NVIDIA DRIVE OS 6.0.8 Linux

Release Notes

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Introduction

The NVIDIA DRIVE® OS 6.0 Linux Release Notes are for NVIDIA DRIVE AGX Orin™ Development Kits.

Note: **This DRIVE OS release may only be used for test and development.**

NVIDIA DRIVE OS is the reference operating system and associated software stack, which includes CUDA, TensorRT, NvMedia, NvStreams, and Developer Tools, designed specifically for developing and deploying autonomous applications on DRIVE AGX-based hardware. DRIVE OS includes the NVIDIA DriveWorks SDK as a foundation for autonomous vehicle (AV) software development. The DriveWorks SDK provides an automotive-grade middleware with accelerated algorithms and versatile tools.

DRIVE OS Development Kits

NVIDIA DRIVE OS Software Development Kit (SDK) is used to develop DRIVE OS applications for deployment on NVIDIA DRIVE AGX™ based hardware platforms.

Note: **The NVIDIA DRIVE OS Platform Development Kit (PDK) is only available to NVONLINE users.**

NVIDIA DRIVE OS Platform Development Kit (PDK) is used to adapt NVIDIA DRIVE OS to run on custom hardware based on NVIDIA Automotive SoC (i.e., Orin).

DRIVE OS Base Operating Systems

DRIVE OS Linux “Standard”

DRIVE OS Linux “Standard” is a reference platform based on Ubuntu 20.04 LTS Linux, which is intended for prototyping and development of autonomous vehicle platforms. DRIVE OS Linux is production ready but does not go through the same safety assessment as DRIVE OS QNX for Safety.

Release Highlights

Key Features in this Release

For a complete list of new features and enhancements in this release, see New Features and Enhancements.

Deprecations in this Release

The following items are deprecated in this release:

Summary	Module	Impact

DDI callback-based IInterruptStatus::GetInterruptStatus() API is deprecated in 6.0.8.	Standard	Use the fixed-size direct return version (2) in its place.
		`// (1) DEPRECATED - Callback-based interface`
		`virtual SIPLStatus GetInterruptStatus(`
		`  uint32_t const gpioIdx,`
		`  IInterruptNotify &intrNotifier)`
		`{`
		`  return NVSIPL_STATUS_NOT_SUPPORTED;`
		`}`
		
		`// (2) SUCCESSOR - Direct Return interface`
		`/* MAX_DEVGRP_NTFNS_PER_INTR := 8 */`
		`virtual SIPLStatus GetInterruptStatus(`
		`  uint32_t const gpioIdx,`
		
		`std::array<InterruptNotification, MAX_DEVGRP_NTFNS_PER_INTR>`

		`&intrNtfns) const`
		`{`
		`  return NVSIPL_STATUS_NOT_SUPPORTED;`
		`}`
		Example usage of the direct-return interface:
		`if (n < intrNtfns.size()) {`
		`  const struct InterruptNotification intrNtfn {`
		`InterruptCode::INTR_STATUS_SEN_FAILURE, 0, gpioIdx,`
		`static_cast<uint32_t>(GetLinkIndex()), true`
		`  };`
		`  intrNtfns[n++] = intrNtfn;`
		`} else {`
		`SIPL_LOG_ERR_STR("Insufficient storage for error notification");`
		`  return NVSIPL_STATUS_OUT_OF_MEMORY;`
		`}`

MCU Communication Coordinator for IST Client API's four (4) API functions have been removed in 6.0.8 and replaced with the ISTClient_mcc_send_results function.	Standard and Safety PDK	Customers must provide a library compliant to this API, so any customers that added this in release 6.0.6 to 6.0.8 must update.
The SiplControlISPStatsSetting structure defined in NvSiplControlAutoDef.hpp is deprecated in 6.0.8.	Standard and Safety	No impact.

The const keyword is removed in the API below in 6.0.8:
`NvMediaStatus NvMediaIDERegisterNvSciBufObj (`
`  const NvMediaIDE *decoder, //May be used in future to pin the surface`
`  NvSciBufObj  bufObj`
	NvMedia	This is modified to:
		`NvMediaStatus NvMediaIDERegisterNvSciBufObj (`
		`  NvMediaIDE *decoder, //May be used in future to pin the surface`
		`  NvSciBufObj  bufObj`
		This does not deprecate the API or modify any of the existing fields/parameters.

NvMediaIJPEGetBitsEx APIs is deprecated in 6.0.8.0.	Standard	Transition to alternate API.
6.0.8 removes public debug API NvMediaIOFAGetProfileData from all builds and OSes and removes the NvMediaIofaProfileMode argument from the NvMediaIofaInitParams structure as it was getting used by NvMediaIOFAGetProfileData.	Standard	NvMediaIOFAGetProfileData API is not used in production for perf measurement. nvm_iofa_flow_sci and nvm_iofa_stereo_sci have now moved to NvPlayFair APIs for perf measurement and NvMediaIOFAGetProfileData is not used for getting perf numbers.

Planned Upcoming Changes

The following sections describe planned, upcoming changes.

Summary	Module	Impact

The `INvSIPLCamera::GetErrorGPIOEventInfo()` API, which is called by the client after receiving an interrupt error notification to contextualize the GPIO interrupt event, will be imminently removed in 6.0.10.	Standard	`virtual SIPLStatus GetErrorGPIOEventInfo(uint32_t const devBlkIndex,`
		`uint32_t const gpioIndex,`
		`SIPLGpioEvent &event) = 0;`
		This information is now included as part of the interrupt error notification (`intrCode` and `intrData` of `NvSIPLPipelineNotifier::NotificationData`), and can be consumed directly.

The “generate_IFS_image.sh” script will be deprecated in 6.0.9.	Standard PDK	A new script called “qnx_create_ifs.sh”, which leverages NVIDIA build-fs, will be replacing “generate_IFS_images.sh” as the default method for generating IFS Images on the DRIVE OS PDK/SDK.
The `INvSIPLCamera::GetErrorGPIOEventInfo()` API, which is called by the client after receiving an interrupt error notification to contextualize the GPIO interrupt event, will be imminently removed in a future DRIVE OS release.	Standard PDK	This information is now included as part of the interrupt error notification (`intrCode` and `intrData` of `NvSIPLPipelineNotifier::NotificationData`), and can be consumed directly.

New Features and Enhancements

This release includes support for these new features and enhancements.

New Features for DRIVE OS

Integration Test Kits for SCL Parts

DRIVE OS 6.0.8 provides Integration Test Kits for eMMC, UFS, DRAM, and QSPI storage.

API for Transformation of YUV to RGB Formats

Input format:

- YUV420 Planar PL/BL
- YUV420 Semi-Planar PL/BL
- YUV422 YUYV (Packed)
- YUV422 UYVY (Packed)

Output format:

- RGB888 (uint8)
- BGR888 (uint8)

NvSciSync Profiling Support with Nsight

In DRIVE OS standard and extended Safety debug overlay builds, DRIVE OS visualizes the following listed synchronization events of a data streaming pipeline using Nsight systems:

1. Signal Event with attributes: Object ID, timestamp, information on the context.
2. Wait Enter Event with attributes :Object ID, timestamp, information on the HW/SW blocked context.
3. Wait Exit, Event with attributes: Object ID, timestamp, information on the HW/SW unblocked context.

PCIe Bus Link Level Error Detection

For NvStreams use cases, DRIVE OS reports uncorrectable (both fatal and non-fatal) errors in SoC running as RP for both EP and RP via NvStreams API. For NO-NvStreams use cases, DRIVE OS supports reporting of uncorrectable errors at RP via NvSciIpc API.

Customer-Fused Key for Key-Unwrapping in PKCS#11

DRIVE OS provides a client interface for importing a symmetric key that has been key wrapped into an empty client key store.

PKCS#11 Finds Objects Without a Specific CKA_ID

When the user application requests a search for all objects in a PKCS#11 token, the platform returns all object handles within a token without the need for you to provide an object's CKA_ID based on [PKCS11-BASE-v3.0].

PDU Size Indication in FSI-Com

FSI CddCcplexCom and CCPLEX FsiCom indicate the PDU payload length transmitted to the transmitting frame.

Disabling DUVM in Chain A

DRIVE OS verifies:

1. The customer to disable DUVM in Chain A.
2. The workflow to generate the image of Chain A without DRIVE Update.
3. Chain B with DRIVE Update can update Chain A and Recovery C.
4. Recovery C can update Chain A and Chain B.
5. Asymmetric bootchain workflow works as expected together with disabling DUVM in Chain A.

Disabling C-Bootchain Support

DRIVE OS supports disabling C-bootchain on demand. It is possible to exclude C-bootchain when binding/flashing DRIVE OS. This helps avoid unused software from being flashed in production.

Interface to Configure Absolute Start Time of Fsync Signals

DRIVE OS provides an interface to configure the absolute start time of Fsync (TSC_EDGE_OUT) signals.

MCU Firmware Persistent Configuration

DRIVE OS MCU firmware saves any persistent configuration without the need for additional AURIX device resets. Persistent configuration is not lost when performing an AURIX firmware update.

Persistent configuration contains:

- Default bootchain selected when MCU boots Orin(s).
- Hyperion network configurations.

New Features for DriveWorks 5.14

This release includes support for these new features and enhancements.

New Features and Improvements

- Support for Smartlead Camera with Sony IMX623/IMX728 sensor.
- CGF custom nodes can now interface with prebuilt nodes on Orin Linux.

Installation and Getting Started

- DriveWorks 5.14 is installed with DRIVE OS 6.0.8.0. No separate installation of DriveWorks libraries are needed.
- Please refer to the Getting Started section of the DriveWorks SDK Reference Documentation for information about how to verify the installation and get started developing with DriveWorks.
- DriveWorks samples and data are not installed on the target OOBE RFS for DRIVE Linux, as they would occupy too much space. Refer to the Getting Started section of the DriveWorks SDK Reference Documentation for information about building and running samples on Orin.

Fixed Issues

The following DRIVE OS and DriveWorks issues from the previous release are resolved in this release:

Feature	Module	Description
3885243	FSI	**What was the issue?** On production boards with no root key fused, the FSI keyblob from PSC was invalid and FSI SW was not able to parse it. FSI SW reported "ErrorCode-0x9 ReporterId-0x800d" to HSM. **How did it impact the customer?** Since provisioned keys were not usable on non-fused boards, this was harmless and could be ignored. **Was it for SDK/PDK?** Both
3896536	System Software	**What was the issue?** tegra_bootloader_debug driver was broken with K5.15. **How did it impact the customer?** Profiling use cases (such as boot time profiling) did not work by default with DRIVE Linux + K5.15. Note that there was no such issue on DRIVE Linux + K5.10. **Was it for SDK/PDK?** Both
3917664	Camera Core	**What was the issue?** Due to an issue with CSI calibration during capture start, a camera application using SIPL might have seen intermittent failures to start captures and saw no frames being received by the application. **How did it impact the customer?** The impact to customers was limited to repeatedly launching and exiting a camera application. The intermittency rate was ~3-5%. The application could have been launched again even after a failure to successfully start a new capture session most times. **Was it for SDK/PDK?** Linux SDK.
3933195	DRIVE Update	**What was the issue?** Error logs such as "Error 0x2100004 on waitForReply from <path> to <path>" were printed in update VM when the system booted up. **How did it impact the customer?**

		No impact. **Was it for SDK/PDK?** All
3953053	Kernel	**What was the issue?** `/sys/class/gpio` node has been deprecated in K5.15. **How did it impact the customer?** You can no longer use the GPIO sysfs (/sys/class/gpio). **Was it for SDK/PDK?** It applies for K5.15 based packages (PDK/SDK).
4072102	AURIX	**What was the issue?** Multiple clients were communicating with Aurix over socket port 5001. One client was the MCC daemon using local IP address 0.0.0.0; there could be other clients linking with libmcu_common_if.so to communicate with Aurix via socket APIs. The clients linking with libmcu_common_if.so and communicating directly over socket port 5001 might have seen a conflict and timeout error if they were launched using root user. **How did it impact the customer?** The clients linking with libmcu_common_if.so might have seen conflict with MCC daemon for the port 5001 if they were launched as root user. **Was it for SDK/PDK?** Both
4068649	DRIVE Update	**What was the issue?** In AV+L, if SC7 happened when there was a DRIVE Update deployment ongoing, the deployment might have failed after system resume; rate: 1/5. **How did it impact the customer?** Deployment via DRIVE Update might have failed if SC7 happened, rate: 1/5.
3929493	DriveWorks: SAL	**What is the issue?** On x86, video not rendered properly after export from lraw/raw for AR0820, IMX728 Camera. Screen appeared in black color only. **How does it impact the customer?** Cannot use tool video_exporter to export mp4 files from AR0820/IMX728 raw/lraw recordings. **If there is a workaround, what is it?** N/A **When can we expect the fix?** The issue is fixed in the current release. **Is it for SDK/PDK?** SDK
4064704	DriveWorks: SAL	**What is the issue?** On x86, video replay of AR0820 camera sample_camera_replay/sample_camera is failed with error: DW_FAILURE: CameraMaster: camera not present in the NvSIPL database in use. **How does it impact the customer?** Cannot replay AR0820 raw recordings **If there is a workaround, what is it?**

		N/A **When can we expect the fix?** The issue is fixed in the current release. **Is it for SDK/PDK?** SDK
4056215	DriveWorks: SAL	**What is the issue?** On x86, video replay of hyp8 IMX623 camera with sample_camera_replay/sample_camera is getting hung and no renderer screen appeared. Pop-up window display asking for wait/force stop. **How does it impact the customer?** Cannot replay IMX623 raw recordings **If there is a workaround, what is it?** N/A **When can we expect the fix?** The issue is fixed in the current release. **Is it for SDK/PDK?** SDK
4101559	DriveWorks: CGF	**What is the issue?** CGF public header includes some internal header files which are not part of the release. So that caused the compilation failure. **How does it impact the customer?** Customers cannot create any CGF nodes and connect to dwnodes. **If there is a workaround, what is it?** N/A **When can we expect the fix?** The issue is fixed in the current release. **Is it for SDK/PDK?** SDK

NVIDIA Software Security Updates

This release of NVIDIA DRIVE OS 6.0 Linux includes updates that address the following issue[s]:

CVE ID	NVIDIA Issue Number	Description
Not Assigned	4075401	NVIDIA Drive for Orin contains a vulnerability in PKCS11 Lib and TZVault where an Attacker may cause a leakage of sensitive information (key value) by performing key derivation and wrap operations with specific attributes. A successful exploit of this vulnerability may lead to leakage of key values which compromises the confidentiality of the system.

Not Assigned	4060417	NVIDIA Secure Boot Fusing Software for Jetson contains a vulnerability in the logging component, where a local attacker with elevated privileges can obtain fuse key information from the fuse burn logs, leading to limited information disclosure.

For more information about NVIDIA's vulnerability management, refer to the NVIDIA Product Security page.

Third-Party Software Security Updates

This release of NVIDIA DRIVE OS 6.0 QNX includes updates that address the following issue(s):

CVE ID	NVIDIA Issue Number	Description
CVE-2023-0464	4142662	A security vulnerability has been identified in all supported versions of OpenSSL related to the verification of X.509 certificate chains that include policy constraints. Attackers may be able to exploit this vulnerability by creating a malicious certificate chain that triggers exponential use of computational resources, leading to a denial-of-service (DoS) attack on affected systems. Policy processing is disabled by default but can be enabled by passing the `-policy' argument to the command line utilities or by calling the `X509_VERIFY_PARAM_set1_policies()' function.
CVE-2023-0286	4142662	There is a type confusion vulnerability relating to X.400 address processing inside an X.509 GeneralName. X.400 addresses were parsed as an ASN1_STRING but the public structure definition for GENERAL_NAME incorrectly specified the type of the x400Address field as ASN1_TYPE. This field is subsequently interpreted by the OpenSSL function GENERAL_NAME_cmp as an ASN1_TYPE rather than an ASN1_STRING. When CRL checking is enabled (i.e. the application sets the X509_V_FLAG_CRL_CHECK flag), this vulnerability may allow an attacker to pass arbitrary pointers to a memcmp call, enabling them to read memory contents or enact a denial of service. In most cases, the attack requires the attacker to provide both the certificate chain and CRL, neither of which need

		to have a valid signature. If the attacker only controls one of these inputs, the other input must already contain an X.400 address as a CRL distribution point, which is uncommon. As such, this vulnerability is most likely to only affect applications which have implemented their own functionality for retrieving CRLs over a network.
CVE-2023-0215	4142662	The public API function BIO_new_NDEF is a helper function used for streaming ASN.1 data via a BIO. It is primarily used internally to OpenSSL to support the SMIME, CMS and PKCS7 streaming capabilities, but may also be called directly by end user applications. The function receives a BIO from the caller, prepends a new BIO_f_asn1 filter BIO onto the front of it to form a BIO chain, and then returns the new head of the BIO chain to the caller. Under certain conditions, for example if a CMS recipient public key is invalid, the new filter BIO is freed and the function returns a NULL result indicating a failure. However, in this case, the BIO chain is not properly cleaned up and the BIO passed by the caller still retains internal pointers to the previously freed filter BIO. If the caller then goes on to call BIO_pop() on the BIO then a use-after-free will occur. This will most likely result in a crash. This scenario occurs directly in the internal function B64_write_ASN1() which may cause BIO_new_NDEF() to be called and will subsequently call BIO_pop() on the BIO. This internal function is in turn called by the public API functions PEM_write_bio_ASN1_stream, PEM_write_bio_CMS_stream, PEM_write_bio_PKCS7_stream, SMIME_write_ASN1, SMIME_write_CMS and SMIME_write_PKCS7. Other public API functions that may be impacted by this include i2d_ASN1_bio_stream, BIO_new_CMS, BIO_new_PKCS7, i2d_CMS_bio_stream and i2d_PKCS7_bio_stream. The OpenSSL cms and smime command line applications are similarly affected.

Known Limitations

The following sections describe known limitations in this release.

Feature	Module	Description
DriveWorks	DriveWorks	Building the NVIDIA DriveWorks SDK as a Yocto Project® based component is not supported.
Docker	DriveWorks	Sample execution within Docker containers on host is not supported for camera-related samples. Workaround: 1. Downgrade host display driver to version 470.161.03 and then downgrade NvSci inside the Docker container as follows: *$ apt-get remove nvsci* 2. For NVONLINE users: Download nvsci_pkg_x86_64_embedded-6.0.6.0_20230123_32401113.deb from NVONLINE. 3. *$ apt-get install ./nvsci_pkg_x86_64_embedded-6.0.6.0_20230123_32401113.deb*
Docker	DriveWorks	Sample execution within Docker containers on target is not supported.
CGF	DriveWorks	CGF custom nodes can not interface with prebuilt nodes on X86 or QNX.
3972843	System software	CUB is experimental on Tegra products.

Known Issues

Note: Due to the introduction of enhanced persistent partition workflow, if you are upgrading from DRIVE OS 6.0.4 to the current DRIVE OS version and using `-init` persistent partitions, follow all the steps mentioned under the Data Migration for Persistent Partitions chapter in the *DRIVE OS 6.0 Linux SDK Developer Guide*.

These are issues discovered during development and QA and are scheduled to be resolved in a future release.

Feature	Module	Description
4079505	Filesystem	**What was the issue?** The kernel K5.10 built many of the loadable kernel modules (*.ko), and all kernel modules were copied to the filesystem regardless of whether they were used. This was suboptimal as they would not get loaded or got loaded but not used. These modules occupied unnecessary storage space in the filesystem, and there were security concerns with too many unused modules. With kernel K5.15, DRIVE OS enables and copies only the essential kernel modules to the K5.15 root filesystem, which has known use cases. The kernel modules packaged in the filesystem currently for K5.15 is verified to be sufficient to cover the known use cases in DRIVE OS LINUX. The specific use case has issues if the customer has specific use cases on K5.15, which depend on kernel modules unavailable in the K5.15 filesystem that comes with SDK/PDK. **How did it impact the customer?** If the software used in your use case depended on the .ko file, then the software did not run. **Was it for SDK/PDK?** Both
4125801	Camera Core	**What is the issue?** On p3898 platform, if camera capture is launched on CSI-CD port while another capture application is already running on CSI-AB, then capture on CSI-CD disrupts streaming on CSI-AB. **How does it impact the customer?** You may observe capture disruption on CSI-AB. Restart the capture application. **If there is a workaround, what is it?** The workaround is to launch capture on CSI-CD first and then capture on CSI-AB. **When can we expect the fix?** Software and hardware mitigations are being investigated for a future DRIVE OS release (both are necessary).

		Is it for SDK/PDK? Both
3983073	Display	**What is the issue?** SOR and RG FMON Violation - You may see errors with ReporterId-0xe04c, such as "MCU_FOH: ErrReport: ErrorCode-0x28da ReporterId-0xe04c Error_Attribute-0x0 Timestamp-0x13a51bd" on the MCU console during boot. These are violations reported by FMON function due to setting of SOR and RG clocks without notifying BPMP module about the clock change. devg-modeset module must disable monitoring clocks for SOR and RG while updating SOR and RG clocks. Currently, it is not able to do so, causing these FMON violations. **How does it impact the customer?** When nvidia.ko module is loaded by modprobe command as part of boot-up process before launching any display application, this issue occurs. This does not impact you as this violation is for monitoring clocks only. It only identifies that something in clocks changed without disabling monitoring clocks. **If there is a workaround, what is it?** N/A **When can we expect the fix?** 6.0.8.1 **Is it for SDK/PDK?** Both
4184332	System Software	**What is the issue?** Yocto build fails intermittently with compilation failure in Vulkan-samples reporting out of memory error. **How does it impact the customer?** Customers building Yocto with bitbake may hit this failure intermittently when several other bitbake tasks are running. **If there is a workaround, what is it?** Yes, re-attempt the build to resolve intermittent issue. **When can we expect the fix?** The fix will be included in next release. **Is it for SDK/PDK?** Both
4190302	System Software	**What is the issue?** Although SC7_DRAM_AUTHENTICATION is not enabled by default for DRIVE OS Linux builds, DRAM_Authentication disabled causes SC7 entry failure on P3898. **How does it impact the customer?** Customers using P3898 are unable to enter SC7. **If there is a workaround, what is it?** SC7_DRAM_AUTHENTICATION has been kept enabled for P3898 platform. Although this increases boot time, this still meets the committed resume KPIs of 2 seconds for P3898. **When can we expect the fix?** 6.0.8.1 **Is it for SDK/PDK?**

		Both
4201063	Filesystem	**What is the issue?** Mellanox driver sources are not packaged in the SDK. Support, along with instructions to rebuild Mellanox kernel modules, is unavailable due to SDK limitations. **How does it impact the customer?** You are not be able to rebuild Mellanox kernel modules from sources. **If there is a workaround, what is it?** By default, the prebuilt kernel modules are at `$NV_WORKSPACE/drive-linux/kernel/preempt_rt/modules/<kernel_version>/updates/dkms/`. When running the steps for re-compiling the kernel and the directory `$NV_WORKSPACE/drive-linux/kernel/preempt_rt/modules` has been moved, ensure the kernel modules are copied back to `$NV_WORKSPACE/drive-linux/kernel/preempt_rt/modules/<kernel_version>/updates/dkms/`. Otherwise, the Build-FS operation to update the rootfs with the rebuild modules fails due to missing Mellanox kernel modules. If you removed the entire `$NV_WORKSPACE/drive-linux/kernel/preempt_rt/modules/ or NV_WORKSPACE/drive-linux/kernel/preempt_rt/modules/<kernel_version>/updates/dkms/`, re-install the SDK/PDK to get back the DRIVE OS provided Mellanox kernel modules. **When can we expect the fix?** 6.0.8.1. The sources of Mellanox kernel modules, tools, and instructions to rebuild them shall be fixed and enabled in 6.0.8.1. **Is it for SDK/PDK?** Both
3928416	HSI	**What is the issue?** You may see error spews on MCU console during boot, with the following error code. This indicates an HSI EQOS RX FMON error while enabling FMON clock: `MCU_FOH: ErrReport: ErrorCode-0x28de ReporterId-0xe04c Error_Attribute-0x0 Timestamp-0xa4fc08e`. **How does it impact the customer?** There is no impact on the data transfers. T EQOS FMON monitoring for RX CLK may not work. **If there is a workaround, what is it?** No workaround. **When can we expect the fix?** 6.0.8.1 **Is it for SDK/PDK?** SDK
4169204	Camera Core	**What is the issue?** Sample camera application crashes when running with Test Pattern Generator (TPG) from DS90UB971 FPD-Link serializer. **How does it impact the customer?** The impact is minimal since the issue is only observed with TPG, not actual FPD-Link sensors. **If there is a workaround, what is it?**

		No workaround. **When can we expect the fix?** TBD **Is it for SDK/PDK?** PDK
4195508	DRIVE Update	**What is the issue?** Starting from 6.0.8.0, security mandates that one DRIVE Update deployment must include PVIT update if the system has PVIT enabled. **How does it impact the customer?** When constructing the metadata manually in cases like delta update, PVIT partition must be included as part of the deployment; otherwise, install_unlock fails. **If there is a workaround, what is it?** If you do not want to use PVIT update, include "`ENABLE_PVIT=n`" when binding the partition prior to flashing. **When can we expect the fix?** This is a change in behavior due to a security requirement. Documentation will be updated in the next release. **Is it for SDK/PDK?** Both
4193291	DRIVE Update	**What is the issue?** DUPKG tool before 6.0.8.0 only supports the package generation with the partition images from its same release. Starting from 6.0.8.0, DUPKG tool is able to support DRIVE Update package generation with partition image since 6.0.7.0. **How does it impact the customer?** Using DUPKG tool earlier than from 6.0.8.0 release to generate with cross version images may fail. **If there is a workaround, what is it?** Use the DUPKG tool to generate images from its same release. **When can we expect the fix?** 6.0.8.0 DUPKG supports cross version image generation. **Is it for SDK/PDK?** Both
3866554	Bootburn	**What is the issue?** In 6.0.8.0, the flashing kernel has transitioned to K5.15 (from K5.10), but kernel tarball and build scripts are missing in the 6.0.8.0 release packages. **How does it impact the customer?** You are able to build your own 5.15 flashing kernel and modules using the flashing kernel build scripts. **If there is a workaround, what is it?** It is possible to use TOT images for the flashing kernel. **When can we expect the fix?** A patch on 6.0.8.0 potentially available before 6.0.8.1. **Is it for SDK/PDK?** Both
4174916	Nsight	Accelerator workload events for VIC, OFA, NVENC and NVDEC are missing (missing

		job_timestamps ftrace events).
4174916	Nsight	Clicking on accelerator workload events for VI will not reveal the corresponding API call that launched the job (missing vi_task_submit ftrace event).
4184360	Nsight	When remote profiling from the host x86_64, accelerator workload events are not collected.
4115578	Nsight	When localhost profiling on the target arm64 using nsys-ui GUI, accelerator workload events are not collected.
4190938	Nsight	Accelerator workload events for PVA in specific scenarios might not be displayed correctly.
4193687	Nsight	Tegra accelerator workload events in specific scenarios might disappear when zooming in on the timeline.
3961157	Camera Core	**What is the issue?** Demosaic of RGB-IR sensors in nvsipl_camera is not supported. When `--enableRawOutput` is used with Display in nvsipl_camera, the app fails. **How does it impact the customer?** You cannot display raw output of RGB-IR sensors. **If there is a workaround, what is it?** N/A **When can we expect the fix?** 6.0.9 Note: A demosaic'd image will not be displayed; a monochrome image created using G and IR components will be displayed. **Is it for SDK/PDK?** Both
4087839	System Software	**What is the issue?** In bind phase of the build, storage configuration may throw the warning message: “WARNING: Uniqueness failure: Reuse of SID value:”. **How does it impact the customer?** The Warning "WARNING: Uniqueness failure: Reuse of SID value:" can be ignored for Linux and boot chain C builds. **If there is a workaround, what is it?** N/A **When can we expect the fix?** 6.0.9 **Is it for SDK/PDK?** Both
4079771	NvDisplay	**What is the issue?** HDMI is not enabled by default in AV+L build for any of devkit reference boards. **How does it impact the customer?** Platforms with HDMI connector output do not work by default. **If there is a workaround, what is it?** Follow the steps in the Enabling HDMI chapter under NvDisplay to enable HDMI on your board. **When can we expect the fix?**

		6.0.9 **Is it for SDK/PDK?** Both
4070042	Kernel	**What is the issue?** sestatus tool is not available in the Linux RFSes for Linux K5.15 while it is still available in RFSes for Linux K5.10. **How does it impact the customer?** You are not able to use sestatus in K5.15 DRIVE OS package. **If there is a workaround, what is it?** The same information can be extracted from other source such as /sys/fs/selinux/status. You can also `apt install policycoreutils` to get the command installed/supported on the target system. **When can we expect the fix?** 6.0.9 **Is it for SDK/PDK?** Both
4067922	FSI	**What is the issue?** FSISW Interrupt consistency check is not supported for 6.0.7.0. **How does it impact the customer?** In open box solution, missing timer interrupts in FSSIW GPT MCAL cannot be detected for GPT channels. For closed box solution, there is no impact as GPT channels are not configured and not used. **If there is a workaround, what is it?** N/A **When can we expect the fix?** 6.0.9 **Is it for SDK/PDK?** Both
3950134	Safety MCU Firmware	**What is the issue?** On the P3663-TS3 board, SAFETY_NIRQ is low during SC7 exit, which leads to the error print "ERROR: MCU_PLTFPWRMGR: Request Orin SC7 Exit failed!. As this is a safety check, it has no functional impact **How does it impact the customer?** You see error print "ERROR: MCU_PLTFPWRMGR: Request Orin SC7 Exit failed!" though SC7 exit is successful. As this is a safety check, it has no functional impact. **If there is a workaround, what is it?** N/A **When can we expect the fix?** As the issue is seen on only a particular board, analysis/fix will take more time and it is planned to be completed by 6.0.9. **Is it for Standard/Safety, SDK/PDK** All
3895994	System Software	**What is the issue?** SC7 Suspend->Resume causes hang intermittently.

		Issue seen once in 25 cycles of Suspend-Resume. Issue occurs if suspend-resume is triggered in a loop. **How does it impact the customer?** System will be in hang state if this issue is hit **If there is a workaround, what is it?** Need a power reset to come out of this state **When can we expect the fix?** 6.0.9 **Is this Standard?** Issue is seen on Linux, PCT Configuration : AV+L **Is it for SDK/PDK?** All
3854952	DRIVE Update	**What is the issue?** DRIVE Update deploy fails with delay greater than 10s in reboot.json. **How does it impact the customer?** There is no max delay documented anywhere, which may cause customer DRIVE Update deploy fail. **If there is a workaround, what is it?** Maximum value of delay in reboot.json is 10s. **When can we expect the fix?** No fix. Avoid the DRIVE Update deploy failure caused by an inappropriate delay value. **Is it for SDK/PDK?** All
3640535	Provisioning	**What is the issue?** UFS Memory must be provisioned for performance enhancements. The value for bProvisioningType has changed in the NVIDIA reference board UFS provisioning file, from "0 -- Thin Provisioining Disabled" to "3 -- Thin Provisioning enabled with TPRZ". For more information, refer to the To provision a UFS device through the flashing tools chapter in the *NVIDIA DRIVE OS 6.0 Linux Developer Guide*. As per the UFS Jdec spec JESD220D: bProvisioningType shall be set to configure the logical unit provisioning type 00h: to disable thin provisioning, 5534 02h: to enable thin provisioning with TPRZ = 0 03h: to enable thin provisioning with TPRZ = 1. The "bProvisioningType" must be set to either 2 or 3 to allow the UFS device to perform DISACRD or ERASE operations when requested from the host. Otherwise, UFS device does not allow the ERASE/DICARD operations. (Refer JESD220D section "12.2.3.1 Erase" and "12.2.3.2 Discard" for more details). From Jdec spec: The erase functionality is implemented using the UNMAP command and it is enabled if the bProvisioningType parameter in the Unit Descriptor is set to 03h (TPRZ = 1). The discard functionality is implemented using the UNMAP command and it is enabled if the 4409 bProvisioningType parameter in the Unit Descriptor is set to

		02h (TPRZ = 0). NVIDIA SCL Micron devices came with default value of "0" for the value of bProvisioningType setting. **How does it impact the customer?** UFS memory is erased when provisioned. **If there is a workaround, what is it?** This is the recommended setting for bProvisioningType. **When can we expect the fix?** This is not a bug but a recommended setting for bProvisioningType. **Is it for SDK/PDK?** All
3644537	Virtualization	**What is the issue?** Host initiated Refresh (HIR) operation on Micron eMMC device takes around 7 seconds to complete **How does it impact the customer?** If initiated refresh on Micron eMMC from SW, then EMMC becomes busy and no other requests (such as read/write/erase etc.,) are sent to EMMC for that busy period. **If there is a workaround, what is it?** There is no workaround available. Micron is going to provide the eMMC firmware update to reduce the HIR time to 400ms (projected time from Micron). Please check with Micron for more details on this. **When can we expect the fix?** This fix is expected from Micron as an eMMC firmware update. After the new eMMC firmware provided from Micron, it must be flashed to eMMC. For more details, check with Micron. **Is it for SDK/PDK?** All
3769858	Display	Assert observed when display driver kernel modules are loaded
3793667	Camera	**What is the issue?** When isGroupInitProg flag in DeviceBlockInfo structure is set, the links must be initialized in incremental order. **How does it impact the customer?** If the link order is not incremental, some cameras are not initialized correctly so the application cannot receive the frames from the uninitialized cameras. **If there is a workaround, what is it?** The user initializes the cameras in the incremental link order when isGroupInitProg flag is set. **When can we expect the fix?** 6.0.9 **Is it for SDK/PDK?** Linux SDK and PDK.
200775377	System Software	**What is the issue?** PTP client connected to DRIVE Orin AGX Developer Kit 88Q6113 (Spruce) ethernet switch port P7 fails to sync with PTP server due to known bug from Marvell switch

		firmware. **How does it impact the customer?** Any sensor/device connected to spruce port P7 is not able to sync with PTP server. **If there is a workaround, what is it?** N/A **When can we expect the fix?** The issue is being addressed with the vendor; resolution date is TBD. **Is it for SDK/PDK?** All.
200618961	System Software	**What is the issue?** Low fps observed while replaying sf3324/820 lraw/raw camera recordings with sample_camera_replay **How does it impact the customer?** Cannot replay sf3324/820 lraw/raw camera recordings smoothly via the Camera Replay Sample. **If there is a workaround, what is it?** N/A **When can we expect the fix?** N/A **Is it for SDK/PDK?** SDK
3925474		**What is the issue?** Header dump tool failed for lidar and radar with error: Could not cast to virtual sensor. [TC ID: 41643, 41645] **How does it impact the customer?** Cannot dump lidar/radar header by using header-dump **If there is a workaround, what is it?** N/A **When can we expect the fix?** 6.0.9 **Is it for SDK/PDK?** SDK
4184657		**What is the issue?** sample_camera cannot replay multi RAW/LRAW videos that are recorded from cameras connected to the same link index. **How does it impact the customer?** Cannot replay multi videos with same input, RAW/LRAW include link index information, cannot replay same index video at the same time. **If there is a workaround, what is it?** N/A **When can we expect the fix?** Next release **Is it for SDK/PDK?** SDK
4180423		**What is the issue?** Cannot detect some USB cameras in DOS 6080. Those cameras are free driver in

		6070 and before. **How does it impact the customer?** Some USB cameras are free driver in 6070 DOS and before. Camera samples cannot open some USB cameras directly due to driver missing. **If there is a workaround, what is it?** N/A **When can we expect the fix?** Next release **Is it for SDK/PDK?** SDK
4203303		**What is the issue?** Calibration recorder tool failed with input lraw/raw videos. **How does it impact the customer?** Calibration recorder tool cannot work with input lraw/raw videos. **If there is a workaround, what is it?** N/A **When can we expect the fix?** Next release **Is it for SDK/PDK?** SDK
4064878		**What is the issue?** Recorder tool record lraw file that is not encoded as lossless. **How does it impact the customer?** Cannot use recorder tool to record lossless lraw data. **If there is a workaround, what is it?** N/A **When can we expect the fix?** Next release **Is it for SDK/PDK?** SDK
4203115		**What is the issue?** sample_connected_components showing black rendering screen for both raw/lraw video **How does it impact the customer?** sample_connected_components cannot work with input raw/lraw videos. **If there is a workaround, what is it?** N/A **When can we expect the fix?** Next release **Is it for SDK/PDK?** SDK
4064784		**What is the issue?** sample_feature_descriptor fails with raw video input, Driveworks exception thrown: Bad access of safety result (underflow error)

		How does it impact the customer? Cannot run sample_feature_descriptor with raw video **If there is a workaround, what is it?** N/A **When can we expect the fix?** 6.0.9 **Is it for SDK/PDK?** SDK
	Image and Point Cloud Processing	The following algorithms are not supported on Orin's OFA and/or PVA engines in this release: • ImageFilter (Recursive Gaussian Filter, BoxFilter, 2Dconv). • FAST9 Feature Detector, Standard Harris Corner Detector. • IC and fastIC Feature Tracker. • DenseOpticalFlow. • Stereo. • Template Tracker.
3496936		**What is the issue?** Sample_stereo_disparity dumps "Error calling GL deleter" on console **How does it impact the customer?** The same error log may occur during DriveWorks release. But it won't impact functionality. **If there is a workaround, what is it?** N/A **When can we expect the fix?** N/A **Is it for SDK/PDK?** SDK
		Tensor Streaming is not operational in this release.
200782352	SAL	LRAW Preview Extraction Tool fails.
3494734		**What is the issue?** Some networks may suffer accuracy degradation when run on DLA with large batch sizes. **How does it impact the customer?** When running networks on DLA with batch sizes larger than 32, accuracy may degrade. **If there is a workaround, what is it?** To work around this issue, use a smaller batch size. **When can we expect the fix?** The issue will be fixed in a future DLA release. **Is it for SDK/PDK?** Safety, SDK
3498326		**What is the issue?** There is a known issue with DLA clocks that requires users to reboot the system after changing the nvpmodel power mode or otherwise experience a performance drop. **How does it impact the customer?**

		Performance may drop significantly after changing the nvpmodel power mode. **If there is a workaround, what is it?** Reboot the system after changing the nvpmodel power mode. **When can we expect the fix?** 6.0.9 **Is it for SDK/PDK?** Safety, SDK

Release Properties

The following table describes the release properties and software versions.

Release Properties	
Property	Description
Linux	Specifies the operating system.
20.04	Specifies the host Ubuntu operating system version.
Focal Fossa	Specifies the codename for the host version of Ubuntu.
20.04	Specifies the target root file system operating system version.
6.0.8	Specifies the NVIDIA release branch number.
	Specifies the build ID for the Linux operating system.
	Specifies the build ID for the Linux Knext operating system.
drive-linux	Specifies the product name.
Linux	Specifies the platform.
234	Specifies the architecture version.
5.15	Specifies the supported kernel version.
Software Version	
Software	Version
GCC Cross-compiler Toolchain for user applications and libraries for Yocto root file system.	9.3
GCC Cross-compiler Toolchain for user applications and libraries for Ubuntu root file system.	9.3
OpenGL ES	3.2
OpenGL: Provided for development purposes. Production systems are expected to use OpenGL ES.	4.6
Wayland	1.18
Vulkan Provided for development purposes.	1.3

Safety systems are expected to use Vulkan SC.	
Vulkan SC	1.0
OpenWF Display	1.0
DriveWorks	5.14
DLA	3.14.0[1]
CUDA Toolkit	11.4.24 – Reference 11.4.4 documentation
cuDNN	8.9.2
TensorRT	8.6.11
ONNX	1.9.0 and opset 13
TensorFlow	1.15.0
PyTorch	1.9.0
Elementwise	2.4.2

DRIVE OS Supported Sensors

For a list of supported sensors, see the Supported Sensors chapter under Setup and Configuration section in the *NVIDIA DRIVE OS Linux Developer Guide*.

CUDA

The following table describes CUDA support.

Host OS	Host OS Version	Target OS	Target OS Version	Compiler Support
Ubuntu	20.04 LTS	Ubuntu	Ubuntu 20.04	GCC 9.3

Standard

The current release label is 11.4.24. The various components in the toolkit are versioned independently. The following table shows each component and its version:

Component Name	Version Information	Supported Architectures
CUDA Runtime (cudart)	11.4. 409	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
cuobjdump	11.4. 409	Linux (aarch64), Linux (x86_64)
CUPTI	11.4. 409	Linux (aarch64), Linux (x86_64), qnx-

[1] DLA versions 1.3.7, 1.3.8, 3.9.0, and 3.10 are also supported.

		standard_aarch64
CUDA cuxxfilt (demangler)	11.4. 409	Linux (aarch64), Linux (x86_64)
CUDA Demo Suite	11.4. 409	Linux (x86_64)
CUDA GDB	11.4. 409	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA NVCC	11.4. 409	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA nvdisasm	11.4. 409	Linux (aarch64), Linux (x86_64)
CUDA NVML Headers	11.4. 409	Linux (aarch64), Linux (x86_64)
CUDA nvprof	11.4. 409	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA nvprune	11.4. 409	Linux (aarch64), Linux (x86_64)
CUDA NVRTC	11.4. 409	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA NVTX	11.4. 409	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA NVVP	11.4. 409	Linux (x86_64)
CUDA Samples	11.4. 409	l4t_aarch64, Linux (aarch64), Linux (x86_64)
CUDA Compute Sanitizer API	11.4. 409	Linux (aarch64), Linux (x86_64)
CUDA Thrust	11.4. 409	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA cuBLAS	11.6.6.193	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA cuDLA	11.4. 409	Linux (aarch64), qnx-standard_aarch64
CUDA cuFFT	10.6.0.313	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA cuRAND	10.2.5.408	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA cuSOLVER	11.2.0.408	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA cuSPARSE	11.6.0.408	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
CUDA NPP	11.4.0.398	Linux (aarch64), Linux (x86_64), qnx-standard_aarch64
Nsight Compute	2021.2.10.1	Linux (x86_64), qnx-standard_aarch64
NVIDIA Linux Driver	470.182.03	Linux (x86_64)

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