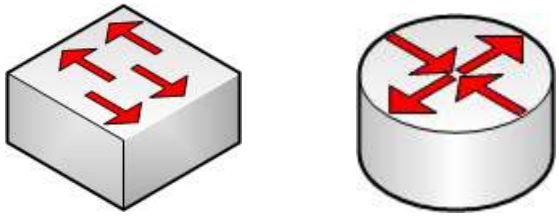
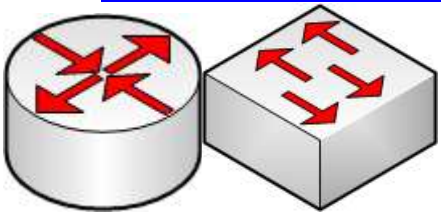
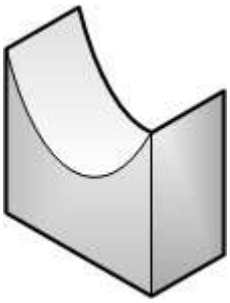
VIRTUAL NETWORKING WITH "VMware Player"

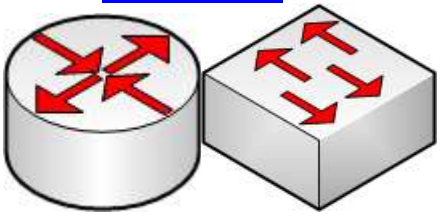
Summary:

"VMware Player" provides **five** virtual networking configurations for the virtual machines of a Windows or Linux host computer:

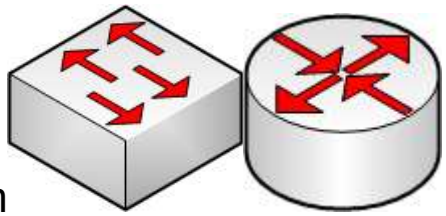
1. a "Shared Folders" gateway/router: 

2. a "Network Address Translation" ("NAT") router with LAN switching:


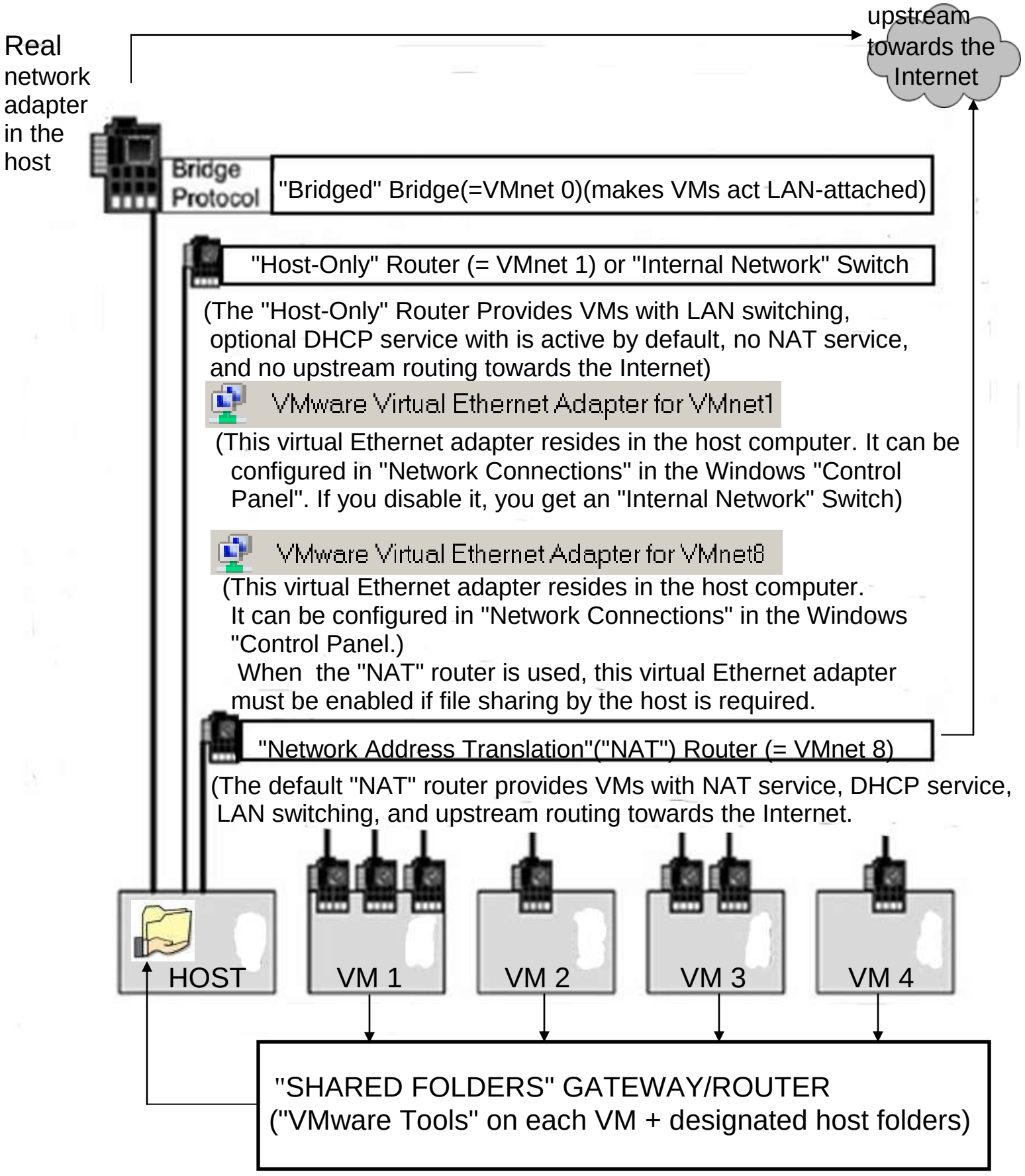
3. a "Bridged" bridge (with no internal LAN switching): 

4. a "Host-only" router with LAN switching:


and

5. an "Internal Network" LAN switch 
with optional DHCP services
which consists of the "Host-Only" router with the host disconnected from it.

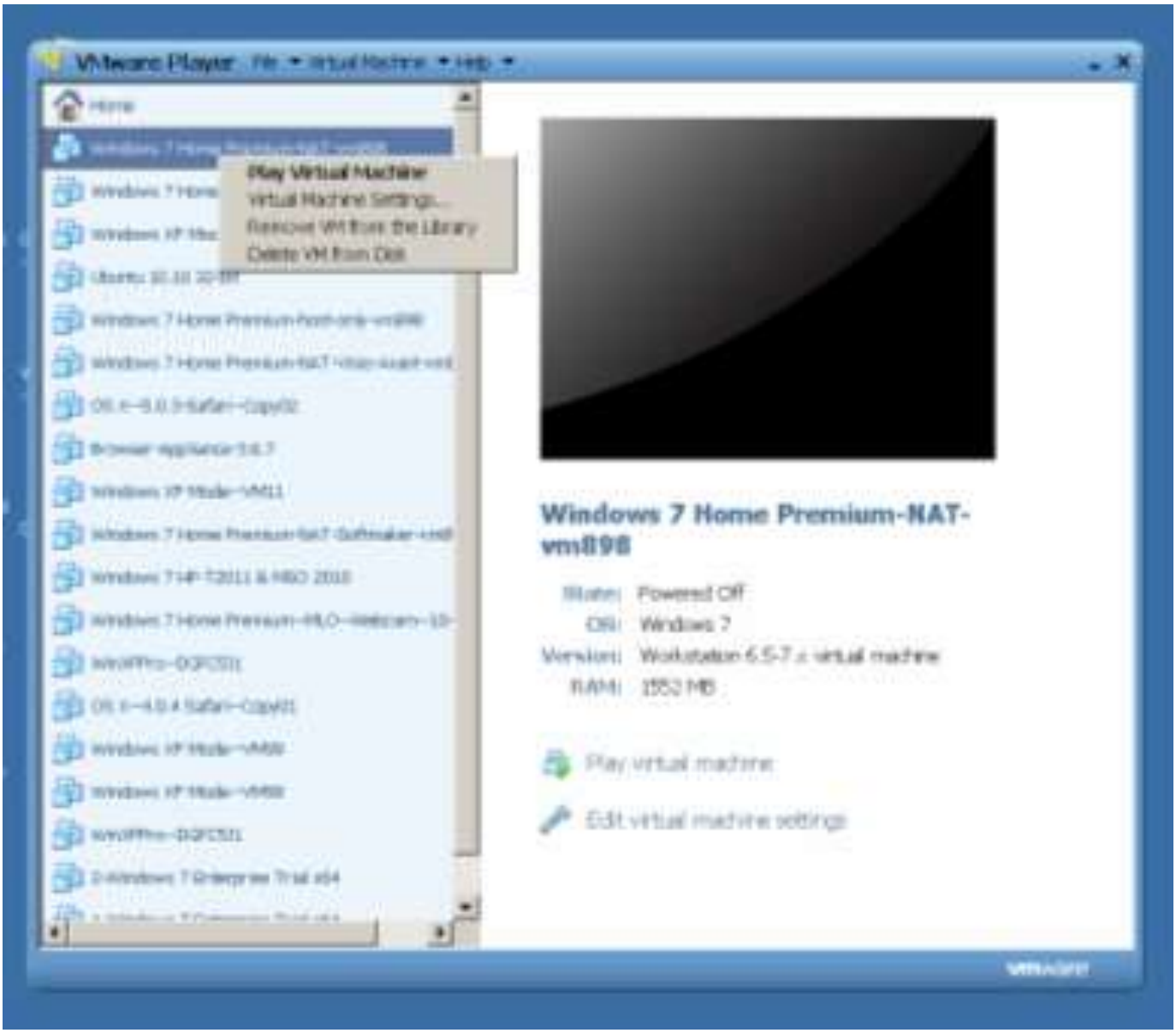
CONFIGURATION DIAGRAM



Reference:
http://media.techtarget.com/searchNetworking/downloads/Book_VMware_Chapter_8.pdf

VIRTUAL NETWORK ADAPTERS FOR THE VIRTUAL MACHINES IN "VMWARE PLAYER" IN A "WINDOWS" HOST COMPUTER

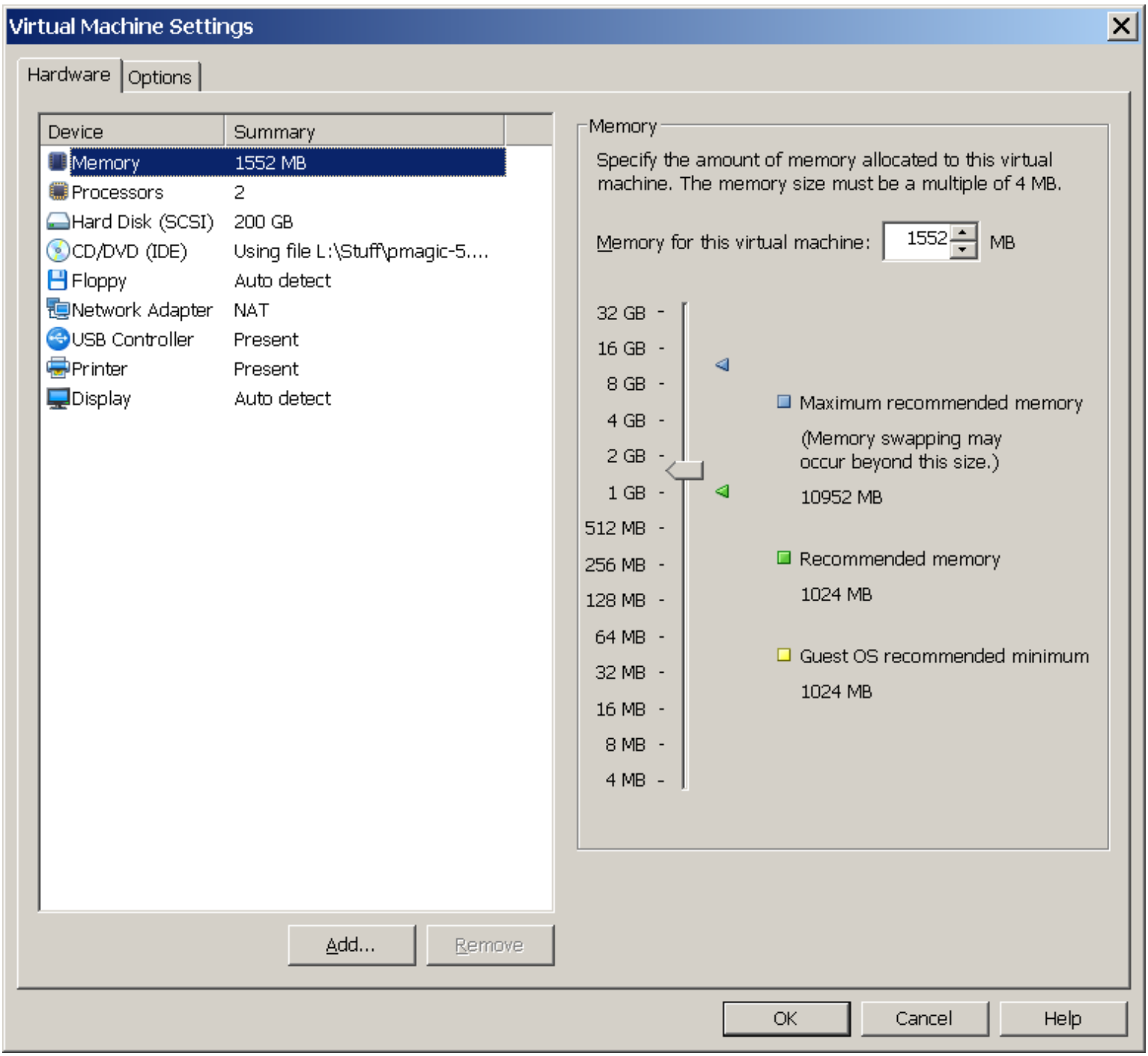
By using the "Add Hardware Wizard" in the "Virtual Machine Settings" box, you can provide unlimited network adapters for each virtual machine:
Use your RIGHT mouse button to click on the virtual machine:



*

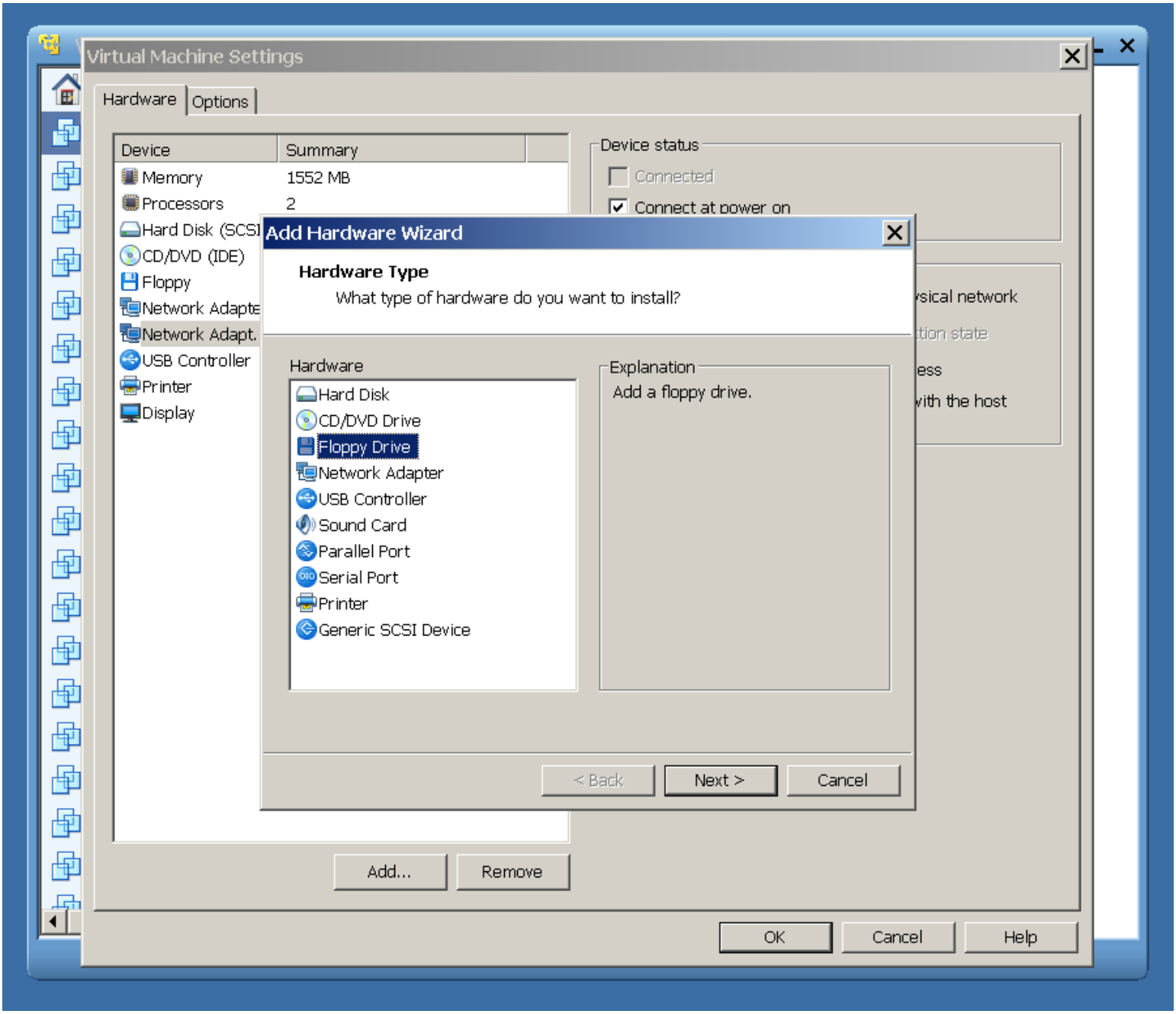
Then, use the left mouse button to click on "Virtual Machine Settings" on the popup context menu.

A "Virtual Machine Settings" box will be displayed:

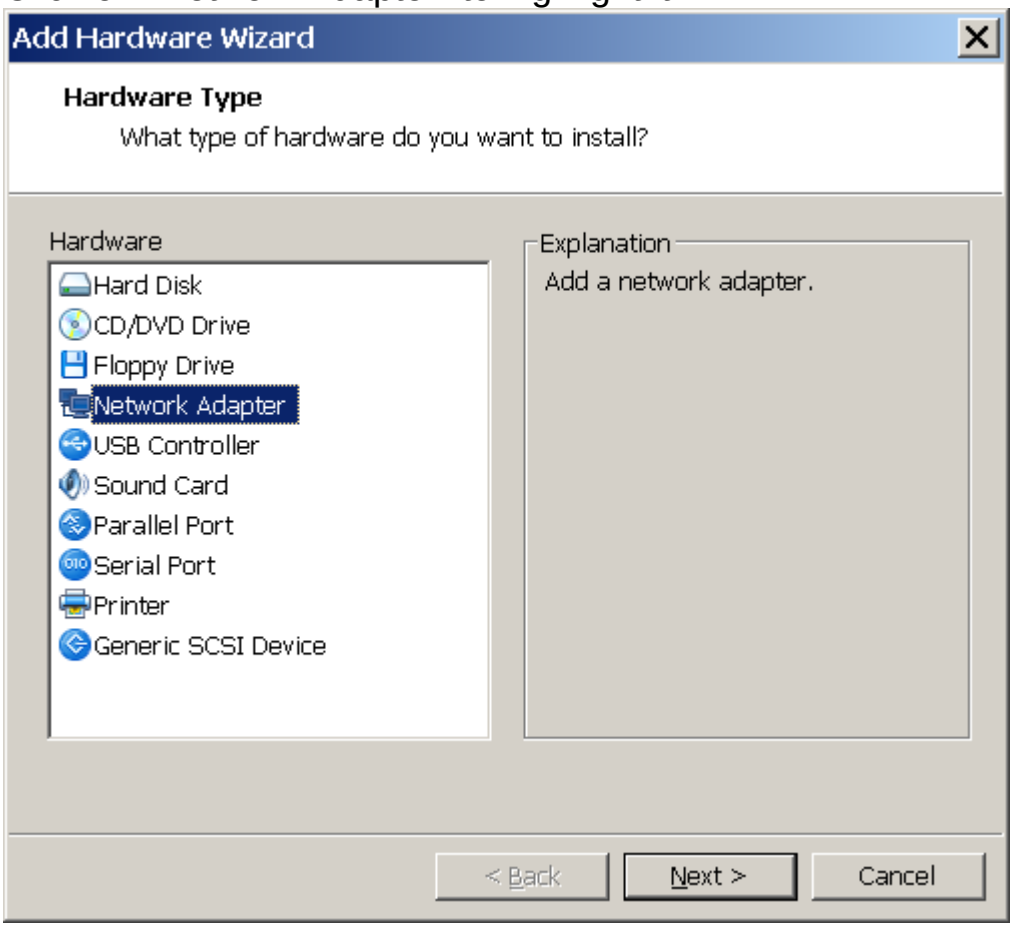


Click on the "Add" button.

An "Add Hardware Wizard" box will be displayed:

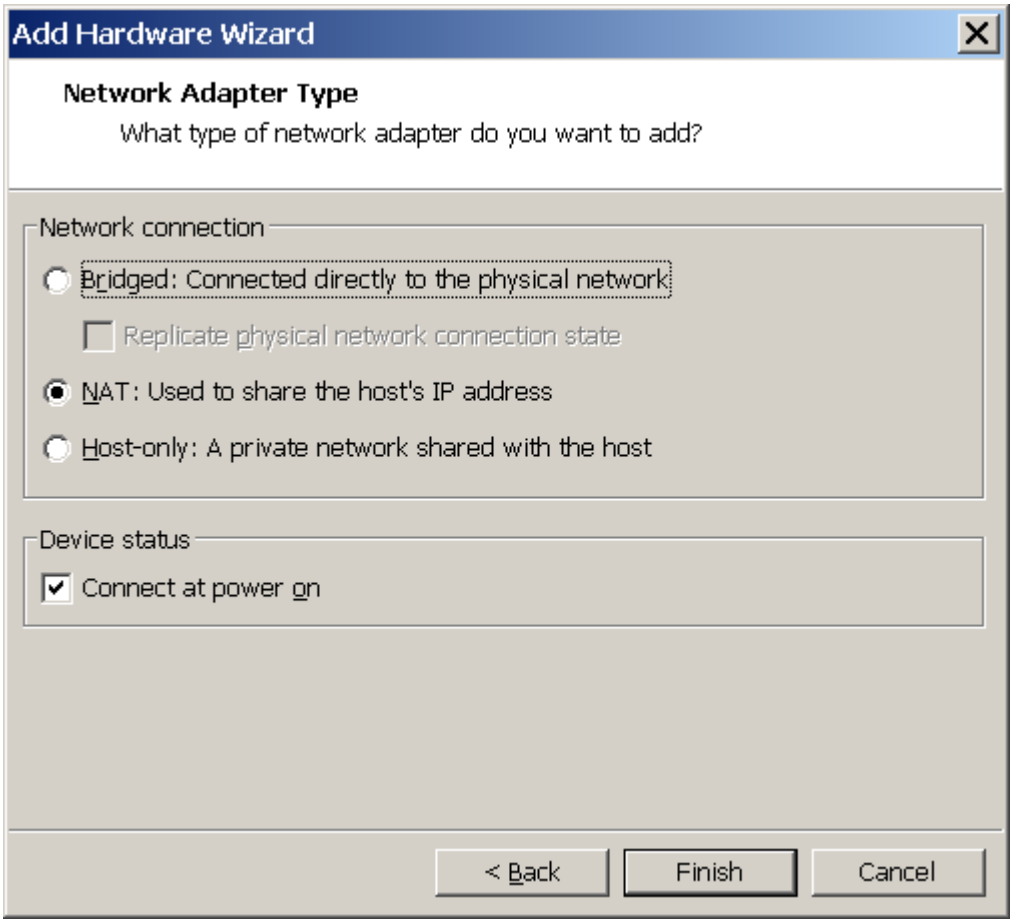


Click on "Network Adapter" to highlight it:



Click on the "Next" button.

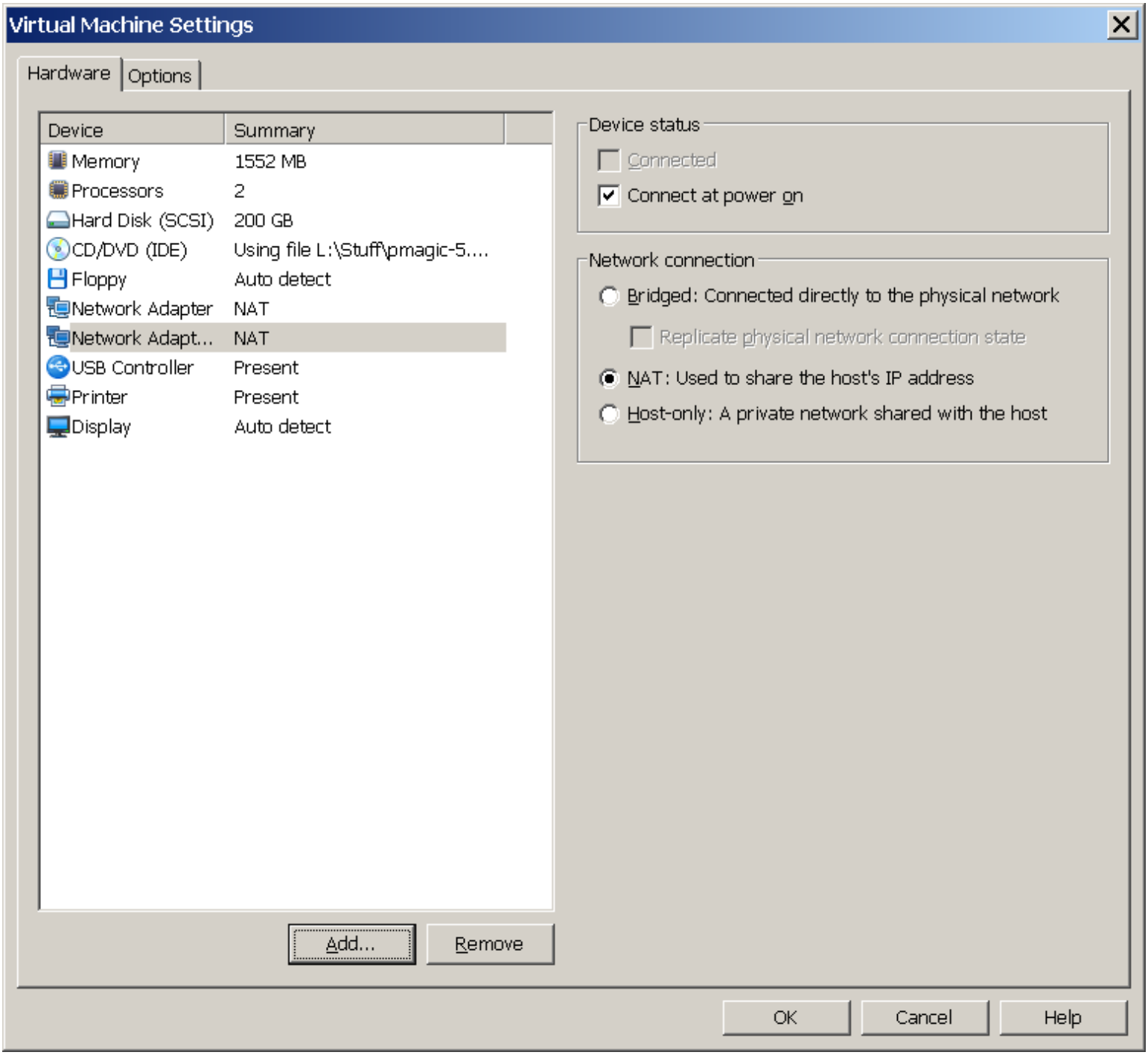
A "Network Adapter Type" box will be displayed:



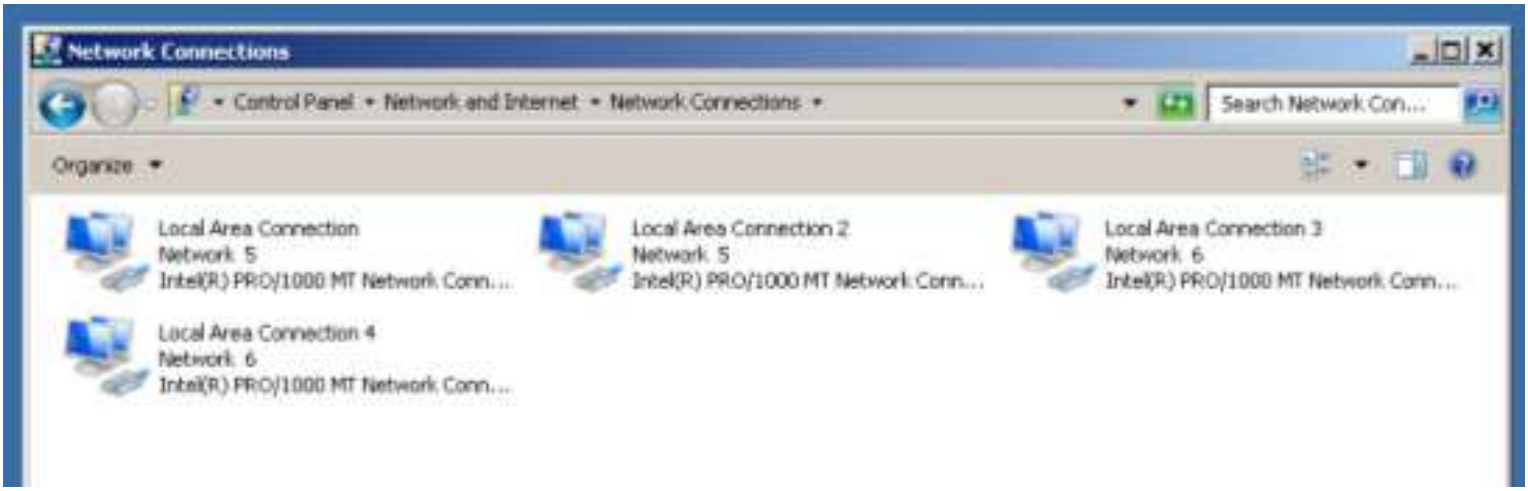
Use the radio buttons to select the desired network configuration.

Then click on the "Finish" button.

The new network adapter will now be displayed in the "Virtual Machine Settings" box:

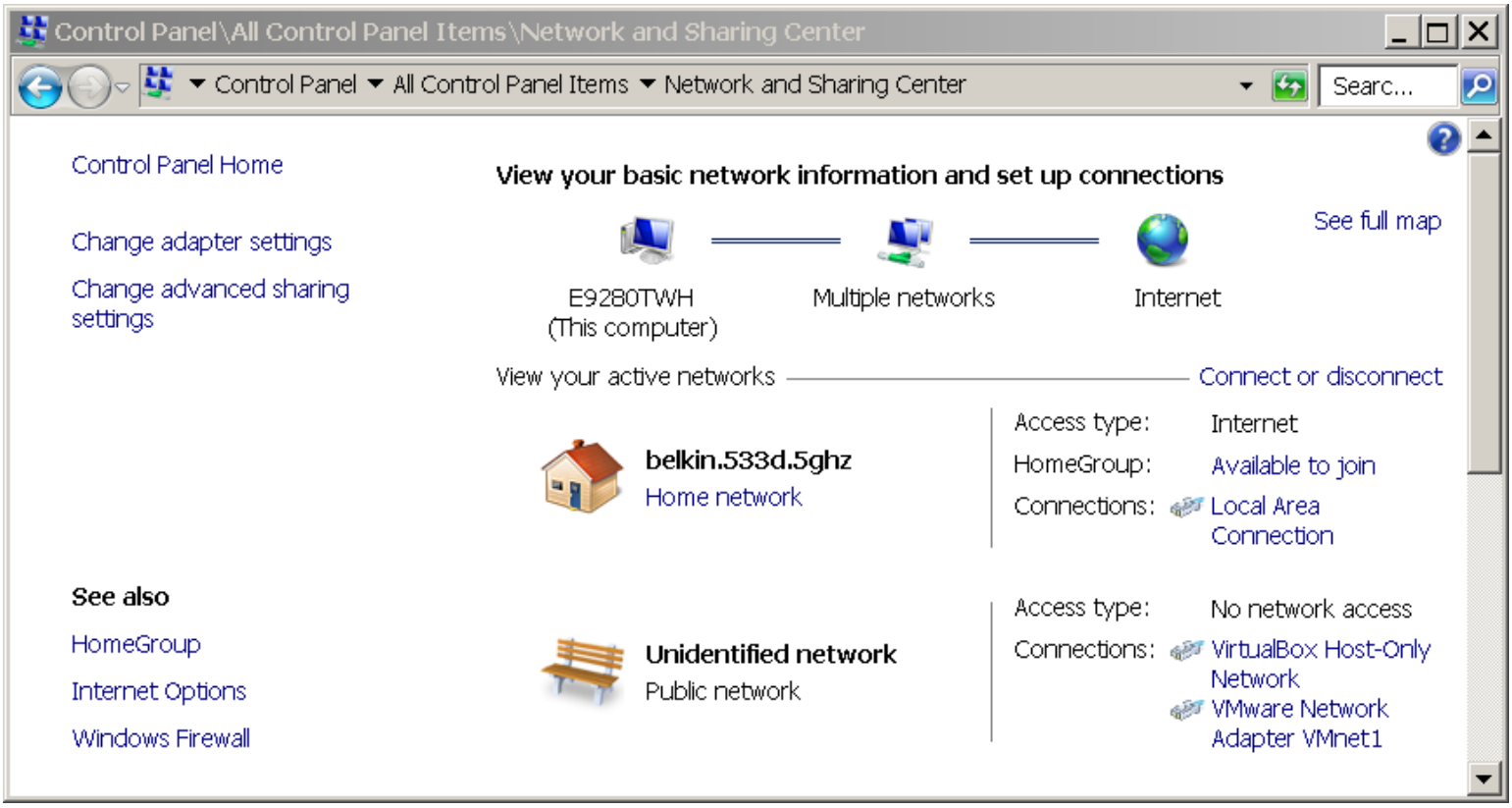


The operating system of the virtual machine treats the all of the virtual network adapters as if they were a real items of hardware:

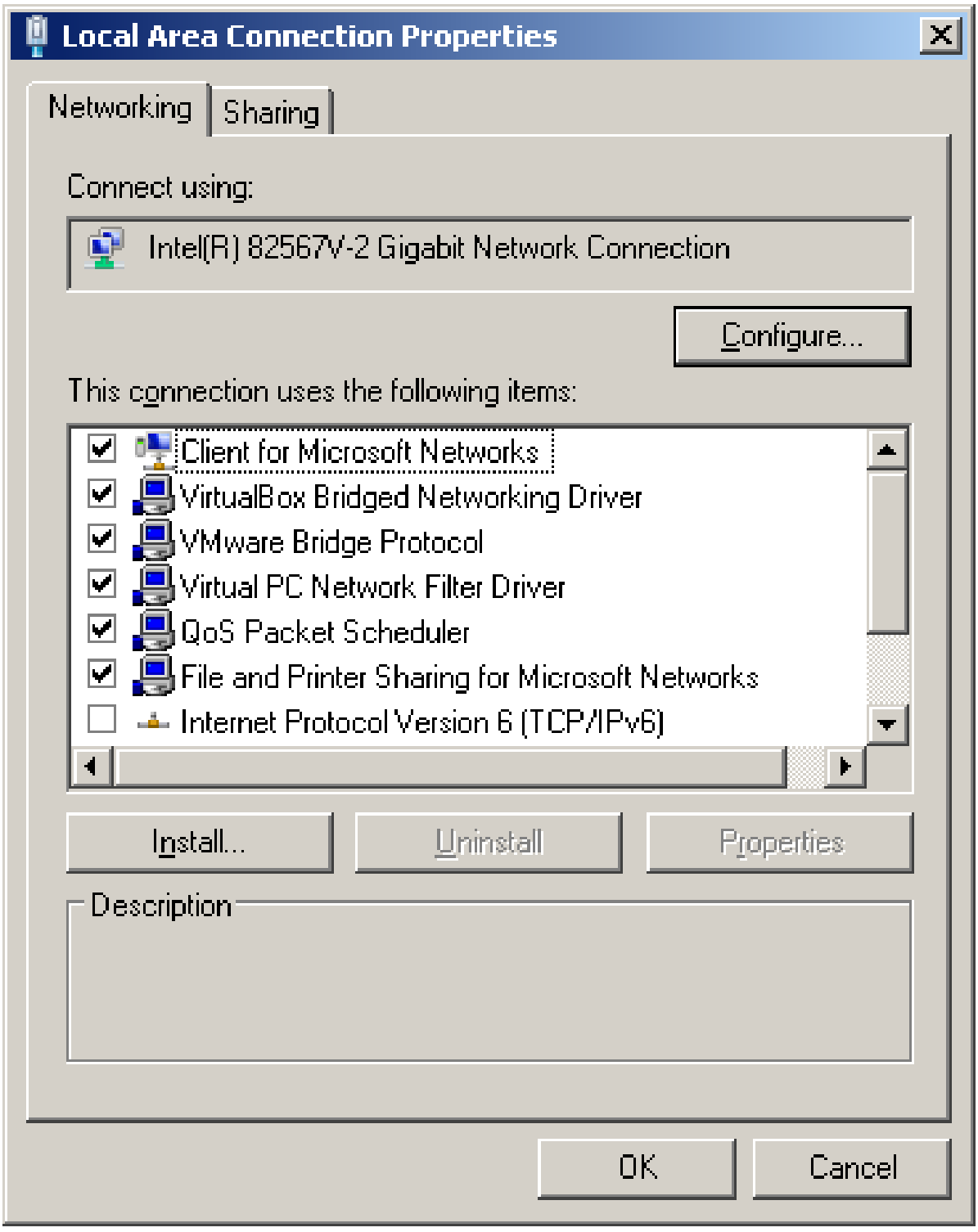


VIEW OF THE VIRTUAL NETWORK FROM THE HOST

From a "Windows Vista", "Windows 7", or "Windows 8" host, the virtual network is shown as an "Unidentified network"
of type ="Public network":

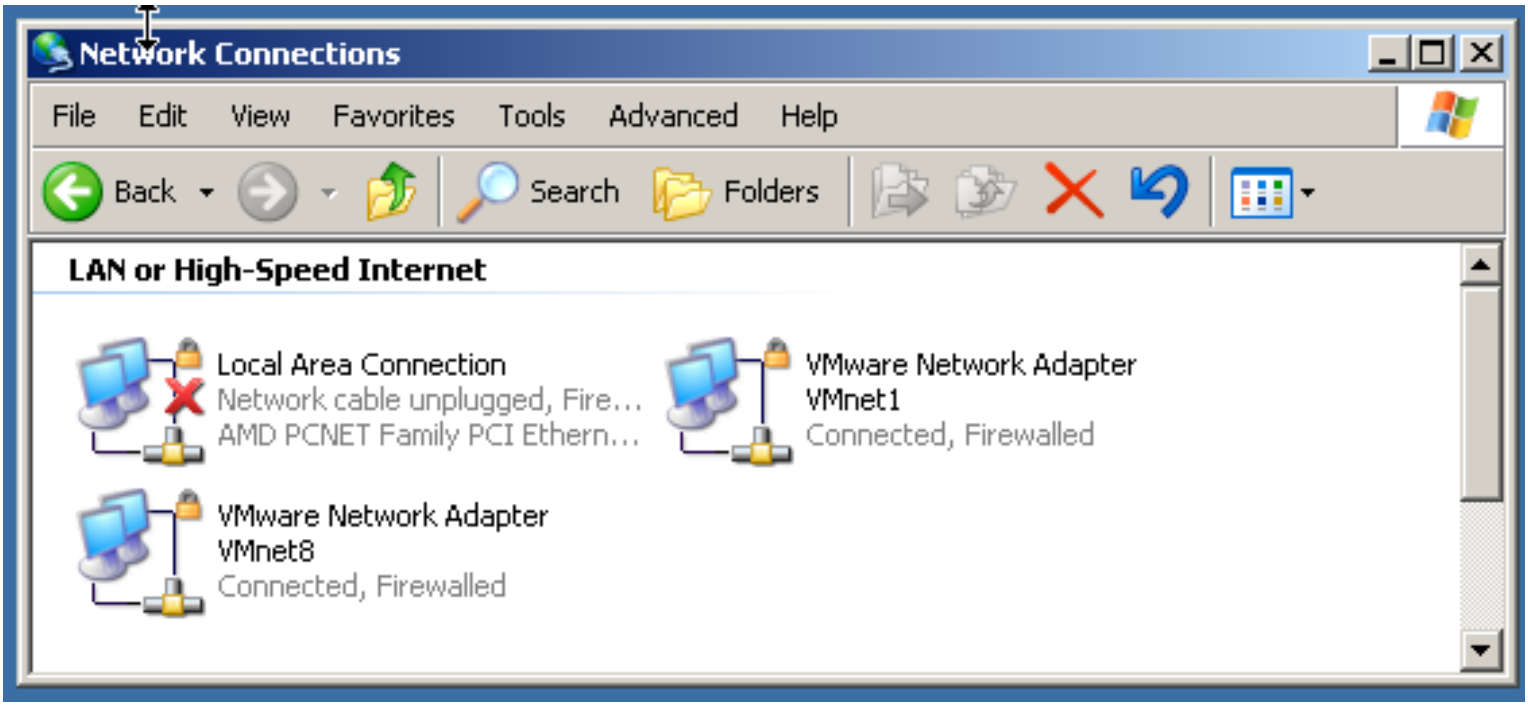


When you install "VMware Player" into a host computer, "VMware Player" "binds" a "VMware Bridge Protocol" driver to the upstream ("toward the Internet") network adapter of the host computer. This is part of the "Bridged" bridge "virtual network" of "VMware Player":



When you install "VMware Player" into a host computer, "VMware Player" provides two virtual network adapters for the host computer:

"VMware Network Adapter VMnet 1"
and
"VMware Network Adapter VMnet 8":



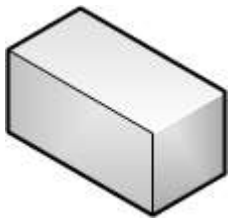
"VMware Network Adapter VMnet 8" connects the host computer to the virtual "Network Address Translation" ("NAT") router.

"VMware Network Adapter VMnet 1" connects the host computer to the virtual "Host-Only" router.

"SHARED FOLDERS" GATEWAY/ROUTER

with designated target folder located on the host
with no accessible or visible network interfaces in the host or the virtual machine
with no upstream routing to the Internet.
"VMware Tools" software must be installed into each virtual machine.
In a Windows host, the "VMware Tools" software for a Windows virtual machine is located at C:\Program Files(x86)\VMware\VMware Player\windows.iso
In a Windows host, "VMware Tools" software for a Linux virtual machine is downloaded from a server at the VMware company directly into the Linux virtual machine.
Multiple virtual machines can access the same target folder on the host.
"Shared Folders" must be configured for each virtual machine.
A "Windows" virtual machine sees a "Shared Folder" inside the "vmware-host" virtual server.
A "Linux" virtual machine sees a folder mounted in /mnt/hgfs/.
No indication in host file system that a folder is being shared.

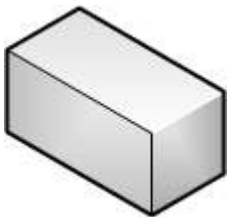
Host computer

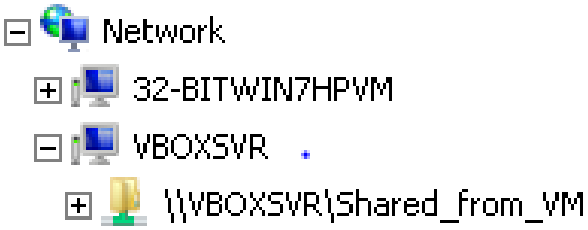


"Shared Folder(s)"
= host folder access
from virtual machine
File system of virtual machine
does not show indicate that the
folder is shared.

"Shared Folders"
Gateway/Router

Virtual Machine





Virtual machine sees a server
called "VBOXSVR"
Virtual network adapter is not used.

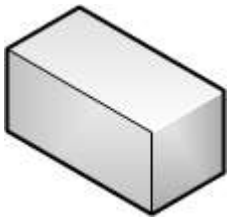
The host computer has no access to file system of virtual machine

When using the "Shared Folders" Gateway/Router of "VMware Workstation",
with "Windows 7 Professional 64-bit" and "Windows 7 Home Premium 64-bit" hosts,
We were able to access "Shared Folders" on the host from inside both "Windows XP Home 32-bit" and "Windows 7 Home Premium 32-bit" virtual machines.
Also, an "Ubuntu 10.10 32-bit" virtual machine was able to access "Shared Folders" on the host.

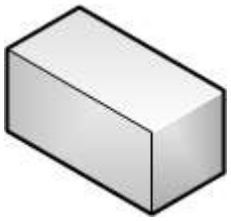
"Network Address Translation" ("NAT") router ("VMnet 8")

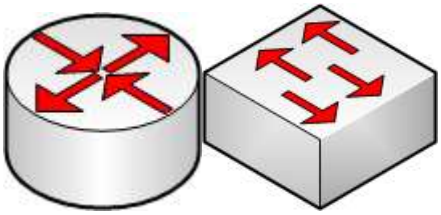
This is the default virtual network that is set up by the "VMware Player" virtual machine program when you use the "New Virtual Machine Wizard" to create a new virtual machine.
The "Network Address Translation" router provides the following services for all virtual machines:
NAT service, DHCP server, and upstream routing to the Internet,
LAN switching between the host and virtual machines provided by the "NAT" Router,
and LAN switching between virtual machines provided by the "NAT" Router
This is the default virtual network that is set up by the "VMware Player" virtual machine program when you use the "Create a New Virtual Machine" button to create a new virtual machine.

Host computer



Virtual Machine

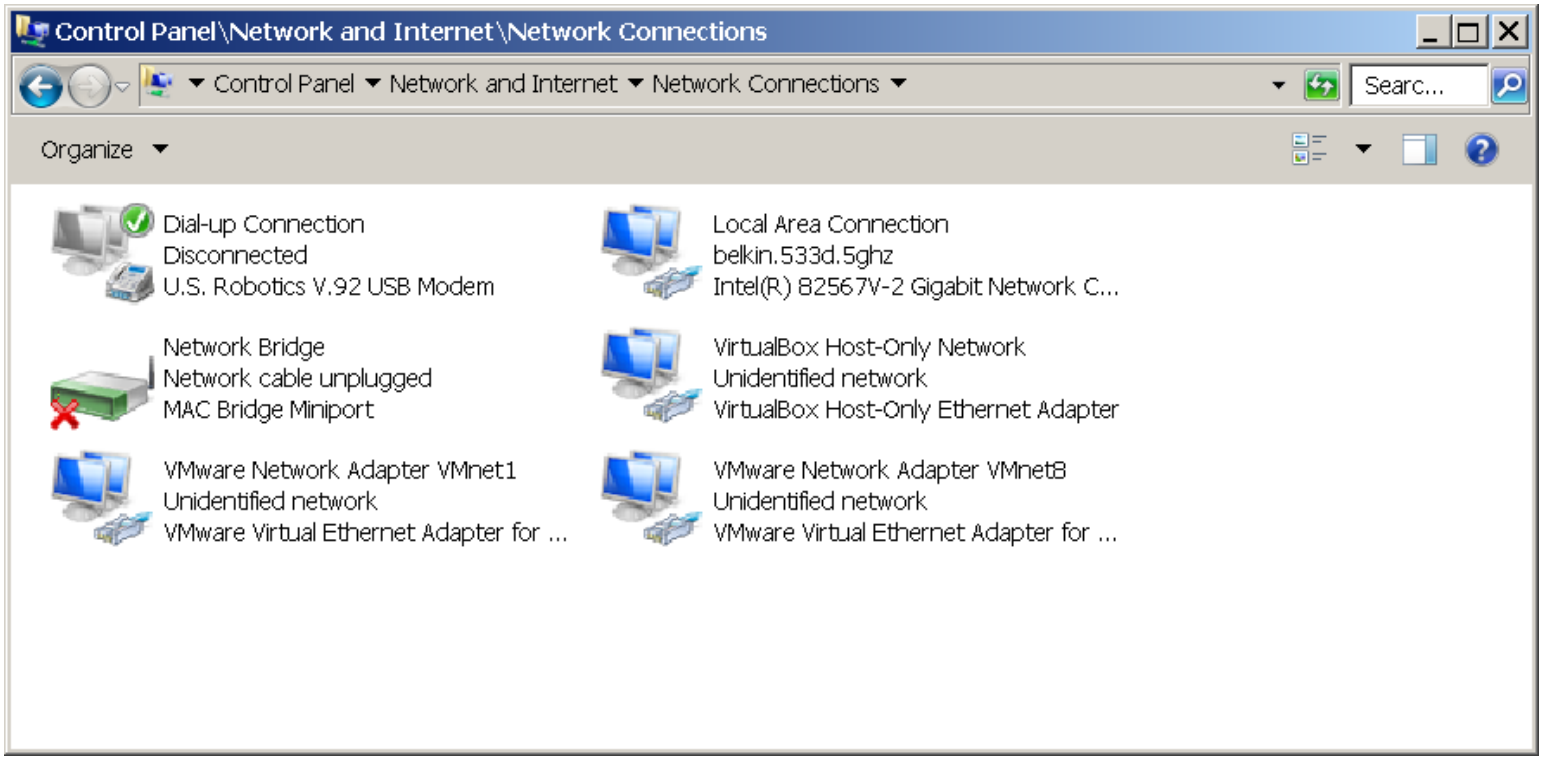


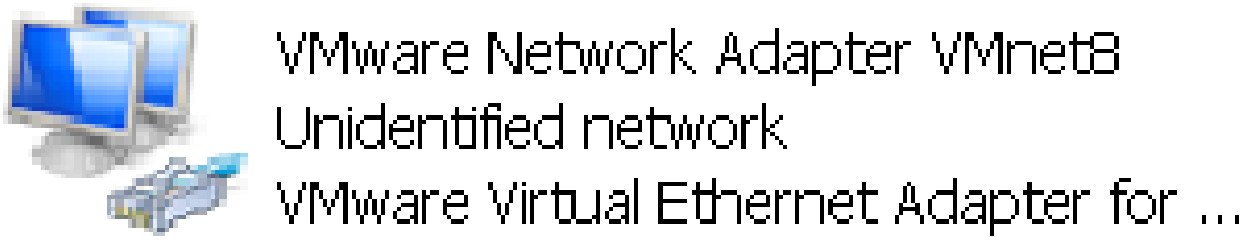


Internet access
from virtual machine
Optional host folder access
from virtual machine
if configured through
Windows file sharing

"NAT" router
with NAT service
with DHCP server
with upstream routing
to the Internet
with LAN switching between
virtual machines
with LAN switching between
the host and virtual machines

The "NAT" router will work fine whether or not the host is attached to it.
To connect or disconnect the host computer from the "NAT" router, you can enable or disable the "VMware Network Adapter VMnet8" virtual Ethernet adapter from "Network Connections" of the "Control Center" of the host computer:





If you use your right mouse button to click on "VMware Network Adapter VMnet8", one of the options in the popup context menu is "Disable". If you disable this network adapter, then the

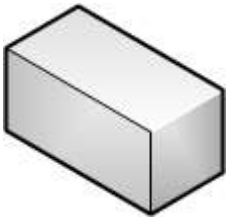
host will be unable to share files with any of the virtual machines, while the virtual machines can still shared files with each each other.

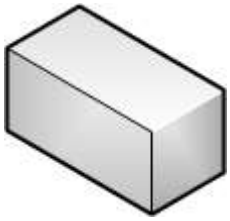
"Bridged" bridge ("VMnet 0")

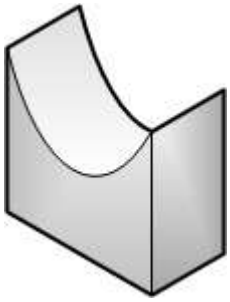
with mandatory "TEE" connection to either an upstream, real network adapter
or to an operating system-provided virtual bridge on the host,
(with LAN switching between virtual machines performed by the real physical network)
(with LAN switching between the host and guests performed by the real physical network)
(with NAT server and DHCP server provided by the real LAN).
With this virtual network option, the virtual machine(s) participate on the real physical network as "peers" with the host.

Host computer

Virtual Machine



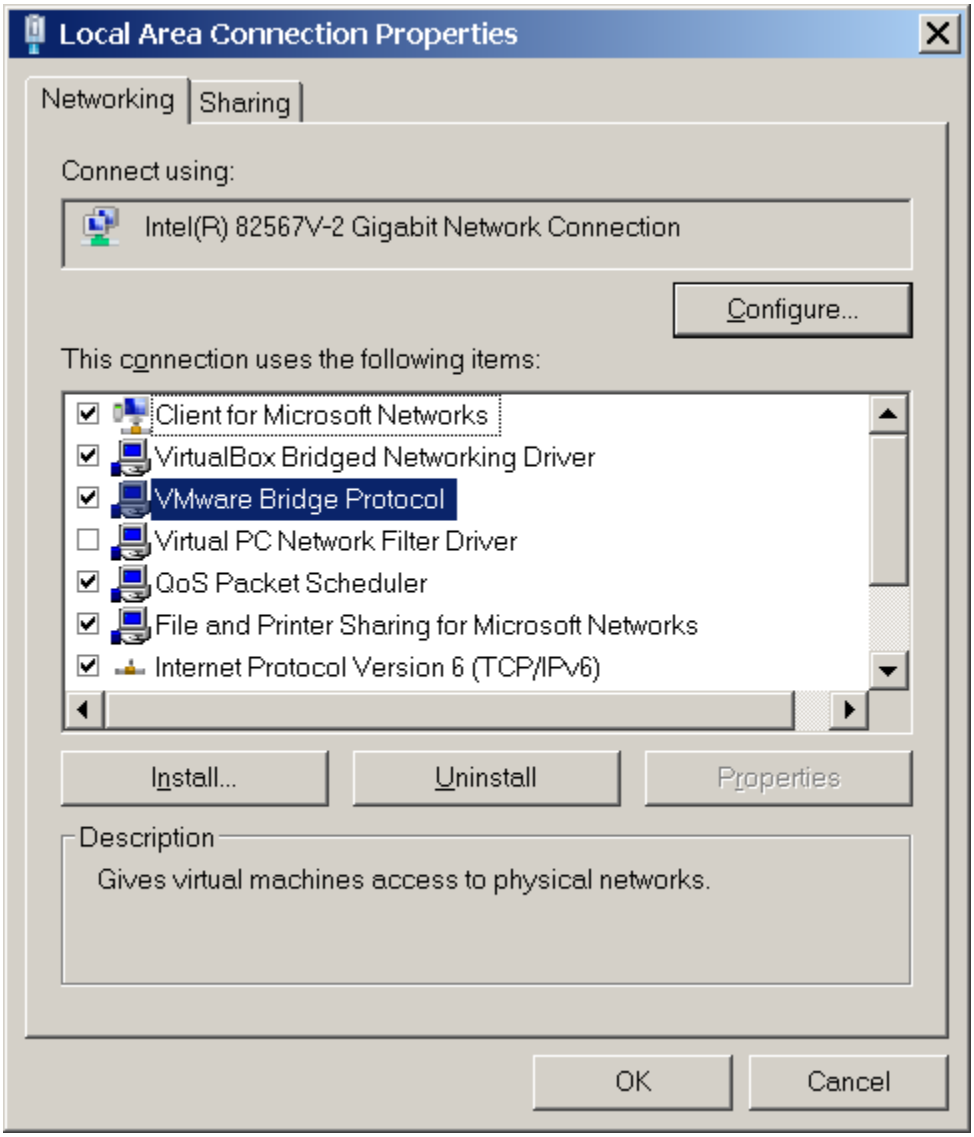




Internet access
from virtual machine
Optional host folder access
from virtual machine
with Windows file sharing

"Bridged" bridge
provides "TEE"
to a real physical
physical network
adapter but does not
switch between
virtual machines

When the host is a Windows computer, the mandatory "TEE" connection between the virtual "Bridged" bridge and the physical network adapter is performed by a "VMware Bridge Protocol" which can be activated or deactivated from the "..Properties" box of the "Network Adapter" in the "Control Panel" of "Windows.." in the host computer:



If their is no checkmark and you click on it to "checkmark" the "VMware Bridge Protocol" Driver", you sometimes have to reboot the host computer before the virtual "Bridged" bridge is re-connected to the real physical network adapter of the host computer.

The real physical network provides DHCP services, upstream routing to the Internet, NAT services, LAN switching between the host and virtual machines, and LAN switching between virtual machines.

PROBLEMS WITH "UBUNTU 10.10" HOSTS THAT HAVE BOTH A WIRED NETWORK ADAPTER AND A WIRELESS NETWORK ADAPTER:

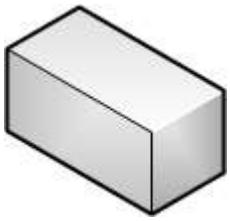
When running "VMware Player 3" on an Ubuntu 10.10 host, if we had both a wired Ethernet adapter and a WiFi adapter installed on the host, both Windows and Linux virtual machines with "bridged" network adapters failed to make an upstream connection to the Internet by acquiring an IP address through DHCP.

When running "VMware Player 3" on an Ubuntu 10.10 host, if we only had a wired Ethernet adapter installed on the host, both Windows and Linux virtual machines with "bridged" network adapters were able to make a connection to the Internet. Our Ubuntu virtual machines were able to automatically acquire a DHCP IP address and made a connection upstream to the Internet. However, we had to use the above workaround for "Windows 7.." virtual machines.

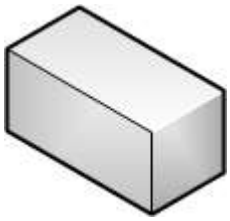
"Host-Only" router ("VMnet 1") or "Internal Network" LAN Switch

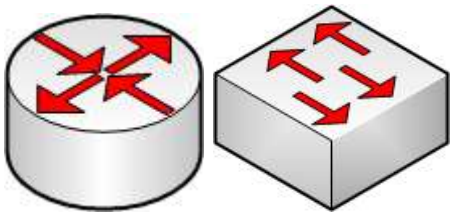
with LAN switching between the host and the virtual machine,
with LAN switching between virtual machines,
with an optional DHCP server, no NAT server, and no upstream routing to the Internet
for virtual machines

Host computer



Virtual Machine





Optional host folder access
from virtual machine
with Windows file sharing
No Internet access
from virtual machine

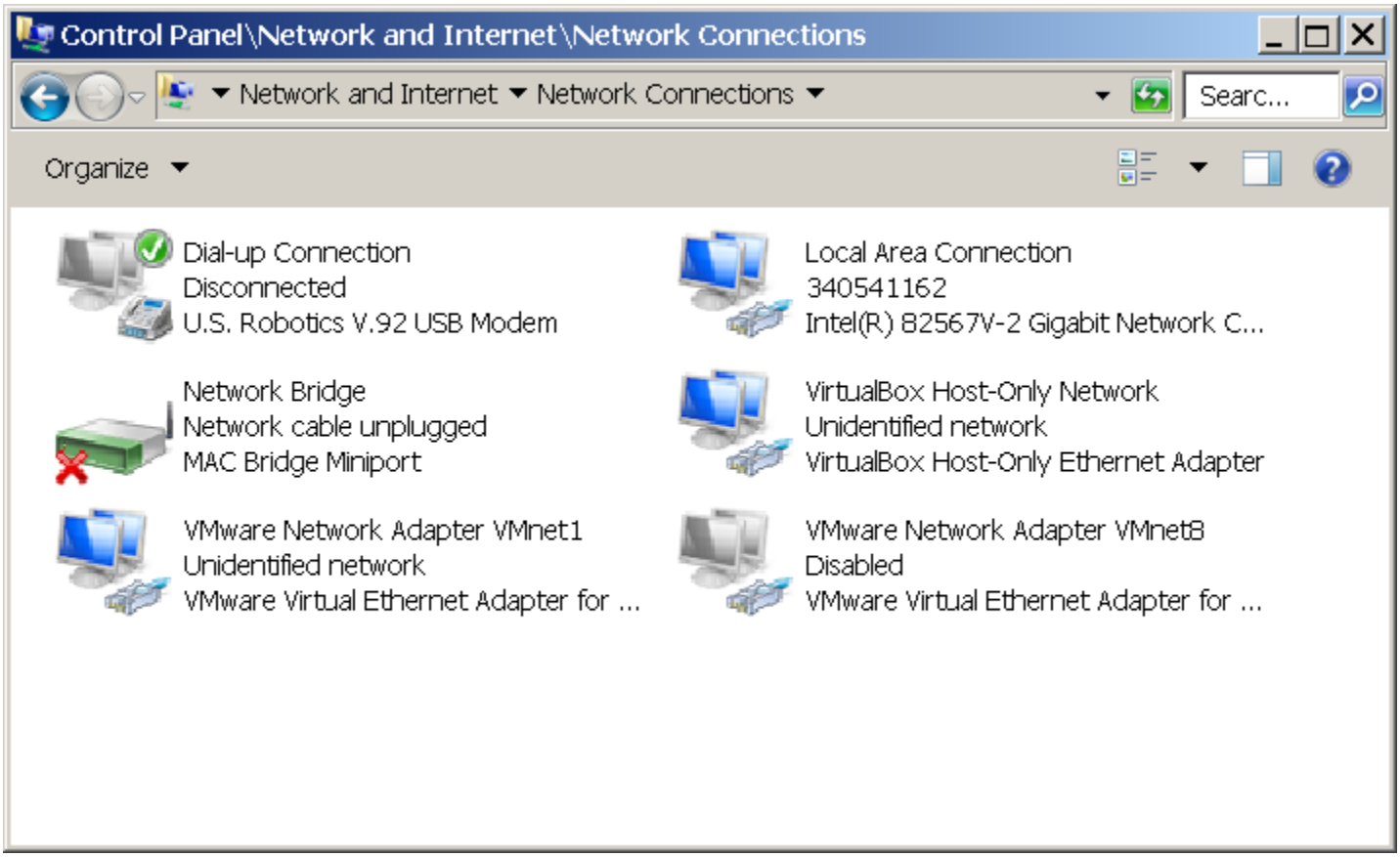
"Host-only" router
with inoperative but theoretically
mandatory LAN switching
between host and virtual machine
with LAN switching between
virtual machines
with optional DHCP server
with no NAT server.

The host has a "VMware Virtual Ethernet Adapter for VMnet1"
which connects the file system of the host
to the "Host-only" router

If you disable the "VMware Network Adapter for VMnet1", then "VMnet1" becomes an "Internal Network" switch with connectivity between virtual machines, but with no connection to the host.

In the "Host-Only" configuration, there is a LAN switching connection between the host and the "Host-only" virtual router: The virtual "VMware Virtual Ethernet Adapter for VMnet1" that VMware provides for the host can be enabled or disabled from the "Network Connections" applet box of the Windows "Control Panel".

If you disable the "VMware Network Adapter for VMnet1", then "VMnet1" becomes an "Internal Network" switch with connectivity between virtual machines, no connection to the host for virtual machines, and no connection to the Internet for virtual machines.



This is the hardest configuration to set up.
The "Host-only" router acts as a firewall to prevent communications between the Internet and all virtual machines.
It often takes a multiple reboots and long waits before the host can see shared files on the virtual machines and vice versa.
Sometimes it is necessary to attach more than one virtual machine to the "Host-only" router before file sharing starts up between virtual machines and between virtual machines and the host.

When using the "Host-Only" Router of VMware Workstation,
with "Windows 7 Professional 64-bit" and "Windows 7 Home Premium 64-bit" hosts:
I was able to share files in both directions with both "Windows XP Home 32-bit" and "Windows 7 Home Premium 32-bit" virtual machines.
However, the host and other virtual machines were unable share NFS or Samba-shared files with an "Ubuntu 10.10 32-bit" virtual machine.

When using the "Host-Only" Router of VMware Workstation,
with a Macintosh "OS X 10.6 64-bit" host:
I was able to share files in both directions with both "Windows XP Home 32-bit" and "Windows 7 Home Premium 32-bit" virtual machines.
A Mac virtual machine was able to access files shared on the host by means of Apple File Protocol.
The Mac host could "see" some of the shared files inside a Macintosh "OS X 10.6" virtual machine but the Mac host was unable to access files shared from the guest by means of Apple File Protocol.
An "Ubuntu 10.10 32-bit" virtual machine was able to access files shared on the host by means of NFS. However the Mac host was unable t access files shared from the Linux virtual machine.

References for host-only configuration:
http://www.virtualbox.org/manual/ch06.html#network_hostonly

References for virtual networking in "Oracle VM VirtualBox" in general:
http://pubs.vmware.com/server1/vm/wwhelp/wwhimpl/common/html/wwhelp.htm?context=vm&file=network_nat_details_gsx.html

and
http://pubs.vmware.com/server1/vm/wwhelp/wwhimpl/common/html/wwhelp.htm?context=vm&file=network_2host_route_gsx.html

ADDITIONAL INFORMATION

If you use the cloning procedure to clone a "Windows 7" virtual machine:
Both the original virtual machine and the cloned virtual machine will have the same Windows "Security Identifier" ("SID").
The two virtual machines will have different UUID.BIOS.
The two virtual machines will have different UUID.location
The two virtual machines will have different MAC addresses for their virtual network adapters.
Initially, the two virtual machines will have the same Windows "network names".
If you run both virtual machines at the same time, you must change the Windows "network name" of one of the virtual machines. After you do this, the two virtual machines can use "conventional (SMB) file sharing" to share files/folders with each other. Also, both virtual machines will be able to use "conventional (SMB) file sharing" to share files/folders with the host computer.