GRID VGPU FOR VMWARE VSPHERE
VERSION 361.45.26/363.07

RN-07347-001_v3.2 (GRID) | September 2016

Release Notes
# TABLE OF CONTENTS

Chapter 1. Release Notes ...................................................................................... 1
Chapter 2. Validated Platforms ............................................................................. 2
  2.1. Hypervisor Software Versions ...................................................................... 2
  2.2. Guest OS Support ....................................................................................... 2
     2.2.1. Windows Guest OS Support ................................................................. 2
     2.2.2. Linux Guest OS Support ....................................................................... 3
  2.3. Hardware Configuration ............................................................................. 3
Chapter 3. Known Product Limitations ................................................................. 4
  3.1. VM running older NVIDIA vGPU drivers fails to initialize vGPU when booted ........................................................................................................... 4
  3.2. Virtual GPU fails to start if ECC is enabled ................................................. 5
  3.3. Single vGPU benchmark scores are lower than passthrough GPU ................. 5
  3.4. VMs configured with large memory fail to initialize vGPU when booted ...... 7
Chapter 4. Resolved Issues .................................................................................. 9
Chapter 5. Known Issues ..................................................................................... 10
  5.1. Memory exhaustion can occur with vGPU profiles that have 512 Mbytes or less of frame buffer ........................................................................................................ 10
  5.2. GNOME Display Manager (GDM) fails to start on Red Hat Enterprise Linux 7.2 and CentOS 7.0 .............................................................................................................. 11
  5.3. NVIDIA Control Panel complains that “you are not currently using a display that is attached to an Nvidia GPU” ...................................................................................... 12
  5.4. VM configured with more than one vGPU fails to initialize vGPU when booted ........................................................................................................... 12
  5.5. A VM configured with both a vGPU and a passthrough GPU fails to start the passthrough GPU ........................................................................................................... 13
  5.6. vGPU allocation policy fails when multiple VMs are started simultaneously ...................................................... 14
  5.7. Prior to installing Horizon agent inside a VM, the Start menu’s sleep option is available ...................................................... 14
  5.8. vGPU-enabled VMs fail to start, nvidia-smi fails when VMs are configured with too high a proportion of the server’s memory ........................................................................ 15
  5.9. On reset or restart VMs fail to start with the error VMIOP: no graphics device is available for vGPU ........................................................................................................... 16
  5.10. nvidia-smi shows high GPU utilization for vGPU VMs with active Horizon sessions ...................................................... 16
  5.11. Multiple WebGL tabs in Microsoft Internet Explorer may trigger TDR on Windows VMs ... 17
These Release Notes summarize current status, information on validated platforms, and known issues with NVIDIA GRID™ vGPU™ software and hardware on VMware vSphere.

This release includes the following software:

- NVIDIA GRID Virtual GPU Manager version 361.45.26 for VMware vSphere 6.0 Hypervisor (ESXi)
- NVIDIA Windows drivers for vGPU version 363.07
- NVIDIA Linux drivers for vGPU version 361.45.26

**Caution**

The GRID vGPU Manager and Windows guest VM drivers must be installed together. Older VM drivers will not function correctly with this release of GRID vGPU Manager. Similarly, older GRID vGPU Managers will not function correctly with this release of Windows guest drivers. See VM running older NVIDIA vGPU drivers fails to initialize vGPU when booted.

Updates in this release:

- Miscellaneous bug fixes
Chapter 2. VALIDATED PLATFORMS

This release of virtual GPU provides support for the following NVIDIA GPUs on VMware vSphere, running on validated server hardware platforms:

- GRID K1
- GRID K2
- Tesla M6
- Tesla M60

For a list of validated server platforms, refer to NVIDIA GRID Certified Servers.

2.1. Hypervisor Software Versions

This release has been tested with the following hypervisor software versions:

<table>
<thead>
<tr>
<th>Software</th>
<th>Version Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware vSphere Hypervisor (ESXi)</td>
<td>6.0 RTM build 2494585, 6.0 update 1, 6.0 update 2</td>
</tr>
<tr>
<td>VMware Horizon</td>
<td>6.2.1 RTM build 3268071</td>
</tr>
<tr>
<td></td>
<td>7.0 RTM build 3618085</td>
</tr>
<tr>
<td>VMware vCenter Server</td>
<td>6.0 RTM build 2562643</td>
</tr>
</tbody>
</table>

2.2. Guest OS Support

GRID vGPU supports several Windows releases and Linux distributions as a guest OS.

2.2.1. Windows Guest OS Support

GRID vGPU supports the following Windows releases as a guest OS:

- Windows 7 (32/64-bit)
- Windows 8 (32/64-bit)
- Windows 8.1 (32/64-bit)
2.2.2. Linux Guest OS Support

GRID vGPU supports the following Linux distributions as a guest OS on Tesla M60 and M6:

- Red Hat Enterprise Linux 6.6
- Red Hat Enterprise Linux 7
- CentOS 6.6
- CentOS 7
- Ubuntu 12.04 LTS
- Ubuntu 14.04 LTS

2.3. Hardware Configuration

Tesla M60 and M6 GPUs support compute and graphics modes, which can be configured by using the `gpumodeswitch` tool provided with GRID software releases. GRID vGPU requires that M60 and M6 GPUs are configured in graphics mode.
Chapter 3.  
KNOWN PRODUCT LIMITATIONS

Known product limitations for this release of NVIDIA GRID are described in the following sections.

3.1. VM running older NVIDIA vGPU drivers fails to initialize vGPU when booted

Description

A VM running older NVIDIA drivers, such as those from a previous vGPU release, will fail to initialize vGPU when booted on a VMware vSphere platform running the current release of GRID Virtual GPU Manager.

In this scenario, the VM boots in standard VGA mode with reduced resolution and color depth. The NVIDIA GRID GPU is present in Windows Device Manager but displays a warning sign, and the following device status:

Windows has stopped this device because it has reported problems. (Code 43)

Depending on the versions of drivers in use, the VMware vSphere VM’s log file reports one of the following errors:

- A version mismatch between guest and host drivers:
  
  vthread-10| E105: vmiop_log: Guest VGX version(2.0) and Host VGX version(2.1) do not match

- A signature mismatch:


Resolution

Install the latest NVIDIA vGPU release drivers in the VM.
3.2. Virtual GPU fails to start if ECC is enabled

Description
GRID K2, Tesla M60, and Tesla M6 support error correcting code (ECC) for improved data integrity. If ECC is enabled, virtual GPU fails to start. The following error is logged in the VMware vSphere VM's log file:

```
vthread10|E105: Initialization: VGX not supported with ECC Enabled.
```

Virtual GPU is not currently supported with ECC active. GRID K2 cards and Tesla M60, M6 cards in graphics mode ship with ECC disabled by default, but ECC may subsequently be enabled using `nvidia-smi`.

Resolution
Ensure that ECC is disabled on all GPUs.

1. Use `nvidia-smi` to list the status of all GPUs, and check for ECC noted as enabled on GPUs.
2. Change the ECC status to off on each GPU for which ECC is enabled by executing the following command:

```
nvidia-smi -i id -e 0
```

`id` is the index of the GPU as reported by `nvidia-smi`.

3.3. Single vGPU benchmark scores are lower than passthrough GPU

Description
A single vGPU configured on a physical GPU produces lower benchmark scores than the physical GPU run in passthrough mode.

Aside from performance differences that may be attributed to a vGPU's smaller framebuffer size, vGPU incorporates a performance balancing feature known as Frame Rate Limiter (FRL), which is enabled on all vGPUs. FRL is used to ensure balanced performance across multiple vGPUs that are resident on the same physical GPU. The FRL setting is designed to give good interactive remote graphics experience but may reduce scores in benchmarks that depend on measuring frame rendering rates, as compared to the same benchmarks running on a passthrough GPU.
Resolution

FRL is controlled by an internal vGPU setting. NVIDIA does not validate vGPU with FRL disabled, but for validation of benchmark performance, FRL can be temporarily disabled by adding the configuration parameter pciPassthru0.cfg.frame_rate_limiter in the VM’s advanced configuration options.

This setting can only be changed when the VM is powered off.

1. Select Edit Settings.
2. In Edit Settings window, select the VM Options tab.
3. From the Advanced drop-down list, select Edit Configuration.
4. In the Configuration Parameters dialog box, click Add Row.
5. In the Name field, type the parameter name pciPassthru0.cfg.frame_rate_limiter, in the Value field type 0, and click OK.

With this setting in place, the VM’s vGPU will run without any frame rate limit. The FRL can be reverted back to its default setting by setting
 pciPassthru0.cfg.frame_rate_limiter to 1 or by removing the parameter from the advanced settings.

3.4. VMs configured with large memory fail to initialize vGPU when booted

Description

When starting multiple VMs configured with large amounts of RAM (typically more than 32GB per VM), a VM may fail to initialize vGPU. In this scenario, the VM boots in VMware SVGA mode and doesn’t load the NVIDIA driver. The NVIDIA GRID GPU is present in Windows Device Manager but displays a warning sign, and the following device status:

Windows has stopped this device because it has reported problems. (Code 43)

The VMware vSphere VM’s log file contains these error messages:

vthread10|E105: NVOS status 0x29
vthread10|E105: Assertion Failed at 0x7620fd4b:179
vthread10|E105: 8 frames returned by backtrace
...vthread10|E105: VGPU message 12 failed, result code: 0x29
...vthread10|E105: NVOS status 0x8
vthread10|E105: Assertion Failed at 0x7620c8df:280
vthread10|E105: 8 frames returned by backtrace
...vthread10|E105: VGPU message 26 failed, result code: 0x8

Resolution

vGPU reserves a portion of the VM’s framebuffer for use in GPU mapping of VM system memory. The reservation is sufficient to support up to 32GB of system memory, and may be increased to accommodate up to 64GB by adding the configuration parameter pciPassthru0.cfg.enable_large_sys_mem in the VM’s advanced configuration options.

This setting can only be changed when the VM is powered off.

1. Select Edit Settings.
2. In Edit Settings window, select the VM Options tab.
3. From the Advanced drop-down list, select Edit Configuration.
4. In the Configuration Parameters dialog box, click Add Row.
5. In the Name field, type the parameter name pciPassthru0.cfg.enable_large_sys_mem, in the Value field type 1, and click OK.
With this setting in place, less GPU framebuffer is available to applications running in the VM. To accommodate system memory larger than 64GB, the reservation can be further increased by adding `pciPassthru0.cfg.extra_fb_reservation` in the VM's advanced configuration options, and setting its value to the desired reservation size in megabytes. The default value of 64M is sufficient to support 64 GB of RAM. We recommend adding 2 M of reservation for each additional 1 GB of system memory. For example, to support 96 GB of RAM, set `pciPassthru0.cfg.extra_fb_reservation` to 128.

The reservation can be reverted back to its default setting by setting `pciPassthru0.cfg.enable_large_sys_mem` to 0, or by removing the parameter from the advanced settings.
# RESOLVED ISSUES

<table>
<thead>
<tr>
<th>Bug ID</th>
<th>Summary and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1756897</td>
<td>BSOD with 361.40/362.13 drivers on GRID K1 cards with Windows 10</td>
</tr>
<tr>
<td></td>
<td>If Windows 10 is the guest OS on a server with a GRID K1 card running the</td>
</tr>
<tr>
<td></td>
<td>361.40/362.13 drivers, the OS crashes. If the 352.83/354.80 drivers are used,</td>
</tr>
<tr>
<td></td>
<td>the system drops the connection, but the guest OS continues to function.</td>
</tr>
<tr>
<td></td>
<td>This issue does not occur if the guest OS is Windows 7.</td>
</tr>
<tr>
<td>200176969</td>
<td>NVIDIA Control Panel is killed during reconnection with a View</td>
</tr>
<tr>
<td></td>
<td>If NVIDIA Control Panel is running while a View session is disconnected and</td>
</tr>
<tr>
<td></td>
<td>then reconnected, NVIDIA Control Panel is killed before the View session is</td>
</tr>
<tr>
<td></td>
<td>reconnected.</td>
</tr>
</tbody>
</table>
5.1. Memory exhaustion can occur with vGPU profiles that have 512 Mbytes or less of frame buffer

Description

Memory exhaustion can occur with vGPU profiles that have 512 Mbytes or less of frame buffer. This issue typically occurs in the following situations:

- Multiple display heads are used with Citrix XenDesktop or VMware Horizon on a Windows 10 guest VM.
- NVENC is in use.

To reduce the possibility of memory exhaustion, the GPU hardware turns off NVENC on profiles that have 512 Mbytes or less of frame buffer.

When memory exhaustion occurs occurs, the NVIDIA host driver reports Xid error 31 and Xid error 43 in the VMware vSphere log file `vmware.log` in the guest VM's storage directory.

The following vGPU profiles have 512 Mbytes or less of frame buffer:

- Tesla M6-0B, M6-0Q
- Tesla M10-0B, M10-0Q
- Tesla M60-0B, M60-0Q
- GRID K100, K120Q
- GRID K200, K220Q
Version

Workaround
Use profiles that have at least 1 Gbyte of frame buffer.

Status
Open

Ref. #
- 200130864
- 1803861

5.2. GNOME Display Manager (GDM) fails to start on Red Hat Enterprise Linux 7.2 and CentOS 7.0

Description
GDM fails to start on Red Hat Enterprise Linux 7.2 and CentOS 7.0 with the following error:

Oh no! Something has gone wrong!

Version

Workaround
Permanently enable permissive mode for Security Enhanced Linux (SELinux).

1. As root, edit the /etc/selinux/config file to set SELINUX to permissive.
   SELINUX=permissive
2. Reboot the system.

   ~]# reboot

For more information, see Permissive Mode in Red Hat Enterprise Linux 7 SELinux User’s and Administrator’s Guide.

Status
Not an NVIDIA bug

Ref. #
200167868
5.3. NVIDIA Control Panel complains that “you are not currently using a display that is attached to an Nvidia GPU”

**Description**

When you launch NVIDIA Control Panel on a VM configured with vGPU, it fails to start and complains about not using a display attached to an NVIDIA GPU. This happens because Windows is using VMware’s SVGA device instead of NVIDIA vGPU.

**Version**

**Fix**

Make NVIDIA vGPU the primary display adapter.

Use Windows screen resolution control panel to make the second display, identified as “2” and corresponding to NVIDIA vGPU, to be the active display and select the Show desktop only on 2 option. Click Apply to accept the configuration.

You may need to click on the Detect button for Windows to recognize the display connected to NVIDIA vGPU.

*If the VMware Horizon/View agent is installed in the VM, the NVIDIA GPU is automatically selected in preference to the SVGA device.*

**Status**

Open

**Ref. #**

5.4. VM configured with more than one vGPU fails to initialize vGPU when booted

**Description**

Using the current VMware vCenter user interface, it is possible to configure a VM with more than one vGPU device. When booted, the VM boots in VMware SVGA mode and doesn’t load the NVIDIA driver. The additional vGPU devices are present in Windows Device Manager but display a warning sign, and the following device status:
Windows has stopped this device because it has reported problems. (Code 43)

Version

Workaround
GRID vGPU currently supports a single virtual GPU device per VM. Remove any additional vGPUs from the VM configuration before booting the VM.

Status
Open

Ref. #

5.5. A VM configured with both a vGPU and a passthrough GPU fails to start the passthrough GPU

Description
Using the current VMware vCenter user interface, it is possible to configure a VM with a vGPU device and a passthrough (direct path) GPU device. This is not a currently supported configuration for vGPU. The passthrough GPU appears in Windows Device Manager with a warning sign, and the following device status

Windows has stopped this device because it has reported problems. (Code 43)

Version

Workaround
Do not assign vGPU and passthrough GPUs to a VM simultaneously.

Status
Open

Ref. #
1735002
5.6. vGPU allocation policy fails when multiple VMs are started simultaneously

Description
If multiple VMs are started simultaneously, vSphere may not adhere to the placement policy currently in effect. For example, if the default placement policy (breadth-first) is in effect, and 4 physical GPUs are available with no resident vGPUs, then starting 4 VMs simultaneously should result in one vGPU on each GPU. In practice, more than one vGPU may end up resident on a GPU.

Version

Workaround
Start VMs individually.

Status
Not an NVIDIA bug

Ref. #
200042690

5.7. Prior to installing Horizon agent inside a VM, the Start menu’s sleep option is available.

Description
When a VM is configured with a vGPU, the Sleep option remains available in the Windows Start menu. Sleep is not supported on vGPU and attempts to use it will lead to undefined behavior.

Version

Workaround
Do not use Sleep with vGPU.
Installing the VMware Horizon agent will disable the Sleep option.
5.8. vGPU-enabled VMs fail to start, `nvidia-smi` fails when VMs are configured with too high a proportion of the server’s memory.

**Description**

If vGPU-enabled VMs are assigned too high a proportion of the server’s total memory, the following errors occur:

- One or more of the VMs may fail to start with the following error:
  
  The available Memory resources in the parent resource pool are insufficient for the operation

- When run in the host shell, the `nvidia-smi` utility returns this error:
  
  `-sh: can't fork`

For example, on a server configured with 256G of memory, these errors may occur if vGPU-enabled VMs are assigned more than 243G of memory.

**Version**

**Workaround**

Reduce the total amount of system memory assigned to the VMs.
5.9. On reset or restart VMs fail to start with the error VMIOP: no graphics device is available for vGPU...

**Description**

On a system running a maximal configuration, i.e. maximum number of vGPU VMs the server can support, some VMs might fail to start post a reset or restart operation.

**Version**

**Fix**

Upgrade to ESXi 6.0 Update 1.

**Status**

Closed

**Ref. #**

200097546

5.10. nvidia-smi shows high GPU utilization for vGPU VMs with active Horizon sessions

**Description**

vGPU VMs with an active Horizon connection utilize a high percentage of the GPU on the ESXi host. The GPU utilization remains high for the duration of the Horizon session even if there are no active applications running on the VM.

**Version**

**Workaround**

None

**Status**

Open
5.11. Multiple WebGL tabs in Microsoft Internet Explorer may trigger TDR on Windows VMs

**Description**

Running intensive WebGL applications in multiple IE tabs may trigger a TDR on Windows VMs.

**Version**

**Workaround**

Disable hardware acceleration in IE.

To enable software rendering in IE, refer to the Microsoft knowledge base article [How to enable or disable software rendering in Internet Explorer](#).

**Status**

Open

**Ref. #**

1735009

200148377
Notice

ALL NVIDIA DESIGN SPECIFICATIONS, REFERENCE BOARDS, FILES, DRAWINGS, DIAGNOSTICS, LISTS, AND OTHER DOCUMENTS (TOGETHER AND SEPARATELY, "MATERIALS") ARE BEING PROVIDED "AS IS." NVIDIA MAKES NO WARRANTIES, EXPRESSED, IMPLIED, STATUTORY, OR OTHERWISE WITH RESPECT TO THE MATERIALS, AND EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE.

Information furnished is believed to be accurate and reliable. However, NVIDIA Corporation assumes no responsibility for the consequences of use of such information or for any infringement of patents or other rights of third parties that may result from its use. No license is granted by implication of otherwise under any patent rights of NVIDIA Corporation. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all other information previously supplied. NVIDIA Corporation products are not authorized as critical components in life support devices or systems without express written approval of NVIDIA Corporation.

HDMI

HDMI, the HDMI logo, and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC.

OpenCL

OpenCL is a trademark of Apple Inc. used under license to the Khronos Group Inc.

Trademarks

NVIDIA and the NVIDIA logo are trademarks or registered trademarks of NVIDIA Corporation in the U.S. and other countries. Other company and product names may be trademarks of the respective companies with which they are associated.

Copyright

© 2013-2016 NVIDIA Corporation. All rights reserved.