

# Development Document

Document Name: DSGW-081  
SmartGateway SDK QuickStart

Revision History

Specification		Sect.	Update Description	By
Rev	Date			
1.0	2023-04-20		New version release	au

Approvals

Organization	Name	Title	Date

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## 1. Introduction

This Quick Start Guide explains the basics: - how to connect and set up your target on the network - how to install the SDK - how to modify and build the firmware images

The Linux Software Developer's Kit (SDK) is an embedded hardware and software suite that enables Linux developers to create applications on Dusun's DSGW-081 gateway.

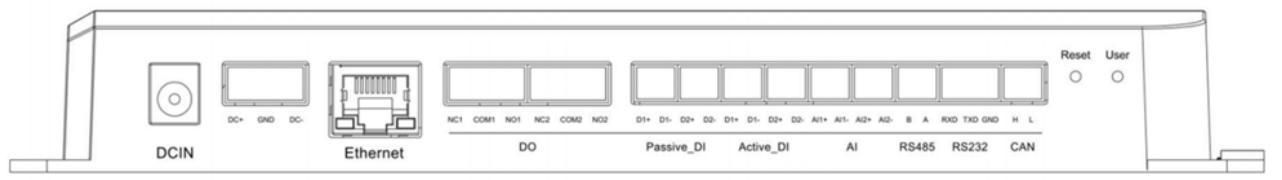
## 2. Gateway Information

This section describes the gateway's basic resource information and interfaces.

### 2.1 Basic information

- Processor: I.MX6UL (ARM32)
- Supply: DC-12V/2A
- RAM: DDR2 512M
- EMMC: 8G
- Ethernet: WAN RJ45/10M/100M
- Bluetooth: ERF32BG21
- Zigbee: EFR32MG1B232
- LTE: BG96/EG91/..
- 1 User Button
- 1 Can
- 1 RS232
- 1 RS485
- 2 Analog in
- 2 Active In
- 2 Passive in
- 2 Digital out

### 2.2 Interface



## 3. Debug Setup

This section describes how to connect the gateway into your host computer and network to debug for development.

### 3.1 Power

- Make sure that the power adapter is 12V/2A.
- Select the appropriate power plug adaptor for your geographical location. Insert it into the slot on the Universal Power Supply; then plug the power supply into an outlet.
- Connect the output plug of the power supply to the gateway

### 3.2 Wire Connect

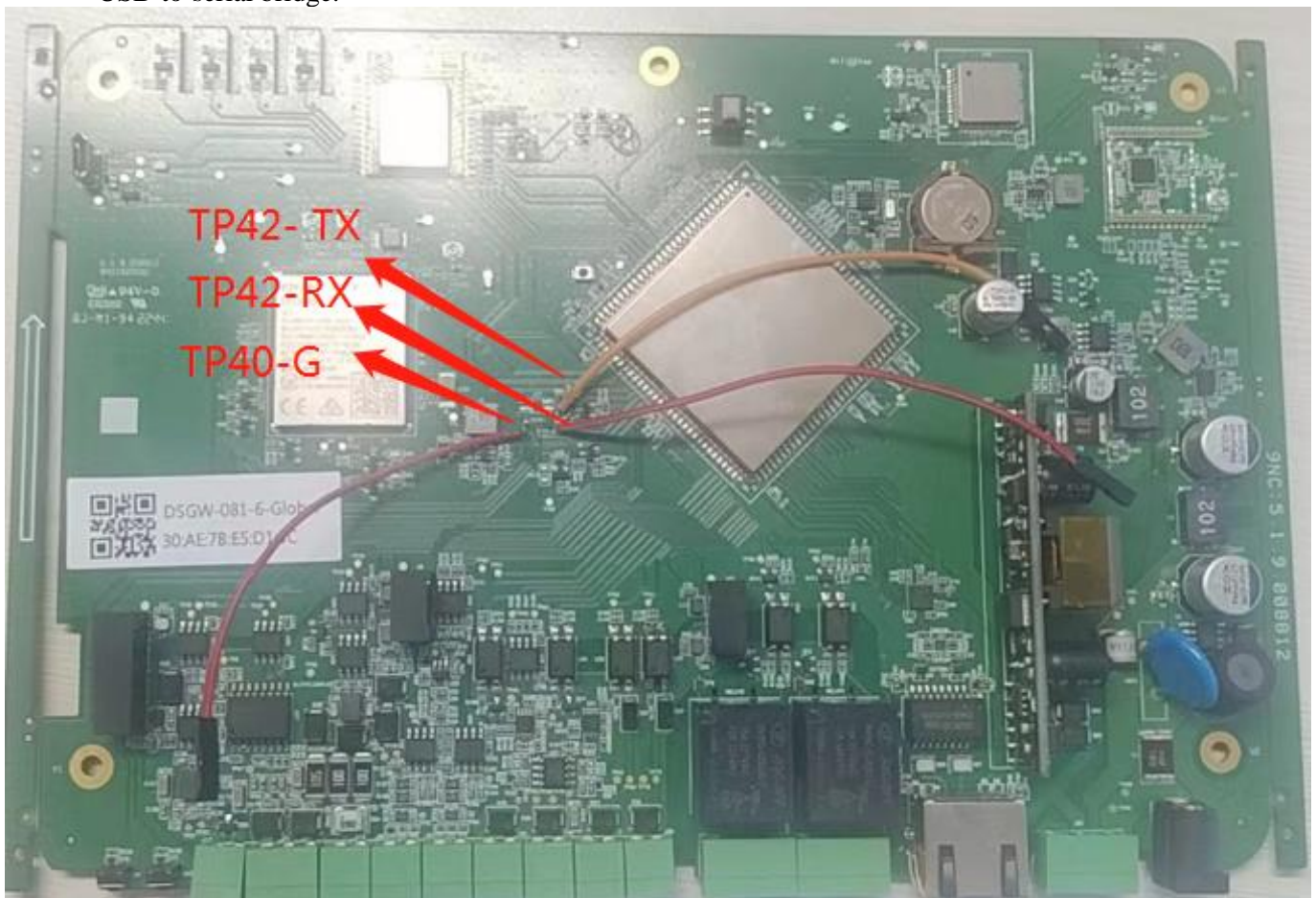
Connect gateway to a router for login



Figure3-1. Connecting a gateway via Ethernet port

### 3.3 Debug Uart Connect

- Before you set up your development test bed, please connect the PCB serial port to your develop PC via USB-to-serial bridge.



- PCB serial port on Gateway



USB-to-serial bridge. Serial port setting:

Baud rate: 115200

Bits: 8

Stop Bits: 1

Hardware flow control: None

## 4. SDK Download And Compile

This section describes how to download the sdk and compile it.

### 4.1 SDK Envirment Prepare

Compilation environment: Centos/Ubuntu Openwrt's compilation tool is automatically generated by SDK built, no additional installation is required

#### 4.1 SDK Download

Get the source code from Dusun FTP server uncompress it under your work directory. For example:

```
mkdir -p ~/workdir/dsgw081
```

```
tar zxvf DSGW-081_sdk_AV1.0.0.10.tar.gz -C /workdir/dsgw081
```

```
cd ~/workdir/dsgw081
```

#### 4.2 SDK Compile

```
cd ~/workdir/dsgw081
```

```
./build.sh
```

#### 4.2 SDK Output

- zImage is the Kernel
- imx6ull-14x14-emmc-4.3-480x272-c.dtb is the dtb file
- modules.tar.bz2 is kernel module file
- fs.img the root filesystem

```
total 11M
```

```
drwxrwxr-x 2 au au 4.0K Apr 11 16:59 .
```

```
drwxrwxr-x 27 au au 4.0K Apr 11 16:59 ..
```

```
-rw-rw-r-- 1 au au 34K Apr 11 16:59 DSGW-081.dtb
```

```
-rw-rw-r-- 1 au au 39K Apr 11 16:59 imx6ull-14x14-emmc-10.1-1280x800-c.dtb
```

```
-rw-rw-r-- 1 au au 39K Apr 11 16:59 imx6ull-14x14-emmc-4.3-480x272-c.dtb
```

```
-rw-rw-r-- 1 au au 39K Apr 11 16:59 imx6ull-14x14-emmc-4.3-800x480-c.dtb
```

```
-rw-rw-r-- 1 au au 39K Apr 11 16:59 imx6ull-14x14-emmc-7-1024x600-c.dtb
```

```
-rw-rw-r-- 1 au au 39K Apr 11 16:59 imx6ull-14x14-emmc-7-800x480-c.dtb
```

```
-rw-rw-r-- 1 au au 40K Apr 11 16:59 imx6ull-14x14-emmc-hdmi.dtb
```

```
-rw-rw-r-- 1 au au 40K Apr 11 16:59 imx6ull-14x14-emmc-vga.dtb
```

```
-rw-rw-r-- 1 au au 39K Apr 11 16:59 imx6ull-14x14-nand-10.1-1280x800-c.dtb
```

```
-rw-rw-r-- 1 au au 39K Apr 11 16:59 imx6ull-14x14-nand-4.3-480x272-c.dtb
```

```
-rw-rw-r-- 1 au au 39K Apr 11 16:59 imx6ull-14x14-nand-4.3-800x480-c.dtb
```

```
-rw-rw-r-- 1 au au 39K Apr 11 16:59 imx6ull-14x14-nand-7-1024x600-c.dtb
```

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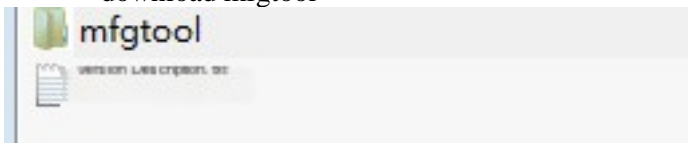
```
-rw-rw-r-- 1 au au 39K Apr 11 16:59 imx6ull-14x14-nand-7-800x480-c.dtb
-rw-rw-r-- 1 au au 40K Apr 11 16:59 imx6ull-14x14-nand-hdmi.dtb
-rw-rw-r-- 1 au au 40K Apr 11 16:59 imx6ull-14x14-nand-vga.dtb
-rw-rw-r-- 1 au au 2.8M Apr 11 16:59 modules.tar.bz2
-rwxrwxr-x 1 au au 7.7M Apr 11 16:59 zImage
total 4.8M
drwxrwxr-x 2 au au 4.0K Apr 11 17:00 .
drwxrwxr-x 23 au au 4.0K Apr 11 17:00 ..
-rwxrwxr-x 1 au au 369K Apr 11 17:00 u-boot-imx6ull-14x14-ddr256-emmc.bin
-rw-rw-r-- 1 au au 375K Apr 11 17:00 u-boot-imx6ull-14x14-ddr256-emmc.imx
-rwxrwxr-x 1 au au 418K Apr 11 17:00 u-boot-imx6ull-14x14-ddr256-nand.bin
-rw-rw-r-- 1 au au 423K Apr 11 17:00 u-boot-imx6ull-14x14-ddr256-nand.imx
-rwxrwxr-x 1 au au 421K Apr 11 16:59 u-boot-imx6ull-14x14-ddr256-nand-sd.bin
-rw-rw-r-- 1 au au 427K Apr 11 16:59 u-boot-imx6ull-14x14-ddr256-nand-sd.imx
-rwxrwxr-x 1 au au 369K Apr 11 17:00 u-boot-imx6ull-14x14-ddr512-emmc.bin
-rw-rw-r-- 1 au au 375K Apr 11 17:00 u-boot-imx6ull-14x14-ddr512-emmc.imx
-rwxrwxr-x 1 au au 418K Apr 11 17:00 u-boot-imx6ull-14x14-ddr512-nand.bin
-rw-rw-r-- 1 au au 423K Apr 11 17:00 u-boot-imx6ull-14x14-ddr512-nand.imx
-rwxrwxr-x 1 au au 421K Apr 11 17:00 u-boot-imx6ull-14x14-ddr512-nand-sd.bin
-rw-rw-r-- 1 au au 427K Apr 11 17:00 u-boot-imx6ull-14x14-ddr512-nand-sd.imx
```

## 5. Firmware Program And Program

### 5.1 Firmware Program

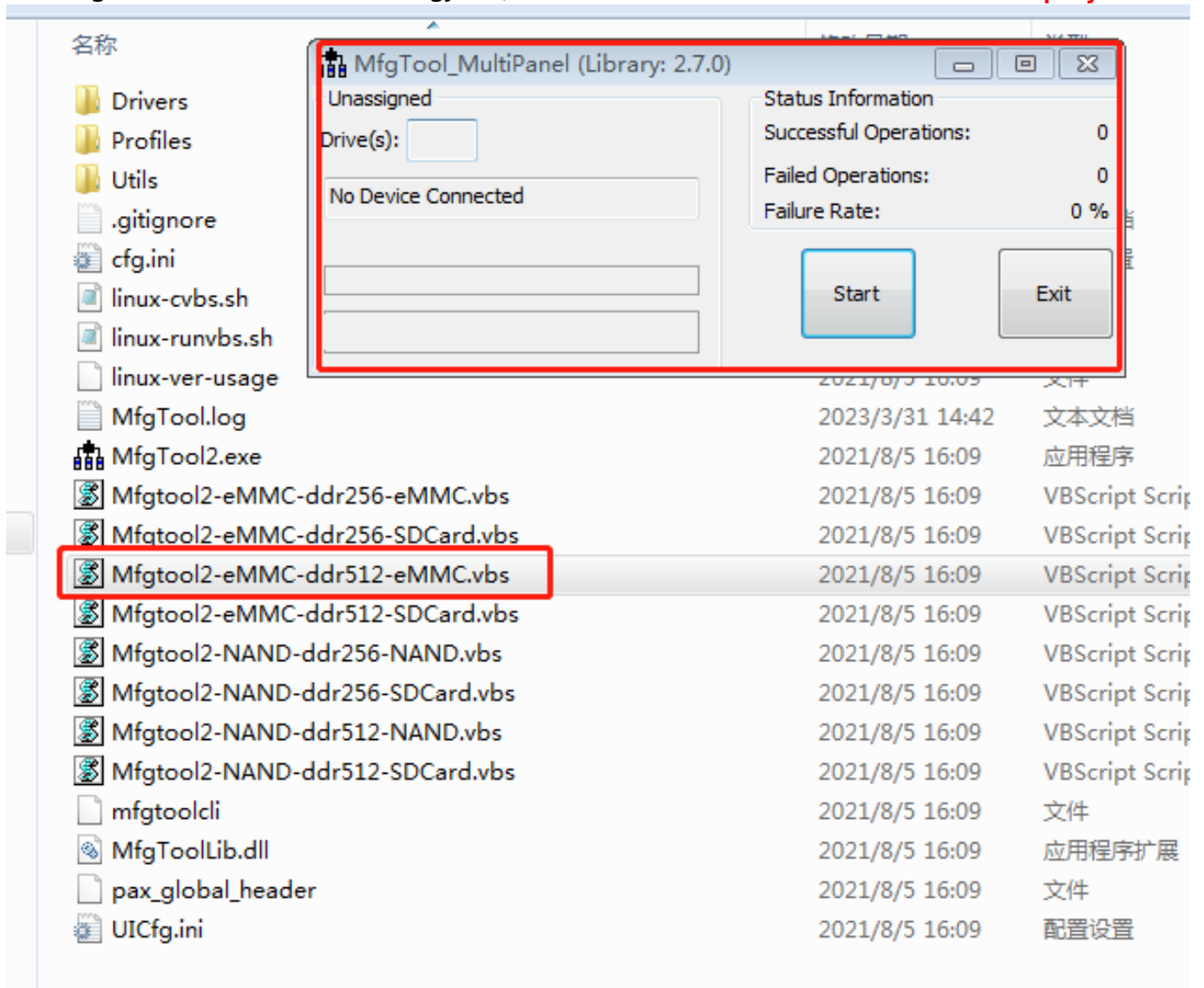
#### 5.1.1 USB OTG

- download mfgtool



- open mfgtool

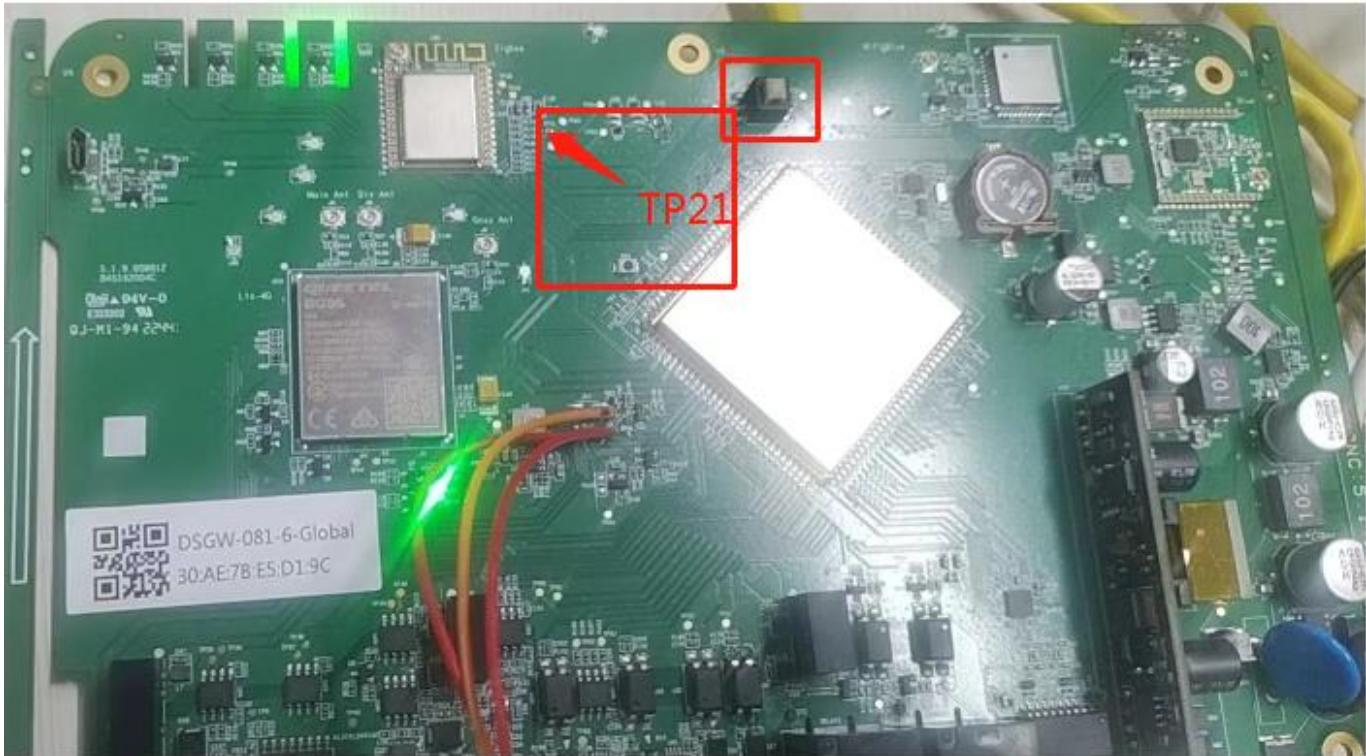




- switch to usb mode






















Press SW4 and ground TP21 at the same time, then power on or press the reset button to enter the burning mode







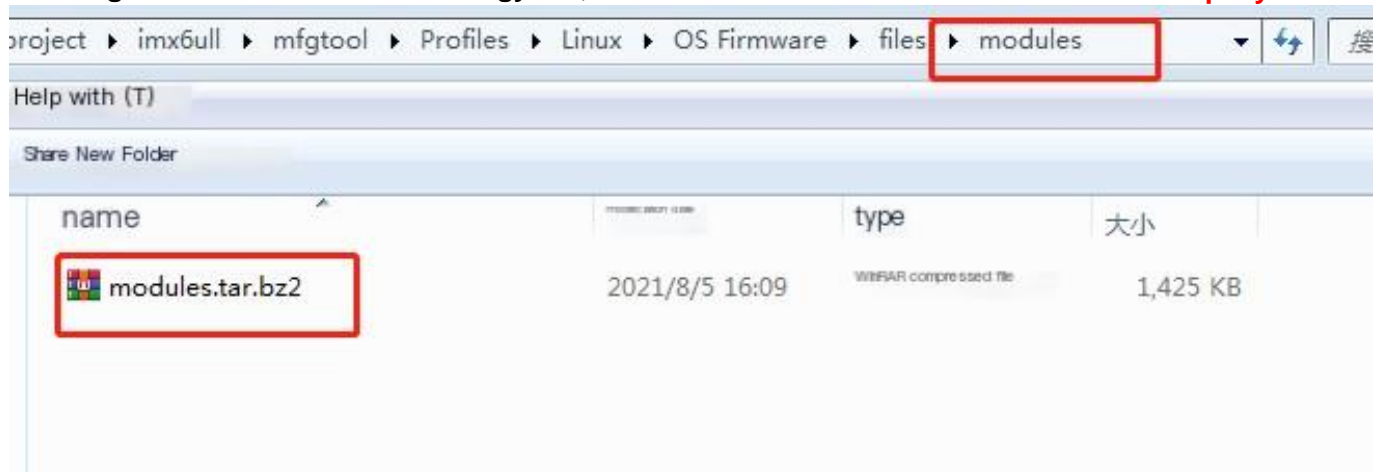


- update the program file

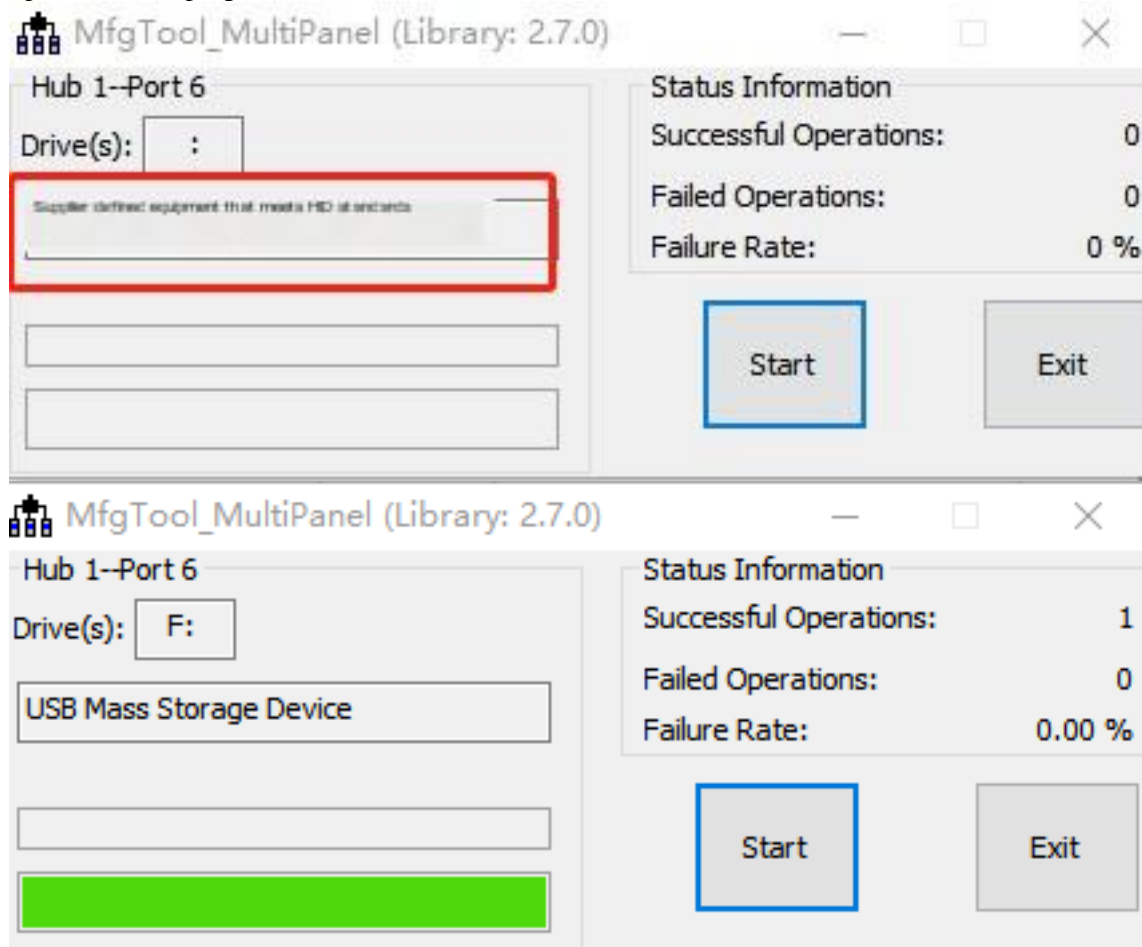
boot	2023/3/31 17:58	文
filesystem	2023/3/31 17:58	文
modules	2023/3/31 17:58	文
imx6mkemmcboot.sh	2021/8/5 16:09	SH
imx6mknandboot.sh	2021/8/5 16:09	SH
imx6mksdboot.sh	2021/8/5 16:09	SH
README.txt	2021/8/5 16:09	文

 imx6ull-14x14-emmc-4.3-480x272-c.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-emmc-4.3-800x480-c.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-emmc-7-800x480-c.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-emmc-7-1024x600-c.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-emmc-10.1-1280x800-c.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-emmc-hdmi.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-emmc-vga.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-nand-4.3-480x272-c.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-nand-4.3-800x480-c.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-nand-7-800x480-c.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-nand-7-1024x600-c.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-nand-10.1-1280x800-c.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-nand-hdmi.dtb	2021/8/5 16:09	DTB 文件
 imx6ull-14x14-nand-vga.dtb	2021/8/5 16:09	DTB 文件
 u-boot-imx6ull-14x14-ddr256-emmc.imx	2021/8/5 16:09	IMX 文件
 u-boot-imx6ull-14x14-ddr256-nand.imx	2021/8/5 16:09	IMX 文件
 u-boot-imx6ull-14x14-ddr256-nand-sd.imx	2021/8/5 16:09	IMX 文件
 u-boot-imx6ull-14x14-ddr512-emmc.imx	2021/8/5 16:09	IMX 文件
 u-boot-imx6ull-14x14-ddr512-nand.imx	2021/8/5 16:09	IMX 文件
 u-boot-imx6ull-14x14-ddr512-nand-sd.imx	2021/8/5 16:09	IMX 文件
 zImage	2021/8/5 16:09	文件

名称	修改日期	类型	大小
 fs.img	2023/3/8 19:37	光盘映像文件	205,872 KB
 fw.bin	2023/3/8 19:37	BIN 文件	205,872 KB
 rootfs.img	2022/12/8 18:20	光盘映像文件	23,016 KB
 rootfs.tar.bz2	2022/12/8 17:09	WinRAR 压缩文件	0 KB



- power on and program



- repower the board after programing

## 5.2 Firmware Upgrade

### 5.2.2 Uboot Web Upgrade

- Press and hold the 'user key' to power on, wait for 3 seconds to release, wait for about 20 seconds, and you can see the device DSGW081 hostname appearing on the router



- Login with root/root

ows 10 or later. This computer is using Windows 7.

**Dusun**  
东胜物联

Home

## Authorization Required

Please enter your username and password.

Username

root

Password

....

- Enter the upgrade page to upgrade

**Dusun**  
东胜物联

Home

Advance ▾

Logout

## Flash operation

Actions

Backup / Flash  
Firmware

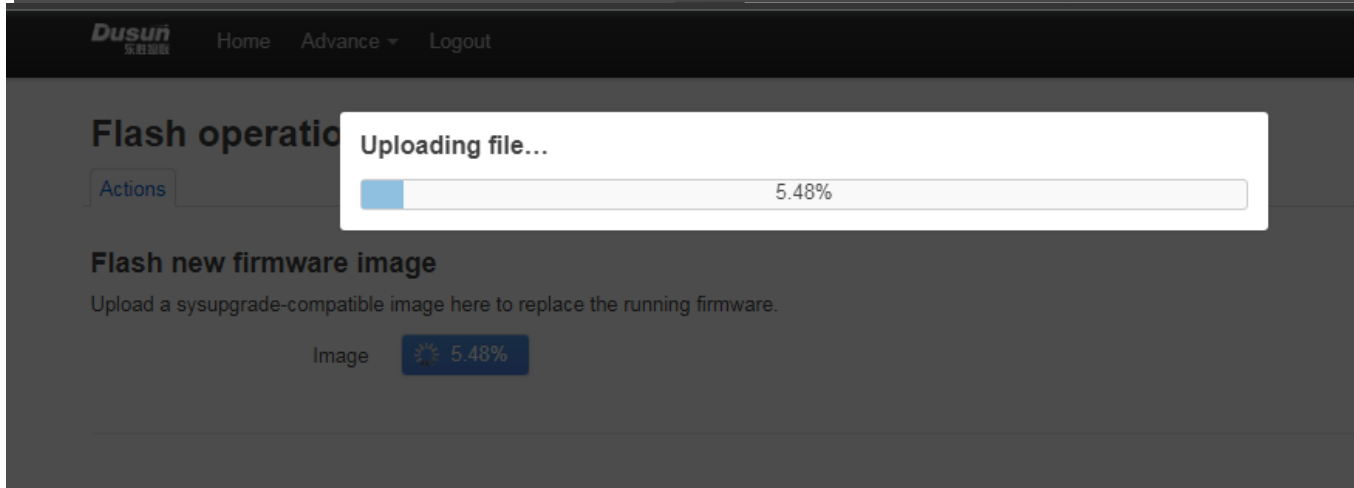
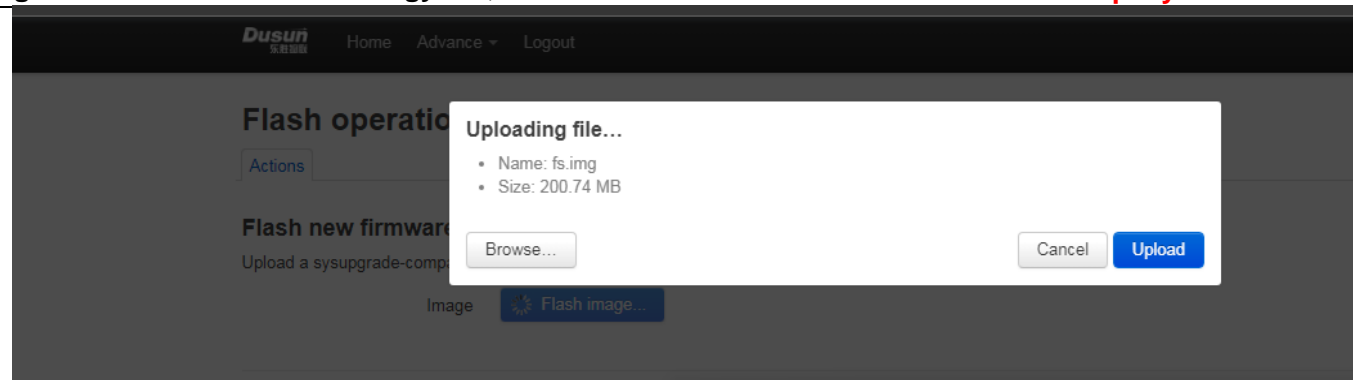
### Flash new firmware image

Upload a sysupgrade-compatible image here to replace the running firmware.

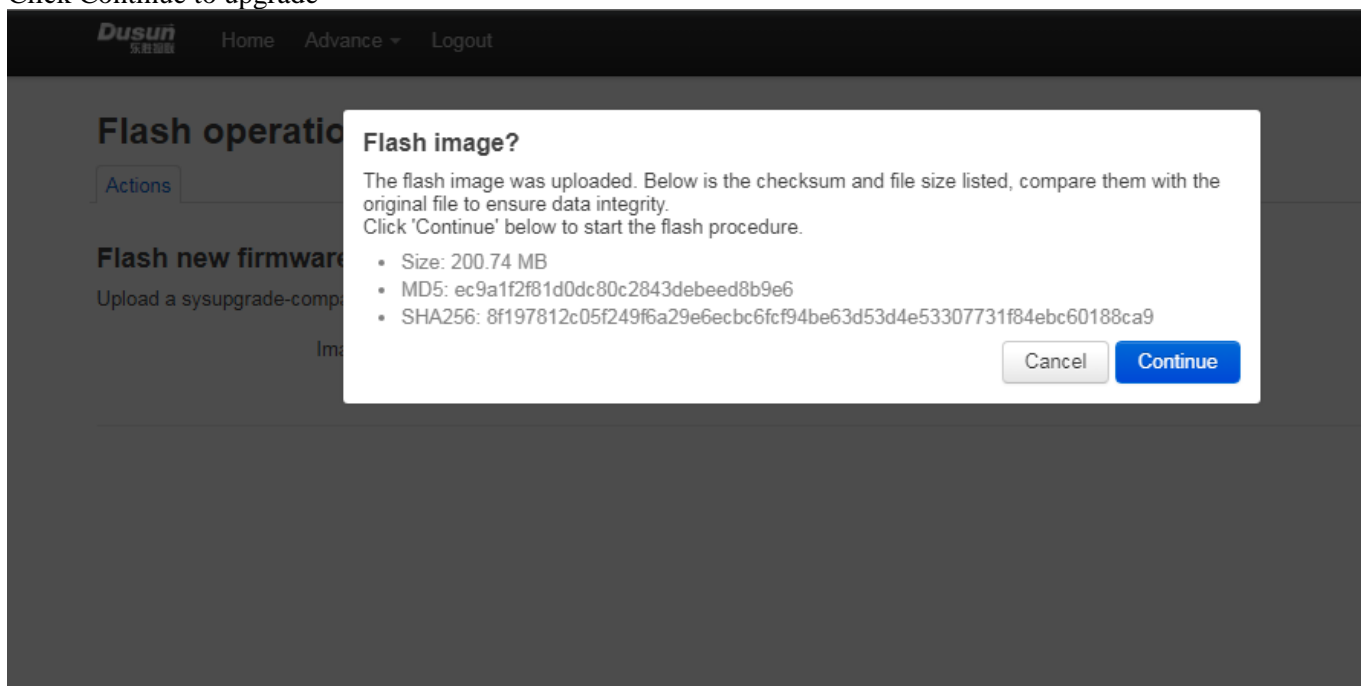
Image

Flash image...

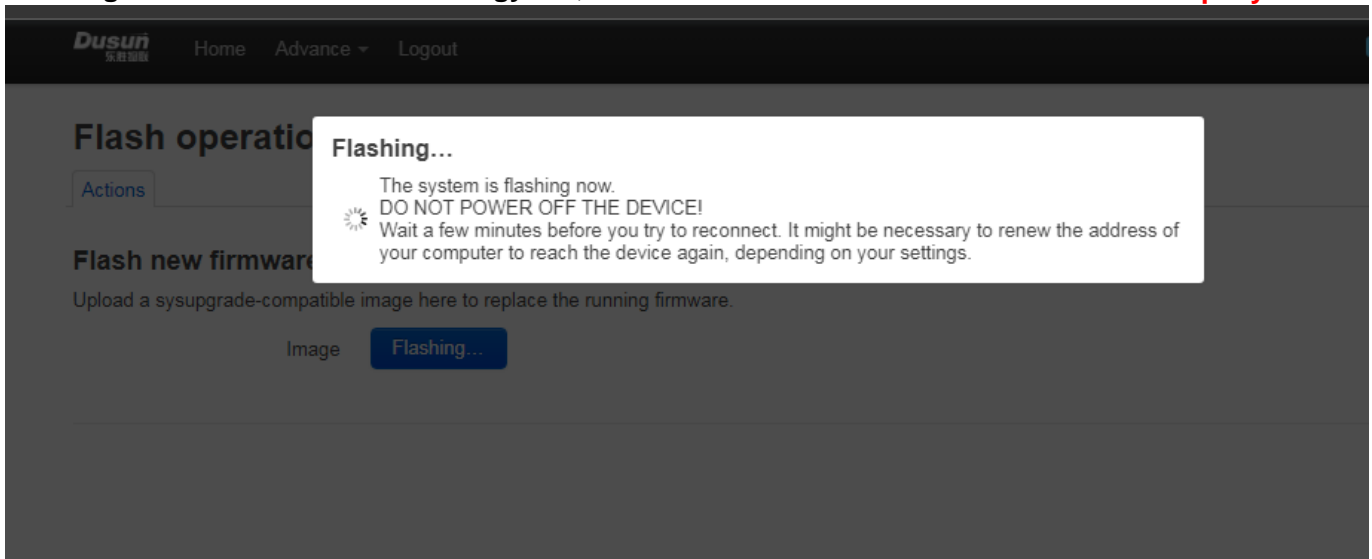
- Select the upgrade file and upload it



- Click Continue to upgrade



- Reminder not to power off and wait for the upgrade to complete (this page will not refresh after completion, so check it on the router yourself or watch the light indicator)



### 5.2.3 System Web Upgrade

- Browser input gateway IP address, account root, password root

Not secure | 192.168.100.103/cgi-bin/luci

DSGW-081 

## Authorization Required

Please enter your username and password.

Username

root

Password

\*\*\*\*

root

Login

Reset

- Enter Advance->Backup And Flash Firmware Menu

DSGW-081 **Dusun** 东胜物联 Status System Interfaces IOT Services Logout

## Flash operations

Actions

- System
- Administration
- Backup / Flash Firmware**
- Reboot

### Flash new firmware image

Upload a sysupgrade-compatible image here to replace the running firmware. Check "Keep settings" to retain the current compatible firmware image).

Keep settings:

☒

Image:

No file chosen

- Select fw.bin Upgrade the firmware for upgrading (fw.bin here is the upgraded firmware compiled earlier)



## Flash operations

Actions

### Flash new firmware image

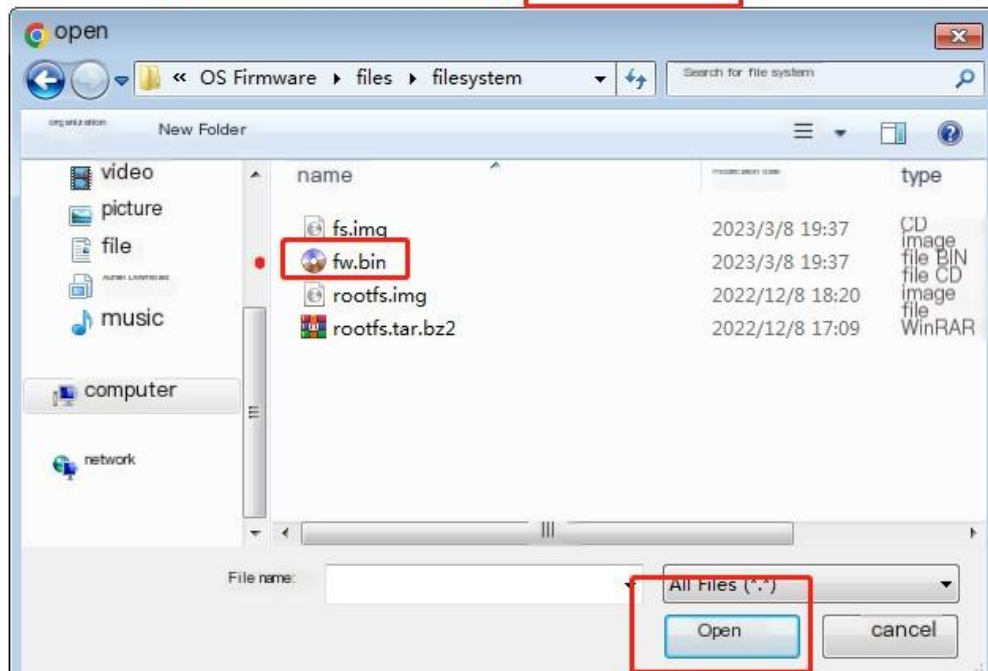
Upload a sysupgrade-compatible image here to replace the running firmware. Check "Keep settings" to retain the current configuration (compatible firmware image).

Keep settings:



Image:

No file chosen



### Flash Firmware - Verify

The flash image was uploaded. Below is the checksum and file size listed, compare them with the original file to ensure data integrity. Click "Proceed" below to start the flash procedure.

Checksum: 979bb4897be588867e1d387d0a75f#81

- Size: 201.05 MB
- Configuration files will be kept.

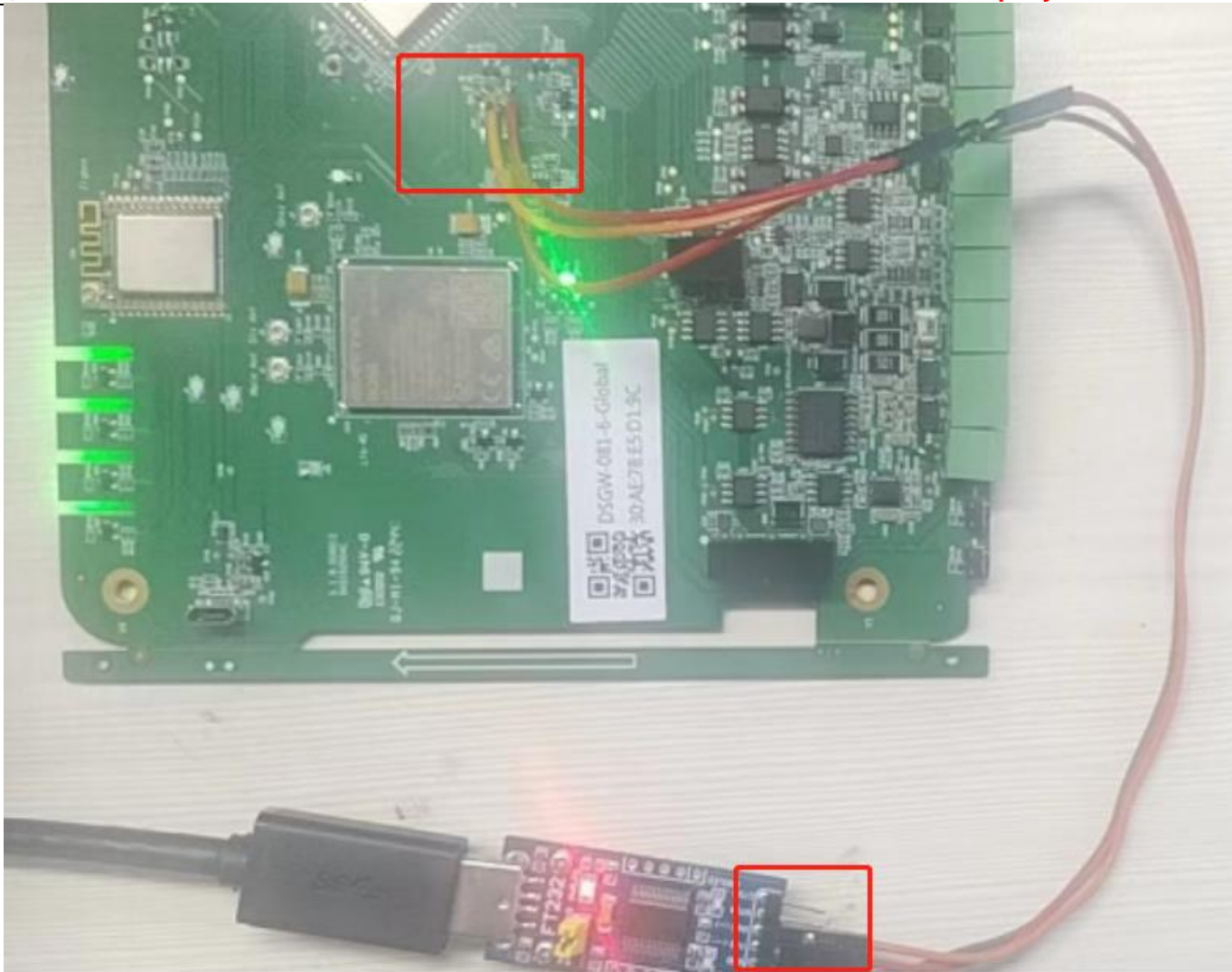
#### 5.2.4 System Command Upgrade

- use scp or winscp tool to put the fw.bin to the board's tmp
- ```
scp fw.bin root@192.168.xxx.xxx:/tmp/
```
- run sysupgrade command to upgrade the firmware
- ```
sysupgrade 0 /tmp/fw.bin
```

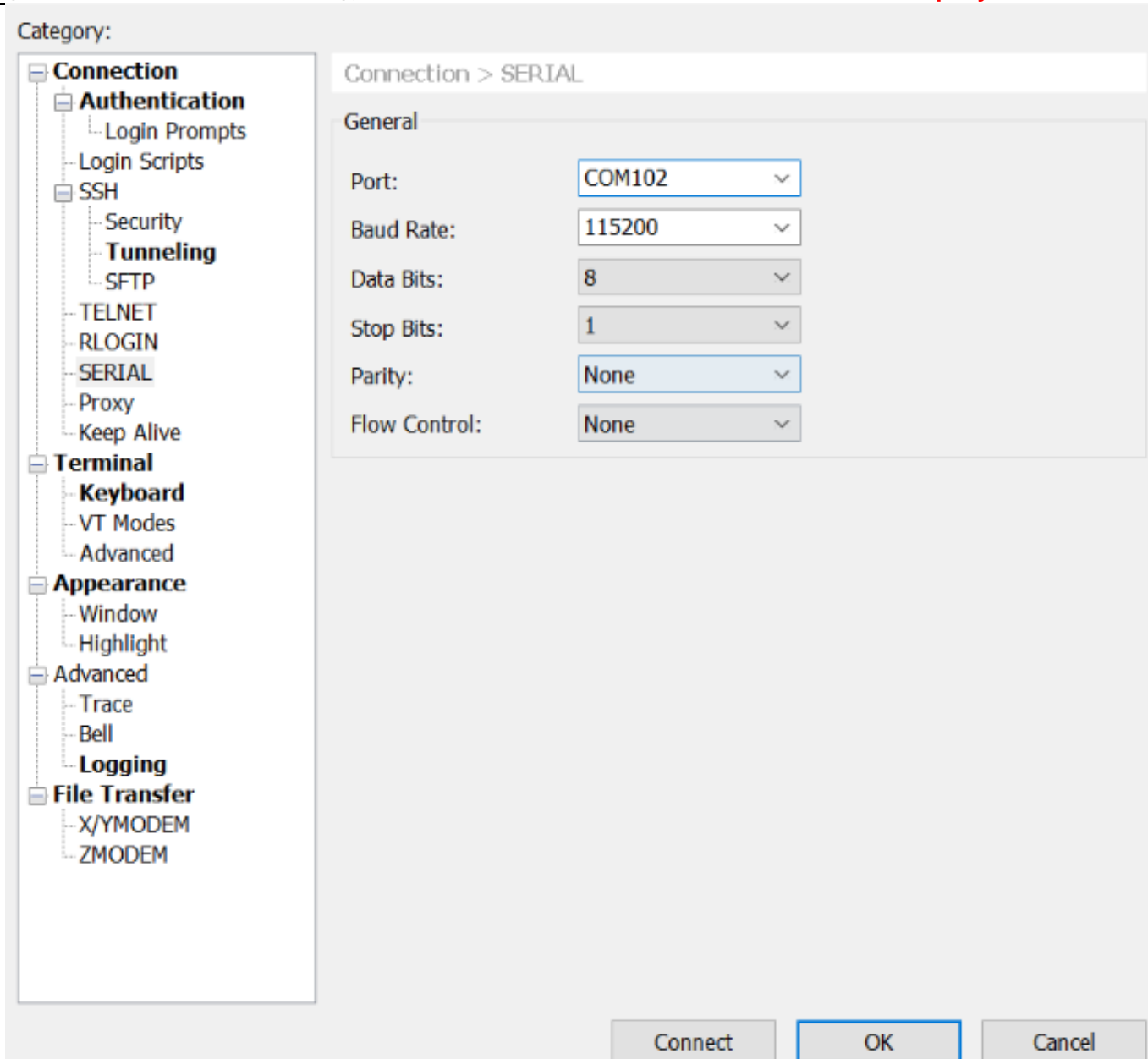
## 6 Gateway Login

### 6.1 Login Through Debug Uart

- connect uart serial tool to the board's debug uart port



- config the serial tools's uart config



- power on the gateway

U-Boot 2016.03 (Dec 08 2022 - 17:03:59 +0800)

CPU: Freescale i.MX6ULL rev1.1 792 MHz (running at 396 MHz)

CPU: Industrial temperature grade (-40C to 105C) at 46C

Reset cause: POR

Board: I.MX6U ALPHA|MINI

I2C: ready

DRAM: 512 MiB

force\_idle\_bus: sda=1 scl=0 sda.gp=0x1d scl.gp=0x1c

MMC: FSL\_SDHC: 0, FSL\_SDHC: 1

\*\*\* Warning - bad CRC, using default environment

Display: ATK-LCD-4.3-480x272 (480x272)

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Video: 480x272x24  
In: serial  
Out: serial  
Err: serial  
reading macaddr  
22 bytes read in 21 ms (1000 Bytes/s)  
mac : 30:ae:1b:1b:dd:63  
key value:1  
reading bootpart  
2 bytes read in 15 ms (0 Bytes/s)  
mem is 0xE5940A33  
p: 3  
switch to partitions #0, OK  
mmc1(part 0) is current device  
Net: Board Net Initialization Failed  
No ethernet found.  
Normal Boot  
Hit any key to stop autoboot: 0  
switch to partitions #0, OK  
mmc1(part 0) is current device  
switch to partitions #0, OK  
mmc1(part 0) is current device  
reading boot.scr  
\*\* Unable to read file boot.scr \*\*  
reading zImage  
7998896 bytes read in 256 ms (29.8 MiB/s)  
Booting from mmc ...  
reading imx6ull-14x14-emmc-4.3-480x272-c.dtb  
34329 bytes read in 18 ms (1.8 MiB/s)  
Kernel image @ 0x80800000 [ 0x000000 - 0x7a0db0 ]  
## Flattened Device Tree blob at 83000000  
Booting using the fdt blob at 0x83000000  
Using Device Tree in place at 83000000, end 8300b618

Starting kernel ...

...

DSGW-081 login:

- input user(root), passwor(root) to login

DSGW-081 login: root

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: Tue Apr 11 05:31:02 UTC 2023 on ttyMXC0

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## 6.2 Login Through Network(SSH)

- config the ssh connection parameters

Category:

- Connection
- Authentication
  - Login Prompts
  - Login Scripts
- SSH
  - Security
  - Tunneling
  - SFTP
- TELNET
- RLOGIN
- SERIAL
- Proxy
- Keep Alive

Terminal

Appearance

Advanced

File Transfer

Connection

General

Name: 192.168.100.100

Protocol: SSH

Host: 192.168.100.100

Port Number: 22

Description: user: root  
passwd: root

Reconnect

☐ Reconnect automatically if connection is terminated unexpectedly

Interval: 0 sec Limit: 0 min

TCP Options

☐ Use Nagle's algorithm

Internet Protocol Version

☒ Auto ☐ IPv4 ☐ IPv6

Connect OK Cancel

- connect success

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: Tue Apr 11 05:34:09 2023

root@DSGW-081:~#

## 7. Easy Function Test Script

- download the test script

```
rm -rf /tmp/tools/;wget http://114.215.195.44:8080/au/gwtest/DSGW-081.tar.gz -O /tmp/x; tar xvf /tmp/x -C /;
```

- run the test script

```
root@DSGW-081:~# /tmp/tools/test.sh
```

```
Stopping done (via systemctl): done.serviceStopping dial (via systemctl): dial.serviceStopping amber (via systemctl): amber.service.
```

```
=====
```

```
Testing [ version]..., please wait...
```

```
BUILD_VERSION="V1.0.0.10_zZBBE"
```

```
BUILD_TIME="Fri Feb 24 20:05:38 CST 2023"
```

```
BUILD_USER="root"
```

```
BUILD_HOST="git.roombanker.cn"
```

```
Test Result : OK
```

```
=====
```

```
Testing [ wan]..., please wait...
```

```
Test Result : OK
```

```
=====
```

```
Testing [ led]..., please wait...
```

```
Test Result : OK
```

```
=====
```

```
Testing [ rtc]..., please wait...
```

```
Wed Jan 1 00:00:00 UTC 2003
```

```
2003-01-01 00:00:03.050919+00:00
```

```
Tue Apr 11 05:38:00 UTC 2023
```

```
2003
```

```
Test Result : OK
```

```
=====
```

```
Testing [ dout_1]..., please wait...
```

```
Test Result : OK
```

```
=====
```

```
Testing [ dout_2]..., please wait...
```

```
Test Result : OK
```

```
=====
```

```
Testing [din_passtive_1]..., please wait...
```

```
please shortcut the passtive input 1!
```

```
Test Result : OK
```

```
=====
```

```
Testing [din_passtive_2]..., please wait...
```

```
please shortcut the passtive input 2!
```

```
Test Result : OK
```

```
=====
```

```
Testing [din_active_1]..., please wait...
```

```
0 V
```

```
Test Result : OK
```

```
=====
```

```
Testing [din_active_2]..., please wait...
```

```
0 V
```

```
Test Result : OK
```

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=====

Testing [ ain\_1]..., please wait...

1

Test Result : OK

=====

Testing [ ain\_2]..., please wait...

5

Test Result : OK

=====

Testing [ r485]..., please wait...

please short circuit 485 tx & rx..

Test Result : OK

=====

Testing [ r232]..., please wait...

please short circuit 232 uart tx & rx..

Test Result : OK

=====

Testing [ can]..., please wait...

Test Result : OK

=====

Testing [ btn]..., please wait...

please press the hold key!

Test Result : OK

=====

Testing [ zigbee]..., please wait...

power on zigbee..

/dev/ttymxc1

ezsp ver 0x06 stack type 0x02

Test Result : OK

=====

Testing [ ble]..., please wait...

power on ble..

/dev/ttymxc2

Test Result : OK

=====

Testing [ wifi24]..., please wait...

Test Result : OK

=====

Testing [ lte]..., please wait...

power on lte..

/dev/ttyUSB2

APP RDY

AT+QGMR

BG96MAR02A07M1G\_01.016.01.016

OK



AT+CPIN?

+CME ERROR: 10

AT+QCCID

+CME ERROR: 13

AT+CSQ

+CSQ: 99,99

OK

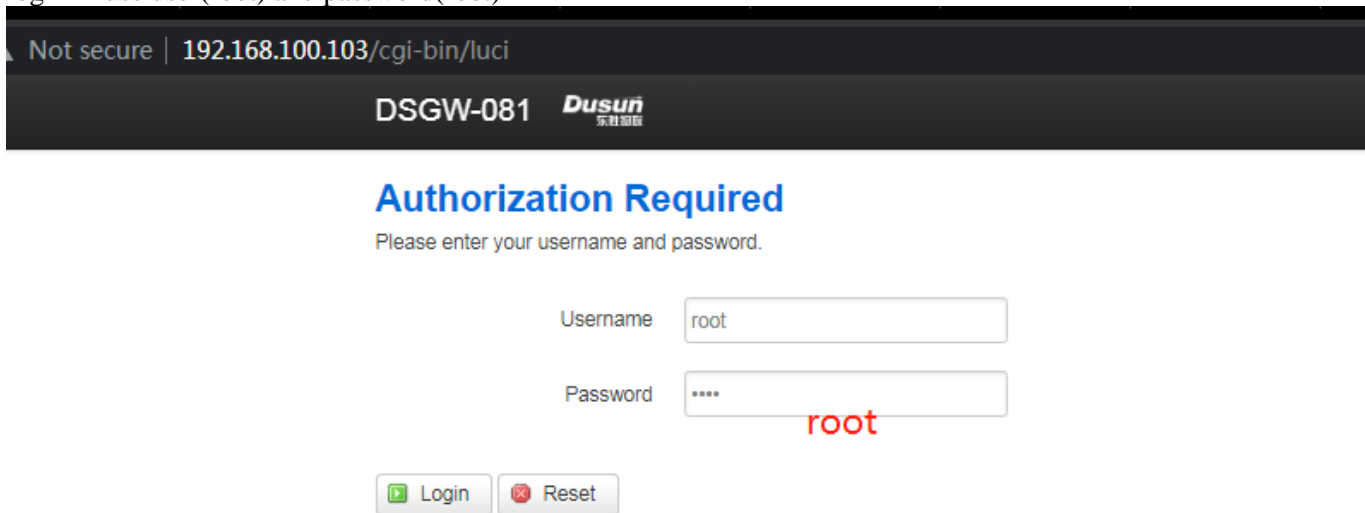
Test Result : OK

Testing [ hcible]..., please wait...

Test Result : OK

## 8. Luci Web Function Description

- login in use user(root) and password(root)



Not secure | 192.168.100.103/cgi-bin/luci

DSGW-081 **Dusun**

### Authorization Required

Please enter your username and password.

Username

Password

- Home Page

Status

System

Hostname	DSGW-081
Model	IMX6ULL
Firmware Version	V1.0.0.10_zZBBE SDK / LuCI (SVN)
Kernel Version	4.1.15-g3c91580-dirty
Local Time	Tue Apr 11 06:44:07 2023
Uptime	792
Load Average	3.10693359375

Memory

Total Available	504296
Free	58696
Cached	317008
Buffered	52820

- Wan Setting Page

## Wan Network Manage

This is configure for gateway Wan Config

WAN Setting

WiFi Setting

Ip address Get Type	<div>DHCP ▾</div>
Static Ip Address	<div>192.168.10.102</div>
Static Netmask	<div>255.255.255.0</div>
Static Gateway	<div>192.168.10.1</div>
Static Dns	<div>192.168.10.1 8.8.8.8</div>

Wifi Setting Page

## Wifi Manage

This is configure for wifi Ap/Sta.

WAN Setting

WiFi Setting

### Wifi Interface Wlan0

Enabled	<div>enable ▾</div>
Wifi Mode	<div>sta ▾</div>
Wireless SSID	<div>AAAAAA ▾</div>
Wifi Key	<div>dl123456</div>

Cloud Mqtt Config Page

DSGW-081

Dusun

Status

System

Interfaces

IOT Services

Logout

Mqtt Config

TuYa Config

Azure Config

AWS Config

Cloud Config

Bluetooth

Zigbee

LTE

Industry

ThingsBoard Config

Http Config

Utp Config

Cloud Connection Manage

This is configure for gateway cloud connect

Connect Server & Port

Mqtt Server

cld0.roombanker.cn

Mqtt Server Port

3100

Mqtt Login ClientId

30:ae:1b:1b:dd:63

Mqtt Login User

30:ae:1b:1b:dd:63-00000001

Mqtt Login Password

30:ae:1b:1b:dd:63-00000001

Mqtt HeartBeat

60

Mqtt Sub Topic

Mqtt Pub Topic

Qos

0

Retain

0

SSL Option

no ssl

Certifacte

Choose File

No file chosen

Private key

Choose File

No file chosen

Root Ca

Choose File

No file chosen

- Cloud Azure Config Page

DSGW-081

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Status ▾

System ▾

Interfaces ▾

IOT Services ▾

Logout

[Mqtt Config](#)[TuYa Config](#)[Azure Config](#)[AWS Config](#)[Udp Config](#)[Tcp Config](#)[Http Config](#)[Utp Config](#)[ThingsBoard Config](#)

## Azure Manage

This is configure for Azure Connect String

### Azure Config

AzureConnectionString

[Save & Apply](#)[Save](#)

- Cloud Aws Mqtt Config Page

[Mqtt Config](#)[TuYa Config](#)[Azure Config](#)[AWS Config](#)[Udp Config](#)[Tcp Config](#)[Http Config](#)[Utp Config](#)[ThingsBoard Config](#)

## AWS Manage

This is configure for aws config

### AWS Config

AWS Server

AWS Port

AWS ClientId

AWS Root Ca

[Choose File](#) No file chosen

AWS Cert

[Choose File](#) No file chosen

AWS Private Key

[Choose File](#) No file chosen

AWS Subscribe Topic

AWS Publish Topic

[Save & Apply](#)[Save](#)

- Things Board page

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Dusun

Status

System

Interfaces

IOT Services

Logout

Mqtt Config

TuYa Config

Azure Config

AWS Config

Udp Config

Tcp Config

Http Config

Utp Config

ThingsBoard Config

### ThingsBoard Cloud Configuration

This is configuration for thingsboard cloud connection.

ThingsBoard Config

ThingsBoard Server

Server Port

Access Token

Bluetooth

DSGW-081

Dusun

Status

System

Interfaces

IOT Services

Logout

Cloud Config

Bluetooth

Zigbee

LTE

Industry

Report Setting:

Data Type: Format Data

Scan Type: 1M and Co

Port Interval: 60

Config

Filter Setting:

Rssi: -101

Device mac: mac

Model String: modelstr

Raw Data: rawdata

Dev Name: name

Config

### Bluetooth devices

DeviceType	Address	Rssi	AddrType	ScanTime	Major	Minor	txPower	UUID	URL	SensorValues	Name	Connect
Bledevice	49:80:B7:21:7B:15	-79	1	1681195832								-
Bledevice	CE:49:21:B4:87:BF	-79	1	1681195830								-
Bledevice	D9:1A:A4:F8:41:74	-84	1	1681195831								-
Bledevice	51:C0:C3:22:90:B5	-87	1	1681195777			8					Connect
Bledevice	7D:56:C8:23:62:3A	-86	1	1681195831			8					Connect
Bledevice	17:6D:2E:0C:5C:E3	-70	1	1681195923								

Zigbee

DSGW-081

Dusun

Status

System

Interfaces

IOT Services

Logout

Zigbee3.0 Operation Page

This Page Can Add Zigbee3.0 Device.

Zigbee Permit

Permit: 

Permit

Add Device

Cloud Config

Bluetooth

Zigbee

LTE

Industry

Zigbee Device List

MAC Address	Signal Quality	Dusun Type	Dusun Sub Type	SoftVersion	Dusun Model	ModelString	Battery	Online	value	Remove
This section contains no values yet										

• LTE

DSGW-081

Dusun

Status

System

Interfaces

IOT Services

Logout

4G/3G Manage

This is configure for 4G/3G Arguments

4G/3G Config

Apn

em

Username

111

Password

1122

Cloud Config

Bluetooth

Zigbee

LTE

Industry

Save & Apply

Save

Reset

• System Setting Page



DSGW-081

Dusun

Status

System

Interfaces

IOT Services

Logout

AUTO REFRESH ON

System

Here you can configure the basic aspects of y or the timezone.

System Properties

General settings

Language and Style

Local Time

Tue Apr 11 06:53:22 2023

Sync with browser

Hostname

DSGW081

Timezone

UTC

Save & Apply

Save

Reset

System Administrator Setting page

DSGW-081

Dusun

Status

System

Interfaces

IOT Services

Logout

Router Password

Changes the administrator password for accessing the device

Password

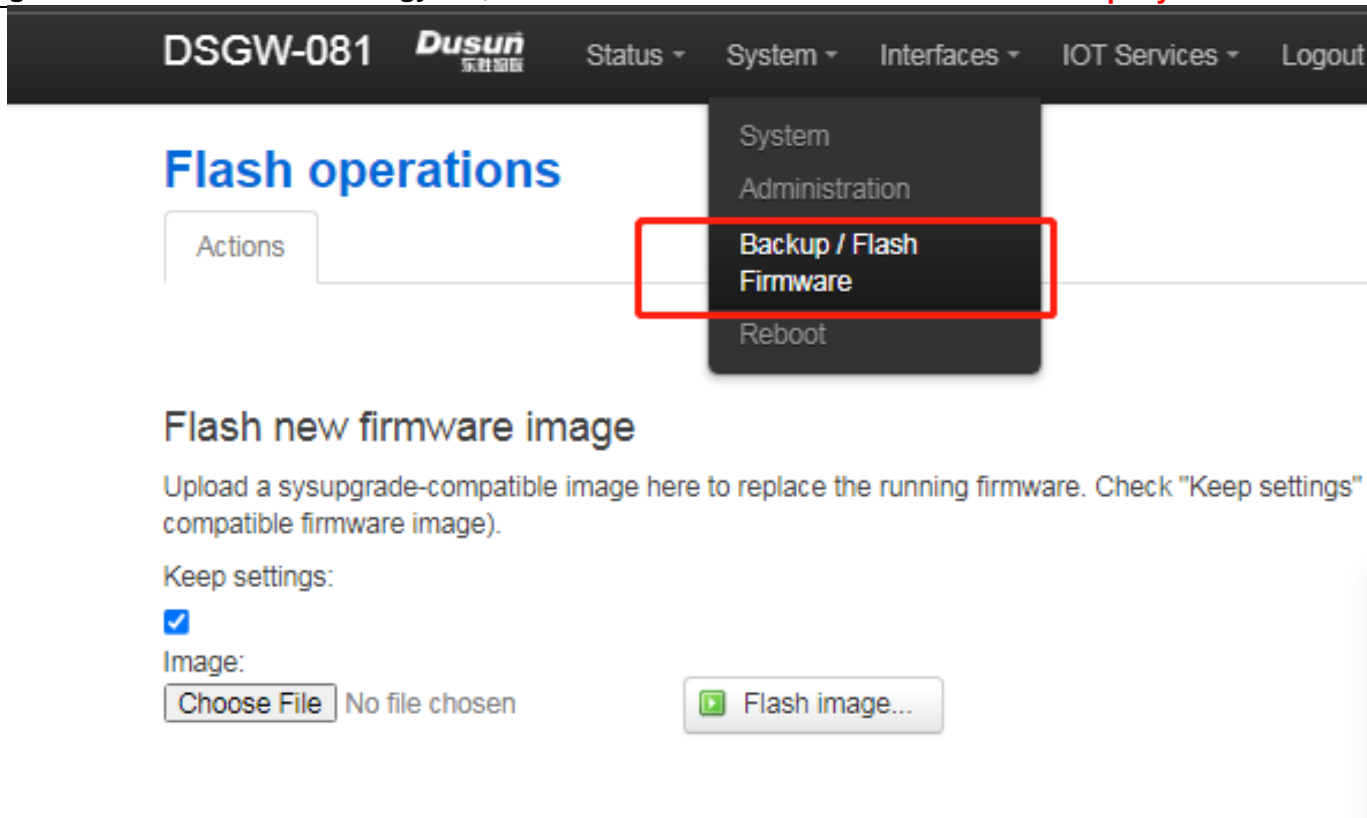
Confirmation

Save & Apply

Save

Reset

System Upgrade Page



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Status ▾ System ▾ Interfaces ▾ IOT Services ▾ Logout

## Flash operations

Actions

- System
- Administration
- Backup / Flash Firmware**
- Reboot

### Flash new firmware image

Upload a sysupgrade-compatible image here to replace the running firmware. Check "Keep settings" (compatible firmware image).

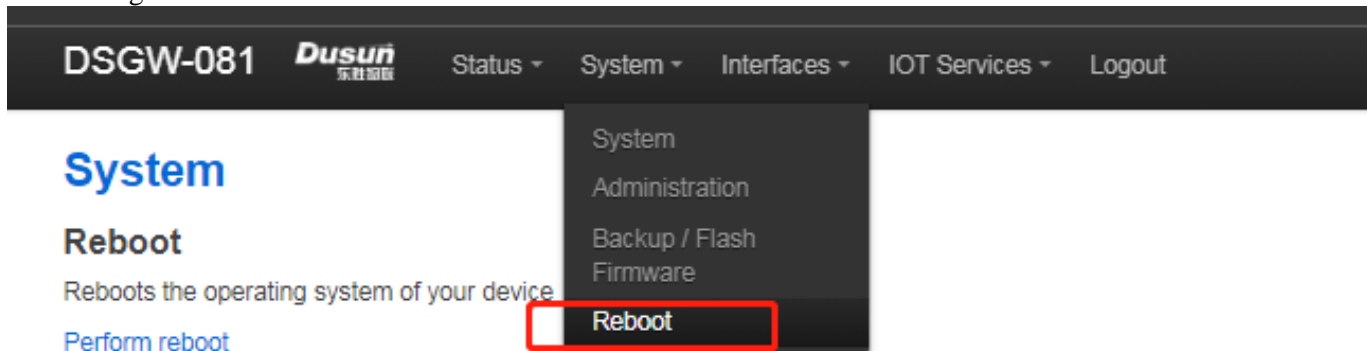
Keep settings:

☒

Image:

No file chosen

- Reboot Page



DSGW-081 **Dusun** 东胜物联

Status ▾ System ▾ Interfaces ▾ IOT Services ▾ Logout

## System

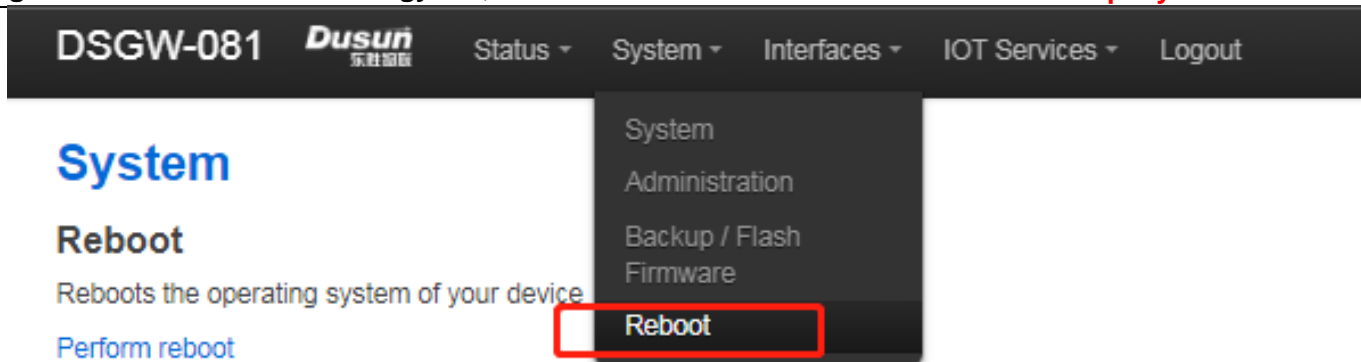
### Reboot

Reboots the operating system of your device

[Perform reboot](#)

- System
- Administration
- Backup / Flash Firmware
- Reboot**

- Logout Page



## # 9. Application Layer Development

### 9.1 Led

This board has three leds can be controlled by software, they are pwrled, zigbee, errled, led4

- 9.1 on led

```
echo none > /sys/class/led/pwrled/trigger
```

```
echo 1 > /sys/class/led/pwrled/brightness
```

- 9.2 off led

```
echo none > /sys/class/led/pwrled/trigger
```

```
echo 0 > /sys/class/led/pwrled/brightness
```

- 9.3 blink led

```
echo timer > /sys/class/led/pwrled/trigger
```

```
echo 500 > /sys/class/led/pwrled/delay_on
```

```
echo 500 > /sys/class/led/pwrled/delay_off
```

### 9.2 Button

This board has one button can used by software, when pressed, the system will auto call the button script in the /etc/rc.button/BTN1

here are two incomming parameters

- SEEN: this is the time, unit seconds
- ACTION: this is the action, it will we pressed or release

see the example has one function in the button script - firts is the long pressed 3 seconds open zigbee pair.

```
root@DSGW-081:~# cat /etc/rc.button/BTN_1
```

```
#!/bin/sh
```

```
#. /lib/functions.sh
```

```
#. /lib/functions/leds.sh
```

```
if [ "${ACTION}" = "pressed" ]; then
```

```
    touch /tmp/BTN_0_pressed
```

```
    touch /tmp/btn1
```

```
else
```

```
    rm -f /tmp/BTN_0_pressed
```

```
fi
```

```
if [ -f /tmp/dusun_upgrade ] ; then
```

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```

exit 0
fi

[ ! "${ACTION}" = "released" ] && {
    exit 0
}

led_off() {
    echo none > /sys/class/leds/$1/trigger
    echo 0 > /sys/class/leds/$1/brightness
}

led_timer() {
    echo timer > /sys/class/leds/$1/trigger
    echo $2 > /sys/class/leds/$1/delay_on
    echo $3 > /sys/class/leds/$1/delay_off
}

[ "$SEEN" -ge 3 ] && {
    logger "Zigbee pairing"
    ubus send DS.GREENPOWER '{"cmd": "start_comission"}'

    logger "$BUTTON pressed for $SEEN seconds : Permit Join For Zigbee3.0/ZWave"
    /usr/bin/alink_ucmd.sh permit 1
    /usr/bin/dusun_ucmd.sh permit 1
    exit 0
}

```

### 9.3 Ethernet

this gateway has two ethernet port - wan port eth1  
 see the config  
 root@DSGW-081:~# cat /etc/network/interfaces  
 # interfaces(5) file used by ifup(8) and ifdown(8)  
 # Include files from /etc/network/interfaces.d:  
 source /etc/network/interfaces.d/\*  
 auto eth1  
 iface eth1 inet dhcp

```

auto wlan0
iface wlan0 inet dhcp
    wpa-conf /etc/wpa_supplicant.conf
    metric 1

```

### 9.4 wifi

This gateway only have one 2.4 radio(rtl8821cs), when startup, it will auto start as sta mode.  
 see the config:

```

root@DSGW-081:~# cat /etc/network/interfaces
...
auto wlan0

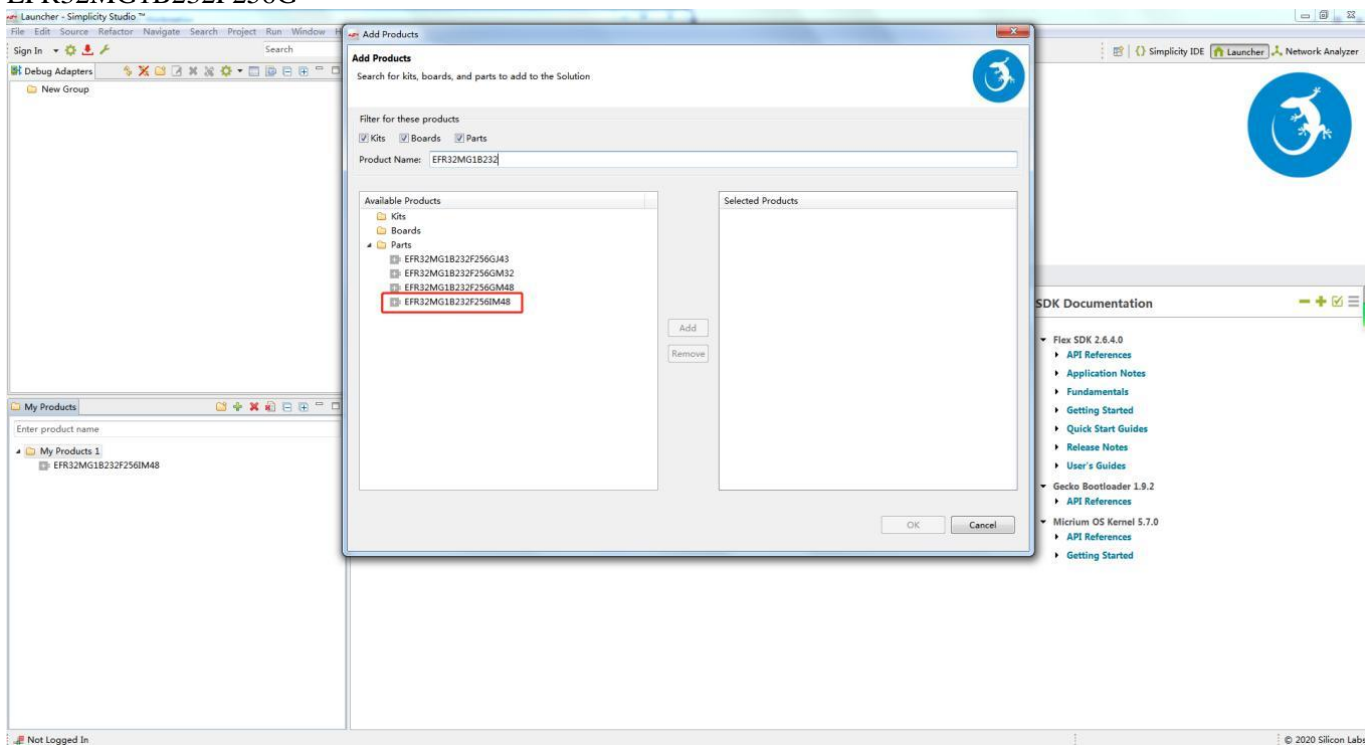
```

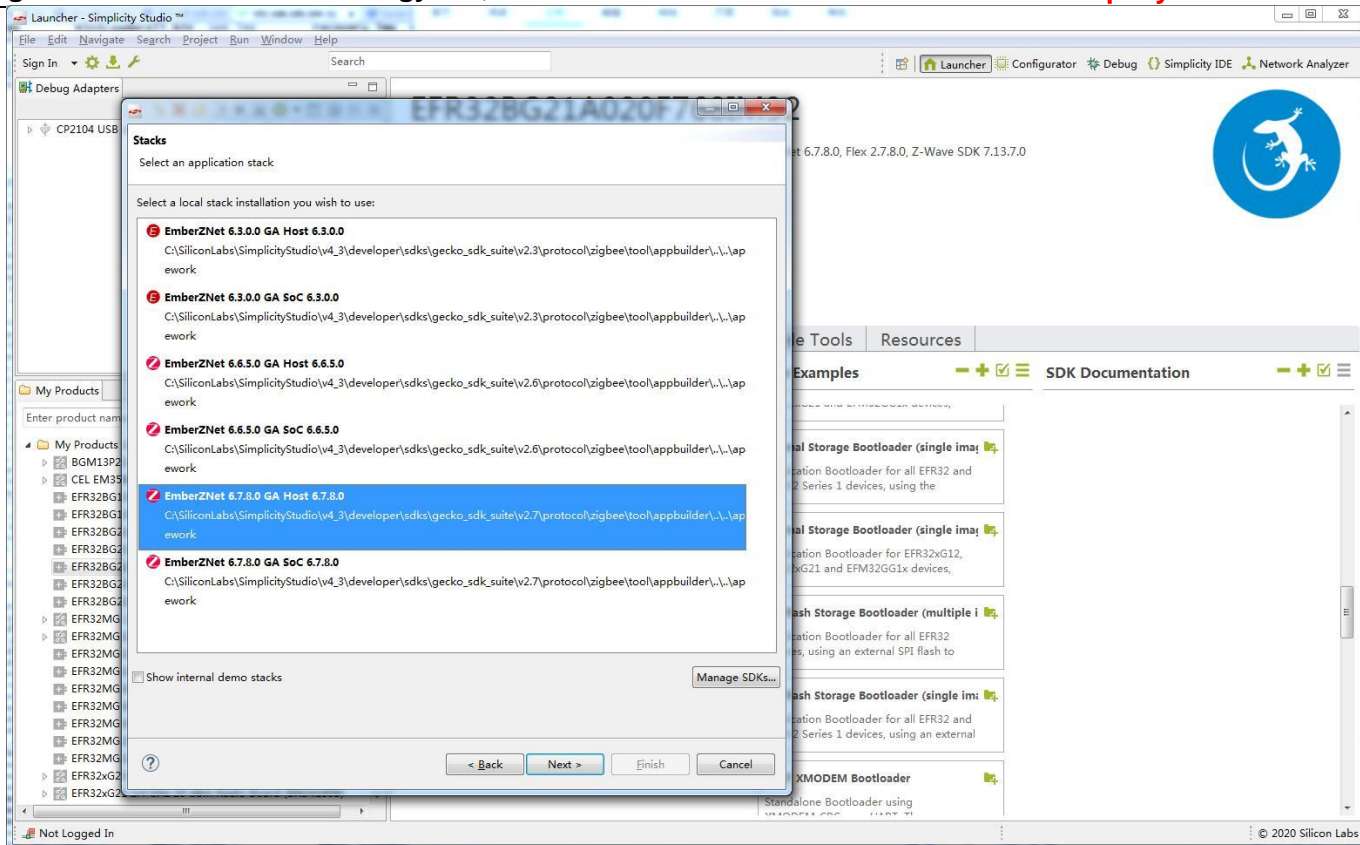
```
iface wlan0 inet dhcp
wpa-conf /etc/wpa_supplicant.conf
metric 1
```

## 9.5 Zigbee

This Gateway Has a Zigbee Module EFR32MG1B232

- Host Development Demo Example
- NCP Development
- User can obtain the zigbee module's NCP program in simplicity studio, the module number is EFR32MG1B232F256G





For detailed information to flash image to the zigbee module, please refer to document ZIGBEE MODULE FLASH FIRMWARE v1.0 For SDK to develop program in gateway, please refer to document API Reference for EmberZNet PC Host. It can be found in the ss5's directory of  
 C:\SiliconLabs\SimplicityStudio\v4\_3\developer\sdk\gecko\_sdk\_suite\v2.7\protocol\zigbee\documentation  
 Silicon Labs EmberZNet Documentation

#### Release Notes / Quick Start Guide

##### EmberZNet PRO Release Notes

Lists compatibility requirements and sources for all software components in the development environment. Discusses the latest changes to the EmberZNet PRO stack (and associated utilities) including added/deleted/deprecated features/API, and lists bugs that have been fixed since the last release and any pending ones.

##### Getting Started with EmberZNet PRO -- QSG106

Provides basic information on configuring, building, and installing applications for the Mighty Gecko family and EM35x using the EmberZNet PRO stack and Simplicity Studio v4.

##### Using the Silicon Labs Dynamic Multiprotocol Demonstrations -- QSG155

Shows how to demonstrate Dynamic Multiprotocol functionality using a Bluetooth LE smartphone app with either Zigbee-Bluetooth or RAIL-Bluetooth demo applications.

#### Zigbee Fundamentals

##### Zigbee Fundamentals -- UG103-02

Describes the key features and characteristics of a Zigbee solution. It also includes a section on Zigbee 3.0.

#### API References

##### API Reference for the EmberZNet SOC Platform

Lists SoC Platform APIs used to interface to the EmberZNet PRO stack, HAL, and status of the application-controlled network. These APIs concern network management, device and stack management, messaging, fragmentation, serial communication, token access, peripheral access, bootloader utilities, and others. They are independent of the Application Framework and therefore can be used to develop applications that do not rely on the Zigbee Cluster Library.

##### API Reference for the EmberZNet STM32F103RET Host

Lists STM32F103RET Host APIs used to interface to the EmberZNet PRO stack, HAL, and status of the application-controlled network. These APIs concern network management, device and stack configuration, message fragmentation, serial communication, peripheral access, and others. They are independent of the Application Framework and therefore can be used to develop applications that do not rely on the Zigbee Cluster Library.

##### API Reference for EmberZNet PC Host

Lists PC Host APIs used to interface to the EmberZNet stack, HAL, and status of the application-controlled network. These APIs concern network management, device and stack configuration, message fragmentation, serial communication, ASH (Asynchronous Serial Host) utilities, and others. They are independent of the Application Framework and therefore can be used for developing applications that do not rely on the ZigBee Cluster Library.

##### Advanced Application Programming with the Stack and HAL APIs -- UG105

A companion to the EmberZNet API references, for developers whose applications require functionality not available through AppBuilder and the application framework, or who prefer working with an API. Includes an introduction to the stack API, a discussion of advanced design issues to consider when developing an application using the API, and provides an example application.

## 9.6 Bluetooth

This Gateway Has a Bluetooth Module EFR32BG21

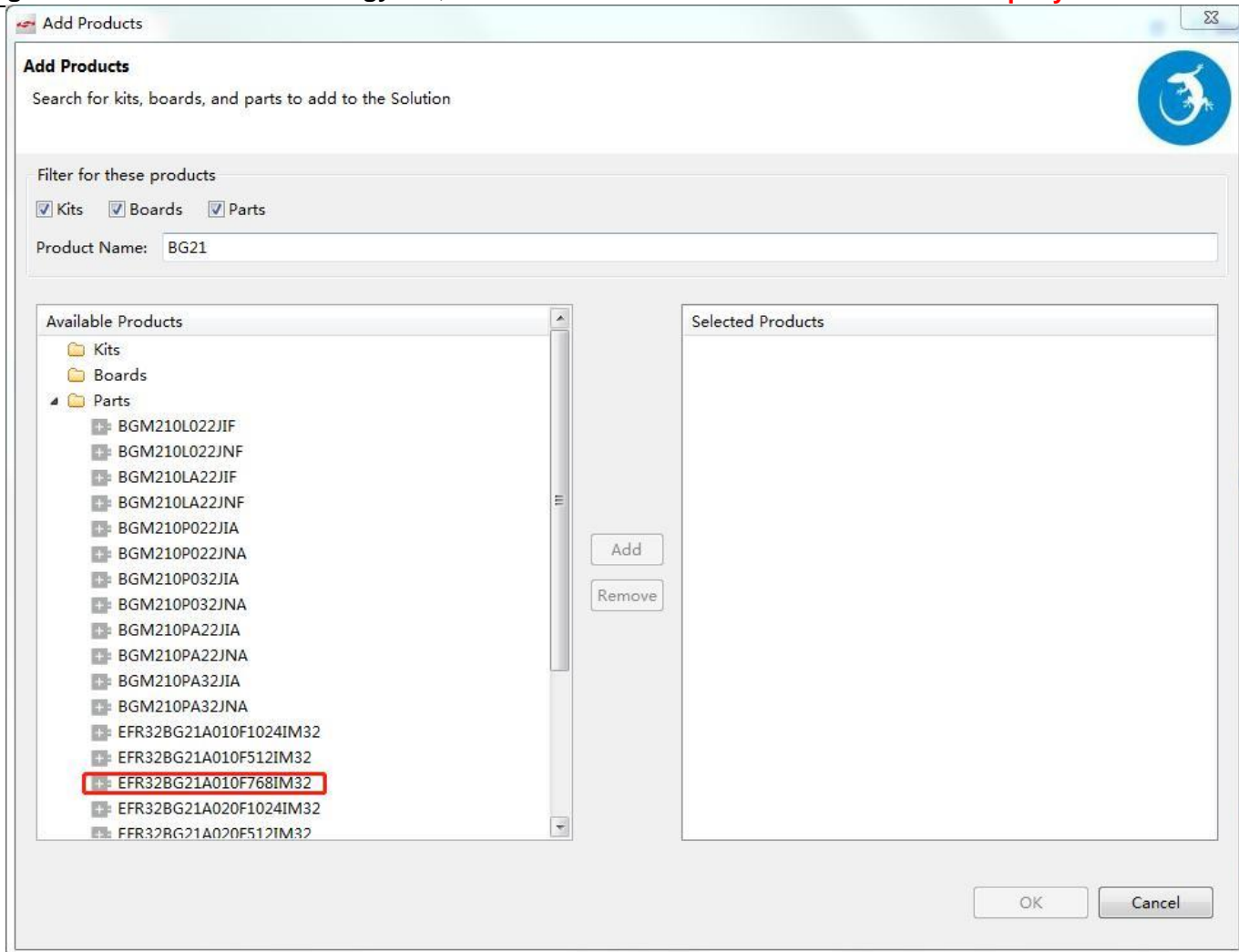
- Host Development Demo Example
- NCP Development User can obtained the ble module's NCP program in simplicity studio, the module number is ERF32BG21

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Find the correct BLE module in simplicity studio, then follow the same guide in section 10

## 9.7 RTC

## 9.8 LTE

This Gateway Has a LTE Module BG96 We use the pppd to dial and manage the bg96. here is some config and steps about the lte module

- the apn config

```
root@DSGW-081:~# cat /etc/config/ppp
```

```
config 'ppp' 'ppp'
    option 'apn' 'em'
    option 'username' '111'
    option 'password' '1122'
```

- pppd dial scripts

```
root@DSGW-081:~# ls /etc/ppp/peers/* -alh
```

```
-rwxr-xr-x 1 root root 359 Feb 27 2020 /etc/ppp/peers/dial
```

```
-rwxr-xr-x 1 root root 163 Feb 27 2020 /etc/ppp/peers/mo_3gmodule.dial
```

- do the pppd call in the foreground

- stop the demo program.

```
/etc/init.d/done stop; /etc/init.d/dial stop;
```

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2. modify the pppd to debug mode

```
root@DSGW-081:~# cat /etc/ppp/options
debug          // remove #, open the debug mode
nodetach       // add this
#logfile /dev/null // comment this line
noipdefault
```

3. open the lte module

```
echo 0 > /sys/class/leds/ltpwr/brightness
echo 0 > /sys/class/leds/lterst/brightness
echo 0 > /sys/class/leds/lterf/brightness
sleep 1
echo 1 > /sys/class/leds/ltpwr/brightness
echo 1 > /sys/class/leds/lterst/brightness
echo 1 > /sys/class/leds/lterf/brightness
sleep 15
```

4. pppd dial

```
root@DSGW-081:~# pppd call dial
timeout set to 3 seconds
send (ate0^M)
expect (OK)
^M
OK
-- got it
```

```
send (at^M)
expect (OK)
^M
^M
OK
-- got it
```

```
send (AT+CSQ^M)
expect (OK)
^M
^M
+CSQ: 99,99^M
^M
OK
-- got it
```

```
send (AT+COPS?^M)
expect (OK)
^M
^M
+COPS: 0^M
^M
OK
-- got it
```

```
send (AT+CREG?^M)
```

```
expect (OK)
^M
^M
+CREG: 0,0^M
^M
OK
-- got it
```

```
send (AT+CEREG?^M)
expect (OK)
^M
^M
+CEREG: 0,0^M
^M
OK
-- got it
```

```
send (AT+CPIN?^M)
expect (READY)
```

### 9.9 Can

this board has two can interace named can0  
we can use loopback mode to test it

- set up can and start receive mode

```
ifconfig can0 down;
ip link set can0 type can bitrate 500000 loopback on;
ifconfig can0 up;
candump can0
```

- clone anther ssh send data

```
cansend can0 5A1#11.22.33.44.55.66.77.88
```

### 9.10 Dout

we can echo '0' or '1' to a file to control the dout1 and dout2 to on or off.

- on

```
echo 1 > /sys/class/leds/do01/brightness
```

- off

```
echo 0 > /sys/class/leds/do01/brightness
```

### 9.11 Passive In

the passive in will auto generate a event to the /dev/input/by-path/platform-gpio\_keys\@0-event

### 9.12 Active in

here is two active input interfaces on the board(iio:device/iio:device1).  
we can easy get the voltage input

```
local val=`cat /sys/bus/iio/devices/iio\:device1/in_voltage_raw`
val=$((val*33*11/2560))
echo $val V
```

### 9.13 Analog in

here is two analog input interfaces on the board(hwmon0/hwmon1).iio:device/iio:device1  
we can easy get the voltage input.

```
local val=`cat /sys/class/hwmon/hwmon0/in1_input`
```

```
val=$((val*33*11/2560))
echo $val
```

### 9.13 RS232

here is a 232 port on the board  
we can use minicom or other user serial tool to test it  
the port is /dev/ttymx3

### 9.12 RS485

here is a 485 port on the board  
we can use minicom or other user serial tool to test it  
the port is /dev/ttymx4

## 10. Kernel Development DTS Description

- This Gateway's dts file is the ./arch/arm/boot/dts/DSGW-081.dts

### 10.1 Led

```
led1{
    //label = "led1";
    label = "pwrled";
    gpios = <&gpio1 4 GPIO_ACTIVE_HIGH>;
    default-state = "off";
    linux,default-trigger = "timer";
};
```

```
led2{
    //label = "led2";
    label = "zigbee";
    gpios = <&gpio1 2 GPIO_ACTIVE_HIGH>;
    default-state = "off";
};
```

```
led3{
    //label = "led3";
    label = "errled";
    gpios = <&gpio5 2 GPIO_ACTIVE_HIGH>;
    default-state = "off";
};
```

```
led4{
    label = "led4";
    gpios = <&gpio5 5 GPIO_ACTIVE_HIGH>;
    default-state = "off";
};
```

### 10.2 Button

```
gpio_keys: gpio_keys@0 {
    compatible = "gpio-keys";
    pinctrl-names = "default";
    pinctrl-0 = <&pinctrl_gpio_keys>;
    #address-cells = <1>;
    #size-cells = <0>;
```

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autorepeat;

```
key1@1 {  
    label = "USER-KEY1";  
    linux,code = <BTN_0>;  
    gpios = <&gpio1 19 GPIO_ACTIVE_LOW>;  
    gpio-key,wakeup;  
};
```

```
};
```

### 10.3 Ethernet

```
&fec2 {  
    pinctrl-names = "default";  
    /*  
    pinctrl-0 = <&pinctrl_enet2  
        &pinctrl_fec2_reset>;  
    */  
    phy-mode = "rmii";  
    phy-handle = <ephy1>;  
    //phy-reset-gpios = <&gpio5 8 GPIO_ACTIVE_LOW>;  
    //phy-reset-duration = <200>;  
    status = "okay";
```

```
mdio {  
    #address-cells = <1>;  
    #size-cells = <0>;  
  
    ethphy0: ethernet-phy@2 {  
        compatible = "ethernet-phy-ieee802.3-c22";  
        reg = <0>;  
    };
```

```
    ethphy1: ethernet-phy@1 {  
        compatible = "ethernet-phy-ieee802.3-c22";  
        reg = <1>;  
    };
```

```
};
```

```
};
```

### 10.4 wifi

```
&usdhc1 {  
    pinctrl-names = "default", "state_100mhz", "state_200mhz";  
    pinctrl-0 = <&pinctrl_usdhc1>;  
    pinctrl-1 = <&pinctrl_usdhc1_100mhz>;  
    pinctrl-2 = <&pinctrl_usdhc1_200mhz>;  
    /* cd-gpios = <&gpio1 19 GPIO_ACTIVE_LOW>; */  
    broken-cd;
```

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Website: [www.dusuniot.com](http://www.dusuniot.com)

[www.dusunremotes.com](http://www.dusunremotes.com)

[www.hzdusun.com](http://www.hzdusun.com)

```
//non-removable;
keep-power-in-suspend;
enable-sdio-wakeup;
vmmc-supply = <?_sd1_vmmc>;
no-1-8-v;
//
//cd-post;
//wifi-host;
//non-removable;
//pm-ignore-notify;
//
status = "okay";
};
```

### 10.5 Zigbee

```
&uart2 {
    pinctrl-names = "default";
    pinctrl-0 = <&pinctrl_uart2>;
    /* fsl,uart-has-rtscs; */
    /* for DTE mode, add below change */
    /* fsl,dte-mode; */
    /* pinctrl-0 = <&pinctrl_uart2dte>; */
    status = "okay";
};
```

### 10.6 Bluetooth

- Bluetooth use the tty->usb device

```
&uart3 {
    pinctrl-names = "default";
    pinctrl-0 = <&pinctrl_uart3>;
    status = "okay";
};
```

### 10.7 RTC

```
&i2c1 {
    clock-frequency = <100000>;
    pinctrl-names = "default";
    pinctrl-0 = <&pinctrl_i2c1>;
    status = "okay";

    pcf85063: rtc@51 {
        compatible = "nxp,pcf85063";
        reg = <0x51>;
    };
};
```

### 10.8 Can

```
&flexcan1 {
    pinctrl-names = "default";
    pinctrl-0 = <&pinctrl_flexcan1>;
};
```

```
xeiver-supply = <?_can_3v3>;  
status = "okay";  
};
```

### 10.9 Dout

```
//Digital output  
led8{  
    label = "do01";  
    //gpios = <&gpio3 0 GPIO_ACTIVE_LOW>;  
    gpios = <&gpio5 6 GPIO_ACTIVE_LOW>;  
    default-state = "on";  
};  
led9{  
    label = "do02";  
    gpios = <&gpio1 8 GPIO_ACTIVE_LOW>;  
    default-state = "on";  
};
```

### 10.10 Passive in

```
gpio_keys: gpio_keys@0 {  
    compatible = "gpio-keys";  
    pinctrl-names = "default";  
    pinctrl-0 = <&pinctrl_gpio_keys>;  
    #address-cells = <1>;  
    #size-cells = <0>;  
    autorepeat;  
  
    key2@1 {  
        label = "USER-KEY2";  
        linux,code = <BTN_1>;  
        gpios = <&gpio1 13 GPIO_ACTIVE_LOW>;  
        gpio-key,wakeup;  
    };  
    key3@1 {  
        label = "USER-KEY3";  
        linux,code = <BTN_2>;  
        gpios = <&gpio1 12 GPIO_ACTIVE_LOW>;  
        gpio-key,wakeup;  
    };  
};
```

### 10.11 Active in

```
&i2c4 {  
    clock-frequency = <100000>;  
    pinctrl-names = "default";  
    pinctrl-0 = <&pinctrl_i2c4>;  
    status = "okay";
```

```
adc081c@55 {  
    compatible = "ti,adc081c";
```

```
reg = <0x55>;
};
adc081c@56 {
    compatible = "ti,adc081c";
    reg = <0x56>;
};
};
```

### 10.12 Analog in

```
&i2c3 {
    clock-frequency = <100000>;
    pinctrl-names = "default";
    pinctrl-0 = <&pinctrl_i2c3>;
    status = "okay";
```

```
ina219@40 {
    compatible = "ti,ina231";
    reg = <0x40>;
    shunt-resistor = <10000>;
};
ina219@41 {
    compatible = "ti,ina231";
    reg = <0x41>;
    shunt-resistor = <10000>;
};
};
```

### 10.13 RS232

```
&uart4 {
    pinctrl-names = "default";
    pinctrl-0 = <&pinctrl_uart4>;
    status = "okay";
};
```

### 10.14 RS485

```
&uart5 {
    pinctrl-names = "default";
    pinctrl-0 = <&pinctrl_uart5>;
    status = "okay";
};
```

## 13. Support

Please contact our sell to get more support.

## 14. Reference

[openwrt](#)