

MUM in Kyrgyzstan 2015

MikroTik



ООО «ЛокТехно»

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Виртуализация RouterOS на базе оборудования MikroTik



- Что такое виртуализация?
- Как создать её с помощью metarouter?
- Для чего нужна виртуализация на RouterOS?
- Плюсы и минусы.



Виртуализация — это проверенная программная технология, которая делает возможной одновременное выполнение нескольких ОС и приложений на одном сервере. Она трансформирует ИТ-ландшафт и коренным образом меняет способ использования технологий



Как создать её с помощью Metarouter?



Возьмем Коммутатор
Mikrotik Cloud Router Switch
CRS125-24G-1S-2HnD-IN



Создадим мост

admin@4C:5E:0C:90:8B:9A (MikroTik) - WinBox v6.32.1 on CRS125-24G-1S-2HnD (mipsbe)

Safe Mode

Hide Passwords

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

Bridge

	Name	Type	L2
R	bridge-local	Bridge	
R	bridge-mr1	Bridge	

2 items out of 28 (1 selected)

Interface <bridge-mr1>

General STP Status Traffic

Name: bridge-mr1
Type: Bridge
MTU:
Actual MTU: 1500
L2 MTU: 65535
MAC Address:
ARP: enabled
Admin. MAC Address:
OK
Cancel
Apply
Disable
Comment
Copy
Remove
Torch

Packet (p/s)	MAC Address	Protoco...
23	4C:5E:0C:90:8B:9A	rstp
0		rstp

enabled running slave

RouterOS WinBox

Создаем 1вый виртуальный роутер

admin@4C:5E:0C:90:8B:9A (MikroTik) - WinBox v6.32.1 on CRS125-24G-1S-2HnD (mipsbe)

Safe Mode Hide Passwords

- Quick Set
- CAPsMAN
- Interfaces
- Wireless
- Bridge
- PPP
- Switch
- Mesh
- IP
- MPLS
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- LCD
- MetaROUTER**
- Partition
- Make Supout.tif
- Manual
- Exit

MetaROUTERS

MetaROUTERS Interfaces Virtual Ethernet

+ = ✓ ✕ ⚡ Import Image

Name	Memory...	Disk Si...	Used
0 items			

New MetaROUTER

Name:

Memory Size: MiB

Disk Size: kiB

Used Disk:

Disk Reads:

Disk Writes:

enabled Status: disabled

RouterOS WinBox

Создаем 2 виртуальных порта и добавляем их в мост mr1

The screenshot displays the MikroTik WinBox interface. The left sidebar contains a navigation menu with the following items: Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, LCD, MetaROUTER (highlighted with a blue circle), Partition, Make Supout.rif, Manual, and Exit. The main window shows the 'MetaROUTERS' configuration page, with the 'Interfaces' tab selected. A 'New VM Interface' dialog box is open, showing the following configuration:

- Virtual Machine: mr1
- Type: dynamic static
- Dynamic MAC Address: 02:5A:5C:0D:F1:92
- Dynamic Bridge: bridge-mr1
- VM MAC Address: 02:C1:6E:4E:66:33

The 'OK' button in the dialog box is also highlighted with a blue circle. The status bar at the bottom of the dialog box indicates 'enabled'. The main window title bar shows 'admin@4C:5E:0C:90:8B:9A (MikroTik) - WinBox v6.32.1 on CRS125-24G-1S-2HnD (mipsbe)'. The top right corner of the window has a 'Hide Passwords' checkbox and a lock icon.

Добавляем физический порт в мост mr1

admin@4C:5E:0C:90:8B:9A (MikroTik) - WinBox v6.32.1 on CRS125-24G-1S-2HnD (mipsbe)

Safe Mode Hide Passwords

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

Bridge

Interface	Bridge	Priority
ether2-master1	bridge-local	
vif1	bridge-mr1	
vif2	bridge-mr1	
wlan1	bridge-local	

4 items (1 selected)

New Bridge Port

General Status

Interface: ether3-slave-local

Bridge: bridge-mr1

Priority: 80 hex

Path Cost: 10

Horizon: auto

Edge: auto

Point To Point: auto

External FDB: auto

Auto Isolate

enabled inactive

OK Cancel Apply Disable Comment Copy Remove

Find

Для связи с виртуальным роутером указываем ему ip 10.10.1.1/24

The screenshot displays the Mikrotik WinBox interface. The top status bar shows the user is logged in as 'admin' on a MikroTik device. The left sidebar contains a menu with 'IP' highlighted. The main window shows the 'Address List' configuration page. A 'New Address' dialog box is open, with the 'Address' field set to '10.10.1.1/24' and the 'Interface' set to 'bridge-mr1'. The 'Address List' table below the dialog shows 2 items.

RouterOS WinBox

admin@4C:5E:0C:90:8B:9A (MikroTik) - WinBox v6.32.1 on CRS125-24G-1S-2HnD (mipsbe)

Safe Mode

Hide Passwords

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

Address List

New Address

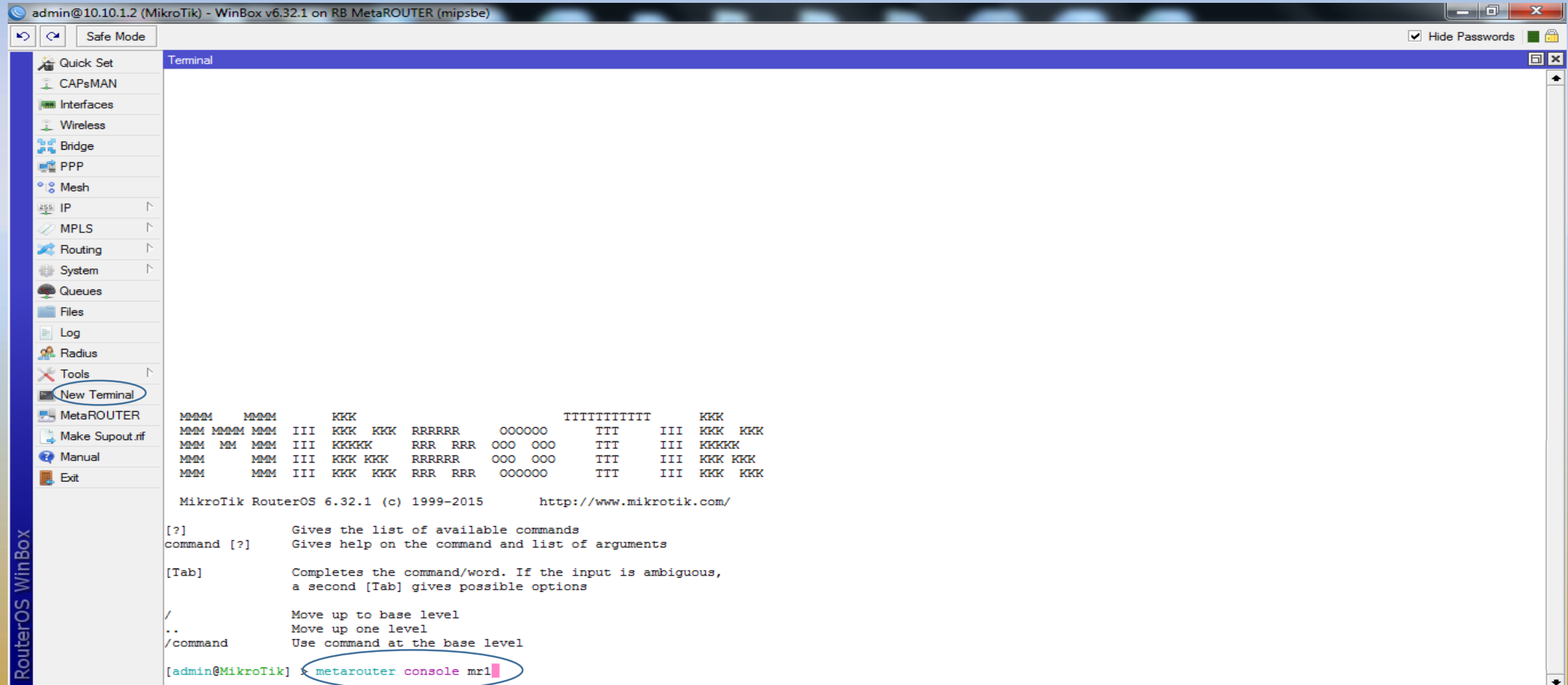
Address: 10.10.1.1/24
Network:
Interface: bridge-mr1

OK
Cancel
Apply
Disable
Comment
Copy
Remove

enabled

2 items

Заходим через консоль на виртуальный роутера командой



The screenshot shows the WinBox interface for MikroTik RouterOS. The left sidebar contains a menu with items like Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Make Supout.tif, Manual, and Exit. The 'New Terminal' item is circled in blue. The main terminal window displays the RouterOS boot screen with a ASCII art logo, version information (6.32.1), and a list of help commands. At the bottom of the terminal, the command `metarouter console mr1` is being entered, with 'metarouter' circled in blue.

```
admin@10.10.1.2 (MikroTik) - WinBox v6.32.1 on RB MetaROUTER (mipsbe)
Safe Mode
Hide Passwords

Terminal

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

MMMM  MMM  KKK                TTTTTTTTTT  KKK
MMM MMMM MMM III  KKK  KKK  RRRRRR  OOOOOO  TTT  III  KKK  KKK
MMM MM  MMM III  KKKKKK  RRR  RRR  OOO  OOO  TTT  III  KKKKK
MMM  MMM III  KKK  KKK  RRRRRR  OOO  OOO  TTT  III  KKK  KKK
MMM  MMM III  KKK  KKK  RRR  RRR  OOOOOO  TTT  III  KKK  KKK

MikroTik RouterOS 6.32.1 (c) 1999-2015      http://www.mikrotik.com/

[?]          Gives the list of available commands
command [?]  Gives help on the command and list of arguments

[Tab]        Completes the command/word. If the input is ambiguous,
              a second [Tab] gives possible options

/            Move up to base level
..           Move up one level
/command     Use command at the base level

[admin@MikroTik] > metarouter console mr1
```

Производим базовую настройку прописываем ip, настраиваем dhcp

```
admin@4C:5E:0C:90:8B:9A (MikroTik) - WinBox v6.32.1 on CRS125-24G-1S-2HnD (mipsbe)
Safe Mode
Terminal
MMM   MMM   III   KKK   KKK   RRR   RRR   OOOOOO   TTT   III   KKK   KKK
MikroTik RouterOS 6.32.1 (c) 1999-2015      http://www.mikrotik.com/

[?]          Gives the list of available commands
command [?]  Gives help on the command and list of arguments

[Tab]       Completes the command/word. If the input is ambiguous,
            a second [Tab] gives possible options

/           Move up to base level
..         Move up one level
/command    Use command at the base level
Jan/02/1970 00:01:03 system,error,critical router was rebooted without proper shu
tdown

[admin@MikroTik] > interface ethernet print
Flags: X - disabled, R - running, S - slave
#   NAME   MTU MAC-ADDRESS   ARP   MASTER-PORT   SWITCH
0 R ether1 1500 02:C1:6E:4E:66:33 enabled none
1 R ether2 1500 02:76:24:00:66:C7 enabled none

[admin@MikroTik] > ip address add address=10.10.1.2/24 interface=ether1
[admin@MikroTik] > ip address add address=10.10.10.1/24 interface=ether2
[admin@MikroTik] > ip dhcp-server setup
Select interface to run DHCP server on

dhcp server interface: ether2
Select network for DHCP addresses

dhcp address space: 10.10.10.0/24
Select gateway for given network

gateway for dhcp network: 10.10.10.1
Select pool of ip addresses given out by DHCP server

addresses to give out: 10.10.10.2-10.10.10.254
Select DNS servers

dns servers: 10.10.10.1
Select lease time

lease time: 10m
[admin@MikroTik] >
```

Подключаемся через Winbox с рабочего компьютера для которого мы добавили ip

The screenshot shows the WinBox interface for RouterOS. The title bar indicates the user is logged in as 'admin@10.10.10.1' on a MikroTik RB MetaROUTER. The left sidebar contains a menu with options like Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Make Supout.rif, Manual, and Exit. The 'IP' menu item is circled in blue. Two windows are open in the main area: 'Interface List' and 'Address List'.

Interface List

Interface	Name	Type	L2
R	ether1	Ethernet	
R	ether2	Ethernet	

Address List

Address	Network	Interface
10.10.1.2/24	10.10.1.0	ether1
10.10.10.1/24	10.10.10.0	ether2

2 items

RouterOS WinBox

Это не все



- Также в качестве операционной системы для виртуального маршрутизатора, можно использовать не только Mikrotik RouterOS, но и специально собранные образы других систем на базе ядра Linux. Так, например, собрать образ операционной системы OpenWRT, с необходимым вам набором пакетов, и установить его в MetaRouter. Или же, скачать уже готовый образ.



Качаем готовый OpenWRT. Зальем файл на маршрутизатор, в раздел Files.

- <http://www.mikrotik.com/download/metarouter/openwrt-mr-mips-rootfs.tgz>



Перетаскиваем скопированный нами в файл в файлообменник

The screenshot shows the Mikrotik WinBox interface. The left sidebar contains various configuration categories, with 'Files' highlighted. A 'File List' window is open, displaying a table of files and directories. The file 'openwrt-mr-mips-rootfs.tgz' is circled in blue. The status bar at the bottom of the window indicates 3 items, 19.5 MiB of 128.0 MiB used, and 84% free space.

File Name	Type	Size	Creation Time
openwrt-mr-mips-rootfs.tgz	tgz file	2112.2 KB	Sep/20/2015 17:36:35
pub	directory		Sep/20/2015 18:18:23
skins	directory		Jan/01/1970 06:00:01

3 items | 19.5 MiB of 128.0 MiB used | 84% free

Далее переходим в раздел MetaROUTER и нажимаем на кнопку Import Image. Выбираем наш файл.

The screenshot shows the WinBox interface for a MikroTik device. The left sidebar contains a navigation menu with the following items: Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, LCD, MetaROUTER (highlighted with a blue circle), Partition, Make Supout.rif, Manual, and Exit. The main window displays the 'MetaROUTERS' configuration page, which is divided into three tabs: 'MetaROUTERS', 'Interfaces', and 'Virtual Ethernet'. The 'MetaROUTERS' tab is active, showing a table with the following data:

Name	Memory...	Disk Si...	Used D...	Status
mr1	24		112	running
mr2	16			

Below the table, there is a '2 items' indicator. The 'Import Image' button is circled in blue. An 'Import Image (Running)' dialog box is open, showing the following fields and buttons:

- File Name: openwrt-mr-mips-rootfs.tgz (circled in blue)
- Memory Size: 16 MiB
- Enabled:
- Imported: 18 %
- Buttons: Start (circled in blue), Stop

Создаем второй виртуальный роутер mr2 по схеме как и первый

The screenshot displays the MikroTik WinBox interface with the following configurations:

- Bridge Table:**

Name	Type	L2 MTU	Tx	Rx
bridge-local	Bridge	1588	5.5 kbps	9.6 kbps
bridge-mr1	Bridge	1588	0 bps	0 bps
bridge-mr2	Bridge	1588	0 bps	0 bps

- MetaROUTERS Table:**

Virtual Machine	Type	Static Interface	VM MAC Address
mr1	dynamic		02:C1:6E:4E:66:33
mr1	dynamic		02:76:24:00:66:C7
mr2	dynamic		02:7C:93:BE:D7:88
mr2	dynamic		02:B1:33:8C:BA:85

- Bridge Interface Table:**

Interface	Bridge	Priority (h...)	Path Cost	Horizon	Role	Root P...
ether2-master-local	bridge-local	80	10		designated port	
ether3-slave-local	bridge-mr1	80	10		designated port	
ether4-slave-local	bridge-mr2	80	10		disabled port	
vif1	bridge-mr1	80	10		designated port	
vif2	bridge-mr1	80	10		designated port	
vif3	bridge-mr2	80	10		designated port	
vif4	bridge-mr2	80	10		designated port	
wlan1	bridge-local	80	10		designated port	

- Address List Table:**

Address	Network	Interface
10.10.1.1/24	10.10.1.0	bridge-mr1
10.10.2.1/24	10.10.2.0	bridge-mr2
::: default configuration		
192.168.87.1/...	192.168.87.0	ether2-master-lo...
192.168.88.24...	192.168.88.0	ether1-gateway

Заходим на консоль виртуального роутера mr2 командой `metarouter console mr2` или же нажав кнопку КОНСОЛЬ.

The screenshot shows the WinBox interface for MikroTik WinBox v6.32.1. The main window displays the 'MetaROUTERs' configuration page. A table lists two MetaROUTERs: 'mr1' and 'mr2'. The 'mr2' row is selected and highlighted in blue. To the right, a configuration window for 'MetaROUTER <mr2>' is open, showing various settings like Name, Memory Size, Disk Size, Used Disk, Disk Reads, and Disk Writes. The 'Console' button in this window is circled in blue. The left sidebar contains various system management options, with 'MetaROUTER' also circled in blue. The top status bar shows 'CPU: 7%' and 'Hide Passwords' checked.

Name	Memory...	Disk Size (kiB)	Used Disk (kiB)	Status
mr1	24		112	running
mr2	24		5146	running

MetaROUTER <mr2> configuration window details:

- Name: mr2
- Memory Size: 24 MiB
- Disk Size: [] kiB
- Used Disk: 5146 kiB
- Disk Reads: 4852
- Disk Writes: 224
- Buttons: OK, Cancel, Apply, Disable, Copy, Remove, Console (circled), Start, Shut down, Reboot
- Status: running

Для чего нужна виртуализация на RouterOS?



- Обучения.
- Создания тестовой среды.
- Создания разных сетей.
- Использование других ос.



Плюсы

- Все в одной коробке
- Простота в настройке
- Цена



Минусы

- Отказоустойчивость
- Потеря
производительности



Вопросы?



Спасибо за внимание!

