Connect Tech

BOARD SUPPORT PACKAGE

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

BSP Version: ORIN-NX-NANO-35.4.1 V006
Last Updated: 2024/02/16

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 8 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 5.1.2 / L4T 35.4.1 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: 4.1

3. BSP Features

3.1 Supported Cameras in BSP

- Raspberry Pi IMX219
- Econ Nilecam21

- Econ NeduCAM25
- Econ E-CAM80*
- Framos IMX290
- Framos IMX296
- Framos IMX412
- Framos IMX415
- Framos IMX464
- Framos IMX565
- Framos IMX568
- Framos IMX585
- Framos IMX678
- LI IMX390

Note: Econ E-CAM80 only works with 15 pin adapter

3.2 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

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

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

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

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

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

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

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

3.3 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.

4. Installation

4.1 Obtaining NVIDIA® Jetpack

Before Installing the BSP you will need to install JetPack 5.1.2 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-r3541

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_r35.4.1_aarch64.tbz2
- tegra_linux_sample-root-filesystem_r35.4.1_aarch64.tbz2

5. Extract the "L4T Driver Package" tarball:

```
cd <BSP_ROOT>
sudo tar -jxf jetson_linux_r35.4.1_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_r35.4.1_aarch64.tbz2
```

4.2 CTI BSP Installation

1. Copy the CTI-L4T-ORIN-NX-NANO-35.4.1-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-35.4.1-V###.tgz <BSP_ROOT>/Linux_for_Tegra
```

2. Extract the BSP: tar -xzf CTI-L4T-ORIN-NX-NANO-35.4.1-V###.tgz
cd <BSP_ROOT>/Linux_for_Tegra

sudo tar -xzf CTI-L4T-ORIN-NX-NANO-35.4.1-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. Upgrading to a New Package Release

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

7. Switching Profiles on Orin™ NX

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. Change Log

Version ORIN-NX-NANO-35.4.1 V006, Feb 16, 2024

- Added Framos IMX585 to Boson and Boson for Orin.

Version ORIN-NX-NANO-35.4.1 V005, Feb 12, 2024

- Added Boson22 for Orin support for Orin™ NX and Orin™ Nano

Version ORIN-NX-NANO-35.4.1 V004, Feb 02, 2024

- BSP for Hadron GMSL NGX018 Rev A for Orin™ NX and Orin™ Nano
- Includes LI-IMX390 camera config.
- Added support for Econ E-CAM80 on Photon

Version ORIN-NX-NANO-35.4.1 V003, Dec 21, 2023

- Added support for Framos IMX568 to Boson and Boson for Orin.

Version ORIN-NX-NANO-35.4.1 V002, Dec 11, 2023

- Initial release of Polaris (NGX015) in mainline bsp. Includes configuration for Econ NileCAM21.

Version ORIN-NX-NANO-35.4.1 V001, Oct 12, 2023

- Initial release of Jetpack 5.1.2 (l4t 35.4.1) for Orin™ NX/Orin™ Nano
- Initial release of Boson for Orin (NGX020) which includes all of the Framos camera configs currently supported by the older boson carrier (NGX007).

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.
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