

The Mikrotik logo is positioned in the upper left corner. It features the word "Mikrotik" in a bold, black, sans-serif font. A stylized white crescent moon is placed above the letter 'i'. The background of the slide is a scenic photograph of a Balinese temple complex with traditional tiered roofs and a lake, with mountains in the distance under a blue sky with light clouds.

Mikrotik

Mikrotik User Meeting

Bali, 24-25 Oktober 2019



Implementasi Queue With Firewall Mangle at Mikrotik RouterOS

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Perkenalan 😊



Pelajar di SMKN 1 Bojonegoro

Belajar MikroTik mulai Desember 2018

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SMKN 1 Bojonegoro

MikroTik User Meeting 2019
Denpasar, 24 – 25 Oktober 2019

Tentang SMKN 1 Bojonegoro



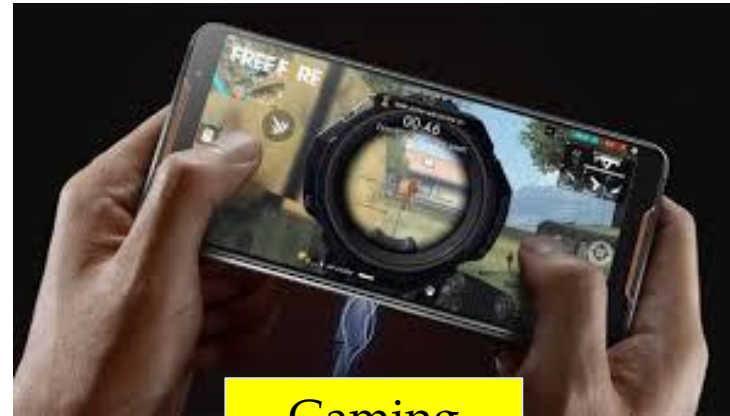
Latar Belakang

Presentasi kali ini akan menjelaskan tentang implementasi management bandwidth menggunakan Queue dengan Firwall Mangle untuk jaringan Hotspot di SMKN 1 Bojonegoro

Kebutuhan anak Milenial



Browsing



Gaming



Media Sosial



Streaming

Tujuan

- Management bandwidth lebih Tertata
- Pengalokasian bandwidth lebih terkontrol
- Mengurangi terjadinya Kepadatan antrian pada suatu Jaringan
- Memprioritaskan Paket Data yang Lebih Penting

Apa Itu Queue??

Queue=Antrian

Salah Satu fitur Mikrotik yang berfungsi sebagai Bandwith Management.

Mengimplementasikan Sistem Antrian dan akan di Proses dengan berbagai macam metode.

At-thoriq Firdaus Ramadhan
SMKN 1 Bojonegoro



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Mengenal Firewall Mangle

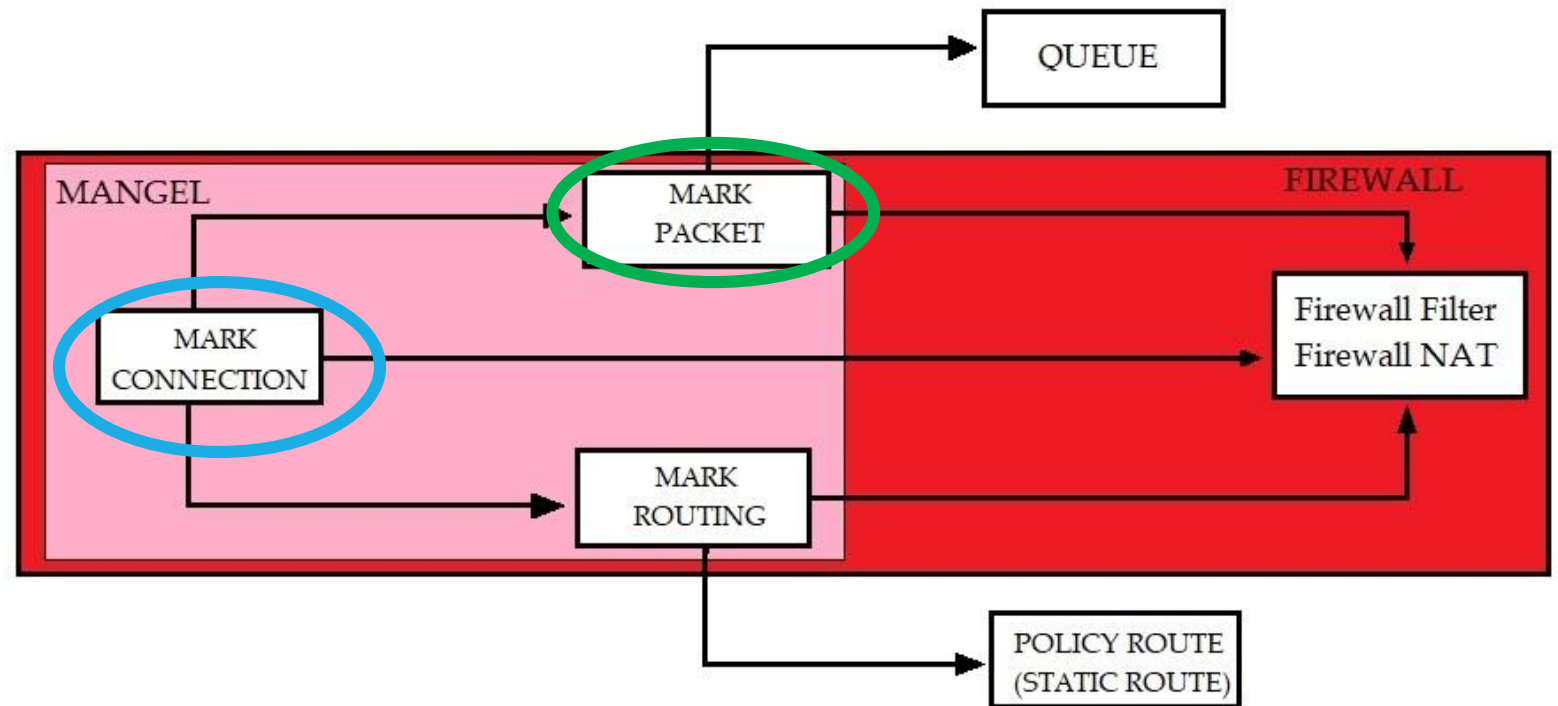
- Firewall Mangle adalah salah satu fitur di Mikrotik yang berfungsi untuk Marking/Penandaan Paket data tertentu, dan Paket data yang telah di tandai dapat di manfaatkan di fitur fitur mikrotik Lainnya.
- Paket data yang telah di marking hanya dapat di gunakan oleh router yang Melakukan Marking.



Penggunaan Firewall Mangle

- Ada 3 Jenis Marking yang dapat digunakan di Mikrotik
Yaitu:

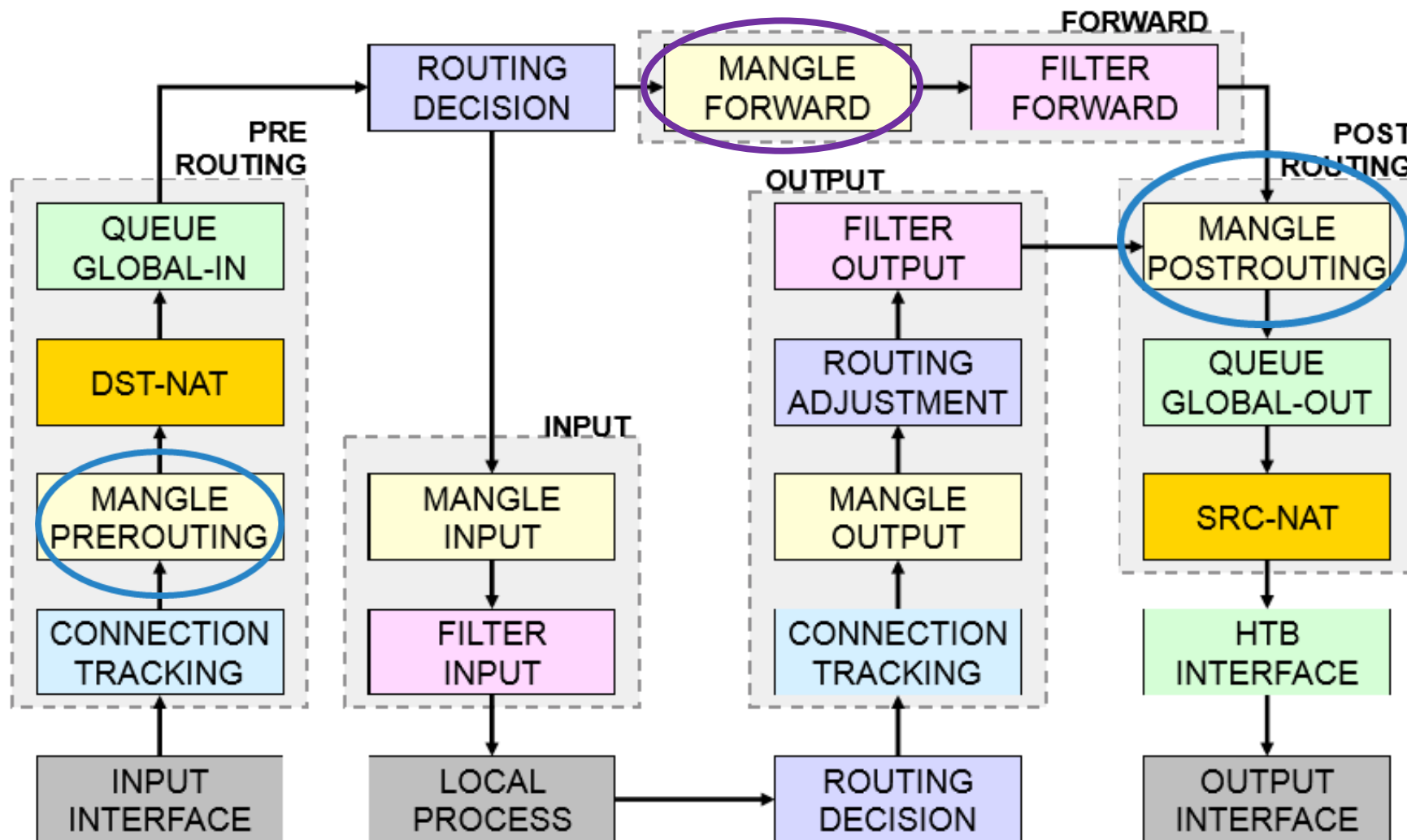
- Connection Mark
- Packet Mark
- Route Mark



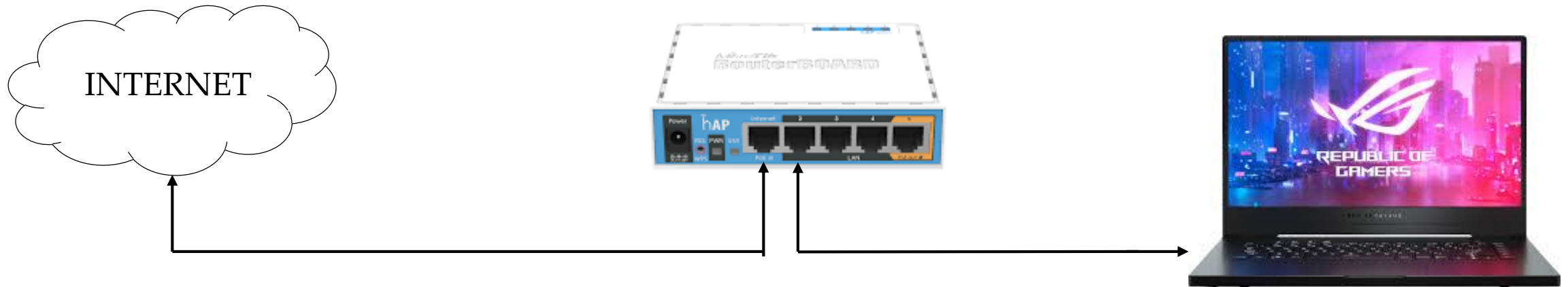
Pemilihan Chain pada Firewall Mangle

- **Prerouting**
- **Input**
- **Forward**
- **Output**
- **Postrouting**

Pemilihan Chain



Topologi



Step Konfigurasi

- Pada Implementasi kali ini ada beberapa fitur yang akan kita Konfigurasi. Yaitu:
 1. Marking browsing, game, Sosmed dan Youtube menggunakan firewall Mangle.
 2. Bandwith Management
 - a. Konfigurasi PCQ Upload dan Download.
 - b. Konfigurasi Queue Tree untuk Browsing, Game, Sosmed, dan Youtube

Step Konfigurasi

- Tandai Koneksi dan paket dari setiap gamenya terlebih dahulu.
- Melakukan Marking Dapat menggunakan patokan Protokol Transport Dan Port Setiap aplikasi dan game.
- Untuk Mendapatkan Protokol dan Port dari setiap aplikasi dapat menggunakan Tools Torch atau bisa mencari di internet.

Marking untuk koneksi Game

Konfigurasi connection Mark untuk setiap game

Mangle Rule <172.16.0.0/24->10012,17500>

General | Advanced | Extra | Action | Statistics

Chain: **forward**

Src. Address: 172.16.0.0/24

Dst. Address:

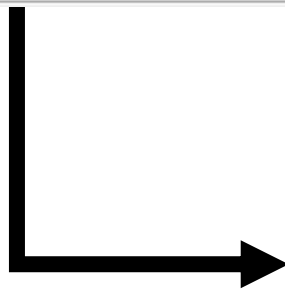
Protocol: 6 (tcp)

Src. Port:

Dst. Port: 10012,17500

Any. Port:

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Reset Counters



Mangle Rule <172.16.0.0/24->10012,17500>

General | Advanced | Extra | Action | Statistics

Action: **mark connection**

Log

Log Prefix:

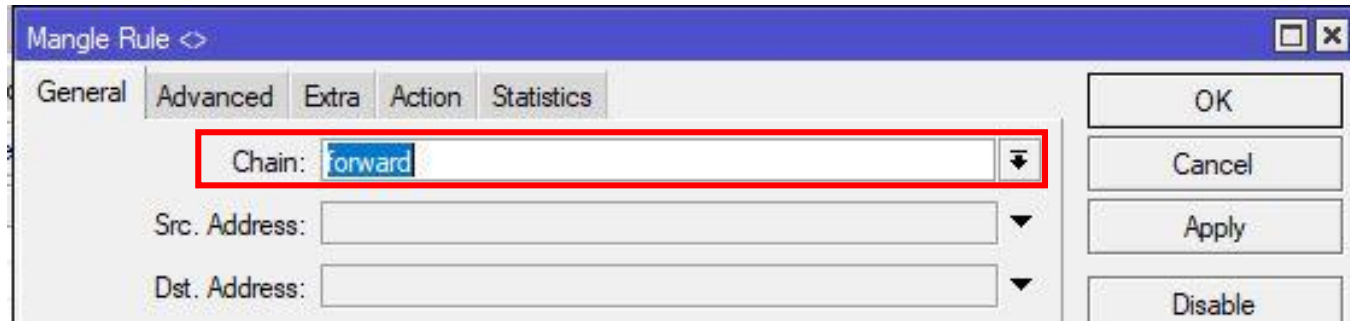
New Connection Mark: Koneksi Game

Passthrough

OK
Cancel
Apply
Disable
Comment
Copy

Marking untuk paket Game

Konfigurasi Packet mark untuk Game



Mangle Rule <>

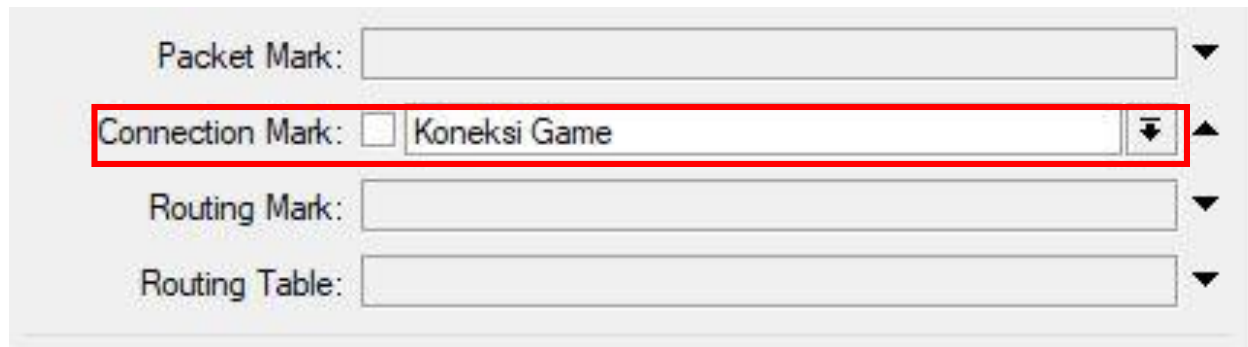
General Advanced Extra Action Statistics

Chain: **forward**

Src. Address:

Dst. Address:

OK
Cancel
Apply
Disable

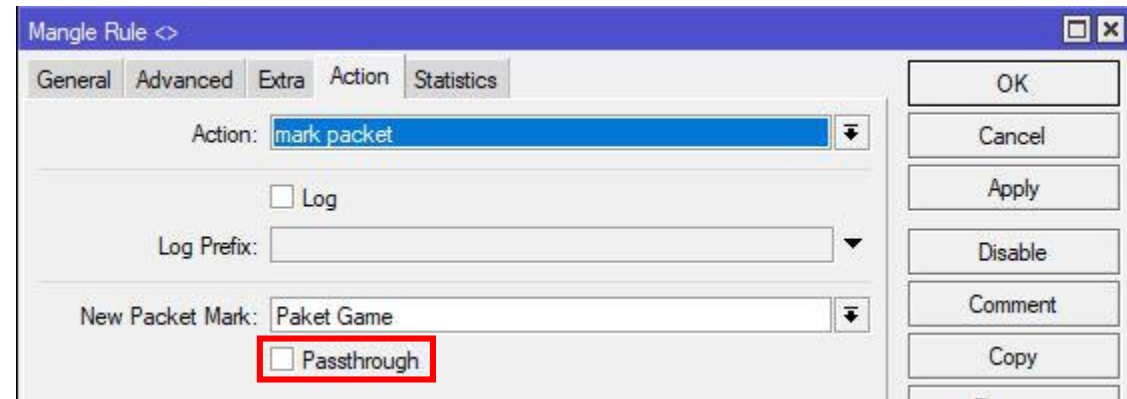
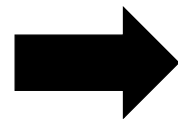


Packet Mark:

Connection Mark: **Koneksi Game**

Routing Mark:

Routing Table:



Mangle Rule <>

General Advanced Extra Action Statistics

Action: **mark packet**

Log

Log Prefix:

New Packet Mark: **Paket Game**

Passthrough

OK
Cancel
Apply
Disable
Comment
Copy

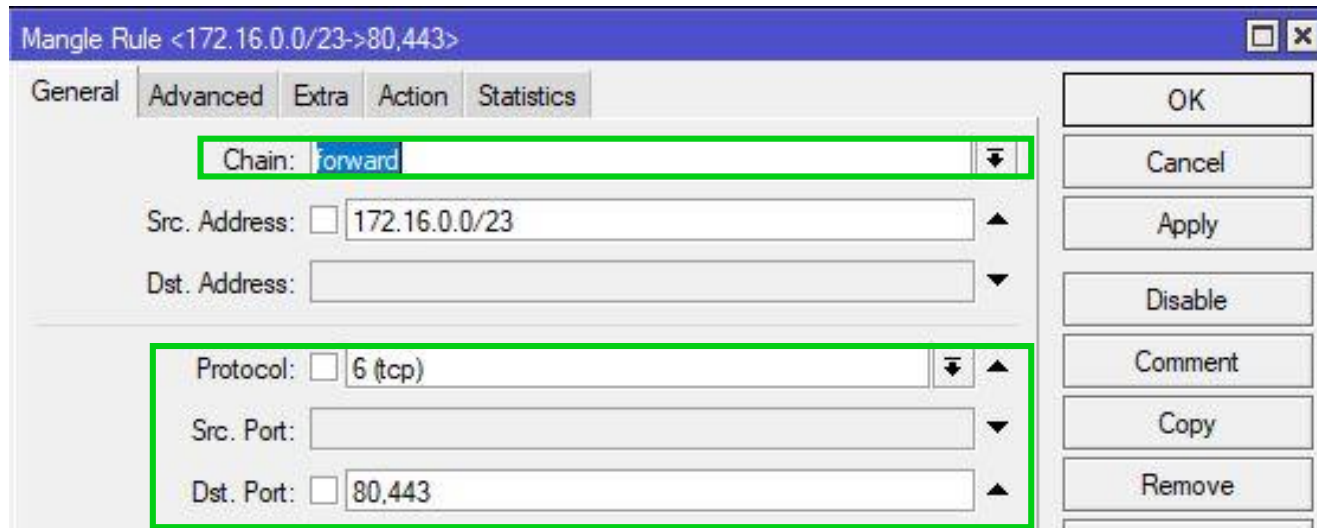
Marking Untuk Koneksi Browsing, Sosmed dan Youtube

Untuk Menandai Koneksi browsing cukup Marking Koneksi Protokol TCP port 80 dan 443.

Untuk menandai koneksi Sosmed dan youtube bisa memanfaatkan L7 Protokol atau add dst to address list di Firewall Filter.

Marking Untuk Koneksi Browsing

Konfigurasi Connection Mark untuk Koneksi Browsing



Mangle Rule <172.16.0.0/23->80,443>

General Advanced Extra Action Statistics

Chain: forward

Src. Address: 172.16.0.0/23

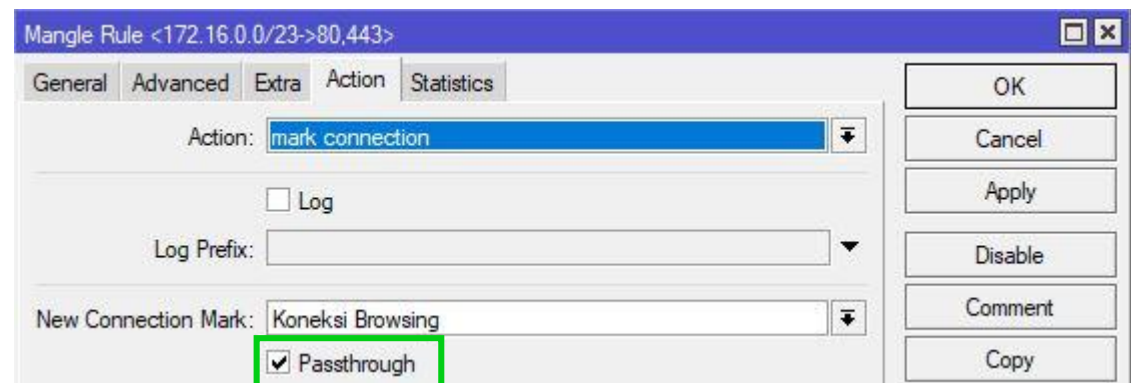
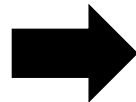
Dst. Address:

Protocol: 6 (tcp)

Src. Port:

Dst. Port: 80,443

OK
Cancel
Apply
Disable
Comment
Copy
Remove



Mangle Rule <172.16.0.0/23->80,443>

General Advanced Extra Action Statistics

Action: mark connection

Log

Log Prefix:

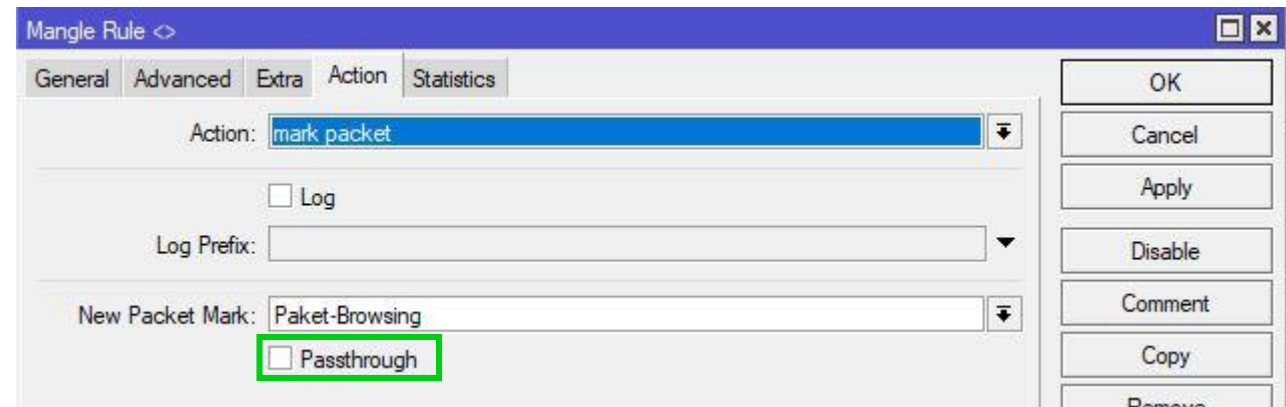
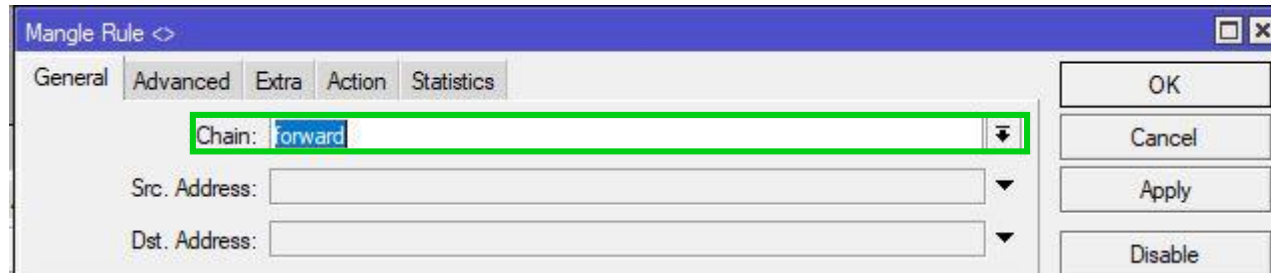
New Connection Mark: Koneksi Browsing

Passthrough

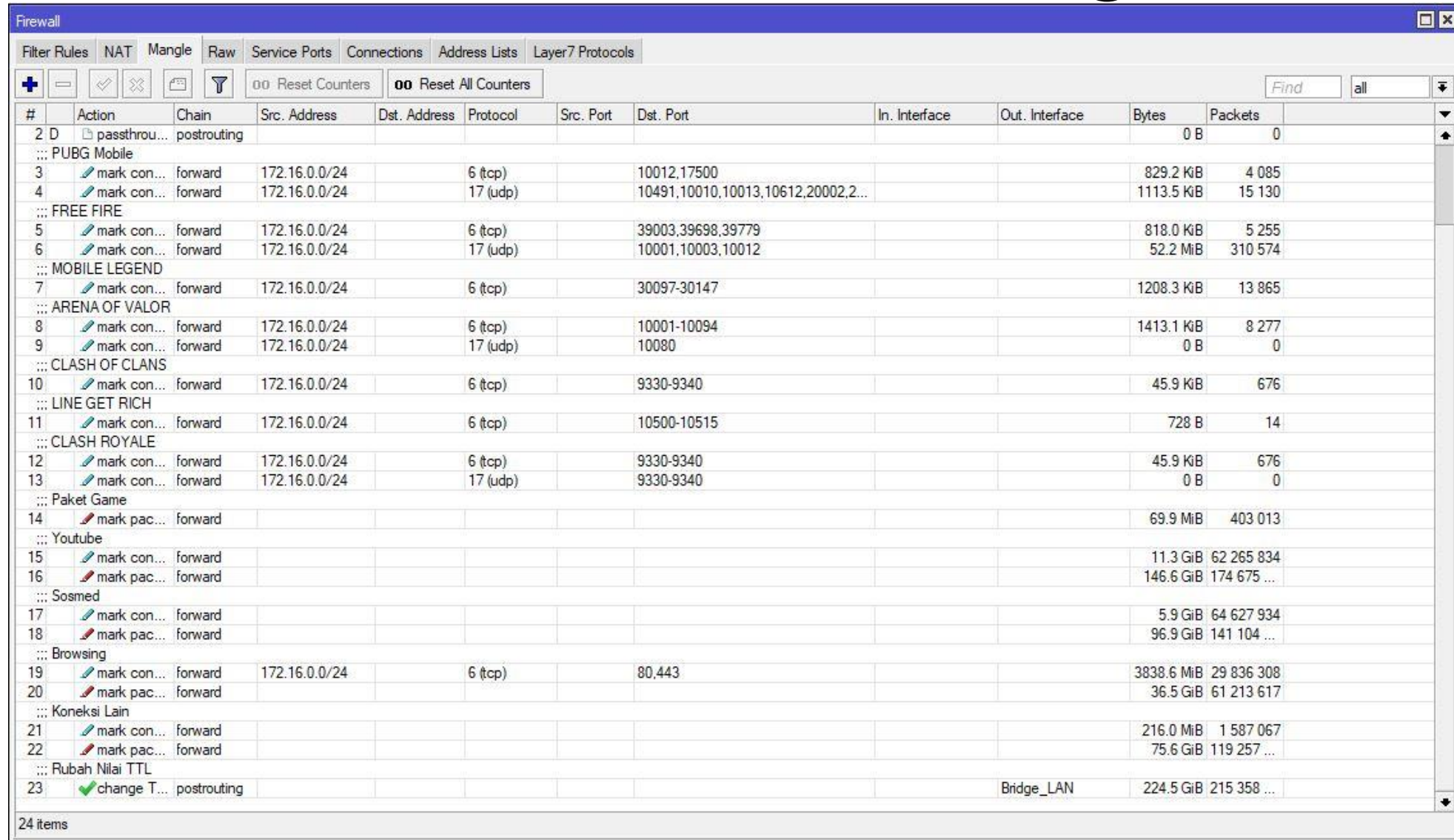
OK
Cancel
Apply
Disable
Comment
Copy

Marking Untuk Koneksi Browsing

Konfigurasi Packet Mark untuk trafik Selain game



Hasil Akhir Rule Firewall Mangle



The screenshot shows the Mikrotik WinBox Firewall Mangle rule configuration table. The table lists 24 rules with columns for Action, Chain, Src. Address, Dst. Address, Protocol, Src. Port, Dst. Port, In. Interface, Out. Interface, Bytes, and Packets. The rules are grouped by game names like PUBG Mobile, FREE FIRE, MOBILE LEGEND, etc.

#	Action	Chain	Src. Address	Dst. Address	Protocol	Src. Port	Dst. Port	In. Interface	Out. Interface	Bytes	Packets
2	passthrou...	postrouting								0 B	0
::: PUBG Mobile											
3	mark con...	forward	172.16.0.0/24		6 (tcp)		10012,17500			829.2 KiB	4 085
4	mark con...	forward	172.16.0.0/24		17 (udp)		10491,10010,10013,10612,20002,2...			1113.5 KiB	15 130
::: FREE FIRE											
5	mark con...	forward	172.16.0.0/24		6 (tcp)		39003,39698,39779			818.0 KiB	5 255
6	mark con...	forward	172.16.0.0/24		17 (udp)		10001,10003,10012			52.2 MiB	310 574
::: MOBILE LEGEND											
7	mark con...	forward	172.16.0.0/24		6 (tcp)		30097-30147			1208.3 KiB	13 865
::: ARENA OF VALOR											
8	mark con...	forward	172.16.0.0/24		6 (tcp)		10001-10094			1413.1 KiB	8 277
9	mark con...	forward	172.16.0.0/24		17 (udp)		10080			0 B	0
::: CLASH OF CLANS											
10	mark con...	forward	172.16.0.0/24		6 (tcp)		9330-9340			45.9 KiB	676
::: LINE GET RICH											
11	mark con...	forward	172.16.0.0/24		6 (tcp)		10500-10515			728 B	14
::: CLASH ROYALE											
12	mark con...	forward	172.16.0.0/24		6 (tcp)		9330-9340			45.9 KiB	676
13	mark con...	forward	172.16.0.0/24		17 (udp)		9330-9340			0 B	0
::: Paket Game											
14	mark pac...	forward								69.9 MiB	403 013
::: Youtube											
15	mark con...	forward								11.3 GiB	62 265 834
16	mark pac...	forward								146.6 GiB	174 675 ...
::: Sosmed											
17	mark con...	forward								5.9 GiB	64 627 934
18	mark pac...	forward								96.9 GiB	141 104 ...
::: Browsing											
19	mark con...	forward	172.16.0.0/24		6 (tcp)		80,443			3838.6 MiB	29 836 308
20	mark pac...	forward								36.5 GiB	61 213 617
::: Koneksi Lain											
21	mark con...	forward								216.0 MiB	1 587 067
22	mark pac...	forward								75.6 GiB	119 257 ...
::: Rubah Nilai TTL											
23	change T...	postrouting							Bridge_LAN	224.5 GiB	215 358 ...

Effect Passthrough

The screenshot shows the Mikrotik WinBox Firewall configuration interface. The 'Filter Rules' tab is active, displaying a list of rules. The table below summarizes the visible rules and their configurations.

#	Action	Chain	Src. Address	Dst. Address	Protocol	Src. Port	Dst. Port
::: Free Fire							
0	mark connection	forward	10.100.100.0/24		6 (tcp)		39698,39779,39003
1	mark connection	forward	10.100.100.0/24		17 (udp)		10002,10004
::: Clash OF Clan							
2	mark connection	forward	10.100.100.0/24		6 (tcp)		9330-9340
::: PUBG Mobile							
3	mark connection	forward	10.100.100.0/24		6 (tcp)		10012,17500,10173
4	mark connection	forward	10.100.100.0/24		17 (udp)		10100,20002,17000,9000,20001,10173
::: Mobile Legend							
5	mark connection	prerouting	10.100.100.0/24		6 (tcp)		30107,5222,5228
6	mark connection	prerouting	10.100.100.0/24		17 (udp)		5678
::: Arena Of Valor							
7	mark connection	forward	10.100.100.0/24		6 (tcp)		10001-10094
8	mark connection	forward	10.100.100.0/24		17 (udp)		10080,17000
::: Paket Game							
9	mark packet	forward					
::: Koneksi Browsing							
10	mark connection	forward	10.100.100.0/24				
11	mark connection	forward	10.100.100.0/24				

Annotations in the image:

- A black box with green text "Passthrough=Yes" is placed over rule #3.
- A black box with green text "Passthrough=No" is placed over rule #10.
- A black speech bubble with green text "Mark= Koneksi-game" points to rule #2.
- A black speech bubble with green text "Mark= Paket Game" points to rule #9.
- Vertical arrows point from rule #0 to rule #3, and from rule #7 to rule #9.
- Horizontal green boxes highlight rules #5-6 and rule #9.

Effect Passthrough

The screenshot shows the Mikrotik WinBox Firewall configuration window. The 'Filter Rules' tab is active, displaying a list of rules. The table below summarizes the visible rules:

#	Action	Chain	Src. Address	Dst. Address	Protocol	Src. Port	Dst. Port
::: Free Fire							
0	mark connection	forward	10.100.100.0/24		6 (tcp)		39698,39779,39003
1	mark connection	forward	10.100.100.0/24		17 (udp)		10002,10004
::: Clash OF Clan							
2	mark connection	forward	10.100.100.0/24		6 (tcp)		9330-9340
::: PUBG Mobile							
3	mark connection	forward	10.100.100.0/24		6 (tcp)		10012,17500,10100,10012
4	mark connection	forward	10.100.100.0/24		17 (udp)		10100,20002,17000,9030,20001,10173
::: Mobile Legend							
5	mark connection	prerouting	10.100.100.0/24		6 (tcp)		30107,5222,5228
6	mark connection	prerouting	10.100.100.0/24		17 (udp)		5678
::: Arena Of Valor							
7	mark connection	forward	10.100.100.0/24		6 (tcp)		10001-10002
8	mark connection	forward	10.100.100.0/24		17 (udp)		10080,17000
::: Paket Game							
9	mark packet	forward					
::: Koneksi Browsing							
10	mark connection	forward	10.100.100.0/24				
11	mark packet	forward					

Annotations in the image:

- A black box with green text "Passthrough=Yes" is placed over rule 7.
- A black arrow points from rule 7 down to rule 9.
- A black speech bubble with green text "Mark= Paket Game" points to rule 9.
- A red box highlights rule 10.
- A black speech bubble with red text "Mark= Paket Browsing" points to rule 10.

Bandwith Management

- Untuk Contoh kali ini saya akan menggunakan Bandwith 100 M untuk Download dan 30 M untuk Upload yang akan saya alokasikan untuk
 - Paket Game=6 M,10 M
 - Paket Browsing=6 M,25 M
 - Paket Sosmed=6 M,20 M
 - Paket Youtube=6 M,30 M
 - Paket Lain=6 M,15 M

Konfigurasi PCQ

The image displays two configuration windows for PCQ (Per-Connection Queue) settings. The left window is titled "Queue Type <PCQ-Upload>" and the right window is titled "Queue Type <PCQ-Download>".

Queue Type <PCQ-Upload> Configuration:

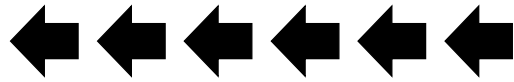
- Type Name: PCQ-Upload
- Kind: pcq
- Rate: 0 bits/s
- Limit: 50 KiB
- Total Limit: 2000 KiB
- Burst Rate: (empty) bits/s
- Burst Threshold: (empty)
- Burst Time: 00:00:10
- Classifier: Src. Address, Dst. Address, Src. Port, Dst. Port
- Src. Address Mask: 32
- Dst. Address Mask: 32
- Src. Address6 Mask: 64
- Dst. Address6 Mask: 64

Queue Type <PCQ-Download> Configuration:

- Type Name: PCQ-Download
- Kind: pcq
- Rate: 0 bits/s
- Limit: 50 KiB
- Total Limit: 2000 KiB
- Burst Rate: (empty) bits/s
- Burst Threshold: (empty)
- Burst Time: 00:00:10
- Classifier: Src. Address, Dst. Address, Src. Port, Dst. Port
- Src. Address Mask: 32
- Dst. Address Mask: 32
- Src. Address6 Mask: 64
- Dst. Address6 Mask: 64

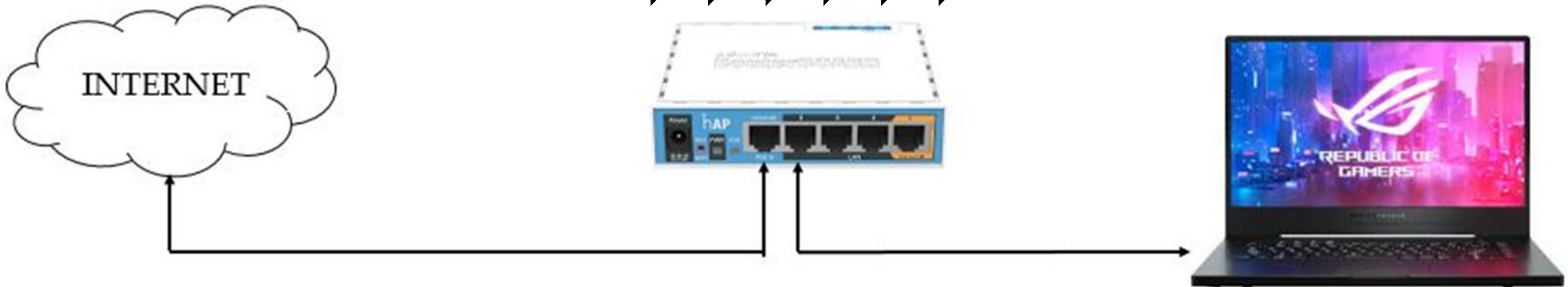
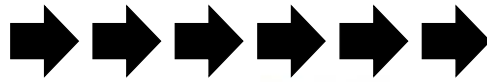
PCQ Classifier

PCQ Upload
Classifier=Src-Address



PCQ Classifier

PCQ Download
Classifier= Dst-Address



Queue Tree

Konfigurasi Parent untuk Upload dan Download

Queue <Upload Hotspot>

General Statistics

Name: Upload Hotspot

Parent: ether1_Internet

Packet Marks:

Queue Type: default

Priority: 8

Bucket Size: 0.100

Limit At: bits/s

Max Limit: 30M bits/s

Burst Limit: bits/s

Burst Threshold: bits/s

Burst Time: s

OK

Cancel

Apply

Disable

Comment

Copy

Remove

Reset Counters

Reset All Counters

enabled

Queue <Download Hotspot>

General Statistics

Name: Download Hotspot

Parent: Bridge_LAN

Packet Marks:

Queue Type: default

Priority: 8

Bucket Size: 0.100

Limit At: bits/s

Max Limit: 100M bits/s

Burst Limit: bits/s

Burst Threshold: bits/s

Burst Time: s

OK

Cancel

Apply

Disable

Comment

Copy

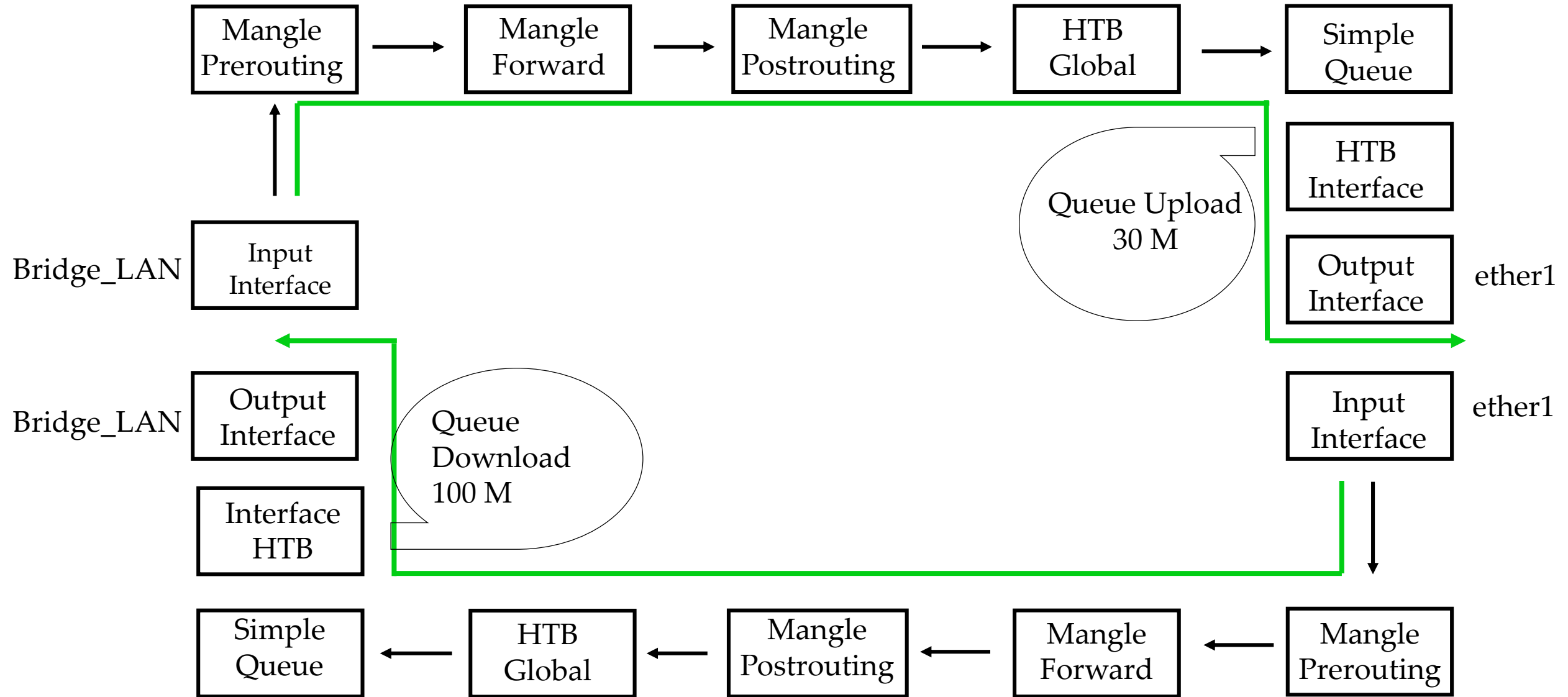
Remove

Reset Counters

Reset All Counters

enabled

Pemilihan Parent



Konfigurasi child upload Queue Tree

The image shows a screenshot of the Mikrotik Queue Manager configuration window for a child upload queue. The window title is "Queue <browsing>". It has two tabs: "General" and "Statistics". The "General" tab is active. The configuration fields are as follows:

- Name: browsing
- Parent: Upload Hotspot
- Packet Marks: Paket Browsing
- Queue Type: PCQ_Upload
- Priority: 8
- Bucket Size: 0.100
- Limit At: (empty) bits/s
- Max Limit: 6M bits/s
- Burst Limit: (empty) bits/s
- Burst Threshold: (empty) bits/s
- Burst Time: (empty) s

On the right side of the window, there are several buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove, Reset Counters, and Reset All Counters. At the bottom left of the window, the status "enabled" is displayed.

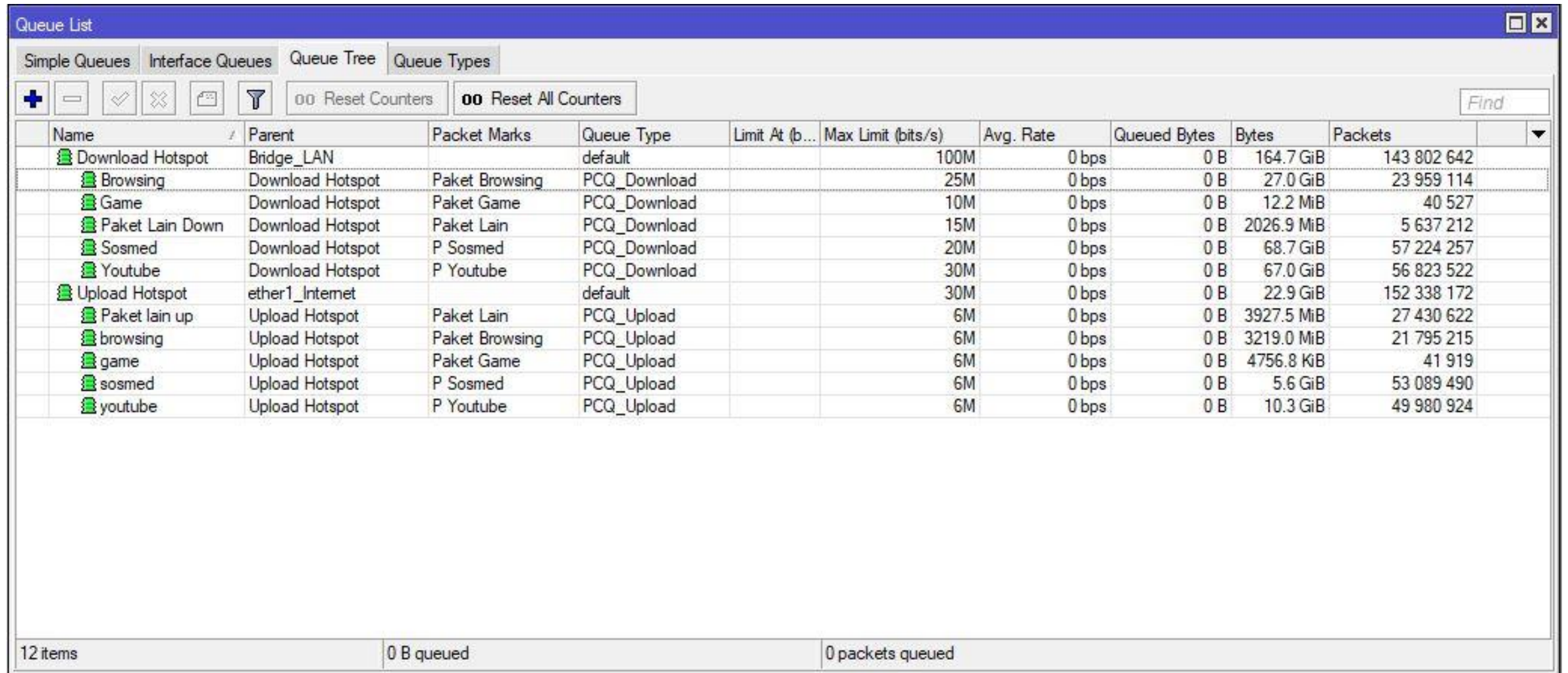
Konfigurasi child Download Queue Tree

The image shows a configuration window titled "Queue <Browsing>". It has two tabs: "General" and "Statistics". The "General" tab is active. The window contains several input fields and dropdown menus for configuring a queue. On the right side, there is a vertical stack of buttons for actions like "OK", "Cancel", "Apply", "Disable", "Comment", "Copy", "Remove", "Reset Counters", and "Reset All Counters". At the bottom left, there is a status indicator that says "enabled".

Field	Value
Name	Browsing
Parent	Download Hotspot
Packet Marks	Paket Browsing
Queue Type	PCQ_Download
Priority	8
Bucket Size	0.100
Limit At	
Max Limit	25M
Burst Limit	
Burst Threshold	
Burst Time	

enabled

Hasil Queue Tree



The screenshot shows the Mikrotik Queue List window with the 'Queue Tree' tab selected. The interface includes a toolbar with icons for adding, deleting, and filtering queues, along with buttons to reset counters and a search field. The main area displays a table of queue configurations.

Name	Parent	Packet Marks	Queue Type	Limit At (b...	Max Limit (bits/s)	Avg. Rate	Queued Bytes	Bytes	Packets
Download Hotspot	Bridge_LAN		default		100M	0 bps	0 B	164.7 GiB	143 802 642
Browsing	Download Hotspot	Paket Browsing	PCQ_Download		25M	0 bps	0 B	27.0 GiB	23 959 114
Game	Download Hotspot	Paket Game	PCQ_Download		10M	0 bps	0 B	12.2 MiB	40 527
Paket Lain Down	Download Hotspot	Paket Lain	PCQ_Download		15M	0 bps	0 B	2026.9 MiB	5 637 212
Sosmed	Download Hotspot	P Sosmed	PCQ_Download		20M	0 bps	0 B	68.7 GiB	57 224 257
Youtube	Download Hotspot	P Youtube	PCQ_Download		30M	0 bps	0 B	67.0 GiB	56 823 522
Upload Hotspot	ether1_Internet		default		30M	0 bps	0 B	22.9 GiB	152 338 172
Paket lain up	Upload Hotspot	Paket Lain	PCQ_Upload		6M	0 bps	0 B	3927.5 MiB	27 430 622
browsing	Upload Hotspot	Paket Browsing	PCQ_Upload		6M	0 bps	0 B	3219.0 MiB	21 795 215
game	Upload Hotspot	Paket Game	PCQ_Upload		6M	0 bps	0 B	4756.8 KiB	41 919
sosmed	Upload Hotspot	P Sosmed	PCQ_Upload		6M	0 bps	0 B	5.6 GiB	53 089 490
youtube	Upload Hotspot	P Youtube	PCQ_Upload		6M	0 bps	0 B	10.3 GiB	49 980 924

12 items 0 B queued 0 packets queued

Pengujian

Queue List

Simple Queues Interface Queues Queue Tree Queue Types

+ - ✓ ✗ ☰ ⚙ 00 Reset Counters 00 Reset All Counters Find

Name	Parent	Packet Marks	Queue Type	Limit At (b...	Max Limit (bits/s)	Avg. Rate	Queued Bytes	Bytes	Packets
Download Hotspot	Bridge_LAN		default		100M	10.3 Mbps	0 B	166.2 GiB	145 016 416
Browsing	Download Hotspot	Paket Browsing	PCQ_Download		25M	826.8 kbps	0 B	27.3 GiB	24 174 345
Game	Download Hotspot	Paket Game	PCQ_Download		10M	3.0 kbps	0 B	12.4 MiB	40 870
Paket Lain Down	Download Hotspot	Paket Lain	PCQ_Download		15M	26.0 kbps	0 B	2045.2 MiB	5 659 033
Sosmed	Download Hotspot	P Sosmed	PCQ_Download		20M	3.8 Mbps	0 B	69.2 GiB	57 705 153
Youtube	Download Hotspot	P Youtube	PCQ_Download		30M	5.6 Mbps	5.4 KiB	67.6 GiB	57 319 009
Upload Hotspot	ether1_Internet		default		30M	628.3 kbps	0 B	23.0 GiB	153 227 502
Paket lain up	Upload Hotspot	Paket Lain	PCQ_Upload		6M	7.6 kbps	0 B	3936.4 MiB	27 473 832
browsing	Upload Hotspot	Paket Browsing	PCQ_Upload		6M	125.2 kbps	0 B	3236.9 MiB	21 968 320
game	Upload Hotspot	Paket Game	PCQ_Upload		6M	1248 bps	0 B	4833.1 KiB	42 294
sosmed	Upload Hotspot	P Sosmed	PCQ_Upload		6M	134.8 kbps	0 B	5.6 GiB	53 481 137
youtube	Upload Hotspot	P Youtube	PCQ_Upload		6M	359.3 kbps	0 B	10.4 GiB	50 261 917

12 items | 17.7 KiB queued | 13 packets queued



Terima Kasih