



# GRID VGPU FOR VMWARE VSPHERE VERSION 367.92/369.95

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## Release Notes



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# Chapter 1.

## RELEASE NOTES

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 367.92 for the VMware vSphere releases listed in [Hypervisor Software Versions](#)
- ▶ NVIDIA Windows drivers for vGPU version 369.95
- ▶ NVIDIA Linux drivers for vGPU version 367.92



### 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
- ▶ Support for the following Linux guest OS versions:
  - ▶ Red Hat Enterprise Linux 7.3
  - ▶ CentOS 7.3
  - ▶ Ubuntu 16.04 LTS

# Chapter 2.

## VALIDATED PLATFORMS

This release of virtual GPU provides support for several NVIDIA GPUs on validated server hardware platforms, VMware vSphere hypervisor software versions, and guest operating systems.

### 2.1. Supported NVIDIA GPUs and Validated Server 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 M10
- ▶ Tesla M60

For a list of validated server platforms, refer to [NVIDIA GRID Certified Servers](#).



Tesla M60 and M6 GPUs support compute mode and graphics mode. GRID vGPU requires GPUs that support both modes to operate in graphics mode.

Recent Tesla M60 GPUs and M6 GPUs are supplied in graphics mode. However, your GPU might be in compute mode if it is an older Tesla M60 GPU or M6 GPU, or if its mode has previously been changed.

To configure the mode of Tesla M60 and M6 GPUs, use the `gpumodeswitch` tool provided with GRID software releases.

### 2.2. Hypervisor Software Versions

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

Software	Version Tested
VMware vSphere Hypervisor (ESXi)	6.0 RTM build 2494585 6.0 update 1 6.0 update 2 6.5
VMware Horizon	6.2.1 RTM build 3268071 7.0.2 build 4368292
VMware vCenter Server	6.0 RTM build 2562643 6.5.0 RTM build 4602587

## 2.3. Guest OS Support

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



Use only a guest OS release that is listed as supported by GRID vGPU with your virtualization software. To be listed as supported, a guest OS release must be supported not only by GRID vGPU, but also by your virtualization software. NVIDIA cannot support guest OS releases that your virtualization software does not support.

### 2.3.1. Windows Guest OS Support

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

- ▶ Windows 7 (32/64-bit)
- ▶ Windows 8 (32/64-bit)
- ▶ Windows 8.1 (32/64-bit)
- ▶ Windows 10 (32/64-bit)
- ▶ Windows Server 2008 R2
- ▶ Windows Server 2012 R2
- ▶ Windows Server 2016

### 2.3.2. Linux Guest OS Support

GRID vGPU supports the following Linux distributions as a guest OS **only** on supported Tesla GPUs on VMware vSphere:

- ▶ Red Hat Enterprise Linux 7.0-7.3 and later compatible 7.x versions
- ▶ CentOS 7.0-7.3 and later compatible 7.x versions
- ▶ Red Hat Enterprise Linux 6.6 and later compatible 6.x versions
- ▶ CentOS 6.6 and later compatible 6.x versions
- ▶ Ubuntu 16.04 LTS
- ▶ Ubuntu 14.04 LTS

▶ Ubuntu 12.04 LTS



GRID K1 and GRID K2 do not support vGPU on a Linux guest OS.

# Chapter 3.

## KNOWN PRODUCT LIMITATIONS

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

### 3.1. vGPU profiles with 512 Mbytes or less of frame buffer support only 1 virtual display head on Windows 10

#### Description

To reduce the possibility of memory exhaustion, vGPU profiles with 512 Mbytes or less of frame buffer support only 1 virtual display head on a Windows 10 guest OS.

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

#### Workaround

Use a profile that supports more than 1 virtual display head and has at least 1 Gbyte of frame buffer.

## 3.2. NVENC requires at least 1 Gbyte of frame buffer

### Description

Using the frame buffer for the NVIDIA hardware-based H.264/HEVC video encoder (NVENC) may cause memory exhaustion with vGPU profiles that have 512 Mbytes or less of frame buffer. To reduce the possibility of memory exhaustion, NVENC is disabled on profiles that have 512 Mbytes or less of frame buffer. Application GPU acceleration remains fully supported and available for all profiles, including profiles with 512 Mbytes or less of frame buffer. NVENC support from both Citrix and VMware is a recent feature and, if you are using an older version, you should experience no change in functionality.

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

### Workaround

If you require NVENC to be enabled, use a profile that has at least 1 Gbyte of frame buffer.

## 3.3. 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:

```
vthread-10| E105: vmiop_log: VGPU message signature mismatch.
```

## Resolution

Install the latest NVIDIA vGPU release drivers in the VM.

## 3.4. 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`.

## 3.5. 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.

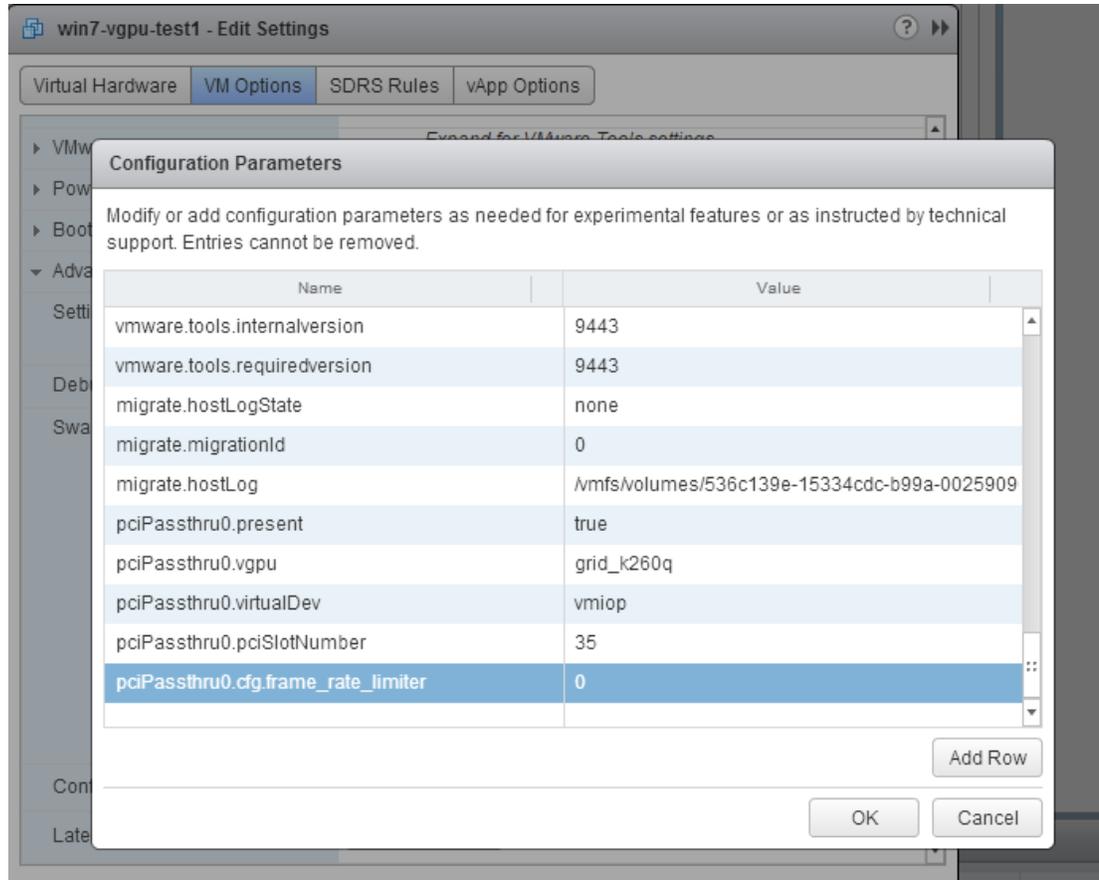
### Resolution

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.

## 3.6. GRID K1 and GRID K2 cards do not support monitoring of vGPU engine usage

### Description

GRID K1 and GRID K2 cards do not support monitoring of vGPU engine usage. All tools and APIs for any vGPU running on GRID K1 or GRID K2 cards report 0 for the following usage statistics:

- ▶ 3D/Compute
- ▶ Memory controller bandwidth
- ▶ Video encoder
- ▶ Video decoder

## 3.7. 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.

# Chapter 4. RESOLVED ISSUES

Bug ID	Summary and Description
1877935	<b>NVIDIA driver installer on Linux removes Flexera libraries from vendors other than NVIDIA</b> The NVIDIA driver installer removes all <code>libFlxCore64</code> and <code>libFlxComm64</code> files, including files outside the <code>nvidia</code> directories.
1816508	<b>YouTube or other video players get stuck at full screen in Google Chrome</b> When GRID vGPU is used with a Windows 10 guest OS, YouTube or other video players get stuck at full screen in the Google Chrome web browser. This issue does not occur with a Windows 7 guest OS.

# Chapter 5.

## KNOWN ISSUES

### 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:

- ▶ Full screen 1080p video content is playing in a browser. In this situation, the session hangs and session reconnection fails.
- ▶ Multiple display heads are used with Citrix XenDesktop or VMware Horizon on a Windows 10 guest VM.
- ▶ Higher resolution monitors are used.
- ▶ Applications that are frame-buffer intensive are used.
- ▶ NVENC is in use.

To reduce the possibility of memory exhaustion, NVENC is disabled on profiles that have 512 Mbytes or less of frame buffer.

When memory exhaustion 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

The root cause is a known issue associated with changes to the way that recent Microsoft operating systems handle and allow access to overprovisioning messages and errors. If your systems are provisioned with enough frame buffer to support your use cases, you should not encounter these issues.

### Workaround

- ▶ Use an appropriately sized vGPU to ensure that the frame buffer supplied to a VM through the vGPU is adequate for your workloads.
- ▶ Monitor your frame buffer usage.
- ▶ If you are using Windows 10, consider these workarounds and solutions:
  - ▶ Use a profile that has 1 Gbyte of frame buffer.
  - ▶ Optimize your Windows 10 resource usage.

To obtain information about best practices for improved user experience using Windows 10 in virtual environments, complete the [NVIDIA GRID vGPU Profile Sizing Guide for Windows 10 download request form](#).

Additionally, you can use the [VMware OS Optimization Tool](#) to make and apply optimization recommendations for Windows 10 and other operating systems.

### Status

Open

### Ref. #

- ▶ 200130864
- ▶ 1803861

## 5.2. The VMware VIB installer incorrectly reports that reboot is not required after installing the vGPU Manager VIB

### Description

After installing the NVIDIA Virtual GPU Manager VIB for vSphere on the ESXi host, the `esxcli` command to install the VIB incorrectly reports `Reboot Required: false` in the installation result message.

The instructions in *GRID Virtual GPU User Guide* for installing and updating the NVIDIA Virtual GPU Manager VIB are correct.

### Workaround

Reboot the ESXi host and remove it from maintenance mode as instructed in *GRID Virtual GPU User Guide*. Ignore the line `Reboot Required: false` in the installation result message.

### Status

Open

### Ref. #

1816290

## 5.3. vGPU VM fails to boot in ESXi 6.5 if the graphics type is Shared

### Description

On VMware vSphere Hypervisor (ESXi) 6.5, after vGPU is configured, VMs to which a vGPU is assigned may fail to start and the following error message may be displayed:

```
The amount of graphics resource available in the parent resource pool is insufficient for the operation.
```

The vGPU Manager VIB provides vSGA and vGPU functionality in a single VIB. After this VIB is installed, the default graphics type is Shared, which provides vSGA functionality. To enable vGPU support for VMs in VMware vSphere 6.5, you must change the default graphics type to Shared Direct. If you do not change the default graphics type you will encounter this issue.

### Version

VMware vSphere Hypervisor (ESXi) 6.5

### Workaround

Change the default graphics type to Shared Direct as explained in *GRID Virtual GPU User Guide*.

### Status

Open

**Ref. #**

200256224

## 5.4. ESXi 6.5 web client shows high memory usage even when VMs are idle

**Description**

On VMware vSphere Hypervisor (ESXi) 6.5, the web client shows a memory usage alarm with critical severity for VMs to which a vGPU is attached even when the VMs are idle. When memory usage is monitored from inside the VM, no memory usage alarm is shown. The web client does not show a memory usage alarm for the same VMs without an attached vGPU.

**Version**

VMware vSphere Hypervisor (ESXi) 6.5

**Workaround**

Avoid using the VMware vSphere Hypervisor (ESXi) 6.5 web client to monitor memory usage for VMs to which a vGPU is attached.

**Status**

Not an NVIDIA bug

**Ref. #**

200191065

## 5.5. 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!
```

**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

## 5.6. NVIDIA Control Panel fails to start and reports 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 reports that you are not using a display attached to an NVIDIA GPU. This happens because Windows is using VMware's SVGA device instead of NVIDIA vGPU.

### 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. #

## 5.7. 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)
```

### 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. #

## 5.8. 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)
```

### Workaround

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

**Status**

Open

**Ref. #**

1735002

## 5.9. 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.

**Workaround**

Start VMs individually.

**Status**

Not an NVIDIA bug

**Ref. #**

200042690

## 5.10. Before Horizon agent is installed 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.

**Workaround**

Do not use Sleep with vGPU.

Installing the VMware Horizon agent will disable the **Sleep** option.

**Status**

Closed

**Ref. #**

200043405

## 5.11. 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.

**Workaround**

Reduce the total amount of system memory assigned to the VMs.

**Status**

Closed

**Ref. #**

200060499

## 5.12. 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, that is, with the maximum number of vGPU VMs the server can support, some VMs might fail to start post a reset or restart operation.

### Fix

Upgrade to ESXi 6.0 Update 1.

### Status

Closed

### Ref. #

200097546

## 5.13. `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.

### Workaround

None

### Status

Open

Partially resolved for Horizon 7.0.1:

- ▶ For Blast connections, GPU utilization is no longer high.
- ▶ For PCoIP connections, utilization remains high.

**Ref. #**

1735009

## 5.14. 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.

**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. #**

200148377

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