Embedded 5G Modem

MDG230-0G001

User Manual

Embedded 5G Modem

Chapter 1 Introduction

1.1 Introduction

Congratulations on your purchase of AMIT's MDG230 Embedded 5G Modem. With this AMIT cellular modem you have made a great first step in the world of connected Internet of things (IoT) by simply inserting a SIM card from a local mobile operator into this device to get things connected. This section gives you all the information you need to set up your device.

Benefits:
1. Carrier approval* - cost saving and time-to-market
   (*under implemnentation, check with sales for the availability)
2. Plug and play - Linux kernel 5.0 & Windows 10, or higher version.
3. Flexible SIM selection – support internal SIM / external SIM / dual SIM failover

Main Features:
✓5G NR (FR1) / 4G LTE (DL Cat. 19, UL Cat. 18)
✓ Standalone network-ready
✓ 4FF Nano SIM slot
✓ Compact Board-to-Board design for system Integration

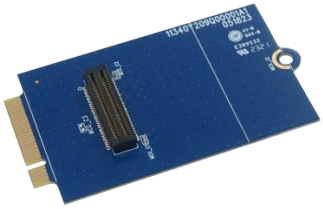
Supported OS:
- **Linux**: Linux kernel 5.0 or higher
- **Windows**: Windows 10 or higher; MDG230 driver installation is required.

Before installing and using this product, please thoroughly read this manual to fully exploit the functions of the product.

1.2 Contents List

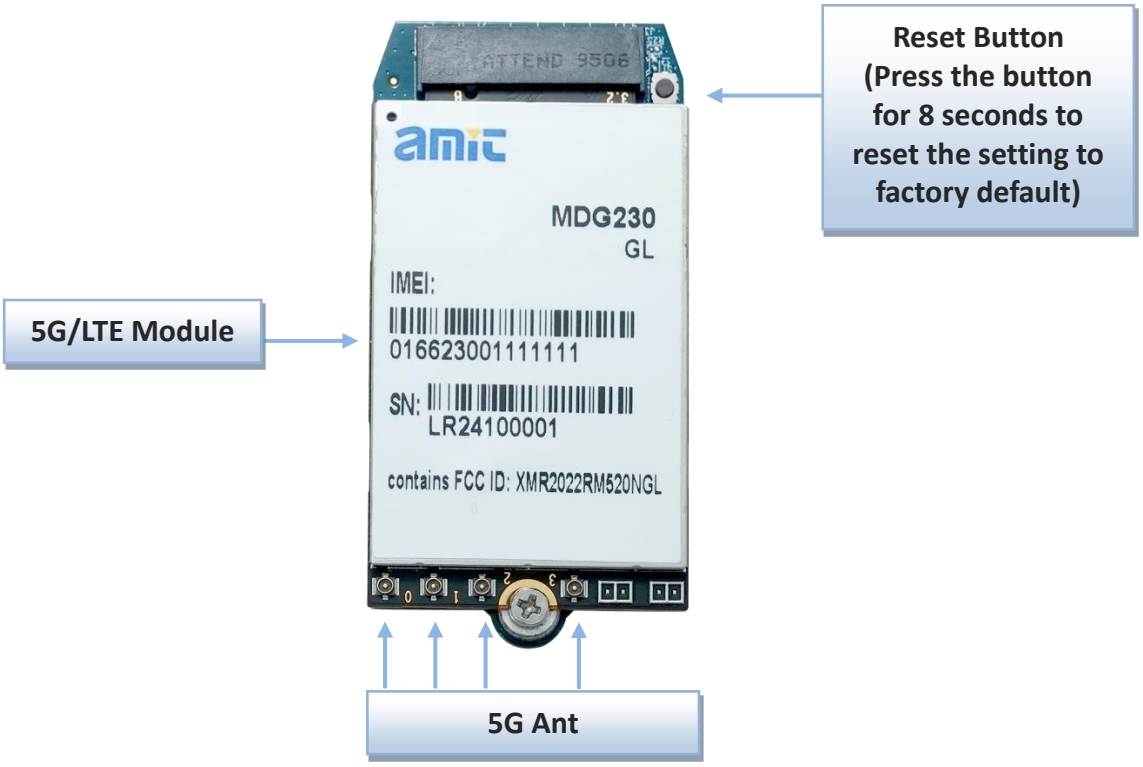
1.2.1 Package Contents

#Standard Package

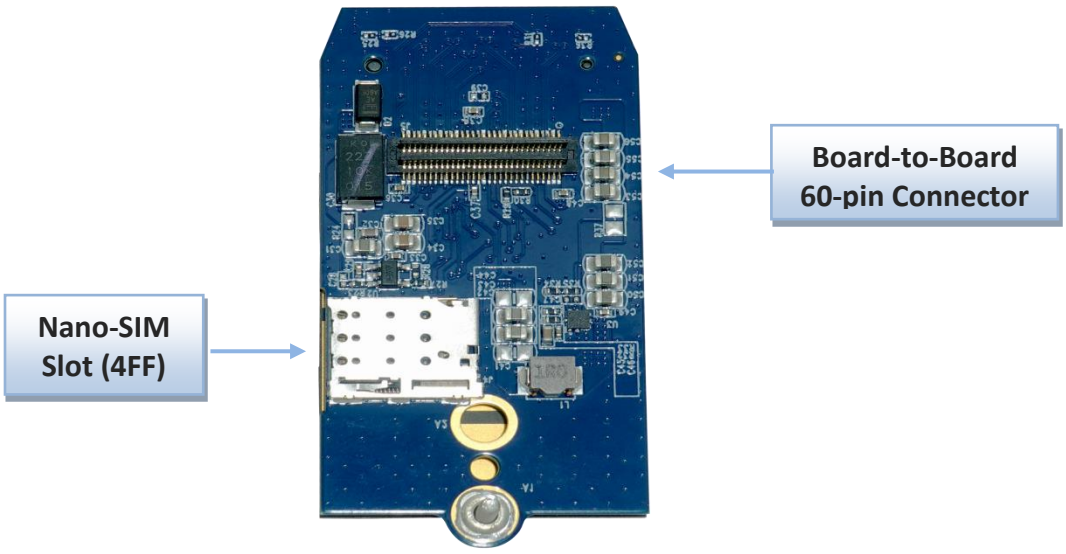
Items	Description	Contents	Quantity
1	**MDG230-0G001** **Embedded 5G Modem**		1pcs
2	**M.2 Adapter Board**		1pcs
3	**Screw Bag**		1 set

1.3 Hardware Configuration

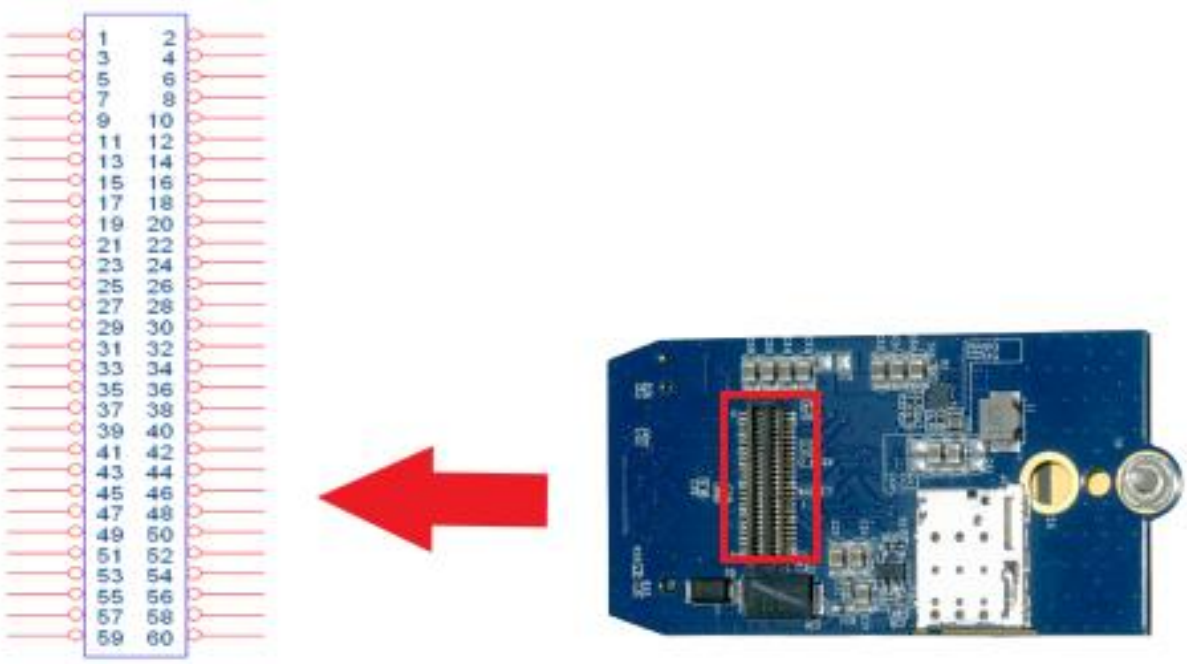
- Top View



- Bottom View



- Pin Definition



Embedded 5G Modem

Pin No.	Pin Name	Pin No.	Pin Name
1	SIM1_DET	2	3.3V
3	GND	4	3.3V
5	PCIE_CLK+	6	3.3V
7	PCIE_CLK-	8	Reset_Def_N
9	GND	10	GPIO11
11	PCIE_RX+	12	DPR
13	PCIE_RX-	14	Cell_LED
15	GND	16	5G/LTE_LED
17	PCIE_TX+	18	GND
19	PCIE_TX-	20	N79_TX_EN
21	GND	22	RFFE_DATA
23	PCIE_CLKREQ_N	24	RFFE_CLK
25	PCIE_RST_N	26	PCIE_WAKE_N
27	RM500_Signal_LED	28	RESET#
29	SIM1_VCC	30	SIM2_VCC
31	GND	32	GND
33	SIM1_IO	34	SIM2_CLK
35	SIM1_RST	36	SIM2_RST
37	SIM1_CLK	38	SIM2_IO
39	GND	40	SIM2_DET
41	USB3.0_RX+	42	RM520_Signal_LED
43	USB3.0_RX-	44	W_Disable2#
45	GND	46	GPIO7
47	USB3.0_TX+	48	GPIO6
49	USB3.0_TX-	50	GPIO5
51	GND	52	GPIO9
53	USB_DM	54	M2_Power_OFF
55	USB_DP	56	3.3V
57	GND	58	3.3V
59	W_Disable1#	60	3.3V

1.4 Installation

1.4.1 SYSTEM REQUIREMENTS

Network Requirements	• USB3.0 interface • 4G/5G cellular service subscription
Web-based Configuration Utility Requirements	**Computer with the following:** • Windows®, Macintosh, or Linux-based operating system **Browser Requirements:** • Microsoft Edge 119 or higher • Chrome 73 or higher • Firefox 60.0 or higher

Federal Communication Commission Interference 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, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FOR PORTABLE DEVICE USAGE (<20m from body/SAR needed)

Radiation Exposure Statement:

The product comply with the FCC portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

FOR MOBILE DEVICE USAGE (>20cm/low power)

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

FOR COUNTRY CODE SELECTION USAGE (WLAN DEVICES)

Note: The country code selection is for non-US model only and is not available to all US model. Per FCC regulation, all WiFi product marketed in US must fixed to US operation channels only.

1.4.2 Product Information for CE RED Requirements

The following product information is required to be presented in product User Manual for latest CE RED requirements.[1]

(1) Frequency Band & Maximum Power

1. Frequency Band for 5G NR /4G LTE /3G Connection (for RM520N-GL version)[2]

Band number	Operating Frequency	Max output power
5G NR bands (n1/n3/5/n7/n8/n20/ n28/n38/n40/n41/n75/ n76/n77/n78)	N1 Uplink:1920-1980 MHz Downlink:2110-2170 MHz N3 Uplink:1710-1785 MHz Downlink:1805-1880 MHz N5 Uplink: 824-849 MHz Downlink: 869-894 MHz N7 Uplink:2500-2570 MHz Downlink:2620-2690 MHz N8 Uplink:880-915 MHz Downlink:925-960 MHz N20 Uplink:832-862 MHz Downlink:791-821 MHz N28 Uplink: 703-748 MHz Downlink: 758-803 MHz N38 Uplink: 3550-3700MHz Downlink: 3550-3700MHz N40 Uplink: 2300-2400MHz Downlink: 2300-2400MHz N41 Uplink: 2496-2690MHz Downlink: 2496-2690MHz N75 Downlink: 1432-1517MHz N76 Downlink: 1427-1432MHz N77 Uplink: 3300-4200MHz Downlink: 3300-4200MHz N78 Uplink: 3550-3700MHz Downlink: 3550-3700MHz	n1/n3/n5/n7/n8/n20/n28/n38/n40: 25dBm n41/n77/n78 (class 2): 28dBm
LTE Bands E-UTRA FDD Band:1/3/5/7/8/20/28/ 32 E-UTRA TDD Band:	B1 Uplink:1920-1980 MHz Downlink:2110-2170 MHz B3 Uplink:1710-1785 MHz Downlink:1805-1880 MHz B5 Uplink: 824-849 MHz	E-UTRA FDD 1/3/5/7/8/20/28: 25 dBm E-UTRA TDD 34/38/40/41/42/43: 25 dBm

1. The information presented in this section is ONLY valid for the EU/EFTA regional version.For those non-CE/EFTA versions, please refer to the corresponding product specification.

2. There can be different cellular module integrated in the device for EU/EFTA regional version. Refer to the cellular module identifier printed on the device label for the purchased device.

34/38/40/41/42/43/46	Downlink: 869-894 MHz B7 Uplink:2500-2570 MHz Downlink:2620-2690 MHz B8 Uplink:880-915 MHz Downlink:925-960 MHz B20 Uplink:832-862 MHz Downlink:791-821 MHz B28 Uplink: 703-748 MHz Downlink: 758-803 MHz B32 Downlink: 1452-1496 MHz B34 Uplink: 2010-2025 MHz Downlink: 2010-2025 MHz B38 Uplink: 2570-2620 MHz Downlink: 2570-2620 MHz B40 Uplink: 2300-2400 MHz Downlink: 2300-2400 MHz B41 Uplink: 2496-2690 MHz Downlink: 2300-2400 MHz B42 Uplink: 3400-3600 MHz Downlink: 3400-3600 MHz B43 Uplink: 3600-3800 MHz Downlink: 3600-3800 MHz B46 Downlink: 5150-5925 MHz	UL CA: 25 dBm
WCDMA BANDs Band I/V/VIII	B1 Uplink:1920-1980 MHz Downlink:2110-2170 MHz B5 Uplink: 824-849 MHz Downlink: 869-894 MHz B8 Uplink:880-915 MHz Downlink:925-960 MHz	25 dBm

(2) DoC Information

You can get the DoC information of this product from the following URL:
http://www.amitwireless.com/products-doc/

(3) Manufacture Information

Manufacture Name: AMIT Wireless Inc.
Manufacture Address: No. 28, Lane 31, Sec. 1, Huandong Rd., Sinshih Dist., Tainan 74146, Taiwan

1.5 Hardware Installation

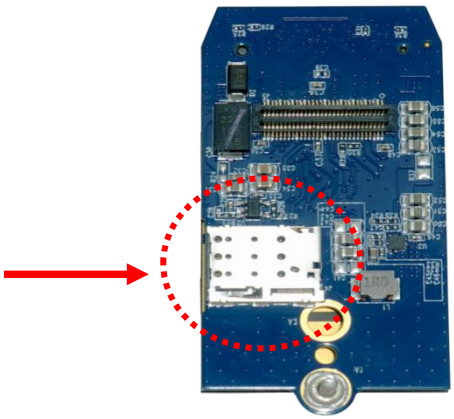
This chapter describes how to install and configure the hardware

1.5.1 Insert the SIM Card

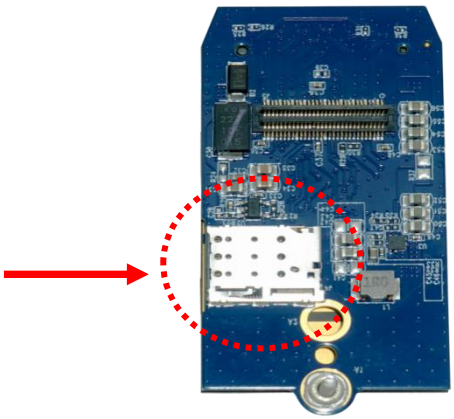
WARNING: BEFORE INSERTING OR CHANGING THE SIM CARD, PLEASE MAKE SURE THAT POWER OF THE DEVICE IS SWITCHED OFF.

SIM card slot is located in the bottom side of MDG230. Please follow the following instructions to install or remove a SIM card.

Step 1:
Push the SIM card into the SIM slot.



Step 2:
Push the inserted SIM card again to eject it from the SIM slot.

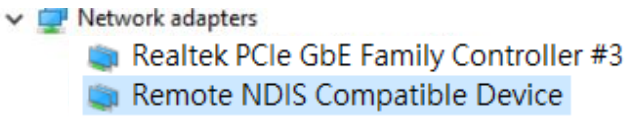


1.5.2 Connecting to the host board

After you connect MDG230 embedded modem to your host board, you will see the new device shown up on Windows and Linux OS. (The MDG230 support RNDIS for Win10 up and Linux Kernel 5.0 up)

#Windows

Download Windows driver from the link below.
https://www.amitwireless.com/productDetail.php?cate=1030&product_id=1314&pid=1309&pid1=1260&pid2=1030#



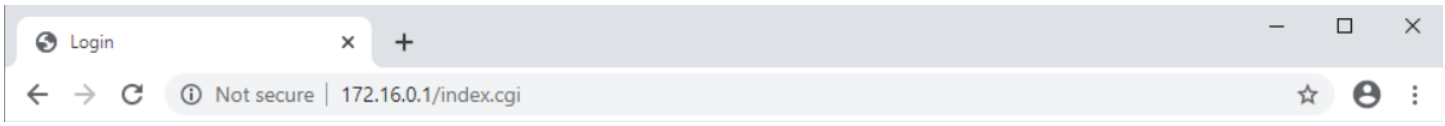
#Linux:

```
[7450302.582398] usb 2-1: new SuperSpeed USB device number 12 using xhci-hcd
[7450302.600979] usb 2-1: LPM exit latency is zeroed, disabling LPM.
[7450302.601704] usb 2-1: New USB device found, idVendor=2c7c, idProduct=90b3, b
cdDevice= 5.04
[7450302.601724] usb 2-1: New USB device strings: Mfr=1, Product=2, SerialNumber
=3
[7450302.601730] usb 2-1: Product: RM520N-GL
[7450302.601734] usb 2-1: Manufacturer: Quectel
[7450302.601738] usb 2-1: SerialNumber: 26be0bad
[7450303.012771] rndis_host 2-1:1.0 eth1: register 'rndis_host' at usb-xhci-hcd.
3.auto-1, RNDIS device, 4c:e7:86:90:46:b6
[7450303.012932] usbcore: registered new interface driver rndis_host
root@LX2202:~#
```

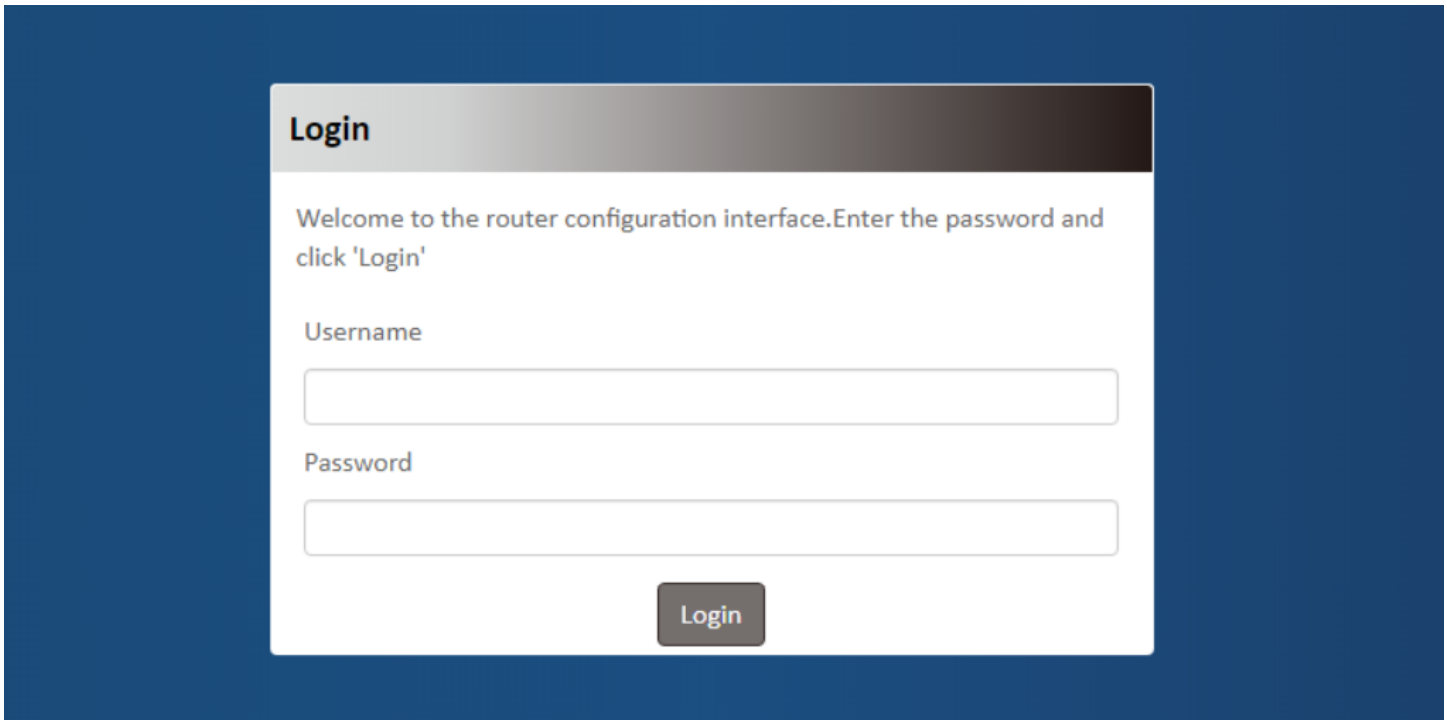
1.5.2 Setup by Configuring WEB UI

User can browse web UI to configure the modem device.

Type in the IP Address (**http://192.168.123.254/**)[3]



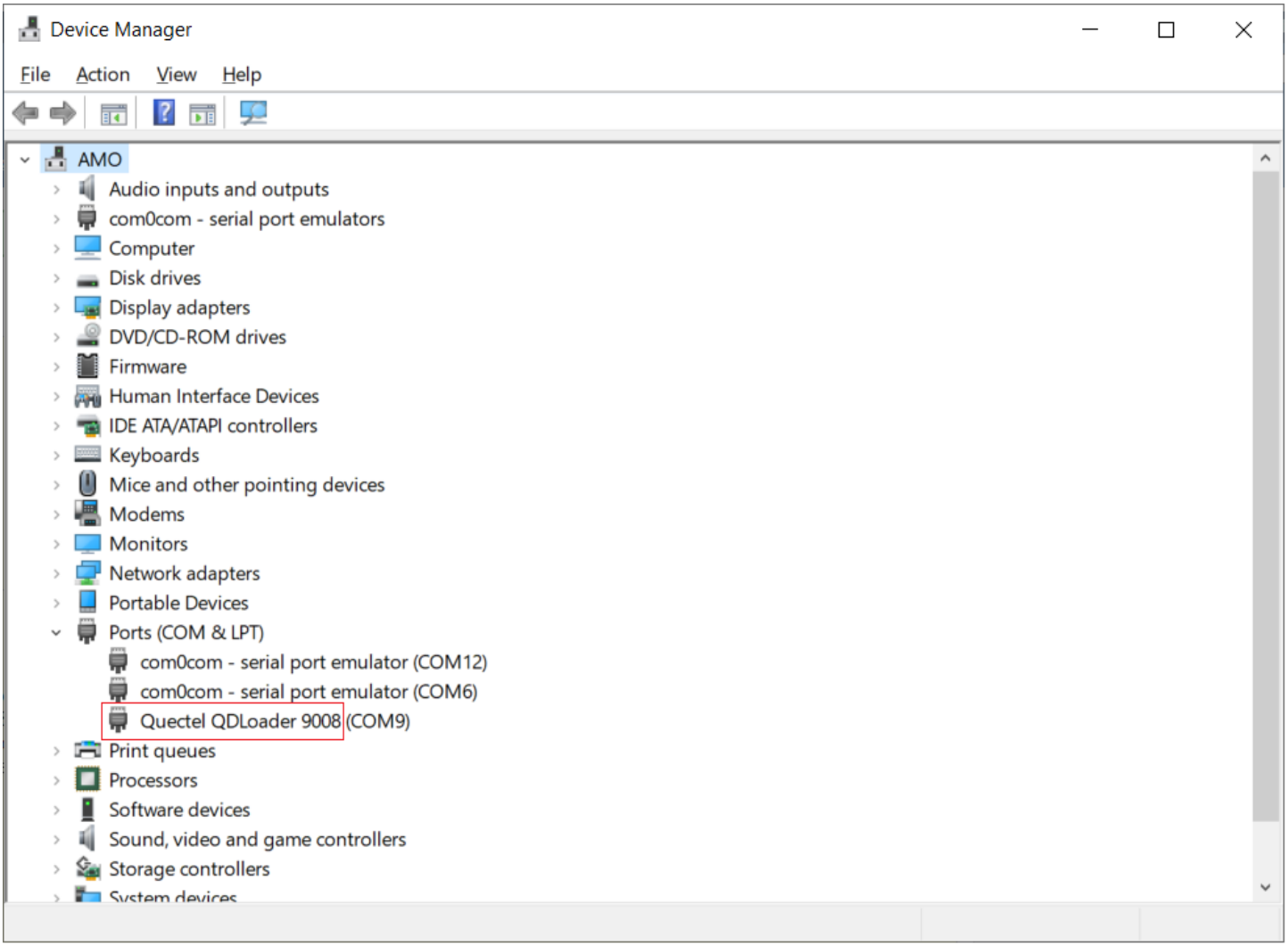
When you see the login page, enter the user name and password and then click **'Login'** button.
The default setting for both username and password is **'admin'** [4].



3 The default LAN IP address of this device is 192.168.123.254. If you change it, you need to login by using the new IP address.

4 For security concern, the login process will force user to change default password at the first time.

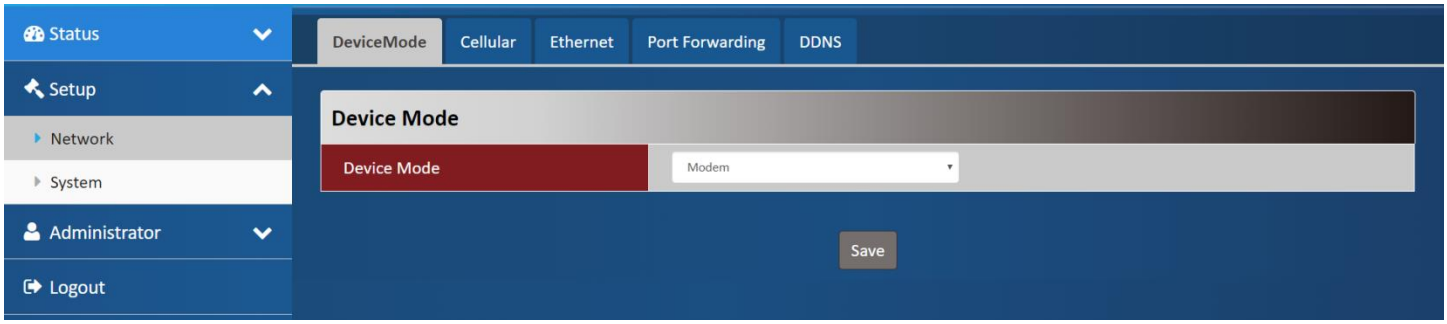
If the screen above does not appear after entering the IP address, please check the Device Manager. If 'Quectel QDLoader 9008' appears (as shown in the red box below), please return the product to the vendor for adjustment.



Chapter 2 Setup

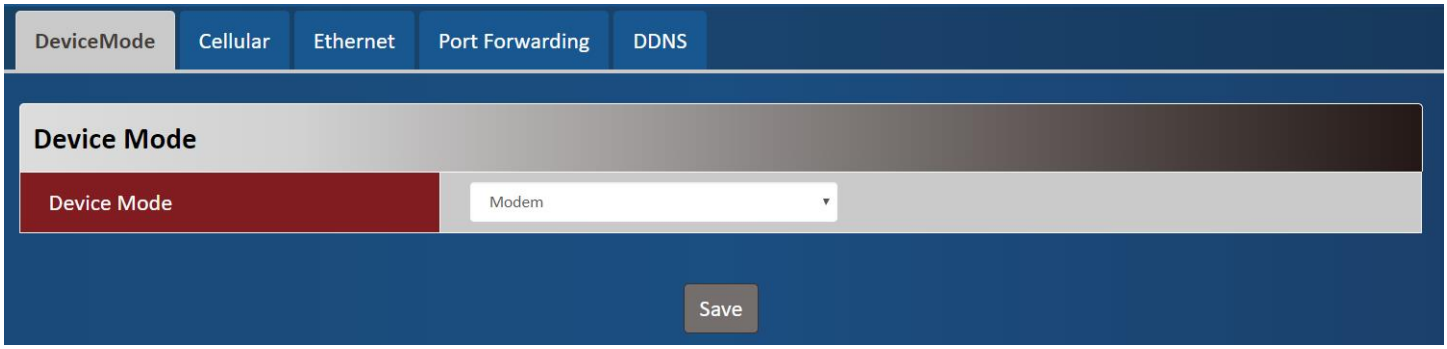
The MDG230 series connect to a machine via USB 3.0 interface for 4G/5G network connection. MDG230 provides NAT and Modem functions and helps the network application more flexible.

2.1 Network



Network Page	
Item	**Description**
Device Mode	Set the unit operating mode
Cellular	Set the parameter for cellular network.
Ethernet	Set the IP of LAN side and DHCP service
Port Forwarding	Enable specified port or protocol for service on connected device.
DDNS	Register a dynamic host name for the unit.

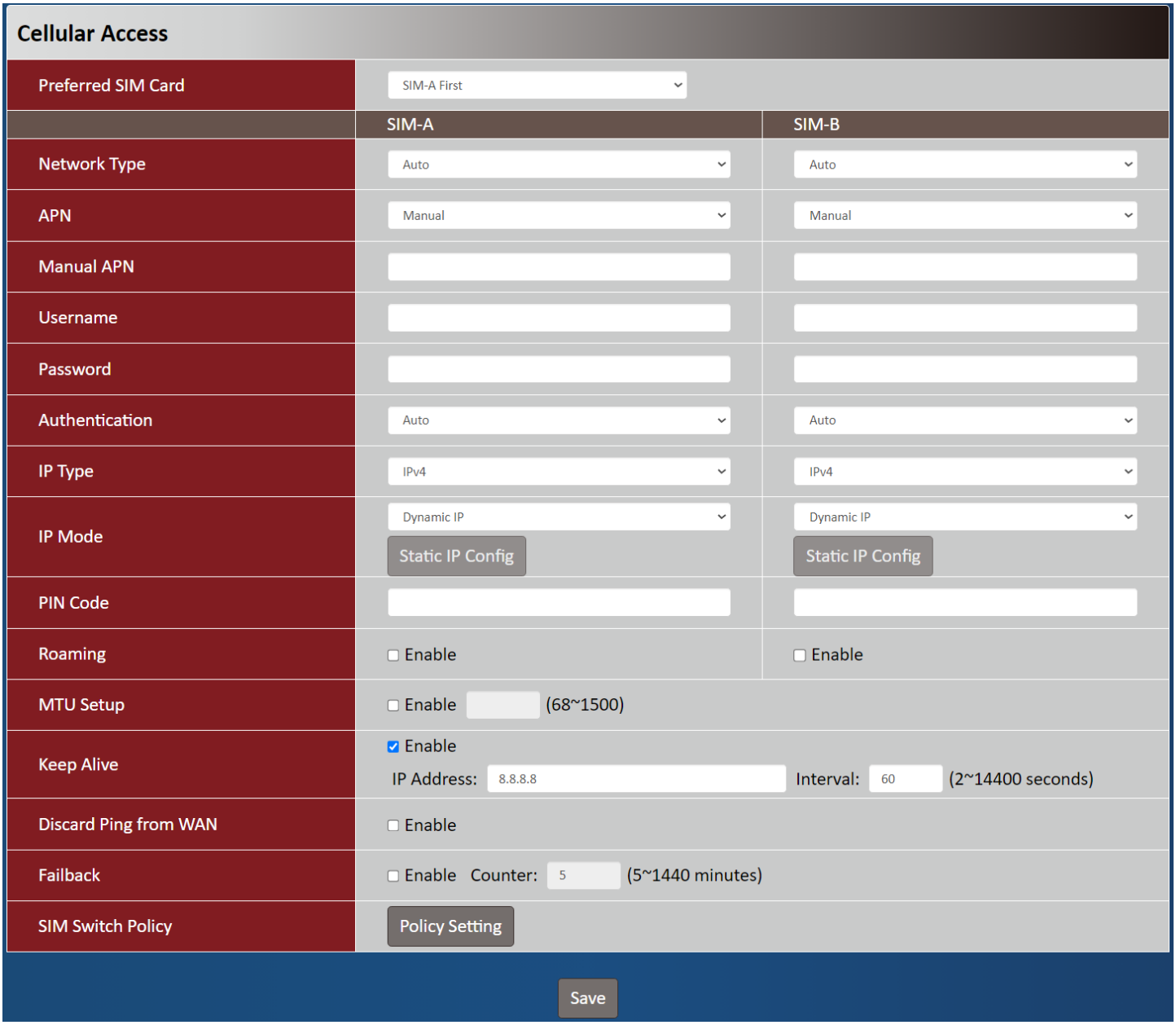
2.1.1 Device Mode



Device Mode		
Item	**Value setting**	**Description**
Device Mode	1. A Must filled setting 2. By default **NAT** is selected	**NAT** The unit will provide a NAT service and provide a simple firewall for the connected device. **Modem** The unit will pass the cellular IP to connected device on LAN side.

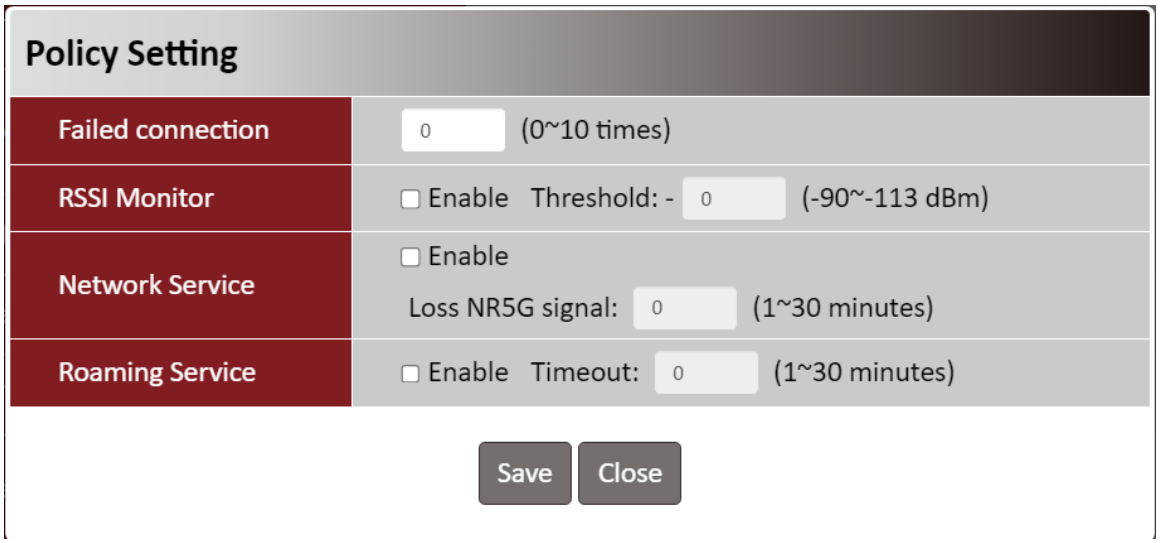
2.1.2 Cellular

Embedded 5G Modem

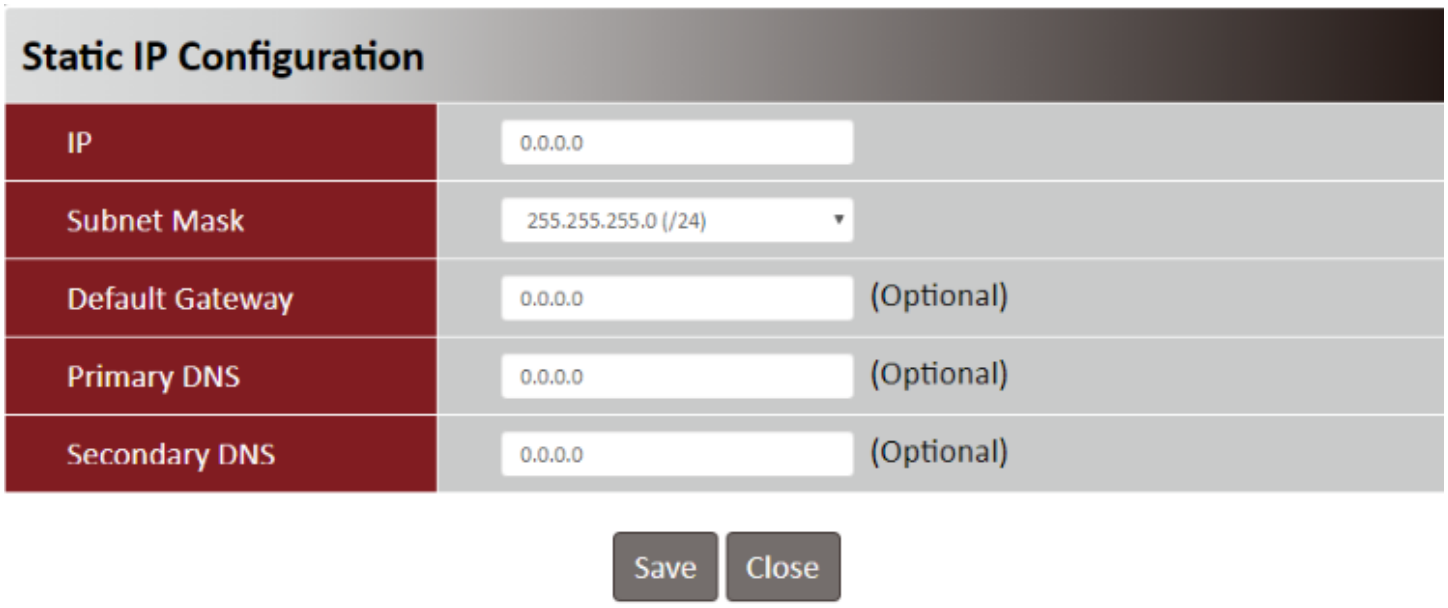


Device Mode Item	Value setting	Description
Preferred SIM Card	1. A Must filled setting 2. By default **SIM-A First** is selected	Choose which SIM card you want to use for the connection. When **SIM-A First** or **SIM-B First** is selected, it means the connection is built first by using SIM A/SIM B. And if the connection is failed, it will change to the other SIM card and try to dial again, until the connection is up. When **SIM-A only** or **SIM-B only** is selected, it will try to dial up only using the SIM card you selected. **Note_1**: For the product with single SIM design, only **SIM-A Only** option is available.
APN	1. A Must filled setting 2. By default **Auto** is	**Auto** The unit will detect the SIM and set an APN from internal database. **Manual**

	selected	User must set APN manually.
Manual APN	1. A Must filled setting 2. String format : any text	Enter the **APN** you want to use to establish the connection. This is a must-filled setting if you selected **Manual APN** as APN scheme.
Username	1. An Optional setting 2. String format : any text	Enter the optional **username** settings if your ISP provided such settings to you.
Password	1. An Optional setting 2. String format : any text	Enter the optional **Password** settings if your ISP provided such settings to you.
Authentication	1. A Must filled setting 2. By default **Auto** is selected	Select **PAP** (Password Authentication Protocol) and use such protocol to be authenticated with the carrier's server. Select **CHAP** (Challenge Handshake Authentication Protocol) and use such protocol to be authenticated with the carrier's server. When **Auto** is selected, it means it will authenticate with the server either **PAP** or **CHAP**.
IP Mode	1. A Must filled setting 2. By default **Dynamic IP** is selected	**Dynamic IP** The unit will get IP from cellular service.. **Static IP** The unit will set IP according **Static IP Config**.
IP Type	1. A Must filled setting 2. By default **IPv4** is selected	Specify the IP type of the network service provided by your 3G/4G network. It can be **IPv4**, **IPv6**, or **IPv4v6**.
PIN Code	1. An Optional setting 2. String format : interger	Enter the PIN (Personal Identification Number) code if it needs to unlock your SIM card.
MTU Setup	1. An Optional setting 2. **Uncheck** by default	Check the Enable box to enable the MTU (Maximum Transmission Unit) limit, and specify the **MTU** for the 3G/4G connection. **MTU** refers to Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission. ***Value Range*:** 68 ~ 1500.
Keep Alive	1. An optional setting 2. Box is checked by default	Input **IP Address** and **interval** to send an ICMP packet to check the network status.
DiscardPing from WAN	1. AnOptional setting 2. **Uncheck** by default	The modem will not respond the ICMP request packet from remote hosts when the checkbox is checked.
SIM Switch Policy		Click the **Policy Setting** button to define the SIM Switch policy or browse the current policy settings.



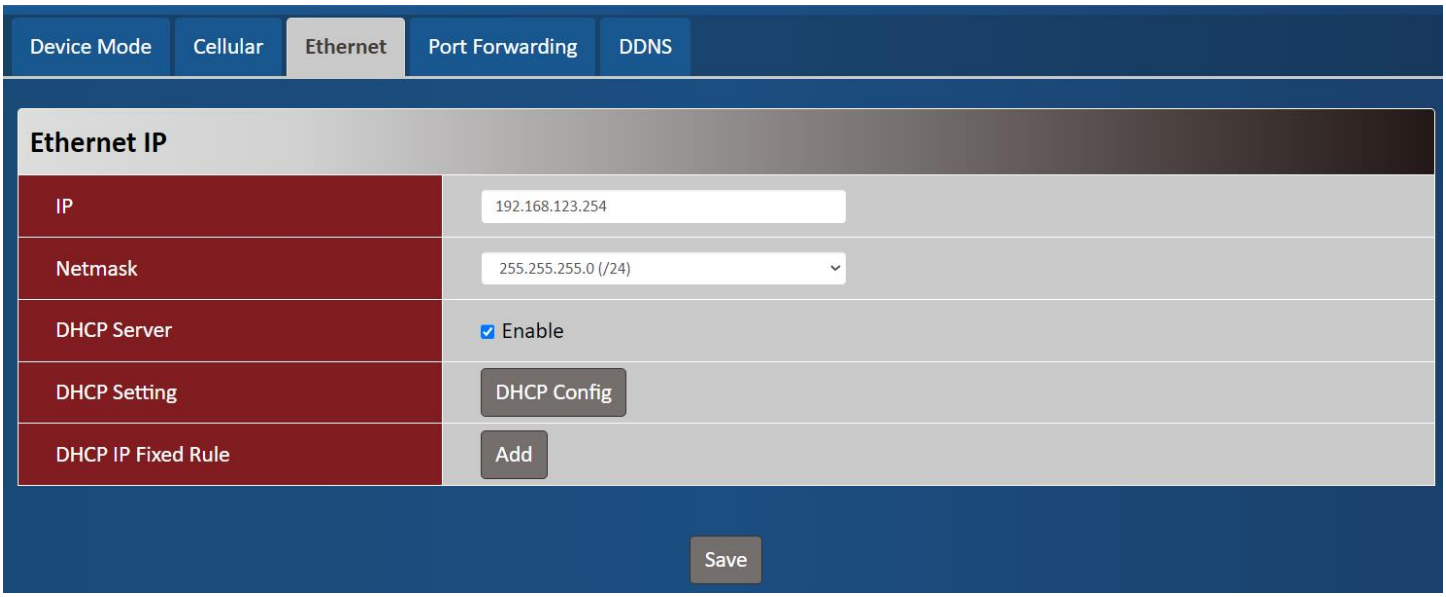
Policy Setting Item	Value setting	Description
Failed connection	1. 0 By default 2. Uncheck by default	Number of failed connections,After the number of times is reached, switch the SIM
RSSI Monitor	1. 0 By default 2. Uncheck by default	When the signal is less than the set value, the SIM will be switched
Network service	1. 0 By default 2.	When the loss NR5G signal reaches the set value time, start switching SIM
Roaming service	1. 0 By default	**Switch SIM when roaming timeout time reaches the set value**



Static IP Configuration Item	Value setting	Description
IP	1. IPv4 format. 2. A Must filled setting	The Static IP Address setting of this unit.

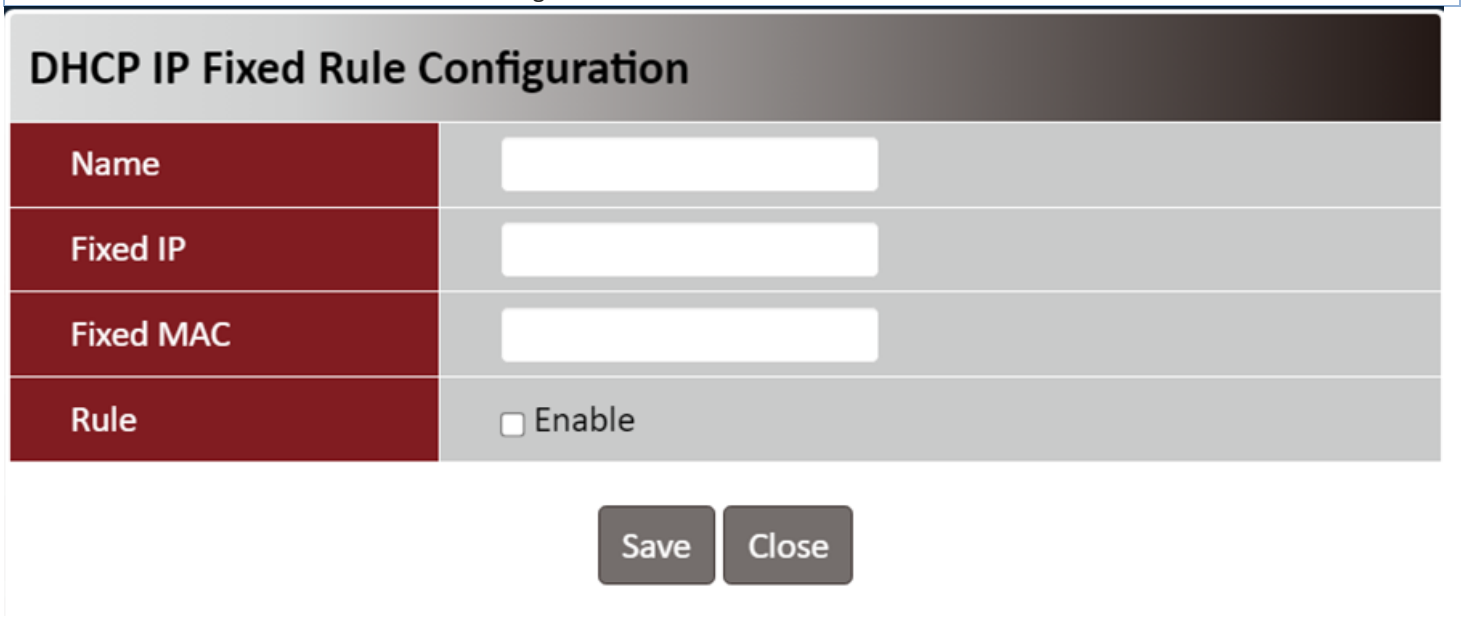
Subnet Mask	255.255.255.0 (/24) is set by default	The Subnet Mask of this configed static IP.
Default Gateway	1. IPv4 format. 2. An Optional setting	The gateway setting of this configed static IP.
Primary DNS	1. IPv4 format. 2. An Optional setting	Assigned DNS server of this configed static IP.
Secondary DNS	1. IPv4 format. 2. An Optional setting	Assigned DNS server of this configed static IP.

2.1.3 Ethernet



Ethernet IP Item	Value setting	Description
IP	1. IPv4 format. 2. A Must filled setting	The LAN IP Address of this unit.
Netmask	255.255.255.0 (/24) is set by default	The Subnet Mask of this unit.
DHCP Server	The box is checked by default.	Click **Enable** box to activate DHCP Server.
DHCP Setting	N/A	Click **DHCP Config** button to pop-up the **DHCP Setting** page.
DHCP IP Fixed Rule	N/A	Click **Add** button to pop-up the **DHCP IP Fixed Rule** page.

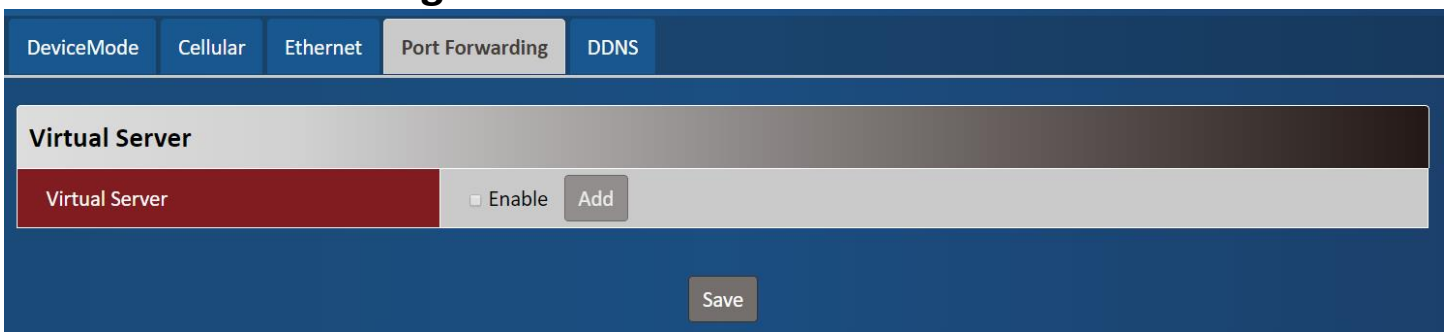
DHCP Setting		
Item	**Value setting**	**Description**
IP Pool Start	1. Numberic string format. 2. A Must filled setting	The IP Pool of this DHCP Server. It is Starting Address entered in this field.
IP Pool End	1. Numberic string format. 2. A Must filled setting	The IP Pool of this DHCP Server. It is Ending Address entered in this field.
Lease Time	1. Numberic string format. 2. A Must filled setting	The Lease Time of this DHCP Server. ***Value Range***: 300 ~ 604800 seconds.



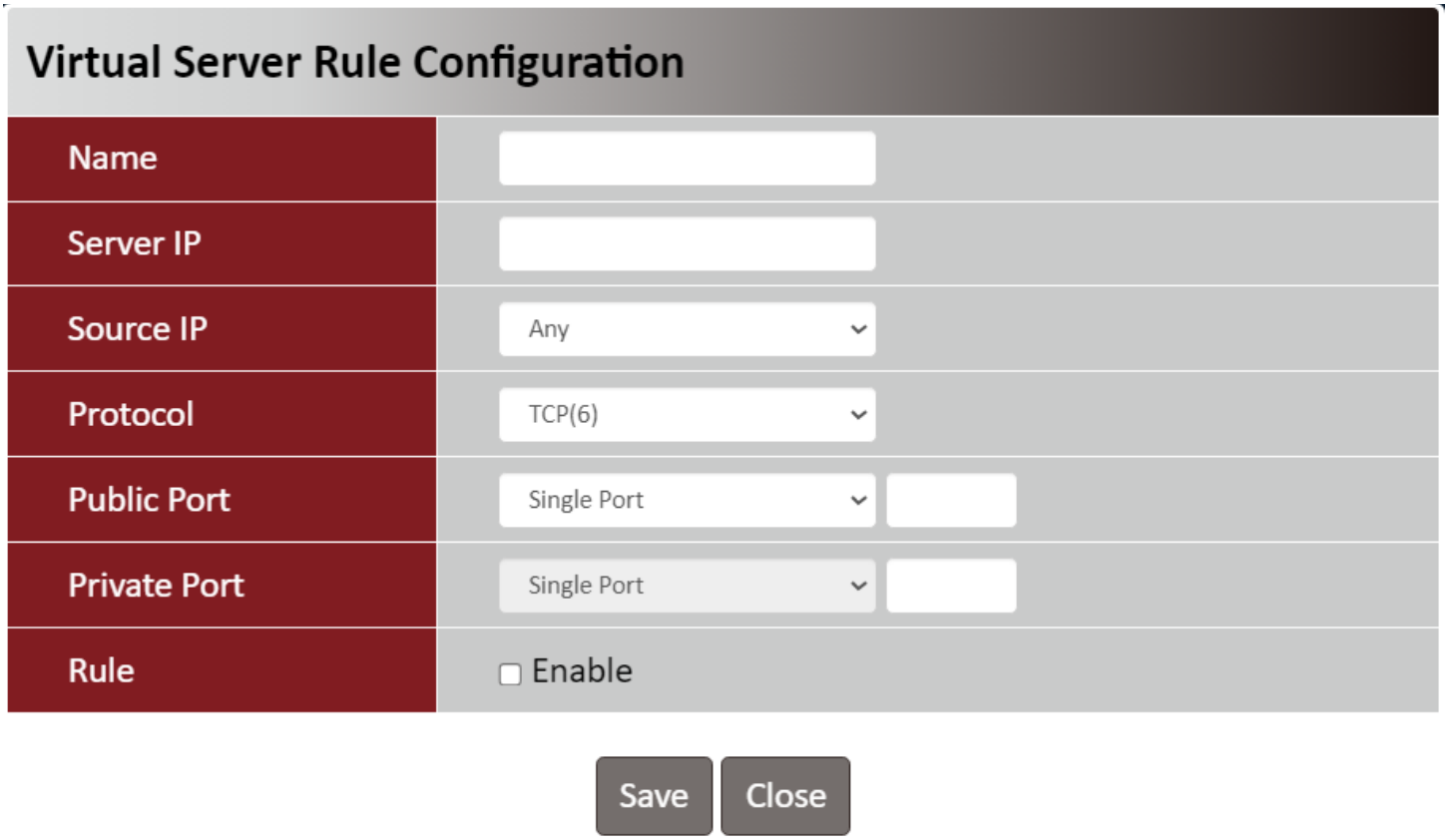
DHCP IP Fixed Mapping		
Item	**Value setting**	**Description**
Name	1. String format can be any text 2. A must-filled setting	The name of current rule.

Fixed IP	1. IPv4 format. 2. A must-filled setting	The IP address of this mapping rule.
Fixed MAC	1. MAC address string format 2. A must-filled setting	The MAC address of this mapping rule.
Rule	The box is unchecked by default.	Click **Enable** box to activate this rule.

2.1.4 Port Forwarding



Virtual Server Item	Value setting	Description
Virtual Server	The box is unchecked by default	Check the **Enable** box to activate this port forwarding function Click **Add** will pop-up **Virtual Server Rule Configuration** page.

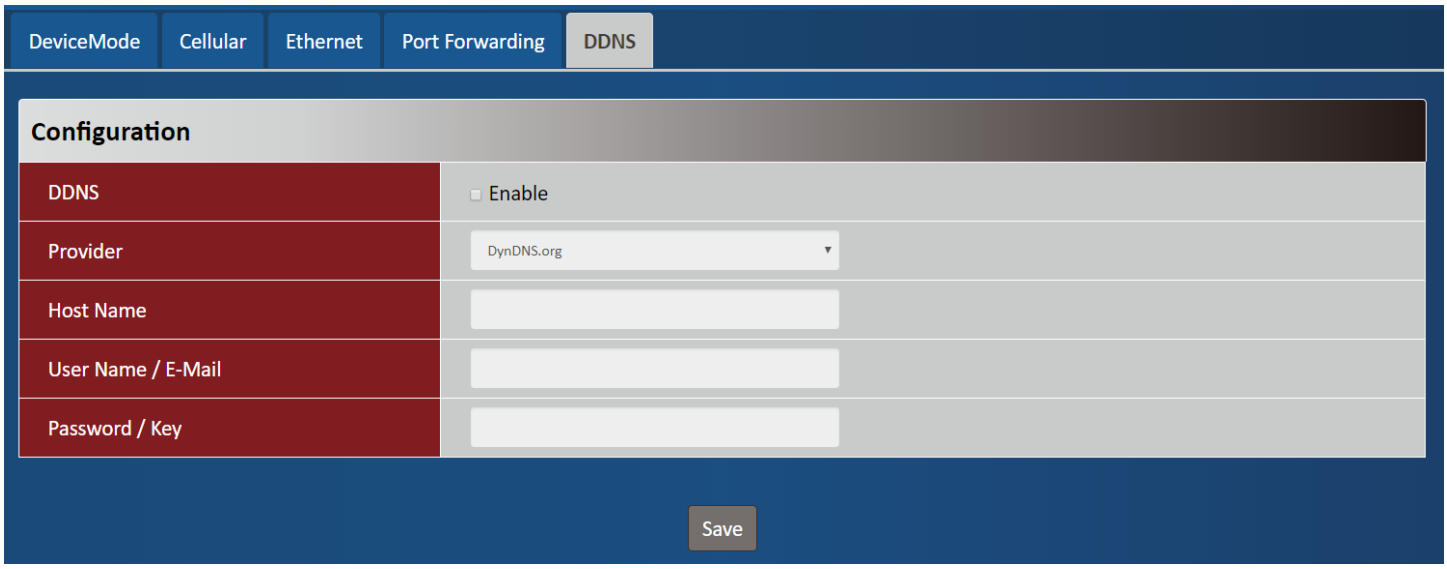


Virtual Server Rule Configuration		
Item	Value setting	Description

Name	1. String format can be any text 2. A Must filled setting	The name of current rule
Server IP	A Must filled setting	This field is to specify the IP address of the interface selected in the WAN Interface setting above.
Source IP	1. A Must filled setting 2. By default Any is selected	This field is to specify the **Source IP address**. Select **Any** to allow the access coming from any IP addresses. Select **Specific IP Address** to allow the access coming from an IP address. Select **IP Range** to allow the access coming from a specified range of IP address.
Protocol	A Must filled settin	When **"TCP(6)"** is selected It means the option "Protocol" of packet filter rule is TCP. **Public Port** selected a predefined port from **Well-known Service**, and **Private Port** is the same with **Public Port** number. **Public Port** is selected **Single Port** and specify a port number, and **Private Port** can be set a **Single Port** number. **Public Port** is selected **Port Range** and specify a port range, and **Private Port** can be selected **Single Port** or **Port Range**. *Value Range*: 1 ~ 65535 for Public Port, Private Port. When **"UDP(17)"** is selected It means the option "Protocol" of packet filter rule is UDP. **Public Port** selected a predefined port from **Well-known Service**, and **Private Port** is the same with **Public Port** number. **Public Port** is selected **Single Port** and specify a port number, and **Private Port** can be set a **Single Port** number. **Public Port** is selected **Port Range** and specify a port range, and **Private Port** can be selected **Single Port** or **Port Range**. *Value Range*: 1 ~ 65535 for Public Port, Private Port. When **"TCP(6) & UDP(17)"** is selected It means the option "Protocol" of packet filter rule is TCP and UDP. **Public Port** selected a predefined port from **Well-known Service**, and **Private Port** is the same with **Public Port** number. **Public Port** is selected **Single Port** and specify a port number, and **Private Port** can be set a **Single Port** number. **Public Port** is selected **Port Range** and specify a port range, and **Private Port** can be selected **Single Port** or **Port Range**. *Value Range*: 1 ~ 65535 for Public Port, Private Port. When **"User-defined"** is selected It means the option "Protocol" of packet filter rule is User-defined. For **Protocol Number**, enter a port number.
Rule	1. An optional filled setting 2.The box is unchecked by default.	Check the Enable box to activate the rule.

Virtual Server – Rule Name		
Item	**Value setting**	**Description**
Rule name	N/A	Clicl "**Edit**" button to pop-up **Virtual Server Rule Configuration** page to edit the rule. Click "**Delete**" button to delete this rule

2.1.5 DDNS

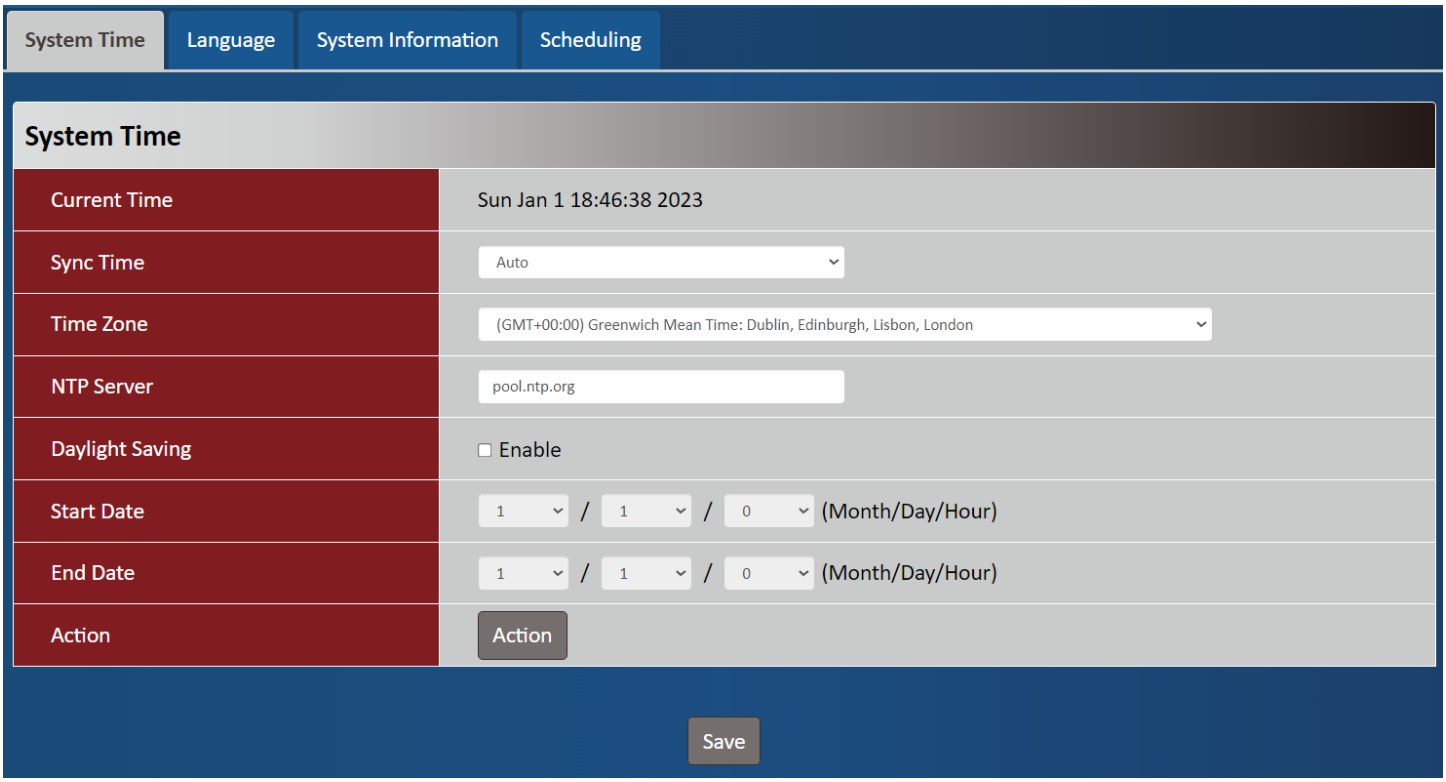


DDNS		
Item	**Value setting**	**Description**
DDNS	The box is unchecked by default	Check the **Enable** box to activate this function.
Provider	**DynDNS.org** is set by default	Select your DDNS provider of Dynamic DNS. It can be **DynDNS.org**, **NO-IP.com**, **TZO.com** etc...
Host Name	1. String format can be any text 2. A Must filled setting	Your registered host name of DDNS Service. ***Value Range*:** 0 ~ 63 characters.
User Name / E-Mail	1. String format can be any text 2. A Must filled setting	Enter your User name or E-mail addresss of DDNS Service.
Password / Key	1. String format can be any text 2. A Must filled setting	Enter your Password or Key of DDNS Service.

2.2 System

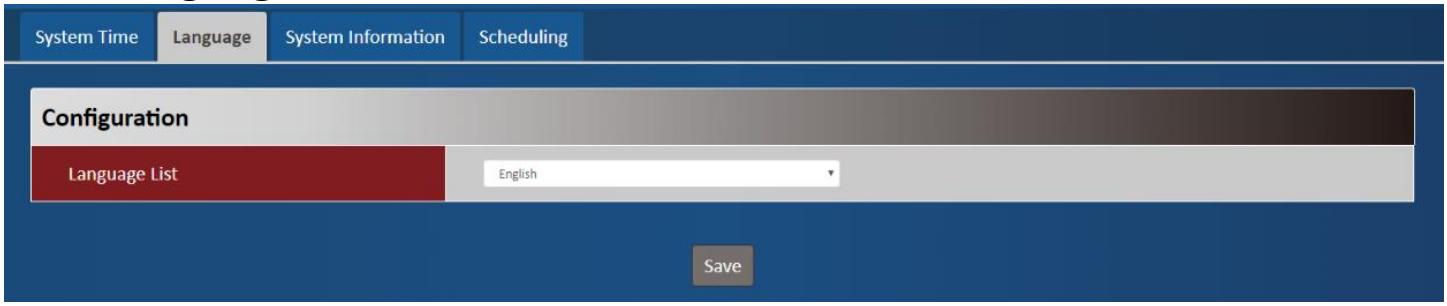
This section provides the configuration of system features.

2.2.1 System Time



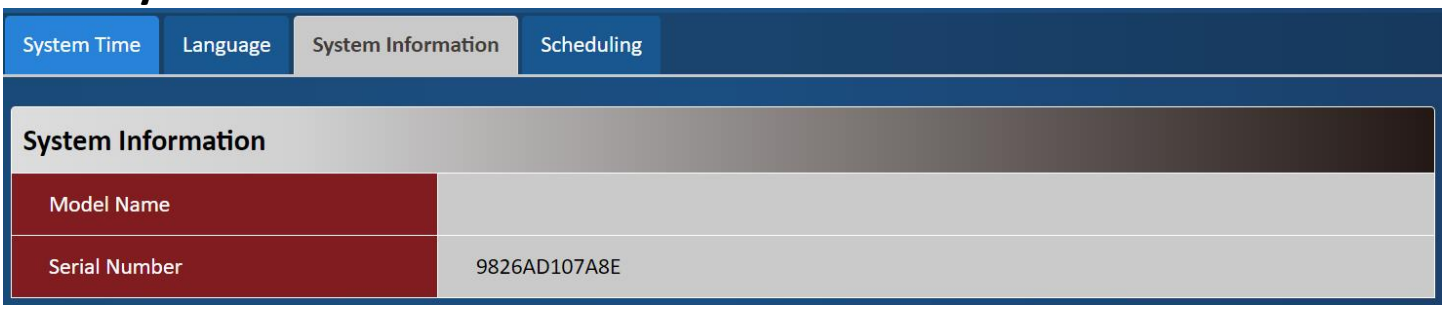
System Time Item	Value setting	Description
Current Time	N/A	Show the current time of the unit.
Sync Time	1. A must-filled item. **2. Atuo is selected by default.**	When select **Auto**, unit will sync the time via cellular cell, and then try to use NTP if cellular cell doesn't provide time information. When select **NTP**, the unit will sync time via ntp service.
Time Zone	1. A must-filled item. 2. **GMT+00 :00** is selected by default.	Select a time zone where this device locates.
NTP Server	1. A must-filled item.	Indicate which NTP server will be used of the time synchronization.
Daylight Saving	1. It is an optional item. 2. Un-checked by default	Check the **Enable** button to activate the daylight saving function. When user enabled this function, user has to specify the **Start Date** and **End Date** for the daylight saving time duration.
Start Date	N/A	Start time for Daylight Saving.
End Date	N/A	End Time of Daylight Saving.
Action	N/A	Click **Action** to sync time immediately

2.2.2 Language



Language		
Item	**Value setting**	**Description**
Language List	1. A Must-filled item. **2. English** is selected by default.	Language setiing of the WebGUI.

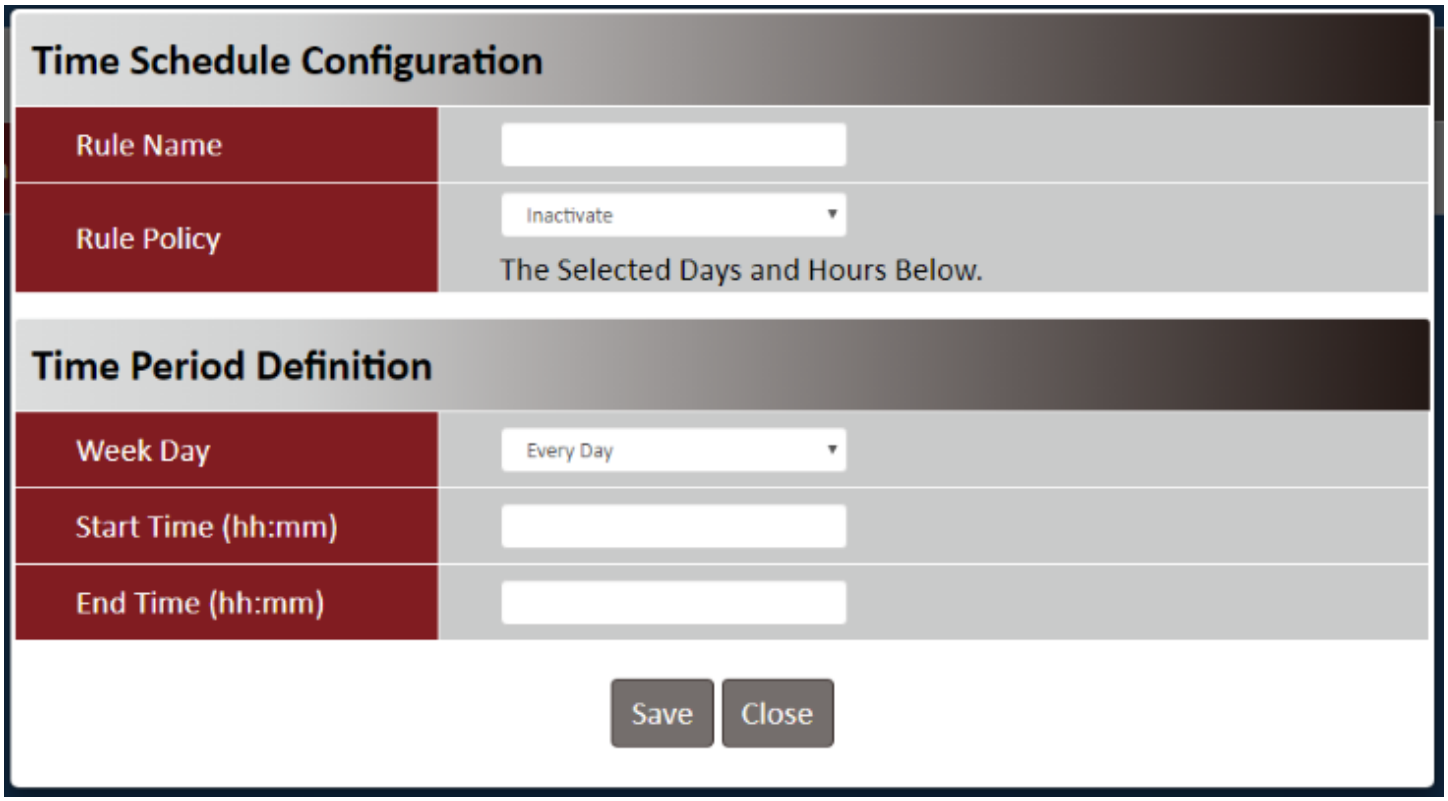
2.2.3 System Information



System Information		
Item	**Value setting**	**Description**
Model Name	N/A	Show the model name of the device
Serial Number	**N/A**	Show the serial number of the device

2.2.4 Scheduling

Scheduling		
Item	**Value setting**	**Description**
Time Schedule	N/A	Press **Add** to create a schedule rule for system.



Time Schedule Configuration		
Item	**Value Setting**	**Description**
Rule Name	String: any text	Set rule name
Rule Policy	Default Inactivate	Inactivate/activate the function been applied to in the time period below

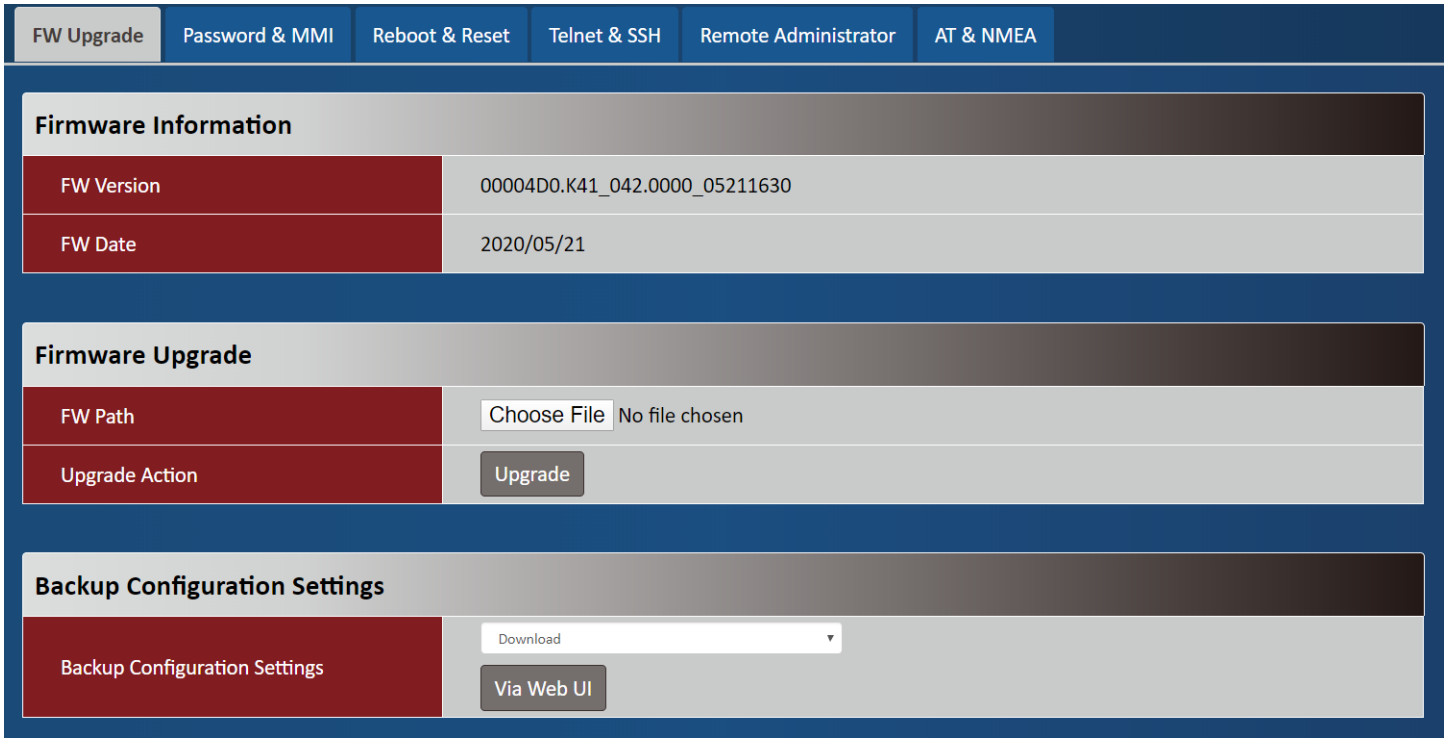
Time Period Definition		
Item	**Value Setting**	**Description**
Week Day	Select from menu	Select everyday or one of weekday
Start Time	Time format (hh :mm)	Start time in selected weekday
End Time	Time format (hh :mm)	End time in selected weekday

Chapter 3 Administrator

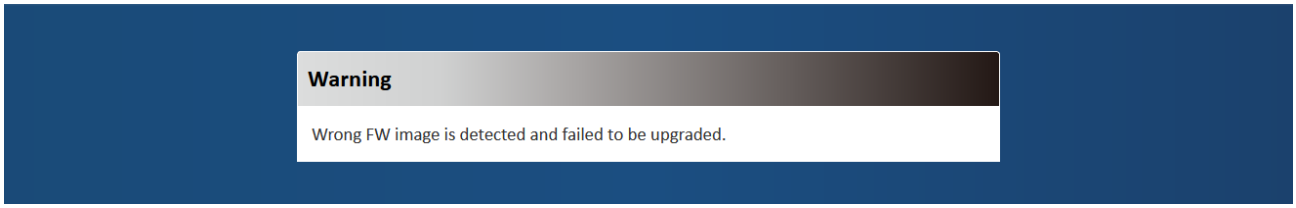
3.1 Manager

This section provides configuration to manage the device.

3.1.1 FW Upgrade

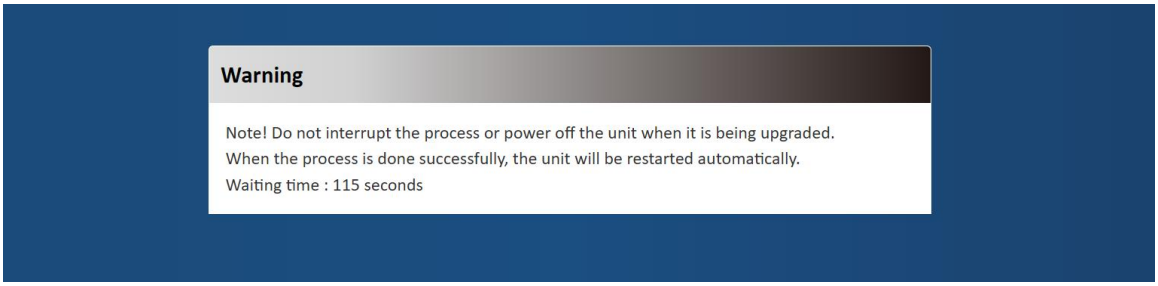


The screen after a failed firmware upgrade



(The firmware only allows upgrades to newer versions.)

The screen after a successful firmware upgrade

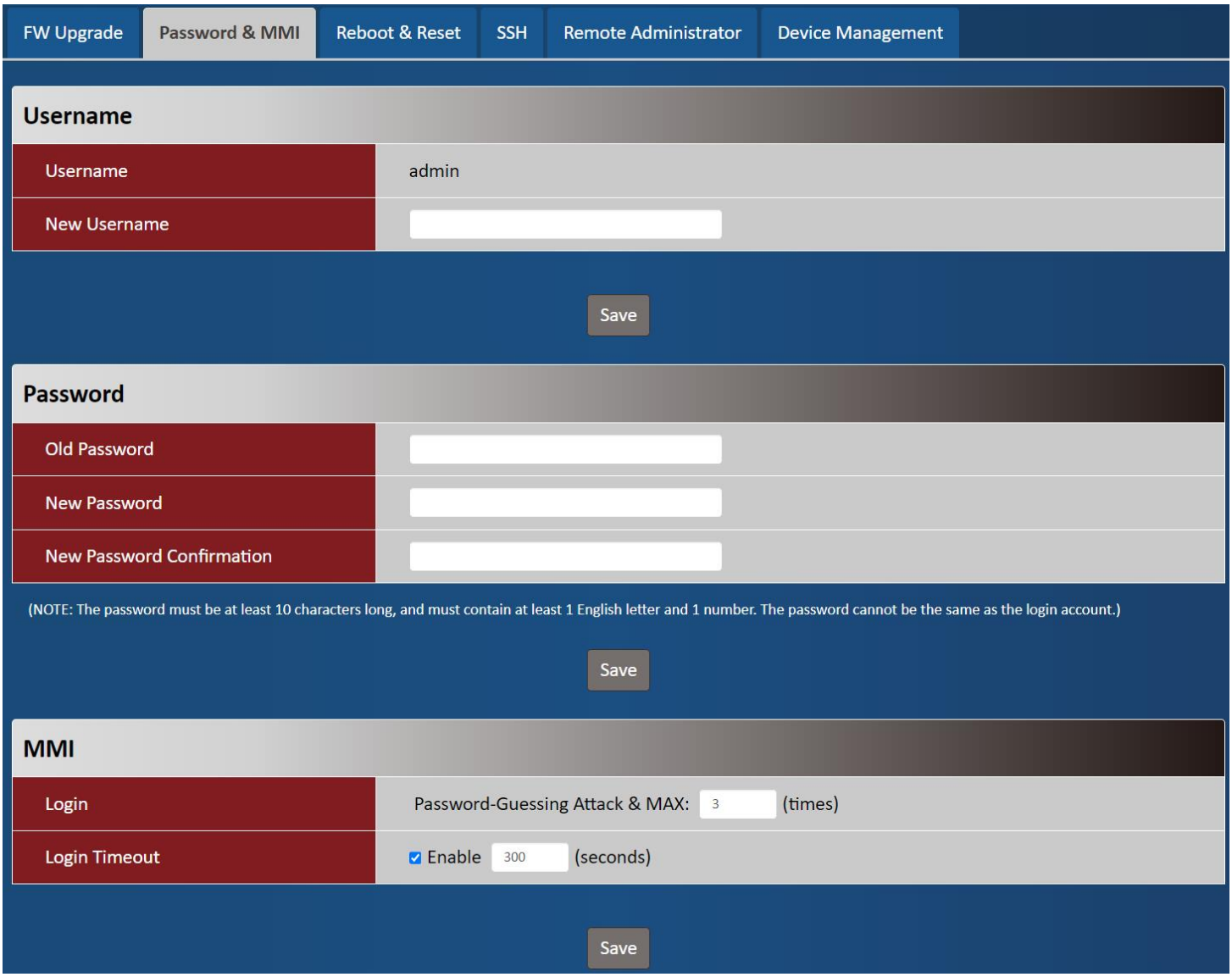


Firmware Upgrade		
Item	**Value setting**	**Description**
FW Version	N/A	It displays the firmware version of the product.
FW Date	N/A	It displays the build time of the firmware.

Firmware Upgrade		
Item	**Value setting**	**Description**
FW Path	N/A	Select firmware file to be upgraded
Upgrade Action	N/A	Click **Upgrade** button to start upgrade process with selected FW

Backup Configuration Settings		
Item	**Value setting**	**Description**
Backup Configuration Settings	**Download** is selected by default	Select "**Download**" to backup current configuration to a file. Select "**Upload**" to restore configuration from selected file.

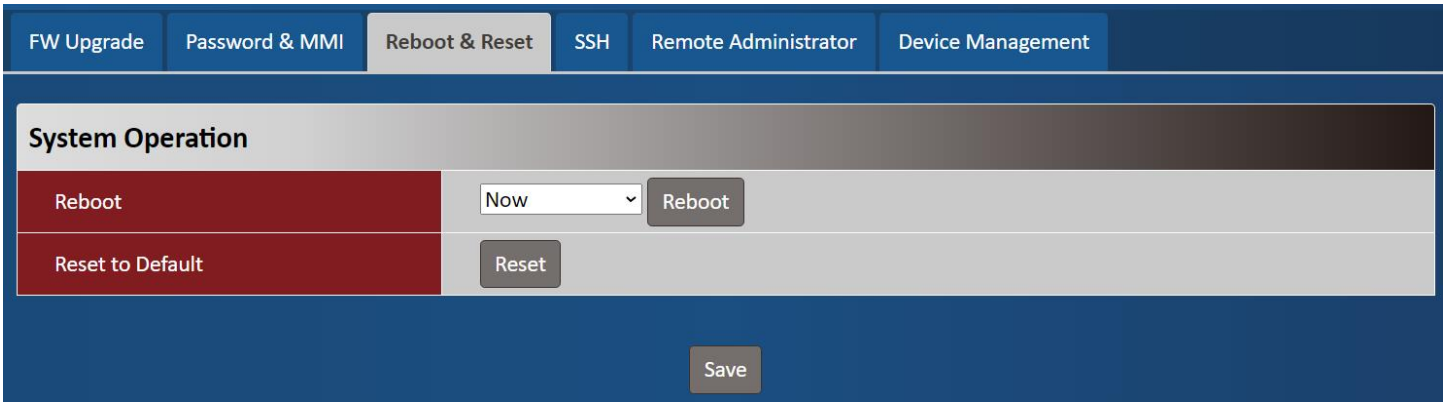
3.1.2 Password & MMI



Password Item	Value setting	Description
Old Password	1. String: any text **2. The default password for web-based MMI is 'admin'.**	Enter the current password to enable you unlock to change password.
New Password	String: any text	Enter new password
New Password Confirmation	String: any text	Enter new password again to confirm

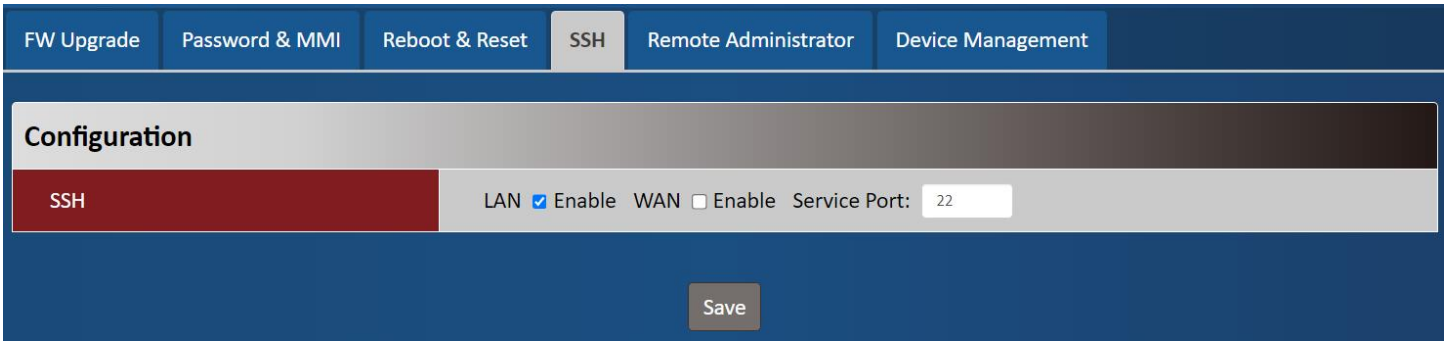
MMI Item	Value setting	Description
Login	3 times is set by default	Enter the login trial counting value. ***Value Range***: 3 ~ 10. If someone tried to login the web GUI with incorrect password for more than the counting value, an warning message "***Already reaching maximum Password-Guessing times, please wait a few seconds!***" will be displayed and ignore the following login trials.
Login Timeout	The Enable box is checked, and 300 is set by default.	Check the Enable box to activate the auto logout function, and specify the maximum idle time as well. ***Value Range***: 30 ~ 65535.

3.1.3 Reboot & Reset



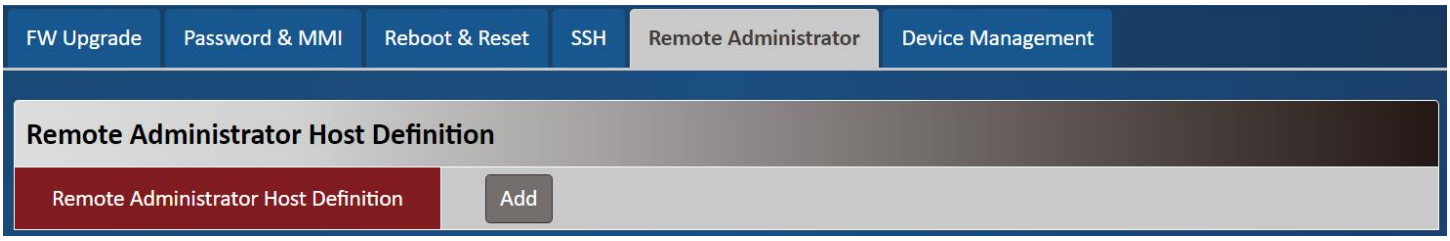
Device Mode Item	Value setting	Description
Reboot	N/A	Chick the **Reboot** button to reboot the unit immediately
Reset to Default	N/A	Click the **Reset** button to reset the device configuration to its default value.

3.1.4 SSH

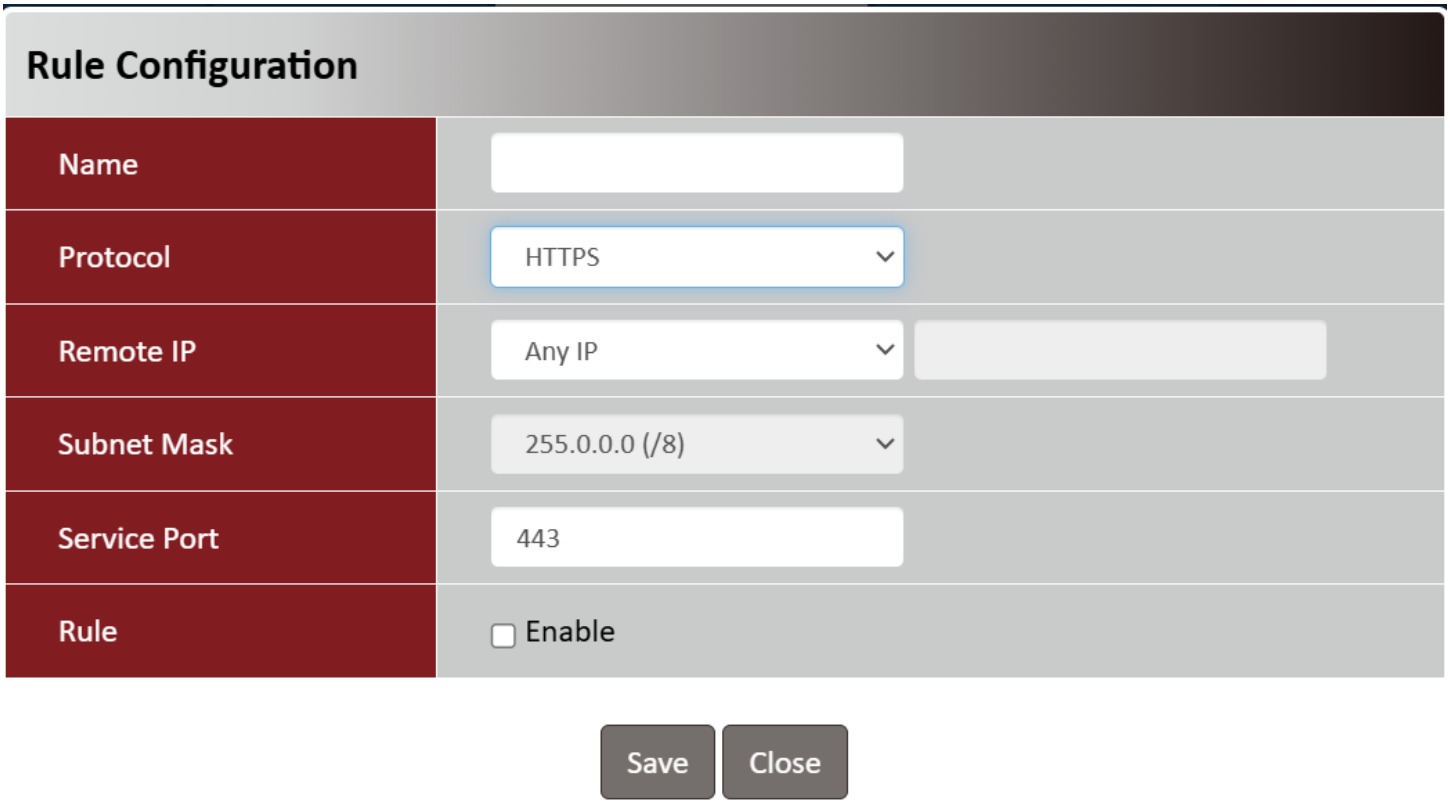


SSH Item	Value setting	Description
SSH	1. Deafule value is disable such service. 2. By default **Service Port** is 22.	Check the **Enable** box to activate the SSH function for connecting from LAN or WAN interfaces. You can set which number of **Service Port** you want to provide for the corresponding service. ***Value Range***: 1 ~65535.

3.1.5 Remote Administrator



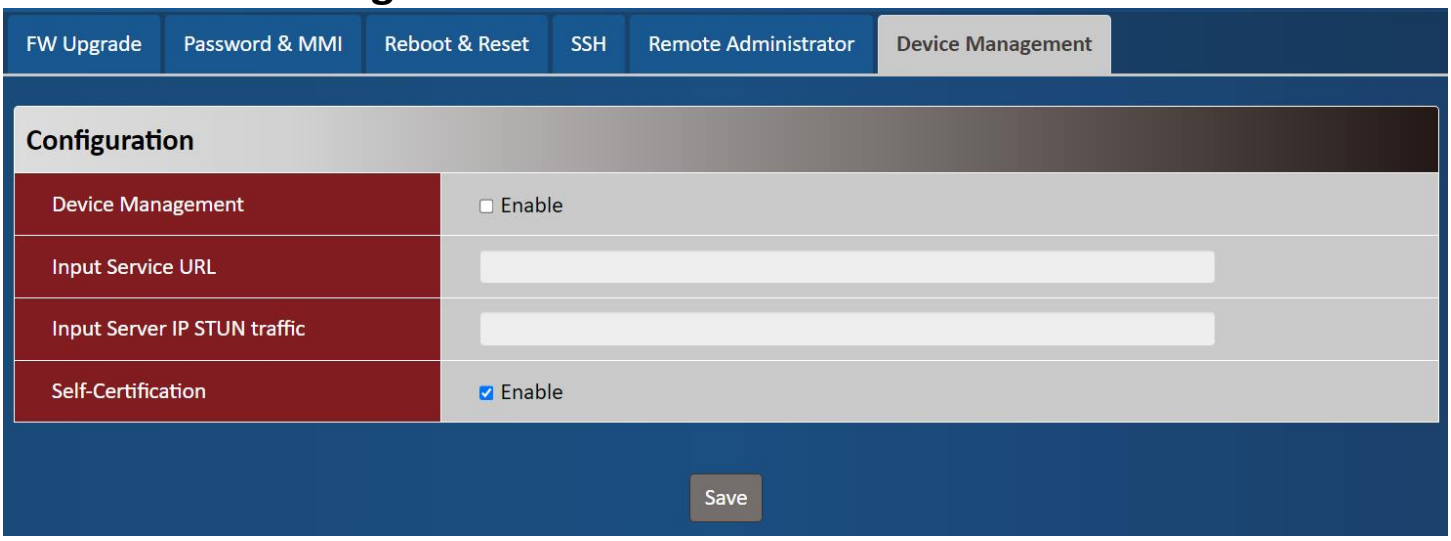
Remote Administrator Host Definition		
Item	**Value setting**	**Description**
Remote Administrator Host Definition	N/A	Press "Add" to set a remote administrator rule



Rule Configuration		
Item	**Value setting**	**Description**

Name	String: any text	Set rule name
Protocol	HTTPS is set by default	Select **HTTP** or **HTTPS** method for router access.
Remote IP	A Must filled setting	This field is to specify the remote host to assign access right for remote access. Select **Any IP** to allow any remote hosts Select **Specific IP** to allow the remote host coming from a specific subnet.
Subnet Mask	N/A	An IP address entered in this field and a selected **Subnet Mask** to compose the subnet if Remote IP set in **Specific IP.**
Service Port	1. 80 for HTTP by default 2. 443 for HTTPS by default	This field is to specify a Service Port to HTTP or HTTPS connection. ***Value Range***: 1 ~ 65535.
Rule	The box is unchecked by default.	Click **Enable** box to activate this rule.

3.1.6 Device Management



configuration Item	Value setting	Description
Device management	The box is unchecked by default	Check the **Enable** box to activate this **Device management** function
Input service URL	Blank is set by default	Specify ANMS service domain nameURL
Input server IP stun traffic	Blank is set by default	Specify **ANMS server public ip or** domain name
Self-certiffcation	The Enable box is checked by default	Check the **Enable** box to activate this **Self-certiffcation** function

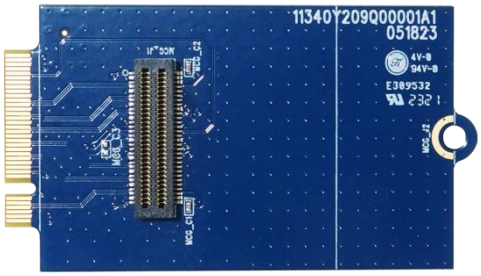
Appendix A How to Use MDG230 with M.2 Adapter

For the ease of the integration at the end user's side, we develop a M.2 adapter that can connect MDG230 to a standard 3052 M.2 socket.

Pin Definition of M.2 adapter

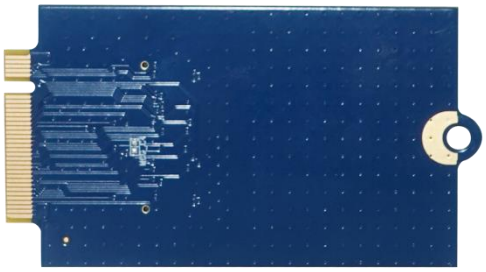
Top Side

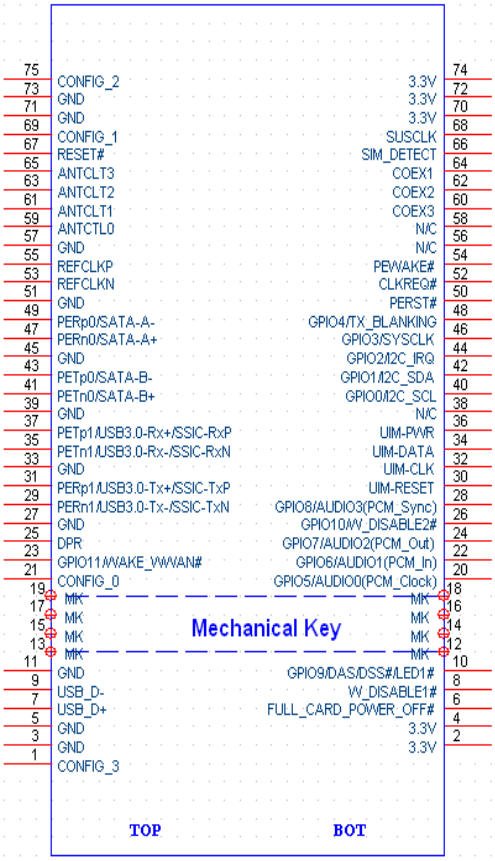
Pin #75
:
:
:
#3
#1



Bottom Side

Pin #2
#4
:
:
:
#74



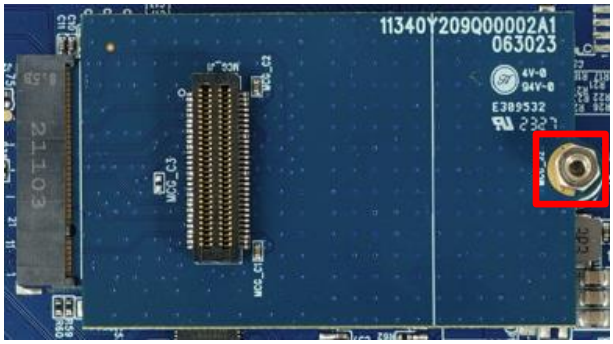


Embedded 5G Modem

M.2 Golden Finger Pin No.	Pin Name	M.2 Golden Finger Pin No.	Pin Name
75	NC	74	3.3V
73	GND	72	3.3V
71	GND	70	3.3V
69	NC	68	Reset_Def_N
67	RESET#	66	SIM1_DET
65	NC	64	Cell_LED
63	NC	62	5G/LTE_LED
61	NC	60	N79_TX_EN
59	NC	58	RFFE_DATA
57	GND	56	RFFE_CLK
55	PCIE_CLK+	54	PCIE_WAKE_N
53	PCIE_CLK-	52	PCIE_CLKREQ_N
51	GND	50	PCIE_RST_N
49	PCIE_RX+	48	SIM2_VCC
47	PCIE_RX-	46	SIM2_RST
45	GND	44	SIM2_CLK
43	PCIE_TX+	42	SIM2_IO
41	PCIE_TX-	40	SIM2_DET
39	GND	38	RM500_Signal_LED
37	USB3.0_RX+	36	SIM1_VCC
35	USB3.0_RX-	34	SIM1_IO
33	GND	32	SIM1_CLK
31	USB3.0_TX+	30	SIM1_RST
29	USB3.0_TX-	28	RM520_Signal_LED
27	GND	26	W_Disable2#
25	DPR	24	GPIO7
23	GPIO11	22	GPIO6
21	NC	20	GPIO5
19	NC	18	NC
17	NC	16	NC
15	NC	14	NC
13	NC	12	NC
11	GND	10	GPIO9
9	USB_DM	8	W_Disable1#
7	USB_DP	6	M2_Power_OFF
5	GND	4	3.3V
3	GND	2	3.3V
1	NC		

Installation

Step 1: Fasten the M.2 adapter to the host board by a screw boss.



Step 2: Insert the SIM card to MDG230 by following the instructions at page 14.

Step 3: Mount the main board of MDG230 on the M.2 adapter and fasten by a screw.

Step 3: Fasten the module to the main board of MDG230 by a screw boss.

Step 4: Connecting antenna cables accordingly.

Appendix B How to Install RF Cable

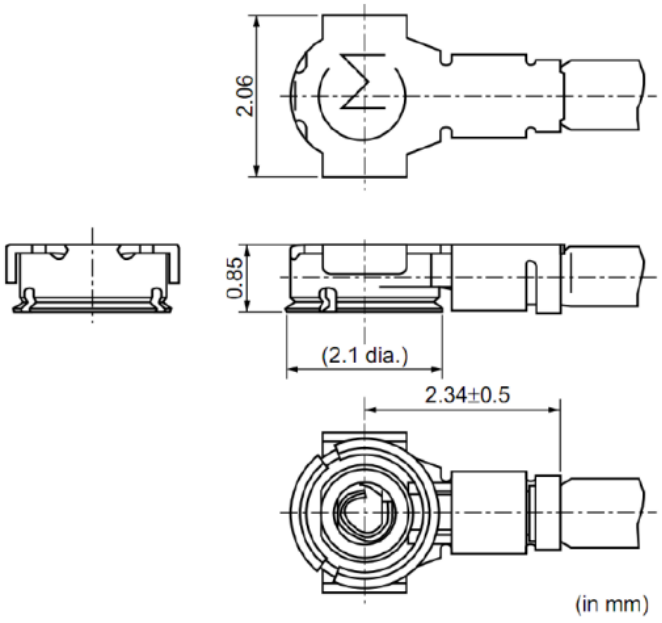
Antenna Connector Location

MDG230 has four antenna connectors: ANT0, ANT1, ANT2 and ANT3.

Antenna Connector Installation

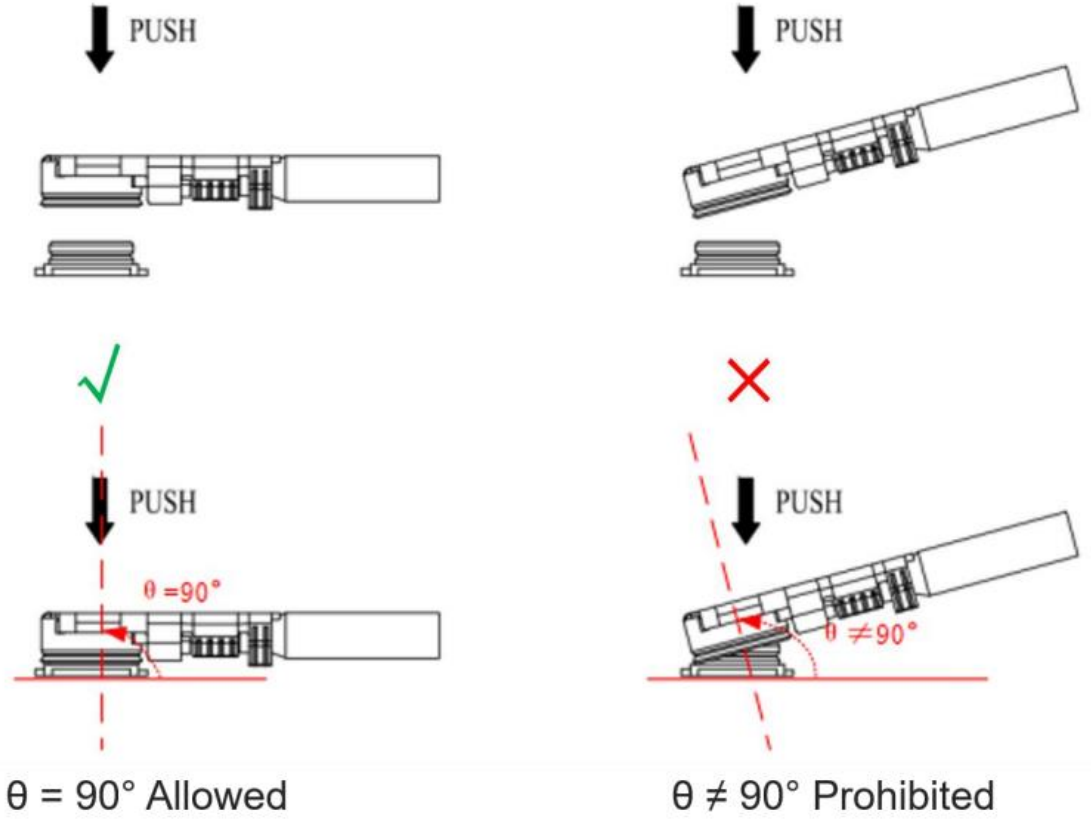
The receptacle RF connector used in conjunction with the module will accept two types of mating plugs that will meet a maximum height of 1.2 mm using a Ø 0.81 mm coaxial cable or a maximum height of 1.45 mm utilizing a Ø 1.13 mm coaxial cable.

The following figure shows the specifications of mated plugs using Ø 0.81 mm coaxial cables.

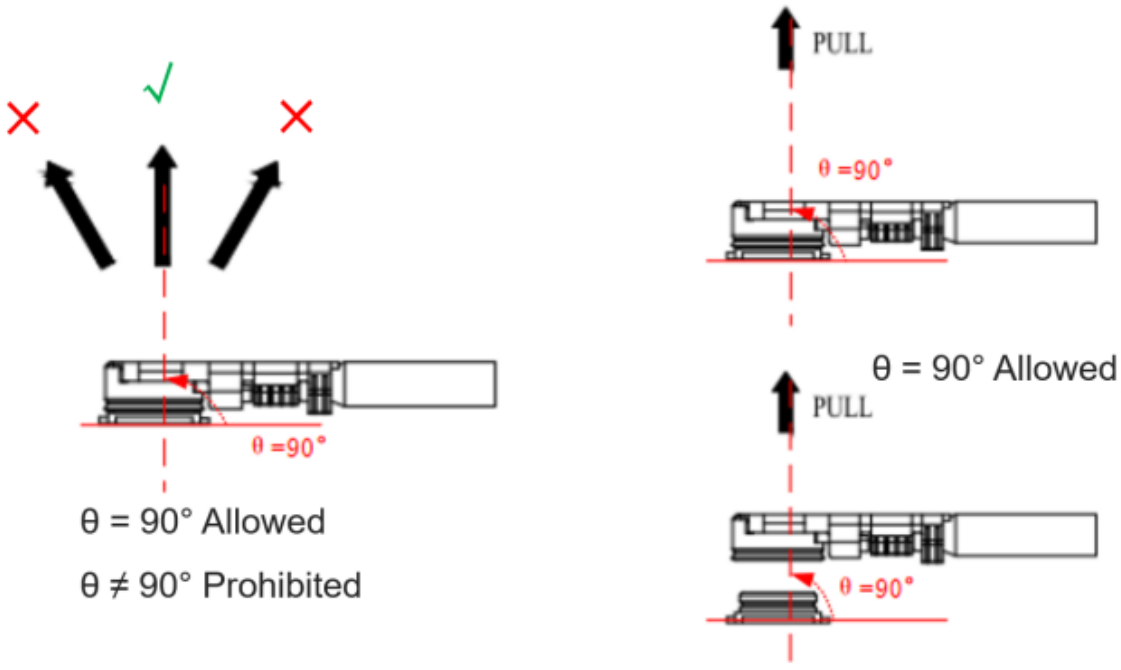


Assemble Coaxial Cable Plug Manually

The illustration for plugging in a coaxial cable plug is shown below, θ = 90°is acceptable, while θ ≠ 90° is not



The illustration of pulling out the coaxial cable plug is shown below, θ = 90° is acceptable, while θ ≠ 90° is not.



Embedded 5G Modem

Antenna Requirements

The following table shows the requirements on WCDMA, LTE, 5G NR antenna and GNSS antennas.

Type	Requirements
WCDMA/LTE/5G NR	● VSWR: ≤ 2 ● Efficiency: > 30 % ● Input Impedance: 50 Ω ● Cable insertion loss: - < 1 dB: LB (<1 GHz) - < 1.5 dB: MB (1–2.3 GHz) - < 2 dB: HB (> 2.3 GHz)
GNSS	● Frequency range: L1: 1559–1609 MHz L5: 1166–1187 MHz ● Polarization: RHCP or linear ● VSWR: ≤ 2 (Typ.) ● Passive antenna gain: > 0 dBi