

VIRTUAL NETWORKS IN VIRTUAL MACHINE PROGRAMS

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SUMMARY

When you install a “virtual machine program” (such as “Vmware Workstation Player..”, “Oracle VM VirtualBox”, “Windows Virtual PC”, “Windows Virtual PC”, or “Microsoft Virtual PC 2007”), you automatically install some “virtual machine networks”. One of these “virtual machine networks” will be automatically connected to any virtual machine that you create.

TOPICS

- “VIRTUAL NETWORK” BASICS
- VIEW OF A “VIRTUAL NETWORK” FROM A “WINDOWS” HOST COMPUTER
- VIEW OF A “VIRTUAL NETWORK” FROM WITHIN A VIRTUAL MACHINE
- GENERIC DESCRIPTION OF THE "VIRTUAL NETWORKS" CREATED BY MOST "VIRTUAL MACHINE PROGRAMS"

TOPICS (continued)

- “VIRTUAL NETWORKS” PROVIDED BY “VMWARE WORKSTATION PLAYER”
- “VIRTUAL NETWORKS” PROVIDED BY “ORACLE VM VIRTUALBOX”
- “VIRTUAL NETWORKS” PROVIDED BY “WINDOWS VIRTUAL PC” AND “MICROSOFT VIRTUAL PC 2007”

TOPICS (continued)

- MAKING A “VIRTUAL MACHINE” ACT LIKE IT IS DIRECTLY CONNECTED TO YOUR REAL “LOCAL AREA NETWORK” (“LAN”)

“VIRTUAL NETWORK” BASICS

- All virtual machine programs provide you with "virtual networks":
 - When you install a "virtual machine program" such as "VMware Workstation Player" (free), "Oracle VM VirtualBox (free), "Windows Virtual PC" (free), or "Microsoft Virtual PC 2007 (free) into your "Windows.." "host" computer, you will also be automatically installing some "virtual networks" that belong to the "virtual machine program".

“VIRTUAL NETWORK” BASICS

(continued)

- All virtual machine programs provide you with "virtual networks":
 - When you install a "virtual machine program" such as "Oracle VM VirtualBox" (free), "Parallels" (not free), or "VMware Fusion" (not free) into your "Mac" "host" computer, you will also be automatically installing some "virtual networks" that belong to the "virtual machine program".

“VIRTUAL NETWORK” BASICS

(continued)

- All virtual machine programs provide you with "virtual networks":
 - When you install a "virtual machine program" such as "VMware Workstation Player" (free), or "Oracle VM VirtualBox" (free), into your "GNU/Linux" "host" computer, you will also be automatically installing some "virtual networks" that belong to the "virtual machine program"

“VIRTUAL NETWORK” BASICS

(continued)

- All virtual machine programs provide you with "virtual networks":
 - These "virtual machine networks" are mandatory modules that are proprietary and specific parts of the "virtual machine program".

“VIRTUAL NETWORK” BASICS

(continued)

- All virtual machine programs provide you with "virtual networks" (continued):
 - A "virtual network" that is part of a certain "virtual machine program" cannot interoperate with a "virtual machine program" that is part of another "virtual machine program".

"Windows.." host computer

"VMware Workstation Player" software

"Virtual Network 1"

"Virtual Network 2"

"Virtual Network 3"

"Virtual Machine 1"

"Virtual Machine 2"

(Real) Network Connections in the "Control Panel"

(Wired) Ethernet Adapter

Wireless WiFi Adapter

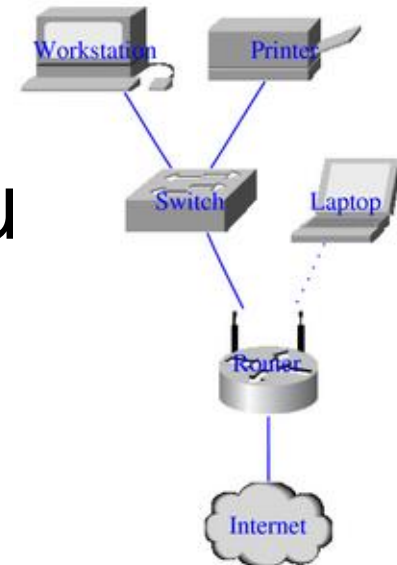
Microsoft Virtual WiFi Miniport Adapter

Microsoft Hosted Network Virtual Adapter

“VIRTUAL NETWORK” BASICS

(continued)

- All virtual machine programs provide you with "virtual networks":
 - By default, the "virtual network" that is used when you create a "virtual machine" will be connected to a "virtual router" that gives you an extra measure of security when you are accessing Web sites on the Internet.



“VIRTUAL NETWORK” BASICS

(continued)

- All "virtual machine" programs provide you with "virtual networks"
(continued):
 - The "virtual networks" allow you to test networking capabilities of operating systems and application software, without actually having to purchase and install piles of network equipment.

“VIRTUAL NETWORK” BASICS (continued)

- All "virtual machine" programs provide you with "virtual networks" (continued):
 - The virtual networks that are provided by the various “virtual machine programs” are similar with slight differences in details of operation.

VIEW OF “VIRTUAL NETWORKS” FROM A “WINDOWS..” HOST COMPUTER

- When you install “Vmware Workstation Player”, or “Oracle VM VirtualBox” virtual machine programs into a “Windows..” computer the “virtual networks” that are created by the “virtual machine program” are shown in the Windows Vista, 7, or 8 “Network and Sharing Center” as a new “Unidentified network”.¹⁶

VIEW OF “VIRTUAL NETWORKS” FROM A “WINDOWS..” HOST COMPUTER (continued)

- This single “Unidentified network” represents all of the “virtual networks” from the previously-mentioned “virtual machine programs”.
- Even if you install more than one of the previously-mentioned “virtual machine programs” into your “Windows..” host computer, you will only see one “Unidentified network”.

VIEW OF A “VIRTUAL NETWORK” FROM A “WINDOWS..” HOST COMPUTER (continued)

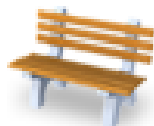
View your active networks

Connect or disconnect






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Home network

Access type: Internet
HomeGroup: Ready to create
Connections:  Local Area Connection



Unidentified network
Public network

Access type: No Internet access
Connections:  VirtualBox Host-Only Network
 VMware Network Adapter VMnet1
 VMware Network Adapter VMnet8

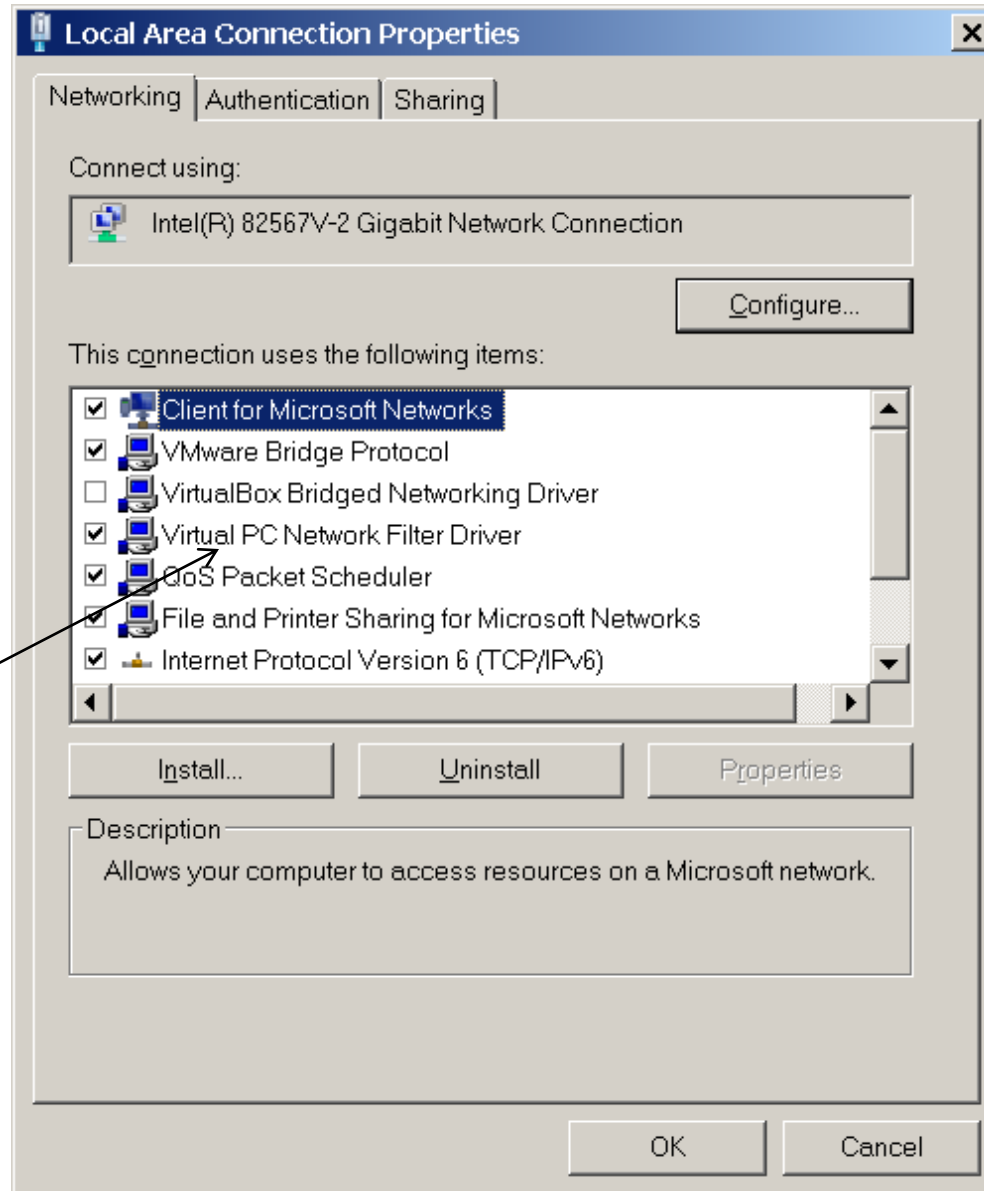
VIEW OF A VIRTUAL NETWORK FROM A “WINDOWS..” HOST COMPUTER (continued)

- When you install the “Windows Virtual PC” or “Windows XP Mode”, or “Microsoft Virtual PC 2007” virtual machine programs into a “host” “Windows...” computer, the “virtual networks” that are provided by the “Windows Virtual PC” are not shown in the Windows “Network and Sharing Center”.

VIEW OF A VIRTUAL NETWORK FROM A “WINDOWS..” HOST COMPUTER (continued)

- When you install the “Windows Virtual PC” or “Windows XP Mode” virtual machine programs into a “host” “Windows...” computer, your only indication that some “virtual networks” are present is the new “Virtual PC Network Filter Driver” in the “..Properties” box of the upstream network adapter.

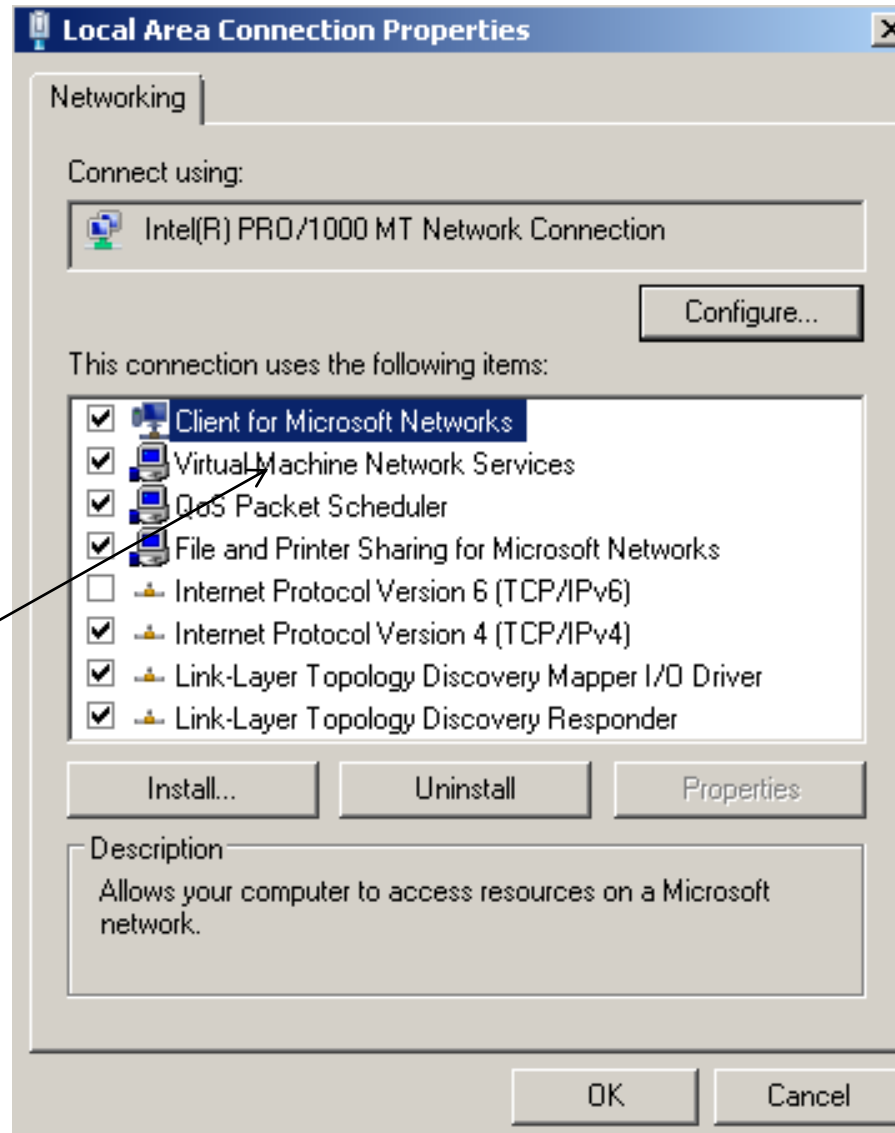
VIEW OF A VIRTUAL NETWORK FROM A “WINDOWS..” HOST COMPUTER (continued)



VIEW OF A VIRTUAL NETWORK FROM A “WINDOWS..” HOST COMPUTER (continued)

- When you install the “Microsoft Virtual PC 2007” virtual machine program into a “host” “Windows...” computer, your only indication that some “virtual networks” are present is the new “Virtual Machine Network Services” driver in the “..Properties” box of the upstream network adapter.

VIEW OF A VIRTUAL NETWORK FROM A “WINDOWS..” HOST COMPUTER (continued)



VIEW OF A VIRTUAL NETWORK FROM A VIRTUAL MACHINE

- When you create a “virtual machine” and install an operating system into it, the operating system in the “virtual machine” will treat its “virtual network adapter” and the entire “virtual network” as if these items were real hardware components of a real physical network hardware.

GENERIC DESCRIPTION OF THE "VIRTUAL NETWORKS" CREATED BY MOST "VIRTUAL MACHINE PROGRAMS"

- When you install a "virtual machine program" into your real "host" computer, the "virtual machine program" will create the following "virtual networks":

GENERIC DESCRIPTION OF "VIRTUAL NETWORKS"...(CONTINUED)

- A virtual "router" network with "Dynamic Host Configuration Protocol"("DHCP") service, "Network Address Translation"("NAT"), and wired LAN switching for virtual machines.
(These are standard functions that you will find in any off-the-shelf router that you buy.)

GENERIC DESCRIPTION OF "VIRTUAL NETWORKS"...(CONTINUED)

- A virtual "shared folders" hidden network that allows the host computer to share files with any virtual machine.
 - This "hidden network" is not shown in most of the network configuration screens of the operating system of the virtual machine
 - This "hidden network" is not shown in the operating system of the host computer
 - This "hidden network" relies on an add-on software program that has to be installed into the operating system of a virtual machine. This add-on software program is provided by your "virtual machine program".

GENERIC DESCRIPTION OF "VIRTUAL NETWORKS"...(CONTINUED)

- A virtual "bridged network" that provides a virtual network bridge between virtual machines and the real (upstream) network adapter in the host computer
 - A virtual machine that is connected to the virtual "bridged" network will act like it is directly attached to the real physical LAN that the host computer is attached to. It will depend on the real physical router on your LAN for DHCP and NAT services.

GENERIC DESCRIPTION OF "VIRTUAL NETWORKS"...(CONTINUED)

- A virtual "host-only" or "internal" router network which interconnects the host computer and all virtual machines with a virtual LAN switch. This "host-only" or "internal" router network does not provide Internet access to virtual machines.

“VIRTUAL NETWORKS” PROVIDED BY “VMWARE WORKSTATION PLAYER”

- For information on the “virtual networks” that are provided by “VMware Workstation Player”, see

http://aztcs.org/meeting_notes/winhardsig/virtualmachines/vmware/Virtual_Networks_in_VMware--Windows.pdf

“VIRTUAL NETWORKS” PROVIDED BY “ORACLE VM VIRTUALBOX”

- For information on the “virtual networks” that are provided by “Oracle VM VirtualBox”, see http://aztcs.org/meeting_notes/winhardsig/virtualmachines/virtualbox/Virtual_Networks_in_VirtualBox--Windows.pdf

“VIRTUAL NETWORKS” PROVIDED BY “WINDOWS VIRTUAL PC”

- For information on the “virtual networks” that are provided by “Windows Virtual PC”, see http://aztcs.org/meeting_notes/winhardsig/virtualmachines/WindowsVirtualPC/Virtual_Networks_in_WinVirtualPC.pdf

“VIRTUAL NETWORKS” PROVIDED BY “WINDOWS VIRTUAL PC” AND “MICROSOFT VIRTUAL PC 2007

- For workarounds for some of the networking problems that occur for “Windows XP Mode” and “Windows Virtual PC”, see http://aztcs.org/meeting_notes/winhardsig/virtualmachines/WindowsVirtualPC/NetworkProblemswithWVPC.pdf

“VIRTUAL NETWORKS” PROVIDED BY “MICROSOFT”..(continued)

- For information on the “virtual networks” that are provided by “Microsoft Virtual PC 2007”, see http://aztcs.org/meeting_notes/winhardsig/virtualmachines/WindowsVirtualPC/Virtual_Networks_in_MSVirtualPC2007.pdf

MAKING A “VIRTUAL MACHINE” ACT LIKE IT IS DIRECTLY CONNECTED TO YOUR REAL “LOCAL AREA NETWORK” (“LAN”)

- All “virtual machine programs” provide you with a “virtual network” that allows you to connect a “virtual machine” directly to your real “local area network” (“LAN”).
- In most “virtual machine programs”, this “virtual machine” is called “Bridged..”

MAKING A “VIRTUAL MACHINE” ACT LIKE IT IS DIRECTLY CONNECTED TO YOUR REAL “LOCAL AREA NETWORK” (“LAN”) (continued)

- A “bridged” “virtual network” lets you share files and printers between your real computers and your virtual machines

MAKING A “VIRTUAL MACHINE” ACT LIKE IT IS DIRECTLY CONNECTED TO YOUR REAL “LOCAL AREA NETWORK” (“LAN”)

(continued)

- For example, in “Vmware Workstation Player”, you attach a virtual machine to the “bridged” “virtual network” by means of a “radio option” form:

Device status

Connected

Connect at power on

Network connection

Bridged: Connected directly to the physical network

Replicate physical network connection state

NAT: Used to share the host's IP address

Host-only: A private network shared with the host












LAN segment:



Virtual Machine Settings

Hardware

Options

Device	Summary
 Memory	1.1 GB
 Processors	2
 Hard Disk (SCSI)	960 GB
 CD/DVD (IDE)	Using file C:\Stuff\WindowsD...
 Floppy	Auto detect
 Network Adapter	Bridged 
 USB Controller	Present
 Sound Card	Auto detect
 Printer	Present
 Display	Auto detect

Virtual Machine Settings



Hardware | Options

Device	Summary
Memory	1.1 GB
Processors	2
Hard Disk (SCSI)	960 GB
CD/DVD (IDE)	Using file C:\Stuff\WindowsD...
Floppy	Auto detect
Network Adapter	Bridged
USB Controller	Present
Sound Card	Auto detect
Printer	Present
Display	Auto detect

Device status

Connected

Connect at power on

Network connection

Bridged: Connected directly to the physical network

Replicate physical network connection state

NAT: Used to share the host's IP address

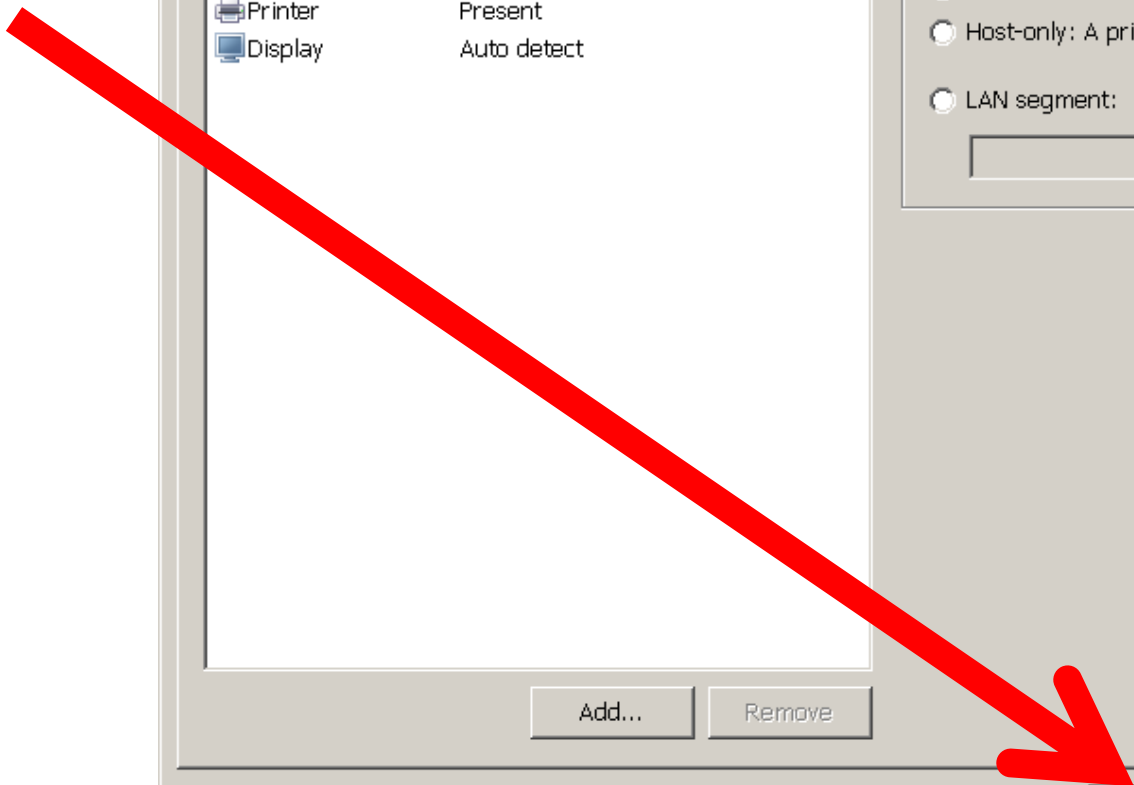
Host-only: A private network shared with the host

LAN segment:

LAN Segments... Advanced...

Add... Remove

OK Cancel Help



APPENDIX 1

“ADD-ON” SOFTWARE FOR VIRTUAL MACHINES

- “ADD-ON” SOFTWARE TO INSTALL INTO EACH VIRTUAL MACHINE:
AFTER YOU CREATE A VIRTUAL MACHINE, YOU SHOULD START THE VIRTUAL MACHINE AND INSTALL “ADD-ON” SOFTWARE THAT IS PROVIDED BY THE MAKER OF THE “VIRTUAL MACHINE PROGRAM.

APPENDIX 1(continued)

“ADD-ON” SOFTWARE FOR VIRTUAL MACHINES

- Add on “VMware Tools” into each “VMware Workstation Player” virtual machine to enable enhanced functions such as the “Shared Folders” virtual network. See <http://www.vmware.com/download/packages.html>

and

<http://www.hackernotcracker.com/2007-02/obtaining-vmware-tools-for-vmware-player-through-extraction.html>

and

http://www.ehow.com/how_6809913_install-tools-vmware-player.html

APPENDIX 1(continued)

“ADD-ON” SOFTWARE FOR VIRTUAL MACHINES

- Add “Guest Additions” software to each “Oracle VM VirtualBox” virtual machine to enable enhanced functions such as the “Shared Folders” virtual network

See

[http://www.virtualbox.org/manual/c
h04.html](http://www.virtualbox.org/manual/ch04.html)

APPENDIX 1 (continued)

“ADD-ON” SOFTWARE FOR VIRTUAL MACHINES

- Add on “Virtual PC Integration Components” software into each “Windows Virtual PC” virtual machine to provide enhanced functions such as the “Other” virtual network.
 - “Virtual PC Integration Components” is also known as “Integration Features” in the pull-down menu of each virtual machine.

APPENDIX 1 (continued)

“ADD-ON” SOFTWARE FOR VIRTUAL MACHINES

- For information on installing “Virtual PC Integration Components, see

[http://technet.microsoft.com/en-us/library/ee449409\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/ee449409(WS.10).aspx)

or

<http://www.7tutorials.com/boost-performance-integration-components-windows-virtual-pc>

or

http://www.ehow.com/list_7380069_virtual-pc-integration-components.html

APPENDIX 1(continued)

“ADD-ON” SOFTWARE FOR VIRTUAL MACHINES

- Add on “Virtual Machine Additions” software” into each “Microsoft Virtual PC 2007” virtual machine to provide enhanced functions such as the “Shared Folders” virtual network.

See

<http://www.vistax64.com/tutorials/247857-virtual-pc-2007-install-virtual-machine-additions.html>

or

<http://www.pctips3000.com/how-to-install-virtual-machine-additions-in-virtual-pc-2007/>

or

<http://lifehacker.com/238071/geek-to-live--run-windows-xp-inside-vista-with-virtual-pc>

APPENDIX 2

VIRTUALIZATION “BIG PICTURE”

- Real fax machine → Virtual fax
 - “Windows Fax and Scan” inside “Windows” and fax modem instead of a fax machine
 - See http://aztcs.org/meeting_notes/winhardsig/windowsfax/windowsfax.htm

APPENDIX 2 (continued)

VIRTUALIZATION “BIG PICTURE”

- Real hard drive → Virtual Hard Drive
 - Windows 7 allows you to boot from a .vhd “virtual hard disk”.
 - See <http://www.techrepublic.com/blog/window-on-windows/expand-the-number-of-windows-7-installs-with-bootable-vhds/1578>

APPENDIX 2 (continued)

VIRTUALIZATION “BIG PICTURE”

- Real Television Set → Virtual TV
 - “live TV” option inside “Windows Media Center” software
or Hauppauge “WinTV” software program
 - USB tuner “stick” or PCI/PCIe tuner card
 - See
http://www.hauppauge.com/site/products/data_hvr950q.html

APPENDIX 2 (continued)

VIRTUALIZATION “BIG PICTURE”

- Real physical computer
→ Virtual machines

See

<http://www.windowsitpro.com/article/virtualization2/marketwatch-virtualization-from-the-desktop-to-the-datacenter-129722/3>

APPENDIX 2 (continued)

VIRTUALIZATION “BIG PICTURE”

- Real Local Area Network (LAN)
 - Virtual networks
 - from “virtual machine programs”

APPENDIX 2 (continued)

VIRTUALIZATION “BIG PICTURE”

- Real Router → Virtual Router
 - "Internet Connection Sharing" inside "Windows"
 - See <http://support.microsoft.com/kb/306126>

APPENDIX 2 (continued)

VIRTUALIZATION “BIG PICTURE”

- Real Router → Virtual Router
 - "Internet Connection Sharing" inside "Windows" (continued)
 - See also
 - <http://windows.microsoft.com/en-US/windows-vista/Using-ICS-Internet-Connection-Sharing>

APPENDIX 2 (continued)

VIRTUALIZATION “BIG PICTURE”

- Real network bridge
 - Virtual network bridge
 - “Network Bridge” capability of “Windows”
 - See <http://windows.microsoft.com/en-US/windows7/Create-a-network-bridge>

APPENDIX 2 (continued)

VIRTUALIZATION “BIG PICTURE”

- Hardware Wireless Access Point → Virtual Wireless Access Point
 - Free "Connectify" software for "Windows 7"
 - See <http://www.connectify.me/>

APPENDIX 2 (continued)

VIRTUALIZATION “BIG PICTURE”

- Hardware DVD/CD Drive
 - Virtual DVD/CD Drive
 - “Virtual CloneDrive” software by “SlySoft”
 - See <http://www.slysoft.com/en/virtual-clonedrive.html>