



DEVELOPMENT GUIDE

VIA AMOS-9000s

Linux BSP



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Revision History

Version	Date	Remarks
1.00	06/03/2025	Initial release

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1. Introduction

This Development Guide details how to set up the necessary build environment for users to customize the VIA AMOS-9000s Linux BSP source code to create and install their own OS image on a VIA AMOS-9100 or VIA AMOS-9000 system, as well as test the system's functions.

The VIA AMOS-9000s Linux BSP is developed based on the NVIDIA Jetson Linux BSP v36.4, and it enables the hardware features of the VIA AMOS-9100 and VIA AMOS-9000 systems.

1.1 BSP Package Contents

There are two folders in the package listed as below.

Source Code folder	Description
VIA_AMOS-9000s_Linux_BSP.tgz	VIA AMOS-9000s Linux BSP source code
Document folder	Description
VIA_AMOS-9000s_Linux_BSP_Development_Guide.pdf	Development Guide

1.1.1 Source Code Folder Contents

VIA_AMOS-9000s_Linux_BSP.tgz: Includes VIA Linux source codes with required binary files.

1.1.2 Document Folder Contents

VIA_AMOS-9000s_Linux_BSP_Development_Guide.pdf: This Development Guide details how to set up the necessary build environment for users to customize the VIA AMOS-9000s Linux BSP source code to create and install their own OS image on a VIA AMOS-9100 or VIA AMOS-9000 system, as well as test the system's functions.

1.2 Version Information and Supported Features

- Kernel Version: 5.15.148
- Development based on NVIDIA Jetson Linux 36.4 BSP (part of JetPack SDK 6.1)
- Supports M.2 SSD boot
- Supports an HDMI display and audio outputs
- Supports the Micro USB OTG port for debugging
- Supports the two Gigabit Ethernet ports (and PoE only on the AMOS-9100-2H11A0 SKU)
- Supports three USB 3.2 Gen 1 Type A ports
- Supports the Micro SIM Card slot
- Supports ALC5616-CGT High Definition Audio Codec for Headphone out and MIC in
- Supports the two COM RS-232/422/485 ports
- Supports the CAN/UART COM port
- Supports the TDK ICM-42607 6-Axis IMU for navigation
- Supports the 12-pin DIO port
- Supports the optional Wi-Fi 6 and Bluetooth 5.3 module
- Supports the optional 4G LTE mobile broadband M.2 module



- Supports the optional 5G mobile broadband M.2 module
- Supports LoRa (only on the AMOS-9100-2H11A0 SKU)

2. Build Environment Setup

This section guides you through setting up the build environment for development. All instructions are using Ubuntu 22.04 or 20.04 LTS.

To make sure the build process can be completed successfully, we recommend at least 500GB of disk space, 16GB of combined memory, and 15GB swap space on the Linux host machine.

2.1 Configure the Linux Host Machine

Follow the steps below to configure the Linux host machine for development.

Step 1

Download the "Bootlin Toolchain gcc 11.3" from the [NVIDIA Jetson Linux webpage](#).

WebRTC
Bootlin Toolchain gcc 11.3
Bootlin Toolchain Sources, 2020.08-1
CUDA Tools
NVIDIA Nsight Systems

Step 2

Run the following commands to extract the downloaded "Bootlin Toolchain gcc 11.3" package:

```
$ mkdir $HOME/9100 (ex: $HOME=/home/u2204/9000s)
$ cd /home/u2204/9000s
$ mkdir 14t-gcc
$ mv aarch64-glibc-stable-2022.08-1.tar.bz2 /home/u2204/9000s/14t-gcc
$ cd $HOME/14t-gcc
$ tar xf aarch64--glibc--stable-2022.08-1.tar.bz2
```

Step 3

Run the following commands to install the software packages required to set up the Jetson Linux development environment:

```
$ sudo apt update
$ sudo apt install git-core build-essential bc
```

Step 4

Download the "Jetson Linux v36.4 Driver Package", "Sample Root Filesystem", and "Driver Package Sources" from the [NVIDIA Jetson Linux webpage](#).

Jetson Orin Modules and Developer Kit	
DRIVERS	Driver Package (BSP)
	Sample Root Filesystem
	Jetson Linux API Reference
SOURCES	Driver Package (BSP) Sources

Step 5

Run the following commands to extract the downloaded packages:

```
$ mv Jetson_Linux_R36.4.0_aarch64.tbz2/Tegra_Linux_Sample-Root-Filesystem_R36.4.0_aarch64.tbz2/public_sources.tbz2 to /home/u2204/9000s
$ tar xf Jetson_Linux_R36.4.0_aarch64.tbz2
$ sudo tar xpf Tegra_Linux_Sample-Root-Filesystem_R36.4.0_aarch64.tbz2 \
-C Linux_for_Tegra/rootfs/
$ tar xf public_sources.tbz2
$ cd Linux_for_Tegra/
$ sudo ./tools/l4t_flash_prerequisites.sh
$ sudo ./apply_binaries.sh
$ tar xf source/kernel_src.tbz2 -C ./source
$ tar xf source/kernel_oot_modules_src.tbz2 -C ./source
$ tar xf source/nvidia_kernel_display_driver_source.tbz2 -C ./source
$ cd ..
```

**Note:**

Refer to the [NVIDIA Developer website](#) for detailed instructions.

3. Image Build

This section explains how to use the source code to build the firmware installer image for a VIA AMOS-9100 or VIA AMOS-9000 system.

3.1 Build the OS Image

Follow the steps below to build the OS image.

Step 1

The first step is to extract the "VIA_AMOS-9000s_Linux_BSP.tgz" source code package using the following command:

```
$ mv VIA_AMOS-9000s_Linux_BSP.tgz /home/u2204/9000s
$ sudo tar xf VIA_AMOS-9000s_Linux_BSP.tgz
```

Step 2

Run the following commands to set up the CROSS_COMPILE environment variable:

```
$ export CROSS_COMPILE=/home/u2204/9000s/l4t-gcc/aarch64-glibc--stable-2022.08-1/bin/
aarch64-buildroot-linux-gnu-
$ export L4T=${PWD}/Linux_for_Tegra
$ export LINUXDIR=$L4T/source/kernel/kernel-jammy-src
$ export BCMDDIR=$LINUXDIR/drivers/net/wireless/bcmdhd.101.10.591.x_36.4
$ export KERNEL_HEADERS=$L4T/source/kernel/kernel-jammy-src
$ export INSTALL_KERNEL_PATH=$L4T/rootfs/usr/lib/modules/5.15.148-tegra
$ export INSTALL_MOD_PATH=$L4T/rootfs/
```

Step 3

Run the following commands to build the OS image:

```
$ cd $L4T/source
$ sudo apt-get install -y flex
$ sudo apt-get install -y bison
$ sudo apt-get install libssl-dev
$ make -C kernel
$ sudo -E make install -C kernel
$ sudo cp kernel/kernel-jammy-src/arch/arm64/boot/Image \
$L4T/kernel/Image
```

Step 4

Run the following commands to build the required modules:

```
$ cd $L4T/source
$ make modules
$ cd kernel/kernel-jammy-src/drivers/net/wireless/bcmdhd.101.10.591.x_36.4
$ make bcmdhd_pcie
$ cd $L4T/source
$ sudo -E make modules_install
```

Step 5

Run the following commands to build the device tree:

```
$ cd $L4T/source
$ make dtbs
$ sudo cp kernel-devicetree/generic-dts/dtbs/* $L4T/kernel/dtb/
$ sudo cp kernel-devicetree/generic-dts/dtbs/* $INSTALL_MOD_PATH/boot/
```

Step 6

Run the following commands to update the initial RAM disk:

```
$ cd $L4T
$ sudo ./tools/l4t_update_initrd.sh
```

Step 7

Run the following commands to update the NVIDIA proprietary modules:

```
$ cd $L4T
$ sudo cp ./rootfs/usr/lib/modules/5.15.148-tegra/updates/nvidia*.ko \
./rootfs/usr/lib/modules/5.15.148-tegra/updates/opensrc-disp/
```

Step 8

Run the following commands to update the Wi-Fi/Bluetooth modules:

```
$ cd $L4T
$ sudo cp $BCMDDIR/bcmdhd.ko \ $INSTALL_KERNEL_PATH/kernel/drivers/net/wireless/
```

Step 9

Run the following commands to remove unnecessary files:

```
$ cd $L4T
$ sudo rm \ $INSTALL_KERNEL_PATH/updates/drivers/net/ethernet/realtek/pgdrv.ko
$ sudo rm $INSTALL_KERNEL_PATH/kernel/drivers/usb/class/cdc-acm.ko
```

Step 10

Proceed to install the compiled OS image on a VIA AMOS-9100 or VIA AMOS-9000 system as described in the following section.

4. Image Installation

This section explains the setup requirements for installing the Linux OS image on a VIA AMOS-9100 or VIA AMOS-9000 system.

4.1 Install the OS Image

Follow the steps below to install the OS image.

Step 1

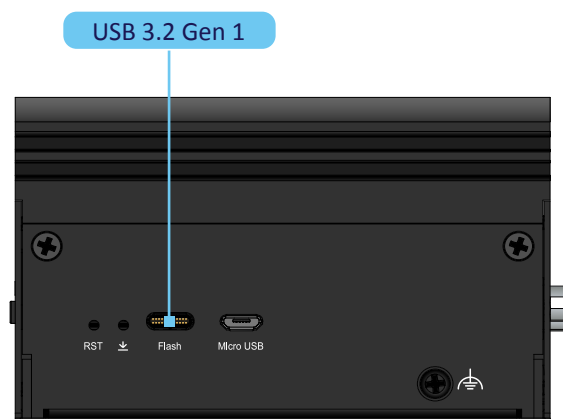
Insert the Phoenix plug of the provided power cable into the DC-in jack labeled "DCIN" on the front panel of the VIA AMOS-9100/9000 system.



Inserting the power cable into the DC-in jack of the VIA AMOS-9100/9000 system

Step 2

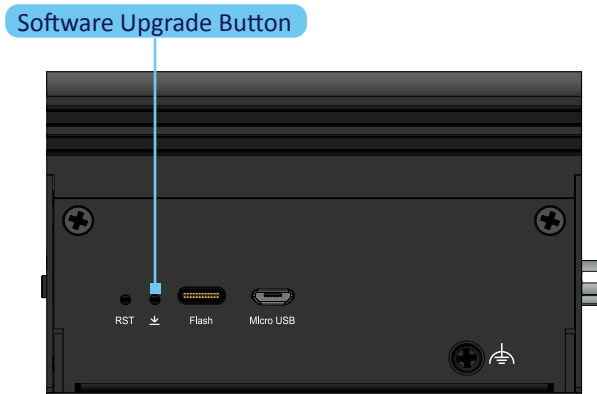
Connect a USB Type-C cable between the Linux host machine and the USB 3.2 Gen 1 port located on the right panel of the VIA AMOS-9100/9000 system.



Location of the USB 3.2 Gen 1 port

Step 3

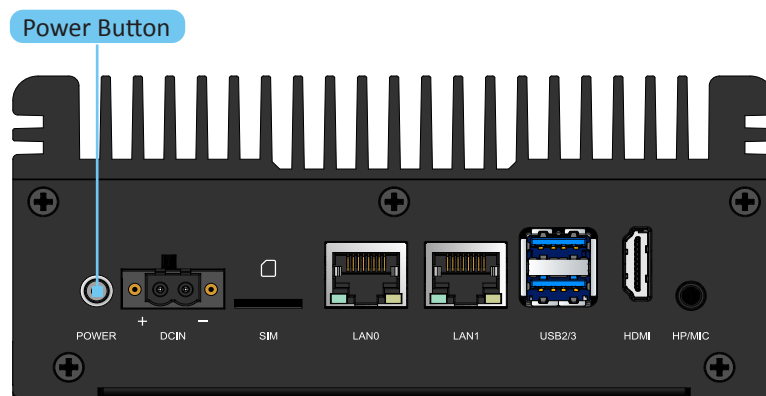
Next, press and hold the software upgrade button located on the right panel of the VIA AMOS-9100/9000 system, and plug in the AC-to-DC power adapter. The system will automatically power ON.



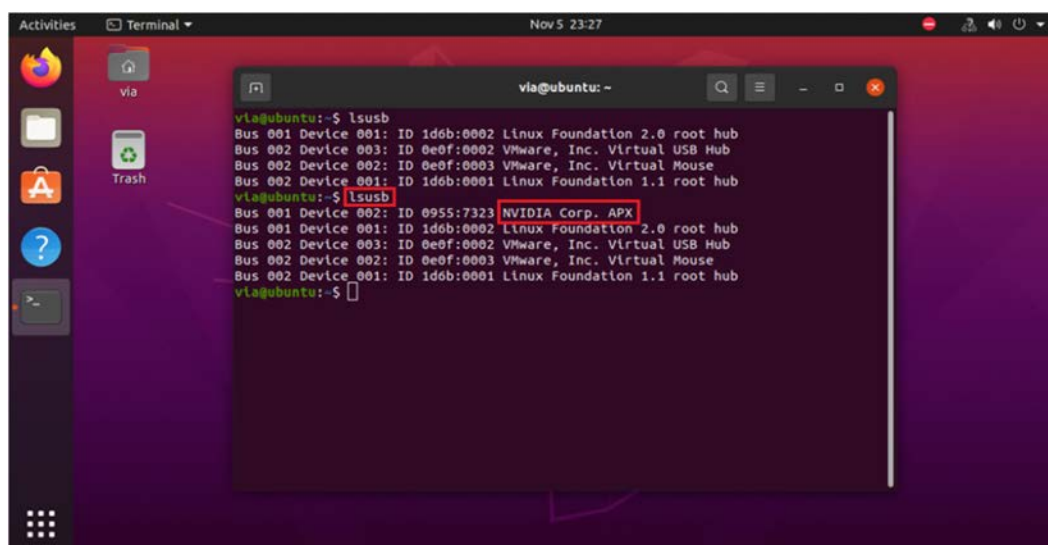
Location of the software upgrade button

Step 4

Confirm that the "POWER" button located on the front panel of the VIA AMOS-9100/9000 system is flashing red and then run the "lsusb" command on the Linux host machine to check if it is connected to the VIA AMOS-9100/9000 system. If the connection is secure, "NVIDIA Corp. APX" will be displayed on the command-line interface.



Location of the power button



Step 5

Run the following commands on the Linux host machine for packing and installing the OS image on the VIA AMOS-9100/9000 system and to show the progress of the installation process:

```
$ cd $L4T
$ sudo ./flash.sh -S 117GiB amos_9k internal
```

Step 6

When the installation process is complete, confirmation messages will be printed as shown below.

```
File Edit Setup Control Window Help
[ 468.2077 ] Writing partition recovery-dtb with tegra234-p3768-0000+p3767-0001-nv.dtb.rec [ 249601 bytes ]
[ 468.2103 ] [.....] 100%
[ 468.2203 ] Writing partition esp with esp.img [ 67108864 bytes ]
[ 468.2221 ] [.....] 100%
[ 470.8112 ] Writing partition APP with system.img [ 6967794836 bytes ]
[ 470.8170 ] [.....] 100%
[ 746.9151 ] tegradevflash_v2 --write BCT br_bct_BR.bct
[ 746.9192 ] Bootloader version 01.00.0000
[ 746.9512 ] Writing partition BCT with br_bct_BR.bct [ 8192 bytes ]
[ 746.9524 ] [.....] 100%
[ 753.6077 ] tegradevflash_v2 --write BCT-boot-chain_backup bct_backup.img
[ 753.6123 ] Bootloader version 01.00.0000
[ 753.6422 ] Writing partition BCT-boot-chain_backup with bct_backup.img [ 32768 bytes ]
[ 753.6427 ] [.....] 100%
[ 754.0669 ] tegradevflash_v2 --write A_MB1_BCT mbl_cold_boot_bct_MB1_sigheader.bct.encrypt
[ 754.0684 ] Bootloader version 01.00.0000
[ 754.0997 ] Writing partition A_MB1_BCT with mbl_cold_boot_bct_MB1_sigheader.bct.encrypt [ 17616 bytes ]
[ 754.1014 ] [.....] 100%
[ 754.3428 ] tegradevflash_v2 --write B_MB1_BCT mbl_cold_boot_bct_MB1_sigheader.bct.encrypt
[ 754.3474 ] Bootloader version 01.00.0000
[ 754.3781 ] Writing partition B_MB1_BCT with mbl_cold_boot_bct_MB1_sigheader.bct.encrypt [ 17616 bytes ]
[ 754.3787 ] [.....] 100%
[ 754.6222 ] tegradevflash_v2 --write A_MEM_BCT mem_coldboot_sigheader.bct.encrypt
[ 754.6235 ] Bootloader version 01.00.0000
[ 754.6552 ] Writing partition A_MEM_BCT with mem_coldboot_sigheader.bct.encrypt [ 243712 bytes ]
[ 754.6571 ] [.....] 100%
[ 757.7027 ] tegradevflash_v2 --write B_MEM_BCT mem_coldboot_sigheader.bct.encrypt
[ 757.7072 ] Bootloader version 01.00.0000
[ 757.7388 ] Writing partition B_MEM_BCT with mem_coldboot_sigheader.bct.encrypt [ 243712 bytes ]
[ 757.7415 ] [.....] 100%
[ 760.7796 ] Flashing completed

[ 760.7800 ] Coldbooting the device
[ 760.7851 ] tegrarcv_v2 --chip 0x23 0 --isb2
[ 760.7896 ] MB2 version 01.00.0000
[ 760.8185 ] Coldbooting the device
[ 760.8237 ] tegrarcv_v2 --chip 0x23 0 --reboot coldboot
[ 760.8283 ] MB2 version 01.00.0000
*** The target generic has been flashed successfully. ***
Reset the board to boot from internal eMMC.
```

Step 7

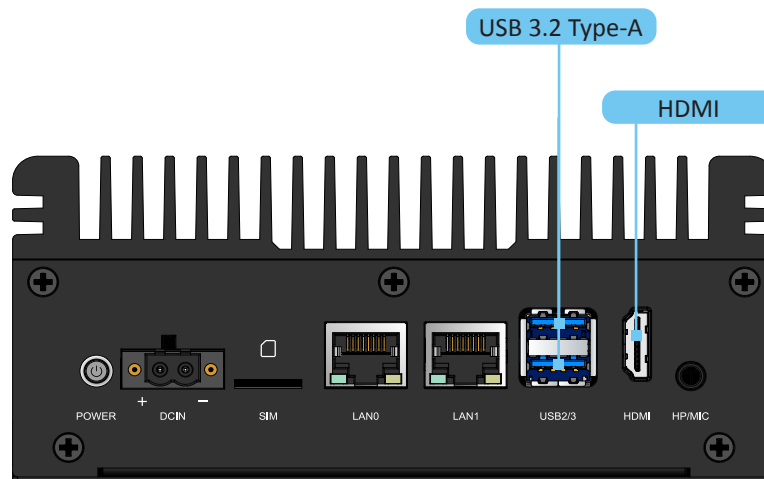
Disconnect the USB Type-C cable between the VIA AMOS-9100/9000 system and the Linux host machine.

4.2 System Configuration

Follow the steps below to configure the VIA AMOS-9100/9000 system.

Step 1

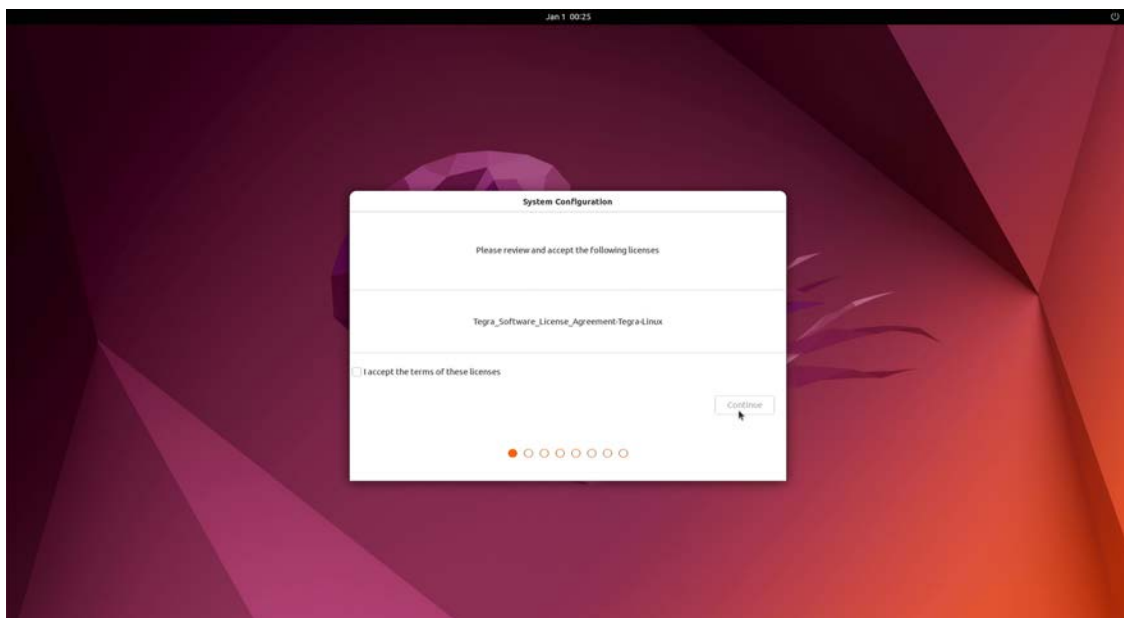
Locate the "HDMI" port and "USB2/3" USB 3.2 Type-A ports on the front panel of the VIA AMOS-9000/ AMOS-9100 system, and connect an HDMI monitor, a USB Type-A keyboard, and a USB Type-A mouse to the ports.



Location of the HDMI and USB Type A ports

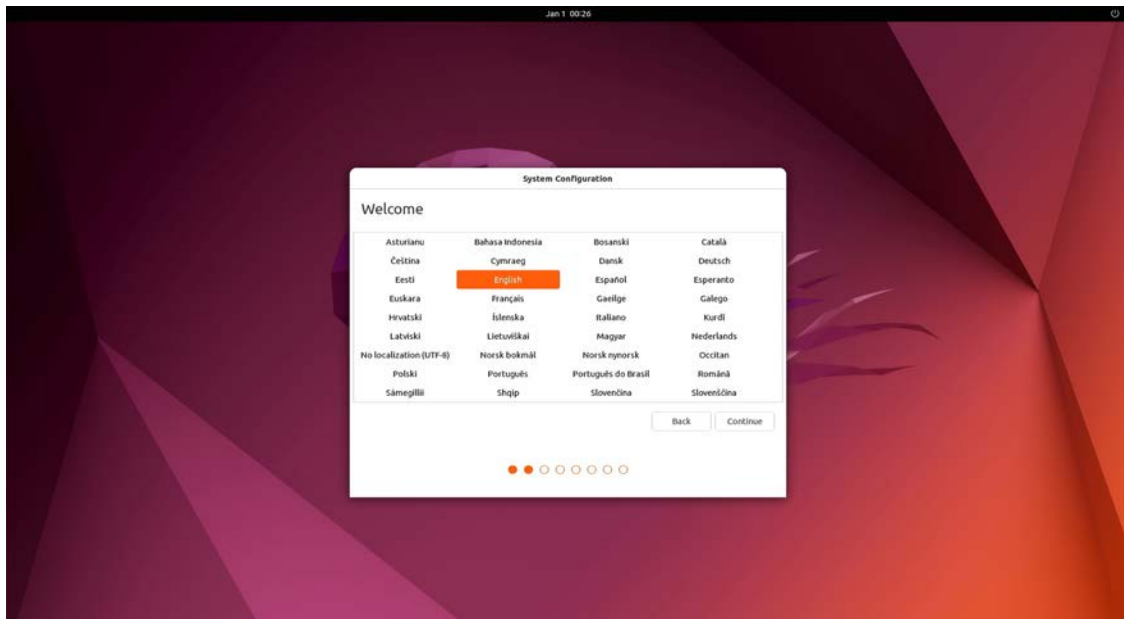
Step 2

Read all the license agreements for using the Linux software running on the VIA AMOS-9100/9000 system. If the terms of the license agreements are acceptable, check the box to confirm acceptance and click "Continue".



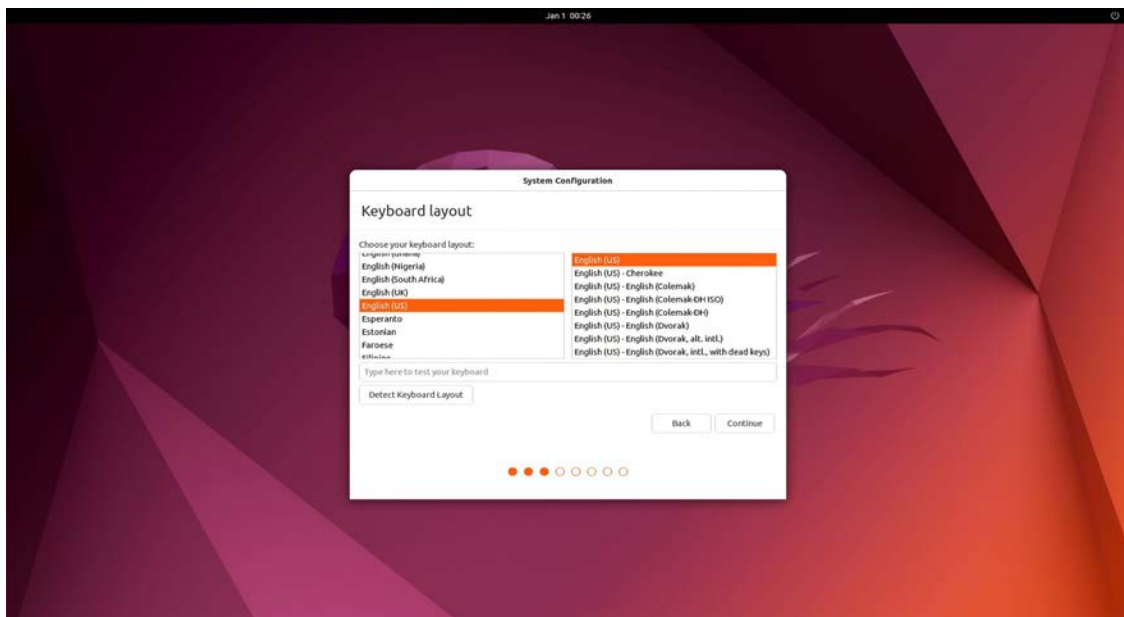
Step 3

On the next screen, select the preferred OS language and click "Continue".



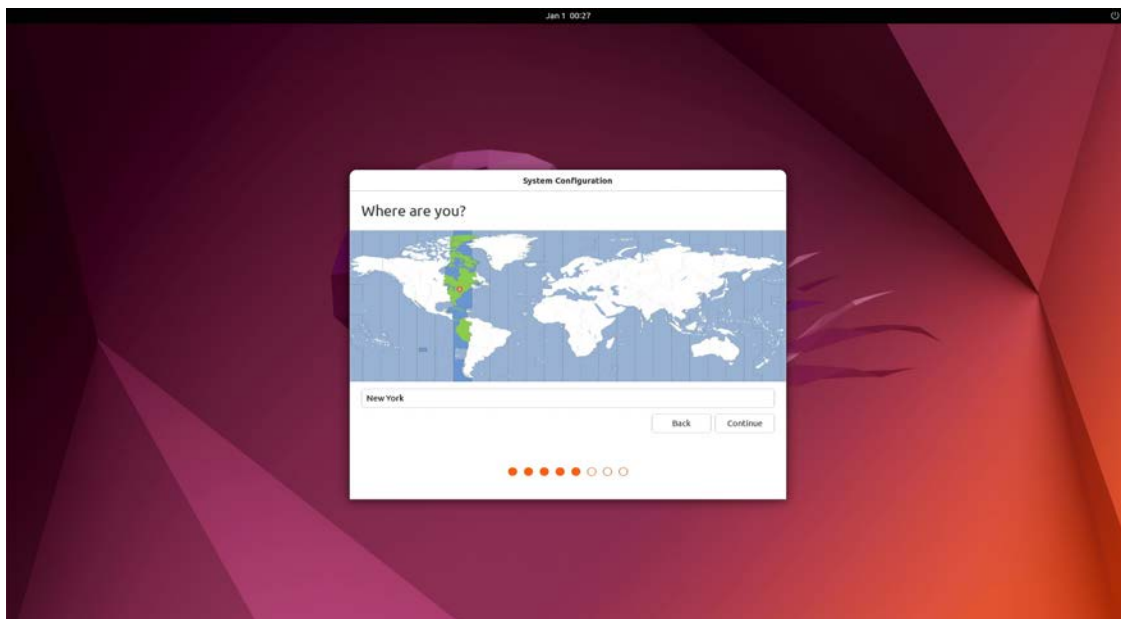
Step 4

On the next screen, select the preferred keyboard layout or keep the default selection and click "Continue".

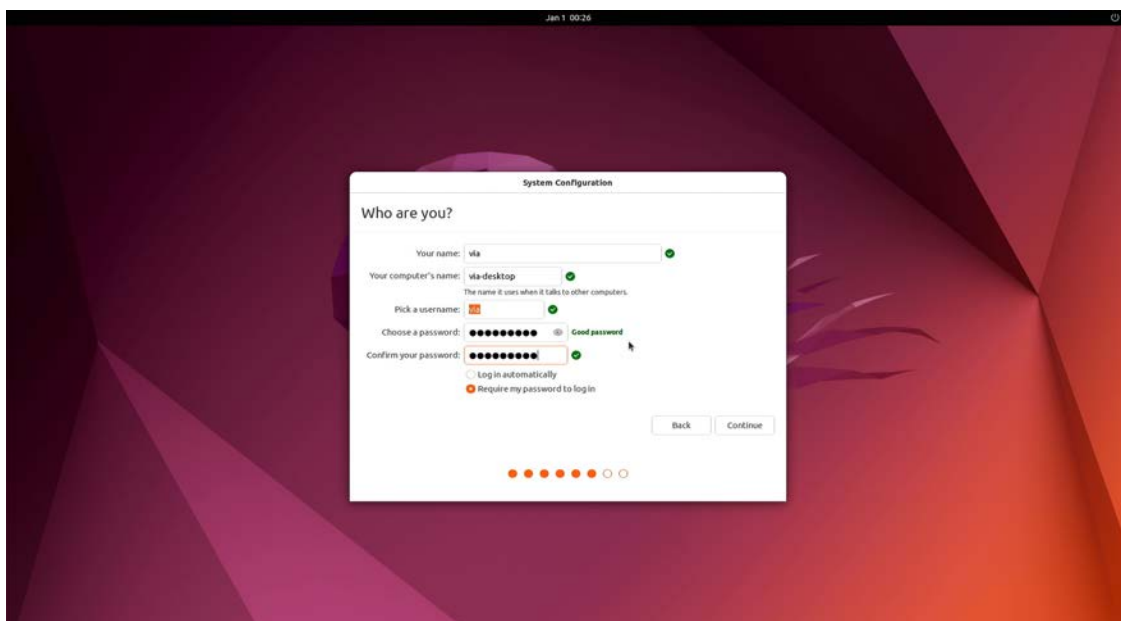


Step 5

On the next screen, select your location and click "Continue".

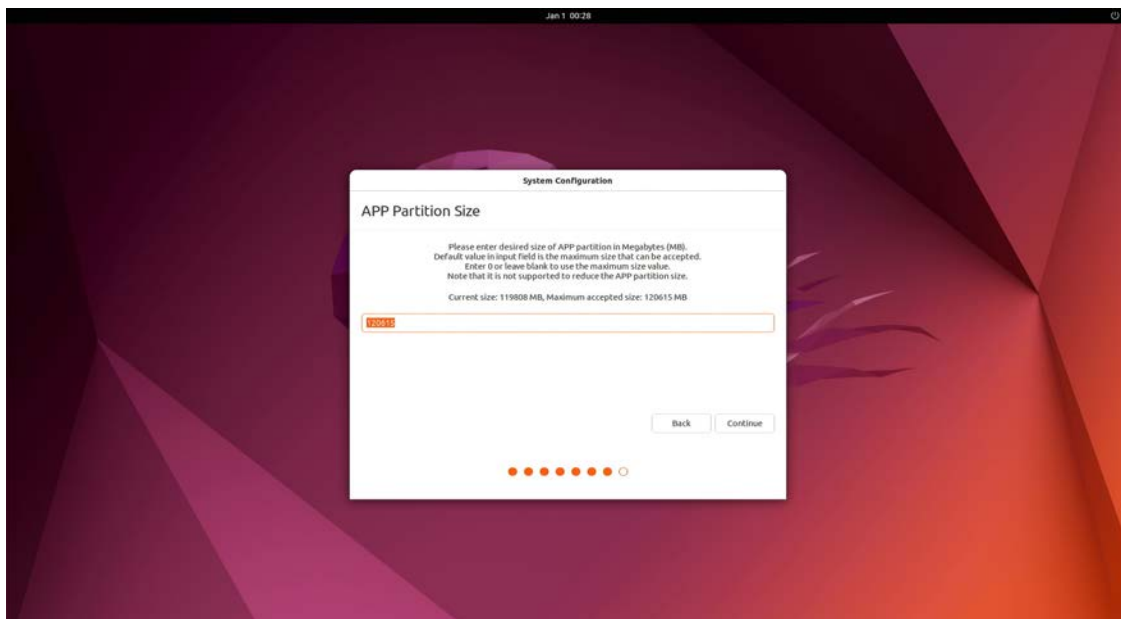
**Step 6**

On the next screen, fill in your name, a computer name, username and password. Then select the desired option for logging in automatically or requiring your password to log in and click "Continue".



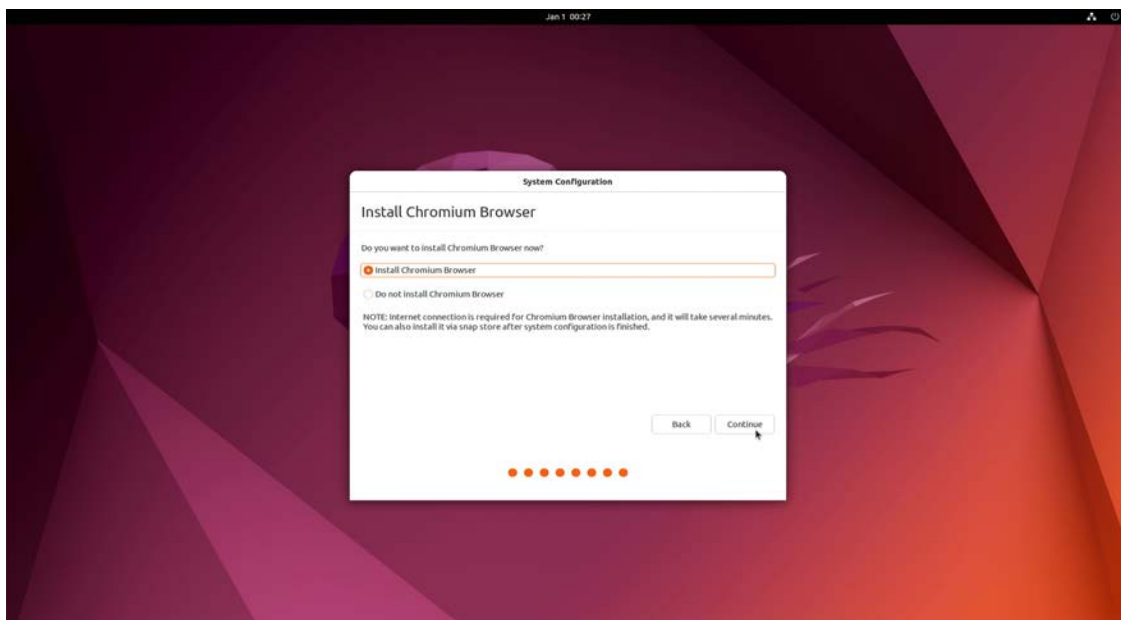
Step 7

Set the default app partition size or keep the default selection and click "Continue".

**Step 8**

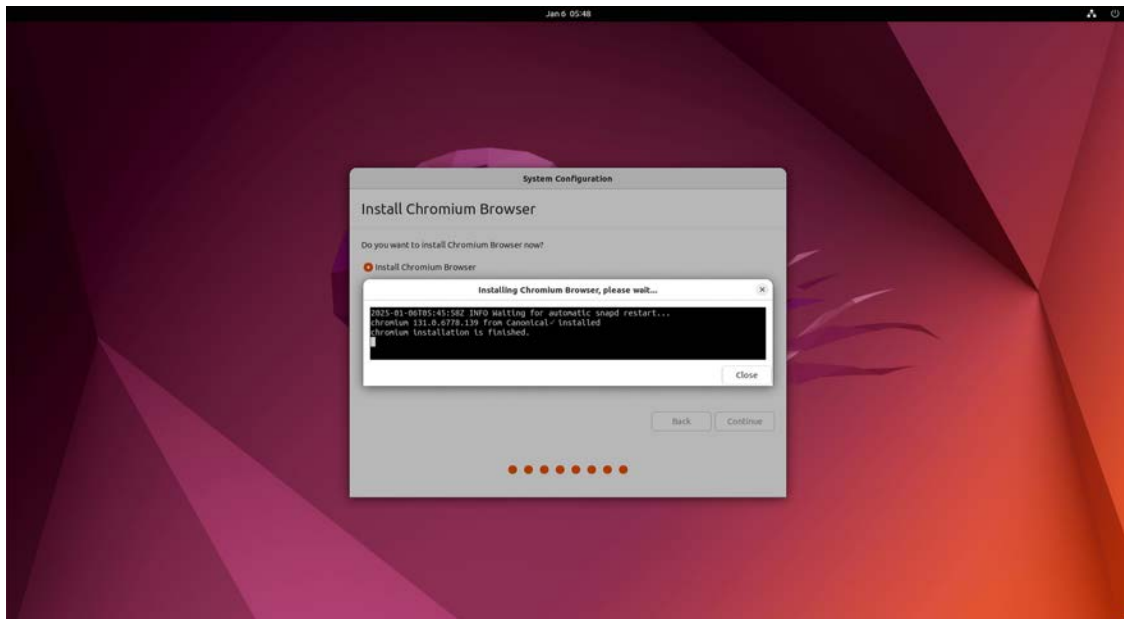
Select the desired option for installing or not installing the Chromium Web browser.

If the desired option is to install the Web browser, ensure that the VIA AMOS-9100/9000 system is connected to the Internet before clicking "Continue". If the desired option is to not install the Web browser, click "Continue" and proceed to Step 10 in this section.



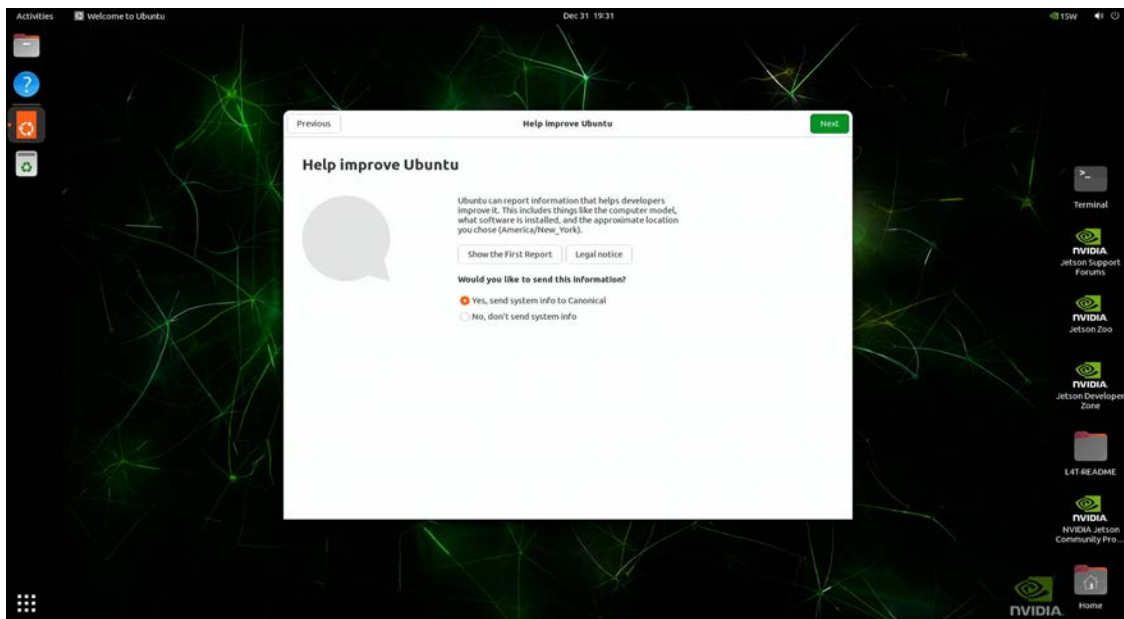
Step 9

Wait till the Chromium Web browser installation finishes and click "Close".



Step 10

The VIA AMOS-9100/9000 system will now automatically restart to apply the configuration settings and boot to the VIA AMOS-9100/9000 system's desktop.



5. Hardware Functions

This section describes how to enable and test the hardware functions compiled in the Linux OS Image for a VIA AMOS-9100 or VIA AMOS-9000 system.



Note:

Refer to the [NVIDIA Developer website](https://developer.nvidia.com) for detailed information on functions of the NVIDIA Jetson Orin Nano and Orin NX 8GB processors.

5.1 Using the Debug Console

Follow the steps below to use the debug console.

Step 1

Connect the Linux host machine and the VIA AMOS-9100/9000 system through the "Micro USB" port using a USB debug cable. The Micro USB 2.0 OTG port is located on the right panel of the VIA AMOS-9100/9000 system.



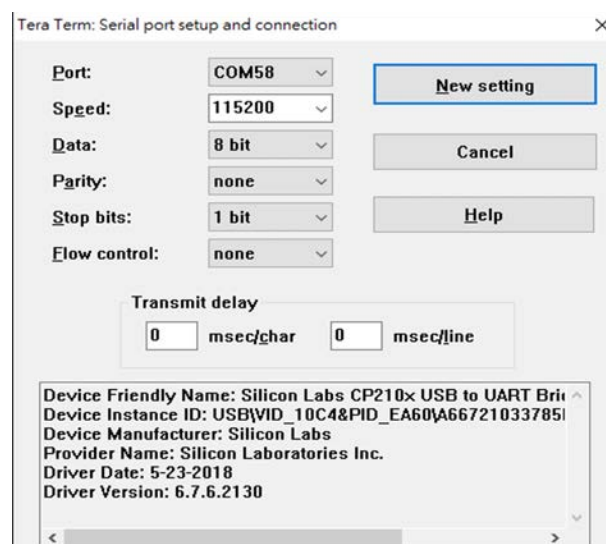
Location of the Micro USB 2.0 OTG port

Step 2

Use a serial port communication program such as PuTTY or Tera Term to connect the debug console.

Step 3

Select the correct serial port and set the Console Baud Rate to "115200".



Step 4

Power ON the VIA AMOS-9100/9000 system to initiate the boot process.

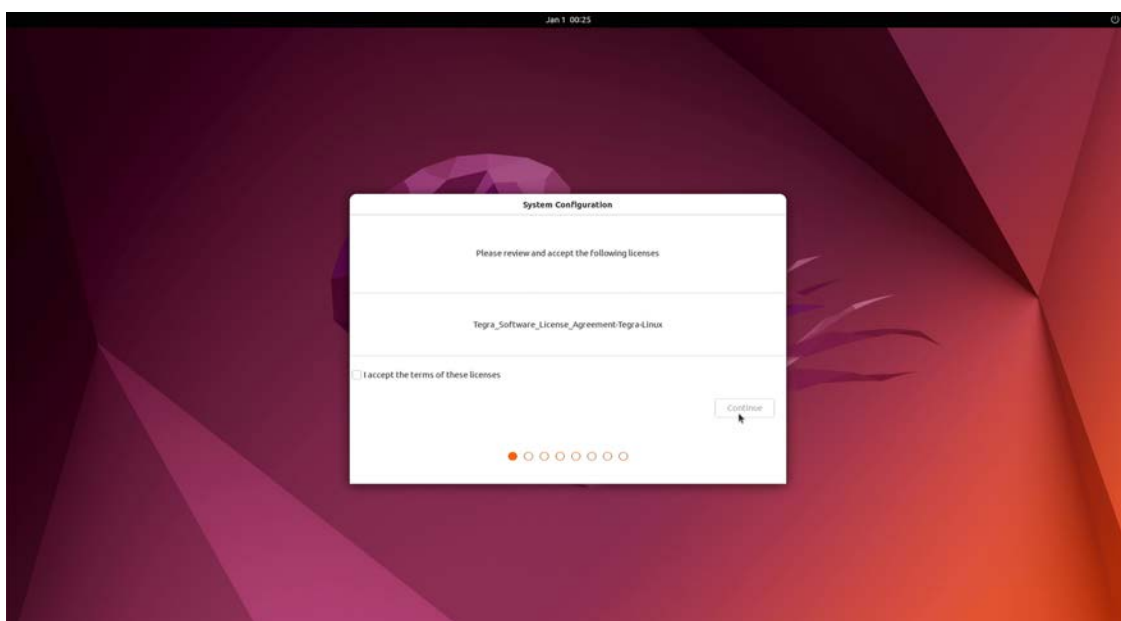
Step 5

When the VIA AMOS-9100/9000 system has completed booting, log in to the debug console using the account username and password set in [Step 6 of section 4.2](#).

5.2 Testing the HDMI Display and Audio Output

5.2.1 HDMI Display Output

Upon successful installation of the OS image on the VIA AMOS-9100/9000 system, HDMI display output was enabled on the system, as confirmed when the HDMI monitor displays the screen below upon connection to the system.

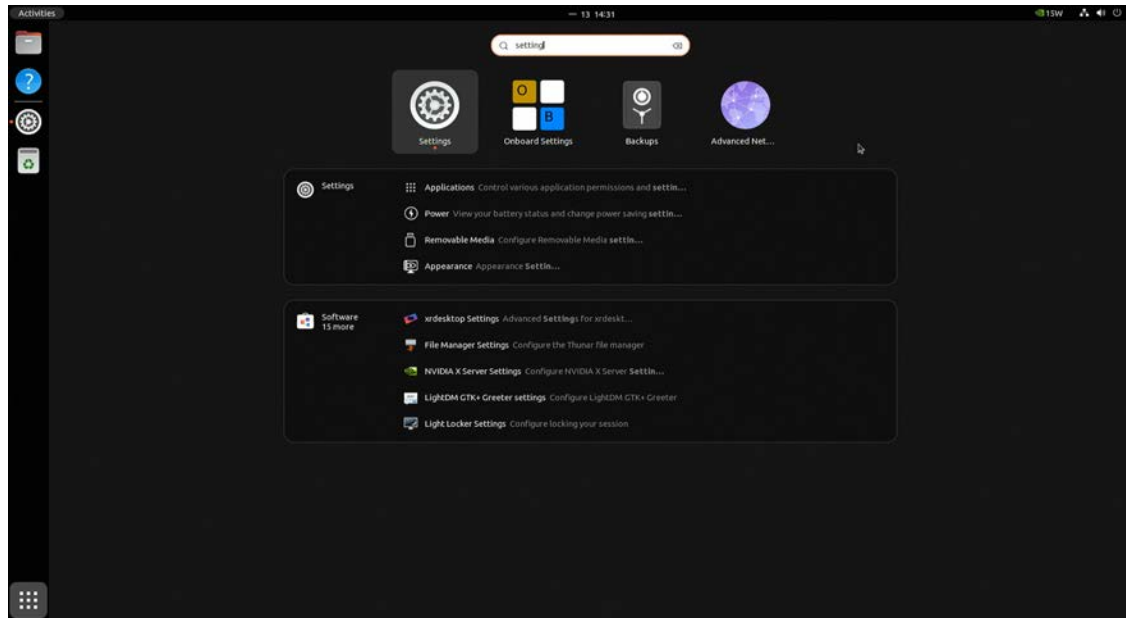


5.2.2 HDMI Audio Output

Follow the steps below to test the HDMI audio output.

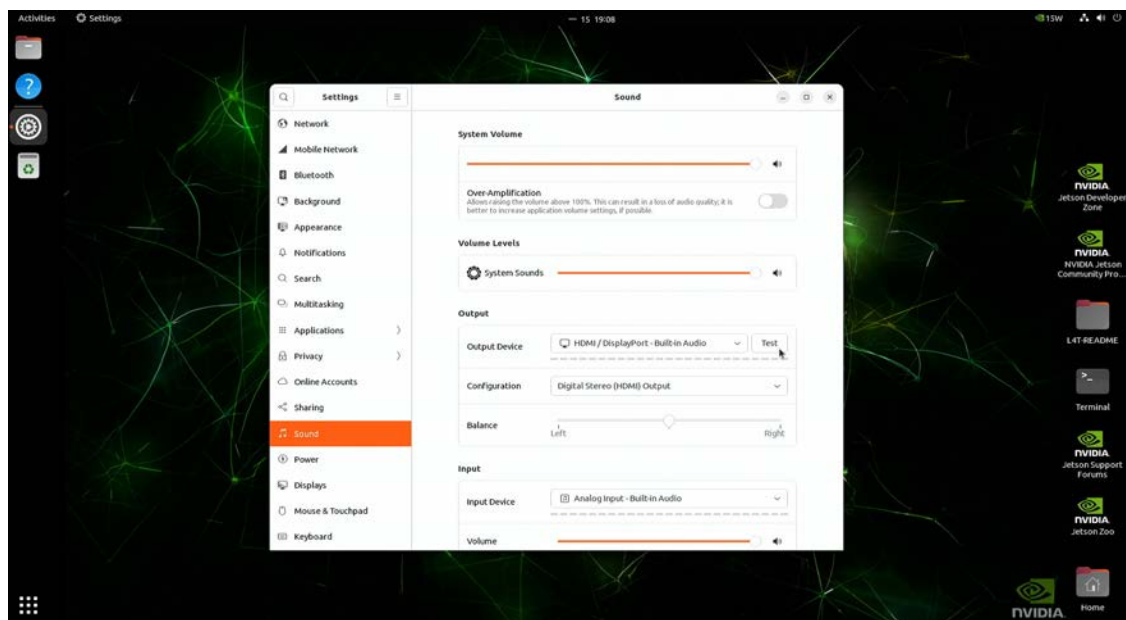
Step 1

Click "Launcher", type "Settings", and click the "Settings" icon.



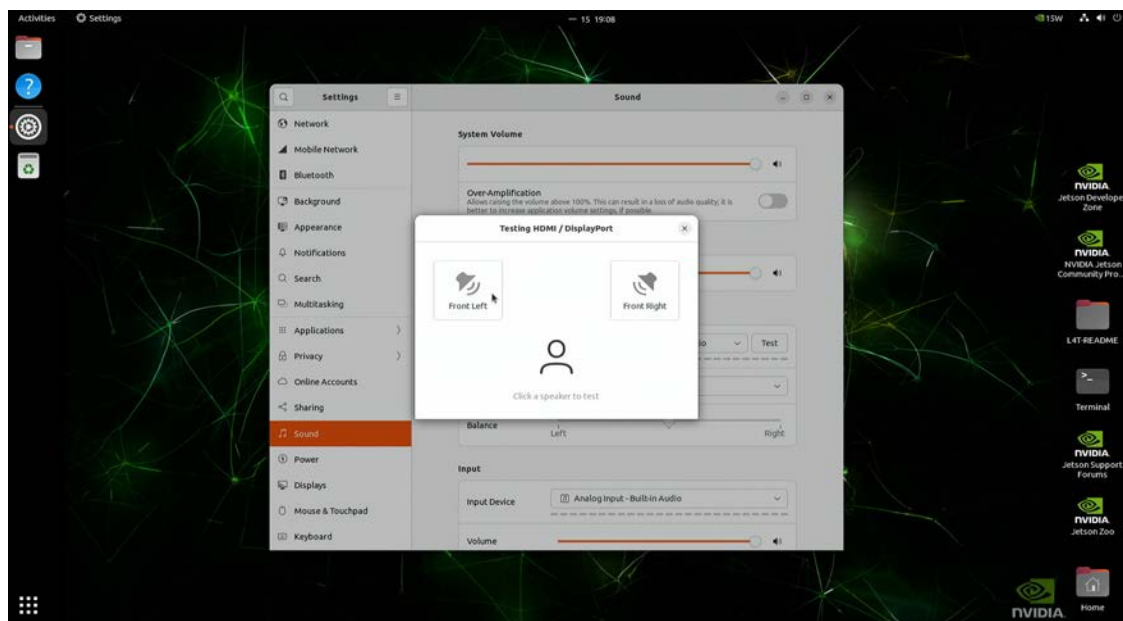
Step 2

Navigate to "Sound", select "HDMI/DisplayPort – Built-in Audio" as the "Output Device" and "Digital Stereo (HDMI) Output" as the "Configuration", then click "Test".



Step 3

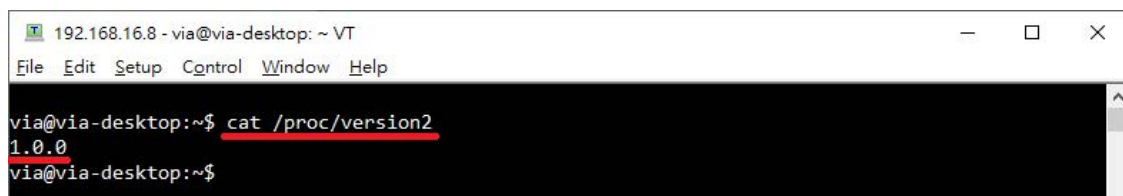
Click "Front Left" or "Front Right" to play audio.



5.3 Checking the BSP's Version

Run the following command to check the VIA AMOS-9000s Linux BSP's version:

```
$ cat /proc/version2
```



5.4 Changing the Power Mode

Follow the steps below to change the power mode of the VIA AMOS-9100/9000 system.

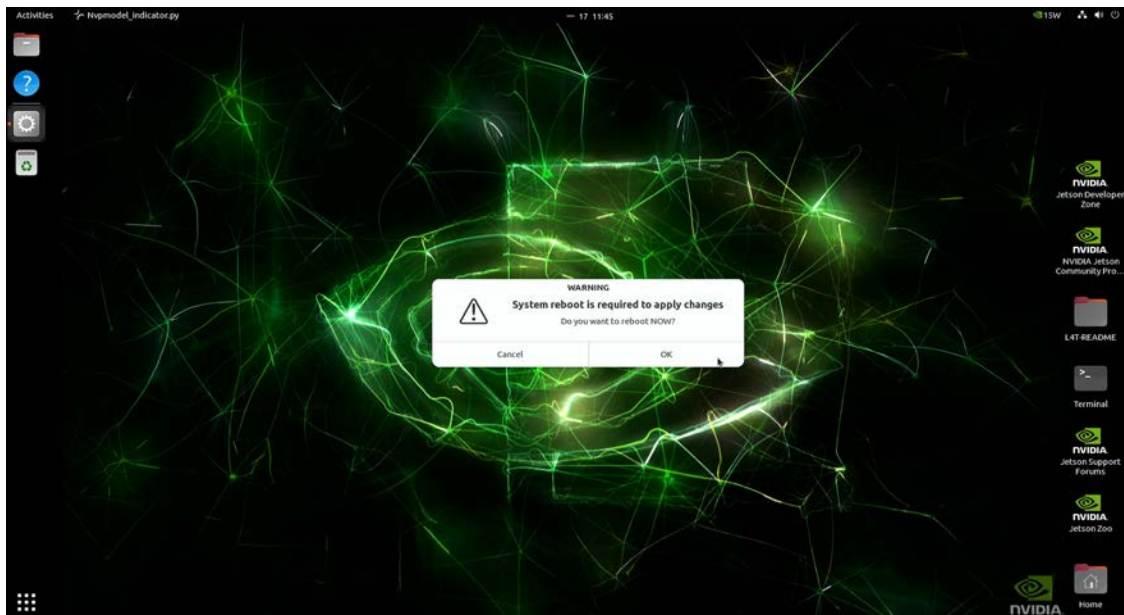
Step 1

Right-click on the power icon "  " on the top right corner of the VIA AMOS-9100/9000 system's desktop, then click "Power Mode" and select the desired power mode.



Step 2

On the next screen, select the desired option for rebooting the system immediately or canceling the change.



Note:

On the VIA AMOS-9100 system (NVIDIA Jetson Orin NX 8GB processor), the default power mode is 15W with four CPU cores engaged. All six CPU cores will be engaged when 20W or MAXN is set as the power mode.

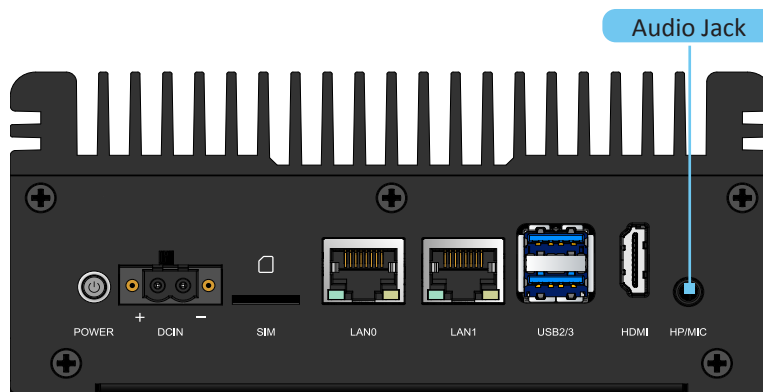
5.5 Testing the Microphone Input and Headphone Output

5.5.1 Microphone Input

Follow the steps below to test the microphone input.

Step 1

Plug in a microphone into the "HP/MIC" audio jack on the front panel of the VIA AMOS-9100/9000 system.



Location of the audio jack

Step 2

Run the following commands to set up the microphone's DAPM:

```
$ amixer -c1 cset name='CVB-RT RECMIXL BST1 Switch' 1
$ amixer -c1 cset name='CVB-RT RECMIXR BST1 Switch' 1
$ amixer -c1 cset name='CVB-RT Stereo1 ADC MIXL ADC1 Switch' 1
$ amixer -c1 cset name='CVB-RT Stereo1 ADC MIXR ADC1 Switch' 1
$ amixer -c1 cset name='CVB-RT ADC Capture Switch' 1
$ amixer -c1 cset name='CVB-RT IN1 Boost Volume' 5
```

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help
via@via-desktop:~$ amixer -c1 cset name='CVB-RT RECMIXL BST1 Switch' 1 && \
amixer -c1 cset name='CVB-RT RECMIXR BST1 Switch' 1 && \
amixer -c1 cset name='CVB-RT Stereo1 ADC MIXL ADC1 Switch' 1 && \
amixer -c1 cset name='CVB-RT Stereo1 ADC MIXR ADC1 Switch' 1 && \
amixer -c1 cset name='CVB-RT ADC Capture Switch' 1 && \
amixer -c1 cset name='CVB-RT IN1 Boost Volume' 5
numid=1188,iface=MIXER,name='CVB-RT RECMIXL BST1 Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
numid=1191,iface=MIXER,name='CVB-RT RECMIXR BST1 Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
numid=1192,iface=MIXER,name='CVB-RT Stereo1 ADC MIXL ADC1 Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
numid=1193,iface=MIXER,name='CVB-RT Stereo1 ADC MIXR ADC1 Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
numid=277,iface=MIXER,name='CVB-RT ADC Capture Switch'
; type=BOOLEAN,access=rw-----,values=2
: values=on,on
numid=274,iface=MIXER,name='CVB-RT IN1 Boost Volume'
; type=INTEGER,access=rw--R--,values=1,min=0,max=8,step=0
: values=5
| dBRange-
rangemin=0,,rangemax=0
| dBscale-min=0.00dB,step=0.00dB,mute=0
rangemin=1,,rangemax=1
| dBscale-min=20.00dB,step=0.00dB,mute=0
```

Run the following command to record audio and create a WAV file. Press Ctrl+C on the keyboard to stop recording once finished:

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help

via@via-desktop:~$ arecord -f cd -D plughw:1,0 -d 60 test.wav
Recording WAVE 'test.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo

^CAborted by signal Interrupt...
arecord: pcm_read:2221: read error: Interrupted system call
via@via-desktop:~$ ls -l test.wav
-rw-r--r-- 1 via via 1585196  15 19:17 test.wav
via@via-desktop:~$
```



To playback the recorded audio, check instructions in the following section.

Follow the steps below to test the headphone output.

Plug in a headphone into the audio jack labeled "HP/MIC" on the front panel of the VIA AMOS-9100/9000 system.

Run the following commands to set up the audio codec's DAPM:

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help
via@via-desktop:~$ amixer -c1 cset name="I2S2 Mux" "ADMAIF2" && \
amixer -c1 cset name='CVB-RT DAC MIXL INF1 Switch' 1 && \
amixer -c1 cset name='CVB-RT DAC MIXR INF1 Switch' 1 && \
amixer -c1 cset name='CVB-RT Stereo DAC MIXL DAC L1 Switch' 1 && \
amixer -c1 cset name='CVB-RT Stereo DAC MIXR DAC R1 Switch' 1 && \
amixer -c1 cset name='CVB-RT HPO MIX DAC1 Switch' 1 && \
amixer -c1 cset name='CVB-RT HP Playback Volume' 39
numid=1118,iface=MIXER,name='I2S2 Mux'
; type=ENUMERATED,access=rw-----,values=1,items=81
; Item #0 'None'
; Item #1 'ADMAIF1'
; Item #2 'ADMAIF2'
; Item #3 'ADMAIF3'
; Item #4 'ADMAIF4'
; Item #5 'ADMAIF5'
; Item #6 'ADMAIF6'
; Item #7 'ADMAIF7'
; Item #8 'ADMAIF8'
; Item #9 'ADMAIF9'
; Item #10 'ADMAIF10'
; Item #11 'ADMAIF11'
; Item #12 'ADMAIF12'
; Item #13 'ADMAIF13'
; Item #14 'ADMAIF14'
; Item #15 'ADMAIF15'
; Item #16 'ADMAIF16'
```

Step 3

Run the following commands to playback the previously-recorded or another WAV file, and check the headphone output:

```
$ aplay -D hw:1,1 test.wav
```

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help

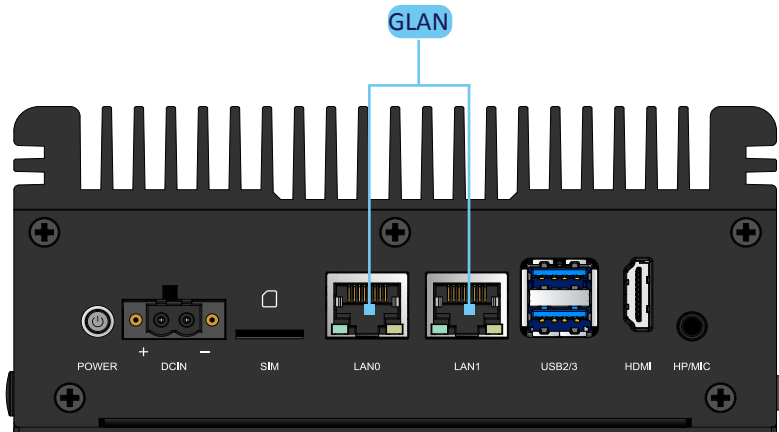
via@via-desktop:~$ aplay -D hw:1,1 test.wav
Playing WAVE 'test.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
via@via-desktop:~$
```

5.6 Testing the Ethernet Connectivity

Follow the steps below to test the Ethernet connectivity.

Step 1

Connect an active Ethernet cable to the "LAN0" or "LAN1" Gigabit Ethernet port on the front panel of the VIA AMOS-9100/9000 system.



Location of the Gigabit Ethernet ports

Step 2

Run the following command:

```
$ ifconfig
```

```
COM58 - Tera Term VT
File Edit Setup Control Window Help

via@via-desktop:~$ ifconfig
enP7p1s0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
ether c6:91:c8:ba:ba:8e txqueuelen 1000 (Ethernet)
RX packets 10012 bytes 13543397 (13.5 MB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 5718 bytes 491680 (491.6 KB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
device interrupt 252 base 0x3000

enP8p1s0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
ether 3c:6d:66:01:89:a2 txqueuelen 1000 (Ethernet)
RX packets 0 bytes 0 (0.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 0 bytes 0 (0.0 B)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
device interrupt 253 base 0xd000
```


Note:

"enP7p1s0" and "enP8p1s0" are respectively the "LAN0" and "LAN1" Gigabit Ethernet ports on the front panel of the VIA AMOS-9100/9000 system.

5.7 Testing the Power over Ethernet (PoE) Connectivity

Follow the steps below to test the PoE connectivity of a VIA AMOS-9100 system (only supported on the AMOS-9100-2H11A0 SKU).

Step 1

Run the following command to enable the PoE function:

```
$ gpioset 2 9=1
```

Step 2

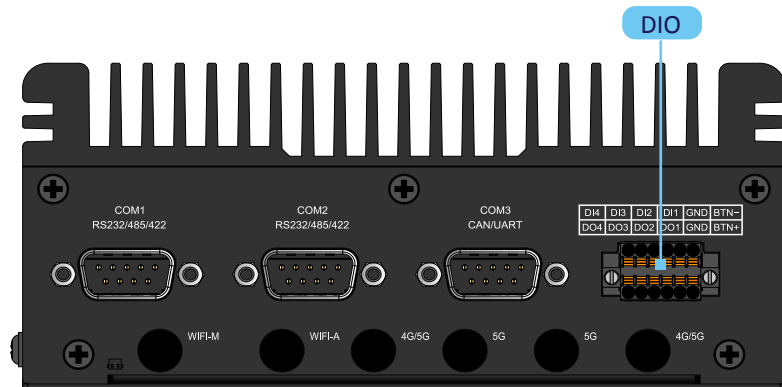
Connect your PoE-enabled device or Power Sourcing Equipment (PSE) to the "LAN0" or "LAN1" Gigabit Ethernet and PoE port on the front panel of the VIA AMOS-9100 system.

Step 3

Use the "ping" command with the PoE-enabled device's IP address to check its connection to the VIA AMOS-9100 system.

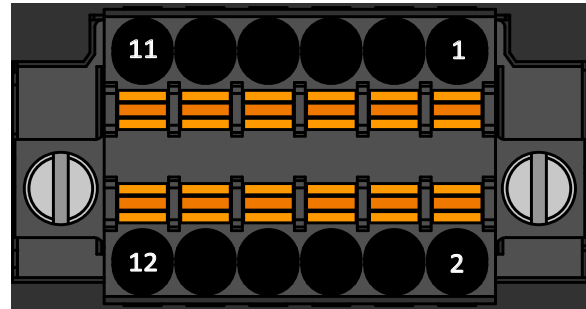
5.8 Using the 12-Pin DIO Port

Follow the mapping below of signals and IDs of the 12-pin DIO port located on the back panel of the VIA AMOS-9100/9000 system for controlling the port's digital input-output.



Location of the 12-pin DIO port

Pin	Signal	ID
1	BTN-	None
2	BTN+	None
3	GND_ISO	None
4	GND_ISO	None
5	DI1	0
7	DI2	1
9	DI3	2
11	DI4	3
6	DO1	4
8	DO2	5
10	DO3	6
12	DO4	7



Mapping of the DIO port's digital input-output signals and IDs

5.8.1 Using the Digital Input Signals

Run the following command to read and use the 12-pin DIO port's digital input signals:

```
$ gpioget 2 $id
```

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help

via@via-desktop:~$ gpioget 2 0
1
via@via-desktop:~$ gpioget 2 1
1
via@via-desktop:~$ gpioget 2 2
1
via@via-desktop:~$ gpioget 2 3
1
via@via-desktop:~$
```

5.8.2 Using the Digital Output Signals

Run the following command to read and use the 12-pin DIO port's digital output signals:

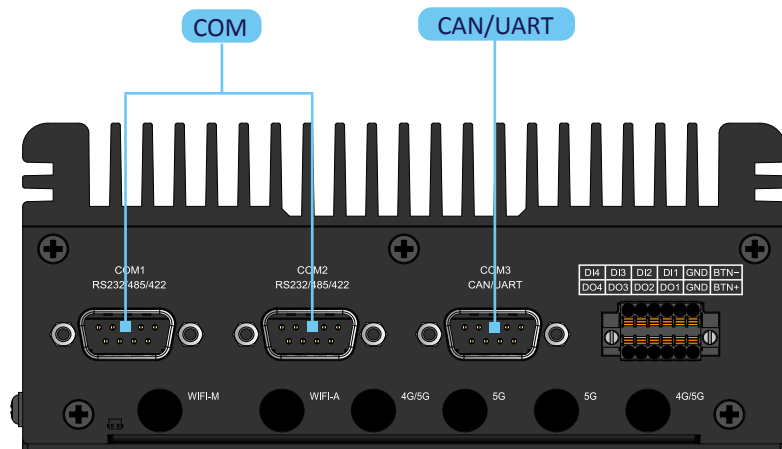
```
$ gpioset 2 $id=$value
```

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help

via@via-desktop:~$ gpioset 2 4=0
via@via-desktop:~$
via@via-desktop:~$ gpioset 2 4=1
via@via-desktop:~$
via@via-desktop:~$ gpioset 2 5=0
via@via-desktop:~$
via@via-desktop:~$ gpioset 2 5=1
via@via-desktop:~$
via@via-desktop:~$ gpioset 2 6=0
via@via-desktop:~$
via@via-desktop:~$ gpioset 2 6=1
via@via-desktop:~$
via@via-desktop:~$ gpioset 2 7=0
via@via-desktop:~$
via@via-desktop:~$ gpioset 2 7=1
via@via-desktop:~$
```

5.9 Using the COM Ports

Two COM RS-232/422/485 ports "COM1" and "COM2", and one CAN/UART port "COM3" are located on the back panel of the VIA AMOS-9100/9000 system.



Location of the COM ports

5.9.1 Using the COM RS-232/422/485 Ports

Follow the steps below to use the "COM1" or "COM2" port.

Step 1

Plug in a COM RS-232 or RS-422/485 cable.

Step 2

Check the mapping of device names and RS- modes in the table below.

	COM1	COM2
Device Name	/dev/ttyCH343USB1	/dev/ttyCH343USB2
RS- Mode	"232", "422", or "485"	"232", "422", or "485"

Mapping of COM port device names and modes

Step 3

Run the following command to configure the RS- mode:

```
$ # sudo com_init.sh $mode_for_com1 $mode_for_com2
$ # For example: (Config com1 mode to be RS232, com2 mode to be RS485)
$ com_init.sh 232 485
```

Step 4

Run the following commands to install and use the "minicom" app:

```
$ sudo apt update
$ sudo apt-get install minicom
$ # sudo minicom -D $com_device_name
$ # For example: (Use COM1)
$ sudo minicom -D /dev/ttyCH343USB1
```

5.9.2 Using the CAN/UART Port

Follow the steps below to use the CAN function of the "COM3" port.

Step 1

Connect a CAN device through a cable.

Step 2

Run the commands below to configure CAN and dump CAN data:

```
$ sudo ip link set can0 up type can bitrate 500000
$ candump can0
```

Follow the steps below to use the UART function of the "COM3" port.

Step 1

Plug in a UART cable.

Step 2

Run the following commands to install and use the "minicom" app:

```
$ sudo apt update
$ sudo apt-get install minicom
$ sudo minicom -D /dev/ttyCH343USB0
```

5.10 Testing the 6-Axis IMU

Run the following command to test the 6-axis IMU:

```
sudo test-sensors-sysfs -d 0 -a 100 -g 100 -c
```

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help
via@via-desktop:~$ sudo test-sensors-sysfs -d 0 -a 100 -g 100 -c
>Start
chip : icm43600
>Get accel orientation
-1,0,0,0,-1,0,0,1
>Get gyro orientation
-1,0,0,0,-1,0,0,1
>Set up IIO
sysfs: 0 -> /sys/bus/iio/devices/iio:device0/buffer/enable
sysfs: 1 -> /sys/bus/iio/devices/iio:device0/scan_elements/in_accel_en
sysfs: 128 -> /sys/bus/iio/devices/iio:device0/buffer/length
sysfs: 1 -> /sys/bus/iio/devices/iio:device0/buffer/enable
>Disable accel
sysfs: 0 -> /sys/bus/iio/devices/iio:device0/in_accel_enable
>Disable gyro
sysfs: 0 -> /sys/bus/iio/devices/iio:device0/in_anglvel_enable
>Set batch timeout
sysfs: 0 -> /sys/bus/iio/devices/iio:device0/misc_batchmode_timeout
>Disable FIFO High resolution mode
sysfs: 0 -> /sys/bus/iio/devices/iio:device0/in_high_res_mode
>Set accel FSR
sysfs: 2 -> /sys/bus/iio/devices/iio:device0/in_accel_scale
>Get accel FSR
sysfs: 8 <- /sys/bus/iio/devices/iio:device0/in_accel_scale
>Set accel rate
sysfs: 100 -> /sys/bus/iio/devices/iio:device0/in_accel_rate
>Enable accel
sysfs: 1 -> /sys/bus/iio/devices/iio:device0/in_accel_enable
>Set gyro FSR
sysfs: 3 -> /sys/bus/iio/devices/iio:device0/in_anglvel_scale
>Get gyro FSR
sysfs: 2000 <- /sys/bus/iio/devices/iio:device0/in_anglvel_scale
>Set gyro rate
```

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help
read len = 432
Accel (m/s^2): -0.074220, -0.093374, -9.502587, Gyro (rad/s): -0.003196,
+0.002131, -0.005326
Accel (m/s^2): -0.071826, -0.098162, -9.495404, Gyro (rad/s): -0.002131,
+0.001065, -0.005326
Accel (m/s^2): -0.086191, -0.076614, -9.481039, Gyro (rad/s): -0.003196,
+0.002131, -0.003196
Accel (m/s^2): -0.098162, -0.093374, -9.490616, Gyro (rad/s): -0.003196,
+0.002131, -0.004261
Accel (m/s^2): -0.093374, -0.098162, -9.507375, Gyro (rad/s): -0.003196,
+0.002131, -0.003196
Accel (m/s^2): -0.083797, -0.098162, -9.502587, Gyro (rad/s): -0.003196,
+0.002131, -0.004261
Accel (m/s^2): -0.095768, -0.093374, -9.490616, Gyro (rad/s): -0.003196,
+0.002131, -0.004261
Accel (m/s^2): -0.102951, -0.105345, -9.495404, Gyro (rad/s): -0.003196,
+0.003196, -0.004261
Accel (m/s^2): -0.081403, -0.090980, -9.485827, Gyro (rad/s): -0.003196,
+0.002131, -0.003196
```

5.11 Configuring and Testing Wi-Fi and Bluetooth

Follow the steps below to configure and test the Wi-Fi and Bluetooth connectivity.



Note:

Check if the optional Wi-Fi 6 and Bluetooth 5.3 module is installed on the VIA AMOS-9100/9000 system before performing configuration and testing.

Step 1

Run the following command for configuring the Wi-Fi and Bluetooth connectivity:

```
$ sudo dpkg -i /usr/src/via/amos9k_bcm_ap12275.deb
```

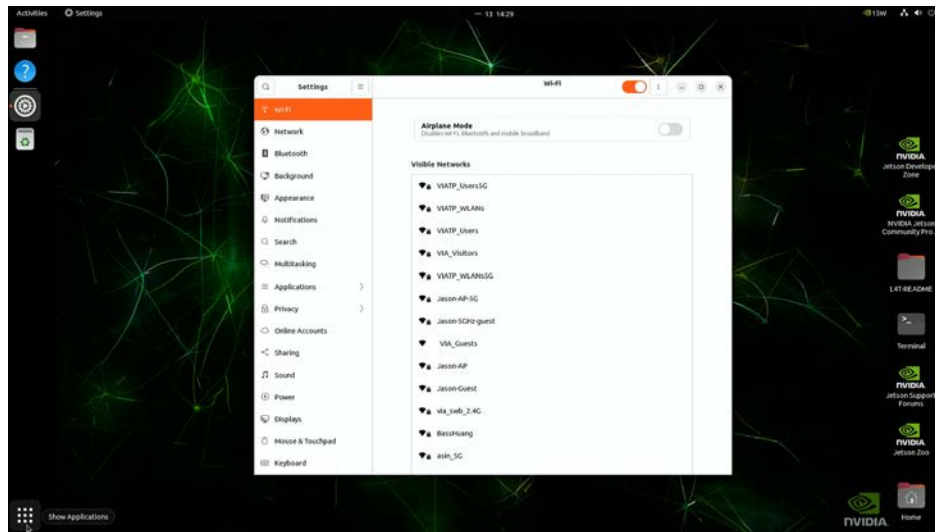
```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help
via@via-desktop:~$ sudo dpkg -i /usr/src/via/amos9k_bcm_ap12275.deb
[sudo] password for via:
Selecting previously unselected package amos9k-bcm-ap12275.
(Reading database ... 188845 files and directories currently installed.)
Preparing to unpack .../src/via/amos9k_bcm_ap12275.deb ...
Unpacking amos9k-bcm-ap12275 (1.0) ...
Setting up amos9k-bcm-ap12275 (1.0) ...
Adding 'diversion of /etc/modprobe.d/bcmdhd.conf to /etc/modprobe.d/bcmdhd.conf.old by amos9k-bc
m-ap12275'
```

Step 2

Click "Launcher", type "Settings", and click the "Settings" icon.

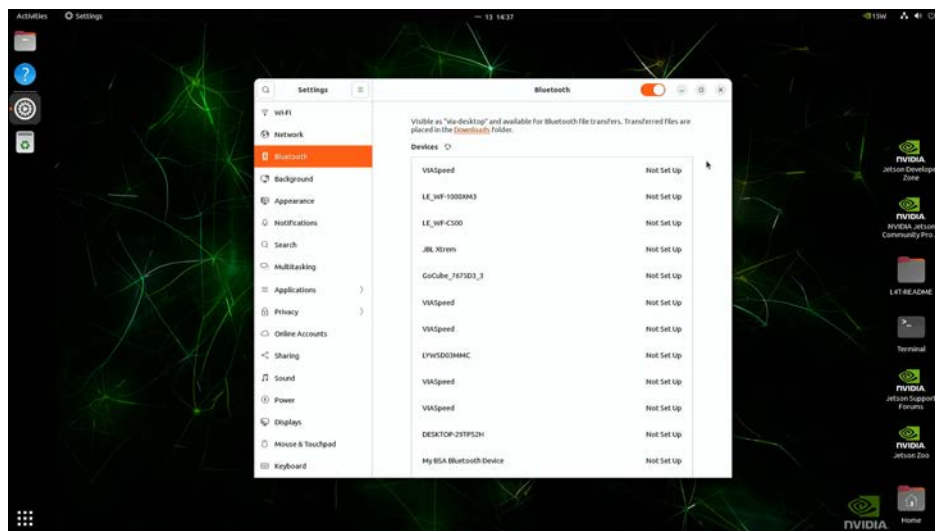
Step 3

Navigate to "Wi-Fi" and select the desired Visible Network to test the Wi-Fi connectivity.



Step 4

Next, navigate to "Bluetooth" and select the desired Device to test the Bluetooth connectivity.



5.12 Configuring and Enabling 4G LTE or 5G

Follow the steps below to configure and enable 4G LTE or 5G.



Note:

Note: Check if the optional 4G LTE or 5G mobile broadband M.2 module is installed on the VIA AMOS-9100/9000 system before proceeding with configuration and enabling procedures.

Step 1

Run the following command for installing the necessary libraries for 4G LTE and 5G connectivity:

```
$ sudo apt update
$ sudo apt install install libqmi-utils udhcpc
```

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help
via@via-desktop:~$ sudo apt update
[sudo] password for via:
Hit:1 https://repo.download.nvidia.com/jetson/common r36.4 InRelease
Hit:2 https://repo.download.nvidia.com/jetson/t234 r36.4 InRelease
Hit:3 https://repo.download.nvidia.com/jetson/ffmpeg r36.4 InRelease
Hit:4 http://ports.ubuntu.com/ubuntu-ports jammy InRelease
Hit:5 http://ports.ubuntu.com/ubuntu-ports jammy-updates InRelease
Hit:6 http://ports.ubuntu.com/ubuntu-ports jammy-backports InRelease
Hit:7 http://ports.ubuntu.com/ubuntu-ports jammy-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
203 packages can be upgraded. Run 'apt list --upgradable' to see them.
via@via-desktop:~$ sudo apt install libqmi-utils udhcpc
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  busybox
The following NEW packages will be installed:
  busybox libqmi-utils udhcpc
0 upgraded, 3 newly installed, 0 to remove and 203 not upgraded.
Need to get 636 kB of archives.
After this operation, 1668 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://ports.ubuntu.com/ubuntu-ports jammy-updates/universe arm64 busybox arm64 1:1.30.1-7ubuntu3.1 [436 kB]
Get:2 http://ports.ubuntu.com/ubuntu-ports jammy-updates/universe arm64 libqmi-utils arm64 1.32.0-1ubuntu0.22.04.1 [197 kB]
Get:3 http://ports.ubuntu.com/ubuntu-ports jammy-updates/universe arm64 udhcpc arm64 1:1.30.1-7ubuntu3.1 [197 kB]
```

Step 2

Run the following command for configuring 4G LTE or 5G:

```
$ gpioset 2 16=1
$ sudo dpkg -i /usr/src/via/amos9k_telit_lte.deb
```

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help
via@via-desktop:~$ gpioset 2 16=1
via@via-desktop:~$ sudo dpkg -i /usr/src/via/amos9k_telit_lte.deb
Selecting previously unselected package amos9k_telit_lte.
(Reading database ... 188869 files and directories currently installed.)
Preparing to unpack .../src/via/amos9k_telit_lte.deb ...
Unpacking amos9k_telit_lte (1.0) ...
Setting up amos9k_telit_lte (1.0) ...
via@via-desktop:~$
```

Step 3

Run the following command for enabling 4G LTE or 5G:

```
$ sudo init.telit.qmi.sh start
```

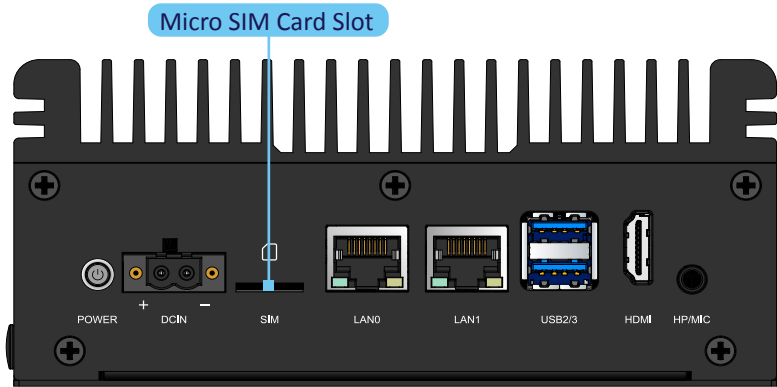
```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help
via@via-desktop:~$ sudo init.telit.qmi.sh start
Starting init_telit_qmi: Telit FN990 5G module detected
```

5.13 Checking the Micro SIM Card's Status

Follow the steps below to check the 4G LTE or 5G Micro SIM card's status.

Step 1

Insert a 4G LTE or 5G Micro SIM card into the Micro SIM card slot located on the front panel of the VIA AMOS-9100/9000 system.



Location of the Micro SIM card slot

Step 2

Run the following command:

```
$ sudo init.telit.qmi.sh start
```

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help

via@via-desktop:~$ sudo init.telit.qmi.sh start
Starting init_telit_qmi: Telit FN990 5G module detected
[/dev/cdc-wdm0] Operating mode set successfully
SIM Ready!
telit_qmi: init telit_qmi: connect telit_qmi: apn:"internet" user:"" password:"" auth:"" |
```

5.14 Configuring and Testing LoRa

Follow the steps below to test the LoRa connectivity of a VIA AMOS-9100 system (only supported on the AMOS-9100-2H11A0 SKU).

Step 1

Run the following command for configuring the LoRa connectivity:

```
$ sudo dpkg -i /usr/src/via/amos9k_ascip_ai50h.deb
```

```
192.168.16.8 - via@via-desktop: ~ VT
File Edit Setup Control Window Help

via@via-desktop:~$ sudo dpkg -i /usr/src/via/amos9k_ascip_ai50h.deb
[sudo] password for via:
Selecting previously unselected package amos9k-acsip-ai50h.
(Reading database ... 188857 files and directories currently installed.)
Preparing to unpack .../src/via/amos9k_ascip_ai50h.deb ...
Unpacking amos9k-acsip-ai50h (1.0) ...
Setting up amos9k-acsip-ai50h (1.0) ...
via@via-desktop:~$
```

Step 2

Run the following command for testing the LoRa connectivity:

```
$ sudo lora AT
```



The screenshot shows a terminal window titled "192.168.16.8 - via@via-desktop: ~ VT". The window has a menu bar with "File", "Edit", "Setup", "Control", "Window", and "Help". The terminal content shows the command `via@via-desktop:~$ sudo lora AT` being entered. Below the command, the output is displayed: `Init /dev/ttyCH343USB3`, `send: AT`, `recv:`, and `OK`. The `OK` line is underlined. The prompt `via@via-desktop:~$` is visible at the bottom of the terminal.



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