MetaROUTER and OpenWrt

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About Me

• Jesse Liu, Convergingstream
  – Over 8 years experience using RouterOS
  – Specialization in Wireless, VPN, Load Balancing and Virtualization
  – MikroTik Certified Consultant
  – MikroTik MTCNA, MTCWE Certifications
  – Cisco CCNP, CCDP Certifications
RouterOS Virtualization

RouterOS has two different Virtualization implementations:

• MetaROUTER
• KVM
MetaROUTER

- MetaROUTER is created by MikroTik and currently is supported on mips-be and powerpc architecture.
- Currently MetaROUTER can create RouterOS and OpenWrt virtual machines.
KVM

• Kernel-based Virtual Machine (KVM) is a virtualization infrastructure for the Linux kernel. Requires your hardware to support virtualization (Intel VT or AMD-V).

• KVM is available only on RouterOS x86 architecture.

• KVM can create virtual machines of different Operating Systems.
OpenWrt

- OpenWrt is described as a Linux distribution for embedded devices.
- All components have been optimized for size, to be small enough to fit the limited storage and memory.
- There are about 2000 optional software packages available for install via the `opkg` package management system.
Requirements

• Currently MetaROUTER can be used on
  – RB400, RB700 and RB2011 series.
  – RB1000, RB1100, RB1100AH and RB800.

• Can’t be used on RB1200, RB1100AHx2 and CCR1036.

• Each virtual machine instance requires at least 16MB RAM (32MB RAM recommended).
Limitations

• One host you can create up to 7 virtual machines.
• External storage devices (CF, microSD or USB) can’t be used in the virtual machines.
RB1100AH
Known Issues

• Random freezing (mips-be)
  – RB450G, RB435G, RB493G

• Not enough resources (powerpc)
  – RB1100AH (Solved in RouterOS 5.12 or later)
New MetaROUTER
Import OpenWrt
Console access through winbox
Console access through winbox
Virtual Interfaces

• Two different types of virtual interfaces
  – Dynamic interfaces used to connect to a bridge.
  – Static interfaces are used to directly connect to physical port.
Dynamic Interface
VIF interface
### Static Interface

![Static Interface Interface](image)

<table>
<thead>
<tr>
<th>Virtual Machine</th>
<th>Type</th>
<th>Static Interface</th>
<th>VM MAC Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>mr1</td>
<td>dynamic</td>
<td>ether1</td>
<td>02:07:22:85:B1:56</td>
</tr>
</tbody>
</table>

- **Virtual Machine**: mr1
- **Type**: dynamic
- **Static Interface**: ether1
- **VM MAC Address**: 02:02:35:59:C7:C0

Enabled
Building your own OpenWrt

• Setting up build environment in Debian 6.0 Squeeze.
• Update the package index files using the following command.
  – *apt-get update*
• Install the following packages to get the system ready.
  – *apt-get install subversion build-essential*
  – *apt-get install libncurses5-dev zlib1g-dev gawk flex libssl-dev unzip python*
Building your own OpenWrt

• Do everything as non-root user!
• Download the OpenWrt sources with svn.
  – `mkdir ~/openwrt`
  – `cd ~/openwrt`
  – `svn co svn://svn.openwrt.org/openwrt/trunk/@22249`
  – `cd trunk`
• `feeds.conf.default` add "@22249" at the end of the line.
Building your own OpenWrt

• Download and install feeds using feeds script.
  – ./scripts/feeds update -a
  – ./scripts/feeds install -a

• Download and patch OpenWrt sources.
  – wget http://www.mikrotik.com/download/metarouter/openwrt-metarouter-1.2.patch
  – patch -p0 <openwrt-metarouter-1.2.patch
Building your own OpenWrt

• Use following commands to check for missing packages.
  – *make defconfig*
  – *make prereq*
Building your own OpenWrt

• Start OpenWrt configuration interface:
  – *make menuconfig*
Building your own OpenWrt

• Everything is now ready for building the image(s), which is done with one single command:
  – `make`

• After a successful build, the freshly built image(s) can be found in the newly created `<buildroot dir>/bin` directory.
Wireless CPE

• Customer can access his own virtual router, without need for other hardware.

• Wireless control only for the WISP, while the Ethernet side is fully under the customer control.
Wireless CPE
Multi-Tenant Applications

• Consolidate a number of routers on one hardware platform, to give the customers their own isolated virtual router.
Multi-Tenant Applications
Server running as guest

• Running specific simple task without need of dedicated server (web server, DNS server, VoIP gateway).

• Install and configure lighttpd, php, bind and asterisk on OpenWrt virtual machine.
Custom applications

• Develop your own custom Linux programs that can be installed on RouterBOARD platforms.
More information at:
http://wiki.mikrotik.com/wiki/Events

Thank you for participating