



NVIDIA Data Center GPU Driver version 450.203.08 (Linux)

Release Notes

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Chapter 1. Version Highlights

This section provides highlights of the NVIDIA Data Center GPU 450 Driver (version 450.203.08 Linux).

For changes related to the 450 release of the NVIDIA display driver, review the file "NVIDIA_Changelog" available in the .run installer packages.

- ▶ This release provides PCIe and SXM support for A800/A100.
- ▶ There is no Windows support in this TRD.
- ▶ Linux driver release date: 10/19/2022

1.1. Software Versions

For this release, the software versions are listed below.

- ▶ CUDA Toolkit 11: 11.0.3

Note that starting with CUDA 11, individual components of the toolkit are versioned independently. For a full list of the individual versioned components (such as nvcc, CUDA libraries, and so on), see the [CUDA Toolkit Release Notes](#)

- ▶ NVIDIA Data Center GPU Driver: 450.203.08 (Linux)
- ▶ Fabric Manager: 450.203.08 (Use `nv-fabricmanager -v`)
- ▶ GPU VBIOS:
 - ▶ HGX A100 PG506
 - ▶ 92.00.45.00.03 SKU200 40GB air cooling (lidless)
 - ▶ 92.00.45.00.04 SKU202 40GB hybrid cooling (lidded)
 - ▶ 92.00.45.00.05 SKU210 80GB air cooling (lidless)
 - ▶ 92.00.45.00.06 SKU212 80GB hybrid cooling (lidded)
 - ▶ HGX A100 PG510
 - ▶ 92.00.81.00.01 SKU200 40GB air cooling (lidless)
 - ▶ 92.00.81.00.02 SKU202 40GB hybrid cooling (lidded)
 - ▶ 92.00.81.00.04 SKU210 80GB air cooling (lidless)

- ▶ 92.00.81.00.05 SKU212 80GB hybrid cooling (lidded)
- ▶ HGX A800 PG506
 - ▶ 92.00.A4.00.01 SKU215 80GB air cooling (lidless)
- ▶ HGX A800 PG510
 - ▶ 92.00.A4.00.05 SKU215 80GB air cooling (lidless)
- ▶ A100 PCIe P1001 SKU230
 - ▶ 92.00.90.00.04 (NVIDIA A100 PCIe)
- ▶ A800 PCIe P1001
 - ▶ 92.00.A4.00.0C 40 GB SKU203 PCIe
 - ▶ 92.00.A4.00.0D 80 GB SKU235 PCIe
- ▶ NVSwitch VBIOS: 92.10.14.00.01
- ▶ NVFlash: 5.791

Due to a revision lock between the VBIOS and driver, VBIOS versions \geq 92.00.18.00.00 must use corresponding drivers \geq 450.36.01. Older VBIOS versions will work with newer drivers.

For more information on getting started with the NVIDIA Fabric Manager on NVSwitch-based systems (for example, HGX A100), refer to the [Fabric Manager User Guide](#).

1.2. Fixed Issues

- ▶ Incorrect SMBPBI reporting of NVLINK will report 12 instead of 8 NVLINKs and errors when querying NVLINK status for 4 of the 12 possible NVLINKS.

1.3. Known Issues

General

- ▶ On HGX A800 8-GPU systems, the nvswitch-audit tool will report 12 NVLinks per GPU. This is a switch configuration report and does not reflect the true number of NVLink interfaces available per-GPU, which remains 8.
- ▶ Combining A800 and A100 SXM modules in a single server is not currently supported with this driver version.
- ▶ Combining A800 and A100 PCIe with NVLink is not fully tested.
- ▶ There is a known issue with installing the Linux driver where installing the driver interferes with the `ipmitool`.
- ▶ When installing a driver on SLES15 or openSUSE15 that previously had an R515 driver installed, users need to run the following command afterwards to finalize the installation:

```
sudo zypper install --force nvidia-gfxG05-kmp-default
```

Without doing this, users may see the kernel objects as missing.

- ▶ By default, Fabric Manager runs as a systemd service. If using `DAEMONIZE=0` in the Fabric Manager configuration file, then the following steps may be required.
 1. Disable FM service from auto starting. (`systemctl disable nvidia-fabricmanager`)
 2. Once the system is booted, manually start FM process. (`/usr/bin/nv-fabricmanager -c /usr/share/nvidia/nvswitch/fabricmanager.cfg`). Note, since the process is not a daemon, the SSH/Shell prompt will not be returned (use another SSH shell for other activities or run FM as a background task).
- ▶ There is a known issue with cross-socket GPU to GPU memory consistency that is currently under investigation

GPU Performance Counters

The use of developer tools from NVIDIA that access various performance counters requires administrator privileges. See this [note](#) for more details. For example, reading NVLink utilization metrics from `nvidia-smi` (`nvidia-smi nvlink -g 0`) would require administrator privileges.

NoScanout Mode

NoScanout mode is no longer supported on NVIDIA Data Center GPU products. If NoScanout mode was previously used, then the following line in the “screen” section of `/etc/X11/xorg.conf` should be removed to ensure that X server starts on data center products:

```
Option      "UseDisplayDevice" "None"
```

NVIDIA Data Center GPU products now support one display of up to 4K resolution.

Unified Memory Support

CUDA and unified memory is not supported when used with Linux power management states S3/S4.

IMPU FRU for Volta GPUs

The driver does not support the IPMI FRU multi-record information structure for NVLink. See the Design Guide for Tesla P100 and Tesla V100-SXM2 for more information.

Experimental OpenCL Features

Select features in OpenCL 2.0 are available in the driver for evaluation purposes only.

The following are the features as well as a description of known issues with these features in the driver:

Device side enqueue

- ▶ The current implementation is limited to 64-bit platforms only.
- ▶ OpenCL 2.0 allows kernels to be enqueued with `global_work_size` larger than the compute capability of the NVIDIA GPU. The current implementation supports only combinations of `global_work_size` and `local_work_size` that are within the compute capability of the NVIDIA GPU. The maximum supported CUDA grid and block size of NVIDIA GPUs is available at <http://docs.nvidia.com/cuda/cuda-c-programming-guide/index.html#computecapabilities>. For a given grid dimension, the `global_work_size` can be determined by CUDA grid size x CUDA block size.
- ▶ For executing kernels (whether from the host or the device), OpenCL 2.0 supports non-uniform ND-ranges where `global_work_size` does not need to be divisible by the `local_work_size`. This capability is not yet supported in the NVIDIA driver, and therefore not supported for device side kernel enqueues.

Shared virtual memory

- ▶ The current implementation of shared virtual memory is limited to 64-bit platforms only.

Chapter 2. Virtualization

To make use of GPU passthrough with virtual machines running Linux, the hardware platform must support the following features:

- ▶ A CPU with hardware-assisted instruction set virtualization: Intel VT-x or AMD-V.
- ▶ Platform support for I/O DMA remapping.
- ▶ On Intel platforms the DMA remapper technology is called Intel VT-d.
- ▶ On AMD platforms it is called AMD IOMMU.

Support for these features varies by processor family, product, and system, and should be verified at the manufacturer's website.

Supported Hypervisors

The following hypervisors are supported:

Hypervisor	Notes
Citrix XenServer	Version 6.0 and later
VMware vSphere (ESX / ESXi)	Version 5.1 and later.
Red Hat KVM	Red Hat Enterprise Linux 7 with KVM

Tesla products now support one display of up to 4K resolution.

Supported Graphics Cards

The following GPUs are supported for device passthrough:

GPU Family	Boards Supported
NVIDIA Ampere GPU Architecture	NVIDIA A100
Turing	NVIDIA T4
Volta	NVIDIA V100
Pascal	Tesla: P100, P40, P4
Maxwell	Tesla: M60, M40, M6, M4

GPU Family	Boards Supported
Kepler	Tesla: K520, K80

Chapter 3. Hardware and Software Support

Support for these features varies by processor family, product, and system, and should be verified at the manufacturer's website.

Supported Operating Systems for NVIDIA Data Center GPUs

The Release 450 driver is supported on the following operating systems:

- ▶ The following table summarizes the supported Linux 64-bit distributions. For a complete list of distributions, kernel versions supported, see the [CUDA Linux System Requirements](#) documentation.

Distribution	x86_64
OpenSUSE Leap 15.x (where y <= 4)	Yes
Red Hat Enterprise Linux 8.y (where y <= 6)	Yes
Red Hat Enterprise Linux / CentOS 7.y (where y <= 9)	Yes
Rocky Linux 8.x (where x<=6)	Yes
SUSE Linux Enterprise Server 15.x (where y <= 4)	Yes
Ubuntu 20.04.x LTS (where y <= 5)	Yes
Ubuntu 18.04.z LTS (where z <= 6)	Yes

Supported Operating Systems and CPU Configurations for NVIDIA HGX A100 and HGX A800

The Release 450 driver is validated with HGX A100 and HGX A800 on the following operating systems and CPU configurations:

- ▶ Linux 64-bit distributions:
 - ▶ Red Hat Enterprise Linux 8.5 (in 4/8/16-GPU configurations)
 - ▶ CentOS Linux 7.9 (in 4/8/16-GPU configurations)

- ▶ Ubuntu 18.04.5 LTS (in 4/8/16-GPU configurations)
- ▶ SUSE SLES 15.3 (in 4/8/16-GPU configurations)

Supported Virtualization Configurations

The Release 450 driver is validated with HGX A100 and HGX A800 on the following configurations:

- ▶ Passthrough (full visibility of GPUs and NVSwitches to guest VMs):
 - ▶ 8-GPU configurations with Ubuntu 18.04.5 LTS
- ▶ Shared NVSwitch (guest VMs only have visibility of GPUs and full NVLink bandwidth between GPUs in the same guest VM):
 - ▶ 1/2/4/8/16-GPU configurations with Ubuntu 18.04.5 LTS

API Support

This release supports the following APIs:

- ▶ NVIDIA® CUDA® 11.0 for NVIDIA® Kepler™, Maxwell™, Pascal™, Volta™, Turing™ and NVIDIA Ampere architecture GPUs
- ▶ OpenGL® 4.5
- ▶ Vulkan® 1.1
- ▶ DirectX 11
- ▶ Open Computing Language (OpenCL™ software) 1.2

Supported NVIDIA Data Center GPUs

The NVIDIA Data Center GPU driver package is designed for systems that have one or more Tesla products installed. This release of the driver supports CUDA C/C++ applications and libraries that rely on the CUDA C Runtime and/or CUDA Driver API.

NVIDIA Server Platforms	
Product	Architecture
NVIDIA HGX A800	A800 and NVSwitch
NVIDIA HGX A100	A100 and NVSwitch

A-Series Products	
Product	GPU Architecture
NVIDIA A800	NVIDIA Ampere GPU architecture
NVIDIA A100	NVIDIA Ampere GPU architecture

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