User Manual

Product Name: Industry Edge computing gateway

Model Name: DSGW-081

Firmware Version: V1.0.0.9

Revision History

Specification		Sect.	Update Description	By
Rev	Date			
1.0	2022-12-14		New version release	Yanguangfei
1.1	2023-2-2		Add new function	yanguangfei
1.2	2023-2-16		Add can	Yan

Approvals

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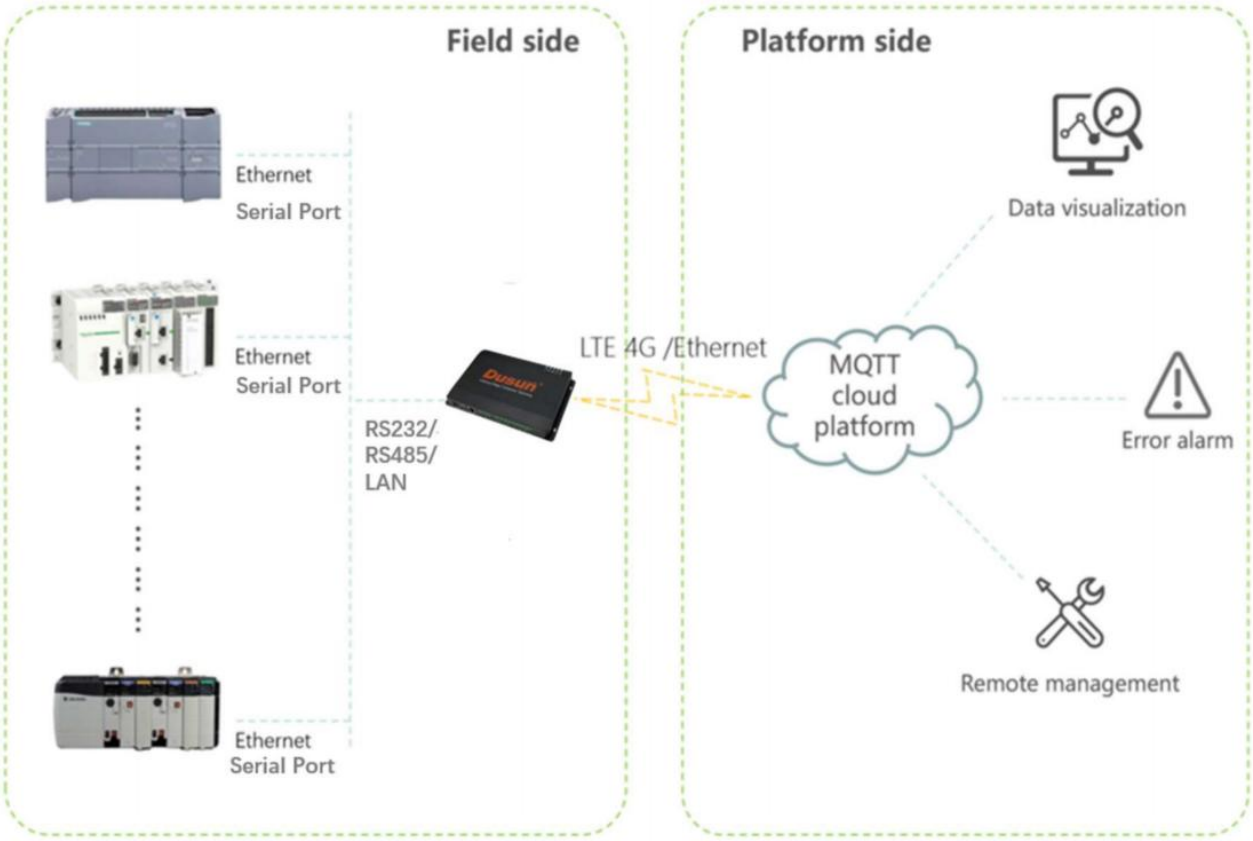
1 Introduction

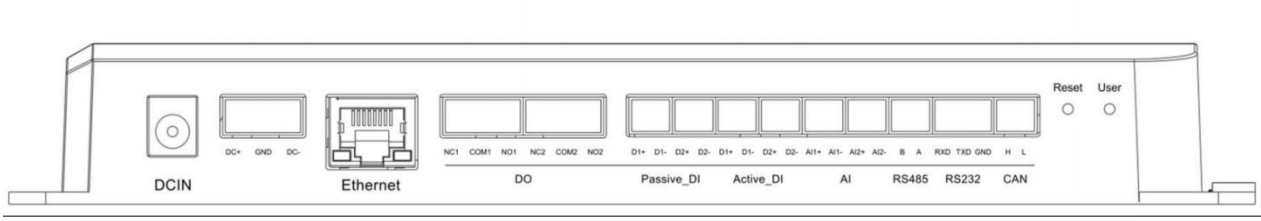
1.1 Purpose & Description

The DSGW-081 Industry Edge Computing Gateway provides uninterrupted Internet access for machines over ubiquitous 3G/4G wireless networks and multiple broadband services. with powerful edge computing capabilities, comprehensive security protection and wireless services. DSGW-081 features powerful edge computing capabilities. It realizes data optimization, real-time response, agile connection and intelligent analysis on the IoT edge, significantly reduces the data flow between field sites and data center, and avoid bottlenecks of cloud-end computing.

1.2 Hardware wiring



The following figure describes how to connect serial port terminals of DSGW-081:

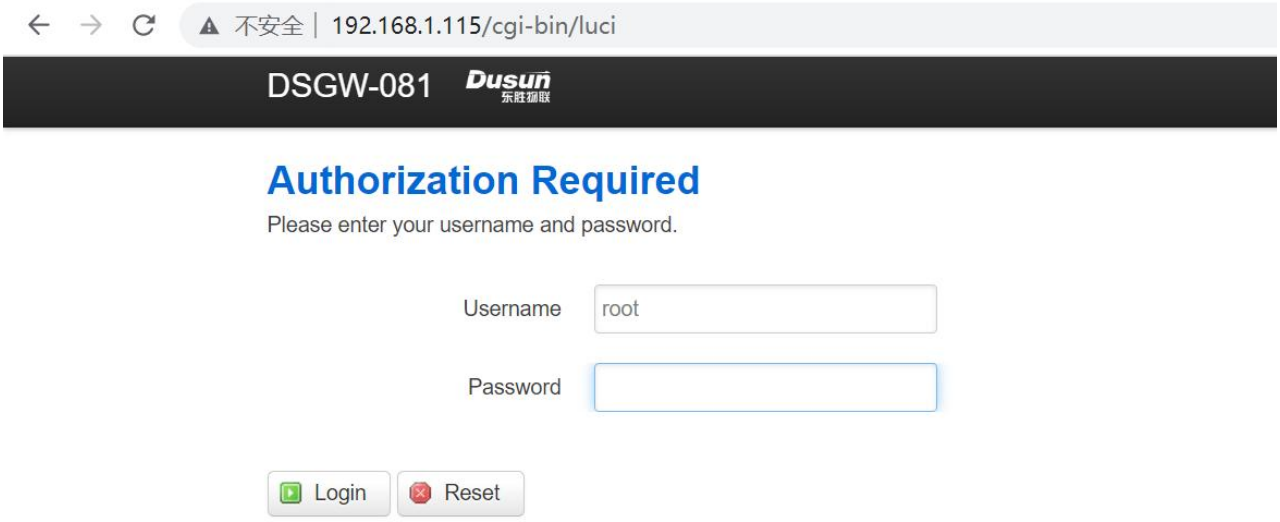


2 LUCI Configuration

2.1 Deploy the environment of configuration

1) Connect the gateway with a router via the Ethernet port
2) Connect a PC to the same router via Wi-Fi
3) Find out the IP address of the gateway in the router

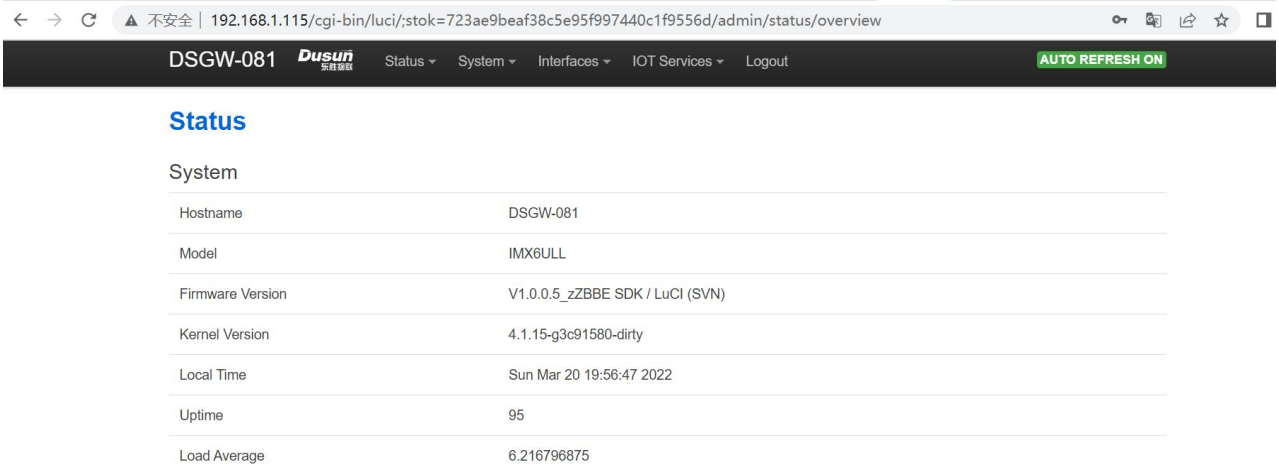
4) Log in the gateway using the IP address in a browser



5) Enter the username and password

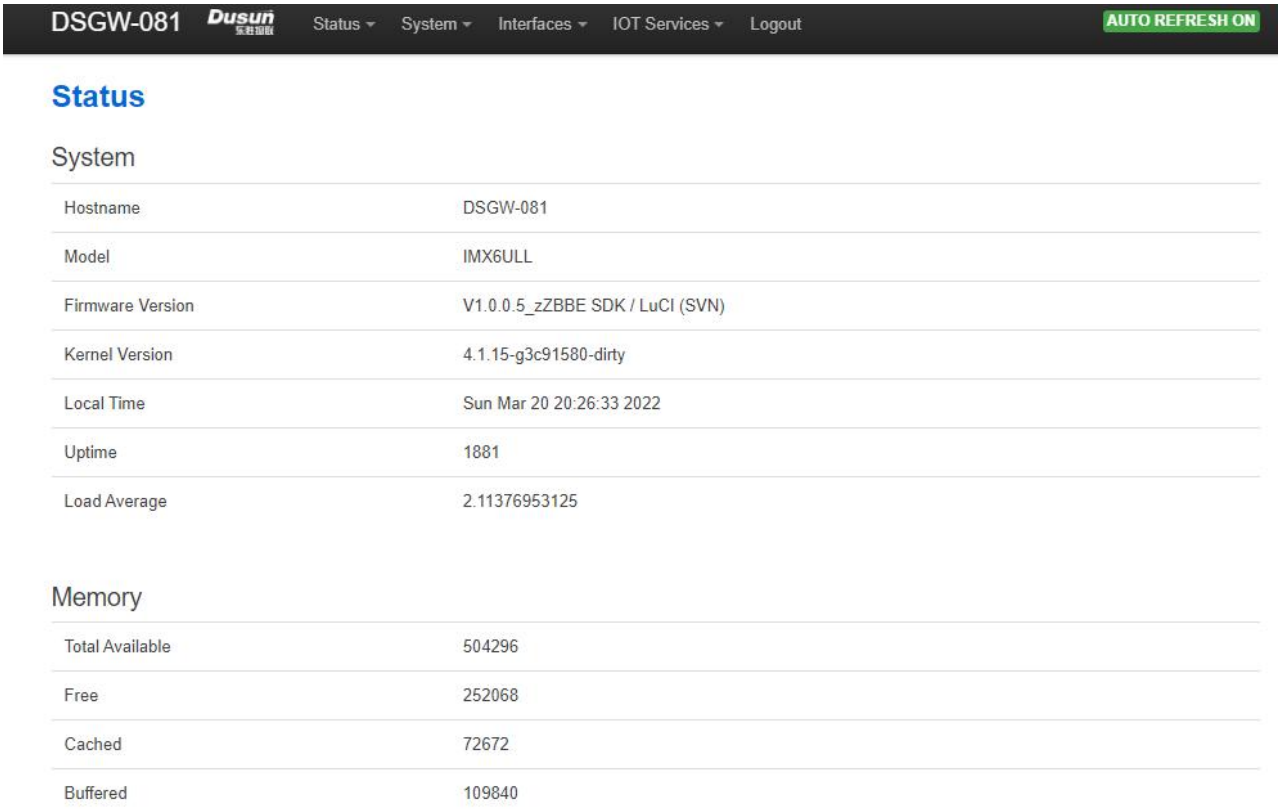
Username: root

Password: root



2.2 Status

2.2.1 Overview

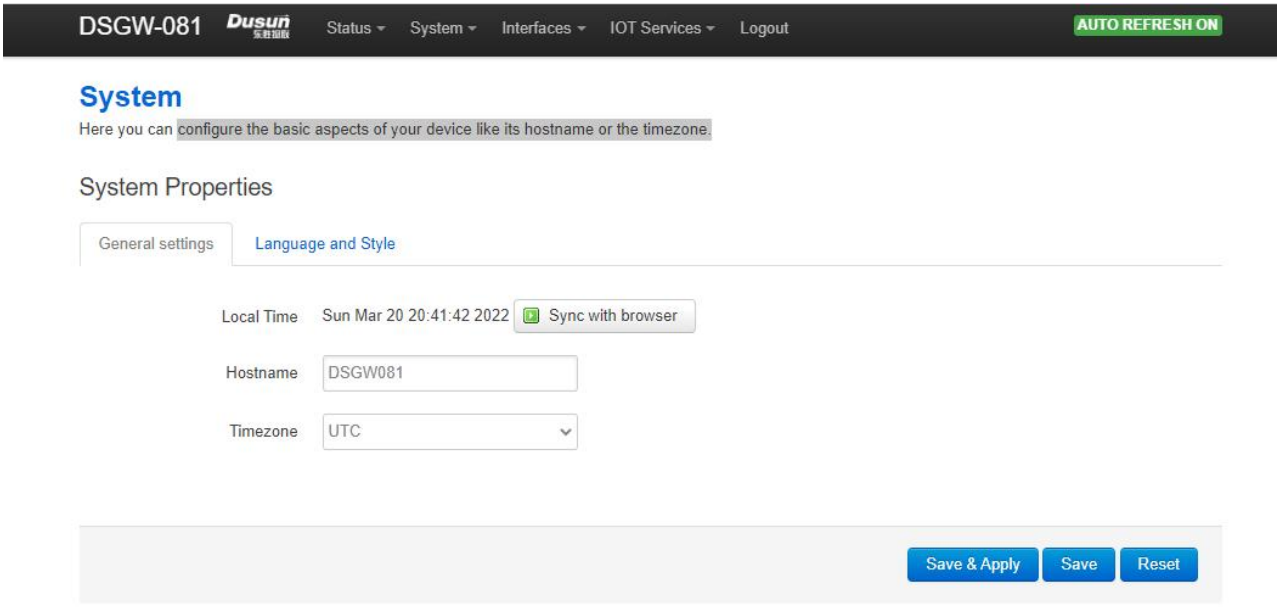


In this page, you can check the status of system, memory.
System Information: Hostname, Model, Firmware Version, Kernel Version, Local Time, Uptime, Load Average.
Memory Information: Total Available, Free, Cached, Buffered.

2.3 System

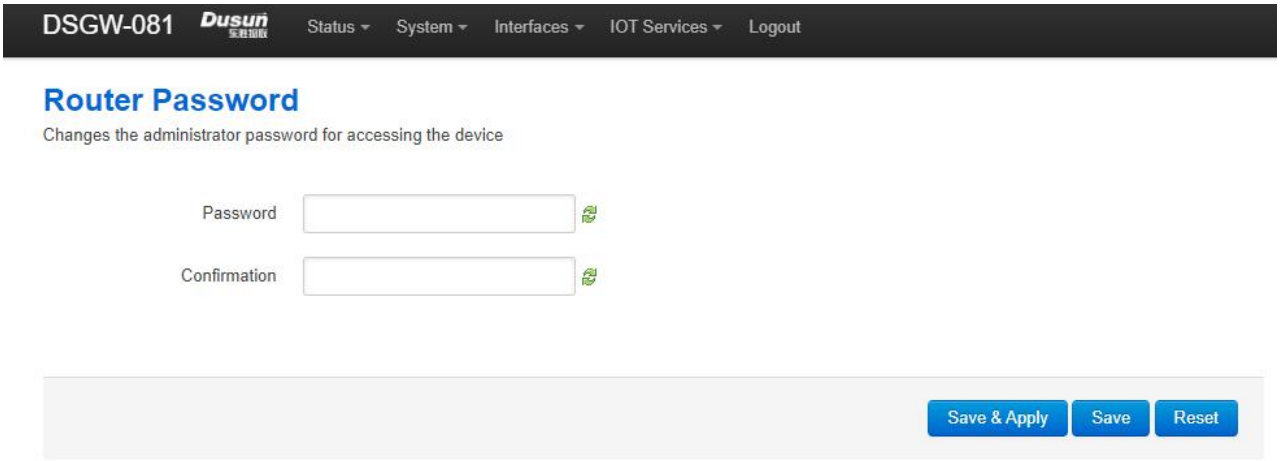
2.3.1 System

Select menu “System”--> “System”, configure the basic aspects of your device like its hostname or the timezone.



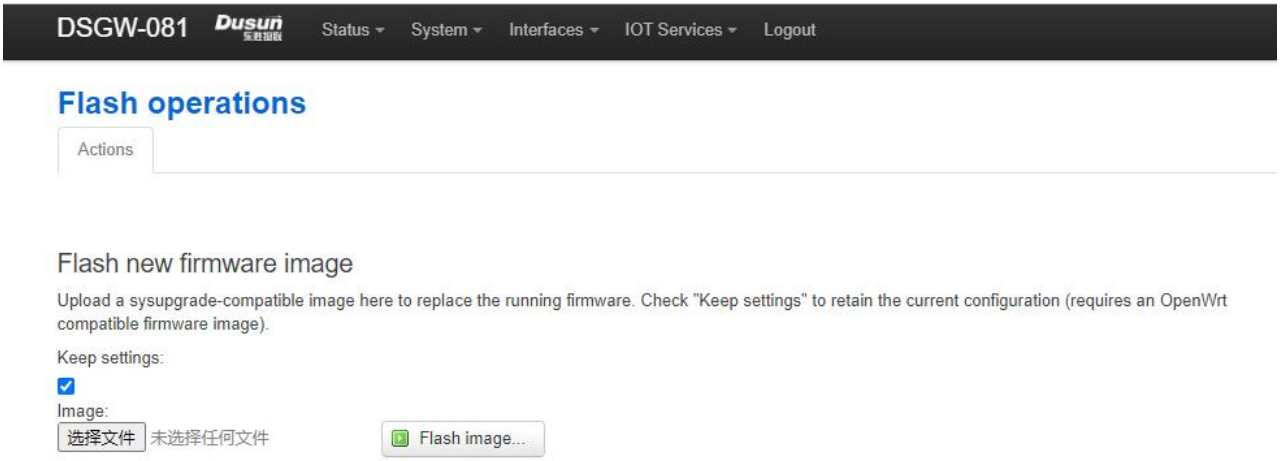
2.3.2 Administration

Select menu “System”--> “Administration”, change the administrator password for accessing the device.



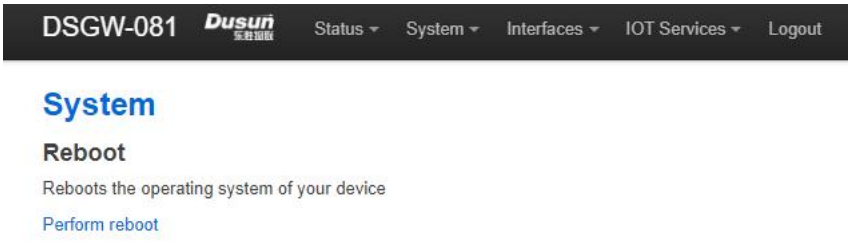
2.3.3 Backup/Flash Firmware

Select menu “System”--> “Backup/Flash Firmware”, flash new firmware.



2.3.4 Reboot

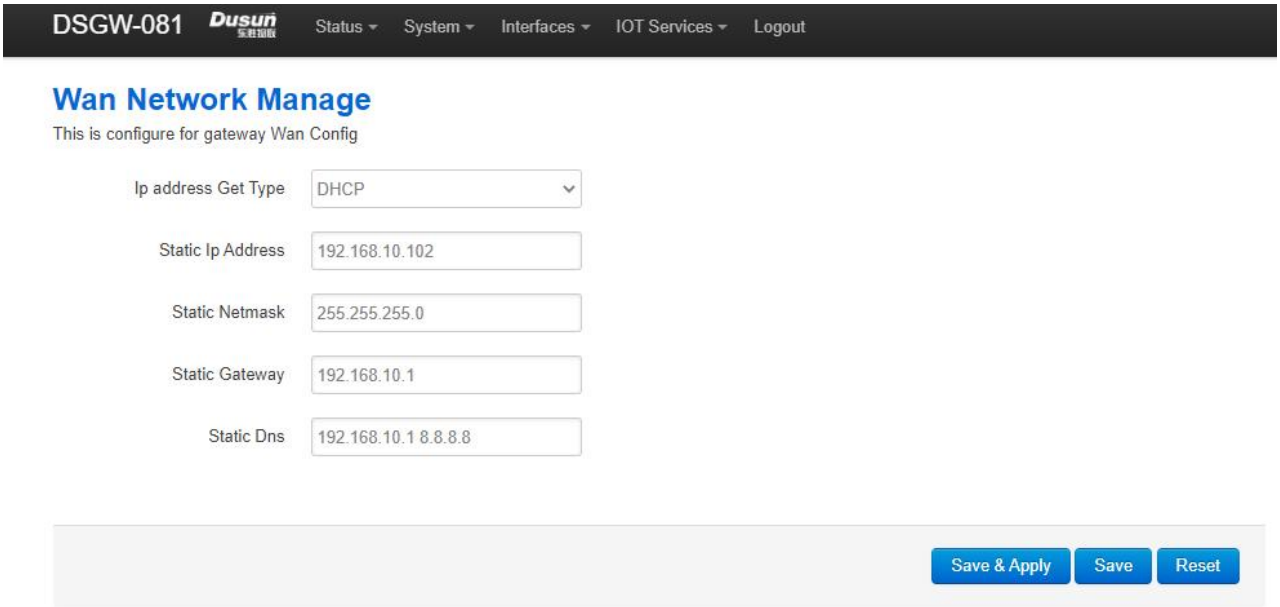
Select menu “System”--> “Reboot”, reboot the operating system of the device.



2.4 Interfaces

2.4.1 WAN Setting

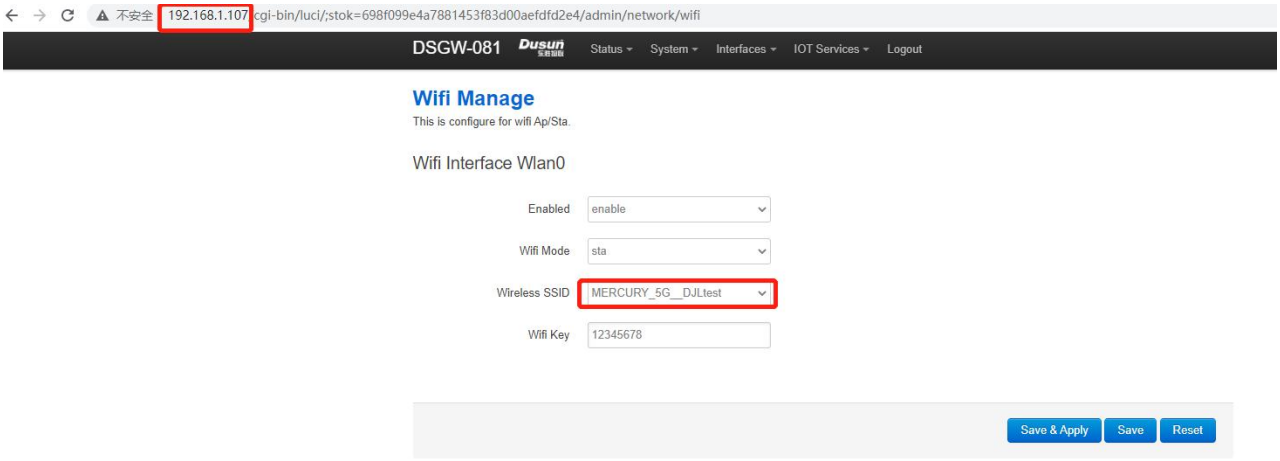
Select menu “Interfaces” --> “WAN Setting”, set the Wan Config.



2.4.2 WiFi Setting

Select menu “Interfaces” --> “WiFi Setting”, config the wifi Ap/Sta.

Choose a wireless SSID, then your PC can access it through the same WiFi.



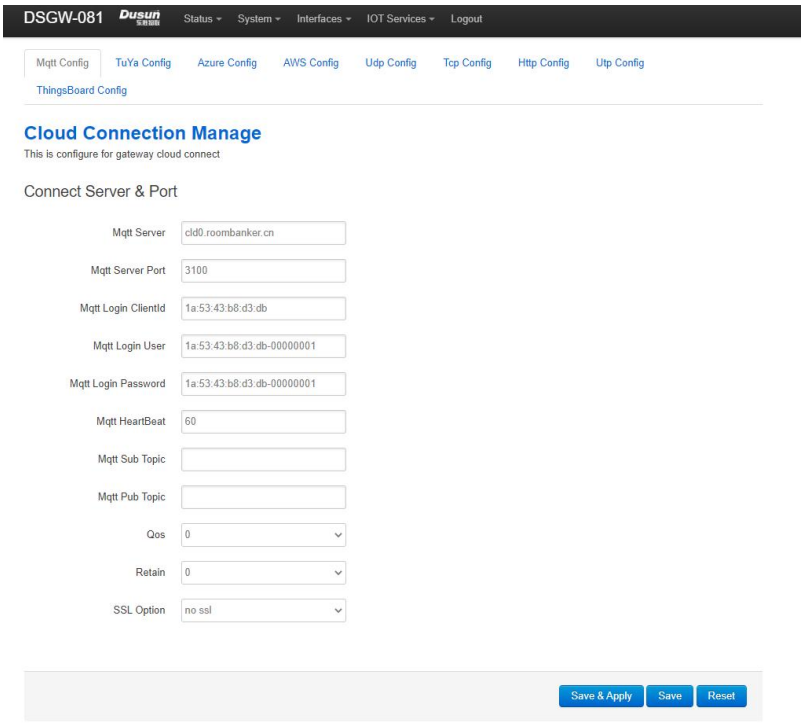
2.5 IOT Services

2.5.1 Cloud Config

Select menu “IOT Services” --> “Cloud Config”.

2.5.1.1 Mqtt Config

Configure the parameter in this page to connect to a mqtt broker. Filled in the right value offered by the MQTT broker.

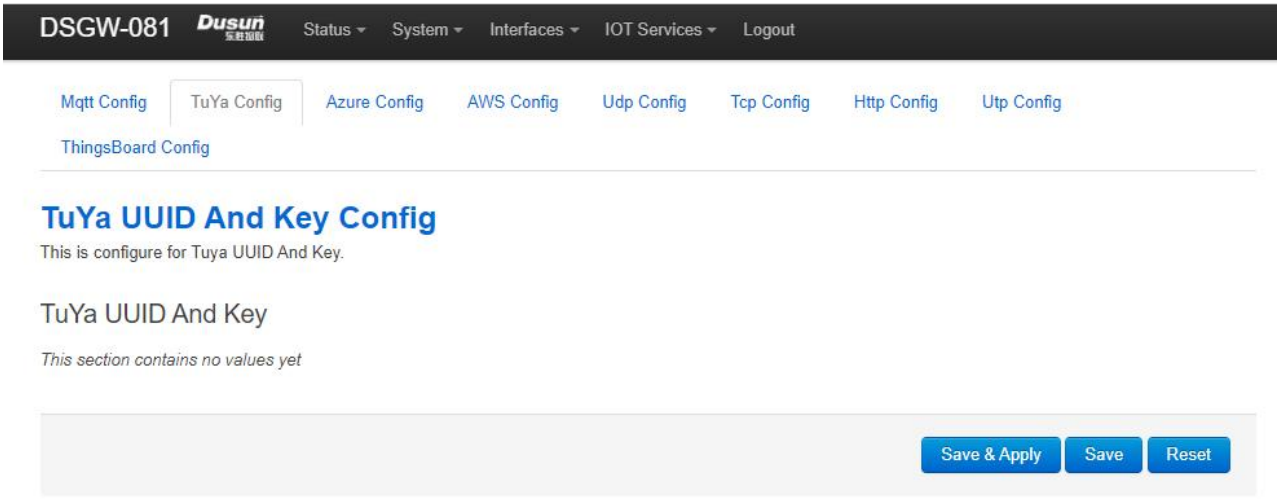


The gateway publishes the messages to topic ‘t’ and subscribes from topic ‘t/<mac>’.

For example, if gateway's mac is 1a:53:43:b8:d3:db, then it subscribes from the topic 't/1a:53:43:b8:d3:db' and publishes data to topic 't'. If you need set other topic, set in this page.

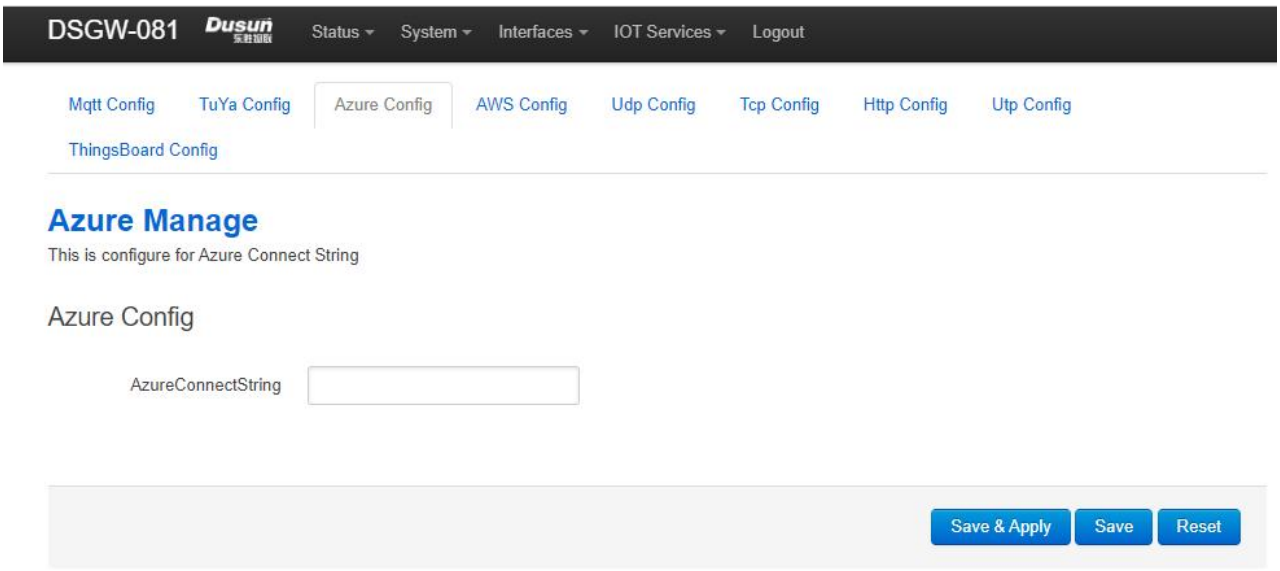
2.5.1.2 TuYa Config

If the gateway is TuYa version, fill in the right UUID and Key then gateway would be able to connect to TuYa Platform.



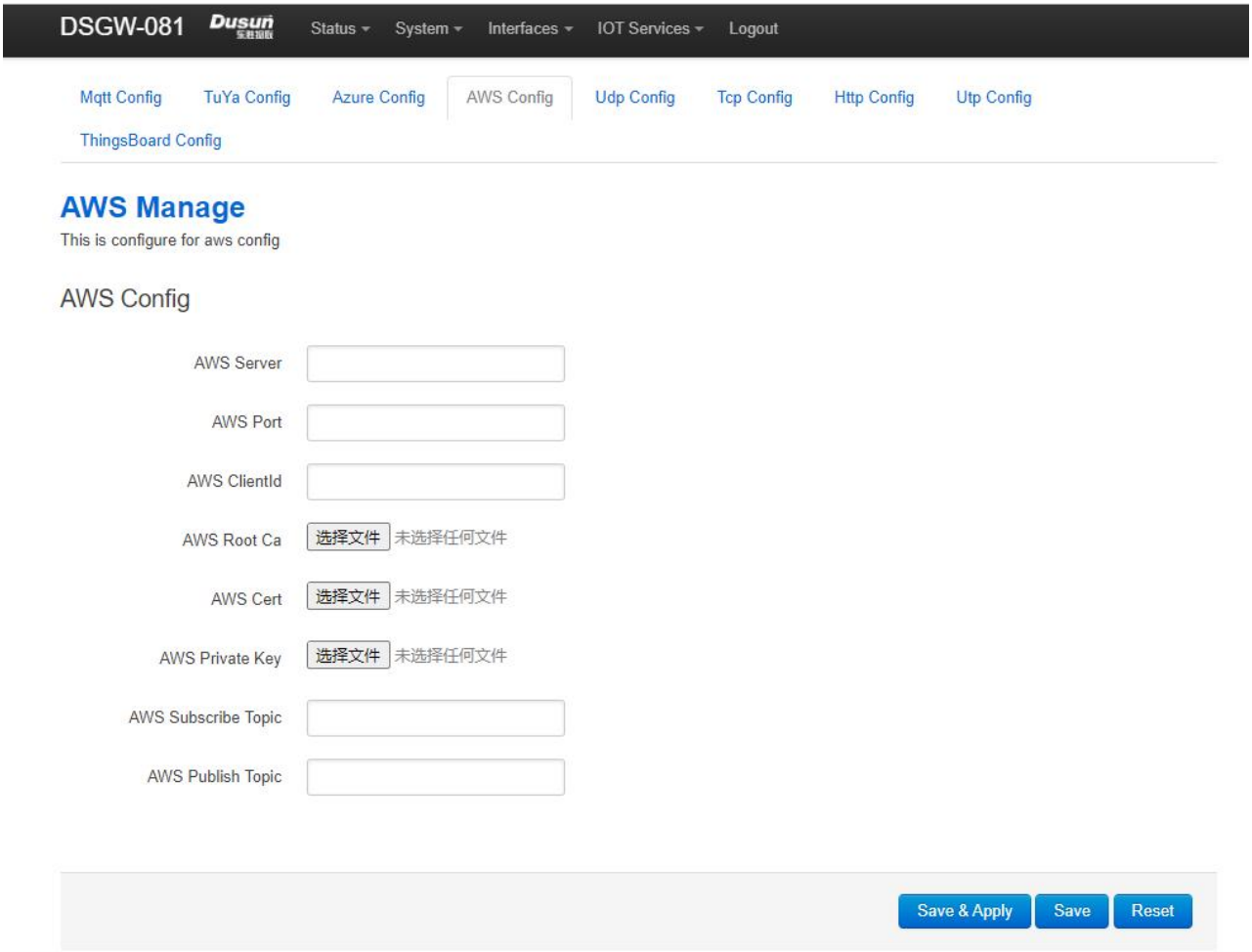
2.5.1.3 Azure Config

Fill in the Azure connection string obtained from the Azure platform to enable gateway's connection.



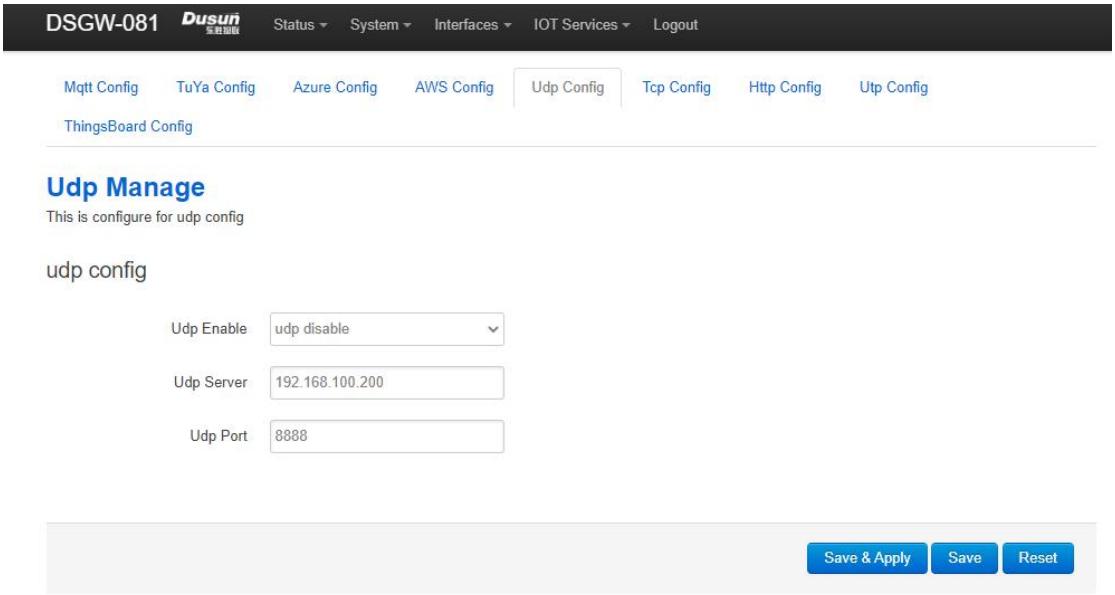
2.5.1.4 AWS Config

Configure the parameters obtained by AWS platform to establish the connection.



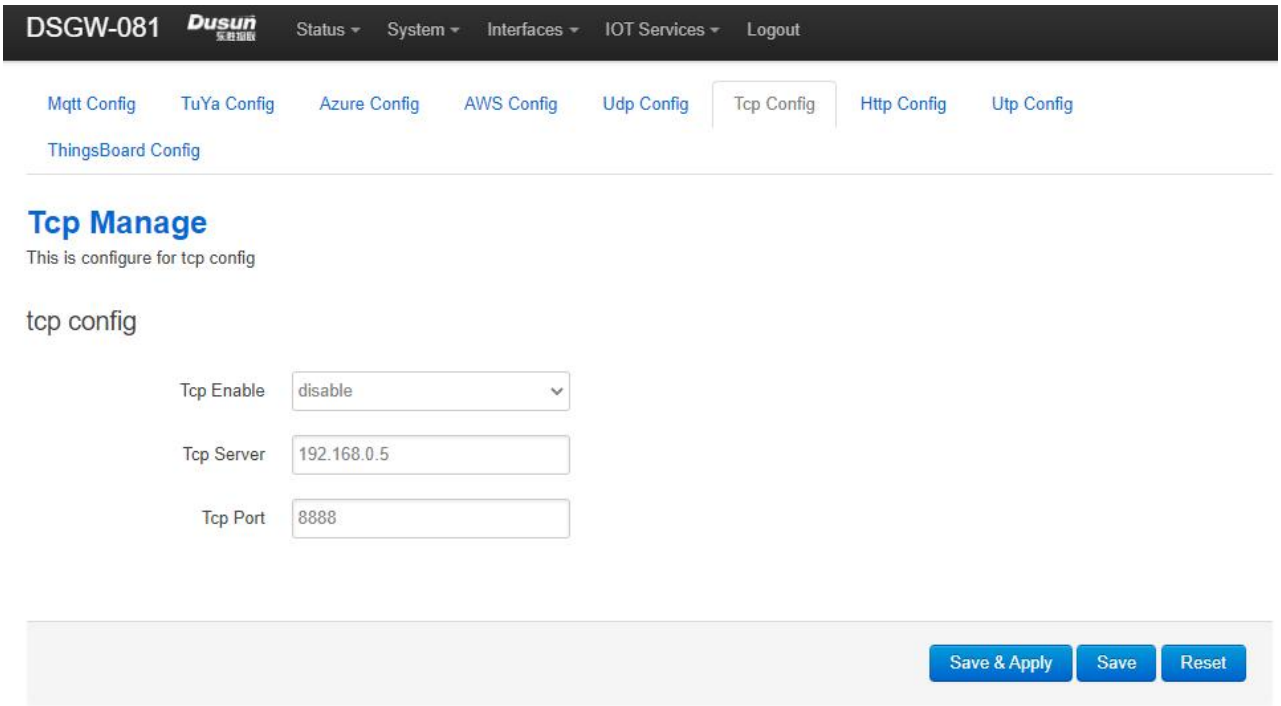
2.5.1.5 Udp Config

Configure the UDP parameters to connect to UDP server.



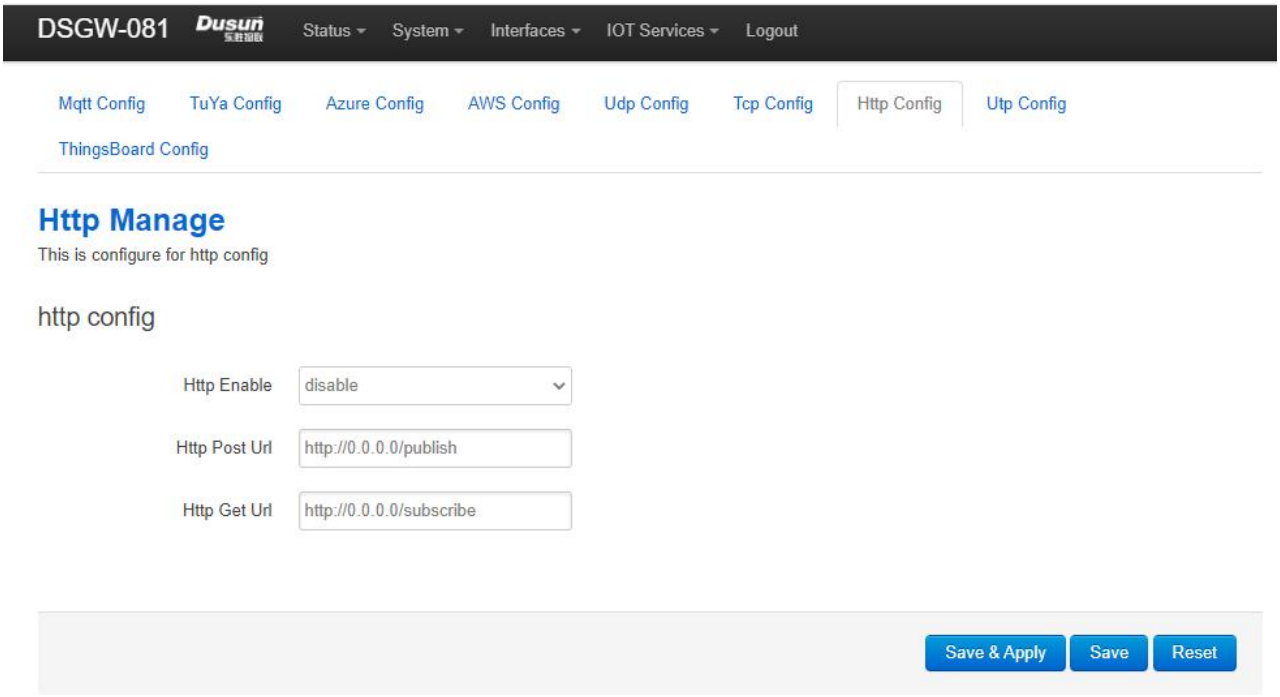
2.5.1.6 Tcp Config

Config the TCP parameters to establish the TCP connection.



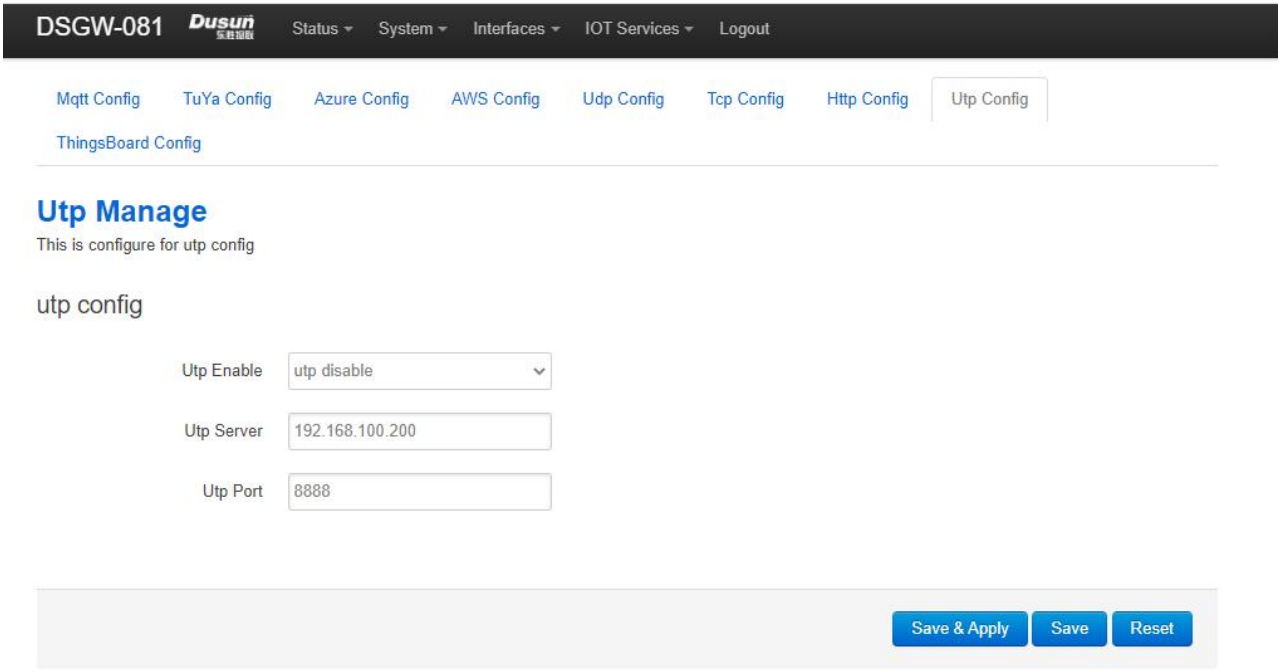
2.5.1.7 Http Config

Config the HTTP parameters to establish the HTTP connection.



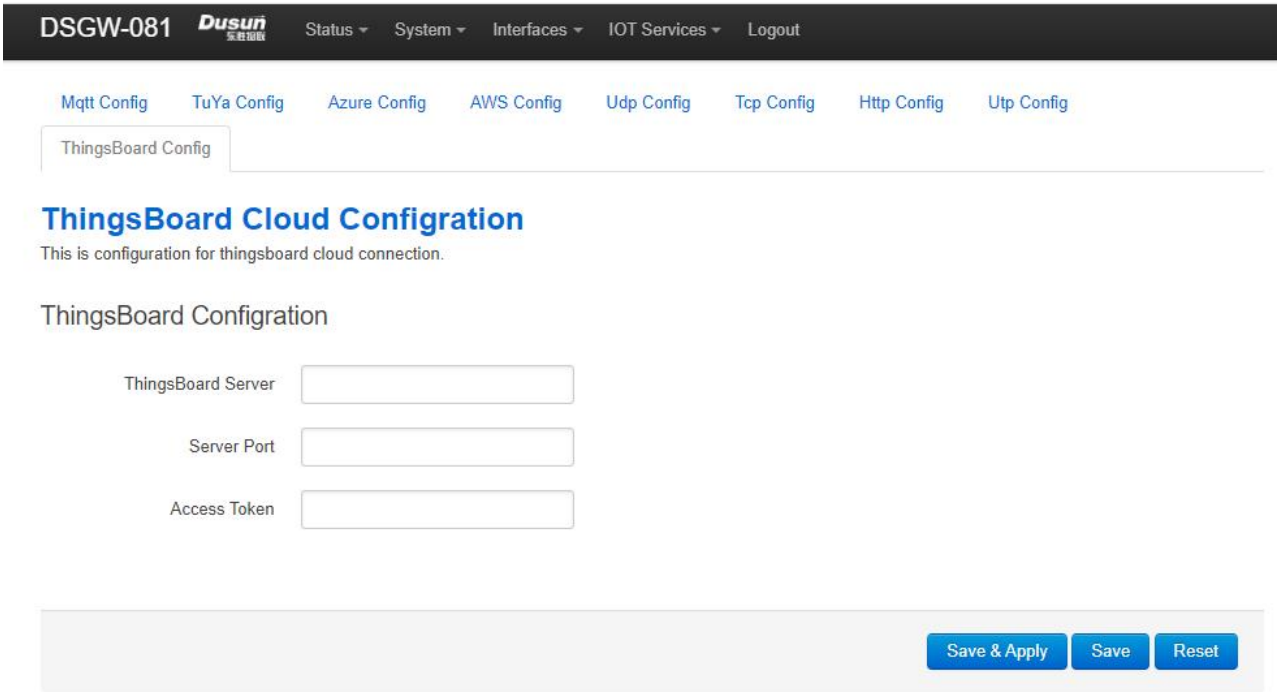
2.5.1.8 Utp Config

Config the Utp parameters to establish the Utp connection.



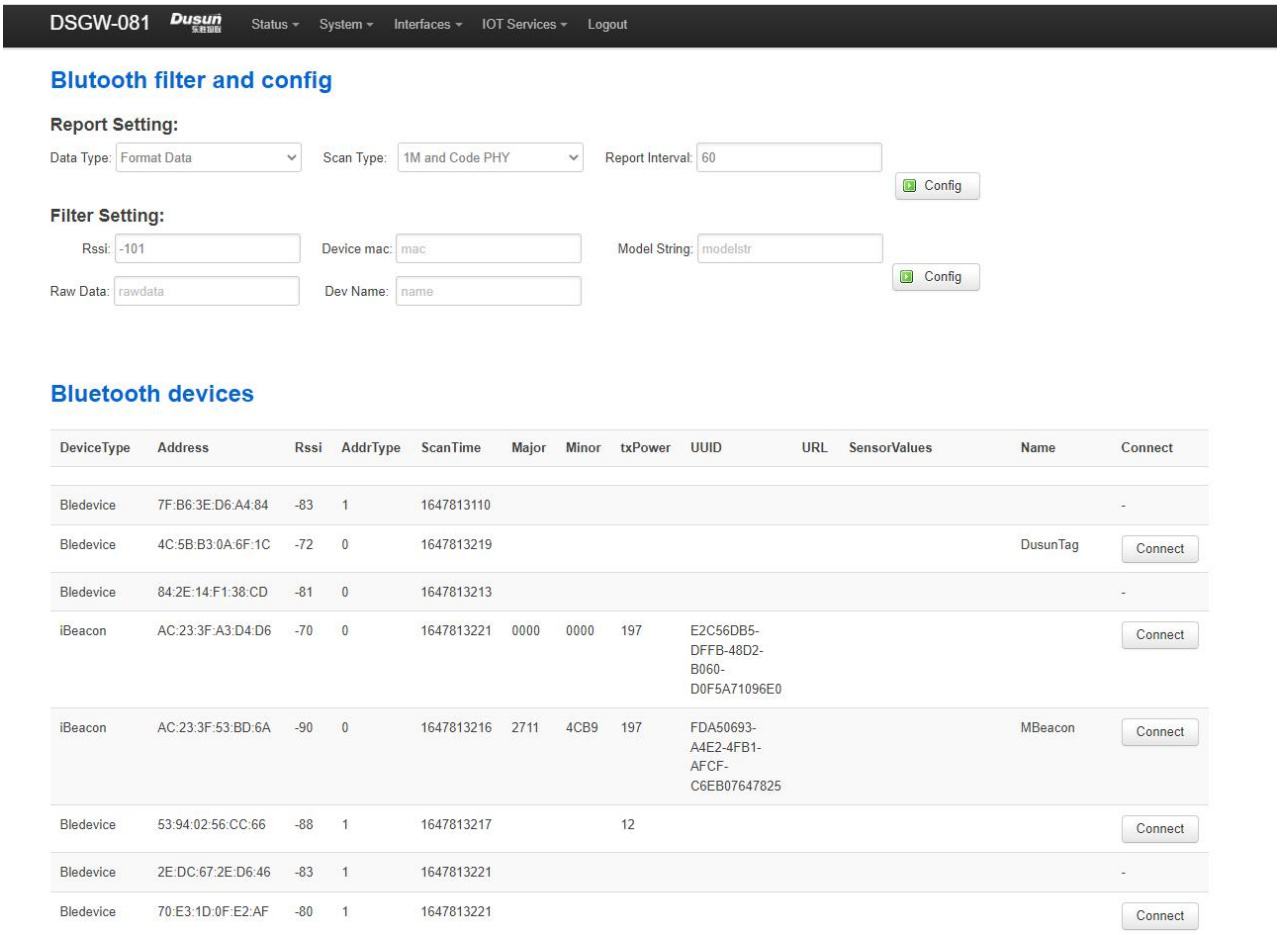
2.5.1.9 ThingsBoard Config

Configure the parameters obtained by ThingsBoard platform to establish the connection.



2.5.2 Bluetooth

Select menu “IOT Services” --> “Bluetooth”



Report Setting:

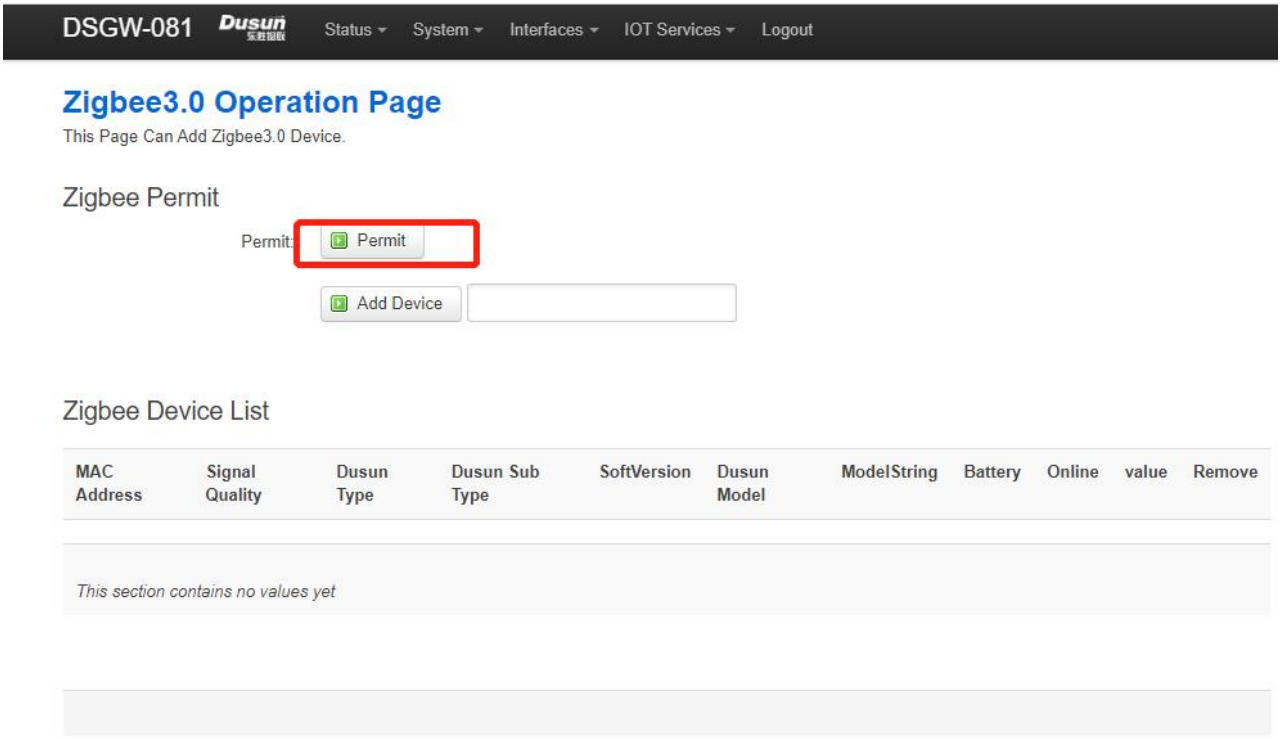
* Data Type
  - Format Data
  - Raw Data
* Scan Type
  - 1M and Code PHY
  - 1M PHY
  - Code PHY
* Report Interval: time gap for ble list to be reported

2.5.3 Zigbee

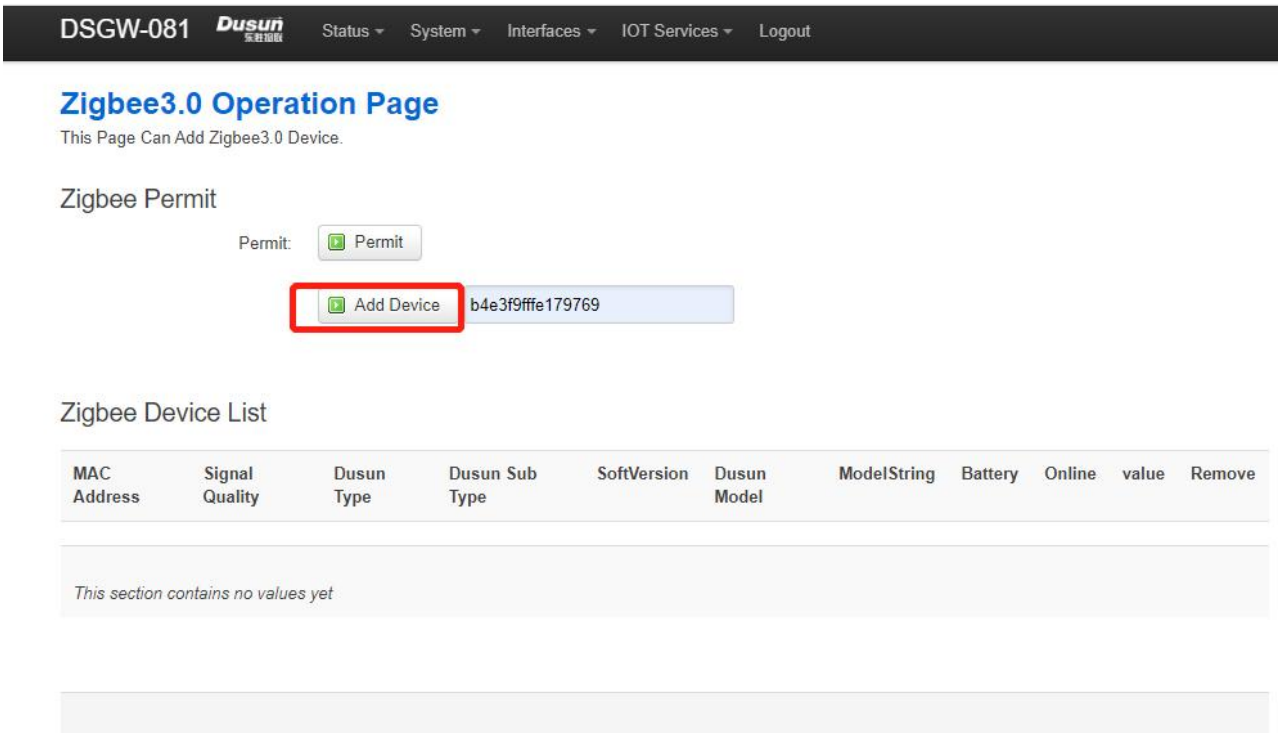
Select menu “IOT Services” --> “Zigbee”.

There are two ways to pair the gateway with nearby zigbee sensors, one is by Permit function, the other is Add Device button.

a) User can press the Permit button to let the nearby zigbee devices to join the network. After pressing the button, there would be 120 seconds for nearby zigbee devices to join.

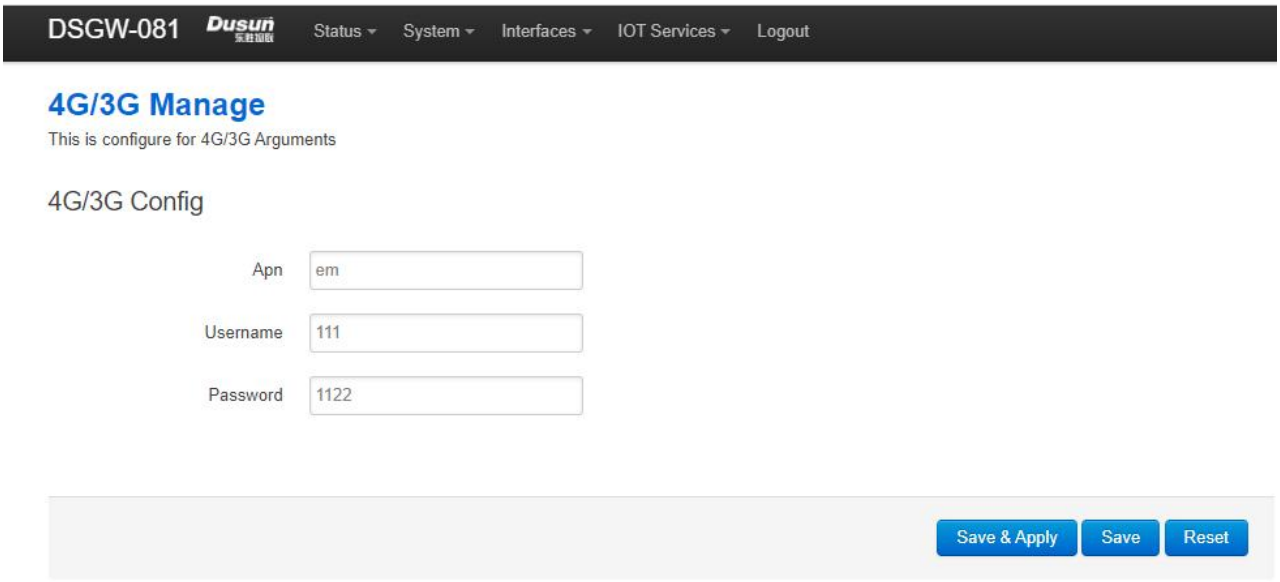


b) User can press the Add Device button and fill in the corresponding MAC address to let a specific zigbee device to join the network.



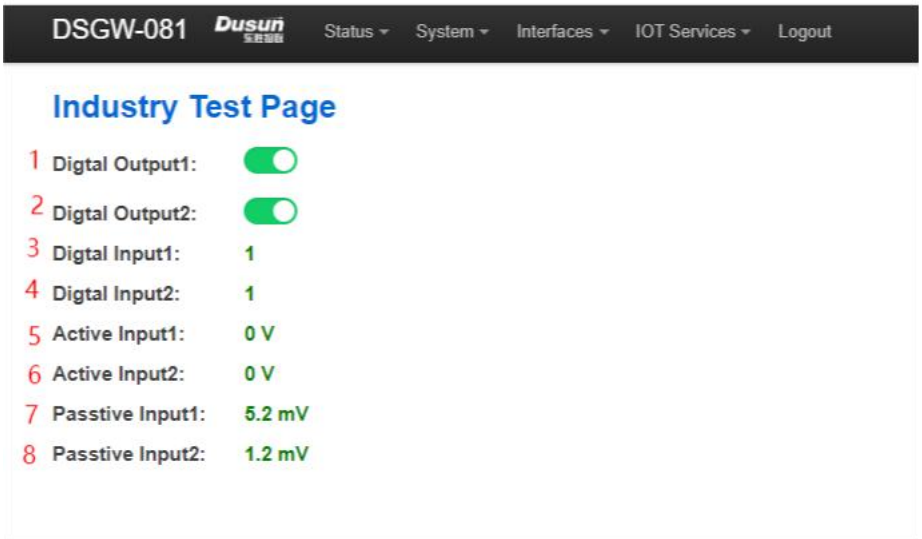
2.5.4 LTE

Select menu “IOT Services” --> “LTE”, fill in the APN, user name and password to enable LTE function, these info can be obtained from the carrier.

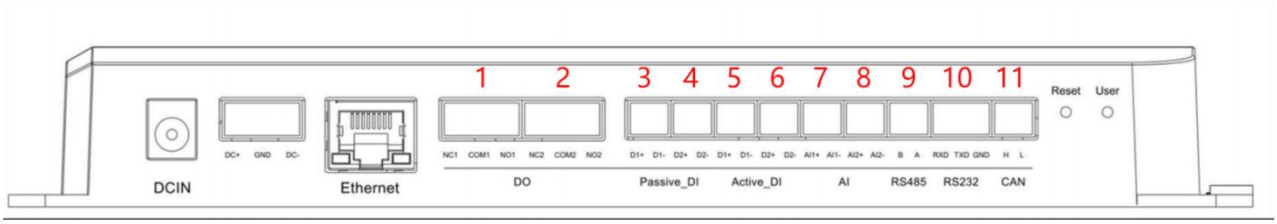


2.5.5 Industry

Select menu “IOT Services” --> “Industry”.



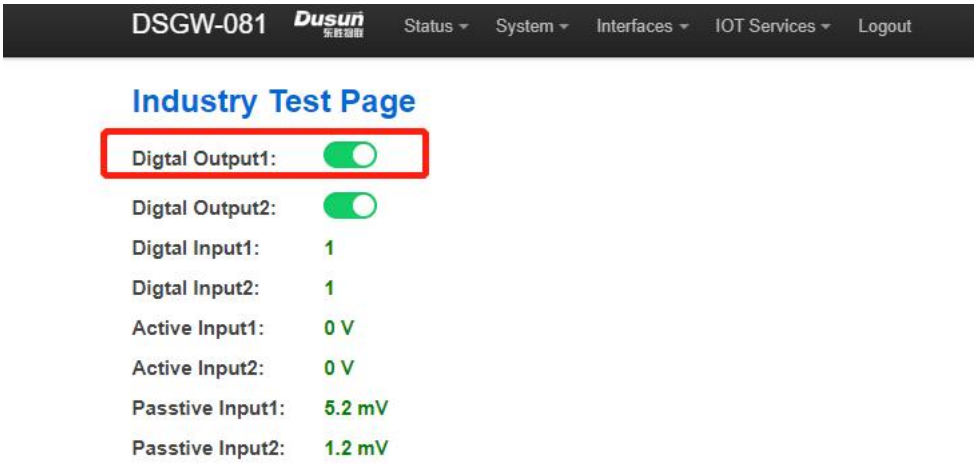
Here shows the correspondence between the web page and physical port.



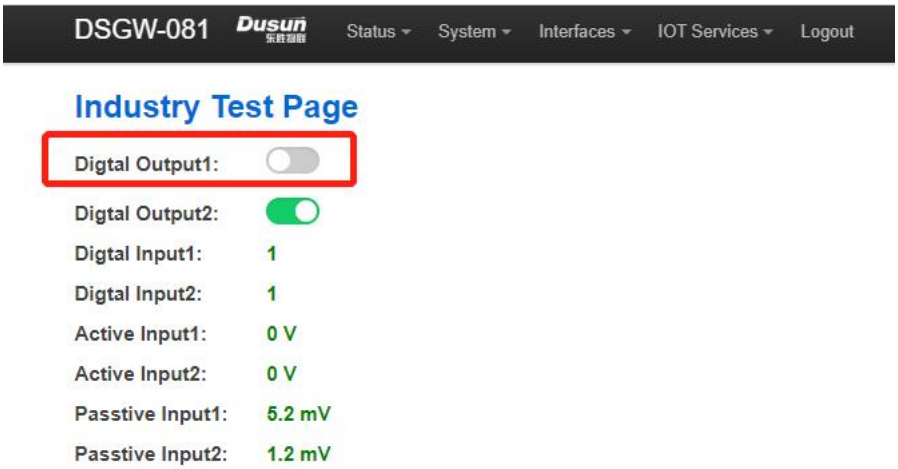
2.5.5.1 Digital Output

There are two same digital outputs, both connect to a relay.Take “Digital Output1” as an example.

* When the switch on the web page is on, the “NC1” pin would be connectable with “COM1” pin.



* When the switch on the web page is off, the “NO1” pin would be connectable with “COM1” pin.



2.5.5.2 Digital Input & Active Input & Passive Input

Shows the signal data of the corresponding port.

2.5.5.3 RS485 & RS232

* Login the OS of the gateway, config via minicom.

Username: root

Password: root

```
15/12/2022  19:19.31  /home/mobaxterm  ssh root@192.168.1.115
root@192.168.1.115's password:
Linux DSGW-081 4.1.15-g3c91580-dirty #47 SMP PREEMPT Mon Nov 7 20:04:35 CST 2022 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sun Mar 20 22:39:08 2022 from 192.168.1.108
root@DSGW-081:~# minicom -s
```

* Choose “Serial port setup”.

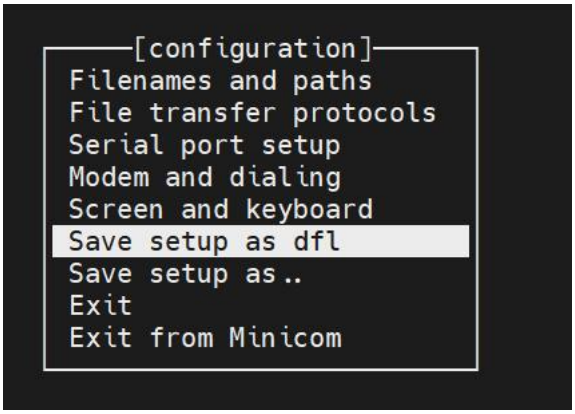
```
        [configuration]
  Filenames and paths
  File transfer protocols
  Serial port setup
  Modem and dialing
  Screen and keyboard
  Save setup as dfl
  Save setup as..
  Exit
  Exit from Minicom
```

* Input “a” to change “Serial Device”, input “Enter” to get out of the editor.
  - RS232 /dev/ttymxc3 115200bps
  - RS485 /dev/ttymxc4 9600bps

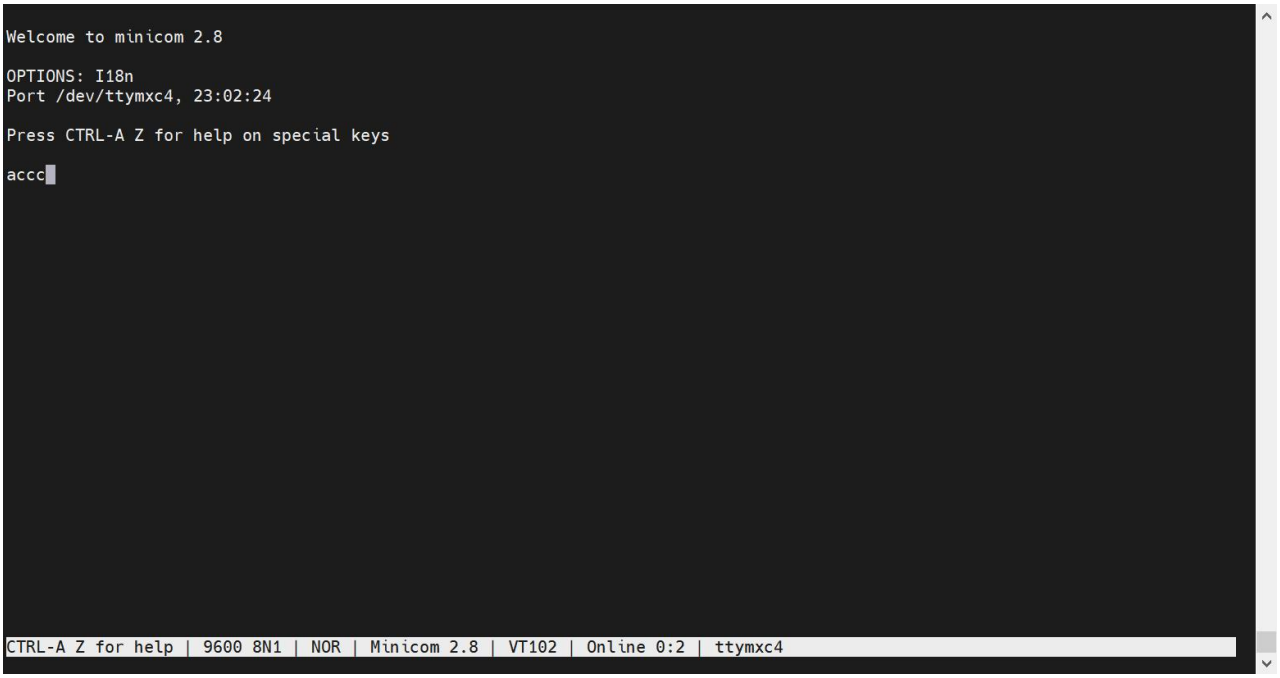
```
A -    Serial Device      : /dev/ttymxc4
B - Lockfile Location     : /var/lock
C -   Callin Program      :
D -  Callout Program      :
E -    Bps/Par/Bits       : 9600 8N1
F - Hardware Flow Control : No
G - Software Flow Control : No
H -     RS485 Enable      : Yes
I -   RS485 Rts On Send   : No
J -  RS485 Rts After Send : No
K -  RS485 Rx During Tx   : No
L -  RS485 Terminate Bus  : No
M - RS485 Delay Rts Before: 0
N - RS485 Delay Rts After : 0

   Change which setting?
```

* Input “Enter” again to save changes and get back to the main menu.

Choose “Save setup as dfl”.



*Now the gateway communicates with other device via serial port.



Besides, you can send data to the gateway via the serial ports on the luci page.

2.5.5.4 CAN

There is the interface “can0” on the gateway system, config it on the Linux system.

```
root@DSGW-081:~# ifconfig
can0: flags=193<UP,RUNNING,NOARP>  mtu 16
        unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00  txqueuelen 10  (UNSPEC)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1  bytes 8 (8.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 25
```

Here is an example.

```
root@DSGW-081:~# ifconfig can0 down;
root@DSGW-081:~# ip link set can0 type can bitrate 125000 loopback off;
root@DSGW-081:~# ifconfig can0 up
```

3 Development Protocol

The gateway runs ubus to control all physical ports.The followings are the protocols.Note that the data sent or received is hexadecimal under these protocols.

3.1 digital output

```
{
    "mac": "30:ae:7b:e2:2e:94",
    "type": "cmd",
    "time": 1675215353,
```

```
    "from": "CLOUD",
    "deviceCode": "db4a7b00-08f4-49e3-9ace-ac59ce035737",
    "data": {
        "command": "setAttribute",
        "arguments": {
            "mac": "30:ae:7b:e2:2e:94",
            "value": {
                "index": 1,
                "value": 1
            },
            "attribute": "ins.dout",
            "ep": 1
        },
        "id": "e30bcc6e-4c04-41bd-88a8-998f45780817"
    },
    "to": "INS"
}
```


Name	type	description			
mac	string	gateway mac			
type	string	message type			
time	integer	timestamp			
from	string	message sender			
deviceCode	string	Identification code assigned by the platform			
data					
	command	string	command type		
	arguments				
		mac	string	gateway mac	
		value			
			index	integer	digtal data output index
			value	integer	digtal data output value: 1 / 2

Name	type	description			
		attribute	string	message attribute	
		ep	integer	message sender endpoint	
	id	string	message uuid		
to	string	message receiver			

3.2 passive digital input


```
{
    "mac": "30:ae:7b:e2:2e:94",
    "type": "cmd",
    "time": 1675215770,
    "from": "CLOUD",
    "deviceCode": "db4a7b00-08f4-49e3-9ace-ac59ce035737",
    "data": {
        "command": "getAttribute",
        "arguments": {
            "mac": "30:ae:7b:e2:2e:94",
            "value": {
                "index": 1
            },
            "attribute": "ins.passive.din",
            "ep": 1
        },
        "id": "416eb6e4-7557-4208-b1f7-2088e7e338f0\u000a"
    },
    "to": "INS"
}
```


Name	type	description
mac	string	gateway mac
type	string	message type
time	integer	timestamp
from	string	message sender

Name	type	description			
deviceCode	string	Identification code assigned by the platform			
data					
	command	string	command type		
	arguments				
		mac	string	gateway mac	
		value			
			index	integer	passive digtal data input index : 1 / 2
		attribute	string	message attribute	
		ep	integer	message sender endpoint	
	id	string	message uuid		
to	string	message receiver			

3.3 active digital input

```
{
    "mac": "30:ae:7b:e2:2e:94",
    "type": "cmd",
    "time": 1675216074,
    "from": "CLOUD",
    "deviceCode": "db4a7b00-08f4-49e3-9ace-ac59ce035737",
    "data": {
        "command": "getAttribute",
        "arguments": {
            "mac": "30:ae:7b:e2:2e:94",
            "value": {
                "index": 0
            },
```

```
                "attribute": "ins.active.din",
                "ep": 1
            },
            "id": "68719efb-cd58-420a-a1b6-7294aadb4988\u000a"
        },
        "to": "INS"
}
```


Name	type	description			
mac	string	gateway mac			
type	string	message type			
time	integer	timestamp			
from	string	message sender			
deviceCode	string	Identification code assigned by the platform			
data					
	command	string	command type		
	arguments				
		mac	string	gateway mac	
		value			
			index	integer	active digtal input index : 0 / 1
		attribute	string	message attribute	
		ep	integer	message sender endpoint	
	id	string	message uuid		
to	string	message receiver			

3.4 analog input


```
{
    "mac": "30:ae:7b:e2:2e:94",
    "type": "cmd",
    "time": 1675216257,
    "from": "CLOUD",
    "deviceCode": "db4a7b00-08f4-49e3-9ace-ac59ce035737",
    "data": {
        "command": "getAttribute",
        "arguments": {
            "mac": "30:ae:7b:e2:2e:94",
            "value": {
                "index": 0
            },
            "attribute": "ins.ain",
            "ep": 1
        },
        "id": "c3e7960c-cf7a-4753-ba7b-3b7b0d258d94\u000a"
    },
    "to": "INS"
}
```


Name	type	description		
mac	string	gateway mac		
type	string	message type		
time	integer	timestamp		
from	string	message sender		
deviceCode	string	Identification code assigned by the platform		
data				
	command	string	command type	
	arguments			
		mac	string	gateway mac
		value		

Name	type	description			
			index	integer	analog input index : 0 / 1
		attribute	string	message attribute	
		ep	integer	message sender endpoint	
	id	string	message uuid		
to	string	message receiver			

3.5 r485 configure

```
{
    "mac": "30:ae:7b:e2:2e:94",
    "type": "cmd",
    "time": 1675216433,
    "from": "CLOUD",
    "deviceCode": "db4a7b00-08f4-49e3-9ace-ac59ce035737",
    "data": {
        "command": "setAttribute",
        "arguments": {
            "mac": "30:ae:7b:e2:2e:94",
            "value": {
                "index": 1,
                "buadrate": 9600
            },
            "attribute": "ins.r485.cfg",
            "ep": 1
        },
        "id": "9db9b842-3cc0-4d49-a24c-0bb98eb853ad\u000a"
    },
    "to": "INS"
}
```

Name	type	description
mac	string	gateway mac

Name	type	description			
type	string	message type			
time	integer	timestamp			
from	string	message sender			
deviceCode	string	Identification code assigned by the platform			
data					
	command	string	command type		
	arguments				
		mac	string	gateway mac	
		value			
			index	integer	485 interface index : 1
			buadrate	integer	485 interface buadrate: 9600/115200
		attribute	string	message attribute	
		ep	integer	message sender endpoint	
	id	string	message uuid		
to	string	message receiver			

3.6 r485 data send

```
{
    "mac": "30:ae:7b:e2:2e:94",
    "type": "cmd",
    "time": 1675216494,
```

```
    "from": "CLOUD",
    "deviceCode": "db4a7b00-08f4-49e3-9ace-ac59ce035737",
    "data": {
        "command": "setAttribute",
        "arguments": {
            "mac": "30:ae:7b:e2:2e:94",
            "value": {
                "index": 1,
                "data": "AABB"
            },
            "attribute": "ins.r485.send",
            "ep": 1
        },
        "id": "49c4940e-8716-4d05-9bab-db6b835a627c\u000a"
    },
    "to": "INS"
}
```


Name	type	description			
mac	string	gateway mac			
type	string	message type			
time	integer	timestamp			
from	string	message sender			
deviceCode	string	Identification code assigned by the platform			
data					
	command	string	command type		
	arguments				
		mac	string	gateway mac	
		value			
			index	integer	485 interface index : 1
			data	integer	485 interface data : “AABBCC”

Name	type	description			
		attribute	string	message attribute	
		ep	integer	message sender endpoint	
	id	string	message uuid		
to	string	message receiver			

3.7 r485 data report

When there's data from gateway are transferring toward outside, the report message is automatically sent uplink, you can receive and process it.

```
{
    "from": "INS",
    "to": "GATEWAY",
    "deviceCode": "0000",
    "mac": "96:65:f3:bd:dc:e6",
    "type": "reportAttribute",
    "time": 1675225524,
    "data": {
        "attribute": "ins.r232.data",
        "mac": "96:65:f3:bd:dc:e6",
        "value": {
            "index": 1,
            "data": "AABB"
        }
    }
}
```

Name	type	description
mac	string	gateway mac
type	string	message type
time	integer	timestamp
from	string	message sender
deviceCode	string	Identification code

Name	type	description		
		assigned by the platform		
data				
	mac	string	gateway mac	
	value			
		index	integer	485 interface index : 1
		data	integer	485 interface data report : “AABBCC”
	attribute	string	message attribute	
to	string	message receiver		

3.8 r232 configure

```
{
    "mac": "30:ae:7b:e2:2e:94",
    "type": "cmd",
    "time": 1675216433,
    "from": "CLOUD",
    "deviceCode": "db4a7b00-08f4-49e3-9ace-ac59ce035737",
    "data": {
        "command": "setAttribute",
        "arguments": {
            "mac": "30:ae:7b:e2:2e:94",
            "value": {
                "index": 1,
                "buadrate": 9600
            },
            "attribute": "ins.r232.cfg",
            "ep": 1
        },
        "id": "9db9b842-3cc0-4d49-a24c-0bb98eb853ad\u000a"
    },
    "to": "INS"
}
```

Name	type	description

Name	type	description			
mac	string	gateway mac			
type	string	message type			
time	integer	timestamp			
from	string	message sender			
deviceCode	string	Identification code assigned by the platform			
data					
	command	string	command type		
	arguments				
		mac	string	gateway mac	
		value			
			index	integer	232 interface index : 1
			buadrate	integer	232 interface data : “AABBCC”
		attribute	string	message attribute	
		ep	integer	message sender endpoint	
	id	string	message uuid		
to	string	message receiver			

3.9 r232 data send

```
{
    "mac": "30:ae:7b:e2:2e:94",
    "type": "cmd",
    "time": 1675216494,
```

```
    "from": "CLOUD",
    "deviceCode": "db4a7b00-08f4-49e3-9ace-ac59ce035737",
    "data": {
        "command": "setAttribute",
        "arguments": {
            "mac": "30:ae:7b:e2:2e:94",
            "value": {
                "index": 1,
                "data": "AABB"
            },
            "attribute": "ins.r232.send",
            "ep": 1
        },
        "id": "49c4940e-8716-4d05-9bab-db6b835a627c\u000a"
    },
    "to": "INS"
}
```


Name	type	description			
mac	string	gateway mac			
type	string	message type			
time	integer	timestamp			
from	string	message sender			
deviceCode	string	Identification code assigned by the platform			
data					
	command	string	command type		
	arguments				
		mac	string	gateway mac	
		value			
			index	integer	232 interface index : 1
			data	string	232 interface data to send : “AABBCC”

Name	type	description			
		attribute	string	message attribute	
		ep	integer	message sender endpoint	
	id	string	message uuid		
to	string	message receiver			

3.10 r232 data report

When there's data from gateway are transferring toward outside, the report message is automatically sent uplink, you can receive and process it.

```
{
    "from": "INS",
    "to": "GATEWAY",
    "deviceCode": "0000",
    "mac": "96:65:f3:bd:dc:e6",
    "type": "reportAttribute",
    "time": 1675225524,
    "data": {
        "attribute": "ins.r232.data",
        "mac": "96:65:f3:bd:dc:e6",
        "value": {
            "index": 1,
            "data": "AABB"
        }
    }
}
```

Name	type	description
mac	string	gateway mac
type	string	message type
time	integer	timestamp
from	string	message sender

Name	type	description		
deviceCode	string	Identification code assigned by the platform		
data				
	mac	string	gateway mac	
	value			
		index	integer	232 interface index : 1
		data	integer	232 interface data report: "AABBCC"
	attribute	string	message attribute	
to	string	message receiver		

3.11 can configure

```
{
    "mac": "30:ae:7b:e2:2e:94",
    "type": "cmd",
    "time": 1675216433,
    "from": "CLOUD",
    "deviceCode": "db4a7b00-08f4-49e3-9ace-ac59ce035737",
    "data": {
        "command": "setAttribute",
        "arguments": {
            "mac": "30:ae:7b:e2:2e:94",
            "value": {
                "index": 0,
                "buadrate": 250000
            },
            "attribute": "ins.can.cfg",
            "ep": 1
        },
        "id": "9db9b842-3cc0-4d49-a24c-0bb98eb853ad\u000a"
    },
    "to": "INS"
```

```
}
```

Name	type	description			
mac	string	gateway mac			
type	string	message type			
time	integer	timestamp			
from	string	message sender			
deviceCode	string	Identification code assigned by the platform			
data					
	command	string	command type		
	arguments				
		mac	string	gateway mac	
		value			
			index	integer	can interface index : 0
			buadrate	integer	can interface data : “AABBCC”
		attribute	string	message attribute	
		ep	integer	message sender endpoint	
	id	string	message uuid		
to	string	message receiver			

3.12 can data send


```
{
    "mac": "30:ae:7b:e2:2e:94",
    "type": "cmd",
    "time": 1675216494,
    "from": "CLOUD",
    "deviceCode": "db4a7b00-08f4-49e3-9ace-ac59ce035737",
    "data": {
        "command": "setAttribute",
        "arguments": {
            "mac": "30:ae:7b:e2:2e:94",
            "value": {
                "index": 0,
                "data": "AABB",
                "can_id": "0001"
            },
            "attribute": "ins.can.send",
            "ep": 1
        },
        "id": "49c4940e-8716-4d05-9bab-db6b835a627c\u000a"
    },
    "to": "INS"
}
```


Name	type	description	
mac	string	gateway mac	
type	string	message type	
time	integer	timestamp	
from	string	message sender	
deviceCode	string	Identification code assigned by the platform	
data			
	command	string	command type

Name	type	description			
	arguments				
		mac	string	gateway mac	
		value			
			index	integer	can interface index : 0
			data	string	can interface data to send : “AABBCC”, max 8 bytes(16 chars)
			can_id	integer	can_id to send
		attribute	string	message attribute	
		ep	integer	message sender endpoint	
	id	string	message uuid		
to	string	message receiver			

3.13 can data report

When there’s data from gateway are transferring toward outside, the report message is automatically sent uplink, you can receive and process it.

```
{
    "from": "INS",
    "to": "GATEWAY",
    "deviceCode": "0000",
    "mac": "96:65:f3:bd:dc:e6",
    "type": "reportAttribute",
    "time": 1675225524,
```

```
    "data": {
        "attribute": "ins.can.data",
        "mac": "96:65:f3:bd:dc:e6",
        "value": {
            "index": 0,
            "data": "AABB"
        }
    }
}
```


Name	type	description		
mac	string	gateway mac		
type	string	message type		
time	integer	timestamp		
from	string	message sender		
deviceCode	string	Identification code assigned by the platform		
data				
	mac	string	gateway mac	
	value			
		index	integer	can interface index : 0
		data	integer	can interface data report: “AABBCC”
	attribute	string	message attribute	
to	string	message receiver		