

BOARD SUPPORT PACKAGE

For Connect Tech NVIDIA Jetson AGX Xavier Carriers

BSP Version: AGX- 32.6.1 V006

Last Updated: 2022/02/24

Introduction

This Board Support Package adds support for Connect Tech Jetson AGX Xavier family of carrier boards to Linux4Tegra. It includes any extra files required to use all the features of the carriers. Please check the "Product Specific Details" section for what features for your board is supported with this BSP release and the "Changes" section 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/>

Requirements

- x86 based host machine running Ubuntu 18.04
- JetPack 4.6 installed (from NVIDIA Embedded Download Center)
- AGX Xavier module
- Connect Tech AGX Xavier Carrier
- USB Cable for flashing
- L4T 32.6.1

*L4T version can be found in `/etc/nv_tegra_release` and will look like this:

```
# R32 (release), REVISION: 6.1
```

Supported Cameras in BSP

- ECON: NileCAM30: AR0330
- ECON: NileCAM21: AR0233
- ECON: STURDeCAM20: AR0230
- Leopard: LI-IMX274-MIPI
- Leopard: LI-IMX390-GMSL2

Installation

1. Before Installing the BSP you will need to install JetPack 4.6 on the x86 host system using the NVIDIA SDK Manager or from the source packages on NVIDIA's website as detailed below.
2. Copy the CTI-L4T-AGX- 32.6.1-V006.tgz package into `~/nvidia/nvidia_sdk/JetPack_4.6_Linux_JETSON_AGX_XAVIER/Linux_for_Tegra/`
3. Extract the BSP:

```
tar -xzf CTI-L4T-AGX-32.6.1-V006.tgz
```

4. Change into the CTI-L4T directory:

```
cd ./CTI-L4T
```
5. Run the install script (as root or sudo) to automatically install the BSP files to the correct locations:

```
sudo ./install.sh  
cd ..
```
6. The CTI-L4T BSP is now installed on the host system and it should now be able to flash the AGX Xavier module.
7. To flash on the AGX Xavier use the following (do not add ".conf"):
CTI Assisted Flashing: `./cti-flash.sh`
Manual Flash: `./flash.sh cti/<module>/<boardname>/<config> mmcblk0p1`
Examples:

```
./flash.sh cti/xavier/rogueX/base mmcblk0p1  
./flash.sh cti/xavier-l/rudi-agx/base mmcblk0p1
```

Installing JetPack from SDK Manager

Please follow installation steps from kdb374 for JetPack 4.2+ <https://connecttech.com/resource-center/kdb374/>

Installing JetPack from NVIDIA's Source Packages (Alternate Approach)

- Go to <https://developer.nvidia.com/embedded/linux-tegra-archive> and click on the green button labeled "32.6.1 >".
- Download the "L4T Driver Package (BSP)" and "Sample Root Filesystem" files for AGX Xavier. Afterwards, you should have the files "Jetson_Linux_R32.6.1_aarch64.tbz2" and "Tegra_Linux_Sample-Root-Filesystem_R32.6.1_aarch64.tbz2".
- Create a directory named `~/nvidia/nvidia_sdk/JetPack_4.6_Linux_JETSON_AGX_XAVIER/` and copy the "Jetson_Linux_R32.6.1_aarch64.tbz2" file you downloaded into that directory.
- Unzip the tarball:

```
"sudo tar jxf Jetson_Linux_R32.6.1_aarch64.tbz2"
```
- You should now have a new directory called `Linux_for_Tegra` in your "JetPack_4.6_Linux_JETSON_AGX_XAVIER" folder. Change directories into that and then copy the "Tegra_Linux_Sample-Root-Filesystem_R32.6.1_aarch64.tbz2" file you downloaded into the `rootfs` folder inside.
- Change into the `rootfs` folder and unzip the tarball:

```
"sudo tar jxf Tegra_Linux_Sample-Root-Filesystem_R32.6.1_aarch64.tbz2"
```

- If you wish to flash one of NVIDIA's devkits, or move on to installing CTI's BSP. You can change directories back to `~/nvidia/nvidia_sdk/JetPack_4.6_Linux_JETSON_AGX_XAVIER/Linux_for_Tegra/` and run: `"sudo ./apply_binaries.sh"`

Flashing Instructions

- Connect the AGX Xavier and Carrier to the computer via USB, following the instructions in the appropriate manual
- Put the system to be flashed into recovery mode, following the instructions in the appropriate manual
- Run `"./cti-flash.sh"` or `"./flash.sh cti/<module>/<boardname>/<config> mmcblk0p1"` from `Linux_for_Tegra` directory
- Once the flashing has completed, the Xavier will reboot
- To switch between different boards, you can repeat these steps. Alternatively follow the instructions below for runtime switching profiles on the Xavier

Switching Profiles on Xavier

- Open a terminal on the Xavier
- Run `"sudo cti-agx-fdt.sh"`
- Select the profile you wish to switch to from the menu
- Restart the system

Note: This script updates dtb by appending/replacing the FDT variable in `extlinux.conf`
It also sets `root=/dev/mmcblk0p1` by modifying the "APPEND" variable

Product Specific Details

AGX101 (Rogue)

- CAN Support
- USB 3.1 Support
- USB OTG Support
- GbE Phy Support
- Supports JCB002 GMSL adapter with 8 cameras.
- Supports Xavier 8GB module
- SPI support
- UART support
- I2C Support
- GPIO Support

- NVMe card support
- Wifi/Bluetooth card support
- Micro SD card support
- HDMI support

AGX103 (RogueX)

- CAN Support
- USB 3.1 Support
- USB OTG Support
- Wifi/Bluetooth card Support
- Supports Xavier 8GB module
- NVMe card support
- I2C Support
- GPIO Support
- GbE Phy Support
- Supports JCB002 GMSL adapter with 8 cameras.
- SPI support
- UART support
- HDMI support
- Micro SD Card support.

AGX104 (RudiAGX)

- CAN Support
- USB 3.1 Support
- USB OTG Support
- Supports Xavier 8GB module
- Wifi/Bluetooth card Support
- NVMe card Support
- GbE Phy Support
- Supports GMSL with 8 cameras.
- SPI Support
- SD Card Support
- HDMI Support
- I2C Support
- GPIO Support
- RS485 Support
- UART Support
- Cellular card support

AGX001 (Mimic)

- Mimic + Elroy:
- USB support
- PCIe Support
- GbE Phy Support
- SATA support

- SD card support
- UART0(/dev/ttyTCU0) and UART1(/dev/ttyTHS0) support
- I2C, SPI, MIPI cameras are not supported

- Mimic + Spacely:
 - Not supported

- Mimic + Astro:
 - Not supported

- Mimic + Orbitty:
 - Not supported

- Mimic + Rudi:
 - Not supported

- Mimic + Cogswell:
 - Not supported

- Mimic + Quasar:
 - Not supported

- Mimic + Sprocket:
 - Not supported

Changes

Version AGX-32.6.1 V006, Feb 24, 2022

- Added leopard imx390 20210715 patch that was intended to fix flicker issues.
- This patch appears to have improved reliability issues seen in the bug noted below in V001, that was present since 32.5.
 - When testing with 2 cameras, both will often launch immediately, although sometimes one will timeout. If a stream does fail, a second run of gstreamer will work.

Version AGX-32.6.1 V005, Feb 02, 2022

- Added fix for AGX111 and AGX113 variants of AGX101 and AGX103
- OTA for hardware updates are not currently supported for the Xavier industrial

Version AGX-32.6.1 V004, Nov 02, 2021

- Initial Xavier Industrial module rollout.
 - Ported over support for all configurations implemented for standard AGX.
- Implemented audio over hdmi for AGX and AGX industrial.

Version AGX-32.6.1 V003, Oct 14, 2021

- Added econ sync and crash fix patches for AR0233.
- Added econ AR0233 to rudi-agx.
- Added econ AR0230 to RogueX.
- Removed 8G configs as it is EOL.
- Remove DevKit + JCB004 as they are no longer supported.

Version AGX-32.6.1 V001, Aug 19, 2021

- Adds updates addressed in Nvidia's June 18th security bulletin
- Initial release on Jetpack 4.6 L4T 32.6.1.
- Note: Found bug with Leopard LI-IMX390-GMSL2 previously present in BSP 32.5. When using gstreamer or nvstcapture, LI-IMX390-GMSL2 will always fail to connect the first time, succeeding on the second attempt. Leopard has been contacted and we will work to resolve this issue.

Version AGX-32.5.2 V001, July 19, 2021

- Initial release on Jetpack 4.5.2 L4T 32.5.2.
- (Note) at the time of release (2021-07-19), jetpack 4.5.2 is not supported by sdkmanager, sources also need to be manually downloaded (source_sync.sh does not work for 32.5.2 tag).

Version AGX-32.5 V007, June 30, 2021

- Added 8 camera support for the ECON NileCAM21 (AR0233 sensor) for the AGX-Xavier Dev kit, AGX101 (Rogue) and AGX103 (Rogue-X).
- Added isp overrides for Leopard LI-IMX390-GMSL2 cameras.
- Found 2 bugs with Leopard LI-IMX390-GMSL2 in BSP 32.5.
- When using gstreamer or nvstcapture, LI-IMX390-GMSL2 will always fail to connect the first time, succeeding on the second attempt.
- Only one LI-IMX390-GMSL2 video stream can be launched at a time using gstreamer or nvstcapture. When launched, a feed will destroy any previously launched LI-IMX390-GMSL2 feed.
- Leopard has been contacted and we will work to resolve this issue.
- Added 8 camera support for the ECON STURDeCAM20 (AR0230 sensor) on the Rudi-AGX.
- Support found bug with linux console port on Rudi-AGX board. Logs freeze after Ubuntu Desktop launches (system still useable through HDMI+mouse and keyboard or SSH). Added to bug fix queue.

Version AGX-32.5 V006, June 03, 2021

- Restored support for Mimic + Elroy

Version AGX-AVT-32.5 V005, May 20, 2021

- Supports Allied Vision Camera on JCB005 adapter board on AGX101(Rogue).
- Uses GPIO35 as reset pin to enable external camera GPIOs on JCB005.
- Note: This package does not support other camera sensors.

Version AGX-32.5 V004, May 07, 2021

- Restored IMX390 camera support

Version AGX-32.5 V003, Apr 23, 2021

- Added support for ECON STURDeCAM20: AR0230 cameras for Rogue.

Version AGX-AVT-32.5 V002, Mar 18, 2021

- Supports Allied Vision Camera on JCB005 adapter board on AGX101(Rogue).
- Supports 4-Camera and 6-Camera profiles.
- Note: This package does not support other camera sensors.

Version AGX-32.5 V001, Feb 05, 2021

- Initial release on Jetpack 4.5 L4T 32.5
- IMX390 cameras not supported
- Bootloader OTA upgrades are supported.

Version AGX-32.4.4 V004, Jan 14, 2021

- Supports IMX274 MIPI camera on Leopard 6 camera adapter board on AGX101(Rogue) and AGX103 (RogueX).
- Supports up to 6 Cameras.
- Note: This package does not support other camera sensors or adaptor boards.

Version AGX-32.4.4 V003, Dec 09, 2020

- Resolves "disagrees about module_layout" issue for loading external kernel modules
- Note: This package does not support Allied Vision Camera on JCB005 adapter.

Version AGX-32.4.4 V002, Dec 07, 2020

- Supports Allied Vision Camera on JCB005 adapter board on AGX101 (Rogue).
- Supports 4-Camera and 6-Camera profiles.
- Note: This package does not support other camera sensors.

Version AGX-32.4.4 V001, Nov 13, 2020

- Initial release on JetPack 4.4.1 L4T 32.4.4

Version AGX-32.4.3 V002, October 15, 2020

- Added color patch from Leopard for IMX390 camera
 - This supports single camera
- Upgrade support from cti debian server from this version onwards
- Supports apt-get upgrade
- Installs a script to modify extlinux.conf to switch dtb
- Script: cti-agx-fdt.sh
- Install path: /usr/bin
- Execute: sudo cti-agx-fdt.sh
- Recommended: perform power cycle when switching between camera profiles using extlinux.conf(cti-agx-fdt.sh)
- Set power mode as "MAXN" when running all 8 cameras to avoid any lag

Version AGX-32.4.3 V001, July 29, 2020

- Initial release on JetPack 4.4 L4T 32.4.3

Version AGX-32.4.2 V002, June 15, 2020

- Added support for JCB004 IMX390 and E-Con cameras on dev kit
- Added support for JCB002 E-Con camera on rogue/rogueX
- Added support for Elroy, Spacely on Mimic

Version AGX-32.4.2 V001, June 05, 2020

- Initial release

Version AGX-32.3.1 V006, May 29, 2020

- Fixed login loop
- Added deb packaged

Version AGX-32.3.1 V004, May 07, 2020

- Fixed issue with install.sh script

Version AGX-32.3.1 V004, Feb 24, 2020

- Added support for Leopard IMX390 cameras on JCB004 for Xavier devkit

Version AGX-32.3.1 V003, Feb 14, 2020

- Added support for E-CON AR0330 cameras on JCB004 for Xavier devkit

Version AGX-32.3.1 V002, Feb 13, 2020

- Added support for E-CON AR0330 cameras on JCB002 for Rogue and RogueX

Version AGX-32.3.1 V001, Feb 06, 2020

- Initial version for JetPack 4.3 (L4T 32.3.1)
- Added JCB002 adapter support to RogueX
- Fixed eth0 hotplug issue
- Prevented i2c error message from appearing in dmesg logs of modules with no camera support
- Added SPI support

Version AGX-32.2.1 V003, Dec 23, 2019

- Fixed cti-flash.sh to support flashing
- Corrected verbose in install.sh

Version AGX-32.2.1 V002, Dec 10, 2019

Support for Xavier 8GB module for Rogue and Rogue X carriers

Version AGX-32.2.1, Dec 05, 2019

- Initial Release for JetPack 4.2.2 (L4T 32.2.1)

Version AGX-32.1.0, Nov 08, 2019

- Added camera support (MIPI CSI Expansion)

Version AGX-32.1.0, Nov 04, 2019

- Initial Release

Version 203, Jun 17, 2019

- Added Rogue Camera Support
- Fixed an Issue Where Some Modules Would Not Flash

Version 202, Apr 30, 2019

- Changed Kernel Name to 4.9.104-tegra

Version 201, Apr 8, 2019

- Initial Release for the Mimic and Rogue JetPack 4.2 (L4T 32.1.0)

Version 200, Mar 15, 2019

- Initial Release for the Mimic and Rogue JetPack 4.1 (L4T 31.1.0)

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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