



<b>Product Name</b>	GAOTek Embedded Industrial Linux Android Development Board
<b>Product SKU</b>	GAOTek-IDK-360
<b>Product URL</b>	<a href="https://gaotek.com/product/gaotek-embedded-industrial-linux-android-development-board/">https://gaotek.com/product/gaotek-embedded-industrial-linux-android-development-board/</a>

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Based in New York City & Toronto, GAO Tek Inc. is ranked as one of the top 10 global B2B technology suppliers. GAO ships overnight within the U.S. & Canada & provides top-notch support thanks to its 4 decades of experience.

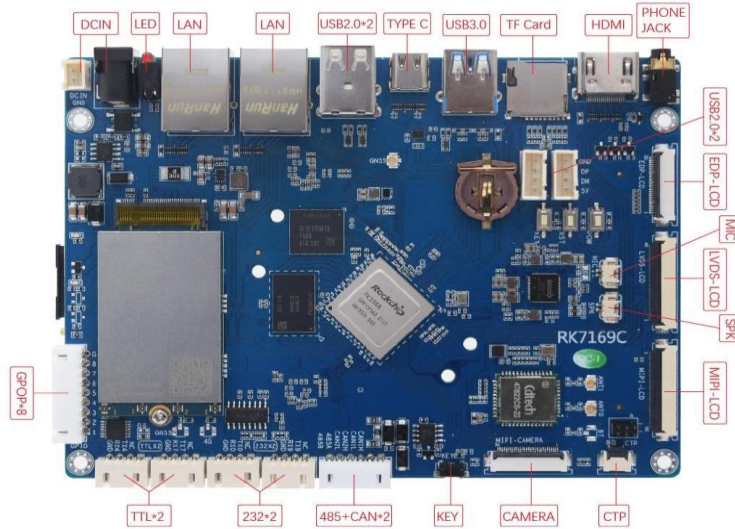


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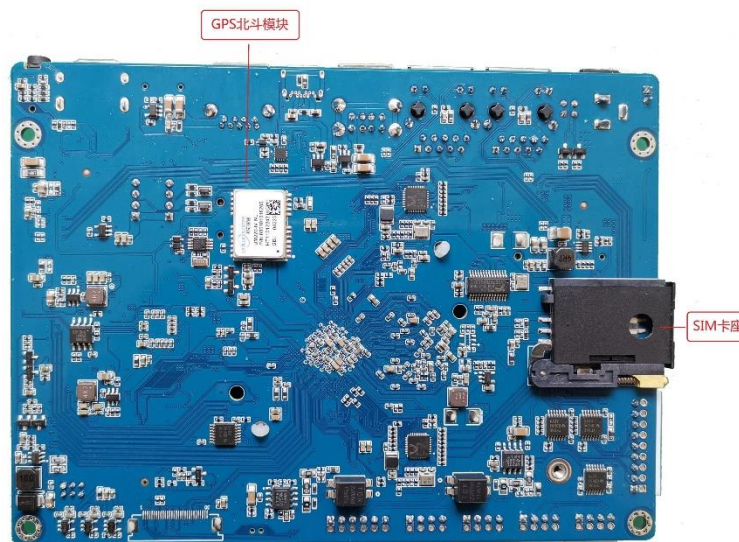
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# GAOTek Embedded Industrial Linux Android Development Board

## 1. Interface introduction



Front view



Back view

Based in New York City & Toronto, GAO Tek Inc. is ranked as one of the top 10 global B2B technology suppliers. GAO ships overnight within the U.S. & Canada & provides top-notch support thanks to its 4 decades of experience.

## 2. Software Development

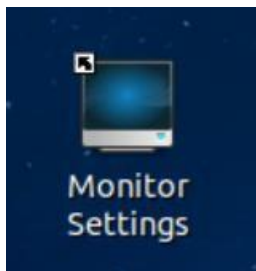
### 2.1 Ubuntu account

The existing ubuntu version is 18.04 long term support version, default account ubuntu, password ubuntu, you can change the account password and account to add.

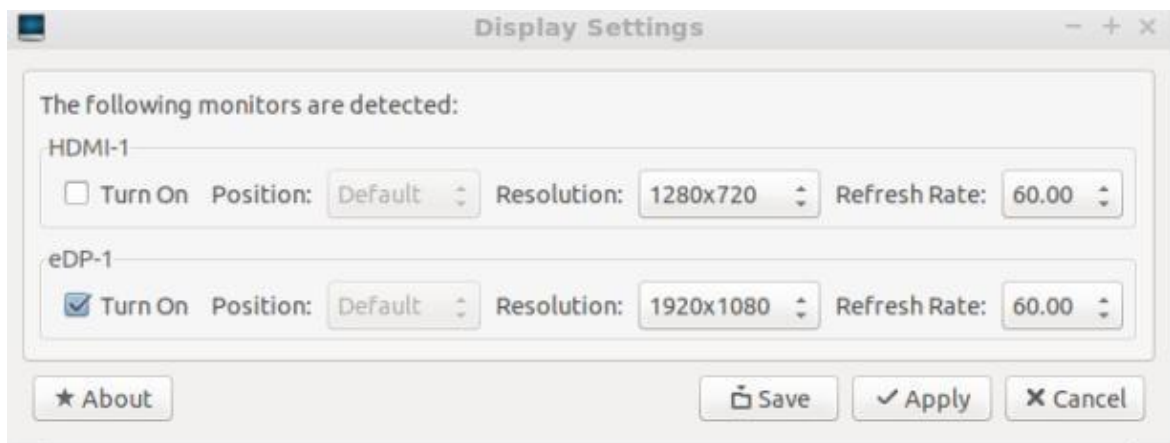
Desktop environment lubuntu (lxde).

### 2.2 Dual screen setup

Ubuntu can support dual-screen display and dual-screen display, and there is a Monitor Settings program on the desktop to set up dual-screen settings.



After launching the application, the interface is as follows:





HDMI-1 is to set the resolution of HDMI, eDP-1-1 is to set the LCD settings, according to the specific needs of the relevant parameters.

Each option has Turn On to turn off the corresponding display device, if you simply use the HDMI output, you can turn off the LCD display output, the display interface will be displayed according to the actual HDMI resolution.

Resolution and Refresh Rate do not select auto, select the specific value, click apply to view the display effect after selection, and finally be sure to click Save to save, the next boot can use the saved settings.

## 2.3 Screen setup (command line)

The screen orientation can be executed at the terminal command line.

Normal orientation: `xrandr -o normal` (normal can also be replaced by 0).

- Left 90°: `xrandr -o left` (left can be replaced by 1) Right 90°: `xrandr -o right` (right can also be replaced by 3) up and down: `xrandr -o inverted` (inverted can also be replaced by 2).
- The above command restores the screen orientation after reboot.

Screen orientation can also be added in the configuration file `/etc/X11/xorg.conf`, without the file you can create a new one with the following configuration.

Normal orientation: Option "Rotate" "normal"

- Left 90°: Option "Rotate" "left".
- Right 90° Option "Rotate" "right".
- Rotate up and down: Option "Rotate" "inverted".

You can comment the relevant configuration by yourself as needed, save the modification and reboot the device to take effect permanently.

```
Section "Monitor"
  Identifier   "eDP-1"
  Option      "Rotate" "normal"
#  Option     "Rotate" "left"
#  Option     "Rotate" "right"
#  Option     "Rotate" "inverted"
EndSection
```

Touch screen orientation can be executed from the terminal command line.



Normal orientation: xinput set-prop '6' "Coordinate Transformation Matrix" 1 0 0 0 0 1 0 0 0 1

- Left 90°: xinput set-prop '6' "Coordinate Transformation Matrix" 0 -1 1 1 0 0 0 0 0 1
- Right 90°: xinput set-prop '6' "Coordinate Transformation Matrix" 0 1 0 -1 0 1 0 0 0 1
- Flip up and down: xinput set-prop '6' "Coordinate Transformation Matrix" -1 0 1 0 -1 1 0 0 0 1

You can configure it by yourself according to the screen orientation. After reboot, the touch screen orientation is restored. This method needs to install xinput command first, sudo apt-get install xinput in terminal, xinput --list lists related devices, 6 in the above is the touch screen device number.

Touch screen orientation can also be added in the configuration file /etc/X11/xorg.conf, without this file you can create a new one, the configuration content is as follows:

- Left 90 °: Option "TransformationMatrix" "0 -1 1 1 0 0 0 0 0 1"
- Right 90°: Option "TransformationMatrix" "0 1 0 -1 0 1 0 0 0 1"
- Flip up and down: Option "TransformationMatrix" "-1 0 1 0 -1 1 0 0 0 1"

All commented as normal direction, you can comment the relevant configuration by yourself as needed. Save the modification and reboot the device to take effect permanently.

```
Section "InputClass"
    Identifier "calibration"
    MatchProduct "ILITEK ILITEK-TP"
    # Option "TransformationMatrix" "0 -1 1 1 0 0 0 0 0 1"#left 90 as xrandr -o 1
    # Option "TransformationMatrix" "0 1 0 -1 0 1 0 0 0 1"#right 90 as xrandr -o 3
    # Option "TransformationMatrix" "-1 0 1 0 -1 1 0 0 0 1"#inverted as xrandr -o 2
EndSection
```

## 2.4 USB camera

Open the Start menu -> Audio&Video -> cheese application to display the USB camera screen. If the application is not pre-installed on your device, you can install it with sudo apt-get install cheese in the terminal to use it.

## 2.5 Audio settings

Open by default, no settings required.

## 2.6 Extended GPIO settings

The operation file is in the `/sys/class/gpio/` directory. Before using the gpio port, you need to apply for the gpio port, and the following is an example of the operation of the IO0 port of the expansion port.

The gpio number of IO0 is 64, and the command to apply gpio is as follows `echo 64 > /sys/class/gpio/export`.

In the `/sys/class/gpio/` directory will generate `gpio64` folder (the folder name is composed of gpio and number).

Under the `gpio64` file there are operational interfaces related to gpio port operations, which are related as follows:

- Direction Set output or input mode
- Set to input : `echo in > direction`
- Set to output : `echo out > direction`
- Value When output, control the high and low levels; when input, get the high and low levels
- High level : `echo 1 > value`
- Low level : `echo 0 > value`





**Terminals: XH2.54-9PIN**

<b>Pin</b>	<b>Description</b>	<b>GPIO Remark</b>
1	IO1	8
2	IO2	15
3	IO3	33
4	IO4	32
5	IO5	36
6	IO6	40
7	IO7	41
8	IO8	42
9	GND	

There is 1 red LED indicator, also gpio. port for control, number 60.

There is also 1 red LED, also gpio. port for control, number 95.



## 2.7 UART interface

Provides 2 (TTL level) interfaces, each connected via a 4PIN 2.54mm pitch terminal block, UART and device number correspondence.



Serial port identification	Equipment number
TX4/RX4/G	/dev/ttyS4
TX7/RX7/G	/dev/ttyS7

## 2.8 RS232

Supports RS232x2 channels, each connected via a 4PIN 2.54mm pitch terminal.



Correspondence between RS232 and device number:

Serial port identification	Equipment number
RX0/TX0/G	/dev/ttyS0
TX9/RX9/G	/dev/ttyS9

## 2.9 RS485

Supports RS485x1, connected via 6PIN 2.54mm pitch terminal block.



RS485 and device number correspondence.

Serial port identification	Equipment number
485A , 485B	/dev/ttyS3

## 2.10 GPS

The message can be read from the terminal command line using `cat /dev/ttyS2`.

## 2.11 CAN

Supports 2-way CAN bus function, connected via 6PIN 2.54mm pitch terminal block. Can be externally connected to related CAN devices.



Use `ifconfig -a` to query for recognized can devices:

```
ubuntu@ubuntu:/$ ifconfig -a
can0: flags=128<NOARP> mtu 16
    unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00 txqueuelen 10 (UNSPEC)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Configuration can example:



**CAN baud rate set to 125K: sudo ip link set can0 type can bitrate 125000 dbitrate 125000 fd on**

**Enable to turn on the CAN device: sudo ifconfig can0 up**

**Turn off the CAN device: sudo ifconfig can0 down**

**Receive CAN data: candump can0**

**Send CAN data: cansend can0 <message to send>**

cansendcan0123#1122334455667788

Send standard data frame with the ID 123 and the content 0x1122334455667788 cansendcan 012345678#aabbccdd

Send an extended frame with ID 12345678 and 0xaabbccdd

CAN tool complete source code: <https://github.com/linux-can>

## 2.12 TF card and SIM card installation method



The upper TF card slot, installation direction: TF card gold finger facing inward and downward, insert the upper slot, push to the bottom; uninstall TF card, push down TF inward, TF will automatically pop out.



The top is the SIM card holder, you can only use card type sim cards, nano cards need to use the card holder, press the beige spring button, pull out the card slot, put the sim card into the slot, and then push into the card holder.



## 2.13 Setting up the SSH console

Ubuntu supports SSH protocol console login, the default username is ubuntu and password is ubuntu, you can use the network for SSH login.

## 2.14 Setting up the serial console

Ubuntu can specify a serial port as the Ubuntu console, take ttyS4 as an example Type the following command in the desktop LXTerminal `sudo cp /lib/systemd/system/serial-getty@.service /lib/systemd/system/serial-getty@ttyS4.service` `sudo ln -s /lib/systemd/system/serial-getty@ttyS4.service/etc/systemd/system/getty.target.wants/serial-getty@ttyS4.service`. Modification/lib/systemd/system/serial-getty@ttyS4.service Documents %i. device Change to %i. Default Baud Rate 9600.

Save and reboot, ttyS4 will have the console function.

```
Ubuntu 18.04.1 LTS ubuntu ttysWK3
ubuntu login: root (automatic login)

Last login: Fri Jan  3 11:22:17 CST 2020 on ttysWK3
Welcome to Ubuntu 18.04.1 LTS (GNU/Linux 4.4.167 aarch64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

 * Overheard at KubeCon: "microk8s.status just blew my mind".

    https://microk8s.io/docs/commands#microk8s.status
This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.

526 packages can be updated.
291 updates are security updates.

root@ubuntu:~# █
```

## 2.15 Wired network setup (GUI interface)

Wired network default is DHCP to get the address, plug in the network automatically get the address

There is a network settings icon in the lower right corner of the desktop status bar:

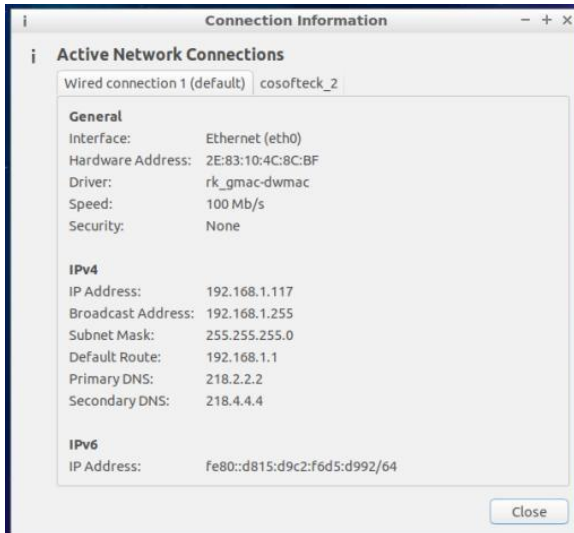


Click on this icon and the following screen appears, showing that the network connection is successful.





Click Connection Information to view the connection information of the relevant network:



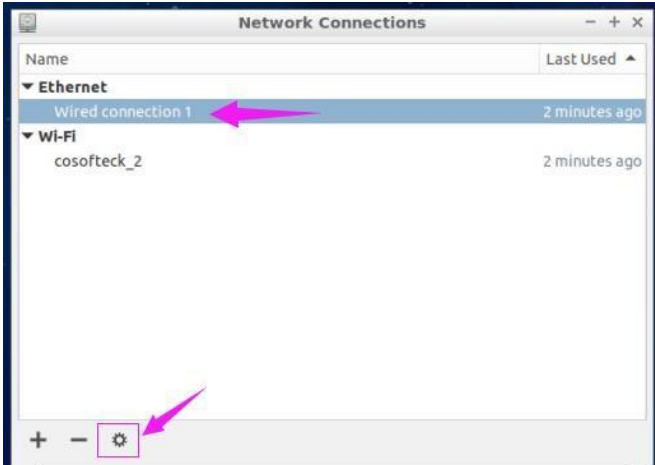
## 2.16 Wired network static address setting (GUI interface)

Click on the network icon in the bottom right corner of the status bar, the following screen appears, click on Edit Connections in the screen.

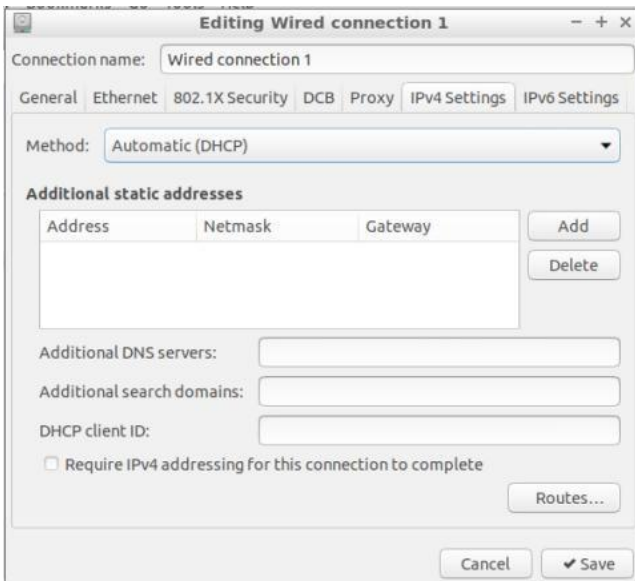




The network configuration screen appears:



Select the connection related to wired network, click the gear icon at the bottom right corner of the interface, access the configuration interface, select IPv4 Settings, the default is DHCP.

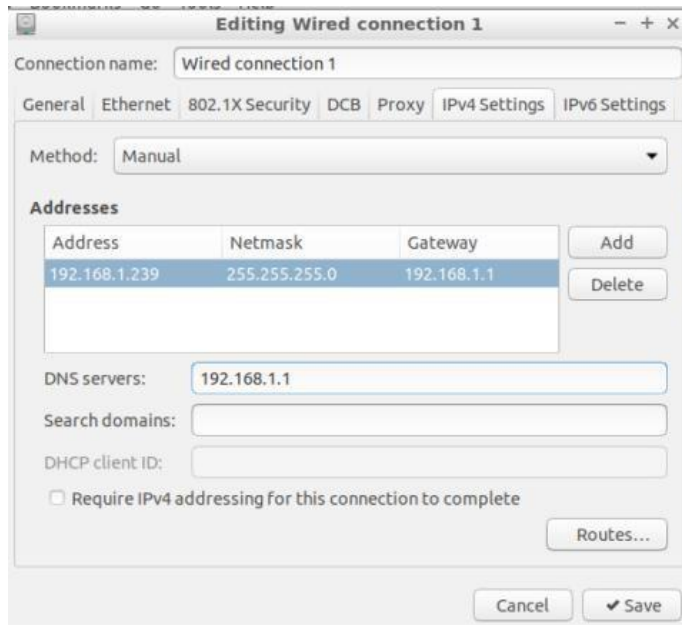


Change DHCP to Manual(manual).





Add the specified IP address, and then save it.



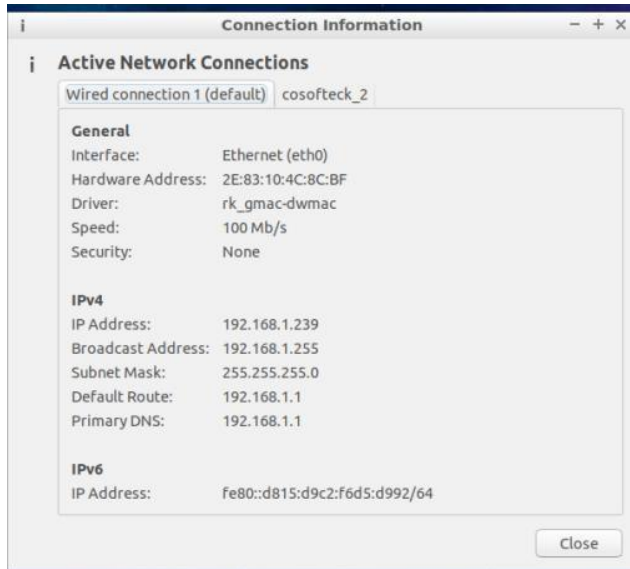
After saving, the wired network is not updated, you need to handle it manually, click the network icon.



Click Disconnect to disconnect from the wired network.



Click Wired connection 1 and the system will reconnect to the wired network. Click Connection Information to view the connection information of the relevant network.



You can see that the IP address has been changed to the set IP address.

## 2.17 Wired Network Setup(/etc/network/interfaces)

Ubuntu does not support /etc/network/interfaces to configure the network by default, if you need to configure the network this way, do the following

Install ifupdown, skip this step if it is already installed `sudo apt-get`

install ifupdown

Modify the /etc/network/interfaces file to add the network IP address configuration.

```
# interfaces(5) file used by ifup(8) and ifdown(8)
# Include files from /etc/network/interfaces.d:
source-directory /etc/network/interfaces.d

auto eth0
iface eth0 inet static
address 192.168.1.239
gateway 192.168.1.1
netmask 255.255.255.0
```



Modify the `/etc/systemd/resolved.conf` file to add DNS configuration.

```
# Defaults can be restored by simply deleting this file.
# See resolved.conf(5) for details

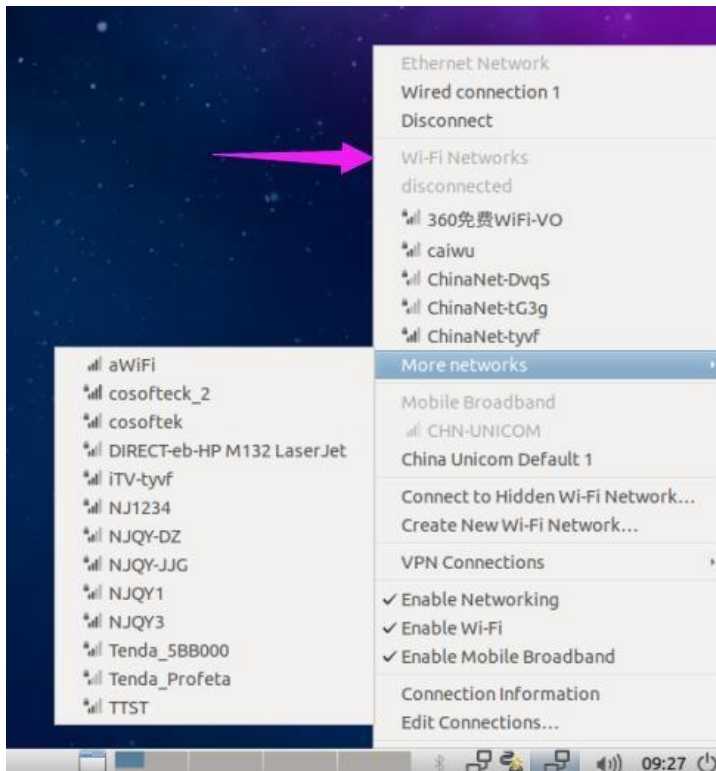
[Resolve]
DNS=114.114.114.114
DNS=8.8.8.8
#FallbackDNS=
#Domains=
#LLMNR=no
#MulticastDNS=no
#DNSSEC=no
#Cache=yes
#DNSStubListener=yes
~
```

Restart the network service `sudo /etc/init.d/networking force-reload sudo/etc/init.d/networking restart`.

After this configuration, the wired network configuration in the GUI will be disabled.

## 2.18 Wifi connection settings (GUI interface)

Click the network icon in the bottom right corner of the status bar, the following screen appears.



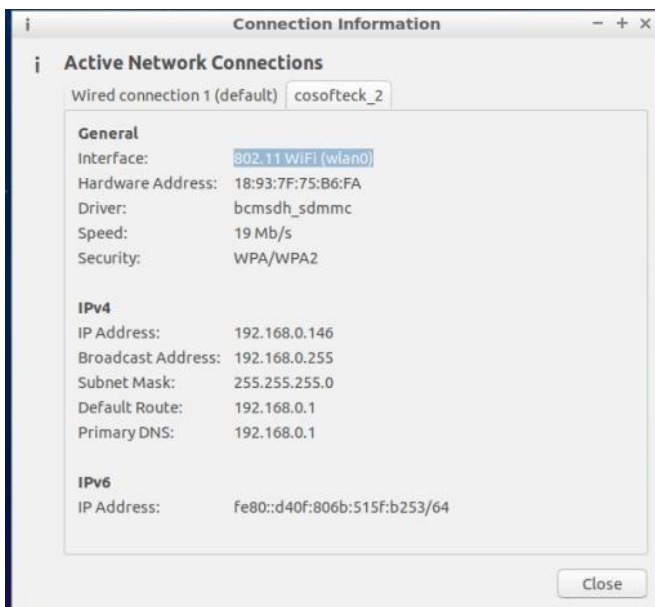
You can see the search for nearby wireless networks, select a wireless network, choose cosofteck\_2 for example, click on it and enter the password.



Click connect, the system will connect to the wireless network.



The above shows that the connection is successful, click Connection Information to view the relevant network connection information.





## 2.19 Wifi connection settings(/etc/network/interfaces)

Ubuntu does not support /etc/network/interfaces to configure the network by default, if you need to configure the network this way, do the following:

- Install ifupdown, skip this step if it is already installed `sudo apt-get install ifupdown`  
Generate a wireless connection profile.

- ESSID: the name of the WiFi connection to be made PWD: password of the wireless connection `sudo wpa_passphrase ESSID PWD > /home/ubuntu/wifi.conf`

Modify the /etc/network/interfaces file to add the wifi configuration.

```
# interfaces(5) file used by ifup(8) and ifdown(8)
# Include files from /etc/network/interfaces.d:
source-directory /etc/network/interfaces.d

auto eth0
iface eth0 inet static
address 192.168.1.239
gateway 192.168.1.1
netmask 255.255.255.0

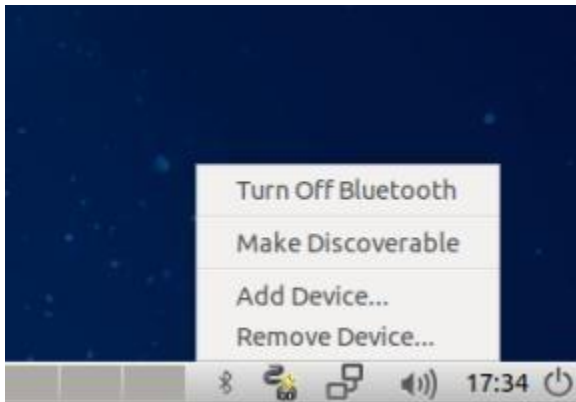
auto wlan0
iface wlan0 inet dhcp
wpa-conf /home/ubuntu/wifi.conf
```

Restart the network service `sudo /etc/init.d/networking force-reload sudo /etc/init.d/networking restart`.

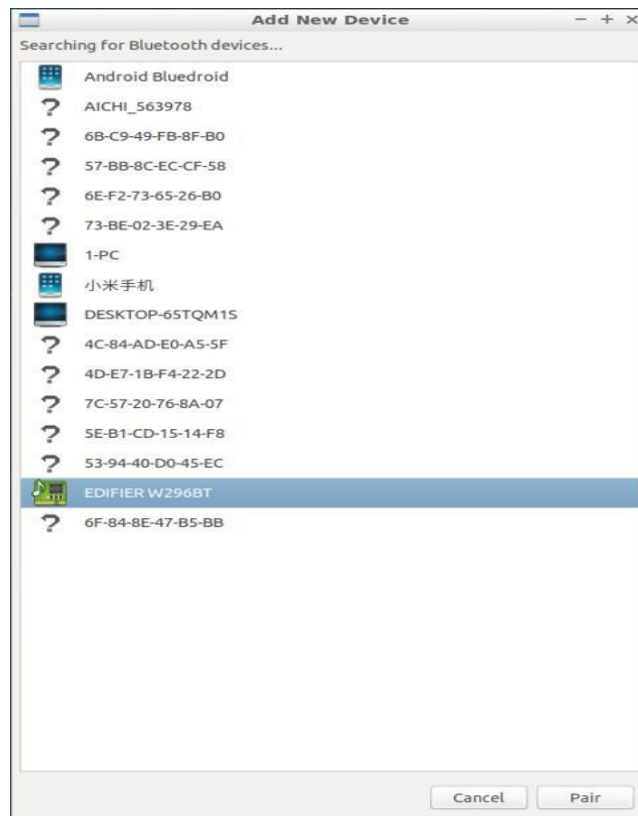
After this configuration, the wireless network configuration in the GUI interface will be invalid.

## 2.20 Bluetooth connectivity (GUI interface)

Execute `rtk_hciattach -n -s 115200 ttyS8 rtk_h5` under terminal to open the Bluetooth device. Click the Bluetooth icon in the status bar, a menu will pop up.



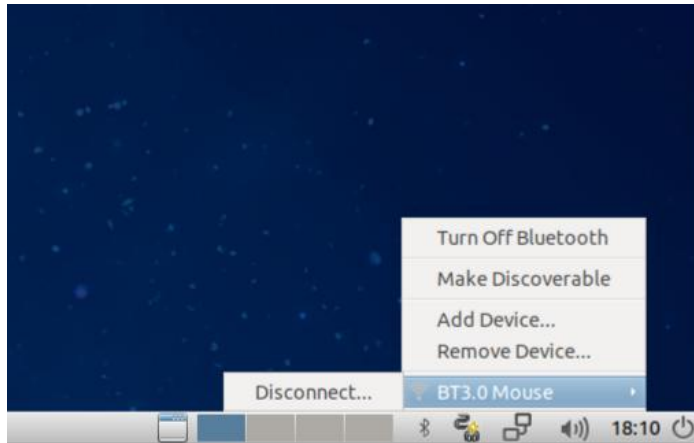
Click "Add Device...". Enter the device pairing interface and click on one of the devices to pair.



Based in New York City & Toronto, GAO Tek Inc. is ranked as one of the top 10 global B2B technology suppliers. GAO ships overnight within the U.S. & Canada & provides top-notch support thanks to its 4 decades of experience.



The name of the corresponding device appears on the interface and the pairing is successful.



## 2.21 Bluetooth connection (command line)

Turn on bluetooth: `rfkill unblock all`

Set Bluetooth: `rtk_hciattach -n -s 115200 ttyS8 rtk_h5`

Bluetooth configuration command: `bluetoothctl`

```
root@ubuntu:/home/ubuntu# bluetoothctl
[NEW] Controller 40:AA:56:10:B4:E0 ubuntu [default]
Agent registered
```

After entering the Bluetooth configuration command, type scan on to scan for Bluetooth devices.



```
[bluetooth]# scan on
Discovery started
[CHG] Controller 40:AA:56:10:B4:E0 Discovering: yes
[NEW] Device 4F:05:37:B0:17:8A 4F-05-37-B0-17-8A
[NEW] Device 57:BB:8C:EC:CF:58 57-BB-8C-EC-CF-58
[NEW] Device 5C:41:96:E6:B5:20 5C-41-96-E6-B5-20
[NEW] Device 41:26:8C:77:0A:A8 41-26-8C-77-0A-A8
[NEW] Device 79:48:F0:A2:2C:70 79-48-F0-A2-2C-70
[NEW] Device 28:B2:BD:AE:49:A2 1-PC
[NEW] Device A4:04:50:CE:35:07 AICHI_563978
[NEW] Device 94:E7:0B:0A:7C:EB DESKTOP-65TQM1S
[CHG] Device 94:E7:0B:0A:7C:EB RSSI: -99
[CHG] Device 94:E7:0B:0A:7C:EB RSSI: -85
[NEW] Device 00:23:02:32:26:CF EDIFIER W296BT
[CHG] Device 00:23:02:32:26:CF RSSI: -87
```

We connect one of the Device 00:23:02:32:26:CF EDIFIER W296BT

Enter pair 00:23:02:32:26:CF for pairing.

```
[bluetooth]# pair 00:23:02:32:26:CF
Attempting to pair with 00:23:02:32:26:CF
[CHG] Device 00:23:02:32:26:CF Connected: yes
[CHG] Device 00:23:02:32:26:CF UUIDs: 00001108-0000-1000-8000-00805f9b34fb
[CHG] Device 00:23:02:32:26:CF UUIDs: 0000110b-0000-1000-8000-00805f9b34fb
[CHG] Device 00:23:02:32:26:CF UUIDs: 0000110c-0000-1000-8000-00805f9b34fb
[CHG] Device 00:23:02:32:26:CF UUIDs: 0000110e-0000-1000-8000-00805f9b34fb
[CHG] Device 00:23:02:32:26:CF UUIDs: 0000111e-0000-1000-8000-00805f9b34fb
[CHG] Device 00:23:02:32:26:CF ServicesResolved: yes
[CHG] Device 00:23:02:32:26:CF Paired: yes
Pairing successful
```

Pairing successful

Enter connect 00:23:02:32:26:CF to connect the device.

```
[bluetooth]# connect 00:23:02:32:26:CF
Attempting to connect to 00:23:02:32:26:CF
[CHG] Device 00:23:02:32:26:CF Connected: yes
Connection successful
```

Connection successful!



## 2.22 4G network setup (PPP dial-up method)

4G mobile network support PPP dialing method, (move far module) default file as follows:

```
Script files 1 : /etc/ppp/peers/go-ppp debug nodetach dump /dev/ttyUSB2 115200 nolock
noctrlscts modem hide-password novjnovjccompipcp-accept-localipcp-accept-remote
Noipdefault defautroute usepeerdns noccp connect 'chat -s -v -f/etc/ppp/peers/air-chat-
connect' disconnect 'chat -s -v -f /etc/ppp/peers/air-` -disconnect'.
```

Script files 2 : /etc/chatscripts/air-chat-connect

- ABORT "NO CARRIER"
- ABORT "NO DIALTONE"
- ABORT "NO ANSWER"
- ABORT "BUSY"
- ABORT "Username/Password Incorrect""
- AT
- OK-+++OK ATH0
- OKAT+CREG?
- OKAT+CPIN?
- OKAT+CESQ
- OKATD\*99#
- CONNECT ""
- Script files 3 : /etc/chatscripts/air-chat-disconnect
- ABORT "ERROR"
- ABORT "NO DIALTONE"
- SAY "\nSending break to the modem\n"
- "" "\K"
- "" "+++ATH0"
- SAY "\nGood bay\n" PPP Dialing

commands sudopppdcallgo-ppp



## 2.23 5G network setup (NIC dial-up method)

Default AT port in PCIE mode : /dev/stty\_nr31

1. Use AT command to switch to PCIE operating mode in USB mode :  
AT+QCFG="pcie/mode",0
2. AT command to set PCIE NIC dial-up : AT+QNETDEVCTL=1,3,1
3. Set the pcie0 NIC to normal mode and execute the command : echo normal>/sys/class/net/pcie0/mode
4. Enable the sipa\_dummy0 NIC and execute the command : ifconfig sipa\_dummy0 up
5. To set up routing and DNS resolution through the UDHCP program, execute the command : udhcp -i pcie0.

After the above settings are completed, the device can access the Internet via 5G.

## 2.24 Board-level QT environment construction

Execute the command `sudo apt install qt5-default qtcreator` in the terminal to install the QT environment, where `qt5-default` is the basic QT runtime and compilation environment, and `qtcreator` is the graphical development tool. The default QT version installed on the system is 5.95.

Extended third-party libraries `sudo apt install libqt5serialport5` (QT serial library)

`sudo apt install libqt5sql5-mysql` ( QTmysql Treasury )

If other libraries are missing in the run: you can search and install `sudo apt install library name` according to the missing library name.



## 2.25 Virtual machine QT cross-compilation environment build

Under ubuntu execute `sudo apt-get install gcc-7-aarch64-linux-gnu g++-7-aarch64-linux-gnu` to install gcc, g++, execute `sudo apt install qtcreator` to install graphics tools

QT official website download `qt-everywhere-opensource-src-5.9.5.tar.xz` source package.

### 1. Static compilation

Decompress `qt-everywhere-opensource-src-5.9.5.tar.xz`

Under the terminal `tar xvf qt-everywhere-opensource-src-5.9.5.tar.xz` Execute under terminal `cd qt-everywhere-opensource-src-5.9.5` Go to the source code directory

Cross-compilation configuration

```
./configure -prefix /opt/qt-aarch-lib-595 -opensource -confirm-license -release -xplatform linux-aarch64-gnu-g++ -no-pkg-config -nomake tests -nomake examples -nomake tools -qpa xcb -no-opengl -make libs-static
```

Compilation `make -j8` Installation `make install`

### 2. Dynamic Compilation

Decompress `qt-everywhere-opensource-src-5.9.5.tar.xz`

Under the terminal `tar xvf qt-everywhere-opensource-src-5.9.5.tar.xz` Execute under terminal `cd qt-everywhere-opensource-src-5.9.5` Go to the source code directory

Cross-compilation configuration

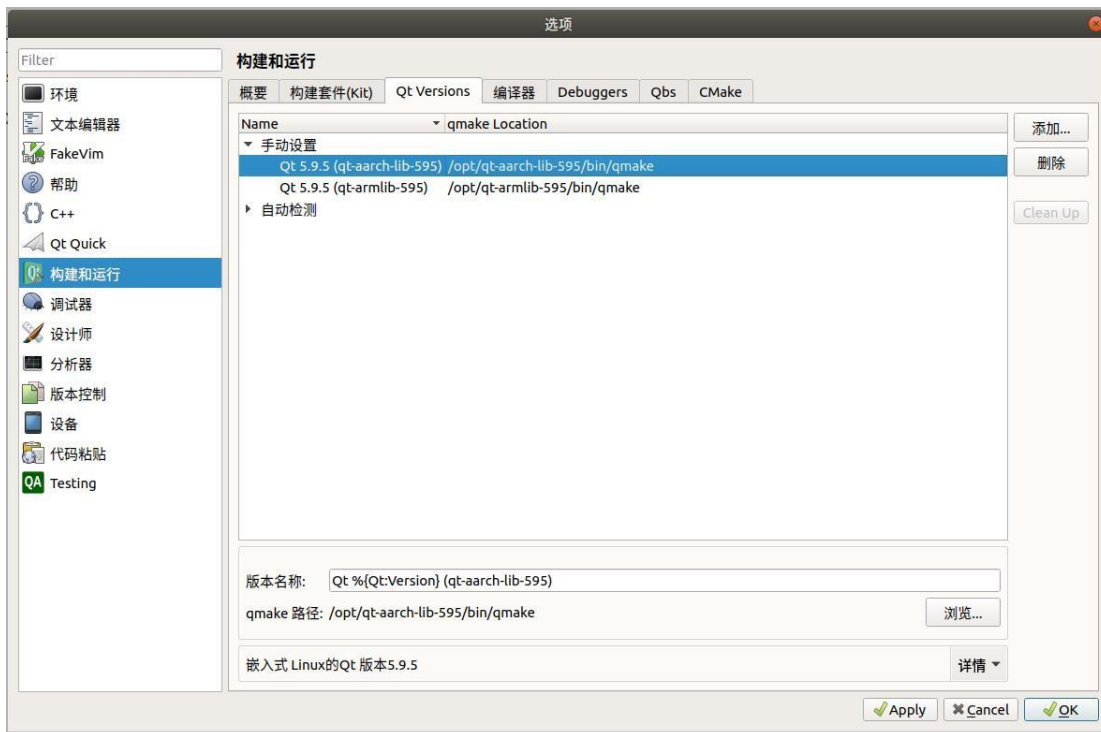
```
./configure -prefix /opt/qt-aarch-lib-595 -opensource -confirm-license -release -xplatform linux-aarch64-gnu-g++ -no-pkg-config -nomake tests -nomake examples -nomake tools -qpa xcb -no-opengl  
Compilation make -j8 Installation make install
```

After compilation, the QT cross-compilation environment is in the /opt/qt-aarch-lib-595 directory, and you can choose dynamic or static compilation by yourself.

### 3. Environment Configuration

#### a) Settings qmake

Select Build and Run->Select Qt Versions->Add to set up qmake, select the path to the qmake tool compiled in the cross-compile environment, the path here is the qmake path generated by compiling qt in the ubuntu environment.



#### b) Set the compilation toolchain

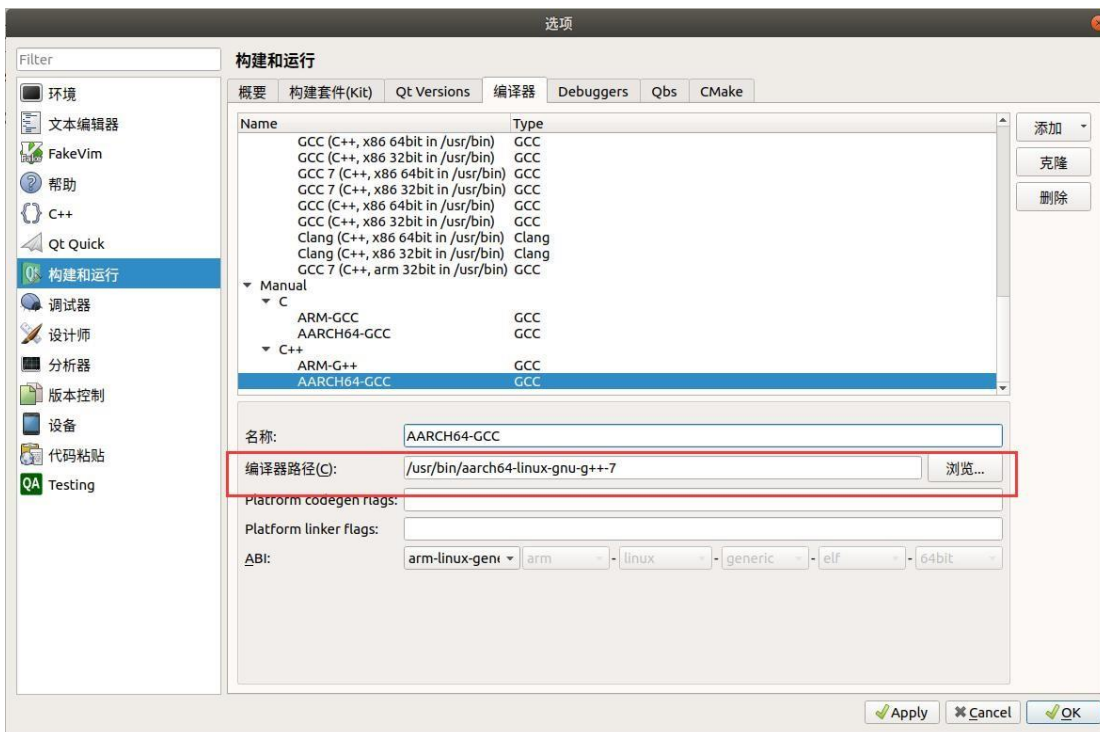
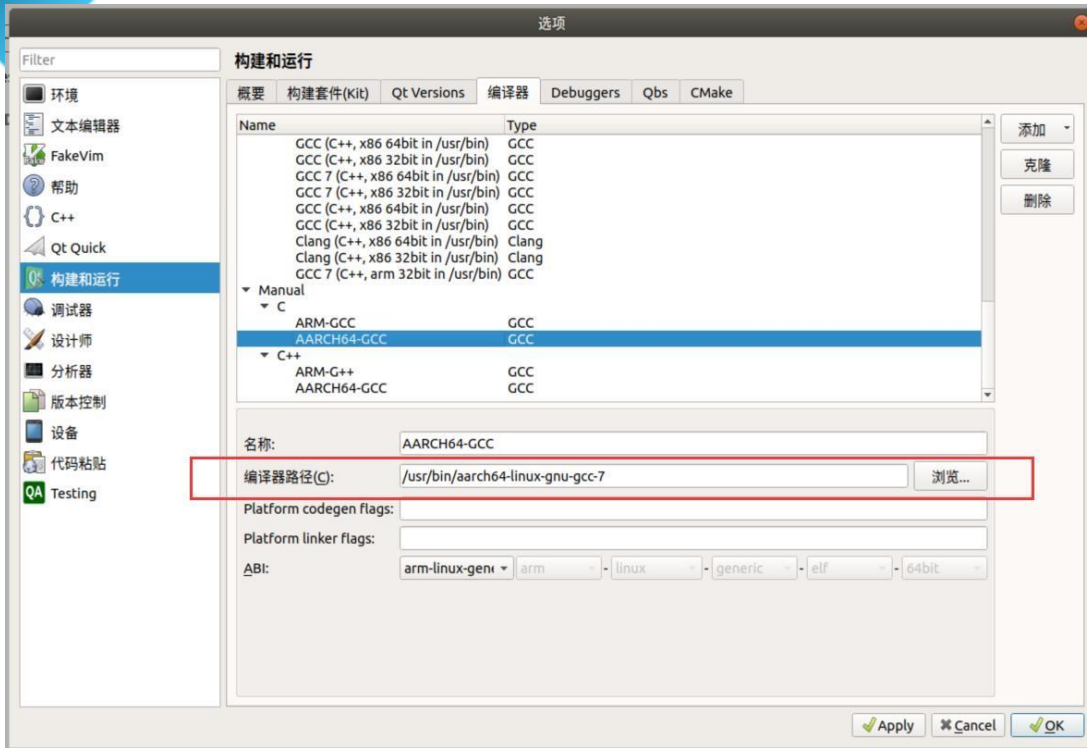
Select compiler->Add->GCC->C Select path to add cross-compile gcc toolchain path.

Select compiler->Add->GCC->C++ Select path, add cross-compile g++ toolchain path.



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### c) Build Suite

Select Build Kit->Add, add compiler toolchain path, QT version path.

