

VirtualBox Networking

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Virtual Networking hardware

- Virtualbox can virtualize the following types of networking hardware:
 - AMD PCNet PCI II (Am79C970A)
 - AMD PCNet FAST III (Am79C973), the default setting
 - Intel PRO/1000 MT Desktop (82540EM)
 - Intel PRO/1000 T Server (82543GC)
 - Intel PRO/1000 MT Server (82545EM)
 - Paravirtualized network adapter (virtio-net)

VirtualBox Networking Modes

Mode	VM → Host	VM ← Host	VM1 <-> VM2	VM → Internet	VM ← Internet
Host-only	+	+	+	-	-
Internal	-	-	+	-	-
Bridged	+	+	+	+	+
NAT	+	Port forward	-	+	Port forward
NAT network	+	Port forward	+	+	Port forward

Virtual box networks – BRIDGED NETWORK

- VM can directly connect to the outside world.
- Outside world treats your virtual machine as equal to your host machine.

Virtual box networks – Internal NETWORK

- Completely isolated from outside world
- Host can not see internal network
- No internet access
- Need to setup a DHCP server using VBOXMANAGE utility to enable communication between VM in the same internal network

Virtual box networks – Host only

- Creates an internal network of guest virtual machines
- Host is part of the internal network
- Virtual box provides dhcp server
- Guests can not see outside world
- No internet access

Virtual box networks – NAT

- Default mode
- Guest is a client
- Every VM is assigned the same IP address (10.0.2.15)
- Each VM thinks they are on their own isolated network.
- Gateway (10.0.2.2) VirtualBox rewrites the packets to make them appear as though they originated from the Host, rather than the Guest (running inside the Host).nt type VM which means most traffic is outgoing
- connecting to a server running in the Guest is not (normally) possible using NAT mode as there is no route into the Guest OS.

Virtual box networks – NAT network

- VirtualBox can make selected services available to the world outside the guest through **port forwarding**. This means that VirtualBox listens to certain ports on the host and resends all packets which arrive there to the guest, on the same or a different port.
- External machines connect to "host":"port number" and connections are forwarded by VirtualBox to the guest:port number specified.
- You cannot run the same service on the same ports on the host

Configure Port Forwarding with NAT

- To configure port forwarding you can use the graphical **Port Forwarding** editor which can be found in the **Network settings** dialog for network adaptors configured to use NAT.
- Alternatively, the cmd line tool VBoxManage can be used. For example, to set up incoming NAT connections to an ssh server in the guest, use the following command:
 - `VBoxManage modifyvm "VM name" --natpf1 "guestssh,tcp, 127.0.0.1,2222,10.0.2.19,22"`
 - The number after `--natpf` denotes to network card.
 - To remove this forwarding rule, use the following command:
 - `VBoxManage modifyvm "VM name" --natpf1 delete "guestssh"`

NAT Limitations

- **ICMP protocol limitations:** Vbox ICMP support has some limitations, meaning *ping* should work but some other tools may not work reliably.
- **Receiving of UDP broadcasts:** The guest does not listen to UDP broadcasts. (NetBios name resolution relied on UDP broadcast does not always work.)
- **Some protocols are not supported:** Protocols other than TCP and UDP are not supported. GRE is not supported. Some VPN such as PPTP from Microsoft cannot be used.
- **Forwarding host ports below 1024:** On UNIX based hosts, such as Linux or MacOS, it is not possible to bind to ports below 1024 from applications that are not run by root.

NAT Service

- *VBoxManage natnetwork add --natname natnet1 --network "192.168.15.0/24" --enable*
- *VBoxManage natnetwork modify --netname natnet1 --dhcp on*
- Combined 2 commands (create nat network with dhcp)
- *VBoxManage natnetwork add --netname natnet1 --network "192.168.15.0/24" --enable --dhcp on*
- *VBoxManage natnetwork modify --netname natnet1 --dhcp off*
- To start the NAT service, use the following command:
 - *VBoxManage natnetwork start --netname natnet1*
 - *VBoxManage natnetwork stop --netname natnet1*
 - *VBoxManage natnetwork remove --netname natnet1*

Port Forwarding

- *VBoxManage natnetwork modify --netname natnet1 --port-forward-4 "ssh:tcp:[]:1022:[192.168.15.5]:22"*
- This adds a port-forwarding rule from the host's TCP 1022 port to the port 22 on the guest with IP address 192.168.15.5
- *VBoxManage natnetwork modify --netname natnet1 --port-forward-4 delete ssh*
- *VBoxManage list natnetworks*

Improving Network Performance

- Whenever possible use the virtio network adapter: Otherwise, use one of the Intel PRO/1000 adapter.
- Make sure segmentation offloading is enabled in the guest OS. Usually it will be enabled by default. You can check and modify offloading using the ethtool command on Linux guests.