# IBOX66 Embedded Industrial Computer



# User Manual

## Version: 1.7

## Revision History:

| No. | Version | Description | Date |
| --- | --- | --- | --- |
| 1 | V1.0 | First release | Sep. 22, 2022 |
| 2 | V1.1 | Updated I/O description | Dec. 4, 2022 |
| 3 | V1.2 | Deleted the first-time setup guide as per system design | Mar. 17, 2023 |
| 4 | V1.3 | Added App installation description | Jul. 20, 2023 |
| 5 | V1.4 | Updated Android & Debian system manuals | Oct.19, 2023 |
| 6 | V1.5 | Updated the use of serial ports in Debian system | Nov. 15, 2023 |
| 7 | V1.6 | Added 5.5 Use of the Debug UART | Jan. 15, 2024 |
| 8 | V1.7 | Modified the definition of the Power button under Linux system | Feb. 16, 2024 |

# Table of Contents

# Foreword

Thank you for purchasing IBOX66 Embedded Industrial Computer ("the Device" or "the Product"). This manual intends to provide guidance and assistance necessary on setting up, operating or maintaining the Product. Please read this manual and make sure you understand the structure and functionality of the Product before putting it into use.

## Intended Users

This manual is intended for:

- Operator of the Device
- Technical support engineers
- Other users

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It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without notice.

## Technical Support and Assistance

Should you have any question about the Product that is not covered in this manual, contact your sales representative for solution. Please contain the following information in your question:

- Product name and PO number;
- Complete description of the problem;
- Error message you received, if any.

## Vantron Technology, Inc.

Address: 48434 Milmont Drive, Fremont, CA 94538
Tel: (650) 422-3128
Email: sales@vantrontech.com

## Regulatory Information

The Product is designed to comply with:

- Part 15 of the FCC Rules;

Please refer to the Appendix for Regulatory Compliance Statement.

## Symbology

This manual uses the following signs to prompt users to pay special attention to relevant information.

| ⚠ | Caution for latent damage to system or harm to personnel |
|---|---|
| ⓘ▷ | Attention to important information or regulations |

## General Safety Instructions

The Product is supposed be installed by knowledgeable, skilled persons familiar with local and/or international electrical codes and regulations. For your safety and prevention of damage to the Product and other equipment connected to it, please read and observe carefully the following safety instructions prior to installation and operation. Keep this manual well for future reference.

- Do not disassemble or otherwise modify the Product. Such action may cause heat generation, ignition, electronic shock, or other damages including human injury, and may void your warranty.

- Keep the Product away from heat source, such as heater, heat dissipater, or engine casing.

- Do not insert foreign materials into any opening of the Product as it may cause the Product to malfunction or burn out.

- To ensure proper functioning and prevent overheating of the Product, do not cover or block the ventilation holes of the Product.

- Follow the installation instructions with the installation tools provided or recommended.

- The use or placement of the operation tools shall comply with the code of practice of such tools to avoid short circuit of the Product.

- Cut off the power before inspection of the Product to avoid human injury or product damage.

## Precautions for Power Cables and Accessories

⚠ Use proper power source only. Make sure the supply voltage falls within the specified range. The Product is designed to use 9-36V DC. Always check whether the Product is DC powered before applying power.

⚠ Place the cables properly at places without extrusion hazards.

⚠ Use only approved antenna(s). Non-approved antenna(s) may produce spurious or excessive RF transmitting power which may violate FCC limits.

⚠ Cleaning instructions:

- Power off before cleaning the Product
- Do not use spray detergent
- Clean with a damp cloth
- Do not try to clean exposed electronic components unless with a dust collector

⚠ Power off and contact Vantron technical support engineer in case of the following faults:

- The Product is damaged
- The temperature is excessively high
- Fault is still not solved after troubleshooting according to this manual

⚠ Do not use in combustible and explosive environment:

- Keep away from combustible and explosive environment
- Keep away from all energized circuits
- Unauthorized removal of the enclosure from the device is not allowed
- Do not change components unless the power cable is unplugged
- In some cases, the device may still have residual voltage even if the power cable is unplugged. Therefore, it is a must to remove and fully discharge the device before replacement of the components.

# CHAPTER 1 INTRODUCTION

## 1.1 Product Overview

Vantron IBOX66 is a multi-functional embedded industrial computer designed for smart businesses. Running Android 11 operating system, the high-performance industrial computer is GMS certified to enable customers to have unimpeded access to Google mobile services. Moreover, customers have the option of Linux systems for more flexibility and system customization.

IBOX66 is running on RK3566, a cost-effective multi-core processor developed by Rockchip. With 4GB memory and 32GB eMMC storage, it features quick access to data and ultra large capacity. As such, it is capable of dealing with huge volume of data in a timely manner.

As IBOX66 provides rich interfaces, a wide choice of peripherals can be connected for extended applications, including barcode scanners, cameras, barcode printers and keyboard plates. It also supports ultra-high-definition video outputs thanks to the high-performance video engine coupled with H.265 (HEVC) hardware decoding and 1080p/4K video decoding. Moreover, display interfaces of different specifications allow flexible application of the device in intelligent retailing, new retailing, financial self-service terminals, and other scenarios.

## 1.2   Unpacking

The Product has been carefully packed with special attention to quality. However, should you find any component damaged or missing, please contact your sales representative in due time.

| Standard accessories | | Optional accessories | |
|---|---|---|---|
|  | 1 x IBOX66 Industrial computer |  | 1 x 12V DC Power adapter & power cord |
|  | 1 x Wi-Fi & BT antenna |  | 1 x DC power connector |
| \ | \ |  | 2 x 4G LTE antenna |

> *Actual accessories might vary slightly from the list above as the customer order might be different from the standard configuration options.*

## 1.3　Specifications

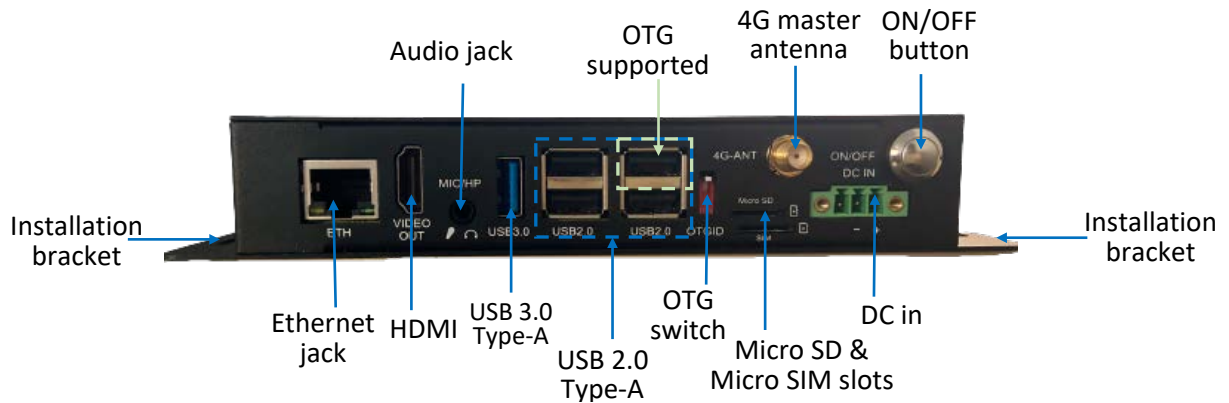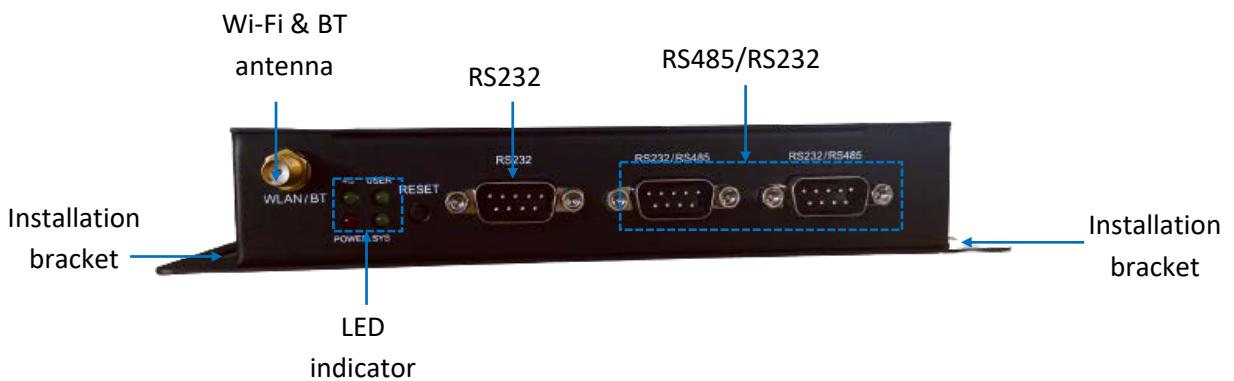| IBOX66 | | |
|---|---|---|
| System | CPU | Rockchip RK3566, Quad core ARM Cortex-A55 Processor, 1.8GHz (Max.) |
| | Memory | 4GB (up to 8GB) |
| | Storage | 32GB (up to 128GB)<br>1 x Micro SD slot (up to 128GB) |
| Communication | Ethernet | 1 x RJ45, 10M/100M/1000Mbps |
| | 4G LTE (AT&T, Verizon) | Optional |
| | Wi-Fi & Bluetooth | Wi-Fi 802.11 a/b/g/n/ac + BT 5.0 |
| Media | Display | 1 x HDMI, Type-A<br>1 x 4-lane eDP, 2560 x 1600 @60Hz<br>1 x 8-lane MIPI DSI (including 4 lanes multiplexed to LVDS), single-channel MIPI DSI: 1920 x 1080 @60Hz, LVDS: 720P @60Hz; dual-channel MIPI DSI: 2560 x 1440 @60Hz |
| | Audio | 1 x 3.5mm Combo audio jack |
| | Speaker | 1 x Speaker connector |
| | Camera | 1 x MIPI CSI, 2 x 10 x 2.0mm |
| I/Os | Serial port | 2 x RS232, DB9 Connector<br>2 x RS232/RS485, DB9 Connector |
| | USB | 4 x USB 2.0 Type-A (USB OTG supported by the top right port)<br>1 x USB 3.0 Type-A |
| | SIM slot | 1 x Micro SIM slot |
| | GPIO | 8 x GPIO, 3.3V |
| | Watchdog | Supported |
| | RTC | Supported |
| Expansion | Mini-PCIe | 1 x Mini-PCIe for LTE module |
| System Control | Button | 1 x ON/OFF button<br>1 x Reset button |
| | LED | 1 x Power LED (Red)<br>1 x System LED (Green)<br>1 x 4G LED (Green)<br>1 x User defined (Green) |
| Software | OS | Android 11, GMS certified (Optional: Linux OS) |
| | Device management platform | BlueSphere MDM (Android version only) |
| | OTA tool | BlueSphere OTA |
| Power | Input | 12V/24V 3A DC (±5%)<br>1 x 3 x 3.81mm power terminal |
| | Consumption | 15W |
| Mechanical | Dimensions | 160mm x 110mm x 30mm (Enclosure only)<br>195mm x 110mm x 30mm (With installation bracket) |
| | Weight | 680g |
| | Installation | Desktop/Wall mounting |
| Environment Condition | Temperature | Operating: 0℃~+60℃ · Storage: -40℃~+85℃ |
| | Humidity | Operating: 5%~95% RH · Storage: 5%~95% RH |
| | Certification | FCC<br>ESD: ±4KV (contact) and ±8KV (air) |

## 1.4    Product Layout

### 1.4.1  Front view



Audio jack · OTG supported · 4G master antenna · ON/OFF button · Installation bracket · Installation bracket · Ethernet jack · HDMI · USB 3.0 Type-A · USB 2.0 Type-A · OTG switch · Micro SD & Micro SIM slots · DC in

### 1.4.2  Back view



Wi-Fi & BT antenna · RS232 · RS485/RS232 · Installation bracket · Installation bracket · LED indicator

## 1.4.3  Left side view

RS232    4G diversity antenna



MIPI CSI    MIPI DSI/ LVDS    Backlight connector

## 1.4.4  Right side view

Grounding screw



GPIO    eDP    Speaker connector    Backlight connector

## 1.5    Operating System

IBOX66 runs Android 11 operating system with GMS certified and users have the option of Linux operating systems.

## 1.6    Mechanical Dimensions

- 160mm x 110mm x 30mm (Enclosure only)
- 195mm x 110mm x 30mm (With installation bracket)
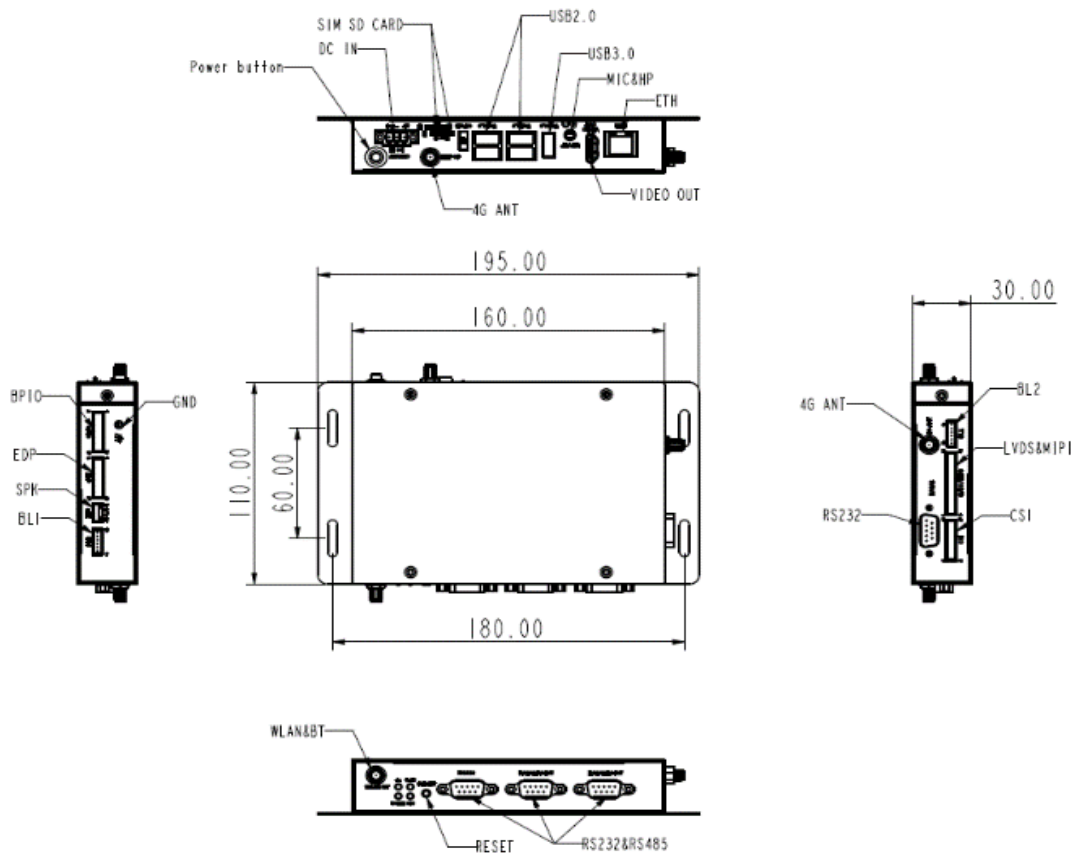


## 1.7    Power Supply and Consumption

IBOX66 works with 12V/24V 3A DC power input supplied by the power terminal.

The power consumption of IBOX66 is about 15W. It should be pointed out that the power consumption is largely dependent on the RAM, storage capacity, peripherals, and other configurations of the Product.

# CHAPTER 2 GETTING STARTED

## 2.1   Device Setup

Before you proceed with the configuration of IBOX66, follow the steps below to finish hardware connection.

1.  Position the Device on a desired place, for instance, a wall or a desktop；
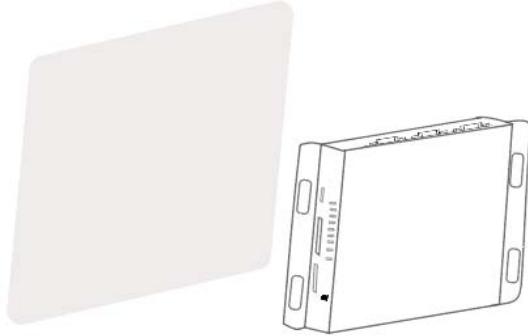
2.  Align the screws (M4 x 6 / M4 x 8 recommended) to the screw holes reserved on the mounting bracket, and mark the position of the screws on the wall or the desktop;
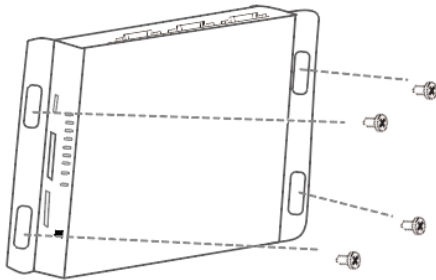
3.  Drill four screw holes on the marks made in the prior step;

4. Place the Device back and adjust the position of the bracket, if needed, then use a screwdriver to tighten the screws and secure the device;
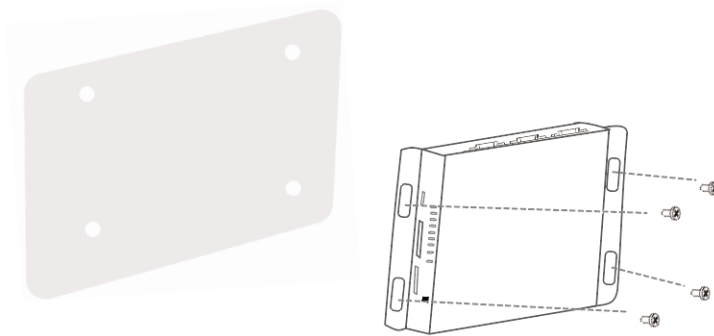


5. Insert an activated Micro SIM card, if any, into the Micro SIM slot with the gold-colored contacts facing up, then push the card to secure it;
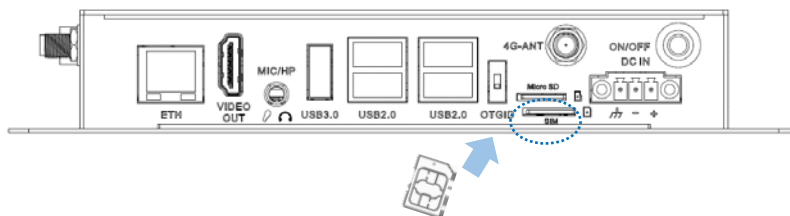


6. Insert a Micro SD card, if any, into the corresponsive slot with the gold-color contacts facing down, then push the card to secure it;
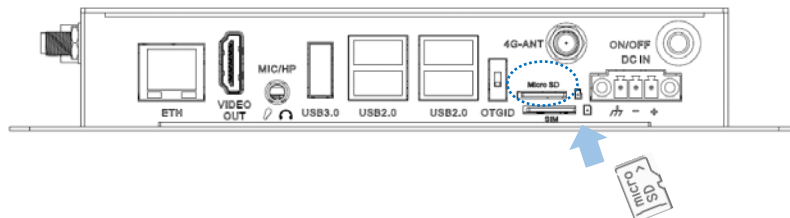


7. Install the antennas to the antenna connectors and tighten the connectors;
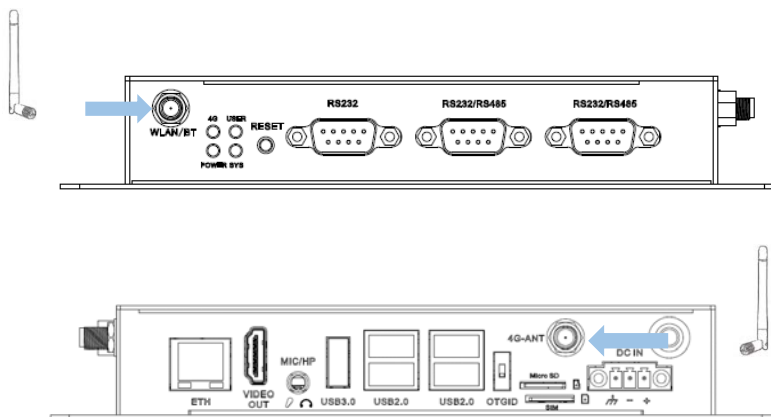


▷ *If you have only one 4G antenna in hand, please install it to the 4G primary antenna connector next to the ON/OFF button.*

8. When necessary, plug one end of an Ethernet cable into the RJ45 jack of IBOX66 and the other to a live Ethernet port;
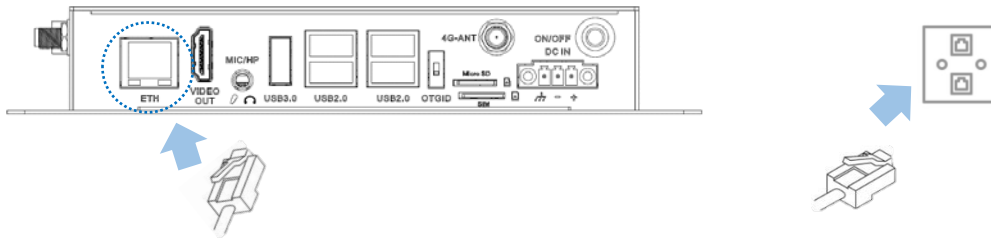
9. Insert the terminal end of the female DC connector into the power terminal of IBox66 and the other end into the power adapter;
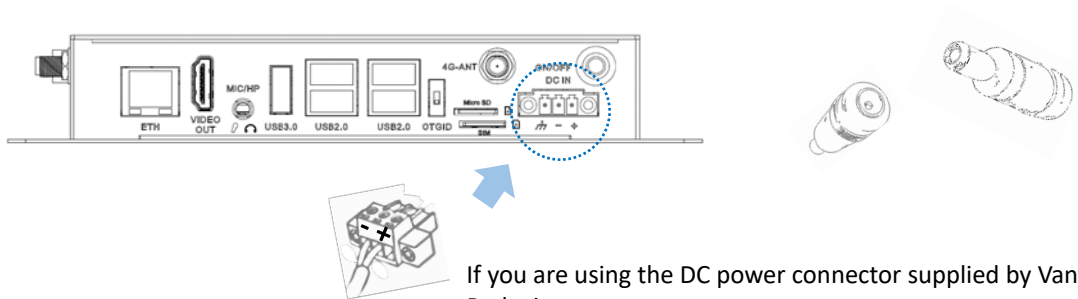
If you are using the DC power connector supplied by Vantron
Red wire:      +
Black wire:    -

10. Plug the adapter to a power outlet that meets the supply voltage requirement (12V/24V DC) to turn on the IBOX66.

## 2.2    Using the Device

To access the GUI of the device, follow the steps below to connect it to a mouse, keyboard and monitor.

1. Insert one end of an eDP/LVDS/HDMI cable to the corresponsive video interface of the device and the other end to a monitor;

> *The video cable shall vary with the interface to be connected, and an adapter connector is sometimes needed (HDMI interface for illustration here).*
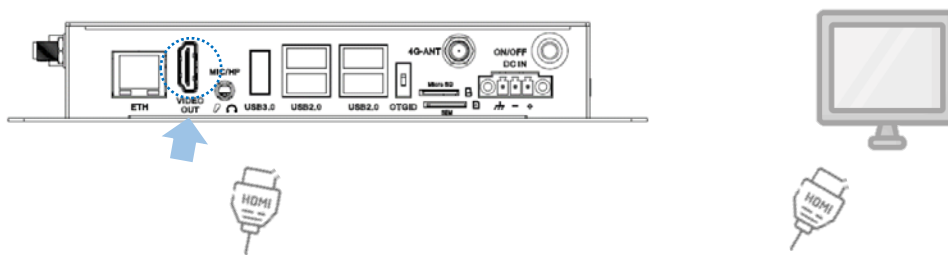


2. Connect a mouse and keyboard separately to the USB interfaces on the device;
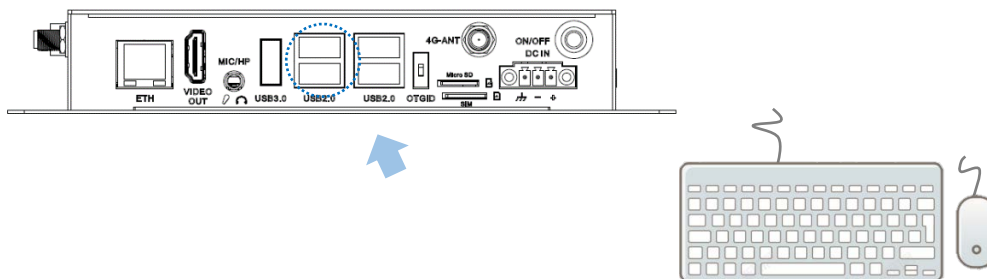


3. Power on the device using a 12V/24 DC power adapter;

4. To debug the device remotely, dial the OTG switch up (client mode) and insert a USB Type-A to Type-A cable into the USB OTG port to connect the device and the host computer.



USB OTG    OTG switch
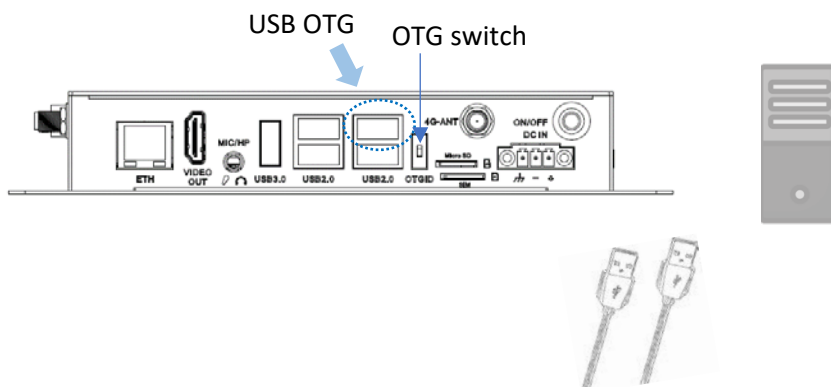
## 2.3   Turning on/off the Device

Having set up IBOX66 according to the aforementioned steps, users can operate the device following the steps below:

- The device will automatically boot up after power-on;

- After IBOX6425E starts up, users can:

  1. Press the Reset button once to restart the device;

  2. Press the ON/OFF button once to turn off the monitor/wake up the device from the sleep mode;

  3. Press the ON/OFF button and hold for about 2 seconds to call the power menu, and click **Power off** to turn off the device orderly;

  4. Press the ON/OFF button and hold for about 5 seconds to turn off the device directly;

  5. When necessary, unplug the power adapter from the power connector of IBOX66 or the outlet to force shutdown.

> *The action might vary with the operating system.*

# CHAPTER 3 HARWARE DESCRIPTION

This section briefs on the hardware definition and connector/jumper pinout.

## 3.1    Power input

IBOX66 is designed to support 12V/24V DC (12V 3A recommended) power input with OVP/OCP protection. Since the terminal block also provides backlight power supply, please take the input voltage of the backlight into consideration when selecting the power supply.

Specification of the power connector: 1 x 3-pin, 3.81mm, 10A

Pin 1

Pinout description:

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | GND | Ground |
| 2 | -VDC | 12V Power input - |
| 3 | +VDC | 12V Power input + |

## 3.2    ON/OFF button
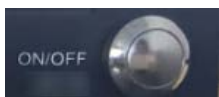
Button definition (Android OS):

| Action (with power connected) | Description |
|-------------------------------|-------------|
| Short press | Enable sleep mode or wake up the device |
| | Turn on the device if it is previously turned off |
| Press and hold for 1~2 seconds | Open the power menu to power off/restart the device/make an emergency call |
| Press and hold for 5 seconds | Power off the device |

Button definition (Linux OS):

| Action (with power connected) | Description |
|---|---|
| Short press | Turn on the device |
| Press and hold for 5 seconds | Power off the device |

## 3.3    Ethernet port

IBOX66 implements an Ethernet port.

Specification: RJ45, supporting 10M/100M/1000M Base-T. The Ethernet connector has two link/act LEDs to indicate the working status of the Ethernet. The solid green indicator means it supports 1000Mbps transmission rate and the blinking amber indicator means the network is functioning properly and the transmission rate is 10/100Mbps.



## 3.4    USB 2.0

IBOX66 offers four USB 2.0 interfaces (Type-A), including one USB OTG on the top right that can switch between host (down) and device (up) modes with the red switch next to the USB interfaces. When switching the OTG modes, please position the switch in place before plugging into the USB cable.
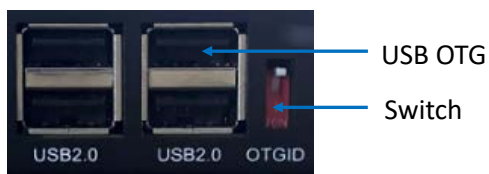


Make sure you have switched the USB OTG to the device mode before connecting the device to a host computer for App installation or image flashing.

## 3.5    USB 3.0

IBOX66 offers a USB 3.0 Type-A interface for connecting a peripheral.

## 3.6    HDMI port

IBOX66 offers an HDMI port (Type-A) for connecting a display, supporting HDMI 2.0a protocol with resolution up to 4K × 2K @60Hz.

## 3.7    Micro SD & Micro SIM slots

IBOX66 provides a Micro SD card slot that supports a storage device of up to 128GB.

The SIM card slot supports SIM card hot plugging. The 4G LTE module of the Device is AT&T and Verizon pre-certified, and you may consult your sales executive for the module name before applying a SIM card from the carrier.

## 3.8    Audio jack

IBOX66 offers a 3.5mm 4-pole combo audio jack supporting headphone and microphone functions.

## 3.9    Serial ports

IBOX66 implements two DB9 RS232 connectors (uart4 and uart5) and two DB9 RS232/RS485 multiplexers (uart0 and uart7) for serial communication.

The two RS232 connectors are mapped as /dev/ttyS4 and /dev/ttyS5 respectively, while the two RS232/RS485 connectors are mapped as /dev/ttyS0 and /dev/ttyS7 respectively.
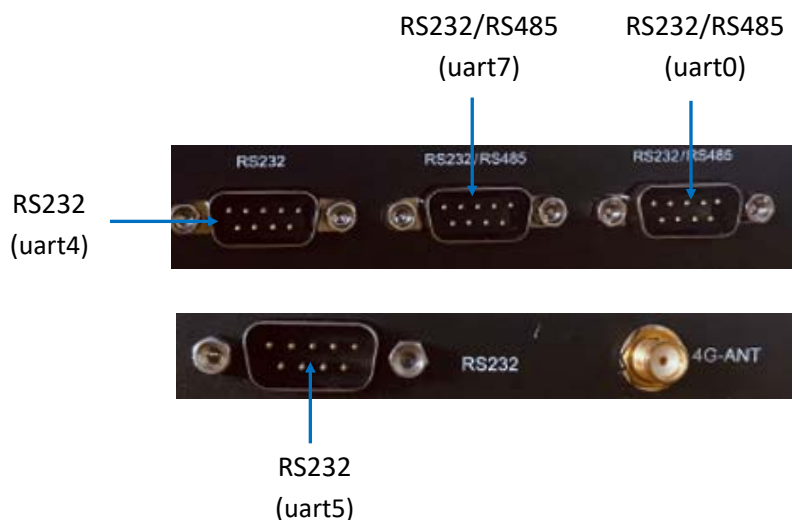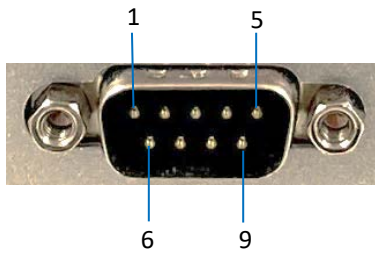
Pinout description of UART4:

| No. | Signal | Description |
|---|---|---|
| 1 | / | / |
| 2 | RXDA | RS232_A receive data |
| 3 | TXDA | RS232_A Transmit data |
| 4 | / | / |
| 5 | GND | Ground |
| 6 | / | / |
| 7 | / | / |
| 8 | / | / |
| 9 | / | / |

Pinout description of UART5:

| No. | Signal | Description |
|---|---|---|
| 1 | / | / |
| 2 | RXDB | RS232_B receive data |
| 3 | TXDB | RS232_B Transmit data |
| 4 | / | / |
| 5 | GND | Ground |
| 6 | / | / |
| 7 | / | / |
| 8 | / | / |
| 9 | / | / |

Pinout description of UART0:

| No. | Signal | Description |
|---|---|---|
| 1 | RS485_1_A | RS485_1 A |
| 2 | RXDE/RS485_1__B | RS232_E receive data /RS485_1 B |
| 3 | TXDE | RS232_E Transmit data |
| 4 | / | / |
| 5 | GND | Ground |
| 6 | / | / |
| 7 | / | / |
| 8 | / | / |
| 9 | / | / |

Pinout description of UART7:

| No. | Signal | Description |
|---|---|---|
| 1 | RS485_2_A | RS485_2 A |
| 2 | RXDF/RS485_2__B | RS232_F receive data /RS485_2 B |
| 3 | TXDF | RS232_F Transmit data |
| 4 | / | / |
| 5 | GND | Ground |
| 6 | / | / |
| 7 | / | / |
| 8 | / | / |
| 9 | / | / |

## 3.10    Reset button

IBOX66 offers a reset button which will restart the device upon a short press.

## 3.11    LED indicators

IBOX66 offers four LED indicators with definition explained below:



| Indicator name | Definition |
|---|---|
| 4G indicator | Blinking: 4G communication working properly<br>Off: Problem with 4G communication |
| USER indicator | Refer to 4.8 for the command to enable the LED in Android system |
| POWER indicator | Solid red: System power OK<br>Off: Problem with system power |
| SYS indicator | Solid green: System running properly<br>Off: System abnormality |

> *If the power indicator is on while the other three indicators are off, the Device is shut down with power connected.*

## 3.12 GPIO

IBOX66 provides 8 GPIOs on a 20-pin connector (2 × 10 × 2.0mm) to allow custom development of the Device.



Pinout description:

| Pin | Signal | Description |
|---|---|---|
| 1 | GND | Ground |
| 2 | GND | Ground |
| 3 | CPU_GPIO0 | CPU general purpose input output |
| 4 | CPU_GPIO4 | CPU general purpose input output |
| 5 | GND | Ground |
| 6 | GND | Ground |
| 7 | CPU_GPIO1 | CPU general purpose input output |
| 8 | CPU_GPIO5 | CPU general purpose input output |
| 9 | VCC_EXT_3V3 | DC 3.3V external power output |
| 10 | VCC_EXT_3V3 | DC 3.3V external power output |
| 11 | GND | Ground |
| 12 | GND | Ground |
| 13 | CPU_GPIO2 | CPU general purpose input output |
| 14 | CPU_GPIO6 | CPU general purpose input output |
| 15 | GND | Ground |
| 16 | GND | Ground |
| 17 | CPU_GPIO3 | CPU general purpose input output |
| 18 | CPU_GPIO7 | CPU general purpose input output |
| 19 | VCC_EXT_3V3 | DC 3.3V general purpose input output |
| 20 | VCC_EXT_3V3 | DC 3.3V general purpose input output |

## 3.13　eDP & backlight connector

IBOX66 implements a 4-lane eDP connector (2 × 10 × 2.0mm) to connect to an external display via an extension cable. Moreover, there is an LCD backlight power connector BL1 (1 x 6 x 2.0mm) that supplies power to the LCD backlight.
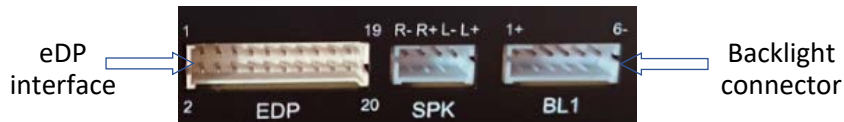
eDP pinout description:

| Pin | Signal | Description |
| --- | --- | --- |
| 1 | EDP_TX_D0N | eDP differential lane 0 negative |
| 2 | EDP_TX_D1N | eDP differential lane 1 negative |
| 3 | EDP_TX_D0P | eDP differential lane 0 positive |
| 4 | EDP_TX_D1P | eDP differential lane 1 positive |
| 5 | GND | Digital ground |
| 6 | GND | Digital ground |
| 7 | EDP_TX_D2N | eDP differential lane 2 negative |
| 8 | EDP_TX_D3N | eDP differential lane 3 negative |
| 9 | EDP_TX_D2P | eDP differential lane 2 positive |
| 10 | EDP_TX_D3P | eDP differential lane 3 positive |
| 11 | GND | Digital ground |
| 12 | GND | Digital ground |
| 13 | EDP_TX_AUXN | eDP differential AUX channel negative |
| 14 | eDP_HPD | Hot Plug Detect |
| 15 | EDP_TX_AUXP | eDP differential AUX channel positive |
| 16 | GND | Digital ground |
| 17 | GND | Digital ground |
| 18 | GND | Digital ground |
| 19 | EDP_VDD | Power Supply |
| 20 | EDP_VDD | Power Supply |

BL1 connector pinout description:

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | EDP_BLK | LCD power supply for LED driver |
| 2 | EDP_BLK | LCD power supply for LED driver |
| 3 | EDP_BKLT_EN | LED driver enabling |
| 4 | EDP_BKLT_PWM | PWM signal for LED driver |
| 5 | GND | Ground |
| 6 | GND | Ground |

## 3.14 Speaker

IBOX66 provides an L/R speaker connector (1 × 4 × 2.0mm) that allows connection of a 5W/8Ω speaker.

Pin 1 →



Pinout description:

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | OUTR- | Class-D H-bridge negative output for right channel |
| 2 | OUTR+ | Class-D H-bridge positive output for right channel |
| 3 | OUTL- | Class-D H-bridge negative output for left channel |
| 4 | OUTL+ | Class-D H-bridge positive output for left channel |

## 3.15 Grounding screw

The grounding screw on IBOX66 helps avoid any fatal electrical accidents and ensure the durability of the device.

## 3.16  MIPI DSI/LVDS

IBOX66 implements a dual-channel 8-lane MIPI DSI connector (2 × 16 × 2.0mm) to connect an external screen via an extension cable, including 4 lanes that can be used as LVDS. Moreover, there is an LCD backlight power connector BL2 (1 x 6 x 2.0mm) that supplies power to the LCD backlight.



MIPI DSI/LVDS pinout description:

| Pin | Signal | Description |
| --- | --- | --- |
| 1 | MIPI1_DSI_DN3 | MIPI1_DSI Differential Lane 3 - |
| 2 | MIPI1_DSI_DP3 | MIPI1_DSI Differential Lane 3 + |
| 3 | MIPI1_DSI_CLKN | MIPI1_DSI Differential Clock Lane - |
| 4 | MIPI1_DSI_CLKP | MIPI1_DSI Differential Clock Lane + |
| 5 | GND | Digital Ground |
| 6 | GND | Digital Ground |
| 7 | MIPI1_DSI_DN2 | MIPI1_DSI Differential Lane 2 - |
| 8 | MIPI1_DSI_DP2 | MIPI1_DSI Differential Lane 2 + |
| 9 | MIPI1_DSI_DN1 | MIPI1_DSI Differential Lane 1 - |
| 10 | MIPI1_DSI_DP1 | MIPI1_DSI Differential Lane 1 + |
| 11 | MIPI1_DSI_DN0 | MIPI1_DSI Differential Lane 0 - |
| 12 | MIPI1_DSI_DP0 | MIPI1_DSI Differential Lane0 + |
| 13 | LVDS_MIPI0_DN3 | LVDS/MIPI_DSI Differential Lane 3 - |
| 14 | LVDS_MIPI0_DP3 | LVDS/MIPI_DSI Differential Lane 3 + |
| 15 | LVDS_MIPI0_CLKN | LVDS/MIPI_DSI Differential Clock Lane - |
| 16 | LVDS_MIPI0_CLKP | LVDS/MIPI_DSI Differential Clock Lane + |
| 17 | GND | Digital Ground |
| 18 | GND | Digital Ground |
| 19 | LVDS_MIPI0_DN2 | LVDS/MIPI_DSI Differential Lane 2 - |
| 20 | LVDS_MIPI0_DP2 | LVDS/MIPI_DSI Differential Lane 2 + |
| 21 | LVDS_MIPI0_DN1 | LVDS/MIPI_DSI Differential Lane 1 - |
| 22 | LVDS_MIPI0_DP1 | LVDS/MIPI_DSI Differential Lane 1 + |
| 23 | LVDS_MIPI0_DN0 | LVDS/MIPI_DSI Differential Lane 0 - |

| 24 | LVDS_MIPI0_DP0 | LVDS/MIPI_DSI Differential Lane 0 + |
|----|----------------|-------------------------------------|
| 25 | GND | Digital Ground |
| 26 | GND | Digital Ground |
| 27 | LVDS_PWR | Power Supply |
| 28 | GND | Digital Ground |
| 29 | LVDS_PWR | Power Supply |
| 30 | LVDS_PWR | Power Supply |
| 31 | GND | Digital Ground |
| 32 | GND | Digital Ground |

BL2 connector pinout description:

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | LCD_BLK | LCD Power Supply for LED Driver |
| 2 | LCD_BLK | LCD Power Supply for LED Driver |
| 3 | LCD_BKLT_EN | LED Driver Enabling |
| 4 | LCD_BKLT_PWM | PWM Signal for LED Driver |
| 5 | GND | Ground |
| 6 | GND | Ground |

## 3.17   MIPI CSI

IBOX66 implements a 4-lane MIPI CSI connector (2 × 10 × 2.0mm) for HD cameras via an extension cable.

Pinout description:

| Pin | Signal | Description |
|:---:|:---:|:---:|
| 1 | MIPI_CSI_RX_D2N | MIPI-CSI differential lane 2 negative |
| 2 | MIPI_CSI_RX_D3N | MIPI-CSI differential lane 3 negative |
| 3 | MIPI_CSI_RX_D2P | MIPI-CSI differential lane 2 positive |
| 4 | MIPI_CSI_RX_D3P | MIPI-CSI differential lane 3 positive |
| 5 | GND | Digital ground |
| 6 | GND | Digital ground |
| 7 | MIPI_CSI_RX_D0N | MIPI-CSI differential lane 0 negative |
| 8 | MIPI_CSI_RX_D1N | MIPI-CSI differential lane 1 negative |
| 9 | MIPI_CSI_RX_D0P | MIPI-CSI differential lane 0 positive |
| 10 | MIPI_CSI_RX_D1P | MIPI-CSI differential lane 1 positive |
| 11 | MIPI_ CSI_RX _CLK0N | MIPI-CSI differential clock lane negative |
| 12 | I2C2_SCL | I2C serial port 2 clock signal |
| 13 | MIPI_ CSI_RX _CLK0P | MIPI-CSI differential clock lane positive |
| 14 | I2C2_SDA4 | I2C serial port 2 data signal |
| 15 | MCLK | Main Clock |
| 16 | CAM_RST | Reset control signal |
| 17 | VCC1V8_DVP | 1.8V IO power |
| 18 | CAM_PWN | Power down control signal |
| 19 | VCC1V5_DVP | 1.5V Core power |
| 20 | VCC2V8_DVP | 2.8V Analog power |

# CHAPTER 4 ANDROID SYSTEM MANUAL

This chapter briefs on the settings and common use of the interfaces in the Android system. Please connect a mouse, keyboard and monitor to IBOX66 for smooth operation.

# 4.1 Time and Date Setup

Please confirm if the system time is correct after first bootup. Change of the system settings will synchronize the date and time to the RTC which ensures correct display of the system time and date after recovery from abrupt power failure or system fault.

1. Swipe up to unlock the screen;

2. Navigate to **Settings > System > Time and Date** in sequence to enter the settings page;

3. By default, the system applies the date and time zone provided by the network, you can keep the settings or change the them manually;

4. If the system applies the time zone provided by network, please confirm if the time zone coincides with your local time zone. If not, please disable the option first;

5. Then click the **Time Zone** to access the settings page;

6. Select a region where the device is located (for instance, United States);

7. Select a proper time zone for it;

8. Enable the **Time zone provided by network** option, which will not change the settings you have made;

9. You can then choose to set the date and time manually or synchronize to the network time. If you use the time provided by network, the system time will automatically align to the current time zone;

10. When the time and date are all set, they will be synchronized to the RTC.


> *To ensure smooth setup, please make sure the Device is connected to Internet if you choose the network time.*

## 4.2    Enable Developer Options

To enable Developer options of IBOX66, follow the steps below:

1. Connect IBOX66 to a mouse, keyboard and monitor for easier operations;

2. After the system has booted, swipe up to access the application drawer;

3. Click **Settings** > **About <Tablet>** in sequence;

4. Scroll down to **Build number**, and click it consecutively for at least 7 times until you see a prompt indicating you are now a developer;

5. Go back to **Settings > System > Advanced** > **Developer options** and toggle on **USB debugging** (under the DEBUGGING sub-menu), then you can customize the device settings.

▷ *Depending on the Android version, the entry might vary slightly.*

## 4.3    ADB Setup on the Windows host

Android Debug Bridge (ADB) is a tool that is designed to connect your development workstation directly to your Android device for debugging, device upgrading, app installation, etc.

Adding the ADB executable file to the system's environment variable allows you to run the ADB tool regardless of your current working directory.

Follow the steps below to set up the ADB on the Windows host.

1. Unzip the software release package and navigate to the following directory: \SW\tools;

2. Extract the **adb_fastboot_and_other_tools_for_windows** zip file;

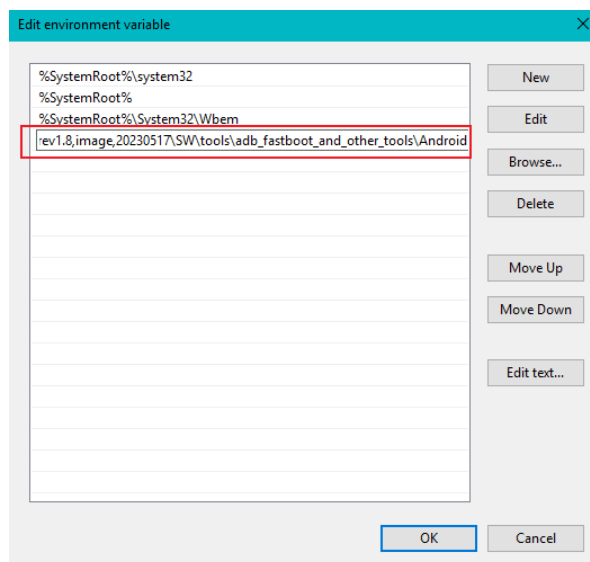3. Navigate to the **Android** folder that contains the ADB tool kit, and copy the folder path;
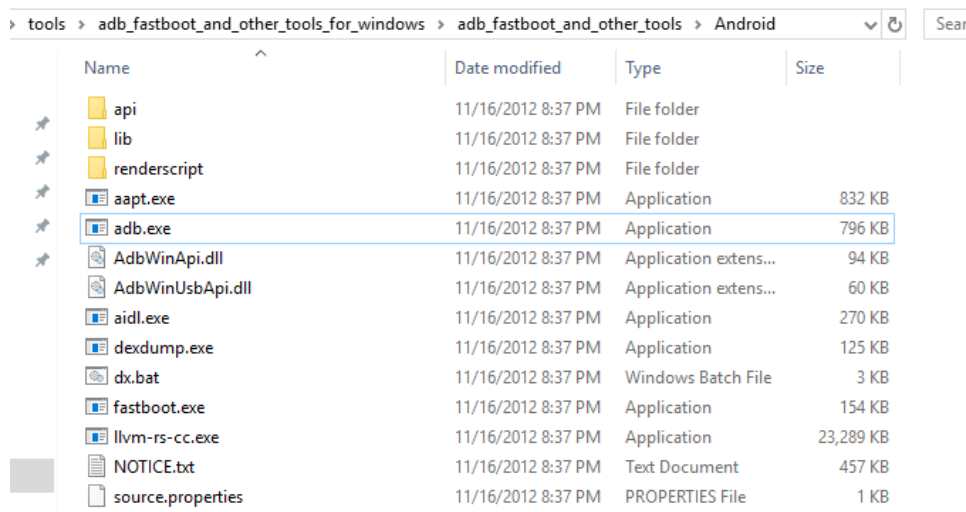
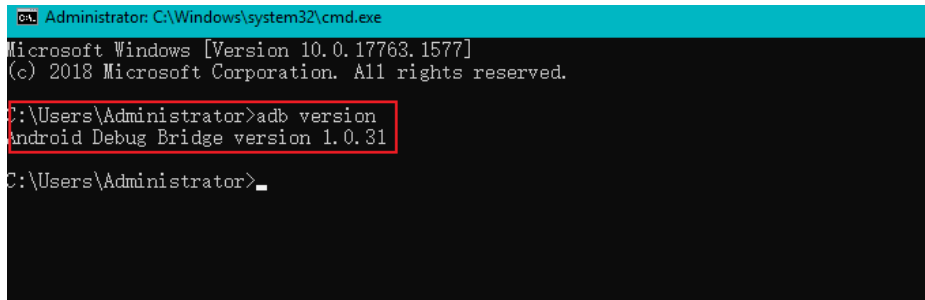4. Press "Win + R" and input sysdm.cpl in the dialogue box to open the settings interface;
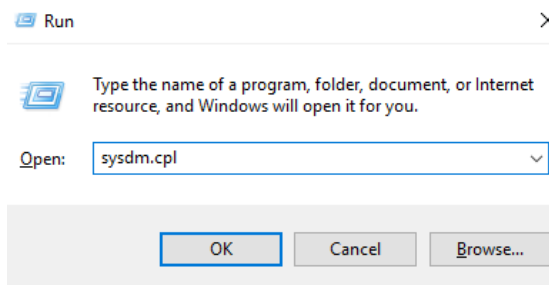


5. Click in sequence **Advanced > Environment Variables > System Variables > Path > Edit**, and click **New** in the pop-up;
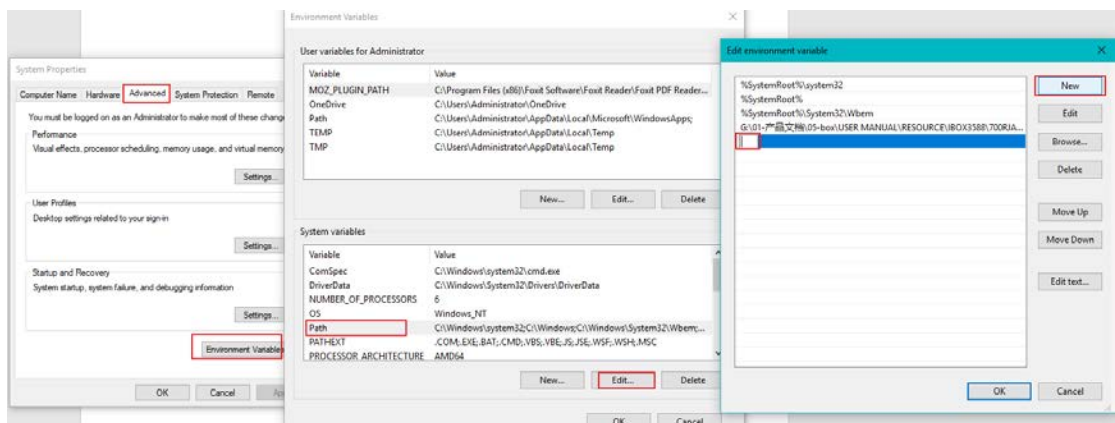


6. Paste the path of the **Android** folder, and click **OK** one by one to confirm and exit;

7. Press "Win + R" and input cmd in the dialogue box to open the command prompt;

8. Input adb version in the command prompt to check if the ADB tool is installed.



## 4.4    App Installation via ADB Commands

In addition to the standard pre-installed Android applications, users can install their own applications on the device provided that it runs Android system and the ADB tool kit is installed and accessible on the Windows host computer.

### 4.4.1   Prerequisites

- IBOX66 running Android operating system

- A host computer running Windows 7 or later (with ADB setup finished)

- A USB cable (Type-A to Type-A)

- The device is in client mode (OTG switch dialed up)

### 4.4.2  App installation

1.  Connect the device and the host computer via the USB Type-A to Type-A cable;

2.  Press "Win + R" and input cmd in the dialogue box to open the command prompt;

3.  Input adb devices -l in the command prompt to check if the device is connected to the host computer;

```
C:\Users\Administrator>adb devices -1
List of devices attached
64MU4JUVY0              device product:IBOX66 model:IBOX66 device:IBOX66 transport_id:1
```

4.  When the device information is displayed under the command, you can copy the serial number (squared as shown above) for the next-step use;

5.  Input the following command line to install the app;

> adb -s <serial number> install <APP path>

6.  The installation will be executed after the command line is input and the result of installation will be displayed below the command;

```
C:\Users\Administrator>adb -s 64MU4JUVY0 install "C:\Users\Administrator\Desktop\Libraries for
developers_v3.83_apkpure.com.apk"
Performing Streamed Install
Success
```

7.  The newly installed app will be displayed on the App drawer in the Alphabetic order.

▷ *The screenshots are for illustration only and are not intended to represent the actual device number and other information of the device currently in your possession.*

▷ *In step 5 shown above, you can drag the .apk file from the local directory to the command line to replace the <App path> you typed in manually.*

▷ *Make sure there is no special character in the app path. If you failed to install the apk, try using the absolute path of the .apk file enclosed in double quotation marks.*

## 4.5    Image Flashing on a Windows Host

Whenever a new image is available, Vantron will provide a release package consisting of all the tools/files necessary so that you can flash the image as needed. This section briefs on the image flashing on a Windows host.

### 4.5.1    Prerequisites

- IBOX66

- A host computer running Windows 7 or later (with ADB setup finished)

- A USB Type-A to Type-A cable

- The device is in client mode (OTG switch dialed up)

### 4.5.2    Image flashing

1. Unzip the release package, and open the directory of the upgrade driver (\SW\ DriverAssitant_vxxx) to locate the **DriverInstall.exe**;
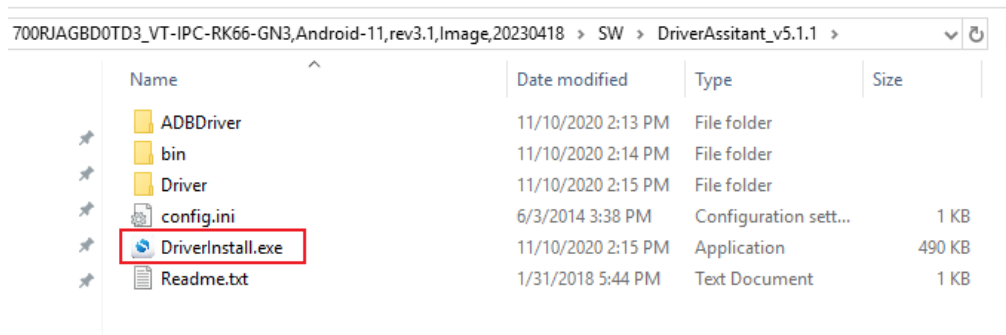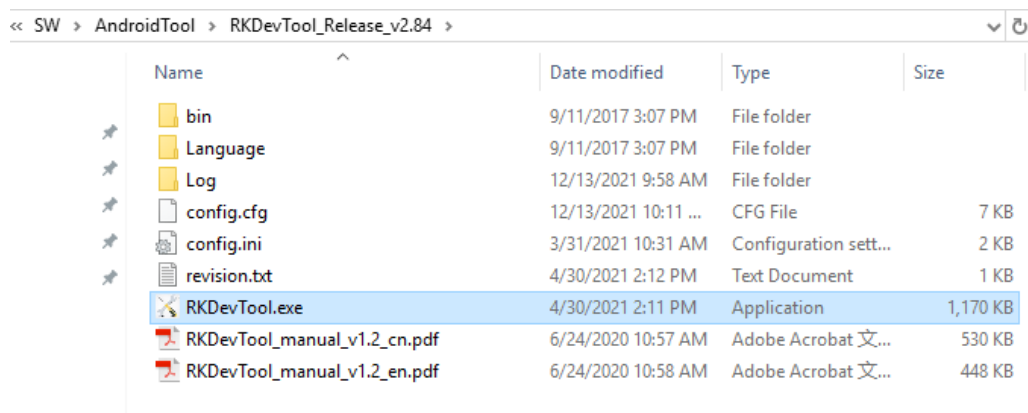


2. Right click the mouse and run the program as administrator;

3. Click **Uninstall Driver** first to remove the previously installed driver, if any, then click **Install Driver** and wait;
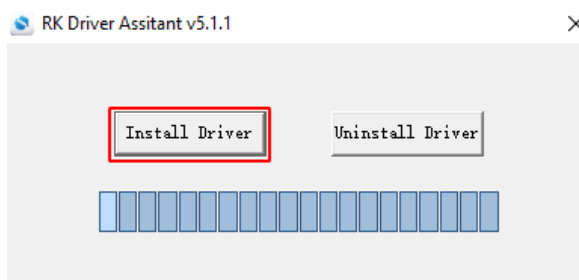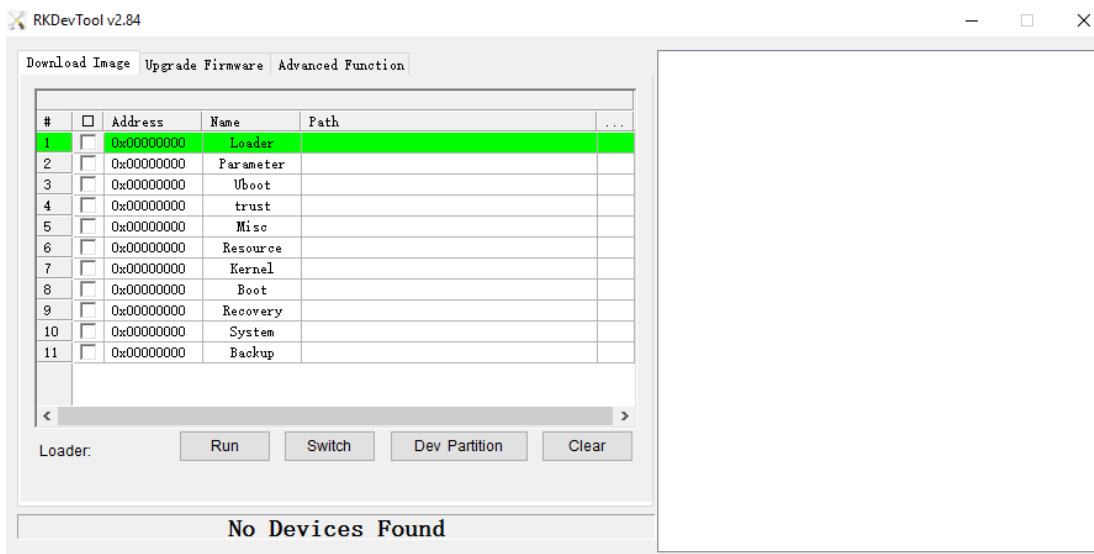
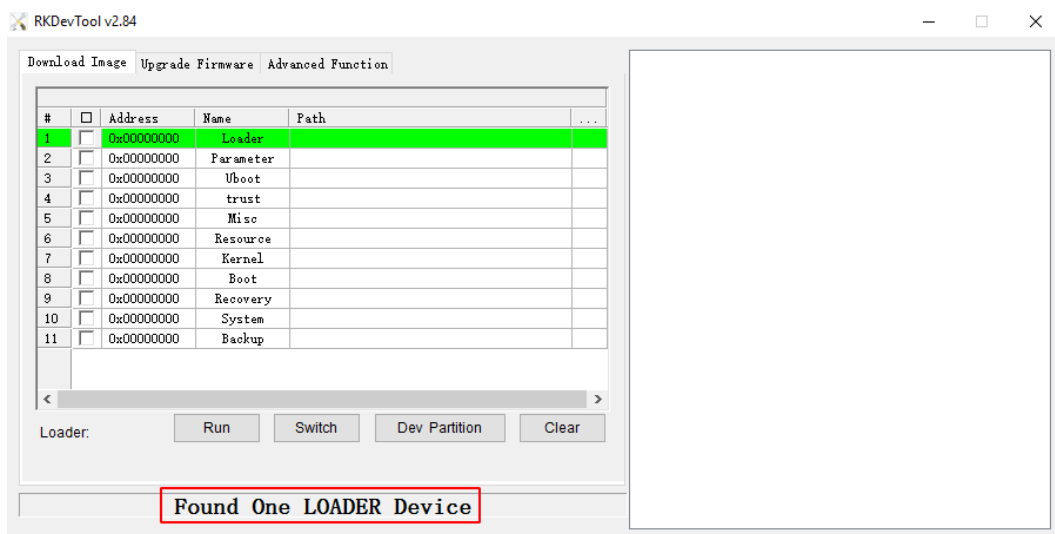4. A pop-up will appear in a second suggesting the driver is installed;
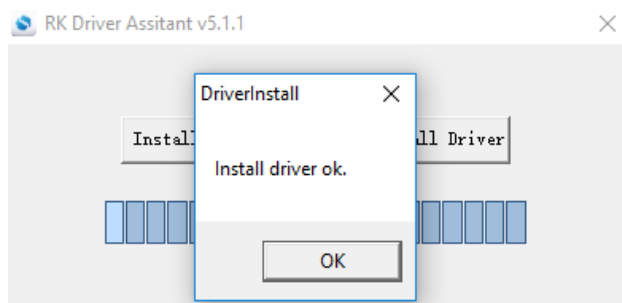


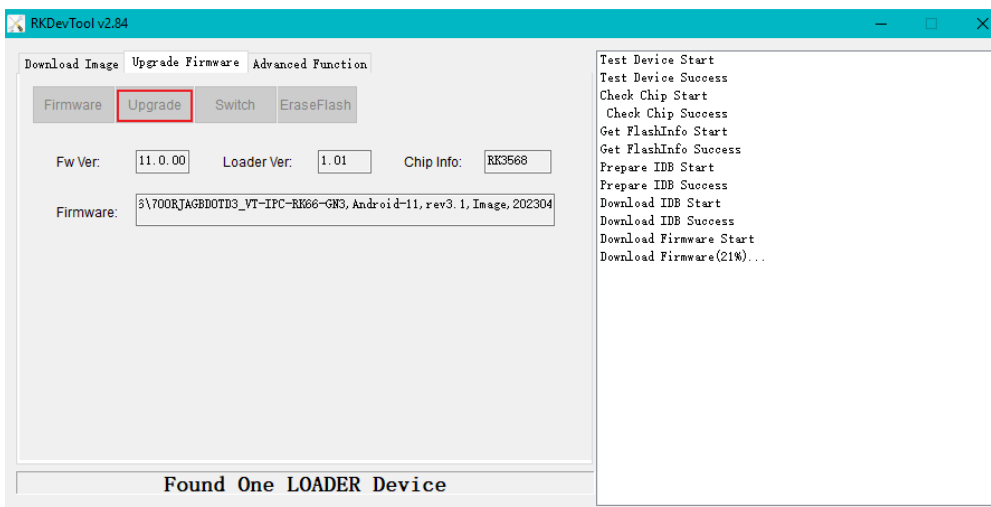5. Open the directory of the upgrade tool (path: \SW\AndroidTool\RKDevTool_Release_vxxx\RKDevTool);



6. Double click **RKDevTool.exe** to open the upgrade window;

7. Connect IBOX66 to the Windows host with the USB Type-A to Type-A cable;

8. Press "Win + R" and input cmd in the dialog box to open the command prompt;

9. Input adb devices in the command prompt to check if the device is connected to the Windows host;

10. Once the device is identified by the Windows host, input adb reboot loader to reboot the device into the bootloader mode;

11. Then the upgrade window will prompt for the existence of a Loader device, indicating that the upgrade process is ready.



12. Click **Upgrade Firmware** > **Firmware** in the upgrade window;

13. Open the image file **update.img** from the local directory (\SW\Image), and the firmware details will be automatically populated;

14. Click the **Upgrade** button and the system will start to download the image and upgrade the firmware automatically;



15. When the upgrade finishes, the system will reboot automatically.

## 4.6    Serial Ports

IBOX66 offers two DB9 RS232 connectors (uart4 and uart5) and two DB9 RS232/RS485 connectors (uart0 and uart7) for serial communication.

To test if the serial ports function properly:

1.  Connect the device to a Linux host (Ubuntu 22.04 for instance) with the USB cable (Type-A to Type-A);

2.  Use a proper serial adapter to connect the target serial port to a serial device;

▷ *Refer to 3.9 for the pinout description of the ports.*

3.  Open a terminal and install a serial communication program ('microcom' for instance);

    $ sudo apt install microcom

4.  Input the following command line to install ADB tool;

    $ sudo apt install adb

5.  Check if the Device is connected to the Linux host via ADB;

    $ adb devices -l

```
        ubuntu:~$ adb devices -l
List of devices attached
64MU4JUVY0              device usb:1-1 product:IBOX66 model:IBOX66 device:IBOX66
  transport_id:3
```

6.  Input adb shell in the terminal to execute shell commands on the Device;

```
        @ubuntu:~$ adb shell
IBOX66:/ $
IBOX66:/ $ ls
acct        d                etc           mnt        sdcard
apex        data             init          odm        storage
bin         data_mirror      init.environ.rc  oem      sys
bugreports  debug_ramdisk    linkerconfig  proc       system
cache       default.prop     lost+found    product    system_ext
config      dev              metadata      res        vendor
IBOX66:/ $ cd sys
IBOX66:/sys $ ls
bcm-dhd  bus    dev      firmware  kernel  power  system_monitor
block    class  devices  fs        module  rk8xx  van-misc
IBOX66:/sys $ 
```

7.  Input su in the terminal to switch to the root user;

```
2|IBOX66:/ $ su
IBOX66:/ #
IBOX66:/ #
```

8. Enter cd sys/van-misc to access the directory of the serial ports as follows:

```
IBOX66:/ # cd sys/van-misc
IBOX66:/sys/van-misc # ls
eeprom_wp  uart0_mode  uart0_rts  uart7_mode  uart7_rts  user_led
IBOX66:/sys/van-misc #
```

9. Set the baud rate (9600 for instance) of the serial ports (uart4 for instance);

# microcom -s 9600 /dev/ttyS4

<Text the data to send to the connected device>

10. For the RS232/RS485 ports, input the following commands to switch the serial mode of the port:

# echo 1 > sys/van-misc/uart0_mode          // uart0 RS232 mode

# echo 0 > sys/van-misc/uart0_mode          // uart0 RS485 mode

# echo 1 > sys/van-misc/uart7_mode          // uart7 RS232 mode

# echo 0 > sys/van-misc/uart7_mode          // uart7 RS485 mode

# 4.7    GPIO

IBOX66 provides 8 GPIOs, starting from GPIO0 to GPIO7. GPIO0 to GPIO7 are mapped as GPIO104, GPIO107, GPIO108, GPIO109, GPIO110, GPIO111, GPIO112, and GPIO113 in the software system, respectively.

Please refer to 3.12 for the pinout description of the GPIOs.

Before you start to use the GPIOs, please install the ADB tool on the Linux host, if necessary, as set out in step 4 in 4.6.

1. Execute adb shell command in the terminal;

2. Input the following commands to access the directory of the GPIOs and check the GPIO nodes:

~# cd sys/class/gpio/

  /sys/class/gpio # ls

```
IBOX66:/ # cd sys/class/gpio/
IBOX66:/sys/class/gpio # ls
export    gpio108  gpio111  gpio22     gpiochip255  gpiochip96
gpio104   gpio109  gpio112  gpiochip0  gpiochip32   unexport
gpio107   gpio110  gpio113  gpiochip128  gpiochip64
IBOX66:/sys/class/gpio #
```

3.  Set a GPIO (GPIO104 for instance) to the high level;

    # echo 1 > /sys/class/gpio/gpio104/value

    # cat /sys/class/gpio/gpio104/value

4.  Set a GPIO (GPIO104 for instance) to the low level;

    # echo 0 > /sys/class/gpio/gpio104/value

    # cat /sys/class/gpio/gpio104/value

▷ *Follow the same way to set the levels of the remaining GPIOs. You can use a voltmeter to check if the settings are valid.*

## 4.8    User Indicator Control

There is a user-defined LED indicator on the REAR enclosure of IBOX66, users can use the following command line to enable and disable the indicator.

1.  Install ADB tool on the Linux host, if needed, as set out in step 4 in 4.6;

2.  Execute adb shell command in the terminal;

3.  Input the following commands to enable and disable the indicator.

    # echo 1 > /sys/van-misc/user_led          [enable]

    # echo 0 > /sys/van-misc/user_led          [disable]

# CHAPTER 5 DEBIAN SYSTEM MANUAL

This chapter briefs on the settings and common use of the Interfaces in the Debian system. Please connect a mouse, a keyboard and a monitor to IBOX66 for smooth operation.

# 5.1 About the System

Debian is a Linux distribution and the Device was built by Debian GNU/Linux 10 operating system.

## 5.1.1 User and password

The system will automatically log in without the need to input the password. However，if you have switched the account/locked the screen/logged out, you will be prompted to input the password to log in the system.

° Default user: vantron

° Password: vantron

## 5.1.2 System information

1. Connect a mouse, a keyboard and a monitor to IBOX66;

2. Power on the Device to login;

3. Click the Debian icon, then click **System Tools > LXTerminal** in sequence to open the system terminal;

4. Input cat /etc/os-release in the terminal to check the system information;



5. Input sudo su to switch to the root user (no password).

## 5.2 System Settings

By clicking on the power icon [icon] on the bottom right corner of the screen, you can

° Shut down/Restart/Suspend the Device

° Lock the screen

° Switch the user

° Log out the current user

The menu bar on the bottom of the screen:

° [icon] Main menu: You can open accessories, applications, the console terminal, or customize the system settings

° [icon] File manager: Provides access to device files, applications

° [icon] Web browser: Provides access to webs on Internet

° [icon] Window tool: To minimize or fold the windows

° [icon] Desktop switch: To switch between working areas

° [icon] CPU usage: Displays the CPU usage in real time

° [icon] Volume menu: Adjusts the system volume

° [icon] Virtual keyboard: To open/close the virtual keyboard, set the input method upon a right click of the mouse

° [icon] Network settings: You can connect to Ethernet/Wi-Fi/VPN, or create/edit the connection

° [icon] Bluetooth settings: To pair and set up the Bluetooth devices

° [icon] System time

° [icon] Screen lock

° [icon] Power icon

## 5.2.1 Language setup

Assume the system langue is Simplified Chinese. The following example demonstrates how to change the system langue to English (US).

1. Right click the mouse on the desktop background;

2. Select the desktop preference option at the bottom of the menu;



3. Check the 'show menus provided by window managers when desktop is clicked' option (first line) in the advanced menu (third tab) to change the right-click menu;
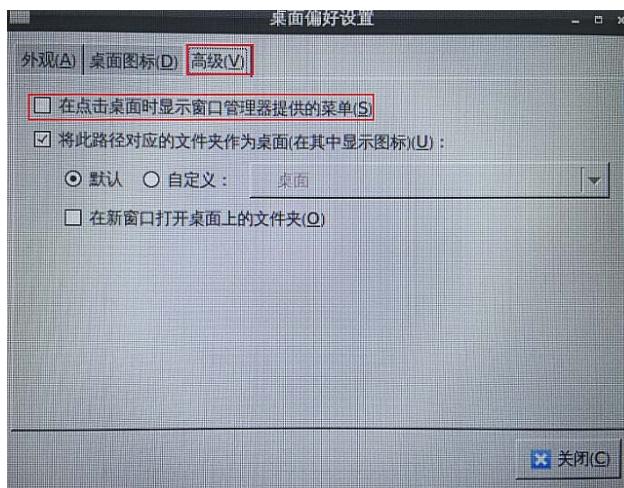


4. Return to the desktop background and open the terminal emulator;

5. Input sudo su in the terminal to switch to the root mode;
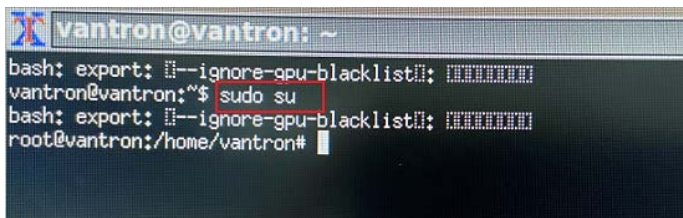


6. Run the following command to check the language currently used by the system;

```
# env | grep LANG
LANG= zh_CN.UTF-8                    // the system language is simplified Chinese
```

7. Run the following command to call the locale configuration page (en_US.UTF-8 refers to the locale for the target language that you wish to switch to);

```
# export LANG=en_US.UTF-8
```

8. Use the following command to re-configure the locales;

```
# dpkg-reconfigure locales
```

9. Use the up and down arrows on the keyboard to move to the target locale (en_US.UTF-8);

10. Press "Space" in front of the target locale to select the language;
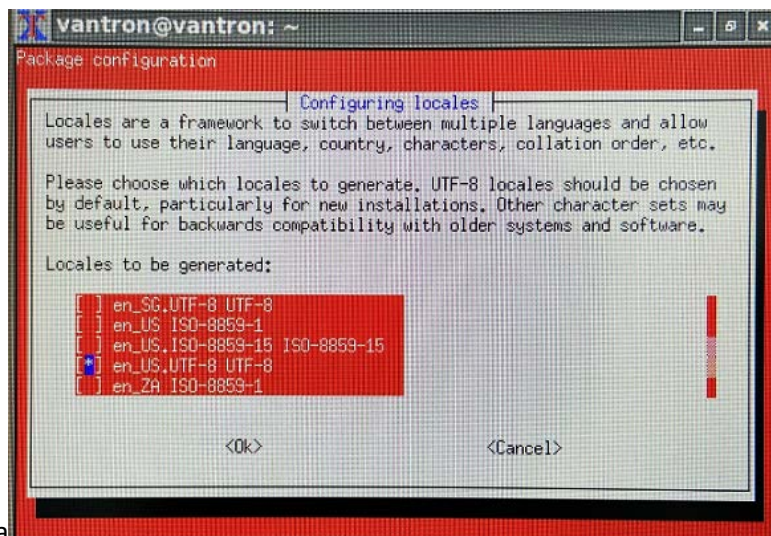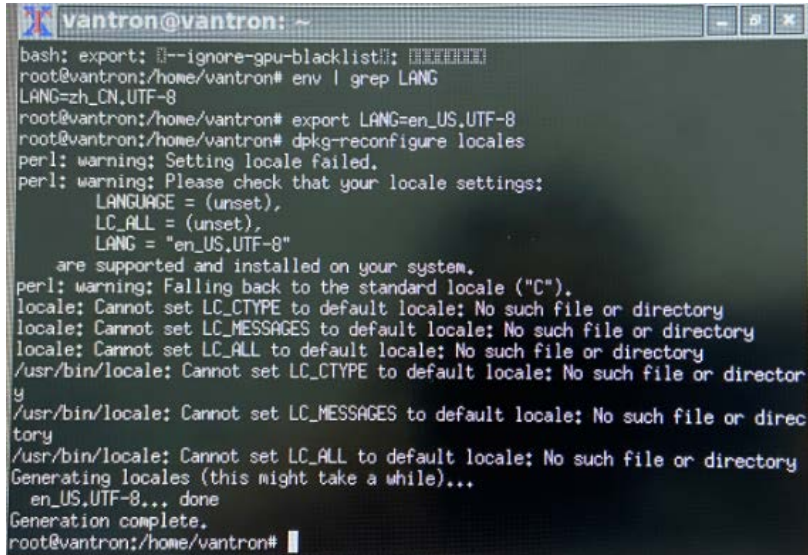


11. Move down to the current locale (zh_CN.UTF-8) and press "Space" to uncheck the current language;
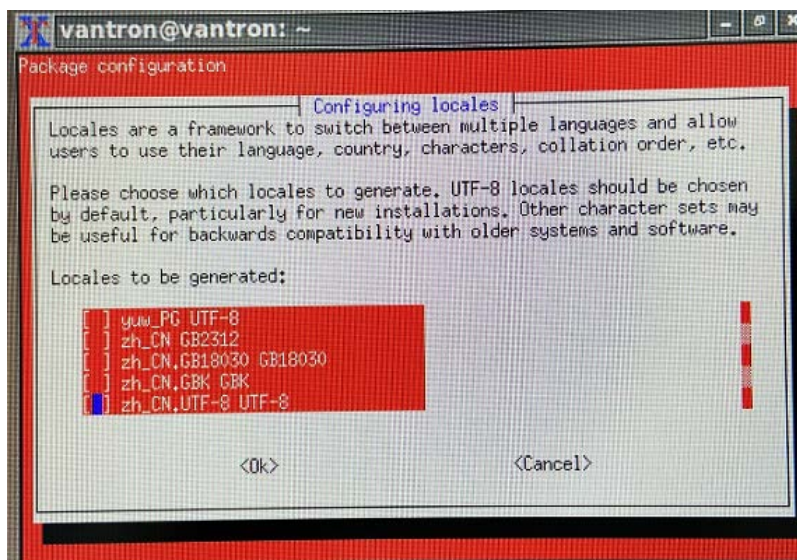


12. Press "Tab" to move the cursor to the <OK> option and press "Enter" to confirm your choice;

13. In the following pop-up, use the up and down arrows to move to the target locale (en_US.UTF-8) in the list, then press "Tab" to move the cursor to the <OK> option and press "Enter" to confirm your choice;

14. Wait a few seconds for the locale to take effect;



15. Then input reboot to restart the system;

16. Select "Update Names" after device reboot to update the files to the current language;

17. Run locale -a command to check if the locale is set as the default system language.

## 5.2.2  Time and date setup

Please confirm if the system time is correct after first bootup. To change the system time:

1.  Click the **Debian icon > Preference > Time and Date** to open the Time and Date settings;
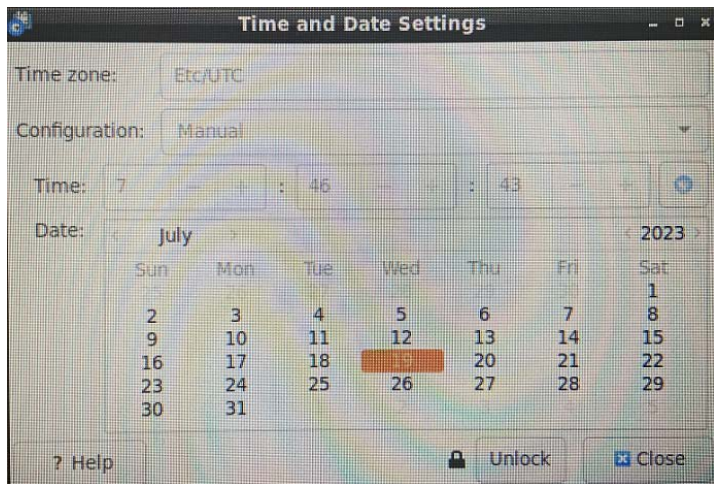
2. Click **Unlock** and enter the password (vantron) before editing;

3. Click Time zone and select the correct one for the Device from the list;

4. Choose to synchronize the time with the Internet server (device shall have Internet access) or fill in the time manually;

5. Click **Lock** and close the window;

6. Reboot the device to let the settings take effect.

The real-time clock (RTC) component provides accurate time and date information for the system after its recovery from abrupt power failure r system fault. When necessary, follow the steps below to synchronize the RTC and system time.

1. Click the **Debian icon > System Tools > LXTerminal** to open a terminal;

2. Input sudo su to switch to the root user;

3. Set the date and time for the system：

   # date -s "2023-03-24 14:38:10"

4. Synchronize the date and time to the RTC;

   # hwclock -w

5. Reboot the Device;

   # reboot

6. Check the RTC information.

   # hwclock -r

### 5.2.3 Network configuration

The Device is configured to have Internet access once it connects to a live Ethernet or joins to a Wi-Fi network.

Make sure you have installed the Wi-Fi antennas before connecting to an existing wireless network.

1. To join to a Wi-Fi network, click the network icon [icon] on the menu bar and search for the target network in the list;

2. Input the password of the target Wi-Fi network and wait for the connection;

3. To check the current network connection, you can move the cursor to the network icon, and right click the mouse to select **Connection Information**:
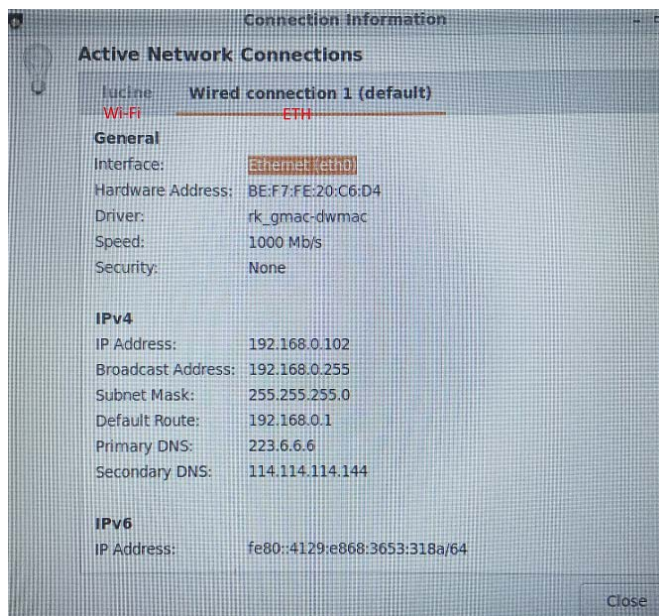


4. To edit the network configurations, you can right click the network icon and select **Edit Connections**, then select a connection and click the cog icon to edit the settings.
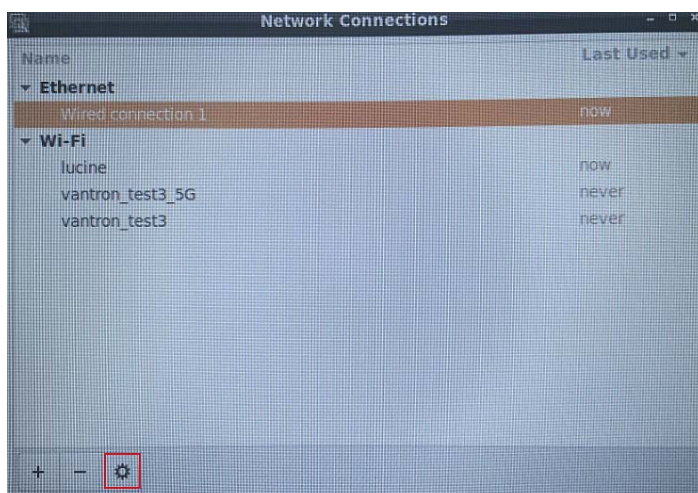
## 5.3    Image Flashing on a Windows Host

Whenever a new image is available, Vantron will provide a release package consisting of all the tools/files necessary so that you can flash the image as needed. This section briefs on the image flashing on a Windows host.

### 5.3.1  Prerequisites

- IBOX66

- A host computer running Windows 7 or later (with ADB setup finished, refer to  4.3)

- A USB Type-A to Type-A cable

- IBOX66 is in the device mode (OTG switch dialed up, refer to 3.4)

### 5.3.2  Image flashing

1. Unzip the software release package and open the directory of the upgrade driver (\DriverAssitant_vxxx) to locate the **DriverInstall.exe**;
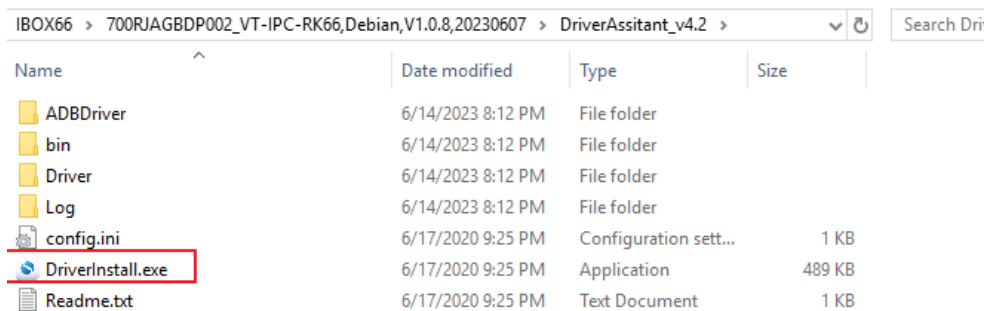


2. Right click the mouse and run the program as administrator;

3. Click **Uninstall Driver** first to remove the previously installed driver, if any, then click **Install Driver** and wait;
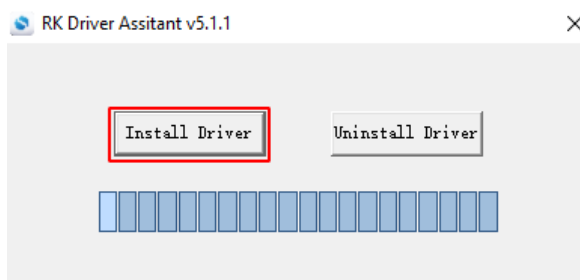
**4.** A pop-up will appear in a second suggesting the driver is installed;
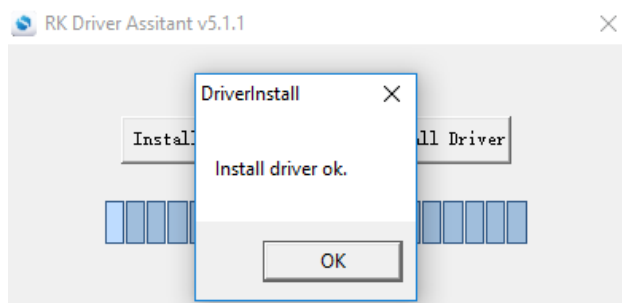


5. Return to the release package and open the directory of the upgrade tool (path: \RKDevTool_Release\ RKDevTool.exe);
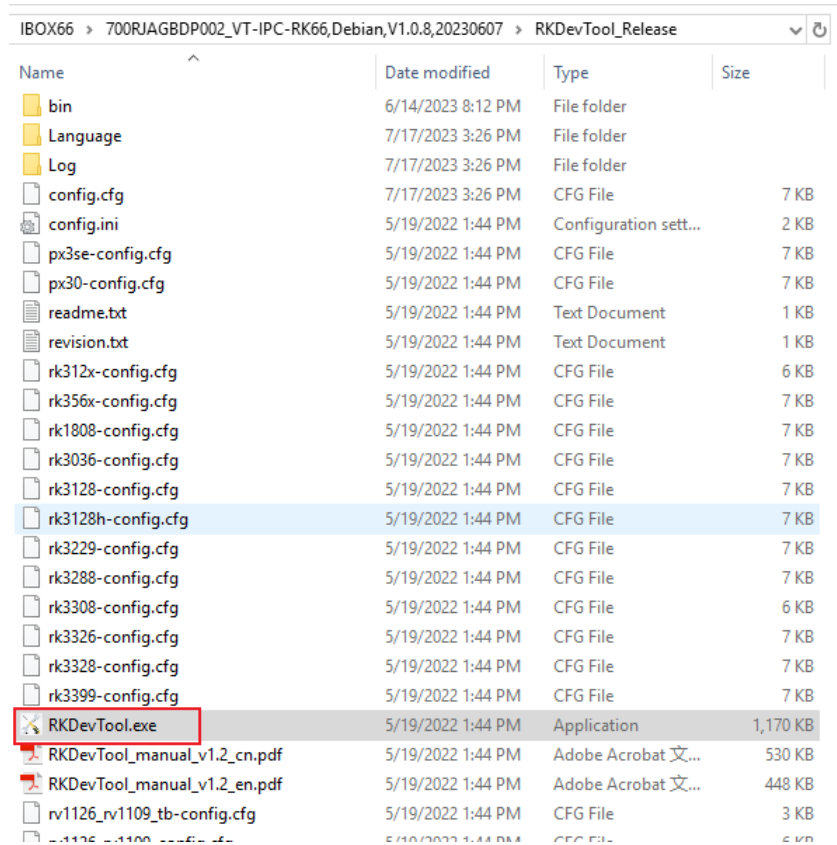
6.  Double click **RKDevTool.exe** to open the upgrade window;
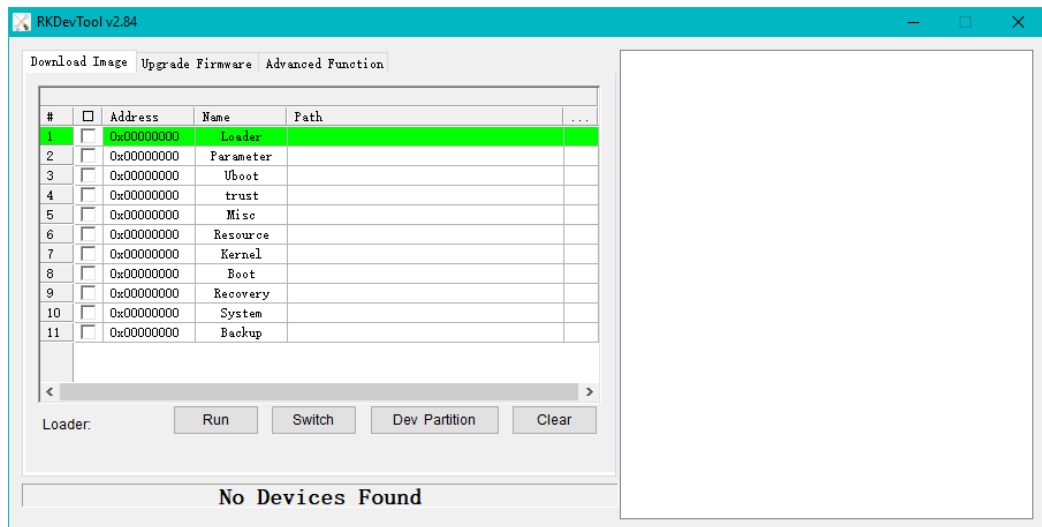


7.  Connect the USB OTG port (refer to 3.4) of IBOX66 to the Windows host with the USB Type-A to Type-A cable;

8.  Press "Win + R" and input cmd in the dialog box to open the command prompt;

9.  Input adb devices in the command prompt to check if the Device is connected to the Windows host;

10. Once the device is identified by the Windows host, input adb reboot loader to reboot the device into the bootloader mode;

11. Then the upgrade window will prompt for the existence of a Loader device, indicating that the upgrade process is ready.

12. Click **Upgrade Firmware** > **Firmware** in the upgrade window;

13. Open the image file **update.img** from the local directory (\rockdev), and the firmware details will be automatically populated;

14. Click the **Upgrade** button, and the system will start to download the image and upgrade the firmware automatically;



15. When the upgrade finishes, the system will reboot automatically.

## 5.4    Serial Ports

IBOX66 offers two DB9 RS232 connectors (UART4 and UART5) and two DB9 RS232/RS485 connectors (UART0 and UART7) for serial communication. The ports are mapped as /dev/ttyS0, /dev/ttyS4, /dev/ttyS5, and /dev/ttyS7 respectively in the system. Please refer to 3.9 for the details of the serial ports.

To switch the serial modes of UART0 and use it for serial communication:

```
# echo 20 > /sys/class/gpio/export              // To export the pin

# echo out > /sys/class/gpio/gpio20/direction       // To configure the pin as an output

# echo 0 > /sys/class/gpio/gpio20/value           // To enable the RS485 mode

# echo 1 > /sys/class/gpio/gpio20/value          // To enable the RS232 mode

# busybox microcom -t 5000 -s 4800 /dev/ttyS0     // To use the 'microcom' utility to set
                  a timeout of 5s for data transmission and set the baud rate to 4800
```

To switch the serial modes of UART7 and use it for serial communication:

```
# echo 5 > /sys/class/gpio/export                // To export the pin

# echo out > /sys/class/gpio/gpio5/direction        // To configure the pin as an output

# echo 0 > /sys/class/gpio/gpio5/value            // To enable the RS485 mode

# echo 1 > /sys/class/gpio/gpio5/value           // To enable the RS232 mode

# busybox microcom -t 5000 -s 4800 /dev/ttyS7     // To use the 'microcom' utility to set
                  a timeout of 5s for data transmission and set the baud rate to 4800
```

To set UART4 and use it for serial communication:

```
stty -F /dev/ttyS4 speed 115200 // To use the 'stty' utility to set the baud rate to 115200

echo abcd    > /dev/ttyS4       // To send 'abcd' to UART4

cat /dev/ttyS4                 // To read the data sent to UART4 and output to the terminal
```

To set UART5 and use it for serial communication:

```
# stty -F /dev/ttyS4 speed 115200 // To use the 'stty' utility to set the baud rate to 115200

# echo abcd > /dev/ttyS5        // To send 'abcd' to UART5

# cat /dev/ttyS5                 // To read the data sent to UART5 and output to the terminal
```

## 5.5 Use of Debug UART

In the event that you would like to debug the device via the debug UART, please unscrew the upper cover of IBOX66 first.

1. Use a Philips screwdriver to remove the screws from the upper cover and open IBOX66;



2. The debug UART is labeled as J18, and the pinout description is shown below;
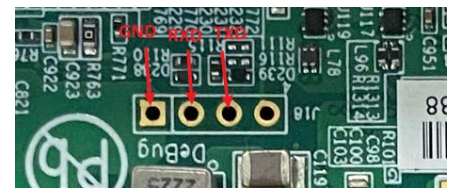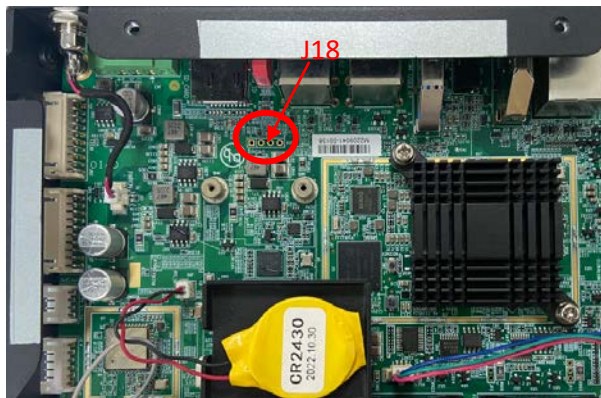


J18 Pinout

3. Insert the male ends of three male-to-female DυPont wires into the pinholes of J18 connector, and the other ends into the serial headers of a serial-to-USB adapter (TXD-RXD, RXD-TXD, GND-GND);

Black, red, brown: GND, TXD, RXD

Black, red, brown: GND, RXD, TXD
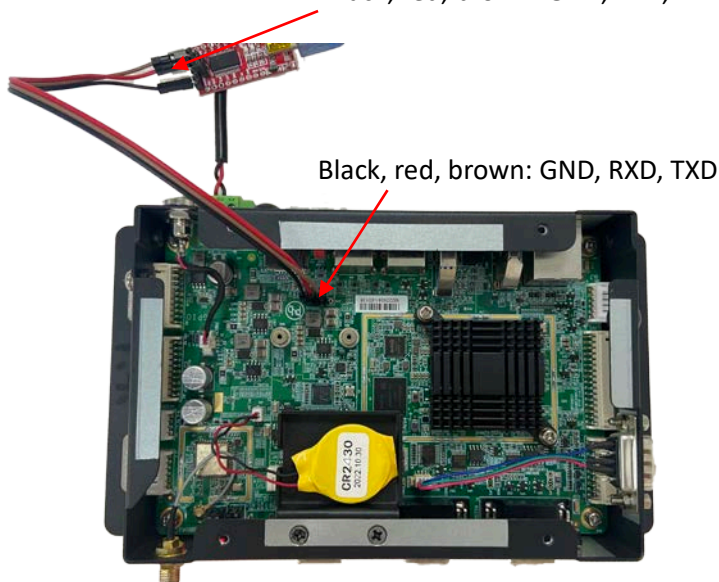
4. Plug the USB end of the serial-to-USB adapter into the host computer;

5. Power on IBOX66 with a 12V DC adapter;

6. Launch a terminal emulator on a host computer (in the following description, a terminal in ubuntu system is used for illustration)

7. Identify the device name of the serial-to-USB adapter mapped in the software system;

$ ls /dev/ttyUSB*
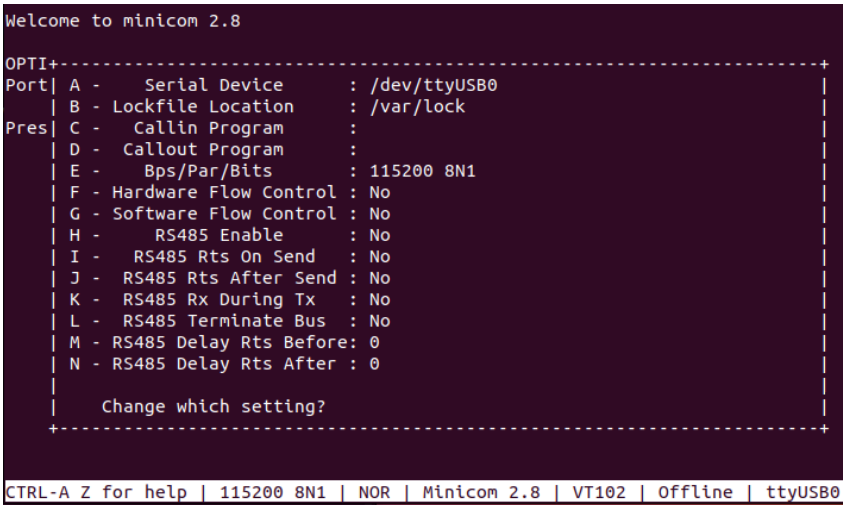
8. Use a serial communication program (e.g., minicom) to set the parameters of the debug UART;

$ sudo apt-get install minicom       //install minicom

9. Open the debug UART;

$ sudo minicom -D /dev/ttyUSB0 -b 115200

10. Press Ctrl + A and release, then press O to open the port configurations;

11. Use the keyboard to navigate to the **Serial port setup** option;

12. Set the baud rate, data bit, parity, and stop bit (8N1) without hardware or software flow control;

```
Welcome to minicom 2.8

OPTI+-------------------------------------------------------------+
Port| A -    Serial Device      : /dev/ttyUSB0                    |
    | B - Lockfile Location      : /var/lock                      |
Pres| C -    Callin Program      :                                |
    | D -    Callout Program     :                                |
    | E -    Bps/Par/Bits        : 115200 8N1                     |
    | F - Hardware Flow Control  : No                             |
    | G - Software Flow Control  : No                             |
    | H -      RS485 Enable      : No                             |
    | I -   RS485 Rts On Send    : No                             |
    | J -  RS485 Rts After Send  : No                             |
    | K -   RS485 Rx During Tx   : No                             |
    | L -   RS485 Terminate Bus  : No                             |
    | M - RS485 Delay Rts Before : 0                              |
    | N - RS485 Delay Rts After  : 0                              |
    |                                                             |
    |     Change which setting?                                   |
    +-------------------------------------------------------------+

CTRL-A Z for help | 115200 8N1 | NOR | Minicom 2.8 | VT102 | Offline | ttyUSB0
```

13. Press **Enter** to save the settings and return to the configuration window;

14. Navigate to **Save setup as dfl** and press **Enter** to save the changes to default settings;

15. Exit the settings and you can now proceed with debugging the device.

## 5.6    4G module

IBOX66 integrates an automatic dial-up script. The dial-up fails when there is no SIM card in the slot, yet the normal operation of the Device will not be impacted.

Before using the cellular communication, please remember to insert the activated SIM card into the SIM slot and install the 4G antennas before power up.

1.  The dial-up script runs automatically upon power up;

2.  Use the ifconfig command to check the information of the network card (PPP0 in this case) after successful dial-up;

```
ppp0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST>  mtu 1500
        inet 10.58.143.26  netmask 255.255.255.255  destination 10.64.64.64
        ppp  txqueuelen 3  (Point-to-Point Protocol)
        RX packets 76  bytes 5970 (5.8 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 85  bytes 5964 (5.8 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

3.  Add a default route;

    # route add default gw **10.58.143.126**          // use the IP address obtained by ppp0

4.  Test the network connection using the ping command.

```
root@vantron:~# route add default gw 10.58.143.26
root@vantron:~#
root@vantron:~# ping www.baidu.com
PING www.a.shifen.com (14.215.177.39): 56 data bytes
64 bytes from 14.215.177.39: icmp_seq=0 ttl=54 time=161.061 ms
64 bytes from 14.215.177.39: icmp_seq=1 ttl=54 time=123.829 ms
^C--- www.a.shifen.com ping statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max/stddev = 123.829/142.445/161.061/18.616 ms
```

## 5.7    Ethernet

IBOX66 is configured to connect to Internet once it connects to a live Ethernet.

1.  Connect the RJ45 Ethernet jack of the Device to network;

2.  Use the ifconfig command to check the information of the network card (eth0 in this case);

```
root@vantron:~#
root@vantron:~# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.9.167  netmask 255.255.255.0  broadcast 192.168.9.255
        inet6 fe80::bcf3:fe35:e071:f00b  prefixlen 64  scopeid 0x20<link>
        ether 46:e6:8f:6f:80:cf  txqueuelen 1000  (Ethernet)
        RX packets 89  bytes 20331 (19.8 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 43  bytes 4170 (4.0 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 38
```

3.  Test the network connection using the ping command.

```
root@vantron:~#
root@vantron:~# ping 192.168.9.166
PING 192.168.9.166 (192.168.9.166): 56 data bytes
64 bytes from 192.168.9.166: icmp_seq=0 ttl=128 time=0.525 ms
64 bytes from 192.168.9.166: icmp_seq=1 ttl=128 time=1.020 ms
64 bytes from 192.168.9.166: icmp_seq=2 ttl=128 time=1.040 ms
64 bytes from 192.168.9.166: icmp_seq=3 ttl=128 time=1.048 ms
64 bytes from 192.168.9.166: icmp_seq=4 ttl=128 time=1.017 ms
^C--- 192.168.9.166 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.525/0.930/1.048/0.203 ms
```

## 5.8    Wi-Fi

1.  Check the Wi-Fi status of the Device;

    # nmcli radio wifi

2.  Make sure the Wi-Fi feature is enabled. If not, use the following command;

    # nmcli radio wifi on

3.  Check available Wi-Fi access points;

    # nmcli dev wifi list

4.  Connect the Device to a Wi-Fi access point using nmcli.

    # sudo nmcli dev wifi connect [network ssid] password [network password]

## 5.9   USB

When any of the USB interfaces connects to a storage device, input the following commands to check/configure the USB interface.

1. Display the details of the partitions on the USB device:

   $ fdisk -l

2. Mount the USB device to a specified directory (e.g., /mnt):

   $ mount /dev/xxx /mnt

3. Check the mounted content in /mnt:

   $ ls /mnt

4. Unmount the USB device from /mnt:

   $ umount /dev/mnt

## 5.10  RTC

RTC module provides accurate time and date information to the system. Follow the steps below to change the RTC time.

1. Access the time zone settings;

   # Tzselect              // You can then follow the prompts to change the time zone

2. Copy the time zone information (Shanghai, China for instance) to the local file;

   # sudo cp /usr/share/zoneinfo/Asia/Shanghai /etc/localtime

3. Set the system date & time;

   # date -s "2023-03-24 14:38:10"

4. Synchronize the RTC time with the system time;

   # hwclock -w

5. Reboot the Board;

   # reboot

6. Check the RTC time information.

   # hwclock -r

# CHAPTER 6 DISPOSAL AND WARRANTY

## 6.1    Disposal

When the device comes to end of life, you are suggested to properly dispose of the device for the sake of the environment and safety.

Before you dispose of the device, please back up your data and erase it from the device.

It is recommended that the device is disassembled prior to disposal in conformity with local regulations. Please ensure that the abandoned batteries are disposed of according to local regulations on waste disposal. Do not throw batteries into fire or put in common waste canister as they are explosive. Products or product packages labeled with the sign of "explosive" should not be disposed of like household waste but delivered to specialized electrical & electronic waste recycling/disposal center.

Proper disposal of this sort of waste helps avoid harm and adverse effect upon surroundings and people's health. Please contact local organizations or recycling/disposal center for more recycling/disposal methods of related products.

## 6.2    Warranty

### Product warranty

VANTRON warrants to its CUSTOMER that the Product manufactured by VANTRON, or its subcontractors will conform strictly to the mutually agreed specifications and be free from defects in workmanship and materials (except that which is furnished by the CUSTOMER) upon shipment from VANTRON. VANTRON's obligation under this warranty is limited to replacing or repairing at its option of the Product which shall, within <u>24 months</u> after shipment, effective from invoice date, be returned to VANTRON's factory with transportation fee paid by the CUSTOMER and which shall, after examination, be disclosed to VANTRON's reasonable satisfaction to be thus defective. VANTRON shall bear the transportation fee for the shipment of the Product to the CUSTOMER.

### Out-of-Warranty Repair

VANTRON will furnish the repair services for the Product which are out-of-warranty at VANTRON's then-prevailing rates for such services. At customer's request, VANTRON will provide components to the CUSTOMER for non-warranty repair. VANTRON will provide this service as long as the components are available in the market; and the CUSTOMER is requested to place a purchase order up front. Parts repaired will have an extended warranty of 3 months.

### Returned Products

Any Product found to be defective and covered under warranty pursuant to Clause above, shall be returned to VANTRON only upon the CUSTOMER's receipt of and with reference to a VANTRON supplied Returned Materials Authorization (RMA) number. VANTRON shall supply a RMA, when required within three (3) working days of request by the CUSTOMER. VANTRON shall submit a new invoice to the CUSTOMER upon shipping of the returned products to the CUSTOMER. Prior to the return of any products by the CUSTOMER due to rejection or warranty defect, the CUSTOMER shall afford VANTRON the opportunity to inspect such products at the CUSTOMER's location and no Product so inspected shall be returned to VANTRON unless the cause for the rejection or defect is determined to be the responsibility of VANTRON. VANTRON shall in turn provide the CUSTOMER turnaround shipment on defective Product within fourteen (14) working days upon its receipt at VANTRON. If such turnaround cannot be provided by VANTRON due to causes beyond the control of VANTRON, VANTRON shall document such instances and notify the CUSTOMER immediately.

# Appendix   Regulatory Compliance Statement

## FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy and, if not 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.

This device complies with Part 15 of 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: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate this equipment.