Connect Tech

BOARD SUPPORT PACKAGE

For Connect Tech NVIDIA® Jetson Orin™ NX/Orin™ Nano Carriers

BSP Version: ORIN-NX-NANO-35.6.0 V005
Last Updated: 2025/07/24

1. Introduction

This Board Support Package adds support for the Connect Tech Jetson Orin™ NX and Orin™ Nano family of carrier boards to Linux4Tegra. It includes any extra files required to use all the features of Connect Tech carriers.

Please check Section 3 for supported features for your board and Section 9 for the changes made between versions. You can check which version of the BSP you have installed by running:

cat /etc/cti/CTI-L4T.version

Check for the Latest Version of the CTI-L4T BSP at:
https://connecttech.com/resource-center/l4t-board-support-packages/

2. Requirements

- x86/x64 based host machine running Ubuntu 18.04 or 20.04
- JetPack 5.1.4 / L4T 35.6.0 installed (see Section 4)
- Orin™ NX or Orin™ Nano module
- Connect Tech Orin™ NX/Orin™ Nano Carrier
- USB Cable for flashing

*L4T version can be found in /etc/nv_tegra_release and will look like this:
R35 (release), REVISION: 6.0

3. BSP Features

3.1 Product Specific Details

NGX003 (Photon)

- USB 3.0 Support
- USB OTG Supported in device mode.
- HDMI Support
- Micro SD Card Not Supported on Orin™ NX/Orin™ Nano
- NVMe Card Support
- PoE Support
- Wifi/Bluetooth Card Not Supported on Orin™ NX/Orin™ Nano
    - NVMe/Wifi-bluetooth mux switch must always be on NVMe Since device flashes onto NVMe!
- Cellular Card Support
- RGB LED Support
- UART Support
- I2C Support
- GPIO Support
- Tachometer read through driver currently Not Supported.
- MIPI camera support

Supported Mipi Cameras:

- Raspberry Pi IMX219
- ArduCAM IMX477
- Econ E-CAM80 (IMX415)

NGX007 (Boson)

- USB 3.0 Support
- USB OTG Support
- Display(HDMI)
- Micro SD Card Not Supported on Orin™ NX/Orin™ Nano
- GbE Phy Support
- CAN Support
- UART Support
- SPI Support
- I2C Support
- PWM Support
- Wifi/Bluetooth Support
- NVMe Card Support
- Framos Camera support
    - Note that CAM4 is disabled as CSI4 is unsupported on Orin™ NX/Orin™ Nano

Supported Framos Cameras:

- FSM-IMX290
- FSM-IMX296
- FSM-IMX412
- FSM-IMX415

- FSM-IMX462
- FSM-IMX464
- FSM-IMX477
- FSM-IMX565
- FSM-IMX568
- FSM-IMX585
- FSM-IMX678
- FSM-IMX715

NGX010 (Rudi-NX)

- USB 3.0 Support
- USB OTG Support
- HDMI Support
- NVMe Card Support
- CAN Support
- GbE Phy Support
- Cellular Card Support
- Wifi/Bluetooth card Support
- UART Support
- RS485 Support
- I2C Support
- GPIO Support
- SPI Support
- PWM Support
- RTC Battery Support

Supported GMSL Cameras:

- StereoLabs ZED X
- Leopard IMX390
- Leopard IMX568
- Tier4 C1 ISX021
- Tier4 C2 IMX490

NGX012 (Hadron)

- USB 3.0 Support
- USB OTG Support
- GbE Phy Support
- NVMe Card Support
- Wifi/Bluetooth support
- CAN Support
- UART Support
- I2C Support
- GPIO Support

- SPI Support
- PWM Support
- MIPI camera support

Supported MIPI Cameras:

- ArduCAM IMX477
- Raspberry PI IMX219
- Framos FSM-IMX678 (with FPA-A/P22-v2a adapter)

NGX015 (Polaris)

- USB 3.0 Support
- USB OTG Support
- GbE Phy Support
- NVMe Card Support
- Wifi/Bluetooth support
- CAN Support
- M12 GBE sensor support
- M.2 B-Key modem support
- Wake on LAN Support
- Wake on gpio expander support
- 2x fan and tach support
- Pressure/Temp sensor support
- BMS Support (for reading battery voltage)
- M12 Isolated I/O support
- GMSL Camera Support

Supported GMSL Cameras:

- Econ NileCAM21
- Tier4 C1 (ISX021)
- Tier4 C2 (IMX490)
- StereoLabs ZED X

NGX018 (Hadron GMSL)

- USB 3.0 Support
- USB OTG Support
- GbE Phy Support
- NVMe Card Support
- Wifi/Bluetooth support
- CAN Support
- UART Support
- I2C Support
- GPIO Support
- PWM Support

- GMSL Camera Support

  Supported GMSL Cameras:
- Leopard IMX390
- Leopard IMX568
- Leopard OWL
- Econ SturdeCAM20

NGX020 (Boson for Orin)

- USB 3.0 Support
- USB OTG Support
- Display(HDMI)
- GbE Phy Support
- CAN Support
- UART Support
- SPI Support
- I2C Support
- PWM Support
- Wifi/Bluetooth Support
- NVMe Card Support
- Framos Camera Support

  Supported Framos Cameras:
- FSM-IMX290
- FSM-IMX296
- FSM-IMX412
- FSM-IMX415
- FSM-IMX462
- FSM-IMX464
- FSM-IMX477
- FSM-IMX565
- FSM-IMX568
- FSM-IMX585
- FSM-IMX678
- FSM-IMX715

NGX021 (Boson22 for Orin)

- USB 3.0 Support
- USB OTG Support
- Display(HDMI)
- GbE Phy Support
- CAN Support
- UART Support

- SPI Support
- I2C Support
- PWM Support
- Wifi/Bluetooth Support
- NVMe Card Support
- 22-pin CSI camera connector Support

  (No Camera Configs in Current BSP)

NGX022 (Lepton FPDLink III)

- USB 3.0 Support
- USB OTG Support
- Display(HDMI)
- GbE Phy Support
- CAN Support
- UART Support
- SPI Support
- I2C Support
- PWM Support
- Wifi/Bluetooth Support
- NVMe Card Support
- FPDLINK III Camera Support
- External Trigger Support

  Supported MIPI Cameras:
- Econ NeduCAM25

NGX024 (Hadron Dual Mipi)

- USB 3.0 Support
- USB OTG Support
- GbE Phy Support
- NVMe Card Support
- Wifi/Bluetooth support
- CAN Support
- UART Support
- I2C Support
- GPIO Support
- SPI Support
- PWM Support
- x2 MIPI camera support

  Supported MIPI Cameras:
- ArduCAM IMX477

- Raspberry PI IMX219
- FSM-IMX678 (with FPA-A/P22-v2a adapter)

3.2 Limitations and Known Issues

1. Micro SD card on CTI Xavier™ NX carriers will not work with Orin™ NX or Orin™ Nano As pin mapping for those pins has changed.

2. Camera Port 4 on the Boson Carrier designed for Xavier™ NX (NGX007) will not work with Orin™ NX or Orin™ Nano as they do not support CSI_4. Therefore only 2 camera 4-lane and 3 camera 2-lane configurations are provided.

A new carrier design "Boson for Orin (NGX020)" reroutes the csi lanes to stream on 4 ports. 4 camera 2-lane and 2 camera 4-lane configurations for the NGX020.

3. Hadron GMSL requires unsetting the display for argus to stream.
Ex. unset DISPLAY

4. Leopard Imaging IMX568 GMSL requires specifying the framerate within the GStreamer pipeline. Ex. gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/xraw(memory:NVMM), width=(int)2472,height=(int)2064,framerate=20/1' ! nvvidconv flipmethod=0 ! 'video/x-raw,format=(string)I420' ! xvimagesink -e

5. The 720x1280 resolution for Framos camera IMX462 could not be fully verified.

6. The Framos IMX565 monochrome camera is only supported with the 4 camera configuration on Boson (NGX007) and Boson for Orin (NGX020).

3.3 Installing ZED X camera SDK

The ZED SDK is required to operate the ZED X camera. To use the SDK, Nvidia's CUDA, along with a few other dependancies, must first be installed (It is not installed automatically with this BSP). To install these dependancies, run this command:

"sudo apt install zstd libqt5network5 libqt5opengl5 libqt5sql5 libqt5xml5 cuda libcudnn8"

The ZED SDK can then be downloaded onto the AGX Orin™ from the Stereolabs website here: https://www.stereolabs.com/developers/release/

Click on "SDK Downloads", then the link for "ZED SDK for JetPack 5.1.4 (L4T 35.6)".
Note: ZED X drivers are already included in this BSP and do not need to be downloaded.

Once you have downloaded the executable onto your AGX Orin™ system, follow the

rest of the instructions under "Download and Install the ZED SDK" at this link:
https://www.stereolabs.com/docs/installation/jetson/

Additional questions about the SDK and camera applications can be answered by Stereolabs at https://support.stereolabs.com/hc/en-us/

4. Installation

4.1 Obtaining NVIDIA® Jetpack

Before Installing the BSP you will need to install JetPack 5.1.4 on the host system using NVIDIA® SDK Manager (section 4.1.1) or from the NVIDIA® Embedded Download Center (section 4.1.2)

4.1.1 Installing JetPack from SDK Manager

For installing using sdkmanager, please follow installation steps from kdb373 for Jetpack 4.2+
https://connecttech.com/resource-center/kdb373/

4.1.2 Installing JetPack from NVIDIA® Embedded Download Center

1. Create a new directory for installing the Jetpack. Referred to as <BSP_ROOT> in these instructions.

2. Go to Jetpack Release Page https://developer.nvidia.com/embedded/jetson-linux-r3560

3. Download the "L4T Driver Package (BSP)" and "Sample Root Filesystem" files for Orin modules (t234 platform).

4. Put the "L4T Driver Package (BSP)" and "Sample Root Filesystem" in <BSP_ROOT>. Afterwards, you should have the following files in <BSP_ROOT>

- jetson_linux_r35.6.0_aarch64.tbz2
- tegra_linux_sample-root-filesystem_r35.6.0_aarch64.tbz2

5. Extract the "L4T Driver Package" tarball:

```
cd <BSP_ROOT>
sudo tar -jxf jetson_linux_r35.6.0_aarch64.tbz2
```

6. You should now have a new directory called Linux_for_Tegra in your <BSP_ROOT> folder. Extract the "Sample Root Filesystem" into Linux_for_Tegra/rootfs.

sudo tar -C Linux_for_Tegra/rootfs/ -xjf tegra_linux_sample-root-filesystem_r35.6.0_aarch64.tbz2

4.2 CTI BSP Installation

1. Copy the CTI-L4T-ORIN-NX-NANO-35.6.0-V###.tgz package into <BSP_ROOT>/Linux_for_Tegra.

If you are using Nvidia's SDK manager then "<BSP_ROOT>" will be:
~/nvidia/nvidia_sdk/<JetPack_Version>_Linux_JETSON_NX_ORIN_TARGETS/
or
~/nvidia/nvidia_sdk/<JetPack_Version>_Linux_JETSON_NANO_ORIN_TARGETS/
depending on your target module.

Otherwise if manually installing from the NVIDIA® Embedded Download Center <BSP_ROOT> will be the folder created previously

cp CTI-L4T-ORIN-NX-NANO-35.6.0-V###.tgz <BSP_ROOT>/Linux_for_Tegra

2. Extract the BSP: tar -xzf CTI-L4T-ORIN-NX-NANO-35.6.0-V###.tgz
cd <BSP_ROOT>/Linux_for_Tegra
sudo tar -xzf CTI-L4T-ORIN-NX-NANO-35.6.0-V###.tgz

3. Change into the CTI-L4T directory:
cd <BSP_ROOT>/Linux_for_Tegra/CTI-L4T

4. Run the install script (as root or sudo) to automatically install the BSP files to the correct locations:

sudo ./install.sh
#return to Linux_for_Tegra
cd ..

5. The CTI-L4T BSP is now installed on the host system and it should now be able to flash the Orin™ NX/Orin™ Nano module.

5. Flashing Orin™ NX/Orin™ Nano Modules

1. Connect an NVMe m.2 card to one of the m.2 slots on your Orin™ NX/Orin™ Nano carrier.

2. Connect the Orin™ NX/Orin™ Nano and Carrier to the computer via USB, following the instructions in the appropriate manual.

3. Put the system to be flashed into recovery mode, following the instructions in the appropriate manual

4. There are two options for flashing Jetson modules:

Using CTI's automated script:
./cti-flash.sh

Follow the menu and select your desired configuration. Once selected,

the device will start to flash.

Using the Manual Method with cti-nvme-flash:

Note do not add the ".conf" file extension to the <config> parameter:

Manual Flash: ./cti-nvme-flash.sh cti/<module>/<boardname>/<config>

<module> is either orin-nx or orin-nano depending on your module.

Examples:
./cti-nvme-flash.sh cti/orin-nx/boson/base
./cti-nvme-flash.sh cti/orin-nano/boson/base

5. Once the flashing has completed, the Orin™ NX/Orin™ Nano will reboot

6. Software Updates

Upgrading L4T or CTI-BSP versions without reflashing is not currently supported.

Apt upgrades from Nvidia's t234 repository (https://repo.download.nvidia.com/jetson/t234) have been commented out of the
/etc/apt/sources.list.d to prevent overriding the CTI BSP packages. Installing and upgrading NVIDIA® SDK packages such as CUDA, that are not part of the L4T group is still permitted.

Running "apt-get upgrade" with no further arguments is not supported.

7. Switching Profiles on Orin™ NX/Orin™ Nano

1. Open a terminal on the Orin™ NX/Orin™ Nano

2. Run "sudo cti-orin-nx-nano-fdt.sh"

3. Select the profile you wish to switch to from the menu.

4. Select the target module (Orin-NX or Orin-NANO) from the menu.

5. Restart the system

Note: This script updates the dtb by appending/replacing the FDT variable in extlinux.conf

8. Tier4 Camera Info

8.1 Tier4 C1

cti-tier4-firmware.sh is bundled with the rootfs and can be run directly from the linux shell from any location. This script is required for packing the firmware of C1 into the initrd filesystem.
Failing to do so will cause the camera probe to fail.

To pack the firmware into the initrd filesystem, run the following command: cti-tier4-firmware.sh /boot/initrd tier4-isx021.bin. When the script is done, reboot the system for the changes to take effect.

8.2 Tier4 C2

Note that the Following trigger modes have been verified for Orin-NX/Orin-NANO:

Mode	Index
MASTER_MODE_10FPS	0
MASTER_MODE_20FPS	2
MASTER_MODE_30FPS	4

Manual triggering in a slave mode has currently not been verified.

The default is set as MASTER_MODE_30FPS, but you can set the trigger mode at runtime through the filesystem:
echo <n> > /sys/module/tier4_imx490/parameters/trigger_mode
where n is the Index shown in the table above.

For 20FPS/30FPS on the C2:
When launching two cameras on the same deserializer at the same time using gstreamer,

one of the camera streams intermittenly would freeze on first launch after boot. Relaunching would fix the stream, but staggering the launch of the cameras seemed to prevent this issue from happening. We tested with a 1 second delay, but it is likely you can use a shorter delay. This seemed to be an issue unique to Orin™ NX/Orin™ Nano This issue was not observed on the 10FPS master mode.

9. Change Log

Version ORIN-NX-NANO-35.6.0 V005, Jul 24, 2025

- Added missing Framos IMX678 support for hadron-dual-mipi (NGX024)

Version ORIN-NX-NANO-35.6.0 V004, Apr 14, 2025

- Added support for Framos IMX462

Version ORIN-NX-NANO-35.6.0 V003, Mar 24, 2025

- Added Econ SturdeCAM20 to hadron-gmsl (NGX018) and Econ NeduCAM25 to Lepton (NGX022).

Version ORIN-NX-NANO-35.6.0 V002, Mar 05, 2025

- Added Leopard IMX568 to rudi-nx and hadron-gmsl for Orin™ NX/Orin™ Nano
- Added UEFI fix that addresses startup issues that can manifest due to the mirroring of console on all serial ports.

Version ORIN-NX-NANO-35.6.0 V001, Mar 03, 2025

- Initial release of Jetpack 5.1.4 (l4t 35.6.0) for Orin™ NX/Orin™ Nano
- Includes support for Framos cameras and other configs supported in l4t 35.4.1

Contact Connect Tech

If you have any problems, questions or suggestions regarding the Board Support Package and hardware, please feel free to contact Connect Tech Inc.

Contact Information	
Support	Please go to the Connect Tech Resource Center for product manuals, installation guides, device drivers, BSPs and technical tips. Submit your technical support questions to our support engineers. Technical Support representatives are available Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time.
Contact Information	support@connecttech.com sales@connecttech.com www.connecttech.com

	Toll Free: 800-426-8979 (North America only) Telephone: +1-519-836-1291 Facsimile: 519-836-4878 (on-line 24 hours)