



Virtualización en MetaROUTER

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MKE Solutions

www.mikrotikexpert.com

MetaROUTER

- MetaROUTER es un modulo de virtualización, propio de MikroTik.
- Está disponible desde la versión de RouterOS 3.21
- Actualmente se puede implementar en:
 - RB400, RB700 series, RB900 series, RB2011 boards.
 - PPC boards: RB1000, RB1100, RB1100AH and RB800.
- Es posible crear VM para correr RouterOS y OpenWrt.



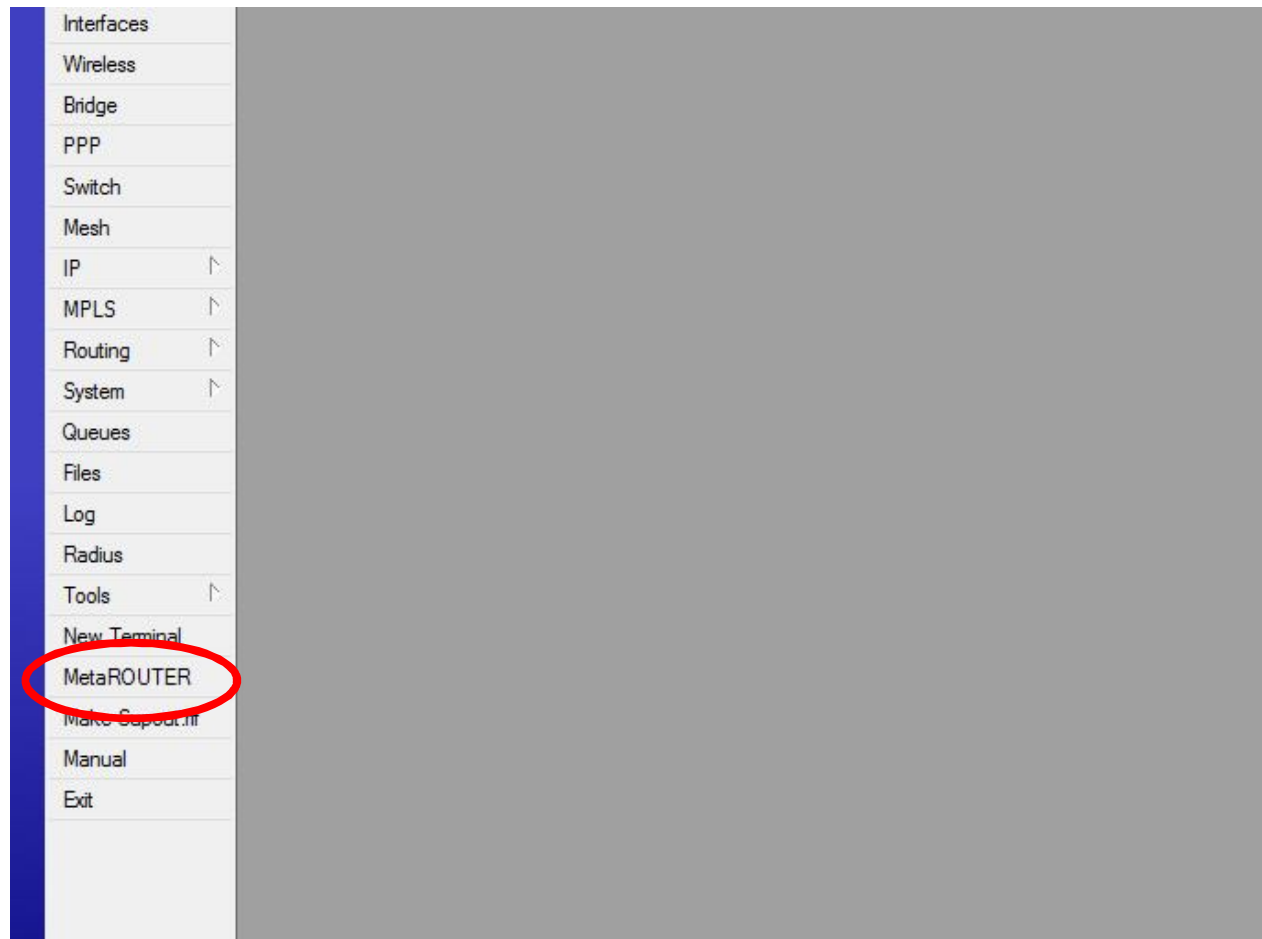
OpenWRT

- OpenWRT es una distribución Linux para dispositivos embebidos.
- Esta distribución ha sido optimizada para ocupar un mínimo espacio en la instalación.
- Hay alrededor de 2000 paquetes disponibles para ser instalados a través **opkg**.
- <http://wiki.openwrt.org/doc/>

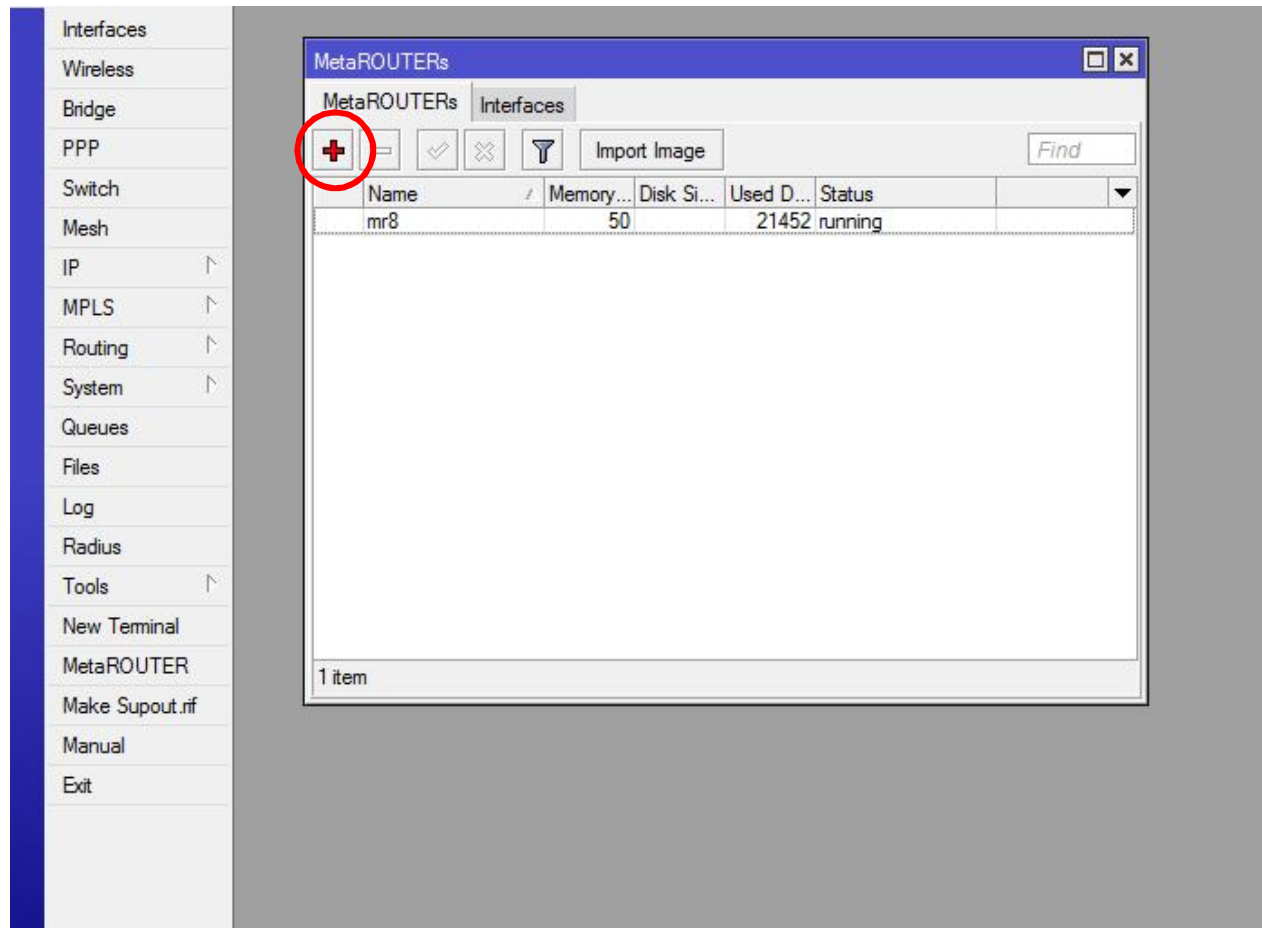
MetaROUTER – Requerimientos y Limitaciones

- Cada VM requiere al menos 16 MB memoria RAM (32 MB RAM recomendado).
- Hasta 8 máquinas virtuales por host.
- Hasta 8 interfaces virtuales pueden ser conectadas a VM de MetaROUTER.
- No soporta el uso de dispositivos de almacenamiento externo.

Configuración de MetaROUTER



Configuración de MetaROUTER

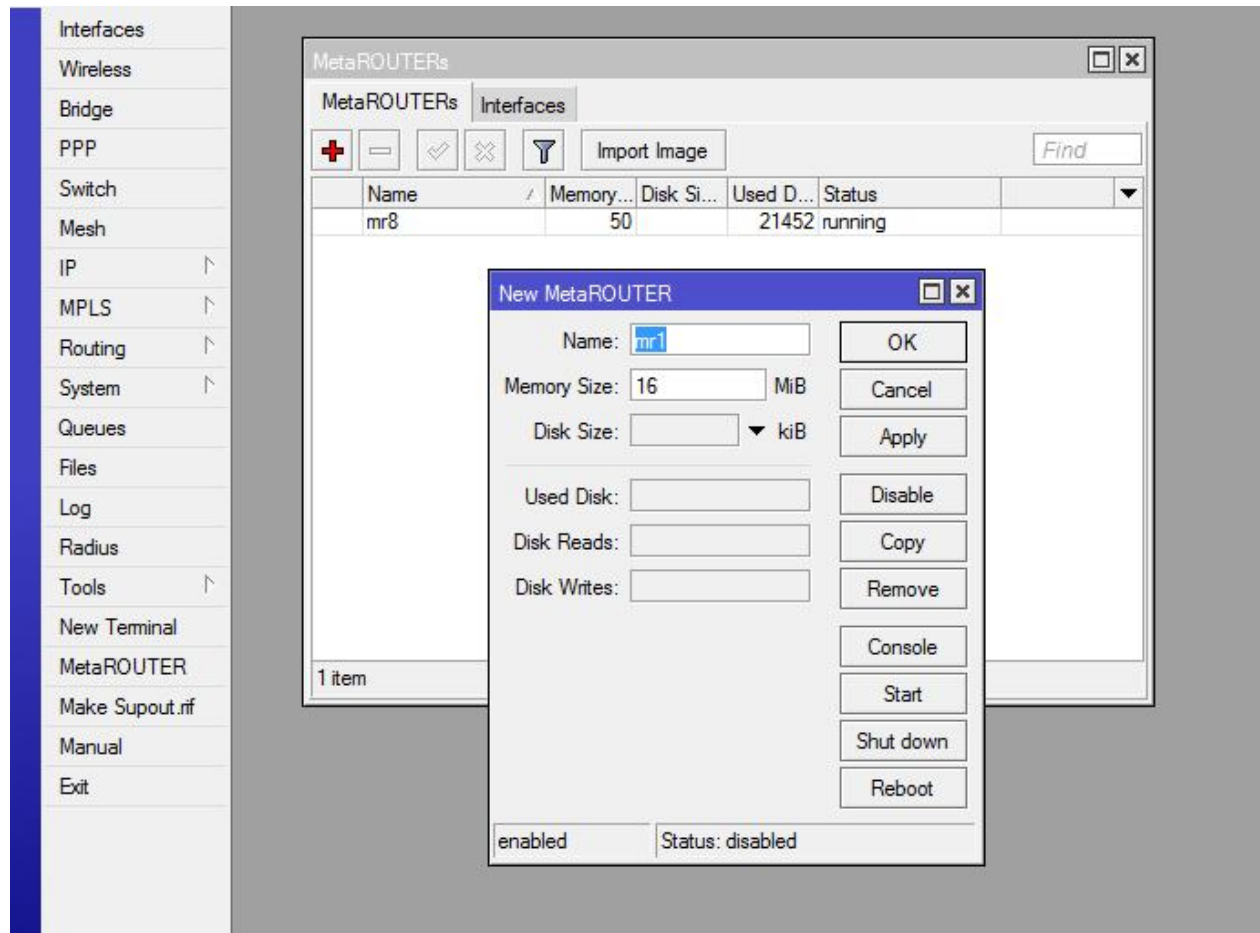


The screenshot shows the WinBox interface with the 'MetaROUTERs' window open. The 'Add' button (+) is circled in red. The table below shows one existing MetaROUTER named 'mr8'.

Name	Memory...	Disk Si...	Used D...	Status
mr8		50	21452	running

1 item

Configuración de MetaROUTER



The screenshot shows the MikroTik WinBox interface. On the left is a navigation menu with options like Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Make Supout.nf, Manual, and Exit. The main window displays the 'MetaROUTERs' configuration page. A table lists the existing MetaROUTERs:

Name	Memory...	Disk Si...	Used D...	Status
mr8	50		21452	running

Below the table, there is a '1 item' indicator. A 'New MetaROUTER' dialog box is open, allowing for the creation of a new instance. The dialog contains the following fields and buttons:

- Name:
- Memory Size: MiB
- Disk Size: kiB
- Used Disk:
- Disk Reads:
- Disk Writes:
- Buttons: OK, Cancel, Apply, Disable, Copy, Remove, Console, Start, Shut down, Reboot

At the bottom of the dialog, there are two checkboxes: 'enabled' (checked) and 'Status: disabled'.

Configuración de MetaROUTER

The screenshot displays the WinBox interface for configuring MetaROUTERs. On the left is a sidebar menu with categories like Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Make Suptout.tif, Manual, and Exit. The main window shows the 'MetaROUTERs' configuration table with columns for Name, Memory, Disk Size, Used Disk, and Status. A dialog box for 'MetaROUTER <mr1>' is open, showing configuration details for 'mr1'.

Name	Memory...	Disk Si...	Used Disk (kiB)	Status
mr1	32		265	running
mr8	50		21452	running

The configuration dialog for 'mr1' shows:

- Name: mr1
- Memory Size: 32 MiB
- Disk Size: [] kiB
- Used Disk: 265 kiB
- Disk Reads: 5990
- Disk Writes: 767

Buttons include OK, Cancel, Apply, Disable, Copy, Remove, Console, Start, Shut down, and Reboot. The status is 'enabled' and 'Status: running'.

The terminal window on the right shows the MetaROUTER boot sequence:

```

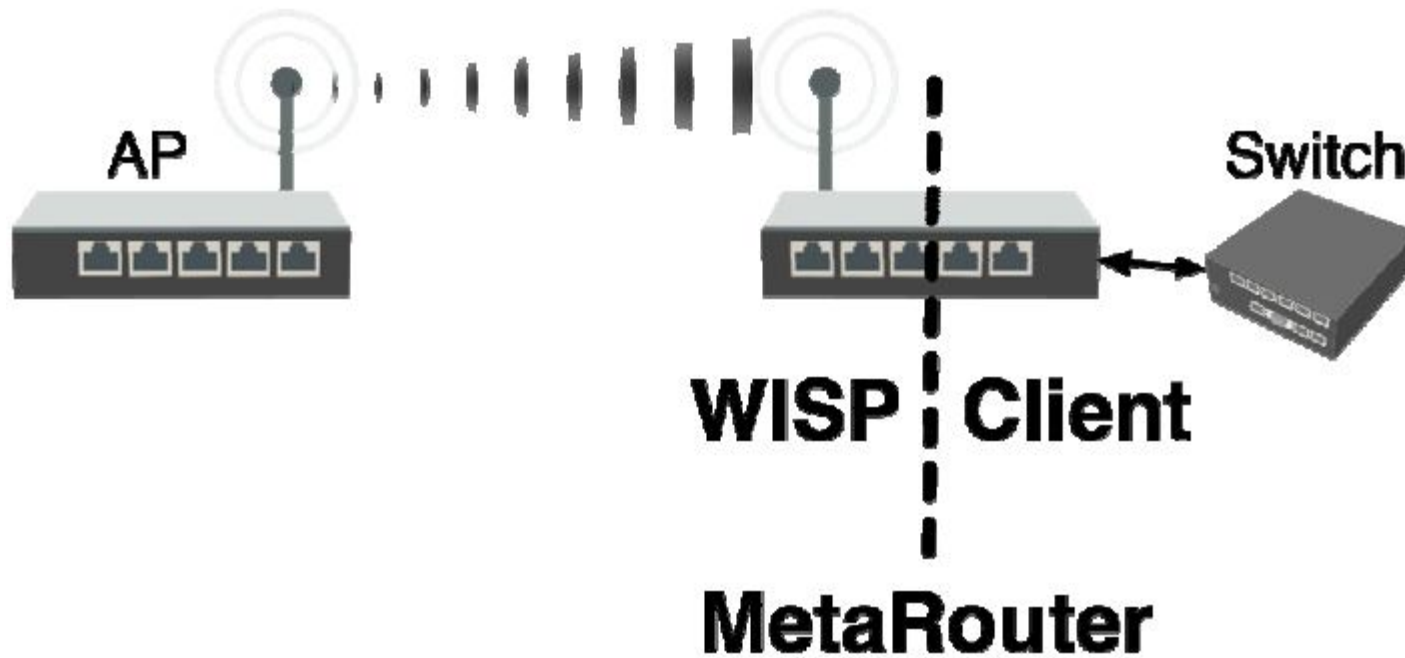
MMM      MMM      KKK
MMM      MMM      KKK
MMM MMM MMM III  KKK KKK RRRRRR  OOOOOO  TTT  III  KKK KKK
MMM MM  MMM III  KKKKKK  RRR RRR  OOO OOO  TTT  III  KKKKKK
MMM  MMM  III  KKK KKK  RRRRRR  OOO OOO  TTT  III  KKK KKK
MMM  MMM  III  KKK KKK  RRR RRR  OOOOOO  TTT  III  KKK KKK

MikroTik RouterOS 5.22 (c) 1999-2012      http://www.mikrotik.com/

jan/02/1970 00:02:39 system,error,critical login failure for user admin\t via loc
al

[admin@MikroTik] >
    
```


Ejemplo: Uso en clientes WISP



Ejemplo: Uso en clientes WISP

El cliente accede a “su” router, sin la necesidad de colocar otro hardware.

De esta manera configura su router virtual de acuerdo a sus necesidades, sin interferir en la configuración del router principal del WISP.

Ejemplo: Uso en clientes WISP

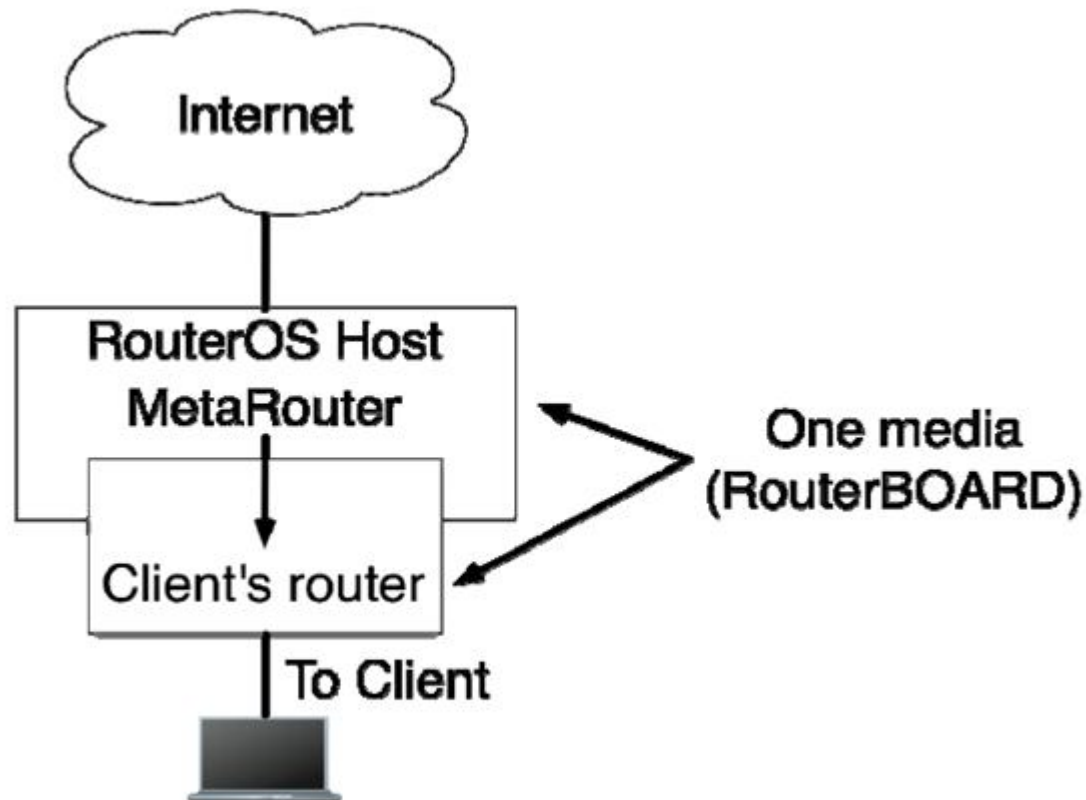
• Acceso WISP

- Administración inalámbrica
- Configuración IP
- Control de ancho de banda
- Firewall del WISP
- Ruteo

• Acceso Cliente

- VPN tunnels
- DHCP
- Firewall
- Control de ancho de banda para clientes locales.
- VLANs
- Monitoreo de tráfico

Ejemplo: Uso en clientes WISP



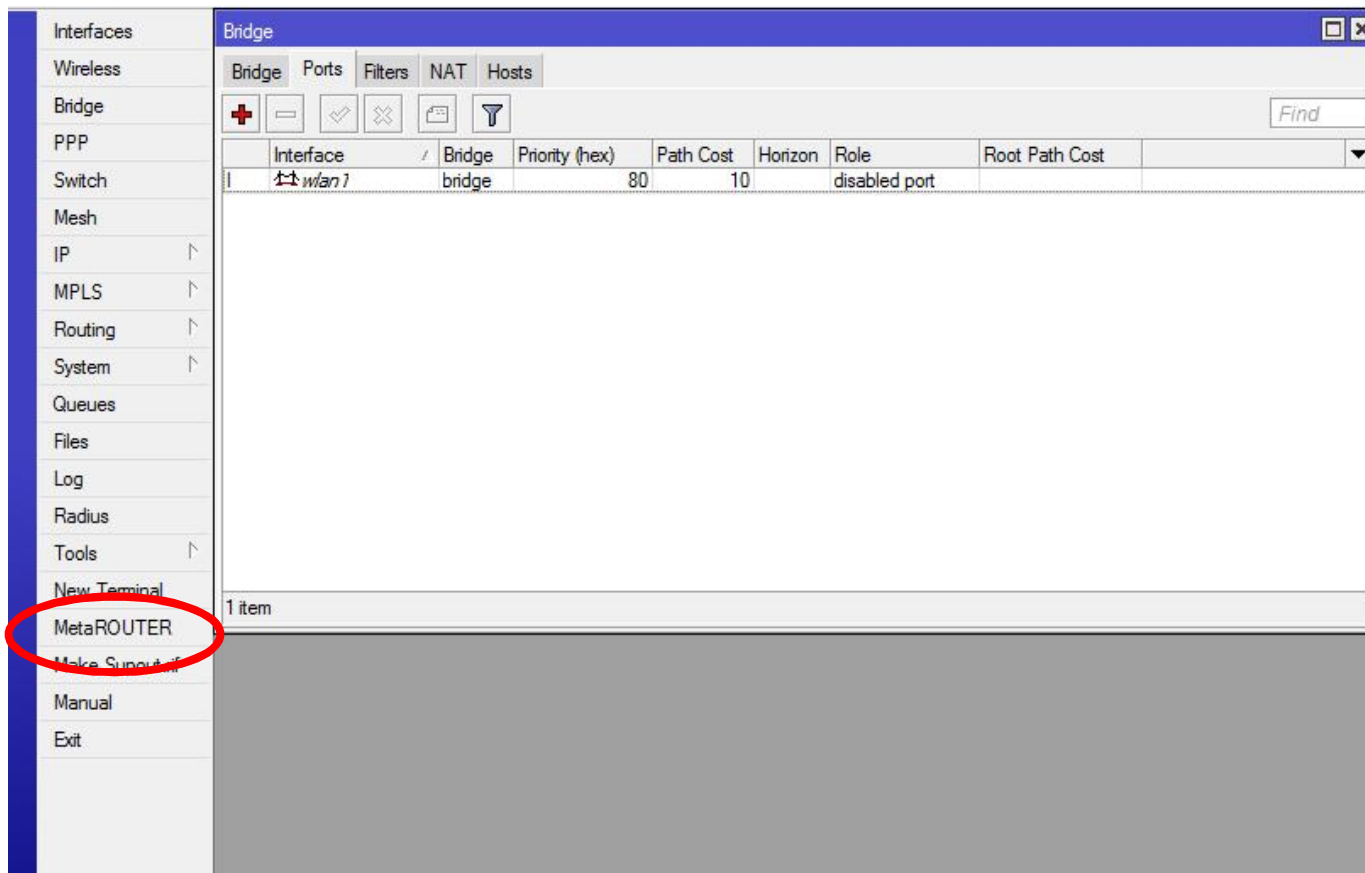
Referencia: MUM 2009 - Uldis Cernevskis

Ambos routerOS con la misma licencia

Interfaces Virtuales en MetaROUTER

- Dos tipos de interfaces virtuales:
 - Interfaces virtuales **dinámicas**, usadas para conectar a un bridge.
 - Interfaces virtuales **estáticas** usadas para conectar a un puerto físico.

Interface virtual Dinámica

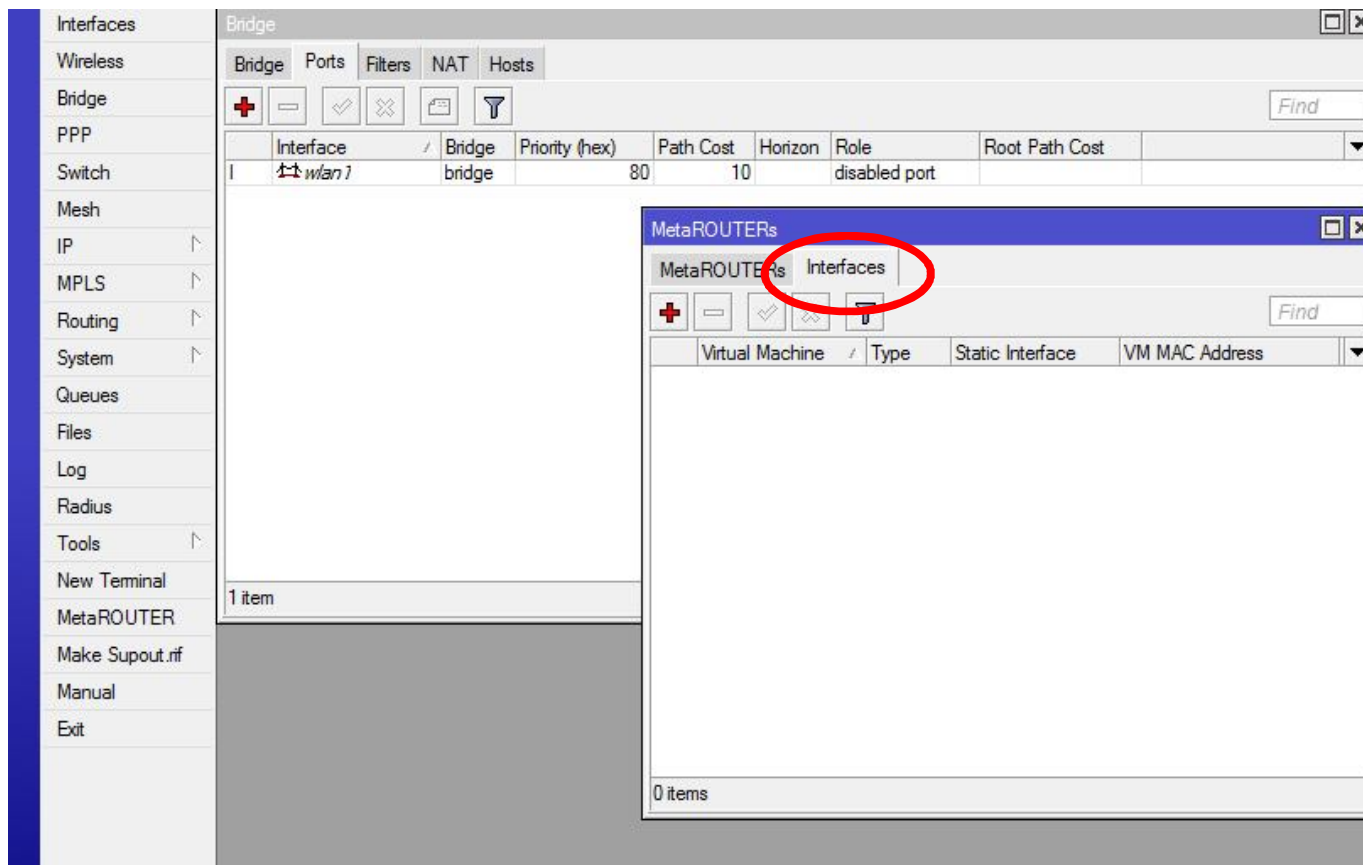


The screenshot shows the MikroTik WinBox interface. On the left is a navigation menu with the following items: Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER (circled in red), Make Support, Manual, and Exit. The main window is titled 'Bridge' and contains tabs for Bridge, Ports, Filters, NAT, and Hosts. Below the tabs are several icons and a 'Find' search box. A table displays bridge configuration details:

Interface	Bridge	Priority (hex)	Path Cost	Horizon	Role	Root Path Cost
wan1	bridge	80	10		disabled port	

At the bottom of the table area, it indicates '1 item'.

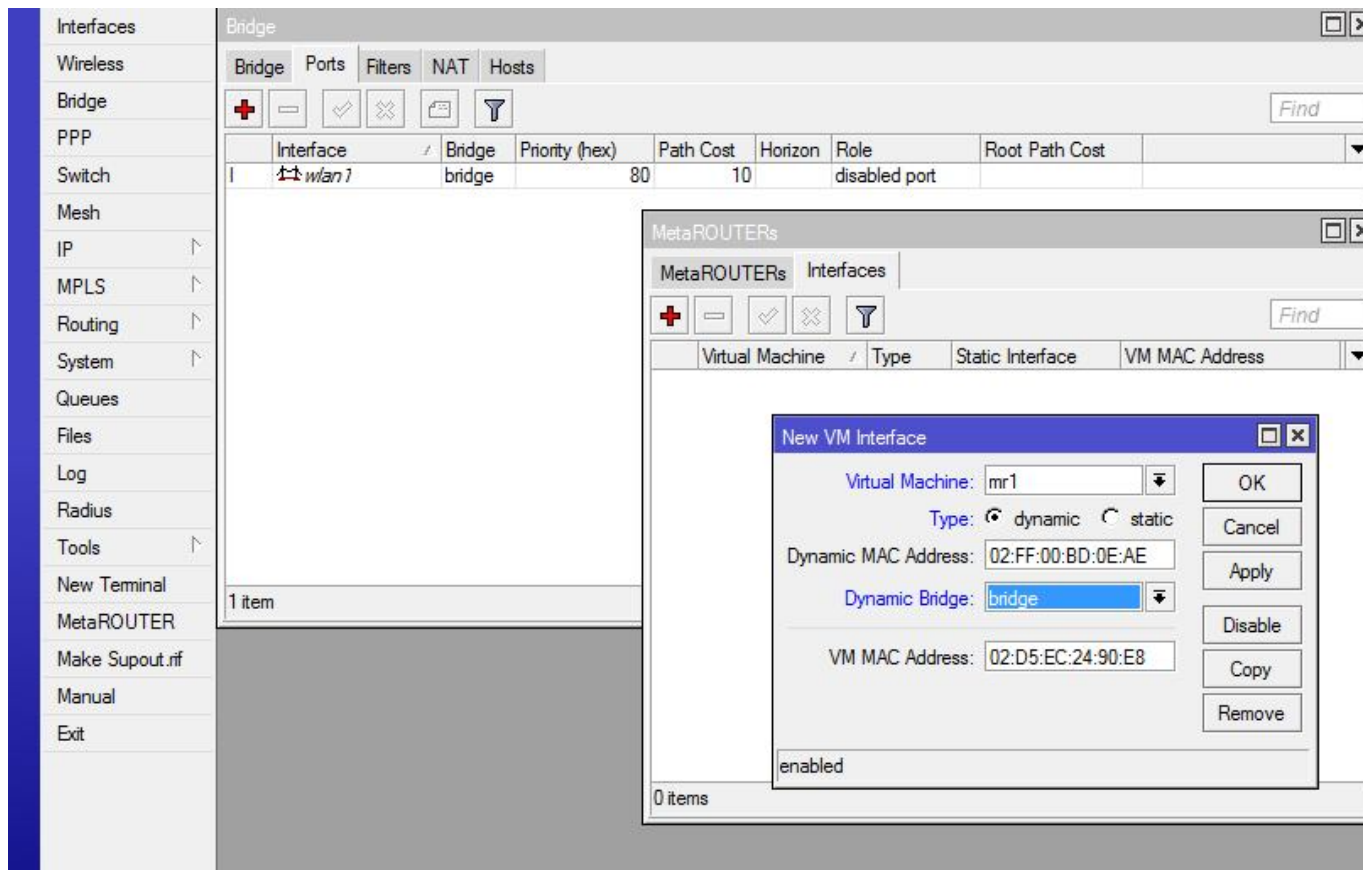
Interface virtual Dinámica



The screenshot displays the MikroTik WinBox interface. On the left is a navigation menu with categories like Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, and various utility options. The main area is divided into two windows:

- Bridge Window:** Shows a table with columns: Interface, Bridge, Priority (hex), Path Cost, Horizon, Role, and Root Path Cost. One entry is visible: Interface *wlan1*, Bridge *bridge*, Priority *80*, Path Cost *10*, Role *disabled port*.
- MetaROUTERS Window:** Has tabs for *MetaROUTERS* and *Interfaces*. The *Interfaces* tab is selected and circled in red. It contains a table with columns: Virtual Machine, Type, Static Interface, and VM MAC Address. The table is currently empty.

Interface virtual Dinámica



The screenshot shows the MikroTik WinBox interface. On the left is a navigation menu with categories like Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Make Supout.rif, Manual, and Exit. The main window is titled 'Bridge' and contains a table of bridge interfaces. A 'MetaROUTERS' window is open, showing a table of virtual machines. A 'New VM Interface' dialog box is also open, showing the configuration for a dynamic interface.

Bridge Table:

Interface	Bridge	Priority (hex)	Path Cost	Horizon	Role	Root Path Cost
wlan1	bridge	80	10		disabled port	

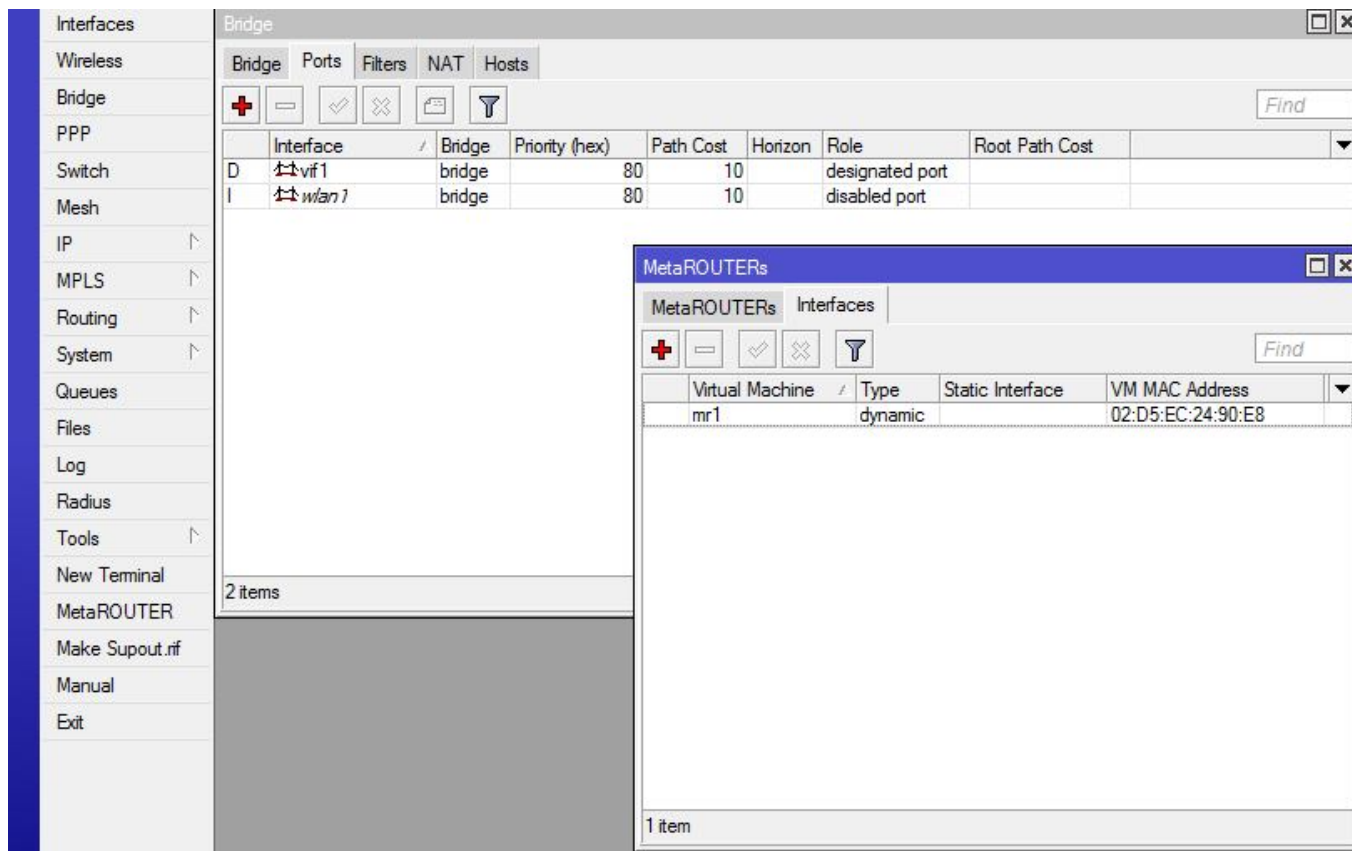
MetaROUTERS Table:

Virtual Machine	Type	Static Interface	VM MAC Address
mr1	dynamic		02:FF:00:BD:0E:AE

New VM Interface Dialog:

- Virtual Machine: mr1
- Type: dynamic static
- Dynamic MAC Address: 02:FF:00:BD:0E:AE
- Dynamic Bridge: bridge
- VM MAC Address: 02:D5:EC:24:90:E8

Interface virtual Dinámica



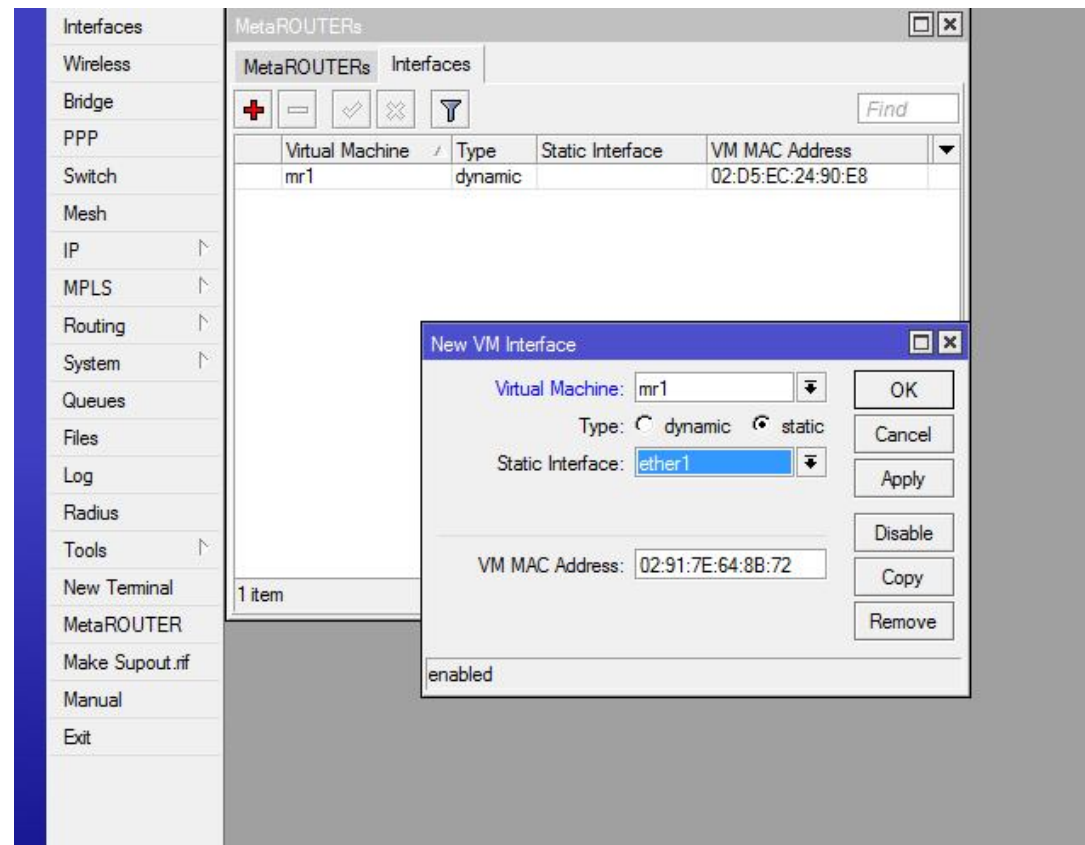
The screenshot displays the MikroTik WinBox interface. On the left is a navigation menu with categories like Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Make Supout.rf, Manual, and Exit. The main area is split into two windows:

- Bridge Window:** Shows a table of bridge interfaces.

	Interface	Bridge	Priority (hex)	Path Cost	Horizon	Role	Root Path Cost
D	vif1	bridge	80	10		designated port	
I	wan1	bridge	80	10		disabled port	
- MetaROUTERs Window:** Shows a table of virtual machines.

	Virtual Machine	Type	Static Interface	VM MAC Address
	mr1	dynamic		02:D5:EC:24:90:E8

Interface virtual Estática



The screenshot shows the MikroTik WinBox interface. On the left is a navigation tree with categories like Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Make Supout.rif, Manual, and Exit. The main window is titled 'MetaROUTERS' and has a sub-tab 'Interfaces'. It contains a table with the following data:

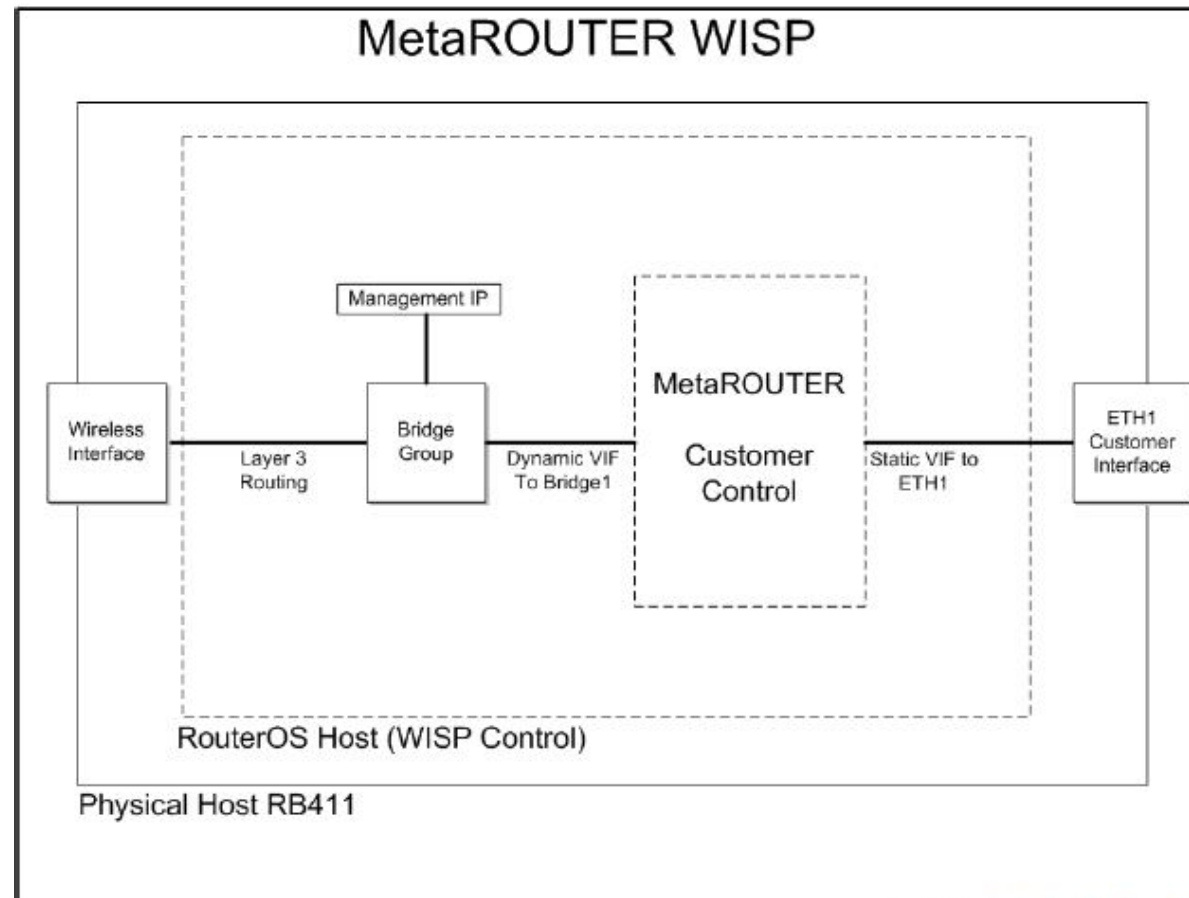
Virtual Machine	Type	Static Interface	VM MAC Address
mr1	dynamic		02:D5:EC:24:90:E8

Below the table, it says '1 item'. A 'New VM Interface' dialog box is open in the foreground, showing the following configuration:

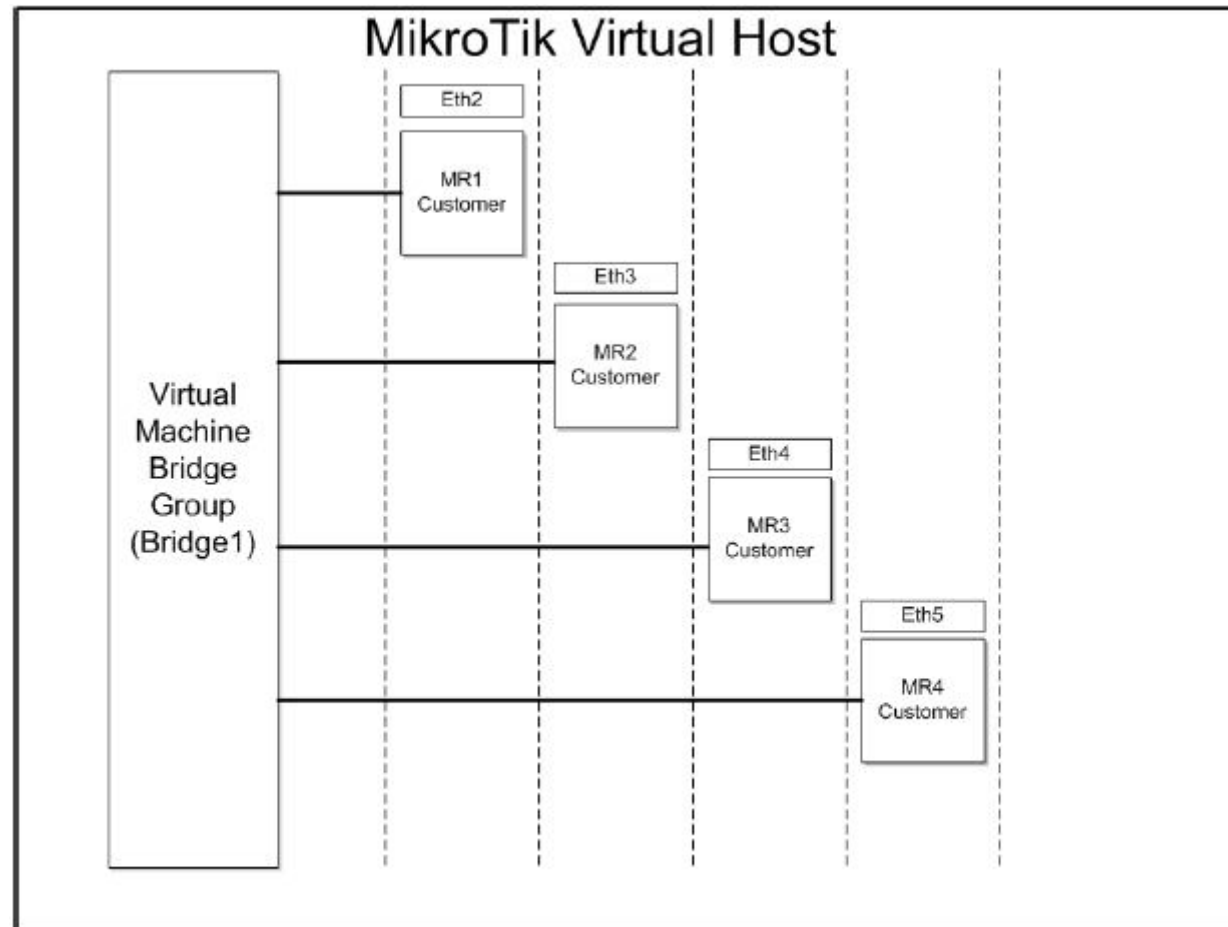
- Virtual Machine: mr1
- Type: dynamic static
- Static Interface: ether1
- VM MAC Address: 02:91:7E:64:8B:72

Buttons in the dialog include OK, Cancel, Apply, Disable, Copy, and Remove. The status 'enabled' is shown at the bottom of the dialog.

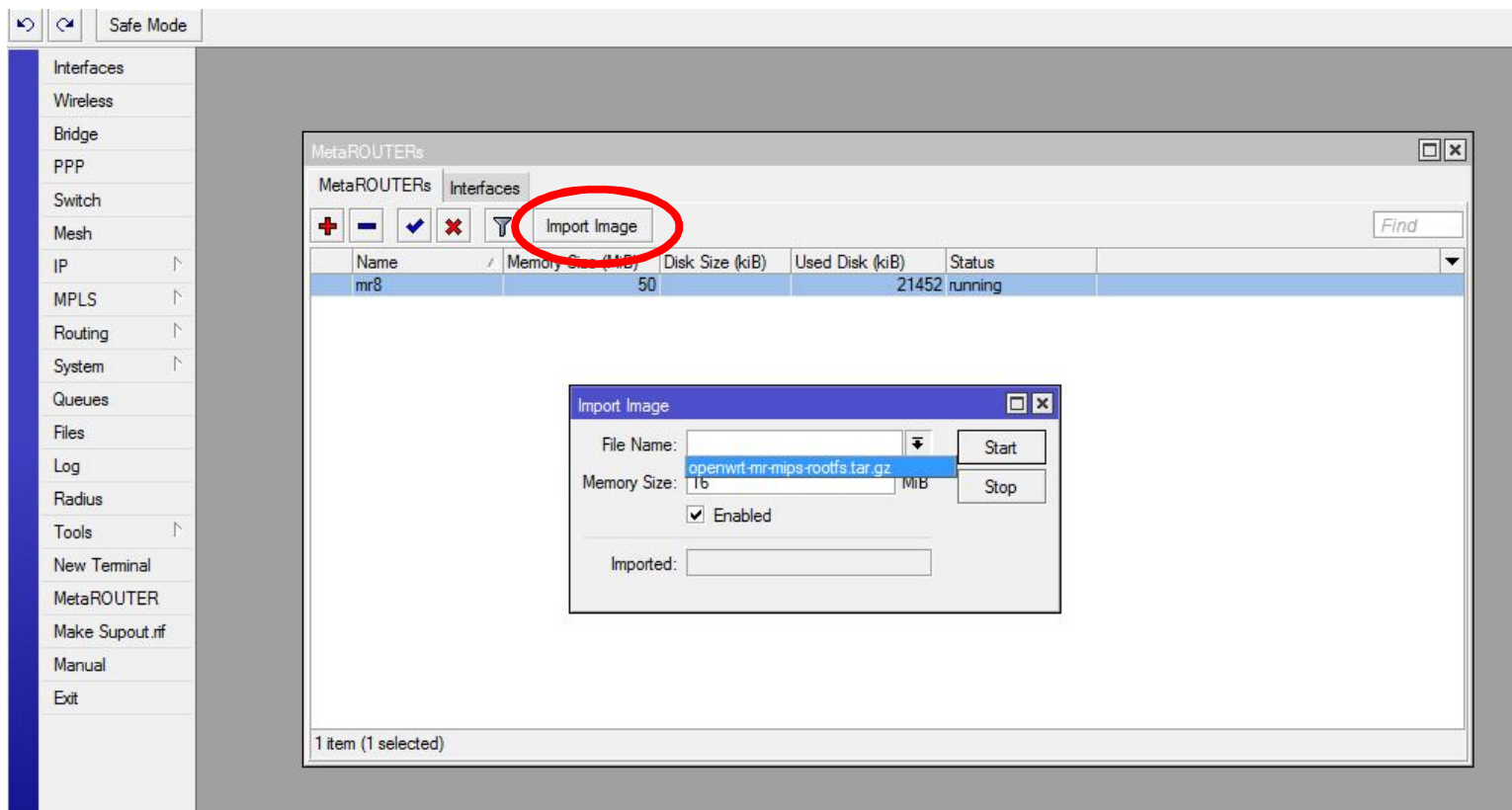
Ejemplo: Uso en clientes WISP



Ejemplo: Múltiples VM en mismo hardware



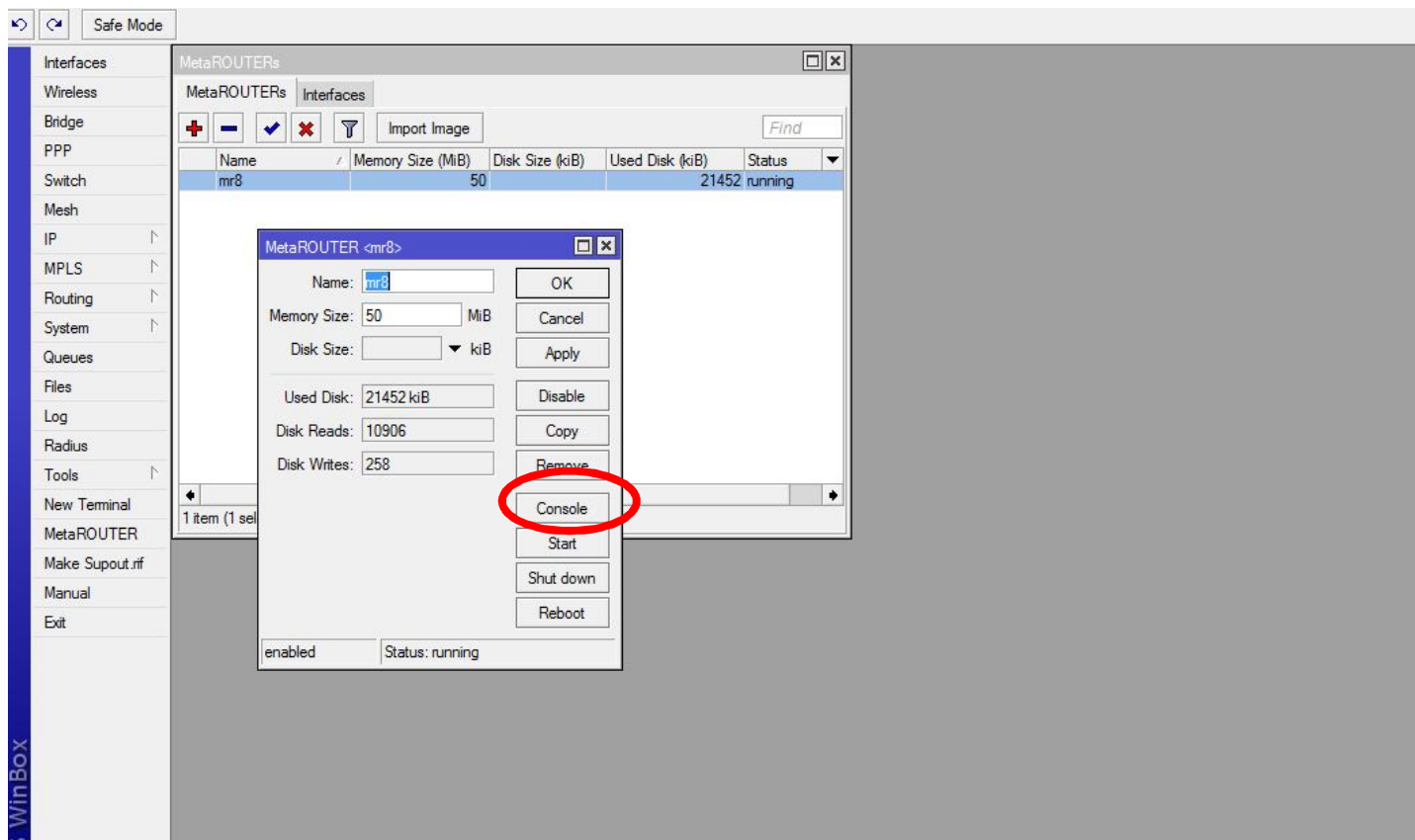
Implementando OpenWRT en Metarouter



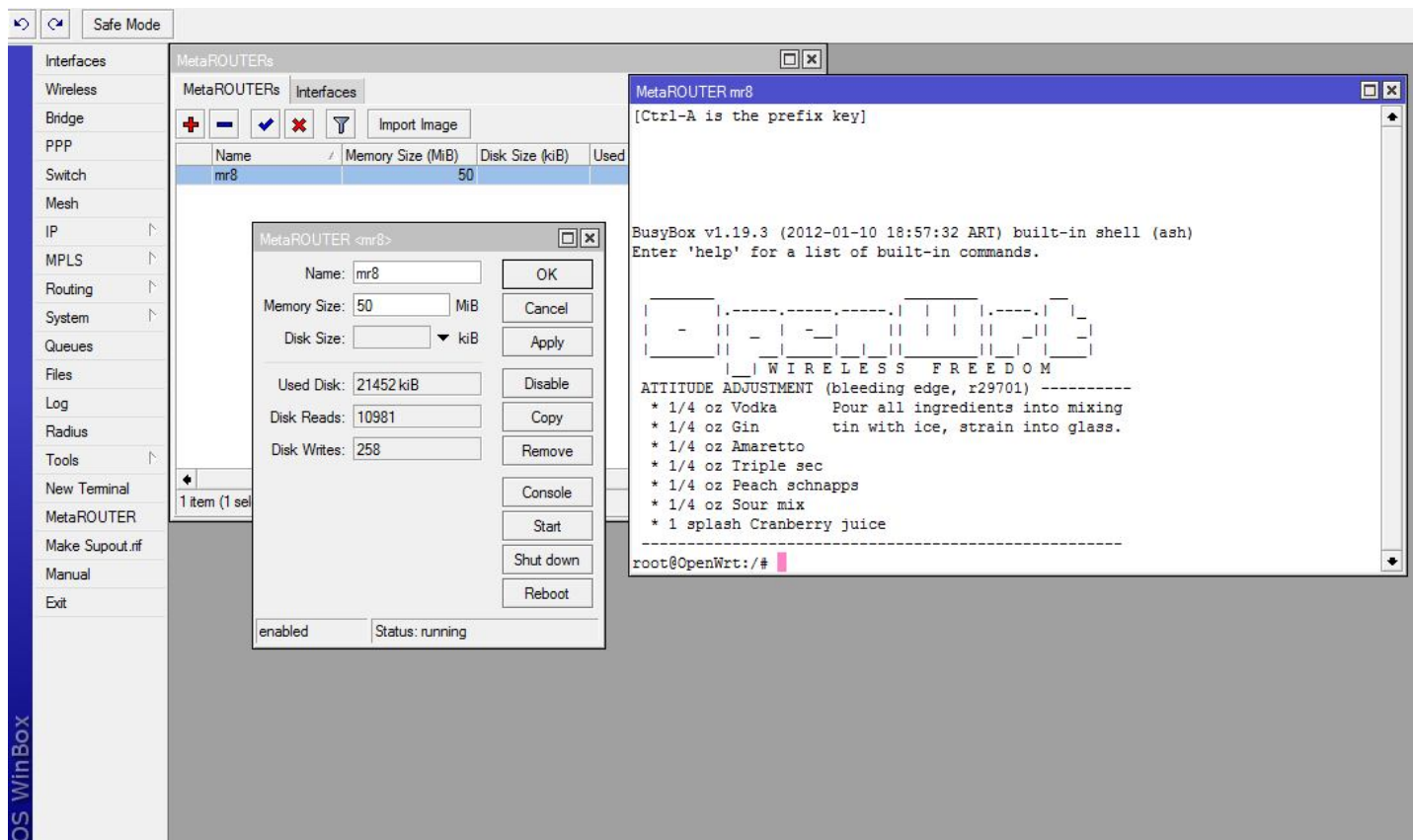
The screenshot shows the MikroTik WinBox interface. On the left is a navigation menu with options like Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Make Supout.nf, Manual, and Exit. The main window displays the 'MetaROUTERS' configuration page. At the top, there are tabs for 'MetaROUTERS' and 'Interfaces', and a toolbar with buttons for adding, deleting, and importing images. The 'Import Image' button is circled in red. Below the toolbar is a table with columns: Name, Memory Size (MiB), Disk Size (kiB), Used Disk (kiB), and Status. A single entry 'mr8' is listed with a memory size of 50 MiB and a disk size of 21452 kiB, with a status of 'running'. An 'Import Image' dialog box is open in the foreground, showing a file name field with 'openwrt-mr-mips-rootfs.tar.gz' selected, a memory size field set to '16' MiB, an 'Enabled' checkbox, and 'Start' and 'Stop' buttons. The status bar at the bottom indicates '1 item (1 selected)'.

Name	Memory Size (MiB)	Disk Size (kiB)	Used Disk (kiB)	Status
mr8	50	21452	21452	running

Acceso a consola de OpenWRT



Acceso a consola de OpenWRT



The screenshot shows the Mikrotik WinBox interface. On the left is a sidebar menu with categories like Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, and OS WinBox. The main area is titled 'MetaROUTERS' and shows a table with one entry: 'mr8' with a Memory Size of 50 MB and a Disk Size of 50 kB. A configuration dialog for 'MetaROUTER <mr8>' is open, showing fields for Name (mr8), Memory Size (50 MiB), and Disk Size (kiB). Below these are statistics: Used Disk (21452 kiB), Disk Reads (10981), and Disk Writes (258). At the bottom of the dialog, it shows 'enabled' and 'Status: running'. A terminal window titled 'MetaROUTER mr8' is also open, displaying a BusyBox v1.19.3 shell prompt. The terminal output includes a ASCII art logo for 'WIRELESS FREEDOM' and a list of ingredients for a drink: 'ATTITUDE ADJUSTMENT (bleeding edge, r29701)'. The ingredients are: 1/4 oz Vodka, 1/4 oz Gin, 1/4 oz Amaretto, 1/4 oz Triple sec, 1/4 oz Peach schnapps, 1/4 oz Sour mix, and 1 splash Cranberry juice. The terminal prompt is 'root@OpenWrt:/#'.

Que hacer con OpenWRT ?

- WebServer
- DNS Server
- Utilidades de red
- Asterisk
- Radius
- PHP....etc



**Servicio Suspendido
Temporalmente**

Contáctenos para
regularizar su situación

Servicio de Internet Inalámbrico

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Mail: info@mikrotikexpert.com | Web: <http://mikrotikexpert.com>

Que hacer con OpenWRT ?

- WebServer
- DNS Server
- Utilidades de red
- Asterisk
- Radius
- PHP....etc

```
20.20.20.2 - PuTTY
login as: root
root@20.20.20.2's password:

BusyBox v1.19.3 (2012-01-10 18:57:32 ART) built-in shell (ash)
Enter 'help' for a list of built-in commands.

_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|
|_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||
|_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||_||
|_|_|W I R E L E S S F R E E D O M
ATTITUDE ADJUSTMENT (bleeding edge, r29701) -----
* 1/4 oz Vodka      Pour all ingredients into mixing
* 1/4 oz Gin        tin with ice, strain into glass.
* 1/4 oz Amaretto
* 1/4 oz Triple sec
* 1/4 oz Peach schnapps
* 1/4 oz Sour mix
* 1 splash Cranberry juice

-----
root@OpenWrt:~# asterisk -r
Asterisk 1.8.8.0, Copyright (C) 1999 - 2011 Digium, Inc. and others.
Created by Mark Spencer <markster@digium.com>
Asterisk comes with ABSOLUTELY NO WARRANTY; type 'core show warranty' for details.
This is free software, with components licensed under the GNU General Public
License version 2 and other licenses; you are welcome to redistribute it under
certain conditions. Type 'core show license' for details.

-----
Connected to Asterisk 1.8.8.0 currently running on OpenWrt (pid = 1555)
OpenWrt*CLI> sip show peers
Name/username          Host                       Dyn Forcerport ACL Port      Status
-----
300/300                (Unspecified)            D   N      0           Unmonitored
301/301                20.20.20.250            D   N     11292      Unmonitored
mke/298                10.10.10.3              N           5060      Unmonitored

3 sip peers [Monitored: 0 online, 0 offline Unmonitored: 2 online, 1 offline]
OpenWrt*CLI>
```

Info para construir tu OpenWRT

- *sudo apt-get update*
- *sudo apt-get install subversion build-essential*
- *mkdir ~/openwrt*
- *cd ~/openwrt*
- *svn co svn://svn.openwrt.org/openwrt/trunk/*

Info para construir tu OpenWRT

- **wget**

<http://www.mikrotik.com/download/metarouter/openwrt-metarouter-1.2.patch>

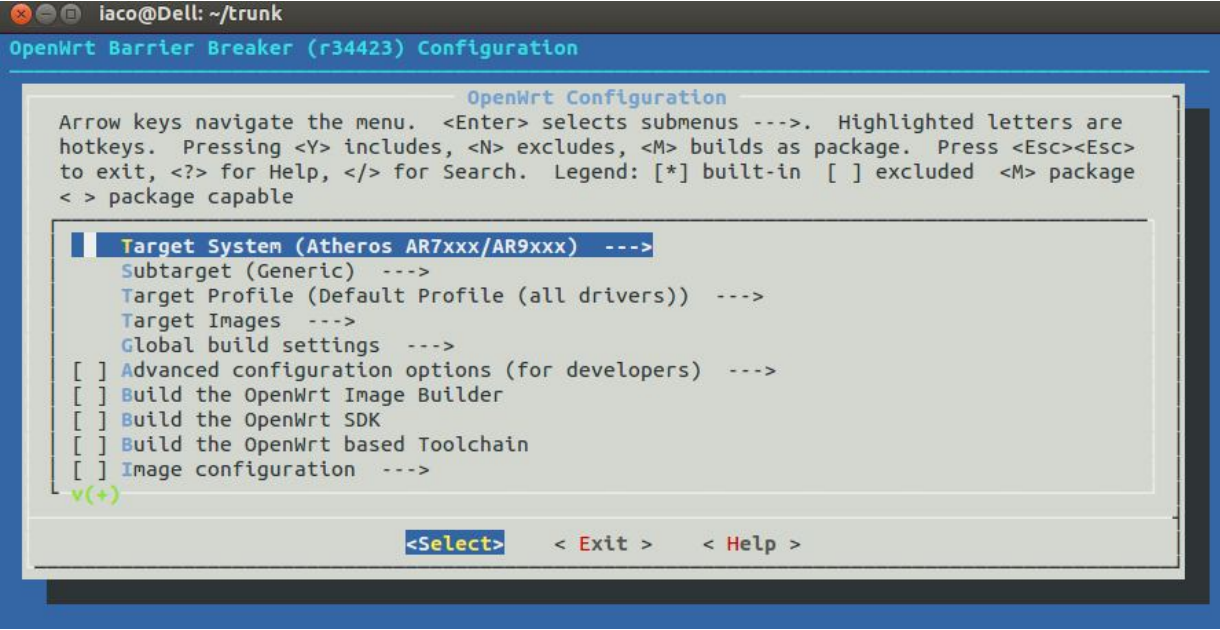
- ***patch -p0 <openwrt-metarouter-1.2.patch***

- ***./scripts/feeds update -a***

- ***./scripts/feeds install -a***

Info para construir tu OpenWRT

- *make menuconfig*



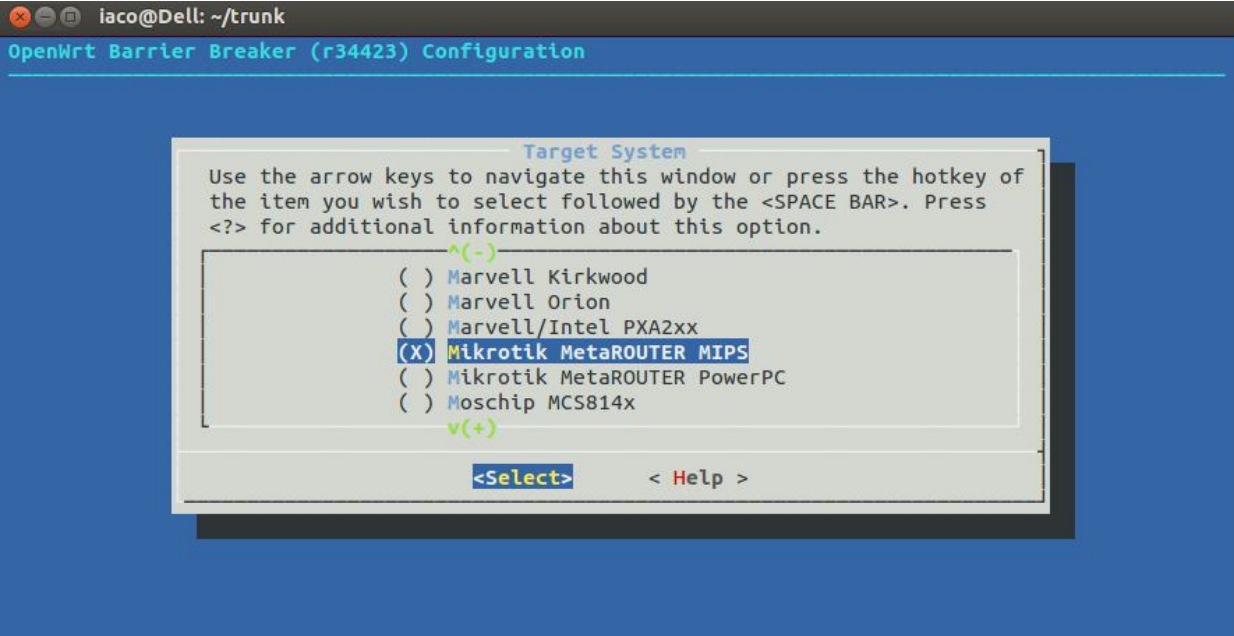
```
iaco@Dell: ~/trunk
OpenWrt Barrier Breaker (r34423) Configuration

OpenWrt Configuration
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are
hotkeys. Pressing <Y> includes, <N> excludes, <M> builds as package. Press <Esc><Esc>
to exit, <?> for Help, </> for Search. Legend: [*] built-in [ ] excluded <M> package
< > package capable

Target System (Atheros AR7xxx/AR9xxx) --->
Subtarget (Generic) --->
Target Profile (Default Profile (all drivers)) --->
Target Images --->
Global build settings --->
[ ] Advanced configuration options (for developers) --->
[ ] Build the OpenWrt Image Builder
[ ] Build the OpenWrt SDK
[ ] Build the OpenWrt based Toolchain
[ ] Image configuration --->
v(+)
```

<Select> < Exit > < Help >

Info para construir tu OpenWRT



```
iaco@Dell: ~/trunk
OpenWrt Barrier Breaker (r34423) Configuration

Target System
Use the arrow keys to navigate this window or press the hotkey of
the item you wish to select followed by the <SPACE BAR>. Press
<?> for additional information about this option.
^(-)
( ) Marvell Kirkwood
( ) Marvell Orion
( ) Marvell/Intel PXA2xx
(X) Mikrotik MetaROUTER MIPS
( ) Mikrotik MetaROUTER PowerPC
( ) Moschip MCS814x
v(+)
<Select> < Help >
```

Recursos:

Imagen y Repositorios:

<http://openwrt.mikrotikexpert.com>

+ Info:

<http://wiki.mikrotik.com/wiki/Metarouter>

<http://forum.mikrotik.com/>

<http://wiki.openwrt.org>

mum



MikroTik User Meeting in Peru
November 30 - December 01, 2012

Gracias!

Vicente Iaconetti

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MKE solutions 

