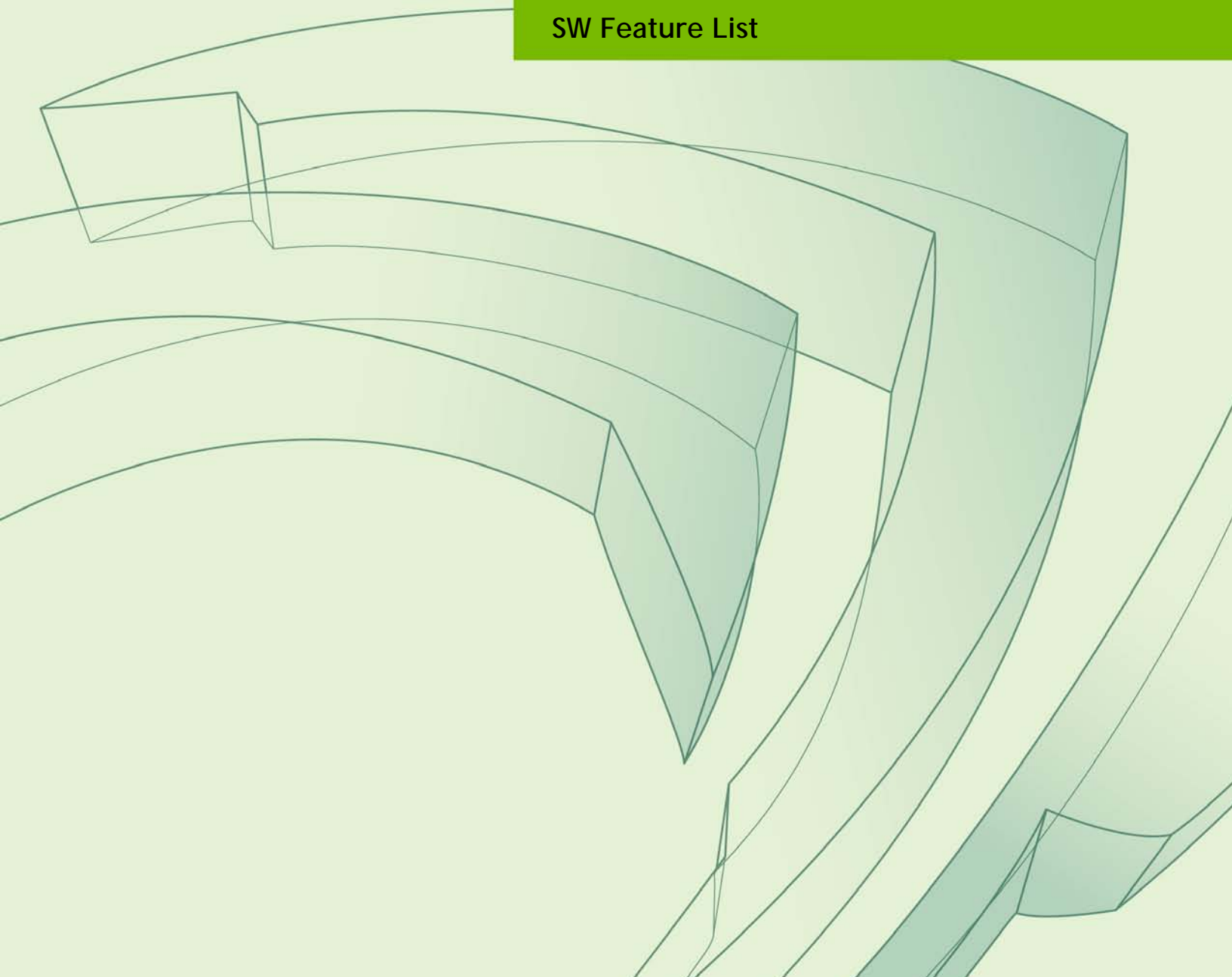




# NVIDIA TEGRA LINUX DRIVER PACKAGE R16 RELEASE

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## SW Feature List



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# SOFTWARE FEATURES

This document describes the software features expected to be supported with this release of NVIDIA® Tegra® Linux Driver Package, which provides users with a complete package to bring up Linux on certain Tegra devices.

This release supports NVIDIA® Tegra® 3 series code-name Cardhu and NVIDIA® Tegra® 2 series code-name Ventana devices.

**Note:** Always check the *Release Notes* for constraints related to these features. Read the following sections to learn more about supported features in this release.

- [Linux](#)
- [Graphics and Multimedia](#)
- [Decoders](#)
- [Encoders](#)
- [Container Formats](#)
- [Streaming Protocols](#)
- [Playback](#)
- [Camera](#)
- [Displays](#)
- [Power](#)
- [Boot Loaders](#)

## LINUX

Kernel	Notes
Linux Kernel	3.1
Kernel Native Drivers	Notes
Audio	ALSA
External SD card	-
USB	Keyboard/mouse, mass storage device (MSD)
Wi-Fi	Firmware provided separately
Boot Devices	Notes
eMMC	-
External boot media	USB flash devices and hard-drives, SD Cards
Network file-system (NFS) boot	-
Additional Notes	
Unless otherwise noted, all features pertain to Cardhu and Ventana.	

## GRAPHICS AND MULTIMEDIA

Media APIs	Notes
EGL 1.4 with EGLImage	-
GStreamer OpenMAX-IL plug-in	Both for A/V playback and A/V capture
Open GL ES path extensions	-
OpenGL ES 1.1	-
OpenGL ES 2.0	For automatic stereo support
OpenMAX IL 1.1 decoding	Planned to be deprecated in a later release
OpenMAX IL 1.1 encoding	Planned to be deprecated in a later release
X11	ABI: 5, 6, 7, 8, 10, 11, 12
X Resize, Rotate and Reflect Extension (RandR) 1.3	-
<b>Additional Notes</b>	
Unless otherwise noted, all features pertain to Cardhu and Ventana.	

## DECODERS

### Audio Decoders (Tegra 3/Tegra 2)

The features in this table are supported by both Tegra 3 and Tegra 2.

Audio Decode	Profile	Sampling	Bitrate
AAC+	AAC-LC with SBR; mono, stereo, and 2-channel mixing only	Up to 48 kHz	Up to 320 kilobits per second (Kbps)
AAC-LC	Mono, stereo, and 2-channel [5.1]	Up to 48 kHz	Up to 320 Kbps
eAAC+	AAC-LC with SBR+PS; mono, stereo, and 2-channel mixing only	Up to 48 kHz	Up to 320 Kbps
AMR-NB	1 channel	Up to 8 kHz	Up to 12.2 Kbps
AMR-WB	1 channel	Up to 16 kHz	Up to 23.85 Kbps
MP3	2 channel	Up to 48 kHz	Up to 320 Kbps
MPEG-2 (MPEG-1 Layer 2)	2 channel	Up to 48 kHz	Up to 320 Kbps
Vorbis	Ogg Audio	Up to 48 kHz	Up to 256 Kbps
WAV linear PCM	16-bit, 2 channels	Up to 48 kHz	-
WMA 9 Std.	Standard 2-channel	Up to 48 kHz	Up to 384 Kbps
WMA Lossless	Lossless: Up to N1 Profile; WMA 10: 2 channel	Up to 48 kHz	-
WMA Pro LBR 10	M2 Profile; 2 channel [5.1]	Up to 96 kHz	Up to 768 Kbps

### Image Decoders (Tegra 3/Tegra 2)

The features in this table are supported by both Tegra 3 and Tegra 2.

Image Decode	Profile	Resolution	Notes
JPEG	Baseline	Up to 20 MP	Gstreamer JPEG decoder supported by default



## Video Decoders (Tegra 3)

The features in this table are supported by Tegra 3.

Video Decode	Profile and Level	Sampling Frequency and Bit rate/Frame rate	Notes
DivX 4/5/6	1080p HD Profile	Up to 1080p @ 30 fps Up to 10 Mbps	-
DivX 4/5/6	PlusHD	Up to 1080p @ 30 fps Up to 20 Mbps	-
H.263	Baseline Profile 0	Standard H.263 picture formats up to 4CIF @ 30 fps Up to 8 Mbps	Baseline Profile 0 Tools; Also supports custom formats at any resolution
H.264 AVC	Baseline Profile, Main Profile High Profile @ L4.1	Up to 720p @ 60 fps Up to 40 Mbps	-
H.264 AVC	Baseline Profile Main Profile High Profile @ L4.1	Up to 720p @ 60 fps Up to 40 Mbps	-
H.264 AVC	Baseline Profile Main Profile High Profile @ L4.1	Up to 1080i @ 60 fps Up to 40 Mbps	-
H.264 AVC	Baseline Profile Main Profile High Profile @ L4.1	Up to 1140p @ 30 fps Up to 40 Mbps	-
H.264 AVC (SEI)	High Profile	Up to 1080p @ 30 fps Up to 40 Mbps	-
MPEG-2 Video	Main Profile @ High Level	Up to 720p @ 60p Up to 80 Mbps	-
MPEG-2 Video	Main Profile @ High Level	Up to 1080p @ 30p/1080i 60 fps Up to 80 Mbps	-
MPEG-4	Advanced Simple Profile @ L5	Up to 1080p @ 30 fps Up to 10 Mbps	-

VC-1/WMV	Simple Profile	Up to 1080p @ 30 fps Up to 45 Mbps	-
VC-1/WMV	Main Profile	Up to 1080p @ 30 fps Up to 45 Mbps	-
VC-1/WMV	Advanced Profile	Up to 1080p @ 30 fps Up to 45 Mbps	-
Xvid	Highdef Profile	Up to 1080p @ 30 fps Up to 10 Mbps	-

## Video Decoders (Tegra 2)

The features in this table are supported by Tegra 2.

Video Decode	Profile and Level	Sampling Frequency and Bit rate/Frame rate	Notes
DivX 4/5/6	1080p HD	Up to 1080p 30 fps Up to 10 Mbps	-
H.263	Baseline Profile 0	Standard H.263 formats up to 4CIF 30 fps Up to 8 Mbps peak	Standard H.263 picture formats = SQCIF, QCIF, CIF, 4CIF; Also supports custom formats at any resolution
H.264	Baseline Profile @ L4	Up to 1080p 30 fps Up to 20 Mbps peak	
H.264 Dynamic Resolution Change (DRC)	-	-	AP20 only
H.264	Main Profile @ L2.2	Up to 576i 60 fps Up to 4 Mbps	CABAC; MBAFF; Interlaced
H.264	Main Profile @ L3.1	Up to 720p 30 fps Up to 4 Mbps	CAVLC; With weighted prediction
H.264	Main Profile @ L3.1	Up to 720p 30 fps Up to 5 Mbps	CABAC; CAVLC; No weighted prediction
H.264	High Profile @ L2.2	Up to 576i 60 fps Up to 4 Mbps	CABAC; MBAFF; Interlaced

H.264	High Profile @ L3.1	Up to 720p 30 fps Up to 4 Mbps	CAVLC; With weighted prediction
H.264	High Profile @ L3.1	Up to 720p 30 fps Up to 5 Mbps	CAVLC; CABAC; No weighted prediction
MPEG-4	Advanced Simple Profile @ L5	Up to 1080p 30 fps Up to 10 Mbps	-
VC-1	Simple Profile	Up to 1080p 30 fps Up to 10 Mbps	-
VC-1	Main Profile	Up to 1080p 30 fps Up to 10 Mbps	-
VC-1	Advanced Profile	Up to 1080p 30 fps Up to 10 Mbps	-
Xvid	Highdef Profile	Up to 1080p 30 fps Up to 10 Mbps	-

## ENCODERS

### Audio Encoders (Tegra 3/Tegra 2)

The features in this table are supported by both Tegra 3 and Tegra 2.

Audio Encode	Profile	Resolution	Bit Rates
AAC-LC	-	-	Up to 320 kbps

### Image Encoders (Tegra 3/Tegra 2)

The features in this table are supported by both Tegra 3 and Tegra 2.

Image Decode	Profile	Resolution	Bit Rates
JPEG	Exif	Up to 14 MP	Q-100

### Video Encoders (Tegra 3)

The features in this table are supported by Tegra 3 only.

Video Encode	Profile and Level	Sampling Frequency and Bit rate/Frame rate	Notes
H.264	Baseline Profile	Up to 1080p 30 fps Up to 20 Mbps	-
MPEG4	Simple Profile	Up to 30fps	-
H.263	Baseline Profile	Up to 30fps	-

### Video Encoders (Tegra 2)

The features in this table are supported by Tegra 2 only.

Video Encode	Profile and Level	Sampling Frequency and Bit rate/Frame rate	Notes
H.264	Baseline Profile	Up to 1080p 24 fps Up to 14 Mbps	-

## CONTAINER FORMATS

Codecs are provided by GStreamer. You can download GStreamer codecs from the gstreamer opensource project at:

<http://gstreamer.freedesktop.org>

Or you can use `apt-get` in the provided Ubuntu-derived sample file system.

Hardware codecs are not included in the base release but can be provided separately under a software license agreement.

## STREAMING PROTOCOLS

Streaming protocols are provided by GStreamer. You can download GStreamer codecs from the gstreamer opensource project at:

<http://gstreamer.freedesktop.org>

Or you can use `apt-get` in the provided Ubuntu-derived sample file system.

Hardware codecs are not included in the base release but can be provided separately under a software license agreement.

Protocol	Notes
HTTP 1.0	ASF, AVI, 3GP, MOV, MP3, MP4, WMA, WMV
HTTP 1.1	ASF, AVI, 3GP, MOV, MP3, MP4, WMA, WMV
RTP/RTSP/RTCP	3GP, MP3
SDP (RFC 4566)	3GP

## PLAYBACK

General	Notes
NvGstPlayer application	Supports the following functionality: <ul style="list-style-type: none"><li>· Basic local playback</li><li>· Streaming playback with HTTP and RTSP</li><li>· Trick modes</li><li>· Audio/video synchronization</li><li>· Automation for batch mode execution</li><li>· Playbin2 support</li><li>· Native pipeline support</li></ul>

## CAMERA

Application	Feature	Notes
NvGstCapture application	Bayer camera sensor	-
	Camera capture mode selection	-
	Still image capture	-
	Video record	-
	Camera focus position control	-
	Camera exposure control	-
	Camera ISO control (exposure control)	-
	Camera contrast control	-
	Camera flash control	-
	Camera zoom control	-
	Camera pre-capture converge control	-
	Camera half press with 3A control	-
	Camera brightness control	-
	Camera saturation control	-
	Camera hue control	-
	Camera white balance control	-
	Image multishot	-
	Camera image filter control (color effect)	-
	Camera pause preview after capture	-
	Camera EV compensation Control	-
	Camera flicker control	-
	Camera edge enhancement control	-
	Camera meter mode control (exposure control)	-
	Camera preview rotate control	-
	Camera capture rotate control	-
	Camera timer control (delay capture)	-
	Camera scene mode control (non-standard modes)	-
	Camera noise reduction	-
	Camera still capture resolution	-
	Camera video capture resolution	-
	Camera video encoder selection	-
	Voice control	-



Application	Feature	Notes
	Camerabin2 support	GStreamer 10.36 only
	GstPhotography support	GStreamer 10.36 only

## DISPLAYS

Feature	Description		Notes
HDMI 1.4a	Up to 1080p		-
Internal LCD	-		-
Feature	Mode No.	Resolution	Rate
HDMI supported modes	1	640 X 480	60
	2	640 X 480	72
	3	640 X 480	74
	4	720 x 480	59
	5	720 X 576	50
	6	800 X 600	59
	7	800 X 600	72
	8	800 X 600	74
	9	1024 X 768	60
	10	1024 X 768	70
	11	1024 X 768	74
	12	1152 X 864	74
	13	1280 X 720	60
	14	1280 X 1024	74
	15	1280 X 1024	59
	16	1680 X 1050	59
	17	1920 X 1080	50
	18	1920 X 1080	60
Feature	Description		Notes
HDMI DDC modesetting support	-		-
Dual display (LVDS + HDMI)	Mirror mode, Extended mode		-
Additional Notes			
DC fallback mode (640x480 @ 60Hz) is the default video mode for an HDMI monitor when using an fb_console device. See the <i>Release Notes</i> for known issues.			

## POWER

General	Notes
DVFS	-
Tegra Active Power Management	Notes
Dynamic voltage scaling for core	-
Dynamic voltage scaling for CPU	-
Dynamic frequency scaling for CPU	-
Dynamic frequency scaling for memory controller	-
Dynamic frequency scaling for AVP	-
Dynamic frequency scaling for system buses	-
Low power idle state (LP2)	Cardhu only
Frequency-boosted burst modes	Cardhu only; CPU running at higher frequencies in single-core mode
EDP support	Cardhu only
External temperature sensing	-
CPU hotplug support	Cardhu only
Switch to ULP CPU mode	Cardhu only
Dynamic thermal throttling	Software with hardware fail-safe
DRAM self-refresh	
Ultra-Low Power Standby	Notes
Suspend (LP1)	-
Deep Sleep (LP0)	-
USB Suspend during Deep Sleep	-
Wake with power button and RTC	-
Peripheral Power Management	Notes
NVIDIA Pixel Rendering Intensity and Saturation Management (PRISM)	Cardhu only; Display driver
Additional Notes	
Unless otherwise noted, all features pertain to Cardhu and Ventana.	

## BOOT LOADERS

General	Notes
Fastboot	Supports booting from USB, SD card, internal memory (eMMC), and network file-system (NFS) boot
U-Boot	Source code available. Supports booting from USB, SD card, internal memory (eMMC), network file-system (NFS) boot, and Trivial File Transfer Protocol (TFTP) boot