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”
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".
• 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"
• 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".
• 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
• 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.
• All "virtual machine" programs provide you with "virtual networks":

– 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
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

- 340541165
  Home network

- Unidentified network
  Public network

Connect or disconnect

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

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)
• 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.
When you install a "virtual machine program" into your real "host" computer, the "virtual machine program" will create the following "virtual networks":
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.)
• 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 installed into the operating system of a virtual machine. This add-on software program is provided by your "virtual machine program".
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.
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--\nWindows.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/windows_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:
<table>
<thead>
<tr>
<th>Device</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory</td>
<td>1.1 GB</td>
</tr>
<tr>
<td>Processors</td>
<td>2</td>
</tr>
<tr>
<td>Hard Disk (SCSI)</td>
<td>960 GB</td>
</tr>
<tr>
<td>CD/DVD (IDE)</td>
<td>Using file C:\Stuff\WindowsD...</td>
</tr>
<tr>
<td>Floppy</td>
<td>Auto detect</td>
</tr>
<tr>
<td>Network Adapter</td>
<td>Bridged</td>
</tr>
<tr>
<td>USB Controller</td>
<td>Present</td>
</tr>
<tr>
<td>Sound Card</td>
<td>Auto detect</td>
</tr>
<tr>
<td>Printer</td>
<td>Present</td>
</tr>
<tr>
<td>Display</td>
<td>Auto detect</td>
</tr>
</tbody>
</table>
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.
“ADD-ON” SOFTWARE FOR VIRTUAL MACHINES

“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/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


or

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

or

“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


or


or

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
• 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
APPENDIX 2 (continued)
VIRTUALIZATION “BIG PICTURE”

• Real Local Area Network (LAN)
  → Virtual networks
    from “virtual machine programs”
• Real Router $\rightarrow$ Virtual Router
  – "Internet Connection Sharing" inside "Windows"
• See
  http://support.microsoft.com/kb/306126
• Real Router → Virtual Router
  – "Internet Connection Sharing" inside "Windows" (continued)
• See also
APPENDIX 2 (continued)
VIRTUALIZATION “BIG PICTURE”

• Real network bridge
  → Virtual network bridge
  – "Network Bridge" capability of "Windows"

• See
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