QUICK START GUIDE

ARTiGO A820

Android EVK v5.0.4

1.01-08112017-103800

Revision History

Version	Date	Remarks
1.00	07/26/2017	Initial release
1.01	08/11/2017	Updated section 1.1 heading name

Table of Contents

1. Introduction

This Quick Start Guide provides an overview on how to boot the Android EVK system image in the ARTiGO A820 system and configure the supported hardware functions in the build.

The ARTiGO A820 Android EVK v5.0.4 is developed based on the NXP android_m6.0.1_1.0.0-ga (Android 6.0 Marshmallow) and it enables the hardware features of the ARTiGO A820 system.

1.1. EVK Package Contents

There are three folders in the package as listed below.

Firmware folder	Description
Images_autoinstall_sd.zip	Android EVK system image and installation script files
Document folder	**Description**
ARTiGO_A820_Android_EVK_v5.0.4_Quick_Start _Guide _v1.01_20170811.pdf	Quick Start Guide
Tools folder	**Description**
ARTiGO_A820_Smart_ETK_Demo_v1.0.apk	Smart ETK demo program
BluetoothSPPTest.apk	Bluetooth SPP testing program

ARTiGO A820 Android EVK contents

1.1.1. Firmware Folder Contents

Images_autoinstall_sd.zip: contains installation script files and the precompiled U-boot and Android image for evaluating the ARTiGO A820 system.

1.1.2. Document Folder Contents

ARTiGO_A820_Android_EVK_v5.0.4_Quick_Start_Guide _v1.01_20170811.pdf: This Quick Start Guide provides an overview on how to boot the Android EVK system image in the ARTiGO A820 system and configure the supported hardware functions in the build.

1.1.3. Tools Folder Contents

ARTiGO_A820_Smart_ETK_Demo_v1.0.apk: is the Smart ETK demo program.

BluetoothSPPTest.apk: is the Bluetooth SPP profile test program.

1.2. Version Information and Supported Features

- U-Boot version: 2015.04
- Kernel version: 3.14.52
- Evaluation image: Android Marshmallow 6.0
- Development based on NXP android_M6.0.1_1.0.0-ga (Android 6.0 Marshmallow)
- Supports SPI with eMMC boot
- Supports HDMI display
- Supports HDMI audio output
- Supports COM1(RS-232/RS-485), onboard COM debug connector
- Supports Gigabit Ethernet (LAN1)
- Supports 10/100Mbps Ethernet (LAN2)
- Supports VNT9271 USB Wi-Fi dongle
- Supports EMIO-1541 miniPCIe Wi-Fi module
- Supports EMIO-2531 miniPCIe Wi-Fi & Bluetooth module
    - Supports Bluetooth A2DP and SPP profile
- Supports EMIO-2550 miniPCIe Mobile Broadband module
- Supports Smart ETK v1.0: Watchdog Timer, GPIO, and UART
- Support OTA (Over-The-Air technology)
- Support shutdown option in Quick Settings
- Support Ethernet configuration in Settings

2. Image Installation

The ARTiGO A820 only supports booting Android from the SPI ROM and eMMC. This section explains the setup requirements for booting from the SPI ROM and eMMC.

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

2.1. Booting from the SPI ROM with eMMC

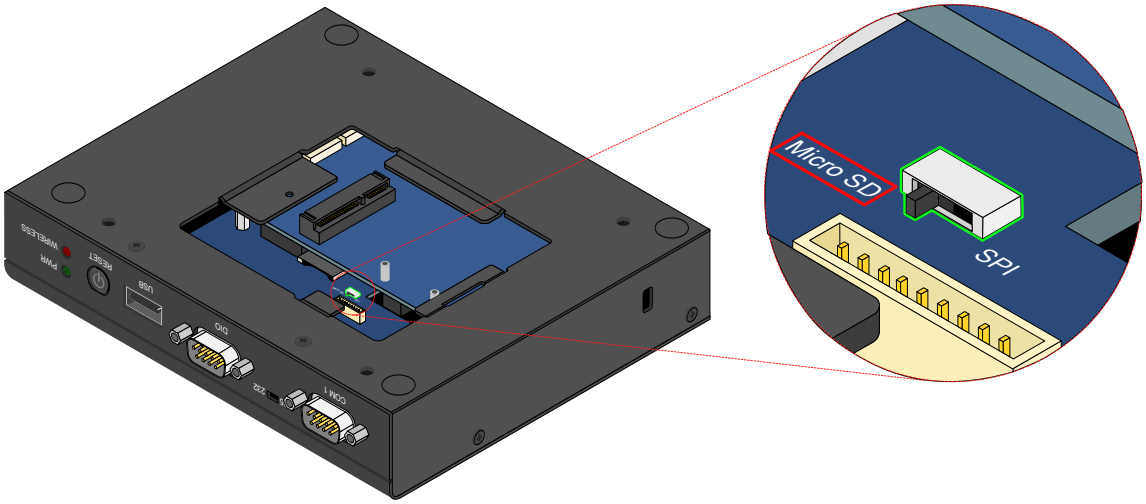
The **Images_autoinstall_sd.zip** includes the Android EVK system image and the installation scripts files.

The first step is to extract the **Images_autoinstall_sd.zip** file to make a bootable Micro SD card. Insert a Micro SD card into your Linux host machine and make sure it is not mounted. Open the terminal on your host machine, and run the script **mk_android6_install_sd.sh** as shown below, replacing <device name> with the correct value for the card, for example "sdb".

Important: Make sure you are writing to the correct device or the host system environment could be damaged.

```
$ sudo ./mk_android6_install_sd.sh /dev/<device name>
```

Next, on the ARTiGO A820, set the Micro SD/SPI boot switch to the Micro SD position as shown below.



Micro SD / SPI boot switch diagram

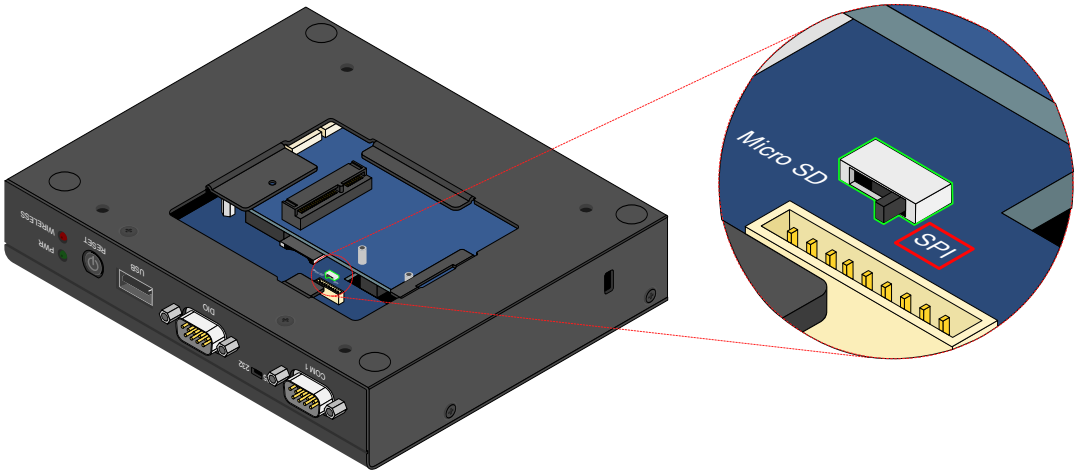
Insert the prepared Micro SD card into the ARTiGO A820, connect an HDMI display, and power on the ARTiGO A820 to initiate the update process automatically.

```
VIA Technologies, Inc.
iMX6_Android6.0.1

---------------------------------

   U-Boot Version : v2015.04-0.1.0
   Kernel Version : v3.14.52-0.1.0

   Base File System Version : 0.1.0
   Reference File System Version : 0.1.0
   OtherInfo :

   [=========                    ] 30 %
   erasing spi flash (mtd0)

   Warnings! Please don't power off! Please wait...
```

Update process screen

When the install process is completed, unplug the power cable and remove the Micro SD card.

In order to boot from the SPI ROM make sure the Micro SD/SPI boot switch is set to SPI ROM boot.



Micro SD / SPI boot switch diagram

Next, power on the device to initiate the boot process. When the boot process is completed, you will see the Android desktop.

3. Hardware Functions

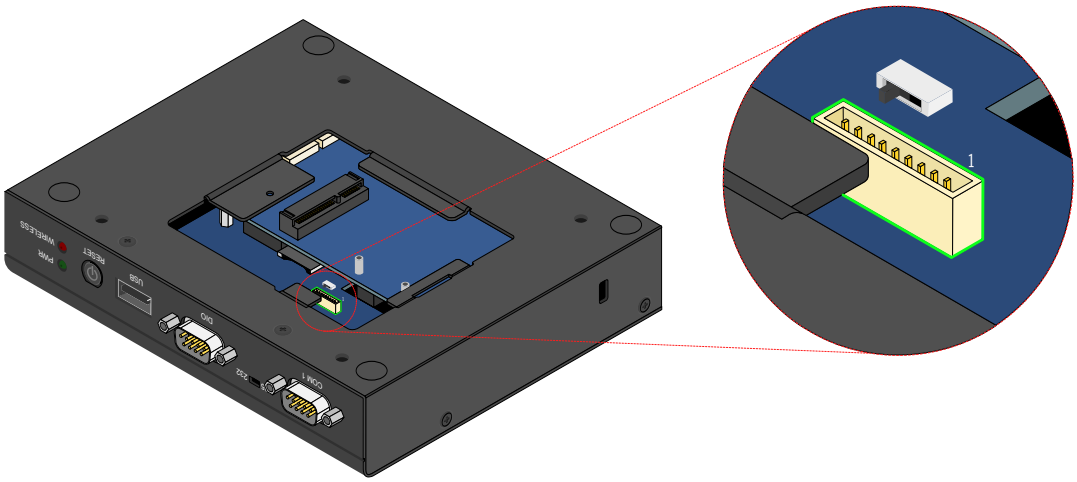
This section explains how to enable and test the hardware functions precompiled in the Android EVK including setting u-boot parameters, restoring default u-boot parameters, using the Android console, setting up display device, configuring LAN port as well as installing and applying the different functions included in the VIA Smart ETK sample program.

3.1. Setting Up U-Boot Parameters

The first step is to connect the host machine and the ARTiGO A820 through the onboard COM debug connector. 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



COM debug connector diagram

Next, power on the ARTiGO A820 system 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.

```
U-Boot 2015.04 (Mar 7 2017 - 18:49:13)ARTiGO A820 ver:5.0.4

CPU:   Freescale i.MX6DL rev1.2 at 996 MHz
CPU:   Temperature 30 C, calibration data: 0x5894f169
Reset cause: POR
I2C:   ready
DRAM:  1 GiB
MMC:   FSL_SDHC: 0, FSL_SDHC: 1
SF: Detected W25Q32BV with page size 256 Bytes, erase size 4 KiB,
total 4 MiB
*** Warning - bad CRC, using default environment

No panel detected: default to Hannstar-XGA
Display: Hannstar-XGA (1024x768)
In:    serial
Out:   serial
Err:   serial
Net:   FEC [PRIME]
Warning: failed to set MAC address

Normal Boot
Hit any key to stop autoboot:  0
=>
```

Debug console view of boot process

To list the current U-Boot parameters, use the following command:

```
=> printenv
```

Make sure the printout message is as follows:

```
=> printenv

baudrate=115200
boot_emmc_root=mmc dev ${root_media_uboot};ext2load mmc
${root_media_uboot}:${root_partition} ${loadaddr} uImage;ext2load  mmc
${root_media_uboot}:${root_partition} ${dtbaddr} imx6q-vab820.dtb;bootm ${loadaddr} -
${dtbaddr};
boot_media=booti mmc1
```

3.2. Restoring Default U-Boot Parameters

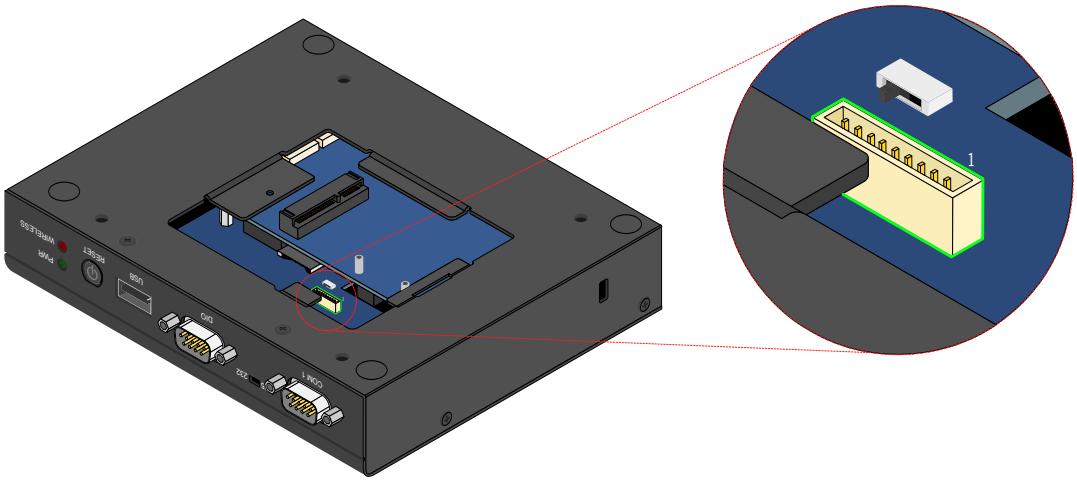
If the U-Boot parameters have been modified, the "destroyenv" command in the U-Boot console can restore the factory default settings.

To restart the device, use the reset command.

```
=> destroyenv
=> saveenv
=> reset
```

3.3. Using the Android Console

The first step is to connect the host machine and the ARTiGO A820 through the onboard COM debug connector. Use a serial port communication program such as PuTTY, GtkTerm, or Minicom, to connect to the debug console.



COM debug connector diagram

Next, power on the ARTiGO A820 to initiate the boot process. When the boot process is completed, you will automatically log in to the Android console.

```
root@artigo_a820_6dl:/ #
```

3.4. Configuring Display Parameters

The ARTiGO A820 Android EVK v5.0.4 supports HDMI display.

To set HDMI as the display output, use the following command:

```
=> setenv display 'run hdmi'
=> saveenv
```

HDMI only supports CEA modes as shown in the table below.

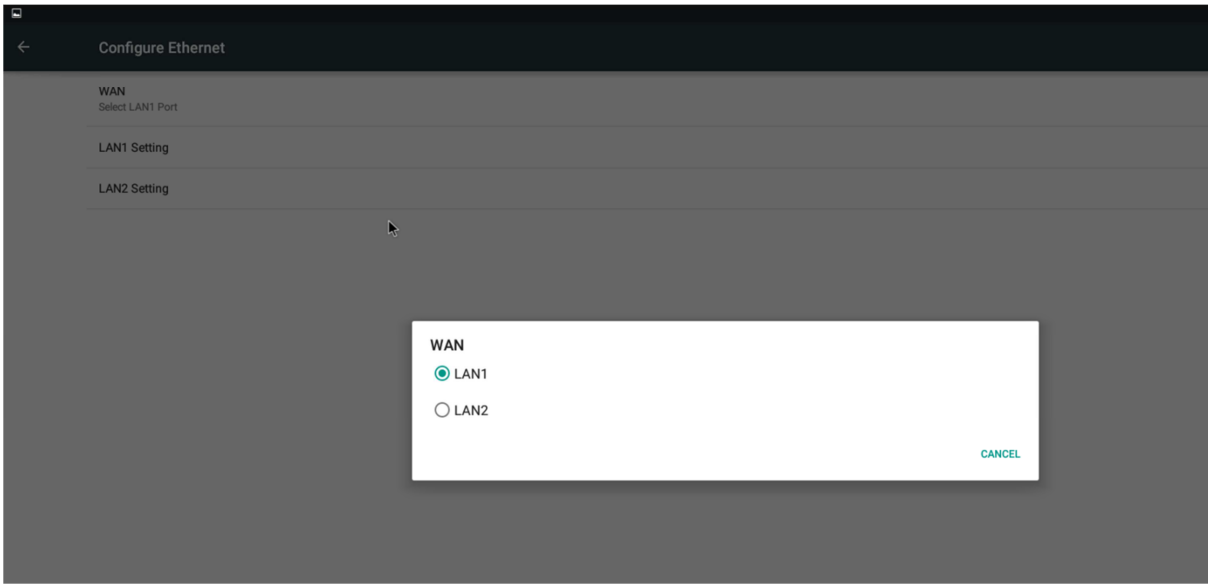
Width	Height	Frame rate
640	480	60
720	480	60
1280	720	60
1440	240	60
1440	480	60
1920	1080	60
720	576	50
1280	720	50
1440	288	50
1440	576	50
1920	1080	50
1920	1080	24
1920	1080	25
1920	1080	30
1280	720	100
1280	720	120

For example, if you would like to set the HDMI resolution to 1280x720@60Hz, use the following command:

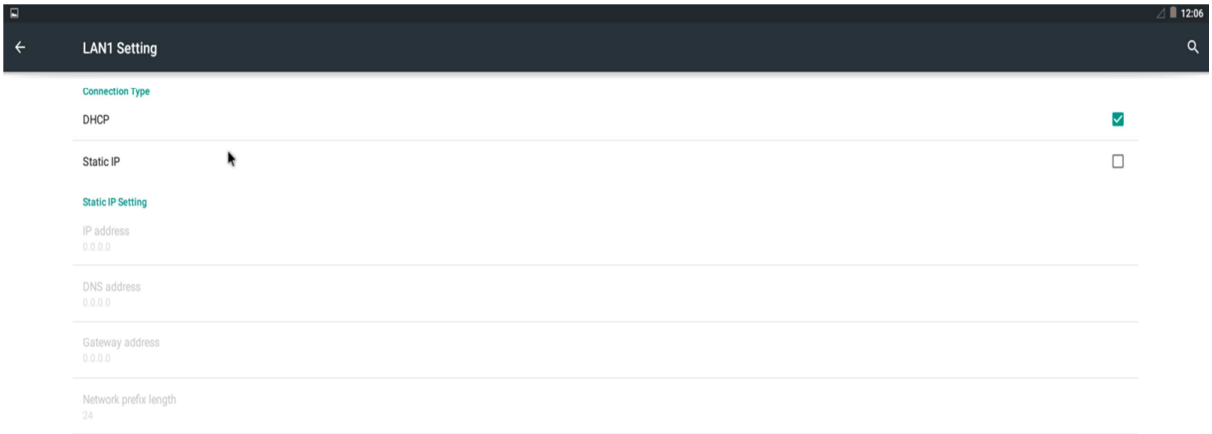
```
=> setenv hdmi_timing '1280x720M@60,bpp=32'
=> saveenv
```

3.5. Configuring LAN Ports

The ARTiGO A820 supports two LAN ports. LAN1 is for Gigabit Ethernet and LAN2 is for 10/100Mbps Ethernet. The first step is to select a LAN port to be configured. Click Settings -> More -> Configure Ethernet -> WAN to select the LAN port.



To configure LAN1 or LAN2, Click Settings -> More -> Configure Ethernet -> select LAN1 Setting or LAN2 Setting

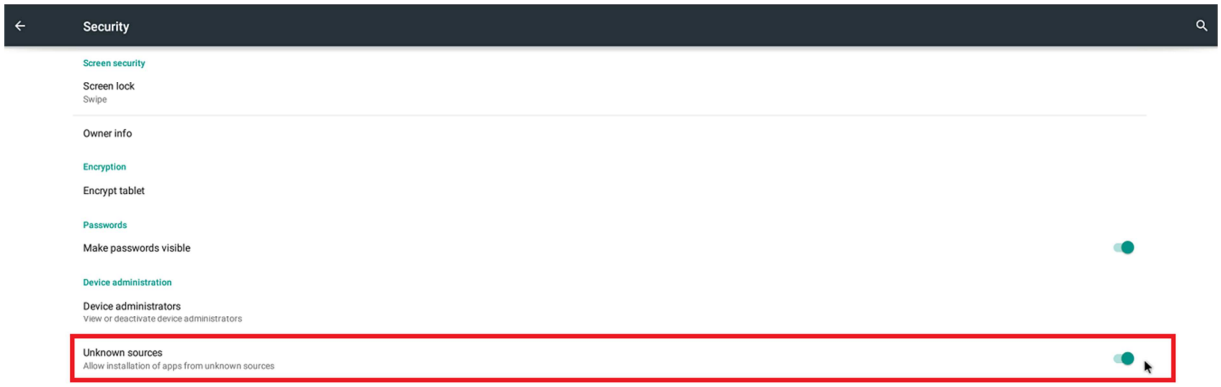


After the LAN setting is finished, connect to the Internet through web browser.

3.6. Smart ETK

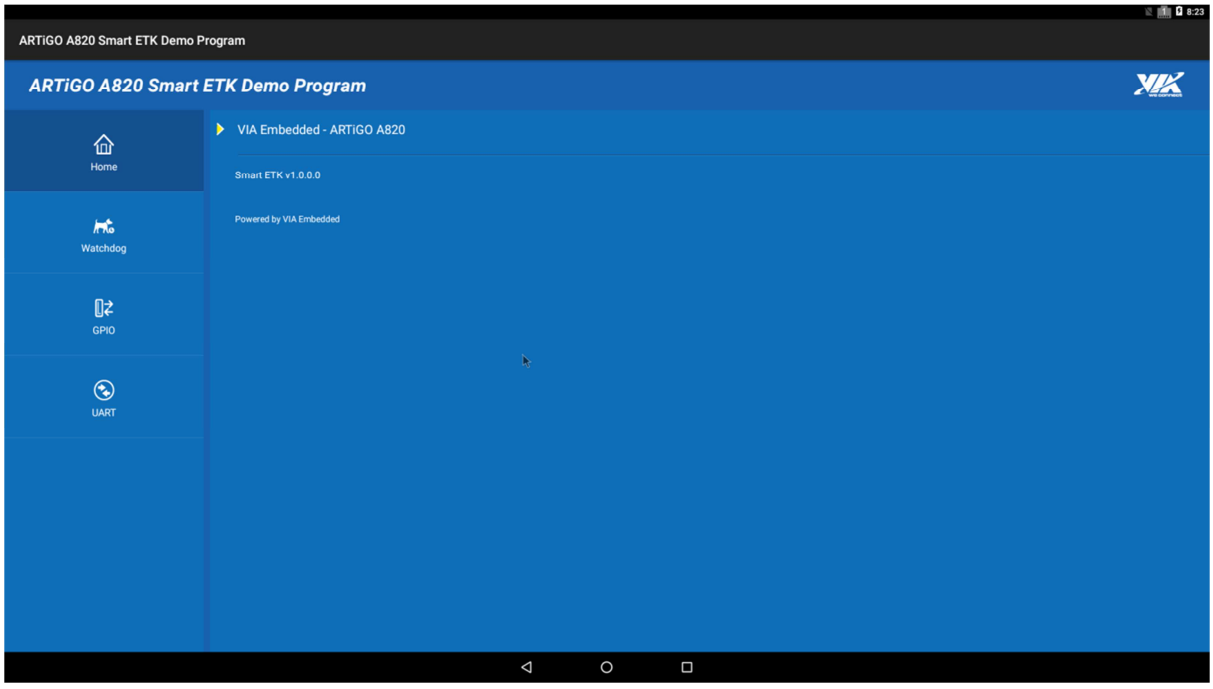
The ARTiGO A820 Smart ETK supports Watchdog timer, GPIO, and UART functions. Please follow the procedures below to experiment with the Smart ETK functions on the ARTIGO A820 system.

The first step is to copy the ARTiGO_A820_Smart_ETK_Demo_v1.0.apk onto a mass storage device such as a USB thumb drive. Next, from the Settings screen, click Security, and then switch on the "Unknown sources" as shown in the diagram below.



Finally, insert the USB thumb drive into the ARTiGO A820 and double click on the ARTiGO_A820_Smart_ETK_Demo_v1.0.apk file to install.

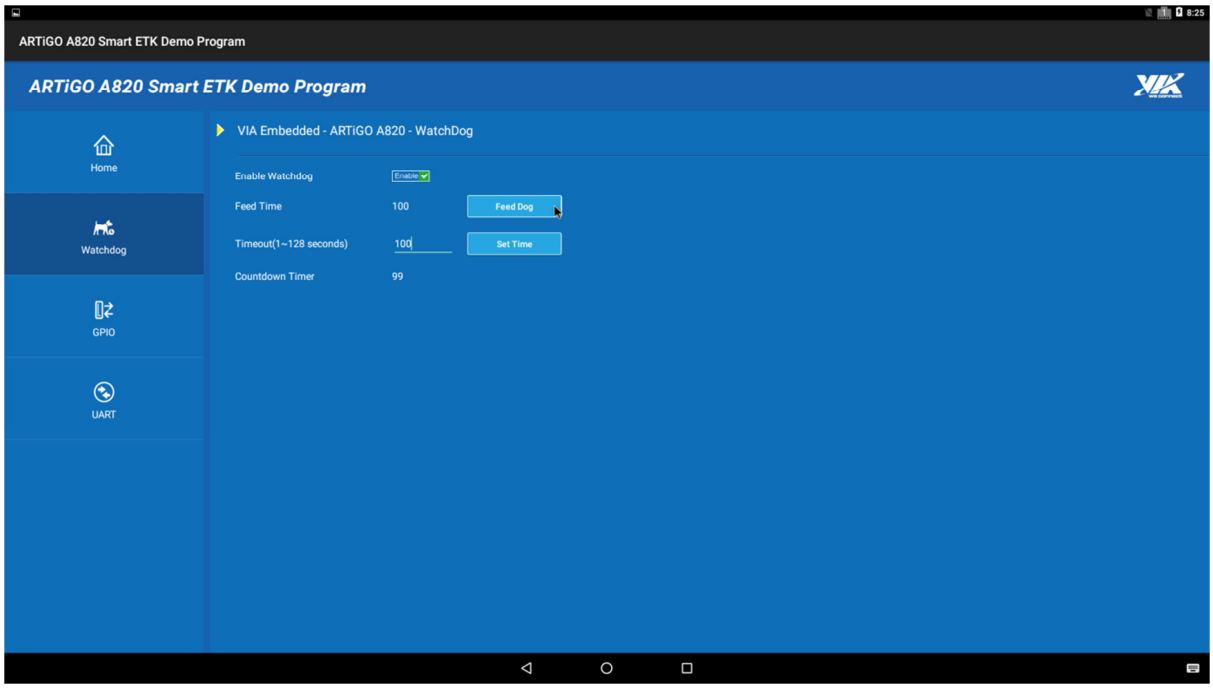
When the installation process has completed, run the ARTiGO_A820_Smart_ETK_Demo_v1.0.apk and start to test the different functions with it.



Smart ETK SDK sample screen

3.6.1. Testing Watchdog Timer Function

The Watchdog timer includes Enable/Disable, Set Timeout, Feed Dog, Feed time and Countdown Timer functions.



Smart ETK Watchdog timer diagram

First, please open the Smart ETK sample program then, from the left side of the; select Watchdog.

Next, select Enable to active the Watchdog function.

Next, enter the time value (1~128 seconds) in the Timeout setting section.

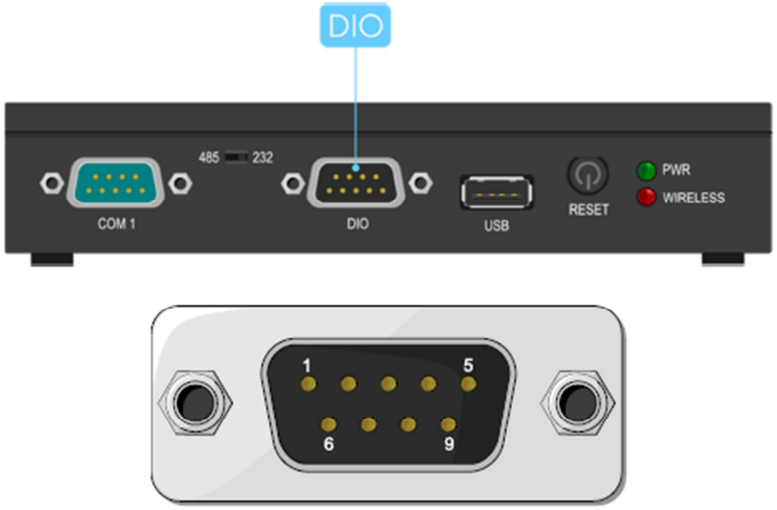
Click on the Feed Dog button to refresh the countdown time value back to the beginning.

The Feed time section shows the Timeout setting start value.

The Countdown time section shows the countdown time value.

3.6.2. Testing GPIO Function

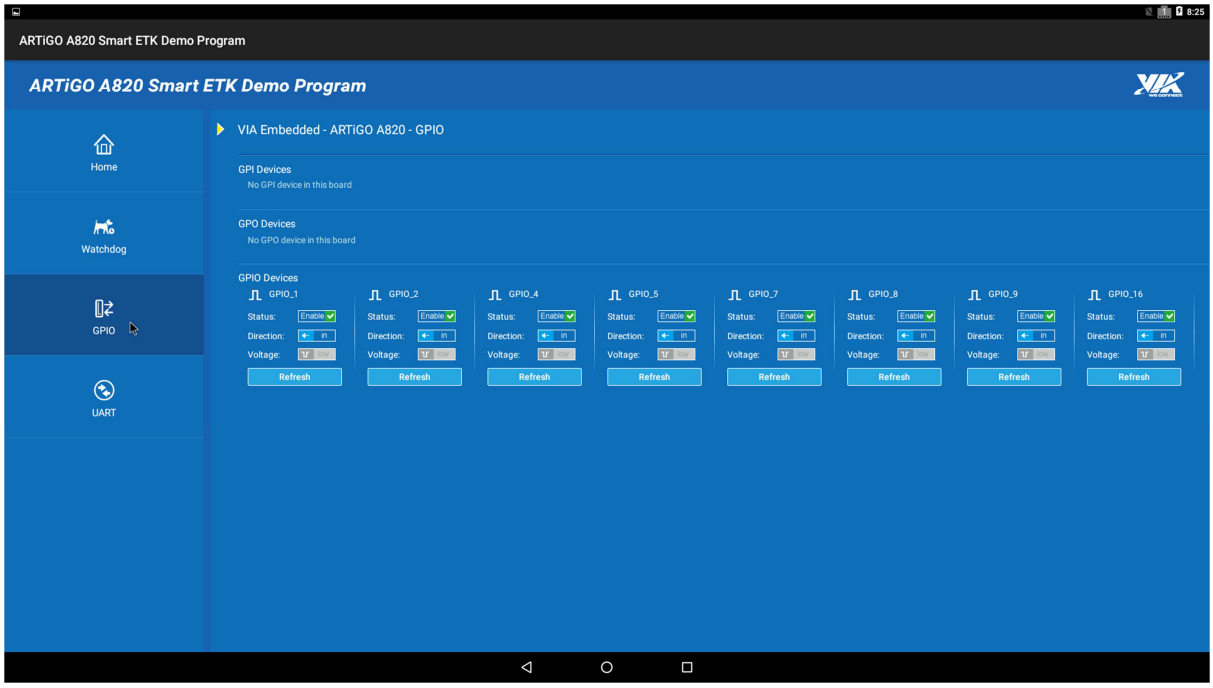
The DIO port on the ARTiGO A820 consists of 9 pins. The following section explains how to set up these pins for input/output communication.



DIO port diagram

Pin	Signal
1	GPIO_7
2	GPIO_1
3	GPIO_8
4	GPIO_2
5	GPIO_9
6	GPIO_4
7	GPIO_16
8	GPIO_5
9	GND

DIO port pinout table



Smart ETK GPIO interface diagram

First, please open the Smart ETK sample program, then from the left side select GPIO to start testing. In the demo program, pins 1~8 have been set as programmable GPIO pins.

The toggles under each pin can be used to set the desired configuration.
Enable/Disable: Sets whether the pin function is enabled or disabled.
IN/OUT: Sets whether the pin is defined as input (in) or output (out).

If you have set a GPIO pin as an input (in), the Voltage value will show whether the input voltage signal is high or low.
Voltage low: the input signal is low for voltage level.
Voltage high: the input signal is high for voltage level.

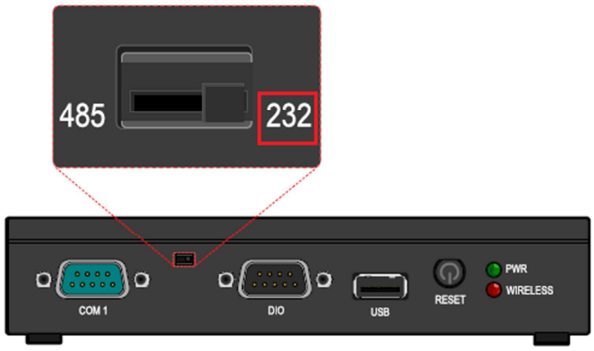
If you have set the GPIO pin as an output (out), you can then set the output voltage to high or low with the Value setting.
Voltage low: the output voltage signal is low.
Voltage high: the output voltage signal is high.

3.6.3. Testing UART Function

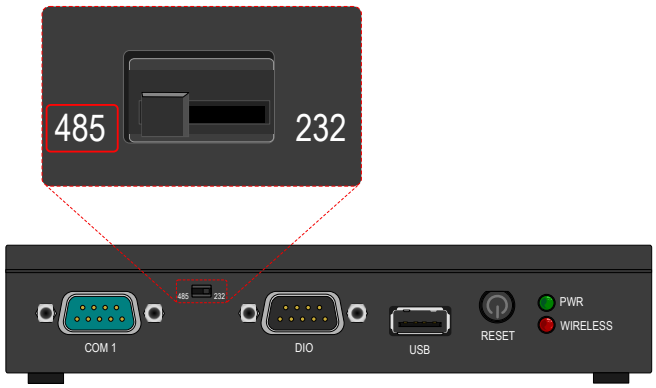
The COM 1 port supports RS-232 and RS-485 mode. The default setting is RS-232 mode. The VIA Smart ETK UART function supports TX/RX communication with other devices.

COM 1 port diagram

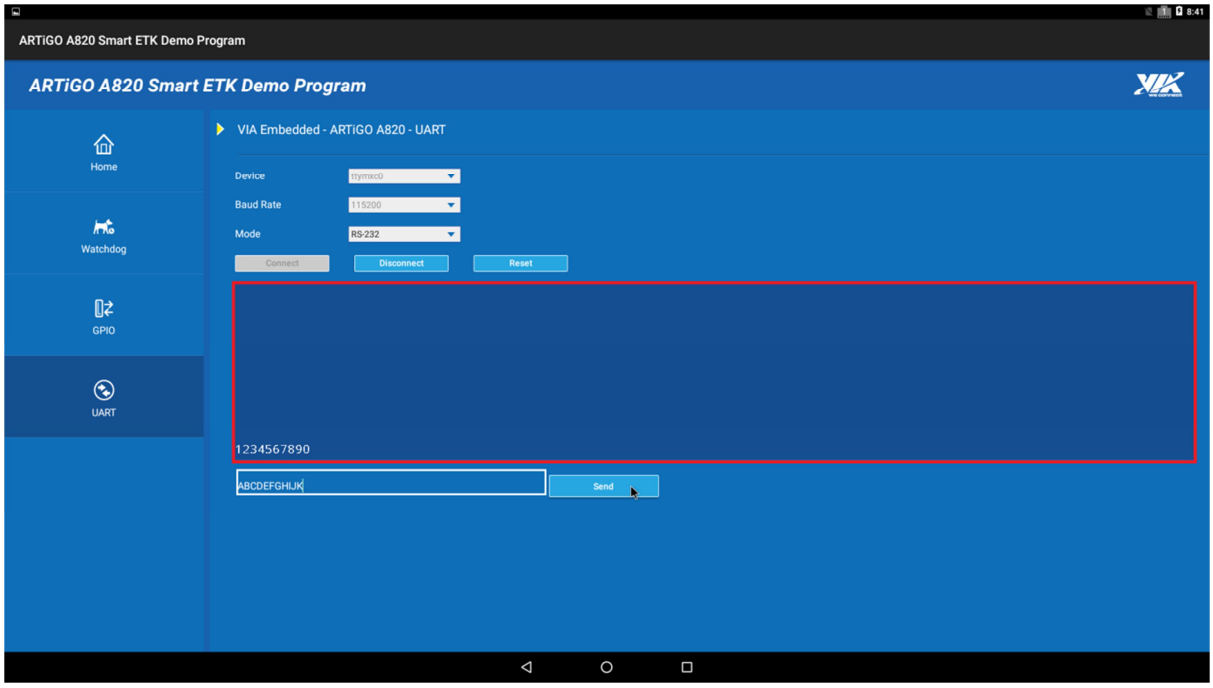
The first step is to select a mode to test the UART function. If you want to activate the RS-485 mode, set the switch to the RS-485 position. Next on the host machine start a serial communication program such as Putty, GtkTerm or Minicom with the same serial port setting using the appropriate serial device.



RS-232/RS-485 switch diagram (RS-232 mode)



RS-232/RS-485 switch diagram (RS-485 mode)



Smart ETK UART diagram

Then, please open the Smart ETK sample program, from the left side of the Smart ETK sample page, select UART.

To begin, select "ttymxc0" from the device drop-down menu and a Baud rate of "115200" for the Baud Rate drop-down menu.

The ARTiGO A820 supports mode "RS-232" and "RS-485". In order to establish a connection, please make sure that the Mode you've selected on the ARTiGO A820 system and on the Mode drop-down menu are the same.

Next, click on the Connect button to enable the UART function and start communication between the host machine and ARTiGO A820 system.

When the host machine transfers data to the ARTiGO A820, the data will be displayed inside the red frame.

To send data from host machine to ARTiGO A820, you need to type the data inside the white frame and click the Send button.

Click on the Disconnect button to disable this function.

Click on the Reset button to reset this function.

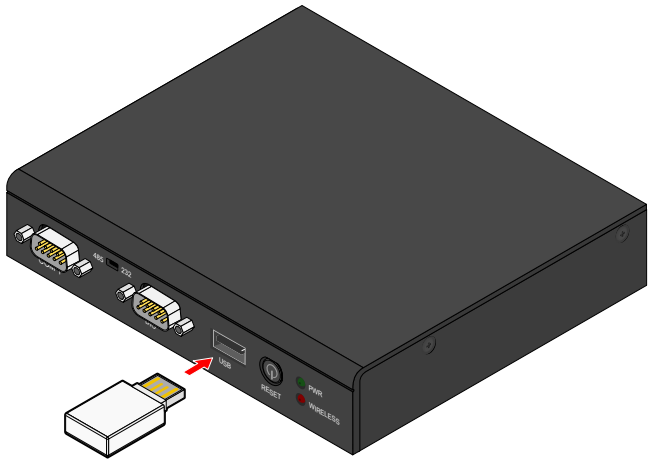
4. Wireless Accessories

This section explains how to install and configure the various EMIO wireless modules available for the ARTiGO A820 system.

4.1. Configuring the VNT9271 USB Wi-Fi Dongle

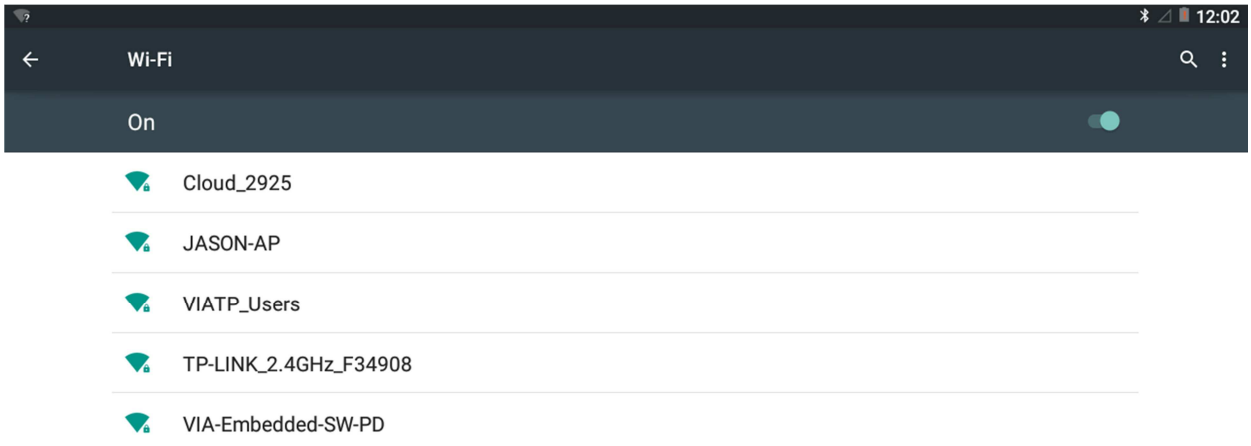
The VNT9271 USB Wi-Fi dongle supports Wi-Fi functionality through USB port.

The first step is to insert the VNT9271 USB Wi-Fi dongle into a USB port. Next, make sure to unplug any LAN cables or other Wi-Fi/3G modules you have installed. Finally, power on the ARTiGO A820.



Inserting the VNT9271 dongle

To enable the Wi-Fi, go to Settings -> Wi-Fi-> On.



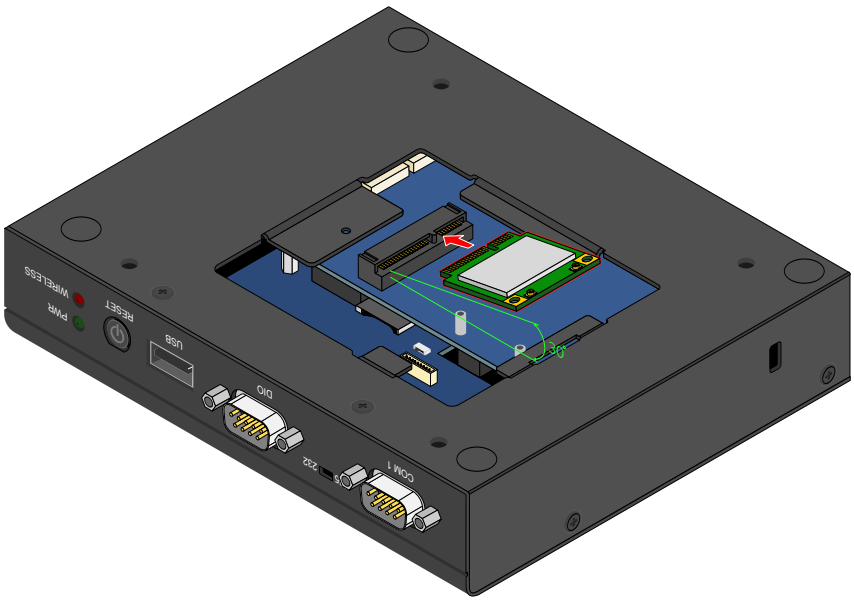
A list of Wi-Fi connections will appear on the screen, select the appropriate device to complete the Wi-Fi connection.

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

4.2. Configuring the EMIO-1541 miniPCIe Wi-Fi Module

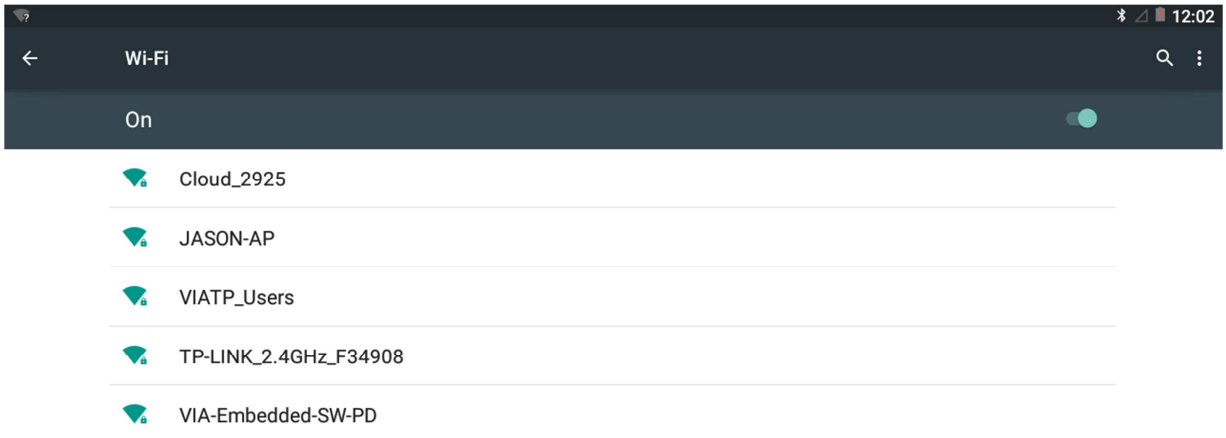
The EMIO-1541 miniPCIe Wi-Fi module supports Wi-Fi function.

The first step is to insert the EMIO-1541 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 A820.



Inserting the EMIO-1541 module

To enable Wi-Fi, go to Settings -> Wi-Fi-> On



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

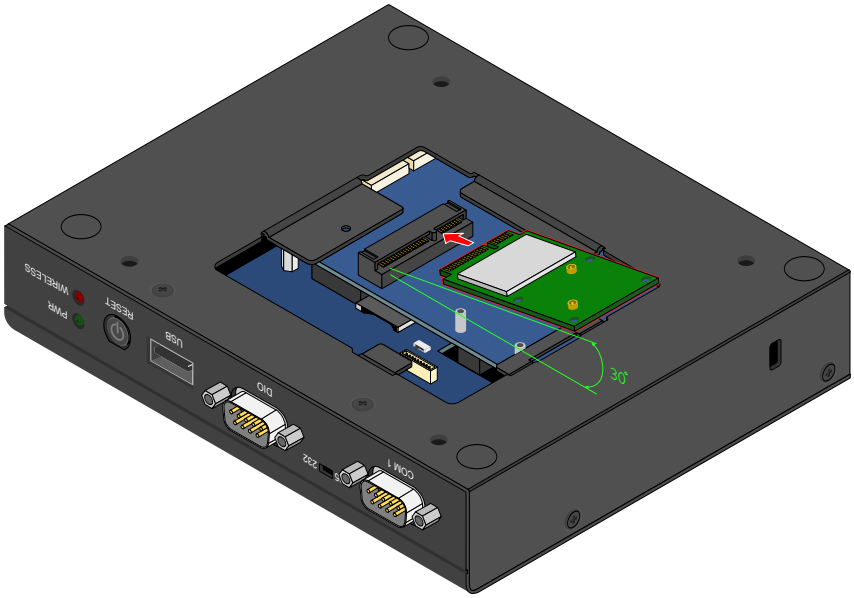
When the connection is created, connect to the internet through your web browser.

4.3. Configuring the EMIO-2531 miniPCIe Wi-Fi & Bluetooth Module

The EMIO-2531 miniPCIe Wi-Fi & Bluetooth module supports Wi-Fi and Bluetooth functions.

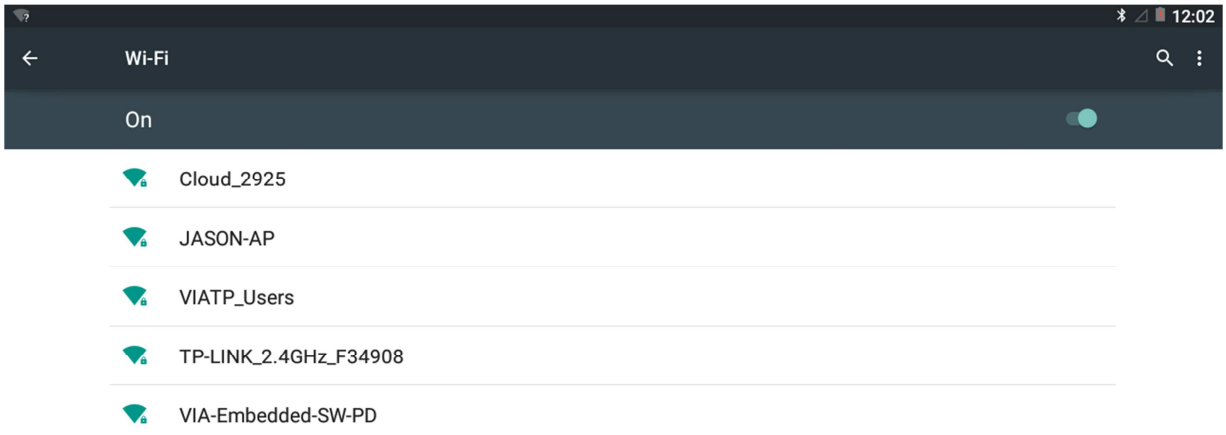
4.3.1. Connecting to the Internet

The first step is to insert the EMIO-2531 module into the miniPCIe slot. Next, make sure to unplug any LAN cables or other Wi-Fi/3G modules you have installed. Finally, power on the ARTiGO A820.



Inserting the EMIO-2531 module

To enable Wi-Fi, go to Settings -> Wi-Fi-> On



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

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

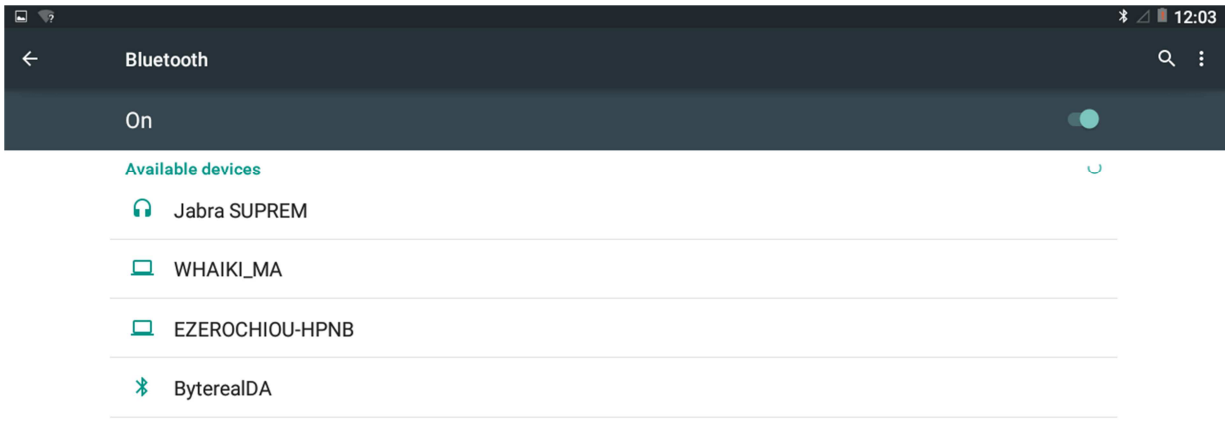
4.3.2. Enabling Bluetooth

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).

4.3.2.1. Setting Up Bluetooth A2DP Profile

First, put the accessory you want to use into discovery mode. The exact way to do this depends on the accessory. If you have a headset, you may need to hold a button down on the headset for several seconds until a light starts flashing. It will only stay discoverable for a few minutes.

If you are not sure how to put your accessory into discovery mode, please refer to its manual, check the manufacturer's website, or perform a web search for instructions. To enable the Bluetooth A2DP function, go to Settings -> Bluetooth and set the switch to On to enable the Bluetooth function.



A list of local devices will appear on the screen, select the appropriate device to complete the Bluetooth paring.

4.3.2.2. Setting Up Bluetooth SPP Profile

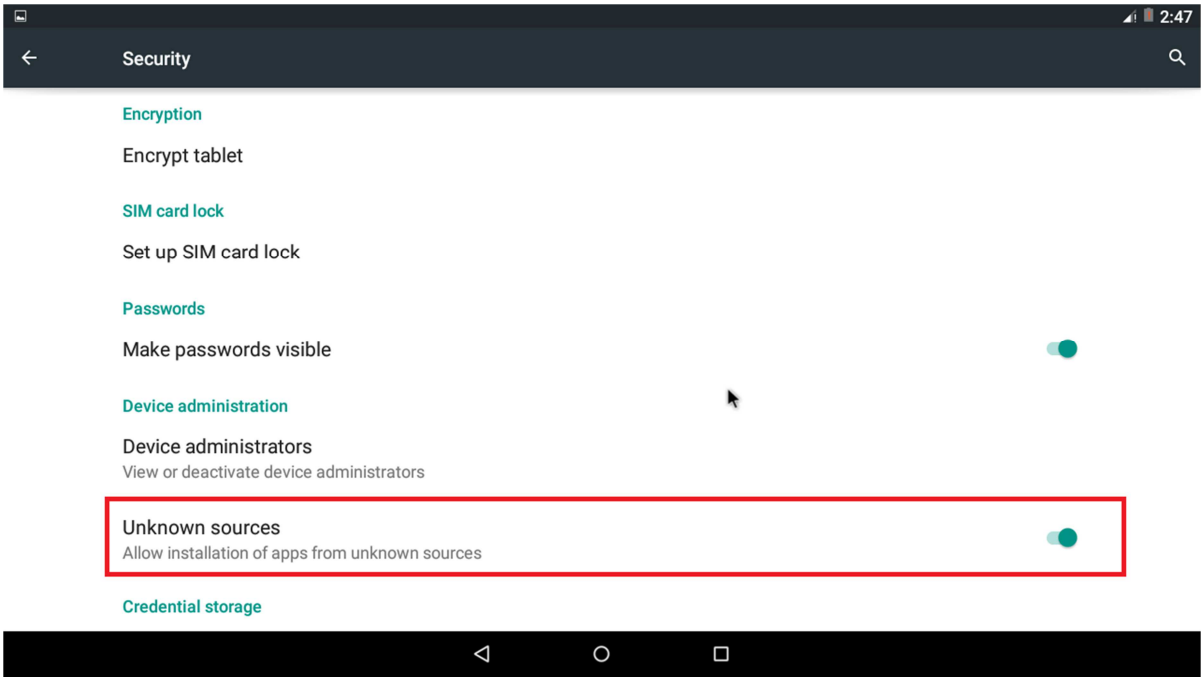
The ARTiGO A820 implements the Bluetooth Serial Port Profile allowing serial port communication between two Android devices.

Included in the ARTiGO A820 Tools folder is the **BluetoothSPPTest.apk** which is a simple communication application which utilizes the Bluetooth SPP Profile to transmit and receive data between two paired Android devices.

The first step is to copy the **BluetoothSPPTest.apk** onto a mass storage device such as USB thumb drive. Next, from the Settings screen, click Security -> Unknown sources to allow installation of non-Market apps.

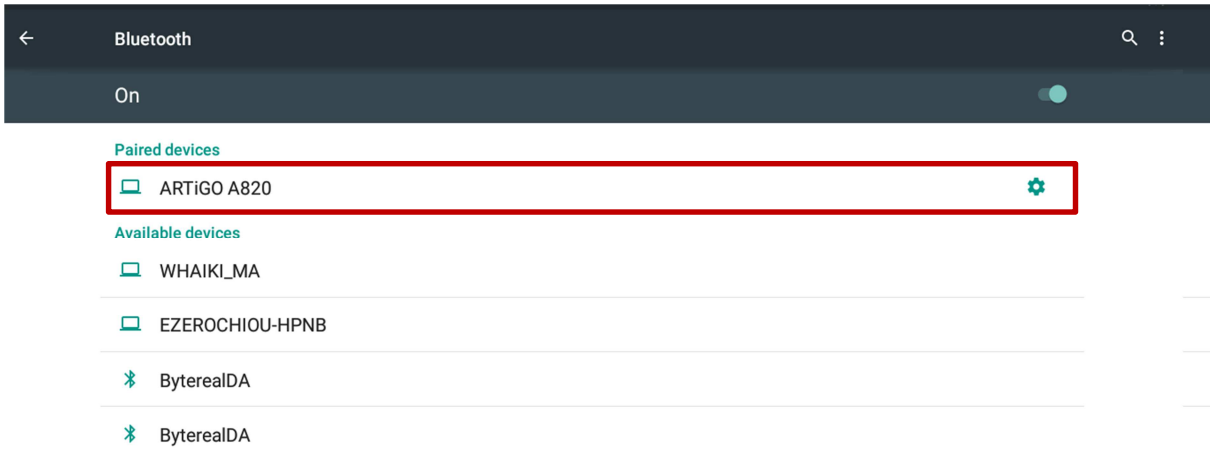
The following example will demonstrate how to use the BluetoothSPPTest.apk to communicate over the Bluetooth SPP Profile between two ARTiGO A820 systems.

First, the **BluetoothSPPTest.apk** must be installed onto each ARTiGO A820 system. From the Settings screen, click Security -> Unknown sources and then switch on the "Unknown sources". Next, copy the BluetoothSPPTest.apk onto a mass storage device, such as USB thumb drive, and install the BluetoothSPPTest.apk onto both ARTiGO A820 systems.



After the installation process has completed, go to Settings -> Bluetooth -> On to enable the Bluetooth function on both ARTiGO A820 systems.

A list of local devices will then appear on each screen. From either screen, select the ARTiGO A820 system from the list to complete the pairing process as seen in the figure below.

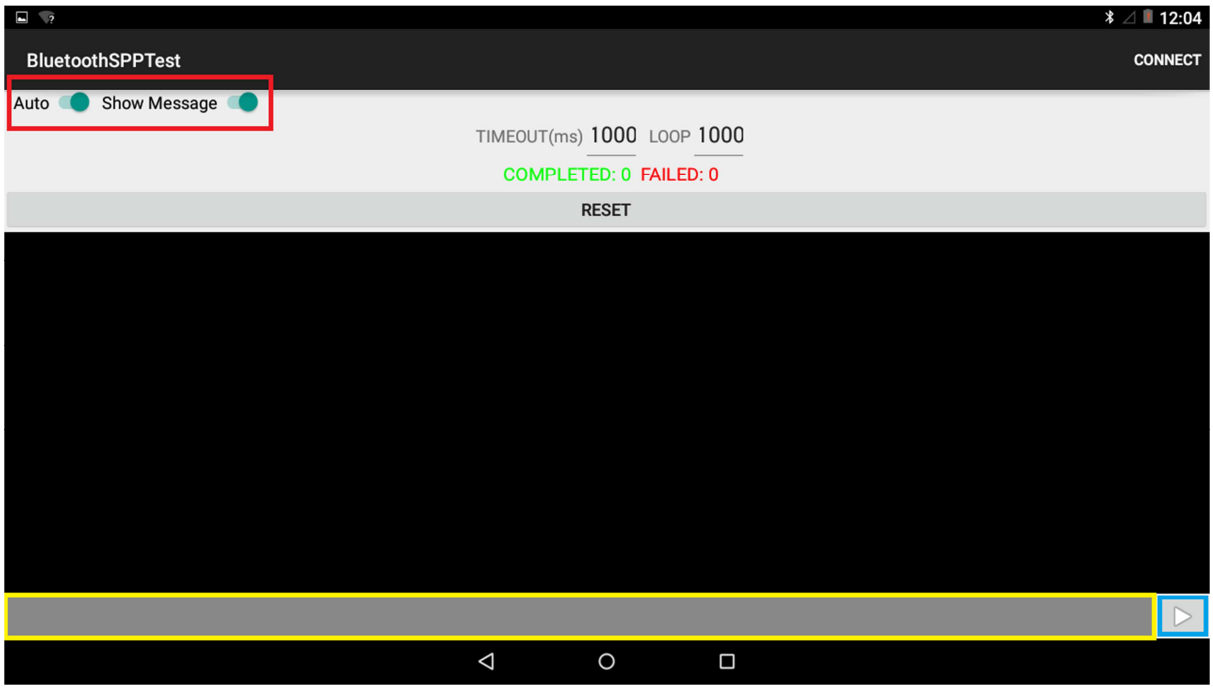


After the devices have paired, open the BluetoothSPPTest.apk on both ARTiGO A820 systems and configure the settings as follows in both apps.

"**Auto**" – enabled

"**Show Message**" – enabled

Select **CONNECT** from either ARTiGO A820 system to create the connection between the two. Both ARTiGO A820 systems can communicate over the Bluetooth SPP Protocol.



BluetoothSPPTest diagram

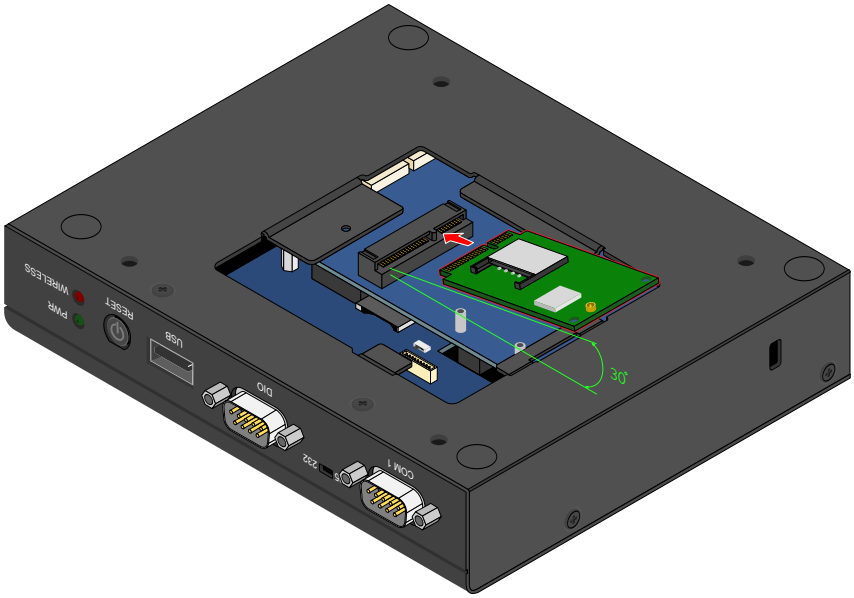
At the bottom of the screen, enter the data inside the bar (highlighted in the yellow frame above) and then click the play button (highlighted in the blue frame above) to send the data. The data will then be received and displayed on the other ARTiGO A820 system.

4.4. Configuring the EMIO-2550 miniPCIe Mobile Broadband Module

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

4.4.1. Connecting to the Internet.

The first step is to insert an active SIM card into the EMIO-2550 module, and then insert the EMIO-2550 module into the miniPCIe slot. After installing the module connect the provided antenna. Next, make sure to unplug any LAN cables or USB Wi-Fi dongles you have installed. Finally, power on the ARTiGO A820.



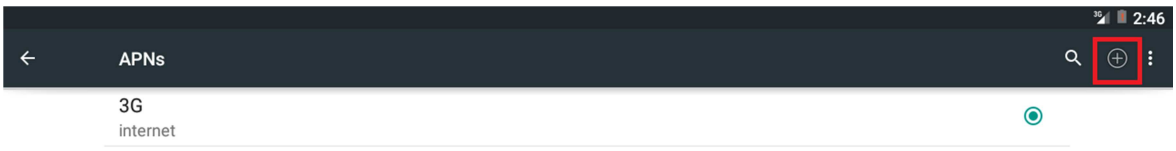
Inserting the EMIO-2550 module

To check that the system has correctly detected the EMIO-2550 module, use the following command:

```
root@artigo_a820_6dl:/ # busybox ifconfig
```

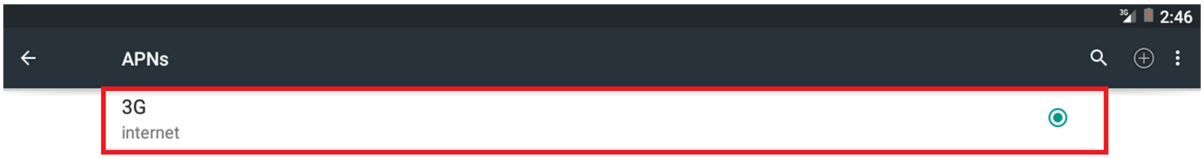
Make sure the printout message includes "ppp0 Link encap: Point-to-Point Protocol".

To enable 3G, go to Settings->Wireless & networks-> More -> Cellular network ->Access Point Names. Next, click the plus button to add your APNs setting.



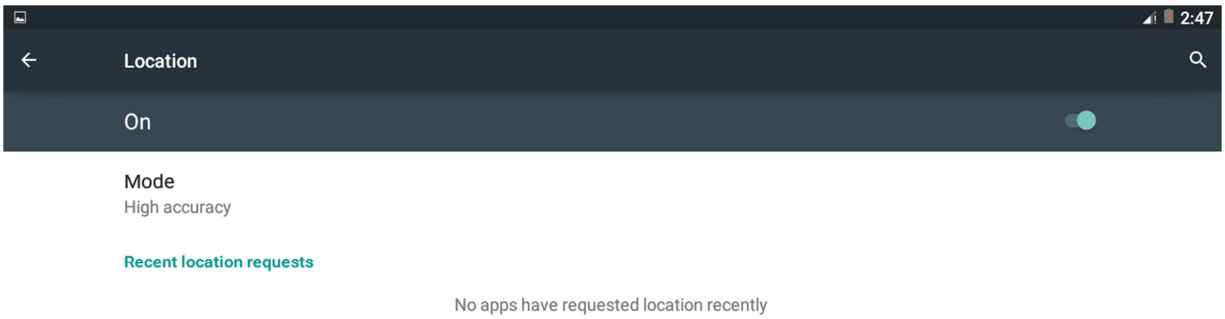
Fill in the required fields for APNs setting. If you are unsure of what the required fields and value are, check with your Mobile Broadband provider.

When the APNs setting is completed, click your APNs to enable the 3G network. Next, open the browser to connect to the Internet.



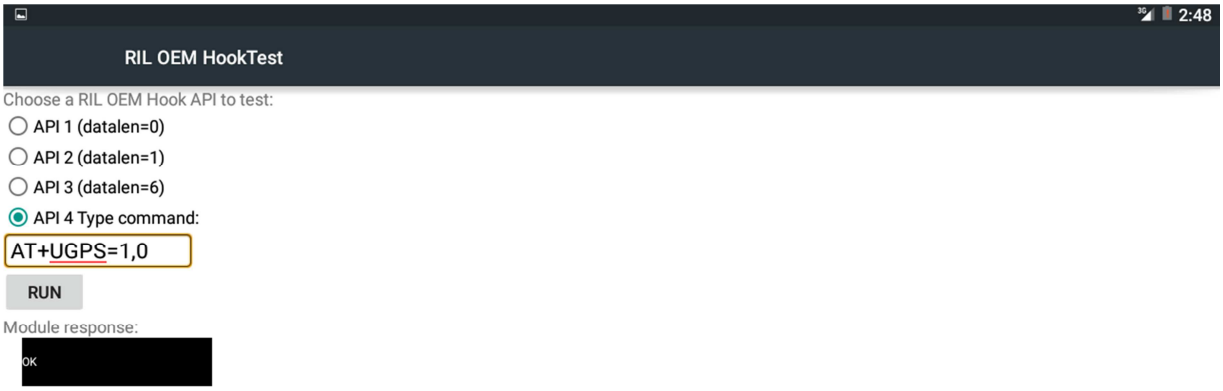
4.4.2. Enabling GPS

To enable GPS, go to Settings-> Location -> On.



Next, go to Settings-> Wireless & networks-> More -> RIL OEM Hook Test -> API 4 Type command. Full in "AT+UGPS=1.0" and click RUN button.

Wait for the "OK" message and open the GPS program.



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