

**Effective work with Mikrotik**

**Эффективная работа  
с Mikrotik**

**MUM in Kiev, Ukraine, June 08, 2018**

# Об авторе

- системный администратор более 10 лет
- настройка Windows, Linux
- виртуализация на основе VmWare (ESXi)
- сетевой инженер: Mikrotik, L2-L3 свитчи Cisco, D-Link, Edge-core etc.
- IP PBX (Asterisk) - open source программная АТС
- проектирование IT инфраструктуры заказчика и реализация проекта “под ключ”
- работа с Mikrotik более 8 лет (от hAP Lite до CCR)

# Mikrotik это:



Дано:



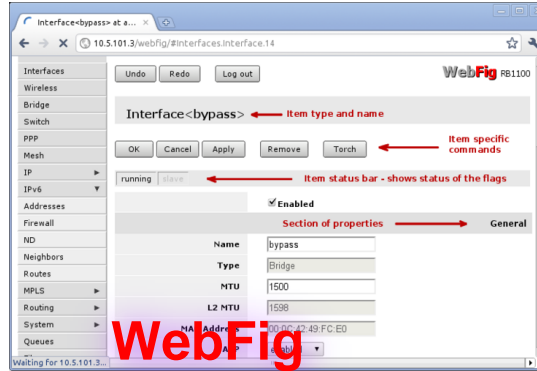
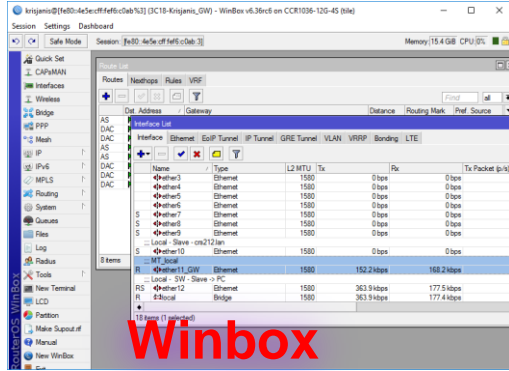
Можно сделать качественное решение



ИЛИ



# Варианты настройки Mikrotik



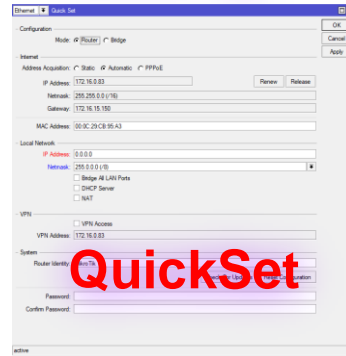
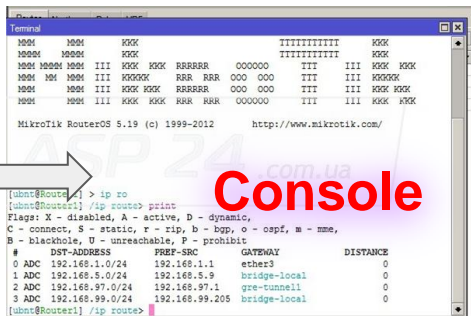
Initial login

```

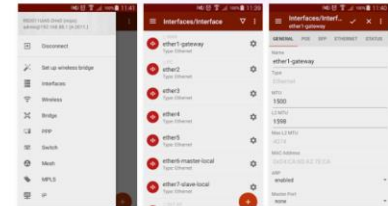
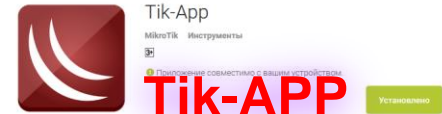
/login
! done
=ret=ebddd18303a54111e2dea05a92ab46b4
/login
=name=admin
=response=001ea726ed53ae38520c8334f82d44c9f2
! done
    
```

API

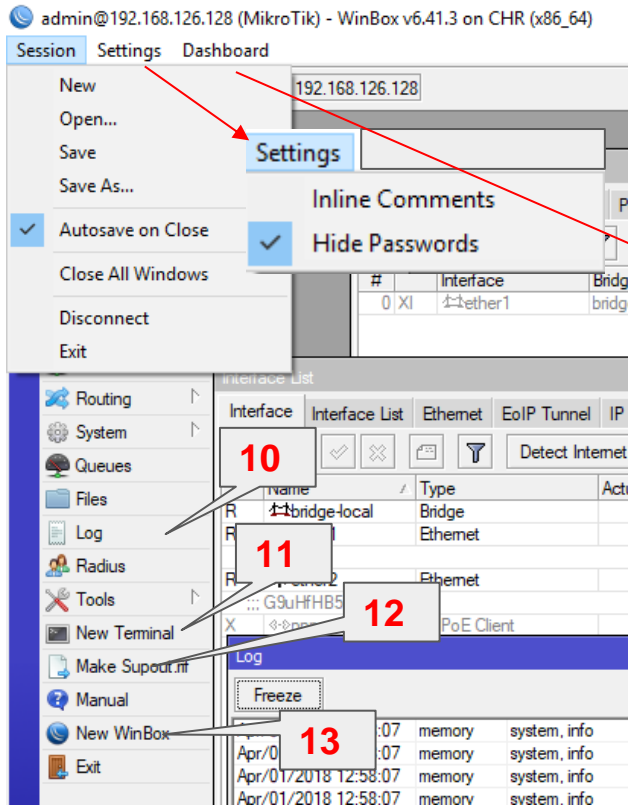
winbox  
telnet  
ssh  
WebFig



winbox  
WebFig



# Winbox



admin@192.168.126.128 (MikroTik) - WinBox v6.41.3 on CHR (x86\_64)

Session Settings Dashboard

New  
Open...  
Save  
Save As...  
Autosave on Close  
Close All Windows  
Disconnect  
Exit

Settings

Inline Comments  
Hide Passwords

#	Interface	Bridge
0	XI ether1	bridge

Interface List

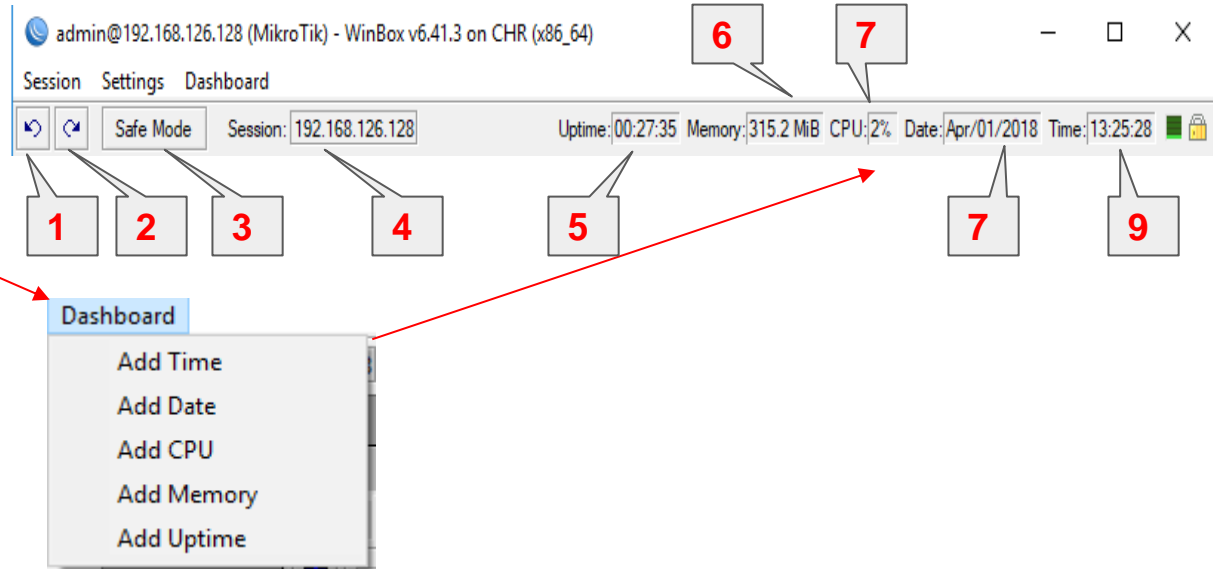
Interface	Interface List	Ethernet	EoIP Tunnel	IP
R	bridge-local	Bridge		
R		Ethernet		
R		Ethernet		
X	G9uHfHB5	PoE Client		

Log

Time	Memory	System	Info
Apr/01/2018 12:58:07	memory	system	info
Apr/01/2018 12:58:07	memory	system	info
Apr/01/2018 12:58:07	memory	system	info
Apr/01/2018 12:58:07	memor	svstem	info

Freeze

10  
11  
12  
13



admin@192.168.126.128 (MikroTik) - WinBox v6.41.3 on CHR (x86\_64)

Session Settings Dashboard

Safe Mode Session: 192.168.126.128 Uptime: 00:27:35 Memory: 315.2 MiB CPU: 2% Date: Apr/01/2018 Time: 13:25:28

1 2 3 4 5 6 7 7 9

Dashboard

- Add Time
- Add Date
- Add CPU
- Add Memory
- Add Uptime

# Winbox

WinBox v3.13 (Addresses) [Minimize] [Maximize] [Close]

File Tools

Connect To:   Keep Password

Login:   Secure Mode

Password:   Autosave Session

Session:  Browse...  Open In New Window

Note:

Group:

RoMON Agent:

---

Managed Neighbors

Find

Address	User	Session	Group	RoMON Agent	Note
67 items					

# Используем фильтры

The screenshot shows the 'Interface List' window with the 'Interface List' tab selected. The filter icon (a funnel) is highlighted with a red circle. Below the filter icon, the filter criteria are set to 'Name' contains '|'. The '+ -' buttons are also highlighted with a red box.

The screenshot shows the 'Interface List' window with the filter criteria set to 'Name' contains 'eth' and 'Comment' contains 'inter'. The table below shows the filtered results:

Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Pack
::: internal						
R ether2	Ethernet	1500			27.2 kbps	5.8 kbps

At the bottom of the window, it says "1 item out of 4 (1 selected)".

- Name
- Actual MTU
- Comment
- Dynamic
- Enabled
- FP Rx
- FP Rx Packet
- FP Tx
- FP Tx Packet
- L2 MTU
- Link Downs
- Name
- Running
- Rx
- Rx Bytes
- Rx Drops
- Rx Errors
- Rx Packet
- Rx Packets
- Slave
- Tx

# Инструменты поиска

Interface List

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

+ - ✓ ✗ [Detect Internet] intel

Name ↓ contains ↓ eth + - Filter

	Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Pack
R	ether1	Ethernet	1500		47.5 kbps	9.8 kbps	
::: internal							
R	ether2	Ethernet	1500		26.8 kbps	5.3 kbps	

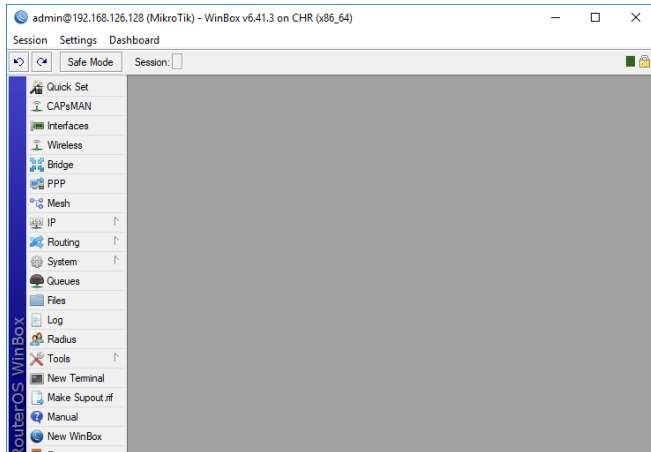
2 items out of 4

строка поиска

Ctrl-F  
Ctrl-G



# Использование сессий



admin@192.168.126.128 (MikroTik) - WinBox v6.41.3 on CHR (x86\_64)

Session Settings Dashboard

Safe Mode Session: MUM-Session CPU: 0% Uptime: 01:08:47 Time: 14:06:41 Date: Apr/01/2018

Interface List

Interface	Type	MTU	Actual MTU	L2 MTU	Last Link	Down Time	Tx	Rx	Tx Packet	Rx Packet	FP Tx	FP Rx	FP Tx Pac	FP Rx
R ether1	Ethernet	1500	1500	0			58.3 kbps	16.6 kbps	13	14	0 bps	0 bps	0	0
R internal	Ethernet	1500	1500	0			57.2 kbps	8.6 kbps	9	12	0 bps	0 bps	0	0

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

Reset Counters Reset All Counters

Route List

#	Action	Chain	Src. Address	Dst. Address	Proto.	Src. Port	Dst. Port	In. Interface	Out. Interface	Connection M...	Routing Mark	Src. Address List	Log

Routes Neighbors Rules VRF

Dst. Address	Gateway	Distance	Routing Mark	Pref. Source
DAS 0.0.0.0/0	172.16.15.150 reachable ether1	1		172.16.0.83
DAC 172.16.0.0/16	ether1 reachable	0		172.16.0.83
DAC 192.168.126.0	ether2 reachable	0		192.168.126.

DHCP Client

Interface	Use P.	Add D.	IP Address	Expires After	Status
bridge-local	yes	yes	172.16.0.83/16	00:06:38	bound
ether1	yes	yes	172.16.0.83/16	00:06:38	bound
ether2	yes	no	192.168.126.128/24	00:21:29	bound

Address List

Address	Network	Interface	Comment
D 172.16.0.83/16	172.16.0.0	ether1	
D 192.168.126.128/24	192.168.126.0	ether2	

Network

Host	Interval	Timeout	Status	Since
8.8.8.8	00:01:00	1000	up	Apr/01/2018 14:06:28

Script List

Name	Owner	Last Time Started	Run Count
------	-------	-------------------	-----------

Log

Date/Time	Message
Apr/01/2018 12:58:10	memory system.info item added
Apr/01/2018 12:58:19	memory system.info item added
Apr/01/2018 12:58:19	memory dhcp.info dhcp-client on ether1 got IP address 172.16.0.83
Apr/01/2018 12:58:22	memory system.info.account user admin logged in via local
Apr/01/2018 12:58:33	memory system.info.account user admin logged in from 172.16.0.83 via web
Apr/01/2018 12:59:18	memory system.info.account user admin logged in from 172.16.0.83 via winbox
Apr/01/2018 13:05:15	memory system.info.account user admin logged in via local
Apr/01/2018 13:07:25	memory system.info.account user admin logged in from 172.16.0.83 via telnet
Apr/01/2018 13:15:28	memory system.info.account user admin logged in from 192.168.126.1 via winbox
Apr/01/2018 14:02:49	memory system.info.account user admin logged in from 192.168.126.1 via winbox
Apr/01/2018 14:06:28	memory system.info monitoring new host by admin

# Добавление/удаление “своих” колонок

28 (MikroTik) - WinBox v6.41.3 on CHR (x86\_64)

nboard

Session: Fido\_1920\_1080

Interface List

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

Name	Type	Actual ...	L2 MTU	Tx	Rx
eoip-tunnel1	EoIP Tunnel	1458	65535		

1 item out of 5 (1 selected)

0 items

- Name
- Type
- MTU
- Actual MTU
- L2 MTU
- Last Link Down Time
- Last Link Up Time
- Link Downs
- Tx
- Rx
- Tx Packet
- Rx Packet
- FP Tx
- FP Rx
- FP Tx Packet
- FP Rx Packet
- Tx Bytes
- Rx Bytes
- Tx Packets
- Rx Packets
- Tx Drops
- Rx Drops
- Tx Errors
- Rx Errors
- MAC Address
- ARP
- ARP Timeout
- Local Address
- Remote Address
- Tunnel ID
- IPsec Secret
- Keepalive
- DSCP
- Dont Fragment
- Clamp TCP MSS
- Allow Fast Path
- Loop Protect
- Send Interval

# Используя сессии:

Interface List

Interface	Interface List	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE					
+ - ✓ ✗ 📄 🔍														
Name	Type	Actual ...	L2 MTU	Tx	Rx	Tx Packet (...)	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx Pa...	FP Rx Pa...	Local Address	Remote Address	Tunnel ID
eoip-tunnel1	EoIP Tunnel	1458	65535	0 bps	0 bps	0	0	0 bps	0 bps	0	0	1.1.1.1	1.1.1.2	10

RT1

+ - ✓ ✗ 📄 🔍														
Name	Type	Actual ...	L2 MTU	Tx	Rx	Tx Packet (...)	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx Pa...	FP Rx Pa...	Local Address	Remote Address	Tunnel ID
eoip-tunnel1	EoIP Tunnel	1458	65535	0 bps	0 bps	0	0	0 bps	0 bps	0	0	1.1.1.2	1.1.1.1	1

RT2

## Стандартные настройки колонок:

+ - ✓ ✗ 📄 🔍														
Name	Type	Actual ...	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)	Find		
eoip-tunnel1	EoIP Tunnel	1458	65535	0 bps	0 bps	0	0	0 bps	0 bps	0	0			

RT1

нет отличий

RT2

Interface eoip-tunnel1

General	Loop Protect	Status	Traffic	OK
Name: eoip-tunnel1	Cancel			
Type: EoIP Tunnel	Apply			
MTU: 65535	Disable			
Actual MTU: 1458	Comment			
L2 MTU: 65535	Copy			
MAC Address: 02:12:8F:43:DF:BB	Remove			
ARP: enabled	Torch			
ARP Timeout: 30				
Local Address: 1.1.1.1				
Remote Address: 1.1.1.2				
Tunnel ID: 10				
IPsec Secret: [empty]				
Keepalive: [empty]				
DSCP: inherit				
Dont Fragment: no				
Clamp TCP MSS				
Allow Fast Path				
enabled	Apply	Save		

Interface eoip-tunnel1

General	Loop Protect	Status	Traffic	OK
Name: eoip-tunnel1	Cancel			
Type: EoIP Tunnel	Apply			
MTU: 65535	Disable			
Actual MTU: 1458	Comment			
L2 MTU: 65535	Copy			
MAC Address: 02:12:8F:43:DF:BB	Remove			
ARP: enabled	Torch			
ARP Timeout: 30				
Local Address: 1.1.1.2				
Remote Address: 1.1.1.1				
Tunnel ID: 1				
IPsec Secret: [empty]				
Keepalive: [empty]				
DSCP: inherit				
Dont Fragment: no				
Clamp TCP MSS				
Allow Fast Path				
enabled	Apply	Save		

Обычный подход



New Tunnel Rule

General	Advanced	Extra	Action	Statistics	OK
Chain: default	Cancel				
Src Address: [empty]	Apply				
Dst Address: [empty]	Disable				
Protocol: [empty]	Comment				
Src Port: [empty]	Copy				
Dst Port: [empty]	Remove				
Any Port: [empty]	Reset Counters				
In Interface: [empty]	Reset All Counters				
Out Interface: [empty]					
In Interface List: [empty]					
Out Interface List: [empty]					
Package Mark: [empty]					
Connection Mark: [empty]					
Routing Mark: [empty]					
Routing Table: [empty]					
Connection Type: [empty]					
Connection State: [empty]					
Connection NAT State: [empty]					
enabled					

Interface eoip-tunnel1

General	Advanced	Extra	Action	Statistics	OK
Chain: default	Cancel				
Src Address: [empty]	Apply				
Dst Address: [empty]	Disable				
Protocol: [empty]	Comment				
Src Port: [empty]	Copy				
Dst Port: [empty]	Remove				
Any Port: [empty]	Reset Counters				
In Interface: [empty]	Reset All Counters				
Out Interface: [empty]					
In Interface List: [empty]					
Out Interface List: [empty]					
Package Mark: [empty]					
Connection Mark: [empty]					
Routing Mark: [empty]					
Routing Table: [empty]					
Connection Type: [empty]					
Connection State: [empty]					
Connection NAT State: [empty]					
enabled					

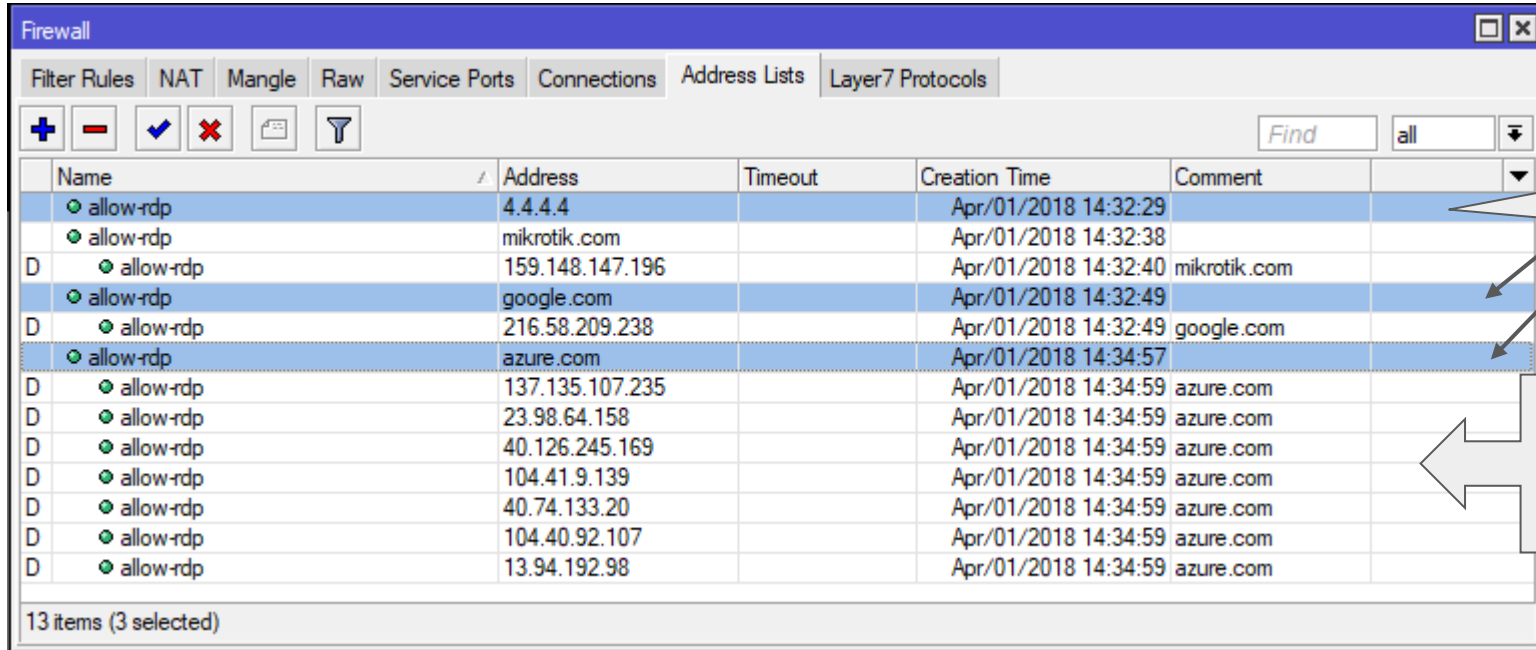
Interface eoip-tunnel1

General	Advanced	Extra	Action	Statistics	OK
Chain: default	Cancel				
Src Address: [empty]	Apply				
Dst Address: [empty]	Disable				
Protocol: [empty]	Comment				
Src Port: [empty]	Copy				
Dst Port: [empty]	Remove				
Any Port: [empty]	Reset Counters				
In Interface: [empty]	Reset All Counters				
Out Interface: [empty]					
In Interface List: [empty]					
Out Interface List: [empty]					
Package Mark: [empty]					
Connection Mark: [empty]					
Routing Mark: [empty]					
Routing Table: [empty]					
Connection Type: [empty]					
Connection State: [empty]					
Connection NAT State: [empty]					
enabled					

Interface eoip-tunnel1

General	Advanced	Extra	Action	Statistics	OK
Chain: default	Cancel				
Src Address: [empty]	Apply				
Dst Address: [empty]	Disable				
Protocol: [empty]	Comment				
Src Port: [empty]	Copy				
Dst Port: [empty]	Remove				
Any Port: [empty]	Reset Counters				
In Interface: [empty]	Reset All Counters				
Out Interface: [empty]					
In Interface List: [empty]					
Out Interface List: [empty]					
Package Mark: [empty]					
Connection Mark: [empty]					
Routing Mark: [empty]					
Routing Table: [empty]					
Connection Type: [empty]					
Connection State: [empty]					
Connection NAT State: [empty]					
enabled					

# Address Lists



The screenshot shows the Mikrotik WinBox Firewall configuration interface, specifically the 'Address Lists' tab. The table below represents the data shown in the interface:

Name	Address	Timeout	Creation Time	Comment
allow-rdp	4.4.4.4		Apr/01/2018 14:32:29	
allow-rdp	mikrotik.com		Apr/01/2018 14:32:38	
D allow-rdp	159.148.147.196		Apr/01/2018 14:32:40	mikrotik.com
allow-rdp	google.com		Apr/01/2018 14:32:49	
D allow-rdp	216.58.209.238		Apr/01/2018 14:32:49	google.com
allow-rdp	azure.com		Apr/01/2018 14:34:57	
D allow-rdp	137.135.107.235		Apr/01/2018 14:34:59	azure.com
D allow-rdp	23.98.64.158		Apr/01/2018 14:34:59	azure.com
D allow-rdp	40.126.245.169		Apr/01/2018 14:34:59	azure.com
D allow-rdp	104.41.9.139		Apr/01/2018 14:34:59	azure.com
D allow-rdp	40.74.133.20		Apr/01/2018 14:34:59	azure.com
D allow-rdp	104.40.92.107		Apr/01/2018 14:34:59	azure.com
D allow-rdp	13.94.192.98		Apr/01/2018 14:34:59	azure.com

13 items (3 selected)

статическая запись

формируется автоматически

Используя Address List - в Firewall будет всего **ОДНО** правило, а не 10. Не нужно следить за изменениями IP адресов

# Interface List

The screenshot illustrates the steps to add a new interface list member in Mikrotik WinBox. The main window is titled "Interface List" and has tabs for "Interface", "Interface List", "Ethernet", "EoIP Tunnel", "IP Tunnel", "GRE Tunnel", "VLAN", "VRRP", "Bonding", and "LTE". The "Interface List" tab is active, showing a table with columns "List" and "Interface". The "Lists" button is highlighted with a red "1". A red arrow points from the "Lists" button to the "New Interface List Member" dialog box, which is also highlighted with a red "2". The dialog box shows "List: VIP" and "Interface: ether1". A third dialog box, "Interface Lists", is open, showing a list of interface lists with "VIP" selected. A fourth dialog box, "Interface List <VIP>", is open, showing the configuration for the "VIP" list. A fifth dialog box, "Routerboard", is partially visible at the bottom right.

List	Interface
VIP	ether1

New Interface List Member

List: VIP

Interface: ether1

OK

Cancel

Apply

Disable

Comment

Copy

Remove

enabled

13 items (3 selected)

Interface Lists

Name
VIP
WAN
::: contains all interfaces
* all
::: contains dynamic interfaces
* dynamic
::: contains no interfaces
* none

5 items (1 selected)

Interface List <VIP>

Name: VIP

Include:

Exclude:

OK

Cancel

Apply

Comment

Copy

Remove

Routerboard

Routerboard

Model:

Serial Number:

Current Firmware:

# Права пользователей

Гранулированные права доступа на основе групп  
/system users groups

Стандартные full, read, write

Категории прав:

**Login policies:** local, telnet, ssh, web, winbox, password, api, dude

**Config Policies:** ftp, reboot, read, write, policy, test, sensitive, sniff, romon

New User

Name: user1

Group: read

Allowed Address:

Last Logged In:

Password:

Confirm Password:

enabled

User List

Users Groups SSH Keys SSH Private Keys Active Users

Name Group Allowed Address Last Logged In

admin full

Login Authentication & Accounting

Use RADIUS

Accounting

Interim Update:

Default Group: read

Exclude Groups:

New Group

Name: group-test

Policies:

local telnet

ssh ftp

reboot read

write policy

test winbox

password web

sniff sensitive

api romon

dude tikapp

Skin: default

# RADIUS

Единая точка хранения данных аутентификации, авторизации и аккаунтинга (при необходимости)

RADIUS можно использовать для аутентификации служб:

login, ppp, hotspot, dhcp (MAC), wireless (MAC), ipsec

The screenshot displays the Mikrotik WinBox interface for configuring a RADIUS server. The 'New Radius Server' dialog is open, showing the following configuration options:

- Service:**  ppp,  login,  hotspot,  wireless,  dhcp,  ipsec
- Called ID:** [Empty field]
- Domain:** [Empty field]
- Address:** 0.0.0.0
- Secret:** [Empty field]
- Authentication Port:** 1812
- Accounting Port:** 1813
- Timeout:** 300 ms
- Accounting Backup
- Realm:** [Empty field]
- Src. Address:** [Empty field]

The background shows the RADIUS server list table:

#	Service	Called ID	Domain	Address	Secret
0	ppp login wireless			172.16.15.125	test-mikr
1					
2					

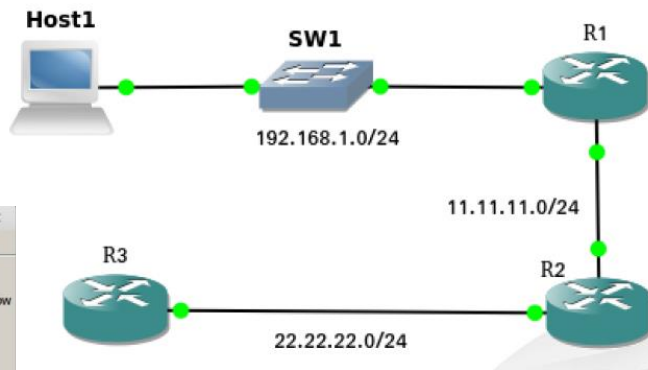
# А Вы используете RoMON?

"Router Management Overlay Network" - возможность достучаться до роутера, когда сеть не работает

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

[https://mum.mikrotik.com/presentations/ID15/presentation\\_2841\\_1447681048.pdf](https://mum.mikrotik.com/presentations/ID15/presentation_2841_1447681048.pdf)

появился в ROS 6.28



WinBox v3.0rc13 (Addresses)

Connect To:   Keep Password  
Login: admin  Open In New Window  
Password:

Add/Set **Connect To RoMON** Connect

Managed **Neighbors** 1

**Refresh** 2 Find all

MAC Address	IP Address	Identity	Version	Board
00:00:AB:2C:DC:00	192.168.1.2	R1	6.29.1	x86
00:00:AB:2C:DC:00	fe80::200:abff:fe2c:...	R1	6.29.1	x86

3

WinBox v3.0rc13 (Addresses)

Connect To: 192.168.1.2  Keep Password  
Login: admin  Open In New Window  
Password:

RoMON Agent: 192.168.1.2

Add/Set Disconnect From RoMON Connect

Managed RoMON Neighbors

**Refresh** Find

Address	Cost	Hops	Path	L2MTU	Identity	Veri
00:00:AB:AE:ED:04	200	1	00:00:AB:AE:ED:04	1500	R2	6.29.1
00:00:AB:E4:C2:04	400	2	00:00:AB:AE:ED:04, 0	1500	R3	6.29.1



# Родительский контроль

`/ip kid-control` Работает на ROS >6.42. Хотя на wiki указано 6.41+

Блокируем или ограничиваем по скорости устройства “детей”

Каждому MAC адресу задается принадлежность к владельцу

Одной командой разрешаем/запрещаем/задаем параметры доступа в интернет сразу на ВСЕ устройства

```
/ip kid-control add name=kid1 fri=7h-22h mon="" sat=6h-22h sun="" \
```

```
thu="" time-rate-limited="" tue="" wed="" rate-limit=10k time-rate-limited=0s-0s
```

```
/ip kid-control device add mac-address=AA:AA:F1:99:11:A1 name=device1 user=kid1
```

```
/ip kid-control device add mac-address=AA:AA:F1:99:11:A2 name=device2 user=kid1
```

```
/ip kid-control pause kid1
```

```
/ip kid-control resume kid1
```

The screenshot shows two windows from Mikrotik WinBox. The top window is the Firewall configuration page, displaying a table of filter rules. The bottom window is the Kid Control configuration page, showing a table of user profiles.

#	Action	Chain	Src. Address	Dst. Address	Proto...	Src. Port	Dst. Port	In. Inter...	Out. Int...	Bytes	Packets
24	D	reject	forward	192.168.1.2						0 B	0
25	D	reject	forward		192.168.1.2					0 B	0

Name	Mon	Tue	Wed	Thu	Fri	Sat
kid1	00:00:00-00:00:00	00:00:00-00:00:00	00:00:00-00:00:00	00:00:00-00:00:00	00:00:00-00:00:00	00:00:00-00:00:00

# MetaRouter

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

MetaRouter is a new feature in RouterOS 4.0 beta 1 and RouterOS v3.21

Currently MetaRouter can be used on

- **RB400, RB700 series** except models with SPI flash, **RB900 series** except models with SPI flash, **RB2011** boards
- Listed PPC boards: **RB1000, RB1100, RB1100AH and RB800.**

MetaRouter - виртуальная машина. Можно поставить Open-WRT и там уже настроить SQUID, Asterisk

Нужно от 16Мб ОЗУ

<https://netflow.by/blog/net/629-zapusk-asterisk-na-mikrotik-s-pomoshchyu-metarouter-i-open-wrt>

<https://habrahabr.ru/post/180889/>

<http://asp24.com.ua/blog/virtualnaja-mashina-metarouter-i-zapusk-openwrt-na-marshrutizatorah-mikrotik/>

# Рекомендации:

- Address Lists
- Interface List (static, dynamic)
- DNS имена в address-list (> 6.36), туннельных интерфейсах и т.д.
- регулярно обновляем ROS и firmware (software “/system package”, firmware “/system routerboard ” ).
- В 6.42 появилось /system routerboard settings set **auto-upgrade**=yes  
routerboard - added RouterBOOT "auto-upgrade" after RouterOS upgrade  
(extra reboot required);

# Рекомендации (продолжение):

- /ip firewall layer7-protocol - используем аккуратно. Сильно грузит CPU
- /ip service - отключаем ненужное, ограничиваем разрешенные IP
- /ip cloud - Dynamic DNS от Mikrotik (появилось в 6.27)  
имя вида *529c0491d41c.sn.mynetname.net*
- Safe mode - бережем свои нервы и ноги !!!
- не забываем о бекапах (\*.rsc and \*.backup)
- bridge - admin mac address

Name	Port	Available From	Certificate
X api	8728		
X api-ssl	8729		none
X ftp	21		
ssh	22	10.0.0.0/8	
telnet	23		
winbox	8291		
www	80		
X www-ssl	443		none

8 items (1 selected)

# Продвинутые возможности:

- remote log, topic log
- users: group right (full, read, write and custom), allow address, SSH keys
- TFTP сервер (загрузка по сети, конфигурация устройств)
- /ip service - меняем порты на нестандартные
- /system watchdog - перезагрузка роутера, если узел недоступен
- /system scheduler - планировщик (on boot, on time, repeat interval)
- AAA, remote radius, user manager
- /tool bandwidth-test - тест пропускной способности канала
- динамическая маршрутизация
- NTP server
- NTP client

# Продвинутые возможности (продолжение):

- auto upgrade (one mikrotik as packages repository, from DUDE)

System -> Auto Upgrade

[https://wiki.mikrotik.com/wiki/Manual:Upgrading\\_RouterOS](https://wiki.mikrotik.com/wiki/Manual:Upgrading_RouterOS)

- QoS - приоритезация трафика (simple queue, queue tree)
- /tool mac-telnet
- шифрование (IPSec, GRE, OpenVPN, L2TP, EoIP т.д.) в т.ч. аппаратное в некоторых моделях н.р. hEX (RB750Gr3)
- Scripting (<https://wiki.mikrotik.com/wiki/Manual:Scripting>)
- /ip settings set rp-filter=strict - игнорируем пакеты с неправильным src (защита от bogon/bogus networks - немаршрутизируемые в интернет сети <https://www.securitylab.ru/blog/personal/aodugin/305208.php>)

# Продвинутые возможности (продолжение):

- /ip neighbor - ищем устройства в сети. Нас тоже могут обнаружить!!!  
подобней <https://habr.com/post/312236/>

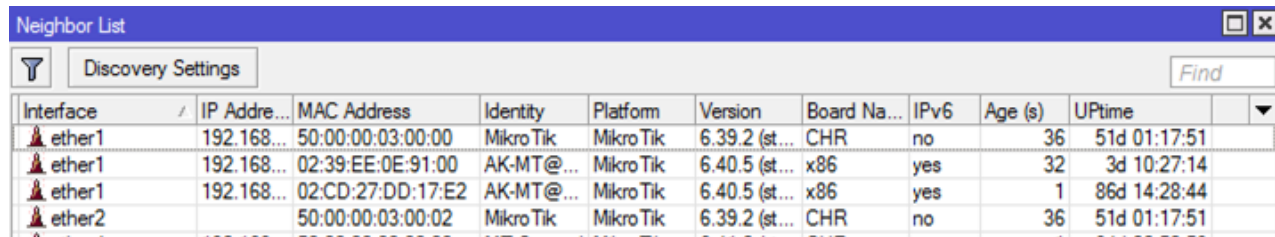
```
/interface bridge filter
```

```
add action=drop chain=output dst-mac-address=01:00:0C:CC:CC:CC/FF:FF:FF:FF:FF:FF \  
    out-interface=ether1-gateway comment="MNDP, CDP"
```

```
add action=drop chain=output comment="LLDP" \  
    dst-mac-address=01:80:C2:00:00:0E/FF:FF:FF:FF:FF:FF out-interface=ether1-gateway
```

```
/ip firewall filter
```

```
add action=drop chain=output comment=Discovery dst-port=5678 \  
    out-interface=ether1-gateway protocol=udp
```



The screenshot shows the 'Neighbor List' window in Mikrotik WinBox. It features a search bar and a table with columns for Interface, IP Address, MAC Address, Identity, Platform, Version, Board Name, IPv6, Age (s), and Uptime. The table contains three entries for ether1 and one for ether2, all identified as MikroTik devices.

Interface	IP Address	MAC Address	Identity	Platform	Version	Board Na...	IPv6	Age (s)	Uptime
ether1	192.168...	50:00:00:03:00:00	MikroTik	MikroTik	6.39.2 (st...	CHR	no	36	51d 01:17:51
ether1	192.168...	02:39:EE:0E:91:00	AK-MT@...	MikroTik	6.40.5 (st...	x86	yes	32	3d 10:27:14
ether1	192.168...	02:CD:27:DD:17:E2	AK-MT@...	MikroTik	6.40.5 (st...	x86	yes	1	86d 14:28:44
ether2		50:00:00:03:00:02	MikroTik	MikroTik	6.39.2 (st...	CHR	no	36	51d 01:17:51

# Методы отладки (troubleshooting):

- /tool ping
- /tool traceroute
- /tool torch
- /log, /system logging - логируем нужное подробно
- /tool sniffer - захватываем и анализируем пакеты.

Складываем локально или отправляем по протоколу TZSP и смотрим в real time в Wireshark (udp.port == 37008)



# Нужна помощь, интернет не работает?

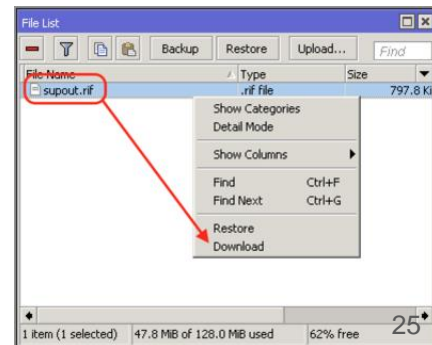
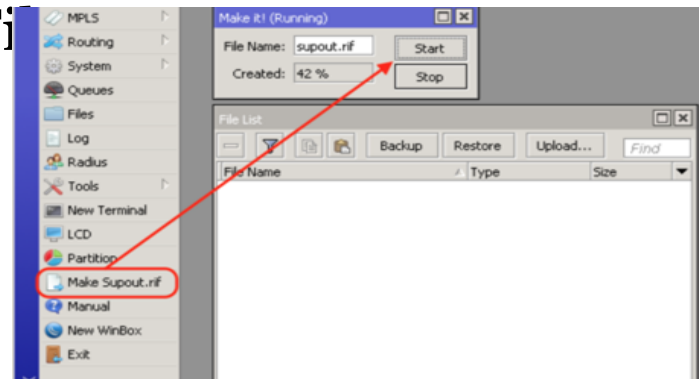
## Support Output File

доступно создание из Winbox, Webfig, Console

```
/system sup-output name=supout.rif
```

Копируем файл к себе и передаем другу или в техподдержку. В нем содержится: логи, конфигурация, текущее состояние

Посмотреть содержимое файла можно на сайте <https://mikrotik.com/client/supout>



# Нужна помощь, инетрет не работает?

## Support Output File

address	instchk	queue
address6	interface	queue-bytes
arp	ippool	queue-packets
bfd	ipsec	queue-stats
bgp	license	resource
bridge	log	route
certificate	mesh	route6
dhcp	mme	routerboard
export	mpls	store
firewall	neighbor	switch
firewall-bytes	neighbor6	usb
firewall-packets	nexthop	web-proxy
firewall-stats	ospf	webproxy
firewall6	package	webproxy-test
firewall6-stats	pci	wireless
health	port	
hotspot	ppp	

# Полезные ссылки и контакты:

- <https://mikrotik.com/download>
- <https://wiki.mikrotik.com/wiki/Manual:TOC>
- mikrotik backup and configure system - Ansible  
([http://mum.mikrotik.com/presentations/RU16/presentation\\_3841\\_1476092869.pdf](http://mum.mikrotik.com/presentations/RU16/presentation_3841_1476092869.pdf),  
<https://youtu.be/-NfES26eE-c> )
- <https://mum.mikrotik.com/archive>
- [https://wiki.mikrotik.com/wiki/Manual:Packet\\_Flow](https://wiki.mikrotik.com/wiki/Manual:Packet_Flow)



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