

Fast Path, Fast Track and ISP Network Design



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İstanbul, Turkey- 2018

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MikroTik Türkiye

@mikrotikturkiye

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/wap_lte_kit... Devamını Gör



Beğen

Yorum Yap

Nihat Karabulut · Sinan Doğu · MikroTik Türkiye ve 5 diğer kişi bunu beğendi

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

1.5K views • 1 year ago



2:27

Mac Telnet ile PPPoE Client Tanımlama

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 μ s for 10 Mbit/s Ethernet

0.96 μ 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 μ s mikrosaniye

Interframe Spacing



Interframe Spacing

Interface Rate = 10Mbps

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 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

20 items

Interface <ether2>

Overall Stats Rx Stats Tx Stats Status Traffic

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
63	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	320.us
62	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	308.us
61	0	85	1020.0 kbps	85	1020.0 kbps	0	0 bps	291.us	296.us	413.us
60	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	306.us
59	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	318.us
58	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	325.us
57	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	291.us	295.us	313.us
56	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	306.us
55	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	326.us
54	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	306.us
53	0	84	1008.0 kbps	84	1008.0 kbps	0	0 bps	291.us	294.us	307.us
52	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	306.us
51	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	314.us
50	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	294.us	307.us
49	0	85	1020.0 kbps	85	1020.0 kbps	0	0 bps	291.us	296.us	412.us
48	0	83	996.0 kbps	83	996.0 kbps	0	0 bps	291.us	295.us	323.us

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: 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	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:

Oct/10/2018 19:1

Last Link Up Time:

Oct/10/2018 19:1

Link Downs:

7

Auto Negotiation:

done

Rate:

1Gt 1Gbps

☒ Full Duplex

Advertising:

10M full

100M full

1000M full

Link Partner Advertising:

10M half

10M full

100M half

packet_gap

Interframe Spacing

Interface Rate = 10Gbps

Quick Start (Running)

Test ID: Start

Stream: Stop

Port: Close

Interface: New Window

Packet Size:

PPS:

MBPS:

Tx Template:

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				
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)

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 μ s

Fast Path

Slow Path



Slow Path



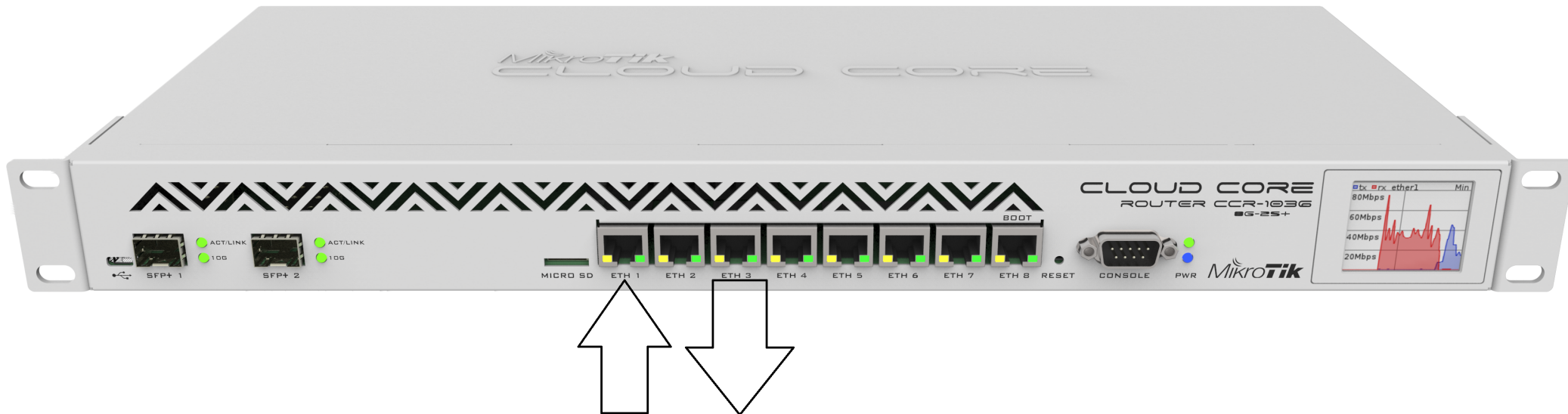
Slow Path



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.

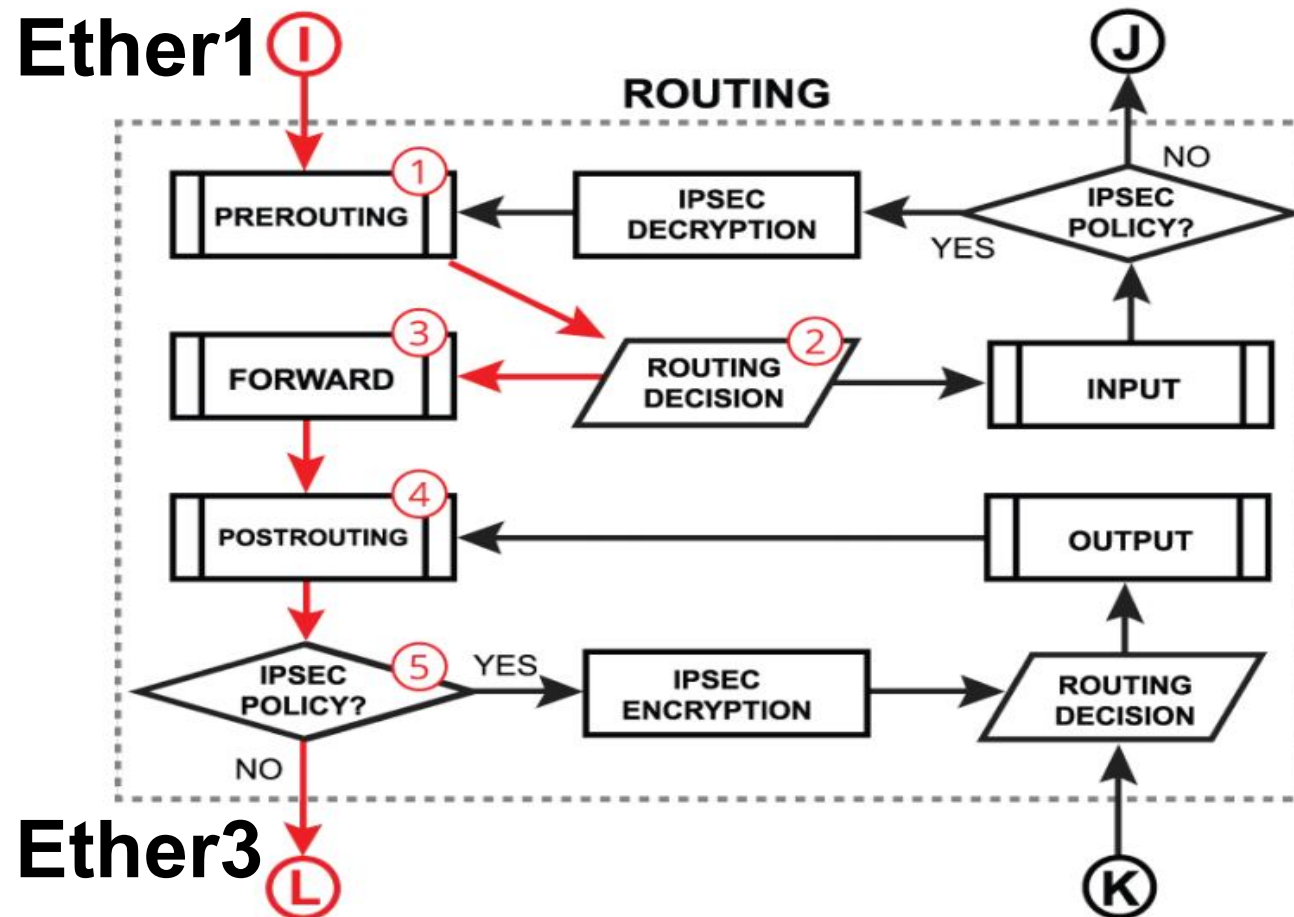
Slow Path



- 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?

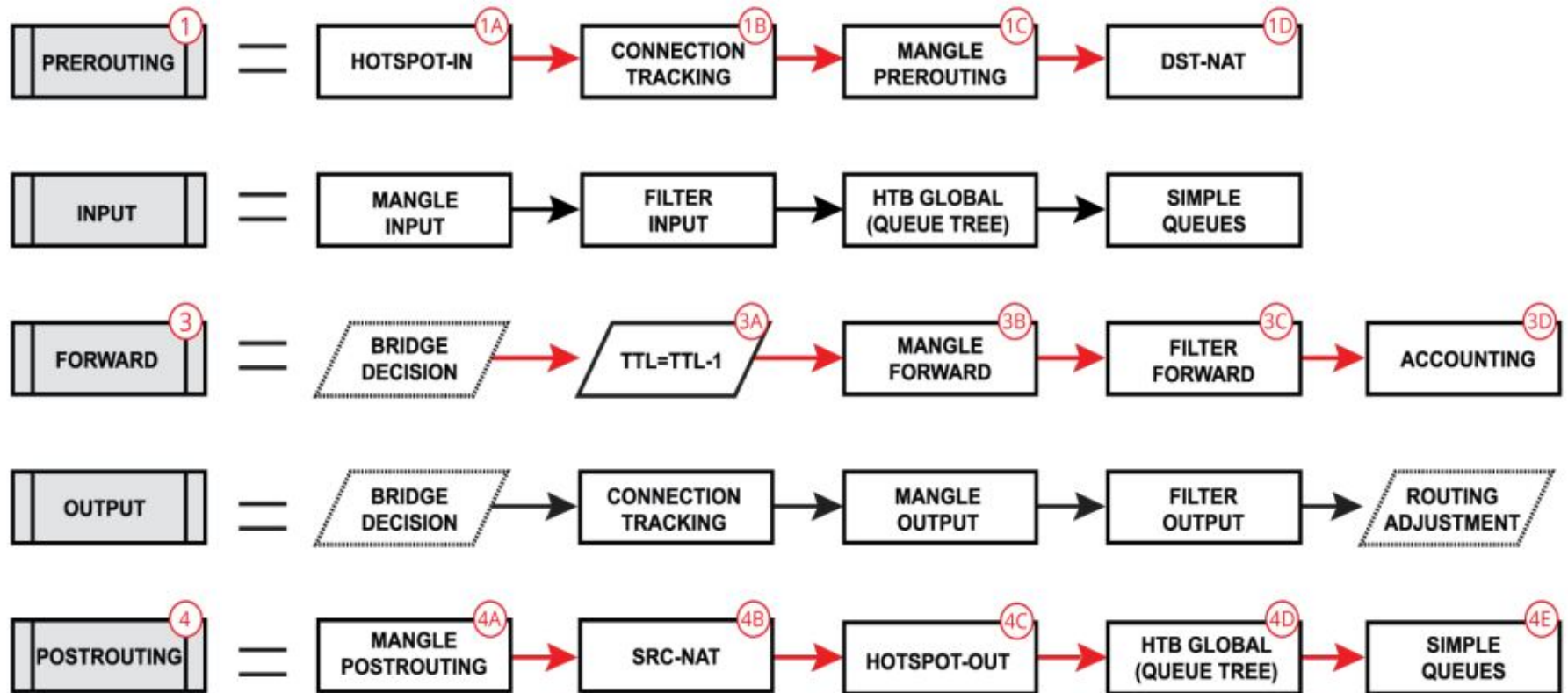
Slow Path

Routing Forwarding

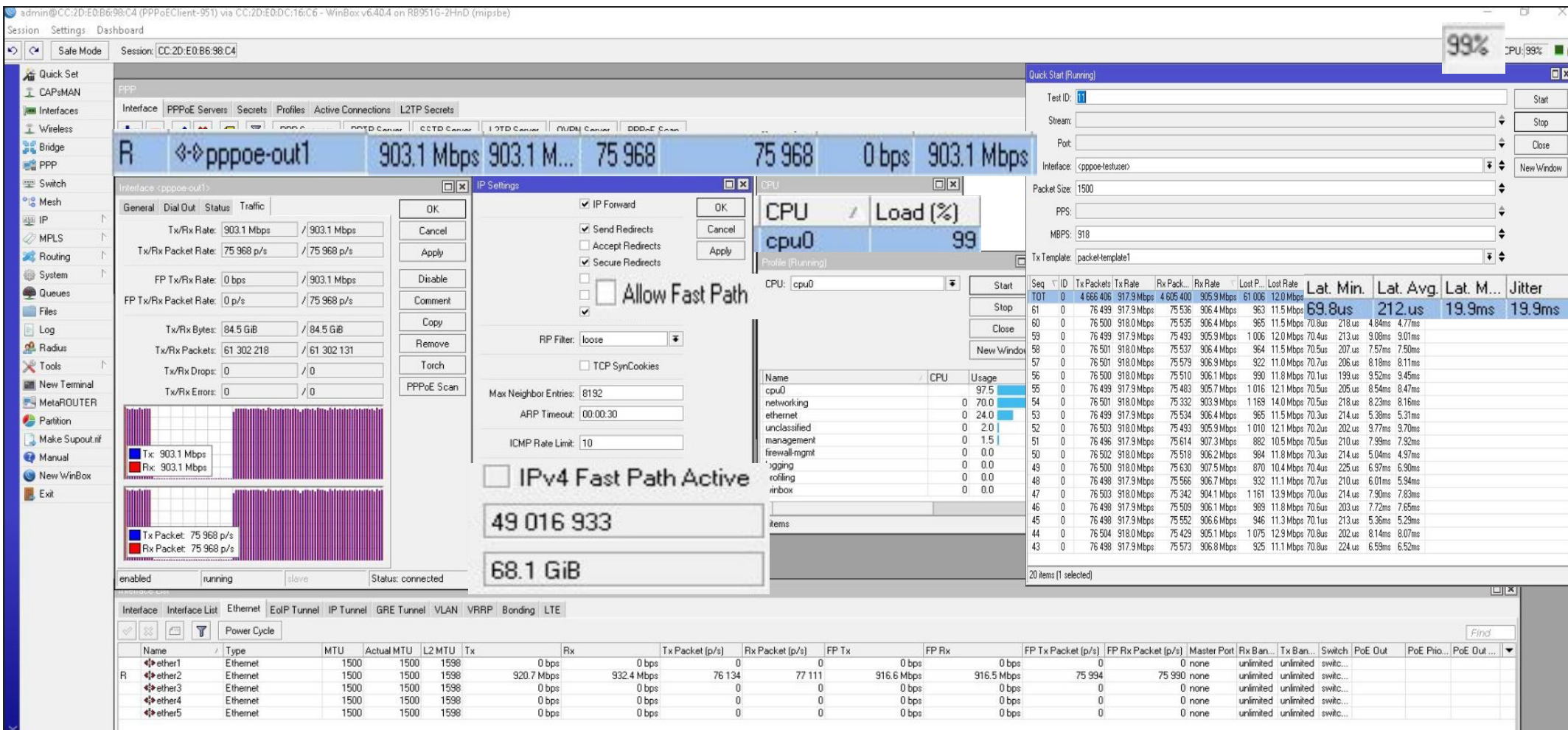


Slow Path

Routing Forwarding



Slow Path



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

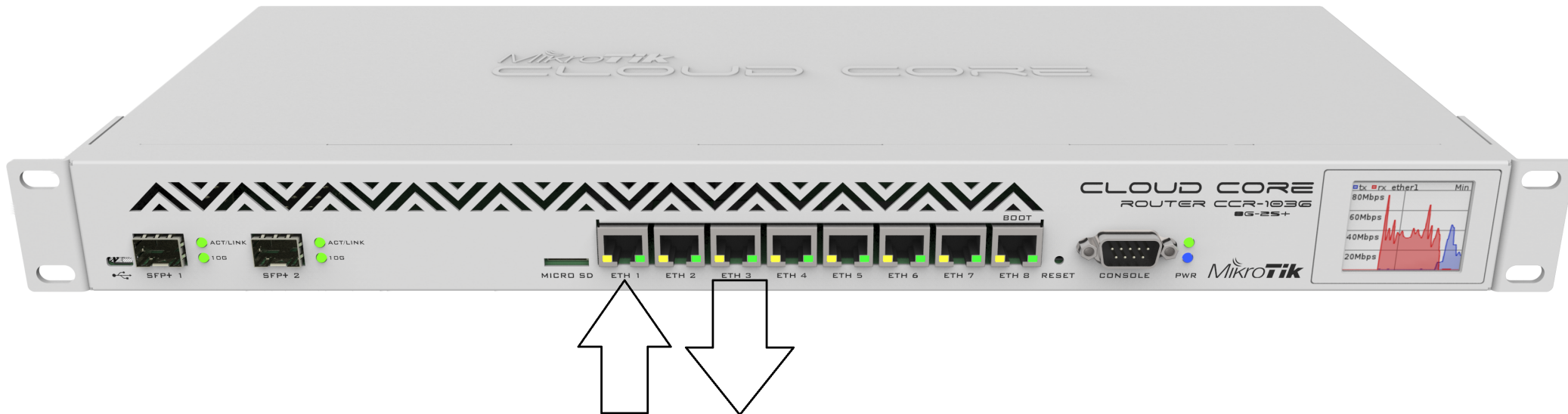
The IPv4 Fast Path runs automatically when the following conditions are met.

- 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

	☒ IPv4 Fast Path Active
IPv4 Fast Path Packets:	95 440 144
IPv4 Fast Path Bytes:	133.3 GiB

Fast Path

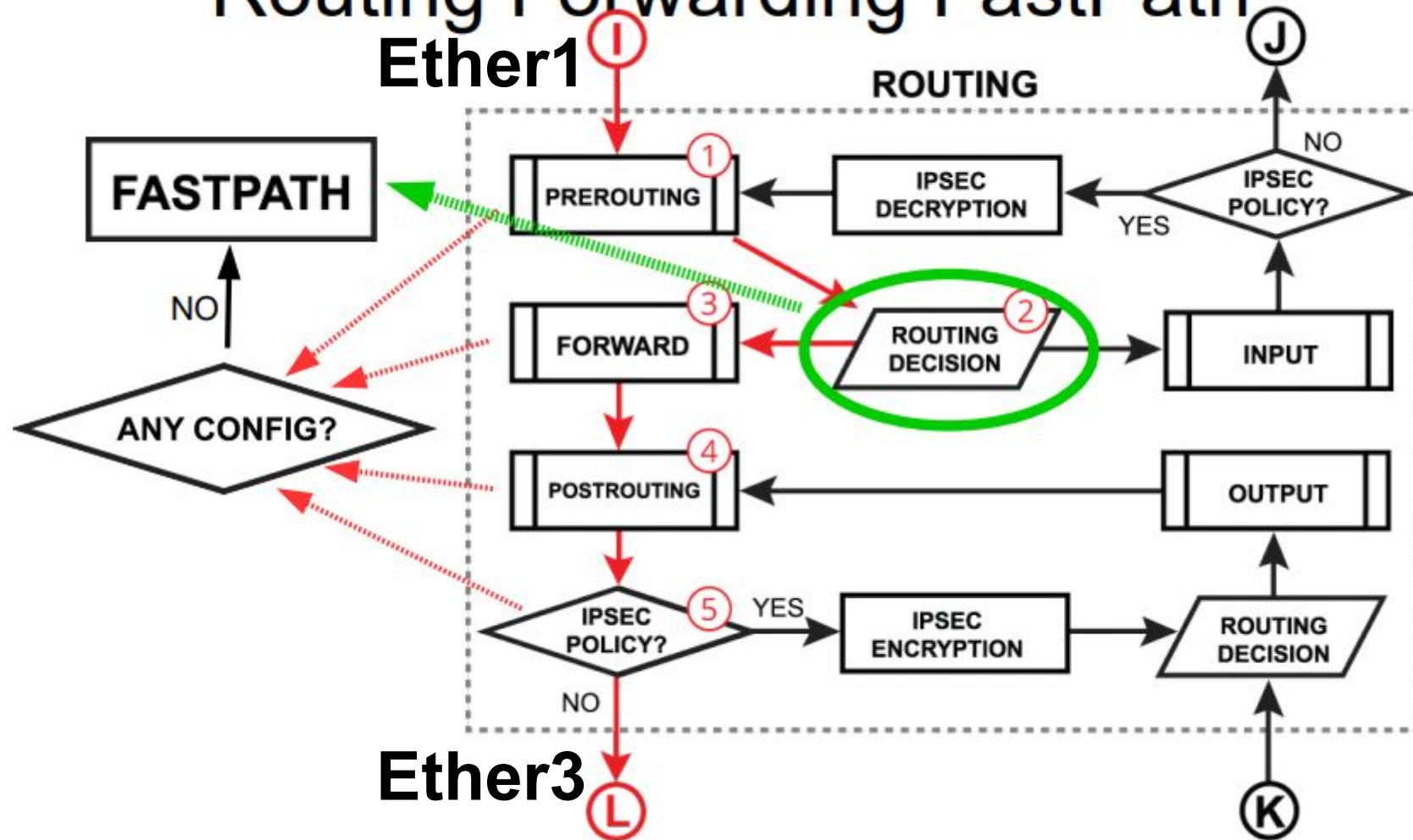
Ipv4 Fast Path



- 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?

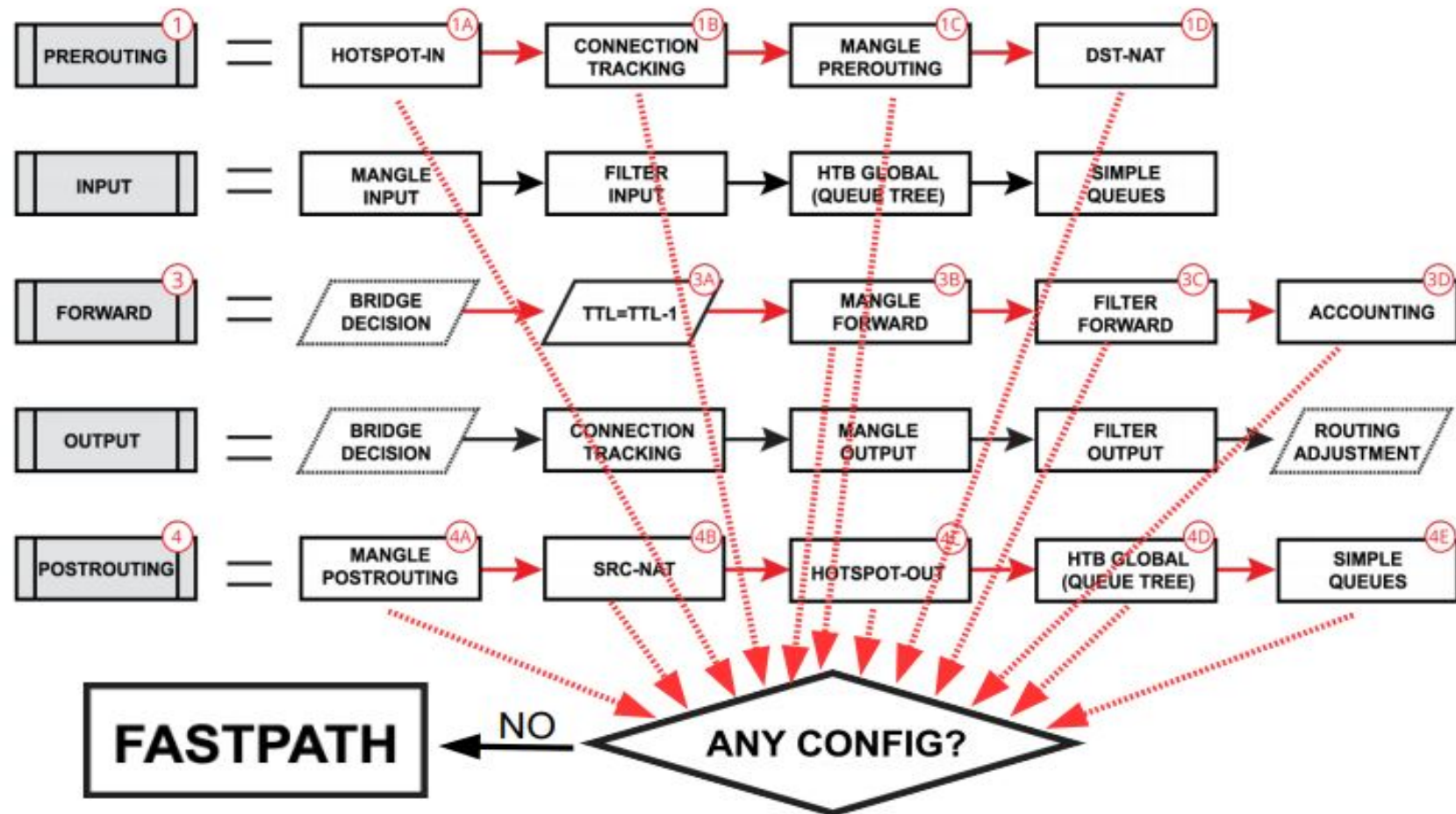
Fast Path

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%

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

PPP Interface: PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

Interface: PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

MTU: 1500 Tx Rx Tx Pa... Rx Packet (p/s) FP Tx FP Rx FP Tx ... FP Rx Packet (p/s)

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

OK Cancel Apply Disable Comment Copy Remove Torch PPPoE Scan

IP Settings

☒ IP Forward

☒ Send Redirects

☐ Accept Redirects

☒ Secure Redirects

☒ 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: 60 073 965

IPv4 Fasttrack: 83.6 GiB

IPv4 Fasttra

CPU Load (%)

cpu0 53

Profile (Running)

CPU: cpu0

Name	CPU	Usage
cpu0	48	16
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
101	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				
142	0	76 503	918.0 Mbps	76 327	915.9 Mbps	176	2.1 Mbps	66.3us	184.us	3.62ms	3.75ms
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	3.73ms
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)

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 ...
ether1	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	0 none	unlimited	unlimited	switch...			
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	0 none	unlimited	unlimited	switch...			
ether3	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	0 none	unlimited	unlimited	switch...			
ether4	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	0 none	unlimited	unlimited	switch...			
ether5	Ethernet	1500	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0	0 none	unlimited	unlimited	switch...			

Ipv4 Fast Path & Slow Path Versus

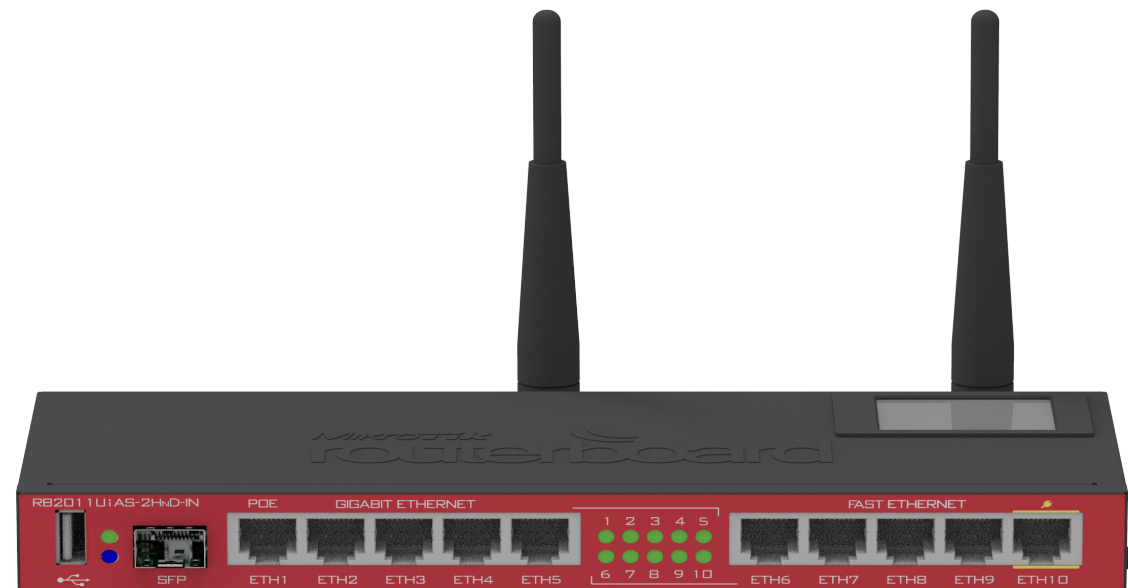
	<u>Lost Rate</u>	<u>Minimum</u>	<u>Average</u>	<u>Maximum</u>	<u>Traffic</u>	<u>CPU</u>
<u>Slow Path</u>	<u>%0.76</u>	<u>69.8us</u>	<u>212.us</u>	<u>19.9ms</u>	<u>Tx 903Mbps</u> <u>Rx 903Mbps</u>	<u>%99</u>
<u>Fast Path</u>	<u>%0.39</u>	<u>66.0us</u>	<u>170.us</u>	<u>10.4ms</u>	<u>TX 911Mbps</u> <u>RX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

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

admin@10.0.0.6 (2) - WinBox v6.34.6 on RB2011UiAS-2HnD (mipsbe)

Settings Dashboard

Safe Mode Session: 10.0.0.6

CPU: 97%

Quick Set

Interfaces

Bridge

PPP

Switch

Mesh

IP

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

LCD

MetaROUTER

Partition

Make Supout.nif

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 Find

Name	Type	A...	Tx	Rx	Tx Pa...	Rx Packe...	FP Tx ...	FP Rx P...
DR <><pppoe...	PPPoE Serv...	1...	977.3 kbps	114.9 kbps	83	10	0	10
DR <><pppoe...	PPPoE Serv...	1...	961.6 kbps	129.0 kbps	82	11	0	11
DR <><pppoe...	PPPoE Serv...	1...	954.3 kbps	229.9 kbps	81	20	0	20
DR <><pppoe...	PPPoE Serv...	1...	942.8 kbps	160.9 kbps	80	14	0	14
DR <><pppoe...	PPPoE Serv...	1...	942.8 kbps	149.4 kbps	80	13	0	13
DR <><pppoe...	PPPoE Serv...	1...	938.2 kbps	140.7 kbps	80	12	0	12
DR <><pppoe...	PPPoE Serv...	1...	938.2 kbps	117.2 kbps	80	10	0	10
DR <><pppoe...	PPPoE Serv...	1...	938.2 kbps	149.4 kbps	79	13	0	13

495 items out of 506

500 items out of 511

Interface List

Interface Tunnel VLAN VRRP Bonding LTE

Power Cycle Find

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

11 items out of 506 [1 selected]

Send Redirects

Accept Redirects

Secure Redirects

Accept Source Route

Allow Fast Path

Ro

RP Filter: no

TCP SynCookies

Max Neighbor Entries: 8192

ARP Timeout: 00:00:30

ICMP Rate Limit: 10

IPv4 Fast Path Packets: 94 603

IPv4 Fast Path Bytes: 133.6 MiB

IPv4 Fast Path Active

IPv4 Fasttrack Active

Terminal

```
[admin@2] > interface monitor-traffic aggregate
[admin@2] >
[admin@2] > interface monitor-traffic
rx-packets-per-second: 42 383
rx-bits-per-second: 503.1M 503.1Mbps
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
[Q quit|D dump|C-z pause]
```

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

Safe Mode Session: 10.0.0.6

CPU Load 78 %

500 items out of 511

Interface List

Interface	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Pack...	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx Packet (p/s)
ether1	1500	1500	1598	0 bps	0 bps	0	0 bps	0 bps	0	0
ether2	1500	1500	1598	19.5 Mbps	733.2 Mbps	1 659	19.9 Mbps	729.1 Mbps	1 697	61
ether3	1500	1500	1598	697.2 Mbps	81.4 Mbps	58 461	715.8 Mbps	87.5 Mbps	60 168	7
ether4	1500	1500	1598	0 bps	0 bps	0	0 bps	0 bps	0	0

11 items out of 511

Allow Fast Path

RP Filter: no

Max Neighbor Entries: 8192

ARP Timeout: 00:00:30

ICMP Rate Limit: 10

IPv4 Fast Path Active

Pv4 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

70 095

830.2Mbps

0

0

63 012

751.5Mbps

70 095

830.2Mbps

0

0

0

0

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	
	%14	%54	%32	%70	%24	

Fast Path

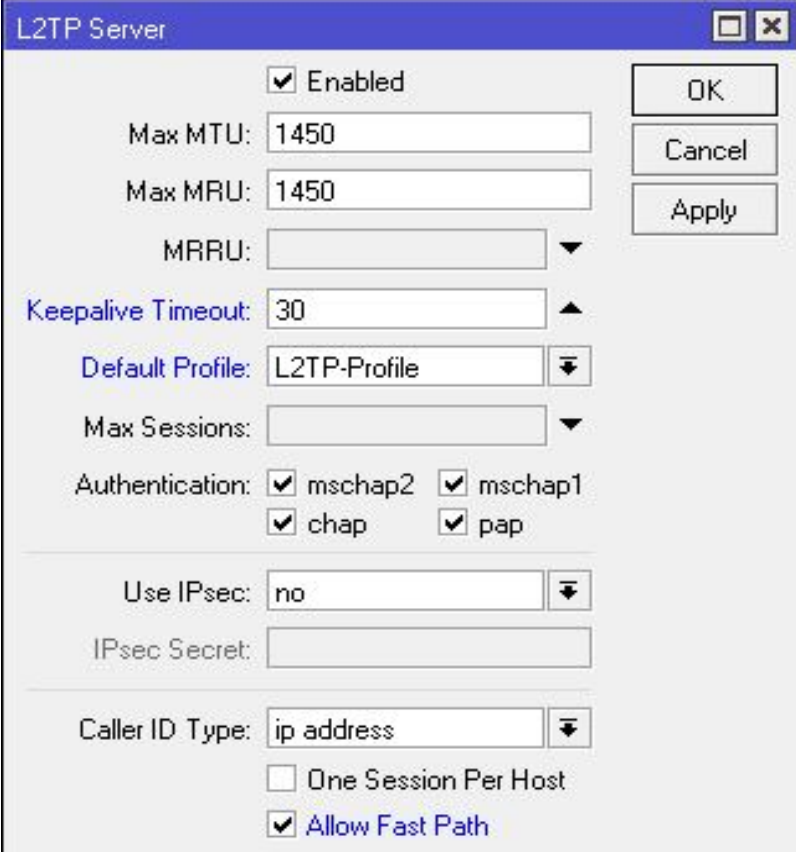
Virtual Interface Fast Path

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



The screenshot shows the 'L2TP Server' configuration window. The 'Enabled' checkbox is checked. 'Max MTU' and 'Max MRU' are both set to 1450. 'MRRU' is set to a default value. 'Keepalive Timeout' is set to 30. 'Default Profile' is set to 'L2TP-Profile'. 'Max Sessions' is set to a default value. Under 'Authentication', 'mschap2', 'mschap1', 'chap', and 'pap' are all checked. 'Use IPsec' is set to 'no'. 'IPsec Secret' is empty. 'Caller ID Type' is set to 'ip address'. At the bottom, 'One Session Per Host' is unchecked, and 'Allow Fast Path' is checked.

☒ Enabled	OK
Max MTU: 1450	Cancel
Max MRU: 1450	Apply
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	

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 RulesNATMangleService PortsConnectionsAddress ListsLayer7 Protocols

Tracking

Find

	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

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 D	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

Quick Set

CAPsMAN

Interfaces

Wireless

Bridge

PPP

Switch

Mesh

IP

MPLS

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

MetaROUTER

Partition

Make Supout.tif

Manual

New WinBox

Exit

Firewall

Filter Rules

NAT

Mangle

Raw

Service Ports

Connections

Address Lists

Layer7 Protocols

Find

all

00 Reset Counters

00 Reset All Counters

7 items (1 selected)

#	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	acc...	forward						6.1 GiB	4 397 952
3									
4									
5	drop	input						0 B	0
6	drop	forward						0 B	0

Interface List

Interface

Interface List

Ethernet

EoIP Tunnel

IP Tunnel

GRE Tunnel

VLAN

VRRP

Bonding

LTE

8 items (1 selected)

Interface	Name	Type	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)
R	br0	Bridge	1500	1598	296.7 Mbps	5.9 Mbps	24 672	11 157	0 bps	5.9 Mbps	0	11 157
R	ether1	Ethernet	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0
R	ether2	Ethernet	1500	1598	8.4 Mbps	362.0 Mbps	11 808	29 884	7.7 Mbps	299.3 Mbps	11 266	24 777
RS	user-1-PC	Ethernet	1500	1598	100.4 Mbps	2.4 Mbps	8 392	4 314	103.5 Mbps	2.3 Mbps	8 664	4 493
R	pppoe-out1	PPPoE Client	1500		5.6 Mbps	294.9 Mbps	11 240	24 754	0 bps	294.9 Mbps	0	294.9 Mbps
R	pppoe-out1	PPPoE Client	1500	1600	5.6 Mbps	294.9 Mbps	11 240	24 754	0 bps	294.9 Mbps	0	294.9 Mbps
R	wlan1	Wireless (Atheros AR9...	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0

CPU

CPU

Load (%)

100

1 item

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

ice (pppoe-out1)

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

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:

Active 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

Quick Set

CAPS MAN

Interfaces

Wireless

Bridge

PPP

Switch

Mesh

IP

MPLS

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

MetaROUTER

Partition

Make Supout.tif

Manual

New WinBox

Exit

Firewall

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

Filter Rules

+

-

✓

✗

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🔍

00 Reset Counters 00 Reset All Counters

Find all

#	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	fas							
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 List Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

+

-

✓

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🔍

Interface	Name	Type	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)
R	br0	Bridge	1500	1598	847.5 Mbps	14.9 Mbps	70 254	27 843	847.4 Mbps	14.9 Mbps	70 250	27 843
R	ether1	Ethernet	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0
R	ether2	Ethernet	1500	1598	17.0 Mbps	807.8 Mbps	26 761	66 468	16.8 Mbps	852.0 Mbps	27 876	70 283
RS	ether3	Ethernet	1500	1598	291.3 Mbps	5.4 Mbps	24 086	9 607	289.5 Mbps	4.8 Mbps	24 005	9 094
RS	ether4	Ethernet	1500	1598	279.9 Mbps	5.2 Mbps	23 149	9 325	277.0 Mbps	4.7 Mbps	22 965	8 942
RS	ether5	Ethernet	1500	1598	231.4 Mbps	4.4 Mbps	19 142	7 807	280.9 Mbps	5.2 Mbps	23 295	9 815
R	pppoe-out1	PPPoE Client	1500		11.7 Mbps	839.6 Mbps	27 843	70 254	11.7 Mbps	839.6 Mbps	27 836	70 254

R ether pppoe-out1 PPPoE Client 1500 11.7 Mbps 839.6 Mbps 27 843 70 254 11.7 Mbps 839.6 Mbps

CPU

CPU / Load (%)

cpu0 72

Load (%)

72

1 item

Secure Redirects

☐ Allow Fast Path

☒ Allow Fast Path

☒ Fasttrack counters

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 1

IPv4 Fasttrack Bytes: 123 1

124 903 706

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

Own Time: Oct/10/2018 19:21:54

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

Link Downs: 6

Uptime: 02:30:45

Encoding:

MTU: 1500

MRU: 1500

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

Local Address: 100.64.34.2

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>	<u>3X</u>	<u>60X</u>	<u>%33</u>	<u>%70</u>	<u>%28</u>

Fast Path & Fast Track

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

WinBox v6.43.1 on RB951Ui-2HnD (mipsbe)

Session Settings Dashboard

Safe Mode Session: 159.146.11.28

CPU: 5% Memory: 100%

Interface List

Interface	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Pac...	Rx...	FP Tx	FP Rx
R ether0	Ethernet	1500	1500	12.7 kbps	47.8 kbps	13	23	10.0 kbps	23.5 kbps
R ether1	Ethernet	1500	1500	11.5 kbps	46.8 kbps	13	23	9.7 kbps	22.8 kbps
R ether2	Ethernet	1500	1500	22.5 kbps	217.7 kbps	28	42	14.7 kbps	217.7 kbps
R ether3	Ethernet	1500	1500	24.7 Mbps	302.4 kbps	2127	620	24.4 Mbps	302.4 kbps
R ether4	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether5	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether6	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether7	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether8	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether9	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether10	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether11	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether12	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether13	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether14	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether15	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether16	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether17	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether18	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether19	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether20	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether21	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether22	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether23	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether24	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether25	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether26	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether27	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether28	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether29	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether30	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether31	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether32	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether33	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether34	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether35	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether36	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether37	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether38	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether39	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether40	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether41	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether42	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether43	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether44	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether45	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether46	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether47	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether48	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether49	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether50	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether51	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether52	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether53	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether54	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether55	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether56	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether57	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether58	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether59	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether60	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether61	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether62	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether63	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether64	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether65	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether66	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether67	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether68	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether69	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether70	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether71	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether72	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether73	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether74	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether75	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether76	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether77	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether78	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether79	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether80	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether81	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether82	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether83	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether84	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether85	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether86	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether87	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether88	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether89	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether90	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether91	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether92	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether93	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether94	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether95	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether96	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether97	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether98	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether99	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps
R ether100	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps

Firewall

#	Action	Chain	Src. Address	Dst. Address	In. Inter...	Out. Inter...	Bytes	Packets
0	special dummy rule to show fasttrack counters	pas...					2934.7 MiB	2 695 030
1	defconf: accept established,related,untracked	input					12.9 MiB	27 126
2	defconf: drop invalid	input					1160 B	28
3	defconf: drop all not coming from LAN	input					0 B	0
4	defconf: fasttrack	input					0 B	0
5	defconf: fasttrack	forward					159.1 MiB	152 141
6	defconf: accept established,related,untracked	forward					159.1 MiB	152 141
7	defconf: drop invalid	forward					14.5 KiB	300
8	defconf: drop all from WAN not DSTNATed	forward					635 B	12

Simple Queue <queue1>

General	Advanced	Statistics	Traffic	Total	Total Statistics
Target Upload: 7.4 kbps Target Download: 29.2 kbps					
Rate: 7.4 kbps 29.2 kbps					
Packet Rate: 7 p/s 8 p/s					
Upload: 7.4 kbps Download: 29.2 kbps					
Upload Packets: 7 p/s Download Packets: 8 p/s					
enabled					

IP Settings

IP Settings
☒ IP Forward
☒ Send Redirects
☐ Accept Redirects
☒ Secure Redirects
☐ Accept Source Route
☒ 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: 129
IPv4 Fast Path Bytes: 10.1 KiB
☒ IPv4 Fasttrack Active
IPv4 Fasttrack Packets: 2 697 745
IPv4 Fasttrack Bytes: 2937.7 MiB

Queue List

Simple Queues	Interface Queues	Queue Tree	Queue Types	
#	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).

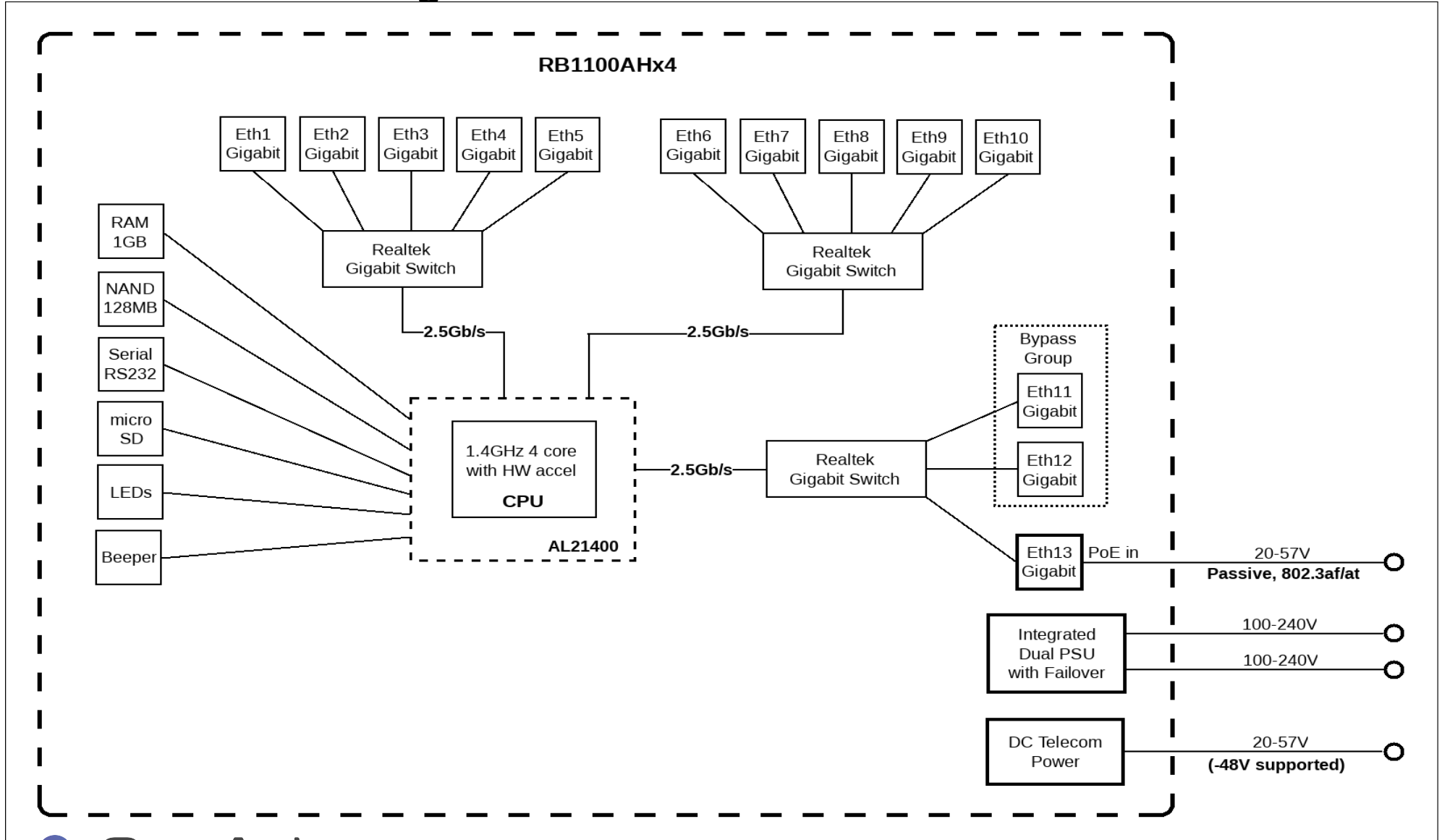
<https://mikrotik.com/product/RB1100Dx4>

\$299



ISP network Planning, Design And Installation

RB1100x4 Block Diagram



ISP network Planning, Design And Installation

admin@CC:2D:E0:DC:16:BC (1100v4) - WinBox v6.40.4 on RB1100AHx4 (arm)

Session Settings Dashboard

Safe Mode Session: CC:2D:E0:DC:16:BC

Quick Set

CAPsMAN

Interfaces

Wireless

Bridge

PPP

Mesh

IP

MPLS

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

Partition

Make Supout.tif

Manual

New WinBox

Exit

RouterOS WinBox

Interface List										
Interface Interface List Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE										
Power Cycle										
Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx
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		

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	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx	FP
DR <<<pppoe-1>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-2>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-3>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-4>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-5>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-6>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-7>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-8>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-9>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-10>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-11>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-12>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-13>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-14>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-15>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-16>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-17>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-18>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-19>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-20>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-21>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-22>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-23>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-24>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-25>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-26>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-27>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-28>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-29>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-30>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-31>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-32>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-33>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-34>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	
DR <<<pppoe-35>	PPPoE Server Binding	1480		0 bps	0 bps	0	0	0 bps	0 bps	

6144 items out of 6158

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

4 items (1 selected)

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

6144 items

0 B queued

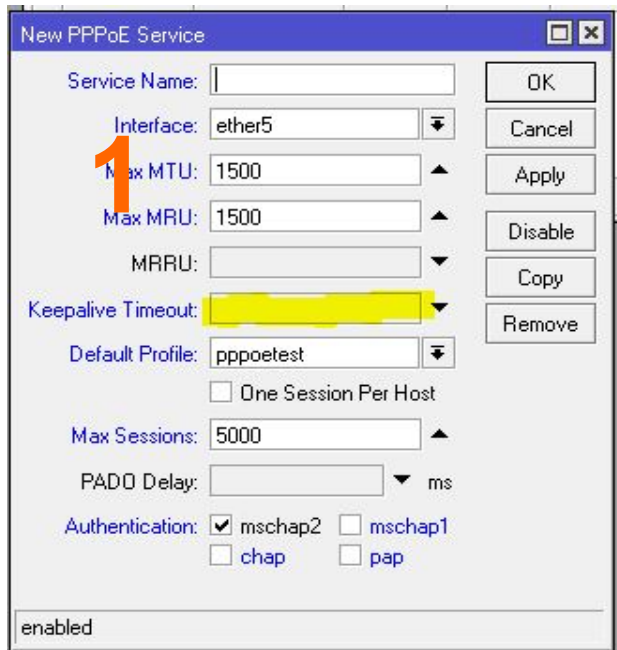
0 packets queued

CPU: 53%

CPU: 53%

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```
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
```



1

New PPPoE Service

Service Name:

Interface: ether5

Max MTU: 1500

Max MRU: 1500

MRRU:

Keepalive Timeout: (highlighted)

Default Profile: pppoetest

☐ One Session Per Host

Max Sessions: 5000

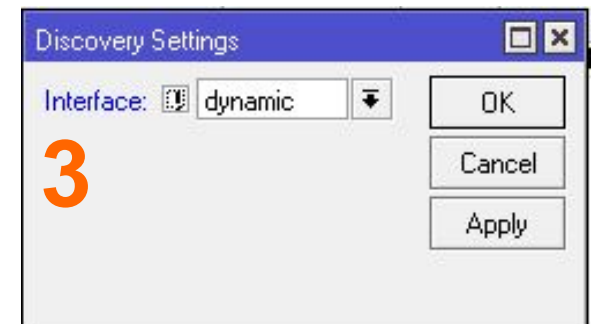
PADO Delay: ms

Authentication: ☒ mschap2 ☐ mschap1
☐ chap ☐ pap

enabled

OK Cancel Apply Disable Copy Remove

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

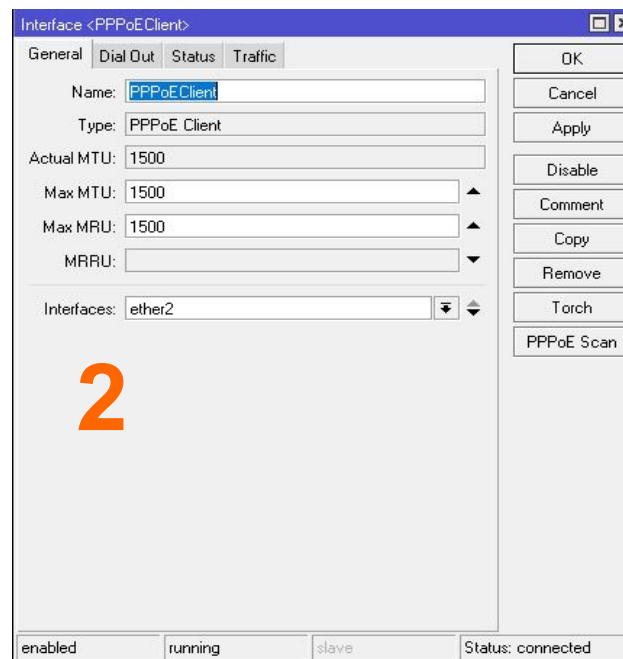


3

Discovery Settings

Interface: dynamic

OK Cancel Apply



2

Interface <PPPoEClient>

General Dial Out Status Traffic

Name: PPPoEClient

Type: PPPoE Client

Actual MTU: 1500

Max MTU: 1500

Max MRU: 1500

MRRU:

Interfaces: ether2

enabled running slave Status: connected

OK Cancel Apply Disable Comment Copy Remove Torch PPPoE Scan

```
/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
```

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```
/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:

OK

Cancel

Apply

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 MRU: 15 MTU: 1500 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

OK

Cancel

Apply

Disable

Comment

Copy

Remove

Torch

PPPoE Scan

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 .

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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, Firewall 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									
Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets									
PPP Scanner PPTP Server SSTP Server L2TP Server OVPN Server PPPoE Scan									
Name	Type	Actual	Rx	Tx	Rx P...	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx P...
DR <<<pppoe-1>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-2>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-3>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-4>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-5>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-6>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-7>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-8>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-9>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-10>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-11>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-12>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-13>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-14>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-15>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-16>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-17>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-18>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-19>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-20>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-21>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-22>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-23>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-24>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-25>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-26>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-27>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-28>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-29>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-30>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-31>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-32>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-33>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-34>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-35>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-36>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-37>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-38>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-39>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-40>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-41>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-42>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-43>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-44>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-45>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-46>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-47>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-48>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-49>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-50>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-51>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-52>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-53>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-54>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0
DR <<<pppoe-55>	PPPoE Server Binding	1500	0 bps	0 bps	0	0 bps	0 bps	0	0

Queue List									
Simple Queues Interface Queues Queue Tree Queue Types									
Reset Counters Reset All Counters									
#	Name	Target	Upload M...	Download ...	Upload Avg. Rate	Download Avg. Rate	Queue	Queue Type	Queue
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-2438>	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					

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

CPU: 2%

time: 04:49:50 CPU: 2%

[illegible]

RouterOS WinBox

ISP network Planning, Design And Installation

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

Session Settings Dashboard

Safe Mode Session: 100.64.55.223

Quick Set

Interfaces

Bridge

PPP

Mesh

IP

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

LCD

Partition

Make Spout.tif

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	Actual MTU	L2 MTU	Tx	Rx	Tx...	Rx...	FP Tx	FP Rx
DR ⇄ <pppoe-2963>	PPPoE Server Binding	1480		1619.8 kbps	5.8 kbps	1...			
DR ⇄ <pppoe-2402>	PPPoE Server Binding	1480		1583.5 kbps	5.9 kbps	1...			
DR ⇄ <pppoe-2228>	PPPoE Server Binding	1480		1559.7 kbps	11.9 kbps	1...			
DR ⇄ <pppoe-1961>	PPPoE Server Binding	1480		1552.2 kbps	11.4 kbps	1...			
DR ⇄ <pppoe-2324>	PPPoE Server Binding	1480		1549.7 kbps	5.9 kbps	1...			
DR ⇄ <pppoe-980>	PPPoE Server Binding	1480		1546.1 kbps	8.7 kbps	1...			
DR ⇄ <pppoe-386>	PPPoE Server Binding	1480		1544.6 kbps	4.0 kbps	1...			
DR ⇄ <pppoe-1670>	PPPoE Server Binding	1480		1544.0 kbps	5.8 kbps	1...			
DR ⇄ <pppoe-1548>	PPPoE Server Binding	1480		1538.9 kbps	5.7 kbps	1...			
DR ⇄ <pppoe-1532>	PPPoE Server Binding	1480		1538.5 kbps	5.8 kbps	1...			
DR ⇄ <pppoe-1928>	PPPoE Server Binding	1480		1538.1 kbps	0 bps	1...			
DR ⇄ <pppoe-1262>	PPPoE Server Binding	1480		1534.9 kbps	11.4 kbps	1...			
DR ⇄ <pppoe-968>	PPPoE Server Binding	1480		1534.3 kbps	4.4 kbps	1...			
DR ⇄ <pppoe-2809>	PPPoE Server Binding	1480		1532.7 kbps	0 bps	1...			
DR ⇄ <pppoe-492>	PPPoE Server Binding	1480		1532.6 kbps	21.1 kbps	1...			
DR ⇄ <pppoe-2525>	PPPoE Server Binding	1480		1531.8 kbps	5.9 kbps	1...			
DR ⇄ <pppoe-1852>	PPPoE Server Binding	1480		1529.2 kbps	5.7 kbps	1...			
DR ⇄ <pppoe-843>	PPPoE Server Binding	1480		1524.6 kbps	11.7 kbps	1...			
DR ⇄ <pppoe-7657>	PPPoE Server Binding	1480		1521.4 kbps	7.9 kbps	1...			
DR ⇄ <pppoe-6172>	PPPoE Server Binding	1480		1520.8 kbps	4.7 kbps	1...			
DR ⇄ <pppoe-1844>	PPPoE Server Binding	1480		1517.7 kbps	5.7 kbps	1...			
DR ⇄ <pppoe-2811>	PPPoE Server Binding	1480		1515.6 kbps	18.0 kbps	2...			
DR ⇄ <pppoe-2280>	PPPoE Server Binding	1480		1513.8 kbps	0 bps	1...			
DR ⇄ <pppoe-2335>	PPPoE Server Binding	1480		1511.3 kbps	6.0 kbps	1...			
DR ⇄ <pppoe-266>	PPPoE Server Binding	1480		1509.5 kbps	11.8 kbps	1...			
DR ⇄ <pppoe-2490>	PPPoE Server Binding	1480		1508.7 kbps	0 bps	1...			
DR ⇄ <pppoe-1342>	PPPoE Server Binding	1480		1507.8 kbps	11.5 kbps	1...			
DR ⇄ <pppoe-2111>	PPPoE Server Binding	1480		1507.8 kbps	5.9 kbps	1...			
DR ⇄ <pppoe-1508>	PPPoE Server Binding	1480		1507.8 kbps	5.7 kbps	1...			
DR ⇄ <pppoe-1613>	PPPoE Server Binding	1480		1507.8 kbps	5.7 kbps	1...			
DR ⇄ <pppoe-1214>	PPPoE Server Binding	1480		1503.7 kbps	11.6 kbps	1...			
DR ⇄ <pppoe-1570>	PPPoE Server Binding	1480		1502.1 kbps	5.7 kbps	1...			
DR ⇄ <pppoe-950>	PPPoE Server Binding	1480		1502.1 kbps	0 bps	1...			
DR ⇄ <pppoe-2370>	PPPoE Server Binding	1480		1501.9 kbps	0 bps	1...			
DR ⇄ <pppoe-602>	PPPoE Server Binding	1480		1499.9 kbps	8.4 kbps	1...			
DR ⇄ <pppoe-5938>	PPPoE Server Binding	1480		1496.8 kbps	9.1 kbps	1...			
DR ⇄ <pppoe-1525>	PPPoE Server Binding	1480		1496.3 kbps	11.5 kbps	1...			
DR ⇄ <pppoe-1452>	PPPoE Server Binding	1480		1496.3 kbps	5.7 kbps	1...			
DR ⇄ <pppoe-1715>	PPPoE Server Binding	1480		1496.3 kbps	0 bps	1...			
DR ⇄ <pppoe-6491>	PPPoE Server Binding	1480		1496.0 kbps	12.4 kbps	1...			

32002 items out of 32019

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.

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%

U: 9% Uptime: 05:47:35

	Tx	Rx	Tx Pa...	Rx Pa...	FP Tx	FP Rx
ether1	929.1 Mbps	890.2 Mbps	78 052	75 236	929.1 Mbps	890.2 Mbps
ether2	981.9 Mbps	950.3 Mbps	82 490	80 264	981.9 Mbps	950.3 Mbps
ether3	931.1 Mbps	893.3 Mbps	78 219	75 447	931.1 Mbps	893.3 Mbps
ether4	615.2 Mbps	948.2 Mbps	51 680	80 088	615.2 Mbps	948.2 Mbps
ether5	925.5 Mbps	890.7 Mbps	77 751	75 233	925.5 Mbps	890.7 Mbps
ether6	929.7 Mbps	952.8 Mbps	78 101	80 477	929.7 Mbps	952.8 Mbps
ether7	930.0 Mbps	895.5 Mbps	78 128	75 636	930.0 Mbps	895.5 Mbps
ether8	927.4 Mbps	950.7 Mbps	77 909	80 291	927.4 Mbps	950.7 Mbps
ether9	928.7 Mbps	896.0 Mbps	78 016	75 681	928.7 Mbps	896.0 Mbps
ether10	933.8 Mbps	951.0 Mbps	78 446	80 321	933.8 Mbps	951.0 Mbps
ether11	930.5 Mbps	897.1 Mbps	78 175	75 761	930.5 Mbps	897.1 Mbps
ether12						
fp1						
fp2						
fp3						

Load (...)

IRQ (...)

	Load (...)	IRQ (...)
cpu9	90	9
cpu4	59	1
cpu27	30	4
cpu22	22	2
cpu24	15	2
cpu30	14	3
cpu35	11	2
cpu8	7	1
cpu18	5	5
cpu33	3	3
cpu16	3	1
cpu1	2	2
cpu25	2	2
cpu26	2	2
cpu32	2	2
cpu34	2	2
cpu0	1	1
cpu3	1	1
cpu6	1	1
cpu7	1	1
cpu11	1	1
cpu12	1	1
cpu13	1	1
cpu14	1	1
cpu17	1	1
cpu19	1	1
cpu28	1	1
cpu2	0	0
cpu5	0	0
cpu10	0	0
cpu15	0	0
cpu20	0	0
cpu21	0	0
cpu23	0	0
cpu29	0	0
cpu31	0	0

tx-packets-per-second:

tx-bits-per-second:

fp-tx-packets-per-second:

fp-tx-bits-per-second:

tx-drops-per-second:

tx-queue-drops-per-second:

10.0Gbps

10.0Gbps

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

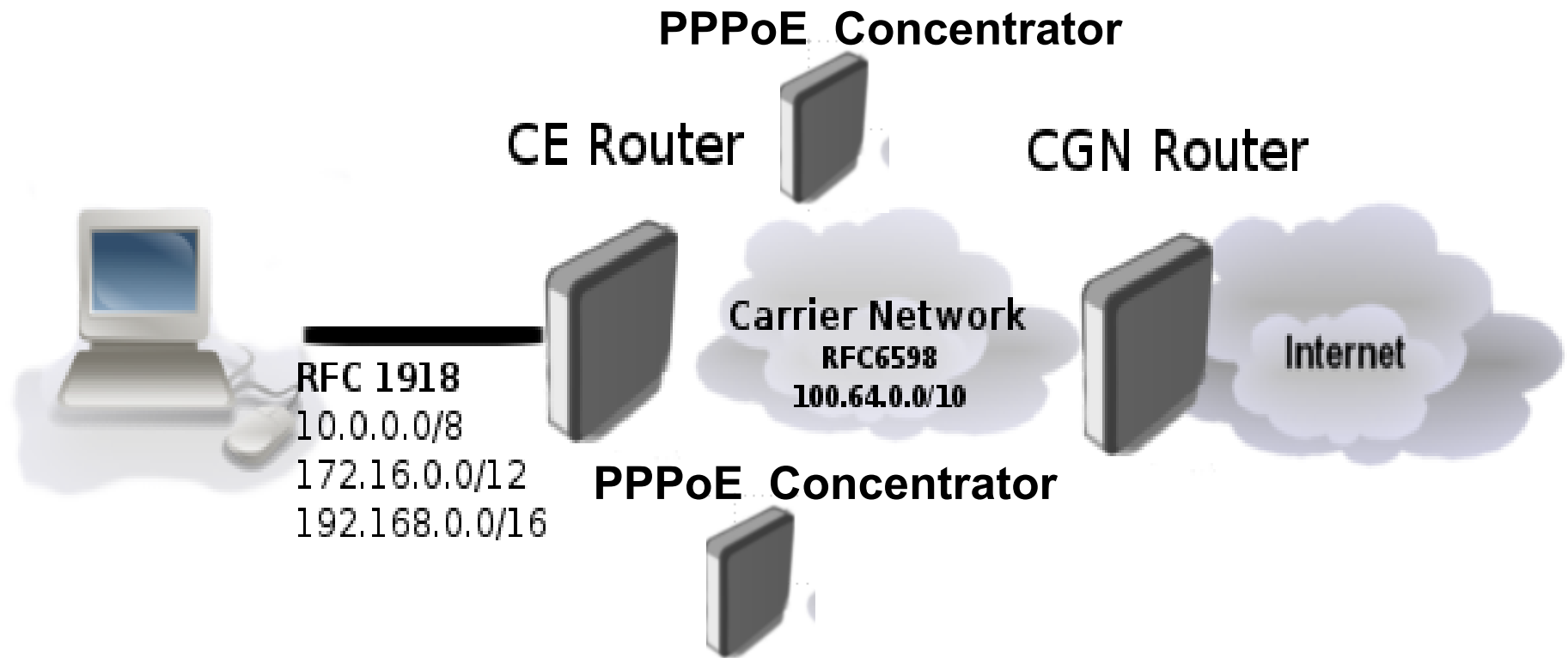
Version: 6.43.2

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

Factory Software: 6.38.5

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] 00 Reset Counters 00 Reset All Counters											
#	Action	C...	Src. Ad...	Ds...	Proto...	Src. Port	Dst. Port	Out. Int...	Byt...	Packets	
8...	cg nat		100.64...		1 (ic...			internet	0 B	0	
8...	cg nat		100.64...		6 (tcp)			internet	8...	137	
8...	cg nat		100.64...		17 (u...			internet	33...	274	
8...	cg nat		100.64...		1 (ic...			internet	0 B	0	
8...	cg nat		100.64...		6 (tcp)			internet	23...	218	
8...	cg nat		100.64...		17 (u...			internet	15...	117	
8...	cg nat		100.64...		1 (ic...			internet	0 B	0	
8...	cg nat		100.64...		6 (tcp)			internet	18...	3 008	
8...	cg nat		100.64...		17 (u...			internet	28...	3 344	
8...	cg nat		100.64...		1 (ic...			internet	0 B	0	
8...	cg nat		100.64...		6 (tcp)			internet	38...	493	
8...	cg nat		100.64...		17 (u...			internet	10...	337	
8...	cg nat		100.64...		1 (ic...			internet	0 B	0	
8...	cg nat		100.64...		6 (tcp)			internet	52...	579	
8...	cg nat		100.64...		17 (u...			internet	46...	573	
8...	cg nat		100.64...		1 (ic...			internet	0 B	0	
8...	cg nat		100.64...		6 (tcp)			internet	24...	323	
31836 items											

ISP network Planning, Design And Installation

Carrier-Grade NAT (CGNAT) or NAT444

Session Settings Dashboard
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

Find all

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

Interface List

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

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 bps	0	0	0 bps	0 bps	0	0			
R	sfp-stpplus1	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	1036-1															
R	sfp-stpplus2	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	1036-2															
R	sfp-stpplus3	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-stpplus4	Ethernet	1500	1500	1580	0 bps	0 bps	0	0	0 bps	0 bps	0	0			
S	sfp-stpplus5	Ethernet	1500	1500	1580	0 bps	0 bps	0	0	0 bps	0 bps	0	0			
S	Servers Switch															
RS	sfp-stpplus6	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	TT-3011 burdaydi-1036-1 sfp1 de															
S	sfp-stpplus7	Ethernet	1500	1500	1580	0 bps	0 bps	0	0	0 bps	0 bps	0	0			
S	sfp-stpplus8	Ethernet	1500	1500	1580	0 bps	0 bps	0	0	0 bps	0 bps	0	0			

9 items out of 17

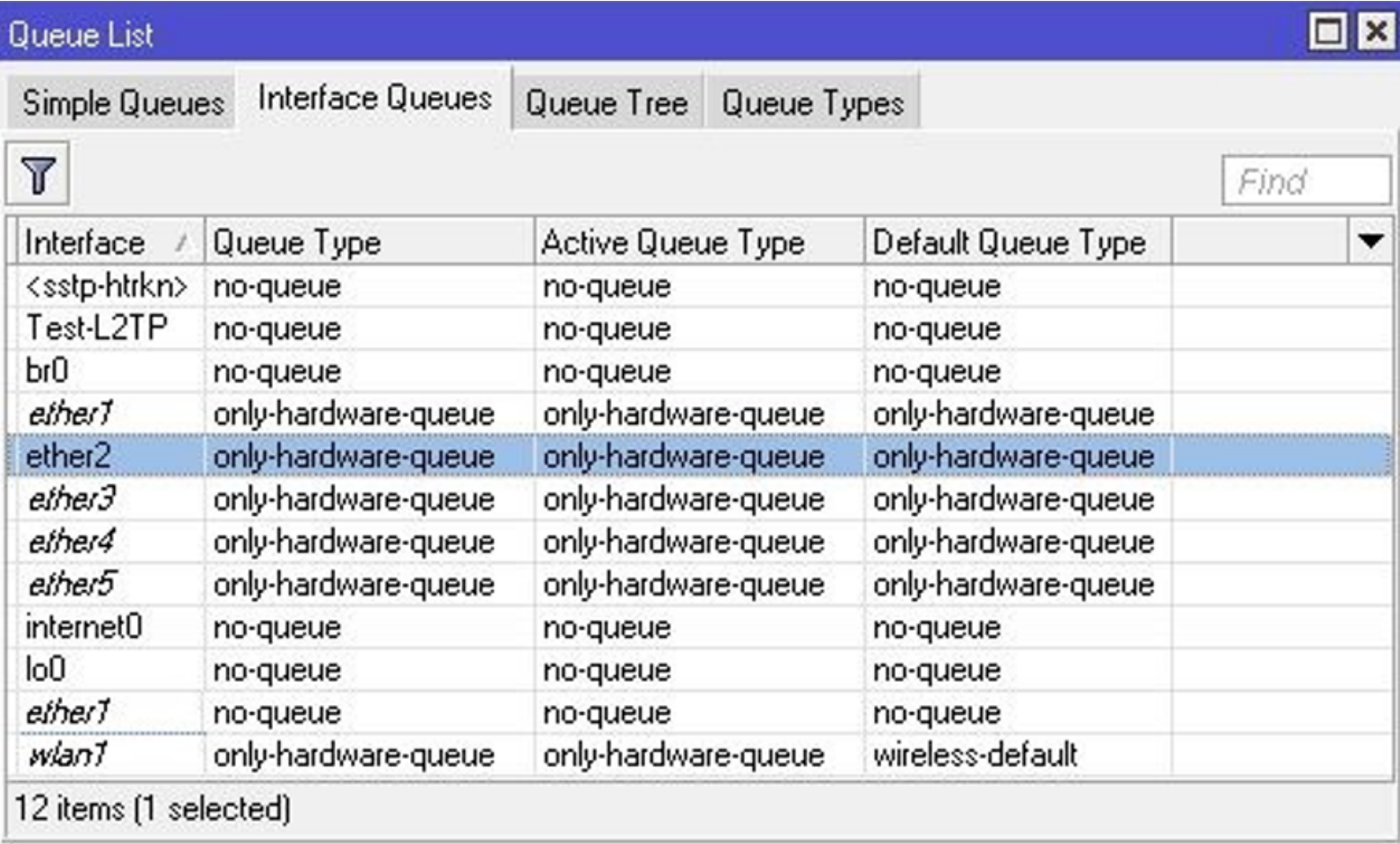
Type and tricks

- 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	
ether1	only-hardware-queue	only-hardware-queue	only-hardware-queue	
ether2	only-hardware-queue	only-hardware-queue	only-hardware-queue	
ether3	only-hardware-queue	only-hardware-queue	only-hardware-queue	
ether4	only-hardware-queue	only-hardware-queue	only-hardware-queue	
ether5	only-hardware-queue	only-hardware-queue	only-hardware-queue	
internet0	no-queue	no-queue	no-queue	
lo0	no-queue	no-queue	no-queue	
ether1	no-queue	no-queue	no-queue	
wlan1	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

FastPath Overview (MuM Ukraine, 2015)

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

Open FastPath

https://openfastpath.org/wp-content/uploads/2018/01/OpenFastPath_Overview.pdf

MikroTik Wiki 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

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

Janis-Megis New Product !

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://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