# Edge Computer EC300 Series

# User's Manual

(Applicable for Debian11)

Version1.2, October 2023

www.inhandnetworks.com

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# Contents

# 1 Introduction

This user's manual is for the Arm architecture based edge computer EC300 and covers a complete set of instructions for all supported models. Before referring to these chapters, verify that the hardware specifications of your computer model support the features/Settings covered.

# 2 Hardware installation instructions

In this chapter, we will cover the external interface instructions of EC300, an edge computer based on Arm architecture.

## 2.1 Introduction

The following sections describe the application of external connectors and pin assignment.

## 2.2 EC300 panel

### 2.2.1 Front panel

## 2.2.2 Left panel
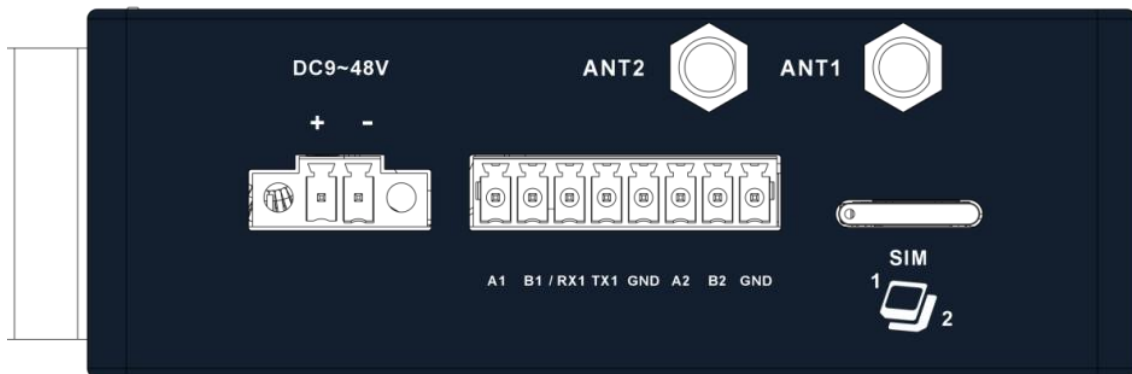


## 2.2.3 Right panel
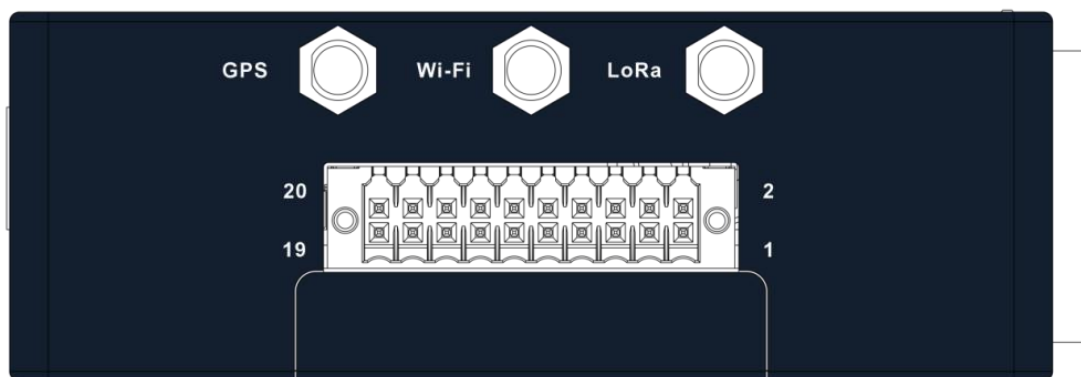


# 2.3 EC300 external interface

## 2.3.1 Ethernet

This is a dual RJ45 connector for Ethernet connection

The EC300 has 2 RJ45 Ethernet ports and supports 10M/100M adaptive rates.

Yellow light: LINK indicator light, the end device is on when the interface is 1000M, and the end device is off when the interface is 10/100M.

Green light: ACT light, flashing when there is data

## 2.3.2 Serial port

The EC300 supports up to four serial ports.

COM1: RS-232 / RS-485 (RX1 TX1 / A1 B1)

COM2: RS-485 (A2 B2)

COM3: RS232 / RS485 (extended interface PIN1 Extended interface PIN2)

COM4: RS232 / RS485 (extended interface PIN5 extended interface PIN6)

## 2.3.3 CAN

The EC300 has a 3-way CAN bus interface and supports the CAN 2.0A/B standard. It is compatible with CAN FD and can achieve a maximum rate of 5Mbps.

CAN1: Extended interface PIN1 Extended interface PIN2

CAN2: Extend interface PIN5 Extend interface PIN6

CAN3: Expand interface PIN9 expand interface PIN10

## 2.3.4 Switch Input interface (Digital Input)

| Interface identification | Features | Description |
|---|---|---|
| GND | Power reference ground | 4 digital input DI, |
| DICOM | Input public side | Wet contact state<br>"1" :+10~+30V/-30 ~ -10VDC |
| DI0 | Digital input port 0 | Wet contact state |
| DI1 | Digital input port number 1 | 0": 0 ~ +3V/-3 ~ 0V |

| Interface identification | Features | Description |
|---|---|---|
| DI2 | Digital input port number 2 | Isolate 3000VDC |
| DI3 | Digital input port number 3 | |

## 2.3.5 Switching Output Interface (Digital Output)

| Interface identification | Features | Description |
|---|---|---|
| DO0 | Digital output port 0 | |
| DO1 | Digital output port number 1 | |
| DO2 | Digital output port 2 | 4 DO OD output, isolated 3000VDC |
| DO3 | Digital output port No. 3 | |
| GND | End of ground | |

## 2.3.6 USB

The EC300 provides a USB 2.0 Host port.

## 2.3.7 LED

EC300 has 8 LED lights to indicate the power supply and system operation status respectively.

| Signage | Name | Definition |
|---|---|---|
| PWR | Power indicator | Power on and always on |
| STATUS | System operating status indicator light | When the system starts normally, the STATUS blinks. If the system fails to start due |

| | | to an exception in the system startup phase; Or when the factory recovery operation has not been completed, STATUS is long out. |
|---|---|---|
| WARN | Warning indicator light | When a warning exception occurs in the system and the system upgrade or factory restoration has not been completed, the WARN light blinks. |
| User1 | User Programmable indicator 1 | It is off by default and can be controlled by user programming |
| User2 | User Programmable indicator light 2 | It is off by default and can be controlled by user programming |
| User3 | User Programmable indicator 3 | It is off by default and can be controlled by user programming |
| User4 | User Programmable indicator 4 | It is off by default and can be controlled by user programming |
| NET | Cellular connection status indicator | Keep on after successful dialing |

## 2.3.8 User programmable keys

The EC300 provides an API interface, which you can call to check the state of the programmable key, and then implement your own keypress logic.

## 2.3.9 DC input

The EC300 supports 9 to 48V DC input

## 2.3.10 SIM card slot

The EC300 supports 2 SIM card slots, and the SIM card needs to be installed with power off by pressing the SIM card into the slot.

## 2.3.11 MicroSD card slot

The EC300 has a slot for the MircoSD card, SD does not support hotplugging and needs to be plugged in and out with power off.

## 2.3.12 Restore the factory keys

There is a reset button for the system to restore the factory. Refer to Restore Factory Settings to do so.

## 2.3.14 Antenna interface

There are 5 antenna interfaces in EC300, and the number of antennas standard with different models is different. Screw the antenna into the corresponding antenna interface to complete the antenna installation.

| Identification | Name |
| --- | --- |
| ANT1 | 4G LTE main antenna /5G antenna |
| ANT2 | 4G LTE diversity receive antenna /5G antenna |
| GPS | GPS antenna |

| Wi-Fi | WiFi antenna |
|-------|--------------|
| Lora | Lora antenna |

## 2.3.15 Extended interface

The EC300 enables flexible interface expansion, which is freely combined by four independent expansion modules (module A, module B, module C and module D) according to requirements, allowing different combinations of isolated CAN, RS485, RS232, analog input and DI/DO. Each extension module supports only one functional option at a time. The expansion module is pre-installed on the expansion socket inside the device, and the overall structure is small and compact. The following table shows the supported extension combinations and ordering codes.

| Expansion Module | Functional | P/N Code |
|------------------|------------|----------|
| Module A | NONE | N |
| | LORA | L |
| Module B | NONE | N |
| | RS232 | 2 |
| | RS485 | 4 |
| | CAN FD | C |
| | 4-20mA | A |
| Module C | NONE | N |
| | RS232 | 2 |

| | | |
|---|---|---|
| | RS485 | 4 |
| | CAN FD | C |
| | 4-20mA | A |
| Module D | NONE | N |
| | 4DI+4DO | D |
| | CAN FD | C |

\* Expansion module selection example: EC312-B-LQA3-L22D, indicating that the product supports additional LORA+RS232\*1+RS232\*1+4DI+4DO.

\* For extended functionality, please contact us to determine the model available for order.

The extension interface is defined as follows:
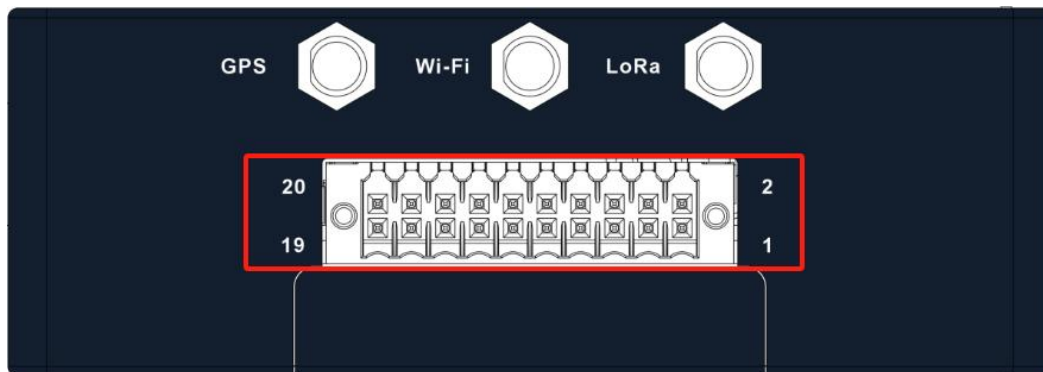


| Extension module | PIN | Interface Definition |
|---|---|---|
| Extension Module A | 1 | A_232_TX/485_A/CAN1_H/AIN1+ |
| | 2 | A_232_RX/485_B/CAN1_L |

| | | |
|---|---|---|
| | 3 | AIN1- |
| | 4 | GND |
| Extension Module B | 5 | B_232_TX/485_A/CAN2_H/AIN2+ |
| | 6 | B_232_RX/485_B/CAN2_L |
| | 7 | AIN2- |
| | 8 | GND |
| Extension Module C | 9 | CAN3_H |
| | 10 | CAN3_L |
| | 11 | DO0 |
| | 12 | DO1 |
| | 13 | DO2 |
| | 14 | DO3 |
| | 15 | DI0 |
| | 16 | DI1 |
| | 17 | DI2 |
| | 18 | DI3 |

| | 19 | DI_COM | |
|---|---|---|---|
| | 20 | GND | |

# 3 Getting Started

In this chapter, we will cover the basic configuration of EC300, an edge computer based on Arm architecture.

## 3.1 Connect to the EC300

You will need a computer that you can use to connect to the EC300 and log in to the command line interface. It can be connected by means of an Ethernet cable.

Factory default username and password:

**System Username: edge**

**Password: security@edge**

EC300 devices are factory created root by default, but login is disabled. If you need to use the root user, change the system configuration manually and type sudo -s to switch to the root user. The user edge is in the sudo group, so you can use sudo under the edge user to execute system-level commands. See the sudo Mechanism section in Chapter 5 for additional details.

Tips

When **command not found** appears, type sudo -s to switch to the root user or use the sudo command to operate.

Note

# 3.1.1 Connecting via the SSH Console

The EC300 supports SSH connections over Ethernet. Connect to the EC300 using the following default IP address.

| Port | Default IP |
|------|-----------|
| ETH 1 | 192.168.3.100 |
| ETH 2 | 192.168.4.100 |

## 3.1.1.1 Linux users

Tips

These steps apply if you are connecting to EC300 on a Linux PC. Please do not apply these steps to the EC300 device itself. Before you run the ssh command, be sure to configure your PC's Ethernet port IP address to be within a specific range. ETH1:192.168.3.0/24, ETH2:192.168.4.0/24.

Use the ssh command to access the ETH1 port of the EC300 on a Linux PC.

```
user@PC:~$ ssh edge@192.168.3.100
```

Type **yes to** continue to complete the connection.

```
The authenticity of host '192.168.3.100 (192.168.3.100)' can't be established.
ECDSA key fingerprint is SHA256:jqiLREbTX6Ut2whNFdpLvCcQfM3KUnl3Ta7/dWppBCU.
Are you sure you want to continue connecting (yes/no)? yes
```

When the terminal prompt edge@edge-computer:~$appears and shell commands can be entered, the connection is successful.

```
    ?IIIII                ?I   IIIIIIIIIIII?        ?III
     IIII            IIII   ?IIIIIIIIIIIIIIIIIIIIIIII
      ?III        7IIIIIIII   IIIIIIIIIIIIIIIIIIIIIIII
        II     I?IIIIIIIIIII   IIIIIIIIIIIIIIIIIIIIIII
               IIIIIIIIIIIII?    ?IIIIIIIIIIIIIIIII
               ?IIIIIII         ?IIIIIIIIIIIII?
II
II                 ?b                              Ib
                   ?II                             IIN
II    I?IIIII      ?IIIII?    IIIIII    IIIIIII    $?IIIIIN
II    IIIIIIIII    ?IIIIIIII ?IIIIIII   IIIIIIII?  IIIIIIIIN
II    II?   IIN   III    II         II   II   OII 8II    IIN
II    II?   IIN   III    II   III??II    II    II 8I?    IIN
II    II?   IIN   III    II ZIIIIIIII    II    II 8I?    IIN
II    III   IIN   III    II II?    II    II    II 8I?    IIN
II    III   IIN   III    II ?II    II    II    II  II$   IIN
IIIIIIII    IIIIIIIII    II  ZIIIIIIIIIIII    II  7IIIIIIIN
            IIN
            IIN
            IIN
            IIN
            IIN
            NN

For further infomation check:
https://www.inhand.com.cn/ or https://www.inhandnetworks.com/

Last login: Tue Jan 17 16:48:58 2023 from 192.168.4.5
edge@edge-computer:~$
```

# 3.1.1.2 Windows users

Tips

These steps apply if you are connecting the EC300 on a Windows PC. Please do not apply these steps to the EC300 device itself.

Make the following steps on your Windows PC

Click the link http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html, download PuTTY (free) software, SSH command in Windows environment to establish a connection to the edge computer EC300. The following is an example of using SSH to connect:
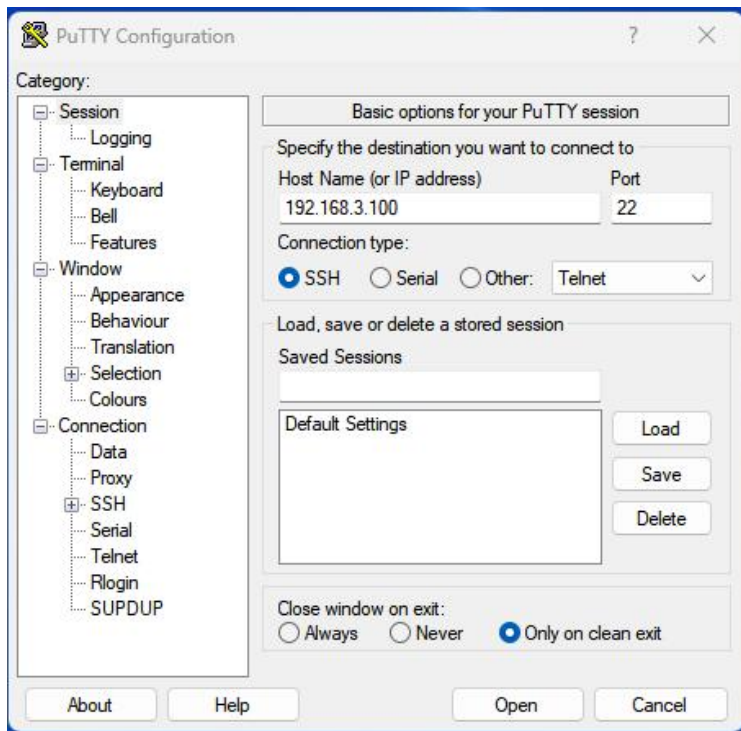
# 3.2 User Account management

## 3.2.1 Switch to the root user

You can use the sudo -s command to switch to the root user. For security reasons, do not operate all commands as root.

Tips

Click on the link for more information on sudo commands.

https://wiki.debian.org/sudo

Pay attention to

You may get a "permission denied" message when using some pipe or redirect behavior without root permissions. In this case, you must use 'sudo su -c' instead of '>','<','>>','<<','etc', etc. You need to include the full command in single quotes.

## 3.2.2 Creating and deleting user accounts

You can use the **useradd** and **userdel** commands to create and delete a user's account. Be sure to use these commands in the home screen to set the relevant access rights for that account. Here is an example of how to create test1 in the sudo group (the default login environment for test1 users is bash and their home directory is /home/test1)

```
edge@edge-computer:~$ sudo useradd -m -G sudo  -s /bin/bash test1
```

To change test1's password, use the passwd command, enter the new password and repeat to confirm the change

```
edge@edge-computer:~$ sudo passwd test1
New password:
Retype new password:
passwd: password updated successfully
```

If you want to remove user test1, use the command userdel

```
edge@edge-computer:~$ sudo userdel test1
```

## 3.2.3 Disable the default user account

Note

You should first create a user account before disabling the default account

Use the passwd command to lock the default user account so that edge users cannot log in

```
edge@edge-computer:~$ sudo passwd -l edge
passwd: password expiry information changed.
```

Unlock the edge user

```
edge@edge-computer:~$ sudo passwd -u edge
passwd: password expiry information changed.
```

# 3.3 Network administration and system administration

The EC300 is based on debian 11, so it can use native Linux commands for network management and system administration. In order to facilitate user configuration, InHand has developed a set of IEOS system programs, providing a web interface, users can easily through the web network management and system management, but it should be noted that when the IEOS function is enabled, IEOS will take over the network management and system management. At this time through the Linux native command for network management and system management may fail. IEOS is enabled by default, if users need to perform network management and system management based on Linux native command line, they need to close IEOS first.

## 3.3.1 Web management based on IEOS

IEOS is a set of network management and system management program running on Linux system developed by InHand. IEOS provides web interface, users can access Ethernet port ip address, cellular dial-up, Wi-Fi Station, DHCP Client/Server, static routing, and network management through the web. Firewalls and other network configuration; System time, time zone, firmware upgrade and system restart can also be operated; In addition, IEOS also supports docking with device management platform DeviceLive. Users can remotely monitor and manage EC300 devices through DeviceLive platform.

IEOS adopts the design scheme of status and configuration separation, which is divided into three functional sections: network management, system management and status. The network management menu and the system management menu can only be used for network and system related configuration, and the status information needs to be unified to the status page.

Important note: When using IEOS program to manage network configuration and system configuration, if you use Linux native commands at the same time, the two may affect each other, resulting in abnormal running state. It is recommended that the

## 3.3.1.1 Login to the web

Considering that the user's program may need to use the standard HTTP/HTTPS port number 80/443, IEOS uses the port number 9100 as the HTTPS connection port, and does not support access through HTTP; When the user uses HTTP to access the web, it will automatically jump to HTTPS. This document uses eth2's default address of 192.168.4.100 as an example.

Login Address:https://192.168.4.100:9100

login account: adm

login password: 123456
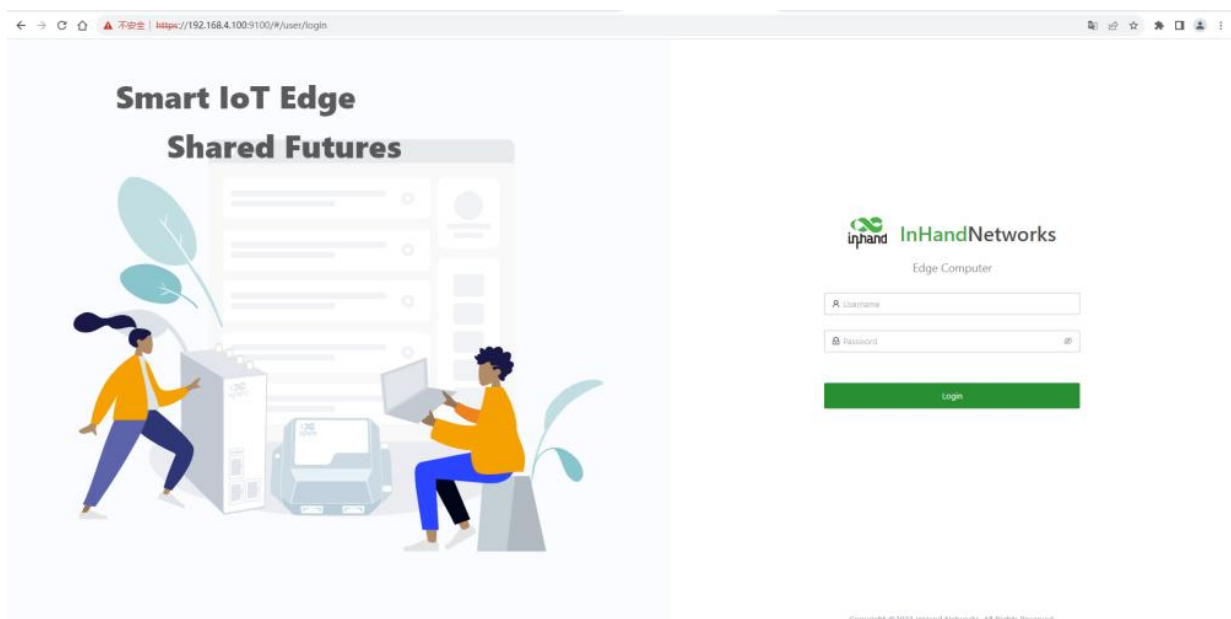
## 3.3.1.2 Network management

## 3.3.1.2.1 Configuring the Ethernet interface

Configure the eth1 interface with a static IP address
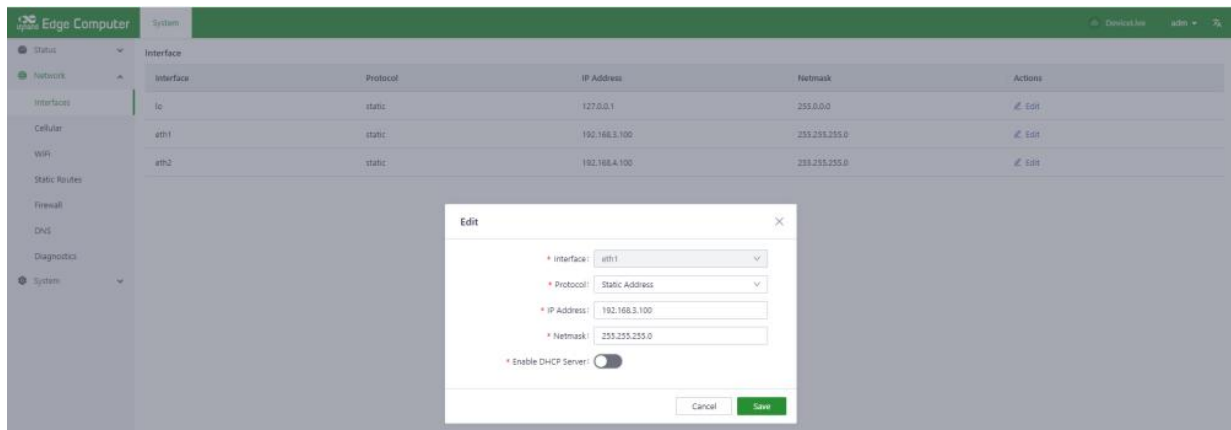


Configure the eth1 interface with a DHCP Client
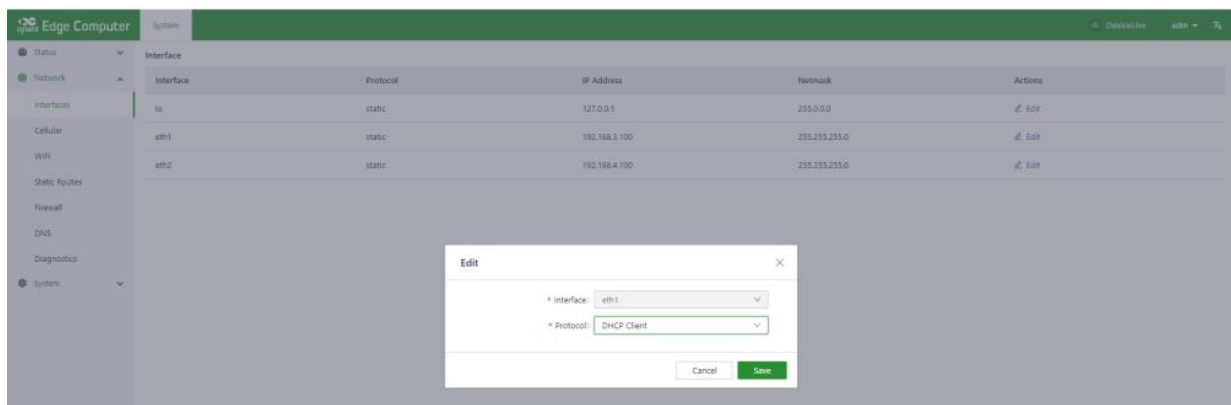


Start the dhcp server function on the eth1 interface and assign an address to the eth1 unhooked device
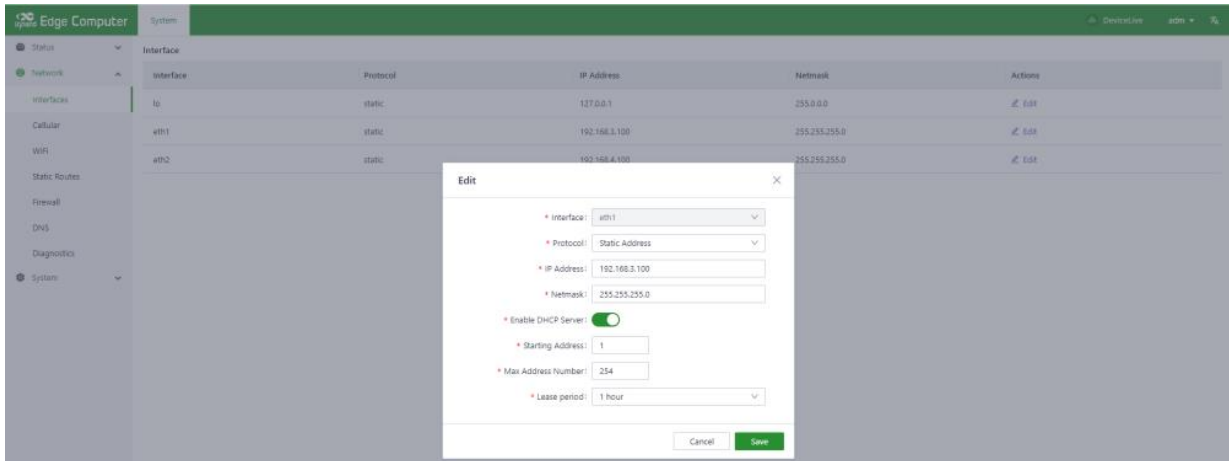
DHCP Server configuration parameters description:

**Enable DHCP Server**: The switch of DHCP Server function

**Starting Address**: Starting base address of DHCP Server address pool, network segment + starting address = starting ip address of address pool. In the screenshot, the network segment of eth1 is 192.168.3.0/24, and the base address is 1, then the starting address of the address pool is 192.168.3.1/24.

**Max Address Number**: The maximum number of addresses in the address pool.

**Lease period**: The length of the lease period

## 3.3.1.2.2 Configure cellular dialing
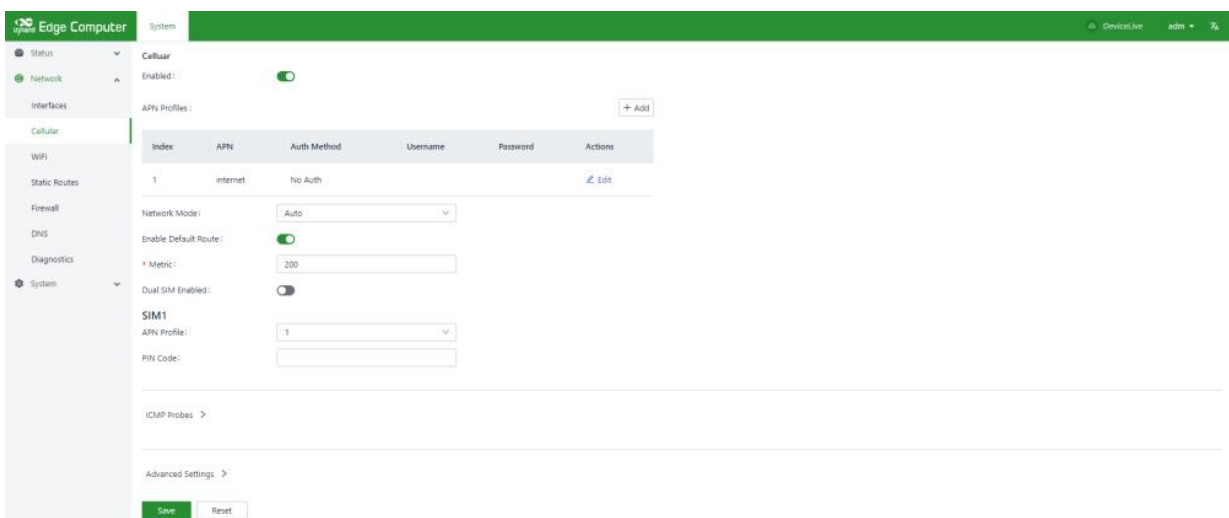


Cellular network parameters Description:

**Enabled**: The switch of cellular function; Enabled by default.

10. **Profiles**: A set of dial parameters used to configure APN, username, password, and authentication methods when dialing a dedicated network card. If you are not a dedicated network card, you usually do not need to change the configuration here. You can add up to 10 records to the dial-up parameter set.

**Network Mode**: The network mode of the cell, you can choose 3G, 4G and other related network mode, such as LTE, WCDMA, etc. If it is not clear which network mode to choose, select automatic; The program will automatically select the most appropriate network mode. The default is automatic.

**Enable Default Route**: Enable the add default route function, when enabled, when the dial is successful, it will add a default route of the cellular port. The default route is enabled.

**Metric**: This is the metric for the default routing of the cellular port. When default routing is configured on the cellular, Wi-Fi, and Ethernet ports, the metric with the lowest value is used.



**Dual SIM** Enabled: Dual Sim enabled. In order to improve the reliability of the network, EC300 supports dual SIM and single dial. Two sim cards need to be inserted into the device. If the sim1 card fails to dial because of unpaid charges, it will automatically switch to the sim2 card for dialing. By default, it is off.

**Main SIM**: The main sim card, when dialing, the selected sim card will be preferred for dialing. When dialing fails to reach a certain number of times, when switching to another sim card for dialing, the default is to use sim1 for dialing.

**Max Number of Dials**: When the dual-SIM single-dial function is enabled, the current sim card will be dialed to another sim card for dialing when the number of dials reaches a specified number.

**APN Profile**: sim card selected dialing parameters set, the default value is automatic. Usually special network card usually need to configure the dial parameter set, and select the Index of the dial parameter set here.

**PIN Code**: The PIN code of the sim card.



Wireless cellular networks are complex, sometimes there will be dial-up false connection, that is, the dial-up state is successful, but the target address can not be ping; When this happens, you can simply dial again and get back to normal. IEOS cellular dialing supports ICMP probing to detect spurious connections. <span style="color:red">It is recommended that customers with cellular connections enable ICMP probing so that false connections can be quickly recovered.</span>

ICMP probe parameters:

**ICMP Detection Server Probes**: ICMP probe address; 2 probe addresses can be configured, as long as 1 address is successfully probed, it means that there is no fake connection in the cell. When neither address is configured, ICMP probing is turned off.

**Detection** Interval: How often should ICMP probes be performed?

**Detection Timeout**: The duration of ICMP probe timeout. If no probe response packet is received, the probe is considered to have failed

**Detection Max Retries**: the maximum number of probes; When a probe fails to reach this value, a redial is triggered. Range [1,5]

**Detection Strict**: Whether strict detection is enabled. When strict detection is turned off, the detection program will detect whether the packet received by the cellular interface has changed in each detection cycle. If there is a change, it means that the cellular network is working, and ICMP packets will not be sent for detection, so as to save some traffic; If the probe is turned on, ICMP probe packets will be sent periodically regardless of whether the number of packets received by the cellular interface has changed. By default, it is off.

Advanced Settings ∨

| | |
|---|---|
| Debug Mode enabled: | (toggle off) |
| Enable Infinitely Redial: | (toggle off) |
| Dial Interval: | 10  Seconds (0-3600) |
| Signal Query Interval: | 120  Seconds ( 0: disabled ) |

In Advanced configuration are some less commonly used Settings options.

**Debug Mode enabled**: Whether the debug function is enabled. After enabled, some dial-related debugging information will be added to the log, and it is disabled by default.

**Enable Redial**: Enable infinite redial. In some cases, dialing will be in an abnormal state, which can be restored by rebooting the system; By default infinite redialing is turned off, and the system will be restarted to try to recover after a certain number of dialing failures. Since dialing is enabled by default, some customers without sim card, dialing failure, the system will restart, in this case, you can open unlimited redialing; In this way, no matter how many times the dialing fails, the system will not restart.

Dial Interval; But if a dial fails, the amount of time to wait before making another dial.

**Signal Query Interval**: Signal query interval. When the signal is bad, you may have problems with false connections; At this time, redialing has a certain probability to solve the problem of false connection. The dialing program will check the signal strength at regular intervals; here, the signal detection period is configured.

## 3.3.1.2.3 Configure the Wi-Fi Station



**Enable Wi-Fi**: Enable the switch; Off by default

**Client SSID**: The ssid you want to connect to, you can enter it manually; You can also use the scan button to get nearby SSIDs that you can connect to

**Enable Default Route**: Enable the function of adding default route. If enabled, when the wifi connection is successful, a default route of wlan port will be added. The default route is enabled.

**Metric**: This is the metric for the default route of the wifi port. When the default route is configured for the cellular, Wi-Fi, and Ethernet ports, the metric with the lowest value is applied.

**Auth Method**: Auth method, supports no auth, WPA-PSK, WPA2-PSK, WPA-PSK/WPA2-PSK Mixed

**-Sheldon**: Encrypt Mode. CCMP, TKIP, TKIP and CCMP are supported

**WPA/WPA2 PSK Key**: Key information

## 3.3.1.2.4 Configuring static routes

This is a static routing for Ethernet. When the default routing for Ethernet, cellular, and wifi is configured, the default route with the lowest metric value will take effect. You need to make sure that the Metric value of the default route is different.
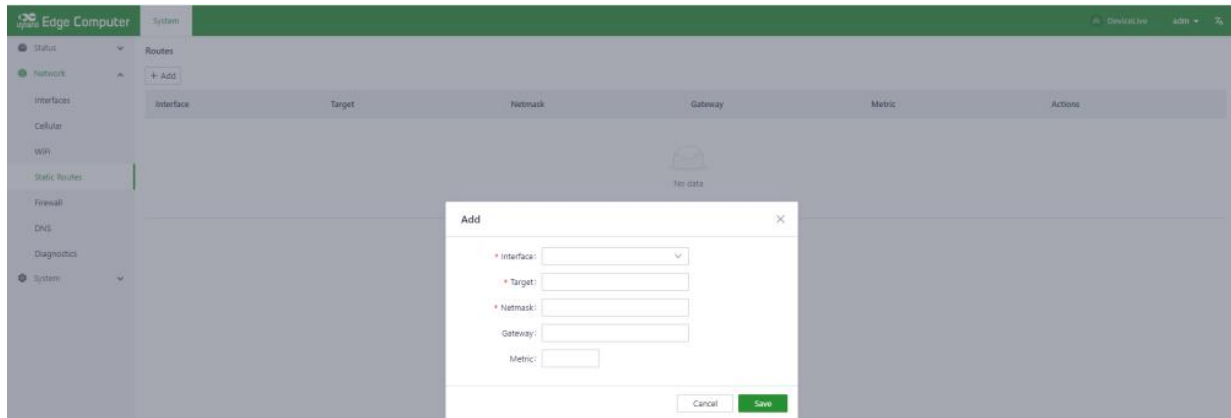
Static route configuration parameters:

**Interface**: The outgoing interface of the static route

**Target**: The target network

**Netmask**: Target network mask

**Gateway**: Next hop address

**Metric**: The metric for the static route

## 3.3.1.2.5 Configuring the firewall
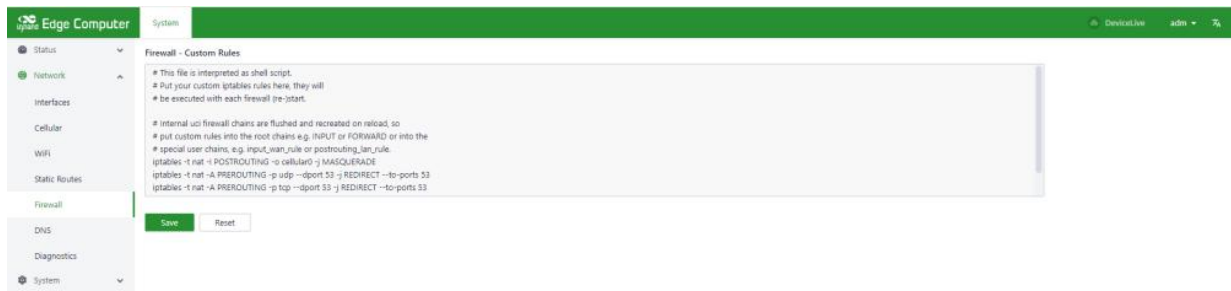


Only the iptables command is currently supported for configuration.

## 3.3.1.2.6 Configuring DNS
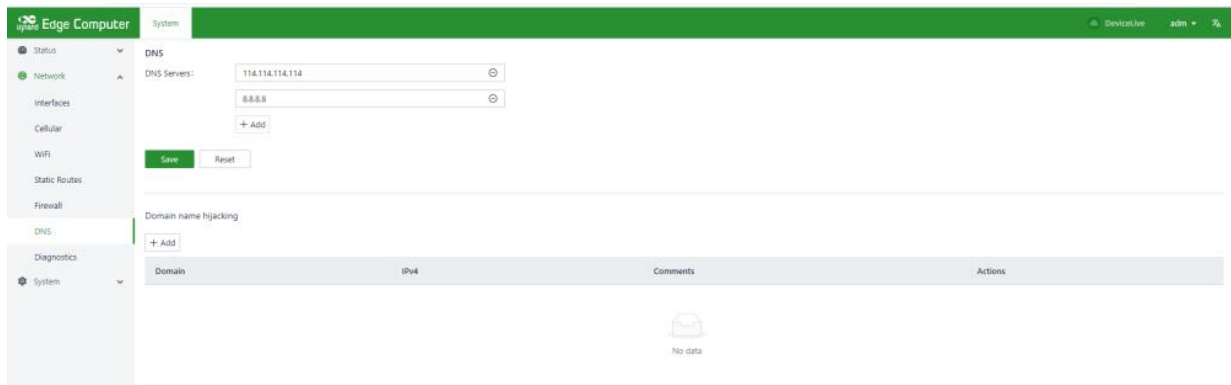


**DNS Servers**: DNS Server address, up to 4 can be configured

**Domain name hijacking:** Domain name hijacking function, can realize the binding between IP address and domain name.
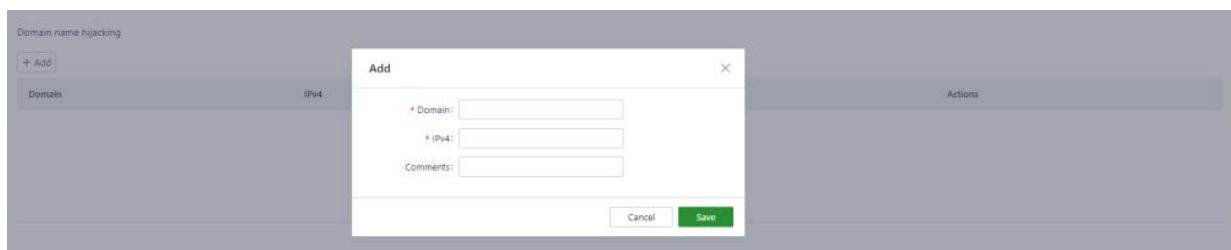


## 3.3.1.2.7 Network diagnostics

Network diagnostics support ping, traceroute and nslookup functions.

# 3.3.1.3 System administration

## 3.3.1.3.1 Basic configuration

Cloud management



**Enabled:** the enable switch that connects to the DeviceLive platform; DeviceLive is the remote monitoring and management platform of InHand equipment;

**Cloud Server:** DeviceLive platform has 2 addresses; One is the address of the domestic platform, the other is the address of the overseas platform; Here you choose which platform to connect to.

Time zone and NTP client

A maximum of 10 NTP Server addresses can be configured, and the program periodically sends synchronization requests to each server address in turn. After the synchronization is successful, the system time is written to the RTC and no longer continues to send synchronization requests to the later NTP servers.

In addition to using NTP to synchronize the time, there is a synchronization button in the Device Info status page to synchronize the time manually, but only when the device time and the local time (the time of accessing the computer used by the device) differ by more than 3s, this synchronization button will be displayed.



Configuration import, export and factory restore are supported here.

### 3.3.1.3.2 Firmware upgrade
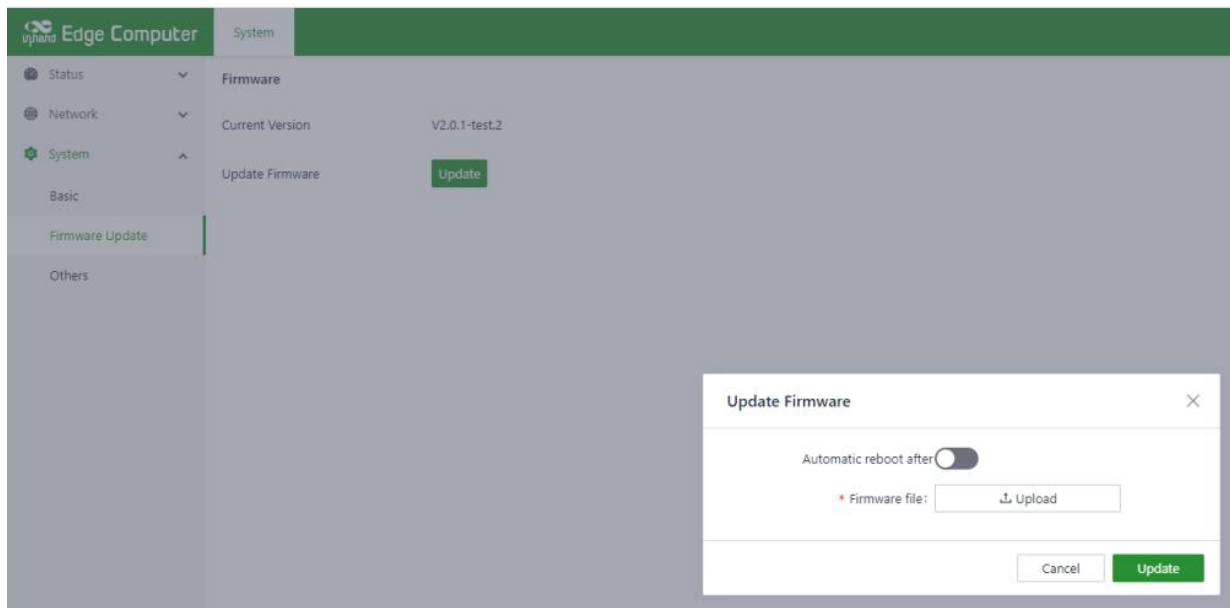


The automatic restart option is turned off by default. After upgrading the firmware, you need to manually restart the system to take effect; When the automatic restart option is enabled, the system will be restarted automatically after the firmware upgrade is successful.

### 3.3.1.3.3 Others
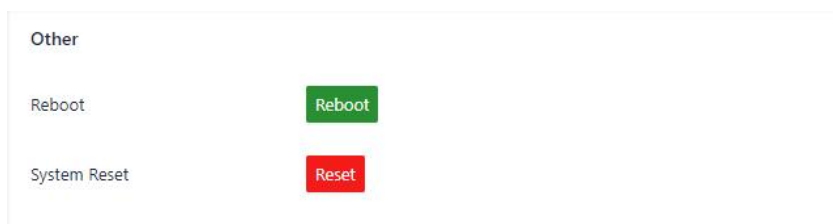


This page has 2 functions: restart the system and reset the system. Resetting the system needs to be used carefully. The resetting system function will restore the system configuration status and file system status to the factory, which means that the software installed by the user will also be cleared.

### 3.3.1.4 Status

### 3.3.1.4.1 Equipment information

The device information status page shows hostname, device model, serial number, firmware version, kernel version, filesystem version, and an overview of CPU, memory, and disk space usage.
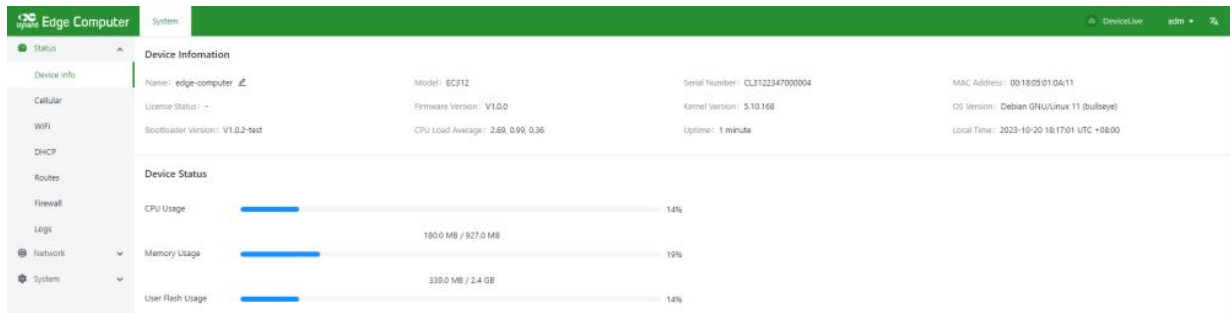


### 3.3.1.4.2 Cellular dialing status information

The cellular dial status page shows the sim card, IMIE, IMSI, ICCID, signal strength used by the current dial, as well as the IP address, DNS and other information obtained by the dial.
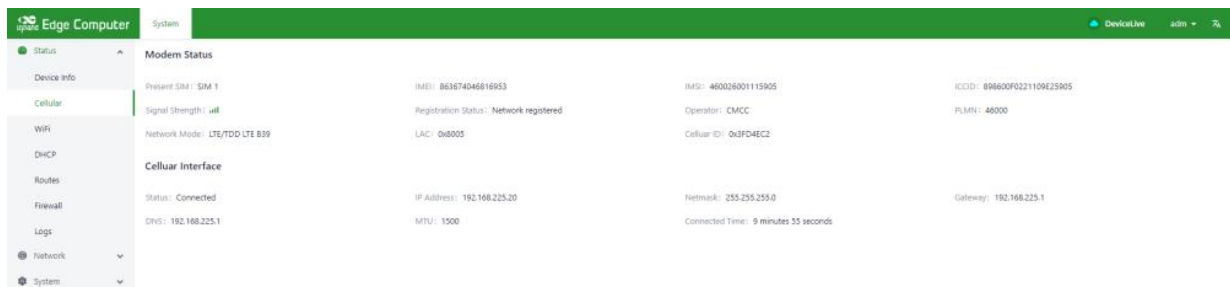


### 3.3.1.4.3 Wi-Fi Station status information

The Wi-Fi status page shows the IP address, gateway, and DNS information obtained after the Wi-Fi connection was successful.
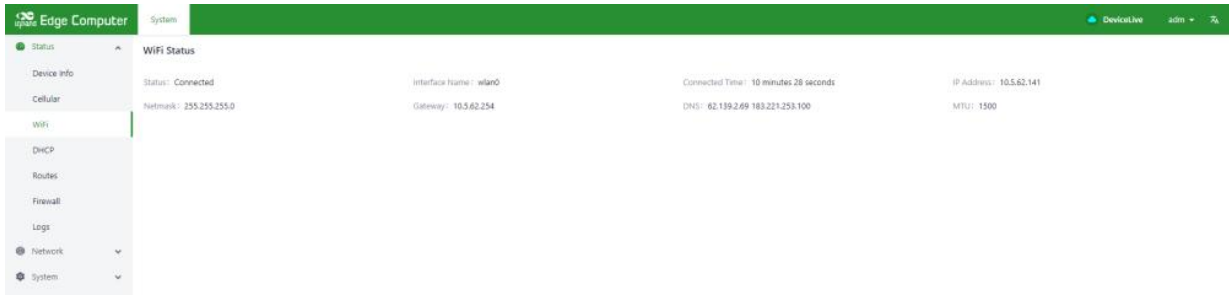
## 3.3.1.4.4 DHCP Server status information

The DHCP Server status page shows the assigned IP address of the device as a DHCP
Server, the client hostname, the client host mac, and the expiration time.
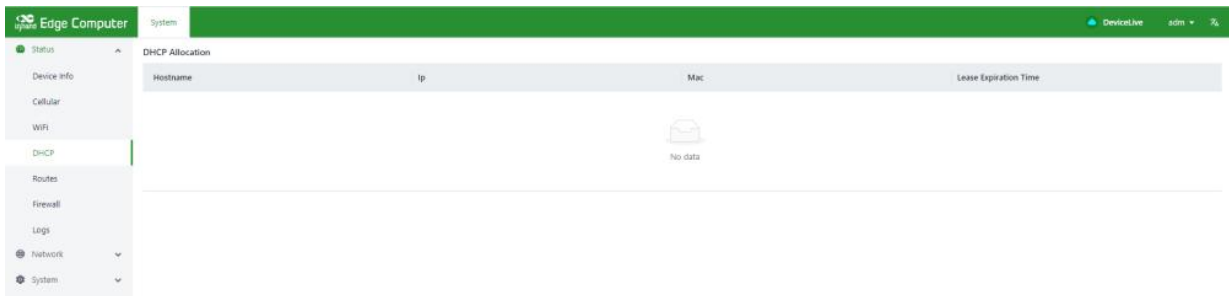


## 3.3.1.4.5 Routing status information

The route status page displays IPv4 direct route, static route and route neighbor
information.

## 3.3.1.4.6 Firewall status information

Firewall status information shows filtering rules, IP address mapping rules and other information.



## 3.3.1.4.7 Log information

The log page can view the system log, user log and set the log level, including Error, Info, Debug and other levels. Logs can also be downloaded locally.
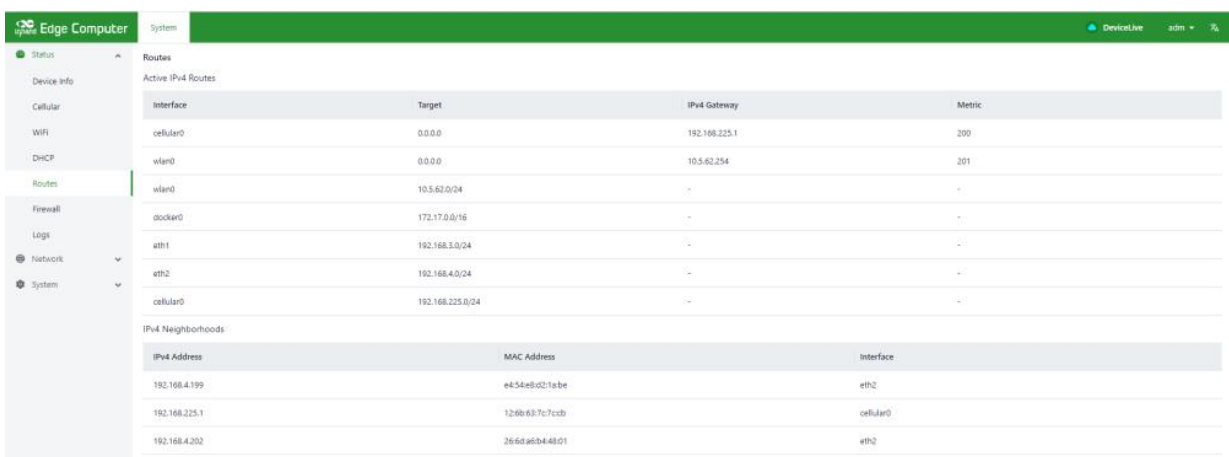
## 3.3.2 Linux-based command-line management

When using the Linux command line for network and system configuration, the first thing you need to do is close the IEOS program. IEOS is managed through systemctl,

Shutting down IEOS is done as follows:

```
systemctl stop ieos_daemon
```

This shutdown only applies to this startup, and IEOS programs will still start after the system is rebooted. Here's how to prevent IEOS programs from starting:

```
systemctl disable ieos_daemon
```

Important note: After IEOS is turned off, wireless networking functions such as dialing and Wi-Fi require native Linux commands, and there is no way to remotely manage devices on the DeviceLive platform.

## 3.3.2.1 Network management

## 3.3.2.1.1 Set up a static IP address

If you want to set static IP address for EC300, through the command vim/etc/network/interfaces. D/eth1 or vim/etc/network/interfaces. D/for eth2 modify the corresponding network configuration file to the default gateway for Ethernet interface, address, Network and subnet mask. As an example, let's set a static IP address for the eth2 port:

After changing the interface IP configuration, run /etc/init.d/networking restart to restart the network service for the configuration to take effect.

## 3.3.2.1.2 Set up a dynamic IP address

If you want to set dynamic IP address for EC300, through the command vim/etc/network/interfaces. D/eth1 or vim/etc/network/interfaces. D/for eth2 modify the corresponding network configuration file, Setting it to DHCP after inet will automatically get the IP address.

Here is an example of setting a dynamic IP to the eth1 port.

After changing the interface IP configuration, run /etc/init.d/networking restart to restart the network service for the configuration to take effect.

## 3.3.2.3 System administration

### 3.3.2.3.1 Querying the firmware version

To check the computer firmware version for the EC300, type:



### 3.3.2.3.2 Check available disk space

To determine the amount of available drive space, use the df command with the -h option. The system will return the amount of drive space broken down by file system. For EC300 products, the disk partition available to users is /dev/mmcblk0p8. Here's an example:

```
edge@edge-computer:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/mmcblk0p8  9.6G  139M  8.9G   2% /userdata
/dev/loop0      128K  128K     0 100% /userdata/.ro/layer
overlay         9.6G  139M  8.9G   2% /
/dev/mmcblk0p6   57M   16K   53M   1% /etc/.ieos
tmpfs           464M  8.0K  464M   1% /tmp
devtmpfs        4.0M     0  4.0M   0% /dev
tmpfs           464M     0  464M   0% /dev/shm
tmpfs           186M  1.1M  185M   1% /run
tmpfs           5.0M     0  5.0M   0% /run/lock
tmpfs            93M  4.0K   93M   1% /run/user/0
edge@edge-computer:~$
```

## 3.3.2.3.4 Adjust the time

The EC300 has two time Settings. One is system time and the other is RTC (Real Time Clock) time, which is maintained by the EC300's hardware. Use the date command to query the current system time or to set a new system time. Use the hwclock command to query the current RTC time or set a new RTC time.

Set the system time with the command date MMDDhhmmYYYY:

MM: month

DD: day

hh: hour

mm: minutes

YYYY: Year

```
edge@edge-computer:~$ sudo date 030115052023
Wed Mar  1 15:05:00 CST 2023
```

RTC time can be set to system time using the following command

```
edge@edge-computer:~$ sudo hwclock
2023-03-01 15:05:55.192961+08:00
```

Click on the link below for more details about the date and time:

https://www.debian.org/doc/manuals/system-administrator/ch-sysadmin-time.html

https://wiki.debian.org/DateTime

## 3.3.2.3.5 set time zone

There are two ways to configure the time zone for the EC300. One is to use the command tzselect. The other is to use the /etc/localtime file.

## 3.3.2.3.6 Use the tzselect command

When you type the tzselect command, you will be taken to the area selection screen. Select the approximate area (divided by continent and ocean) and enter the number in front of the continent or ocean

```
edge@edge-computer:~$ tzselect
Please identify a location so that time zone rules can be set correctly.
Please select a continent, ocean, "coord", or "TZ".
 1) Africa
 2) Americas
 3) Antarctica
 4) Asia
 5) Atlantic Ocean
 6) Australia
 7) Europe
 8) Indian Ocean
 9) Pacific Ocean
10) coord - I want to use geographical coordinates.
11) TZ - I want to specify the time zone using the Posix TZ format.
```

Then select the continent or the country under the ocean

```
#? 4
Please select a country whose clocks agree with yours.
 1) Afghanistan        18) Israel          35) Palestine
 2) Armenia            19) Japan           36) Philippines
 3) Azerbaijan         20) Jordan          37) Qatar
 4) Bahrain            21) Kazakhstan      38) Russia
 5) Bangladesh         22) Korea (North)   39) Saudi Arabia
 6) Bhutan             23) Korea (South)   40) Singapore
 7) Brunei             24) Kuwait          41) Sri Lanka
 8) Cambodia           25) Kyrgyzstan      42) Syria
 9) China              26) Laos            43) Taiwan
10) Cyprus             27) Lebanon         44) Tajikistan
11) East Timor         28) Macau           45) Thailand
12) Georgia            29) Malaysia        46) Turkmenistan
13) Hong Kong          30) Mongolia        47) United Arab Emirates
14) India             31) Myanmar (Burma)  48) Uzbekistan
15) Indonesia          32) Nepal           49) Vietnam
16) Iran               33) Oman            50) Yemen
17) Iraq               34) Pakistan
```

Follow the steps above to get the China time zone keyword Asia/Shanghai and execute the following command to set the time zone

```
#? 9
Please select one of the following time zone regions.
1) Beijing Time
2) Xinjiang Time
#? 1

The following information has been given:

        China
        Beijing Time

Therefore TZ='Asia/Shanghai' will be used.
Selected time is now:   Wed Mar  1 15:07:31 CST 2023.
Universal Time is now:  Wed Mar  1 07:07:31 UTC 2023.
Is the above information OK?
1) Yes
2) No
#? Yes
Please enter a number in range.
#? 1

You can make this change permanent for yourself by appending the line
        TZ='Asia/Shanghai'; export TZ
to the file '.profile' in your home directory; then log out and log in again.

Here is that TZ value again, this time on standard output so that you
can use the /usr/bin/tzselect command in shell scripts:
Asia/Shanghai
```

## 3.3.2.3.7 Using a localtime file

The localtime zone is stored in /etc/localtime and is used by the GNU library for C (glibc) if no value is set for the TZ environment variable. This file is either a copy of /usr/share/zoneinfo/file or a symbolic link to it. If EC300 cannot find/usr/share/zoneinfo/file, please download from the web site you need the time zone information file (https://www.iana.org/time-zones), and links to the local time in the EC300 file.

Note

After successfully downloading the required time zone information file, unzip it, and then compile and generate the corresponding binary file using zic command. The generated time zone file is "/usr/share/zoneinfo/custom time zone filename".

# 4 Advanced configuration of the peripheral interface

In this chapter, we will introduce the advanced configuration of peripheral interfaces for EC300, an edge computer based on Arm architecture.

This chapter covers the following topics:

## 4.1 Serial Ports

EC300 has four serial ports, one serial port supports RS485, three serial ports support RS-232 or RS-485 mode.

The corresponding device node for COM1 is /dev/ttyS4

The device node for COM2 is /dev/ttyS5

The device node for COM3 is /dev/ttyS6

COM4 is represented by /dev/ttyS8

## 4.1.1 Change the serial port Settings

View and set the serial port with the stty command

To see the details, type sudo stty --help:

```
edge@edge-computer:~$ sudo stty --help
Usage: stty [-F DEVICE | --file=DEVICE] [SETTING]...
  or:  stty [-F DEVICE | --file=DEVICE] [-a|--all]
  or:  stty [-F DEVICE | --file=DEVICE] [-g|--save]
Print or change terminal characteristics.

Mandatory arguments to long options are mandatory for short options too.
  -a, --all          print all current settings in human-readable form
  -g, --save         print all current settings in a stty-readable form
  -F, --file=DEVICE  open and use the specified DEVICE instead of stdin
      --help     display this help and exit
      --version  output version information and exit

Optional - before SETTING indicates negation.  An * marks non-POSIX
settings.  The underlying system defines which settings are available.

Special characters:
 * discard CHAR  CHAR will toggle discarding of output
   eof CHAR      CHAR will send an end of file (terminate the input)
   eol CHAR      CHAR will end the line
 * eol2 CHAR     alternate CHAR for ending the line
   erase CHAR    CHAR will erase the last character typed
   intr CHAR     CHAR will send an interrupt signal
   kill CHAR     CHAR will erase the current line
 * lnext CHAR    CHAR will enter the next character quoted
   quit CHAR     CHAR will send a quit signal
 * rprnt CHAR    CHAR will redraw the current line
   start CHAR    CHAR will restart the output after stopping it
   stop CHAR     CHAR will stop the output
   susp CHAR     CHAR will send a terminal stop signal
 * swtch CHAR    CHAR will switch to a different shell layer
 * werase CHAR   CHAR will erase the last word typed

Special settings:
   N               set the input and output speeds to N bauds
 * cols N          tell the kernel that the terminal has N columns
 * columns N       same as cols N
 * [-]drain        wait for transmission before applying settings (on by default)
   ispeed N        set the input speed to N
 * line N          use line discipline N
   min N           with -icanon, set N characters minimum for a completed read
   ospeed N        set the output speed to N
 * rows N          tell the kernel that the terminal has N rows
 * size            print the number of rows and columns according to the kernel
   speed           print the terminal speed
   time N          with -icanon, set read timeout of N tenths of a second

Control settings:
   [-]clocal       disable modem control signals
   [-]cread        allow input to be received
 * [-]crtscts      enable RTS/CTS handshaking
   csN             set character size to N bits, N in [5..8]
   [-]cstopb       use two stop bits per character (one with '-')
   [-]hup          send a hangup signal when the last process closes the tty
   [-]hupcl        same as [-]hup
```

```
   [-]parenb       generate parity bit in output and expect parity bit in input
   [-]parodd       set odd parity (or even parity with '-')
 * [-]cmspar       use "stick" (mark/space) parity
```

```
Input settings:
   [-]brkint     breaks cause an interrupt signal
   [-]icrnl      translate carriage return to newline
   [-]ignbrk     ignore break characters
   [-]igncr      ignore carriage return
   [-]ignpar     ignore characters with parity errors
 * [-]imaxbel    beep and do not flush a full input buffer on a character
   [-]inlcr      translate newline to carriage return
   [-]inpck      enable input parity checking
   [-]istrip     clear high (8th) bit of input characters
 * [-]iutf8      assume input characters are UTF-8 encoded
 * [-]iuclc      translate uppercase characters to lowercase
 * [-]ixany      let any character restart output, not only start character
   [-]ixoff      enable sending of start/stop characters
   [-]ixon       enable XON/XOFF flow control
   [-]parmrk     mark parity errors (with a 255-0-character sequence)
   [-]tandem     same as [-]ixoff

Output settings:
 * bsN           backspace delay style, N in [0..1]
 * crN           carriage return delay style, N in [0..3]
 * ffN           form feed delay style, N in [0..1]
 * nlN           newline delay style, N in [0..1]
 * [-]ocrnl      translate carriage return to newline
 * [-]ofdel      use delete characters for fill instead of NUL characters
 * [-]ofill      use fill (padding) characters instead of timing for delays
 * [-]olcuc      translate lowercase characters to uppercase
 * [-]onlcr      translate newline to carriage return-newline
 * [-]onlret     newline performs a carriage return
 * [-]onocr      do not print carriage returns in the first column
   [-]opost      postprocess output
 * tabN          horizontal tab delay style, N in [0..3]
 * tabs          same as tab0
 * -tabs         same as tab3
 * vtN           vertical tab delay style, N in [0..1]

Local settings:
   [-]crterase   echo erase characters as backspace-space-backspace
 * crtkill       kill all line by obeying the echoprt and echoe settings
 * -crtkill      kill all line by obeying the echoctl and echok settings
 * [-]ctlecho    echo control characters in hat notation ('^c')
   [-]echo       echo input characters
 * [-]echoctl    same as [-]ctlecho
   [-]echoe      same as [-]crterase
   [-]echok      echo a newline after a kill character
 * [-]echoke     same as [-]crtkill
   [-]echonl     echo newline even if not echoing other characters
 * [-]echoprt    echo erased characters backward, between '\' and '/'
 * [-]extproc    enable "LINEMODE"; useful with high latency links
 * [-]flusho     discard output
   [-]icanon     enable special characters: erase, kill, werase, rprnt
   [-]iexten     enable non-POSIX special characters
   [-]isig       enable interrupt, quit, and suspend special characters
```

```
   [-]noflsh     disable flushing after interrupt and quit special characters
 * [-]prterase   same as [-]echoprt
 * [-]tostop     stop background jobs that try to write to the terminal
 * [-]xcase      with icanon, escape with '\' for uppercase characters
```

```
Combination settings:
 * [-]LCASE         same as [-]lcase
   cbreak           same as -icanon
   -cbreak          same as icanon
   cooked           same as brkint ignpar istrip icrnl ixon opost isig
                    icanon, eof and eol characters to their default values
   -cooked          same as raw
   crt              same as echoe echoctl echoke
   dec              same as echoe echoctl echoke -ixany intr ^c erase 0177
                    kill ^u
 * [-]decctlq       same as [-]ixany
   ek               erase and kill characters to their default values
   evenp            same as parenb -parodd cs7
   -evenp           same as -parenb cs8
 * [-]lcase         same as xcase iuclc olcuc
   litout           same as -parenb -istrip -opost cs8
   -litout          same as parenb istrip opost cs7
   nl               same as -icrnl -onlcr
   -nl              same as icrnl -inlcr -igncr onlcr -ocrnl -onlret
   oddp             same as parenb parodd cs7
   -oddp            same as -parenb cs8
   [-]parity        same as [-]evenp
   pass8            same as -parenb -istrip cs8
   -pass8           same as parenb istrip cs7
   raw              same as -ignbrk -brkint -ignpar -parmrk -inpck -istrip
                    -inlcr -igncr -icrnl -ixon -ixoff -icanon -opost
                    -isig -iuclc -ixany -imaxbel -xcase min 1 time 0
   -raw             same as cooked
   sane             same as cread -ignbrk brkint -inlcr -igncr icrnl
                    icanon iexten echo echoe echok -echonl -noflsh
                    -ixoff -iutf8 -iuclc -ixany imaxbel -xcase -olcuc -ocrnl
                    opost -ofill onlcr -onocr -onlret nl0 cr0 tab0 bs0 vt0 ff0
                    isig -tostop -ofdel -echoprt echoctl echoke -extproc -flusho,
                    all special characters to their default values

Handle the tty line connected to standard input.  Without arguments,
prints baud rate, line discipline, and deviations from stty sane.  In
settings, CHAR is taken literally, or coded as in ^c, 0x37, 0177 or
127; special values ^- or undef used to disable special characters.

GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
Report stty translation bugs to <https://translationproject.org/team/>
Full documentation at: <https://www.gnu.org/software/coreutils/stty>
or available locally via: info '(coreutils) stty invocation'
```

## 4.1.2 View the serial port information

```
edge@edge-computer:~$ sudo stty -a -F /dev/ttyS3
speed 9600 baud; rows 0; columns 0; line = 0;
intr = ^C; quit = ^\; erase = ^?; kill = ^U; eof = ^D; eol = <undef>;
eol2 = <undef>; swtch = <undef>; start = ^Q; stop = ^S; susp = ^Z; rprnt = ^R;
werase = ^W; lnext = ^V; discard = ^O; min = 1; time = 0;
-parenb -parodd -cmspar cs8 hupcl -cstopb cread clocal -crtscts
-ignbrk -brkint -ignpar -parmrk -inpck -istrip -inlcr -igncr icrnl ixon -ixoff
-iuclc -ixany -imaxbel -iutf8
opost -olcuc -ocrnl onlcr -onocr -onlret -ofill -ofdel nl0 cr0 tab0 bs0 vt0 ff0
isig icanon iexten echo echoe echok -echonl -noflsh -xcase -tostop -echoprt echoctl
echoke -flusho -extproc
```

## 4.1.3 Set the baud rate of COM1 serial port

```
edge@edge-computer:~$ sudo stty -F /dev/ttyS4 ispeed 9600 ospeed 9600 cs8
```

Note

## 4.2 the USB interface

The EC300 provides a USB 2.0 Host interface, which is mainly used to expand storage devices

The EC300 supports USB storage device hotplugging.

Note

Remember to enter the sync sync command before disconnecting your USB mass storage device to prevent data loss. When you disconnect the storage device, exit from the mount directory.

## 4.3 Mount the micro SD card

The EC300 supports micro SD memory cards without hotplugging. Mount the reference
https://www.man7.org/linux/man-pages/man8/mount.8.html

## 4.4 CAN bus interface

The three-way CAN port of the EC300 supports the CAN bus.

### 4.4.1 Configure the connection CAN interface

By default, the CAN port will be initialized. If you need any other configuration, check the CAN device using the ip link command. To check the status of the CAN device, use the ip link command:

To configure a CAN device, use ip link set can* down to first turn off the device

Where can* down is selected from can1, can2, or can3.

```
edge@edge-computer:~$ sudo ip link set can1 down
edge@edge-computer:~$ 
```

Then configure the bit rate (here's a 50k bit rate example) :

```
edge@edge-computer:~$ sudo ip link set can1 type can bitrate 50000 dbitrate 50000 fd on
edge@edge-computer:~$ 
```

Finally turn the device back on

```
edge@edge-computer:~$ sudo ip link set can1 up
edge@edge-computer:~$ 
```

# 4.5 IO Debugging

The EC300 supports 4-way IO input and 4-way IO output.

| Port number | Device description file |
|---|---|
| DI0 | /sys/class/gpio/gpio454/value |
| DI1 | /sys/class/gpio/gpio455/value |
| DI2 | /sys/class/gpio/gpio456/value |
| DI3 | /sys/class/gpio/gpio457/value |
| DO0 | /sys/class/gpio/gpio323/value |
| DO1 | /sys/class/gpio/gpio453/value |
| DO2 | /sys/class/gpio/gpio465/value |
| DO3 | /sys/class/gpio/gpio461/value |

Reading the DI status can be done using cat "Device profile";

```
edge@edge-computer:~$
edge@edge-computer:~$ cat /sys/class/gpio/gpio454/value
0
edge@edge-computer:~$
```

DO status can be controlled by using echo 1 > "Device Profile" or echo 0 > "Device Profile" as root user

```
root@edge-computer:/home/edge# echo 0 > /sys/class/gpio/gpio323/value
root@edge-computer:/home/edge# echo 1 > /sys/class/gpio/gpio323/value
```

# 5 Security

In this chapter, we will introduce the security mechanism of EC300, an edge computer based on ARM architecture.

## 5.1 sudo mechanism

In EC300, the root user is banned for better security. Sudo is a program that lets the system administrator allow an approved user to execute some commands as the root user or another user. The most basic rule is to give as few privileges as possible to get the job done. Using sudo is more secure than root session opening for a number of reasons, including:

• Grant privileges to normal users without having to know the root password (sudo will prompt for the current user's password)

• It's easy to run privileged commands via sudo, and the rest of the time, work as an unprivileged user, reducing potential damage due to wrong operations.

## 5.2 Firewalls

Netfileter/iptables is an excellent and free firewall tool based on packet filtering which comes with nuix/linux system. It is very powerful and flexible, and can control the data packets flowing in, out and through the server in fine detail.

## 5.3 TPM2.0

TPM stands for "Trusted Platform Module" and it is a hardware security module designed to provide security and encryption capabilities for computer systems. It is a secure microcontroller that can be embedded in a computer system or sold as a standalone hardware device. It contains a cryptographic coprocessor for storing encryption keys, digital certificates, and other secure data, as well as supporting multiple cryptographic algorithms and security protocols. On EC300, the standard TPM2 protocol stack and TPM2 tools have been integrated for user use.

# 6 The system restores factory Settings

In this chapter, we will describe how EC300, an edge computer based on Arm architecture, restores factory Settings and updates.

This chapter covers the following topics:

## 6.1 Restore factory Settings

There are two ways to restore factory Settings:

1. By typing the command, the system will automatically restart and restore the factory Settings.

```
edge@edge-computer:~$ sudo update reset
```

2. Restore factory Settings by pressing:

- Long press the restore factory Settings button for 10-20s and see the warn light long on.

- When the warn light has turned on, release the Restore Factory Settings button.

- After releasing the Restore Factory Settings button, the error light blinks several times before the system starts to restart and perform Restore Factory Settings

- After the system restarts, the warn light and error light will flash, and status will be off; After about 30s, when both warn light and error light stop flashing and status starts flashing at the same time, the system is finished restoring the factory Settings.

# 7 Programming Guidelines

EC300 provides a JSON format device information description file. Customers who need to operate IO, LED, serial port and other peripherals can obtain the device node information of these peripherals by querying the device description information file.

Device description file path: /tmp/ieos/etc/system_info.json, the content is as follows:

```
{
  "device_info": {
"model_info": {
"model": "EC312",
"pn": "H-LQA3-LC4D",        "sn
": "CL3124050000001",
"oem": "inhand",        "features
": "; std; cell-LQA3; wlan;"
},
"software_info": {"boot_loader
": "V1.0.2", "kernel
": "5.10.168", "version
": "V1.0.1-beta1", "os
": "Debian GNU/Linux 11 (bullseye)"
},
"hardware_info": {"arch
```

": "armv8",        "soc

": "AM6231",       "interface

": {        "eth

": [

{

"iface_name": "eth1",

"iface_mac": "00:08:5f:17:04:00"

},

{

"iface_name": "eth2",

"iface_mac": "00:18:5f:17:04:02"

}

],

"wlan": [

{

"iface_name": "wlan0",            "iface_mac

": "f4:3c:3b:ca:e9:36"

},

{            "iface_name

": "wlan1",           "iface_mac

": "f6:3c:3b:ca:e9:36"

}

]

},     "gpio

": [

{        "gpio_name

": "cellular_power",         "dev_node

": "/sys/class/gpio/gpio401"

},

{        "gpio_name

": "sim_switch",          "dev_node

": "/sys/class/gpio/gpio405"

}

],      "user_key

": [        {         "user_key_name": "user1",          "dev_node":

"/dev/input/event2"          }       ],       "uart":

[        {               "uart_name": "com1",            "dev_node": "/dev/ttyS4"          },
{          "uart_name":

"com2",           "dev_node": "/dev/ttyS5"          }        ],        "led": [          {
"led_name":

"user1",            "dev_
node": "/sys/class/leds/user1"           },          {               "led_name":

"user2",           "dev_node": "/sys/class/leds/user2"           },
{          "led_name":

"user3",           "dev_node": "/sys/class/leds/user3"           },
{          "led_name":

"user4",           "dev_node": "/sys/class/leds/user4"           },
{          "led_name":

"cell",          "dev_node": "/sys/class/leds/cell"          },          {          "led_name":

"warn",          "dev_node": "/sys/class/leds/warn"          },          {          "led_name":

"status",          "dev_node": "/sys/class/leds/status"          }
],      "io": {          "di":

[          {                    "di_name": "di1",                    "dev_nod
e":

"/sys/class/gpio/gpio454"          },          {                    "di_name":
"di2",          "dev
_node":

"/sys/class/gpio/gpio455"          },          {          "di_name": "di3",
"dev_node":

"/sys/class/gpio/gpio456"          },          {          "di_name": "di4",
"dev_node":

"/sys/class/gpio/gpio457"          }          ],          "do":
[          {          "do_name":

"do1",            "dev_node": "/sys/class/gpio/gpio323"           },          {

  "do_name":


"do2",            "dev
_node": "/sys/class/gpio/gpio453"           },          {                "do_name":


"do3",            "dev_node": "/sys/class/gpio/gpio465"           },

  {            "do_name":


"
do4",            "dev_node": "/sys/class/gpio/gpio461"           }       ]       }   }   }}

# 7.1 IO Programming Guide

Currently, there are a total of 8 IO interfaces on the device: for example, there are 4 input pins from DI1 to DI4 on the device panel; DO1~DO4 are 4 output pins.

According to the device description file /tmp/ieos/etc/system_info.json, the IO device nodes are:

When you need to programming IO interface, direct manipulation background device nodes below the value value (sys/class/gpio/gpioxxx/value)
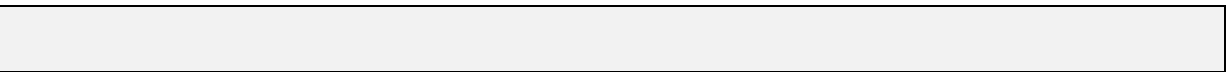
Case study:

When DO1 need to output high electricity at ordinary times, can be directly to **sys/class/write 1 gpio/gpio323 / value**

echo 1 > /sys/class/gpio/gpio323/value

When you need to check the DI1 level is, the same can be directly to check **the sys/class/gpio gpio454 / the value of the** value

cat /sys/class/gpio/gpio454/value

The full shell script:

<br>

# 7.2 Led Programming Guide

The user can use the four lights USER1, USER2, USER3 and USER4 on the device for status prompts, please check the light label to confirm the position of the light.

According to the device description information file /tmp/ieos/etc/system_info.json, the device node corresponding to LED can be obtained as follows:

user1: /sys/class/leds/user1

user2: /sys/class/leds/user2

user3: /sys/class/leds/user3

user4: /sys/class/leds/user4

There are some control files in /sys/class/leds/user1 to control the attributes and status of leds:

/ sys/class/leds/user1 / brightness: this file is used to control the user1 lights on or off. Write 1 to always on, write 0 to always off.

/ sys/class/leds/user1 / trigger: leds trigger, can write the timer timer trigger, write none said cancel the trigger.

/ sys/class/leds/user1 / delay_on: it is time to file said led lights, is an unit with ms.

/ sys/class/leds/user1 / delay_off: it is time to file said led lights, is an unit with ms.

If trigger is configured for timing, the value in the brightness will no longer take effect and will automatically change to 0.

Replace user1 with user2 in the file path to control the operation of the USER2 light, and the same for USER3 and USER4.

Example:

Write 1 to the brightness file when you need the USER1 light to be on

echo 1 > /sys/class/leds/user1/brightness

When the USER1 light is needed to flash, the timer is written to the trigger file, and the light and off times are controlled by delay_on and delay_off

```
Echo # start timer
 timer > / sys/class/leds light echo 1 seconds/user1
 / trigger
#
 > 1000 / sys/class/leds/user1 / delay_on
 echo out
# 1 seconds
 1000 > /sys/class/leds/user1/delay_off
```

Full shell script:

```
#! /bin/bashUS
ER1_BRIGTHNESS
="/sys/class/leds/user1/brightness"USER1_TRIGGER
```

```
="/sys/class/leds/user1/trigger"USER1_DELAY_ON
= "/ sys/class/leds/user1 / delay_on" USER1_DELAY_OFF
 = "/ sys/class/leds/user1 / delay_off" # light user
1
 lamps if [-f "$
USER1_BRIGTHNESS" ]; then echo 1 > $U
SER1_BRIGTHNESSelse echo "no
file exit "$USER1_BRIGTHNESSfi# Set the USER1 light to flash if [-f "$USER1_TRIGGER"];




 then echo timer > $USER1_TRIGGERelse echo "no file
 exit "$USER1_TRIGGERfi# Set the USER1 light to f
la
sh 100
0msif [-f


"$USER1_DELAY_ON" ]; then echo 1000 > $USER1_DELAY_ONelse echo "no file exit
"$USER1_DELAY_ONfi# Set USER1 light off 1000msif [-f







"$USER1_DELAY_OFF" ]; then echo 1000 > $USER1_DELAY_OFFelse echo "no file exit
"$USER1_DELAY_OFFfi# Turn off USER1 blink if [-f "$USER1_TRIGGER
"];







 then    echo none > $US
```

```
ER1_TRIGGERelse    echo "no file exit
"$US
ER1_TRIGGERfi
```

# 7.3 Cross-compiling

A user's own c/ C ++ program can be cross-compiled by using the cross-compilation toolchain on the development machine, and then the object file is uploaded to the EC300 device for execution.

Cross-compilation tool zip package: gcc-linaro-6.3.1-2017.05-x86_64_aarch64-linux-gnu.tar.gz

Here's how to configure the environment variables for the cross-compilation toolchain:

1. Unzip gcc-linaro-6.3.1-2017.05-x86_64_aarch64-linux-gnu.tar.gz to /opt on your development machine (you can also unzip it to any other PATH, adjust the path environment variable in step 2)

2. Edit the ~/.bashrc file and add a line PATH=$PATH:/opt/gcc-linaro-6.3.1-2017.05-x86_64_aarch64-linux-gnu/bin at the end of the file

3. Execute source ~/.bashrc to make the environment variables work in the current terminal; The newly opened terminal will take effect automatically.

Using the classic hello world program as an example, create the following directories and files

```
mkdir ~/example
touch ~/example/hello.c
touch ~/example/Makefile
```

The contents of the ~/example/hello.c file are as follows:

```c
#include <stdio.h>


int main(void)
 {

        printf("hello, world! \n");

         return 0;

}
```

The contents of the ~/example/Makefile are as follows:

```makefile
# Define TARGET and source filenames
target := hellworld
DIRS := $(shell find.-maxdepth 3-type d)
SRCS := $(foreach dir,$(DIRS),$(wildcard $(dir)/*.c))
OBJS := $(SRCS:.c=.o)



CC=aarch64-linux-gnu-gcc


# Define compiler and compile options
CFLAGS := -Wall-Wextra -g-wno-unused-parameters


# define default TARGET
all: $(TARGET)


# define target file dependencies and compile commands
$(TARGET): $(OBJS)
$(CC) $(CFLAGS) $(LIBS) $^ -o $@


# Define the command to compile the source file to the target file
 %.o: %.c
 $(CC) $(CFLAGS) $(LIBS) -C $< -o $@


# Define command to clear temporary files
 clean:
 rm -f $(TARGET) $(OBJS)
```

```
# declare pseudo target ".PHONY"

.PHONY: all clean
```

Run make in the ~/example directory to generate the object file helloworld

FCC STATEMENT

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

conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause

undesired operation.

NOTE 1: This equipment has been tested and found to comply with the limits for a Class B

digital device , pursuant to part 15 of the FCC Rules. These limits are designed to provide

reasonable protection against harmful interference in a residential installation. This equipment

generates, uses and can radiate radio frequency energy and, if not installed and used in

accordance with the instructions, installed and used in accordance with the instructions, may

cause harmful interference to radio communications. However, there is no guarantee that

interference will not occur in a particular installation. If this equipment does cause harmful

interference to radio or television reception, which can be determined by turning the

equipment off and on, the user is encouraged to try to correct the interference by one or more

of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is

connected.

-Consult the dealer or an experienced radio/TV technician for help.

NOTE 2: Any changes or modifications to this unit not expressly approved by the party

responsible for compliance could void the user's authority to operate the equipment.

RF Exposure

The equipment complies with FCC radiation exposure limits set forth for an uncontrolled

environment. This device should be installed and operated with minimum distance 20cm

between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or

transmitter. The availability of some specific channels and/or operational frequency bands is

country dependent and firmware programmed at the factory to match the intended destination.

The firmware setting is not accessible by the end user.

IC STATEMENT

This device complies with Industry Canada license-exempt RSS standard(s): Operation is

subject to the following Two conditions:

(1) this device may not cause interference, and

(2) This device must accept any interference, including interference that may cause

undesired operation

of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio

exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareildoit accepter tout brouillage radioélectrique subi, même si le

brouillage est susceptible d'en compromettre le fonctionnement.

CAN ICES-3 (B)

Avis d'Industrie Canada

Le présent appareil est conforme aux CNR d'industrie Canada applicables aux appareils radio

exem pts de licence L'exploitation est autorisée aux deux conditions suivantes:

1) l'appareil ne doit pas produire de brouillage; et

2) l'utillsateur de l'appareil doit accepterbrouillage radioélectrique subi meme si le brouillage

est susceptible d'encompromettre le fonctionnement. mauvais fonctionnement de l'appareil.

Cet appareil numériquie de la classe B est conforme à la norme NMB-003 du Canada.

CAN NMB-3 (B)

Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled

environment. This equipment should be installed and operated with minimum distance 20cm

between the radiator & your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20cm de distance entre la source de rayonnement et votre corps.