QUICK START GUIDE

ARTiGO A630

Linux EVK v1.0.1

1.00-08292017-100800

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Revision History

Version	Date	Remarks
1.00	08/29/2017	Initial release.

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1. Introduction

This Quick Start Guide provides an overview on how to boot the Linux EVK system image on the ARTiGO A630 and configure the supported hardware functions in the build.

The ARTiGO A630 Linux EVK is developed based on debian-8.6.0-lxde-player (Debian 8.6) and it enables the hardware features of the ARTiGO A630 system.

1.1 EVK Package Content

There are two folders in the package listed as below.

Firmware folder	Description
ARTiGO_A630_Linux_EVK_v1.0.1.zip	Precompiled Image
Document folder	**Description**
ARTiGO_A630_Linux_EVK_ v1.0.1_Quick_Start_ Guide_v1.00_20170829.pdf	Quick Start Guide

ARTiGO-A630 Linux EVK contents

1.1.1 Firmware Folder Contents

ARTiGO_A630_Linux_EVK_v1.0.1.zip: contains installation script files and the precompiled U-boot and image for evaluating the ARTiGO A630 system.

1.1.2 Document Folder Contents

ARTiGO_A630_Linux_EVK_v1.0.1_ Quick_Start_Guide_v1.00_20170829.pdf: This Quick Start Guide provides an overview on how to boot the Linux EVK system image in the ARTiGO A630 system and configure the supported hardware functions in the build.

1.2 Version Information and Supported Features

- U-Boot version: 1.1.4
- Kernel version: 3.4.5
- Evaluation image: Debian 8.6
- Development based on WM8980
- Supports SPI with eMMC boot
- Supports HDMI display
- Supports HDMI audio output
- Supports Micro USB 2.0 OTG port
- Supports Debug UART connector
- Supports 10/100Mbps Ethernet
- Supports Line-out and Mic-in
- Supports EMIO-5531 USB Wi-Fi & Bluetooth module
  - Supports Bluetooth A2DP and SPP profile
- Supports EMIO-2531 miniPCIe Wi-Fi & Bluetooth module
  - Supports Bluetooth A2DP and SPP profile
- Supports EMIO-2550 miniPCIe Mobile Broadband module
- Supports GPIO, UART and Watchdog timer

2. Image Installation

The ARTiGO A630 only supports booting Linux from the SPI ROM with eMMC. This section explains the setup requirements for booting from the SPI ROM with eMMC.

The installation script files, the precompiled U-boot and image are provided in the “Firmware” folder.

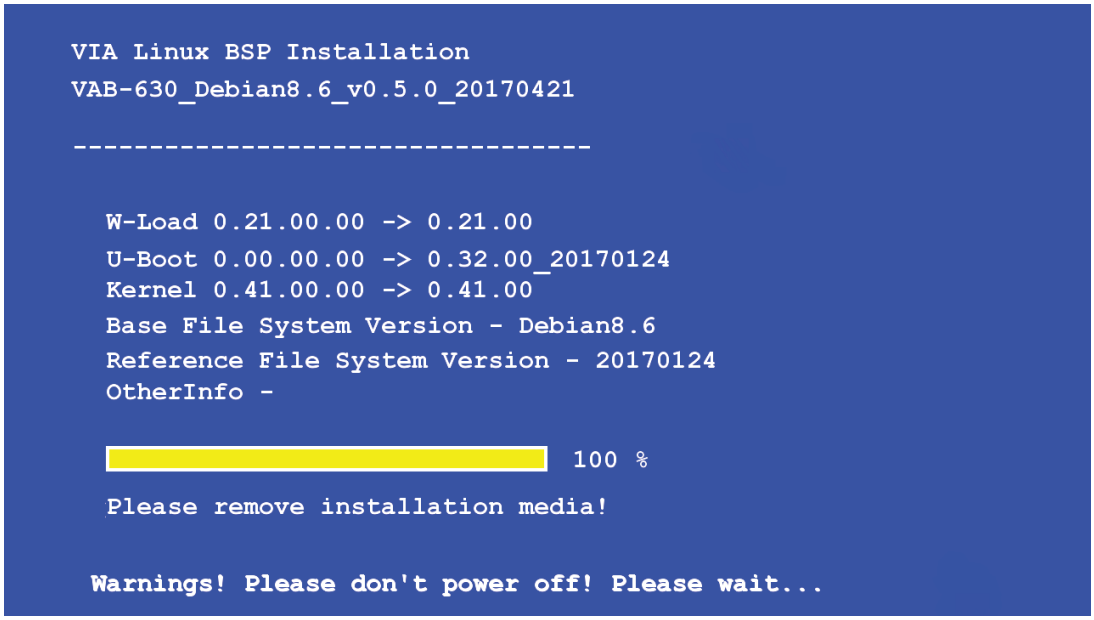
2.1 Requirements

- Host machine
- Micro SD card
- EVK package : ARTiGO_A630_Linux_EVK_v1.0.1.zip

2.2 Booting from the SPI ROM with eMMC

The first step is to insert a Micro SD card into the host machine and create a FAT formatted partition. Next, extract the **ARTiGO_A630_Linux_EVK_v1.0.1.zip** and copy the **bspinst** folder and **scriptcmd** file onto the Micro SD card.

Insert the prepared Micro SD card into the ARTiGO A630, connect an HDMI display, and power on the device to initiate the update process.



Update process screen

***Note:**

Keep the power on during the installation process. After the installation process has completed, the system will automatically restart.

Wait for the login prompt to appear. The default user name is debian and the password is debian.

3. Hardware Fuction

This section explains how to enable and test the hardware functions precompiled in the ARTiGO A630 Linux EVK including setting up U-Boot parameters, configuring display parameter, configuring watchdog timer, setting up GPIO, and configuring UART.

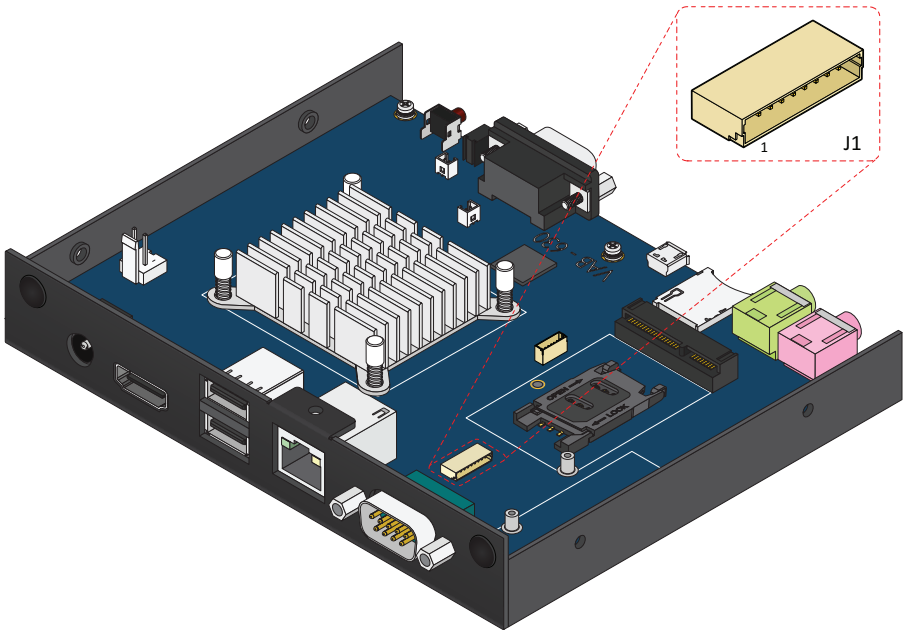
3.1 Setting Up U-Boot Parameters

VIA recommends that console board (P/N: 15GCU000000-20) and console cable (P/N: 99G33-192486) are used in order to configure the ARTiGO A630 parameters.

The first step is to connect the host machine to the console board, then connect the console board to the ARTiGO A630 through the Debug UART connector (J1). Use a serial port communication program such as PuTTY, GtkTerm, or Minicom, to configure the serial port setting and connect to the debug console. There you will be able to see the U-Boot boot log and adjust settings in the U-Boot console.

```
+-----------------------------------------------------------------------+
|  A    -         Serial Device                : /dev/ttymxc0         |
|  B    -       Lockfile Location              : /var/lock            |
|  C    -         Callin Program               :                      |
|  D    -        Callout Program               :                      |
|  E    -          Bps/Par/Bits                : 115200 8N1           |
|  F    -       Hardware Flow Control          : No                   |
|  G    -       Software Flow Control          : No                   |
+-----------------------------------------------------------------------+
```

Serial port setting of host machine



Debug UART connector (J1) diagram

Pin	Signal
1	UART0TXD
2	UART0RXD
3	SFCLK
4	GND
5	SFDO
6	SFDI
7	SFCS0-
8	VCC_SF

Debug UART connector (J1) pinout table

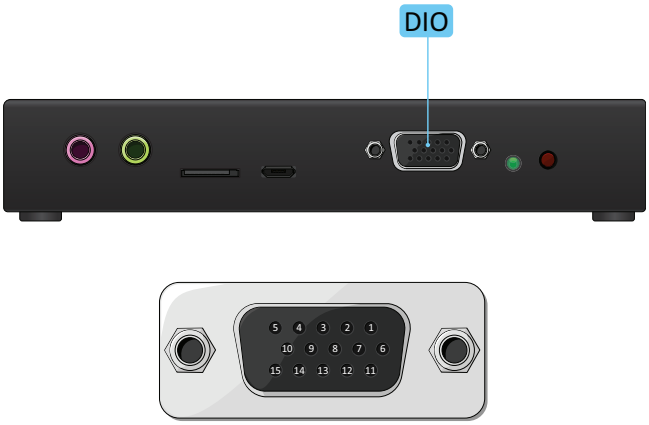
Next, power on the ARTiGO A630 to initiate the boot process. When prompted, press any key to stop the boot process and enter the U-Boot console as illustrated by the screenshot below.

```
WonderMedia Technologies, Inc.
W-Load Version : 0.21.00.00

Uncompressing U-Boot... done, booting
U-Boot.

U-Boot 1.1.4 (Jan 24 2017 - 15:55:04)
WonderMedia Technologies, Inc.
U-Boot Version : 0.32.00.00
logo = 675 ms
Hit any key to stop autoboot:  0
WMT #
```

Debug console view of boot process

3.2 Setting Up GPIO

The DIO port on the ARTiGO A630 system consists of 15 pins. Pins 1~7 and 10~12 are the active pins. The following section explains setting up these pins for input/output communication.



DIO port diagram

3.2.1 Setting Up DIO Port for GPIO Functionality

The echo value of GPIO pins are listed below:

Pin	Signal	GPIO echo value
1	GPIO-1	1
2	GPIO-2	2
3	GPIO-3	3
4	GPIO-5	5
5	GPIO-6	6
6	GPIO-7	7
7	GPIO-8	8
8	GND	
9	NC	
10	GPIO-12	12
11	GPIO-13	13
12	GPIO-14	14
13	VO_33	
14	VO_33	
15	GND	

DIO port pinout table

```
$ sudo -i
```

Type the following command to login to root's shell:

```
# echo 1 > /sys/class/gpio/export
```

To set the multifunction pin as a GPIO pin. Here is the example for GPIO pin 1:

```
# echo 1 > /sys/class/gpio/unexport
```

To disable the multifunction pin as a GPIO pin. Here is the example for GPIO pin 1:

To display the multifunction pin as a GPIO pin status:

```
# cat /sys/kernel/debug/gpio
```

3.2.2 Setting Up GPI Mode

To set a pin to “input” mode (GPI), use the following command (here is the example for GPIO pin 1):

```
# echo in > /sys/class/gpio/gpio1/direction
```

To read the GPI input value, use the following command:

```
# cat /sys/class/gpio/gpio1/value
```

3.2.3 Setting Up GPO Mode

To set a pin to “output” mode (GPO), use the following command (here is the example for GPIO pin 1):

```
# echo out > /sys/class/gpio/gpio1/direction
```

To output a “Low” value on the GPO pin, use the following command:

```
# echo 0 > /sys/class/gpio/gpio1/value
```

To output a “High” value on the GPO pin, use the following command:

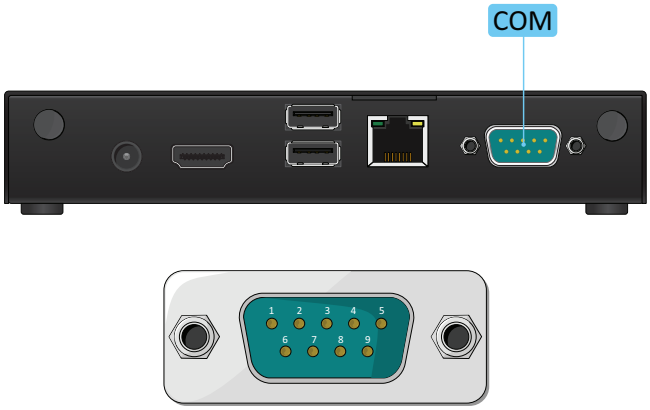
```
# echo 1 > /sys/class/gpio/gpio1/value
```

3.3 Configuring UART

The COM port of the ARTiGO A630 system supports RS-232 mode (Serial Device: /dev/ttyS1) and TX/RX communication with other devices.

The first step is to connect the host machine to the COM port on the ARTiGO A630 using an RS-232 cable.

Next on the host machine, and ARTiGO A630 start a serial communication program such as Putty, GtkTerm or Minicom with the same serial port setting using the appropriate serial device.



COM port diagram

Pin	Signal
1	NC
2	IC_RXD1
3	IC_RXD1
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC

COM port pinout table

To start the Minicom serial communication program on the ARTiGO A630, use the following command:

```
# minicom -s
```

Start a serial communication program on the host machine with the same communication settings using the appropriate serial device. Afterwards the host machine and the ARTiGO A630 will be able to communicate through the programs (for example sending a keypress on one machine will be shown on the other machine).

3.4 Configuring Watchdog Timer

A Watchdog timer is an electronic timer that is used to detect and recover system malfunctions.

The **wdt_driver_test.out** provides an application to configure the Watchdog timer.

To enable the Watchdog with the default timeout (60 seconds), use the following command:

```
$ sudo ./wdt_driver_test.out enable
```

To change the timeout <value> and the system reboot <value> (seconds), use the following command:

```
$ sudo ./wdt_driver_test.out set_timeout <value>
```

To send keep-alive requests to the Watchdog <value> (seconds), use the following command:

```
$ sudo ./wdt_driver_test.out set_keep_alive <value>
```

When the value of “set_keep_alive” is smaller than the value of ”set_timeout”, the system will not reboot.

To disable the Watchdog, use the following command:

```
$ sudo ./wdt_driver_test.out disable
```

4. Accessories

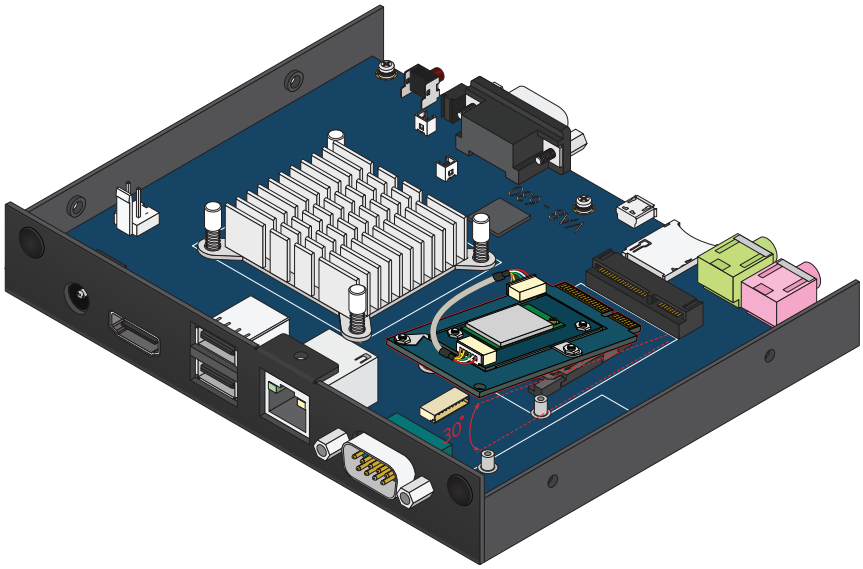
This section explains how to install and configure the various EMIO wireless modules available for the ARTiGO A630 system.

4.1 Configuring the EMIO-2531 miniPCIe/EMIO-5531 USB Wi-Fi & Bluetooth Module

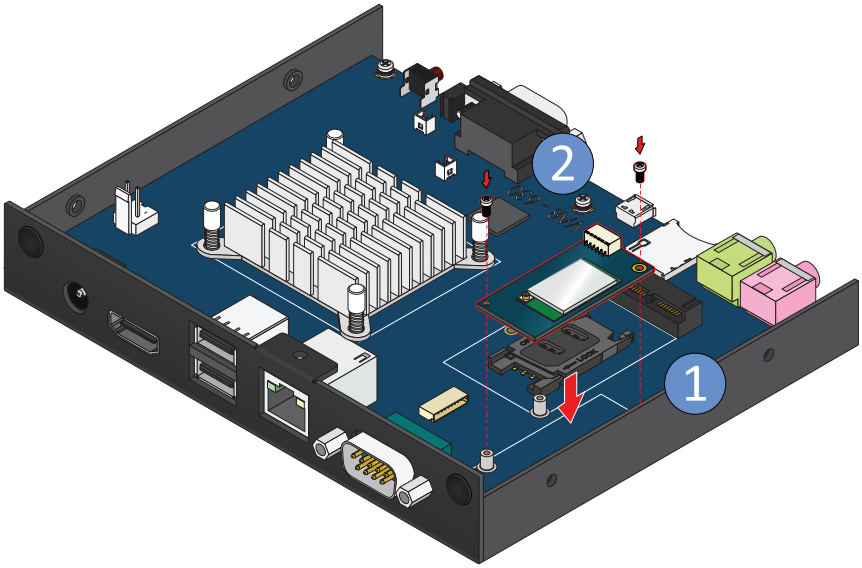
The ARTiGO A630 default driver supports the EMIO-2531 miniPCIe/EMIO-5531 USB Wi-Fi & Bluetooth module.

4.1.1 Connecting to the Internet

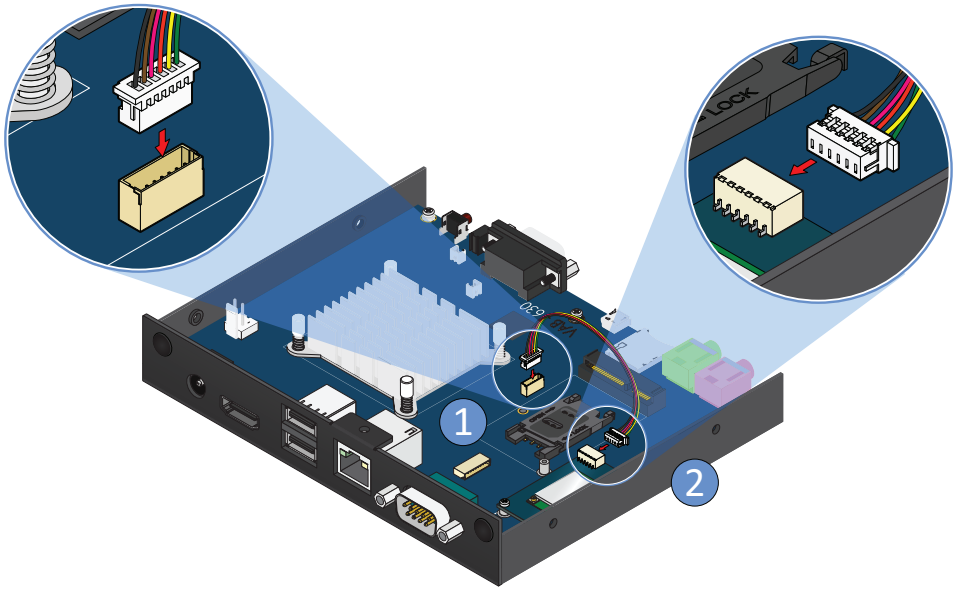
The first step is to insert the EMIO-2531 module into the miniPCIe slot or connect the EMIO-5531 module to the onboard USB connector (JUSB1) using the USB cable (P/N: 99G3-190042). After installing either module, connect the provided antenna to the module. Finally, power on the ARTiGO A630.



Inserting the EMIO-2531 module

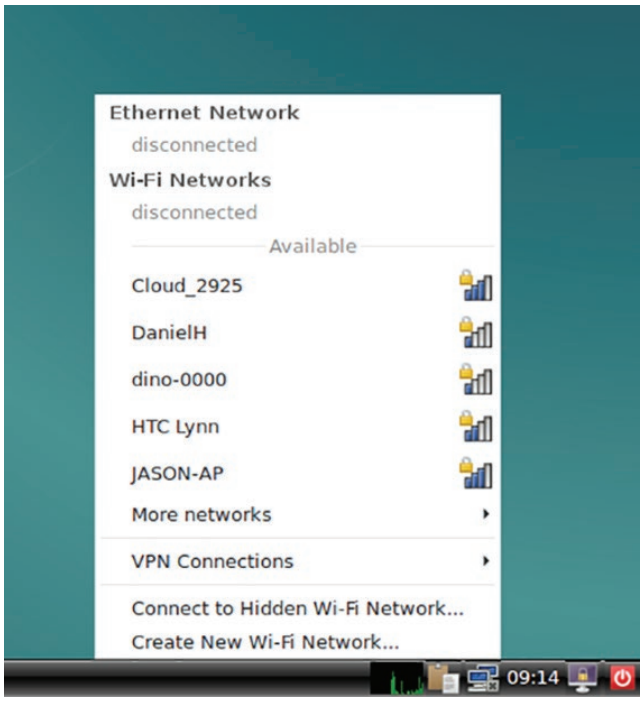


Installing the EMIO-5531 module



Connecting the USB Wi-Fi & Bluetooth cable

When the boot process is completed, click on the “Network Manager” icon to configure the Wi-Fi.



A list of Wi-Fi connections will appear on the screen, select the appropriate device to complete the Wi-Fi connection.

After the connection is created, connect to the internet through your web browser.

4.1.2 Enabling Bluetooth

The following sections show how to enable the Bluetooth Advanced Audio Distribution Profile (A2DP) to allow audio playback through a connected Bluetooth device as well as how to configure the Bluetooth Serial Port Profile (SPP).

4.1.2.1 Setting Up Bluetooth A2DP Profile

The first step is to extract to BT_Config.zip file. Next, copy the pulseaudio-system.conf, bluetooth.conf and system.pa files to /etc/dbus-1/system.d/ folder to replace the original pulseaudio-system.conf, Bluetooth.conf and system.pa files in order to add the A2DP support into the system.

To enable the Bluetooth service, use the following command:

```
$ rfkill unblock bluetooth
$ hciconfig hci0 up
$ /usr/lib/bluez5/bluetooth/bluetoothd -C -d &
$ hciconfig hci0 piscan
```

Use the following commands to run the “bluetoothctl” to show the EMIO-2531 Bluetooth MAC address and set up pairing mode.

```
$ bluetoothctl
[NEW] Controller 5C:F3:70:24:4B:2E
[bluetooth]#
[bluetooth]# show
Controller 5C:F3:70:24:4B:2E
        Name: BlueZ 5.25
        Alias: BlueZ 5.25
        …..
[bluetooth]# select 5C:F3:70:24:4B:2E
[bluetooth]# power on
Changing power on succeeded
[bluetooth]# agent on
Agent registered
[bluetooth]# default-agent
Default agent request successful
[bluetooth]# discoverable on
Changing discoverable on succeeded
[CHG] Controller 5C:F3:70:24:4B:2E Discoverable: yes
[bluetooth]# pairable on
Changing pairable on succeeded
[bluetooth]# scan on
Discovery started
[CHG] Controller 5C:F3:70:24:4B:2E Discovering: yes
[NEW] Device 00:1D:82:BC:C1:C4 Jabra BT-530
…
[bluetooth]# scan off
[bluetooth]# devices
Device 00:1D:82:BC:C1:C4 Jabra BT-530
Device …
[bluetooth]# pair 00:1D:82:BC:C1:C4
[bluetooth]# trust 00:1D:82:BC:C1:C4
```

To enable Bluetooth device, use the following commands:

```
[bluetooth]# connect 00:1D:82:BC:C1:C4
[bluetooth]# info 00:1D:82:BC:C1:C4
[bluetooth]# quit
```

4.1.2.2 Setting Up the Bluetooth SPP Profile

The ARTiGO A630 supports SPP server mode and SPP client mode.

Use the following commands to run the “bluetoothctl” to show the Bluetooth MAC address and set up pairing mode for the EMIO-2531 or EMIO-5531 module.

```
$ bluetoothctl
[NEW] Controller 5C:F3:70:24:4B:2E
[bluetooth]# scan on
Discovery started
[CHG] Controller 5C:F3:70:24:4B:2E Discovering: yes
[NEW] Device 5C:F3:70:25:DD:33 BlueZ 5.25
…
[bluetooth]# scan off
[bluetooth]# devices
Device 5C:F3:70:25:DD:33 BlueZ 5.25
Device …
[bluetooth]# pair 5C:F3:70:25:DD:33
[bluetooth]# trust 5C:F3:70:25:DD:33
[bluetooth]# quit
```

SPP server mode:
If you do not change the listen channel number, the service will automatically use the default channel number. Make sure the server or client mode is using the same Bluetooth channel number.

To set up the SPP server mode and allow other devices to connect, use the following commands:

```
# sdptool add SP
Serial Port service registered
# rfcomm listen hci0
Waiting for connection on channel 1
Connection from 5C:F3:70:25:DD:33 to /dev/rfcomm0
Press CTRL-C for hangup
```

SPP client mode:
If you do not change the listen channel number, the service will automatically use the default channel number. Make sure the server or client mode is using the same listen channel number.

Use the following commands to set up the SPP client mode and request a connection to SPP server.

```
# sdptool add SP
Serial Port service registered
# rfcomm connect hci0 5C:F3:70:24:4B:2E
Connected /dev/rfcomm0 to 5C:F3:70:24:4B:2E on channel 1
Press CTRL-C for hangup
```

To open the minicom serial communication program, use the following command:

```
# minicom -s
```

Connect to the /dev/rfcomm0 serial device with the following settings:

```
+-----------------------------------------------------------------------+
| A    -        Serial Device              : /dev/rfcomm0               |
| B    -      Lockfile Location            : /var/lock                  |
| C    -        Callin Program             :                            |
| D    -       Callout Program             :                            |
| E    -         Bps/Par/Bits              : 115200 8N1                 |
| F    -      Hardware Flow Control        : No                         |
| G    -      Software Flow Control        : No                         |
+-----------------------------------------------------------------------+
```

Serial port setting

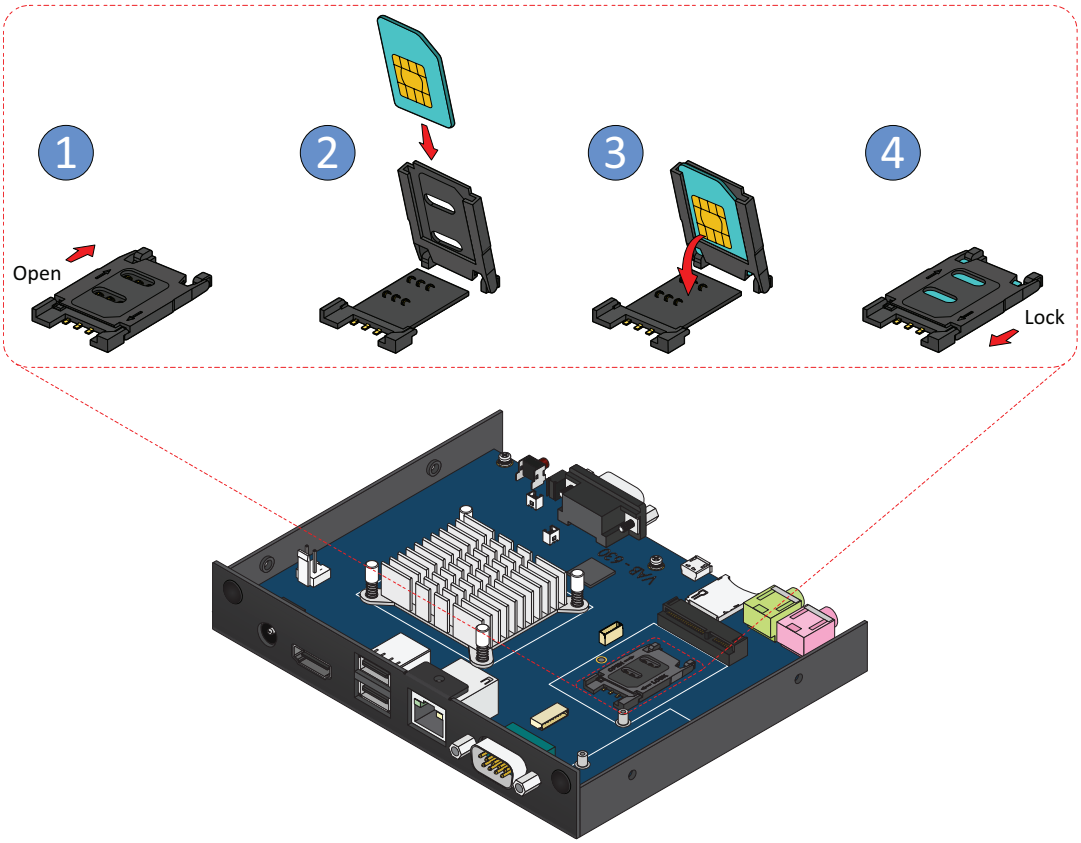
Start a serial communication program on the host machine with the same communication settings using the appropriate Bluetooth SPP device. Afterwards the Bluetooth SPP device and the ARTiGO A630 will be able to communicate through the programs (for example sending a keypress on one machine should be shown on the other machine).

4.2 Configuring the EMIO-2550 miniPCIe Mobile Broadband Module

The EMIO-2550 miniPCIe Mobile Broadband module supports 3G functions.

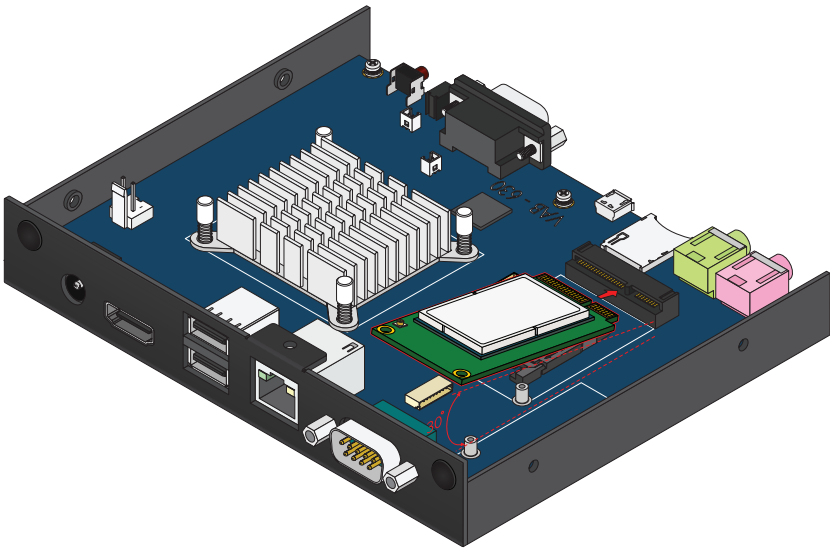
4.2.1 Connecting to the Internet

The first step is to insert an active SIM card into the SIM card slot on the ARTiGO A630 system, and then insert the EMIO-2550 module into the miniPCIe slot. After installing the module connect the provided antenna to the module. Next, make sure to unplug any LAN cables or USB Wi-Fi dongles you have installed. Finally, power on the ARTiGO A630.



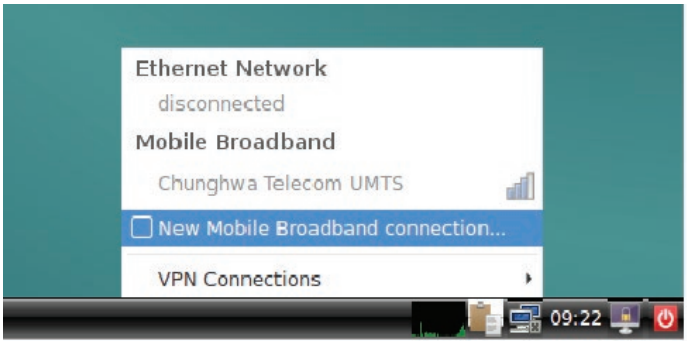
Inserting the SIM card

Next, insert the EMIO-2550 module into the miniPCIe slot. Finally, power on the ARTiGO A630.



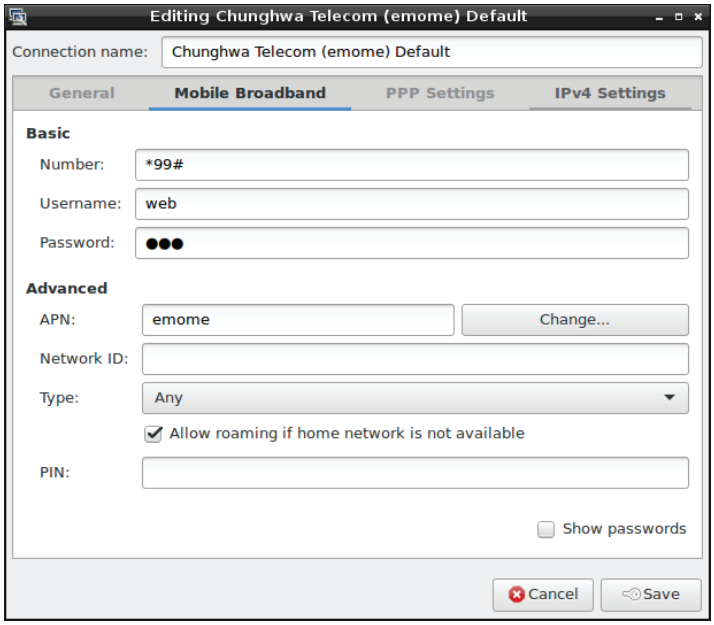
Inserting the EMIO-2550 module

To configure the Mobile broadband connection, click on the “Network Manager” icon located in the notification area then click “New Mobile Broadband connection” and a wizard will appear; follow the wizard screen dialogue box to create the connection.



Network Manger configuration

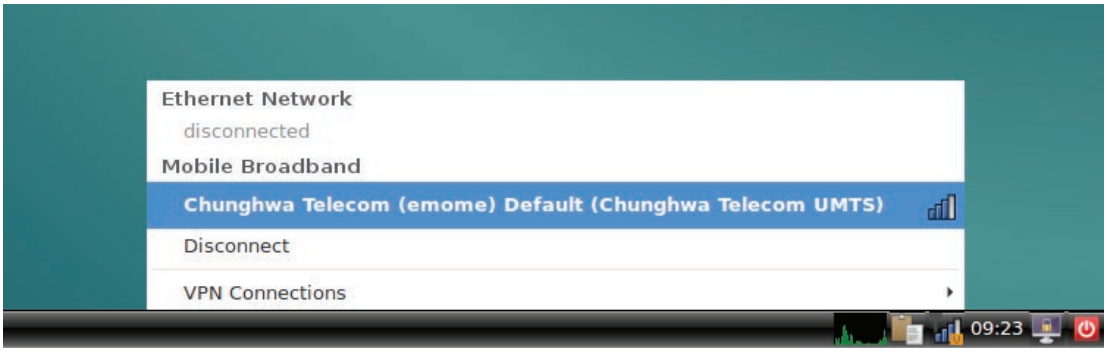
Fill in the required fields to setup your connection. If you are unsure of what the required fields and values are, check with your Mobile Broadband provider.



3G connection configuration

After the connection is created, click on the “Network Manager” icon again and select the connection you just created.

The successful connection looks like this:



Successful connection screen

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