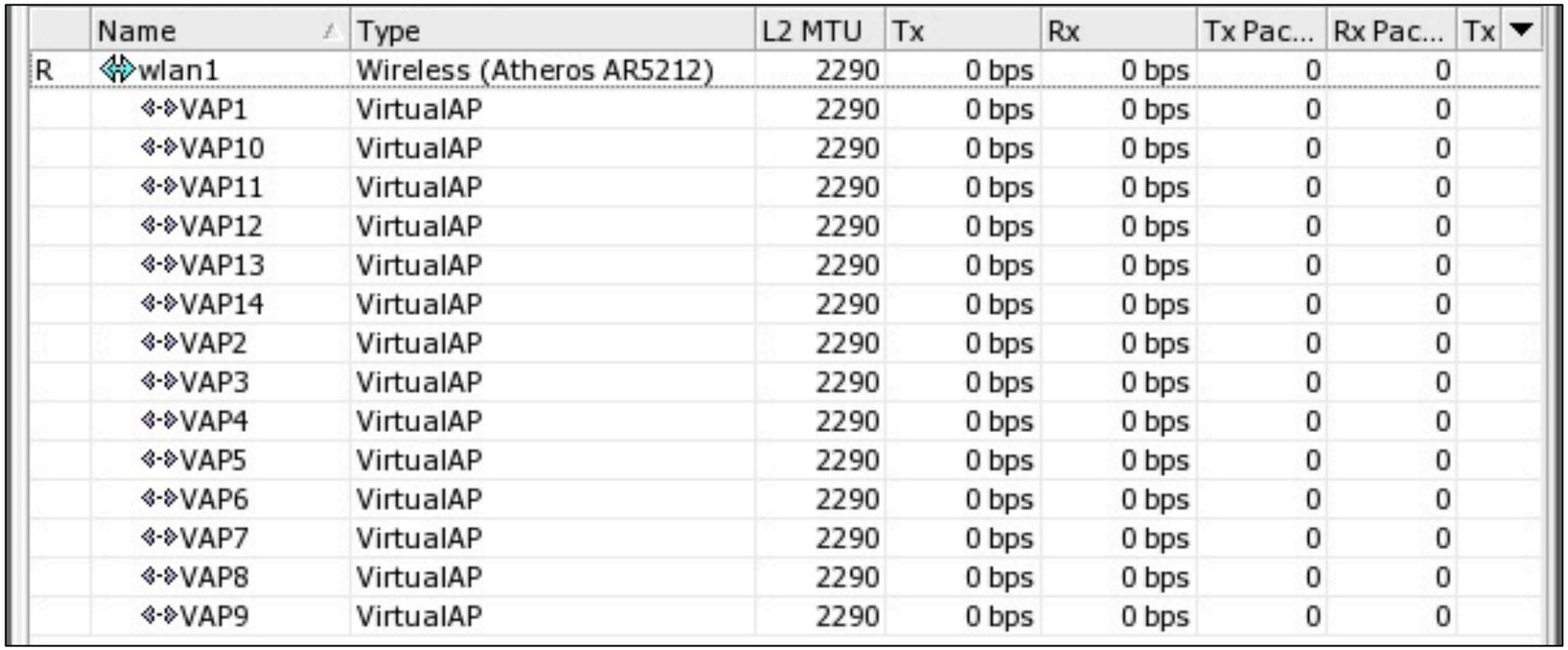
Konfigurasi Master Router

R	VE1	Interface		0 bps	0 bps
R	VE10	Interface		0 bps	0 bps
R	VE11	Interface		0 bps	0 bps
R	VE12	Interface		0 bps	0 bps
R	VE13	Interface		0 bps	0 bps
R	VE14	Interface		0 bps	0 bps
R	VE2	Interface		0 bps	0 bps
R	VE3	Interface		0 bps	0 bps
R	VE4	Interface		0 bps	0 bps
R	VE5	Interface		0 bps	0 bps
R	VE6	Interface		0 bps	0 bps
R	VE7	Interface		0 bps	0 bps
R	VE8	Interface		0 bps	0 bps
R	VE9	Interface		0 bps	0 bps

Dynamic Interface

DR	tap1	Interface		0 bps	0 bps
DR	tap10	Interface		0 bps	0 bps
DR	tap11	Interface		0 bps	0 bps
DR	tap12	Interface		0 bps	0 bps
DR	tap13	Interface		0 bps	0 bps
DR	tap14	Interface		0 bps	0 bps
DR	tap2	Interface		0 bps	0 bps
DR	tap3	Interface		0 bps	0 bps
DR	tap4	Interface		0 bps	0 bps
DR	tap5	Interface		0 bps	0 bps
DR	tap6	Interface		0 bps	0 bps
DR	tap7	Interface		0 bps	0 bps
DR	tap8	Interface		0 bps	0 bps
DR	tap9	Interface		0 bps	0 bps

Virtual AP



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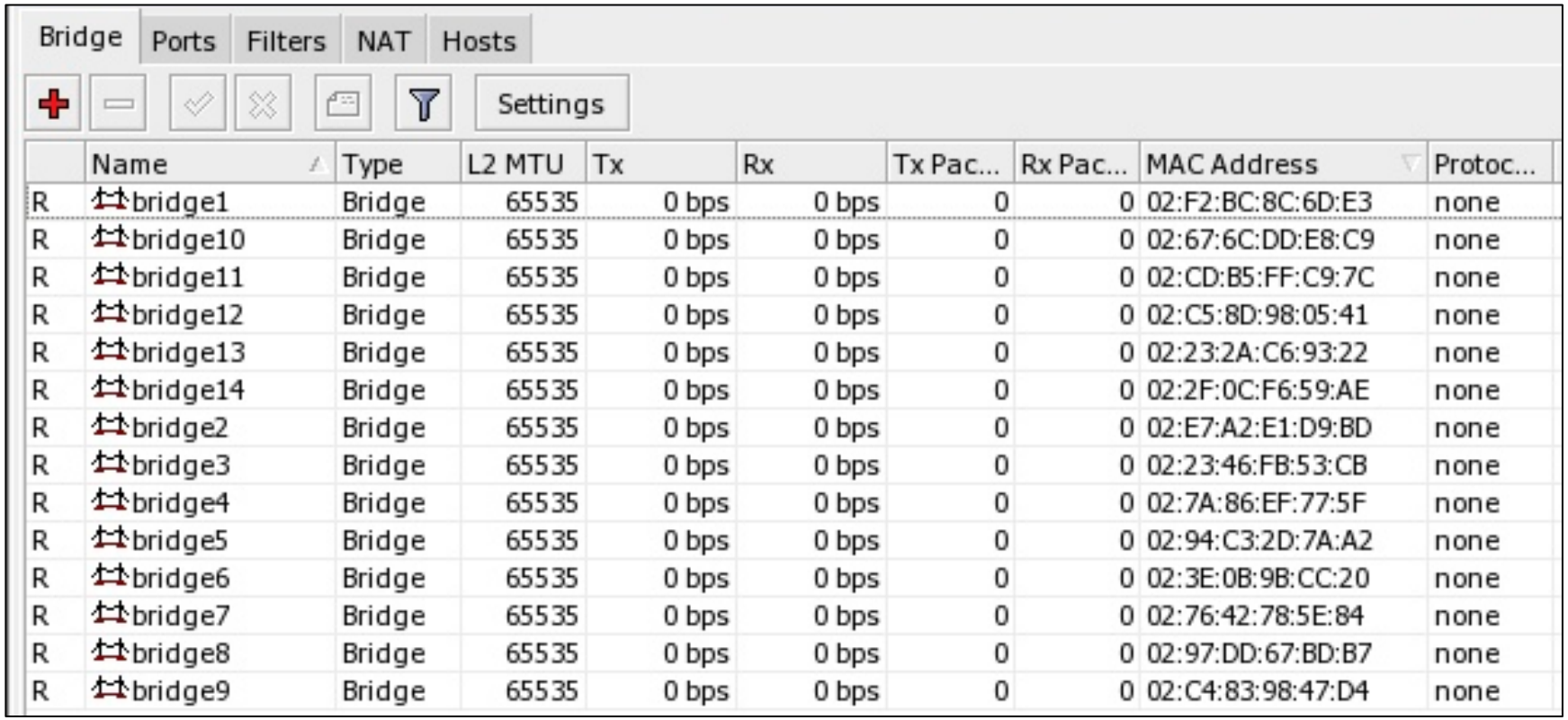
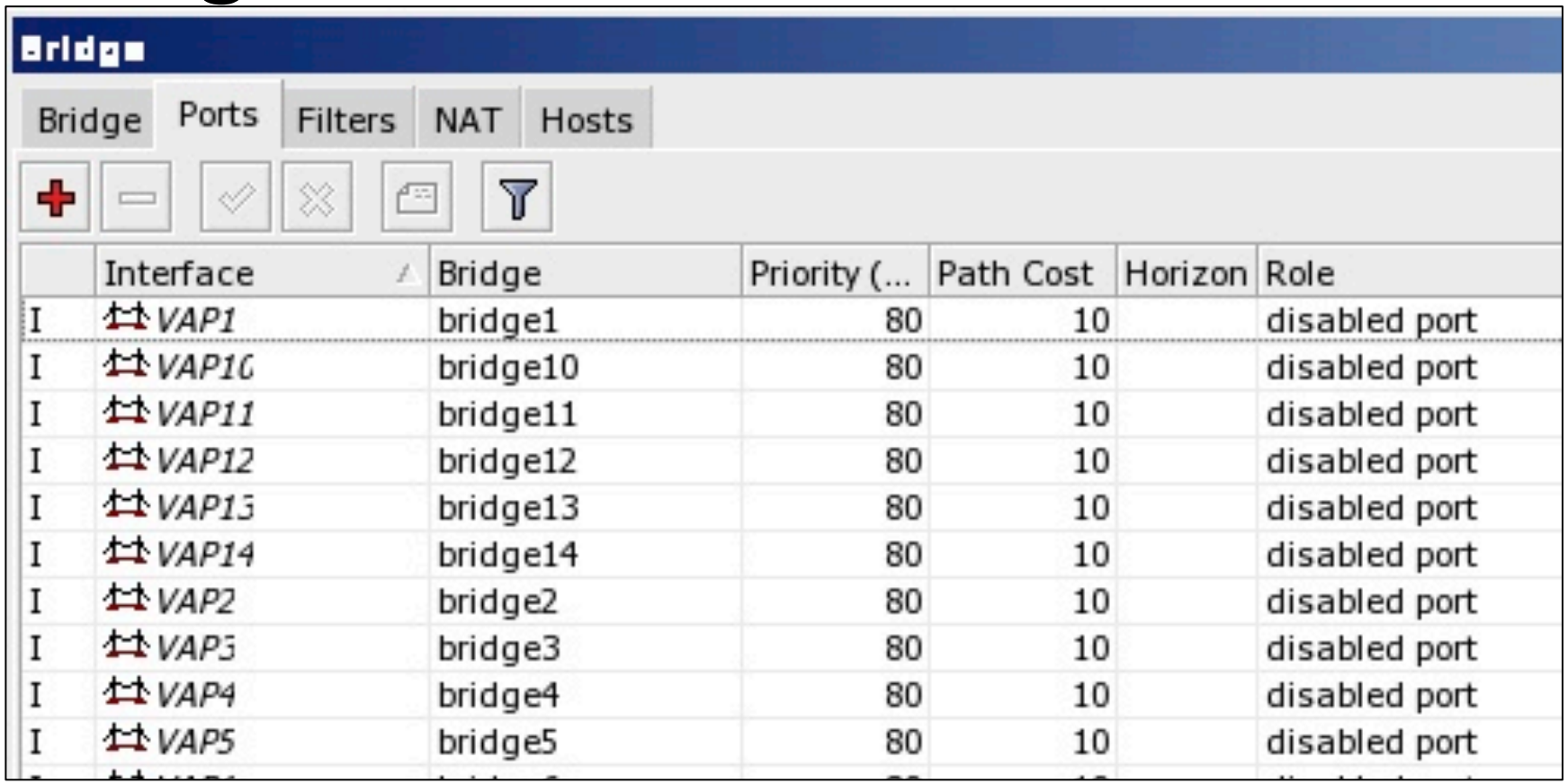
	VAP1	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP10	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP11	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP12	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP13	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP14	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP2	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP3	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP4	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP5	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP6	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP7	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP8	VirtualAP	2290	0 bps	0 bps	0	0	
	VAP9	VirtualAP	2290	0 bps	0 bps	0	0	

Bridge



	Name	Type	L2 MTU	Tx	Rx	Tx Pac...	Rx Pac...	MAC Address	Protoc...
R	bridge1	Bridge	65535	0 bps	0 bps	0	0	02:F2:BC:8C:6D:E3	none
R	bridge10	Bridge	65535	0 bps	0 bps	0	0	02:67:6C:DD:E8:C9	none
R	bridge11	Bridge	65535	0 bps	0 bps	0	0	02:CD:B5:FF:C9:7C	none
R	bridge12	Bridge	65535	0 bps	0 bps	0	0	02:C5:8D:98:05:41	none
R	bridge13	Bridge	65535	0 bps	0 bps	0	0	02:23:2A:C6:93:22	none
R	bridge14	Bridge	65535	0 bps	0 bps	0	0	02:2F:0C:F6:59:AE	none
R	bridge2	Bridge	65535	0 bps	0 bps	0	0	02:E7:A2:E1:D9:BD	none
R	bridge3	Bridge	65535	0 bps	0 bps	0	0	02:23:46:FB:53:CB	none
R	bridge4	Bridge	65535	0 bps	0 bps	0	0	02:7A:86:EF:77:5F	none
R	bridge5	Bridge	65535	0 bps	0 bps	0	0	02:94:C3:2D:7A:A2	none
R	bridge6	Bridge	65535	0 bps	0 bps	0	0	02:3E:0B:9B:CC:20	none
R	bridge7	Bridge	65535	0 bps	0 bps	0	0	02:76:42:78:5E:84	none
R	bridge8	Bridge	65535	0 bps	0 bps	0	0	02:97:DD:67:BD:B7	none
R	bridge9	Bridge	65535	0 bps	0 bps	0	0	02:C4:83:98:47:D4	none

Bridge Port - 1



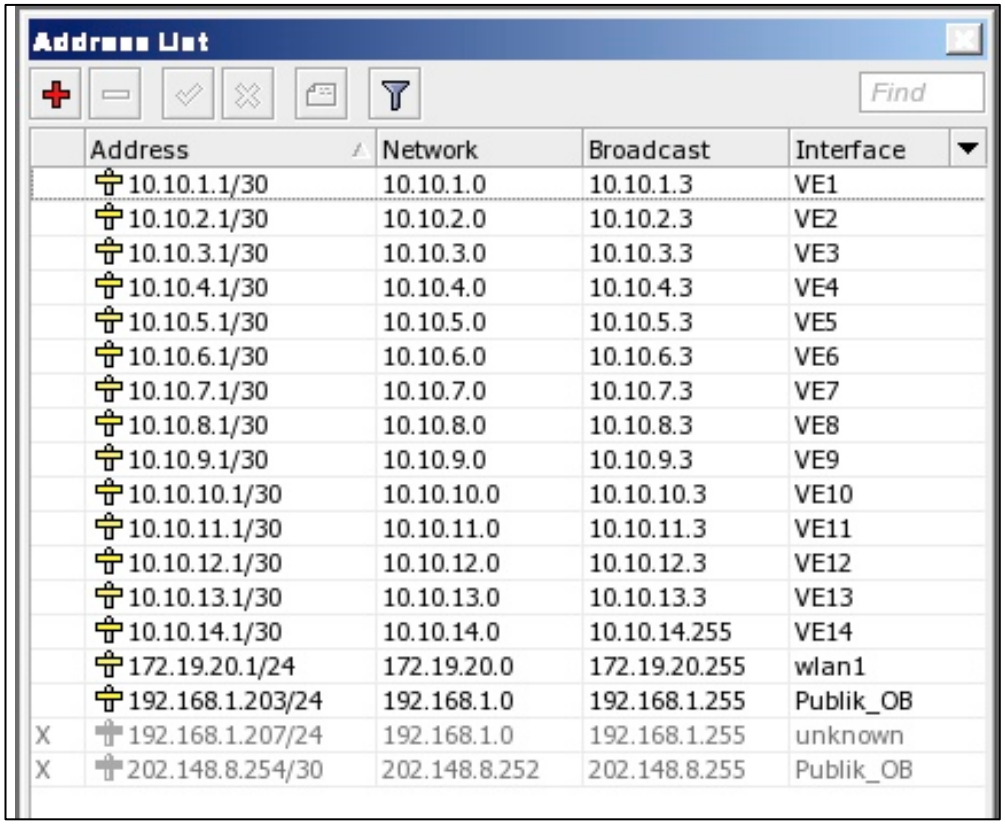
Bridge Port - 2

I	VAP6	bridge6	80	10		disabled port
I	VAP7	bridge7	80	10		disabled port
I	VAP8	bridge8	80	10		disabled port
I	VAP9	bridge9	80	10		disabled port
D	tap1	bridge1	80	10		designated port
D	tap10	bridge10	80	10		designated port
D	tap11	bridge11	80	10		designated port
D	tap12	bridge12	80	10		designated port
D	tap13	bridge13	80	10		designated port
D	tap14	bridge14	80	10		designated port
D	tap2	bridge2	80	10		designated port
D	tap3	bridge3	80	10		designated port
D	tap4	bridge4	80	10		designated port
D	tap5	bridge5	80	10		designated port
D	tap6	bridge6	80	10		designated port

Bridge Port - 3

D	tap7	bridge7	80	10		designated port
D	tap8	bridge8	80	10		designated port
D	tap9	bridge9	80	10		designated port

IP Address


Address List
Find
Address
Network
Broadcast
Interface
10.10.1.1/30 10.10.1.0 10.10.1.3 VE1
10.10.2.1/30 10.10.2.0 10.10.2.3 VE2
10.10.3.1/30 10.10.3.0 10.10.3.3 VE3
10.10.4.1/30 10.10.4.0 10.10.4.3 VE4
10.10.5.1/30 10.10.5.0 10.10.5.3 VE5
10.10.6.1/30 10.10.6.0 10.10.6.3 VE6
10.10.7.1/30 10.10.7.0 10.10.7.3 VE7
10.10.8.1/30 10.10.8.0 10.10.8.3 VE8
10.10.9.1/30 10.10.9.0 10.10.9.3 VE9
10.10.10.1/30 10.10.10.0 10.10.10.3 VE10
10.10.11.1/30 10.10.11.0 10.10.11.3 VE11
10.10.12.1/30 10.10.12.0 10.10.12.3 VE12
10.10.13.1/30 10.10.13.0 10.10.13.3 VE13
10.10.14.1/30 10.10.14.0 10.10.14.255 VE14
172.19.20.1/24 172.19.20.0 172.19.20.255 wlan1
192.168.1.203/24 192.168.1.0 192.168.1.255 Publik_OB
X 192.168.1.207/24 192.168.1.0 192.168.1.255 unknown
X 202.148.8.254/30 202.148.8.252 202.148.8.255 Publik_OB

KVM Router - 1

```
[admin@MikroTik] /kvm> print
Flags: X - disabled
 0   disk-images=hda:ros1.img initrd="" kernel="" kernel-cmdline="" name="r1" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

 1   disk-images=hda:ros2.img initrd="" kernel="" kernel-cmdline="" name="r2" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

 2   disk-images=hda:ros3.img initrd="" kernel="" kernel-cmdline="" name="r3" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

 3   disk-images=hda:ros4.img initrd="" kernel="" kernel-cmdline="" name="r4" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

 4   disk-images=hda:ros5.img initrd="" kernel="" kernel-cmdline="" name="r5" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

 5   disk-images=hda:ros6.img initrd="" kernel="" kernel-cmdline="" name="r6" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running
```

KVM Router - 2

```
 6   disk-images=hda:ros7.img initrd="" kernel="" kernel-cmdline="" name="r7" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

 7   disk-images=hda:ros8.img initrd="" kernel="" kernel-cmdline="" name="r8" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

 8   disk-images=hda:ros9.img initrd="" kernel="" kernel-cmdline="" name="r9" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

 9   disk-images=hda:ros10.img initrd="" kernel="" kernel-cmdline="" name="r10" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

10   disk-images=hda:ros11.img initrd="" kernel="" kernel-cmdline="" name="r11" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

11   disk-images=hda:ros12.img initrd="" kernel="" kernel-cmdline="" name="r12" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running
```

KVM Router - 3

```
12   disk-images=hda:ros13.img initrd="" kernel="" kernel-cmdline="" name="r13" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running

13   disk-images=hda:ros14.img initrd="" kernel="" kernel-cmdline="" name="r14" cpu-count=2
     memory=128MiB snapshot=no vnc-server=0.0.0.0:0 state=running
```

KVM Interface - 1

```
[admin@MikroTik] /kvm> interface print
Flags: X - disabled, A - active
 #   VIRTUAL-MACHINE     INTERFACE     TYPE     VM-MAC-ADDRESS
 0 A r1                  VE1           static   02:65:F6:FD:01:97
 1 A r1                                dynamic  02:41:8E:9A:AC:55
 2 A r2                  VE2           static   02:1D:60:3A:B6:4D
 3 A r2                                dynamic  02:E2:3E:B3:E0:40
 4 A r3                  VE3           static   02:E0:19:CE:7B:C5
 5 A r3                                dynamic  02:FF:71:2C:3A:27
 6 A r4                  VE4           static   02:87:3C:3A:3B:1D
 7 A r4                                dynamic  02:30:58:79:FE:D3
 8 A r5                  VE5           static   02:E8:6D:99:AE:1E
 9 A r5                                dynamic  02:44:CD:F0:F1:E6
10 A r6                  VE6           static   02:5D:44:64:BC:EC
11 A r6                                dynamic  02:1A:B4:8D:B3:62
```

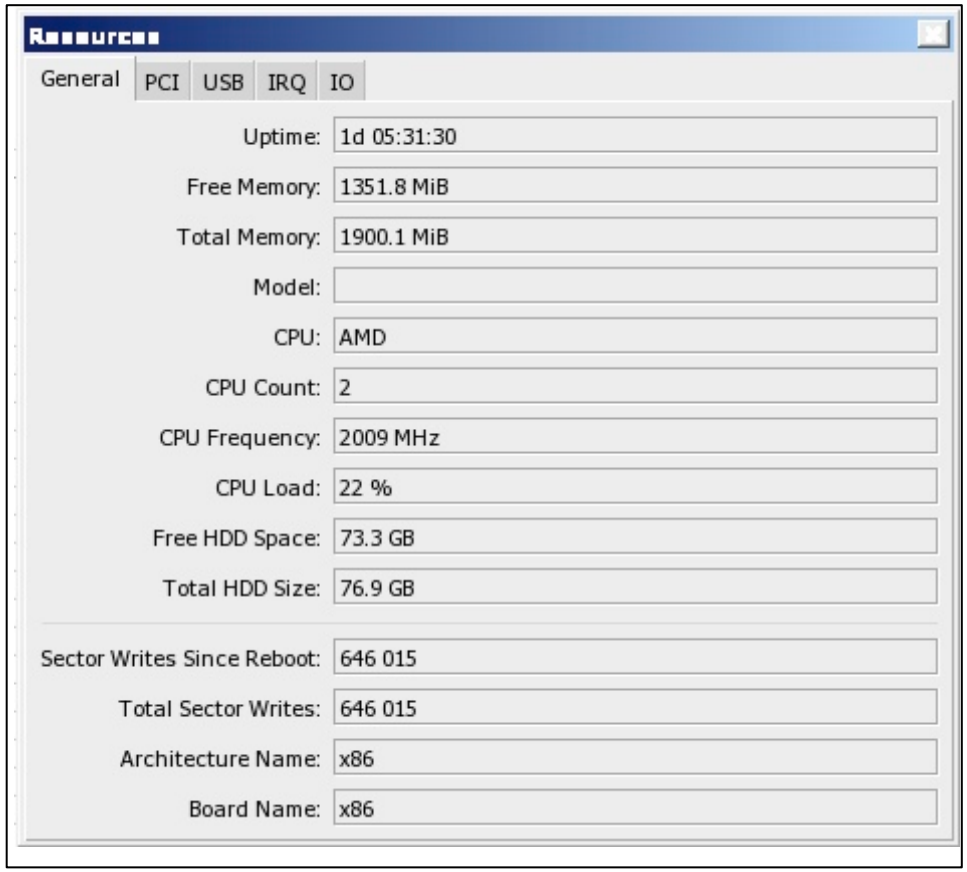
KVM Interface - 2

```
12 A r7                    VE7          static  02:C8:1E:90:B8:0F
13 A r7                                 dynamic 02:10:BC:C8:75:78
14 A r8                    VE8          static  02:A4:6B:34:31:1F
15 A r8                                 dynamic 02:2A:86:D5:BA:3E
16 A r9                    VE9          static  02:05:6D:4B:CE:E3
17 A r9                                 dynamic 02:18:EC:40:4D:1D
18 A r10                   VE10         static  02:B2:F1:28:87:AC
19 A r10                                dynamic 02:6C:ED:37:B8:BC
20 A r11                   VE11         static  02:14:CC:B0:55:19
21 A r11                                dynamic 02:A2:7B:6E:CB:03
22 A r12                   VE12         static  02:3A:64:08:71:1C
23 A r12                                dynamic 02:5C:1A:0D:0C:6F
24 A r13                   VE13         static  02:A1:C8:1F:0F:93
25 A r13                                dynamic 02:E1:CD:87:EA:3F
26 A r14                   VE14         static  02:EE:0A:39:69:E8
27 A r14                                dynamic 02:A4:F3:8D:6B:30
```

Scan Wireless

AP	00:80:48:7E:64:15	Pantry	2GHz-...	20MHz	2452	-81	-106	25	0080487E6415	4.17
AR	02:80:48:7E:64:15	AP1	2GHz-...	20MHz	2452	-81	-106	25	0080487E6415	4.17
AR	02:80:48:7E:64:16	AP2	2GHz-...	20MHz	2452	-81	-106	25	0080487E6415	4.17
AR	02:80:48:7E:64:18	AP4	2GHz-...	20MHz	2452	-81	-106	25	0080487E6415	4.17
AR	02:80:48:7E:64:17	AP3	2GHz-...	20MHz	2452	-80	-106	26	0080487E6415	4.17
AR	02:80:48:7E:64:1A	AP6	2GHz-...	20MHz	2452	-81	-106	25	0080487E6415	4.17
AR	02:80:48:7E:64:1B	AP7	2GHz-...	20MHz	2452	-81	-106	25	0080487E6415	4.17
AR	02:80:48:7E:64:19	AP5	2GHz-...	20MHz	2452	-82	-106	24	0080487E6415	4.17
AR	02:80:48:7E:64:1C	AP8	2GHz-...	20MHz	2452	-83	-106	23	0080487E6415	4.17
AR	02:80:48:7E:64:1F	AP11	2GHz-...	20MHz	2452	-83	-106	23	0080487E6415	4.17
AR	02:80:48:7E:64:1E	AP10	2GHz-...	20MHz	2452	-80	-106	26	0080487E6415	4.17
AR	02:80:48:7E:64:1D	AP9	2GHz-...	20MHz	2452	-84	-106	22	0080487E6415	4.17
AR	02:80:48:7E:64:20	AP12	2GHz-...	20MHz	2452	-80	-106	26	0080487E6415	4.17
AR	02:80:48:7E:64:21	AP13	2GHz-...	20MHz	2452	-82	-106	24	0080487E6415	4.17
AR	02:80:48:7E:64:22	AP14	2GHz-...	20MHz	2452	-81	-106	25	0080487E6415	4.17

Resource Router Box



Dokumentasi Online

- http://wiki.mikrotik.com/wiki/Metarouter
- http://wiki.mikrotik.com/wiki/Xen
- http://wiki.mikrotik.com/wiki/Kvm

Terima Kasih

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