FUROR TEUTONICUS

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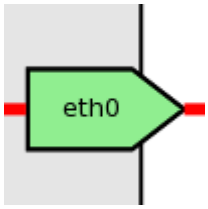
Enabling host-guest networking with KVM, Macvlan and Macvtap

The perfect setup, nearly



You installed your Linux server and naturally selected KVM (Kernel Virtual Machine) as hypervisor. Using virt-manager, you also created one or more guest VMs (Virtual Machines).

You want fast networking. So you use the paravirtualized *virtio* drivers for the guests.

You also want no difference between virtual and non-virtual machines. All should be able to talk over the same LAN, use the same subnet, contact the same DHCP server and talk with each other. So you use the Macvtap driver. Macvtap makes use of Macvlan, also written as MAC VLAN. MAC VLAN allows you to have multiple Ethernet MAC (Media Access Control) addresses on one NIC (Network Interface Card). Network traffic will go directly to and from the physical line to the guest VM. If you enable *bridge* mode, then all kind-of-virtual NICs attached to the same host (or physical NIC, I'm not sure) can see each other.

It's just so much easier than having to create and manage traditional *brctr* bridges. And probably it performs better, too.

GO

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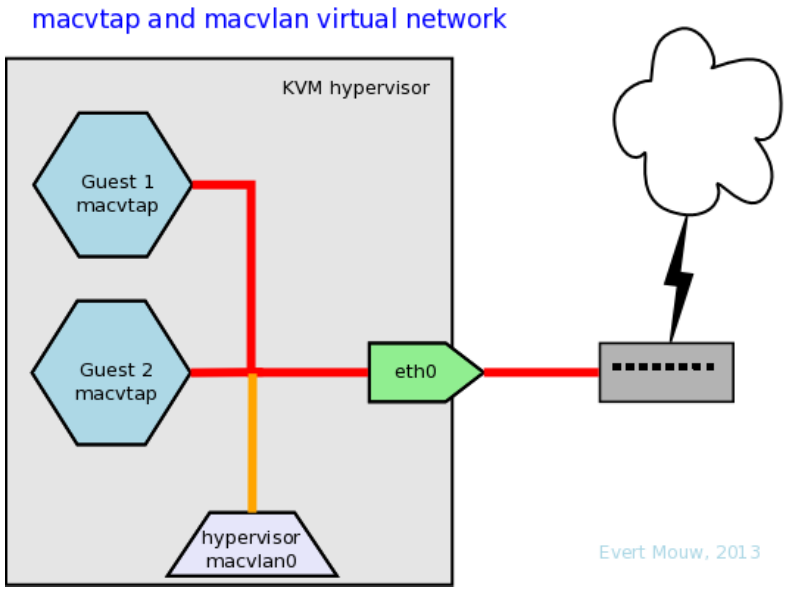
The problem: the host cannot talk with the guests

The guests can talk to each other. But the host is excluded from the social event. Look at the picture below. Guest 1 and guest 2 are connected using a red line; they are also connected with the *eth0* physical NIC of the host. Packets delivered to *eth0* will be sent to the network immediately. The hypervisor cannot intercept them.



Solution: create a macvlan interface on the host

If you create a macvlan interface on the host, and use that one instead of *eth0*, than the host can communicate with the guests. Some people don't like this solution because of bad integration with the NetworkManager, but I like it because I don't have to modify the guests. And I'm using only one host machine, so I can handle that with ease.

I have tested this solution myself on two different computers, both running Scientific Linux 6.4 (a RHEL derivative). So beware, YMMV.

What I did: I wrote a simple shell script that takes care of the creation of and routing to a macvlan interface on the host. So on the host, you have to run this script on startup, e.g. by adding the full path to the script in */etc/rc.local*. Here is the script:

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- Hogere BTW is drie keer slecht

CATEGORIEËN

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```
#!/bin/bash

# let host and guests talk to each other over
macvlan
# configures a macvlan interface on the
hypervisor
# run this on the hypervisor (e.g. in
/etc/rc.local)
# made for IPv4; need modification for IPv6
# meant for a simple network setup with only
eth0,
# and a static (manual) ip config
# Evert Mouw, 2013

HWLINK=eth0
MACVLN=macvlan0
TESTHOST=www.google.com

# ------------
# wait for network availability
# ------------

while ! ping -q -c 1 $TESTHOST > /dev/null
do
    echo "$0: Cannot ping $TESTHOST, waiting
another 5 secs..."
    sleep 5
done

# ------------
# get network config
# ------------

IP=$(ip address show dev $HWLINK | grep "inet "
| awk '{print $2}')
NETWORK=$(ip -o route | grep $HWLINK | grep -v
default | awk '{print $1}')
GATEWAY=$(ip -o route | grep default | awk
'{print $3}')

# ------------
# setting up $MACVLN interface
# ------------

ip link add link $HWLINK $MACVLN type macvlan
mode bridge
ip address add $IP dev $MACVLN
ip link set dev $MACVLN up

# ------------
# routing table
# ------------
```

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```
# empty routes
ip route flush dev $HWLINK
ip route flush dev $MACVLN

# add routes
ip route add $NETWORK dev $MACVLN metric 0

# add the default gateway
ip route add default via $GATEWAY
```

Beware: If the underlying eth{n} link is down, then also the macvlan will go to the "down" state. That means that the hardware ethernet link must be up, otherwise macvlan/macvtap based VMs will not be able to communicate with each other, or with the host. Also, NetworkManager can play nasty on your customized routing table when the link comes up again.

The resulting routing table will look like this:

```
Destination     Gateway         Genmask
Flags Metric Ref    Use Iface
10.0.0.0        0.0.0.0         255.0.0.0
U     0      0        0 macvlan0
0.0.0.0         10.0.0.2        0.0.0.0
UG    0      0        0 macvlan0
```

Guest configuration

The guest must be configured to use macvtap in bridge mode. Typically, in the configuration XML (/etc/libvirt/qemu) you will find:

```
<interface type='direct'>
  <source dev='eth0' mode='bridge'/>
```

Remember that the guest will then use the DHCP server of the physical LAN. No need any more for the dnsmasq part on the hypervisor. If all your guests use this trick, then you can do:

```
rm /etc/libvirt/qemu/networks/autostart/*
```

That removes the bridge interfaces you see when you run *ifconfig*. If you cannot wait until the next reboot, also do for each network:

```
virsh net-destroy _network-name_
```

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Attachments

- create_macvlan_bridge.sh
- macvtap_macvlan.dia

Acknowledgements / sources

- Superuser “Guest and host cannot see each other using linux-kvm and macvtap”
- KVM mailing list, Arnd Bergmann in “Re: Does macvtap support host to guest communication?”
- libvirt.org “Guest can reach outside network, but can’t reach host (macvtap)”
- crashmag “Linux KVM host to guest connectivity” (*link to original article is broken*)
- Gentoo forums “one way communication with kvm+macvlan”
- Jim’s Depository “Notes on Linux’s macvlan module”
- Kernelnewbies MacVTap
- pocketnix “Linux Networking: MAC VLANs and Virtual Ethernets”
- Oracle “Configuring Operating System Containers”
- Red Hat “Interface Configuration Files”

Auteur: Evert Mouw

Evert geeft hier actuele en minder actuele commentaren over informatietechnologie, oude mythen, politiek, zijn persoonlijke belevenissen en wat hij nog meer leuk vind. Evert heeft een MA politicologie en een MSc medical informatics. Furor Teutonicus is geen blog voor de massa of het grote publiek. De artikelen zijn geschreven voor de enkele

Afdrukken

hypervisor KVM Linux Macvlan s Macvtap

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3. *John*
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   hi,

   first thanks for your post.

   Ive done all that, but I cant ping the guest ☹
   I've got 2 eth interfaces (eth0 and eth1) … i've used eth1 for macvlan.

   any hint?

   regards
   john

4.  *Evert Mouw*
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   Hi John,

   I can only do guesswork here, as I did not try this myself on a host with two NICs.

   Of course, you did check the firewall settings on both host and client, right? Also, can other guests ping your guest? Furthermore, you need to carefully study your routing tables.

   I'm afraid I cannot help you out. I don't have enough information, and even if I had, I have neither the possibility

not the time to test it in practice. You might consider posting your problem to appropriate newsgroups, with your host and guest network configuration and routing tables.

Good luck!
Evert

5.  *El Blog de Marcelo! » Migrando Host de VMs KVM de Ubuntu 12.04 a 14.04*
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[…] que lo anterior, por diferentes motivos, pero tiene un lado feo, y es que de esta manera los guests no pueden comunicarse con el host [6]. Apliqué la “less painful solution” de esa wiki, y fue crear una red NAT aislada […]

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