

BOARD SUPPORT PACKAGE

For Connect Tech NVIDIA Jetson ORIN-AGX Carriers

BSP Version:	ORIN-AGX-35.3.1-INTELR V004
Last Updated:	2024/05/14

1. Introduction

This Board Support Package adds support for the Connect Tech Jetson AGX 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 5.1.1 / L4T 35.3.1 installed (see Section 4)
- AGX Orin module
- Connect Tech AGX Orin Carrier
- USB Cable for flashing

*L4T version can be found in /etc/nv_tegra_release and will look like this:
R35 (release), REVISION: 3.1

3. BSP Features

3.1 Supported Modules in BSP

- AGX-Orin 32GB
- AGX-Orin 64GB

3.2 Supported Cameras in BSP

- Intel Realsense D457

3.2.1 Installing Librealsense

Clone Intel's librealsense github repository on the device and run cmake in the librealsense folder to build.

- **git clone <https://github.com/IntelRealSense/librealsense.git> -b R/254**
- cd librealsense/
- cmake .
- make
- make install
- realsense-viewer # test the cameras (Doesn't work with OWL + Realsense config)

3.3 Product Specific Details

AGX201/ESG620 (Forge/Anvil)

- 10G and 1G ethernet Support.
- CAN Support.
- Display Port Support.
- USB 3.2 Support.
- USB OTG Support.
- I2C Support.
- SPI Support.
- UART Support.
- RS232/485 Support.
- GPIO Support.
- M.2 pcie Support.
- Key E 2230 Wifi/BT.
- Key B 3042/3052 LTE/5G with micro SIM.
- Micro SD support.
- Oculink support
- MIPI Camera support
- Endpoint Mode not Supported
- JCB002 GMSL adapter support.

AGX202/AGX203 (Rogue-Orin/Rogue-Orin RX)

- x2 10G ethernet Support.
- CAN Support.
- HDMI Support.
- USB 3.2 Support.

- USB OTG Support.
- I2C Support.
- SPI Support.
- UART Support.
- RS232/485 Support.
- GPIO Support.
- M.2 pcie Support.
- Key E 2230 Wifi/BT.
- Micro SD support.
- MIPI Camera support.
- JCB002 GMSL adapter support.

3.4 Limitations and Known Issues

1. Due to firmware and bootloader limitations there is no way to move a module flashed from one Orin-agx carrier to another without reflashing. This includes the Nvidia Devkit. This means a module flashed for the Orin-agx Devkit cannot be used with a CTI carrier without reflashing the module.
2. When using the OWL + Intel Realsense device tree, Intel's realsense-viewer application will fail to enumerate the cameras because, the application assumes that all /dev/video[0..X] nodes must be Realsense cameras.

4. Installation

4.1 Obtaining Nvidia Jetpack

Before Installing the BSP you will need to install JetPack 5.1.1 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

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-r3531>

3. Download the "L4T Driver Package (BSP)" and "Sample Root Filesystem" files for AGX 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_r35.3.1_aarch64.tbz2
- tegra_linux_sample-root-filesystem_r35.3.1_aarch64.tbz2

5. Extract the "L4T Driver Package" tarball:

```
cd <BSP_ROOT>
sudo tar -jxf jetson_linux_r35.3.1_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_r35.3.1_aarch64.tbz2
```

4.2 CTI BSP Installation

1. Copy the CTI-L4T-ORIN-AGX-35.3.1-INTELR-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_AGX_ORIN_TARGETS/

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

```
cp CTI-L4T-ORIN-AGX-35.3.1-INTELR-V####.tgz <BSP_ROOT>/Linux_for_Tegra
```

2. Extract the BSP: tar -xzf CTI-L4T-ORIN-AGX-35.3.1-INTELR-V####.tgz
cd <BSP_ROOT>/Linux_for_Tegra
sudo tar -xzf CTI-L4T-ORIN-AGX-35.3.1-INTELR-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 AGX Orin module.

5. Flashing AGX Orin Modules

1. Connect the AGX Orin and Carrier to the computer via USB, following the instructions in the appropriate manual.

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

3. 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:

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

Manual Flash: ./flash.sh cti/<module>/<boardname>/<config> mmcblk0p1

<module> is orin-agx for all orin-agx modules

Example:
./flash.sh cti/orin-agx/forge/base mmcblk0p1

4. Once the flashing has completed, the Orin-agx will reboot

6. Upgrading to a New Package Release

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

Support for upgrades via apt and OTA packages will be added in the future

7. Switching Profiles on Orin-AGX

1. Open a terminal on the Orin-AGX
2. Run "sudo cti-orin-agx-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-AGX-35.3.1 V004 (Intel Realsense), May 14, 2024

- Added support for LI-OWL + Intel Realsense, 2x RS & 6x OWL

Version ORIN-AGX-35.3.1 V003 (Intel Realsense), December 5, 2023

- Fixed driver bug with uploading new firmware to the camera over GMSL
- Driver stability improvements
- If launching a stream fails in realsense-viewer, attempt to relaunch it, this is a known issue with the driver provided by the vendor

Version ORIN-AGX-35.3.1 V002 (Intel Realsense), July 14th, 2023

- Added device tree to enable depth and RGB streaming on all 8 ports.

Version ORIN-AGX-35.3.1 V001 (Intel Realsense), June 8th, 2023

- Initial Release for L4T 35.3.1 with Intel Realsense support.

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>
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