TEGRA LINUX DRIVER PACKAGE R24.2.3

Release Notes

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1.0 About this Release

The NVIDIA® Tegra® Linux Driver Package supports development of platforms running on:

▶ NVIDIA® Jetson™ TX1 Developer Kit (P2371-2180)

Platform and Release Information

Description	Supported Version
Host machine version required for flashing software onto Jetson TX1. Ubuntu 16.04 is NOT recommended on the host machine.	Ubuntu 14.04 amd64 distribution
Sample root file system (rootfs) Ubuntu operating system to run on Jetson TX1.	Ubuntu 16.04 arm64 distribution
Supported Linux kernel version.	3.10.96
Supported ARM architecture.	aarch64
The board name used in flashing and for paths in the software.	jetson-tx1
The board and revision number.	Jetson TX1: p2371-2180
The release tag name. Consult the kernel source to identify the tag name at: http://nv-tegra.nvidia.com/gitweb/?p=linux-3.10.git	tegra-l4t-24.2.3
Supported EGL or OpenGL version.	362.24.18.0

1.1 Login Credentials

The default login credentials are:

▶ Username: `ubuntu`
▶ Password: `ubuntu`

The release also includes the following credentials:

▶ Username: `nvidia`
▶ Password: `nvidia`

1.2 Sources for Included Linux Distribution Packages

Visit the [Jetson Embedded Platform website](#) for source code provided subject to the terms of open source licenses that require source code availability, such as the GNU General Public License.

1.3 Top Fixed Issues

These fixed issues apply to Jetson TX1 devices. For a complete list of kernel fixes that go into this release, please consult the NVIDIA git repository available at:

`https://nv-tegra.nvidia.com/gitweb/?p=linux-3.10.git`

1.3.1 Camera

Camera related issues resolved in this release are as follows.

Issue	Description
200319623	Green line corruption with v4l2cuda capture using application allocated buffers and zero copy CUDA memory (-u -z).

1.3.2 Kernel

Kernel related issues resolved in this release are as follows.

Issue	Description
200225877	Target's "About This Computer" reports disk size 0.
200315053	Update the EMC DVFS table and the BCT table to properly support the Samsung K4F6E304HB-MGCH(3200) and Hynix H9HCNNNBPUMLHR-NME(3733) 4GB LPDDR4 on the Jetson TX1 platform.
	Problems fixed by this correction include data corruption at high temperatures when using 2x or 4x refresh rate with the affected memory modules.

Issue	Description
1927185	Large memory allocation with `CudaHostAlloc` fails.

1.3.3 Multimedia

Multimedia related issues resolved in this release are as follows.

Issue	Description
1892082	After a zero length buffer is enqueued in outputplane, the encoder cannot get encoded data from the callback function because EOS is not handled correctly.
1893482	When the SDK runs with profiler on, profiler data is always stored in a vector.
200305789	Call to `conv->capture_plane.qBuffer` blocks under some conditions, e.g. when resources are destroyed then recreated.
1995742	`video_decode` memory leak, leaks ~65 MB about once per hour. nvIlDevice.heads structure is not deleted when destroying windows.
200344305	Low rate hang in video_decode, particularly when CPU load is very high.

2.0 Known Issues

This section provides details about issues that were discovered during development but not resolved prior to this release of the Tegra Linux Driver Package.

Issue	Description
200411568	Docker support is not enabled from the kernel side.
2093022	SSHD keys are not regenerated on clean installs.

3.0 Implementation Notes

3.1 NVIDIA argus-daemon Startup on First Boot is Unsuccessful

The NVIDIA argus-daemon fails to start on the first boot of the system.

To workaround

1. After running `apply_binaries.sh`, but before flashing the target, in the following file:

   ```
   Linux_for_Tegra/rootfs/etc/systemd/system/argus-daemon.service
   ```

   change the line:

   ```
   After=network-online.target
   ```

   to:

   ```
   After=network-online.target nvfb.service
   ```

2. Boot the device normally.

   This issue only occurs on the very first boot of the target.

3.2 Software-based Power Consumption Modeling

Jetson TX1, Revision 300 or greater, enables use of INA monitors for the module and Developer Kit carrier board. Note that developer kits may have an earlier revision of the module, in which case only INA monitors related to the carrier board are available.

To monitor power consumption in software

1. Verify the version of L4T is 24.2 or higher with the following command:

```
head -1 /etc/nv_tegra_release
```

If the version of L4T is not at least 24.2, please download the latest JetPack installer from the Embedded Developer Zone website and update your Jetson TX1.

2. Verify that the Jetson TX1 module is revision 300 or higher from the module SKU with the following command:

```
sudo i2cdump -y -r 0x14-0x26 2 0x50 b
```

The feature to enable use of INA monitors is added in revision 300 and later of Jetson TX1. For example, SKU 699-82180-1000-300 has the feature.

3. Read the information from the INA3221 monitors via sysfs nodes. The naming convention for sysfs nodes is given in the following table, where <N> is a channel number 0-2.

Command	Description
rail_name_<N>	Exports the rail name.
in_current<N>_input	Exports rail current in mA.
in_voltage<N>_input	Exports rail voltage in mV.
In_power<N>_input	Exports rail power in mW.

Note: The INA driver may also present other nodes. Do not modify any INA sysfs node value. Modifying these values could result in damage to your device.

The Jetson TX1 module has a 3-channel INA3221 monitor at I2C address 0x40. The sysfs nodes to read for rail names, voltage, current, and power are in the following directory:

```
/sys/devices/platform/7000c400.i2c/i2c-1/1-0040/iio_device/
```

The rail names for I2C address 0x40 are described in the following table:

Rail Name	Description
Channel 0: VDD_IN	Main module power input.
Channel 1: VDD_GPU	GPU power rail.
Channel 2: VDD_CPU	CPU power rail.

The Jetson TX1 Developer Kit carrier board has 3-channel INA3221 monitors at I2C addresses 0x42 and 0x43. The sysfs nodes to read rail name, voltage, current & power can be found at:

```
/sys/devices/platform/7000c400.i2c/i2c-1/1-0042/iio_device/
/sys/devices/platform/7000c400.i2c/i2c-1/1-0043/iio_device/
```

These are the rail names for I2C address 0x42:

Rail Name	Description
Channel 0: VDD_MUX	Main carrier board power input.
Channel 1: VDD_5V_IO_SYS	Main carrier board 5 V supply.
Channel 2: VDD_3V3_SYS	Main carrier board 3.3 V supply.

These are the rail names for I2C address 0x43:

Rail Name	Description
Channel 0: VDD_3V3_IO (Name on schematic is VDD_3V3_SLP)	Carrier board 3.3 V sleep supply.
Channel 1: VDD_1V8_IO (Name on schematic is VDD_1V8)	Main carrier board 1.8 V supply.
Channel 2: VDD_M2_IN (Name on schematic is VDD_3V3_SYS_M2)	3.3 V supply for M.2 Key E connector.

Examples

▶ To read INA3221 at 0x40, the channel-0 rail name (i.e., VDD_IN), use the following command:

```
cat /sys/devices/platform/7000c400.i2c/i2c-1/1-0040/iio_device/rail_name_0
```

▶ To read VDD_IN voltage, current, and power, use the following commands:

```
cat /sys/devices/platform/7000c400.i2c/i2c-1/1-0040/iio_device/in_current0_input
cat /sys/devices/platform/7000c400.i2c/i2c-1/1-0040/iio_device/in_voltage0_input
cat /sys/devices/platform/7000c400.i2c/i2c-1/1-0040/iio_device/in_power0_input
```

Use of this feature also has the following considerations:

▶ The feature enabling use of INAs was not part of the original Jetson TX1 specification. Therefore, earlier modules are not subject to RMA or automatic exchange because they lack this feature. If you need to measure module INAs, purchase the latest module.

▶ All production modules (i.e., bare modules purchased separately from a Developer Kit) are revision 400 or newer, and support use of INAs.

▶ In terms of accuracy, common practice is to assume a 10% guard band when working with INAs.

▶ For Ubuntu, the `i2cdump` program is part of the `i2c-tools` package. You can install it with commands similar to the following:

```
sudo add-apt-repository universe
sudo apt-get update
sudo apt-get install i2c-tools
```

3.3 HDMI Audio Devices in the Audio Settings Application

The HDMI audio output device is not getting listed for some televisions and monitors including the following:

▶ Samsung TV 1080p LA40M81BM/XTL
▶ LG Flatron W2363D
▶ Samsung UA21ES5000RLXL
▶ LG 25UM65-p

The issue is inconsistent and sometimes occurs on subsequent reboots.

To workaround

▶ If the HDMI audio output device is not listed in audio settings, restart the pulseaudio daemon by killing the running instance as a normal user with the following command:

```
pulseaudio --kill
```

or register the systemd pulseaudio service to start the pulseaudio daemon at every login:

```
systemctl --user enable pulseaudio.service
```

Note: **Do not run pulseaudio as a root user**.

3.4 New Users Must be Added to Video Group

When adding users to the system you must add them to the `video` group for the Linux desktop to appear correctly and function correctly.

3.5 Symlinks May be Overwritten by Installation of Third Party Libraries

Installing third party libraries on the target device may overwrite the accelerated library provided by Linux for Tegra.

For example, installing Mesa EGL may create a `/usr/lib/<arch>/libEGL.so` symlink, overwriting the symlink to the implementation library that should be used instead, `/usr/lib/<arch>/tegra-egl/libEGL.so`.

Linux for Tegra installs a boot-time initialization script `/etc/init/nv.conf`, that corrects typical occurrences, such as with OpenGL, EGL, and X11 GLX libraries. This script runs at boot and corrects typical occurrences.

To workaround

▶ Reboot after installation of packages that install conflicting library symlinks.

3.6 GStreamer-0.10 Not Included

Gstreamer version 0.10 is not included in this release. Use of GStreamer version 1.0 is required for development.

3.7 Maximizing Tegra X1 Performance

Use the `jetson_clocks.sh` script to maximize performance by disabling DVFS, CPU Idle, and CPU Quit. JetPack installer or the flashing script places the script in the home directory on the target at:

```
$HOME/jetson_clocks.sh
```

On the host system, the script is delivered in the TAR file at:

```
Linux_for_Tegra/nv_tegra/nv_tools.tbz2
```

For more information on power and performance management, see:

```
http://elinux.org/Jetson/Performance
```

Sample Script Usage

1. Show the current (initial) settings with the following command:

   ```
   sudo ./jetson_clocks.sh --show
   ```

2. Store the current settings with the following command:

   ```
   sudo ./jetson_clocks.sh --store
   ```

3. Maximize Jetson TX1 performance with the following command:

   ```
   sudo ./jetson_clocks.sh
   ```

4. Show the current settings with the following command:

   ```
   sudo ./jetson_clocks.sh --show
   ```

5. Restore the previous settings with the following command:

   ```
   sudo ./jetson_clocks.sh --restore
   ```

6. Show the current settings with the following command:

   ```
   sudo ./jetson_clocks.sh --show
   ```

3.8 32-bit hardfp Support Removed

Beginning with L4T R24.2.1 release, all releases onward support aarch64. The R24.1 release was the last release that the hardfp BSP for 32-bit user space support was also provided.

3.9 Media Controller Support Included in V4L2 for CSI Camera

Support for the `soc_camera` driver is disabled in the the R24.2.1 release and onward releases.

3.10   SSDH Keys Are Not Regenerated on Clean Installs

This issue is reported in bug 2093022, listed in <u>Known Issues</u>.

You can protect the target from security issues by deleting the SSH host keys from `/etc/ssh/` before flashing.

You can either apply this workaround manually, or by adding this command to `apply_binaries.sh`:

```
rm -f "${LDK_ROOTFS_DIR}"/etc/ssh/ssh_host*
```

4.0 About Earlier Releases

Oct 16, 2017, 24.2.2

What's New

No new features were introduced in this release.

Top Fixed Issues

These fixed issues apply to Jetson TX1 devices. For a complete list of kernel fixes that go into this release, please consult the NVIDIA git repository available at:

`https://nv-tegra.nvidia.com/gitweb/?p=linux-3.10.git`

Bluetooth

Bluetooth related issues resolved in this release are as follows.

Issue	Description
1810994	Bluetooth audio is disabled in this release to ensure that the bluetooth software stack is conformant in the provided configuration. If you enable additional bluetooth audio profiles, product conformance may be impacted. For compliance information, consult the Jetson TX1 OEM Wireless Compliance Guide Application Note DA_08149-001.

Bootloader

Bootloader related issues resolved in this release are as follows.

Issue	Description
200165179	The device occasionally becomes non-responsive during reboot (u-boot) stress loop testing.
1809446 1818826	ARM Trusted Firmware replaces the NVIDIA secure monitor.
1818826	The EKS partition is now written during the flashing process. This partition is a placeholder reserved for future use.
1818826	U-Boot is enhanced to copy the DT property/status from the bootloader-supplied DTB into the DTB and passed to the Linux kernel.

Browser

Browser related issues resolved in this release are as follows.

Issue	Description
1796833	The Firefox browser is not supported in this release.

Camera

Camera related issues resolved in this release are as follows.

Issue	Description
200191194	Error messages are displayed when running (successfully) the camera_recording sample application.
200143368	Corruption is displayed in camera preview for USB 3.0 camera.
200206942	The libargus implementation does not support USB cameras in this release.

Display

Display related issues resolved in this release are as follows.

Issue	Description
200175128	Resolution goes to 1440 x 576 at 52.1 Hz with warnings from tegra_dc upon idle timeout resume.

Graphics

Graphics related issues resolved in this release are as follows.

Issue	Description
200186978	When X server is terminated (e.g., service lightdm stop), non X11 application display is unsuccessful.
200168814	Display is blank after switching to virtual terminal from desktop with Alt+Ctrl+F1-F6.

Kernel

Kernel related issues resolved in this release are as follows.

Issue	Description
200159844	Register dump/data CRC error occurs on mmc3/mmcblk1p1 during LP switching.
200159844	Register dumps and data CRC errors are displayed on mmc2/mmcblkIp1 during LP switching.

Multimedia API Improvements

The multimedia API SDK related improvements provided in this release are as follows.

Issue	Description
200246098	New samples are provided to display with libdrm.
200247807	By default, error log is enabled to prevent silent failures.
200249574	Improved performance from ~20 FPS to 30 FPS for usin the camera_recording samples on the 4K H264 video in the Multimedia API SDK.
1857247	Support is added for Surface Composition function in the libv4l2 APIs.
1710615	Samples are added to render V4L2 stream. The user can capture V4L2 video stream (YUV422), from HDMI-to-CSI bridge, and then render the stream to display on the screen.
1928668	The v4l2cuda sample is added to demonstrate zero copy between V4L2 capture and CUDA processing.

Tools

Tools related issues resolved in this release are as follows.

Issue	Description
200227653	NVIDIA Visual Profiler is unable to login via ssh to the target from a Windows host system.
200279703	The flash.sh script is enhanced to allow the -k option to operate on partitions that are renamed during the flashing process.
200232589	Graphics Debugger is unsuccessful when loading a remote binary if the file name of the binary includes spaces.

Nov 2016, 24.2.1

What's New

- ▶ libargus is now multi-process by default, verified two 5MP Ov5693 sensors at 30fps.
- ▶ New metadata and controls to support application layer AE and AWB as well as working sample applications.
- ▶ Input image is correctly scaled to compensate for black-level correction if lens shading is disabled.
- ▶ Implemented fixes for camera stability and performance.

See "Software Features" in the *Tegra Linux Driver Package Developer Guide* for more information about the features of this release.

For a complete list of kernel changes in this release see the following website:

```
http://nv-tegra.nvidia.com/gitweb/?p=linux-
3.10.git;a=shortlog;h=refs/heads/l4t/l4t-r24.2
```

Top Issues Fixed Since Last Release

The following issues are resolved in this release.

- ▶ [1794670] HDMI audio output device is not listed in system settings application
- ▶ [200232592] Graphics Debugger is unable to debug CUDA graphics samples
- ▶ [1806888] VisionWorks samples cannot be successfully built with the 16.04 compiler
- ▶ [200214749] Camera preview functions correctly but errors display in logs
- ▶ [200194792] Connected Bluetooth headset audio sink shows mode as "mono"
- ▶ [200089362] EDID read is unsuccessful using read-edid package
- ▶ [200199690] CUDA sample compilation on device is unsuccessful
- ▶ [1762118] Multimedia playback and camera preview corruption may occur when using the Gstreamer eglimagesink component on 64-bit X11
- ▶ [200152749] Unhandled level 3 translation fault occurs during Bluetooth data transfer
- ▶ [200134773] System intermittently becomes non-responsive during reboot stress testing with `reboot` or `init 6`
- ▶ [200244330] Unstable exposure/flickering with `userAutoExposure` with IMX-185 sensor
- ▶ [200244295] Un-freed EGL handle while quitting `gstvideoencode` sample application
- ▶ [200239249] Preview is black and white, unresponsive, and finally becomes non-responsive with some libargus-based sample applications
- ▶ [200228912] Preview is black and white after several images are captured
- ▶ [200226718] Corruption in preview image occurs in libargus-based camera application
- ▶ [200224210] Running `argus_syncsensor` and `argus_multisensor` is unsuccessful

- [200214733] The `argus_conformance` test is unsuccessful, results in segmentation fault
- [1822082] The `argus_conformance` test is unsuccessful when performing multiple iterations
- [1821526] Stuttering and dropped frames occur when recording video with libargus-based camera application
- [1792264] SCF unit tests and libargus multi-camera tests are unsuccessful
- [1736102] Camera becomes non-responsive during stress testing
- [200247203] Linearity test is unsuccessful
- [200246779] Syncpoint errors occur when quitting nvtuner with live preview enabled
- [200228319] Live preview is tinted green with nvtuner 3.2.0e
- [200242413] "Invalid xywh" displays when using `02_video_dec_cuda` to verify the result of backend or `04_video_dec_gie`.
- [200239465] Some BBOXs detect nothing while using B02 sample to verify `result.txt` from backend or B04 sample
- [200239200] The `make` utility does not build the B04 sample
- [200233839] The video_dec_gie sample is unsuccessful with larger batch sizes
- [200227668] Arbitrary batch sizes for GIE-based samples are not supported
- [1806268] Unable to compile `11_camera_object_identification` is because Thread.o is missing
- [200240455] IMX172 camera sensor conformance test is unsuccessful

12 Sep 2016, 24.2

What's New

- Multimedia API
- CUDA 8.0
- Ubuntu 16.04-derived sample rootfs
- Chromium browser
- Previously deprecated features removed:
  - hardfp support
  - CSI driver
  - Gstreamer 0.10

Top Issues Fixed Since Last Release

The following issues are resolved in this release.

- [1747157] Support disabling suspend-to-ram and cpu-idle kernel configurations
- [200203807] Installing libegl1-mesa or updating the corresponding package overwrites libEGL.so.1
- [1794309] Nvcamera daemon is unsuccessful on multiple image capture runs

- [200196911] Intermittently unable to boot the kernel due to PCIe errors
- [1691314] LP switching is unsuccessful when SATA is connected to the Jetson TX1 target (firmware version 50.11).
- [1736102] Camera preview becomes non-responsive during stress testing of video/image recording
- [200122163] Disabled (DSI-0) Primary HDMI display causes the following error to display in logs: "vgaarb: this pci device is not a vga device"
- [200151236] The Camera app (NvGstPlayer-1.0) invokes an out of memory killer because of memory leak when playing multiple images in a loop
- [200174822] Corrupted pixels occur after the image shows up on the preview for a few minutes

11 Jun 2016, 24.1

What's New

- Support for 64-bit user space and runtime libraries
- Vulkan support
- V4L2 media-controller driver support for camera sensors (bypassing ISP)

Top Issues Fixed Since Last Release

The following issues are resolved in this release.

- [1723265] Hard resetting the TX1 board while it is above 44°C will cause boot failure due to default system shut down value is set to 44°C. The system will boot up once cooled down to below 44°C. This issue does not occur upon warm reset.
- [1723265] Hard resetting the TX1 board while it is above 44°C will cause boot failure due to default system shut down value is set to 44°C.
- [200170514] OSidle power consumption is around 185mW higher when eth0 is disabled.
- [1708129] GStreamer unable to set FPS rate to rate supported by sensor.

www.nvidia.com