TEGRA LINUX DRIVER PACKAGE R16.5

RN_05071-R16 | January 26, 2015
Advance Information | Subject to Change

Release Notes

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1.0 ABOUT THIS RELEASE

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

- NVIDIA® Tegra® 3 series computer-on-a-chip
- NVIDIA® Tegra® 2 series computer-on-a-chip
- Linux kernel 3.1
- Git tag for the release: tegra-l4t-r16-16.5

Note: This release of Tegra Linux Driver Package R16.5 is a release for:

- **Tegra 3 devices code-named "Cardhu"**
- **Tegra 2 devices code-named "Ventana"**

The NVIDIA binaries provided for Ventana devices may be able to support Tegra 2 devices code-named "Harmony". Please note however that Harmony is no longer supported.

The release is contained in the following files:

Cardhu devices

cardhu_Tegra-Linux-codecs-R16.5.0_armhf.tbz2
cardhu_Tegra-Linux-R16.5.0_armhf.tbz2

Ventana devices

ventana_Tegra-Linux-codecs-R16.5.0_armhf.tbz2
ventana_Tegra-Linux-R16.5.0_armhf.tbz2

1.1 CHANGES SINCE LAST RELEASE

The following enhancements and fixes for previous issues are provided in this release. Refer to the publicly-available kernel repository for details about kernel changes.

Kernel

- USB stability improvements
- HDMI resolution support improvements

Multimedia

- nvvidconv: Fix memory leak
- nvvidconv: Support "nv-yuv" as output format
- gst-openmax: Fix memory leak in base_video_dec
- gst-openmax: Fix plugin restart on Dynamic Resolution Change
- gst-openmax: Modify overlay position and size parameters
- gst-openmax: Add support to limit bitrate variation (H.264)
- gst-openmax: Add support to set encode alignment (H.264)
- gstomx: base_encoder: Enable use of OMX encoder configuration file
- gst-openmax: Properly set rc-mode property for H.264 encoder
- gst-openmax: Set default frame rate while during OMX setup
- gstnv4l2: Plug-in parameter modified to support frame rate and resolution ranges
- gst-openmax: Add support for LimitBitrateVariation parameter (H.264)
- nvmm: Add support for AVC stream mode
- omx: make H.264 stream mode property configurable
- nvgstplayer: Option to set overlay position and size
- nvgstcapture: add functionality to set apptype
- nvgstcapture: Add functionality to set rc-mode
- nvgstplayer: Functionality to disable full-screen mode

1.2 TOP ISSUES FIXED SINCE LAST RELEASE

The following issues have been resolved in this release.

System

- [1521306] Intermittent PCI initialization issue
- [1478467] Kernel issue in gstreamer capture/encode pipeline
- [1478352] CSI video capture skips frames
- [1399592] PCIe driver incorrectly negotiates GEN2 PCIe
- [1421388] Video capture and encoding into a file with gst-launch is unsuccessful

Multimedia

- [1222222] Distortion (pixelation) is displayed in recorded video playback
- [1417370] The "--disable-fullscreen" option is not available in NvGstplayer
- [1417376] Video playback not displayed when using "--disable-vnative" option in NvGstplayer
- [1421381] Property device on nv412src is read-only
- [1421390] 720p display resolution is not supported by nv4l2src plug-in

- [1423155] Video encode is unsuccessful when using nv-yuv as input from the nv4l2src plugin
- [1433922] H.264 encoder is not controlled by bitrate setting unless frame rate is also set
- [1478467] Kernel failure occurs in the gstreamer capture/encode pipeline
- [1497641] Gst-openmax does not set correct rc-mode (VBR)
- [1503791] The enctune.conf encoder configuration file (for H.264 and MPEG-4 is not flashed to the device
- [1526450] Unable to move nv_omx_hdmi_videosink on the screen without restarting the pipeline
- [1531164] Memory leak during gstreamer video playback
- [1543714] Pipeline for displaying to videotestrc views side by side is unsuccessful
- [200007473] H.264 encoder does not correctly encode the stream in CBR rate-control mode

2.0 IMPLEMENTATION NOTES

This section provides additional implementation and support information specific to this release of the Tegra Linux Driver Package.

2.1 THE L4T DEVELOPER ZONE WEBPAGE

The Developer Zone web site can be found at the below URL:

```
http://developer.nvidia.com/linux-tegra
```

2.2 MUST SYNC TO THE CORRECT TAG TO USE THE SOURCE_SYNC.SH SCRIPT

In the release, the supplied `source_sync.sh` script must be provided a tag name to sync to the sources that were used to create the kernel `zImage` and `u-boot.bin` binary files that are included in the release. To sync to the correct sources that the provided sample kernel and U-Boot binaries were built from, use the `tegra-l4t-r16-16.5` tag.

- Execute the above mentioned script and use the following tag when prompted:

```
tegra-l4t-r16-16.5
```

2.3 UPSTART FAILS TO CREATE PTY DURING BOOT

At boot of the target device using the provided 12.04 Ubuntu sample file system, upstart displays the following messages. [1025863]

```
init: Failed to create pty - disabling logging for job
init: Temporary process spawn error: No such file or directory
```

This defect in upstart is tracked through the following Launchpad bug:

https://bugs.launchpad.net/ubuntu/+source/upstart/+bug/980917

2.4 USING THE TEGRA X ABI 13 DRIVER

X ABI 13 is not required for use with the provided sample file system, but may be required for other distributions, such as Ubuntu 12.10.

NOTE: If using a Linux distribution that includes Plymouth, such as Ubuntu 12.10, disable Plymouth using the following command or similar:

```
# mv /etc/init/plymouth.conf /etc/init/plymouth.conf.disabled
```

2.5 WI-FI ENTERS INCONSISTENT STATE AFTER RESUME FROM DEEP SLEEP (LP0) OR SUSPEND (LP1)

Cardhu platforms with BCM4330 Wi-Fi devices might not suspend properly and might cause a system hang upon subsequent attempts.

2.6 USING ROOTSTOCK TO GENERATE AN 'ARMHF' SAMPLE FILESYSTEM

In the "Getting Started" section of the *NVIDIA Tegra Linux Driver Package Developers' Guide*, in the subsection "About the Root File System" the use of rootstock to generate the sample file system is documented. By default, rootstock generates an armel sample file system. To generate an armhf sample file system, you must modify rootstock so that all armel references are changed to armhf.

2.7 LICENSING

All files in the NVIDIA release package itself are covered under the NVIDIA Tegra Software License unless explicitly identified inside another License file included in the release.

2.8 NVGSTPLAYER PLAYBACK PATH

For performance reasons, on T20 devices NvGstPlayer (nvgstplayer) uses the overlay sink by default. On T30 devices nvgstplayer uses the nvxvimagesink path instead.

2.9 MULTIMEDIA STREAMING

Multimedia streaming (HTTP, RTP, RTSP) is supported using accelerated Gst-OpenMax Plugins for T30/T20.

2.10 DISABLING PLYMOUTH RECOMMENDED

Disable Plymouth to avoid the system staying powered on after halt.

2.11 MESA EGL CONFLICTS WITH NVIDIA EGL LIBRARIES

If you have installed Mesa OpenGL ES libraries, to use the Tegra OpenGL ES implementation instead, enter the following commands:

```
pushd /usr/lib/arm-linux-gnueab*/mesa-egl/
sudo mv ld.so.conf ld.so.conf.bak
popd
sudo ldconfig
```

To revert back to the Mesa OpenGL ES implementation, enter the following commands:

```
pushd /usr/lib/arm-linux-gnueab*/mesa-egl/
sudo mv ld.so.conf.bak ld.so.conf
popd
sudo ldconfig
```

Note: Installing the MESA EGL libraries over the L4T release may cause undesired functionality.

2.12 FORMAT CONVERSION AND SCALING OPERATIONS USED WITH GST-OMX VIDEOSINK PLUGINS

Format conversion and scaling operations used with gst-omx videosink plugins are supported in the following use cases:

Use Case 1

High performance video scaling with the nv4l2src capture plugin and rendering using the nv_omx_videosink and nv_omx_hdmi_videosink plugins is supported. For example, for nv-yuv to nv-yuv:

```
$ gst-launch-0.10 nv4l2src num-buffers=500 device="/dev/video0" !
'video/x-nv-yuv, width=640, height=480, format=(fourcc)I420,
framerate=(fraction)30/1, interlaced=(boolean)false' ! nvvidconv !
'video/x-nv-yuv, width=(int)1280, height=(int)720' ! nv_omx_videosink
sync=0 -v -e
$ gst-launch-0.10 nv4l2src num-buffers=500 device="/dev/video0" !
'video/x-nv-yuv, width=1920, height=1080, format=(fourcc)I420,
framerate=(fraction)30/1, interlaced=(boolean)false' ! nvvidconv !
'video/x-nv-yuv, width=(int)640, height=(int)480' ! nv_omx_hdmi_videosink
sync=0 -v -e
```

Use Case 2

Video scaling with OSS gst plugins and rendering using the nv_omx_videosink and nv_omx_hdmi_videosink plugins is supported. for example for usage pipelines raw-yuv to nv-yuv (raw input format : I420, YUY2, UYVY, YVYU, Y444):

Video test source input:

```
$ gst-launch-0.10 videotestsrc ! 'video/x-raw-yuv, width=(int)1920,
height=(int)1080, format=(fourcc)YUY2' ! nvvidconv ! 'video/x-nv-yuv,
width=(int)640, height=(int)480' ! nv_omx_videosink sync=0 -v
```

USB camera capture:

```
$ gst-launch-0.10 v4l2src device="/dev/video0" ! 'video/x-raw-yuv,
width=(int)640, height=(int)480, format=(fourcc)I420' ! nvvidconv !
'video/x-nv-yuv, width=(int)320, height=(int)240' ! nv_omx_videosink
sync=0 -v
```

3.0 KNOWN ISSUES

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

3.1 [1247957] AFTER INCREASING RESOLUTION MULTIPLE EXCESS NONVIEWABLE IMAGES CAPTURED

After setting the image capture resolution(ICR) of NvGstCapture (nvgstcapture) to higher than 1600 x 1200, nvgstcapture performs multiple captures not viewable by nvgstplayer.

3.2 [1247038] NO AUDIO OUTPUT TO HDMI FROM VENTANA

With HDMI connected, aplay does not display any HDMI audio card, and no audio is routed.

3.3 [1243918] X SERVER CRASHES AFTER GRAPHIC INTENSIVE INTERACTION IN UBUNTU-DESKTOP

The X server might crash or the system become non-responsive when multiple X11 applications are running concurrent with touch controller activity. This occurs with the Unity3D desktop environment.

3.4 [1219233] WI-FI INTERMITTENTLY WAKES UP SYSTEM FROM DEEP SLEEP (LP0) STATE

Wi-Fi (bcmdhd) intermittently wakes up systems with Ubuntu-desktop from Deep Sleep (LP0) state without cause.

3.5 [1238080, 1238081] ERROR MESSAGES REPORTED BY NVGSTCAPTURE DURING CAPTURE

The nvgstcapture application reports “Error parsing: ae.FlickerCorrectionRangeMultiplier=1.15” and “FocuserNvc_GetParameter: ioctl to set parameter failed: Invalid argument” when opening the camera module. The device and software function normally.

3.6 [1227068, 1233418] REBOOT USING SYSRQ HANGS THE SYSTEM WITH EXCEPTION STACK SHOWN

Rebooting the device with sysrq (`echo b > /proc/sysrq-trigger`) causes the system to hang, with an exception stack shown.

3.7 [1237209] U-BOOT BOOT LOADER FAILS TO BOOT FROM USB

Booting from a USB-MSD (containing the rootfs sample file system) connected to the USB-Micro port with a Micro-USB converter is unsuccessful, because the USB-MSD is not suitable for a boot device for U-Boot.

3.8 [1210794] DEVICES USING U-BOOT BOOT LOADER CANNOT CHANGE SCREEN BRIGHTNESS

Devices using the U-Boot boot loader have the same screen brightness for any non-zero brightness setting. For a setting of zero, the display is blank. Those two settings are the only two brightness levels.

3.9 [1235141] TEARING OBSERVED WHEN X11 display is in portrait orientation

Tearing is observed with X11 in portrait orientation. This does not occur when the X11 display is in landscape orientation.

4.0 ABOUT EARLIER RELEASES

12 MAR 2014

What's New Linux Driver Package R16.4

This release adds the following features:

- All fixes and features from the R16 (version 1.0), R16.2, R16.3 releases.
- Support in nvvidconv plug-in for dynamic changes in output caps.
- Decoder and encoder support for OOB and nvvidconv conversion and scaling.
- NvV4l2 plugin to support CSI camera.

Top Issues Fixed Since Last Release

The following issues have been resolved in this release.

- [1330751] Initialization of the framebuffer console on DVI-D (HDMI) is intermittently unsuccessful, causing the system to stop responding when connected to an HDMI display
- [1417318] The kernel warning "Division by zero in kernel" displays when the system enters Deep Sleep (LP0) or Suspend (LP1) using HDMI as primary display but without an actual connection to an HDMI display
- [1362326] The nvvidconv plug-in does not scale video correctly

26 MAR 2013

What's New in Linux Driver Package R16.3

- All fixes and features from the R16 (version 1.0) and R16.2 releases.
- Bluetooth keyboard and mouse support.

- U-Boot support.
- This is the final release supporting Ventana. T20 support will not be included in future releases.

Top Issues Fixed Since Last Release

- [1209618] Hotplug of OTG-MSD cable from USB1 port causes null pointer dereference resulting in system crash.
- [1212505] Resume from Deep Sleep (LP0) fails on devices using the U-Boot boot loader with corrupted output to the UART console.
- [1214802] Resume from Deep Sleep (LP0) fails on devices in usb_device_mode.
- [1204024] Devices with the Broadcom BCM4329 Wi-Fi device hang when running iwconfig.
- [1205910] Wi-Fi stability issues in devices with the Broadcom BCM4330 Wi-Fi device.
- [1166008] HDMI panel as primary display has output corrupted on boot.
- [1178367] FB_console display shows two cloned vertical halves after booting with U-Boot boot loader.
- Kernel and U-Boot stability issues.

12 NOV 2012

What's New in Linux Driver Package R16.2

- All fixes and features from R16 (version 1.0).
- Kernel bug and stability fixes
- Added Tegra X11 driver for X ABI 13
- The Tegra "fuse" driver is renamed "tegra_fuse"
- The EGL and GLES libraries have versioned 'SONAME' ELF entries for these libraries. Additionally, the library file names are now also versioned:

- libEGL.so.1
- libGLESv1_CM.so.1
- libGLESv2.so.2

Top Issues Fixed Since Last Release

- [1031687] Some distributions (ChromiumOS) could show inverted video while displaying multimedia.
- [1058350] Tegra fuse driver renamed "tegra_fuse" to avoid collision with the standard kernel module "fuse".
- [1047048] Unable to detect USB OTG devices, using the U-Boot boot loader, from Ventana devices.

- [1029733, 1029792] Wi-Fi: BCM4330 driver enablement and various bug fixes

4 SEP 2012

What's New in Linux Driver Package R16

This release adds the following features.

- Adds full support for the hardfp ABI (armhf, arm hard float)
- Adds hardfp sample file system derived from Ubuntu

Top Issues Fixed Since Last Release

The following issues are assumed to have been resolved in this release but are still being verified.

Applications

- [973119] Firefox browser exits when URL is entered
- [1004978] Aisleriot Solitare card background textures are not rendered correctly

Power and Performance

- [964626] Display corruption observed when entering/resuming from LP0 on Ventana

11 JUN 2012

What's New in Linux Driver Package R15

This release fixes some issues that were found during continued testing and adds/enhances the following features.

- Adds Ventana kernel support for U-Boot
- Adds `source_sync.sh` script to sync kernel and U-Boot source code

Top Issues Fixed Since Last Release

The following issues are assumed to have been resolved in this release but are still being verified.

System

- [965154] I2C device registration fails on Ventana
- [954564] Cardhu cannot resume after USB device is changed during LP1

- [937902] Kernel command line parameter should make serial console the default console
- [961259] VDD voltage regulator initialization error on Ventana
- [946922] Voltage regulator configuration does not succeed on Ventana
- [932086] Second modprobe of a Wi-Fi module does not succeed

Boot Loader/BDK

- [959318] U-Boot debug messages about warnings/errors from GPT and bootm are expected on Cardhu
- [930663] I2C bus errors observed during and after boot

Display

- [959676] Tegra user space graphics driver lists more video modes than are supported
- [946409] DVI display is corrupted on Cardhu and Ventana

Multimedia

- [966041] The nvgstcapture application does not run successfully when flashed with U-Boot on Cardhu
- [955196] Corruption observed with nvgstplayer on Ventana

Power and Performance

- [964400] Audio corruption heard when WAV file is played after device resumes from LP0
- [961907] Harmony is unable to enter LP0

18 APR 2012

What's New in Linux Driver Package R15.BETA

This release fixes some issues that were found during continued testing and adds/enhances the following features.

- Preliminary U Boot support. For more information, see U-Boot support is preliminary in this release in the Implementation Notes section.
- The multimedia streaming and capture applications `nvgstplayer` and `nvgstcapture` are included in the release file instead of being provided as a separate downloadable package.
- The Tegra X Driver ABI 12 is supported.
- A version checking file has been included in `/etc/nv_tegra_release`. For more information, see "Determining the Success of a Driver Update" in *NVIDIA Tegra Linux Driver Package Developers' Guide*. [959325]

Top Issues Fixed Since Last Release

The following issues are assumed to have been resolved in this release but are still being verified.

System

- [961258] VDD regulator errors observed during initialization
- [935225] Cardhu device reboots with thermal throttle
- [946328] Driver probes fail during boot on Cardhu
- [946330] Kernel chip initialization fails with "uninitialized object…" error on Cardhu
- [915638] Volume keys are not working on Cardhu and Ventana

I/O

- [932023] USB host/device mode functionality does not work after plug-in/plug-out of USB devices to USB-1 on Cardhu

Multimedia

- [931180] Display flickers or corruption occurs during nvgstplayer video playback on Ventana
- [893571] "Non-secure read" error message may display during multimedia playback on Cardhu
- [963995] System crash observed when changing resolution to 1080p in both Video and Still mode

Power and Performance

- [942490] Suspend/resume cycles leads to file system instability on Cardhu and Ventana
- [933291] Resume after Deep Sleep or Suspend does not succeed on Harmony
- [947673] Resume fails after Deep Sleep or Suspend with dock installed on Cardhu
- [941531] Intermittent warning message after Resume from Deep Sleep (LP0) on Cardhu

12 MAR 2012

What's New in Linux Driver Package R15.ALPHA

This release fixes some issues that were found during continued testing and adds/enhances the following features:

Linux kernel 3.1
Camera support + capture application

Top Issues Fixed Since Last Release

The following issues are assumed to have been resolved in this release but are still being verified.

System

- [931120] Race condition prevents kernel boot completion on Cardhu

17 FEB 2012

What's New in Linux Driver Package R15.ER2

This release fixes some issues that were found during continued testing and adds/enhances the following features:

Camera capture application (nvgstcapture) provided.

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