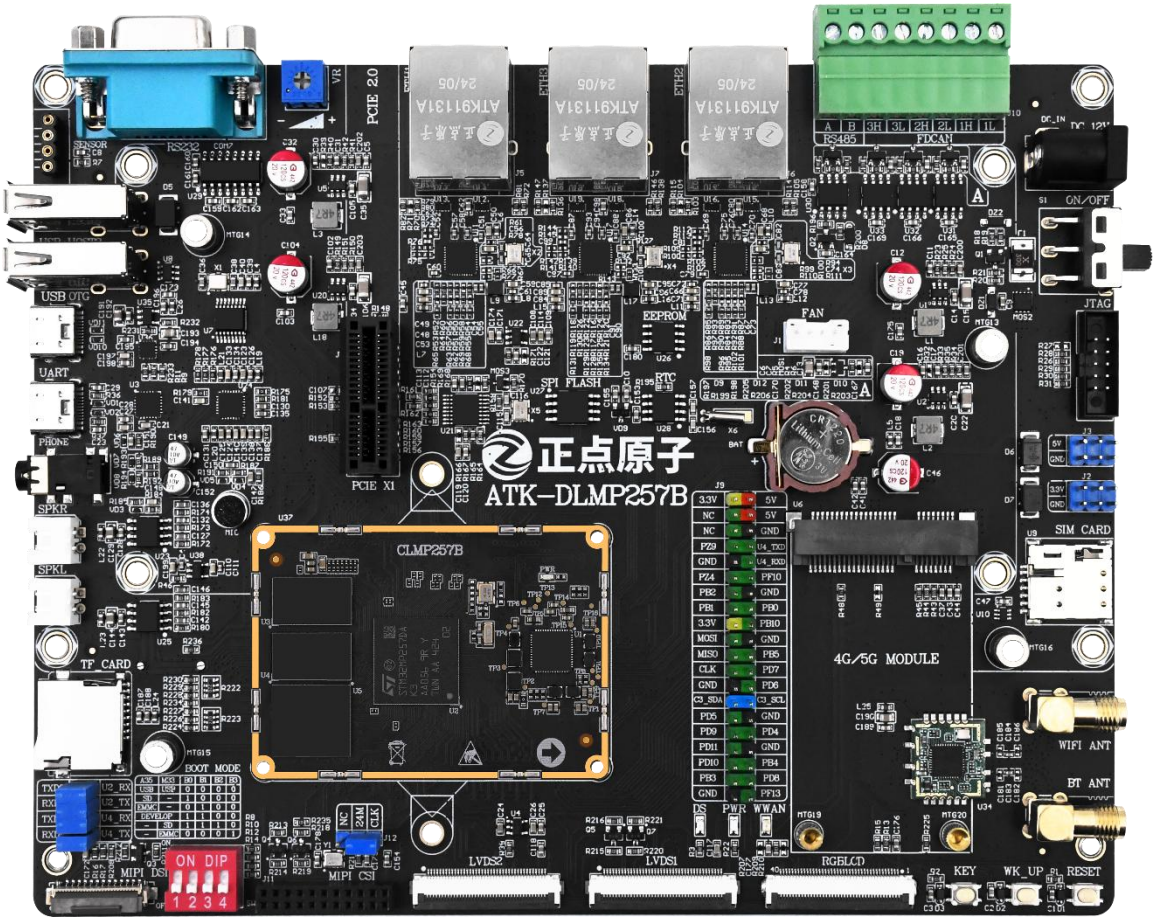
ATK-DLMP257B

Linux Network Environment Setup Manual

V1.0



ALIENTEK

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Disclaimer

The product specifications and instructions mentioned in this document are for reference only and subject to update without prior notice; Unless otherwise agreed, this document is intended as a product guide only, and none of the representations made herein constitutes a warranty of any kind.

In order to get the latest version of product information, please regularly visit the download center or contact the customer service of Taobao ALIENTEK flagship store. Thank you for your tolerance and support.

Revision History:

Version	Version Update Notes	Responsible person	Proofreading	Date
V1.0	release officially	ALIENTEK	ALIENTEK	2025.04.01

Catalogue

Introduction

In order to solve the problem of using the Linux development board network for the users of ALIENTEK, ALIENTEK has written this network environment building manual. Since the launch of the first Alpha Linux development board (pre-sale amount of 500W) in 2019, we know the problems encountered by users and the problems that need to be solved. After many revisions, we summarize the experience from the reply to the forum of the ALIENTEK, and write this tutorial, which is original by the ALIENTEK Linux team. If there are similar tutorials on the market are plagiarize or copy version.

Supporting video, network environment to build the basic concept of the supporting reference video has been recorded, all the ALIENTEK Linux development board can be referenced. Note This document is a copy of the IMX6ULL tutorial.

The video has been uploaded to B station and ALIENTEK Brother platform, please move to watch.

B station: https://www.bilibili.com/video/BV1n541197rk?t=2.3

ALIENTEK platform: https://www.yuanzige.com/course/detail/50096

Chapter 1. Linux network environment

1.1 Environmental Analysis

There are many fans of ALIENTEK, and each user uses different development tools and network environments. Here are some common network environments for your reference. Note that the network environment of some schools, institutions and companies with good confidentiality may not be completed in accordance with the document due to force majeure factors.

1.1.1 Development tools

First look at the basic equipment and tools we use: computers (computers), development boards, direct network cable.

These three are the most basic tools in this document. The computer here refers to the Windows system computer host we use and the Ubuntu system virtual machine, the Ubuntu system computer host. The Apple computer is not explained here.

In addition to these three basic devices, some users may also use routers, switches, USB to network port expansion cable, USB to WIFI interface and other tools, encounter specific circumstances specific analysis.

There is a difference between a router and a switch. If the switch is used, the IP generated by the access network line is in the same network segment as the IP of the original broadband. If the router is used and the broadband is connected to the WLAN port, the network cable of the development board and the network cable of the computer are connected to the LAN port, the network segment of the development board and the network segment of the computer are in the same network segment, but it is not in the same network segment with the broadband. That is, the router will generate a new network segment for the development board and computer to use.

The use of specific tools is in the following corresponding network topologies.

1.1.2 Network topology

According to Baidu Baike, Network Topology refers to the physical layout of various devices interconnected by transmission media. Refers to a specific physical, i.e., real, or logical, i.e., virtual arrangement among the members of a network. The understanding of this document is the development board and computer LAN combination form.

Various devices refer to computer hosts, virtual machines, development boards, routers/switches, etc.

The transmission medium refers to the straight-through network cable, WIFI, etc.

1.1.3 Ubuntu Common Network Tools Installation

Ubuntu18 + default does not support ifconfig instructions to view network information.

Update the software in Ubuntu by running the following commands.

```
sudo apt update
```

To install net-tools, run the following command.

```
sudo apt install net-tools
```

1.1.4 Same network segment

Same network segment: This document uses class C IP, IP address range 192.0.0.0-223.255.255.255. Class C IP The first three numbers denote different networks, and the last number denotes different hosts in the same network segment. For example, 192.168.10.0 and 192.168.18.0 are different networks (e.g., LAN and wireless network), and 192.168.10.50 and 192.168.10.100 are on the same network segment (both on the LAN). Only hosts in the same network segment can ping.

1.1.5 ping Testing concepts

ping: ping is a network diagnostic tool with the format:

ping IP address

Here are three examples of successful ping tests used in this document:

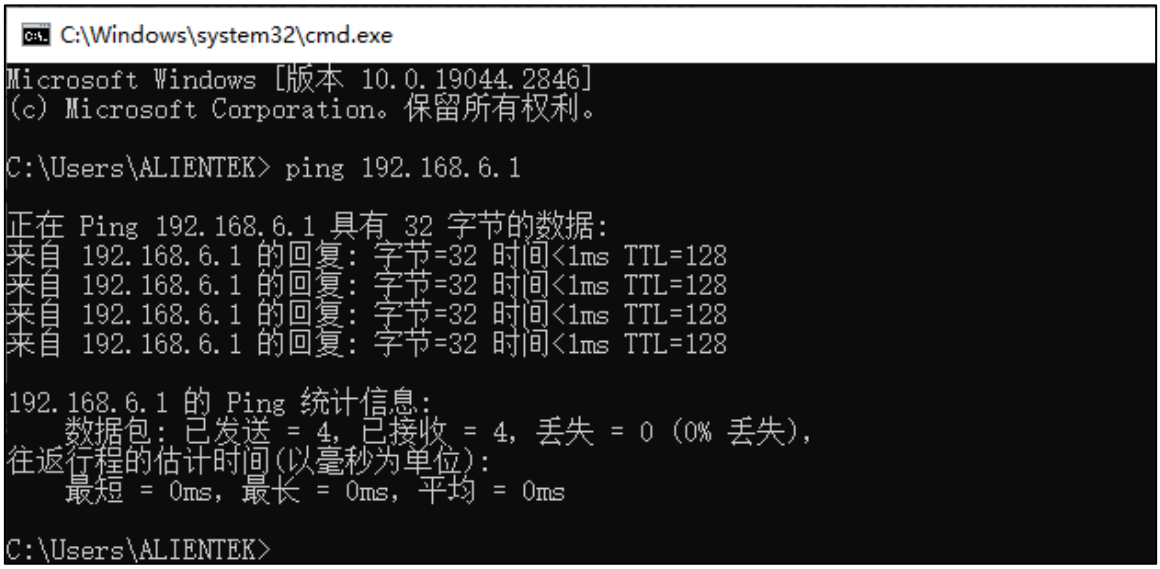

Figure 1.1-1 Windows command terminal ping example

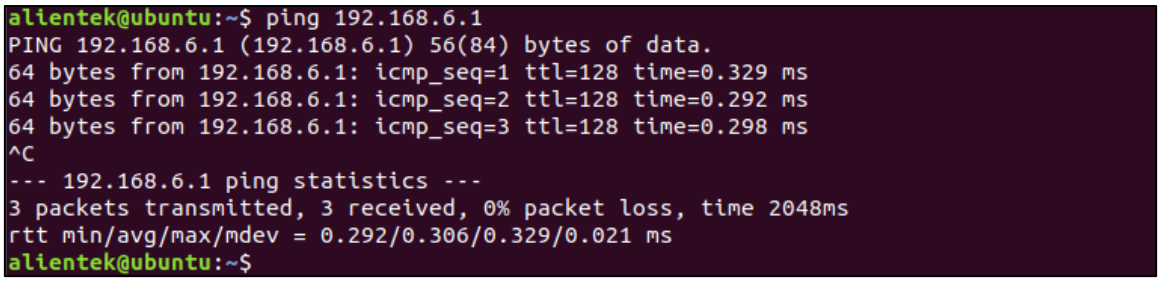

Figure 1.1-2 Example of Ubuntu terminal ping

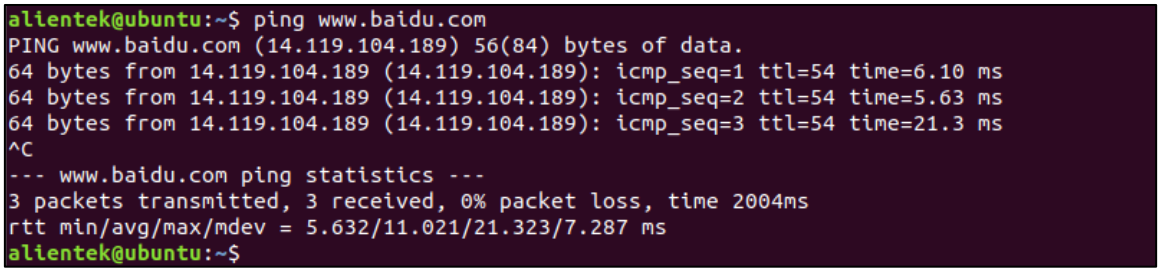

Figure 1.1-3 Example ping website

Here are some common ping failures: If you ping an invalid address, ping keeps blocking and has no data to reply to. If you ping a Destination on the same local network that doesn't have a Destination Host Unreachable, the ping will print a "destination host unreachable."

```
alientek@ubuntu:~$ ping 192.168.6.111
PING 192.168.6.111 (192.168.6.111) 56(84) bytes of data.
From 192.168.6.179 icmp_seq=1 Destination Host Unreachable
From 192.168.6.179 icmp_seq=5 Destination Host Unreachable
From 192.168.6.179 icmp_seq=8 Destination Host Unreachable
From 192.168.6.179 icmp_seq=9 Destination Host Unreachable
^C
--- 192.168.6.111 ping statistics ---
10 packets transmitted, 0 received, +4 errors, 100% packet loss, time 9201ms
pipe 4
alientek@ubuntu:~$
```

Figure 1.1-4 Destination Host Unreachable

This generally does not set the IP on the same network segment. Other ping failures can be analyzed in conjunction with the feedback, see the blog link below.

Ping result of the failure analysis of blog: https://www.cnblogs.com/pinganzi/p/6812281.html

Stop the test by pressing ctrl + Z. If it's not feedback from the example above, the ping test fails and you need to check your network or firewall.

1.1.6 Disable the Firewall for Ubuntu and Windows

Before Ubuntu and Windows can communicate with each other, the firewall needs to be turned off. In the Control Panel \ System and Security \Windows Defender Firewall select Turn off the firewall.

Figure 1.1-5 Open firewall Settings

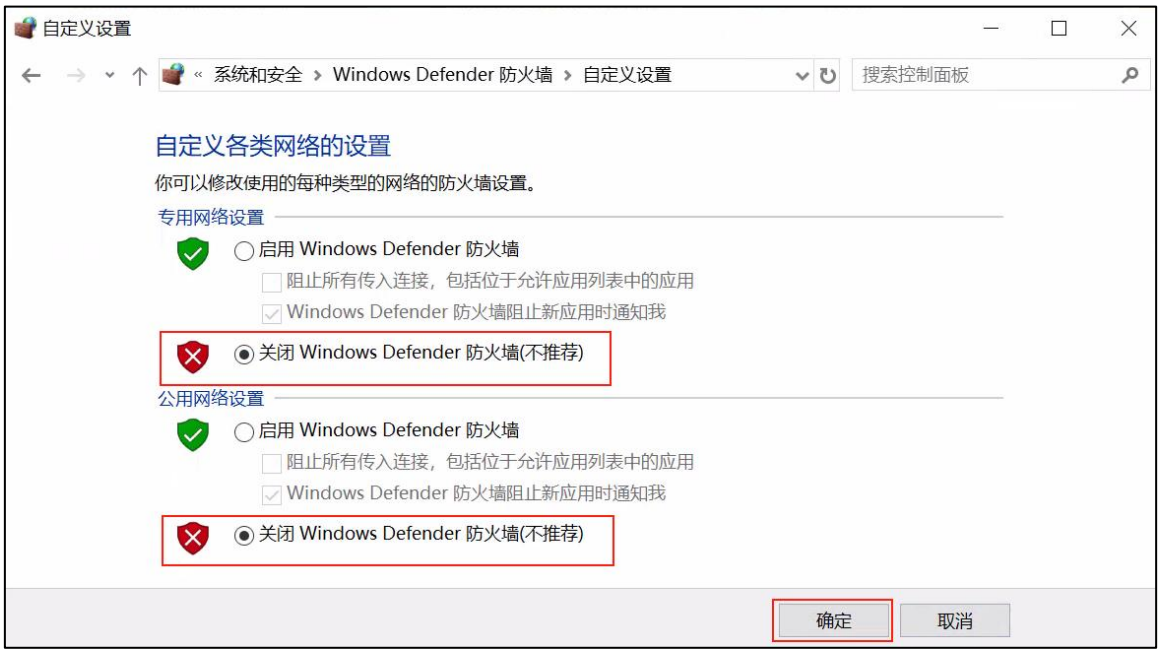

Figure 1.1-6 Turn off Windows Firewall

Open the Ubuntu terminal and turn off the Ubuntu firewall using the following command.

```
sudo ufw disable
```

```
alientek@ubuntu:~$ sudo ufw disable
[sudo] alientek 的密码:
防火墙在系统启动时自动禁用
alientek@ubuntu:~$
```

Figure 1.1-7 Turn off Ubuntu Firewall

1.2 The computer and the development board are directly connected with a router

1.2.1 Preparation

Use case: The computer is close to the router/switch, and there are two network cables. It's easy to set up.

Equipment: computer (Windows), ALIENTEK Linux development board (factory system), router, direct network cable (2).

Network topology: the computer network port is connected to the LAN port of the router through the direct network cable, the development board network port is connected to the LAN port of the router through the direct network cable, and the WAN port of the router is connected to the external broadband, so as to realize the Internet.

The following IP addresses are configured by the author according to his network segment, only for reference. The IP address of the user should be configured according to his network segment.

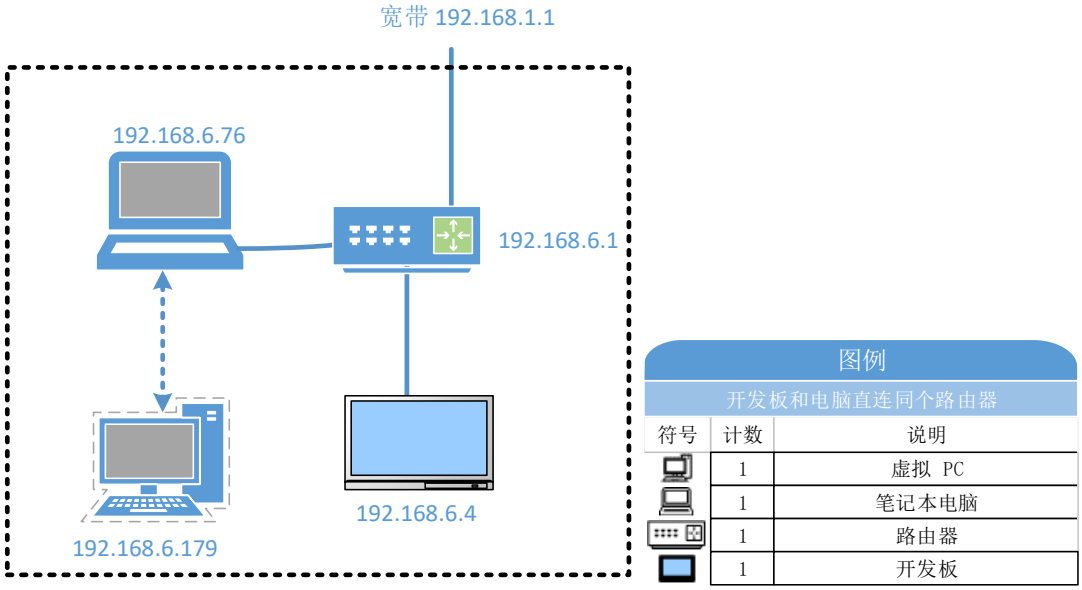

Figure 1.2-1 The development board and the computer are connected with a router

The direct router and the direct switch have the same effect, but the router will have a separate network segment, and the switch will have the same network segment as the broadband allocation. That is, one is the router as the center of the LAN, one is the broadband as the center of the LAN.

1.2.2 VMware Settings

Open Virtual Machine -> Settings in VMware Workstation Pro

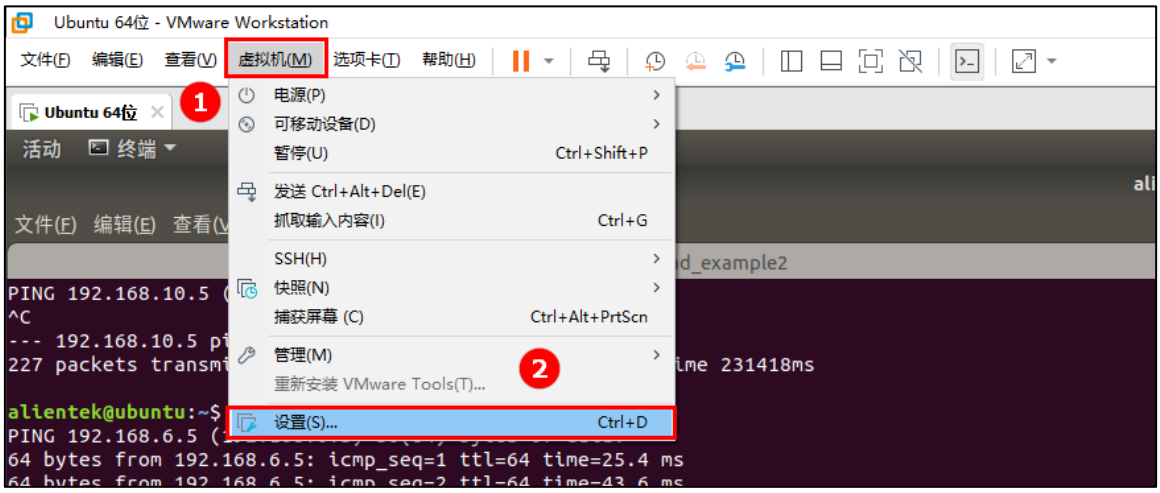

Figure 1.2-2 Open the virtual machine Settings

In the virtual machine Settings, change the network adapter to bridge mode and click OK.

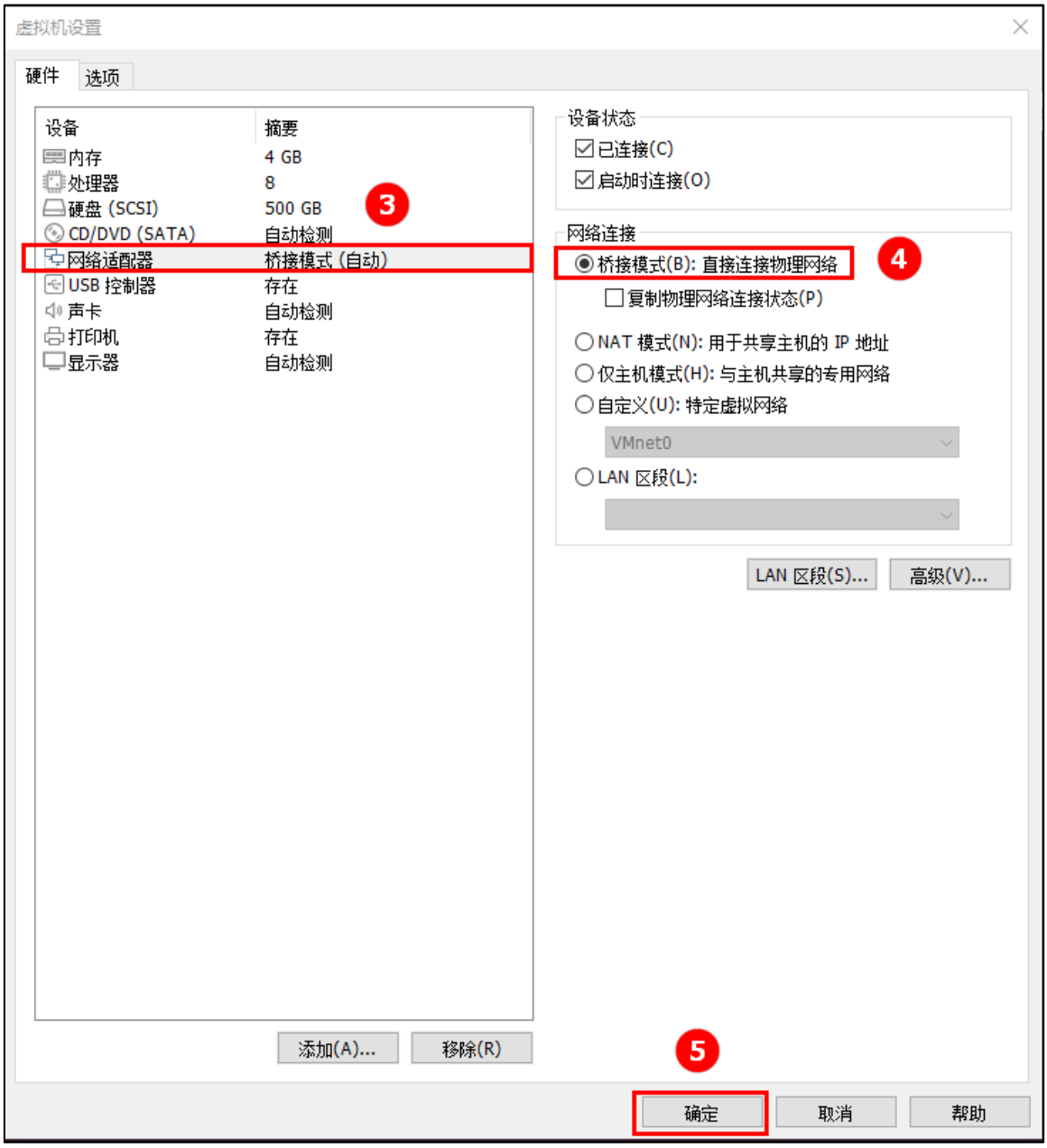

Figure 1.2-3 Modify the network adapter to bridge mode

1.2.3 Checking the Ubuntu virtual machine IP

Open Ubuntu18 system and run ifconfig to see Ubuntu network information. Here you can see that the IP of ens33 on Ubuntu is 192.168.6.179.

```
ifconfig
```

```
alientek@ubuntu:~$ ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.6.179  netmask 255.255.255.0  broadcast 192.168.6.255
        inet6 fe80::ba2f:fad4:b934:f03a  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:cf:1c:b6  txqueuelen 1000  (以太网)
        RX packets 24911  bytes 15651072 (15.6 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 9746  bytes 2798623 (2.7 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (本地环回)
        RX packets 287  bytes 27896 (27.8 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 287  bytes 27896 (27.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

alientek@ubuntu:~$
```

Figure 1.2-4 Check the Ubuntu virtual machine IP

1.2.4 Check the IP of the development board

Connect one end of the direct network cable to the network port of the ALIENTEK Linux development board, and the other end to the LAN network port of the router. Start the development board, and input the ifconfig command in the serial port terminal to query the development board to obtain the IP assigned by the router. Here you can see that the development board IP is 192.168.6.4. Note: eth0 and eth1 indicate that the development board has two network ports, if there is only one eth0, there is only one network port, and so on.

ifconfig

```
[root@正点原子Linux开发板 /]#ifconfig
eth0      Link encap:Ethernet  HWaddr 88:EE:0F:71:2A:C7
          inet addr:192.168.6.4  Bcast:192.168.6.255  Mask:255.255.255.0
          inet6 addr: fe80::783c:448b:c4b5:691b/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:55 errors:0 dropped:0 overruns:0 frame:0
          TX packets:31 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:12439 (12.1 KiB)  TX bytes:3434 (3.3 KiB)
          Interrupt:46 Base address:0xc000

eth1      Link encap:Ethernet  HWaddr 88:EB:E7:04:D6:84
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:55 Base address:0x2000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:52 errors:0 dropped:0 overruns:0 frame:0
          TX packets:52 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:4013 (3.9 KiB)  TX bytes:4013 (3.9 KiB)

[root@正点原子Linux开发板 /]#
```

Figure 1.2-5 Development board IP

1.2.5 Checking the Windows host IP

On the Windows side, press win + R shortcut key to open the running bar, enter the cmd command and press Enter.

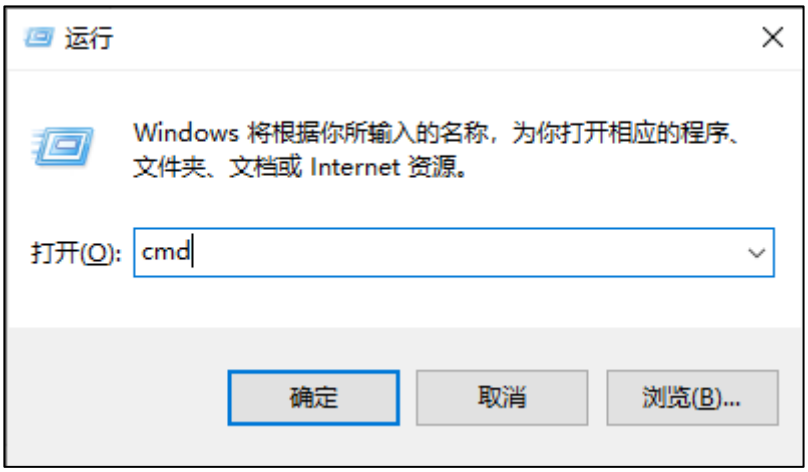

Figure 1.2-6 Execute the cmd command

Enter the ipconfig command into the terminal that opens to see the IP address of your computer.

```
ipconfig
```

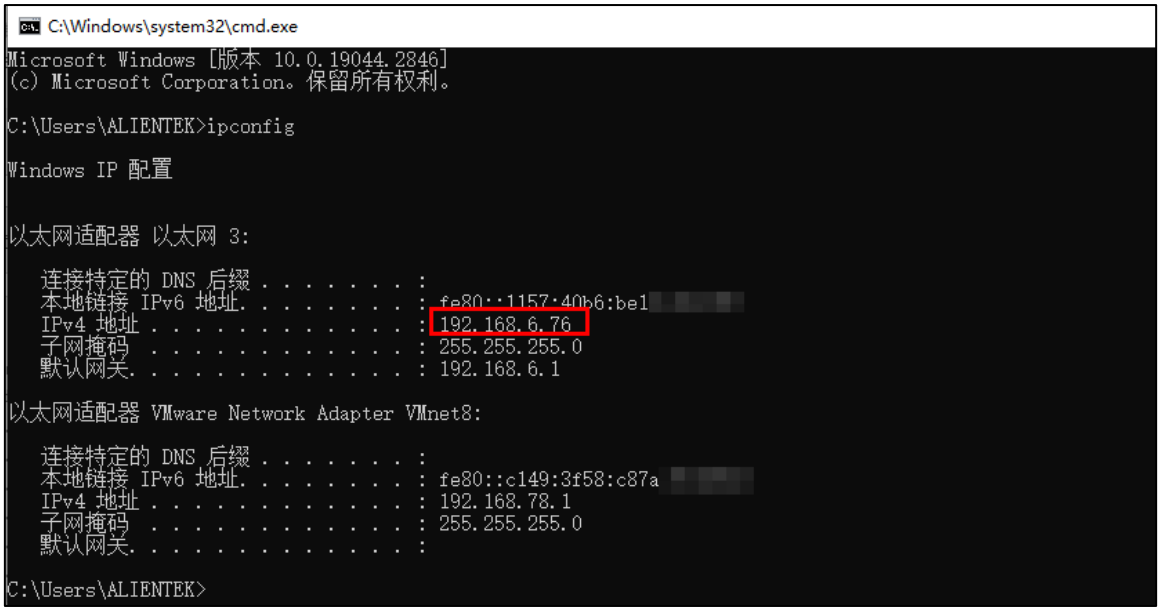

Figure 1.2-7 Check the Windows host IP

1.2.6 The ping test

Disable Windows and Ubuntu firewalls before ping.

Synthesizing the above, here the author's IP is as follows.

Windows host IP: 192.168.6.76

Ubuntu virtual machine IP: 192.168.6.179

Linux development board IP: 192.168.6.4

Test development board and Ubuntu, Windows ping.

Dev board ping virtual machine Ubuntu IP:

```
ping 192.168.6.179
```

```
[root@正点原子Linux开发板 /]#ping 192.168.6.179
PING 192.168.6.179 (192.168.6.179): 56 data bytes
64 bytes from 192.168.6.179: seq=0 ttl=64 time=1.256 ms
64 bytes from 192.168.6.179: seq=1 ttl=64 time=0.760 ms
64 bytes from 192.168.6.179: seq=2 ttl=64 time=0.686 ms
64 bytes from 192.168.6.179: seq=3 ttl=64 time=0.648 ms
^C
--- 192.168.6.179 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 0.648/0.837/1.256 ms
[root@正点原子Linux开发板 /]#
```

Figure 1.2-8 Development board ping virtual machine

Linux development board ping external network.

ping www.baidu.com

```
[root@正点原子Linux开发板 /]#ping www.baidu.com
PING www.baidu.com (14.215.177.39): 56 data bytes
64 bytes from 14.215.177.39: seq=0 ttl=54 time=5.639 ms
64 bytes from 14.215.177.39: seq=1 ttl=54 time=5.291 ms
64 bytes from 14.215.177.39: seq=2 ttl=54 time=5.476 ms
64 bytes from 14.215.177.39: seq=3 ttl=54 time=5.723 ms
^C
--- www.baidu.com ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 5.291/5.532/5.723 ms
[root@正点原子Linux开发板 /]#
```

Figure 1.2-9 Linux development board ping external network

Linux development board ping host Windows.

ping 192.168.6.76

```
[root@正点原子Linux开发板 /]#ping 192.168.6.76
PING 192.168.6.76 (192.168.6.76): 56 data bytes
64 bytes from 192.168.6.76: seq=0 ttl=128 time=1.086 ms
64 bytes from 192.168.6.76: seq=1 ttl=128 time=0.658 ms
64 bytes from 192.168.6.76: seq=2 ttl=128 time=0.655 ms
^C
--- 192.168.6.76 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.655/0.799/1.086 ms
[root@正点原子Linux开发板 /]#
```

Figure 1.2-10 Linux development board ping host Windows

Ubuntu virtual machine ping development board IP

ping 192.168.6.4

```
alientek@ubuntu:~$ ping 192.168.6.4
PING 192.168.6.4 (192.168.6.4) 56(84) bytes of data.
64 bytes from 192.168.6.4: icmp_seq=1 ttl=64 time=1.08 ms
64 bytes from 192.168.6.4: icmp_seq=2 ttl=64 time=0.611 ms
64 bytes from 192.168.6.4: icmp_seq=3 ttl=64 time=0.538 ms
^C
--- 192.168.6.4 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2020ms
rtt min/avg/max/mdev = 0.538/0.745/1.086/0.242 ms
alientek@ubuntu:~$
```

Figure 1.2-11 Virtual machine ping Linux development board

Ubuntu virtual machine ping external network.

ping www.baidu.com

```
alientek@ubuntu:~$ ping www.baidu.com
PING www.baidu.com (14.119.104.189) 56(84) bytes of data.
64 bytes from 14.119.104.189 (14.119.104.189): icmp_seq=1 ttl=54 time=5.59 ms
64 bytes from 14.119.104.189 (14.119.104.189): icmp_seq=2 ttl=54 time=5.71 ms
64 bytes from 14.119.104.189 (14.119.104.189): icmp_seq=3 ttl=54 time=5.70 ms
^C
--- www.baidu.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 5.592/5.672/5.717/0.104 ms
alientek@ubuntu:~$
```

Figure 1.2-12 Ubuntu virtual machine ping external network

Ubuntu virtual machine ping host Windows.

ping 192.168.6.76

```
alientek@ubuntu:~$ ping 192.168.6.76
PING 192.168.6.76 (192.168.6.76) 56(84) bytes of data.
64 bytes from 192.168.6.76: icmp_seq=1 ttl=128 time=0.310 ms
64 bytes from 192.168.6.76: icmp_seq=2 ttl=128 time=0.198 ms
64 bytes from 192.168.6.76: icmp_seq=3 ttl=128 time=0.146 ms
64 bytes from 192.168.6.76: icmp_seq=4 ttl=128 time=0.131 ms
^C
--- 192.168.6.76 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3051ms
rtt min/avg/max/mdev = 0.131/0.196/0.310/0.070 ms
alientek@ubuntu:~$
```

Figure 1.2-13 Ubuntu virtual machine ping host Windows

Windows host ping Linux development board.

ping 192.168.6.4

```
C:\Users\ALIENTEK>ping 192.168.6.4

正在 Ping 192.168.6.4 具有 32 字节的数据:
来自 192.168.6.4 的回复: 字节=32 时间<1ms TTL=64
来自 192.168.6.4 的回复: 字节=32 时间<1ms TTL=64
来自 192.168.6.4 的回复: 字节=32 时间<1ms TTL=64
来自 192.168.6.4 的回复: 字节=32 时间<1ms TTL=64

192.168.6.4 的 Ping 统计信息:
    数据包: 已发送 = 4, 已接收 = 4, 丢失 = 0 (0% 丢失),
往返行程的估计时间(以毫秒为单位):
    最短 = 0ms, 最长 = 0ms, 平均 = 0ms

C:\Users\ALIENTEK>
```

Figure 1.2-14 Windows host Linuxping development board

Windows host ping virtual machine Ubuntu.

ping 192.168.3.11

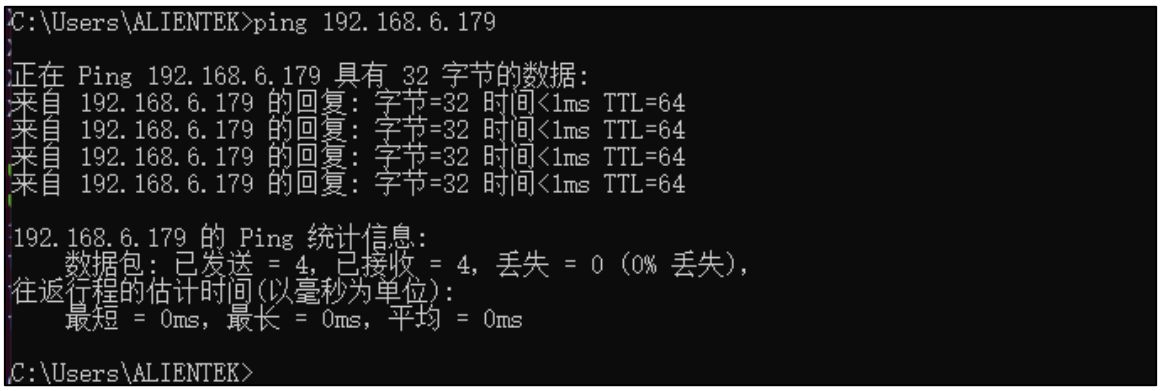

Figure 1.2-15 Windows host ping virtual machine Ubuntu

The above is the mutual ping test of the development board, Ubuntu and Windows. After setting the IP related information of the development board in the uboot phase of the development board, the virtual machine Ubuntu can also be ping.

1.2.7 Summary

Firewall Settings: Turn off the firewall of the computer and virtual machine.

Network connection: the development board network port and the computer network port are directly connected to the same router through the network cable.

VMware Settings: Set the network adapter bridge mode, and the virtual network editor restores the default Settings.

Ubuntu Settings: Set the network connection mode to Automatic (DHCP).

Windows Settings: Set Ethernet TCP/IPv4 property to automatically obtain IP address.

Development board Settings: the ALIENTEK Linux factory system will automatically obtain IP by default, if you use your own system without this function, you can execute the following instructions to obtain IP.

```
ifconfig eth0 up # Open the network
udhcpc -i eth0
```

Note: There is no feedback on the Ubuntu virtual machine ping board during the uboot phase. Once the tests have been completed as described above, the kernel, device tree, and filesystem can be mounted using TFTP and NFS.

1.3 The computer and the development board are directly connected with a switch

1.3.1 Preparation

Use case: broadband can be directly connected to the switch, with two network cables, no router, no WiFi or wireless network card.

Equipment: computer (Windows), ALIENTEK Linux development board (factory system), switch, direct network cable (2).

Network topology: the computer network port is connected to the LAN port of the router/switch through the straight-through network cable, the development board network port is connected to the LAN port of the switch through the straight-through network cable, and the WAN port of the switch is connected to the external broadband, so as to realize the Internet.

The following IP addresses are configured by the author according to his network segment, only for reference. The IP address of the user should be configured according to his network segment.

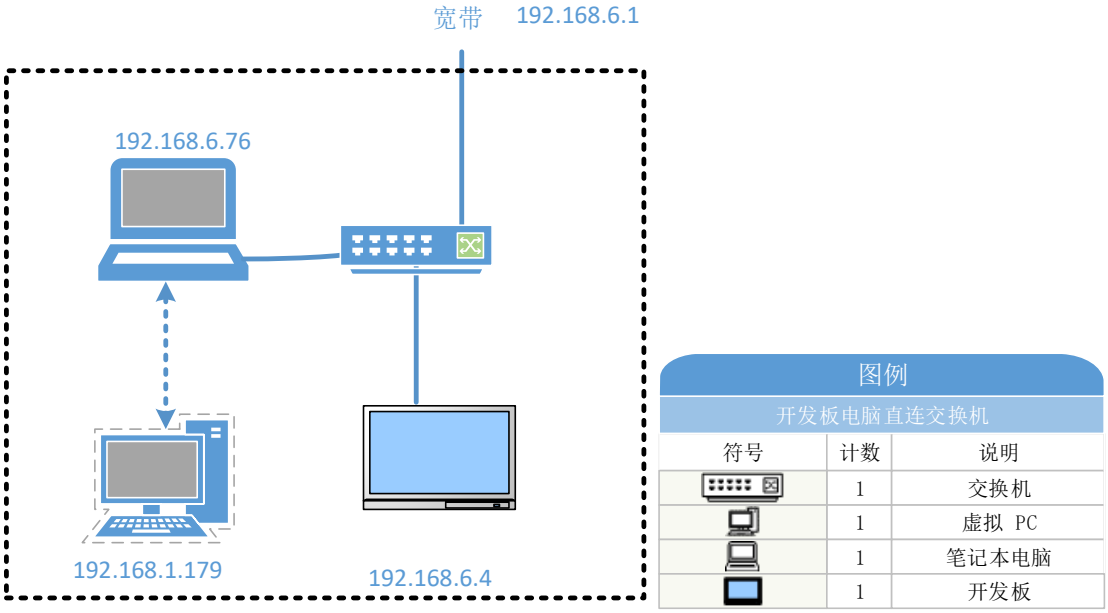

Figure 1.3-1 The computer and the development board are connected directly with a switch

The direct router and the direct switch have the same effect, but the router will have a separate network segment, and the switch will have the same network segment as the broadband allocation. That is, one is the router as the center of the LAN, one is the broadband as the center of the LAN.

For Windows, Ubuntu virtual machine and Linux development board, please refer to Section 1.2 for mutual ping test.

1.3.2 Summary

Firewall Settings: Turn off the firewall of the computer and virtual machine.

Network connection: the development board network port and the computer network port are directly connected to the same router through the network cable.

VMware Settings: Set the network adapter bridge mode, and the virtual network editor restores the default Settings.

Ubuntu Settings: Set the network connection mode to Automatic (DHCP).

Windows Settings: Set Ethernet TCP/IPv4 property to automatically obtain IP address.

Development board Settings: the factory system will automatically obtain IP by default, if you use your own system, without this function, you can execute the following instructions to obtain IP.

```
ifconfig eth0 up # Open the network
udhcpc -i eth0
```

Note: There is no feedback on the Ubuntu virtual machine ping board during the uboot phase. Once the tests have been completed as described above, the kernel, device tree, and filesystem can be mounted using TFTP and NFS.

1.4 The computer is connected to the Internet via WiFi, and the development board is directly connected to the computer

1.4.1 Preparation

Use case: The router/switch is far away from the computer, only one network cable.

Equipment: computer (Windows), ALIENTEK Linux development board (factory system), router/switch, direct network cable. If you don't have a wireless card on your desktop, you can use a portable WIFI to connect your computer to WiFi.

Network topology: The computer uses wireless network card to access the Internet, and the Ethernet port of the computer is directly connected to the network port of the development board.

The following IP addresses are configured by the author according to his network segment, only for reference. The IP address of the user should be configured according to his network segment.

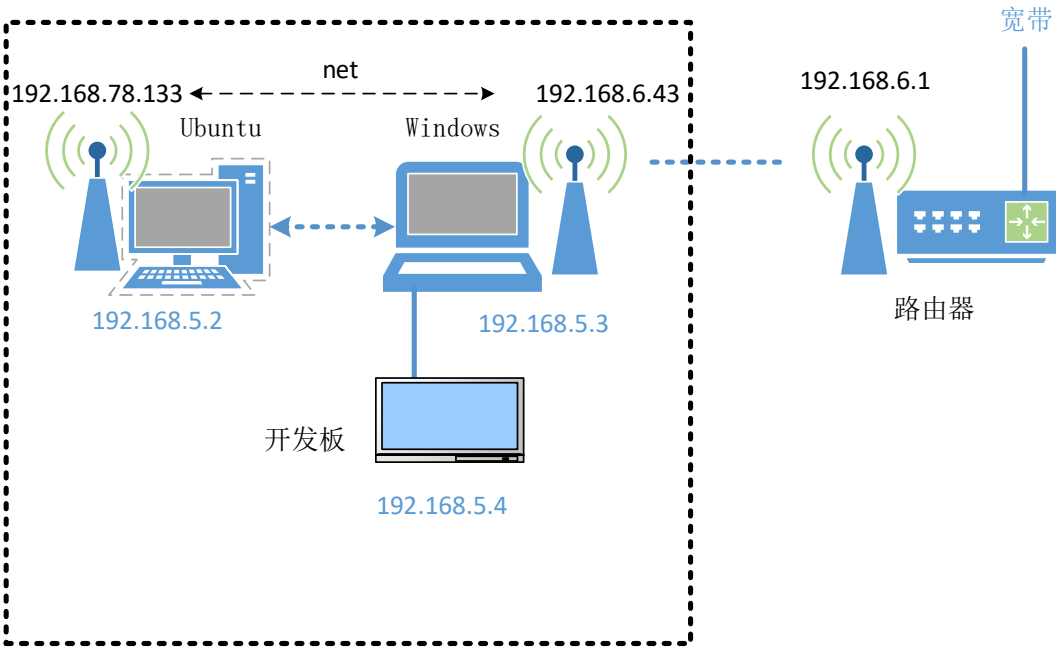

Figure 1.4-1 Computer WiFi access, development board directly connected to the computer

1.4.2 VMware Settings

Open Virtual Machine -> Settings in VMware Workstation Pro

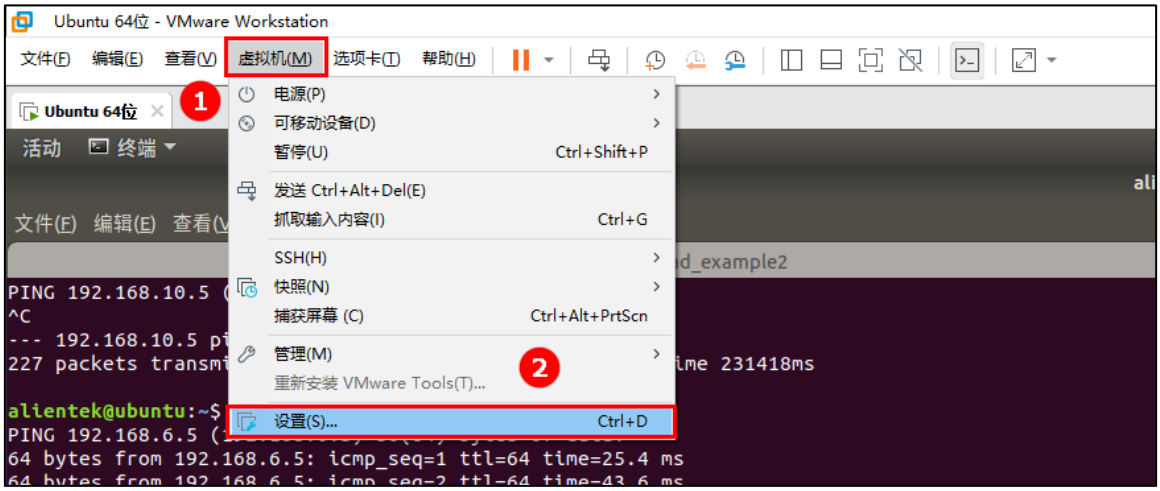

Figure 1.4-2 Open the virtual machine Settings

In the virtual machine Settings, change the network adapter to bridge mode and click OK.

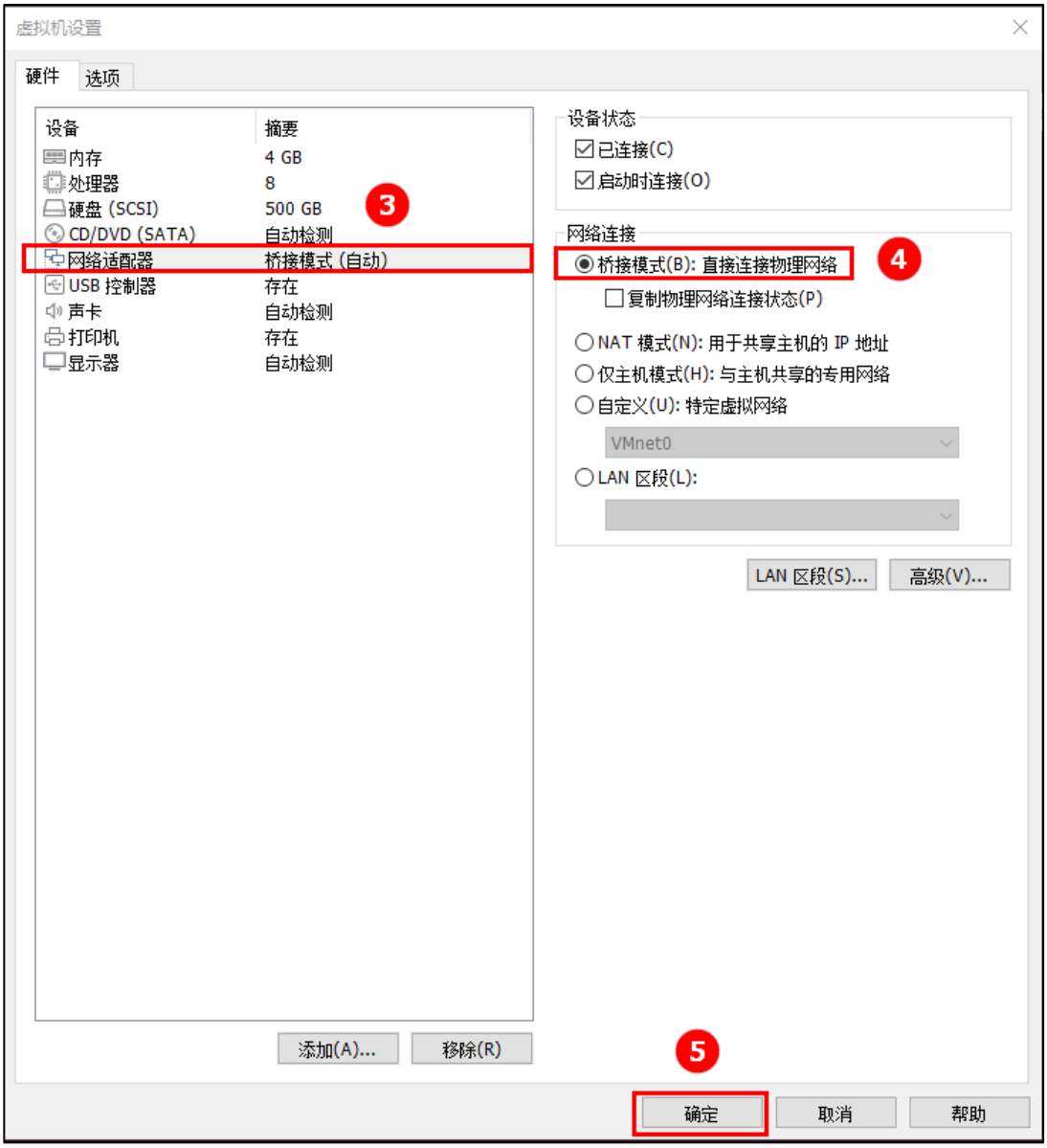

Figure 1.4-3 Modify the network adapter to bridge mode

Since the computer is connected via WiFi, we need to add a network adapter and set it to NAT mode for the virtual machine to connect to the Internet. The specific operation is shown in the following figure.

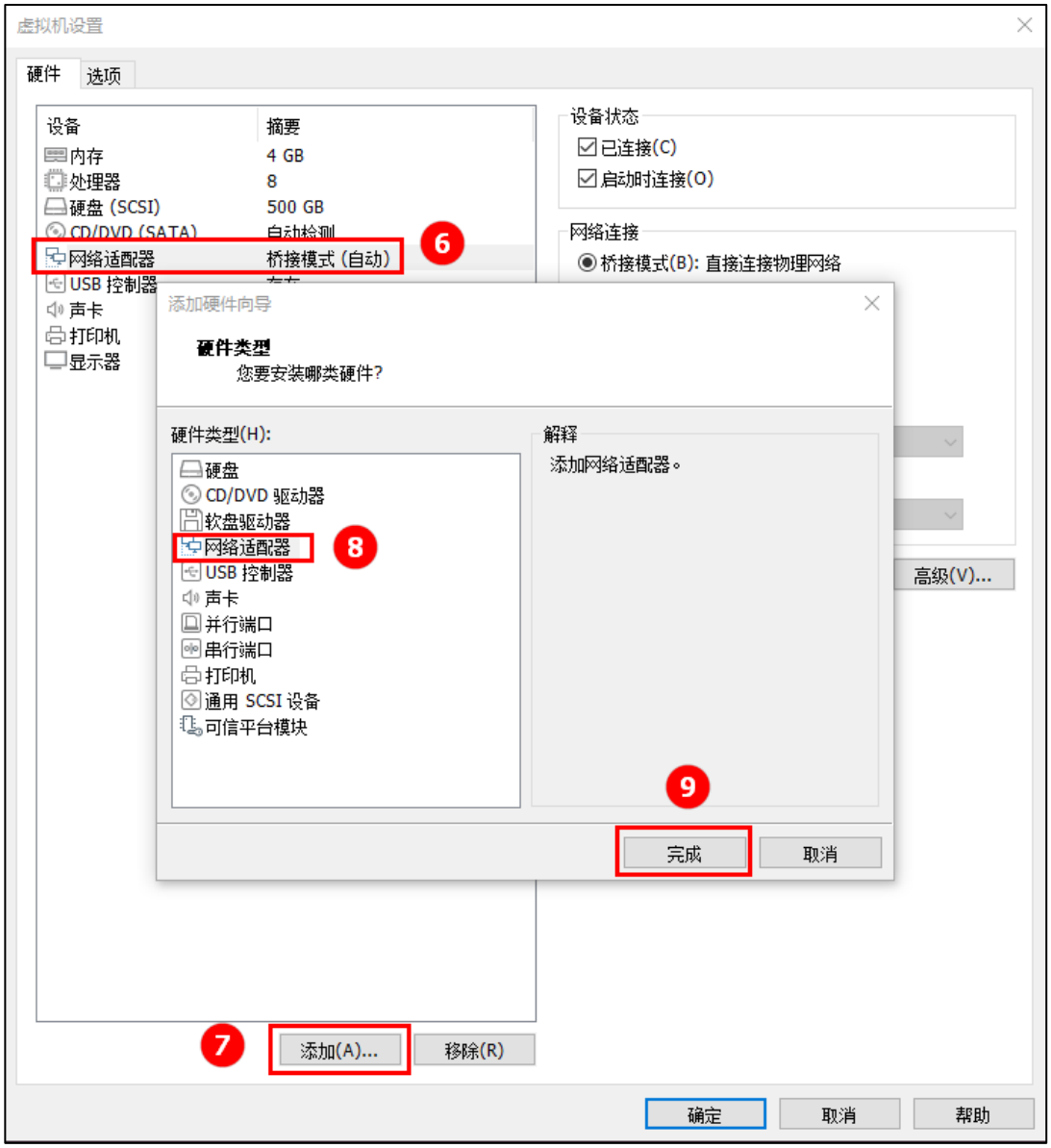

Figure 1.4-4 Adding a network adapter

By default, the network adapter is added in NAT mode, but if it is not, it must be set to NAT mode manually.

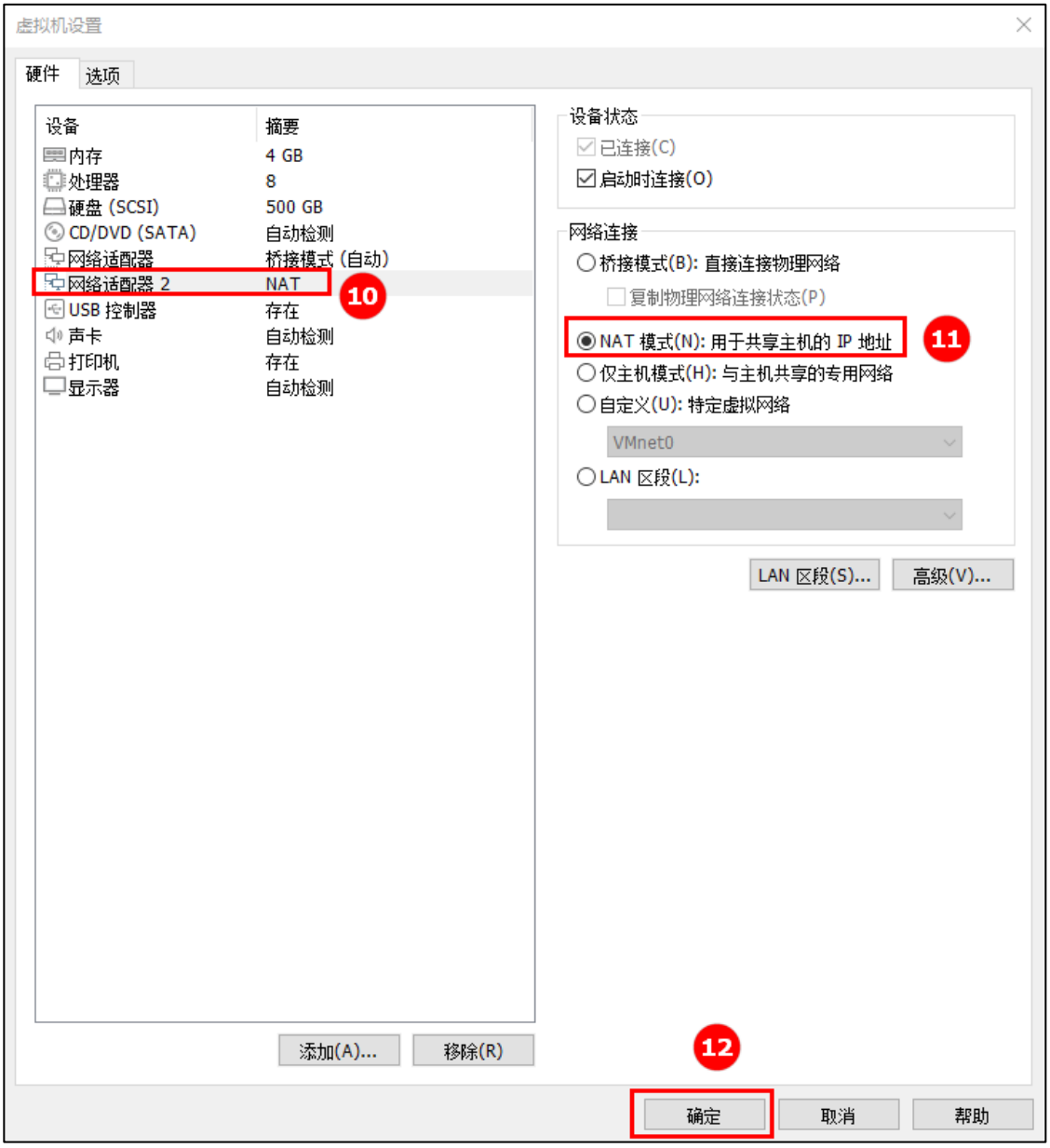

Figure 1.4-5 Set network adapter 2 to NAT mode

Open Edit -> Virtual Network Editor in the menu bar.

Figure 1.4-6 Open the Virtual Network Editor

Click the Change Settings option in the Virtual Network Editor.

Figure 1.4-7 Changing Settings

This requires computer administrator privileges, if there is a prompt prompt for user account control, click yes.

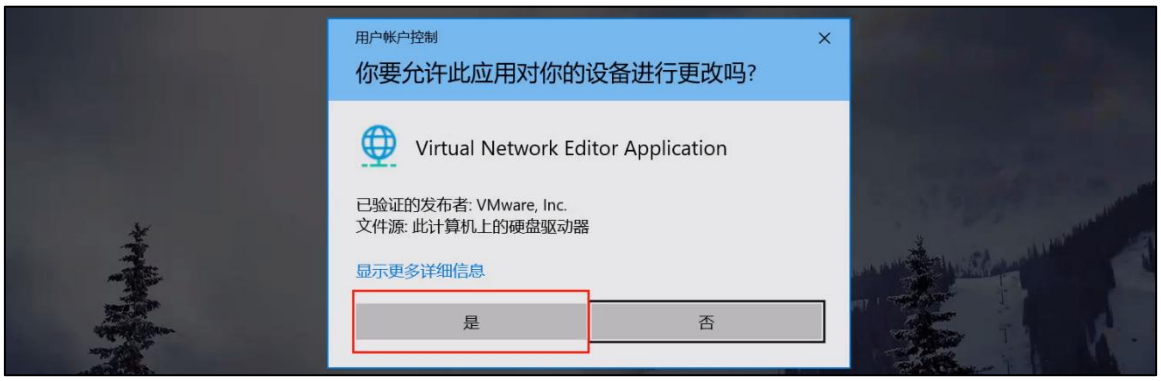

Figure 1.4-8 Give permission to change

Re-open the Virtual Network Editor and see the following screen:

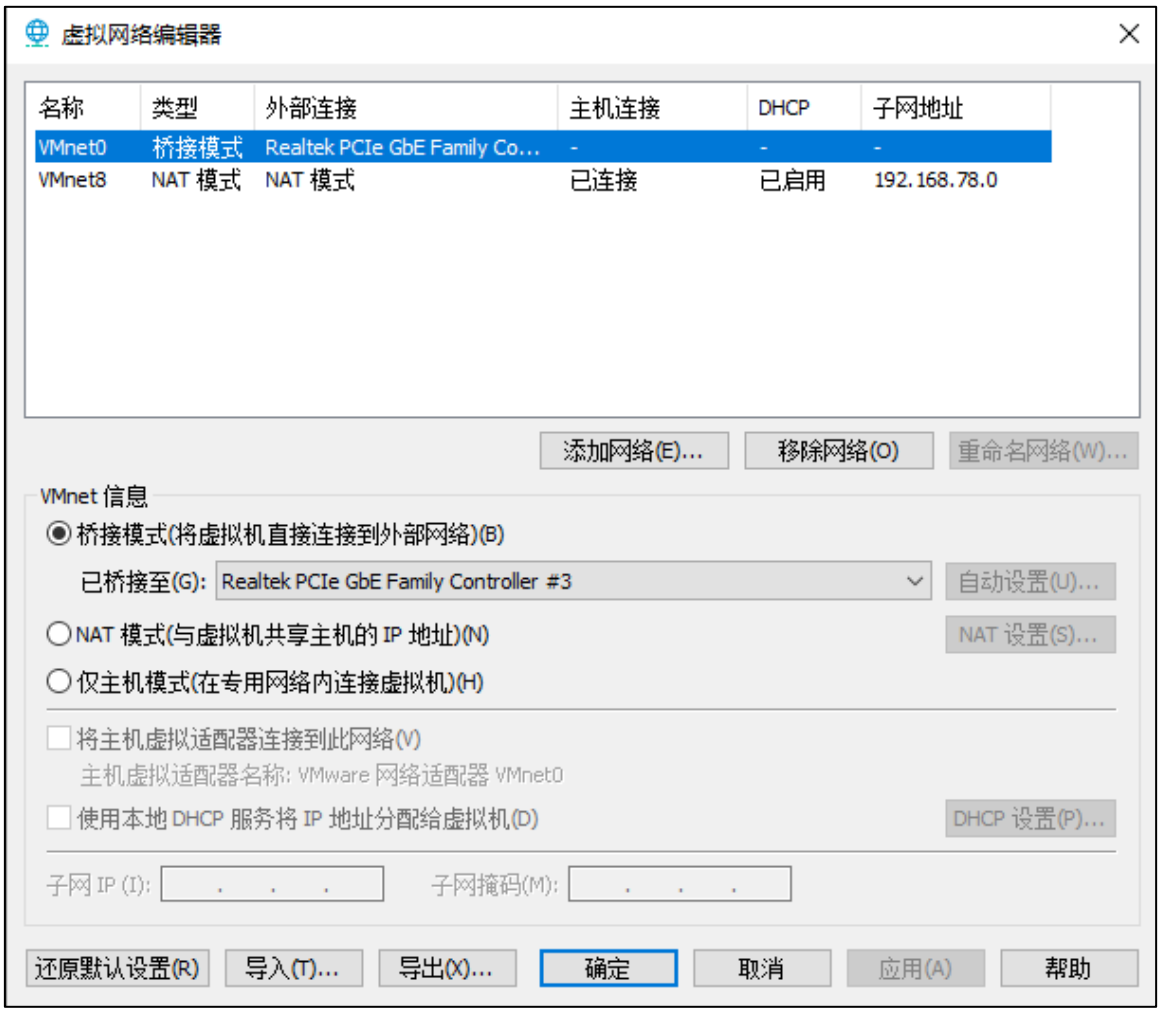

Figure 1.4-9 The virtual network editor interface after giving permissions

The development board is directly connected to the network port of the computer, so the VMnet0 bridge in the virtual network editor is needed to connect to the wired network card, as shown in the following figure. If your computer has more than one network card, you can set up your own bridge to any network card. All network adapters you add, if configured with bridge mode, will be bridged from VMnet0 to the real network, from which they will be assigned ip addresses. In addition, VMnet8 is the virtual network card that the virtual machine runs automatically. If you set a network adapter to be in Net mode, your virtual network will get an ip from this VMnet8.

Figure 1.4-10 Set up network adapter 1 Bridge to wired network card

If the virtual machine has set the related information of the network before, but you are confused, and you are not clear about the setting of the virtual machine network (the virtual network is complex), you can click the bottom left of the virtual network editor to restore the default Settings.

Figure 1.4-11 Restore default Settings

We will be prompted to revert to the default network Settings, so click yes.

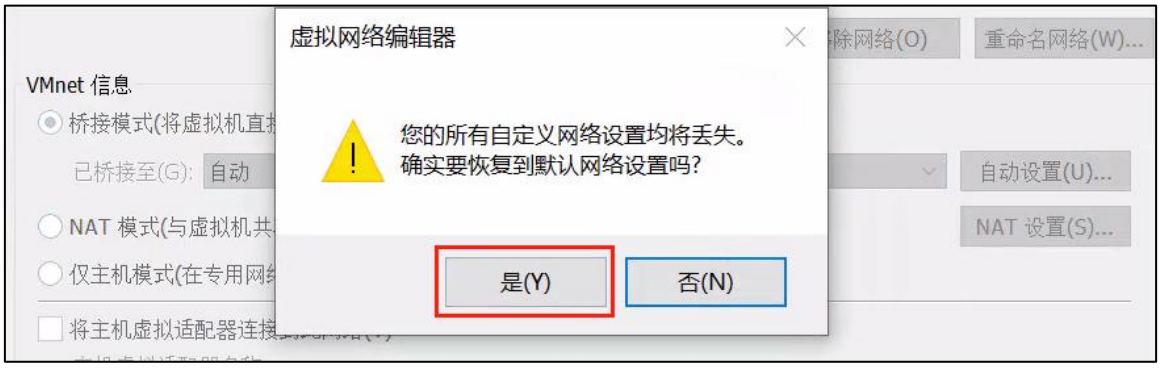

Figure 1.4-12 Confirm that the default network Settings are restored

After reverting to the default network Settings, all VMnet subnet addresses are reassigned randomly as shown in the following figure.

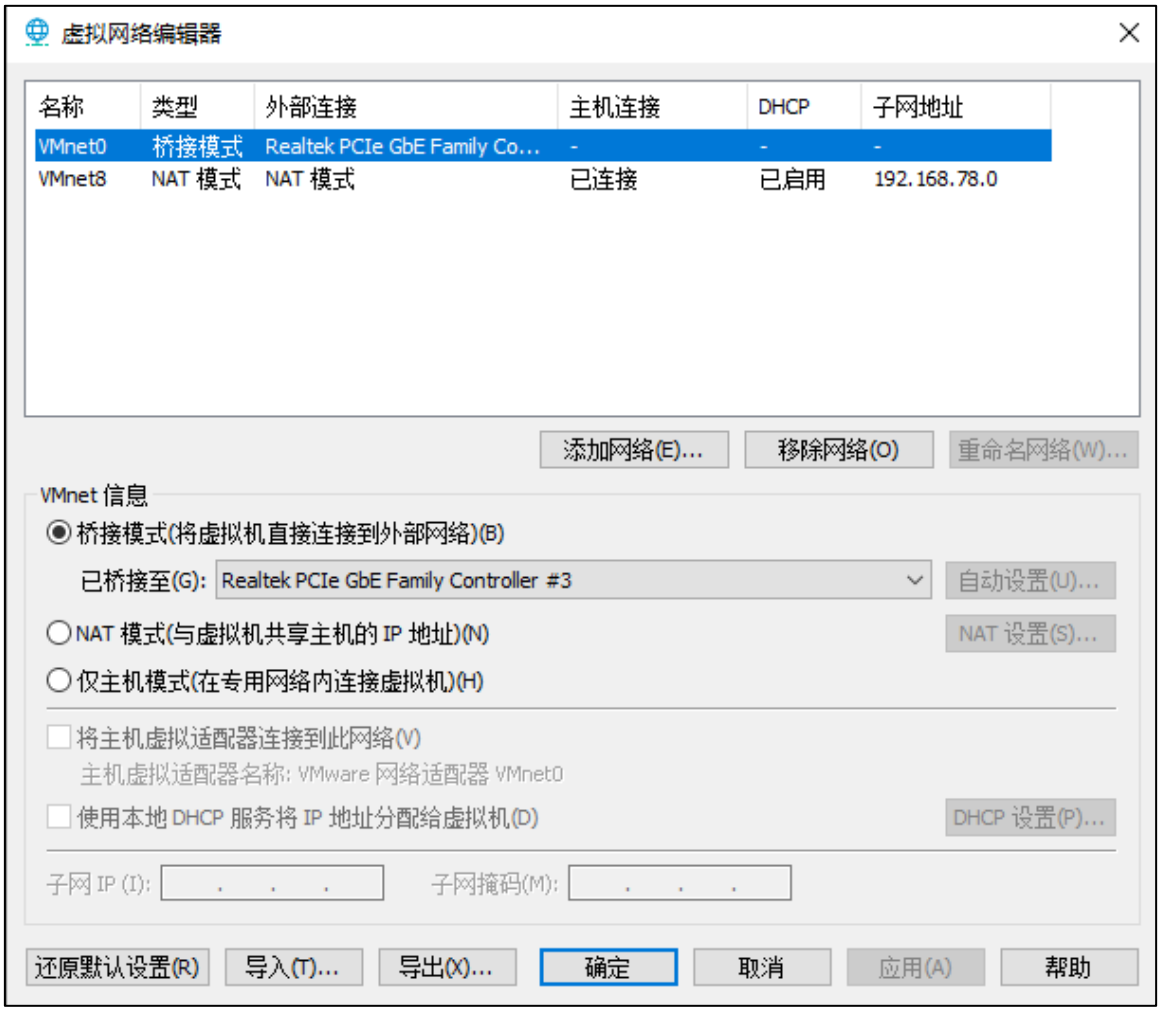

Figure 1.4-13 Revert to the default network Settings

At this point, you can follow the previous steps to set up the network adapter bridge to the wired network adapter, and the final setup is as follows:

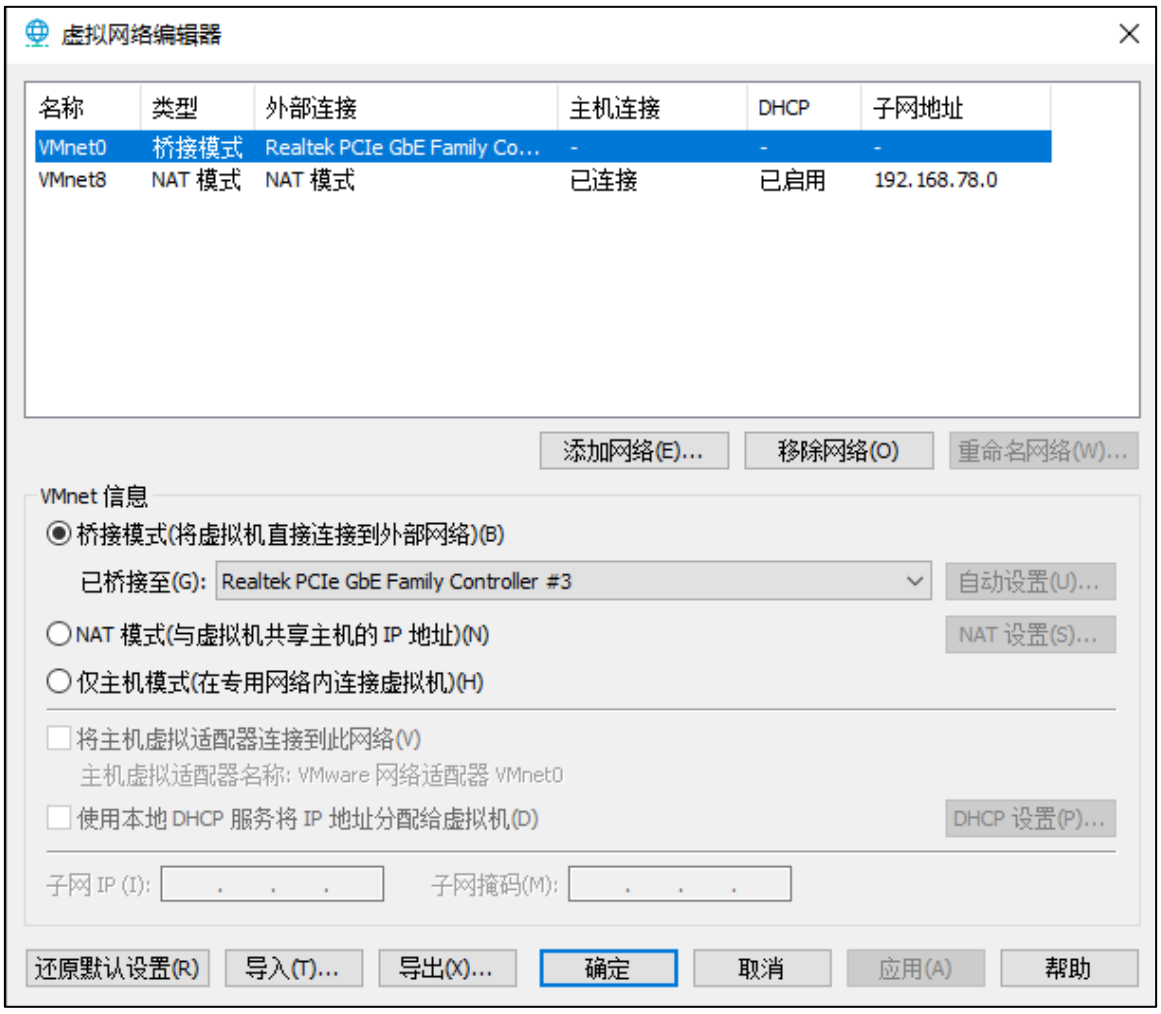

Figure 1.4-14 The virtual machine is bridged to a wired network card

1.4.3 Ubuntu Setting up a Static IP

Start the virtual machine and execute ifconfig instruction to query IP information.

```
ifconfig
```

In the figure below, we can see that 192.168.78.xxx in the ens38 network node is the ip obtained from VMnet8, and ens33 is the network card we bridge. So why is it not assigned to an ip? Only routers, or devices such as VMnet8, are capable of allocating ip. Development board and computer with network cable direct connection is not able to get ip, because they do not enable dhcpd distribution ip services.

```
alientek@ubuntu:~$ ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        ether 00:0c:29:cf:1c:b6  txqueuelen 1000  (以太网)
        RX packets 132  bytes 28027 (28.0 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 97  bytes 19534 (19.5 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ens38: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.78.133  netmask 255.255.255.0  broadcast 192.168.78.255
        inet6 fe80::63e8:be11:4b41:2b80  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:cf:1c:ca  txqueuelen 1000  (以太网)
        RX packets 334  bytes 48539 (48.5 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 217  bytes 25415 (25.4 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (本地环回)
        RX packets 1994  bytes 188631 (188.6 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1994  bytes 188631 (188.6 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

alientek@ubuntu:~$
```

Figure 1.4-15 Ubuntu IP information

The network ens33 is our bridge network, and the IP needs to be set manually. Network ens38 is a virtual machine NAT mode connection to the Windows network, with this network Ubuntu can and Windows normal traffic and Internet access.

First test Ubuntu Internet function, ping Baidu.

```
ping www.baidu.com
```

```
alientek@ubuntu:~$ ping www.baidu.com
PING www.baidu.com (14.119.104.254) 56(84) bytes of data.
64 bytes from 14.119.104.254 (14.119.104.254): icmp_seq=1 ttl=128 time=14.3 ms
64 bytes from 14.119.104.254 (14.119.104.254): icmp_seq=2 ttl=128 time=47.1 ms
64 bytes from 14.119.104.254 (14.119.104.254): icmp_seq=3 ttl=128 time=33.6 ms
64 bytes from 14.119.104.254 (14.119.104.254): icmp_seq=4 ttl=128 time=9.62 ms
^C
--- www.baidu.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 9.621/26.191/47.171/15.079 ms
alientek@ubuntu:~$
```

Figure 1.4-16 Ubuntu Internet Test

All you need to do now is set the IP information for Network adapter 1 (ens33) in bridge mode. Network Adapter 1 is used to communicate with Windows and the development board, so let's first take a look at the IP of the Windows host used to bridge the network.

Check the IP of the Windows host: Press win + R shortcut key on the Windows side to open the running bar, enter the cmd command and press Enter.

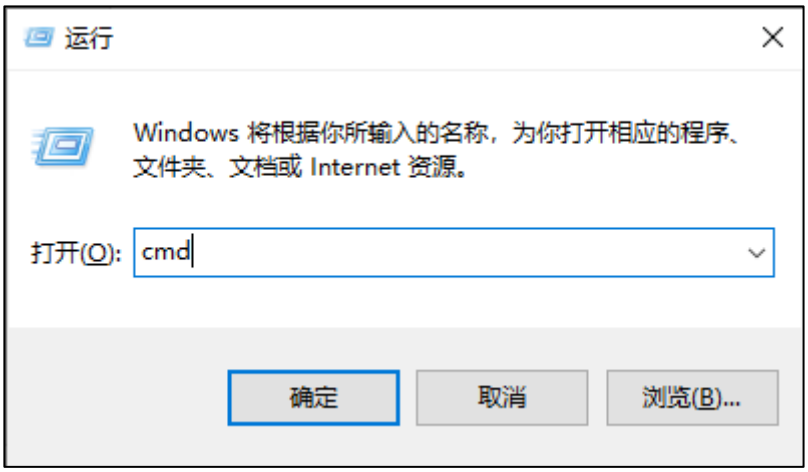

Figure 1.4-17 Execute the cmd command

Enter the ipconfig command into the terminal that opens to see the IP address of your computer.

```
ipconfig
```

```
C:\Users\ALIENTEK>ipconfig

Windows IP 配置


以太网适配器 以太网 3:

   连接特定的 DNS 后缀 . . . . . . . :
   本地链接 IPv6 地址. . . . . . . . : fe80::1157:40b6:be18:31f
   自动配置 IPv4 地址 . . . . . . . : 169.254.149.59
   子网掩码 . . . . . . . . . . . . : 255.255.0.0
   默认网关. . . . . . . . . . . . . :

无线局域网适配器 本地连接* 14:

   媒体状态 . . . . . . . . . . . . : 媒体已断开连接
   连接特定的 DNS 后缀 . . . . . . . :

无线局域网适配器 本地连接* 15:

   媒体状态 . . . . . . . . . . . . : 媒体已断开连接
   连接特定的 DNS 后缀 . . . . . . . :

以太网适配器 VMware Network Adapter VMnet8:

   连接特定的 DNS 后缀 . . . . . . . :
   本地链接 IPv6 地址. . . . . . . . : fe80::c149:3f58:c87a:501
   IPv4 地址 . . . . . . . . . . . . : 192.168.78.1
   子网掩码 . . . . . . . . . . . . : 255.255.255.0
   默认网关. . . . . . . . . . . . . :

无线局域网适配器 WLAN 5:

   连接特定的 DNS 后缀 . . . . . . . :
   本地链接 IPv6 地址. . . . . . . . : fe80::fd4a:eb6a:bef9:9
   IPv4 地址 . . . . . . . . . . . . : 192.168.6.43
   子网掩码 . . . . . . . . . . . . : 255.255.255.0
   默认网关. . . . . . . . . . . . . : 192.168.6.1

C:\Users\ALIENTEK>
```

Figure 1.4-18 View the IP information of the Windows host

As you can see, the network of Windows hosts is quite complex, so here we will only intercept the information we may need. Using Windows' ipconfig command and Ubuntu Virtual Network Editor, this corresponds to the following table:

Network adapter name	IP Address	Remarks
Ethernet adapter Ethernet 3	169.254.149.59	The network card behind the host chassis, because it is

		directly connected to the development board, the dhcp service cannot obtain the ip, so it is assigned a field of ip 169.254.xx.xx that cannot be used.
Ethernet adapter VMware Network Adapter VMnet8	192.168.78.1	DHCP service is provided, which is used to communicate between host and virtual machine, and virtual machine is connected to the Internet
Wireless LAN adapter WLAN5	192.168.6.43	For Windows host Internet access

Table 1.4.3 1 Host IP table

VMnet0 is not visible in the Windows terminal, but it is visible in the Virtual Network Editor. This is the network adapter we will use for bridging, and it does not automatically assign an IP address, so it needs to be set manually. Note that the segment set for VMnet0 must not be the same as the segment set for VMnet1 or VMnet8, otherwise there will be conflicts.

We need to manually set the IP of the bridge network in Ubuntu.

Back in Ubuntu, follow these steps to set up the ens33 IP information:

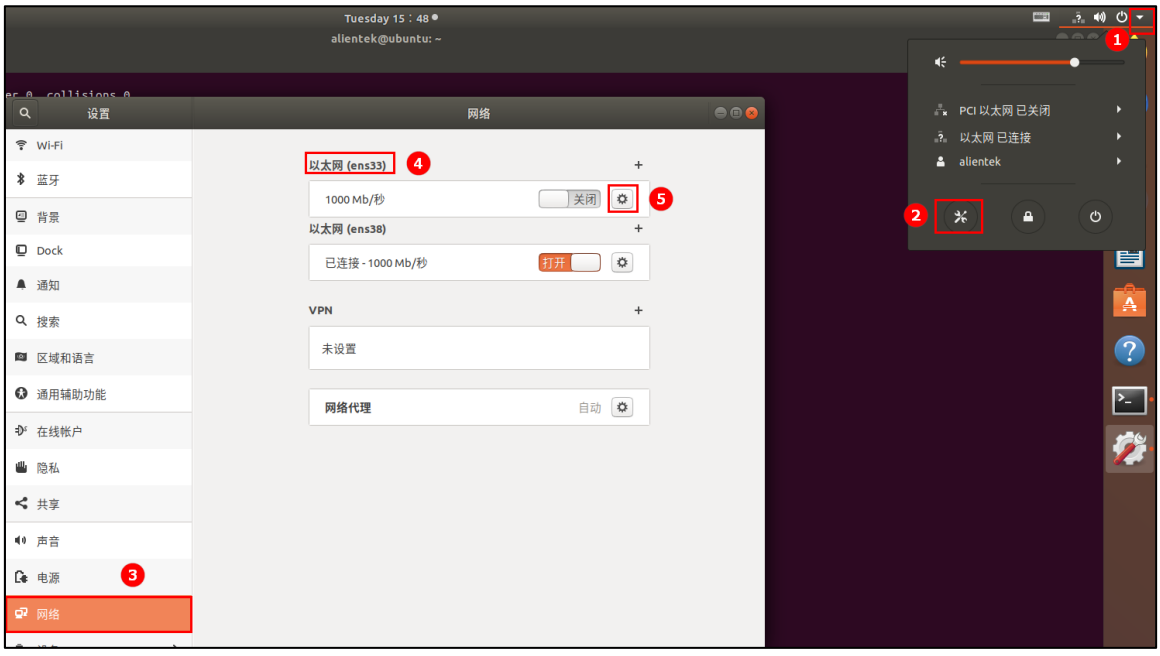

Figure 1.4-19 Open ens33 Settings

Set up a static ip for Ubuntu as shown below. Set the IPv4 address, address can be set at will, but to meet the requirements of the network protocol. If the gateway is 192.168.5.1, then your IP address can range from 192.168.5.2 to 192.168.5.254

Figure 1.4-20 Set the IP information of ens33

Figure 1.4-21 Re-open ens33

Run the ifconfig command in the terminal to see the information of ens33.

```
ifconfig
```

```
alientek@ubuntu:~$ ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.5.2  netmask 255.255.255.0  broadcast 192.168.5.255
        inet6 fe80::ba2f:fad4:b934:f03a  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:cf:1c:b6  txqueuelen 1000  (以太网)
        RX packets 995  bytes 238701 (238.7 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 693  bytes 133951 (133.9 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ens38: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.78.133  netmask 255.255.255.0  broadcast 192.168.78.255
        inet6 fe80::63e8:be11:4b41:2b80  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:cf:1c:ca  txqueuelen 1000  (以太网)
        RX packets 2815  bytes 365386 (365.3 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1521  bytes 168595 (168.5 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (本地环回)
        RX packets 4212  bytes 365767 (365.7 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 4212  bytes 365767 (365.7 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

alientek@ubuntu:~$
```

Figure 1.4-22 ens33 has updated its IP

1.4.4 Windows IP Setup

We also need to set a static ip for Windows.

In Windows host, open Control Panel -> Network and Internet -> Network and Sharing Center -> Change Adapter Settings and find Ethernet.

Figure 1.4-23 Changing adapter Settings

At this time, the Ethernet shows the unrecognized network, and we need to manually set the IP information. If the Ethernet display network cable is pulled out, please connect the network port of the computer and the network port of the development board with the network cable, and the development board is powered on to start the system.

Select Ethernet, right-click to open the menu bar, and select Properties. In the Network Settings that open, double-click Internet Protocol version 4 (TCP/IPv4), as shown below. Set the IP of Ethernet to 192.168.5.3 according to the figure below, which should be on the same network segment as ens33 of the virtual machine.

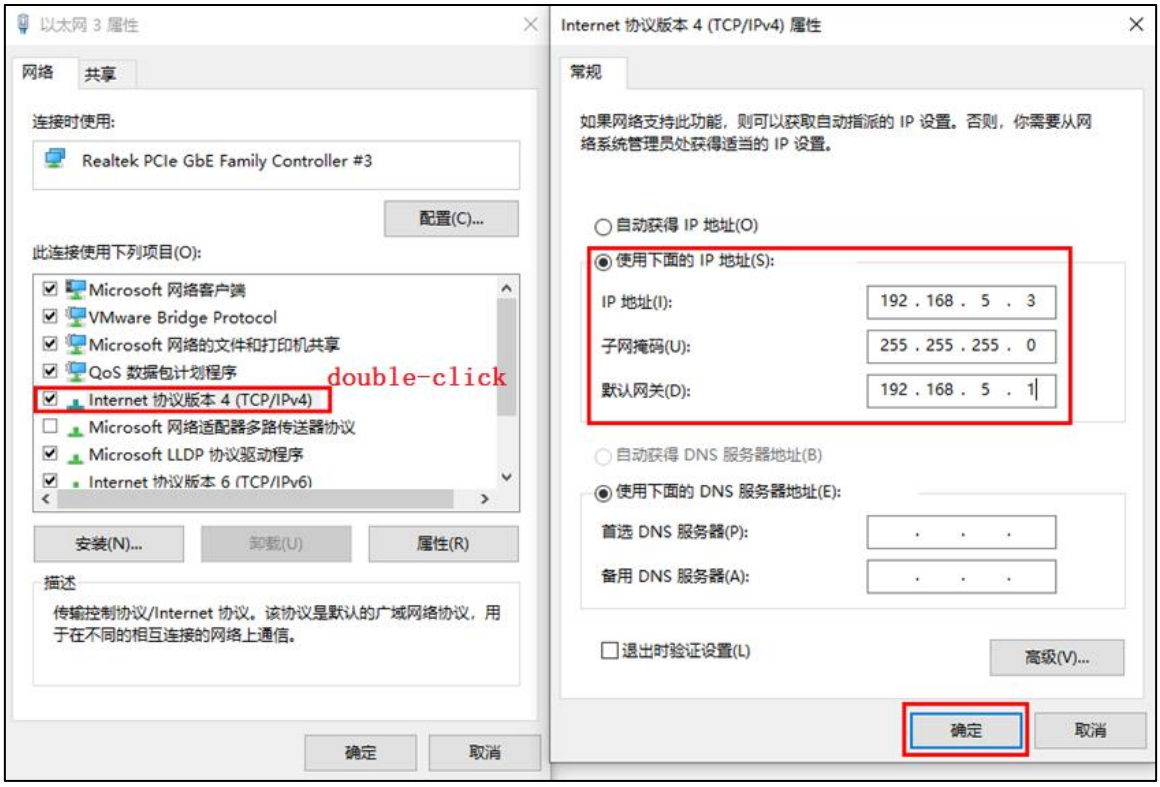

Figure 1.4-24 Open Ethernet Internet Protocol Version 4 (TCP/IPv4)

1.4.5 Development board set static IP

Next, set the IP of the development board. Here, we set the IP of the development board to 192.168.5.4, which is on the same network segment as ens33.

Enter the development board file system and set the development board IP.

```
ifconfig eth0 up
ifconfig eth0 192.168.5.4
ifconfig
```

```
[root@正点原子Linux开发板 /]#ifconfig eth0 192.168.5.4
[root@正点原子Linux开发板 /]#ifconfig
eth0      Link encap:Ethernet  HWaddr 88:EE:0F:71:2A:C7
          inet addr:192.168.5.4  Bcast:192.168.5.255  Mask:255.255.255.0
          inet6 addr: fe80::783c:448b:c4b5:691b/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:28059 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1676 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2503140 (2.3 MiB)  TX bytes:387355 (378.2 KiB)
          Interrupt:46 Base address:0xc000

eth1      Link encap:Ethernet  HWaddr 88:EB:E7:04:D6:84
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:55 Base address:0x2000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:168 errors:0 dropped:0 overruns:0 frame:0
          TX packets:168 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:16077 (15.7 KiB)  TX bytes:16077 (15.7 KiB)

[root@正点原子Linux开发板 /]#
```

Figure 1.4-25 Set the IP of the development board

1.4.6 The ping test

At this point, we summarize the IP information of Ubuntu, Windows and development board bridge network.

Ubuntu virtual machine IP: 192.168.5.2

IP of Windows computer network port: 192.168.5.3

Linux development board IP address: 192.168.5.4

For Windows, Ubuntu virtual machine and Linux development board, please refer to Section 1.2 for mutual ping test.

Note: There is no feedback on the Ubuntu virtual machine ping board during the uboot phase. Once the tests have been completed as described above, the kernel, device tree, and filesystem can be mounted using TFTP and NFS.

1.4.7 Summary

Firewall Settings: Turn off the firewall of the computer and virtual machine.

Network connection: the computer uses wireless Internet access, the development board network port is directly connected to the computer network port.

VMwear Settings: Set the network adapter to bridge mode; Add a network adapter 2 for NAT mode.

Ubuntu Settings: Set NAT mode network adapter to Automatic fetch mode (DHCP). Manually set the IP information of the network adapter for bridge mode.

Windows Settings: Manually set the IP information in Ethernet TCP/IPv4 attributes.

Development board Settings: Manually set the IP information of the development board.

Note: In Ubuntu, the network adapter in bridge mode, the Ethernet of the computer, and the network port of the development board should be in the same network segment, and cannot be in the

same network segment with the network adapter in NAT mode and the virtual machine subnet. Windows and Ubuntu communicate through a network adapter in NAT mode.

1.5 Computers only have wireless network cards

1.5.1 Preparation

Use scenario: The general computer is to have an Ethernet network port, but some of the ultra-thin, business computer no Ethernet network port, this is not convenient for our development. We can use the USB port device to extend an Ethernet network port to the computer, because the development board must be connected to the computer through the cable way. The USB port device is shown in the following figure.

Figure 1.5-1 USB to network port

Here to explain, some USB port can not avoid driving to use, abnormal use of campus network, after the use of the computer can not access the Internet and other problems, you can consult the store to buy the related problems, try to choose a brand, good sales of products. For example, this document uses the USB port of Green Link.

Equipment: computer (Windows), ALIENTEK Linux development board (factory system), direct network cable, USB port to network.

The following IP addresses are configured by the author according to his network segment, only for reference. The IP address of the user should be configured according to his network segment.

Network topology:

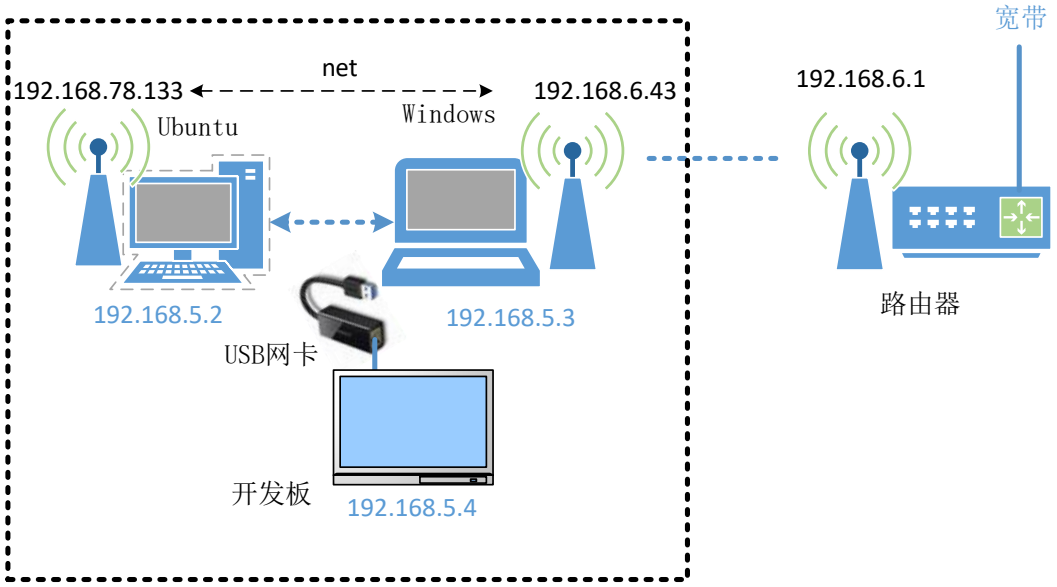

Figure 1.5-2 The computer is connected to the Internet via WiFi, and the external USB port is directly connected to the development board

1.5.2 The bridge is connected to the USB port network card

In fact, this is exactly the same as in Section 1.4, except that in Figure 1.5.3, we choose to bridge to our USB port network card.

At this point, we need to close the virtual network editor, and then connect to the USB port, and then open the VMnet0 bridge option in the virtual network editor. Remember to reopen the virtual network editor, you can see a USB2.0 bridge option, this is our USB port. Note: Different USB ports have different device names. The ones with USB characters shall prevail.)

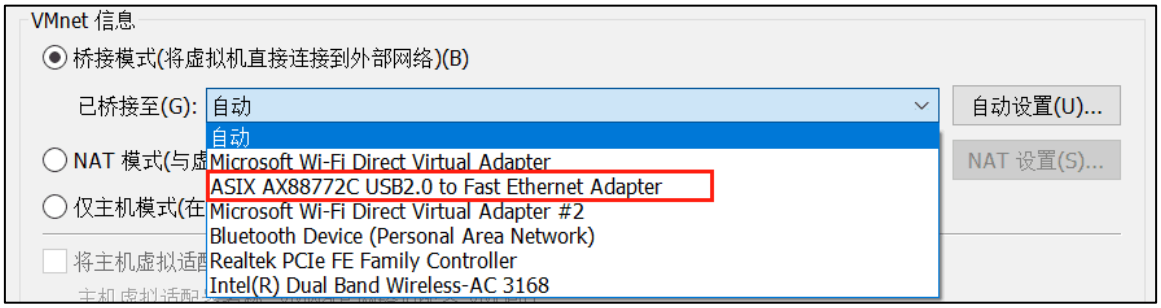

Figure 1.5-3 The bridgeable option after connecting the USB port to the network

The above steps are done before the Ubuntu virtual machine is started. If the user's computer is running the Ubuntu virtual machine at this time, the USB device connection prompt will pop up.

Figure 1.5-4 Connect the USB port device to the Windows host

If there is no USB device connection prompt, please check the connection status of the USB port device as shown in the figure, and do not allow the device to connect to the virtual machine.

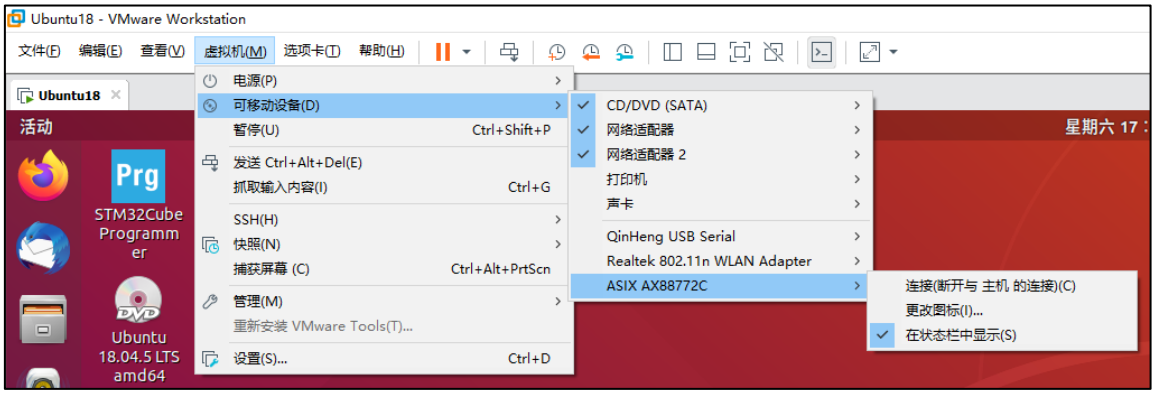

Figure 1.5-5 Check the connection status of the USB port device

If connection is checked, click Cancel to disconnect. (VMS may connect to Ubuntu by default, so check that)

We need to connect the USB port to the Windows host. After connecting to the host, you can also see our USB port device in the Windows host Device Manager -> Network adapter.

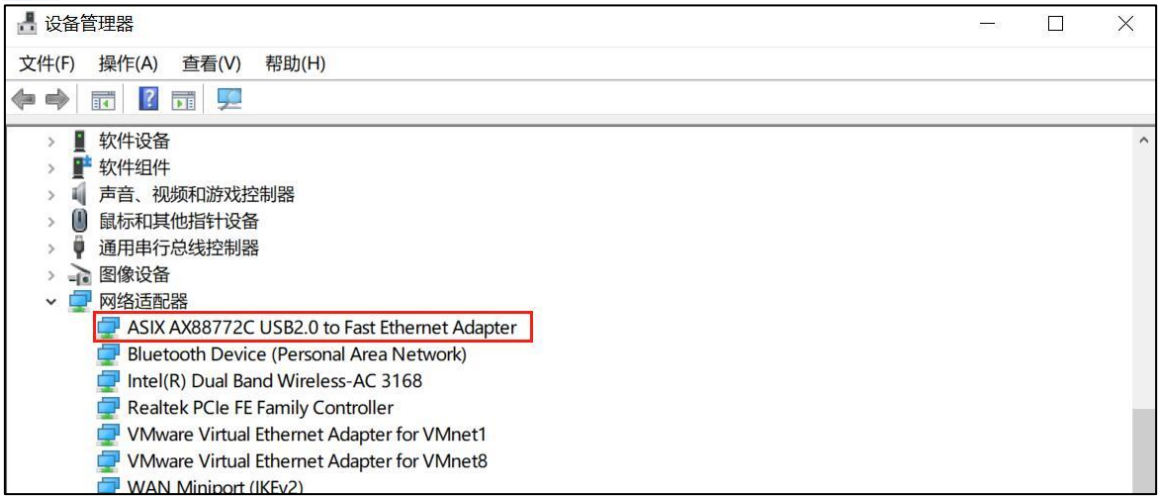

Figure 1.5-6 Windows Device Manager to view the USB port

If not, there may be a problem with the device driver, please consult the merchant.

Back in the Virtual Network Editor, bridge VMnet0 to the USB port as shown below.

Figure 1.5-7 Bridge VMnet0 to the USB port

Connect the development board to the network port of the USB network port device with the direct network cable, and the development board is powered on. After the setup is complete, go to the virtual machine Ubuntu system to set up the network. The method is the same as in section 1.4.3. Hold the ctrl key and click here to jump to section 1.4.3.

When writing the document, the USB port device used by the author is connected to use under Windows, but some users feedback according to the document method is not successful. After remote debugging, it is found that it must be connected to the Ubuntu system to succeed. Therefore, if the user can not successfully build the network environment after mounting the USB network port device to the Windows system according to the method in section 1.5 of the document, it is recommended to mount the USB network port device to the Ubuntu system before building.

Chapter 2. Frequently Asked Questions

2.1 VMware Virtual network card problem

2.1.1 The virtual network cards VMnet1 and VMnet8 do not exist

Normally, after you have built the VM, you will see two virtual network cards, Vmnet1 and VMnet8 (some systems only have VMnet8 and Vmnet1 is in host mode by default) in Control Panel \ Network & Internet\ Network Connections, as shown in the following figure.

Figure 2.1-1 Virtual network card

Solution:

Uninstall clean VMware and reinstall VMware.

If there is an error related to VMCI in the process of installing VMware, the error message is as follows:

Figure 2.1-2 Error message

The solution can refer to the idea of Baidu, the error information input to Baidu to find. Check out this post:

https://tieba.baidu.com/p/6031541992

If there is a problem with the drive, you can use the drive genie to update the drive.

Another possibility is that the version of VMware is too high, you can go to the VMware website to download the vmware version 14 or VMware12 software to try.

2.2 The virtual machine with dual network cards cannot access the Internet

In the previous section, we set up a dual network card for the virtual machine, with vmnet0 as the bridge network card and vmnet8 as the NAT network card. If the virtual machine cannot connect to the Internet after restarting according to the previous configuration, you can refer to the following check.

2.2.1 Network Access with only NAT cards

If you can't access the Internet using dual network card configuration, you can try to close the bridge network card, only keep the NAT network card, and then the virtual machine ping Baidu test to see, you can ping a few times more test.

Figure 2.2-1 Disconnect the bridge network card

Then the problem may be the ubuntu network card priority, you can try to follow the following link to set the priority of two network cards. Before making changes to a file, make a copy of the file you want to change as a backup or take a snapshot of the system in case you make a mistake.

Refer to the link: https://www.cnblogs.com/louby/p/10839187.html

The main thing is to delete the default wired gateway, add wifi IP as the default address, and re-open the two network cards after the modification is completed.

2.2.2 You can't get online even if you only have a NAT card

Refer to the steps in Section 1.4 to check NAT network card Settings, turn off computer and virtual machine firewall, DNS, and other related issues. If the computer is connected directly to the Internet and the virtual machine cannot automatically obtain the IP address, you can try to manually set the IP address (which is on the same network segment as the computer and does not conflict with other ips) to 114.114.114.114 or 8.8.8.8. Or try to restore the default configuration using virtual machine network editing.