LTE-LINK SE

User's Guide

v2.0.0

CUAV TECH INC.,LTD

目录

1 Overview

LTE-LINK SE is a multifunctional link system suitable for open source flight control equipment and camera video data acquisition and transmission. The system works in a 4G network environment and is used with the CUAV cloud platform APP to realize open source flight control equipment and camera video Unlimited distance transmission of data. The system uses 12V ~ 55V DC power supply as power, and a wide range of working voltage is compatible with the power supply system of most drones on the market.

In terms of system upgrade and update, the product can upgrade the system version of the device to the latest version officially released by CUAV Cloud, allowing users to use the system upgrade to bring more convenient and complete functions, while also being able to experience the latest open source flight control protocol technology. In terms of product maintenance and processing, the system provides the function of restoring the system. If the current system is abnormal, the user can use this function to restore the system.

The system adopts OLED display, complete status information indication, simple operation, running status stable and reliable, it is a link device that successfully solves the open source flight control infinite distance control and the infinite distance collection and transmission of camera video data.

1.1 Product Feature

- Efficient 32-bit ARM processor
- SIM card compatible with multiple operators
- Unlimited distance data transmission, the data is processed by the ChaCha20-Poly1305 encryption algorithm
- Support multi-platform cloud management
- Provide remote online upgrade and offline upgrade of equipment

1.2 Main purpose and scope of application

- Drone flight control
- Automatic cruise equipment (such as automatic cruise car, automatic cruise yacht)
- Unlimited distance camera monitoring equipment

1.3 Safety

- The device power cord and flight control data transmission line should use the interface line matched by the product to avoid chip damage.
- When the device is working in an environment with poor heat dissipation for a long time, do not touch the device directly with your hands. You should disconnect the power supply and wait for the surface temperature of the device to drop before removing it.

2 Technical characteristics

2.1 The main function

- Flight control data transmission control
- Real-time viewing of camera video data
- Video
- Taking photos

2.2 The main parameters

Form 2- 1 Overall performance parameter list

CPU	HiSilicon Hi3516DV100
Network card	ME909S(821a)
Network frequency band	LTE(FDD): B1、B3、B8
	LTE(TDD): B38、B39、B40,B41
	DC-HSPA+/HSPA+/HSPA/UMTS: B1、B9、B5、B8、B9
	TD-SCDMA: B34, B39
	EDGE/GPRS/GSM: 900/1800MHz
Flight control type	CUAV series、Pixhawk series and so on.
Data protocol	MAVLink1、MAVLink2
Transmission distance	There is no limit in theory, depending on network coverage
Video input	1080P、720P
Video encoding	H265
Network expansion	No support
Cloud video	No support

storage	
Video recording	Active recording, automatic recording (automatic mode needs to be specified by the user on the client-side)

Form 2- 2 Interface parameter list

data input	UART
Video input	HDMI
Antenna interface	MMCX
Device screen	OLED 128*64 Pixel
Client-side	FeiGong transmission: Windows 7 and above
	CUAV GS：Android 7.0 and above
	For other third-party client-side, the data provided by the third party shall prevail.

Form 2- 3 Working environment and physical parameter list

Operating Voltage	12V ~ 55V
Operating temperature	-10℃ ~ +60℃
Size	75.3mm ⌀ 39.2mm ⌀ 19mm
Weight	78g

3 Product appearance and interface description

3.1 Product appearance

LTE-LINK SE product appearance shown as Figure 3-1.

Figure 3- 1 LTE-LINK SE product appearance

3.2 Product hardware and interface description

3.2.1 Hardware interface diagram

The product hardware interface is shown in Figure 3-2, Figure 3-3.

Figure 3- 2

Figure 3- 3

3.2.2 Hardware and interface description

- **OLED display screen：** Display LTE-LINK SE system status information.
- **SIM card slot：** Used to access the SIM card.
- **Power status light：** Indicates the current power supply situation of the device. If the indicator is found to be off after power-on, it indicates that the power supply of the device is abnormal.
- **System status light：** When system normal operation indicator and the system is in normal operation state, the indicator flashes at a frequency of 1s.
- **NIC status light：** Indicates the current network status of the 4G network card. When it flashes twice continuously within 1s, it means that the current network card is not inserted into the SIM card or the inserted SIM card cannot connect to the network service; when it flashes once within 1s, it means the current network card has been inserted to the SIM card which is capable of connecting to the network ; when it is always on, it indicates that the network card has successfully dialed in and the device can use network services through the 4G network.
- **Power connector：** Power supply for equipment.
- **Button：** Used for account device binding, device CID QR code display and device system restoration.

- **Data transmission：** Connect to external flight control equipment.
- **HDMI video input：** Camera HDMI interface.
- **Fan machine：** External fan power supply interface, which can supply power for external cooling fan.
- **Antenna ANT1：** The main interface of the network card network signal antenna, which must be connected to the antenna when used.
- **Antenna ANT2：** Network card network signal antenna secondary interface, increase the stability of the network card network receiving signal.
- **TF memory card：** Support external TF memory card for saving video recording files, saving photo files and restoring the system offline.

3.2.3 Wiring instructions

- The power cord is shown as Figure 3-4.

Figure 3- 4

- The data transmission interface line is shown as Figure 3-5.

Figure 3- 5

- The antenna and its extension cable are shown as Figure 3-6.

Figure 3- 6

- The HDMI video data acquisition transmission line is shown as Figure 3-7.

Figure 3- 7

4 Hardware installation and debugging

4.1 Device connection diagram

The user can connect the device interface line according to the product appearance description in Chapter 3 to match the wiring instructions.

4.2 Interface operation

4.2.1 Prepare to work

Before debugging the device interface, check the voltage of the power supply device currently pre-supplying the device to ensure that the voltage value is between 12V and 55V. After connecting the power, check whether the OLED screen has a boot interface display. For example, when the OLED screen is not displaying, then check the power indicator status on the LTE-LINK SE. If the power indicator is on but the screen does not display, it is scheduled to be an OLED screen problem. On the contrary, it is the power supply problem of the equipment power supply. After the device is powered on, the OLED screen display interface is shown as Figure 4-1.

Figure 4- 1 Initial detection interface

After the device is powered on, after the system displays the Logo and device system version information finished, the OLED display enters the main display interface, as shown as Figure 4-2.

Figure 4- 2 Main menu interface

4.2.2 Data transmission interface debugging

When the data transmission interface of the LTE-LINK SE device is not connected to the flight control device, it will be indicated by the icon marked as Figure 4-3. When the data transmission interface of the device is connected to the flight control device, if the data transmission interface of the device is normal, the data transmission connection icon indicator on the screen interface will be displayed as shown in Figure 4-4. On the contrary, when the connection is abnormal, the data transmission connection icon display status will not change.

When it is judged that the flight control data transmission connection is abnormal, it may be caused by several reasons listed below. When users or maintenance personnel encounter such problems, You can check and repair the equipment according to this list：

- The end of the interface cable is loose or disconnected
- The data transmission interface of LTE-LINK SE equipment is damaged
- The data transmission interface of the flight control device is damaged
- The connected flight control device is not a device of MAVLink protocol
- The interface cable used does not match the connected flight control device

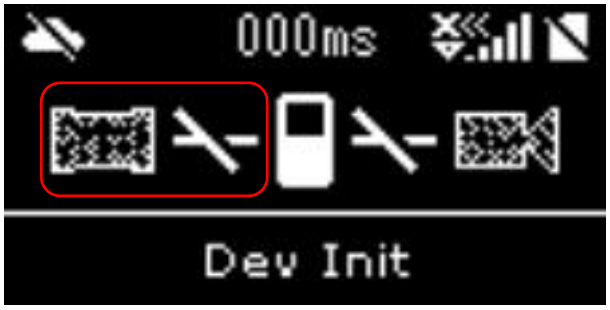

Figure 4- 3 Flight controller not connected

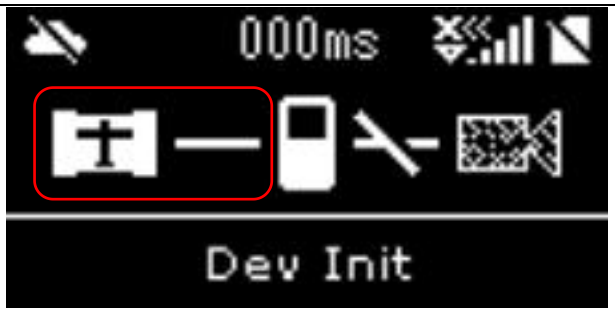

Figure 4- 4 Flight controller connected

Note： The line sequence of the data transmission interface cable connected to the LTE-LINK SE device is fixed and cannot be changed. When connecting the flight control data transmission device, you need to modify it according to the interface line sequence of the connected device. For example, there will be three USB cables when the product is sold. The flight control data cable corresponds to the data transmission interface of the V5/V5 nano, V3/V2, Pixhawk series devices, so this problem should not be ignored when troubleshooting.

4.2.3 HDMI interface debugging

The connection identification of the HDMI interface is shown as Figure 4-5. The identification status of the icon in the figure is that there is no camera connected.

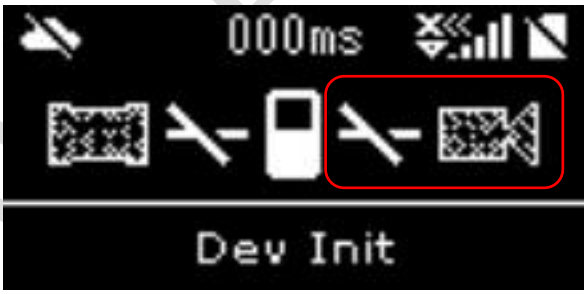

Figure 4- 5 HDMI not connected to the device status

If it is detected that a normal HDMI camera device is connected, the icon indication on the screen interface will indicate the status as shown as Figure 4-6.

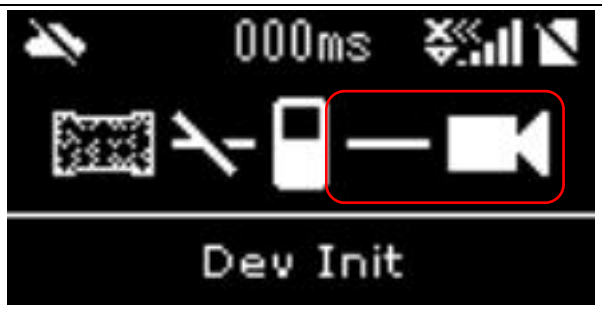

Figure 4- 6 HDMI connected to the device status

For the HDMI input part, the status information prompt area of the LTE-LINK SE device screen has corresponding status information display. When the screen icon does not change to the HDMI connection status after the HDMI camera device is connected, the user needs to troubleshoot the problem according to the screen status information prompt area displays content. HDMI status related information prompts and causes are as follows：

1) < HDMI instability > and < h*v Nonsupport >

   h and v indicate the HDMI input resolution actually detected by the link device. The reasons for this problem are as follows：

   - HDMI cable problem
   - HDMI interface poor contact
   - The output resolution of the camera device connected to the HDMI cable is not supported by the LTE-LINK SE device HDMI, the abnormal state is shown in Figure 4-7.

Figure 4- 7 HDMI not connected to the device status

2) < Video Chip Error >

   The screen prompts this status message, indicating that the HDMI video capture chip of the current device is abnormal. When this problem occurs, the device needs to be returned to the factory for repair. The state diagram is shown in Figure 4-8.

Figure 4- 8Video capture chip abnormal

4.2.4 TF memory card interface debugging

The LTE-LINK SE device supports external storage device TF memory card function . The external TF memory card is mainly used for the storage of the user's video files and photographed photo files. If the user needs the video or photograph function,It is necessary to debug the access status of the TF memory card during installation.

There is a TF memory card access status indicator icon on the main interface of the LTE-LINK SE device screen,shown as Figure 4-9 means the device does not detect the TF memory card access,When it is detected that a TF memory card is connected, the indicator icon will be shown as Figure 4-10.

Figure 4- 9 TF card not connected

Figure 4- 10 TF card connected

4.2.5 SIM card access and network service connection debugging

The LTE-LINK SE device does not support hot swapping of the SIM card, so please insert the SIM card into the SIM card slot and connect two antennas at the same time before powering on the device. After the device is powered on, it needs to judge whether the connected SIM card is valid according to the indication status of the network card status light (LTE).

- When the network card status light quick flashes twice continuously at a frequency of 1s, it means that the SIM card is not inserted or the inserted SIM cannot be connected to the network through the LTE-LINK SE device.
- When the network status light flashes once at a frequency of 1s, it means that the SIM card has been inserted and the LTE-LINK SE device can connect to the network.

For the position of the NIC status light shown as Figure 3-2.

5 Use and operation

5.1 Preparation before use

Before using the LTE-LINK SE device, please debug the various interfaces of the device according to the description in Chapter 4,the preparation of the LTE-LINK SE equipment is completed when the interface debugging is normal.

5.2 Boot interface and system version information

When the LTE-LINK SE device is powered on and the screen is normal, it will first display the screen detection interface as shown in Figure 4-1. After the detection interface finish displayed, the product company logo will be displayed shown as Figure 5-1.After the Logo is displayed for about 3 seconds, the currently running system version number of the device will be displayed,different versions of memory and troubleshooting methods will be different,When using this document to troubleshoot problems, users need to confirm the consistency of the version. The device version display is shown as Figure 5-2

Figure 5- 1 Logo

Figure 5- 2 System version

5.3 CUAV cloud server connection

After the LTE-LINK SE device starts to the main interface, the device will automatically try to connect to the CUAV cloud server. Generally speaking, according to the description in section 4.2.5, after the user inserts the SIM card for debugging, the device can be connected to the CUAV cloud server normally.

5.3.1 Effective SIM card insertion detection

The device detects whether there is a valid SIM card currently connected, at the same time the screen interface displays the "sim check …" status message, shown as Figure 5-3.

Figure 5- 3 Detecting SIM

5.3.2 Register SIM card network

After the SIM card has passed the detects, the device will register the SIM card network status, and the status message on the screen interface will change from "sim check …" to "sim net register", shown as Figure 5-4.

Figure 5- 4 Register SIM public network

5.3.3 Connect to the public network

After the SIM card network registration is successful, the LTE-LINK SE network card device starts to request to connect to the public network, and the status message on the screen interface changes from "sim net register" to "lte net start …", shown as Figure 5-5.

Figure 5- 5 4G network connection request

5.3.4 Public network connection is successful

After the device is successfully connected to the public network, the status message on the screen interface will change from "lte net start …" to "lte net OK".At the same time, the 4G signal strength indicator area on the screen starts to display the current 4G signal strength value of the device in real time, shown as Figure 5-6.

Figure 5- 6 NIC network connection is successful

5.3.5 Synchronize network time to device

After the public network connection is successful, the device needs to synchronize the local time of the device to the network time first. The status message on the screen interface changed from "lte net OK" to "wait time sync", indicating that the device is synchronizing network time, shown as Figure 5-7.

Figure 5- 7 Synchronize network time

5.3.6 Request to connect to CUAV cloud server

After the time synchronization is successful, the device requests to connect to the CUAV cloud server, and the status message on the screen interface changes from "wait time sync" to "connect to server", shown as Figure 5-8.

Figure 5- 8 Connect to CUAV server

5.3.7 Successfully connected to the server

After the device is successfully connected to the CUAV Cloud server, the user can use CUAV cloud's related ground terminal APP to connect to the link device to view the video or control the flight controller.After successfully connecting to the server, the link device screen interface status message information is displayed as "connection eatablish",At the same time, the device indicates the network delay information area will display the delay time of the communication between the current link device and the server in real time. The schematic diagram of successful connection to the server shown as Figure 5-9.

Figure 5- 9 CUAV cloud service successfully connected

5.4 Device binding and unbinding

5.4.1 Device binding

After the LTE-LINK SE device is connected to the CUAV cloud server, the user can bind or unbind the device through the APP software on the CUAV cloud ground terminal. The device binding step is basically to obtain the CID code of the link device (some software can directly request binding through the QR code), and then request to bind the link device according to the device CID code. The user follows the prompt on the link device screen to button, and finally the CUAV cloud ground terminal APP inquires that the corresponding link device has been bound in the binding list. The detailed operation steps of the link device are described as follows:

1) Get the CID code of the link device

   After the user presses the button for 3 seconds, the QR code of the CID information will be displayed on the device screen. Refer to Figure 5-10. The user can scan the QR code on the device screen with the scan QR code function on the mobile device to get the CID code of the current link device.

Figure 5- 10 QR code interface

2) The ground terminal APP requests to bind the link device according to the CID code
The user enters the corresponding CID code on the binding interface of the CUAV cloud ground terminal APP, and then clicks the "Binding" button to start requesting to bind the terminal link device. For detailed operations, please read the relevant APP instructions.

3) The terminal link device confirms that it agrees to the ground terminal APP binding
After the ground-side APP requests to bind the terminal link device, if the terminal link receives the binding request, the screen interface will prompt the user to short press the button to confirm the ground-side APP binding, the interface shown as Figure 5-11,At this time, the user needs to press the button to confirm within 30s, otherwise will prompt the binding timeout, shown as Figure 5-12. If the binding authentication is successful, the interface will jump to the interface shown as Figure 5-13, after that the interface will return to the main menu interface, which means that the binding device action ends.

Figure 5- 11 Binding request

Figure 5- 12 Binding time out

Figure 5- 13 Binding successful

5.4.2 Device unbinding

The unbinding of the terminal link LTE-LINK SE device is more simple compared to the binding action. Regardless of whether the link device is online (connected to the CUAV cloud server), the user can complete the device unbinding on the CUAV cloud ground terminal APP Action, please read the relevant APP instructions for details.

5.5 Digital transmission

Before using the data transmission function of the LTE-LINK SE terminal link device, you need to debug the data transmission interface of the terminal link device according to section 4.2.2 to ensure the communication between the flight control device and the terminal link device is normal.

When there a flight control device is connected and the terminal link device is connected to the CUAV cloud server, the terminal link device will forward the flight control device data in real time. At this time, if the user has bound the terminal link device to the ground terminal APP, The user can view or control the flight control equipment through the ground terminal APP.

5.6 Image transmission

Before using the image transmission function of the LTE-LINK SE terminal link device, you need to debug the HDMI interface of the terminal link device according to section 4.2.3 to ensure that the terminal link device can obtain the video data of the connected camera in real

time.

The LTE-LINK SE terminal link device can transmit the video data on the terminal link device in real time. When the device is connected to the CUAV cloud server and is bound, the user can view video from the terminal link according to the related ground terminal APP of CUAV Cloud.

When video data is being transmitted, the video transmission indicator icon on the screen of the terminal link device will be displayed. When the video transmission function is closed, the video transmission indicator icon on the screen will be hidden, shown as Figure 5-14 for the terminal link device is transmitting video data.

Figure 5- 14 Transmitting video data status

LTE-LINK SE equipment supports at least three video resolutions: smooth, standard definition and high definition. If the camera connected to the link device is a full-HD camera (1080P), it also supports full-HD transmission mode,In particular, some CUAV cloud’s ground-end apps will have "auto" resolution in the video switching options,when setting on the terminal link, if the ground terminal is set to "auto" resolution transmission, according to the highest resolution transmission of the currently captured video.

The corresponding values of transmission resolution are as follows:

- Smooth（640*480）
- Standard definition（854*480）
- High definition（1280*720）
- Full HD（1920*1080）

In particular, video transmission of different resolutions requires different network uplink transmission bandwidth of the SIM. When the video effect viewed on the ground-side APP is

severely blurred, or it is confirmed that the link device has started to transmit video data, but the ground-side APP has no video images,the fundamental reason is that the current network uplink transmission bandwidth of the SIM cannot reach the bandwidth requirement of the video transmission resolution. At this time, it is necessary to reduce the transmission resolution or replace the SIM card with a higher network upstream transmission bandwidth.The uplink bandwidth value of the SIM card network corresponding to the video transmission resolution shown as List 5-1.

List 5- 1The video transmission resolution corresponds to the SIM card network uplink bandwidth value list

Video transmission resolution	**Minimum requirement for SIM card network uplink bandwidth**
Smooth（640*480）	1Mbit
Standard definition（845*480）	2Mbit
High definition（1280*720）	3Mbit
Full HD（1920*1080）	4Mbit

5.7 Video

5.7.1 Premise demand

1) Camera connection

   Debug the HDMI interface of the terminal link device according to section 4.2.3 to ensure that the terminal link device can obtain the video data of the connected camera in real time.

2) TF Memory card

   Debug the TF memory card function of the terminal link device according to section 4.2.4 to ensure that the terminal link device can detect that a valid TF memory card is inserted. The parameters of the inserted TF memory card are as follows:

   - The total storage capacity can not less than 5GB

- The remaining space can not less than 512MB

5.7.2 Video mode

The LTE-LINK SE terminal link equipment supports two modes: active recording and automatic recording,active recording is for the terminal link device user , to start or stop of the recording can be controlled through the on/off button of the CUAV cloud ground terminal APP;Automatic recording is the automatic recording mode set by the user. After the device is powered on next time, it will automatically start recording according to the automatic recording mode set by the user last time.

There are two modes of automatic recording of the equipment, automatic recording when power-on and automatic recording when taking off.

- When the automatic recording mode is turned on, the terminal link device will start recording when it detects a video input when it is powered on, until the user manually stops recording or the device shuts down.
- When the aircraft takes off in video recording mode, the terminal link device will determine the status of the connected flight control device in real time. When it detects that the flight control has changed from the locked state to the unlocked state and there is video input, it will start recording. When it becomes locked, recording stops.

If the recording is started successfully, the status message indication information on the screen interface of the device will prompt "record start", shown as Figure 5-15. When the recording normally end , the status message of the device screen interface will display "video record success", shown as Figure 5-16.

Figure 5- 15 Video record start

Figure 5- 16 Video record success

It should be noted that there is an operational conflict between the active recording mode and the automatic recording mode. For example, the automatic recording mode has allowed the device to start recording, but the user sets the device to start recording on the APP side, and there will be a conflict at this time. In this case , The status message information on the screen interface displays "recording..." prompt, shown as Figure 5-17. There is also a conflict of repeated stopping. The above two conflict situations are handled according to the first instruction to perform the recording action.

Figure 5- 17 Video recording

5.7.3 Several restrictions on recording

- If the recording time is less than 30 seconds, the recording will be regarded as invalid, and the recording file will not be saved to the TF memory card.
- When recording video, if the TF card is abnormal or the TF card is ejected abnormally, the recording video will stop. If the TF memory card can be used normally, the video clip file before the TF memory card ejection will be saved.
- Unplugging the camera or abnormal video input during video recording will cause video recording to stop, and the TF memory card will be saved to the video clip file before the abnormal video input.

5.7.4 TF memory card overflow handling

- Before starting recording, check whether the remaining space in the current TF memory card is less than 512MB. If it is less, delete the earliest file created in the TF card until the remaining space in the TF memory card is greater than or equal to 2GB.
- When recording a video, it will judge whether the size of the recorded video file is larger than 2GB in real time,if the video file is going to be larger than 2GB, the current video file will be saved first, Create a new video source file and save the following video source data, until the recording stops or the remaining storage space in the TF card is less than 100MB.

5.8 Taking photos

Before using the camera function of the LTE-LINK SE link device, the user needs to debug the HDMI interface and TF memory card of the terminal link device according to chapter 4.2.3 and 4.2.4. Some descriptions of the camera function of the terminal link device are as follows:

- The resolution of the photos taken is subject to the highest resolution supported by the camera device, the highest is 1080P;
- The saving path of photos is the photo folder in the root directory of the TF memory card;
- Before taking the photos, make sure that the remaining space of the TF memory card is greater than 100MB , otherwise the photo will fail.

The status message of the screen interface when the photo is taken shown as Figure 5-18, and the photo failed for unknown reasons shown as Figure 5-19. The photo failed because the remaining space of the TF memory card is less than 100MB, screen shown as Figure 5-20.

Figure 5- 18 Photo success

Figure 5- 19 Photo failed for unknown reasons

Figure 5- 20 Photo failed

5.9 System version upgrade

5.9.1 Online upgrade

After the LTE-LINK SE device is connected to the public network (refer to section 5.3), the device will check the latest version of the current system,when a new version of the system is detected, the device will update the current system to the latest version in the background.

The nature of the equipment upgrade is mandatory, and the user does not need to do any operations, and the normal use of the equipment functions will not be affected during the upgrade.The status message on the screen interface shows five upgrade prompt messages, which are as follows:

- **uboot upgrade,** upgrading device BootLoader version.

- **kernel upgrade,** upgrading device kernel system version.
- **rootfs upgrade,** upgrading device root file system version.
- **update fail,** this upgrade failed.
- **reboot to update,** reset the device to complete this upgrade.

When the screen interface status message displays "reboot to update", shown as Figure 5-21, it means that the user can restart the link device to complete the version upgrade.

Figure 5-21 Restart upgrade

5.9.2 Offline upgrade

Offline upgrade means that users can upgrade the system version of the hardware through TF memory card. When the link device is powered on, it will check whether there is an upgrade file of u-boot, kernel or rootfs in the root directory of the TF card, and upgrade the corresponding file if it exists.

Notes：

- The file must be placed in the root directory of the TF card.
- The file name must be named after u-boot/kernel/rootfs.
- After the upgrade is finish, the link device will actively delete the corresponding upgrade file in the TF memory card to avoid the situation that the user forgets to delete the upgrade file in the card and causes the upgrade every time it starts, so if the user needs to upgrade multiple times, please backup upgrade files on PC .
- This operation has certain instability to the hardware system. If you need to use it for offline upgrade, please operate under the guidance of relevant technical personnel.

5.10 System version configuration restore

System version configuration restoration will shorten the service life of some hardware of the device,user should avoid using this operation if is not in special situation.

When the current system of the device is operating abnormally, the device's system can be restored through the device restoration function.After the device is restored, the system version is the version that the system is running normally. the restoration process is described as follows:

When the device is powered on, press and hold the button for 3 seconds.When the screen prompts to detect device restoration, it means that the device has entered the restoration process, shown as Figure 5-22. At this time, just wait for the restoration of the device and restart automatically.

Figure 5- 22 Device restore

5.11 Attention points when equipment use

- If it is necessary to perform waypoint tasks through link equipment, users should confirm the 4G network coverage on the route before installing LTE-LINK SE equipment;
- When conditions permit, choose to install the LTE-LINK SE equipment in a location with better heat dissipation;

6 Failure analysis and troubleshooting

This chapter will list the frequently occurring situations when users use the device and the corresponding solutions. If there are situations not those listed below, please consult relevant technical personnel to solve the problem. Similarly, in the subsequent revision of the document, we will also Supplementary solutions to related problems.

6.1 Network and server connection

- **Screen interface status message display“sim not found”**

  The SIM card is not inserted in the current link device or the SIM card currently inserted is invalid.

  The troubleshooting method is as follows：

  - Confirm the network usage of the inserted SIM card;
  - Confirm that the SIM card is correctly inserted into the SIM card slot;
  - Check whether the device Micro SIM card slot device is damaged;
  - Check according to chapter 4.2.5 LTE light status；

Figure 6- 1

- **The screen interface status message display has been paused in“sim net register”**

  The current link device repeatedly tries to register the public network of the SIM card.

  The troubleshooting method is as follows：

  - Ensure whether the signal antenna is connected;
  - Ensure whether the connected signal antenna is damaged;
  - The current network environment of the device does not support 4G network or the

4G network signal is poor;

Figure 6- 2

- **Screen interface status message display“lte net disconnect”**

  The LTE network card of the current device is disconnected and the external network service cannot be used.

  The troubleshooting method is as follows：

  - The connected signal antenna is damaged;
  - The current network environment of the device does not support 4G network or the 4G network signal is poor;

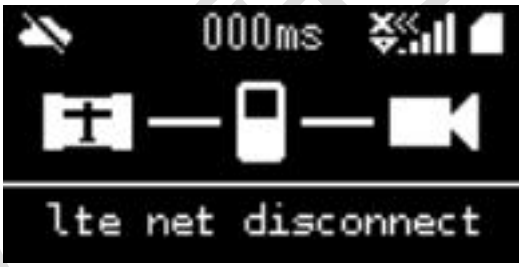

Figure 6- 3

- **Screen interface status message display“lte device reset”**

  The current device's LTE network card has an unrepairable error, and the device is actively restarting the LTE network card.

  The troubleshooting method is as follows：

  - The LTE network card hardware in the link device is abnormal, and the user needs to wait for the link device to actively restart the LTE network card to end.

Figure 6- 4

6.2 Status message indication information list

6.2.1 Upgrade function message prompt list

Form 6- 1 Upgrade function message prompt list

Status message on device	Introduction
uboot upgrade	Upgrading device uboot firmware
kernel upgrade	Upgrading device linux system firmware
rootfs upgrade	Upgrading device root file system firmware
reboot to update	Restart the device to upgrade the device firmware version
update fail	Update failure

6.2.2 Device network detection message prompt list

Form 6- 2 Device network detection message prompt list

Status message on device	Introduction
sim check ...	Checking whether the SIM card is valid
sim not found	No SIM card found or invalid SIM card inserted
sim net register	Registering SIM card network mode
lte net start ...	The device requests to connect to the wireless network
lte net OK	The network connection is successful,can go online normally

lte net disconnect	Network connection lost
lte device Reset	NIC device restart
sim unknown error	Detect unknown errors in SIM card
wait time sync	Wait for network time synchronization

Form 6- 3 Device network detection message prompt list（To be continued）

Status message on device	**Introduction**
time sync timeout	Network time synchronization timeout/synchronization failure
connect to server	Request to connect to CUAV cloud server
connection eatablish	CUAV cloud server successfully connected
Network disconnect	CUAV cloud server connection is disconnected

6.2.3 External device function message prompt list

Form 6- 4 External device function message prompt list

Status message on device	**Introduction**
photo success	Photo taking successfully
photo failed	Failed to take photo
photo fail SD < 100M	Failed to take photo, the remaining space of TF card is less than 100MB
Video Chip Error	Video capture chip error
%d*%d Nonsupport	No supported video input resolution
HDMI Normal	Video input data is normal
HDMI Break Off	Video data input stopped
HDMI instability	Video data input is unstable

video record start	Video recording starts
video record success	Video recording success/finish
SD error	The TF card is not inserted or the inserted TF card is invalid
HDMI input error	Video input error
less 30s failed	Video recording time is less than 30 seconds, recording fails
record start failed	Video recording failed to start

Form 6- 5 External device function message prompt list（To be continued）

Status message on device	Introduction
record ing...	The video is being recorded, the operation is invalid
SD free space < 100M	The remaining space of the TF card is less than 100MB, the operation is invalid
record format error	Video recording format error, invalid operation
SD total space < 5GB	The total space of TF card is less than 5GB, the operation is invalid
autorecord pic error	The auto-recorded video resolution is not supported
record fail unknown	Video recording failed, unknown error

6.2.4 Device management control message prompt list

Form 6- 6 Device management control message prompt list

Status message on device	Introduction
Confirm binding	Confirm binding setting device
Qrcode timeout	QR code shows binding timeout
Press key to bind	Key binding device prompt
Bind timeout	Binding time out

6.3 Other abnormalities

When the temperature of the LTE-LINK SE device reaches above 80° C, the performance of the CPU will be greatly reduced, which will cause the entire link system to enter the "overload" state. The user can judge whether the link system has been "overloaded" according to the state of the system status light. ". When it is judged that the system is in an "overload" state, it is necessary to stop supplying power to the link device, and cool the device temperature to the normal operating temperature before powering on again.