

BOARD SUPPORT PACKAGE

For Connect Tech NVIDIA Jetson ORIN-NX Carriers

BSP Version: ORIN-NX-35.2.1 V001
Last Updated: 2023/03/20

1. Introduction

This Board Support Package adds support for the Connect Tech Jetson NX Orin 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 7 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 / L4T 35.2.1 installed (see Section 4)
- NX Orin module
- Connect Tech NX Orin Carrier
- USB Cable for flashing

*L4T version can be found in /etc/nv_tegra_release and will look like this:
R35 (release), REVISION: 2.1

3. BSP Features

Note *Camera support currently not integrated*

3.1 Product Specific Details

NGX004 (Photon)

- USB 3.0 Support
- USB OTG Supported in device mode.
- HDMI Support
- Micro SD Card Not Supported on ORIN-NX
- NVMe Card Support
- PoE Support
- Wifi/Bluetooth Card Not Supported Supported on ORIN-NX
 - 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.

NGX007 (Boson)

- USB 3.0 Support
- USB OTG Support
- Display(HDMI)
- Micro SD Card Not Supported on ORIN-NX
- GbE Phy Support
- CAN Support
- UART Support
- SPI Support
- I2C Support
- PWM Support
 - On GPIO13 (external connector pin34) only.
 - GPIO07 (external connector pin33) can only be used as a GPIO at this point.
- Wifi/Bluetooth Support
- NVMe Card Support

3.3 Limitations and Known Issues

1. Micro SD card on CTI Xavier-NX carriers will not work with ORIN-NX, As SDMMC is no longer supported.
2. Pinmux GP_PWM7 cannot currently be configured as PWM. This is with NVIDIA for active resolution..

4. Installation

4.1 Obtaining Nvidia Jetpack

Before Installing the BSP you will need to install JetPack 5.0.2 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

*As of the release of this package (Mar 13 2023) Orin-nx is not supported by target hardware in SDK manager.

If you find Orin-nx is not supported in the current version of SDK manager, follow section 4.1.2 instead.

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-r3521>
3. Download the "L4T Driver Package (BSP)" and "Sample Root Filesystem" files for NX Orin.

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_r35.2.1_aarch64.tbz2
- tegra_linux_sample-root-filesystem_r35.2.1_aarch64.tbz2

5. Extract the "L4T Driver Package" tarball:

```
cd <BSP_ROOT>
sudo tar -jxf jetson_linux_r35.2.1_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_r35.2.1_aarch64.tbz2
```

4.2 CTI BSP Installation

1. Copy the CTI-L4T-ORIN-NX-35.2.1-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/

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

```
cp CTI-L4T-ORIN-NX-35.2.1-V###.tgz <BSP_ROOT>/Linux_for_Tegra
```

2. Extract the BSP: tar -xzf CTI-L4T-ORIN-NX-35.2.1-V###.tgz
cd <BSP_ROOT>/Linux_for_Tegra
sudo tar -xzf CTI-L4T-ORIN-NX-35.2.1-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 NX Orin module.

5. Flashing Orin-NX Modules

1. Connect an NVMe m.2 card to one of the m.2 slots on your Orin-nx carrier.
2. Connect the NX Orin 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 `orin-nx` for all `orin-nx` modules

Example:
`./cti-nvme-flash.sh cti/orin-nx/boson/base`

5. Once the flashing has completed, the Orin-nx 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
2. Run `"sudo cti-orin-nx-fdt.sh"`
3. Select the profile you wish to switch to from the menu
4. Restart the system

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

8. Change Log

Version ORIN-NX-35.2.1 V001, Mar 20, 2023

- Initial Release for Orin-NX.

- Includes Photon and Boson base support (no camera configs).

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	<p>Please go to the Connect Tech Resource Center for product manuals, installation guides, device drivers, BSPs and technical tips.</p> <p>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.</p>
Contact Information	<p>support@connecttech.com sales@connecttech.com www.connecttech.com</p> <p>Toll Free: 800-426-8979 (North America only) Telephone: +1-519-836-1291 Facsimile: 519-836-4878 (on-line 24 hours)</p>