AL-800 RFID READER

Getting Started Guide for AWS IoT Core

Table of Contents

1 Document Information

1.1 Revision History

Version	Modifier	Date	Modify content
1.0	BangYao	2022/11/07	First Draft

2 Overview

A fixed RFID UHF Reader with built-in operation data collection functions and integrated with the cloud. It is a RAIN RFID Reader with built-in Compact Edition Middleware that can customize information collection (TID, EPC), designated cloud service location, etc., does not need to integrate through PC or workstation. Moreover, it could be applied into various industries such as parking lots, the gate or forklifts in the warehouse to do further management or inventory to increase work efficiency.

RFID Solutions

Software	AL-800 has two methods available to develop your own application/software: ● AL-800 Software Development Kit (C#) ● AL-800 Utility
Antenna	We provide various antenna patterns, such as near field, far field, and induction field, so as to meet the changeable field environment.
RFID inlay	● General Inlay ● Metal Inlay ● Customized Inlay This RFID inlay has a wide frequency range from 860 to 960 MHz; which means you can make your own choices to use NXP, Impinj, or Alien RFID chip, as all of them are compatible with this RFID inlay

3 Hardware Description

3.1 DataSheet

Interface	
Ethernet	Ethernet 10/100 Base-T auto-MDIX Ethernet port
Wi-Fi	USB 2.0 type-B HID port, 2.4GHz
WWAN	LTE(Optional)
USB 2.0 Host	1
USB HID	1
RFID	
Air Interface Protocol	EPC global UHF Class 1 Gen2 / ISO 18000-63
Frequency Range	860~960 MHz
Frequency Resolution	100 KHz
Power Resolution	0.25dB
RX Sensitivity	-74 dBm
Antenna	4
External Storage	
Micro-SD	1
Power	
DC In	+24V / 1A
Operating Environment	
Operating Temperature	-20°C ~55°C
Storage Temperature	-20°C ~85°C
Operating Humidity	5% ~ 95%
Mechanical	
Size	183mm x 222mm x 32mm
Weight	630g
Software Development / Tool	
URC Protocol	1.1
Tool	URC Client Utility
ATB Session	3
SDK	C# .Net
Certification	
Certification	NCC, SRRC

For more details, please refer to the link below:
https://www.arizontw.com/proimages//RFID_UHF_Reader/AL-800-Data-sheet.pdf

3.2 Standard Kit Contents

The product package should contain the following items:

- **1*AL-800 RFID UHF Reader**
- **1* User Manual**
- **1*Power Supply**
- **1*Wi-Fi Antenna**

3.3 User Provided items

- **RFID Antenna** For more details, please refer to the link below:

https://www.arizontw.com/category-rfid-antenna.html

- **Ethernet Cable**

3.4 3rd Party purchasable items

(None)

3.5 Additional Hardware References

For more information: https://www.arizontw.com/category-new-products.html

4 Set up your Development Environment

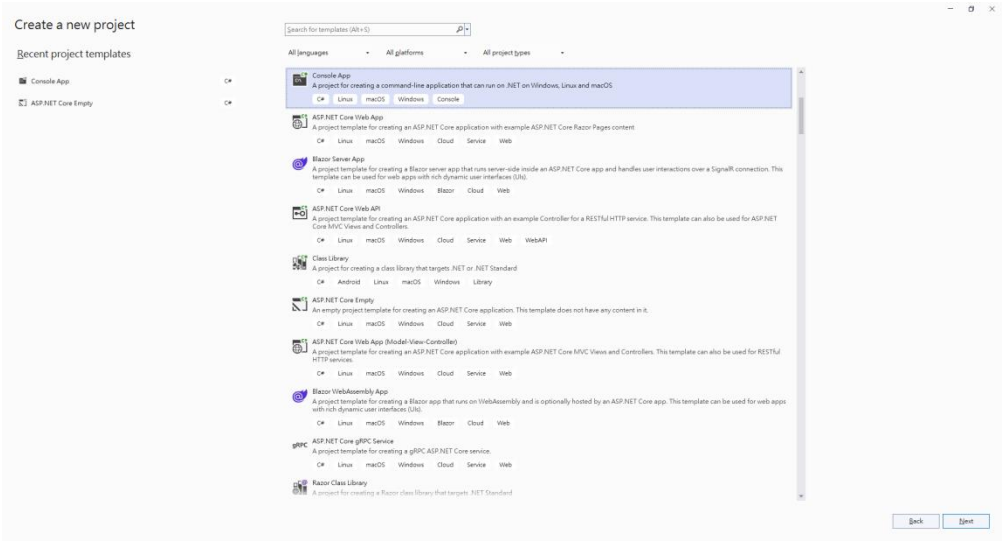
4.1 URC C# SDK

SDK for ARIZON RFID readers with URC protocol

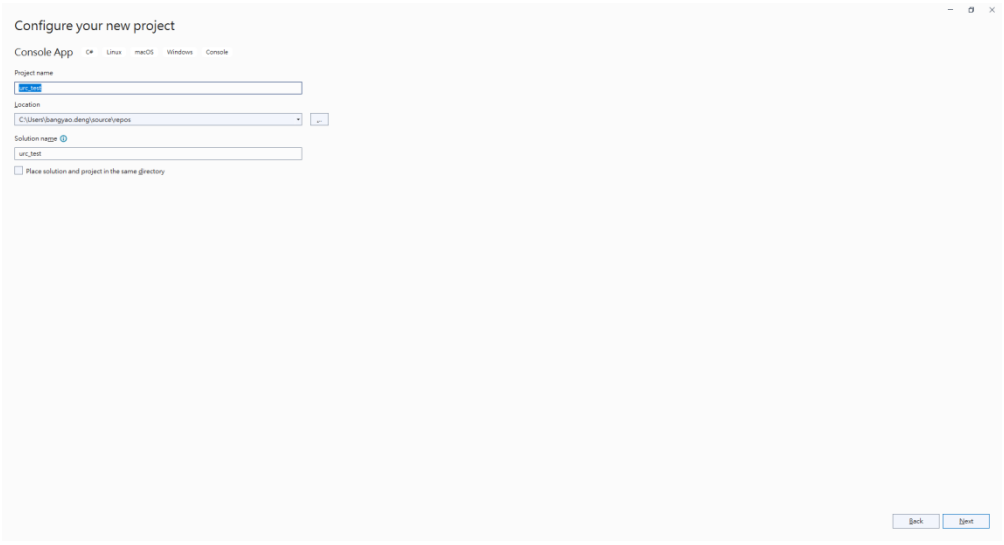
Support	AL-800 RFID Reader
IDE	Visual Studio Code 2022
Environment	.Net Framework 4.8 or .Net Core 7
Programming language	C#

First, you need to add URC_SDK reference to the project. (Example use **Visual Studio 2022**)

Step1. Create a new project (**ASP .NET Core**)

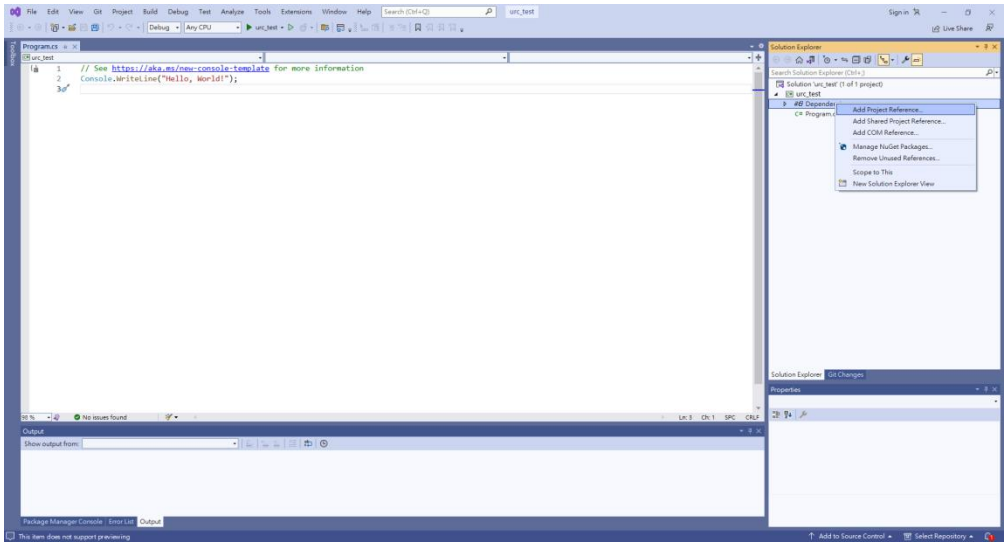


Step2. Name your new project

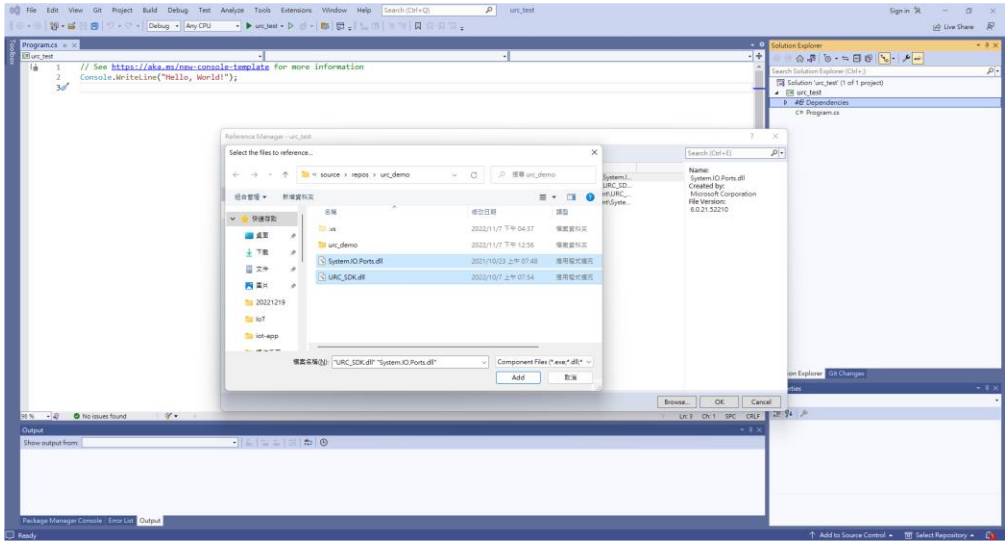


Step3. Select Framework **.NET 7.0**

Step4. In **Solution Explorer**, right-click **Dependencies**, and then choose **Add Project Reference** from the context menu.



Step5. Click **Browse**. Choose「**URC_SDK.dll**」「**System.IO.Ports.dll**」, click **Add -> Confirm**



Step6. Use the Ethernet cable (Wired Network) to connect AL-800 to your computer. Run example code.

```
using URC_SDK.Commnication.Serial;
using URC_SDK.RFIDReader;

void _device_OnConnectionStateChangedEvent(ConnectionStates state)
{
   if (state == ConnectionStates.Connected)
   {
      Console.WriteLine("Connection Status: Connected");
   }
}

URCDevice _device = new URCDevice("Reader1");
_device.Mode = SerialModes.TCP;
_device.OnConnectionStateChangedEvent += _device_OnConnectionStateChangedEvent;
_device.SerialSetting.TCPSetting.Ip = "192.168.50.1";
_device.SerialSetting.TCPSetting.Port = 1001;
_device.Connect();

var temperatureInfo = _device.GetTemperature();
if (temperatureInfo != null)
{
   double systemTemperature = temperatureInfo.SystemTemperature;
   double RFTemperature = temperatureInfo.RFTemperature;
   double PATemperature = temperatureInfo.PowerAmplifierTemperature;
}

_device.Disconnect();
```

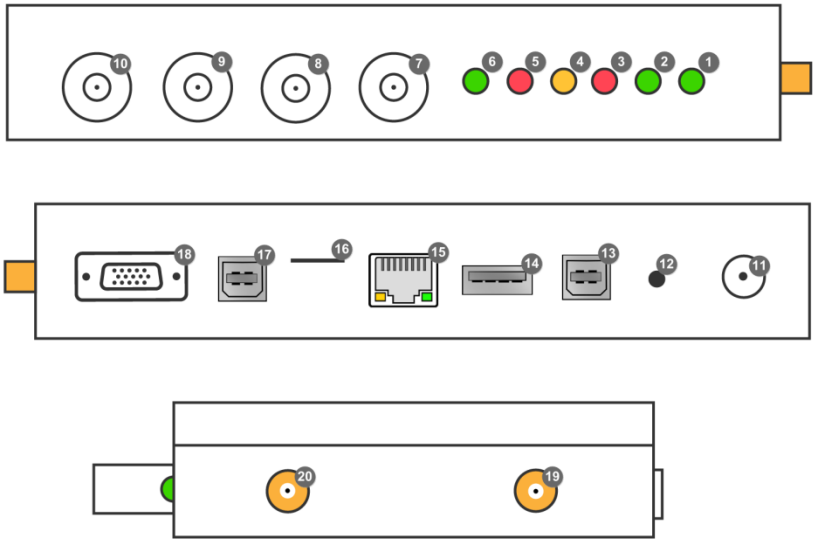
4.2 URC SDK Function

Function	Description
Connect	Connect to reader.
Disconnect	Disconnect to reader.
GetTemperature	Get device temperature. (System, RF, Power Amplifier)
SetATB	Set activity tag broadcast configuration.
GetATB	Get activity tag broadcast configuration.
SetInventoryOperation	Set inventory operation
GetInventoryOperation	Get current inventory operation
SetInventoryConfiguration	Set inventory configuration.
GetInventoryConfiguration	Get inventory configuration
SetAntenna	Set reader antenna power.
GetAntenna	Get reader antenna power.
GetInventoryTag	Get tag object from inventory queue.
SetSelect	Set target tag. (filter by data mask, EPC bank)
GetSelect	Get current select setting.
WriteTag	Write data to target bank.
LockTag	Lock the target tag.
PermalLockTag	Lock the target tag.
KillTag	Kill the target tag.
SetPassword	Set an access password on the target tag. (limit write operation)
SetEndOperation	Stop current operation.
GetOperation	Get current operation.
GetGPIO	Get GPIO status.
SetGPO	Trigger output pin
SetRegion	Set RFID frequency/country.
GetRegion	Get reader RFID frequency/country.

For more details, please refer to the link below:
https://www.arizontw.com/product-AL-800-AL-800.html

5 Set up your hardware

5.1 Appearance description



1. **Power indicator**– On indicates power and off indicates no power.
2. **System Status indicator**– Flashing indicates that the system is powering on, and constant light indicates that the power-on is complete.
3. **System Update indicator**– A quick flash indicates a restore to a preset value in progress, and a slow flash indicates an update in progress
   (***Warning**: Do not turn off the power when this light is blinking!)
4. **RF Status indicator**– Standby mode when blinking slowly and RF signals being emitted when blinking fast.
5. **Receive indicator**– Fast flashing indicates that a UHF tag has been received.
6. **Wi-Fi indicator** – Illuminates to indicate that Wi-Fi is enabled, flashing indicates that communication is in progress, and off indicates that Wi-Fi is disabled.
7. **Antenna 4** – TNC connector with impedance 50Ω.
8. **Antenna 3** – TNC connector with impedance 50Ω.
9. **Antenna 2** – TNC connector with impedance 50Ω.
10. **Antenna 1** – TNC connector with impedance 50Ω.
11. **DC power JACK** – Input voltage 24V / 1.2A power supply.
12. **Reset Button** – Reboot the system on time, press and hold until the system update indicator blinks rapidly and then release to restore the unit to the factory setting.
13. **USB Device**– For RFID function communication, using a HID interface.
14. **USB Host**– Can be connected to USB stickers, VCP, 4G LTE Dongle and more.
15. **RJ-45 Ethernet** – Used to communicate with RFID function and supports 10/100Mbps twisted pair network cables above Cat.5E.
16. **Micro SD** – supports S DHC up to64GB.
17. **Console** – The internal Linux system can be operated using TTY.
18. **GPIO D-SUB**– Connect to an external GPIO control box for use.
19. **Wi-Fi Antenna** – Connects an SMA specification 2.4GHz antenna.

20. Reserved Antenna.

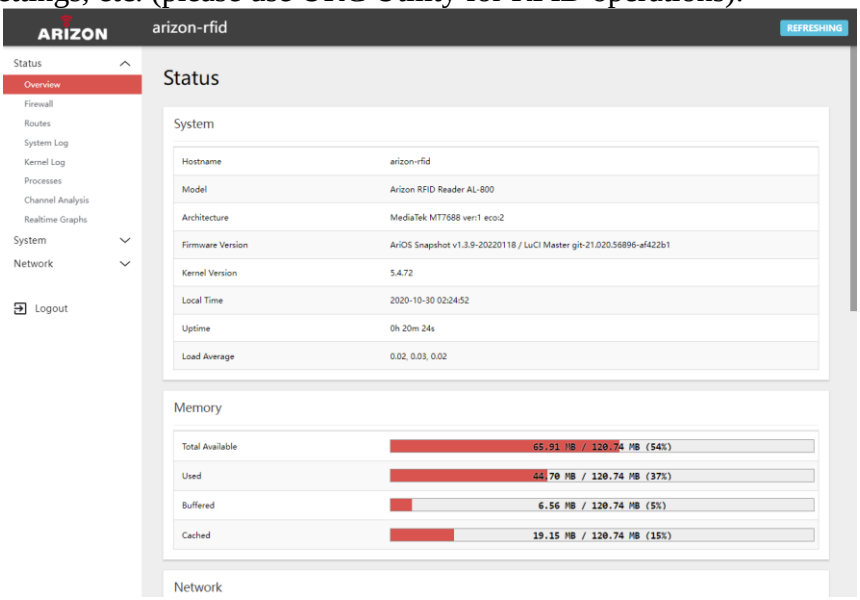
5.2 Connect to the AL-800

AL-800 default built-in DHCP server, the computer please keep the network adapter settings automatically get DHCP, the following figure is Windows 10 network interface settings.

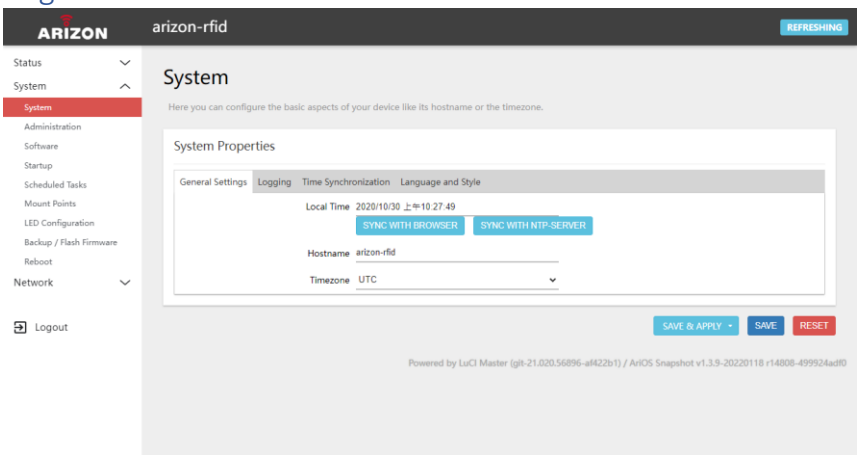
The default IP address and web login information for the AL-800 are as follows:
URL: https://192.168.50.1/
IP Address: 192.168.50.1
User account: root
Password：123456

(For more detail about Network Settings, please refer to Section 5.8)

The AL-800 web control panel provides network settings, firmware updates, system settings, time and date settings, etc. (please use URC Utility for RFID operations).



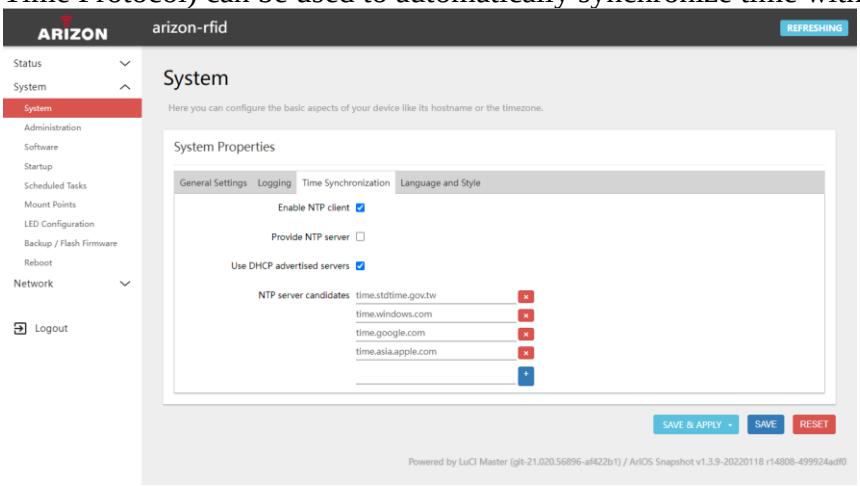
5.3 Time Setting



1. Log in to the web control panel.
2. Click the **System** tab in the left menu.
3. Select **System**.
4. For **the general date and** time setting in the **system properties**, you can choose the following two setting methods:
   4.1 Synchronize time with the browser (computer).
   4.2 Synchronize time with N**TP** server (AL-800 requires a connection to the network).
5. Select the **time zone** you want.
6. Press **Save and Apply** Settings.

➢ NTP Setting

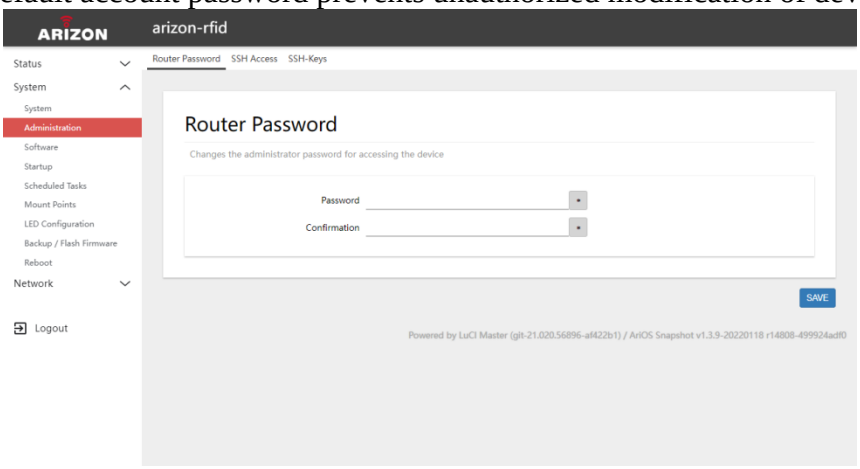
NTP (Network Time Protocol) can be used to automatically synchronize time with the server.



1. Log in to the web control panel.
2. Click the **System** tab in the left menu.
3. Select **System**.
4. Click the **Time Synchronization** tab.
5. Tick **Enable NTP Client.** (*To use the local area network automatically, select **a server that uses DHCP advertising**)
6. In **Alternate NTP Server**, enter a list of destination servers that you want to synchronize.
7. Press **Save** and **Apply** Settings.

5.4 Set the account password

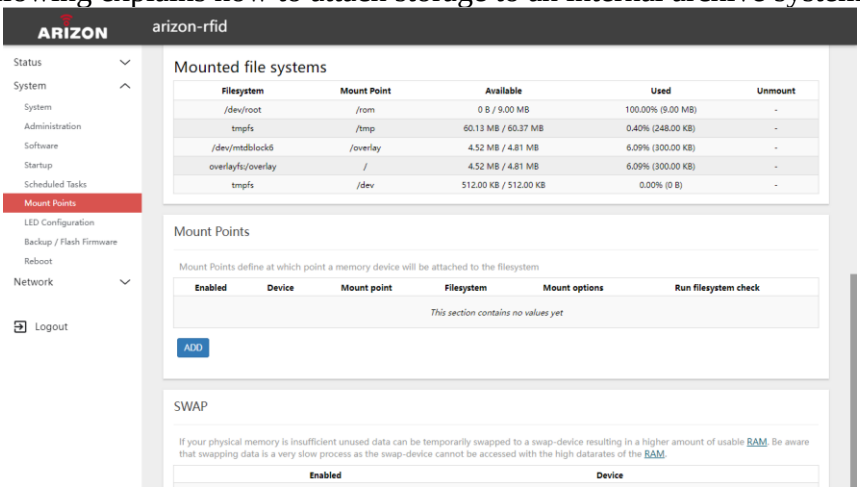
Changing the default account password prevents unauthorized modification of device settings.



1. Log in to the web control panel.
2. Click the **System** tab in the left menu.
3. Select **Administration**.
4. In Router Password, enter the new password
5. Press **Save** and **Apply** Settings.

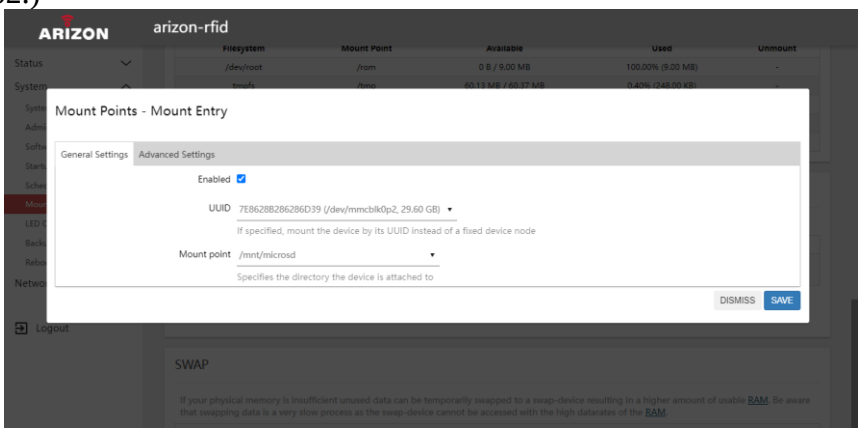
5.5 Mount a USB storage device and Micro-SD card

The AL-800 supports connecting external storage space from a USB storage device or Micro-SD slot, and the following explains how to attach storage to an internal archive system.



1. Plug in a USB storage device or Micro-SD memory
2. Log in to the web page background.
3. Click the **System** tab in the left menu.
4. Select **Mount points**.
5. In **Mount Points**, click **Add New.**
6. After the Enable check box is selected, select the corresponding disk area from **the device universal unique identification code UUID**. (MicroSD is usually /dev/mmcblk0p[N], where [N] is the disk number of the memory card, the example in the picture is

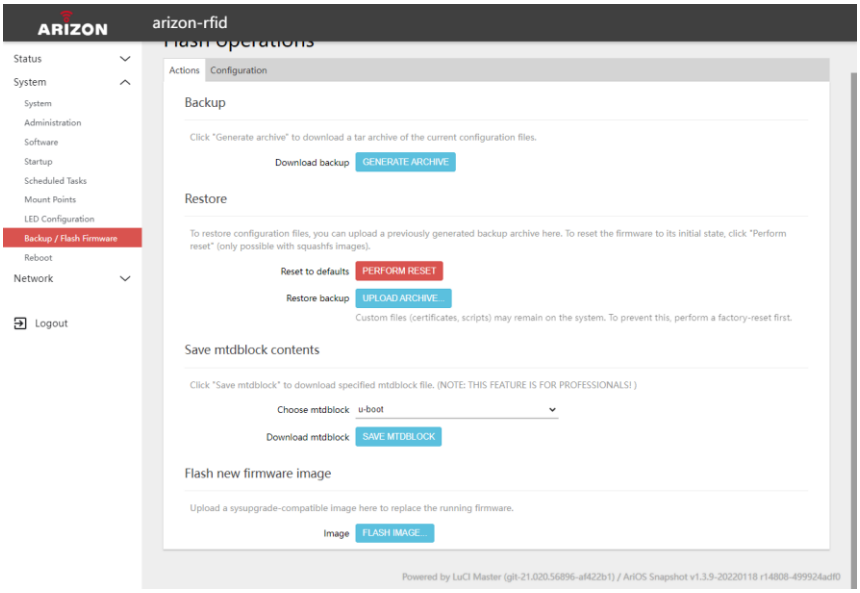
mmcblk0p2.)



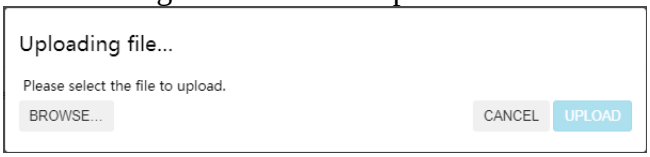
7. Select Custom at **the mount point**, enter /mnt/[Custom Name], and press **Save**.
8. After pressing **Save** and **Apply**, it takes effect immediately.

5.6 Upgrades the firmware

In order to ensure system stability and introduce new features, new versions of the firmware will be released from time to time.



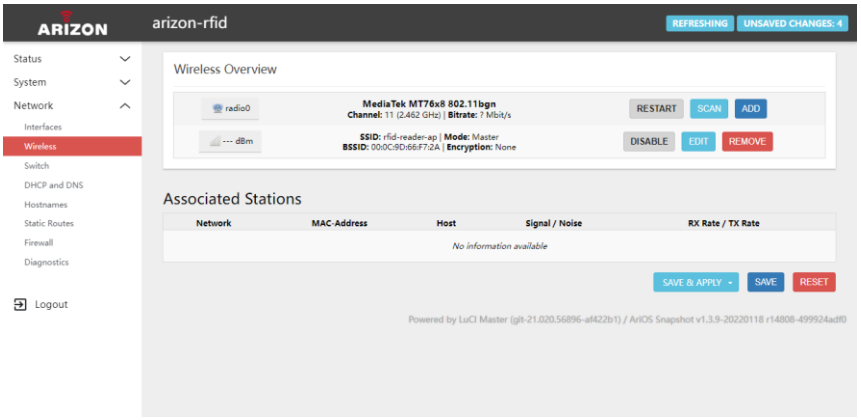
1. Log in to the web page background.
2. Click the **System** tab in the left menu.
3. Select **Backup/Flash Firmware**.
4. In **Flash new firmware image**, click **Flash Image File**.
5. Press **Browse** to select the image file and click Upload.



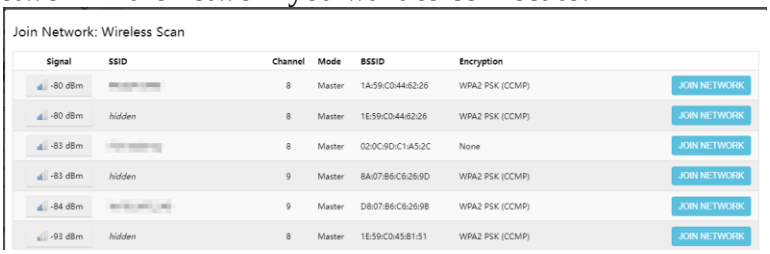
6. Follow the on-screen instructions to continue with the update, and do not interrupt the power supply during the update, otherwise it will cause damage to the firmware.

5.7 Set Wi-Fi to client mode

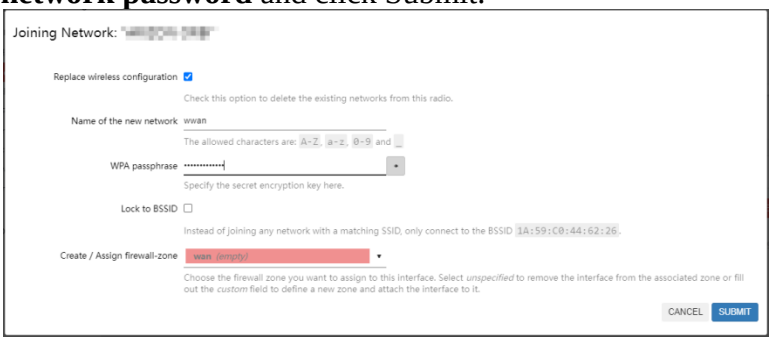
The AL-800 supports 802.11 b/g/n wireless networks, the default is access point mode to accept connections from other computers, you can switch the AL-800 to client mode and connect to other networks.



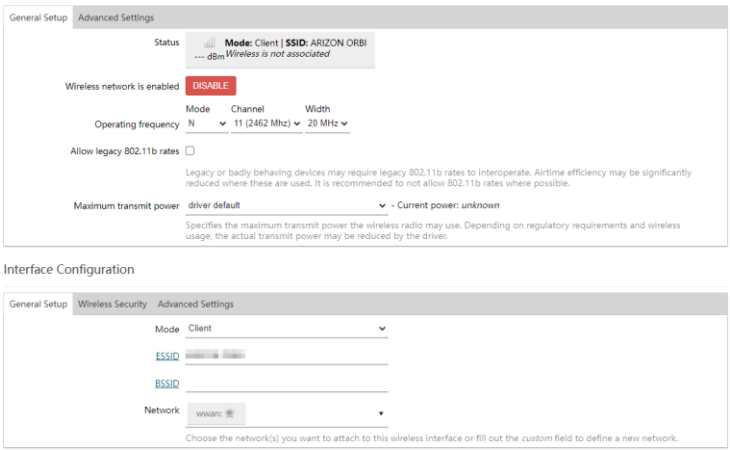
1. Log in to the web control panel.
2. Click on the **Network** tab in the left menu.
3. Select **Wireless**.
4. In the **Wireless Overview**, click **Scan**.
5. Press Join Network in the network you want **to** connect to.



6. Enter your **network password** and click Submit.



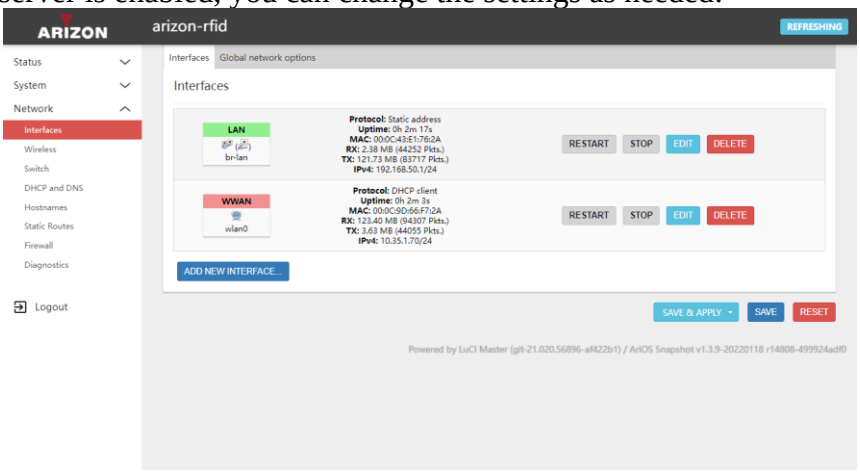
7. The details window appears, if you do not need to change other options, please click **Save** directly.



8. After clicking Save and Apply, wait about 80 seconds for it to take effect.

5.8 Set up Ethernet

The AL-800 has a full-duplex10/100Mbps Ethernet jack, the default IP address is 192.168.50.1 and the DHCP server is enabled, you can change the settings as needed.

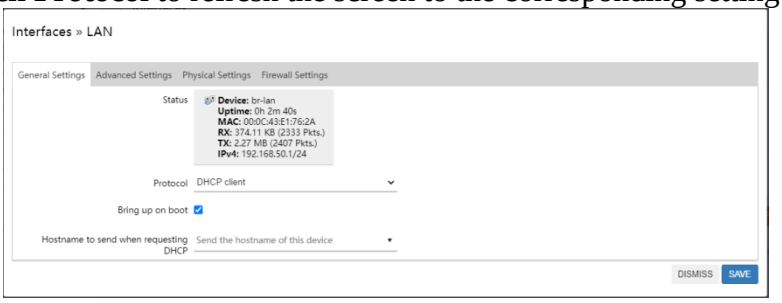


Please follow the instructions below to reach this page first:

1. Log in to the web page background.
2. Click on the **Network** tab in the left menu.
3. Select **Interfaces**.

A. Change to automatically obtain the IP location (the DHCP server will be deactivated) :

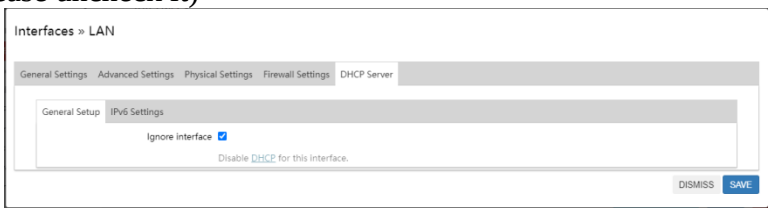
1. Click **Edit** at **LAN**.
2. In the General Settings tab, change the **protocol** to **DHCP client**.
3. Click **Switch Protocol** to refresh the screen to the corresponding setting parameters.



4. Click Save.
5. Click **Save** and **Apply** to make the settings take effect.

B. Change to automatically obtain the IP location (the DHCP server will be deactivated) :

1. Click **Edit** on **LAN.**
2. In the general settings tab, change the **protocol** to **static address.**
3. Click **Switch Protocol** to refresh the screen to the corresponding setting parameters.
4. Please enter the parameters you want to change, such as the IPv4/v6 address, IPv4 gateway, etc.
5. Please click the **DHCP Server** tab.
6. On the **General Settings** tab, select **Ignore Interfaces** and check this interface. (*This setting will disable the DHCP server, if you want the AL-800 to assign an IP address, please uncheck it)



7. Click **Save.**
8. Click **Save and Apply** to make the settings take effect.

6 Setup your AWS account and Permissions

Refer to the online AWS documentation at Set up your AWS Account. Follow the steps outlined in the sections below to create your account and a user and get started:

- Sign up for an AWS account and
- Create a user and grant permissions
- Open the AWS IoT console

Pay special attention to the Notes.

7 Create Resources in AWS IoT

Refer to the online AWS documentation at Create AWS IoT Resources. Follow the steps outlined in these sections to provision resources for your device:

- Create an AWS IoT Policy
- Create a thing object

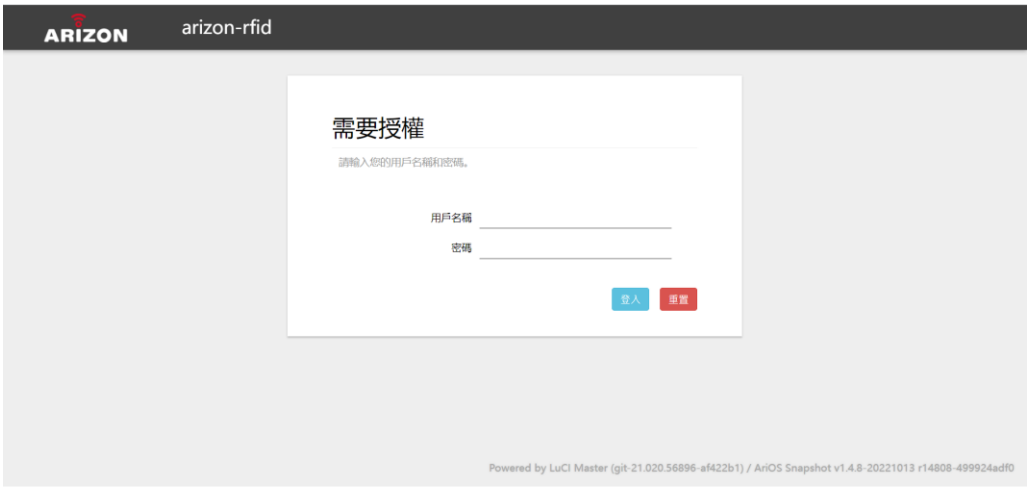
Pay special attention to the Notes.

8 Connect AL-800 reader to AWS IoT Core

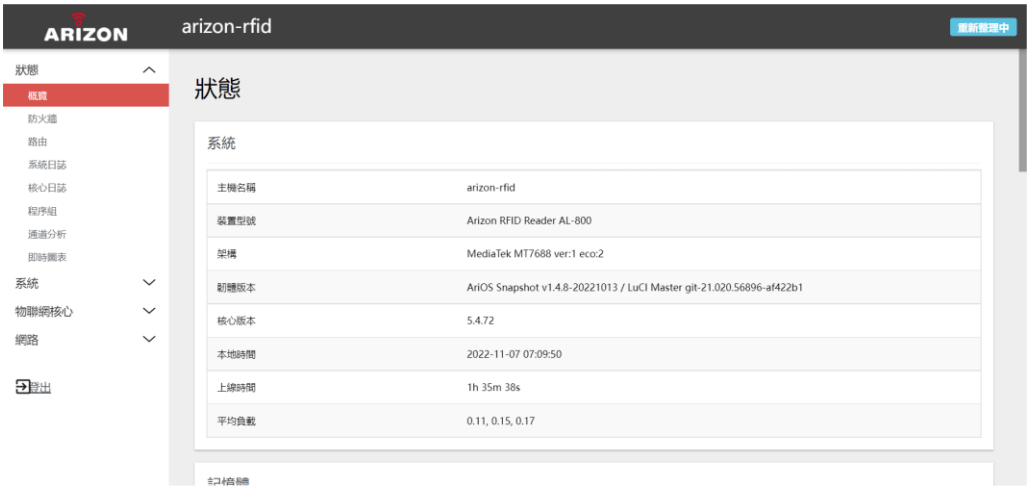
8.1 Connect AL-800 reader to AWS IoT Core

Step1. Use the Ethernet cable (Wired Network) to connect AL-800 to your computer.

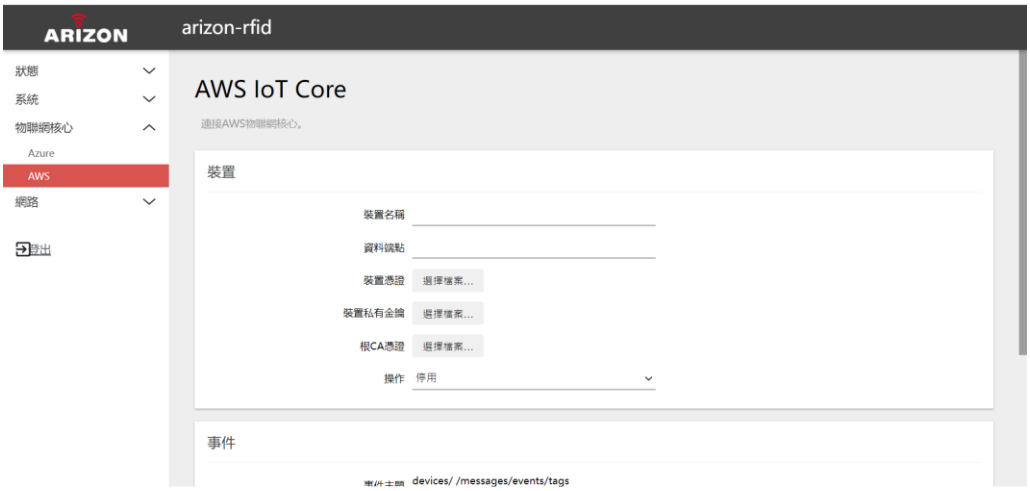
Step2. URL: https://192.168.50.1/cgi-bin/luci/.



Step3. Sign in with the user name and password. Welcome to the main page.

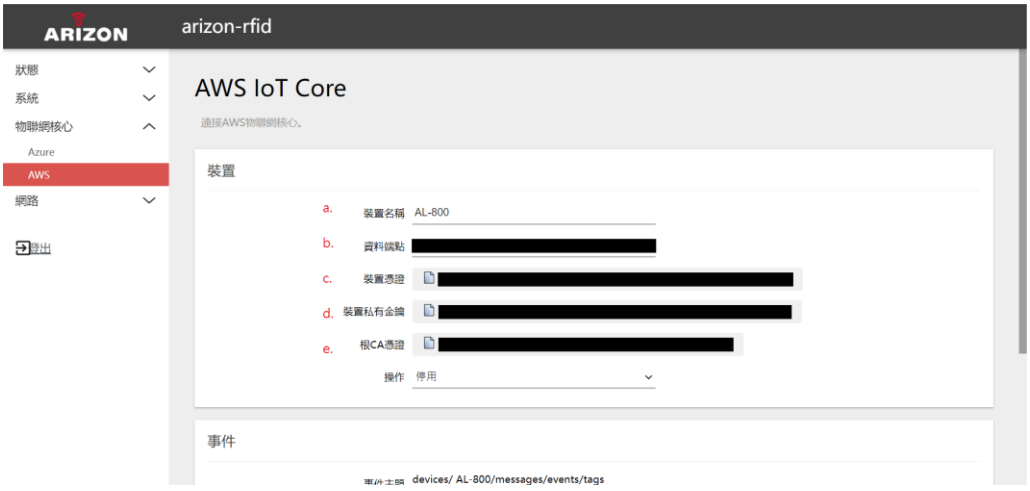


Step4. Choose page **IoT Core ➔ AWS**



Step5. Create a thing in AWS IoT Core (Chapter 6, 7). Edit device information, and upload certificate.

a. Device name
b. Data endpoint
c. Device certificate
d. Private key file
e. Root CA certificate



Step6. Edit event configuration. MQTT Topic: **devices/AL-800/messages/events/tags**

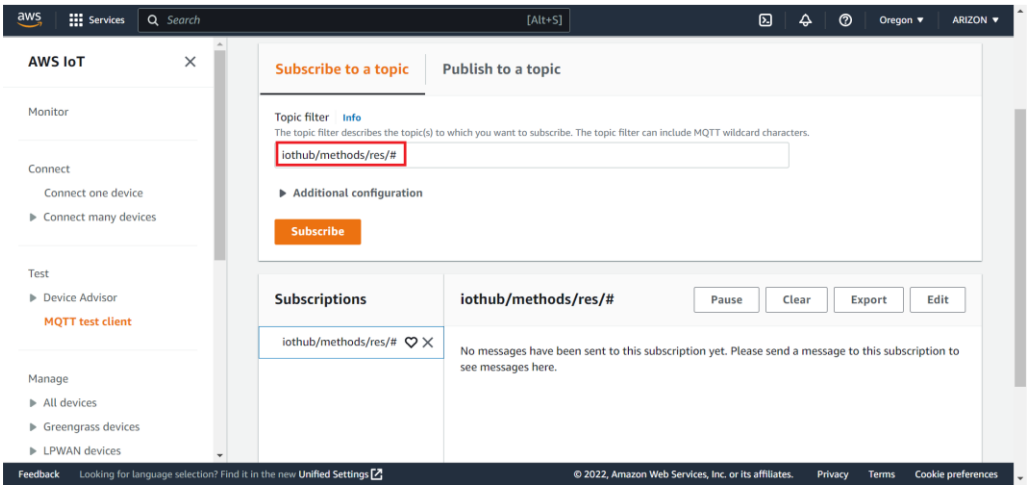
a. Response interval (second)
b. Tag count

Step7. Set operation **Enable**. Click 「**Save**」 and 「**Save and Apply**」

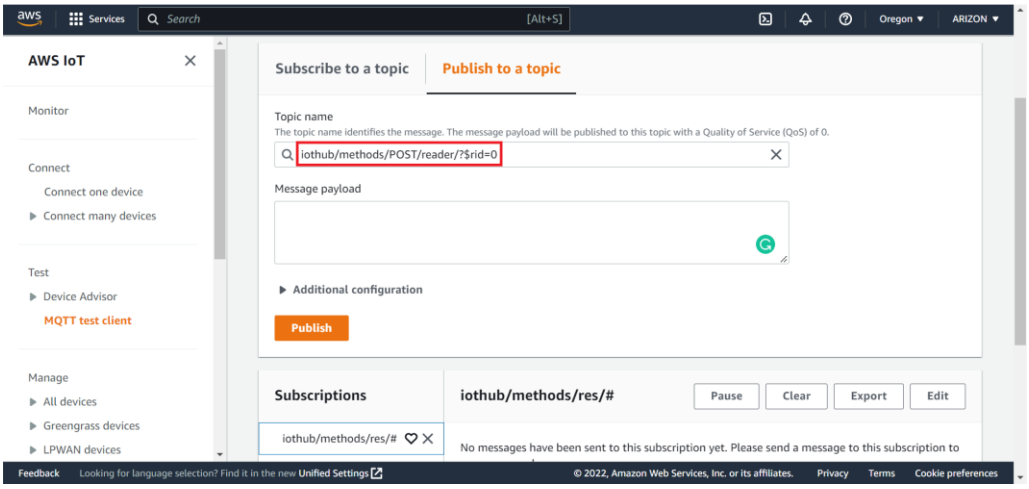
Step8. Apply configuration.

8.2 Test your AL-800 reader with AWS MQTT test client

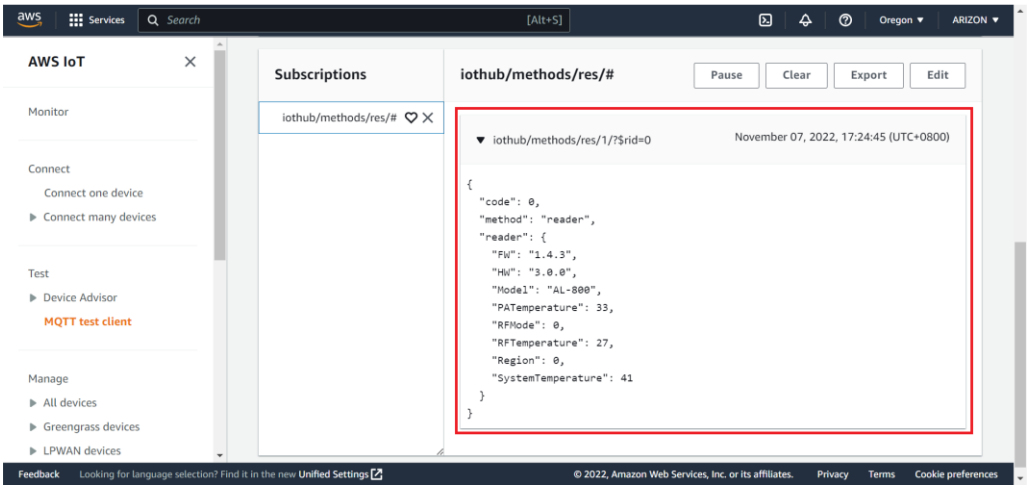
Step1. Subscribe to the topic: **iothub/methods/res/#**



Step2. Publish to the topic: **iothub/methods/POST/reader/?$rid=0**



Step3. AL-800 response device event via MQTT



Tags event topic: **devices/*{device name}*/messages/events/tags**

9 Debugging and Troubleshooting

LED States

Indicator	Description
Power	On indicates power and off indicates no power.
System	Flashing indicates that the system is powering on, and constant light indicates that the power-on is complete.
Update	A quick flash indicates a restore to a preset value in progress, and a slow flash indicates an update in progress. (*__Warning__: Do not turn off the power when this light is blinking!)
RF Status	Standby mode when blinking slowly and RF signals being emitted when blinking fast.
Receive	Fast flashing indicates that a UHF tag has been received.
Wi-Fi	Illuminates to indicate that Wi-Fi is enabled, flashing indicates that communication is in progress, and off indicates that Wi-Fi is disabled.

System Log

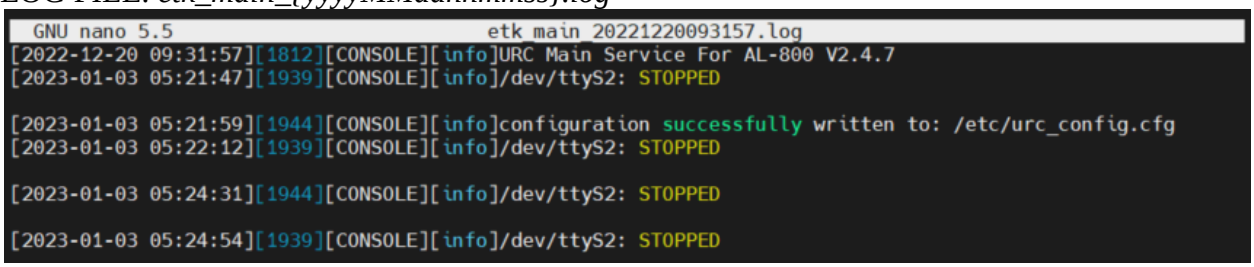
The instructions for viewing device log through SSH are given below.

1. Connect Ethernet cable from PC to the device
2. Open the terminal(such as: windows command prompt)
3. Input command: *ssh root@192.168.50.1* , Default password: *123456*

View device log

```
root@arizon-rfid:~# cd ..
root@arizon-rfid:/# cd tmp/
root@arizon-rfid:/tmp# ls
root@arizon-rfid:/tmp# nano etk_main_20221220093157.log
```

LOG FILE: *etk_main_{yyyyMMddhhmmss}.log*



IoT Connection

The following information might help you troubleshoot common issues in AWS IoT: Link to Troubleshooting AWS IoT.

Also, feel free to contact us if you have any questions. Contact Us