NVIDIA Jetson Linux

Release Notes

Version 35.2.1 GA

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1. About this Release

The NVIDIA® Jetson™ Linux 35.2.1 General Availability (GA) includes the Linux Kernel 5.10, the UEFI based Bootloader, the Ubuntu 20.04 based root file system, NVIDIA drivers, the necessary firmwares, toolchain, and more. This release supports development with NVIDIA Jetson AGX Orin™ 32GB module, NVIDIA Jetson AGX Orin™ Developer Kit, Jetson Orin NX 16GB module and also with NVIDIA Jetson Xavier™ NX, and NVIDIA Jetson AGX Xavier™ developer kits and modules.

Important: This GA release can be used for production purposes.

Platform and Release Information

Description	Supported version
Host machine Linux distribution for flashing software onto Jetson devices	Ubuntu x64 18.04 or 20.04 (x64 distribution)
Sample rootfs derived from Ubuntu operating system to run on Jetson devices	Ubuntu 20.04
Supported Linux kernel version	5.10 LTS
Supported ARM architecture	aarch64

Description	Supported version
Name of the configuration file used in flashing. **Note**: When you flash a configuration file with flash.sh, specify the configuration's basename, i.e. the file name without the .conf suffix. For a complete description of supported platforms and configuration names, see the *Jetson Modules and Configurations* table in Environment Variables.	`p3509-a02+p3767-0000.conf`: Flashes a Jetson Orin NX 16GB module (P3767-0000) that is attached to a Jetson Xavier NX Developer Kit (P3509-0002). `jetson-agx-orin-devkit.conf`: Flashes a Jetson AGX Orin module (P3701-0000) or Jetson AGX Orin 32GB module (P3701-0004) that is attached to a Jetson AGX Orin Developer Kit (P3730-0000) reference carrier board (P3737-0000). `jetson-agx-orin-devkit-as-nx-16gb.conf`: Flashes a configuration that emulates a Jetson Orin NX 16GB module on a Jetson AGX Orin module (P3701-0000) that is attached to a Jetson AGX Orin Developer Kit (P3730-0000) reference carrier board (P3737-0000). `jetson-agx-orin-devkit-as-nx-8gb.conf`: Flashes a configuration that emulates a Jetson Orin NX 8GB module on a Jetson AGX Orin module (P3701-0000) that is attached to a Jetson AGX Orin Developer Kit (P3730-0000) reference carrier board (P3737-0000). `jetson-agx-orin-devkit-as-jao-32gb.conf`: Flashes a configuration that emulates a Jetson AGX Orin 32GB module on a Jetson AGX Orin module (P3701-0000) that is attached to a Jetson AGX Orin Developer Kit (P3730-0000) reference carrier board (P3737-0000). `jetson-agx-xavier-devkit.conf`: Flashes a Jetson AGX Xavier module that is attached to a Jetson AGX Xavier Developer Kit reference carrier board. `jetson-xavier-nx-devkit.conf`: Flashes QSPI-NOR and microSD card for Jetson Xavier NX (P3668-0000).

Description	Supported version
	`jetson-xavier-nx-devkit-emmc.conf`: Flashes QSPI-NOR and eMMC for Jetson Xavier NX (P3668-0001). `Jetson-agx-xavier-industrial.conf`: Flashes QSPI-NOR and eMMC for Jetson AGX Xavier Developer Kit with Jetson AGX Xavier Industrial module (P2888-0008).
Board names, module names, and revision numbers	Refer to the Jetson FAQ for a detailed list of Jetson device information.
Toolchain for cross-compilation	Bootlin GCC 9.3 https://developer.nvidia.com/embedded/jetson-linux
Release Tag	jetson_35.2.1

1.1. Login Credentials

To create your login credentials, follow the system prompts at the first boot.

1.2. What's New

Here is the list of new features in this Jetson Linux 35.2.1 GA production public release:

- Adds support for Jetson Orin NX 16GB production module
- Security
  - UEFI Secure Boot[1]
  - Secure Storage in OP-TEE using RPMB (Replay Protected Memory Block)
  - Memory Encryption on Jetson Orin
- Over The Air Updates:
  - Image Based OTA tools with A/B support to upgrade Jetson AGX Xavier or Jetson Xavier NX modules running JetPack 4.x releases

    - Image Based OTA tools to upgrade Jetson Orin modules will be released with the next release[2].
- Display
    - Fixes for HDMI 2.0 and DP compliance
    - Camera
        - Support for AR1335 YUV camera
        - Enhanced support for simultaneous V4l2 and Argus
        - New Argus Demosaic (`argus_demosaicOutput` sample) to output RGB supported on Orin
        - New Argus RAW reprocessing (`syncStereoRawReprocess` sample) to read Bayer raw images from file & provide reprocessed YUV output to file
        - Updated Argus `SyncSensorCalibrationData` extension with enhanced EEPROM Calibration data to support Camera Module Serial Number, and IMU Noise Parameters
    - MultiMedia
        - Temporal Adaptive Quantization (TAQ) support is extended to H264 encoder
    - Graphics:
        - Support for Vulkan® SC 1.0[3]
            - Vulkan SC is a low-level, deterministic, robust API that is based on Vulkan 1.2. This API enables state-of-the-art GPU-accelerated graphics and computation that can be deployed in safety-critical systems and that are certified to meet industry functional safety standards. Refer to https://www.khronos.org/vulkansc/ for more information.
            - Vulkan SC can also be invaluable for real-time, non-safety critical embedded applications.
              Vulkan SC is designed to increase determinism, provide predictable execution times, and reduce the application size by shifting the preparation of the run-time application environment offline or to application initialization. This process includes the offline compilation of graphics pipelines that define how the GPU processes data and static memory allocation. These options enable detailed GPU control that can be rigorously specified and tested. For more details, see https://www.khronos.org/blog/vulkan-sc-overview.

            - Deprecate the **VK_NV_external_sci_sync** extension, and replaced it with the **VK_NV_external_sci_sync2** extension

              Note: Jetson support for Vulkan SC is not safety certified.

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[1] Signing is supported. Encryption will be supported in the next release.

[2] Jetson Linux 35.2.1 will not require any change to use the OTA tools released in the next release. Jetson Orin based products running Jetson Linux 35.2.1 should be able to upgrade using the OTA tools released in the next release.

[3] The product is based on a published Khronos Specification and has been submitted to, and is expected to pass, the Khronos Conformance Process. Refer towww.khronos.org/conformancefor more information about the current conformance status.

Jetson Linux Sources are now available on Git in addition to the Jetson **Linux page**. Refer to Working with Sources for more information.

For more information about the adaptation and bringup for your custom carrier boards, refer to Jetson Module Adaptation and Bringup for the Bringup and Adaptation Guides for the Jetson AGX Orin, AGX Xavier, and Xavier NX platforms.

Refer to the Jetson Linux Developer Guide for Jetson Linux Documentation and also Implementation Details for more information about implementation details that cover a variety of topics.

2. Known Issues

This section provides details about issues that were discovered during development and QA but have not yet been resolved in this release.

2.1. General System Usability

The following general system usability-related issues are noted in this release.

Issue	Description

3948609	Debian based OTA update on Jetson AGX Orin to 35.2.1/ JP 5.1 will fail on installations that were **not** reflashed with 35.1 / JP 5.0.2 release with the following error
	
	`ERROR. Procedure for A_kernel-dtb update FAILED.`
	
	Example: Jetson AGX Orin flashed originally with 34.1 release updated to 35.1 release would see the above problem when updated to 35.2.1 release.
	
	To work around this issue use the following commands to resize the A_kernel-dtb before **doing APT upgrade.**
	
	`sudo parted /dev/mmcblk0 rm 4`
	
	`sudo parted /dev/mmcblk0 resizepart 3 67.9MB`
	
	`sudo parted /dev/mmcblk0 mkpart A_reserved_on_user 67.9MB 101MB`

3941437	If a Jetson device does not have Internet access by using a connected LAN cable, the OEM configuration screen will take about 4 minutes to display at first boot. We suggest that you connect the LAN cable with Internet access to the Jetson device at first boot, which will shorten the waiting time for the OEM configuration screen.
3931770	After a system suspend and resume, the CPU power at *OSidle* might increase slightly, which causes the *nvpmodel* service on Jetson Orin NX to turn off the

Issue	Description
	CPU cores in some power modes to fit the power budget. This is a known issue and will be fixed in a future release.
3864021	Sometimes after flashing Jetson Orin NX in headless mode, ACM port does not show up, which prevents the OEM configuration.
3854735	UPHY-2 Lane 1 C9 controller is not working. This will be fixed by JetPack 5.1.1.
3747765	The `Video_dec_drm` sample compilation becomes stuck and displays a blank screen when it is run on Jetson AGX Xavier connected to Acer X27 - 4k60 monitor.

2.2. Flashing

The following flashing-related issues are noted in this release.

Issue	Description
3601114 3601261	The minimum recommended SD card size for flashing the complete JetPack SDK to an SD card for Jetson Xavier NX Developer Kit is 64 GB.
3586898	A complete JetPack installation on the Jetson Xavier NX production module on the 16GB EMMC fails. **Workaround** Starting with release 35.1, the SDK Manager offers the following options: ● A complete JetPack installation. ● An installation of **only** the JetPack runtime components

	The JetPack runtime installation does not include samples and documentation and is helpful for Jetson modules with limited storage and during production.
3925680	USB can be used as a flash and boot device for Jetson AGX Xavier series and Jetson Xavier NX because of issues with UEFI Xhci controller driver.

2.3. Camera

The following camera-related issues are noted in this release.

Issue	Description
3949848	Running Jetson-io tool over command line on Jetson AGX Orin does not show an option to configure compatible hardware for "Configure Jetson AGX CSI Connector" option. This issue will be fixed as a follow up debian update.
3692128 3447132	The E3331 (Cphy - IMX318) sensor fails to load and probe. To resolve this issue, before you flash, remove the camera-related DTBO filenames from the `OVERLAY_DTB_FILE` string in the corresponding `<boardname>.conf` file. This file is used to flash the device by using the `sudo ./flash.sh <boardname> mmcblk0p1` command.
3883254	Multi Video recording in the same session fails for argus_camera app.
3914914	`argus_eglimage` fails intermittently due to buffer mapping failure inside camera kernel drivers.

Issue	Description
3739243	In Jetson AGX Industrial boards with IMX185, the sensor may stop streaming at times through argus when sensor mode is set to 0. However, the sensor works through the v4l2 interface..
3933522 3926037	In AGX Orin series and Orin NX series, there can be color shading in the highlight region due to Lens shading limitations. It will be improved in the next JetPack release.
3643516	By default, the IMX185 camera module has a `pca9570` GPIO expander that sets the daymode. If you do not enable the expander, the IR cut filter in the sensor is disabled, and daylight preview might have a pinkish tint. To enable the expander, run the following command: `$ sudo modprobe pca9570`

2.4. Multimedia

The following issues are noted in this release related to multimedia.

Issue	Description
3880856	When you run native rendering X11 applications, such as xterm on a bare X server, you might experience some corruption. To avoid this issue, **before** you run a bare X server, use ForceComposition by adding the following to the `/etc/X11/xorg.conf` file in the Device Section: `Option "ForceCompositionPipeline" "On"`
3796170	A long duration test with `detectnet-camera` on Jetson Xavier NX might lead to an `Out of memory` error after three days.
3907557	In camera preview pipelines (nvarguscamerasrc + nv3dsink), to provide enough buffering for streaming usecases, use the **`queue`** element. Here is a sample pipeline: `$ gst-launch-1.0 nvarguscamerasrc ! "video/x-raw(memory:NVMM),width=(int)3840,height=(int)2160,framerate=(fraction)60/1" ! queue ! nv3dsink -e`

2.5. Display

The following TensorRT-related issues are noted in this release.

Issue	Description
3905997	SC7(suspend/resume) does not work on Jetson devices connected to Display in MST mode. SC7 works as expected with all other DP versions in SST mode.
3695925	On Jetson AGX Orin, the display might intermittently go blank during the boot.
3724559	`HDMI 4K@60Hz` does not work on `ACER Predator X27` Monitor connected to Jetson AGX Xavier. To work around this issue, change the resolution to 4K@30 or a lower resolution.
3666376	By default, after launching X Window, the display does not appear on the Asus XG279Q monitor. To work around this issue, set the mode to 2560x1440 by running the `xrandr --output DP-0 --mode 2560x1440` command.
3517183	After idle time of the display on Jetson AGX Orin the following message is repeated in the logs: `NVRM rpcRmApiControl_dce: NVRM_RPC_DCE: Failed RM ctrl call cmd:0x731341 result 0xffff:` This message should not cause any functional impact.

2.6. Graphics

Issue	Description
3880856	Corruption might be seen when running native rendering X11 applications like xterm on a bare X server. To avoid this issue, use `ForceComposition` by adding the following to `/etc/X11/xorg.conf` in the Device Section **before** you run the bare X server. `Option "ForceCompositionPipeline" "On"`

3. Fixed Issues

This section provides details about the issues that were resolved in this release.

Issue	Description
3697875	If you installed CUDA 11.4.14 from JP 5.0.1 DP and earlier releases, the `apt upgrade` to JP 5.0 GA will fail. This occurs because in the JP 5.0 GA release, the `cuda-nvprof-11-4` package has been renamed. After the apt upgrade, to fix this issue, run the following command: `$ sudo apt install --fix-broken -o Dpkg::Options::=”--force-overwrite”`
3445976	WiFi attachment points on Jetson Xavier NX are not listed after headless installation with default oem-config options.
3660805	The SPE’s IVC channel does not work with Jetson AGX Orin.
3657961	After an `apt upgrade`, the Xavier NVME SSD failed to boot.

Issue	Description
3623353	Flashing Jetson Xavier NX 16GB fails on Jetpack 5.0.
3605453	Flashing the Jetson Orin Developer Kit with a custom carrier board with no EEPROM fails.
3603552	Flashing a custom carrier board with the Jetson Xavier modules fails.
3573905	Monitors with a DP++ interface are not supported.
3570293	**Jetson Xavier NX**: Jetson-IO might fail to configure the IMX477 sensor.
3499398	GPIO configuration utility does not work as expected in the Linux 5.10 kernel that is included in the Jetpack 5.0 DP release.
3712616	`nvdisp-init` does not support SBK/PKC-fused boards, so there will be no boot splash displayed on the screen.
3692886	The Display MST does not work on Jetson AGX Orin and will be addressed in an upcoming release.
3431695	Watchdog nodes are not enabled on Jetson AGX Xavier Industrial.
3420652	Display does not resume after SC7 suspend/resume cycle.

Issue	Description
3447132 3574718	Wake-on-Lan is not supported in release 35.1.
3689332	Jetson IO is not currently supported on Jetson AGX Orin 32GB.
3591721	**Jetson AGX Orin**: The NVIDIA logo that is displayed during shutdown is corrupted.
3591557	**Jetson Xavier NX**: The SD card image only works with Jetpack 5.0 Developer Preview Bootloader.

4. Implementation Details

4.1. Camera

Because UEFI boot is enabled in JP5.x releases, Camera Auto Detection will not work if the EEPROM ID is not configured for a camera sensor.

4.1.1. Device Registration

After you complete the driver development, you **must** add the new device's information to the system kernel device tree so it can be registered (instantiated) when the kernel boots. The following sections describe ways to register a new device.

Before you begin, ensure that you obtain the kernel source files.

4.1.2. Device Tree Overlay

Because UEFI boot is enabled in this release, the plugin manager is no longer supported. You must create a device tree overlay (DTB overlay or `.dtbo`) file to register the camera module.

If your camera module has an on-board EEPROM, and is programmed with a valid camera ID, at runtime, you can use the device tree overlay file to apply the overlay for a specific camera module and update the device tree entries with proper information. Using a device tree overlay with an EEPROM ID allows a system image to support multiple camera devices. To select a different camera, power down the device, replace the camera module, and reboot. The new module works automatically.

To create and apply a device tree overlay file:

1. Add the `.dtsi` file to the camera configuration `.dtsi` file.
2. Set the status of your device tree nodes to `disabled`.

```
imx185_cam0: imx185_a@1a {
    status = "disabled";
};
```

3. Add the overlay information as fragments to a new `.dts` file.

```
<top>/hardware/nvidia/platform/t19x/common/kernel-dts/t19x-common-modules/tegra194-camera-overlay-file.dts
```

You can also see the camera DTB overlay files that are provided with the current release for examples.

4. Update the `.dts` file with the correct overlay information and a compatible string.

```
/ {
        overlay-name = "Jetson Camera Dual-IMX274";
        jetson-header-name = "Jetson AGX Xavier CSI Connector";
        compatible = "nvidia,p2822-0000+p2888-0001";

fragment@0 {
    target= "<&imx185_cam0>";
    board_config {
        ids = "LPRD-dual-imx274-002" ;
        sw-modules = "kernel";
    };
     __overlay__ {
         status = "okay";
    };
                };
                fragment@1 {
                        . . .
                };

  };
```

5. To generate a `.dtbo` file, compile the `.dts` file.
6. **Before flashing**, move the `.dtbo` file to `flash_folder/kernel/dtb/`.
7. Add the following line to the `<board>.conf` file, which is used to flash the device.

```
OVERLAY_DTB_FILE="${OVERLAY_DTB_FILE},tegra194-camera-overlay-file.dtbo";
```

This line causes the following tasks to completed:

- If a specific camera board is found when the kernel boots, the override data is applied to that camera board's tree nodes.
- The tree nodes are made available for the system to use.

4.1.3. Using the Jetson IO Tool

If your camera module does not have an on-board EEPROM, you can use the same DTB overlay file to statically configure the board for the attached camera.

1. After you attach the camera module, apply the camera module's DTB overlay using the Jetson-IO tool, and reboot.

   The new module will work immediately after Jetson Linux starts.

> **Note**: You might have to delete the `board_config{}` node from the fragments in the DTB overlay file.

2. After you compile the `.dts` file to generate a `.dtbo` file, move the `.dtbo` file to `/boot` on the Jetson device, so that the Jetson-IO tool can recognize it.
3. Launch the Jetson-IO tool and configure the DTB overlay.

4.2. UEFI

For fixes that were made in the UEFI sources after the release, go to the UEFI GitHub.

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