

EC954-FQ38 User's Munual_V2.0

Edge Computer EC954-FQ38

Series User's Manual

(Compatible with Debian 11, IEOS V2.0.0 and above versions)

Version 2.0, January 2024

www.inhandnetworks.com.cn



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1 Introduction

This user manual is applicable to the Edge Computer EC954 series based on Arm architecture, and covers a complete set of instructions applicable to all supported models. Before referring to these chapters, please confirm if the hardware specifications of your computer model support the features/settings covered.

2 Hardware installation instructions

In this chapter, we will introduce the hardware installation instructions of the edge computer EC954 series based on Arm structure.

2.1 Introduction

The following chapter takes the EC954 series as an example to describe the application of external connectors and pin assignments in the EC954 series.

2.2 EC954-FQ38 Panel

Top panel



Front panel



2.3 EC954-FQ38 External Connector

2.3.1 Ethernet

These are four RJ45 connectors for Ethernet connection



EC954-FQ38 has four RJ45 Ethernet ports and supports 10M/100M/1000M adaptive rates.

Green light: The LINK indicator light is on for a long time when the peer device has a 1000M interface, and off for a long time when the peer device has a 10/100M interface.

Yellow light: ACT light, flashing when there is data

2.3.2 Serial port

EC954-FQ38 supports 8 serial ports, with the first 4 channels supporting RS-232, RS-485, or RS-422 communication. The software is configurable, and the last 4 channels are fixed to RS-485



RJ45 pin number	RS-232	RS-422	RS-485
one	DSR	-	-
two	RTS	TxD+	-
three	GND	GND	GND
four	TxD	TxD-	-
five	RxD	RxD+	Data+
six	DCD	RxD-	Data-
seven	стѕ	-	
eight	DTR	-	

2.3.3 CAN

EC954-FQ38 has a 2-way CAN bus interface and supports the CAN 2.0A/B standard. CAN2 is compatible with CAN FD and can reach a maximum speed of 5Mbps.



RJ45 pin number	RS-232	RS-422	RS-485
one	DSR	-	-
two	RTS	TxD+	-
three	GND	GND	GND
four	TxD	TxD-	-
five	RxD	RxD+	Data+
six	DCD	RxD-	Data-
seven	CTS	-	
eight	DTR	-	

2.3.4 Digital Input Interface

Interface identification	Function	Describe
СОМ	DI Common Port	
DIO	Digital input interface 0	4-way digital input DI,
	g	Dry contact status
DI1	Digital input interface No.1	"1": Closed dry contact status
DI2	Digital input interface No.2	"0": Open
DI3	Digital input interface No.3	Isolation 3000VDC

2.3.5 Digital Output Interface

Interface identification	function	describe
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GND	DO grounding terminal	
DO0	Digital output interface 0	4-channel digital output
DO1	Digital output interface No.1	DO,
DO2	Digital output interface No.2	Isolation 3000VDC
DO3	Digital output interface No.3	

2.3.6 USB

EC954-FQ38 provides two USB 2.0 Host interfaces.



2.3.7 LED



EC954-FQ38 has 12 LED lights that respectively indicate the power supply and system operation status.

Identification	Name	Definition
PWR	Power indicator light	Always on when powered on
STAT	System operation status indicator light	When the system starts up normally, the STATUS flashes. If there is an abnormality during the system startup phase that causes the system to fail to start; When the factory operation is not yet completed, the STATUS will be turned off for a long time.

WARN	Warning indicator light	When a warning exception occurs in the system and the system upgrade or factory restoration is not yet completed, the WARN light flashes.
ERR	Error indicator light	When a serious error occurs in the system and the system upgrade or factory recovery is not yet completed, the Error light flashes.
SIM1	SIM1 card indicator light,	When selecting SIM card 1 for dialing, it always lights up. When selecting SIM card 2 for dialing or turning off dialing, it stays off.
SIM2	SIM1 card indicator light, if selected, it remains on	When selecting SIM card 2 for dialing, it always lights up. When selecting SIM card 1 for dialing or turning off dialing, it stays off.
USER1	User programmable indicator light 1	Default off, can be programmed and controlled by the user
USER2	User programmable indicator light 2	Default off, can be programmed and controlled by the user
4G	Cellular network connection status indicator light	Always on after successful dialing
L1	Cellular network signal strength	
L2	Cellular network signal strength	See instructions for cellular network signal strength indicator lights
L3	Cellular network signal strength	

Cellular network signal strength indicator light

LED	No signal	Weak signal (RSSI<-90)	Signal medium (-90<=RSSI<-70)	Signal strength (RSSI>=-70)
L1	Extincti on	bright	bright	bright

L2	Extincti on	Extinction	bright	bright
L3	Extincti on	Extinction	Extinction	bright

In addition to the combination of L1, L2, and L3 signal lights to indicate cellular signal strength, there is also a set of LED combinations to indicate the process of factory restoration.

LED	state
WARN	flicker
Error	flicker
STATUS	Extinguish

After restoring the factory settings, the system will undergo a restart. After the restart is completed, the factory reset is not complete. At this time, the WARN light and ERROR flash, and the STATUS goes out. In this state, the device cannot be powered off, otherwise it may cause some files to be lost and affect system functions. This state will last for 30 seconds. After the factory is restored, WARN and ERROR will turn off, and STATUS will flash.

2.3.8 User programmable buttons

EC954-FQ38 provides an API interface, which users can call to detect the status of programmable buttons and then implement their own button logic.



2.3.9 DC Input

EC954-FQ38 supports 12-48V DC input



2.3.10 SIM card slot

EC954-FQ38 supports 2 SIM card slots. SIM cards need to be installed in a power-off state. Simply press and insert the SIM card into the slot.



2.3.11 MicroSD card slot

EC954-FQ38 has a MircoSD card slot, and SD does not support hot swapping. It needs to be plugged and unplugged in the event of a power outage. After inserting the SD card and powering on the device, the system will automatically mount all partitions.

2.3.12 Factory Reset Button

There is a reset button for restoring the system to factory settings. Refer to <u>"Restore Factory</u> <u>Settings"</u> for operation.



2.3.13 On/Off button

EC954-FQ38 is equipped with an on/off button for power on/off.



2.3.14 Antenna interface

EC954-FQ38 has a total of 7 antenna interfaces, and the number of antennas standard for different models varies. The antennas are screwed into the corresponding antenna interfaces to complete antenna installation.



Identification	Name
ANT1	4G LTE main antenna
ANT2	4G LTE diversity receiving antenna
GNSS	GNSS antenna
WiFi1	WiFi antenna
WiFi2	WiFi antenna

Note: The device operating in the 5150-5250 MHz band, under RSS-247, The device is for indoor use only

2.3.15 mSATA hard drive interface

EC954-FQ38 supports mSata hard drives, which are not included by default at the factory. If users have high-capacity storage needs and need to purchase their own mSata hard drives, they can also consult InHand to purchase mSATA.

3 Introduction

In this chapter, we will introduce the basic configuration of the Edge Computer EC900 based on the Arm structure.

3.1 Connecting to EC900

You need a computer to connect to EC900 and log in to the command line interface. It can be connected through an Ethernet cable.

Factory default username and password:

Username: edge

Password: security@edge

EC900 devices default to creating root at the factory, but login is disabled. If you need to use the root user, please manually modify the system configuration and enter sudo - s to switch to the root user. The user edge is in the sudo group, so you can use sudo to execute system level commands under the edge user. For other details, please refer to the sudo mechanism section in Chapter 5.

Prompt

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

Take care

For security reasons, we recommend that you disable the default user account and create your own user account.

3.1.1 Connecting through SSH Console

EC900 supports SSH connection through Ethernet. Connect to EC900 using the following default IP address.

Port	Default IP
ETH 1	192.168.1.100
ETH 2	192.168.1.100
ETH 3	192.168.5.100

3.1.1.1 Linux users

Prompt

These steps apply to connecting to EC900 on a Linux PC. Please do not apply these steps to the EC900 device itself. Before running the ssh command, make sure to configure the Ethernet port IP address of the PC within a specific range. ETH1: 192.168.1.0/24, ETH2: 192.168.4.0/24, ETH3: 192.168.5.0/24, ETH4: 192.168.6.0/24.

Use the ssh command on a Linux PC to access the ETH1 port of EC900.

user@PC:-5 ssh edge@192.168.3.100

Enter **yes** to continue connecting.

The authenticity of host '192.168.3.100 (192.168.3.100)' can't be established. ECDSA key fingerprint is SHA256:jqiLREbTX6Ut2whNFdpLvCcQfN3KUnl3Ta7/dWppBCU. Are you sure you want to continue connecting (yes/no)? yes

When the interface displays the terminal prompt `edge@edge-computer:~\$`, indicating that shell commands can be entered, the connection is successful.

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3.1.1.2 Windows users

Prompt

These steps apply to connecting EC900 on a Windows PC. Please do not apply these steps to the EC900 device itself.

Please take the following steps on your Windows PC

Click on the link <u>http://www.chiark.greenend.org.uk/ ~Sgtatham/putty/download.html</u>, download PuTTY (free software), and establish the connection with the edge computer

EC900 in the way of SSH command in the Windows environment. The following figure is an example of using SSH connection:



3.2 User Account Management

3.2.1 Switch to root user

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

Prompt

Click on the link to get more information about the **sudo** command.

https://wiki.debian.org/sudo

Take care

You may receive a permission denied prompt when using certain pipes or redirection behaviors without root privileges. In this case, you must use 'sudo su - c' instead of commands such as'>','<',' etc ', and include single quotes for the complete command.

3.2.2 Creating and deleting user accounts

You can use the **useradd** and **userdel** commands to create and delete user accounts. Please make sure to use these commands on the main interface to set the relevant access permissions for this 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 🛲 🚳 sudo 📑 /bin/bash test1

Change the password for test1, use the passwd command, enter the new password, and then

repeat the process to confirm the change

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

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

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

3.2.3 Disable default user accounts

Take care

Before disabling the default account, you should first create a user account

Use the passwd command to lock the default user account and prevent edge users from logging in

edge@edge.computer:=\$ sudo passwd -1 edge
passwd: password expiry information changed.

Unlocking edge users

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

3.3 Network and System Management

EC954-FQ38 is based on the Debian 11 system, so it can use native Linux commands for network and system management; In order to facilitate user configuration, InHand has developed an IEOS system program that provides a web interface, allowing users to easily manage networks and systems through the web. However, it should be noted that when the IEOS function is enabled, IEOS will take over network and system management. At this time, using Linux native commands for network and system management may become ineffective; IEOS is enabled by default at the factory of the device. If users need to perform network and system management based on Linux native command lines, they need to first disable IEOS.

3.3.1 Web management based on IEOS

IEOS is a network management and system management program developed by InHand that runs on Linux systems. IEOS provides a web interface, allowing users to configure Ethernet IP addresses, cellular dialing, Wi Fi Station, DHCP Client/Server, static routing, firewalls, and other network configurations through the web; You can also perform operations on system time, time zone, firmware upgrades, and system restarts; In addition, IEOS also supports integration with InHand's device management platform DeviceLive, allowing users to remotely monitor and manage EC954 devices through the DeviceLive platform.

IEOS adopts a design scheme that separates state and configuration, divided into three functional modules: network management, system management, and state. Only network and system related configurations can be performed under the network management menu and system management menu, and status information needs to be viewed uniformly on the status page.

Important note: When using the IEOS program to manage network and system configurations, if Linux native commands are used at the same time, the two may affect each other, leading to abnormal running states. It is recommended that the configurations

supported by IEOS be managed through the IEOS web. For configurations not supported by IEOS, such as VPN, the configuration goals can be achieved by combining native Linux commands.

3.3.1.1 Logging into the web

Considering that the user's program may require the use of HTTP/HTTPS standard port number 80/443, IEOS uses port number 9100 as the port for HTTPS connection and does not support access through HTTP; When users access the web using HTTP, they will automatically redirect to using HTTPS. This document takes the default address 192.168.4100 through eth2 as an example for explanation. After entering 192.168.4100:9100 in the browser, the user will be redirected to the login page

Important note: When the IEOS program is enabled, some port numbers will be reserved for internal communication, with a reserved port number range of 9100 to 9200. After enabling IEOS, customer programs should avoid using these port numbers, otherwise conflicts may occur and functional abnormalities may occur.

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3.3.1.2 Network Management

3.3.1.2.1 Configure Ethernet interface

Configure static IP addresses for the eth1 interface

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Configure DHCP Client for eth1 interface

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Start the dhcp server function on the eth1 interface and assign addresses to the underlying devices of eth1

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DHCP Server configuration parameter description:

Enable DHCP Server: Switch for DHCP Server functionality

Starting Address: The starting base address of the DHCP Server address pool, where network segment+starting address=the starting IP address of the address pool. In the screenshot, the network segment of eth1 is 192.168.1.0/24, and the base address is 1, so the starting address of the address pool is 192.168.1.1/24

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

Lease period: Lease period

3.3.1.2.2 Configure cellular dialing

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Cellular network parameter description:

Enable: switch for cellular function; The default is the enabled state.

APN Profiles: A set of dialing parameters used to configure APN, username, password, and authentication method information when dialing with a dedicated network card. If it is not a dedicated network card, there is usually no need to modify the configuration here. The dialing parameter set can add up to 10 records.

Network Mode: The cellular network format, which can choose from 3G, 4G and other related network formats, such as LTE, WCDMA, etc. If it is unclear which network standard to choose, choose automatic; The program will automatically select the most suitable network format. The default value is automatic.

Enable Default Route: Enable the add default route function. When enabled, a default route for the cellular port will be added after successful dialing. It is enabled by default.

Metric: The metric value of the default routing for cellular ports. When default routing is configured for cellular, Wi Fi, and Ethernet ports, the metric with the smallest value takes effect.

Dual SIM Enabled					
Main SIM:	SIM1	Ŷ			
Man, Number of D	ials: 3				
SIM1			SIM2		
APN Profile :	Auto	¥.	APN Profile	Auto	

Dual SIM enabled: enables the dual SIM feature. EC954 supports dual card single dial to improve network reliability. Two SIM cards need to be inserted into the device. After enabling this function, if the SIM card 1 fails to dial due to arrears, it will automatically switch to the SIM card 2 for dialing. The default is off.

Main SIM: The main SIM card will prioritize the selected SIM card for dialing. When dialing

fails a certain number of times, it will switch to another SIM card for dialing. By default, sim1 will be used for dialing first.

Max Number of Dials: After enabling the dual SIM single dial function, if the current SIM card reaches the specified number of dials, switch to another SIM card for dialing.

APN Profile: The dialing parameter set selected by the SIM card, with the default value being automatic. Usually, a dedicated network card needs to configure a dial-up parameter set and select the Index of the dial-up parameter set here.

PIN Code: The PIN code of the SIM card.

ICMP Detection Server		
Detection Interval:	60	Seconds (1-8640
* Detection Timeout:	5	Secondii (1-8640
= Detection Max Retrie	3	

Wireless cellular networks are quite complex, and sometimes there may be false dialup connections, where the dial-up status is successful but the target address cannot be pinged; When these situations occur, dialing again can restore normal operation. IEOS cellular dialing supports ICMP detection to detect fake connections. It is recommended that customers using cellular networking enable ICMP detection, so that when false connections occur, they can quickly recover.

ICMP detection parameters:

ICMP Detection Server Probes: ICMP detection address; Two detection addresses can be configured, and as long as one address is successfully detected, it indicates that there is no false connection in the cell. When both addresses are not configured, the ICMP detection function is turned off.

Detection Interval: How often should ICMP detection be conducted.

Detection Timeout: The ICMP detection timeout period. If no detection response message is received after waiting for a long time, it is considered that the detection has failed

Detection Max Retries: Maximum number of detections; When the detection fails and reaches this value, trigger a redial. Value range [1,5]

Detection Strict: Whether strict detection is enabled. When strict detection is turned off, the detection program will detect whether the messages received by the cellular interface have changed during each detection cycle. If there are changes, it indicates that the cellular network is connected, and ICMP messages will not be sent for detection, which can save some traffic; If detection is enabled, ICMP detection messages will be periodically sent regardless of whether the number of messages received by the cellular interface has changed. The default is off.

Advanced Settings 🗸 🗸		
Debug Mode enabled		
Enable Infinitely Redia		
Dial Interval:	10	Seconds (0-3600)
Signal Query Interval :	120	Seconds (0: disabled)

In advanced configuration, there are some uncommon setting options.

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

Enable Infinitely Redial: Enable infinite redial. In some cases, dialing may be in an abnormal state and can be restored to normal by restarting the system; The default infinite redial is turned off. After a certain number of failed dials, the system will restart to try to recover. Due to dialing being enabled by default, some customers may fail to dial without inserting a SIM card, and the system may restart. In this case, unlimited redial can be enabled; This way, no matter how many times the dialing fails, the system will not restart.

Dial Interval: Dialing interval; But the time to wait before proceeding to the next dial when a dial fails.

Signal Query Interval: Signal query interval. When the signal is poor, false connections may occur; At this point, there is a certain probability that redialing can solve the problem of fake connections. The dial-up program will regularly check the signal strength, and the signal detection cycle is configured here.

3.3.1.2.3 Configure Wi Fi Station

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Station Role:	Clerk 0 47					
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Enable Wi Fi: enable switch; Default Off

Client SSID: The ssid that needs to be connected, which can be manually entered; You can also obtain nearby accessible ssids by scanning the button

Enable Default Route: Whether to enable the add default route function. When enabled, a default route for the WLAN port will be added after a successful WiFi connection. It is enabled by default.

Metric: The metric value of the default routing for WiFi ports. When default routing is configured for cellular, Wi Fi, and Ethernet ports, the metric with the smallest value takes effect.

Auth Method: Authentication method, supports no authentication, WPA-PSK, WPA2-PSK, WPA-PSK/WPA2-PSK Mixed

Encrypt Mode: encryption method; Supports CCMP, TKIP, TKIP, and CCMP

WPA/WPA2 PSK Key: Key information

3.3.1.2.4 Configure static routing

The configuration here is for static routing of Ethernet. When default routing of Ethernet, cellular, and WiFi is configured simultaneously, the default routing with the lowest metric value takes effect. It is necessary to ensure that the metric value of the default route is different.

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Static routing configuration parameters:

Interface: The outbound interface for static routing

Target: Target network

Netmask: Target Netmask

Gateway: Next hop address

Metric: The metric value of static routing

3.3.1.2.5 Configure firewall



Currently, only the iptables command is supported for configuration.

3.3.1.2.6 Configure DNS

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DNS servers: DNS server addresses, supporting up to 4 configurations

Domain name hijacking: Domain name hijacking function, which can achieve binding between IP addresses and domain names.

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3.3.1.2.7 Network Diagnostics

Network diagnosis supports ping, traceroute, and nslookup functions.

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3.3.1.3 System Management

3.3.1.3.1 Basic Configuration

Cloud management

Cloud Manageme	nt
Enabled	•
* Goad Server!	DeviceUve - China (device inhandd

Enabled: an enable switch for docking with the DeviceLive platform; DeviceLive is a remote monitoring and management platform for InHand devices;

Cloud Server: DeviceLive platform has 2 addresses; One is the address of the domestic platform, and the other is the address of the overseas platform; Choose which platform to connect to here.

Time zone and NTP client

iezone 🗇 :	UTC +08:00 China,Hor	ng Kong,Taiwan,Western Au \vee
P Client:		
ync cycle :	3600 Second	s (1-36000)
ITP Server1:	0.debian.pool.ntp.org	0
TP Server2:	1 debian pool ntp.org	0
TP Server3:	2 debian pool ntp.org	Θ
TP Server4:	3 debian pool ntp org	0
	+ Add a Server	

Up to 10 NTP server addresses can be configured, and the program periodically sends synchronization requests to each server address in sequence. After successful synchronization, the system time is written to the RTC and synchronization requests are no longer sent to subsequent NTP servers.

In addition to using NTP to synchronize time, there is a synchronization button on the Device Info status page that allows for manual synchronization of time. However, this synchronization button is only displayed when the device time and local time (the time of accessing the computer used by the device) differ by more than 3 seconds.



Here, configuration import, export, and factory recovery are supported.

3.3.1.3.2 Firmware Upgrade



The automatic restart option is disabled by default. After upgrading the firmware, the system needs to be manually restarted to take effect; After enabling the automatic restart option, the system will automatically restart after a successful firmware upgrade.

3.3.1.3.3 Others

upu	🖁 Edge Con	nputer	System	Device Supervisor
0	Status	×	Other	
0	Network	*	Reboot	Reboot
٠	System	~		
	Basic		System Reset	Reset
	Firmware Update	e		
	Others			
*	Plugins			

This page has two functions: system restart and system reset. Resetting the system requires careful use. Resetting the system function will restore the configuration and file system status of the system to be consistent with the factory settings, 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 displays the host name, device model, serial number, firmware version, kernel version, file system version, as well as an overview of CPU, memory, and disk space usage.

😂 Eage Computer	terre (Institution)			Section .	en • 1	
6 See	Device Information					
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0.000		3010.0 646.2 1030.0 646				
A Page	Marriery Usegr		114			
	1222	13100233400				
	tion think Grage		675			
3						

3.3.1.4.2 Cellular dialing status information

The cellular dialing status page displays the SIM card, IMEI, IMSI, ICCID, signal strength, as well as the IP address, DNS, and other information obtained during dialing.

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. tree		Modern Statue		
Description		Advent Line: 1844	040 Bent20062014347	6411
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2969		duranty.	F1071 8	Statistica (Statistica)
1999		121	Columb.	
Factor		Celhuar Interfacer		
Firmul		CALCULAR STREET		
ing.		line fut coverind	Pallen -	Processili, -
· Interit	41	Carboning	200	. HETEL: -
0.000	*	Constant Day 1		
A Page				
22				
-3				

3.3.1.4.3 Wi-Fi Station Status Information

The Wi-Fi status page displays the IP address, gateway, and DNS information obtained after a successful Wi Fi connection.

WiFi Status		
Institute Region: STA	Status : Not surveyind	Interface Barriel -
iP Johnesi -	Ninteenand C =	Construction Time
Satteway -	2H451 -	atti -
Tigmal (mengfli) -		

3.3.1.4.4 DHCP Server status information

The DHCP Server status page displays the IP address, client host name, client host MAC, and expiration time assigned to the device as a DHCP Server.

Se Eage Compute	a Sent Section	-		a lana an 1 a
· See	DHCP Allocation			
Denie MD	Holizaria		Mai	LAMA Engination Time
Califier				
(0402)				
(VTR)	<u> </u>		No. Late	
Robert				
Grout				

3.3.1.4.5 Routing status information

The routing status page displays information such as IPv4 direct routing, static routing, and routing neighbors.

😤 Eage Computer	terre (Income)				· ·	-	
Descent -	Rames Active Poli Romes						
Colum	- Interface	Sarget	the Lange	diamin .			
1969	C MARY	noon -	110.029				
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Rubs	shahelf	1001100210					
Present.	102	PER DOB A DODA					
1	the weighter tools						
B Intant.	Inve Autorea	MAC Address		nerlace .			
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A rape	103.00123	al.Note:NPE		ei C			
	102308-4309	NERGENTARD		12			
	101.010	Resolution (N	i i i i i i i i i i i i i i i i i i i				
	sisterne.	to the other lattice		60 C			
	10.1.01.254	No 17 Sectador No.	à	60 C			
	101.01.010	No.00.01112.09	à	άŭ.			

3.3.1.4.6 Firewall status information

The firewall status information displays filtering rules, IP address mapping rules, and other information.

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	laria Descritti Delcer DelC		Freedlike Skiefike Skiefike	rangin san	446,7646 2574						
	1998		Pariets	turk.	Segri	Pretocol	14	Out	Saure Address	Distinution Address	Uption:
	Farmer		17024	150344	ACCEPT			0.50	1311/1	80.940	29417
	ine.	1	THE .	LEYNAM	*945,799		. A.	1.5	121144	80.840	/* INE Catholic
	April and	27	579	101944	ACCEPT	*		0.50	6345/6	10140	streets NELATED.
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Pages Date 199000 dong attributes (cafe it											
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			(B.)		Transfirst rule	*		1.01	40.03/9	80.830	P Not Callery
			5.U		ACCEPT	*		100	530.6/9	80849	statute NGATSEL
3			And service a	and design of the	the last set						

3.3.1.4.7 Log information

The log page can view system logs, user logs, and set the level of logs to be viewed, including Error, Info, Debug, and other levels. Logs can also be downloaded locally.

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A loss of the loss	Spectarian v	Invell All - Nay	Staards Nover	liktive v Rolatesh	v.
Debuter	(and))	Tex	Context		
1907	-	2024-00-17 10:25-02	deep/121		
1099	144	1014-05-0730.0540	dualization:		
Roder	-	2024-09-17 10 (1940	dial07112 - CMI 19903 19		
Errorit	146	2514-09-17 5435-62	6493713)		
inp	ale .	30+8-0 1635-0	dwb7728		
B latent -	10	2544-05-17 1615-62	maintitle -CMEDBACH 16		
0 (part 1)	-	304-09-17 16,25-40	August 1		
A Rept	Warring	1014-00-1216-05-02	del011112 mercine AV (CPN) failed		
	Waterig	3034-09-17 3425-42	diat(8723) fulled to chock tare		
	Warning	2014/01/17 14:25:42	dial (CD); Sheve YM card Salvet for more than 2 dimensional		
	Warong	2014-05-17 12:25-62	dial(21)2); Chaoli Arr cand falled		
	Warring	2014-01-17 16:25 47	shafat (12); Yaland Ayr 76 linnes, result restart requirem		

3.3.2 Linux based command line management

When using the Linux command line for network and system configuration, the first step is to close the IEOS program. IEOS is managed through system ctl,

The way to close IEOS is as follows:

Systemctl stop ieos_daemon

This shutdown only takes effect for this startup. Even after the system restarts, the IEOS program will still start. The way to prevent the IEOS program from starting up is as follows:

Systemctl disable ieos_daemon

Important note: After disabling IEOS, wireless networking functions such as dial-up and Wi Fi require users to implement them based on native Linux commands, and it is also impossible to remotely manage devices through the DeviceLive platform.

3.3.2.1 Network Management

3.3.2.1.1 Set a static IP address

If you want to set a static IP address for EC954-FQ38, modify the corresponding network configuration file by using the commands vim/etc/network/interfaces. d/eth1 or vim/etc/ network/interfaces. d/eth2 to set the default gateway, address, network, and subnet mask for the Ethernet interface. Here is an example of setting a static IP for the eth2 port:



After modifying the interface IP configuration, execute/etc/init.d/networking restart to restart the network service and make the configuration effective.

3.3.2.1.2 Set a dynamic IP address

If you want to set a dynamic IP address for EC954-FQ38, modify the corresponding network configuration file by using the command vim/etc/network/interfaces. d/eth1 or vim/etc/ network/interfaces. d/eth2, and set it to DHCP after inet to automatically obtain the IP address.

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



After modifying the interface IP configuration, execute/etc/init.d/networking restart to restart the network service and make the configuration effective.

3.3.2.2 System management

3.3.2.2.1 Querying Firmware Version

To check the computer firmware version of EC954-FQ38, please type:

edgegodge-computer:-\$ e	cveraton
EC954 version V2.0.0-be	ts.1
edgefjedge-computer:-\$	1.000

By adding the - a option, you can see the complete version information:

ndgegedan-computering ecversion	14.
EC954 version V2.0.0-bets.1 Buil	d 3933127
edgejjedge-consuter:14\$	

3.3.2.2.2 Viewing 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 decomposed by the file system. The available disk partition for users in EC954-FQ38 product is/dev/mmcblk0p8. Here is an example:

edge@edge-compu	iter:~\$	df -l	h		
Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/mmcblk0p7	26M	14K	23M	1%	/custom
/dev/mmcblk0p8	5.8G	241M	5.2G	5%	/userdata
overlay	5.8G	241M	5.2G	5%	1
devtmpfs	1.9G	8.0K	1.96	1%	/dev
tmpfs	2.0G	16K	2.0G	1%	/tmp
tmpfs	2.0G	0	2.0G	9%	/dev/shm
tmpfs	2.8G	18M	1.9G	1%	/run
tmpfs	5.04	4.0K	5.0M	1%	/run/lock
tmpfs	2.0G	0	2.0G	8%	/sys/fs/cgro
tmpfs	391M	4.0K	391M	1%	/run/user/10
tmpfs	391M	4.0K	391M	1%	/run/user/10

3.3.2.2.3 Query product model information

The devinfo tool can view product model information

```
edge@edge-computer:~$ sudo devinfo
model=EC942
alias=
serialnumber=CL9422343000019
partnumber=LQA8-W-G
```

3.3.2.2.4 Adjusting Time

EC954-FQ38 has two time settings. One is the system time, and the other is the RTC (Real Time Clock) time maintained by the hardware of EC954-FQ38. Use the date command to query the current system time or set a new system time. Use the hwclock command to query the current RTC time or set a new RTC time.

Use the command date MMDDhhmmYYYY to set the system time:

MM: Month

DD: Day

Hh: hour

Mm: minutes

YYYY: Year

edge@edge-computer:~5 sudo date 030115052023 Wed Mar 1 15:05:00 CST 2023

The following command can be used to set the RTC time to system time

edge@edge-computer:~\$ sudo hwclock 2023-03-01 15:05:55.192061+08:00

Click on the following link to obtain more detailed information about dates and times:

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

https://wiki.debian.org/DateTime

3.3.2.2.5 Setting Time Zone

There are two methods to configure the time zone of EC954-FQ38. One is to use the command tzselect. Another option is to use the/etc/localtime file.

3.3.2.2.6 Using the tzselect command

After typing the tzselect command, you will enter the region selection interface. First, select the approximate region (divided by continent or ocean) and enter the number in front of the continent or ocean



Choose another country under that continent or ocean

WE-W		
Please select a cour	itry whose clocks agree with	yours.
1) Afghanistan	18) Israel	35) Palestine
2) Armenia	19) Japan	36) Philippines
 Azerbaijan 	20) Jordan	37) Qatar
4) Bahrain	21) Kazakhstan	38) Russta
5) Bangladesh	22) Korea (North)	39) Saudi Arabia
6) Bhutan	23) Korea (South)	401 Singapore
7) Brunet	24) Kuwait	41) Sri Lanka
8) Cambodia	25) Kyrgyzstan	421 Syrta
9) China	26) Laos	43) Taiwan
10) Cyprus	271 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) Indonesta	32) Nepal	49) Vietnam
16) Iran	33) Onlant	501 Yemen
17) Tran	341 Dobiston	

Follow the above steps to obtain the Chinese time zone keyword Asia/Shanghai, and execute the following command to set the time zone



3.3.2.2.7 Using Localtime Files

The local time zone is stored in/etc/localtime, and if no value is set for the TZ environment variable, it is used by the GNU library for C (glibc). This file is either a copy of/usr/share/ zoneinfo/file, or a symbolic link pointing to it. If EC954-FQ38 cannot find the/usr/share/ zoneinfo/file, please download the time zone information file you need from the website (https://www.iana.org/time-zones) And re link to the local time file in EC900.

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

4 Advanced configuration of 4 peripheral interfaces

In this chapter, we will introduce the advanced configuration of the peripheral interface of the edge computer EC900 based on the Arm structure.

4.1 Serial port

EC954-FQ38 has 8 serial ports, and the first 4 ports support multiple serial port modes including RS-232, RS-422, and RS-485. The default mode is RS-485, and the ih_uard_ctl command can be used to switch the serial port mode. The last four serial ports are fixed in RS-485 mode.

The device node corresponding to P1 is/dev/ttyCOM1

The device node corresponding to P2 is/dev/ttyCOM2

The device node corresponding to P3 is/dev/ttyCOM3

The device node corresponding to P4 is/dev/ttyCOM4

Postged	ge-computer:~# lh_uart_	etl
brager	ih_uart_ct1 [OPTIONS]	
DPTTONS		
	help Help info of h	ow to use ih_uart_ctl command.
	port_nue-crue	<pre>num:1,2,3,4 1> /dev/ttyCDM1 2> /dev/ttyCDM2 3> /dev/ttyCDM3 4> /dev/ttyCDM4 show the port mode example: ih_wart_ctl port_mum=1</pre>
	uart_sode+cnum	<pre>num:0,1,2 0> R5233 1> R5485 2> R5422 set the wart port mode if you do not input port number, the default port num is 1 example: ih_wart_ctl wart_mode=0 example: ih_wart_ctl port_num=0 wart_mode=0</pre>

4.1.1 Changing Serial Port Settings

Viewing and Setting Serial Ports with the STTY Command

View detailed command content by typing 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

-r, -file=DEVICE open and use the specified DEVICE instead of stdin
                  help display this help and exit 
version output version information and exit
               -nelp
Optional - before SETTING indicates negation. An * marks non-PDSIX settings. The underlying system defines which settings are available.
Special characters:
   pectal 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 erase the last character typed
kill CHAR CHAR will erase the current line
k low CHAR CHAR will erase the current line
b low CHAR CHAR will erase the current line
 kill CHAR CHAR will erase the current line
* Inext 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:
                                        set the input and output speeds to N bauds
tell the kernel that the terminal has N columns
      . N
   . cois N
                                        same as cols N
wait for transmission before applying settings (on by default)
  * columns N
       [-]drain
                                        set the input speed to N
use line discipline N
       ispeed N
   * Line N
                                        with itemony set N characters minimum for a completed read
       mun N
                                        set the output speed to N
tell the kernel that the terminal has N rows
       ospeed N
      rows N
   · stze
                                        print the number of rows and columns according to the kernel 
print the terminal speed
       speed
       time N
                                         with -icanon, set read timeout of N tenths of a second
Control settings:
        -)clocal
                                       disable modem control signals
allow input to be received
             cread
   ٠
            ]crtsets
                                         enable RTS/CTS handshaking
                                        set character size to N bits, N in [5...]
use two stop bits per character (one with '-')
send a hangup signal when the last process closes the tty
same as [-]hup
       CSN
        [-]cstopb
            Thup
            Thupel
             ]perenb
                                         generate parity bit in output and expect parity bit in input
set odd parity (or even parity with '-')
use "stick" (mark/space) parity
             parodd
```

casper

<pre>[-]brkint breaks cause an interrupt signal [-]Strint translate carriage return to signpar ignore carriage return [-]ignpar ignore carriage return [-]ignpar ignore carriage return [-]ignpar ignore carriage return [-]injpck enable viput parity checking [-]istrip Clear high [dth] bit of unput characters [-]injpck enable viput parity checking [-]istrip Clear high [dth] bit of unput characters [-]injpck enable viput parity checking [-]istrip Clear high [dth] bit of unput characters [-]iunt8 assume unput characters are uTF-8 encoded [-]iut78 assume unput characters are uTF-8 encoded [-]iut78 assume unput character restart output, not only start character [-]ixany let any character restart output, not only start character [-]ixan enable sonding of start/stop characters [-]ixan enables and style, N in [0][]] [-]itandem same as [-]ixoff Output settings: [-]ofdel use delay style, N in [0][]] [-]ofdel use delay style, N in [0][]] [-]ofter numline performs a carriage return.enaline [-]onliet numline performs a carriage return for stops [-]onliet same as the [-]onliet numline performs a carriage return for stops [-]onliet same as the [-]onliet same as for crease theracters in hat notation (-cc)] [-]onliet same as for crease [-]onlie same as for crease [-]onliet same as for crea</pre>	Input settings:	
<pre>clicingle translate carriage return to newlume clignprk ignore break characters ignore ignore characters with parity strong ignore characters with parity strong ignore characters with parity strong inpok enable input parity checking clignty determine to carriage return inpok enable input parity checking clignty determine to carriage return inpok enable input parity checking clignty determine the carriage return is an object of the control inpok enable sonding of startystem to clowercase clignty determine the carriage return to newlume clignty determine the carriage return of lowercase clignty determine the carriage return of lowercase clignty determine the carriage return of lowercase is back carriage return of lowercase is back carriage return delay style. N in [0.1] clignty settings backspace delay style. N in [0.1] clignty determine the delay style. N in [0.1] clignty settings backspace delay style. N in [0.1] clignty determine the delay style. N in [0.1] clignty settings backspace delay style. N in [0.1] clignty settings backspace delay style. N in [0.1] clignty settings backspace delay style. N in [0.1] clignty and clignty style. N in [0.1] clignty and clignty style. N in [0.1] clignty translate carriage return to newline clignty delay style. N in [0.1] clignty translate carriage return. clignty delay style. N in [0.1] clignty translate carriage return. clignty delay style. N in [0.1] clignty translate carriage return in the first column clignty delay style. N in [0.1] clignty translate carriage return in the first column clignty delay style. N in [0.1] clignty to a same as tab0 clignty delay style. N in [0.1] clignty translate delay style. N in [0.1] clignty translate carriage return in the first column clignty delay style. N in [0.1] clignty translate carriage returns in the first column clignty delay style. N in [0.1] clignty translate carriage returns in the first column clignty delay style. N in [0.1] clignty same as tab0 clignty delay style. N in [0.1] clignty same as tab0 clignty delay style. N</pre>	[-]brkint	breaks cause an interrupt signal
<pre>Cliphrk ignore break characters Lignpar ignore carriage return Lignpar ignore characters with parity strors (-)imaxbel beep and do not flush a full ignut buffer on a character translate newline to carriage return Cliphrk enable whut parity checking Clistrip Clear high (2th) bit of unput characters (-)iutt8 assume unput characters are UTF-6 encoded (-)iutt8 assume unput character setart output, not only start character (-)iutof enable sonding of start/stop characters (-)iutof enable sonding of start/stop characters (-)ofill use fill (padding) characters instead of NUL characters (-)ofill use fill (padding) characters instead of NUL characters (-)ofile use fill (padding) characters in the first column (-)onlest insult performs a carriage return (-)onlest pastprocess output (-)onlest same as tab0 (-)onlest same as tab0 (-)onlest same as tab0 (-)onlest same as tab0 (-)onle tharacters in hat notation (^-C') (-)eche same as [-]erterse (-)echo(cl same as [-]erters</pre>	[-]terni	translate carriage return to newline
<pre>:Spect ignore characters with parity error :Signar ignore characters with parity error :inamabel beep and do not flush a full input buffer on a character :inamabel unput parity checking :istrip clear high (Bth) bit of input characters :istrip clear high (Bth) bit of input characters :istrip clear high (Bth) bit of input characters </pre>	[-]ignbrk	ignore break characters
<pre>(-)ignpar ignore characters with parity strars [-)ignabel beep and do not flush a full ignut buffer on a character inler translate newline to carriage return [-)ignek enable input parity characters [-)igned enable input characters are UF-8 encoded [-)igned enable soulding of start/stop characters [-)igned enable soulding of start/stop characters [-)igner mable soulding of start/stop character sequence) [-)Igner mable sould style. W in [0]</pre>	E-ligner	ignore carriage return
<pre>* [-jumaxbel beep and do not flush a full unput buffer on a character injunck enable unput party checking [-jumptk] enable unput characters are UTF-8 encoded * [-jumptk] translate uppercase characters to lowercase * [-jumptk] translate uppercase characters to lowercase * [-jumptk] translate uppercase characters to lowercase * [-jumptk] translate uppercase characters * [-jumptk] translate uppercase * [-jumptk] translate uppercase * [-jumptk] translate uppercase * [-jumptk] translate carriage return to newline * [-jofde] use delete characters for fill instead of NUL characters * [-jofde] use delete characters for uppercase * [-jumptk] translate lowercase characters to uppercase * [-jumptk] translate lowercase characters to uppercase * [-jumptk] translate uppercase uppercase * [-jumptk] translate uppercase uppercase * [-jumptk] translate base stabs * tabs same as tabs * tabs same as [-]crterase * [-]echoct same as [-]crterkil * [-]echoe same as [-]crterkil * [-]echoe same as [-]crterkil * [-]echoe same as [-]crterkil * [-]echoel and/one after a kill character * [-]echoel and/one after a base same as [-]crterkil * [-]echoel and/one after a base same as [-]crterise * [-]echoel and/one after a base and/one after a base same as [-]crterise * [</pre>	[-]ignpar	ignore characters with parity arrors
<pre>i-junck translate newline to carriage roturn i-junck enable input parity (necking i-junck enable input characters are UT-8 encoded i-junct translate uppercase characters to lowercase i-junct translate uppercase characters to lowercase i-junct enable sending of startystic characters sequence) i-jtandem same as [-juxoff Output settings: box backspace delay style, N in [0.1] fill frame field delay style, N in [0.1] inform field delay style, N in [0.1] tabs same as tab0 -tabs same as tab0 -tabs same as tab0 -tabs same as [-]titecho inform field delay style, N in [0.1] inform same as [-]titecho inform field delay style, N in [0.1] inform field delay sty</pre>	 Issaxbol. 	beep and do not flush a full input buffer on a character
<pre>[-]upck enable unput partiy checking [-]ustrip clear high (sth) bit of Unput characters * [-]uutfi assume unput characters are UTF-8 encoded * [-]uucl translate uppercase characters to lowercase * [-]uant unput character restart output, not only start character enable xuN/XOFF flow control *]parmrk mark partiy effects (with a 255-0-character sequence) *]it on enable xuN/XOFF flow control *]parmrk mark partiy effects (with a 255-0-character sequence) *]it on enable xuN/XOFF flow control *]parmrk mark partiy effects (with a 255-0-character sequence) *]it of the flow character sequence (it is a control it is a sequence) *]it of the flow character (it is a control it is a sequence) *]it of the flow character (it is a control it is a sequence) *]it of the flow character (it is a control it is a sequence) *]it of the flow character (it is a control it is a sequence) *]it of the flow character (it is a control it is a sequence) *]it of the flow character (it is a control it is a sequence) *]it of []it is flow character (it is a set of the set of the flow character (it is a set of the set of the flow character (it is a set of the set of the</pre>	[-]inler	translate newline to carriage return
<pre>[-]ustrip Clear high (Bth) bit of uput characters [-]ustrip clear high (Bth) bit of uput characters [-]ustrip character restart output, not only start character [-]usoff enable sending of start/stop character sequence) [-]tandem same as [-]ixoff Output settings: bak backspace delay style. N in [0.1] crN carriage roturn to newline [-]offel use fill (padding) characters instead of NUL characters [-]ofill use fill (padding) characters to uppercase [-]ofill use fill (padding) characters to uppercase [-]oner do ent print carriage return. Her first column [-]onset postprocess output tabs same as tab0 translate lowercase as backspace-space-backspace (rikill all line by obeying the echoct1 and echok settings ".]echoetl same as [_]teteko too input characters i.]echoet same as [_]teteko debae control characters as backspace-space-backspace i.]echoet same as [_]teteko too input characters i.]echoet same as [_]teteko i.]echoet same as [_]tetekoet same as [_]teteko i.]echoet same as [_]tetekoet same as</pre>	[-] unpck	enable input parity checking
<pre>* [-]uitt8 assume unput characters are UT-8 encoded [-]uitch translate uppercase characters to lowercase * [-]uany lot any character restart output, not only start character enable x00/x05F flow control imparantk mark party encoded (with a 255-0-character sequence) I-landem same as [-]ixoff Output settings: * bsN backspace delay style, N in [0.1] * ofN carriage roturn delay style, N in [0.1] * ofN for feed delay style, N in [0.1] * ofN need use delay style, N in [0.1] * ofN carriage roturn delay style, N in [0.1] * ofN need use delay style, N in [0.1] * ofOcu translate characters for fill instead of NUL characters * [-]oflet use fill (padding) characters to uppercase * [-]onlert nameline performs a carriage return.newline * [-]onlert nameline performs a carriage return. * [-]onlert nameline performs a carriage return. * ostprocess output * tabs same as tab3 * vtN vertical tab delay style, N in [0.1] Local settings: [-]ether on input characters as backspace-space-backspace * crtkill kill all line by obeying the choeff and echoe settings * crtkill kill all line by obeying the choeff and echoe settings * crtkill kill all line by obeying the choeff and echoe settings * crtkill kill all line by obeying the choeff and echoe settings * crtkill same as [_]treterase * [_]ethok echo a newline after a kill character * [_]ethok echo e newline for a kill character * [_]ethok echo e newline strer a kill character * [_]ethok echo e newline strer a kill character * [_]ethok disacte characters backward, between ',' and ',' * [_]ether enable "pictwill * [_]tusten enable special characters * [_]tusten enable non-POSIX special characters * [_]tusten enable non-POSIX special characters * [_]tusten enable non-POSIX special characters * [_]tusten character</pre>	[-]istrip	clear high (8th) bit of input characters
<pre>* [-]uclc translate uppercase characters to lowercase * [-]usoff enable sending of start/stop characters [-]ixoff enable XOM/XOFF flow control tipparsrk mark party errors [with s 255-0-character sequence] t-]tandem same as [-]ixoff Output settings: * bsN backspace delay style, N in [0.1] * crN carriage roturn delay style, N in [0.1] * crN carriage roturn delay style, N in [0.1] * crN carriage roturn delay style, N in [0.1] * low newline delay style, N in [0.1] * [-]scrnl translate carriage roturn to newline * [-]ofdel use delete characters for fill instead of MUL characters [-]ofdel use fill [padding] characters instead of thing for delays * [-]ofdel use delete characters for fill instead of MUL characters [-]ofdel use fill [padding] characters instead of thing for delays * [-]oflet translate lowercase characters to uppercase [-]onlet translate lowercase characters to uppercase [-]onlet nameline delay style, N in [0.1] * tabs same as tab0 * tabs same as [-]crterase * crtkill kill all line by obeying the echoprt and echoe settings * [-]echoe echo: input characters in hat notation ('^c') [-]echoe same as [-]crterase * [-]echoe same as [-]crterase * [</pre>	• [-]tutt8	assume input characters are UTF-8 encoded
<pre>* L-juany let any character restart output, not only start character L-juant mable sounyXXFF flow control reparank mark party arrors (with a 255-0-character sequence) L-jtandem same as L-juant output settings: * bsN backspace delay style. N in [0-1] * crN carriage return to newline * L-jofdel use delay style. N in [0-1] * L-jocrn! translate lowercase characters to uppercase * L-jolcu translate lowercase characters to uppercase * L-jonlet nawline performs a carriage return.newline * L-joner de not print carriage returns in the first column * L-joner de not print carriage returns in the first column * L-joner de not print carriage returns in the first column * L-joner de not print carriage returns in the first column * clapost postproces output * tabs same as tab0 * vtN vertical tab delay style. N in [0-1] * Local settings: L-jcrterase * crtkill kill all line by obeying the chopert and echoes settings * crtkill kill all line by obeying the chopert and echoes settings * crtkill kill all line by obeying the chopert and echoes settings * crtkill kill all line by obeying the chopert and echoes settings * crtkill kill all line by obeying the chopert and echoes settings * crtkill kill all line by obeying the chopert and echoes settings * crtkill kill all line by obeying the chopert and echoes settings * crtkill kill all line by obeying the chopert and echoes settings * crtkill kill all line by obeying the chopert and echoes settings * crtkill kill all line by obeying the chopert and echoes settings * crtkill kill all line by obeying the chopert and echoes settings * crtkill chen echoe newline even if not echoing other characters * lechopert echo ensed characters backward, between \' and '/ * lestno</pre>	 I-Imerc 	translate uppercase characters to lowercase
<pre>l-lixoft enable sending of startystop characters l-lixon enable XON/NOFF flow control l-parmrk mark parity affors (with a 255-0-character sequence) l-lixondem same as [-]ixoff Output settings: bak backspace delay style. N in [0.1] ffW form feed delay style. N in [0.1] ffW form feed delay style. N in [0.1] local translate carriage return to mewline l-pofel use delate characters for fill instead of NUL characters l-joftil use fill (padding) characters to uppercase l-joftil use fill (padding) characters to uppercase l-joftil use fill (padding) characters to uppercase l-jonch translate newline to carriage return in the first column l-jonst mewline performs a carriage return in the first column l-jopost postproces output tabs same as tab0 -tabs same as tab0 ethic same as tab0 ethic same as tab0 ethic same as tab0 ethic same as [-]ctterho for output characters i-jeche same as [-]ctterho l-beche same as [-]ctterase i-jeche sam</pre>	 L-Itxany 	let any character restart output, not only start character
<pre>i-juxon enable x00/x00+ flow control i-jumrk mik party effor: (with a 255-0-character sequence) i-jtandem same as [-]twoff Output settings: the backspace delay style, N in [0.5] crN carriage return delay style, N in [0.5] ffN for feed delay style, N in [0.5] inlw newline delay style, N in [0.5] iocrn! translate carriage return to mewline iofdel use delete characters for fill instead of NUL characters iofle use delete characters for fill instead of NUL characters iofle use delete characters for fill instead of NUL characters iofle use delete characters for fill instead of NUL characters iofle use delete characters for fill instead of NUL characters iofle use delete characters to uppercase iofle translate newline to carriage return.newline iofle translate lowercase characters to uppercase iofle translate inwine to carriage return. iofle translate newline to carriage return iofle translate newline to carriage return iofle translate in the first column iofle translate in the lay style, N in [0.5] tabs same as tab0 tabs same as tab0 otabs same as tab3 vtN vertical tab delay style, N in [0.5] Local settings: iofle control characters as backspace-space-backspace crtkill kill all line by obeying the echocit and echok settings iofle cho input characters in hat notation ('^c') iofle control characters in hat notation ('^c') iofle control characters in hat notation ('^c') iofle cho a name ine after a kill character iofle discard output iotaon enable special characters; erase, kill, werase, rprnt iotaon enable special characters; insteam enable interrupt, quit, and suspend special characters ising enable</pre>	L-ITXOLL	enable sending of start/stop characters
<pre>L-jparmrk mark parity end (with a 235-0-character sequence) L-jtandem same as [-]twoff Output settings: bsW backspace delay style, N in [0-1] ffW form feed delay style, N in [0-1] infW form feed delay style, N in [0-1] infW newline delay style, N in [0-1] ijornl translate caritage return to mewline L-jofdel use delate characters for fill instead of NUL characters L-jofdel use fill (padding) characters instead of twing for delays [-jofdel use fill (padding) characters to uppercase [-jofdel use fill (padding) characters to uppercase [-jofdel use fill owertake characters to uppercase [-jonlor translate lowertake characters to uppercase [-jonlor translate newline to carriage return.newline [-jonost postprocess output tabs same as tab0 *tabs same as tab0 *tab</pre>	Texon	enable XON/XOFE TLOW CONTROL
U-jlandem same as [-jland) Output settings: * bsN backspace delay style, N in [0.1] * crN carriage return delay style, N in [0.1] * ffN form feed delay style, N in [0.1] * ffN newlune delay style, N in [0.1] * [-]ocrnl translate carriage return to newlune * [-]ofdel use delete characters for fill instead of NUL characters [-]ofdel use fill (padding) characters instead of timing for delays * [-]olcuc translate lowercase characters to uppercase * [-]olluc translate lowercase characters to uppercase * [-]oller translate newline to carriage return-newline * [-]onfirst newline performs a carriage return-newline * [-]onfirst newline performs a carriage return- * [-]onoer de not print carriage returns in the first column * [-]opost postprocess output * tabs * tabs same as tab0 * tabs same as tab0 * tabs same as tab0 * vtN vertical tab delay style, N in [0.1] Local settings: [-]efterase * crtkill kill all line by obeying the echocit and echos settings * [-]ethech echo input characters in hat notation (*nc*) * [-]ethech same as [-]ettechb * [-]echoct same as [-]etterase * [-]echoct same as [-]ettertase * [-]echoct same as [-]ettertase * [-]echoct same as [-]etterase * [-]echoct sam	L- Iparmrk	mark parity errors (with a 255-0-character sequence)
Output settings: * bsN backspace delay style, N in [0.1] * crN carriage return delay style, N in [0.1] * ffN fora feed delay style, N in [0.1] * nN newlue delay style, N in [0.1] * nN newlue delay style, N in [0.1] * locrnl translate carriage return to newlue * locd use delete characters for fill instead of NUL characters * locd translate lowernase characters to uppercase * londer translate lowernase characters to uppercase * londer denate the delay style, N in [0.1] * londer translate lowernase characters to uppercase * londer denate the delay style, N in [0.1] * londer newline performs a carriage return * londer newline performs a carriage return * londer postprocess output * tabs same as tabd * util hor izontal tab delay style, N in [0.1] * tabs same as tabd * util vertical tab delay style, N in [0.1] * tabs same as tabd * tabs same as tabd * tabs same as tabd * crtkill	L-grandem.	same as L-lixort
<pre>bsH backspace delay style, N in [0.1] crN carriage roturn delay style, N in [0.1] ffN form feed delay style, N in [0.1] elays i-locrnl translate carriage roturn to newline locrnl translate carriage roturn to newline locrnl translate coversase of fill instead of NUL characters locrnl translate lowercase characters to uppercase locrnt translate lowercase characters to uppercase locrnt translate newline to carriage roturn.newline locrnt do not print carriage roturn.newline lopost postprocess output tabs same as tab0 tabs same as tab0 tabs same as tab1 locr table lowercase characters as backspace-backspace critill kill all line by obeying the echogrt and echoe settings critill kill all line by obeying the echogrt and echoe settings critill kill all line by obeying the echogrt and echoe settings critill kill all line by obeying the echogrt and echoe settings critill kill all line by obeying the achort and echoe settings critill kill all line by obeying the achort and echoe settings criticle cho control characters in hat notation (^^cc') lecho same aslecthecho lechok same aslecthecho lechok same aslecthecho lechok same aslecthecho lechok same aslecthecho lechok same aslecthecho lechok cho a newline after a kill character lechopt characters is backward, between \' and // lechopt chose cal characters is case, kill, werase, rprnt liseton enable special characters is case, kill, werase, rprnt liseton enable special characters is case, kill, werase, rprnt liseton enable interrupt, quit, and suspend special characters liseton disable flushing after interrupt and quit special character</pre>	Output settings:	
<pre>crN carriage return delay style, N in [0.1] fin form feed delay style, N in [0.1] in N newline delay style, N in [0.1] i -locrnl translate carriage return to newline i -lofdel use delete characters for fill instead of NUL characters i -loftl use fill (padding) characters instead of NUL characters i -loftl use fill (padding) characters instead of NUL characters i -loftl use fill padding) characters instead of NUL characters i -loftl use fill padding) characters instead of NUL characters i -loping translate lowercase characters to uppercase i -loping translate lowercase characters to uppercase i -loping translate newline to carriage return.newline i -loping do not print carriage returns in the first column i -loping do not print carriage returns in the first column i -loping postprocess output tabs same as tab0 same as tab0 same as tab0 vtN vertical tab delay style, N in [0.1] Local settings: [-lefterase characters as backspace-backspace crtkill kill all lume by obeying the echocit and echoe settings crtkill kill all lume by obeying the echocit and echoe settings crtkill kill all lume by obeying the echocit and echoe settings crtkill same as [-]crterase i -lechoe same as [-]crterase i -lechoe same as [-]crterase i -lechoe same as [-]crterase i -lechoel same as [-]crterase i -lechoel same as [-]crtkill i -lechoel same as [-]crtkill i -lechoel endo newline effer a kill character i -lechopt endo input characters backward, between '' and '/' elechoel endo newline effer a scill characters i -lechopt endo erased characters backward, between '' and '/' elector enable "LINEMODE"; useful with high latency links i -licenon enable special characters; erase, kill, werase, rprnt enable non-POSIX special characters i -lisig enable interrupt, quit, and suspend special characters i -lisig enable interrupt and guit special characters</pre>	+ bsN	backspace delay style. N in 10.11
<pre>ffN form feed delay style, N in [0.1] nlN newline delay style, N in [0.1] [-]ocrnl translate carriage return to newline [-]ofill use fill (padding) characters instead of NUL characters [-]ofill use fill (padding) characters instead of NUL characters [-]ofill use fill (padding) characters instead of NUL characters [-]ofill use fill (padding) characters instead of NUL characters [-]ofill use fill (padding) characters instead of NUL characters [-]ofill use fill (padding) characters instead of NUL characters [-]ofill use fill (padding) characters instead of NUL characters [-]ofill use fill (padding) characters instead of NUL characters [-]onlent translate newline to carriage return-newline [-]onlent newline performs a carriage return [-]opost postprocess output tabw horizontal tab delay style, N in [0.1] tabw same as tab0 output characters as backspace space-backspace crtkill kill all line by obeying the echogert and echoe settings [-]ethor echo input characters [-]echoet same as [-]ettecho [-]echoet same as [-]ettecho [-]echoet same as [-]ettecho [-]echoet same as [-]ettecho [-]echoet same as [-]ettekll [-]ethoe nowline after a kill character [-]echopt echo erased characters backward, between '\' and '/' [-]estproc enable "LINEMODE"; useful with high latency links [-]fushe discard output [-]iesten [-]iesten [-]iesten enable special characters [-]iesten [-]iesten enable special characters [-]iesten enable special characters [-]iesten [-]iesten enable special characters [-]iesten enable special characters [-]iesten enable special characters [-]iesten enable non-POSIX special characters [-]iestel enable flushing after interrupt and guit special characters [-]iesten enable flushing after interrupt and guit special characters [-]iesten enable flushing after interrupt and guit special characters [-]iesten enable flushing after interrupt and guit special characters [-]iesten enable flushing after interrupt and guit special characters [-]iesten enable flushing after interrupt and guit special characters [-]iesten ena</pre>	* crN	carriage return delay style, N in [1]
<pre>* nlN newlume delay style, N in 100.11 * [-locrnl translate carriage return to newlume [-]ofdel use delete characters for fill instead of NUL characters !-]ofill use fill (padding) characters instead of timing for delays !-]olcut translate newlime to carriage return-newline !-]onlor translate newlime to carriage return-newline !-]onlor translate newlime to carriage return !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]onor do not print carriage returns in the first column !-]or do not print carriage returns in the first column !-]or do not print carriage returns in the notation (`^c') !-]echo use on input characters !-]echo use on input characters !-]echon use on input characters !-]echon use on anwline after a kill character !-]echon! use a newline after a kill character !-]echon! use a newline after a kill characters !-]echon! use a signal characters backward, between `' and `?' !-]echon! use a signal characters; erase, kill, werase, rprnt !-]iccanon enable special characters !-]ising enable interrupt, guit, and suspend special characters !-]ising enable interrupt, guit, and suspend special characters !-]ising enable interrupt, guit, and suspend special characters</pre>	* ffN	form feed delay style, N in 19, 11
<pre>* [-locrnl translate carriage return to newline * [-lofdel use delete characters for fill instead of NUL characters [-loful use fill (padding) characters instead of NUL characters * [-locut translate lowercase characters to uppercase * [-locut translate lowercase characters to uppercase * [-locut translate nowline to carriage return-newline * [-loner do not print carriage returns in the first column * [-loner do not print carriage returns in the first column * [-lopest postprocess output * tabk same as tab0 * tabs same as tab0 * tabs same as tab3 * vtN vertical tab delay style, N in [0=1] Local settings: [-!crterase * crtkill kill all line by obeying the echopit and echoe settings * crtkill kill all line by obeying the echopit and echoe settings * crtkill kill all line by obeying the echopit and echoe settings * crtkill kill all line by obeying the echopit and echoe settings * [-!ctlecho scho control characters in hat notation (^cc') * [-!echoe same as [-]crterase * [-!echoet same as [-]crterase * [-!</pre>	* nlN	newline delay style, N in [0, 1]
<pre>* [_]ofdel use delete characters for fill unstead of NUL characters * [_]oflut use fill (padding) characters instead of timing for delays * [_]oflut translate lowercase characters to uppercase * [_]onlrat newline performs a carriage return * [_]onlrat newline performs a carriage return * [_]onpost postprocess output * tabw horizontal tab delay style, N in [0_11] * tabw horizontal tab delay style, N in [0_11] * tabs same as tab3 * vtN vertical tab delay style; N in [0_11] * tabs same as tab3 * vtN vertical tab delay style; N in [0_11] * tabs same as tab3 * vtN vertical tab delay style; N in [0_11] * crtkill kill all line by obeying the echopirt and echoe settings * crtkill kill all line by obeying the echopirt and echoe settings * crtkill kill all line by obeying the echopirt and echoe settings * crtkill kill all line by obeying the echopirt and echoe settings * crtkill kill all line by obeying the echopirt and echoe settings * crtkill kill all line by obeying the echopirt and echoe settings * [_]echoe same as [_]crterase * [_]echoet same as [_]crterase * [_]echoet same as [_]crterase * [_]echok same as [_]crterase * [_]echok same as [_]crterase * [_]echok same as [_]crtkill * [_]echoni mowline even if not echoing other characters * [_]echopirt echo erased characters backward, between '\' and '/' * [_]echopirt echo erased characters; erase, kill, werase, rprnt * [_]iexten enable special characters; erase, kill, werase, rprnt * [_]iexten enable special characters; * [_]isig enable interrupt, quit, and suppend special characters * [_]isig enable interrupt, quit, and suppend special characters * [_]isig enable interrupt, quit, and suppend special characters</pre>	E-locrnl	translate carriage return to newline
<pre> • [_]ofill use fill (padding) characters instead of timing for delays • [_]onler translate lowercase characters to uppercase • [_]onler translate numbles to carriage return.envilue • [_]onler newline performs a carriage return • [_]onorr do not print carriage returns in the first column • [_]opost postprocess output • tabM horizontal tab delay style, N in [0.1] • tabs same as tab0 • tabs same as tab0 • tabs same as tab1 • vtN vertical tab delay style, N in [0.1] Local settings: [_]efterase eche erase characters as backspace-backspace ertkill kill all line by obeying the echopit and echoe settings ertkill kill all line by obeying the echopit and echoe settings ertkill kill all line by obeying the echopit and echoe settings ertkill same as [_]etlecho echo echo input characters fiechoctl same as [_]ettecho [_]echok echo a newline after a kill character [_]echok echo erased characters backward, between '\' and '/' [_]estproc enable "LINEMODE"; useful with high latency links [_]isig enable interrupt, quit, and suspend special characters [_]onfish disable flushing after interrupt and quit special characters [_]onfish disable flushing after interrupt and quit special characters [_]onfish disable flushing after interrupt and quit special characters [_]onfish disable flushing after interrupt and quit special characters [_]onfish disable flushing after interrupt and quit special characters [_]onfish disable flushing after interrupt and quit special characters [_]onfish disable flushing after interrupt and guit special characters [_]onfish disable flushing after interrupt and guit special characters [_]onfish disable flushing after interrupt and guit special characters [_]onfish disable flushing after interrupt and guit special characters [_]onfish disable flushing after interrupt and guit special characters [_]onfish disable flushing after interrupt and guit special characters [_]onfish disable flushing a</pre>	[-]ofdel	use delete characters for fill instead of NUL characters
<pre>[-]olcuc translate lowercase characters to uppercase [-]onlrat translate newline to carriage return-newline [-]onlrat newline performs a carriage return [-]onloat postprocess output tabw horizontal tab delay style, N in [0 = 1] tabs same as tab0 • tabs same as tab0 • tabs same as tab1 • vtN vertical tab delay style, N in [0 = 1] Local settings: [-]crterase ocho erase characters as backspate-space-backspace ecrtkill kill all line by obeying the echopit and echoe settings • crtkill kill all line by obeying the echopit and echoe settings • crtkill kill all line by obeying the echocit and echok settings • crtkill kill all line by obeying the achocit and echok settings • crtkill kill all line by obeying the achocit and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and echok settings • crtkill kill all line by obeying the theoret and '/' • created theore a newline after a kill characters • created theoret backward, between ',' and '/' • created theoret and echok a newline after a set all characters • created and end echopit a</pre>	• [-]ofill	use fill (padding) characters instead of timing for delays
<pre>• [-]unler translate newline to carriage return-newline • [-]unler newline performs a carriage return • [-]unoer do not print carriage returns in the first column • [-]upost postprocess output • tabw horizontal tab delay style, N in [0_11] • tabs same as tab0 • tabs same as tab1 • vtN vertical tab delay style, N in [0_11] Local settings: [_]erterase echo erase characters as backspace-space-backspace ertkill kill all line by obeying the echoprt and echoe settings ertkill kill all line by obeying the echoprt and echoe settings ertkill kill all line by obeying the echocil and echok settings ertkill kill all line by obeying the echocil and echok settings ertkill kill all line by obeying the achocil and echok settings ertkill same as [-]erterase [-]echo ucho input characters [-]echo acho input characters [-]echo same as [-]erterase [-]echok same as [-]erterase [-]echok same as [-]erterase [-]echok same as [-]ertkill Liechonl echo newline even if not echoing other characters [-]echopt echo erased characters backward, between '\' and '/' [-]echopt echo erased characters: erase, kill, werase, rprnt enable "LINEMODE"; useful with high latency links [-]flushe discard output [-]iexten enable special characters: [-]iexten enable special characters: [-]iexten enable interrupt, guit, and suspend special characters [-]iexten enable flushing after interrupt and guit special characters [-]iexten enable flushing after interrupt and guit special characters</pre>	<pre>!-]olcuc</pre>	translate lowercase characters to uppercase
<pre>• [-]onlret newline performs a carriage return • [-]onocr do not print carriage returns in the first column [-]opost postprocess output tabs postprocess output • tabs same as tab0 • tabs same as tab0 • tabs same as tab0 • tabs same as tab1 • vtW 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 echopt and echoe settings • crtkill kill all line by obeying the echopt and echoe settings • crtkill kill all line by obeying the echopt and echoe settings • crtkill kill all line by obeying the echopt and echoe settings • crtkill settings: [-]ctlecho echo control characters in hat notation ('*c') [-]echo same as [-]crtlecho [-]echok ucho input characters • [-]echok ucho a newline after a kill character • [-]echok ucho a newline after a kill character • [-]echon echo erased characters backward, between '\ and '/ • [-echon mewline even if not echoing other characters • [-]echont echo erased characters: erase, kill, werase, rprnt elektor enable "LINEMODE"; useful with high latency links • [-]flushe discard output I-]icaten enable special characters [-]isig enable interrupt, quit, and suspend special characters [-]isig enable interrupt, quit, and suspend special characters</pre>	<pre>[-]anler</pre>	translate newline to carriage return-newline
<pre>* [-]mmecr do not print carriage returns in the first column [-lopost postprocess output * tabw horizontal tab delay style, W in [0.1] tabs same as tab0 * tabs same as tab0 * tabs same as tab0 * tabs same as tab0 * tabs same as tab0 * utW vertical tab delay style, W 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 echoprt and echok settings * crtkill kill all line by obeying the echoprt and echok settings * crtkill kill all line by obeying the echotic and echok settings * crtkill same as [-]crterase in hat notation (*c*) [-]echo ucho input characters * [-]echok same as [-]crterase [-]echok same as [-]crtkill [-]echok same as [-]crtkill [-]echon ucho newline after a kill character * [-]echok same as [-]crtkill [-]echon echo ensed characters backward, between '\' and '/' * [-]estproc enable "LINEMODE"; useful with high latency links * [-]fushe discard output [-]taxten enable special characters; erase, kill, werase, rprnt [-]taxten enable special characters [-]isig enable interrupt, quit, and suspend special characters [-]oofish disable flushing after interrupt and quit special characters [-]oofish disable flushing after interrupt and quit special characters</pre>	[-]onlrat	newline performs a carriage return
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<pre>vtN vertical tab delay style, N in [0.1] Local settings: [-]crterase othe erase characters as backspace-backspace crtkill kill all line by obeying the echoprt and echoe settings i crtkill kill all line by obeying the echocil and echok settings echo control characters in hat notation ('*C') [-]echo echo control characters [-]echok same as [-]crtlecho [-]echok same as [-]crterase [-]echok echo a newline after a kill character [-]echok echo a newline after a kill character [-]echok echo a newline even if not echoing other characters [-]echok echo erased characters backward, between '\' and '/' [-]echopit echo erased characters: erase, kill, werase, rprnt [-]icanon enable special characters: erase, kill, werase, rprnt [-]iexten enable non-POSIX special characters [-]isig enable interrupt, quit, and suspend special characters</pre>	-13804	same as tab3
Local settings: [-]crterase crtkill kill all line by obeying the choprt and choe settings kill all line by obeying the choprt and choe settings kill all line by obeying the choprt and choe settings kill all line by obeying the choprt and choe settings kill all line by obeying the choprt and choe settings kill all line by obeying the choprt and choe settings kill all line by obeying the choprt and choe settings kill all line by obeying the choprt and choe settings kill all line by obeying the choprt and choe settings c-jecho serve as [-jcrterase [-jechok serve a newline after a kill character [-jechok serve a newline after a kill character [-jechont scho newline even if not choing other characters c-jechoprt scho erased characters backward, between '\' and '/' [-jectproc enable "LINEMODE"; useful with high latency links * [-jflushe discard output [-jiexten enable special characters; erase, kill, werase, rprnt [-jiexten enable non-POSIX special characters [-jisig enable interrupt, quit, and suspend special characters [-joofish disable flushing after interrupt and quit special characters	= vtN	vertical tab delay style, N in 10-11
<pre>[-]crterase cho erase characters as backspace space-backspace crtkill kill all line by obeying the echopri and echoe settings i-crtkill kill all line by obeying the echopri and echok settings c-crtkill kill all line by obeying the echopri and echok settings i-lecho echo control characters in hat notation ('^c') [-]echo echo input characters i-lechocil same as [-]crtlecho c-lechok echo a newline efter a kill character [-]echok echo a newline efter a kill character [-]echon echo newline even if not echoing other characters echo erased characters backward, between '\' and '/' [-]echopri echo erased characters; erase, kill, werase, rprnt [-]icanon enable special characters; erase, kill, werase, rprnt [-]isig enable interrupt, quit, and suspend special characters [-]isig enable flushing after interrupt and quit special characters</pre>	Local settings:	
<pre>crtkill kill all line by obeying the echopit and echoe settings</pre>	[-]crterase	echo erase characters as backspace-space-backspace
<pre>* crtkill kill all line by obeying the echocil and echok settings * [-]cilecho echo input characters in hat notation ('^c') [-]echo echo input characters * [-]echok same as [-]cilecho [-]echok echo a nowline after a kill character * [-]echok echo a nowline after a kill character * [-]echok echo a nowline after a kill character * [-]echok echo echo even if not echoing other characters * [-]echopit 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 [-]isig enable interrupt, quit, and suspend special characters [-]noflah disable flushing after interrupt and quit special characters</pre>	 crtkill 	kill all line by obeying the echogrit and echoe settings
<pre>* [-]ctlecho = sche control characters in hat notation ('^c') [-]echo = same as [-]ctlecho [-]echos = same as [-]crterase [-]echok = same as [-]crtkill [-]echok = same as [-]crtkill [-]echonl = sche even if not echoing other characters * [-]echoprt = sche erased characters backward, between '\' and '/' * [-]extproc = nable "LINEMODE"; useful with high latency links * [-]flushe = discard output [-]icanon = enable special characters: erase, kill, werase, rprnt [-]isig = enable interrupt, quit, and suspend special characters [-]nof[sh = disable flushing after interrupt and quit special characters</pre>	 -crtkill 	kill all line by obeying the echocil and echok settings
<pre>> [-]echoctl same as [-]ctlecho [-]echoct same as [-]ctlecho [-]echok echo a newline after a kill character > [-]echok same as [-]crtkill [-]echok same as [-]crtkill [-]echoprt echo newline even if not echoing other characters > [-]echoprt echo erased characters backward, between '\' and '/' [-]estproc 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 [-]oof[sh disable flushing after interrupt and quit special characters</pre>	 L-jctlecho 	<pre>echo control characters in hat notation ('^c') who input characters</pre>
<pre>[-]echoe same as [-]crterase [-]echok echo a newline after a kill character * [-]echoke same as [-]crtkill L-]echonl echo newline even if not echoing other characters * [-]echoprt echo erased characters backward, between '\' and '/' * [-]extproc enable "LINEMODE"; useful with high latency links * [-]flushe discard output [-]icanon enable special characters; erase, kill, werase, rprnt [-]iexten enable non-POSIX special characters [-]isig enable interrupt, quit, and suspend special characters [-]isig disable flushing after interrupt and quit special characters</pre>	• I-lechort1	same as [-lctlecho
<pre>[-]echok echo a newline after a kill character * [-]echoke same as [-]crtkill L-]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</pre>	Lechos	same as [] crterase
 L-jechoke same as [-jertkill L-jechonl echo newline even if not echoing other characters echo erased characters backward, between '\' and '/' L-jechoprt echo erased characters backward, between '\' and '/' L-jectproc enable "LINEMODE"; useful with high latency links L-jflusho discard output L-jicanon enable special characters; erase, kill, werase, rprnt L-jiexton enable non-POSIX special characters L-jisig enable interrupt, quit, and suspend special characters L-joof[sh disable flushing after interrupt and quit special characters 	E-Jechok	eche a newline after a kill character
<pre>[-]echonl echo newline even if not echoing other characters * E-lechoprt echo erased characters backward, between '\' and '/' * E-lectproc enable "LINEMODE"; useful with high latency links * E-lflusho discard output E-licanon enable special characters; erase, kill, werase, rprnt [-]iexton enable non-POSIX special characters [-]isig enable interrupt, quit, and suspend special characters E-loofish disable flushing after interrupt and quit special characters</pre>	• Intechoke	same as f-icrtktll
 E-jechoprt E-jechoprt E-jextproc E-jextproc E-jflusho E-jflusho E-jicanon E-able *LINEMODE*; useful with high latency links E-jicanon E-able special characters: erase, kill, werase, rprnt E-jisig E-jisig E-jisig E-joofish E-josho E-josho E-josho E-joofish E-josho E-josho E-joofish E-josho E-josho E-joofish E-josho E-josh	1-lechon1	echo newline even if not echoing other characters
* [-]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	E-Jechoort	echo erased characters backward, between '\' and '/'
 [-]flusho discard output [-]icanon enable special characters: erase, kill, werase, rprnt [-]iexten enable non-POSIX special characters [-]isig enable interrupt, guit, and suspend special characters [-]oof(sh disable flushing after interrupt and guit special characters 	[-]extproc	enable "LINEMODE"; useful with high latency links
[-]icanon enable special characters: erase, kill, werase, rprnt [-]iexten enable non-POSIX special characters [-]isig enable interrupt, quit, and suspend special characters [-]nof[sh disable flushing after interrupt and quit special characters	* [-]flusha	discard output
<pre>[-]iexten enable non-POSIX special characters [-]isig enable interrupt, guit, and suspend special characters [-]nof[sh disable flushing after interrupt and guit special characters</pre>	[-]icanon	enable special characters: erase, kill, werase, rprnt
[-]isig enable interrupt, quit, and suspend special characters [-]nof[sh disable flushing after interrupt and quit special characters	[-]iexten	enable non-POSIX special characters
[-]nof[sh disable flushing after interrupt and guit special characters	[-]isig	enable interrupt, quit, and suspend special characters
[-]noflsh disable flushing after interrupt and quit special characters		
	L-Inofish	disable flushing after interrupt and guit special characters

	[-]007(50	disable flushing after interrupt and guit special characters	
	[-]prterase	same as [-]echoprt	
12	[-]tostop	stop background jobs that try to write to the terminal	
	- xcase	with icanon, escape with '\' for uppercase characters	



4.1.2 Viewing Serial Port Information:



4.1.3 Set the baud rate of the COM1 serial port:

Sudo stty - F /dev/ttyCOM1 ispeed 9600 ospeed 9600 cs8

4.1.4 Setting the Baud Rate of COM2 Serial Port

Sudo stty - F /dev/ttyCOM1 ispeed 9600 ospeed 9600 cs8

4.1.5 Setting the Baud Rate of COM3 Serial Port

Sudo stty - F /dev/ttyCOM3 ispeed 9600 ospeed 9600 cs8

4.1.6 Setting the Baud Rate of COM4 Serial Port

Sudo stty - F /dev/ttyCOM4 ispeed 9600 ospeed 9600 cs8

Take care

Detailed information about the stty command can be found at the following link

http://www.gnu.org/software/coreutils/manual/coreutils.html

4.2 USB interface

EC954-FQ38 provides two USB 2.0 Host interfaces, mainly used for expanding storage devices, connecting mice and keyboards

4.2.1 USB automatic mounting

EC954-FQ38 supports hot swapping of USB storage devices. It will automatically mount all partitions. EC954-FQ38 will partition all USB storage devices and mount them to the/mnt/path. The naming format for the mounting folder is usb1<node>_<num>. Among them,<node>is the device node name of the partition, and<num>can be a number from 0 to 9.

```
edge@edge.computer:~$ sudo mount[grep "/mnt"
overlay on /mnt type overlay (rw,relatime,lowerdir=/mnt,upperdir=/userdata/v1//mnt_
rw/upper.workdir=/userdata/v1//mnt_rw/work)
/dev/sda1 on /mnt/usb_sda1 8 type vfat (rw,nodev,noatime,fmask=8822,dmask=8822,code
page=936,tocharset=cp936,sbortname=mixed,urrork=remount-ro)
```

Take care

Before disconnecting a USB mass storage device, remember to enter the **sync** synchronization command to prevent data loss. When you disconnect the storage device, please exit from the/media/* directory. If you stay in/media/USB *, the automatic uninstallation process will fail. If this situation occurs, please type umount/media/USB * to manually uninstall the device

4.2.2 Automatic mounting of micro SD card

EC954-FQ38 supports micro SD storage cards but does not support hot swapping. It will automatically mount all partitions. EC954-FQ38 will partition all micro SD storage cards and mount them to the/mnt/path. The naming format for the mounting folder is sd_<node>_<num>. Among them,<node>is the device node name of the partition, and<num>is a number from 0 to 9.

edgeljedge-canpu	ter:-5	af 1	1		
Filesystem	Size	Used	Avail	Useh	Hounted on
/dev/root	3,56	2.76	565M	835	1
devtepfs	1.46	8.8K	1.9G	1.1	/dev
/dev/mmcblk0p0	8.20	473H	7.86	6%	Juserdata
overlay	8.26	47311	7.80	6%	/var
overlay	8,26	47311	7.86	65	/etc
overlay	8,26	473H	7.86	65	/hone
overlay	8.26	473H	7:80	65	/root
overlay	8.26	479H	7.86	6%	/sbin
overlay	8.26	473H	7.80	6%	/bin
overlay	8.26	473H	7.86	65	/usr
overlay	0.26	4738	7.80	6%	/lib
overlay	8.26	473H	7.86	6%	/tmp
overlay	8.26	4731	7.86	6%	/imit
overlay	8.26	473H	7.86	6%	/opt
overlay	8.26	473H	7.86	6%	/modia
overlay	8.2G	473H	7.86	650	/system
overlay	8.2G	4738	7.86	65	/boot
overlay	8.2G	473H	7.80	6%	JARV
overlay	8126	473H	7.80	6%	/vendor
twpfs	1,99	326	1.96	- 14	/dev/shin
tepfs	1.96	8.94	1.96	14	/ run
tepfs	5.0M	4.06	5.0H	- 1%	/run/lock
tepfs	1.96	0	1.96	. 6%	/sys/fs/cgroup
/dev/mncblk0p7	126M	1314	107H	115	/oem
/dev/mmcblk1p2	3.76	800M	2.06	23%	/weit/sd_mmcblk1p2_0
/dev/mmcblk1p1	-69M	-26H	44H	37%	/mnt/sd_mmcblkip1_0
trofs	370M	0	378H	0%	/run/user/108
tepfs	378H	. 0	378H	64	/rum/user/1001

4.2.3 mSATA hard drive automatic mounting

(1) Log in to the system, execute sudo fdisk - I, and locate your hard disk partition, as shown in the following image:/dev/sda1

edge@edge-compu Disk /dev/ram0 Units: sectors Sector size (lo I/O size (minin	uter:~\$ su : 4 MiB, 4 of 1 * 5 ogical/phy mum/optime	udo fdisk 4194304 by 12 = 512 b ysical): 5 al): 4096	-1 ytes, 8192 bytes 512 bytes bytes / 4	secto / 4090 096 by	ors 5 bytes ⁄tes	
Disk /dev/sda: Disk model: Ler Units: sectors Sector size (lo I/O size (minin Disklabel type Disk identifier	119.2 Gil novo SSD 5 of 1 * 5 ogical/phy mum/optimu : dos r: 0x1a63	B, 1280356 SL700 12 = 512 t ysical): 5 al): 512 t 708d	576160 byt bytes 512 bytes bytes / 51	es, 29 / 512 2 byte	50069680 sector bytes s	5
Device Boot /dev/sda1	t Start 2048 2	End 50069679	Sectors 250067632	Sizo 119.20	id Type 3 83 Linux	
Disk /dev/mmcbl Units: sectors Sector size (lo I/O size (minin Disklabel type Disk identifier	lk0: 14.6 of 1 * 5 ogical/phy mum/optime : gpt r: 902C000	GiB, 1563 12 = 512 t ysical): 5 al): 512 t 00-0000-48	84268160 b bytes 512 bytes 512 bytes 512 bytes / 51 864-8000-6	ytes, / 512 2 byte 893000	30535680 secto bytes es 002304	rs
Device	Start	End	Sectors	Size	Type	
/dev/mmcblk0p1	16384	24575	8192	-4M	unknown	
/dev/mmcblk0p2	24576	32767	8192	414	unknown	
/dev/mmcblk0p3	32768	98303	65536	32M	unknown	
/dev/mmcblk0p4	98304	163839	65536	32M	unknown	
/dev/mmcblk0p5	163840	229375	65536	32M	unknown	
/dev/mmcblk0p6	229376	10715135	10485760	5G	unknown	
/dev/mmcblk0p7	10715136	10977279	262144	128M	unknown	
/dev/mmcblk0p8	10977280	13074431	2097152	1G	unknown	
/dev/mmcblk0p9	13074432	30535615	17461184	8.3G	unknown	

(2) Format the partition to the desired file system, such as ext4

(3) Create a mount point, such as/mnt/sda1

(4) Edit the vi/etc/fstab file, Add/dev/sda1/mnt/sda1 ext4 defaults, nofail, x-system. device timeout=1s 0 0 at the end of the line, as shown in the following figure:

/Dev/sda1: Device partition, user needs to configure according to actual situation

/Mnt/sda1: Mount point, user needs to configure according to actual situation

The file system format of the etx4 hard disk partition needs to be configured by the user according to the actual situation

Default, nofail, x-system. device timeout=1s 0 0 fixed configuration. It is recommended to use this configuration, and users can also modify it according to their needs.



4.3 CAN bus interface

The CAN port of EC954-FQ38 supports two CAN buses, with CAN1 corresponding to device can0 and CAN2 corresponding to device can1

4.3.1 Configure Connection CAN1 Interface

By default, the CAN port will be initialized. If any other configuration is required, please use the IP link command to check the CAN device. To check the status of the CAN device, use the IP link command:

```
edge@edge-computer:-$ ip link show can#
J: can@: OMCARF,EDHO> mta 16 qdisc noop state DDAN mode DEFAULT group defmalt glem 10
link/can
edge@edge-computer:-$
```

To configure CAN devices, please use IP link set can0 down to first shut down the device

Sudo IP link set can0 down

Then configure the bit rate (the following is an example of a 125k bit rate):

Sudo IP link set can0 type can bitrate 125000

Finally, restart the device

Sudo IP link set can0 up

4.3.2 Configure Connection CAN2 Interface

By default, the CAN port will be initialized. If any other configuration is required, please use the IP link command to check the CAN device. To check the status of the CAN device, use the IP link command:



To configure CAN devices, please use IP link set can1 down to first shut down the device

Sudo IP link set can1 down

Then configure the bit rate (the following is an example of a 125k bit rate):

IP link set can1 type can bitrate 125000 dbitrate 1250000 fd on

Finally, restart the device

Sudo IP link set can1 up

4.4 IO debugging

EC954-FQ38 supports 4-way DI and 4-way DO. When you want to use the IO port, please type the dio_mgmt command to control the input and output of IO. Usage of dio_mgmt:



When you need to set a certain IO port to high or low, you can type the command dio_mgmt set D<I/O><number><HIGH/LOW>



Print the level information of the corresponding IO port by typing dio_mgmt show D<I/ O><number>.

4.5 GPS

Some EC900 models integrate GPS modules internally, and the data serial port nodes are/ dev/ttyS9.

If you want to view detailed GPS information, there are two ways to view it:

1. Set up serial port nodes using STTY, type CAT to directly output source data



2. Type the gnss command to directly output parsed information such as time, longitude, and latitude

edge@edge-computer:~\$ sudo gnss

4.6 Power on/off button

4.6.1 Shutdown of equipment

1. Press and hold the power button for 8 seconds to turn off the device

2. You can use Linux commands to shut down all software running on the device and stop the system. However, after running this command, major components such as CPU, RAM, and storage devices will power down.

edgededge-computer:~\$ sudo shutdown -h now

4.6.2 Starting the equipment

Short press the power on button, and the system will perform the power on operation.

5 Security

In this chapter, we will introduce the security mechanism of the edge computer EC900 based on ARM architecture.

5.1 Sudo mechanism

In EC900, for better security, root users are prohibited from using it. Sudo is a program that allows system administrators to allow approved users to execute commands as root or other users. The most basic principle is to give as little privilege as possible to complete the work. Using sudo is safer than opening a session with root identity for many reasons, including:

• No need to know the root password (sudo will prompt the current user's password), ordinary user privileges can be granted

- It is easy to run commands that require privileges through sudo, and for the rest of the time, work as an unprivileged user to reduce the potential damage caused by incorrect operations.
- Some system level commands cannot be directly used by users, as shown in the following example output:



5.2 Firewall

Netfileter/iptables (hereinafter referred to as iptables) is an excellent and completely free packet filtering firewall tool that comes with the Nuix/Linux system. Its functions are very powerful, and it is very flexible to use. It can finely control the inflow, outflow, and flow of data packets through the server.

5.3 TPM2.0

TPM stands for Trusted Platform Module, which is a hardware security module designed to provide security and encryption capabilities for computer systems. It is a security microcontroller that can be embedded in computer systems or sold as a standalone hardware device. It includes an encryption coprocessor for storing encryption keys, digital certificates, and other secure data, as well as supporting multiple encryption algorithms and security protocols. On EC954-FQ38, the standard TPM2.0 protocol stack and TPM2.0 tools have been integrated for users to use.

6. System restoration to factory settings and updates

In this chapter, we will introduce how to restore the factory settings and update the edge computer EC900 based on the Arm structure.

6.1 Restoring Factory Settings

There are two methods to restore factory settings:

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

edgeBenge-computer:-I sudo update reset

2. Restore factory settings through buttons:

- Press and hold the factory reset button for 10-20 seconds, and you will see that the warning light is on for a long time.
- After the warning light stays on, release the factory reset button.
- After releasing the factory reset button, the error light flashes a few times before the system starts to restart and perform factory reset
- After the system restarts, the warning and error lights flash and the status goes out; After about 30 seconds, when both the warn and error lights stop flashing and the status starts flashing, the system will complete the factory reset.

6.2 System Upgrade

Prepare a USB flash drive (micro SD card). If the USB drive (SD card) has multiple partitions, please use the first partition. It is recommended not to create multiple partitions. The partition of the USB drive (SD card) needs to be in FAT32 format. This document takes upgrading EC954-V2.0.0.img as an example for explanation.

- Create an empty ec900_img directory in the root directory of the USB drive (SD card), and place the EC954-V2.0.0.img file and md5.txt file published by inhand in the ec900_img directory.
- Confirm that there is only the MD5 hash value in the EC954-V2.0.0.img line in the md5.txt file. EC954 does not support OTA upgrades for multiple IMG images.
- Exit the USB drive (SD card) normally on the computer. Be careful not to directly remove the USB drive, and choose the "Exit" or "Eject" operation on the desktop.
- Insert the USB flash drive (SD card) into the target EC900 device. The target device will automatically verify the EC954-V2.0.0.img file and perform an OTA upgrade. During the upgrade process, the WARN and ERROR lights will be displayed accordingly. After WARN and ERROR return to normal, the upgrade operation will be completed. Due to the large size of the img file and the long upgrade time, please be patient and wait.
- After the upgrade is completed, EC900 will write the key information during the upgrade to the log file in the ec900_img directory. Please review the relevant documents.

7 Programming Guide

EC900 provides a JSON format device information description file. Customers who need to operate peripherals such as IO, LED, serial port, etc. can obtain the device node information of these peripherals by querying the device description information file.

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

{

```
"model_info":{
  "model":"EC954",
  "pn":"IO-FQ58",
  "sn":"EC9540000011111",
  "oem":"inhand",
  "features":";io;cell-FQ58;wlan;ble;gps;"
},
"software_info":{
  "boot_loader":"1.0.2",
  "kernel":"5.10.160-00001-g406d1811beab-dirty",
  "version":"V2.0.0-beta.1",
  "OS":"Debian GNU/Linux 11 (bullseye)"
},
"hardware_info":{
  "arch":"arm64",
  "soc":"rk3568",
  "interface":{
     "eth":[
       {
          "iface_name":"eth1",
          "iface_mac":"00:33:44:11:00:01"
       },
       {
          "iface_name":"eth2",
          "iface_mac":"00:33:44:11:00:02"
       },
       {
          "iface_name":"eth3",
          "iface_mac":"00:33:44:11:00:03"
       },
       {
          "iface_name":"eth4",
          "iface_mac":"00:33:44:11:00:04"
       }
     ],
     "wlan":[
       {
          "iface_name":"wlan0",
          "iface_mac":"94:A4:08:8A:30:CD"
       },
       {
          "iface_name":"wlan1",
          "iface mac":"96:A4:08:8A:30:CD"
       }
     ],
     "ble":[
    ]
  },
  "gpio":[
     {
       "gpio_name":"cellular_power",
       "dev_node":"/sys/class/gpio/gpio0"
     },
```

```
{
     "gpio_name":"sim_switch",
     "dev_node":"/sys/class/gpio/gpio19"
  },
  {
     "gpio_name":"msata_power",
     "dev_node":"/sys/class/gpio/gpio20"
  },
  {
     "gpio_name":"gnss_power",
     "dev_node":"/sys/class/gpio/gpio110"
  },
  {
     "gpio_name":"ble_power",
     "dev_node":"/sys/class/gpio/gpio220"
  }
],
"user_key":[
  {
     "user_key_name":"USER",
     "dev_node":"/sys/class/gpio/gpio95"
  }
],
"uart":[
  {
     "uart_name":"P1",
     "dev_node":"/dev/ttyO1"
  },
  {
     "uart_name":"P2",
     "dev_node":"/dev/ttyO2"
  },
  {
     "uart_name":"P3",
     "dev_node":"/dev/ttyO3"
  },
  {
     "uart_name":"P4",
     "dev_node":"/dev/ttyO4"
  },
  {
     "uart_name":"P5",
     "dev_node":"/dev/ttyO5"
  },
  {
     "uart_name":"P6",
     "dev_node":"/dev/ttyO6"
  },
  {
     "uart_name":"P7",
     "dev_node":"/dev/ttyO7"
  },
  {
```

```
"uart_name":"P7",
     "dev_node":"/dev/ttyO8"
  }
],
"io":{
  "di":[
    {
       "di_name":"DI1",
       "dev_node":"/sys/class/gpio/gpio487"
    },
    {
       "di_name":"DI2",
       "dev_node":"/sys/class/gpio/gpio488"
    },
     {
       "di_name":"DI3",
       "dev_node":"/sys/class/gpio/gpio489"
    },
    {
       "di_name":"DI4",
       "dev_node":"/sys/class/gpio/gpio490"
    }
  ],
  "do":[
    {
       "di_name":"DO1",
       "dev_node":"/sys/class/gpio/gpio491"
    },
     {
       "di_name":"DO2",
       "dev_node":"/sys/class/gpio/gpio492"
    },
    {
       "di_name":"DO3",
       "dev_node":"/sys/class/gpio/gpio493"
    },
     {
       "di_name":"DO4",
       "dev_node":"/sys/class/gpio/gpio494"
    }
  ]
},
"led":[
  {
     "led_name":"USER1",
     "dev_node":"/sys/class/leds/user1"
  },
  {
     "led name":"USER2",
     "dev_node":"/sys/class/leds/user2"
  },
  {
     "led_name":"4G/5G",
```

```
"dev node":"/sys/class/leds/cell"
       },
       {
          "led name":"SIM1",
          "dev_node":"/sys/class/leds/sim1"
       },
       {
          "led name":"SIM2",
          "dev node":"/sys/class/leds/sim2"
       },
       {
          "led_name":"WARN",
          "dev node":"/sys/class/leds/warn"
       },
       {
          "led name":"ERROR",
          "dev_node":"/sys/class/leds/error"
       },
       {
          "led_name":"STATUS",
          "dev_node":"/sys/class/leds/status"
       },
       {
          "led_name":"L1",
          "dev_node":"/sys/class/leds/level1"
       },
       {
          "led name":"L2",
          "dev_node":"/sys/class/leds/level2"
       },
       {
          "led name":"L3",
          "dev_node":"/sys/class/leds/level3"
       }
     ]
  }
}
```

7.1 IO Programming Guide

At present, there are a total of 8 IO interfaces on the device: for example, DI0~DI3 on the device panel have 4 input pins; DO0~DO3 have 4 output pins.

According to the device description information file/tmp/ieos/etc/systeminfo.json, the IO device nodes can be obtained as follows:

DI0~DI3-- sys/class/gpio/gpio487~sys/class/gpio/gpio490

DO0~DO3-- sys/class/gpio/gpio491~sys/class/gpio/gpio494

When you need to program IO interfaces, simply operate on the value value value under the backend device node (**sys/class/gpio/gpioxxx/value**)

Case:

When DO0 needs to output high voltage, it can directly write 1 to sys/class/gpio/gpio491/ value

Echo 1>/sys/class/gpio/gpio491/value

When you need to check the level of DI0, you can also directly check the value of **sys/class/ gpio/gpio487/value**

Cat/sys/class/gpio/gpio487/value

```
Complete shell script:
```

```
#!/bin/bash
gpio491="/sys/class/gpio/gpio491/value"
gpio492="/sys/class/gpio/gpio492/value"
gpio493="/sys/class/gpio/gpio493/value"
gpio492="/sys/class/gpio/gpio494/value"
# To output a high level on DO0, you can directly write a '1' to sys/class/gpio/gpio491/value.
if [ -f "$gpio491" ]; then
  echo 1 > /sys/class/gpio/gpio491/value
else
  echo "no file exit "$gpio491
fi
# To output a low level on DO1, you should write '0' to sys/class/gpio/gpio491/value.
if [ -f "$gpio492" ]; then
  echo 0 > $gpio492
else
  echo "no file exit "$gpio492
fi
gpio487="/sys/class/gpio/gpio487/value"
gpio488="/sys/class/gpio/gpio488/value"
gpio489="/sys/class/gpio/gpio489/value"
gpio490="/sys/class/gpio/gpio490/value"
# To check the level of DI0, you can also directly view the value of `sys/class/gpio/gpio487/value`.
if [ -f "$gpio487" ]; then
  cat $gpio487
else
  echo "no file exit "$gpio487
fi
```

7.2 Led Programming Guide

On the device, users can use two lights, USER1 and USER2, for status prompts. Please check the light label to confirm the positions of USER1 and USER2 lights.

According to the device description information file/tmp/ieos/etc/systeminfo.json, it can be obtained that the USER1 and USER2 device nodes are:

User1:/sys/class/LEDs/user1

User2:/sys/class/LEDs/user2

There are some control files in the sys/class/leds/user1 directory used to control the properties and status of LEDs:

/Sys/class/leds/user1/brightness: This file is used to control whether the USER1 light is on or off. Writing 1 means it is always on, and writing 0 means it is always off.

/Sys/class/leds/user1/trigger: The trigger for the LED light, which can be written as timer to indicate the timer is triggered, and written as none to indicate the cancellation of the trigger.

/Sys/class/leds/user1/delay_on: This file represents the time when the LED light is on, in milliseconds.

/Sys/class/leds/user1/delayed off: This file represents the time when the LED light went out, in milliseconds.

If the trigger is configured for timed triggering, the value in brightness will no longer take effect and will automatically become 0.

Replacing user1 with user2 in the file path controls the operation of the USER2 light.

case:

When the USER1 light needs to stay on, write 1 to the brightness file

Echo 1>/sys/class/LEDs/user1/brightness

When the USER1 light needs to flash, write the timer to the trigger file and control the on and off times through delay_on and delay_off

Start Timer
echo timer > /sys/class/leds/user1/trigger

Light for 1 second echo 1000 > /sys/class/leds/user1/delay_on

Off for 1 second echo 1000 > /sys/class/leds/user1/delay_off

Complete shell script:

#!/bin/bash

USER1_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"

USER2_BRIGTHNESS="/sys/class/leds/user2/brightness" USER2_TRIGGER="/sys/class/leds/user2/trigger"

```
USER2_DELAY_ON="/sys/class/leds/user2/delay_on"
USER2_DELAY_OFF="/sys/class/leds/user2/delay off"
# Light Up USER1 LED
if [ -f "$USER1_BRIGTHNESS" ]; then
  echo 1 > $USER1_BRIGTHNESS
else
  echo "no file exit "$USER1 BRIGTHNESS
fi
# Light Up USER2 LED
if [ -f "$USER2 BRIGTHNESS" ]; then
  echo 1 > $USER2 BRIGTHNESS
else
  echo "no file exit "$USER2_BRIGTHNESS
fi
# Set USER1 LED to Blink
if [ -f "$USER1_TRIGGER" ]; then
  echo timer > $USER1 TRIGGER
else
  echo "no file exit "$USER1 TRIGGER
fi
# Set USER2 LED to Blink
if [ -f "$USER2 TRIGGER" ]; then
  echo timer > $USER2_TRIGGER
else
  echo "no file exit "$USER2_TRIGGER
fi
# Set USER1 LED to Illuminate for 1000ms
if [ -f "$USER1 DELAY ON" ]; then
  echo 1000 > $USER1_DELAY_ON
else
  echo "no file exit "$USER1_DELAY_ON
fi
# Set USER1 LED to Turn Off for 1000ms
if [ -f "$USER1_DELAY_OFF" ]; then
  echo 1000 > $USER1_DELAY_OFF
else
  echo "no file exit "$USER1 DELAY OFF
```

```
# Set USER2 LED to Illuminate for 1000ms
if [ -f "$USER2 DELAY ON" ]; then
  echo 1000 > $USER2 DELAY ON
else
  echo "no file exit "$USER2 DELAY ON
fi
# Set USER2 LED to Turn Off for 1000ms
if [ -f "$USER2_DELAY_OFF" ]; then
  echo 1000 > $USER2 DELAY OFF
else
  echo "no file exit "$USER2 DELAY OFF
fi
# Disable USER1 LED Blinking
if [ -f "$USER1 TRIGGER" ]; then
  echo none > $USER1 TRIGGER
else
  echo "no file exit "$USER1 TRIGGER
fi
# 关Disable USER2 LED Blinking
if [ -f "$USER2_TRIGGER" ]; then
  echo none > $USER2 TRIGGER
else
  echo "no file exit "$USER2_TRIGGER
fi
```

fi

7.3 Cross compilation

The user's own C/C++program can be cross compiled using a cross compilation toolchain on the development machine, and then the target file can be uploaded to the EC954 device for execution.

Cross compilation tool compressed package: gcc-linaro-6.3.1-2017.05-x86_64-arch64 Linux gnu.tar.gz

Method for configuring environment variables for cross compilation toolchain:

- Unzip gcc-linaro 6.3.1-2017.05-x86_64-arch64 Linux gnu. tar. gz to/opt path on the development machine (you can also unzip to other paths, make corresponding adjustments when setting the PATH environment variable in step 2)
- Edit the~/. bashrc file and add a line at the end of the file with PATH=\$PATH:/opt/gcc

linaro 6.3.1-2017.05-x86_64-arch64 Linux gnu/bin

• Execute source~/. bashrc to make the environment variables effective on the current terminal; The newly opened terminal will automatically take effect.

Using the classic Hello World program as an example, create the following directory and files

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

~/The content of the example/hello. c file is as follows:

```
#include <stdio.h>
int main(void)
{
    printf("hello, world!\n");
    return 0;
}
```

~/The content of the example/Makefile file is as follows:

```
# Define Target Filename and Source Filename
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 Compilation Options
CFLAGS := -Wall -Wextra -g -Wno-unused-parameter
# Specify Default Target
all: $(TARGET)
# Declare Dependencies of Target Files and Compilation Commands
$(TARGET): $(OBJS)
    $(CC) $(CFLAGS) $(LIBS) $^ -o $@
# Formulate the Command to Compile Source Files into Target Files
%.o: %.c
    $(CC) $(CFLAGS) $(LIBS) -c $< -o $@
# Establish the Command to Remove Temporary Files
clean:
    rm -f $(TARGET) $(OBJS)
# Declare Pseudo-Target ".PHONY"
.PHONY: all clean
```

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.