

Bandwidth Management by Sites

harijanto@datautama.net.id

Indonesian ISP Operation Director

Short Curriculum Vitae

- ▶ Industrial Engineering, Maranatha Christian University Bandung Indonesia, 1998.
- ▶ Magister Management Information System, Bina Nusantara University Jakarta Indonesia, 2006.
- ▶ PT. Data Utama Dinamika, Internet Service Provider as Operation Director 2006–Until Now.
- ▶ Used Mikrotik 1st Time at 2004 when I work as General Manager Operation at PT. Indo Pratama CyberNet, Internet Service Provider.
- ▶ MTCNA 2010.

Objective

- ▶ To manage queue per client based on sites, example:
 - In Indonesia we can set different queue for local site and global site (local site bandwidth more cheap then global site bandwidth)
 - Or you can differentiate queue policy for antivirus download site and queue policy for others site.
 - Or you can differentiate queue policy for VoIP/SIP server and queue policy for others application.

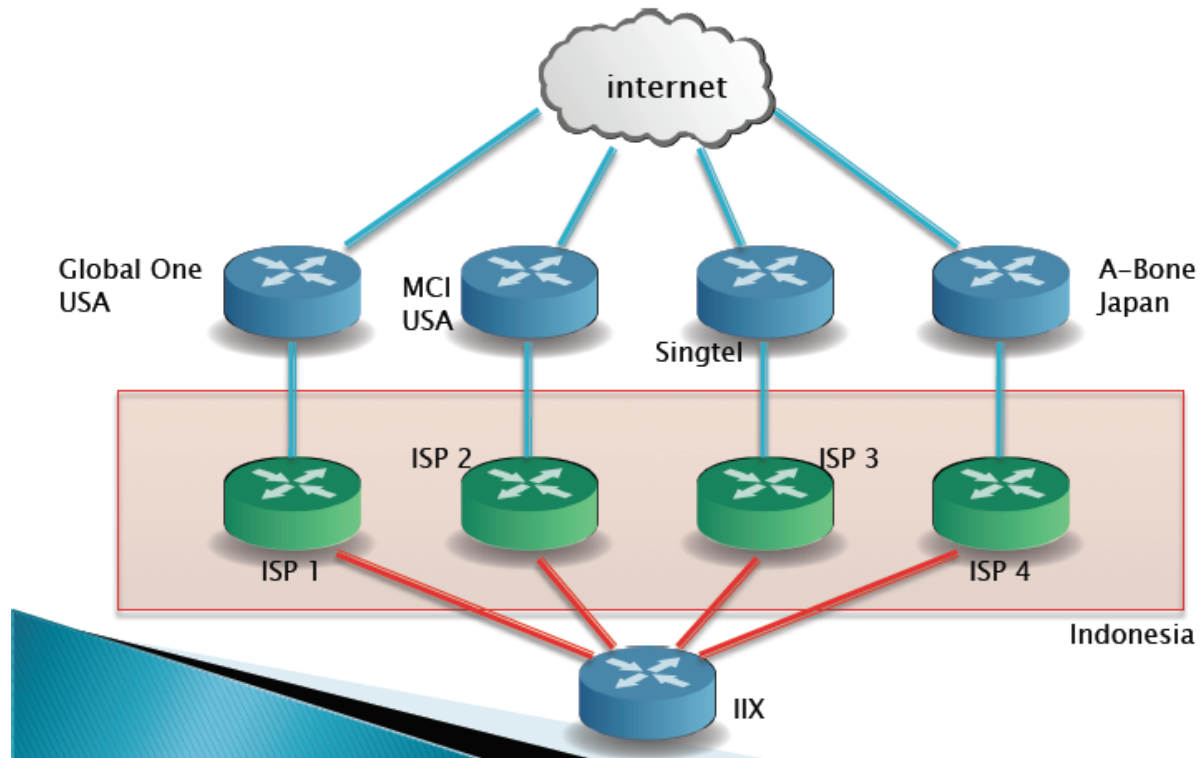
Example 1

- ▶ In Indonesia, we have IIX (Indonesia Internet eXchange) to make local routing between Indonesian ISPs more short , cheap and fast.

Example 1



How traffic routed



Example 1

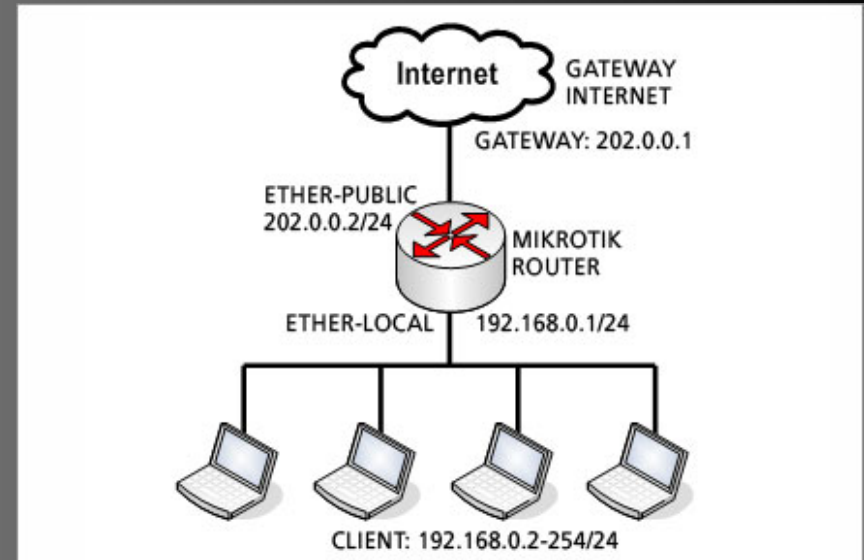
- ▶ To make different queue between local site and global site 1st I download script from <http://www.mikrotik.co.id/getfile.php?nf=nice.rsc>
- ▶ The file contents script to create address-list of prefix from IIX router
- ▶ For China prefix list you can try this URL: http://training.edcwifi.com/?page_id=27

Example 1

```
# Script created by: Valens Riyadi @ www.mikrotik.co.id
# Generated at 26 April 2007 05:30:02 WIB ... 431 lines
/ip firewall address-list
add list=nice address="1.2.3.4"
rem [find list=nice]
add list=nice address="125.162.0.0/16"
add list=nice address="125.163.0.0/16"
add list=nice address="152.118.0.0/16"
add list=nice address="125.160.0.0/16"
add list=nice address="125.161.0.0/16"
add list=nice address="125.164.0.0/16"
.
.
dst...
```

Example 1

- ▶ After I have “nice” address-list next I “mangle” the mark-connection and then mark-packet
- ▶ To help understanding please look to the topology



Example 1

- ▶ This is the interface, address and nat configuration for this example

```
[admin@MikroTik] > /interface pr
Flags: X - disabled, D - dynamic, R - running
#  NAME           TYPE  RX-RATE  TX-RATE  MTU
0  R ether-public  ether  0        0        1500
1  R ether-local   ether  0        0        1500

[admin@MikroTik] > /ip ad pr
Flags: X - disabled, I - invalid, D - dynamic
# ADDRESS          NETWORK      BROADCAST  INTERFACE
0 202.0.0.1/24      202.0.0.0   202.0.0.255 ether-public
1 192.168.0.1/24    192.168.0.0 192.168.0.255 ether-local

[admin@MikroTik] > /ip fi nat pr
Flags: X - disabled, I - invalid, D - dynamic
0  chain=srcnat out-interface=ether-public
   action=masquerade
```

Example 1

- ▶ at Row “0” I mark-connection with “conn-iix”
- ▶ At Row “1” I mark-packet with “packet-iix” based on connection-mark “conn-iix”
- ▶ At Row “2” I mark-packet with “packet-intl”, it’s mean all packet not mark “packet-iix” is must be “packet-intl” or global site because at row “1” passthrough=no

```
[admin@MikroTik] > /ip firewall mangle pr
Flags: X - disabled, I - invalid, D - dynamic

0 chain=prerouting in-interface=ether-local
  dst-address-list=nice
  action=mark-connection new-connection-mark=conn-iix
  passthrough=yes

1 chain=prerouting connection-mark=conn-iix
  action=mark-packet new-packet-mark=packet-iix
  passthrough=no

2 chain=prerouting action=mark-packet
  new-packet-mark=packet-intl passthrough=no
```

Example 1

- ▶ If you using web-proxy internally so add row “2” and “4” print in bold.

```
[admin@MikroTik] > /ip firewall mangle pr
Flags: X - disabled, I - invalid, D - dynamic

0 chain=prerouting in-interface=ether-local
  dst-address-list=nice
  action=mark-connection new-connection-mark=conn-iix
  passthrough=yes

1 chain=prerouting connection-mark=conn-iix
  action=mark-packet new-packet-mark=packet-iix
  passthrough=no

2 chain=output connection-mark=conn-iix
  action=mark-packet new-packet-mark=packet-iix
  passthrough=no

3 chain=prerouting action=mark-packet
  new-packet-mark=packet-intl passthrough=no

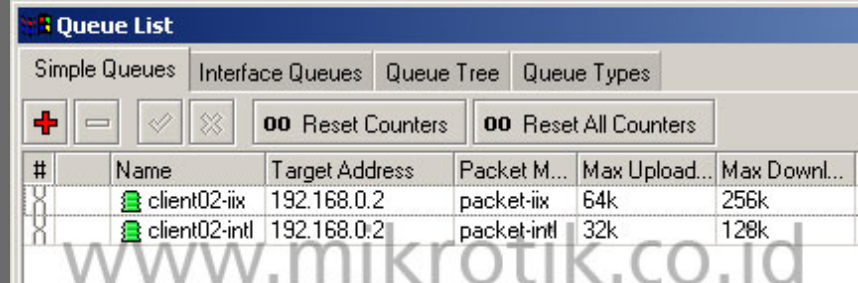
4 chain=output action=mark-packet
  new-packet-mark=packet-intl passthrough=no
```

Example 1

- ▶ After I mangle the packet and differentiate it next I just make the simple queue like this

```
[admin@MikroTik]> /queue simple pr
Flags: X - disabled, I - invalid, D - dynamic
0 name="client02-iix" target-addresses=192.168.0.2/32
  dst-address=0.0.0.0/0 interface=all parent=none
  packet-marks=packet-iix direction=both priority=8
  queue=default-small/default-small limit-at=0/0
  max-limit=64000/256000 total-queue=default-small

1 name="client02-int1" target-addresses=192.168.0.2/32
  dst-address=0.0.0.0/0 interface=all parent=none
  packet-marks=packet-int1 direction=both priority=8
  queue=default-small/default-small limit-at=0/0
  max-limit=32000/128000 total-queue=default-small
```



The screenshot shows the Mikrotik WinBox interface for the Queue List. It features a navigation bar with tabs for Simple Queues, Interface Queues, Queue Tree, and Queue Types. Below the tabs are several control buttons: a plus sign, a minus sign, a checkmark, a cross, and two buttons labeled '00 Reset Counters' and '00 Reset All Counters'. The main area contains a table with the following data:

#	Name	Target Address	Packet M...	Max Upload...	Max Downl...
0	client02-iix	192.168.0.2	packet-iix	64k	256k
1	client02-int1	192.168.0.2	packet-int1	32k	128k

A watermark 'www.mikrotik.co.id' is visible at the bottom of the screenshot.

Example 2

- ▶ You can implement this technique to differentiate queue for antivirus update and download site
- ▶ 1st make address-list for antivirus update site and download site, example:

```
/ip firewall address-list
```

```
add list=antivirus address="1.1.1.1"
```

```
add list=antivirus address="2.2.2.2"
```

```
add list=download address="3.3.3.3"
```

```
add list=download address="4.4.4.4"
```

Example 2

[admin@MikroTik] > /ip firewall mangle pr
Flags: X – disabled, I – invalid, D – dynamic

- ▶ Then mangle the connection and packet
- ▶ Row “0” and “1” mangle connection and packet for antivirus
- ▶ Row “2” and “3” mangle connection and packet for download
- ▶ Row “4” mark-packet for others then antivirus and download site

```
0 chain=prerouting in-interface=ether-local  
  dst-address-list=antivirus  
  action=mark-connection new-connection-mark=conn-antivirus  
  passthrough=yes
```

```
1 chain=prerouting connection-mark=conn-antivirus  
  action=mark-packet new-packet-mark=packet-antivirus  
  passthrough=no
```

```
2 chain=prerouting in-interface=ether-local  
  dst-address-list=download  
  action=mark-connection new-connection-mark=conn-download  
  passthrough=yes
```

```
3 chain=prerouting connection-mark=conn-download  
  action=mark-packet new-packet-mark=packet-download  
  passthrough=no
```

```
4 chain=prerouting action=mark-packet new-packet-mark=packet-others  
  passthrough=no
```

Example 2

- ▶ Then we can make 3 different queue simple for antivirus update, download and others site for client02

```
[admin@MikroTik]> /queue simple pr
Flags: X - disabled, I - invalid, D - dynamic
0 name="client02-antivirus" target-addresses=192.168.0.2/32
  dst-address=0.0.0.0/0 interface=all parent=none
  packet-marks=packet-antivirus direction=both priority=8
  queue=default-small/default-small limit-at=0/0
  max-limit=64000/256000 total-queue=default-small

1 name="client02-download" target-addresses=192.168.0.2/32
  dst-address=0.0.0.0/0 interface=all parent=none
  packet-marks=packet-download direction=both priority=8
  queue=default-small/default-small limit-at=0/0
  max-limit=32000/128000 total-queue=default-small

2 name="client02-others" target-addresses=192.168.0.2/32
  dst-address=0.0.0.0/0 interface=all parent=none
  packet-marks=packet-others direction=both priority=8
  queue=default-small/default-small limit-at=0/0
  max-limit=32000/128000 total-queue=default-small
```

More Complex

The screenshot shows the RouterOS WinBox interface with the Firewall Filter Rules configuration window open. The window title is "datautama@203.89.24.2 (P2-PRESISI) - WinBox v3.23 on x86 (x86)". The system status bar at the top right shows "1d 04:05:14 Memory:204.4 MiB CPU:5% Hide Passwords".

The Firewall Filter Rules window has tabs for "Filter Rules", "NAT", "Mangle", "Service Ports", "Connections", "Address Lists", and "Layer7 Protocols". The "Filter Rules" tab is active, showing a list of 20 rules. The rules are organized into groups, with rule 2 selected. The table below represents the data shown in the screenshot.

#	Action	Chain	Src. Address	Dst. Address	Proto...	Src. Port	Dst. Port	In. Interface	Out. Interface	Bytes	Packets
2	✓ mar... prerouting	203.89.24.87						vlan-id-6-presisi-users		117.2 MiB	235 051
3	✓ mar... prerouting									194.9 MiB	468 073
4	✓ mar... prerouting	203.89.24.87						vlan-id-6-presisi-users		1713.3 MiB	3 036 860
5	✓ mar... prerouting									3479.4 MiB	5 832 250
6	✓ mar... prerouting									0 B	0
7	✓ mar... prerouting									0 B	0
8	✓ mar... prerouting									983.6 MiB	2 363 377
9	✓ mar... prerouting									2748.7 MiB	4 614 728
10	✓ mar... prerouting	203.89.25...						vlan-id-6-presisi-users		0 B	0
11	✓ mar... prerouting									0 B	0
12	✓ mar... prerouting	203.89.25...						vlan-id-6-presisi-users		0 B	0
13	✓ mar... prerouting									0 B	0
14	✓ mar... prerouting	203.89.24.71						vlan-id-6-presisi-users		142.6 MiB	1 718 020
15	✓ mar... prerouting									1850.7 MiB	3 299 913
16	✓ mar... prerouting	203.89.24.71						vlan-id-6-presisi-users		425.8 MiB	916 930
17	✓ mar... prerouting									1123.6 MiB	1 779 536
18	✓ mar... prerouting	203.89.24.90						vlan-id-6-presisi-users		6.8 MiB	14 708
19	✓ mar... prerouting									14.5 MiB	28 865
20	✓ mar... prerouting	203.89.24.90						vlan-id-6-presisi-users		7.7 MiB	56 025

The bottom of the screenshot shows the Windows taskbar with the time "10:32 PM" and various system icons.

More Complex

The screenshot shows the WinBox interface with the 'Queue List' window open. The window title is 'datautama@203.89.24.2 (P2-PRESISI) - WinBox v3.23 on x86 (x86)'. The system status bar at the top right shows '1d 04:06:42 Memory|204.6 MiB CPU|2%' and a 'Hide Passwords' checkbox. The left sidebar contains a tree view of configuration categories: Interfaces, Wireless, Bridge, Mesh, PPP, IP, MPLS, VPLS, IPv6, Routing, Ports, Queues, Drivers, System, Files, Log, SNMP, Users, Radius, Tools, New Terminal, Telnet, Password, Certificates, Stores, Make Supout.nif, Manual, and Exit. The 'Queue List' window has tabs for 'Simple Queues', 'Interface Queues', 'Queue Tree', and 'Queue Types'. Below the tabs are icons for adding, deleting, and filtering queues, along with 'Reset Counters' and 'Reset All Counters' buttons. A search bar is also present. The main table displays a list of queues with columns: Name, Parent, Packet Mark, Limit At (b...), Max Limit..., Avg. R..., Queued Bytes, Bytes, and Packets. The table shows a hierarchy of queues, including 'paket-merdeka-iix' and 'paket-merdeka-intl' as parent queues, and various sub-queues like 'pm-brs-paket-iix', 'pm-cimanggis-paket-iix', etc. The status bar at the bottom of the window shows '22 items out of 199', '11.7 KiB queued', and '10 packets queued'. The Windows taskbar at the bottom shows the time as 10:34 PM.

Name	Parent	Packet Mark	Limit At (b...	Max Limit...	Avg. R...	Queued Bytes	Bytes	Packets	
paket-merdeka-iix	vlan-id-6-presisi-users			3M	0 bps	0 B	2257.3 ...	2 216 6...	
pm-brs-paket-iix	paket-merdeka-iix	pm-brs-paket-iix		1M	0 bps	0 B	80.4 MiB	232 987	
pm-cimanggis-paket-iix	paket-merdeka-iix	pm-Pt-cimanggis-paket-iix		1M	0 bps	0 B	32.7 MiB	28 940	
pm-daiei-paket-iix	paket-merdeka-iix	pm-daiei-paket-iix		1M	0 bps	0 B	9.1 MiB	9 718	
pm-delta-paket-iix	paket-merdeka-iix	pm-delta-paket-iix		2M	0 bps	0 B	0 B	0	
pm-kantor-du-paket-iix	paket-merdeka-iix	pm-kantor-du-paket-iix		3M	0 bps	0 B	1727.9 ...	1 591 3...	
pm-kembangan-paket-iix	paket-merdeka-iix	pm-kembangan-paket-iix		1M	0 bps	0 B	270.4 ...	202 034	
pm-sefar-paket-iix	paket-merdeka-iix	pm-sefar-paket-iix		1M	0 bps	0 B	7.9 MiB	15 154	
pm-sorikmas-paket-iix	paket-merdeka-iix	pm-sorikmas-paket-iix		1M	0 bps	0 B	63.2 MiB	59 912	
pm-sri-rejeki-paket-iix	paket-merdeka-iix	pm-sri-rejeki-paket-iix		1M	0 bps	0 B	65.3 MiB	76 607	
pm-user-personal-paket-iix	paket-merdeka-iix	pm-user-personal-paket-iix		1M	0 bps	0 B	0 B	0	
paket-merdeka-intl	vlan-id-6-presisi-users			3500k	0 bps	0 B	3218.7 ...	4 261 5...	
pm-brs-paket-intl 1M	paket-merdeka-intl	pm-brs-paket-intl		512k	512k	0 bps	0 B	1663.3 ...	2 540 1...
pm-daiei-paket-intl	paket-merdeka-intl	pm-daiei-paket-intl		64k	512k	0 bps	0 B	95.1 MiB	93 046
pm-delta-paket-intl	paket-merdeka-intl	pm-delta-paket-intl		512k	1M	0 bps	0 B	0 B	0
pm-kantor-du-paket-intl	paket-merdeka-intl	pm-kantor-du-paket-intl		1M	1M	0 bps	0 B	702.5 ...	856 768
pm-kembangan-paket-intl	paket-merdeka-intl	pm-kembangan-paket-intl		128k	384k	0 bps	0 B	72.5 MiB	157 191
pm-pt-cimanggis-paket-intl	paket-merdeka-intl	pm-Pt-cimanggis-paket-intl		256k	512k	0 bps	0 B	252.9 ...	211 503
pm-sefar-paket-intl	paket-merdeka-intl	pm-sefar-paket-intl		256k	512k	0 bps	0 B	58.5 MiB	65 879
pm-sorikmas-paket-intl	paket-merdeka-intl	pm-sorikmas-paket-intl		512k	1M	0 bps	0 B	373.7 ...	337 016
pm-sri-rejeki-paket-intl	paket-merdeka-intl	pm-sri-rejeki-paket-intl		512k	1M	0 bps	0 B	0 B	0
pm-user-personal-paket-intl	paket-merdeka-intl	pm-user-personal-paket-intl		64k	512k	0 bps	0 B	0 B	0

Live Demonstration

Other function from China IPv4 address-list

Q & A

Thank you
Xie-xie