Quick Manual

GWS-RFID

RFID Reader
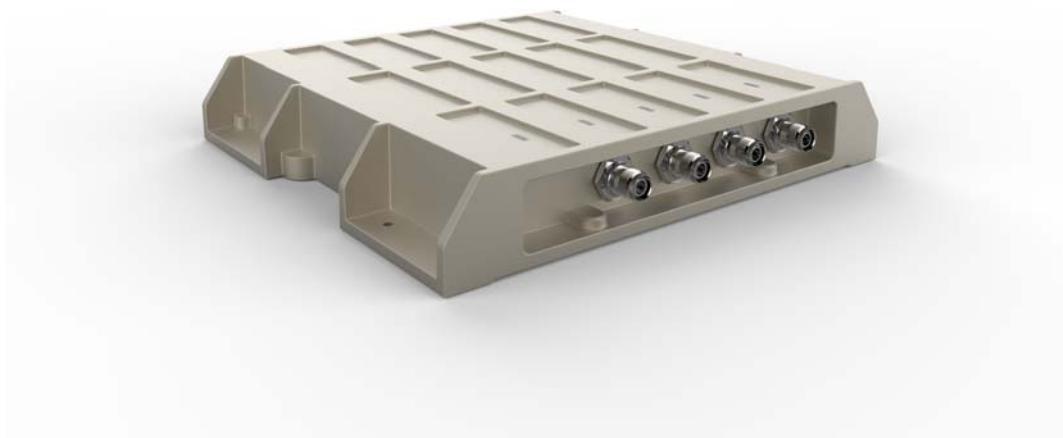
ECS ELITEGROUP

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Acknowledgements

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McAfee* Embedded Control* and the Wind River* Intelligent Device Platform*

All other product names or trademarks are properties of their respective owners.

Declaration of Conformity

FCC Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Label Compliance Statement:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference

(2) This device must accept any interference received, including interference that may cause undesired operation.

	Warning!	Any changes or modifications made to the equipment which are not expressly approved by the relevant standards authority could void your authority to operate the equipment.
	Attention!	Toute modification apportée à l'équipement qui n'est pas expressément approuvé par l'autorité des normes pertinentes peuvent annuler votre droit à faire fonctionner l'équipement.
	Caution!	Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions
	Attention!	Danger d'explosion si la pile est remplacée de façon incorrecte. Remplacez-la uniquement avec le même type ou équivalent recommandé par le fabricant. Jetez les piles usagées selon les instructions du fabricant

Waste disposal instruction

廢電池請回收

Do not throw this electronic device into the trash can when discarding. To minimize pollution and ensure utmost protection of the global environment, please recycle it in European WEEE (waste electrical and electronic equipment) directive system or recycle system in Taiwan.

MPE 警語

Exposure to Radio Frequency Radiation:

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20cm must be maintained between the antenna of this device and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

NCC 警語

本產品符合低功率電波輻射性電機管理辦法 第十二條、第十四條等條文規定

1. 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
2. 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。
   前項合法通信，指依電信法規定作業之無線電通信。
   低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

電磁波曝露量 MPE 標準值 $1mW/cm^2$，送測產品實測值為：$0.0937mW/cm^2$

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any items are missing, please contact your dealer immediately.

- GWS-RFID x1
- User Manual x1

Warning!
To prevent electric shock, Do not remove cover.
No user serviceable parts inside, refer servicing to qualified personnel.

Attention!
Pour éviter un choc électrique, ne pas retirer le couvercle.
Aucune pièce réparable par l'utilisateur, voir l'entretien à du personnel qualifié.

Additional Information and Assistance

1. Visit the ECS websites at www.ECS.com.tw where you can find the latest information about the product.
2. Contact your distributor, sales representative, or ECS's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages
   - This equipment is a source of electromagnetic waves. Before use, please make sure that there are not EMI sensitive devices in its surrounding which may malfunction therefore

Warning!
Maintenance: to properly maintain and clean the surfaces, use only approved products or clean with a dry applicator

Attention!
Entretien: bien entretenir et nettoyer les surfaces, utiliser uniquement des produits approuvés ou nettoyer avec un applicateur sec

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:

    a. The power cord or plug is damaged.

    b. Liquid has penetrated into the equipment.

    c. The equipment has been exposed to moisture.

    d. The equipment does not work well, or you cannot get it to work according to the user's manual.

    e. The equipment has been dropped and damaged.

    f. The equipment has obvious signs of breakage.

15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 55°C (131° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
16. If your computer is losing time significantly or the BIOS configuration resets itself to the default, the battery may have no power.
17. IMPROPER INSTALLATION OF VESA MOUNTING CAN RESULT IN SERIOUS PERSONAL INJURY! VESA mount installation should be performed by a professional technician; please contact the service technician or your retailer if you need this service.
18. Maintenance: to properly maintain and clean the surfaces, use only the approved products or clean with a dry applicator.

Contents

Chapter 1

General Information

1.1　Introduction

GWS-RFID RFID Reader solutions was based on the Intel® Quark SoC X1021 series. The processors are supported by software components, including McAfee* Embedded Control* and the Wind River* Intelligent Device Platform*, needed to connect, manage, and secure gateways.

Common industrial applications include factory automation systems, precision machinery, and production process control. It is also suitable for many non-industrial applications, including interactive kiosk systems, entertainment management, and car park automation. Users can securely aggregate, filter, and share data from edge devices to the cloud in areas such as energy, industrial, and transportation infrastructure.
GWS-RFID is a reliable, cost-effective solution to meet an application's processing requirements

1.2　Specifications

System Spec		
Processor	SOC	Intel® Quark SoC X1021 400 MHz
Memory	Memory	DDR3L SDRAM 512M
Storage	Storage	eMMC 4G
Ethernet	M12 for LAN	10/100Mb Ethernet MACs with 802.3at PoEW8
I/O Interface	M8 for USB	Console
	M12 for DI+DO+RS232	Console
	RF connector	RP TNC Jack Interface
Expansion	RTC	Support
	Button	Reset ,Reboot
	Board	1x MTI RU00-M03-X001 RFID Carrier Card 1 X LED Board
	Switch connector	for case open
Pin Headers	USB 2.0 header	USB 2.0 header
	Intrusion detect header	2*1 pin
Software	OS	MI3.1
Dimension	(W x H x D) System	220 x 205 x 37 mm
Weight	System	1.5kg

System Spec		
Environmental	Operating Temperature	-20˚~55˚C
	Humidity	5-95% RH at 25-35˚C (Non-Condensation)
Chassis	Ingress Protection Rating	IP67
Certifications	EMC	CE, FCC , NCC
	Safety Certifications	UL, CB
RFID Frequency (UHF Band)	902 to 928 MHz band 902.75~927.25MHz	
RFID Power Output	27.76dBm	
Network Service	DHCP, HTTPS, SSH	
IP addressing	Static and Dynamic	
Firmware Upgrade	Network firmware upgrade capabilities	
Security	Secure Boot	
Antenna	Model: PAA-001, PANEL Antenna (TNC Type), 8dBi Cable: 1.0m	

Note:

1. A DC 24V power supply from device or sensor is necessary for the AI port.

2. If DO is designed to drive a relay, a diode must been applied to the relay's coil side.

3. This product is intended to be supplied by an UL certified DC source rated 48 Vdc; 600mA. Tma 55 degree C minimum and output meets SELV, Non-hazardous energy level, if need further assistance, please contact ECS for further information.

1.3 Cleaning/Disinfecting

During normal use GWS-RFID may become soiled and should, therefore, be cleaned regularly.

Steps:

1. Wipe GWS-RFID with a clean cloth that has been moistened in the cleaning solution.
2. Prepare agent per manufacturer's instructions or hospital protocol.
3. Wipe thoroughly with a clean cloth.

Caution! *Do not immerse or rinse GWS-RFID or its peripherals. If you accidentally spill liquid on the device, disconnect the unit from the power source. Contact your Biomed personnel regarding the continued safety of the unit before placing it back in operation.*

Do not spray cleaning agent on the chassis.

Do not use disinfectants that contain phenol.

Do not autoclave or clean GWS-RFID or its peripherals with strong aromatic, chlorinated, ketone, ether, or other solvents, sharp tools or abrasives. Never immerse electrical connectors in water or other liquids.

Attention! *Ne pas immerger ou rincer GWS-RFID ou ses périphériques. Si vous renversez par accident un liquide sur l'appareil, débranchez l'appareil de la source d'alimentation. Contactez votre Biomed concernant la sécurité continue de l'unité avant de la remettre en service.*
Ne pas pulvériser l'agent de nettoyage sur le châssis.
Ne pas utiliser de désinfectants contenant du phénol.
Ne pas passer à l'autoclave ou GWS-RFID propre ou ses périphériques avec fortes, cétone, éther, ou d'autres solvants, des outils tranchants ou abrasifs aromatiques chlorés. Ne jamais plonger connecteurs électriques dans l'eau ou d'autres liquids.

Chapter   2

Getting Started

2.1 A Quick Tour of GWS-RFID

Before you start to set up GWS-RFID, take a moment to become familiar with the locations and purposes of the controls, drives, connections and ports, which are illustrated in the figures below.

When placed upright on the desktop, the GWS-RFID top side appears as shown in Figure 2.1.
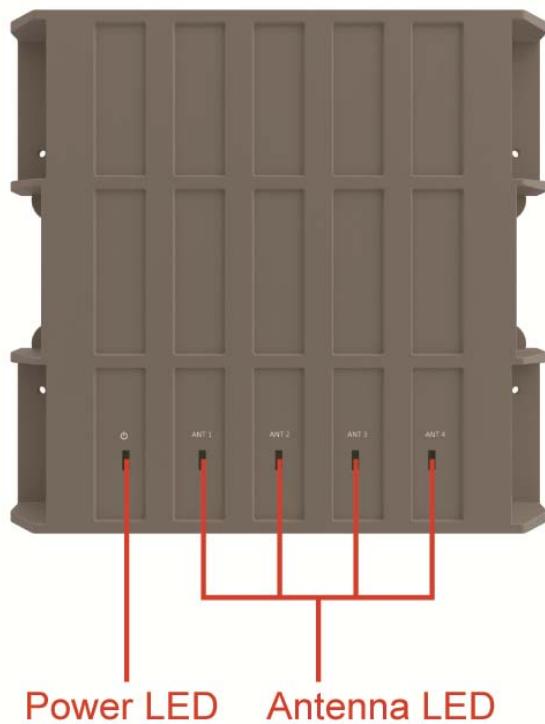

Figure 2.1 Top View

**Figure 2.2   IO Side View**

2.2 PIN Definition

M12 8 pin PIN Definition:
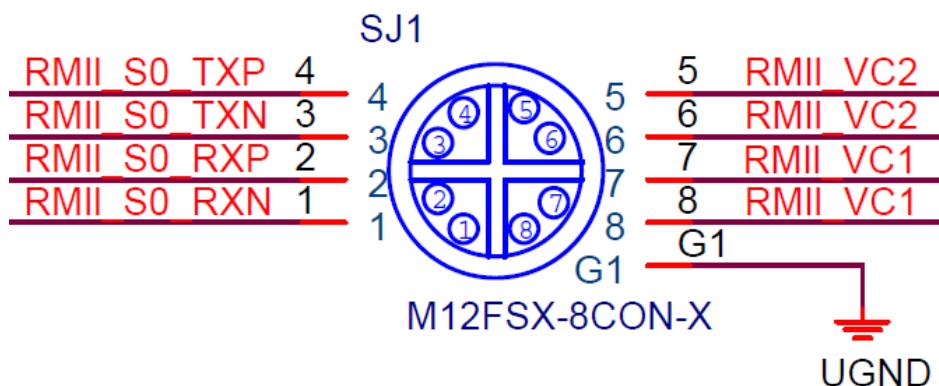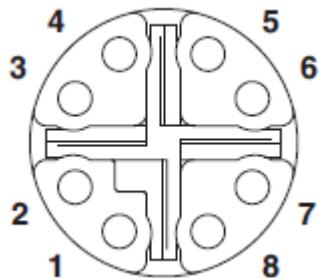
M12 6 pin PIN Definition:
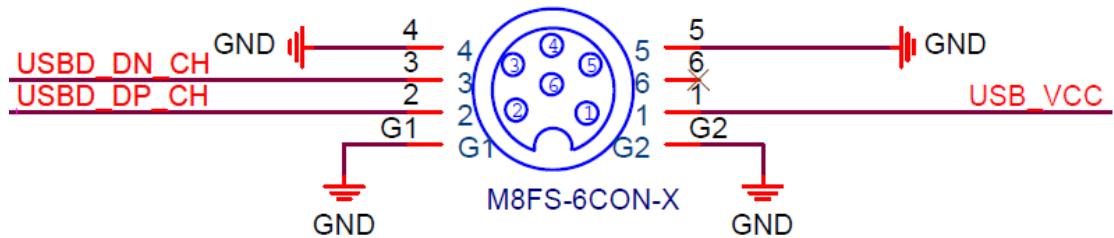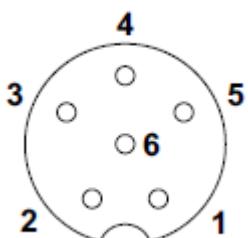
M12 17 pin PIN Definition:
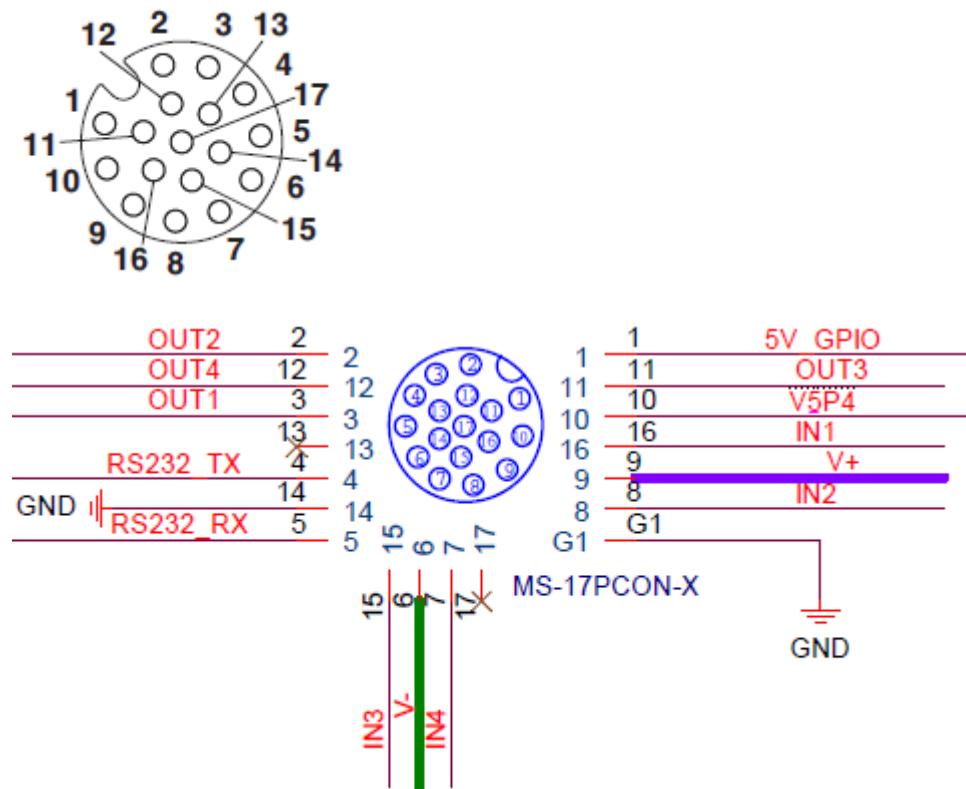
2.3   Sample code

Intel Quark - Programming GPIO From Linux

Most of GPIO capabilities of ECS board are exposed through Linux Sysfs interface, and can be controlled using file based I/O. I will show how to use some of these capabilities using simple shell commands. Of course instead of shell you can implement I/O using file manipulations from your program written using your favorite programming language.

Digital GPIO - Sysfs Interface

GPIO Information

The following command gives information about GPIO in the system and shows if an IO port was allocated to a module or Sysfs (user).

```
root@WR-IDP-B072:~# cat /sys/kernel/debug/gpio

GPIOs 0-7, platform/sch_gpio.2398, sch_gpio.2398:

 gpio-5   (pcal9555a-exp0-int  ) in  hi



GPIOs 8-15, intel_qrk_gip_gpio:



GPIOs 16-31, i2c/0-0025, pcal9555a, can sleep:
```

As you can see from the output all the GPIOs of ECS board is divided into 5 chunks:

1. GPIOs 0-1 - Intel Quark X1021 - GPIO[8:9] pins. These are GPIO pins on Legacy I/O bridge. They are powered and active in S0 state only.
2. GPIOs 2-7 - Intel Quark X1021 - GPIO_SUS[0:5] pins. These are GPIO pins on Legacy I/O bridge. They are powered and active in S3 (suspend) and S0 states.
3. GPIOs 8-15 - Intel Quark X1021 - GPIO[0:7] pins. These are GPIO pins on GPIO controller. They are powered and active in S0 state only.
4. GPIOs 16-31 – pcal9555a(pcal9535a) I/O expander.

Exporting a GPIO Port to Sysfs

To make GPIO port controllable from sysfs you'll need to export it. This is done by writing GPIO port number to */sys/class/gpio/export*:

```
root@WR-IDP-B072:~# echo -n "27" > /sys/class/gpio/export
```

When this operation completes successfully a directory corresponding to the GPIO port number will appear in sysfs. In this case */sys/class/gpio/gpio27*. Once you finished working with I/O you should un-export it by writing the GPIO port number to */sys/class/gpio/unexport*.

Setting GPIO Port Direction

I/O direction is set by writing "in" (for input) or "out" (for output) to */sys/class/gpio/gpioXX/direction* file.

```
root@WR-IDP-B072:~# echo -n "out" > /sys/class/gpio/gpio27/direction
```

Setting GPIO Port Drive Configuration

When configured for output GPIO ports that are connected to PCAL9555A/PCAL9535A can be configured to one of the following drive modes:

- Resistive high, strong low (drive = pullup)

    - This is the default, but it not suitable for driving devices that source significant current, for example for driving an LED connected between GPIO port and GND (it will work though if the LED is connected between GPIO and 5V or 3.3V rails)

- Resistive low, strong high (drive = pulldown)

- Strong low and high (drive = strong)

    - This mode is appropriate for most applications.

- High Z state (drive = hiz)

- (PCAL9555A/PCAL9535A also supports open drain and open source drive modes, but it is not currently exposed through SysFS)

The drive mode is set by writing the mode string ("pullup", "pulldown", "strong", or "hiz") to */sys/class/gpio/gpioXX/drive*.

```
root@WR-IDP-B072:~# echo -n "strong" > /sys/class/gpio/gpio27/drive
```

Reading and Writing GPIO Port

When GPIO port is configured for input the input value (0 or 1) can be read from */sys/class/gpio/gpioXX/value* file.

```
root@WR-IDP-B072:~# cat /sys/class/gpio/gpio27/value
0
```

When GPIO port is configured for output the output value can be written to the same file:

```
root@WR-IDP-B072:~# echo -n "1" > /sys/class/gpio/gpio27/value

root@WR-IDP-B072:~# echo -n "0" > /sys/class/gpio/gpio27/value
```

Chapter   3

Using GWS-RFID

3.1 Distribution Description

The operating system of GWB-RFID/GWS-RFID is based on Wind River IDP XT 3.1(RCPL23 or above). This Linux distribution is based on the Linux 3.4.91 kernel and the GNU 4.6.3 tool chain.

3.2 Powering the System

Connecting the PoE injector, the system will start up automatically.

Figure 1: Location of PoE injector.

NOTE:
You'd better shut down or reboot the system using a console or a secure shell connection (see next section for login).

— Powering off by disconnecting power cord could cause problems. —

Login as 'root' and then issue a 'poweroff' or 'reboot' command.
```
root@WR-IDP-B072:~# poweroff
```

```
root@WR-IDP-B072:~# reboot
```

Or send ssh remote command to gateway
```
ecs@ecs-IoT:~$ ssh root@192.168.1.1 poweroff

root@192.168.1.1's password:

ecs@ecs-IoT:~$
```

```
ecs@ecs-IoT:~$ ssh root@192.168.1.1 reboot

root@192.168.1.1's password:

ecs@ecs-IoT:~$
```

3.3 Login

The system can be accessed and controlled via a Linux shell called 'console'. The users may invoke Linux commands to configure something in the procedures of the following sections.

You should plug an usb-to-RS-232 with d'sub cable to USB port for a serial console. GWB-RFID/GWS-RFID supports two kinds of chip drivers for the cables, FTDI and PL2303.
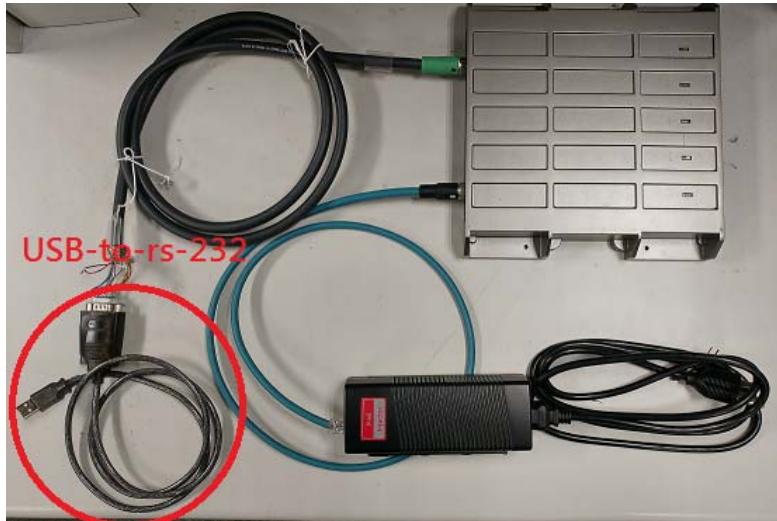
If using serial console or terminal emulator, the serial port settings are

Setting	Value
Baud	115200
Parity	No
Data Bit	8
Stop Bit	1
Flow Control	No

If using secure shell (called SSH), it listens on eth0, **the IP depend on DHCP assigned**. The eth0 is the RJ45 connector nearby the DC-In jack on PoE. The secure shell service is disabled by default. You should enable it via a serial console first.
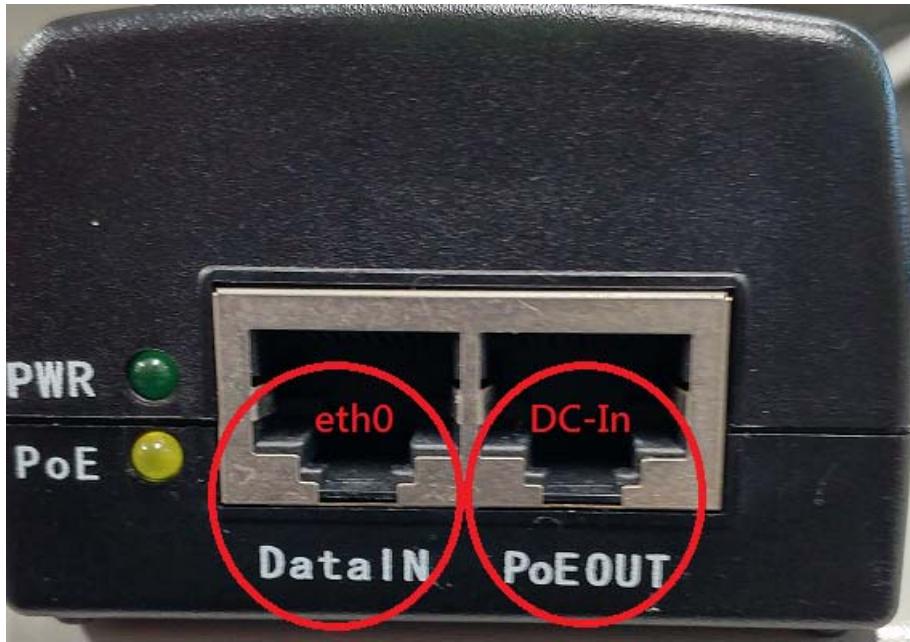
Figure 2: Location of eth1 connector

The login account for both is 'root' with password 'root'.

```
Wind River Linux 7.0.0.16 WR-IDP-B072 ttyS1


WR-IDP-B072 login: root

Password:

root@WR-IDP-B072:~#
```

```
ecs@ecs-IoT:~$ ssh root@<DHCP IP>

The authenticity of host '192.168.1.1 (192.168.1.1)' can't be established.

ED25519 key fingerprint is 5a:3b:0a:ce:8b:04:8e:0b:7e:b0:a7:2e:92:54:3c:b9.

Are you sure you want to continue connecting (yes/no)? yes

Warning: Permanently added '192.168.1.1' (ED25519) to the list of known
hosts.

Password:

Last login: Thu Mar 30 15:56:46 2017

root@WR-IDP-B072:~#
```

For security concern, administrator should change password for 'root' account or do not permit to login as 'root'. To prohibit 'root' login, please set PermitRootLogin option in the file /etc/ssh/sshd_config to no.

The following table lists available default login accounts.

Account	Password	Description
root	root	Privileged User Account

3.4 LAN Configuration

The steps below are used to configure the local area networking (LAN) of GWB-QX/GWS-QX.

If you use a serial console, you might setup networking by manual. Otherwise the networking is workable.

Step 1. Check a network interface.

```
root@WR-IDP-B072:~# ifconfig


eth0      Link encap:Ethernet  HWaddr f4:4d:30:53:b0:72

          inet6 addr: fe80::f64d:30ff:fe53:b072/64 Scope:Link

          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1

          RX packets:0 errors:0 dropped:0 overruns:0 frame:0

          TX packets:227 errors:0 dropped:0 overruns:0 carrier:0

          collisions:0 txqueuelen:1000

          RX bytes:0 (0.0 B)  TX bytes:76754 (74.9 KiB)

          Interrupt:40 Base address:0xc000


lo        Link encap:Local Loopback

          inet addr:127.0.0.1  Mask:255.0.0.0

          inet6 addr: ::1/128 Scope:Host

          UP LOOPBACK RUNNING  MTU:65536  Metric:1

          RX packets:1884 errors:0 dropped:0 overruns:0 frame:0

          TX packets:1884 errors:0 dropped:0 overruns:0 carrier:0

          collisions:0 txqueuelen:0

          RX bytes:122028 (119.1 KiB)  TX bytes:122028 (119.1 KiB)
```

Step 2. Enable a network interface, e.g. eth0.

```
root@WR-IDP-B072:~# ifconfig eth0 up
```

Step 3. Edit /etc/config/network to take effect during boot if the configuration is not fit.

For DHCP,

```
root@WR-IDP-B072:~# vi /etc/config/network



...

config interface 'wan'

        option ifname 'eth0'

        option proto 'dhcp'

...



root@WR-IntelligentDevice:~#
```

For fixed-IP,

```
root@WR-IDP-B072:~# vi /etc/config/network

...

config interface 'wan'

        option ifname 'eth0'

        option proto 'static'

        option ipaddr '192.168.2.1'

        option netmask '255.255.255.0'

...



root@WR-IDP-B072:~#
```

3.5 Reference

Wind River® Intelligent Device Platform XT Release Notes, 2.0 -

http://www.intel.com/content/dam/www/public/us/en/documents/release-notes/wind-river-idp-release-notes.pdf

www.ECS.com.tw