AIMobile

AIM-Edge ncox/ncon

Jetpack 6.1 Developer Image

Refresh over Ethernet

User Manual

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Version 2.1

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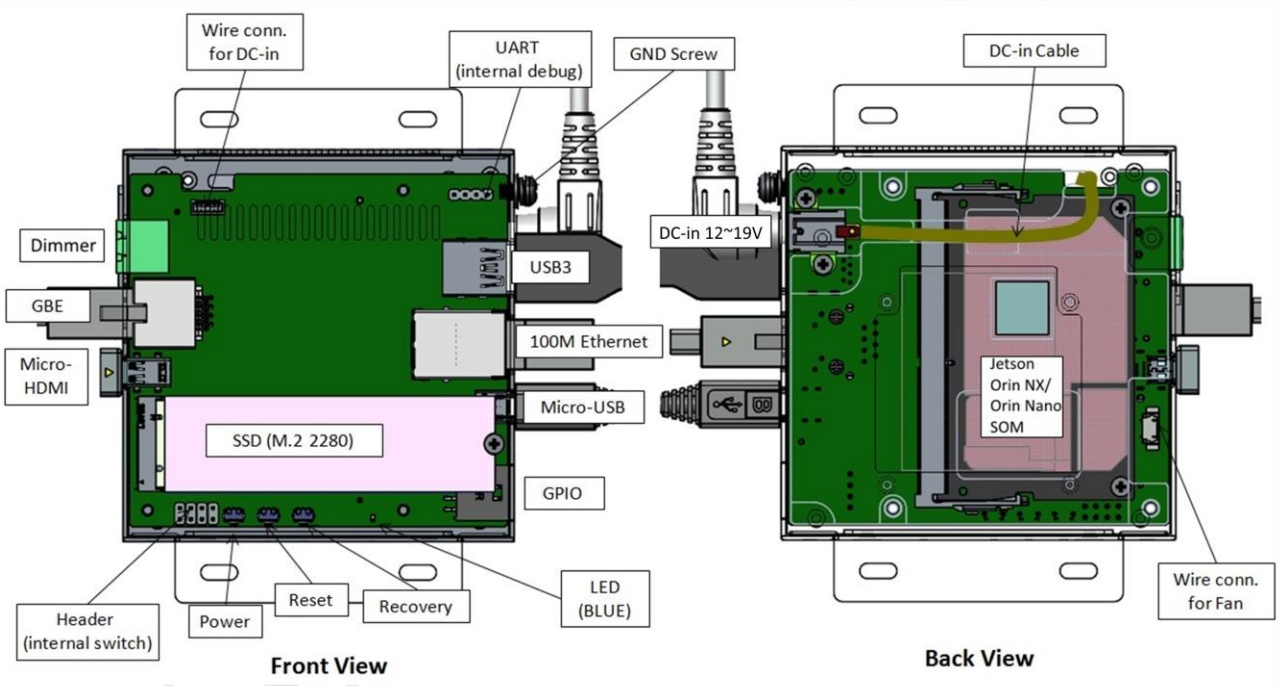
Revision History

Date	Version	Modification
2024/02/26	1.0	Creation
2024/03/19	1.1	Improve user experience of downloading process
2024/05/10	1.2	Add OTA package in parts
2024/09/05	2.0	Upgrade to Jetpack 6.0
2024/11/27	2.1	Upgrade to Jetpack 6.1

1. Introduction

This document is to describe how to download Jetpack 6.1 system image to AIM-Edge ncox/ncon device (which with Jetpack 5.1.2 or Jetpack 6.0 in it, user needs to check the original image version in the device at first) over Ethernet, including hardware requirement, download image package and image refreshing procedures.

2. I/O Port Overview



3. Getting Started

3.1. Hardware Requirement

To refresh the image over Ethernet, it needs a Linux Host PC/Notebook with Ubuntu Linux X64 20.04 or 18.04, and the Host PC/NB should be able to connect to AIM-Edge ncox/ncon through LAN.

3.2. Download OTA Image Package & Tool

Check the OneDrive URL provided by AIMobile for OTA image refresh package folder (O1_dev_6.1_V01_OTA in the example below), there will be OTA image files (ota_payload_package.tar.gz & ota_payload_package_R35-4_R35-5.tar.gz), OTA tool (ota_tools_r36.4.0.tar.bz2), OTA payload list (ota_payload_list) & script (ota.sh). Download all the files above to Host PC/NB.

3.3. Start OTA update

At first, user needs to check the image version of the device will be updated by the command below:

$ cat /etc/nv_tegra_release

The output will be as below for Jetpack 5.1.2 or Jetpack 6.0

- Jetpack 5.1.2:

```
# R35 (release), REVISION: 4.1, GCID: 33958178, BOARD: t186ref, EABI: aarch64, DATE: Tue Aug  1 19:57:35 UTC 2023
```

- Jetpack 6.0

```
# R36 (release), REVISION: 3.0, GCID: 36191598, BOARD: generic, EABI: aarch64, DATE: Mon May  6 17:34:21 UTC 2024
```

Depends on the original image version of the device will be updated, user needs to run the OTA script from Host PC/NB with different OTA image package as below, check the table below for parameters may need change, and user can check section 4.1 about how to get target device IP address.

- Jetpack 5.1.2 (The ota_payload_list contains ota_payload_package_R35-4_R35-5.tar.gz and ota_payload_package.tar.gz):

./ota.sh -i 192.168.55.1 -p @ota_payload_list -t ota_tools_r36.4.0.tar.bz2 --port 22

- Jetpack 6.0 (It needs to update ota_payload_package.tar.gz only):

./ota.sh -i 192.168.55.1 -p ota_payload_package.tar.gz -t ota_tools_r36.4.0.tar.bz2 --port 22

Option	Parameter description
-i	Target device IP
-p	OTA package file name or @OTA package file list
-t	OTA tool file name
--port	Target device SSH port number (default:22)

1. Input target device account and password, the OTA tool & image file will be uploaded to the target device.

```
aim3@aim3-System-Product-Name:/media/aim3/disk/Steven/O1/O1_dev_6.1_V01/O1_dev_6.1_V01_OTA$ ./ota.sh -t ota_tools_r36.4.0.tar.bz2
account : aim
password :
**********************************************
       Updating ota_payload_package.tar.gz
**********************************************
Host 192.168.55.1 not found in /home/aim3/.ssh/known_hosts
sending incremental file list
ota_payload_package.tar.gz
         16.44G 100%   22.29MB/s    0:11:43 (xfr#1, to-chk=1/2)
ota_tools_r36.4.0.tar.bz2
        666.44K 100%  671.64kB/s    0:00:00 (xfr#2, to-chk=0/2)
```

2. After the file uploading is completed, the files will be decompressed on the target device.

```
Linux_for_Tegra/tools/ota_tools/version_upgrade/Image_based_OTA_Examples.txt
Linux_for_Tegra/tools/ota_tools/version_upgrade/nv_ota_update.sh
Linux_for_Tegra/tools/ota_tools/version_upgrade/pv_1.6.6-1_arm64.deb
Linux_for_Tegra/tools/ota_tools/version_upgrade/ota_validate_params.sh
Linux_for_Tegra/tools/ota_tools/version_upgrade/l4t_generate_ota_package.sh
Linux_for_Tegra/tools/ota_tools/version_upgrade/nv_ota_validate.sh
Linux_for_Tegra/tools/ota_tools/version_upgrade/nv_ota_update_without_layout_change.sh
Linux_for_Tegra/tools/ota_tools/version_upgrade/nv_ota_customer.conf
Linux_for_Tegra/tools/ota_tools/version_upgrade/ota_multi_board_specs.sh
Linux_for_Tegra/tools/ota_tools/version_upgrade/kernel_bootctrl.bin.reset
Linux_for_Tegra/tools/ota_tools/version_upgrade/nv_ota_decompress_package.sh
Linux_for_Tegra/p2822-0000+p2888-0004-R32x-R35i.conf
tar: Linux_for_Tegra/tools/ota_tools/version_upgrade: time stamp 2024-03-14 12:01:00 is 136939.707366304 s in the future
Linux_for_Tegra/p2822-0000+p2888-0008-R35A-R35i.conf
Linux_for_Tegra/p2822-0000+p2888-0004-R35A-R35i.conf
Linux_for_Tegra/jetson-agx-xavier-devkit-R32x-R35i.conf
Linux_for_Tegra/jetson-agx-xavier-devkit-R35A-R35i.conf
Linux_for_Tegra/p2822-0000+p2888-0008-R32x-R35i.conf
Linux_for_Tegra/jetson-xnx-devkit-emmc-R35A-R35i.conf
Linux_for_Tegra/jetson-xnx-devkit-emmc-R32i.conf
Linux_for_Tegra/jaxi-R35A-R35i.conf
Linux_for_Tegra/p3509-0000+p3668-0001-qspi-emmc-R35A-R35i.conf
Linux_for_Tegra/jaxi-R32x-R35i.conf
Linux_for_Tegra/Tegra_Software_License_Agreement-Tegra-Linux.txt
Linux_for_Tegra/p3509-0000+p3668-0001-qspi-emmc-R32i.conf
Linux_for_Tegra/bootloader/
Linux_for_Tegra/bootloader/t186ref/
Linux_for_Tegra/bootloader/t186ref/BCT/
Linux_for_Tegra/bootloader/t186ref/BCT/tegra186-mb1-bct-misc-si-l4t-r32i.cfg
Linux_for_Tegra/bootloader/t186ref/cfg/
Linux_for_Tegra/bootloader/t186ref/cfg/flash_t194_sdmmc_rootfs_ab_R35A_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_l4t_t194_spi_emmc_p3668_rootfs_ab_R35A_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_t194_sdmmc_R32x_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_t194_sdmmc_rootfs_ab_R32x_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_l4t_t194_spi_emmc_jaxi_rootfs_ab_R32x_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_l4t_t194_spi_emmc_jaxi_R35A_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_t194_sdmmc_R35A_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_l4t_t194_spi_emmc_p3668_R35A_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_l4t_t194_spi_emmc_p3668_rootfs_ab_R32i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_l4t_t194_spi_emmc_jaxi_R32x_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_l4t_t194_spi_emmc_p3668_R32i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_l4t_t194_spi_emmc_jaxi_rootfs_ab_R35A_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_l4t_t194_spi_emmc_p3668_R32x_R35i.xml
Linux_for_Tegra/bootloader/t186ref/cfg/flash_l4t_t194_spi_emmc_p3668_rootfs_ab_R32x_R35i.xml
[sudo] password for aim: Selecting previously unselected package pv.
(Reading database ... 145653 files and directories currently installed.)
Preparing to unpack pv_1.6.6-1_arm64.deb ...
Unpacking pv (1.6.6-1) ...
Setting up pv (1.6.6-1) ...
Processing triggers for man-db (2.9.1-1) ...
Command: /tmp/Linux_for_Tegra/tools/ota_tools/version_upgrade/nv_ota_start.sh /tmp/ota_payload_package.tar.gz
Current rootfs is on /dev/nvme0n1
init_ota_log /ota_log
Creating log dir at /ota_log
Create log file at /ota_log/ota_20240312-215841.log
OTA_LOG_FILE=/ota_log/ota_20240312-215841.log
Extract /tmp/ota_payload_package.tar.gz
6.88GiB 0:01:30 [85.7MiB/s] [=================>             ] 60% ETA 0:00:59
```

3. After the files are decompressed, it will check the OTA package file integrity.

```
Info. Active boot storage: nvme0n1
Info. Legacy mode: false
TNSPEC 3767-300-0000-L.2-1-0-p3509-a02+p3767-0000-
COMPATIBLE_SPEC 3767-000-0000--1--p3509-a02+p3767-0000-
TEGRA_LEGACY_UPDATE false
TEGRA_BOOT_STORAGE nvme0n1
TEGRA_EMMC_ONLY false
TEGRA_CHIPID 0x23
TEGRA_OTA_BOOT_DEVICE /dev/mtdblock0
TEGRA_OTA_GPT_DEVICE /dev/mtdblock0
Info: Write TegraPlatformCompatSpec with 3767-000-0000--1--p3509-a02+p3767-0000-.
Info. Uninstalling mtdblock.
check_prerequisites
decompress_ota_package ota_package.tar /ota_work
decompress_ota_package: start at Mon 11 Mar 2024 05:59:44 PM CST
11.6GiB 0:00:35 [ 335MiB/s] [================================>] 100%
Sha1 checksum for /ota_work/ota_package.tar (4169b4b774280e73a3b199bc09d5d19ebea7ed1c) matches
1.90GiB 0:00:14 [ 395KiB/s] [====>                             ] 16% ETA 0:01:11
```

4. After file integrity checking is done, the target device will start image updating automatically.

```
install_partition_with_alt /ota_work/external_device/images-R35-ToT esp
prerequisite_check esp
The /ota_work/external_device/images-R35-ToT/esp.img for partition esp is not found
Skip updating esp partition as no valid image is found
update_rootfs /ota_work
update_rootfs_with_a_b_disabled /ota_work
force_booting_to_recovery p3509-a02+p3767-0000
Force booting to recovery by writing \x07\x00\x00\x00\x03\x00\x00\x00 to UEFI variable L4TDefaultBootMode-781e084c-a330-417c-b678-38e696380cb9
dd if=/tmp/var_tmp.bin of=L4TDefaultBootMode-781e084c-a330-417c-b678-38e696380cb9 bs=8
1+0 records in
1+0 records out
8 bytes copied, 0.00706323 s, 1.1 kB/s
Rootfs is to be updated in recovery kernel once device is rebooted.
check_bootloader_version /ota_work
update_bootloader /ota_work
Bootloader on non-current slot(B) is to be updated once device is rebooted
OTA start at Tue Mar 19 15:58:05 CST 2024.
##################################################### [54%]  [-]
```

```
Bootloader on non-current slot(B) is to be updated once device is rebooted
OTA start at Tue Mar 19 15:58:05 CST 2024.
########################################################################################################## [99%]  [\]
```

5. The image updating will take around 15~20 minutes, and the Host PC/NB will monitor the target device status continuously, after the Host PC/NB detect the target device is reconnected to network, the OTA process is completed.

```
force_booting_to_recovery p3509-a02+p3767-0000
Force booting to recovery by writing \x07\x00\x00\x00\x03\x00\x00\x00 to UEFI variable L4TDefaultBootMode-781e084c-a330-417c-b678-38e696380cb9
dd if=/tmp/var_tmp.bin of=L4TDefaultBootMode-781e084c-a330-417c-b678-38e696380cb9 bs=8
1+0 records in
1+0 records out
8 bytes copied, 0.00706323 s, 1.1 kB/s
Rootfs is to be updated in recovery kernel once device is rebooted.
check_bootloader_version /ota_work
update_bootloader /ota_work
Bootloader on non-current slot(B) is to be updated once device is rebooted
OTA start at Tue Mar 19 15:58:05 CST 2024.
OTA status: done.
OTA end at Tue Mar 19 16:14:16 CST 2024.
```

6. If Host PC/NB waits for longer than 30 minutes, it will abort the OTA script and show warning message “OTA status: Timeout please check device power” to remind user to check target device status.

4. Appendix

4.1. Login to AIM-Edge ncox/ncon by ssh

1. AIM-Edge ncox/ncon Gigabit Ethernet port is set to DHCP mode on default, it will try to get IP address from router in LAN directly after power on.
2. Please check the LAN router/access point Web control interface to know the IP assigned to ncox/ncon, the ncox/ncon device name should be "AIM-dev-xxxx" as the screenshot below.

3. Connect to AIM-Edge ncox/ncon from Host NB/PC with ssh (Username: aim /Password: aim12345).
4. Because of security concern, user will be asked to change the password on the first login.

```
WARNING: Your password has expired.
You must change your password now and login again!
Changing password for aim.
Current password:
```

4.2. AIMobile Container Usage

Please check readme.txt on Ubuntu desktop about pre-installed AIMobile container usage including how to relocate the container image.

The AIMobile container image is pre-installed to root file system, it takes around 13GB, and it can be removed with "docker system prune -af" command.

```
aim@AIM-dev-4737:~$ docker images
REPOSITORY              TAG       IMAGE ID       CREATED        SIZE
aimobile/l4t-jetpack    r35.4.1   353b9824dd21   2 weeks ago    12.9GB
```

4.3. OTA Package in Parts

If user meets problem on downloading OTA image file because of slow internet speed, we split the ota_payload_package.tar.gz file to 2GB files to ease the downloading process. After all split files are downloaded, they can be combined with the command below.

```
cat ota_payload_package.tar.gz-part* > ota_payload_package.tar.gz
```