

# Fast Path, Fast Track and ISP Network Design



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Facebook: /mikrotikturkiye

**İstanbul, Turkey- 2018**

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Ana Sayfa

Gönderiler

Videolar

Fotoğraflar

Hakkında

Topluluk

Bilgiler ve Reklamlar

Sayfa Oluştur

Beğen Paylaş Düzenlemeler Öner ...



MikroTik Türkiye, 19 yeni fotoğraf ekledi.

12 Eylül, 12:03 ·

MikroTik external LTE Antenna montajı. Kullanılan ürünler;

<https://mikrotik.com/product/ACUFL>

<https://mikrotik.com/product/smasma>

[https://mikrotik.com/product/mant\\_lte\\_50](https://mikrotik.com/product/mant_lte_50)

[https://mikrotik.com/product/wap\\_lte\\_kit...](https://mikrotik.com/product/wap_lte_kit...) Devamını Gör



Beğen

Yorum Yap

Mesaj Gönder

Kişiler

538 beğenme



Dr. Mutaf International Clinic Inc.

Sağlık/Güzellik



HDH İnşaat & Makina

İnşaat Şirketi



Arduino Clone TR

Elektronik



Cevdet Dogan Işık

Müzik Grubu

Diğerlerini Gör

Bu Sayfanın Beğendiği Sayfalar

Türkçe · English (UK) · Kurdî (Kurmançî) · العربية · Español

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13:49

MikroTik Nv2 QoS 2

69 views • 3 weeks ago



7:18

MikroTik Nv2 QoS 1

80 views • 3 weeks ago



4:36

MikroTik Ders4 ECMP load balancing

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2:27

Mac Telnet ile PPPoE Client Tanimlama

1.4K views • 2 years ago



5:10

MikroTik Sxt Lite 5 Cpe Olarak Kurulumu

3.7K views • 2 years ago



3:03

MikroTik Aile Filtresi Nasıl Yapılır ?

1.3K views • 2 years ago



7:36

MikroTik Ders 3 (Access Point Kurulumu ve Bridge)

7.6K views • 2 years ago



8:22

MikroTik Ders 2 (Ip Adresleme, DHCP Server v...

4.7K views • 2 years ago



7:09

MikroTik Ders 1 (MikroTik Giriş ve PPPoE Client...

7.4K views • 2 years ago

# Interframe Spacing

## Does the interface rate affect transmission times?

- Ethernet cables do not transmit data continuously, data is transmitted periodically.
- Interframe spacing is the waiting time between two ports of Ethernet ports.
- Waiting time between two Frames determines Interface Rate

9.6  $\mu$ s for 10 Mbit/s Ethernet

0.96  $\mu$ s for 100 Mbit/s Ethernet

96 ns for Gigabit Ethernet

9.6 ns for 10 Gigabit Ethernet

1 second = 1,000 ms

1 ms = 1,000  $\mu$ s mikrosaniye

# Interframe Spacing



# Interframe Spacing

Interface Rate = 10Mbps

The screenshot shows a network testing application window titled "Quick Start (Running)". The configuration includes:

- Test ID: 11
- Stream: (empty)
- Port: (empty)
- Interface: <pppoe-testuser>
- Packet Size: 1500
- PPS: (empty)
- MBPS: 1
- Tx Template: packet-template1

On the right side, there are buttons for Start, Stop, Close, and New Window.

The main area displays a table of test results:

Seq	ID	Tx Pa...	Tx Rate	Rx Pa...	Rx Rate	Lost Packet	Lat. Min.	Lat. Avg.	Lat. M...	Jitter	
TOT	0	2 167	1000.1 kbps	2 167	1000.1 kbps						
26	0	83	996.0 kbps	83	996.0 kbps		2.52ms	2.53ms	3.75ms	1.23ms	
25	0	85	1020.0 kbps	85	1020.0 kbps						
24	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.54ms	16.4us
23	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.54ms	20.5us
22	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.54ms	17.2us
21	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	2.52ms	2.53ms	2.54ms	18.3us
20	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.55ms	25.6us
19	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.67ms	147.us
18	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.54ms	19.4us
17	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	2.52ms	2.53ms	2.56ms	33.1us
16	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.55ms	26.0us
15	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.54ms	21.0us
14	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.54ms	17.1us
13	0	85	1020.0 kbps	85	1020.0 kbps	0	0 bps	2.52ms	2.54ms	3.75ms	1.23ms
12	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.54ms	19.2us
11	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.54ms	20.0us
10	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.54ms	19.4us
9	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	2.53ms	2.53ms	2.54ms	16.8us
8	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	2.52ms	2.53ms	2.56ms	30.5us

At the bottom left, it says "20 items".

On the right, there is a panel for "Interface <ether2>" with tabs for Overall Stats, Rx Stats, Tx Stats, Status, and Traffic. The Status tab is active, showing:

- Last Link Down Time: Oct/10/2018 19:10:22
- Last Link Up Time: Oct/10/2018 19:10:25
- Link Downs: 5
- Auto Negotiation: done
- Rate: 10Mbps **10Mbps**
- Full Duplex
- Advertising: 10M full
- Link Partner Advertising: 10M half
- 10M full
- 100M half
- 100M full

# Interframe Spacing

Interface Rate = 100Mbps

Quick Start (Running)

Test ID: 11

Stream:

Port:

Interface: <pppoe-testuser>

Packet Size: 1500

PPS:

MBPS: 1

Tx Template: packet-template1

Start Stop Close New Window

Seq	ID	Tx Pa...	Tx Rate	Rx Pa...	Rx Rate	Lost Packets	Lat. Min.	Lat. Avg.	Lat. M...	Jitter	
TOT	0	5 500	1000.0 kbps	5 500	1000.0 kbps						
66	0	83	996.0 kbps	83	996.0 kbps		291.us	295.us	415.us	125.us	
65	0	84	1008.0 kbps	84	1008.0 kbps						
64	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	307.us	16.1us
63	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	320.us	28.9us
62	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	308.us	16.8us
61	0	85	1020.0 kbps	85	1020.0 kbps	0	0 bps	291.us	296.us	413.us	122.us
60	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	306.us	14.8us
59	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	318.us	26.9us
58	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	325.us	34.6us
57	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	291.us	295.us	313.us	22.0us
56	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	306.us	15.2us
55	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	326.us	35.4us
54	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	306.us	14.2us
53	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	291.us	294.us	307.us	15.6us
52	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	306.us	15.0us
51	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	314.us	22.8us
50	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	307.us	16.3us
49	0	85	1020.0 kbps	85	1020.0 kbps	0	0 bps	291.us	296.us	412.us	121.us
48	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	323.us	32.5us

20 items

Interface <ether2>

Overall Stats Rx Stats Tx Stats Status

Last Link Down Time: Oct/10/2018 19:14

Last Link Up Time: Oct/10/2018 19:14

Link Downs: 6

Auto Negotiation: done

Rate: 100Mbps

Full Duplex

Advertising: 10M full

100M full

Link Partner Advertising: 10M half

10M full

100M half

100M full



# Interframe Spacing

Interface Rate = 1Gbps

Quick Start (Running) □ ×

Test ID:  Start

Stream:  Stop

Port:  Close

Interface:  New Window

Packet Size:

PPS:

MBPS:

Tx Template:

Seq	ID	Tx Pa...	Tx Rate	Rx Pa...	Rx Rate	Lost Packets	Lat. Min.	Lat. Avg.	Lat. M...	Jitter	
TOT	0	3 916	999.8 kbps	3 916	999.8 kbps	0					
47	0	83	996.0 kbps	83	996.0 kbps	0	68.2us	72.7us	174.us	105.us	
46	0	83	996.0 kbps	83	996.0 kbps	0					
45	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	68.5us	72.7us	97.7us	29.2us
44	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	69.2us	72.5us	87.4us	18.2us
43	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	69.0us	72.7us	84.9us	15.9us
42	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	69.4us	72.5us	85.3us	15.9us
41	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	68.9us	72.5us	81.8us	12.9us
40	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	69.0us	72.2us	83.6us	14.6us
39	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	68.9us	72.5us	88.2us	19.2us
38	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	68.9us	74.2us	103.us	34.3us
37	0	85	1020.0 kbps	85	1020.0 kbps	0	0 bps	68.7us	72.9us	92.2us	23.4us
36	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	68.8us	73.2us	101.us	32.2us
35	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	68.8us	72.5us	95.0us	26.2us
34	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	69.0us	72.4us	84.9us	15.9us
33	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	68.9us	73.8us	174.us	105.us
32	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	69.3us	72.8us	113.us	43.8us
31	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	68.9us	72.6us	85.2us	16.3us
30	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	68.9us	72.8us	85.2us	16.3us
29	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	68.5us	72.9us	84.9us	16.3us

20 items

Interface <ether2>

Overall Stats | Rx Stats | Tx Stats | Status

Last Link Down Time:

Last Link Up Time:

Link Downs:

Auto Negotiation:

Rate:

Full Duplex

Advertising:

Link Partner Advertising:

# Interframe Spacing

## Interface Rate = 10Gbps

Quick Start (Running)

Test ID: 1

Stream:

Port:

Interface: sfp-sfpplus2

Packet Size: 1500

PPS:

MBPS: 200

Tx Template: packet-template1

Seq	ID	Tx Pac...	Tx Rate	Rx Pac...	Rx Rate	Los...	Lat. Min.	Lat. A...	Lat. M...	Jitter	
TOT	0	949 975	199.9 Mbps	949 974	199.9 Mbps	1	24.2us	44.9us	2.56ms	2.53ms	
57	0	16 666	199.9 Mbps	16 665	199.9 Mbps	1	24.2us	44.9us	2.56ms	2.53ms	
56	0	16 667	200.0 Mbps	16 667	200.0 Mbps	0	25.6us	43.7us	1.04ms	1.02ms	
55	0	16 666	199.9 Mbps	16 666	199.9 Mbps	0	0 bps	26.1us	45.3us	1.71ms	1.68ms
54	0	16 668	200.0 Mbps	16 668	200.0 Mbps	0	0 bps	24.2us	44.2us	1.34ms	1.32ms
53	0	16 667	200.0 Mbps	16 667	200.0 Mbps	0	0 bps	26.3us	45.1us	1.71ms	1.68ms
52	0	16 665	199.9 Mbps	16 665	199.9 Mbps	0	0 bps	25.7us	44.9us	1.39ms	1.37ms
51	0	16 669	200.0 Mbps	16 669	200.0 Mbps	0	0 bps	26.5us	44.2us	1.18ms	1.16ms
50	0	16 665	199.9 Mbps	16 665	199.9 Mbps	0	0 bps	25.6us	44.3us	1.51ms	1.49ms
49	0	16 666	199.9 Mbps	16 666	199.9 Mbps	0	0 bps	27.0us	42.9us	794.us	767.us
48	0	16 668	200.0 Mbps	16 668	200.0 Mbps	0	0 bps	25.9us	44.8us	1.43ms	1.40ms
47	0	16 667	200.0 Mbps	16 667	200.0 Mbps	0	0 bps	27.1us	43.7us	858.us	831.us
46	0	16 666	199.9 Mbps	16 666	199.9 Mbps	0	0 bps	26.1us	44.7us	1.35ms	1.33ms
45	0	16 666	199.9 Mbps	16 666	199.9 Mbps	0	0 bps	24.7us	44.5us	1.30ms	1.28ms
44	0	16 667	200.0 Mbps	16 667	200.0 Mbps	0	0 bps	26.5us	45.5us	1.44ms	1.41ms

20 items (1 selected)

Start

Stop

Close

New Window

Interface <sfp-sfpplus2>

Overall Stats Rx Stats Tx Stats Status

Last Link Down Time: Sep/28/2018 01:23

Last Link Up Time: Sep/28/2018 01:23

Link Downs: 2

Auto Negotiation: disabled

Rate: 10Gb 10Gbps

Full Duplex

Advertising:

Link Partner Advertising:

# Interframe Spacing

	Minimum	Average	Maximum	Traffic	Performance
10Mbit	2.52ms	2.53ms	3.75ms	1mbps	X
100Mbit	291us	295us	415us	1mbps	8.6x
1Gbit	68.2us	72.7us	174us	1mbps	4.2x
10Gbit	24us	44.9us	X	1mbps	2.8x

1 second = 1,000 ms

1 ms = 1,000  $\mu$ s

# Fast Path

# Slow Path



# Slow Path



# Slow Path

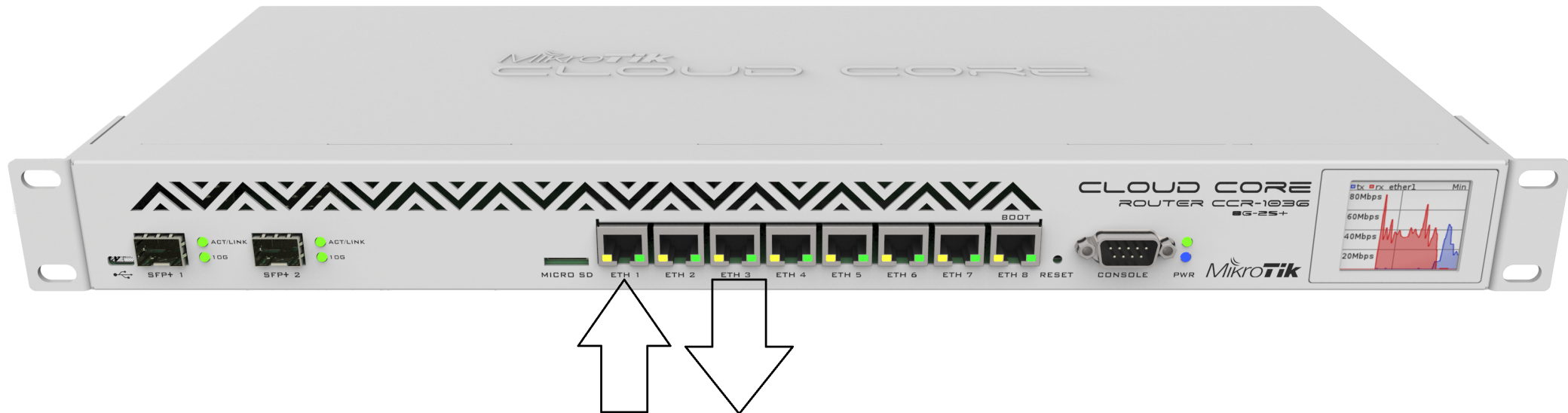


# Slow Path

- Slow Path RouterOS is the normal behavior.
- RouterOS checks individual packages along the way.
- In some cases this process may be extended.
- Slow Path consumes more resources than Fast Path.



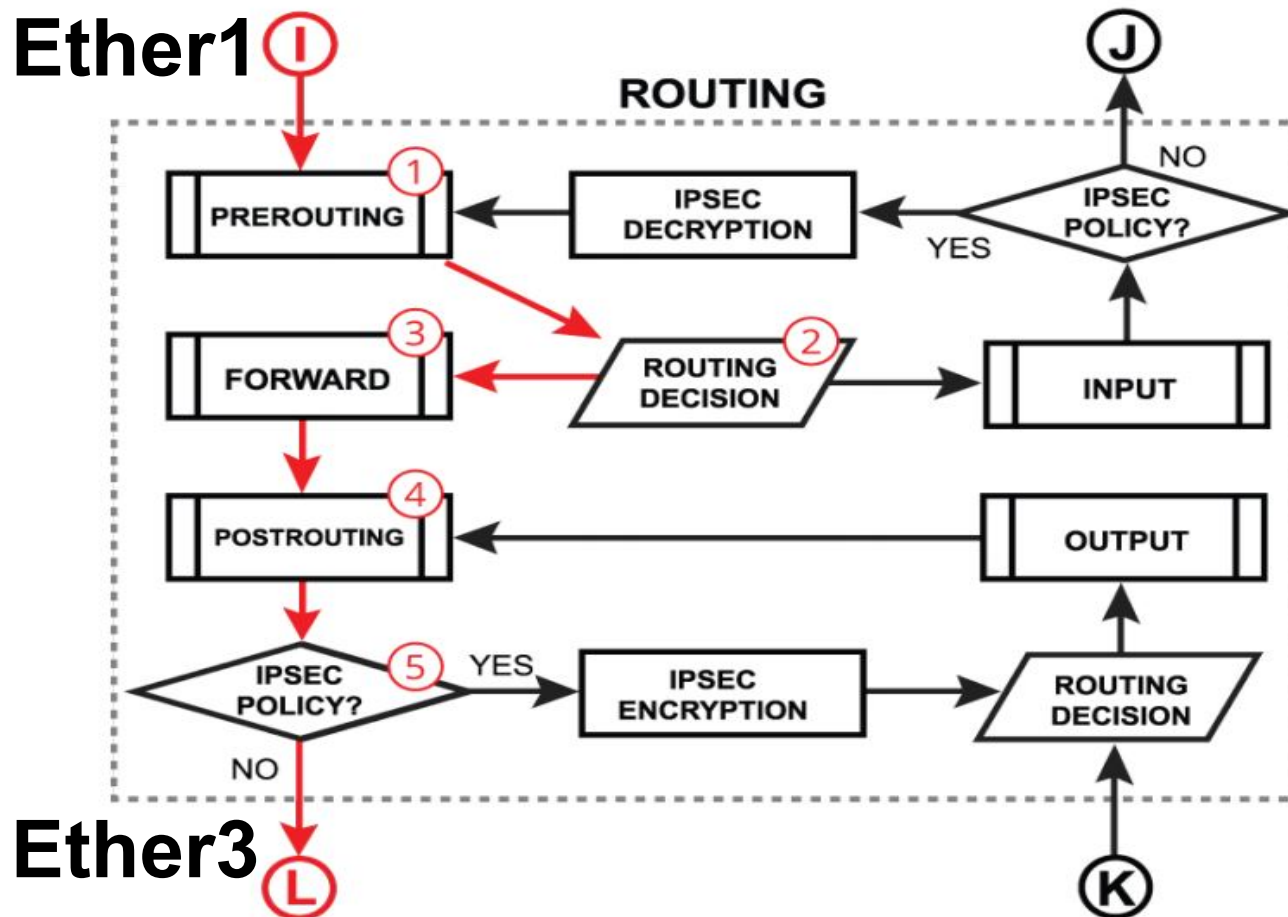
# Slow Path



- The Routera Package will enter through Ether1 and exit through Ether3.
- Ether1 can be considered Internet, Ether3 user (customer).
- When the user starts browsing the web page, what stages does the package go through in the router?

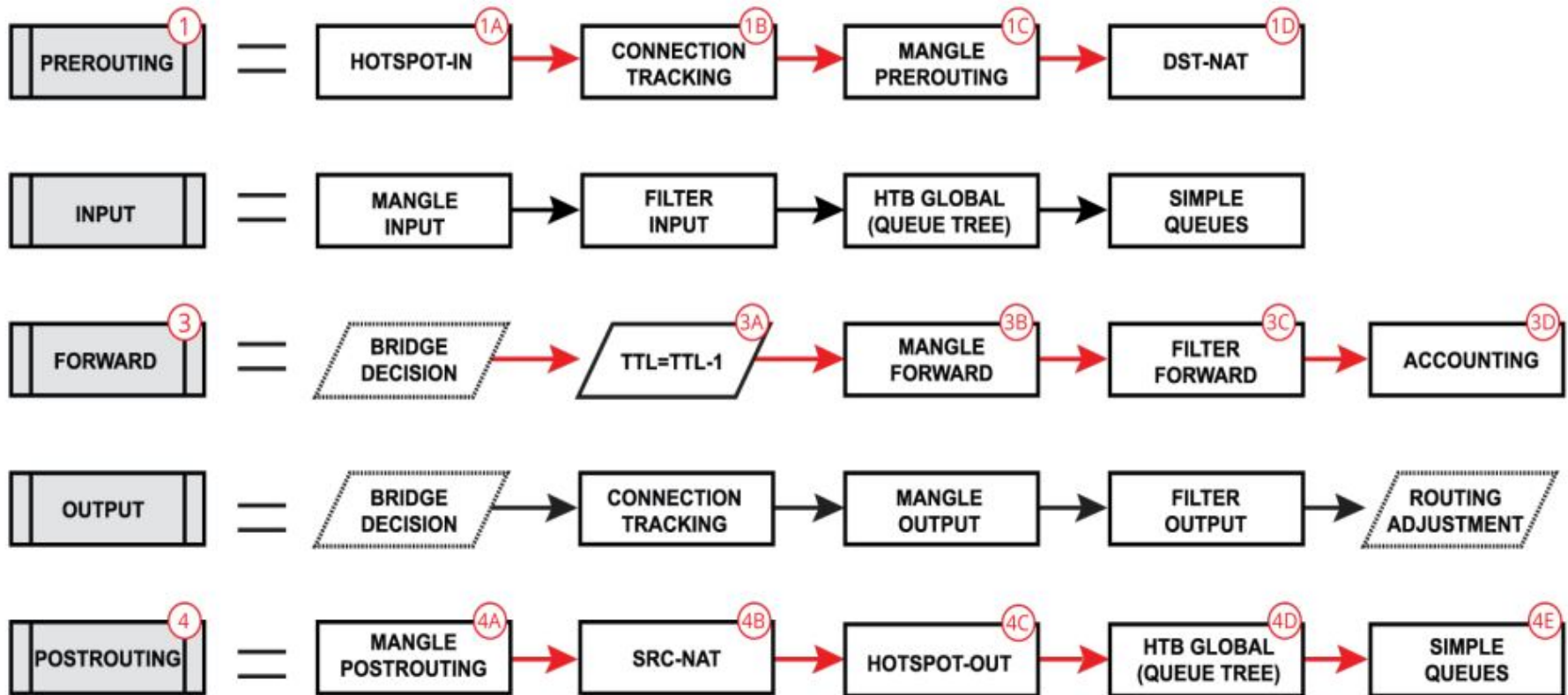
# Slow Path

## Routing Forwarding



# Slow Path

## Routing Forwarding



# Slow Path

admin@CC:2D:E0:B6:98:C4 (PPPoEClient-951) via CC:2D:E0:DC:16:C6 - WinBox v6.40.4 on RB951G-2HnD (mipsbe)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:B6:98:C4

99% CPU

Quick Start (Running)

Test ID: 11

Stream: [ ]

Port: [ ]

Interface: (pppoe-testuser)

Packet Size: 1500

PPS: [ ]

MBPS: 918

Tx Template: packet-template1

Seq	ID	Tx Packets	Tx Rate	Rx Pack...	Rx Rate	Lost P...	Lost Rate	Lat. Min.	Lat. Avg.	Lat. M...	Jitter
TOT	0	4 686 406	917.9 Mbps	4 605 400	905.9 Mbps	61 006	12.0 Mbps				
61	0	76 499	917.9 Mbps	75 536	906.4 Mbps	963	11.5 Mbps	69.8us	212.us	19.9ms	19.9ms
60	0	76 500	918.0 Mbps	75 535	906.4 Mbps	965	11.5 Mbps	70.8us	218.us	4.84ms	4.77ms
59	0	76 499	917.9 Mbps	75 493	905.9 Mbps	1 006	12.0 Mbps	70.4us	213.us	9.08ms	9.01ms
58	0	76 501	918.0 Mbps	75 537	906.4 Mbps	964	11.5 Mbps	70.5us	207.us	7.57ms	7.50ms
57	0	76 501	918.0 Mbps	75 579	906.9 Mbps	922	11.0 Mbps	70.7us	206.us	8.18ms	8.11ms
56	0	76 500	918.0 Mbps	75 510	906.1 Mbps	990	11.8 Mbps	70.1us	199.us	9.52ms	9.45ms
55	0	76 499	917.9 Mbps	75 483	905.7 Mbps	1 016	12.1 Mbps	70.5us	205.us	8.54ms	8.47ms
54	0	76 501	918.0 Mbps	75 332	903.9 Mbps	1 169	14.0 Mbps	70.5us	218.us	8.23ms	8.16ms
53	0	76 499	917.9 Mbps	75 534	906.4 Mbps	965	11.5 Mbps	70.3us	214.us	5.38ms	5.31ms
52	0	76 503	918.0 Mbps	75 493	905.9 Mbps	1 010	12.1 Mbps	70.2us	202.us	9.77ms	9.70ms
51	0	76 496	917.9 Mbps	75 614	907.3 Mbps	882	10.5 Mbps	70.5us	210.us	7.99ms	7.92ms
50	0	76 502	918.0 Mbps	75 518	906.2 Mbps	984	11.8 Mbps	70.3us	214.us	5.04ms	4.97ms
49	0	76 500	918.0 Mbps	75 630	907.5 Mbps	870	10.4 Mbps	70.4us	225.us	6.97ms	6.90ms
48	0	76 498	917.9 Mbps	75 566	906.7 Mbps	932	11.1 Mbps	70.7us	210.us	6.01ms	5.94ms
47	0	76 503	918.0 Mbps	75 342	904.1 Mbps	1 161	13.9 Mbps	70.0us	214.us	7.90ms	7.83ms
46	0	76 498	917.9 Mbps	75 509	906.1 Mbps	989	11.8 Mbps	70.6us	203.us	7.72ms	7.65ms
45	0	76 498	917.9 Mbps	75 522	906.6 Mbps	946	11.3 Mbps	70.1us	213.us	5.36ms	5.29ms
44	0	76 504	918.0 Mbps	75 429	905.1 Mbps	1 075	12.9 Mbps	70.8us	202.us	8.14ms	8.07ms
43	0	76 498	917.9 Mbps	75 573	906.8 Mbps	925	11.1 Mbps	70.8us	224.us	6.59ms	6.52ms

20 items (1 selected)

Interface <pppoe-out1>

General Dial Out Status Traffic

Tx/Rx Rate: 903.1 Mbps / 903.1 Mbps

Tx/Rx Packet Rate: 75 968 p/s / 75 968 p/s

FP Tx/Rx Rate: 0 bps / 903.1 Mbps

FP Tx/Rx Packet Rate: 0 p/s / 75 968 p/s

Tx/Rx Bytes: 84.5 GiB / 84.5 GiB

Tx/Rx Packets: 61 302 218 / 61 302 131

Tx/Rx Drops: 0 / 0

Tx/Rx Errors: 0 / 0

IP Settings

IP Forward

Send Redirects

Accept Redirects

Secure Redirects

Allow Fast Path

RP Filter: loose

TCP SynCookies

Max Neighbor Entries: 6192

ARP Timeout: 00:00:30

ICMP Rate Limit: 10

IPv4 Fast Path Active

49 016 933

68.1 GiB

CPU Load (%)

cpu0 99

Name	CPU	Usage
cpu0		97.5
networking	0	70.0
ethernet	0	24.0
unclassified	0	2.0
management	0	1.5
firewall-mgmt	0	0.0
logging	0	0.0
routing	0	0.0
winbox	0	0.0

Interface List

Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx Packet (p/s)	Master Port	Rx Ban.	Tx Ban.	Switch	PoE Out	PoE Prio.	PoE Out ...
R ether1	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	0 none	unlimited	unlimited	swic...			
R ether2	Ethernet	1500	1500	1598	320.7 Mbps	932.4 Mbps	76 134	77 111	916.6 Mbps	916.5 Mbps	75 994	75 990	0 none	unlimited	unlimited	swic...			
R ether3	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	0 none	unlimited	unlimited	swic...			
R ether4	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	0 none	unlimited	unlimited	swic...			
R ether5	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	0 none	unlimited	unlimited	swic...			

# Fast Path & Fast Track



# Fast Path & Fast Track



# Fast Path & Fast Track



# Fast Path & Fast Track

## Fast Path

- Fast Path is a feature of the Linux kernel. RouterOS uses the Linux kernel.
- It interferes directly to the Fast Path Router Interfaces and shortens the packet flow and leads the package directly to the output.
- Implemented MikroTik Fast Path with 6.29.
- **Fast Path requirements;**
  - Interface driver support
  - Must be enabled on the Fast Path Router
  - No special configuration



# Fast Path

## What are Fast Path Supporting Devices?

All products in MicroTik or Interfaceler may not support Fast Path. Products supporting Fast Path;

- CCR, CRS, RB7xx, RB9xx, hEX, hAP, wAP,cAP, mAP, SXT, Metal, Groove, DynaDish, OmniTIK series - all ports
- RB1100 series – ether1-11 (RB 1100x4 ALL port)
- RB6xx series and RB800 - ether1,2
- RB1000, RB3011, RB2011 - all ports
- Tüm Wireless Interfaceleri (6.37)

# Fast Path

## Fast Path Handlers

- Ipv4
- Bridge
- Ipv4 Fast Track

IPv4 Fast Path Active

IPv4 Fast Path Packets: 95 440 144

IPv4 Fast Path Bytes: 133.3 GiB

Bridge Settings

Use IP Firewall

Use IP Firewall For VLAN

Use IP Firewall For PPPoE

Allow Fast Path

Bridge Fast Path Active

Bridge Fast Path Packets: 37 060

Bridge Fast Path Bytes: 26.1 MiB

OK

Cancel

Apply

IPv4 Fasttrack Active

IPv4 Fasttrack Packets: 321979 310 752

IPv4 Fasttrack Bytes: 279200.5 GiB

# Fast Path

## Ipv4 Fast Path

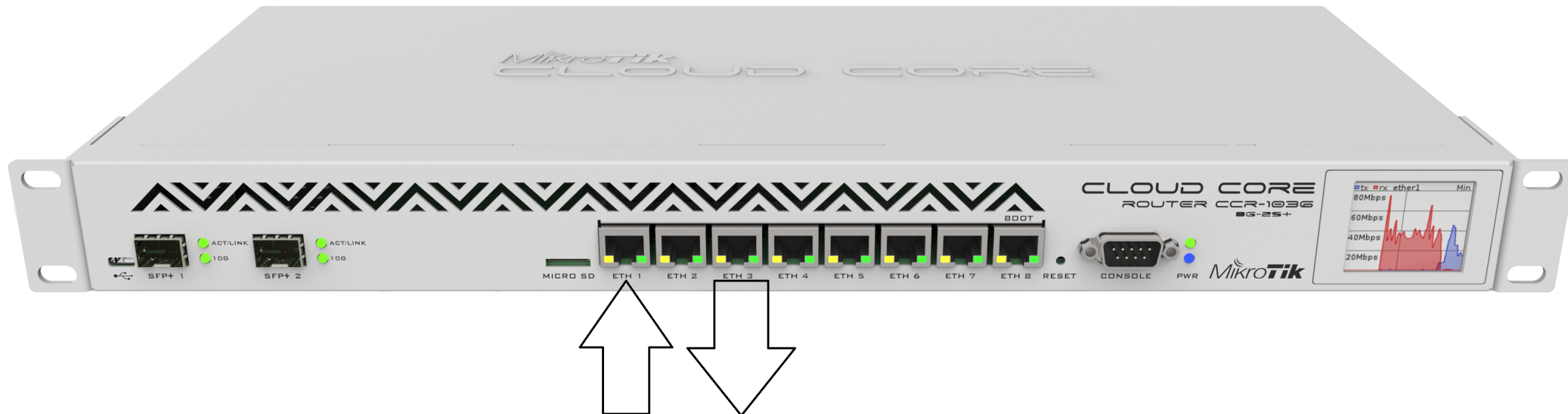
The IPv4 Fast Path runs automatically when the following conditions are met.

- Firewall rules and no address list
- Simple Queue, Queue Trees ve Parent=global not used.
- Mesh, metarouter, sniffer, torch ve Traffic Generator not used.
- Connection Tracking not used.
- (/ip accounting enabled=no);
- VRFs are not set (/ip route vrf is empty);
- Hotspot is not used (/ip hotspot has no interfaces);
- IpSec policies are not configured (ROS v6.8);
- Tool Mac-Scan, ip-scan=no
- Ip Route enabled=yes

	<input checked="" type="checkbox"/> IPv4 Fast Path Active
IPv4 Fast Path Packets:	95 440 144
IPv4 Fast Path Bytes:	133.3 GiB

# Fast Path

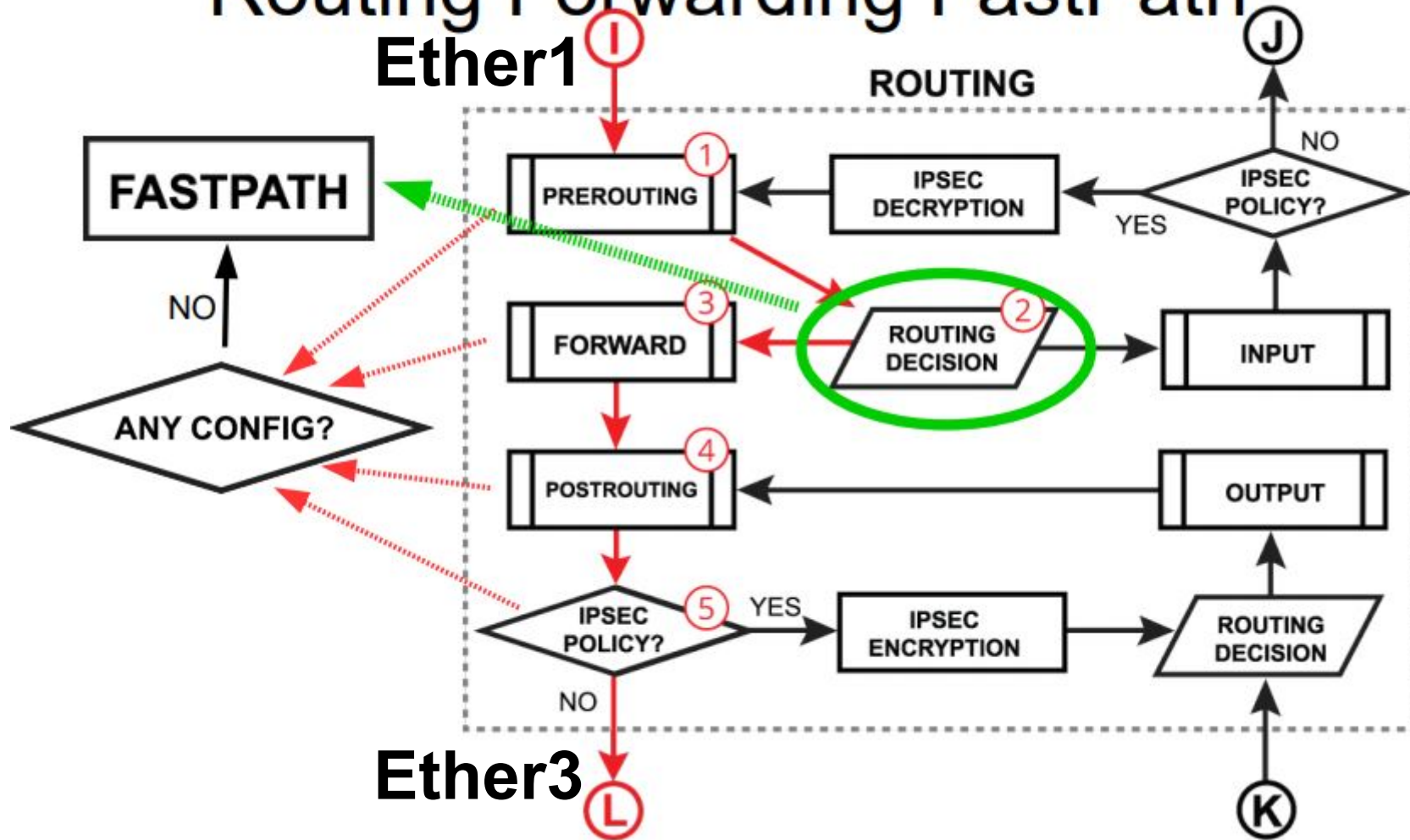
## Ipv4 Fast Path



- The Routera Package will enter through Ether1 and exit through Ether3.
- Ether1 can be considered Internet, Ether3 user (customer).
- When the user starts browsing the web page, what stages does the package go through in the router?

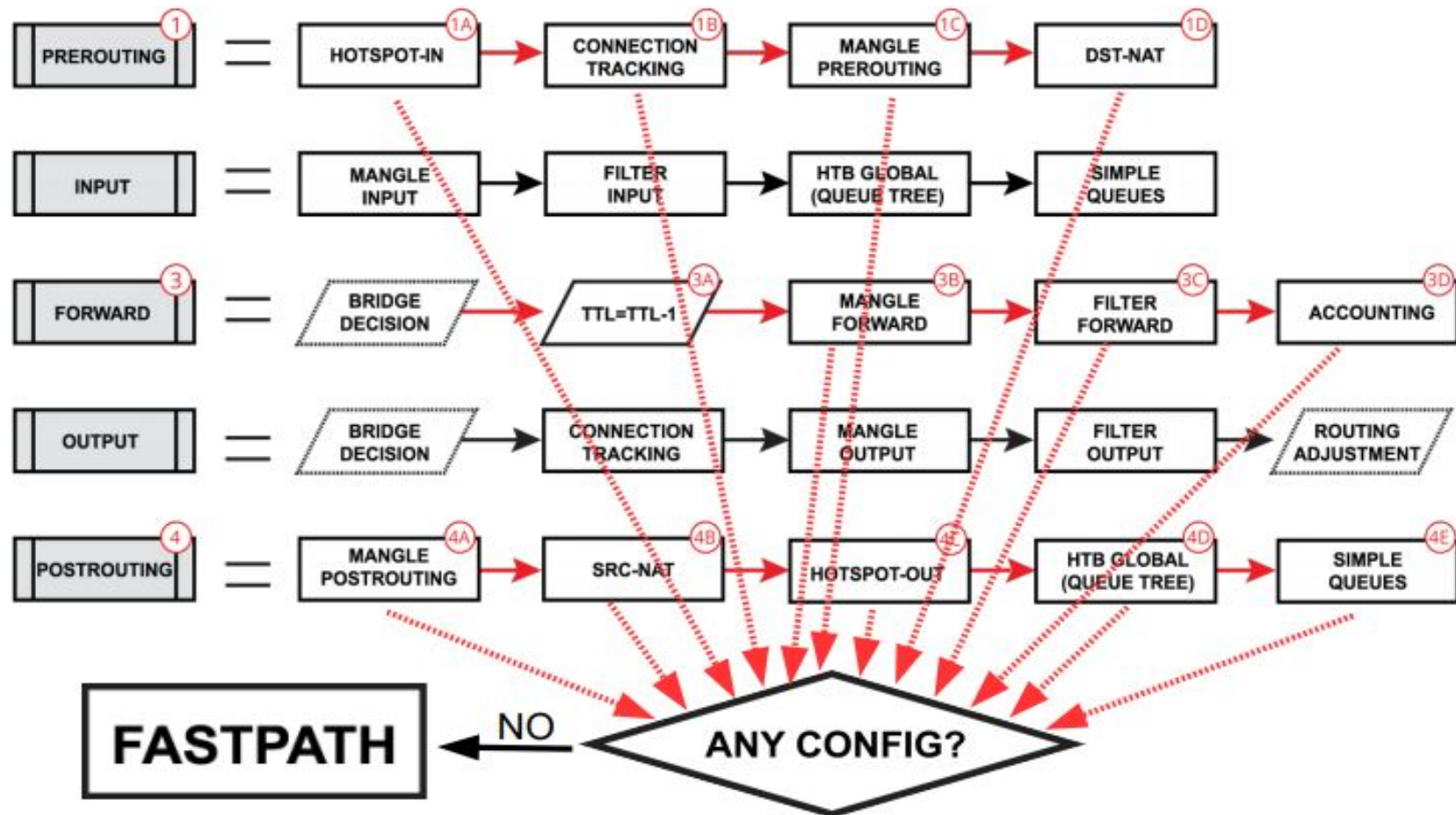
# Fast Path

## Routing Forwarding FastPath



# Fast Path

## Routing Forwarding FastPath



# Fast Path

admin@CC:2D:E0:B6:98:C4 (PPPoEClient-951) via CC:2D:E0:DC:16:C6 - WinBox v6.40.4 on RB951G-2HnD (mipsbe)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:B6:98:C4

49% PU, 49% C

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP MPLS Routing System Queues Files Log Radius Tools New Terminal MetaROUTER Partition Make Spoutout.rif Manual New WinBox Exit

PPP

Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

PPP Scanner PPTP Server SSTP Server L2TP Server OVPN Server PPPoE Scan

Interface	Tx	Rx	Tx Pa...	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx ...	FP Rx Packet (p/s)
R pppoe-out1	911.4 Mbps	911.4 M...	76 673	76 673	911.4 M...	911.4 Mbps	76 673	76 673

Interface <pppoe-out1>

General Dial Out Status Traffic

Tx/Rx Rate: 911.4 Mbps / 911.4 Mbps

Tx/Rx Packet Rate: 76 673 p/s / 76 673 p/s

FP Tx/Rx Rate: 911.4 Mbps / 911.4 Mbps

FP Tx/Rx Packet Rate: 76 673 p/s / 76 673 p/s

Tx/Rx Bytes: 102.9 GiB / 102.9 GiB

Tx/Rx Packets: 74 586 197 / 74 586 106

Tx/Rx Drops: 0 / 0

Tx/Rx Errors: 0 / 0

IP Settings

IP Forward

Send Redirects

Accept Redirects

Secure Redirects

Accept Com...

Allow Fast Path

RP Filter: loose

Max Neighbor Entries: 8192

ARP Timeout: 00:00:30

ICMP Rate Limit: 10

IPv4 Fast Path Active

IPv4 Fast Path:  IPv4 Fast Path Active

IPv4 Fast P: 60 073 965

IPv4 Fasttrack: 83.6 GiB

IPv4 Fasttra: 83.6 GiB

enabled running slave Status: connected

Interface List Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx Packet (p/s)	Master Port	Rx Ban...	Tx Ban...	Switch	PoE Out	PoE Prio...	PoE Out ...
R ether1	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0	0 bps	0 bps	0	0 none	unlimited	unlimited	switch...			
R ether2	Ethernet	1500	1500	1598	903.0 Mbps	902.0 Mbps	74 666	74 596	925.0 Mbps	925.0 Mbps	76 694	76 694	none	unlimited	unlimited	switch...			
R ether3	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	none	unlimited	unlimited	switch...			
R ether4	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	none	unlimited	unlimited	switch...			
R ether5	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	none	unlimited	unlimited	switch...			

CPU Load (%)

cpu0 53

Profile (Running)

Name	CPU	Used
cpu0	53	48
networking	0	16
ethernet	0	16
unclassified	0	14
management	0	2
winbox	0	0
firewall-mgmt	0	0

Quick Start (Running)

Test ID: 11

Stream: [ ]

Port: [ ]

Interface: <pppoe-testuser>

Packet Size: 1500

PPS: [ ]

MBPS: 918

Tx Template: packet-template1

Seq	ID	Tx Packets	Tx Rate	Rx Pack...	Rx Rate	Lost P...	Lost Rate	Lat. Min.	Lat. Avg.	Lat. M...	Jitter
TOT	0	11 015 890	917.9 Mbps	10 972.1	914.3 Mbps	43 702	3.6 Mbps	66.0us	170.us	10.4ms	10.3ms
144	0	76 498	917.9 Mbps	76 333	915.9 Mbps	165	1980.0k				
143	0	76 501	918.0 Mbps	76 194	914.3 Mbps	307	3.6 Mbps				
141	0	76 499	917.9 Mbps	75 777	909.3 Mbps	722	8.6 Mbps	66.3us	180.us	9.07ms	9.00ms
140	0	76 501	918.0 Mbps	76 193	914.3 Mbps	308	3.6 Mbps	66.4us	203.us	4.26ms	4.19ms
139	0	76 498	917.9 Mbps	76 501	918.0 Mbps	-3	36.0 kbps	66.2us	121.us	1.08ms	1.01ms
138	0	76 497	917.9 Mbps	76 054	912.6 Mbps	443	5.3 Mbps	66.1us	218.us	3.94ms	3.88ms
137	0	76 503	918.0 Mbps	76 247	914.9 Mbps	256	3.0 Mbps	66.4us	209.us	3.85ms	3.78ms
136	0	76 499	917.9 Mbps	76 077	912.9 Mbps	422	5.0 Mbps	66.3us	152.us	4.41ms	4.35ms
135	0	76 500	918.0 Mbps	76 301	915.6 Mbps	199	2.3 Mbps	66.5us	193.us	3.86ms	3.79ms
134	0	76 500	918.0 Mbps	76 501	918.0 Mbps	-1	12.0 kbps	66.4us	121.us	1.16ms	1.10ms
133	0	76 498	917.9 Mbps	76 043	912.5 Mbps	455	5.4 Mbps	66.4us	232.us	4.16ms	4.09ms
132	0	76 503	918.0 Mbps	76 307	915.6 Mbps	196	2.3 Mbps	66.4us	140.us	4.26ms	4.20ms
131	0	76 501	918.0 Mbps	75 883	910.5 Mbps	618	7.4 Mbps	66.3us	201.us	8.62ms	8.55ms
130	0	76 497	917.9 Mbps	76 188	914.2 Mbps	309	3.7 Mbps	66.2us	217.us	3.94ms	3.88ms
129	0	76 502	918.0 Mbps	76 351	916.2 Mbps	151	1812.0 k...	66.3us	155.us	3.01ms	2.95ms
128	0	76 500	918.0 Mbps	76 364	916.3 Mbps	136	1632.0 k...	66.4us	149.us	2.85ms	2.78ms
127	0	76 499	917.9 Mbps	76 337	916.0 Mbps	162	1944.0 k...	66.3us	167.us	3.85ms	3.78ms
126	0	76 504	918.0 Mbps	76 195	914.3 Mbps	309	3.7 Mbps	66.4us	182.us	3.95ms	3.88ms

20 Items (1 selected)

## Ipv4 Fast Path & Slow Path Versus

	<u>Lost Rate</u>	<u>Minimum</u>	<u>Average</u>	<u>Maximum</u>	<u>Traffic</u>	<u>CPU</u>
<u>Slow Path</u>	<u>%0.76</u>	<u>69.8us</u>	<u>212.us</u>	<u>19.9ms</u>	<u>Tx 903Mbps</u> <u>Rx 903Mbps</u>	<u>%99</u>
<u>Fast Path</u>	<u>%0.39</u>	<u>66.0us</u>	<u>170.us</u>	<u>10.4ms</u>	<u>TX 911Mbps</u> <u>RX 911Mbps</u>	<u>% 49</u>
<u>Performance</u>	<b><u>%95</u></b>	<b><u>%5</u></b>	<b><u>%25</u></b>	<b><u>%91</u></b>	<b><u>X</u></b>	<b><u>%51</u></b>

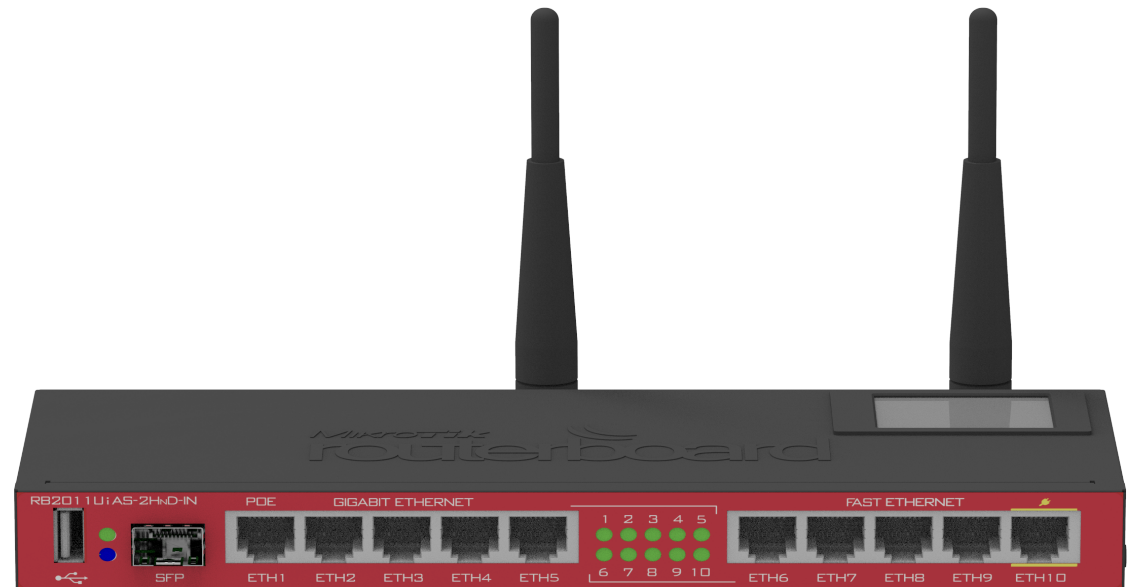


# Fast Path

## RB2011 Capacity & Performance Test(\$129)

Products using the same Chipset as RB2011;

- OmniTIK (L4)
- Omnitik PoE(L5)
- SXT SA5(L4)
- SXT 2(L4)
- SXT Lite5(L3)
- DISC Lite5(L3)
- LDF 5(L3)
- CRS125-24G-1S-2HnD-IN (L5)
- CRS109-8G-1S-2HnD-IN(L5)
- RB2011 (L4)
- RB2011UiAS-2HnD-IN(L5)



Level number	0 (Trial mode)	1 (Free Demo)	3 (WISP CPE)	4 (WISP)	5 (WISP)	6 (Controller)
PPPoE tunnels	24h trial	1	200	200	500	unlimited

# Fast Path

## RB2011 Capacity & Performance Test(\$129)

### Trafik Statistics

Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
94.5us	596.us	16.9ms	16.8ms
94.6us	555.us	11.3ms	11.2ms
96.0us	885.us	13.5ms	13.4ms
94.5us	430.us	10.2ms	10.1ms
94.2us	804.us	18.1ms	18.0ms
94.0us	659.us	10.1ms	9.98ms
95.5us	477.us	19.7ms	19.6ms
95.6us	416.us	10.8ms	10.7ms
97.6us	1.15ms	10.3ms	10.2ms
95.0us	343.us	11.7ms	11.6ms
94.1us	448.us	12.3ms	12.2ms
94.9us	587.us	19.6ms	19.5ms
95.1us	519.us	10.0ms	9.91ms
94.5us	533.us	18.2ms	18.1ms
95.6us	475.us	16.8ms	16.7ms
95.0us	830.us	11.2ms	11.1ms
94.0us	443.us	17.8ms	17.7ms
97.1us	431.us	9.98ms	9.88ms
97.1us	691.us	10.2ms	10.1ms
91.4us	660.us	30.0ms	29.9ms

The screenshot shows the Mikrotik WinBox interface. At the top right, a CPU usage indicator shows 97%. The main window displays the 'PPP' configuration page with a table of PPPoE servers. Below this, the 'Interface List' window is open, showing a table of network interfaces. A terminal window at the bottom right displays the output of the 'interface monitor-traffic aggregate' command, showing traffic statistics for the 'aggregate' interface.

Name	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Pac...	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx Pa...
ether1	1500	1500	1598	0 bps	0 bps	0	0 bps	0 bps	0	0
UPLink-cAP										
ether2	1500	1500	1598	15.0 Mbps	391.0 Mbps	1 272	16.2 Mbps	376.9 Mbps	1 382	
hexpoe										
ether3	1500	1500	1598	314.2 Mbps	81.4 Mbps	26 386	367.0 Mbps	83.7 Mbps	30 889	
ether4	1500	1500	1598	0 bps	0 bps	0	0 bps	0 bps	0	0

Metric	Value
rx-packets-per-second	42
rx-bits-per-second	503.1M
fp-rx-packets-per-second	29
fp-rx-bits-per-second	346.5Mbps
rx-drops-per-second	0
rx-errors-per-second	0
tx-packets-per-second	29 053
tx-bits-per-second	346.2Mbps
fp-tx-packets-per-second	29 286
fp-tx-bits-per-second	346.5Mbps
tx-drops-per-second	0
tx-queue-drops-per-second	0
tx-errors-per-second	0

# Fast Path

## RB2011 Capacity & Performance

Test(\$129)

### Trafik statistics

Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
85.6us	520.us	17.4ms	17.3ms
84.9us	302.us	11.1ms	11.0ms
87.6us	521.us	14.4ms	14.4ms
86.2us	323.us	10.7ms	10.6ms
87.2us	464.us	11.2ms	11.1ms
86.5us	424.us	20.9ms	20.8ms
84.8us	314.us	9.73ms	9.65ms
85.9us	521.us	10.7ms	10.6ms
86.0us	450.us	20.4ms	20.3ms
84.9us	207.us	4.96ms	4.88ms
86.8us	505.us	10.8ms	10.8ms
89.1us	474.us	19.9ms	19.8ms
84.9us	186.us	7.77ms	7.68ms
86.0us	581.us	10.6ms	10.5ms
86.1us	396.us	20.8ms	20.7ms
85.8us	194.us	7.58ms	7.49ms
86.7us	482.us	15.0ms	14.9ms
84.0us	614.us	17.2ms	17.2ms
85.8us	300.us	14.3ms	14.2ms
82.1us	428.us	22.7ms	22.6ms

admin@10.0.0.6 (2) - WinBox v6.43.1 on RB2011UiAS-2HnD (mipsbe)

Session Settings Dashboard

CPU Load 78%

Safe Mode Session: 10.0.0.6

Quick Set Interfaces Bridge PPP Switch Mesh IP Routing System Queues Files Log Radius Tools New Terminal LCD MetaROUTER Partition Make Supout.rtf Manual New WinBox Exit

PPP

Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

PPP Scanner PPTP Server SSTP Server L2TP Server OVPN Server PPPoE Scan

Name	Type	A...	Tx	Rx	Tx Pa...	Rx P...
DR ↔<pppoe... PPPoE Serv...	1...	1655.7 kbps	264.4 kbps	141	23	
DR ↔<pppoe... PPPoE Serv...	1...	1653.6 kbps	211.1 kbps	141	18	
DR ↔<pppoe... PPPoE Serv...	1...	1632.7 kbps	172.4 kbps	139	15	
DR ↔<pppoe... PPPoE Serv...	1...	1632.7 kbps	137.9 kbps	139	12	
DR ↔<pppoe... PPPoE Serv...	1...	1618.4 kbps	129.0 kbps	138	11	
DR ↔<pppoe... PPPoE Serv...	1...	1598.2 kbps	195.4 kbps	136	17	
DR ↔<pppoe... PPPoE Serv...	1...	1598.2 kbps	172.4 kbps	136	15	
DR ↔<pppoe... PPPoE Serv...	1...	1598.2 kbps	114.9 kbps	136	10	
DR ↔<pppoe... PPPoE Serv...	1...	1586.7 kbps	206.9 kbps	135	18	
DR ↔<pppoe... PPPoE Serv...	1...	1567.6 kbps	162.5 kbps	134	14	
DR ↔<pppoe... PPPoE Serv...	1...	1563.7 kbps	206.9 kbps	133	18	
DR ↔<pppoe... PPPoE Serv...	1...	1555.9 kbps	162.5 kbps	133	14	
DR ↔<pppoe... PPPoE Serv...	1...	1552.2 kbps	160.9 kbps	132	14	
DR ↔<pppoe... PPPoE Serv...	1...	103.4 kbps	132	9		

500 items out of 511

Interface List

Interface Interface List Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

Power Cycle

Name	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Pac...	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx Packet (p/s)
UPlink-cAP	1500	1500	1598	0 bps	0 bps	0	0 bps	0 bps	0	0
R ↔<ether2	1500	1500	1598	19.5 Mbps	733.2 Mbps	1 659	19.9 Mbps	729.1 Mbps	1 637	61
R ↔<ether3	1500	1500	1598	697.2 Mbps	81.4 Mbps	58 461	715.8 Mbps	87.5 Mbps	60 168	7
R ↔<ether4	1500	1500	1598	0 bps	0 bps	0	0 bps	0 bps	0	0

11 items out of 511

Send Redirects  Accept Redirects  Secure Redirects  Allow Fast Path  Route Cache  RP Filter: no TCP SynCookies  Max Neighbor Entries: 8192 ARP Timeout: 00:00:30 ICMP Rate Limit: 10 IPv4 Fast Path Active  IPv4 Fast Path Packets: 2969 037 434 IPv4 Fast Path Bytes: 4082.3 GiB

Uptime: 1d 05:43:32 Free Memory: 98.0 MiB Total Memory: 128.0 MiB CPU: MIPS 74Kc V4.12 CPU Count: 1 CPU Frequency: 750 MHz CPU Load: 78% Free HDD Space: 112.8 MiB Total HDD Size: 128.0 MiB Sector Writes Since Reboot: 7 021 Total Sector Writes: 39 789 Bad Blocks: 0.0%

71 907 853.7Mbps

## Ipv4 Fast Path & Slow Path Versus

### MikroTik RB2011

	Minimum	Average	Maximum	Traffic	CPU
Slow Path	91.4us	660.us	30ms	501Mbps	%97
Fast Path	82.us	428.us	22.7ms	853Mbps	%78
	<b>%14</b>	<b>%54</b>	<b>%32</b>	<b>%70</b>	<b>%24</b>

# Fast Path

## Virtual Interface Fast Path

Ethernet, Wireless, Bridge, PPPoE, VLAN, VRRP and Bonding Interface Fast Path uses automatically if it is available to use Fast Path.

## L2TP, EoIP, IPIP, GRE Tunnel Manual Starting Fast Path!

- 1- Use IPsec no
- 2- Allow Fast Path=yes.
- 3- No Packet Fragmentation
- 4- Selected profile should not be encryption.

- Use Encryption -

no  yes  required  default

L2TP Server

Enabled

Max MTU: 1450

Max MRU: 1450

MRRU: [ ]

Keepalive Timeout: 30

Default Profile: L2TP-Profile

Max Sessions: [ ]

Authentication:  mschap2  mschap1  
 chap  pap

Use IPsec: no

IPsec Secret: [ ]

Caller ID Type: ip address

One Session Per Host

Allow Fast Path

OK  
Cancel  
Apply

# Fast Track

## Fast Path + Connection Tracking = Fast Track

- The MikroTik Fast Path and Conntrack's work together gave the name Fast Track.
- Fast Track Fast Path extensions
- Only Ipv4 TCP/UDP (Total Traffic %99)
- FastTrack management is left to network admin
- FastTrack can be used on devices with Fast Path support.
- After the first packet of the connection passing through the router is marked as Fast Track, the other packages of the connection are FastTrack. A single connection can exceed 10,000 packets.

# Fast Track

## Fast Track Performance effects; (What MikroTik said?)

- Firewall CPU Consumer drops 20/1
- Router Performance 5x improve
- FastTrack, Full NAT(SRC ve DSTNAT) support!!!

# Fast Track

Firewall									
Filter Rules NAT Mangle Service Ports Connections Address Lists Layer7 Protocols									
Tracking <span style="float: right;">Find</span>									
	Protocol	Timeout	TCP State	Orig./Repl. Rate	Orig./Repl. Bytes	Orig./Repl. Packets	Orig./Repl. Fasttrack Bytes	Orig./Repl. Fasttrack Packets	
SACFs	6 (tcp)	1d 00:04:02	established	54.4 kbps/1546.4 kbps	141.0 MiB/3662.3 MiB	2 737 217/2 717 ...	141.0 MiB/3662.1 MiB	2 737 213/2 716 883	
SACFd	17 (udp)	00:05:01		1984 bps/34.6 kbps	3107.7 KiB/6.5 MiB	9 070/10 870	3107.1 KiB/6.5 MiB	9 068/10 869	
SACFd	17 (udp)	00:04:33		0 bps/0 bps	2653.7 KiB/3491.0 KiB	6 630/5 828	2653.3 KiB/3490.9 KiB	6 628/5 826	
SACFs	17 (udp)	00:04:51		0 bps/0 bps	445.5 KiB/50.6 KiB	4 842/477	445.0 KiB/50.2 KiB	4 836/474	
SACFd	17 (udp)	00:04:55		0 bps/0 bps	858.6 KiB/3085.5 KiB	4 711/4 608	858.3 KiB/3085.4 KiB	4 709/4 607	
SACFs	17 (udp)	00:05:03		39.7 kbps/3.6 kbps	2856.8 KiB/507.5 KiB	4 566/3 922	2856.3 KiB/507.4 KiB	4 564/3 921	
SACFd	17 (udp)	00:01:52		0 bps/0 bps	1997.0 KiB/2866.6 KiB	4 536/4 754	1996.3 KiB/2866.6 KiB	4 534/4 753	
SACFs	6 (tcp)	1d 00:03:32	established	0 bps/0 bps	922.7 KiB/367.4 KiB	4 406/4 659	920.3 KiB/366.9 KiB	4 399/4 649	
SACFd	17 (udp)	00:01:43		0 bps/0 bps	262.7 KiB/1607.1 KiB	4 260/2 618	262.3 KiB/1607.1 KiB	4 258/2 617	
SACFs	17 (udp)	00:05:02		0 bps/0 bps	518.4 KiB/188.6 KiB	4 254/1 632	517.8 KiB/187.8 KiB	4 248/1 622	
SACFd	17 (udp)	00:05:03		3.1 kbps/39.5 kbps	1066.7 KiB/3245.1 KiB	3 977/5 265	1066.3 KiB/3245.0 KiB	3 975/5 264	
SACFd	6 (tcp)	00:00:00	time wait	0 bps/0 bps	232.7 KiB/2113.2 KiB	3 546/3 540	232.5 KiB/2113.1 KiB	3 541/3 537	
SACFd	17 (udp)	00:02:15		0 bps/0 bps	212.9 KiB/1922.1 KiB	3 154/3 048	212.7 KiB/1921.8 KiB	3 152/3 047	
SACFd	6 (tcp)	1d 23:59:02	established	6.6 kbps/38.0 kbps	217.6 KiB/1869.3 KiB	3 103/4 144	217.5 KiB/1869.3 KiB	3 101/4 143	
SACFs	6 (tcp)	1d 23:59:03	established	37.0 kbps/3.4 kbps	1093.6 KiB/75.3 KiB	2 614/1 111	1093.5 KiB/75.2 KiB	2 611/1 110	
SACFd	S - seen reply, A - assured, C - confirmed, F - fasttrack, d - dstnat				155.3 KiB/1588.4 KiB	2 504/1 973	154.9 KiB/1588.4 KiB	2 502/1 972	
SACFd	17 (udp)	00:04:48		0 bps/0 bps	162.5 KiB/1670.8 KiB	2 483/2 732	162.0 KiB/1670.7 KiB	2 480/2 730	
SACFd	17 (udp)	00:05:00		2.3 kbps/45.6 kbps	153.6 KiB/1617.9 KiB	2 436/2 701	153.3 KiB/1617.8 KiB	2 434/2 700	
SACFd	17 (udp)	00:05:02		992 bps/32.9 kbps	222.0 KiB/1548.0 KiB	2 133/2 608	221.7 KiB/1547.9 KiB	2 131/2 607	
SACFd	17 (udp)	00:03:13		0 bps/0 bps	136.6 KiB/1350.7 KiB	2 063/2 243	136.3 KiB/1350.7 KiB	2 061/2 242	
SACFd	17 (udp)	00:00:31		0 bps/0 bps	134.3 KiB/1451.4 KiB	2 029/2 316	134.0 KiB/1451.3 KiB	2 027/2 315	
SACFd	17 (udp)	00:05:01		3.2 kbps/39.5 kbps	121.1 KiB/1547.2 KiB	1 878/2 379	120.6 KiB/1547.2 KiB	1 876/2 378	
SACFd	17 (udp)	00:05:01		1984 bps/34.3 kbps	119.3 KiB/1259.9 KiB	1 832/2 100	118.7 KiB/1259.8 KiB	1 829/2 098	
SACFs	6 (tcp)	1d 23:59:02	established	34.0 kbps/4.2 kbps	1156.8 KiB/108.4 KiB	1 824/1 777	1156.8 KiB/108.4 KiB	1 822/1 776	
SACFd	6 (tcp)	00:00:00	time wait	0 bps/0 bps	113.1 KiB/1859.6 KiB	1 814/2 089	112.9 KiB/1859.5 KiB	1 810/2 086	

991 items out of 978 (1 selected)

Max Entries: 218032



# Fast Track

## How to enable Fast Track?

#	Action	Chain	Sr...	: D...		Connection State	Bytes	Packets
::: special dummy rule to show fasttrack counters								
0	passthrough	forward					14392.8 GiB	16600 932 859
6	fasttrack connection	forward				established related	191.3 GiB	674 431 993
7	accept	forward				established related	373.0 MiB	1 209 431

```
/ip firewall filter add chain=forward connection-state=established,related action=fasttrack-connection
/ip firewall filter add chain=forward connection-state=established,related action=accept
```

- Fast Track does not work depending on conditions such as Fast path.
- Fast Track automatically fulfills the requirements when you enable Fast Track.

IP Settings

IP Forward

Send Redirects

Accept Redirects

Secure Redirects

Accept Source Route

Allow Fast Path

Route Cache

RP Filter: loose

TCP SynCookies

Max Neighbor Entries: 8192

ARP Timeout: 00:00:30

ICMP Rate Limit: 10

IPv4 Fast Path Active

IPv4 Fast Path Packets: 0

IPv4 Fast Path Bytes: 0 B

IPv4 Fasttrack Active

IPv4 Fasttrack Packets: 15036 808 908

IPv4 Fasttrack Bytes: 13031.8 GiB

OK

Cancel

Apply

# Fast Track (Allow Fast Path =No)

admin@CC:2D:E0:B6:98:C4 (PPPoEClient-951) via CC:2D:E0:DC:16:C6 - WinBox v6.40.4 on RB951G-2HnD (mipsbe)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:B6:98:C4

**Firewall**

Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols

00 Reset Counters 00 Reset All Counters

#	Action	Chain	Proto...	Src. Port	Dst. Port	In. Inter...	Out. Int...	Bytes	Packets
0	special d								
1	fastt...	forward						6.1 GiB	4 397 952
2									
3	acc...	forward						6.1 GiB	4 397 952
4									
5	drop	input						0 B	0
6	drop	forward						0 B	0

7 items (1 selected)

**Interface List**

Interface	Interface List	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRPP	Bonding	LTE
R	br0	Bridge							
R	ether1	Ethernet							
R	ether2	Ethernet							
RS	user-1-PC	Ethernet							
RS	ether3	Ethernet							
RS	user-2-PC	Ethernet							
R	pppoe-out1	PPPoE Client							
R	pppoe-out1	PPPoE Client							
R	wlan1	Wireless (Atheros AR9...							

8 items (1 selected)

**CPU**

CPU	Load (%)
cpu0	100

1 item

**Route List**

Routes	Nexthops	Rules	VRF
DAS	0.0.0.0/0		pppoe-out1 reachable
DAC	100.64.34.1		pppoe-out1 reachable
DAC	192.168.0.0/24		br0 reachable

**Interface (pppoe-out1)**

Secure Redirects

Allow Fast Path

RP Filter: loose

TCP SynCookies

Max Neighbor Entries: 8192

ARP Timeout: 00:00:30

ICMP Rate Limit: 10

IPv4 Fast Path Active

IPv4 Fast Path Packets: 130 886 177

IPv4 Fast Path Bytes: 129.2 GiB

IPv4 Fasttrack Packets: 129.2 GiB

IPv4 Fasttrack Bytes: 129.2 GiB

Link Down Time: Oct/10/2018 19:21:54

Last Link Up Time: Oct/10/2018 19:21:56

Link Downs: 6

Uptime: 02:35:32

Encoding:

MTU: 1500

MRU: 1500

Local Address: 100.64.34.2

Remote Address: 100.64.34.1

Active Links: 1

Service Name:

Device AC Name: MikroTik

MAC Address: CC:2D:E0:1E:10:C9

# Fast Track (Allow Fast Path =Yes)

admin@CC:2D:E0:B6:98:C4 (PPPoEClient-951) via CC:2D:E0:DC:16:C6 - WinBox v6.40.4 on RB951G-2HnD (mipsbe)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:B6:98:C4

**Firewall**

Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols

Reset Counters Reset All Counters

#	Action	Chain	Proto...	Src. Port	Dst. Port	In. Inter...	Out. Int...	Bytes	Packets
::: special dummy rule to show fasttrack counters									
1	pas	fast...	forward					6.1 GiB	4 387 554
2	acr								
3	acr								
4	acr	acc...	forward					6.1 GiB	4 387 554
5	drop	input						0B	0
6	drop	forward						0B	0

7 items (1 selected)

**Interface List**

Interface	Interface List	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
R	br0	Bridge							
R	ether1	Ethernet							
R	ether2	Ethernet							
RS	ether3	Ethernet							
RS	ether4	Ethernet							
RS	ether5	Ethernet							
R	pppoe-out1	PPPoE Client							

**Route List**

Routes	Nexthops	Rules	VRF
DAS	0.0.0.0/0		pppoe-out1 reachable
DAC	100.64.34.1		pppoe-out1 reachable
DAC	192.168.0.0/24		br0 reachable

**CPU**

CPU	Load (%)
cpu0	72

1 item

**Interface: pppoe-out1**

Secure Redirects

**Allow Fast Path**

Filter Rules

RP Filter: loose

TCP SynCookies

Max Neighbor Entries: 8192

ARP Timeout: 00:00:30

ICMP Rate Limit: 10

IPv4 Fast Path Active

IPv4 Fast Path Packets: 61 61

IPv4 Fast Path Bytes: 85.8

IPv4 Fasttrack Active

IPv4 Fasttrack Packets: 124

IPv4 Fasttrack Bytes: 123.1 GiB

Local Address: 100.64.34.2

Link Up Time: Oct/10/2018 19:21:54

Link Down Time: Oct/10/2018 19:21:56

Link Downs: 6

Uptime: 02:30:45

Encoding:

MTU: 1500

MRU: 1500

OK Cancel Apply Disable Comment Copy Remove Torch PPPoE Scan

# Fast Track

## FastTrack off

Seq	ID	Tx Packets	Tx Rate	Rx Pack...	Rx Rate	Lost P...	Lost Rate	Lat. Min.	Lat. Avg.	Lat. M...	Jitter
TOT	0	7 333	999.9 kbps	7 286	993.5 kbps	47	6.4 kbps	92.3us	1.23ms	21.8ms	21.7ms
88	0	83	996.0 kbps	82	984.0 kbps	1	12.0 kbps	95.3us	916.us	8.64ms	8.55ms
87	0	84	1008.0 kbps	83	996.0 kbps	1	12.0 kbps	93.3us	934.us	11.1ms	11.0ms
86	0	83	996.0 kbps	82	984.0 kbps	1	12.0 kbps	98.9us	1.37ms	13.5ms	13.4ms
85	0	83	996.0 kbps	81	972.0 kbps	2	24.0 kbps	92.3us	1.37ms	9.15ms	9.06ms
84	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	102.us	1.24ms	10.2ms	10.1ms
83	0	84	1008.0 kbps	83	996.0 kbps	1	12.0 kbps	109.us	1.21ms	7.38ms	7.27ms
82	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	105.us	1.22ms	10.9ms	10.8ms
81	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	99.1us	1.21ms	9.15ms	9.05ms
80	0	83	996.0 kbps	82	984.0 kbps	1	12.0 kbps	98.5us	1.08ms	9.82ms	9.72ms
79	0	85	1020.0 kbps	84	1008.0 kbps	1	12.0 kbps	95.7us	1.40ms	20.2ms	20.1ms
78	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	99.5us	1.08ms	9.26ms	9.16ms
77	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	100.us	1.38ms	13.5ms	13.4ms
76	0	83	996.0 kbps	82	984.0 kbps	1	12.0 kbps	284.us	1.43ms	11.5ms	11.2ms
75	0	83	996.0 kbps	82	984.0 kbps	1	12.0 kbps	96.0us	1.37ms	12.5ms	12.4ms
74	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	101.us	1.23ms	8.65ms	8.55ms
73	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	300.us	1.47ms	15.0ms	14.7ms
72	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	102.us	1.18ms	9.90ms	9.80ms

20 items

## FastTrack on

Seq	ID	Tx Packets	Tx Rate	Rx Pack...	Rx Rate	Lost P...	Lost Rate	Lat. Min.	Lat. Avg.	Lat. M...	Jitter
TOT	0	2 666	999.7 kbps	2 663	998.6 kbps	3	1125 bps	111.us	921.us	12.8ms	12.7ms
32	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	118.us	761.us	9.45ms	9.33ms
31	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	118.us	876.us	11.3ms	11.1ms
30	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	121.us	1.04ms	11.9ms	11.8ms
29	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	129.us	979.us	12.7ms	12.6ms
28	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	122.us	1.06ms	10.8ms	10.7ms
27	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	116.us	974.us	12.0ms	11.9ms
26	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	118.us	812.us	9.22ms	9.10ms
25	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	146.us	965.us	10.9ms	10.7ms
24	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	114.us	964.us	12.4ms	12.3ms
23	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	114.us	853.us	10.4ms	10.2ms
22	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	112.us	920.us	11.5ms	11.4ms
21	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	111.us	972.us	12.0ms	11.9ms
20	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	121.us	831.us	10.3ms	10.2ms
19	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	117.us	970.us	11.6ms	11.5ms
18	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	116.us	960.us	12.2ms	12.1ms
17	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	115.us	830.us	10.7ms	10.6ms
16	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	116.us	933.us	10.9ms	10.8ms

20 items

# Fast Track

Fast Track Versus;

	<u>Traffic</u>	<u>Lost Rate</u>	<u>Average</u>	<u>Maximum</u>	<u>CPU</u>
<u>Fast Track No</u>	<u>294Mbps</u>	<u>%0.06</u>	<u>1.23ms</u>	<u>21.8</u>	<u>%100</u>
<u>Fast Track Yes</u>	<u>839Mbps</u>	<u>%0.001</u>	<u>921.us</u>	<u>12.8ms</u>	<u>% 72</u>
<u>Performans</u>	<b><u>3X</u></b>	<b><u>60X</u></b>	<b><u>%33</u></b>	<b><u>%70</u></b>	<b><u>%28</u></b>

# Fast Path & Fast Track

ALL Interface Fast Path active  
Ipv4 Fast Track Active  
Firewall Filter and Nat used!

The screenshot displays the Mikrotik WinBox interface with several key components:

- Interface List:** A table showing network interfaces and their statistics. The 'wlan1' interface is highlighted in blue, indicating it is selected.
- FP Tx / FP Rx:** A summary table showing Fast Path transmission and reception rates for various interfaces.
- IP Settings:** A dialog box showing IP configuration options, including 'IP Forward', 'Send Redirects', 'Secure Redirects', 'Accept Source Route', 'Allow Fast Path', and 'Route Cache'. The 'IPV4 Fasttrack Active' checkbox is checked.
- Simple Queue (queue1):** A dialog box showing queue configuration, including 'Target Upload' (7.4 kbps), 'Target Download' (29.2 kbps), and 'Packet Rate' (7 p/s).
- Firewall Filter:** A table showing firewall rules. Rule 8 is highlighted in blue, indicating it is selected.

Interface	FP Tx	FP Rx
ether1	10.0 kbps	23.5 kbps
ether2	9.7 kbps	22.8 kbps
ether3	14.7 kbps	217.7 kbps
ether4	24.4 Mbps	302.4 kbps
ether5	0 bps	0 bps
internet0	341.4 kbps	24.7 Mbps
internet1	0 bps	0 bps
internet2	0 bps	0 bps
internet3	214.0 kbps	24.3 Mbps
internet4	24.4 Mbps	302.4 kbps
internet5	0 bps	0 bps
internet6	0 bps	0 bps

#	Action	Chain	Src. Address	Dst. Address	In. Inter...	Out. Inter...	Bytes	Packets
1	acc...	input					12.9 MiB	27 126
2	drop	input					1160 B	28
3	add...	input					0 B	0
4	drop	input					0 B	0
5	fast...	forward					159.1 MiB	152 141
6	acc...	forward					159.1 MiB	152 141
7	drop	forward					14.5 KiB	300
8	drop	forward					635 B	12

#	Name	Target	Upload Max Limit	Download Max Limit
0	queue1	192.168.0...	555M	555M

# ISP network Planning, Design And Installation

- Capacity Planning
- Productivity
- Performance
- Cost
- Scalability

# ISP network Planning, Design And Installation

Level number	0 (Trial mode)	1 (Free Demo)	3 (WISP CPE)	4 (WISP)	5 (WISP)	6 (Controller)
Price	no key	registration required	volume only	\$45	\$95	\$250
Initial Config Support	-	-	-	15 days	30 days	30 days
Wireless AP	24h trial	-	-	yes	yes	yes
Wireless Client and Bridge	24h trial	-	yes	yes	yes	yes
RIP, OSPF, BGP protocols	24h trial	-	yes(*)	yes	yes	yes
EoIP tunnels	24h trial	1	unlimited	unlimited	unlimited	unlimited
PPPoE tunnels	24h trial	1	200	200	500	unlimited
PPTP tunnels	24h trial	1	200	200	500	unlimited
L2TP tunnels	24h trial	1	200	200	500	unlimited
OVPN tunnels	24h trial	1	200	200	unlimited	unlimited
VLAN interfaces	24h trial	1	unlimited	unlimited	unlimited	unlimited
HotSpot active users	24h trial	1	1	200	500	unlimited
RADIUS client	24h trial	-	yes	yes	yes	yes
Queues	24h trial	1	unlimited	unlimited	unlimited	unlimited
Web proxy	24h trial	-	yes	yes	yes	yes
User manager active sessions	24h trial	1	10	20	50	Unlimited
Number of KVM guests	none	1	Unlimited	Unlimited	Unlimited	Unlimited



# ISP network Planning, Design And Installation

https://mikrotik.com/products/group/ethernet-routers



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## Products

out on port 10, 2x1.4GHz CPU, 1GB RAM, RouterOS L5



### RB4011iGS+RM NEW

Powerful 10xGigabit port router with a Quad-core 1.4Ghz CPU, 1GB RAM, SFP+ 10Gbps cage and desktop case with rack ears



\$199.00

L5



### RB1100AHx4

Powerful 1U rackmount router with 13x Gigabit Ethernet port <p>



\$299.00

L6



### RB1100AHx4 Dude Edition

Powerful 1U rackmount router with 13x Gigabit Ethernet ports, 60GB M.2 drive for Dude database



\$349.00

L6



### CCR1009-7G-1C-PC

7x Gigabit Ethernet, 1x Combo port (SFP or Gigabit Ethernet), 9 cores x 1GHz CPU, 1GB RAM, passive cooling case, RouterOS



\$425.00

L6

# ISP network Planning, Design And Installation

## RB1100x4 Kapasite & Performans Testi

CPU core 4

CPU 1.4 GHz (Overclock 2Ghz)

Routing FastPath 7.35Gbit

RAM 1 GB

License level 6

Ipsec Hardware acceleration 2.2Gbps AES128).

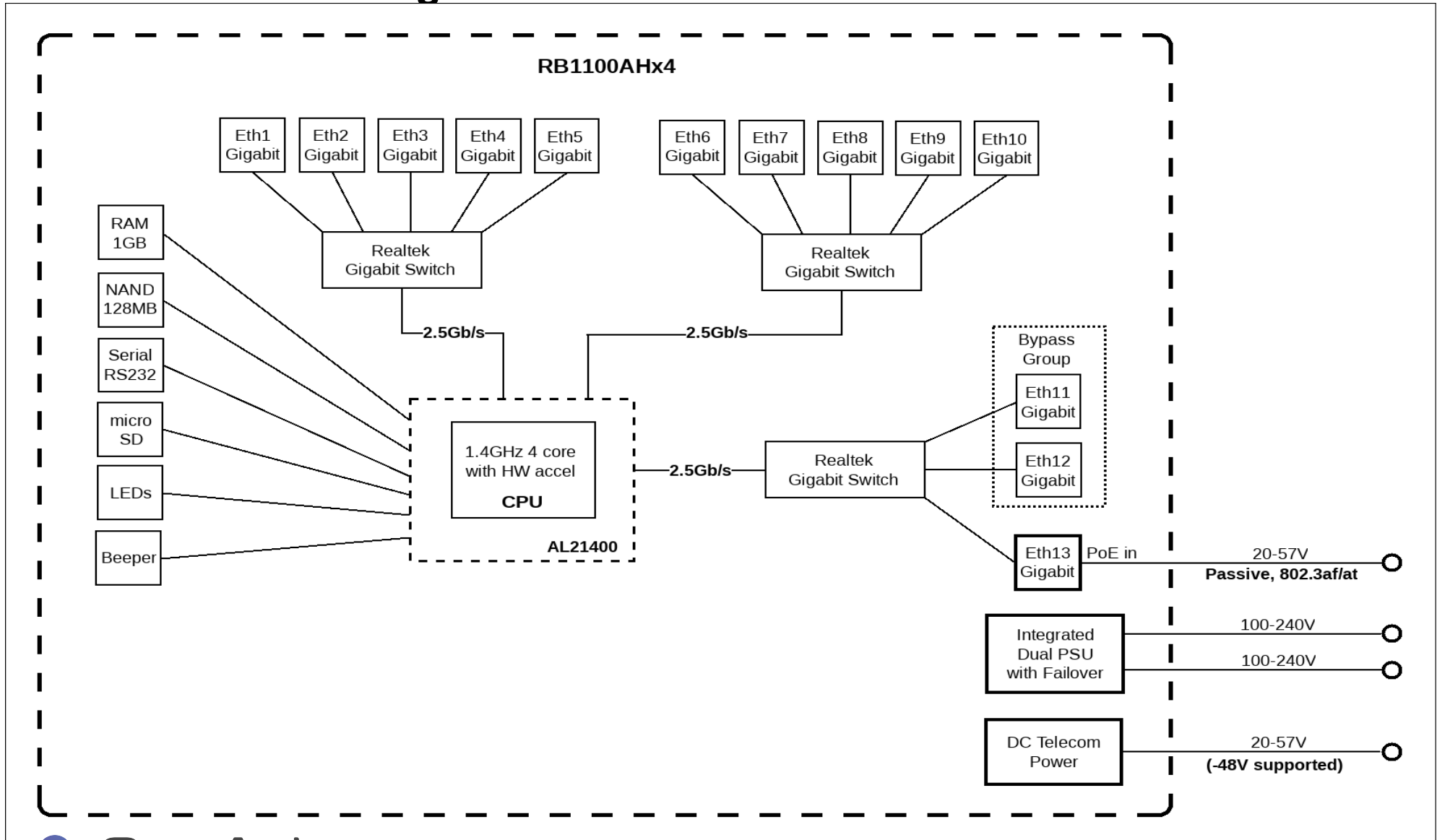
<https://mikrotik.com/product/RB1100Dx4>

\$299



# ISP network Planning, Design And Installation

## RB1100x4 Block Diagram



# ISP network Planning, Design And Installation

admin@CC:2D:E0:DC:16:BC (1100x4) - WinBox v6.40.4 on RB1100AHx4 (arm)

Session Settings Dashboard

CPU: 53%

CPU: 53%

Interface List

Interface	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx
R ether1	Ethernet	1500	1500	1532	109.6 kbps	118.5 kbps	208	202	
R ether2	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	
R ether3	Ethernet	1500	1500	1532	10.1 Mbps	494.9 kbps	876	865	
R ether4	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	
R ether5	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	
R ether6	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	
R ether7	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	
R ether8	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	
R ether9	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	
R ether10	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	
R ether11	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	
R ether12	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	
R ether13	Ethernet	1500	1500	1532	0 bps	0 bps	0	0	

CPU

CPU	Load (%)	IRQ (%)	Disk (%)
cpu0	79	0	0
cpu1	47	1	0
cpu2	46	0	0
cpu3	42	0	0

PPP

Interface	PPPoE Servers	Secrets	Profiles	Active Connections	L2TP Secrets
DR <<<pppoe-1>>	PPPoE Server Binding				
DR <<<pppoe-2>>	PPPoE Server Binding				
DR <<<pppoe-3>>	PPPoE Server Binding				
DR <<<pppoe-4>>	PPPoE Server Binding				
DR <<<pppoe-5>>	PPPoE Server Binding				
DR <<<pppoe-6>>	PPPoE Server Binding				
DR <<<pppoe-7>>	PPPoE Server Binding				
DR <<<pppoe-8>>	PPPoE Server Binding				
DR <<<pppoe-9>>	PPPoE Server Binding				
DR <<<pppoe-10>>	PPPoE Server Binding				
DR <<<pppoe-11>>	PPPoE Server Binding				
DR <<<pppoe-12>>	PPPoE Server Binding				
DR <<<pppoe-13>>	PPPoE Server Binding				
DR <<<pppoe-14>>	PPPoE Server Binding				
DR <<<pppoe-15>>	PPPoE Server Binding				
DR <<<pppoe-16>>	PPPoE Server Binding				
DR <<<pppoe-17>>	PPPoE Server Binding				
DR <<<pppoe-18>>	PPPoE Server Binding				
DR <<<pppoe-19>>	PPPoE Server Binding				
DR <<<pppoe-20>>	PPPoE Server Binding				
DR <<<pppoe-21>>	PPPoE Server Binding				
DR <<<pppoe-22>>	PPPoE Server Binding				
DR <<<pppoe-23>>	PPPoE Server Binding				
DR <<<pppoe-24>>	PPPoE Server Binding				
DR <<<pppoe-25>>	PPPoE Server Binding				
DR <<<pppoe-26>>	PPPoE Server Binding				
DR <<<pppoe-27>>	PPPoE Server Binding				
DR <<<pppoe-28>>	PPPoE Server Binding				
DR <<<pppoe-29>>	PPPoE Server Binding				
DR <<<pppoe-30>>	PPPoE Server Binding				
DR <<<pppoe-31>>	PPPoE Server Binding				
DR <<<pppoe-32>>	PPPoE Server Binding				
DR <<<pppoe-33>>	PPPoE Server Binding				
DR <<<pppoe-34>>	PPPoE Server Binding				
DR <<<pppoe-35>>	PPPoE Server Binding				

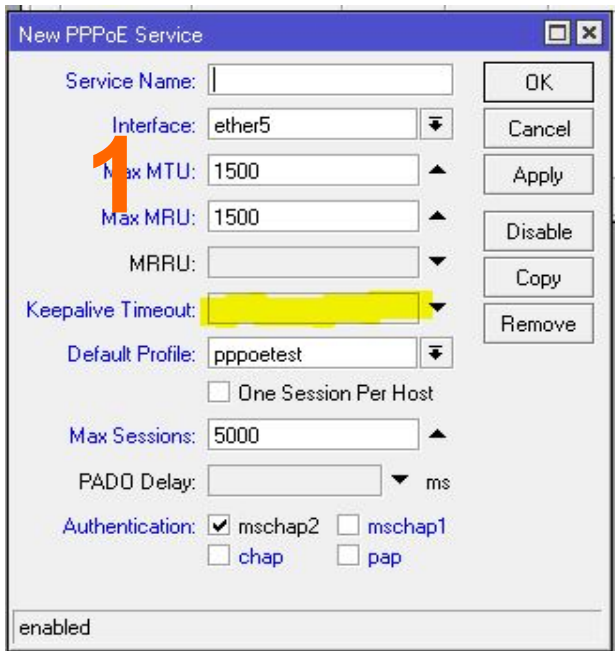
Queue List

#	Name	Target	Upload Max Limit	Download Max Limit	Packet Marks	Total Max Limit (bi...
0 D	<pppoe-...>	<pppoe-57...>	10M	10M		
1 D	<pppoe-...>	<pppoe-51...>	10M	10M		
2 D	<pppoe-...>	<pppoe-16...>	10M	10M		
3 D	<pppoe-...>	<pppoe-51...>	10M	10M		
4 D	<pppoe-...>	<pppoe-76...>	10M	10M		
5 D	<pppoe-...>	<pppoe-25...>	10M	10M		
6 D	<pppoe-...>	<pppoe-25...>	10M	10M		
7 D	<pppoe-...>	<pppoe-56...>	10M	10M		
8 D	<pppoe-...>	<pppoe-41...>	10M	10M		
9 D	<pppoe-...>	<pppoe-13...>	10M	10M		
10 D	<pppoe-...>	<pppoe-19...>	10M	10M		
11 D	<pppoe-...>	<pppoe-40...>	10M	10M		
12 D	<pppoe-...>	<pppoe-46...>	10M	10M		
13 D	<pppoe-...>	<pppoe-18...>	10M	10M		
14 D	<pppoe-...>	<pppoe-43...>	10M	10M		
15 D	<pppoe-...>	<pppoe-25...>	10M	10M		
16 D	<pppoe-...>	<pppoe-23...>	10M	10M		
17 D	<pppoe-...>	<pppoe-25...>	10M	10M		
18 D	<pppoe-...>	<pppoe-35...>	10M	10M		
19 D	<pppoe-...>	<pppoe-56...>	10M	10M		
20 D	<pppoe-...>	<pppoe-14...>	10M	10M		
21 D	<pppoe-...>	<pppoe-91...>	10M	10M		
22 D	<pppoe-...>	<pppoe-21...>	10M	10M		
23 D	<pppoe-...>	<pppoe-23...>	10M	10M		
24 D	<pppoe-...>	<pppoe-36...>	10M	10M		
25 D	<pppoe-...>	<pppoe-47...>	10M	10M		
26 D	<pppoe-...>	<pppoe-57...>	10M	10M		
27 D	<pppoe-...>	<pppoe-53...>	10M	10M		

6144 items out of 6158

# ISP network Planning, Design And Installation

```
interface pppoe-server server add authentication=mschap2 interface=ether5  
keepalive-timeout=disabled max-mtu=1500 max-mru=1500 disabled=no  
default-profile=pppoetest max-sessions=5000
```

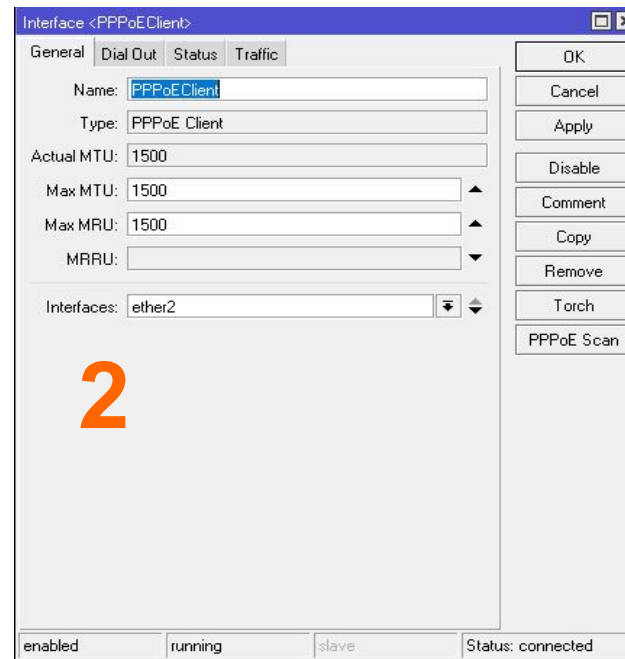


The 'New PPPoE Service' window shows the following configuration:

- Service Name: (empty)
- Interface: ether5
- Max MTU: 1500
- Max MRU: 1500
- MRRU: (empty)
- Keepalive Timeout: disabled (highlighted in yellow)
- Default Profile: pppoetest
- One Session Per Host:
- Max Sessions: 5000
- PADO Delay: (empty) ms
- Authentication:  mschap2,  mschap1,  chap,  pap

Buttons: OK, Cancel, Apply, Disable, Copy, Remove. Status: enabled

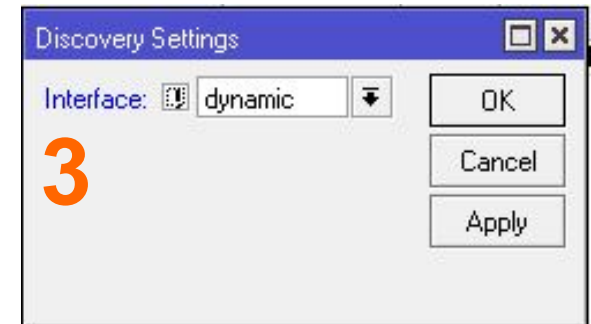
```
/ip neighbor discovery-settings set discover-interface-list=!dynamic
```



The 'Interface <PPPoEClient>' window shows the following configuration:

- Name: PPPoEClient
- Type: PPPoE Client
- Actual MTU: 1500
- Max MTU: 1500
- Max MRU: 1500
- MRRU: (empty)
- Interfaces: ether2

Buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove, Torch, PPPoE Scan. Status: enabled, running, slave, Status: connected



The 'Discovery Settings' window shows the following configuration:

- Interface: dynamic

Buttons: OK, Cancel, Apply. Status: 3

```
/interface pppoe-client add interface=ether2 disabled=no add-default-route=yes default-route-  
distance=1 user=testuser password=testpass max-mtu=1500 max-mru=1500 allow=mschap2  
name=PPPoEClient profile=default
```

# ISP network Planning, Design And Installation

```
/system package uninstall [find]  
/system package unschedule system,ppp,security,routing
```

```
/ip firewall connection tracking set enabled=no
```

Package List

4

Name	Ver...	Build Time	Scheduled
system	6.4...	Apr/23/2018 11:34:28	
security	6.4...	Apr/23/2018 11:34:28	
routing	6.4...	Apr/23/2018 11:34:28	
ppp	6.4...	Apr/23/2018 11:34:28	

5

Connection Tracking

Enabled: no

TCP Syn Sent Timeout: 00:00:04

TCP Syn Received Timeout: 00:00:04

TCP Established Timeout: 00:06:00

TCP Fin Wait Timeout: 00:00:06

TCP Close Wait Timeout: 00:00:06

TCP Last Ack Timeout: 00:00:06

TCP Time Wait: 00:00:06

TCP Close: 00:00:06

TCP Max Retransmit Timeout: 00:01:00

TCP Unacked Timeout: 00:01:00

UDP Timeout: 00:00:05

UDP Stream Timeout: 00:01:00

ICMP Timeout: 00:00:05

Generic Timeout: 00:01:00

6

Interface <PPPoEClient>

General Dial Out Status Traffic

Last Link Down Time:

Last Link Up Time: Oct/08/2018 17:11:10

Link Downs: 0

Uptime: 00:00:35

Encoding:

MTU: 15  MTU: 1500

MRU: 15  MRU: 1500

Local Address: 10

Remote Address: 10

Active Links: 1

Active Service Name:

Active AC Name: 0

AC MAC Address: 6C:3B:6B:F6:A1:CD

enabled running slave Status: connected

# ISP network Planning, Design And Installation

What have we changed for router performance?

- 1- PPPoE Server MTU, MRU and Keep-alive-timeout setting change.
- 2- PPPoE Client için MTU, MRU ve Keep-alive-timeout setting change.
- 3- IP Neighborsh ayarlarını !=Dynamic
- 4- PPPoE Server only requirement packet installing. Any Other packages unistall.
- 5- PPPoE Server Connection Tracking Setting=No .

# ISP network Planning, Design And Installation

## What happened after the router performance changes?

- PPPoE Server FULL MTU Support (1500) Any to Any package No fragmentation!

### Fragmentation packet no Fast path!!!!

- Keep-Alive-Timeout disabled=yes (PPPoE Concentrator Router only Internet Traffic)
- PPPoE Client FULL MTU Support (1500) and Keep-alive-timeout Disabled=yes  
Keep-alive-timeout on the client will improve performance on the server side!
- PPPoE output MNDP packet drop, Only !=Dynamic packet Yes.
- We've removed all the packages we don't need to use resources efficiently on PPPoE Concentrator
- PPPoE Concentrator set ConnTrack=NO No Nat State and other (mangle,Firewal Filter vb disabled=yes)



# ISP network Planning, Design And Installation

admin@CC:2D:E0:DC:16:5F (PPPoE Server) via 159.146.11.28 - WinBox v6.43.2 on RB1100AHx4 (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:DC:16:5F

### PPP

Name	Type	Rx	Tx	FP Rx	FP Tx	FP Rx P
DR **pppoe-1>	PPPoE Server Binding	0 bps	0 bps	0 bps	0 bps	0
DR **pppoe-2>	PPPoE Server Binding	0 bps	0 bps	0 bps	0 bps	0
DR **pppoe-3>	PPPoE Server Binding	0 bps	0 bps	0 bps	0 bps	0
DR **pppoe-4>	PPPoE Server Binding	0 bps	0 bps	0 bps	0 bps	0
DR **pppoe-5>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-6>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-7>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-8>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-9>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-10>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-11>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-12>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-13>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-14>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-15>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-16>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-17>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-18>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-19>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-20>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-21>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-22>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-23>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-24>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-25>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-26>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-27>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-28>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-29>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-30>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-31>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-32>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-33>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-34>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-35>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-36>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-37>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-38>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-39>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-40>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-41>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-42>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-43>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-44>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-45>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-46>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-47>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-48>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-49>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-50>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-51>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-52>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-53>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-54>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0
DR **pppoe-55>	PPPoE Server Binding	1500 bps	0 bps	0 bps	0 bps	0

6144 items out of 6157

### Queue List

#	Name	Target	Upload M...	Download ...	Upload Avg. Rate	Dov
4367	D	<pppoe-4653>	10M	10M		
4368	D	<pppoe-5458>	10M	10M		
4369	D	<pppoe-217>	10M	10M		
4370	D	<pppoe-2587>	10M	10M		
4371	D	<pppoe-4740>	10M	10M		
4372	D	<pppoe-1641>	10M	10M		
4373	D	<pppoe-5940>	10M	10M		
4374	D	<pppoe-2498>	10M	10M		
4375	D	<pppoe-3295>	10M	10M		
4376	D	<pppoe-787>	10M	10M		
4377	D	<pppoe-1906>	10M	10M		
4378	D	<pppoe-5021>	10M	10M		
4379	D	<pppoe-4395>	10M	10M		
4380	D	<pppoe-5401>	10M	10M		
4381	D	<pppoe-717>	10M	10M		
4382	D	<pppoe-3623>	10M	10M		
4383	D	<pppoe-4034>	10M	10M		
4384	D	<pppoe-1773>	10M	10M		
4385	D	<pppoe-2229>	10M	10M		
4386	D	<pppoe-1471>	10M	10M		
4387	D	<pppoe-77>	10M	10M		
4388	D	<pppoe-178>	10M	10M		
4389	D	<pppoe-1976>	10M	10M		
4390	D	<pppoe-5217>	10M	10M		
4391	D	<pppoe-5025>	10M	10M		
4392	D	<pppoe-2635>	10M	10M		
4393	D	<pppoe-5648>	10M	10M		
4394	D	<pppoe-5628>	10M	10M		
4395	D	<pppoe-912>	10M	10M		
4396	D	<pppoe-3950>	10M	10M		
4397	D	<pppoe-4827>	10M	10M		
4398	D	<pppoe-1017>	10M	10M		
4399	D	<pppoe-3937>	10M	10M		
4400	D	<pppoe-5528>	10M	10M		
4401	D	<pppoe-4135>	10M	10M		
4402	D	<pppoe-2571>	10M	10M		
4403	D	<pppoe-4558>	10M	10M		
4404	D	<pppoe-3797>	10M	10M		
4405	D	<pppoe-5384>	10M	10M		
4406	D	<pppoe-1981>	10M	10M		
4407	D	<pppoe-2485>	10M	10M		
4408	D	<pppoe-5491>	10M	10M		
4409	D	<pppoe-3730>	10M	10M		
4410	D	<pppoe-2435>	10M	10M		
4411	D	<pppoe-1766>	10M	10M		
4412	D	<pppoe-3528>	10M	10M		
4413	D	<pppoe-4117>	10M	10M		
4414	D	<pppoe-4552>	10M	10M		
4415	D	<pppoe-2153>	10M	10M		
4416	D	<pppoe-4320>	10M	10M		
4417	D	<pppoe-953>	10M	10M		
4418	D	<pppoe-1049>	10M	10M		
4419	D	<pppoe-2001>	10M	10M		
4420	D	<pppoe-4402>	10M	10M		
4421	D	<pppoe-1610>	10M	10M		

6144 items 0 packets queued

### CPU

CPU	Load (%)	IRQ (%)	Disk (%)
cpu0	7	0	0
cpu1	2	0	0
cpu2	1	0	0
cpu3	1	0	0

4 items

# ISP network Planning, Design And Installation

The screenshot displays the Mikrotik WinBox interface with several windows open:

- PPP Servers:** A table listing 1500 PPPoE server bindings. A tooltip shows 'Actual' values for one entry: Rx 1500 kbps, Tx 0 kbps, FP Rx 0, FP Tx 0.
- Queue List:** A table showing 6144 items in the queue. A tooltip for a selected item shows: CPU 56, L 31, IR 0, D 0.
- Terminal:** Shows the command `interface monitor-traffic aggregate` and its output: `rx-packets-per-second: 166 765`, `rx-bits-per-second: 2.0Gbps`, `fp-rx-packets-per-second: 165 236`, `fp-rx-bits-per-second: 1978.5...`, `tx-packets-per-second: 0`, `tx-errors-per-second: 0`, `tx-drops-per-second: 0`, `tx-queue-drops-per-second: 0`, `tx-errors-per-second: 0`.
- Settings:** A configuration window for IP Forwarding, showing options like 'IP Forward', 'Send Redirects', 'Accept Redirects', 'Secure Redirects', 'Accept Source Route', 'Allow Fast Path', and 'Route Cache'. It also shows 'Max Neighbor Entries: 8192' and 'ICMP Rate Limit: 10'.
- Interface List:** A table showing 13 items out of 6157. The selected interface 'ether2' shows: Name ether2, Type Ethernet, MTU 1500, Act. 1500, L2 MTU 1500, Tx 334.0 Mbps, Rx 353.5 Mbps, Tx Packet (p/s) 27 652, Rx Packet (p/s) 29 375, FP Tx 329.2 Mbps, FP Rx 351.6 Mbps.

# ISP network Planning, Design And Installation

The screenshot displays the Mikrotik WinBox interface for a RouterOS WinBox instance. The main window is the 'PPPoE Servers' configuration table, showing 6144 items selected. The table columns include Name, Type, Actual MTU, L2 MTU, Tx, Rx, Tx Packet (p/s), and Rx Pack. A 'Queue List' window is also open, showing a list of queues with columns for #, Name, Target, Upload Max Limit, Download Max Limit, Upload Avg. R..., Download Avg. R..., and Total M. A terminal window shows the command 'show interface' output, displaying statistics for the interface, including rx-packets-per-second, rx-bits-per-second, tx-packets-per-second, and tx-errors-per-second. A 'CPU' window shows the load percentage for each CPU (cpu0: 97%, cpu1: 92%, cpu2: 96%, cpu3: 93%). A 'Profile (Running)' window shows the CPU usage for various processes, with 'total' at 95.6%, 'queuing' at 59.6%, 'networking' at 23.1%, and 'ethernet' at 7.7%.

Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Pack
DR << <pppoe-5448>	PPPoE Server Binding	1500	1500	10.5 Mbps	50.4 kbps	890	
DR << <pppoe-6051>	PPPoE Server Binding	1500	1500	10.5 Mbps	44.6 kbps	889	
DR << <pppoe-5964>	PPPoE Server Binding	1500	1500	10.5 Mbps	74.1 kbps	889	
DR << <pppoe-6061-1>	PPPoE Server Binding	1500	1500	10.5 Mbps	33.7 kbps	889	
DR << <pppoe-5550>	PPPoE Server Binding	1500	1500	10.5 Mbps	50.4 kbps	889	
DR << <pppoe-6103>	PPPoE Server Binding	1500	1500	10.5 Mbps	59.2 kbps	889	
DR << <pppoe-6027>	PPPoE Server Binding	1500	1500	10.5 Mbps	59.8 kbps	889	
DR << <pppoe-5166>	PPPoE Server Binding	1500	1500	10.5 Mbps	48.8 kbps	887	
DR << <pppoe-5883>	PPPoE Server Binding	1500	1500	10.5 Mbps	59.2 kbps	885	
DR << <pppoe-6126>	PPPoE Server Binding	1500	1500	10.5 Mbps	60.4 kbps	884	
DR << <pppoe-6014>	PPPoE Server Binding	1500	1500	10.5 Mbps	12.0 kbps	884	
DR << <pppoe-5361>	PPPoE Server Binding	1500	1500	10.5 Mbps	24.4 kbps	884	
DR << <pppoe-6094>	PPPoE Server Binding	1500	1500	10.5 Mbps	37.0 kbps	884	
DR << <pppoe-6055>	PPPoE Server Binding	1500	1500	10.5 Mbps	35.9 kbps	883	
DR << <pppoe-5926>	PPPoE Server Binding	1500	1500	10.4 Mbps	33.7 kbps	882	
DR << <pppoe-5870>	PPPoE Server Binding	1500	1500	10.4 Mbps	106.5 kbps	881	
DR << <pppoe-6129>	PPPoE Server Binding	1500	1500	10.4 Mbps	49.4 kbps	881	
DR << <pppoe-5419>	PPPoE Server Binding	1500	1500	10.4 Mbps	95.7 kbps	879	
DR << <pppoe-5336>	PPPoE Server Binding	1500	1500	10.4 Mbps	63.8 kbps	879	
DR << <pppoe-6118>	PPPoE Server Binding	1500	1500	10.4 Mbps	82.9 kbps	878	
DR << <pppoe-5357>	PPPoE Server Binding	1500	1500	10.4 Mbps	47.8 kbps	878	
DR << <pppoe-5700>	PPPoE Server Binding	1500	1500	10.4 Mbps	45.0 kbps	875	
DR << <pppoe-6045>	PPPoE Server Binding	1500	1500	10.4 Mbps	37.0 kbps	875	
DR << <pppoe-6107>	PPPoE Server Binding	1500	1500	10.4 Mbps	35.5 kbps	875	
DR << <pppoe-6089>	PPPoE Server Binding	1500	1500	10.3 Mbps	66.2 kbps	873	
DR << <pppoe-5930>	PPPoE Server Binding	1480	10.3 Mbps	22.5 kbps	1 720		
DR << <pppoe-5276>	PPPoE Server Binding	1500	10.3 Mbps	59.8 kbps	871		
DR << <pppoe-5898>	PPPoE Server Binding	1500	10.3 Mbps	0 bps	870		
DR << <pppoe-5282>	PPPoE Server Binding	1500	10.3 Mbps	27.6 kbps	870		
DR << <pppoe-6037>	PPPoE Server Binding	1500	10.3 Mbps	33.7 kbps	868		
DR << <pppoe-5969>	PPPoE Server Binding	1500	10.3 Mbps	22.5 kbps	868		
DR << <pppoe-5817>	PPPoE Server Binding	1500	10.3 Mbps	120.9 kbps	867		
DR << <pppoe-5735>	PPPoE Server Binding	1500	10.3 Mbps	47.8 kbps	867		
DR << <pppoe-5924>	PPPoE Server Binding	1500	10.2 Mbps	66.9 kbps	864		
DR << <pppoe-5909>	PPPoE Server Binding	1500	10.2 Mbps	55.7 kbps	864		
DR << <pppoe-5988>	PPPoE Server Binding	1500	10.2 Mbps	33.7 kbps	864		
DR << <pppoe-5596>	PPPoE Server Binding	1500	10.2 Mbps	49.4 kbps	863		
DR << <pppoe-6028>	PPPoE Server Binding	1500	10.2 Mbps	59.2 kbps	863		
DR << <pppoe-5859>	PPPoE Server Binding	1500	10.2 Mbps	23.6 kbps	863		
DR << <pppoe-5789>	PPPoE Server Binding	1500	10.2 Mbps	47.8 kbps	863		
DR << <pppoe-5972>	PPPoE Server Binding	1500	10.2 Mbps	35.9 kbps	861		
DR << <pppoe-6067>	PPPoE Server Binding	1500	10.1 Mbps	24.7 kbps	857		
DR << <pppoe-5787>	PPPoE Server Binding	1500	10.1 Mbps	48.3 kbps	857		
DR << <pppoe-5379>	PPPoE Server Binding	1500	10.1 Mbps	66.7 kbps	855		
DR << <pppoe-5691>	PPPoE Server Binding	1500	10.1 Mbps	23.6 kbps	853		
DR << <pppoe-5587>	PPPoE Server Binding	1500	10.1 Mbps	78.8 kbps	852		
DR << <pppoe-5623>	PPPoE Server Binding	1500	10.1 Mbps	41.5 kbps	852		
DR << <pppoe-5677>	PPPoE Server Binding	1500	10.1 Mbps	61.7 kbps	851		
DR << <pppoe-5957>	PPPoE Server Binding	1500	10.1 Mbps	66.9 kbps	850		
DR << <pppoe-5991>	PPPoE Server Binding	1500	10.1 Mbps	78.8 kbps	850		
DR << <pppoe-5807>	PPPoE Server Binding	1500	10.0 Mbps	48.3 kbps	848		
DR << <pppoe-5953>	PPPoE Server Binding	1500	10.0 Mbps	67.5 kbps	846		
DR << <pppoe-5709>	PPPoE Server Binding	1500	10.0 Mbps	47.3 kbps	845		
DR << <pppoe-5933>	PPPoE Server Binding	1500	10.0 Mbps	12.3 kbps	843		
DR << <pppoe-5638>	PPPoE Server Binding	1500	9.9 Mbps	33.4 kbps	839		

```
admin@PPPoEserver] > show interface
Name: eth0
rx-packets-per-second: 375 308
rx-bits-per-second: 4.5Gbps
fp-rx-packets-per-second: 0
fp-rx-bits-per-second: 0
tx-packets-per-second: 0
tx-bits-per-second: 0
tx-errors-per-second: 0
tx-drops-per-second: 0
fp-tx-packets-per-second: 248 873
fp-tx-bits-per-second: 2.9Gbps
tx-tx-packets-per-second: 0
tx-errors-per-second: 0
tx-drops-per-second: 0
```

CPU	Load (%)	I (%)	Disk (%)
cpu0	97	93	0
cpu1	92	86	0
cpu2	96	77	0
cpu3	93	87	0

Name	CPU	Usage
total	95.6	
queuing	59.6	
networking	23.1	
ethernet	7.7	
management	2.3	
winbox	1.1	
unclassified	0.8	
ppp	0.7	
firewall	0.2	
profiling	0.1	
console	0.0	

# ISP network Planning, Design And Installation

admin@100.64.55.223 (PPPoEServer) - WinBox v6.43.2 on CCR1036-12G-4S (tile)

Session Settings Dashboard

Safe Mode Session: 100.64.55.223

PPP

Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

PPP Scanner PPTP Server SSTP Server L2TP Server OVPN Server PPPoE Scan

Name	Type	Actual MTU	L2 MTU	Tx	Rx	T...	Rx...	FP Tx	FP Rx
DR ⇌ <pppoe-2363>	PPPoE Server Binding	1480		1619.8 kbps	5.8 kbps	1...	1...		
DR ⇌ <pppoe-2402>	PPPoE Server Binding	1480		1583.5 kbps	5.9 kbps	1...	1...		
DR ⇌ <pppoe-2228>	PPPoE Server Binding	1480		1553.7 kbps	11.9 kbps	1...	1...		
DR ⇌ <pppoe-1961>	PPPoE Server Binding	1480		1552.2 kbps	11.4 kbps	1...	1...		
DR ⇌ <pppoe-2324>	PPPoE Server Binding	1480		1549.7 kbps	5.9 kbps	1...	1...		
DR ⇌ <pppoe-980>	PPPoE Server Binding	1480		1546.1 kbps	8.7 kbps	1...	1...		
DR ⇌ <pppoe-386>	PPPoE Server Binding	1480		1544.6 kbps	4.0 kbps	1...	1...		
DR ⇌ <pppoe-1670>	PPPoE Server Binding	1480		1544.0 kbps	5.8 kbps	1...	1...		
DR ⇌ <pppoe-1548>	PPPoE Server Binding	1480		1538.9 kbps	5.7 kbps	1...	1...		
DR ⇌ <pppoe-1532>	PPPoE Server Binding	1480		1538.5 kbps	5.8 kbps	1...	1...		
DR ⇌ <pppoe-1928>	PPPoE Server Binding	1480		1538.1 kbps	0 bps	1...	1...		
DR ⇌ <pppoe-1262>	PPPoE Server Binding	1480		1534.9 kbps	11.4 kbps	1...	1...		
DR ⇌ <pppoe-868>	PPPoE Server Binding	1480		1534.3 kbps	4.4 kbps	1...	1...		
DR ⇌ <pppoe-2809>	PPPoE Server Binding	1480		1532.7 kbps	0 bps	1...	1...		
DR ⇌ <pppoe-492>	PPPoE Server Binding	1480		1532.6 kbps	21.1 kbps	1...	2...		
DR ⇌ <pppoe-2525>	PPPoE Server Binding	1480		1531.8 kbps	5.9 kbps	1...	1...		
DR ⇌ <pppoe-1852>	PPPoE Server Binding	1480		1529.2 kbps	5.7 kbps	1...	1...		
DR ⇌ <pppoe-843>	PPPoE Server Binding	1480		1524.6 kbps	11.7 kbps	1...	1...		
DR ⇌ <pppoe-7657>	PPPoE Server Binding	1480		1521.4 kbps	7.9 kbps	1...	1...		
DR ⇌ <pppoe-6172>	PPPoE Server Binding	1480		1520.8 kbps	4.7 kbps	1...	1...		
DR ⇌ <pppoe-1844>	PPPoE Server Binding	1480		1517.7 kbps	5.7 kbps	1...	0...		
DR ⇌ <pppoe-2811>	PPPoE Server Binding	1480		1515.6 kbps	18.0 kbps	1...	2...		
DR ⇌ <pppoe-2280>	PPPoE Server Binding	1480		1513.8 kbps	0 bps	1...	0...		
DR ⇌ <pppoe-2335>	PPPoE Server Binding	1480		1511.3 kbps	6.0 kbps	1...	1...		
DR ⇌ <pppoe-266>	PPPoE Server Binding	1480		1509.5 kbps	11.8 kbps	1...	1...		
DR ⇌ <pppoe-2490>	PPPoE Server Binding	1480		1508.7 kbps	0 bps	1...	0...		
DR ⇌ <pppoe-1342>	PPPoE Server Binding	1480		1507.8 kbps	11.5 kbps	1...	1...		
DR ⇌ <pppoe-2111>	PPPoE Server Binding	1480		1507.8 kbps	5.9 kbps	1...	1...		
DR ⇌ <pppoe-1508>	PPPoE Server Binding	1480		1507.8 kbps	5.7 kbps	1...	0...		
DR ⇌ <pppoe-1613>	PPPoE Server Binding	1480		1507.8 kbps	5.7 kbps	1...	0...		
DR ⇌ <pppoe-1214>	PPPoE Server Binding	1480		1503.7 kbps	11.6 kbps	1...	1...		
DR ⇌ <pppoe-1570>	PPPoE Server Binding	1480		1502.1 kbps	5.7 kbps	1...	0...		
DR ⇌ <pppoe-850>	PPPoE Server Binding	1480		1502.1 kbps	0 bps	1...	0...		
DR ⇌ <pppoe-2370>	PPPoE Server Binding	1480		1501.9 kbps	0 bps	1...	0...		
DR ⇌ <pppoe-602>	PPPoE Server Binding	1480		1499.9 kbps	8.4 kbps	1...	1...		
DR ⇌ <pppoe-5938>	PPPoE Server Binding	1480		1496.8 kbps	9.1 kbps	1...	1...		
DR ⇌ <pppoe-1525>	PPPoE Server Binding	1480		1496.3 kbps	11.5 kbps	1...	1...		
DR ⇌ <pppoe-1452>	PPPoE Server Binding	1480		1496.3 kbps	5.7 kbps	1...	0...		
DR ⇌ <pppoe-1715>	PPPoE Server Binding	1480		1496.3 kbps	0 bps	1...	0...		
DR ⇌ <pppoe-6491>	PPPoE Server Binding	1480		1496.0 kbps	12.4 kbps	1...	1...		

32002 items out of 32019

CPU	Load (...)
cpu9	90
cpu4	59
cpu27	30
cpu22	22
cpu24	15
cpu30	14
cpu35	11
cpu8	7
cpu18	5
cpu33	3
cpu16	3
cpu1	2
cpu25	2
cpu26	2
cpu32	2
cpu34	2
cpu0	1
cpu3	1
cpu6	1
cpu7	1
cpu11	1
cpu12	1
cpu13	1
cpu14	1
cpu17	1
cpu19	1
cpu28	1
cpu2	0
cpu5	0
cpu10	0
cpu15	0
cpu20	0
cpu21	0
cpu23	0
cpu29	0
cpu31	0

9%

Uptime: 05:47:35

Interface	Type	Tx	Rx	Tx Pa...	Rx Pa...	FP Tx	FP Rx
ether1	Ethernet	929.1 Mbps	890.2 Mbps	78 052	75 236	929.1 Mbps	890.2 Mbps
ether2	Ethernet	981.9 Mbps	950.3 Mbps	82 490	80 264	981.9 Mbps	950.3 Mbps
ether3	Ethernet	931.1 Mbps	893.3 Mbps	78 219	75 447	931.1 Mbps	893.3 Mbps
ether4	Ethernet	615.2 Mbps	948.2 Mbps	51 680	80 088	615.2 Mbps	948.2 Mbps
ether5	Ethernet	925.5 Mbps	890.7 Mbps	77 751	75 233	925.5 Mbps	890.7 Mbps
ether6	Ethernet	929.7 Mbps	952.8 Mbps	78 101	80 477	929.7 Mbps	952.8 Mbps
ether7	Ethernet	930.0 Mbps	895.5 Mbps	78 128	75 636	930.0 Mbps	895.5 Mbps
ether8	Ethernet	927.4 Mbps	950.7 Mbps	77 909	80 296	927.4 Mbps	950.7 Mbps
ether9	Ethernet	928.7 Mbps	896.0 Mbps	78 016	75 681	928.7 Mbps	896.0 Mbps
ether10	Ethernet	933.8 Mbps	951.0 Mbps	78 446	80 321	933.8 Mbps	951.0 Mbps
ether11	Ethernet	930.5 Mbps	897.1 Mbps	78 175	75 761	930.5 Mbps	897.1 Mbps
ether12	Ethernet					850	640
fp1	Ethernet					10.0Gbps	850
fp2	Ethernet					10.0Gbps	640
fp3	Ethernet					850	640

tx-packets-per-second: 13 204

tx-drops-per-second: 0

tx-queue-drops-per-second: 0

Resources

Uptime: 05:47:35

Free Memory: 14.7 GiB

Total Memory: 15.9 GiB

CPU: tilegx

CPU Count: 36

CPU Frequency: 1200 MHz

CPU Load: 9%

Free HDD Space: 885.6 MiB

Total HDD Size: 1024.0 MiB

Architecture Name: tile

Board Name: CCR1036-12G-4S

Version: 6.43.2

Build Time: Sep/18/2018 12:12:48

Factory Software: 6.38.5

Route List

Routes Next Hops Rules

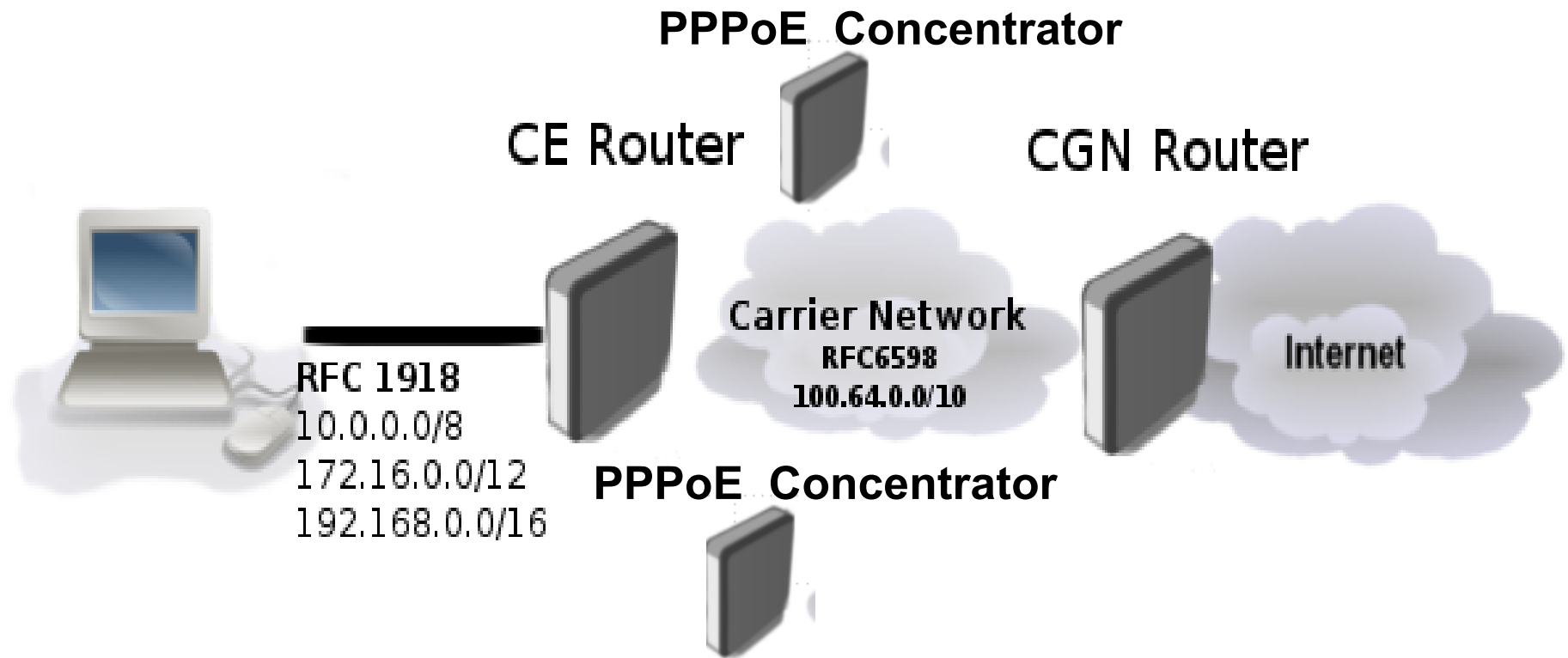
There are too many routes to show them all. Please specify more specific Dst. Address filter.

There are too many routes to show them all. Please specify more specific Dst. Address filter.

0 items

# ISP network Planning, Design And Installation

## Carrier-Grade NAT (CGNAT) or NAT444



# ISP network Planning, Design And Installation

## Carrier-Grade NAT (CGNAT) or NAT444



# ISP network Planning, Design And Installation

## Carrier-Grade NAT (CGNAT) or NAT444

```
[admin@rack1_b18_450] /ip firewall nat> print
Flags: X - disabled, I - invalid, D - dynamic
 0 chain=srcnat action=jump jump-target=xxx src-address=100.64.1.1-100.64.1.6 log=no log-prefix=""

 1 chain=xxx action=jump jump-target=xxx-0 src-address=100.64.1.1-100.64.1.2 log=no log-prefix=""

 2 chain=xxx action=jump jump-target=xxx-1 src-address=100.64.1.3-100.64.1.4 log=no log-prefix=""

 3 chain=xxx action=jump jump-target=xxx-2 src-address=100.64.1.5-100.64.1.6 log=no log-prefix=""

 4 chain=xxx-0 action=src-nat to-addresses=2.2.2.2 to-ports=2000-2099 protocol=tcp src-address=100.64.1.1 log=no log-prefix=""

 5 chain=xxx-0 action=src-nat to-addresses=2.2.2.2 to-ports=2000-2099 protocol=udp src-address=100.64.1.1 log=no log-prefix=""

 6 chain=xxx-0 action=src-nat to-addresses=2.2.2.2 to-ports=2100-2199 protocol=tcp src-address=100.64.1.2 log=no log-prefix=""

 7 chain=xxx-0 action=src-nat to-addresses=2.2.2.2 to-ports=2100-2199 protocol=udp src-address=100.64.1.2 log=no log-prefix=""

 8 chain=xxx-1 action=src-nat to-addresses=2.2.2.2 to-ports=2200-2299 protocol=tcp src-address=100.64.1.3 log=no log-prefix=""

 9 chain=xxx-1 action=src-nat to-addresses=2.2.2.2 to-ports=2200-2299 protocol=udp src-address=100.64.1.3 log=no log-prefix=""

10 chain=xxx-1 action=src-nat to-addresses=2.2.2.2 to-ports=2300-2399 protocol=tcp src-address=100.64.1.4 log=no log-prefix=""

11 chain=xxx-1 action=src-nat to-addresses=2.2.2.2 to-ports=2300-2399 protocol=udp src-address=100.64.1.4 log=no log-prefix=""

12 chain=xxx-2 action=src-nat to-addresses=2.2.2.2 to-ports=2400-2499 protocol=tcp src-address=100.64.1.5 log=no log-prefix=""

13 chain=xxx-2 action=src-nat to-addresses=2.2.2.2 to-ports=2400-2499 protocol=udp src-address=100.64.1.5 log=no log-prefix=""

14 chain=xxx-2 action=src-nat to-addresses=2.2.2.2 to-ports=2500-2599 protocol=tcp src-address=100.64.1.6 log=no log-prefix=""

15 chain=xxx-2 action=src-nat to-addresses=2.2.2.2 to-ports=2500-2599 protocol=udp src-address=100.64.1.6 log=no log-prefix=""
```

# ISP network Planning, Design And Installation

## Carrier-Grade NAT (CGNAT) or NAT444

Firewall

Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols

+ - ✓ ✕ [icon] [icon] 00 Reset Counters 00 Reset All Counters

#	Action	C...	Src. Ad...	Ds...	Proto...	Src. Port	Dst. Port	Out. Int...	Byt...	Packets
8...	cgnat	-  >	src-...	1...	100.64...	1 (ic...		internet	0 B	0
8...	cgnat	-  >	src-...	1...	100.64...	6 (tcp)		internet	8...	137
8...	cgnat	-  >	src-...	1...	100.64...	17 (u...		internet	33...	274
8...	cgnat	-  >	src-...	1...	100.64...	1 (ic...		internet	0 B	0
8...	cgnat	-  >	src-...	1...	100.64...	6 (tcp)		internet	23...	218
8...	cgnat	-  >	src-...	1...	100.64...	17 (u...		internet	15...	117
8...	cgnat	-  >	src-...	1...	100.64...	1 (ic...		internet	0 B	0
8...	cgnat	-  >	src-...	1...	100.64...	6 (tcp)		internet	18...	3 008
8...	cgnat	-  >	src-...	1...	100.64...	17 (u...		internet	28...	3 344
8...	cgnat	-  >	src-...	1...	100.64...	1 (ic...		internet	0 B	0
8...	cgnat	-  >	src-...	1...	100.64...	6 (tcp)		internet	38...	493
8...	cgnat	-  >	src-...	1...	100.64...	17 (u...		internet	10...	337
8...	cgnat	-  >	src-...	1...	100.64...	1 (ic...		internet	0 B	0
8...	cgnat	-  >	src-...	1...	100.64...	6 (tcp)		internet	52...	579
8...	cgnat	-  >	src-...	1...	100.64...	17 (u...		internet	46...	573
8...	cgnat	-  >	src-...	1...	100.64...	1 (ic...		internet	0 B	0
8...	cgnat	-  >	src-...	1...	100.64...	6 (tcp)		internet	24...	323

31836 items



# ISP network Planning, Design And Installation

## Carrier-Grade NAT (CGNAT) or NAT444

CR1072-1G-8S+ (tile)

Session Settings Dashboard

Safe Mode Session: 95.0.60.193 CPU: 3%

Quick Set CAPSMAN Interfaces Wireless Bridge PPP Mesh IP MPLS Routing System Queues Files Log Radius Tools New Terminal LCD Partition Make Supout.tif Manual New WinBox Exit

Firewall

Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols

Reset Counters Reset All Counters Find all

#	Action	C...	Src. Ad...	Ds...	Proto...	Src. Port	Dst. Port	I/Out. Int...	Byt...	Packets
8...	cgnat	-	100.64...	1	(ic...			internet	0 B	0
8...	cgnat	-	100.64...	6	(tcp)			internet	8...	137
8...	cgnat	-	100.64...	17	(u...			internet	33...	274
8...	cgnat	-	100.64...	1	(ic...			internet	0 B	0
8...	cgnat	-	100.64...	6	(tcp)			internet	23...	218
8...	cgnat	-	100.64...	17	(u...			internet	15...	117
8...	cgnat	-	100.64...	1	(ic...			internet	0 B	0

Interface List

Interface Interface List Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

Power Cycle Find

Interface	Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx Packet (p/s)	PoE Out	PoE Volt...	Pol
R	ether1	Ethernet	1500	1500	1600		0 bps	0	0	0 bps	0	0	0			
R	sfp-sfpplus1	Ethernet	1500	1500	1580	165.3 Mbps	1414.9 Mbps	82 677	140 993	165.3 Mbps	1414.9 Mbps	82 677	140 993			
R	sfp-sfpplus2	Ethernet	1500	1500	1580	669.0 Mbps	44.0 Mbps	66 412	28 841	669.0 Mbps	44.0 Mbps	66 412	28 841			
R	sfp-sfpplus3	Ethernet	1500	1500	1580	743.3 Mbps	57.3 Mbps	75 358	48 221	743.3 Mbps	57.3 Mbps	75 358	48 221			
S	sfp-sfpplus4	Ethernet	1500	1500	1580	0 bps	0 bps	0	0	0 bps	0 bps	0	0			
S	sfp-sfpplus5	Ethernet	1500	1500	1580	0 bps	0 bps	0	0	0 bps	0 bps	0	0			
RS	sfp-sfpplus6	Ethernet	1500	1500	1580	3.6 Mbps	64.1 Mbps	2 871	11 921	3.6 Mbps	64.1 Mbps	2 871	11 921			
S	sfp-sfpplus7	Ethernet	1500	1500	1580	0 bps	0 bps	0	0	0 bps	0 bps	0	0			
S	sfp-sfpplus8	Ethernet	1500	1500	1580	0 bps	0 bps	0	0	0 bps	0 bps	0	0			

9 items out of 17

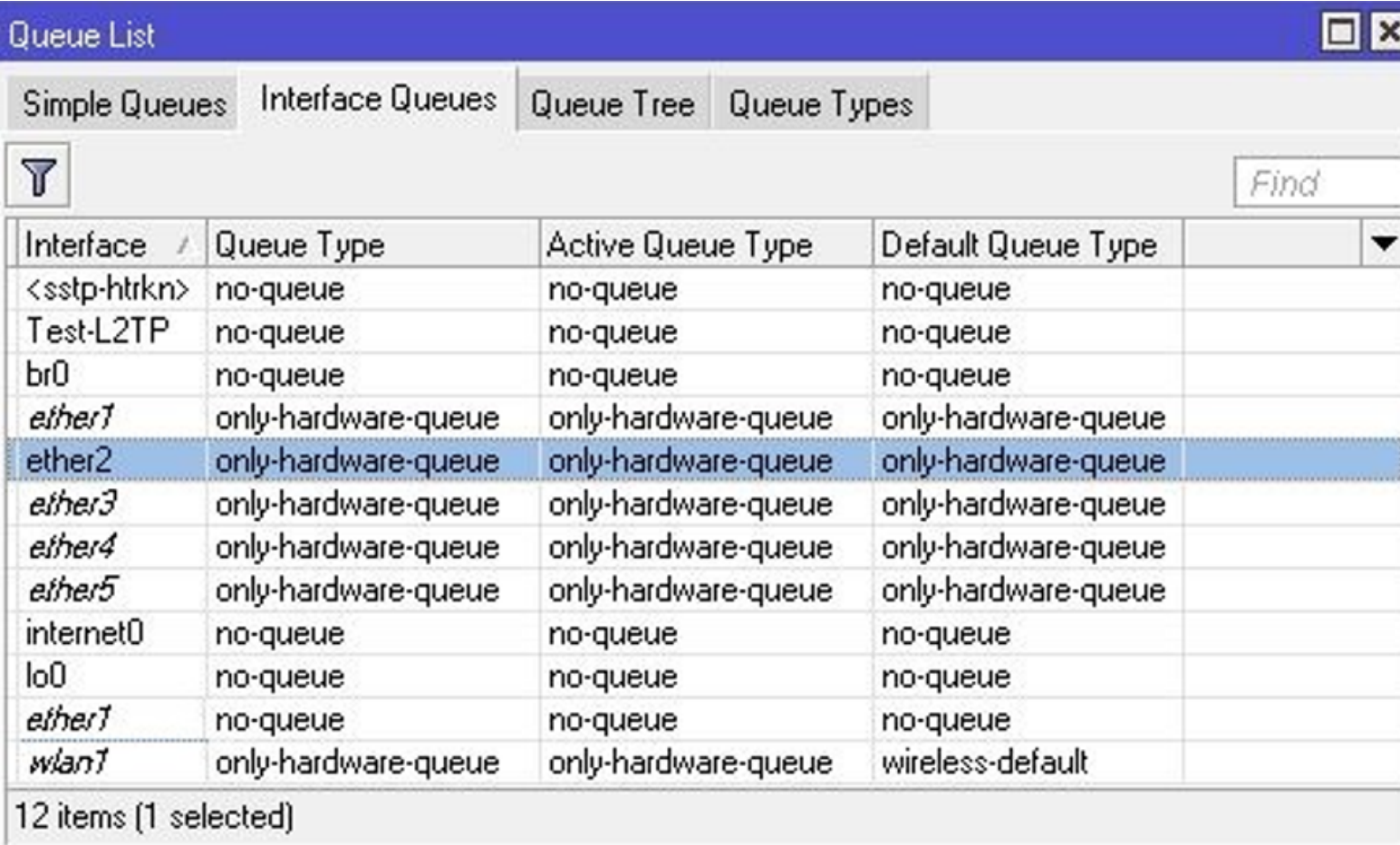
# Type and tricks

- network MTU MRU planning and package to prevent fragmentation
- Overall Performance Using Fast Path and Fast Track Increased Average 4X
- Large gain in delay times and packet losses
- Internet Traffic Only on Routers
- User peer Gigabit rate!
- FULL MTU Support and Overcoming MTU-related problems
- Change MSS is using on PPPoE Server! We may no longer need Change MSS.

# Fast Path

## Guarantee Interface Fast Path

Warranty fast path for Interface Queue Queue Type = "Only-hardware-queue" .



Interface	Queue Type	Active Queue Type	Default Queue Type	
<ssstp-htrkn>	no-queue	no-queue	no-queue	
Test-L2TP	no-queue	no-queue	no-queue	
br0	no-queue	no-queue	no-queue	
<i>ether1</i>	only-hardware-queue	only-hardware-queue	only-hardware-queue	
<b>ether2</b>	<b>only-hardware-queue</b>	<b>only-hardware-queue</b>	<b>only-hardware-queue</b>	
<i>ether3</i>	only-hardware-queue	only-hardware-queue	only-hardware-queue	
<i>ether4</i>	only-hardware-queue	only-hardware-queue	only-hardware-queue	
<i>ether5</i>	only-hardware-queue	only-hardware-queue	only-hardware-queue	
internet0	no-queue	no-queue	no-queue	
lo0	no-queue	no-queue	no-queue	
<i>ether1</i>	no-queue	no-queue	no-queue	
<i>wlan1</i>	only-hardware-queue	only-hardware-queue	wireless-default	

12 items (1 selected)

# Question & answer

## Resources;

### **FastPath Overview (MuM Europe, 2016)**

[https://mum.mikrotik.com/presentations/EU16/presentation\\_2901\\_1456413105.pdf](https://mum.mikrotik.com/presentations/EU16/presentation_2901_1456413105.pdf)

### **FastPath Overview (MuM Ukraine, 2015)**

[https://mum.mikrotik.com/presentations/UA15/presentation\\_3077\\_1449654925.pdf](https://mum.mikrotik.com/presentations/UA15/presentation_3077_1449654925.pdf)

### **Linux Forwarding Stack Fastpath**

[https://netdevconf.org/1.2/slides/oct7/03\\_Linux\\_Forwarding\\_Stack\\_Fastpath.pdf](https://netdevconf.org/1.2/slides/oct7/03_Linux_Forwarding_Stack_Fastpath.pdf)

### **Open FastPath**

[https://openfastpath.org/wp-content/uploads/2018/01/OpenFastPath\\_Overview.pdf](https://openfastpath.org/wp-content/uploads/2018/01/OpenFastPath_Overview.pdf)

### **MikroTik Wiki Fast Path**

[https://wiki.mikrotik.com/wiki/Manual:Fast\\_Path](https://wiki.mikrotik.com/wiki/Manual:Fast_Path)

### **MikroTik wiki Fast Track**

<https://wiki.mikrotik.com/wiki/Manual:IP/Fasttrack>

### **MikroTik Newsletter #65**

[https://download2.mikrotik.com/news/news\\_65.pdf](https://download2.mikrotik.com/news/news_65.pdf)

### **Most underused MikroTik hardware and software features OR “The path between fastpath and advanced features”**

[https://mum.mikrotik.com/presentations/MX18/presentation\\_5286\\_1524556369.pdf](https://mum.mikrotik.com/presentations/MX18/presentation_5286_1524556369.pdf)

### **Janis-Megis New Product !**

[http://www.mikrotik.co.id/download/MOS-ID-2015/Introduction\\_Janis-Megis.pdf](http://www.mikrotik.co.id/download/MOS-ID-2015/Introduction_Janis-Megis.pdf)

### **Wiki MikroTik Scripting**

<https://wiki.mikrotik.com/wiki/Manual:Scripting>

### **Interframe spacing**

[https://en.wikipedia.org/wiki/Interpacket\\_gap](https://en.wikipedia.org/wiki/Interpacket_gap)

<https://www.embedded.com/design/operating-systems/4403058/Accelerating-network-packet-processing-in-Linux>

<https://www.embedded.com/design/programming-languages-and-tools/4425631/Using-fastpath-software-to-boost-performance-of-Linux-based-home-network-routers>

<http://netsecinfo.blogspot.com/2010/03/linux-based-fast-path-why-is-this.html>

<https://slideplayer.com/slide/9469203/>

[support@mikrotik.com](mailto:support@mikrotik.com)