Solution Quick Start Guide

HP Graphics Server Blade Microsoft RemoteFX vGPU Quick Start
Implementation procedure overview on WS460c Graphics Server Blades
Version 1, December 2013

Table of contents

Purpose of this document .................................................................................................................. 2
Prerequisite Recommend Reading ........................................................................................................ 2
HP WS460c Gen8 Graphics Server Blade VMware vDGA guidelines .................................................. 2
  Hyper-V RemoteFX Considerations ................................................................................................. 2
  Tips and Tricks you need to know - Tech Nuggets and Known issues ........................................... 3
Install and Configure RemoteFX vGPU on Graphics Server Blade .................................................... 4
  Configure server for installation ..................................................................................................... 4
  Installation Procedure .................................................................................................................... 4
  Connecting to VM .......................................................................................................................... 7
Appendix A – Graphics Server Blade Video Modes ............................................................................ 8
Resources .......................................................................................................................................... 10
Purpose of this document

Provides an overview of the configuration steps for setting up Microsoft RemoteFX vGPU technology on HP WS460c Graphics Server Blade.

Prerequisite Recommend Reading

It is recommend that you read "HP Hardware Accelerated Graphics for Desktop Virtualization" for a detailed conceptual overview of the HP Graphics Server Blade solution before proceeding.

This document can be found at: [http://h71028.www7.hp.com/enterprise/downloads/4AA4-1701ENW.pdf](http://h71028.www7.hp.com/enterprise/downloads/4AA4-1701ENW.pdf)

**HP WS460c Gen8 Graphics Server Blade RemoteFX vGPU guidelines**

<table>
<thead>
<tr>
<th><strong>Components</strong></th>
<th><strong>Software description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft RFX</td>
<td>Windows Server 2008 R2 SP1 or Server 2012 or 2012 R2</td>
</tr>
<tr>
<td>Microsoft RDP</td>
<td>RDP 7.1 or later version (Recommend RDP 8/8.1)</td>
</tr>
</tbody>
</table>

**Table 2. Required BIOS setting for 2008 R2, 2012, and 2012 R2 Server on Blade Workstation WS460c**

<table>
<thead>
<tr>
<th><strong>Setting</strong></th>
<th><strong>Value</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Management Options/HP Power Profile</td>
<td>Maximum performance</td>
</tr>
<tr>
<td>Video Mode for Server Setup</td>
<td>Setup mode</td>
</tr>
<tr>
<td>Video Mode for Production*</td>
<td>User mode</td>
</tr>
</tbody>
</table>

* Once in production (User mode) the server console will only be accessible via remote connection (see section: Appendix A.)

**Hyper-V RemoteFX Considerations**

- Microsoft RemoteFX vGPU (VM with vGPU connected) virtual machines consume a specific amount of video RAM based on the max number of monitors and resolution set for each virtual machine. This will dictate the maximum number of virtual machine per physical GPU (Tables 3a and 3b)

**Table 3a. 2012 Hyper-V vRAM usage / Max monitor support**

<table>
<thead>
<tr>
<th><strong>Resolution</strong></th>
<th><strong>1 monitor</strong></th>
<th><strong>2 monitors</strong></th>
<th><strong>4 monitors</strong></th>
<th><strong>8 monitors</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1024 x 768</td>
<td>48 MB</td>
<td>52 MB</td>
<td>58 MB</td>
<td>70 MB</td>
</tr>
<tr>
<td>1280 x 1024</td>
<td>80 MB</td>
<td>85 MB</td>
<td>95 MB</td>
<td>115 MB</td>
</tr>
<tr>
<td>1600 x 1200</td>
<td>120 MB</td>
<td>126 MB</td>
<td>142 MB</td>
<td>Not supported</td>
</tr>
<tr>
<td>1920 x 1200</td>
<td>142 MB</td>
<td>150 MB</td>
<td>168 MB</td>
<td>Not supported</td>
</tr>
<tr>
<td>2560 x 1600</td>
<td>252 MB</td>
<td>268 MB</td>
<td>Not supported</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

**Table 3b. 2008 Hyper-V vRAM usage / Max monitor support**

<table>
<thead>
<tr>
<th><strong>Resolution</strong></th>
<th><strong>1 monitor</strong></th>
<th><strong>2 monitors</strong></th>
<th><strong>3 monitors</strong></th>
<th><strong>4 monitors</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1024 x 768</td>
<td>75 MB</td>
<td>105 MB</td>
<td>135 MB</td>
<td>165 MB</td>
</tr>
<tr>
<td>1280 x 1024</td>
<td>125 MB</td>
<td>175 MB</td>
<td>225 MB</td>
<td>275 MB</td>
</tr>
<tr>
<td>1600 x 1200</td>
<td>184 MB</td>
<td>257 MB</td>
<td>330 MB</td>
<td>Not supported</td>
</tr>
<tr>
<td>1920 x 1200</td>
<td>220 MB</td>
<td>308 MB</td>
<td>Not supported</td>
<td>Not supported</td>
</tr>
<tr>
<td>2560 x 1600</td>
<td>Not supported</td>
<td>Not supported</td>
<td>Not supported</td>
<td>Not supported</td>
</tr>
</tbody>
</table>
RemoteFX uses software virtualized GPU API intercept technology, allowing multiple virtual machines to use the recourse of that GPU. The more virtual machines you configure with RFX per host, the lower the potential performance will be.

- Multiple physical graphics cards enhances performance and scalability as Hyper-V will load balance between cards as virtual machines start up.
- GPU assignments are not dynamically managed after virtual machine startup for load balancing.
- GPU is not required for RemoteFX as the 3D components can be rendered in software, but having a GPU will significantly improve performance and offload from CPU.
- At this time this solution only has minimal support of OpenGL applications (See table 4).

**Table 4. Graphics virtualization technology feature comparison**

<table>
<thead>
<tr>
<th>Feature</th>
<th>VMware (vSGA)</th>
<th>Microsoft 2012 for RemoteFX</th>
<th>VMware (vDGA)</th>
<th>Citrix GPU Pass-Through</th>
<th>True Virtual GPU</th>
</tr>
</thead>
<tbody>
<tr>
<td>OpenGL (2.x, 3.x, 4.x)</td>
<td>2.x</td>
<td>2.x</td>
<td>2.x, 3.x, 4.x</td>
<td>2.x, 3.x, 4.x</td>
<td>2.x, 3.x, 4.x</td>
</tr>
<tr>
<td>DirectX (9,10,11)</td>
<td>9</td>
<td>9, 10, 11</td>
<td>9, 10, 11</td>
<td>9, 10, 11</td>
<td>9, 10, 11</td>
</tr>
<tr>
<td>Supported GPUs</td>
<td>K1, K2, Q5000, Q6000</td>
<td>K1, K2, K4000, K5000, K6000, Q5000, Q6000</td>
<td>HP MultiGPU, K1, K2, K4000, K5000, K6000, Q5000, Q6000</td>
<td>HP MultiGPU, K1, K2, K4000, K5000, K6000, Q5000, Q6000</td>
<td>K1, K2</td>
</tr>
<tr>
<td>Maximum monitors</td>
<td>2</td>
<td>8</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**Tips and Tricks you need to know - Tech Nuggets and Known issues**

- If Running Server 2008 R2 and/or Windows 7, it is recommended that you update Microsoft RDP with “Windows 8 update for Windows 7sp1” to get the full feature set of RDP 8+. Information on download can be found at following locations:
  - http://support.microsoft.com/kb/2592687
  - http://support.microsoft.com/KB/2830477

- Windows 2008 R2/2012/2012 R2 requires drivers for the NVIDIA cards to be installed on host, but does not support two different types of video cards running at the same time. The Graphics Server Blade has an Embedded MATROX and an add-in GPU. Because of this of this the following modes must be used:
  - Setup mode—for systems install, setup, and NVIDIA driver loading. This allows both cards to be seen for driver loading but the Add in card (NVIDIA) is secondary and disabled
  - User mode—production RFX mode. This mode the Add On card is enabled and the embedded MATROX card is disabled
    - In this mode it is not possible to reach iLO console through iLO, OA, or front I/O dongle. You must enable remote RDP console for systems management
    - If unfamiliar with this system and video modes, please read Appendix A before continuing

- On Windows Server 2012 there is a known issue during Windows boot process where it will hang on screen stating “Getting Devices Ready”. This issue only happens on 2012 (Not 2012 R2). To work around this, disconnect the GPU and install server fully and patch with all windows updates. Once updates are complete you can reconnect the GPU and continue with installation. Another workaround is to use 2012 R2

- On Graphics server blade with NVIDIA K1 or K2 you must ensure you are running system BIOS version 9/20/13 or later. Documentation on this issues can be found at: http://h20564.www2.hp.com/portal/site/hpsc/public/kb/docDisplay/?docId=emr_na-c04013756
Install and Configure RemoteFX vGPU on Graphics Server Blade

Configure server for installation

Table 5. HP WS460c Gen8 Server and infrastructure firmware recommended minimum revisions

<table>
<thead>
<tr>
<th>Components</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP Onboard Administrator</td>
<td>4.01</td>
</tr>
<tr>
<td>HP Virtual Connect</td>
<td>4.10</td>
</tr>
<tr>
<td>HP WS460c G6 System ROM</td>
<td>12/2/11</td>
</tr>
<tr>
<td>HP WS460c Gen8 System ROM</td>
<td>9/20/13</td>
</tr>
<tr>
<td>HP Integrated Lights-Out 2 (G6)</td>
<td>2.15</td>
</tr>
<tr>
<td>HP Integrated Lights-Out 4 (Gen8)</td>
<td>1.2</td>
</tr>
</tbody>
</table>

**Required bug fixes**

Installation Procedure

1. Update the WS460c Graphics Server Blade with the latest HP SPP firmware by booting to the SPP DVD
   You can obtain the latest SPP at: [http://www.hp.com/go/spp](http://www.hp.com/go/spp)
2. Insure the System BIOS level is at least 9/20/2013
3. Setup system BIOS for installation
   a. Boot to the HP RBSU (BIOS configuration utility) by pressing F9 during boot
   b. Go to and select “System Default Options” > “Restore Default Options” and select to restore
   c. After reset boot back into HP RBSU (BIOS configuration utility) by pressing F9 during boot
   d. Set video mode to “SETUP”
      i. Select System Options
      ii. Select Remote Console Mode
      iii. Set to “SETUP” mode
   e. Set blade to static high performance mode
      i. Select Power Management Options > HP Power Profile
      ii. Select and enable “Maximum performance.”
4. If installing 2012 (Not 2012 R2), due to issues noted above, it is recommended to disconnect GPU until windows is installed and patched with all Windows updates. If installing 2012 R2, ignore this step
5. Install Server 2012/2012 R2 and install latest HP drivers and Windows updates
6. If you unplugged your GPU for 2012 install, plug it back in
8. Install NVIDIA driver
9. Reboot
10. Go to device manager and under “Display Adapters” you should see the new NVIDIA card listed.

**IMPORTANT NOTE** – In “SETUP” mode it is normal for the NVIDIA card to be “banged” out with a yellow exclamation point next to it. Windows does not support two different types for video cards.
11. If you have not done so, install Hyper-V role and Remote Desktop Virtualization Host role according to Microsoft documentation.

12. Go to control panel > Systems > Advanced > Remote tab, and turn on remote access.

13. Determine the hostname or IP of your server and note it.

14. Setup system BIOS for Production:
   a. Boot to the HP RBSU (BIOS configuration utility) by pressing F9 during boot.
   b. Set video mode to “USER”
      i. Select System Options
      ii. Select Remote Console Mode. The current Remote Console Mode appears.
      iii. Set to “USER” mode.

15. Boot systems. When the systems boots you will get a message that states “The HP WS460c Blade Workstation is now in USER MODE”. This means the NVIDIA controller is primary video device and the embedded Matrox control is disabled. To manage the system you must use remote console at this point.

16. Log on to the system via RDP with the server name or IP you recorded earlier.

17. Go to device manager and under “Display Adapters” you should see the new NVIDIA card listed ONLY, as the Matrox is disabled and NVIDIA is enabled.

18. Open Hyper-V Manager and select the “Physical GPU” setting in Hyper-V Settings to confirm the GPU is available for use by RemoteFX.

19. Create or import Windows 7 or 8 virtual machines into you server.

20. After creating and configuring the virtual machine, go to virtual machine settings.
21. In VM settings, under “Hardware” click “Add Hardware > RemoteFX 3D Video Adapter” and click add.

![Image of settings for WIN7 on Win-466C51Q5EB4 with RemoteFX 3D Video Adapter selected and Add button highlighted.]

22. Select maximum number of monitors and max resolution.

![Image of settings for WIN7 on Win-466C51Q5EB4 with RemoteFX 3D Video Adapter selected and Maximum number of monitors and Maximum monitor resolution fields shown.]

23. After reboot you will see a black screen on the virtual machine console with the message “Video Remoting was disconnected. The virtual machine is using the 3D video adaptor, which is not supported by the Virtual Machine Connection console.” This is expected, and you will not be able to log on to the virtual machine from the Virtual Machine Connection.

![Image of black screen with message: Video remoting was disconnected. The virtual machine is currently using the RemoteFX 3D video adapter. A user is currently connected via Remote Desktop. Connect to the virtual machine by using Remote Desktop Connection.]

6
Connecting to VM

1. On Windows 7 client
   a. If connecting from a RDP connection client, on the experience tab make sure “LAN” is selected and all check boxes checked.

   ![Remote Desktop Connection dialog box](image)

   b. Make sure Remote Desktop is allowed through firewall

2. On Windows 8 clients
   a. There are now two clients that can be used in Windows 8
      i. Classic RDP Client

      ![Classic RDP Client](image)

      ii. Integrated app

      ![Integrated app](image)
Appendix A – Graphics Server Blade Video Modes

Configuring Server Blade video mode
The WS460c G6/Gen8 Graphics Server Blade has four distinct graphics modes that may be available. Depending on what OS is installed, different modes are used. In a nutshell, the Graphics Server Blade has an embedded graphics card as well a high end graphics card, depending on configuration, it is necessary to disable one or the other card. Table 11 shows the supported modes for each environment and the following sections describe each.

Table 11. Proper use of video mode for each operating system

<table>
<thead>
<tr>
<th>Hardware Configuration</th>
<th>Bare Metal</th>
<th>Microsoft Server for RemoteFX and XenApp</th>
<th>Citrix XenServer</th>
<th>VMware vSphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS setup and configuration</td>
<td>Setup mode</td>
<td>Setup mode</td>
<td>Setup mode</td>
<td>Setup mode</td>
</tr>
<tr>
<td>Running in production</td>
<td>User mode</td>
<td>User mode</td>
<td>Setup mode</td>
<td>Setup mode</td>
</tr>
</tbody>
</table>

User mode
- This mode is used when it is necessary to disable the embedded graphics card because the installed operating system does not support using two different graphics architectures (Microsoft Server and Client OS’s).
- In this mode the add-in card is enabled and the embedded is disabled. The OS only sees the add-in card.
- This is the primary production mode when the following operating systems are installed:
  - Bare Metal Installations of Windows or Linux
  - Microsoft RemoteFX environments
  - Microsoft/XenApp environments
- In this mode the iLO and front SUV console is available in POST but when control is passed to the OS, it becomes inaccessible because it uses the embedded video card to generate its video. In this mode the server console will show a message indicating it is in User mode.
- In this mode, once the operating system is booted, the system can be accessed via remote protocol only.

Setup mode
- This mode has both video cards enabled but the add-in card is secondary and the embedded is primary.
- This mode is used in the following configurations:
  - Used in full production mode when the installed operating does support using two different graphics architectures at the same time. Currently the operating systems that use this mode for production include the VMware and XenServer Hypervisors.
  - Used during system install and configuration when the installed operating does not support using two different graphics architectures at the same time. For example, this mode is used during install, configuration and driver install for Windows 7 and Server, as well as Linux (Bare Metal). The mode is switch to “User” before going into production.
- This is the primary production mode when the following operating systems are install:
  - Citrix XenServer
  - VMware vSphere
- In this mode the iLO console is accessible at all times.

Admin mode
- This mode is used for troubleshooting only and is not used in production.
- This mode disables the add-in card and only the ATI is active.
Server mode (WS460c G6 only)
- This mode is deprecated and rarely used for troubleshooting only and is not used/supported in production
- This mode operates in the same way as Admin mode

Procedure to set Remote Console:

1. Using either iLO remote console or the Local I/O Connector, connect to server console
2. When prompted during boot, press the F9 key. The ROM-based Setup Utility appears
3. Select System Options > Remote Console Mode. The current Remote Console Mode appears. (figure 16)
4. To change the Remote Console Mode, press Enter. The Remote Console Mode menu appears. Use the Up and Down arrow keys to select the desired mode. When done, press Enter and then perform the steps indicated to exit the ROM-based Setup Utility
5. The Graphics Server Blade will reboot, and then the Remote Console Mode will be in effect

Figure 16. Remote Console Mode
Resources

To read more about HP ProLiant WS460c Gen8 Graphics Server Blade, go to hp.com/go/bladeworkstation
HP and Citrix, hp.com/go/citrix and citrix.com/hp
Citrix XenDesktop, citrix.com/xendesktop
Citrix XenApp, citrix.com/xenapp
Microsoft Hyper-V, microsoft.com/hyper-v
HP and VMware View, hp.com/go/vmware and vmware.com/view