TSNNic Operation Manual

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version number	Modified by	date	Remark
1.0	Peng Jintao	2019 -11 - 2 7	initial version

1. Purpose of the document

TSNNic is a traffic generation and capture system that tests and analyzes networks. This document mainly introduces the How to use TSNNic to build an experimental environment for traffic generation and testing on openbox_s4 devices.

2. Required equipment

1 openbox_s4, 1 computer with linux system and Qt5.8 environment installed, 1 switch, The device/network under test.

3. Experimental scene

The QT interface includes message generation, configuration interface (controller) for capturing related parameters, and real-time display of status information Interface (Insight). The experimental scene built is shown in Figure 1 below:

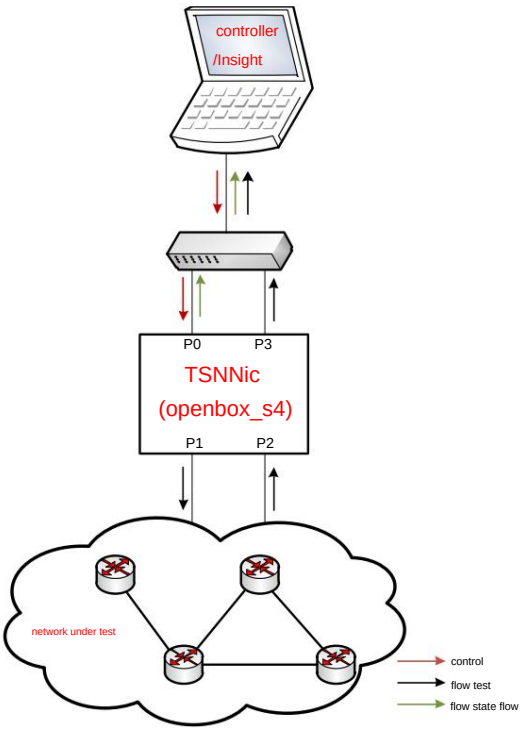

Figure 1 TSNNic experimental scene diagram

The controller sends the control flow through the switch to enter TSNNic from interface 0; the state flow generated by TSNNic starts from 0 port No. 1 is output to Insight through the switch; the test stream generated by TSNNic is output from port No. 1 to the network under test. After passing through the network under test, it returns to TSNNic from interface 2; after TSNNic encapsulates and samples the returned test stream, it returns from interface 3 No. interface output, through the switch to Insight.

4. Use of **TSNNic**

4.1 Introduction of each interface of openbox_s4

There are 4 data network ports (0, 1, 2, 3), 1 management network port (MGMT), 1 A reset button (RST) and 4 led lights, as shown in Figure 2 below:

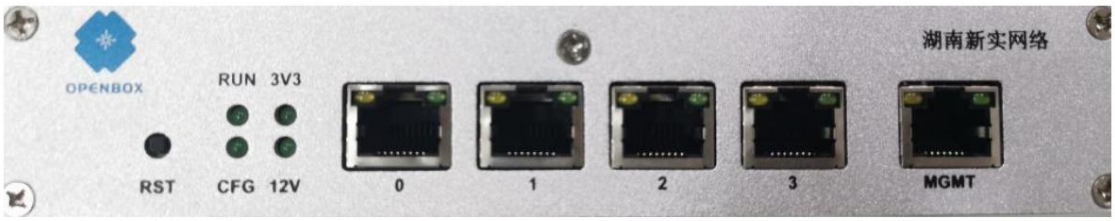

Figure 2 front view of openbox_s4

The back of openbox_s4 has JTAG interface, USB interface, COM serial port, switch and power interface, as shown in Figure 3 below:

Figure 3 back view of openbox_s4

4.2 openbox_s4 is configured as TSNNic

ÿDownload BOOT.bin in the openTSN/bin/TSNNic/hardware/ directory on the code cloud, as shown in Figure 4. The download URL is https://gitee.com/opentsn/openTSN/tree/master/bin/TSNNic/% E7%A1%AC%E4%BB%B6

Figure 4 Download the content

of the code cloud ÿ Copy BOOT.bin to the mnt directory of the TF card in openbox_s4, as shown in Figure 5 below. The specific operation of copying is shown in Appendix 1.

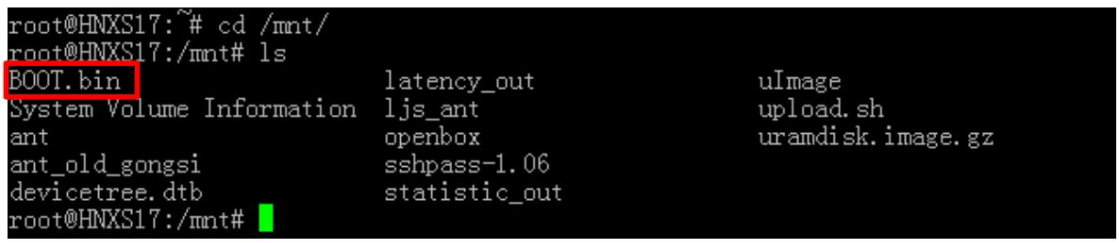

Figure 5 The location of BOOT.bin in openbox_s4 ÿ

Restart openbox_s4 to complete the configuration of openbox_s4.

4.3 Use of TSNNic software

ÿDownload gcl.txt and tester_ui in the openTSN/bin/TSNNic/software/ directory on the code cloud, as shown in Figure 6, Copy it to the linux computer and put it in the same directory.

Figure 6 Download the content of the code cloud

ÿEnter the directory where gcl.txt and tester_ui are located.

Execute "cd gcl.txt and the directory where tester_ui is located (tsnnic in this example)", and enter the command "ls" to view all files in the current directory. As shown in Figure 7.

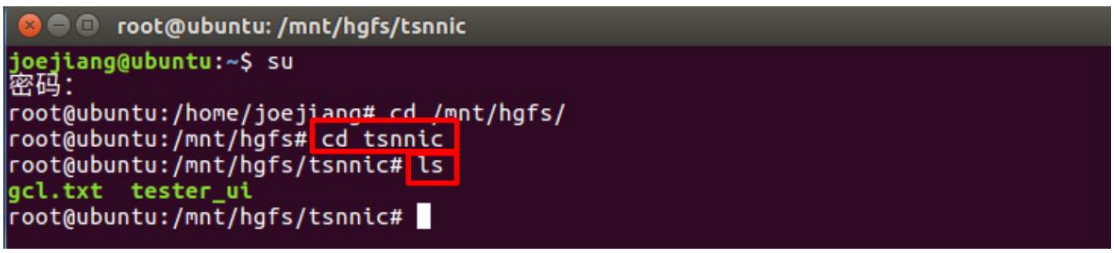

Figure 7 Enter the directory where gcl.txt and tester_ui are located

ÿ Modify the gate list. Enter

the command "vi gcl.txt" as shown in Figure 8. You can enter the script "gcl.txt" file, as shown in Figure 9. The default gate control list is all F.

Figure 8 Enter the command "vi gcl.txt"

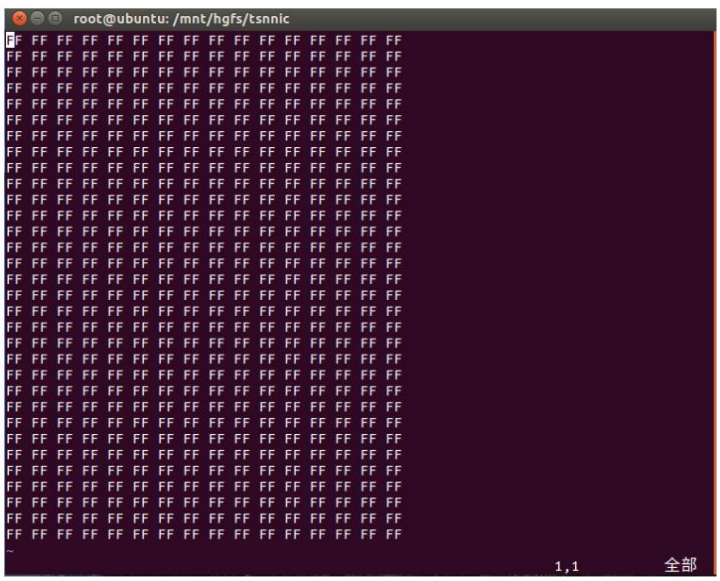

Figure 9 Enter the script "gcl.txt" file

Press the letter "a" key to modify the value of the gate list; after the modification is completed, first press the "Esc" key, then press the "Shift" key and the ":" key at the same time, then enter "wq", and press "Enter" key to return to the interface shown in Figure 8, that is, to complete the modification of the gate control list. ÿ Run tester_ui. Enter the command "./tester_ui" as shown in Figure 10.

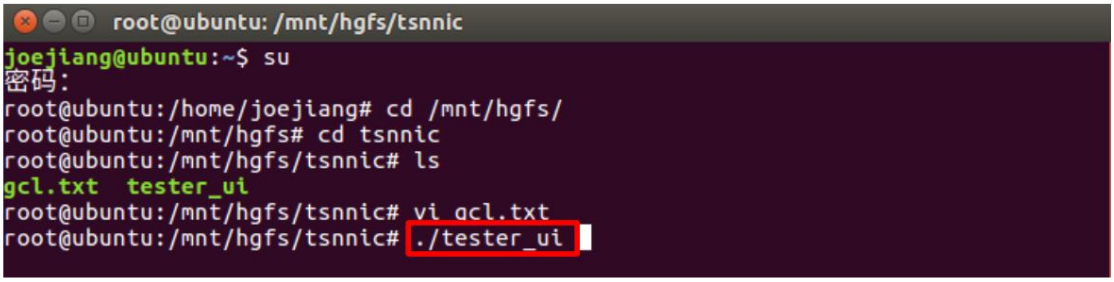

Figure 10 Running tester_ui

The interface shown in Figure 11 pops up, click config_ui_1. Enter the configuration interface of 8 message headers as shown in Figure 9, each header is 64B (the user only needs to pay attention to the first 58B, and the last 6B can be set arbitrarily). The default 8 types of packet headers carry VLAN tags. The PCP values of the type 1, type 2, type 3, type 4, type 5, type 6, type 7, and type 8 packet headers are 7, 6, 5, and 4, respectively. , 3, 2, 1, 0; where 6, 7 correspond to time-sensitive streams (TSN streams), 3, 4, and 5 correspond to bandwidth reservation streams (RC streams), and 0, 1, and 2 correspond to best-effort forwarding streams

(BE flow). The orange field is the quintuple information in the packet header. The user can change the message header information on the interface: You can generate the message to be sent on the Xiaobing Ethernet tester, and then intercept the first 64B of the message header information and copy it to the corresponding box on the interface in Figure 9.

Figure 11 The interface that pops up after running tester_ui

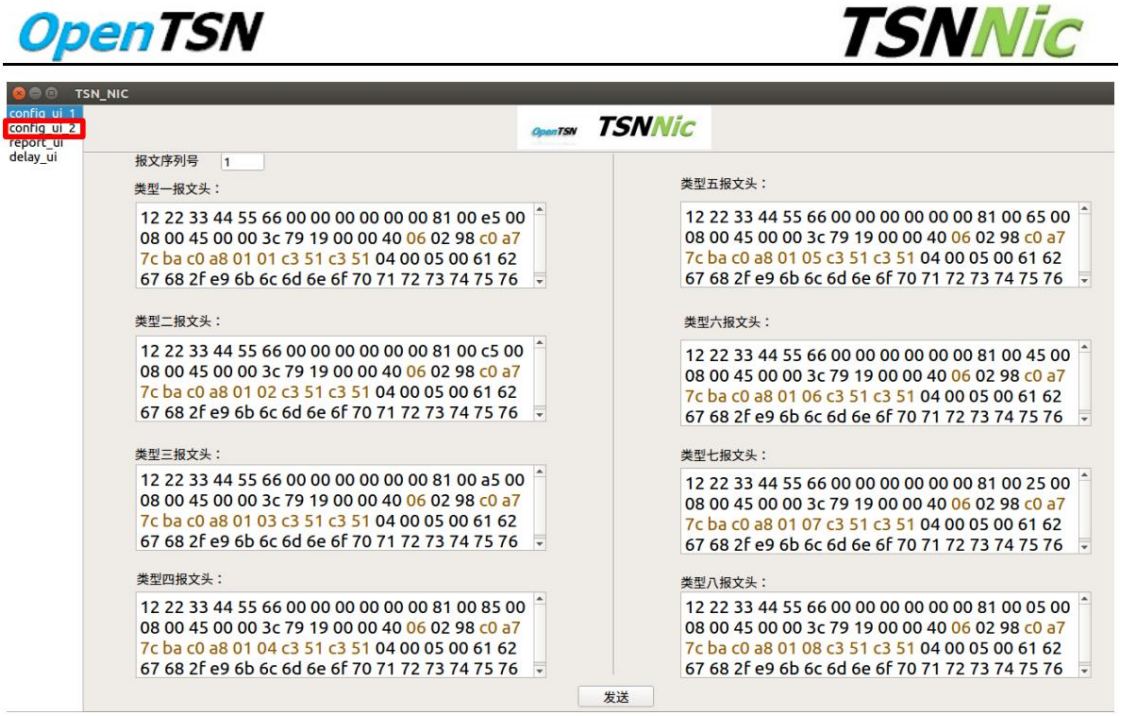

Figure 12 8 header configuration interface

ÿ Click config_ui_2 in Figure 12 to enter the configuration interface of message generation and capture related parameters, as shown in Figure 13;

The meanings of the parameters on the interface are shown in Table 1. After the interface parameters are configured, click report_ui.

Figure 13 Configuration interface of message generation and capture related parameters

Table 1 The meaning of the parameters on the configuration interface of message generation and capture related parameters

	Remark
Parameters Message	the serial number of the message
Serial Number Time	Arbitrary setting in 8ÿs~200ÿs
Slot Size Message	Collect one every how many packets, where 1 means all collection.
Sampling Frequency Type N Message	Transmission Rate The generation and transmission rate of this type of message. The input value ranges from 0 to 1024_000. Enter a decimal.
length	The length of this kind of message, the input value range is 64~1466, the unit is byte.
quintuple	The quintuple information of the packets to be counted, in decimal. Default is type N header The quintuple in , N=1, 2, „, 8.
mask	Decimal value. Default is exact match, N=1, 2, „, 8.

Gated List	It is set by reading the file (gcl.txt), and the maximum support is 32 time slots for the period of configuration, and the default is all F.

ÿ Enter the status information real-time display interface shown in Figure 14. The meaning of the parameters on the interface is shown in Table 2. Click the "Start Test" button and TSNNic starts working. The interface displays TSNNic real-time sending/receiving number, sending/receiving rate, delay/average delay and other data. Click on delay_ui.

Figure 14 Real-time display interface of status information

Table 2 The meaning of the parameters on the status information real-time display interface

Parameter Remarks Type N Number of messages
sent Number of messages of this type generated from TSNNic Number of messages sent Type N
messages received Number of quintuple matches with mask Number of hits Type N messages Real-time
rate of messages of this type Generated from TSNNic Sending rate Type N packets Receive real-time
rate masked quintuple Matching rate Type N packet delay Real-time delay data type N packets of this
type passing through the network/device under test Average delay of messages The average number of delay data of this type of message passing through the network/device
The total number of sent/received messages The total number of sent/received messages of TSNNic. Total send/
receive packet traffic The total number of sent/received bits of TSNNic. Average rate of sent/received messages TSNNic The
total average rate of sent/received messages. ÿ Enter the delay data real-time display interface as shown in Figure 15 to display
the delay jitter of each stream passing through the OpenTSN network. Enter the time slot value of the OpenTSN network in the

"Switch Node Time Slot" box, and the real-time delay discount of each flow will be displayed; in the "Hop Count" box, enter the number of TSN nodes in the OpenTSN network that the flow passes through , the upper and lower bounds in red are displayed.

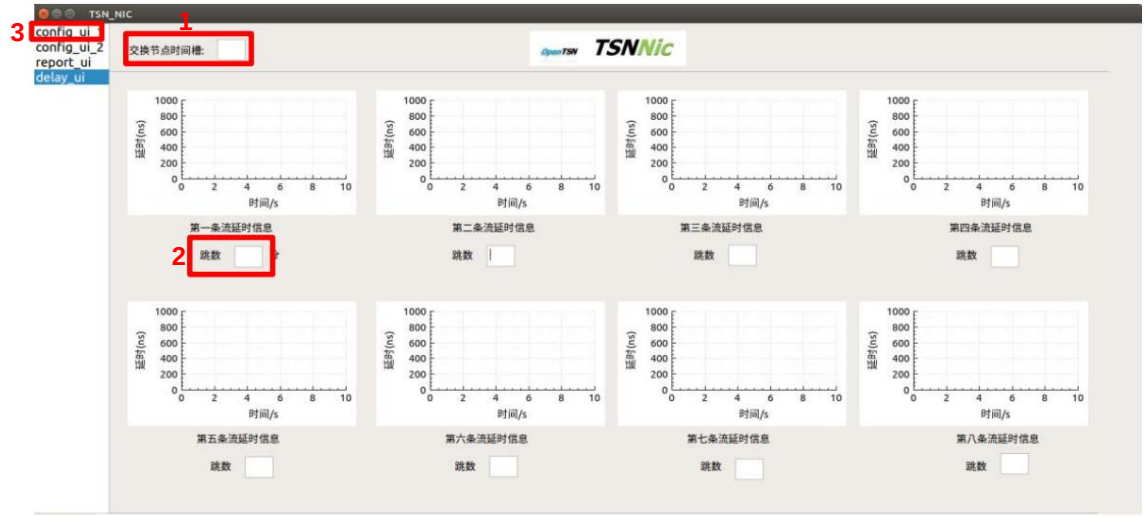

Figure 15 Real-time display interface of status

information ÿ If you need to update the header information of the message generated and sent by TSNNic during the test, click config_ui_1 in Figure 15 to enter the configuration interface of 8 message headers shown in Figure 16; modify The corresponding header information, and then click the "Send" button.

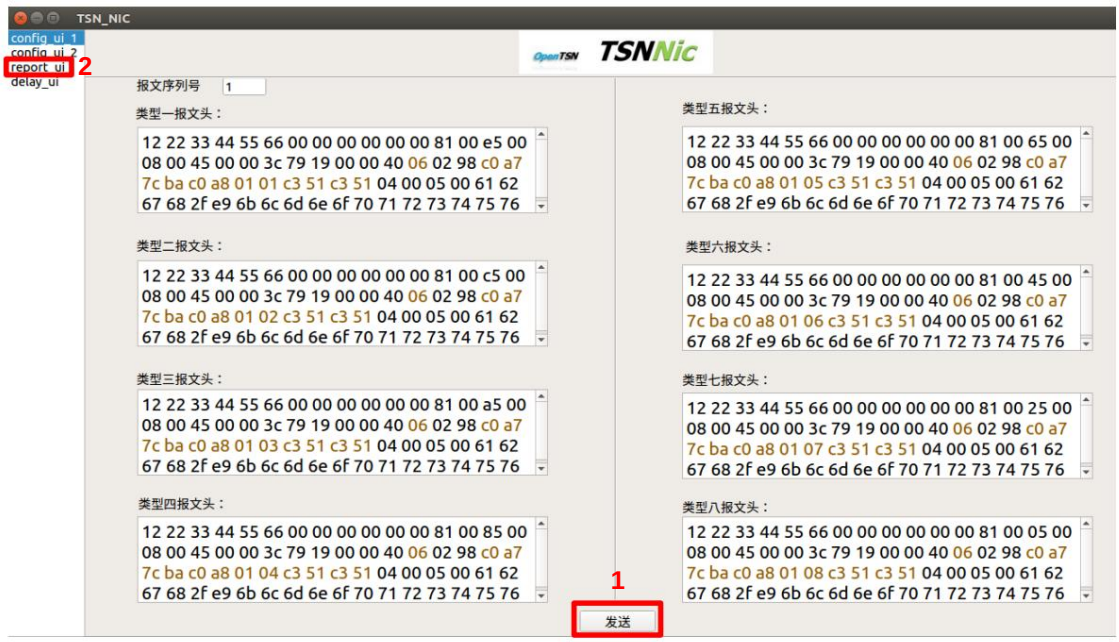

Figure 16 8 header configuration interface

ÿClick report_ui in Figure 16 to enter the real-time display interface of status information in Figure 17; click the "Stop Test" button, TSNNic stops sending packets, and the interface data stops refreshing after 1s; after the interface data stops refreshing, the sending of each type of message will be displayed /Number of received/lost packets, total number of packets sent/received/lost, total average rate of sent/received packets and other information.

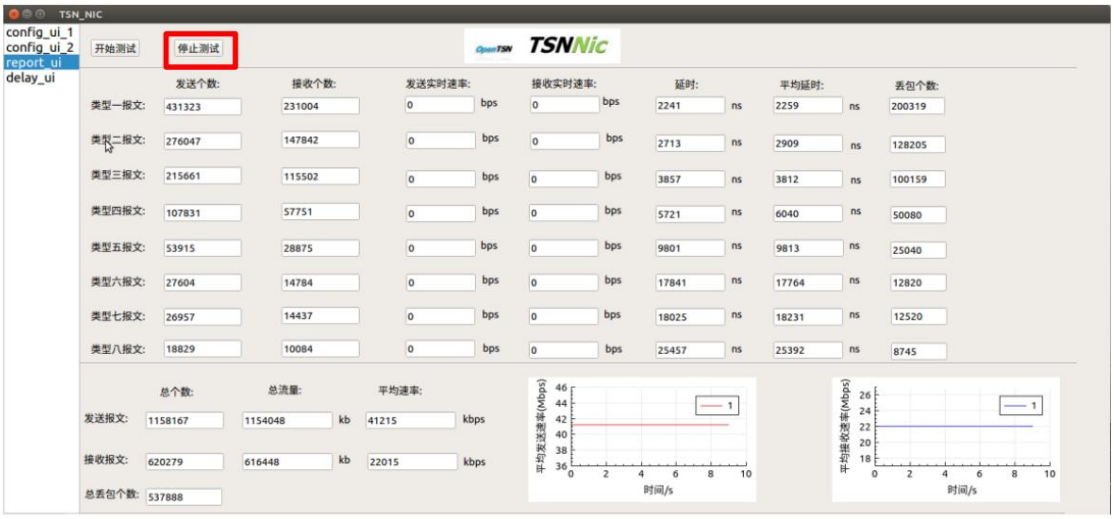

Figure 17 Real-time display interface of status information

Appendix 1: How to copy files into **openbox_s4**

ÿ Step 1: Set the ip address of the linux system device to be in the same network segment as openbox_s4, check

See Appendix IV for the specific operation of the IP address of the management

network port of openbox_s4. ÿ Step 2: Use scp to copy files to openbox_s4 in linux system.

```
scp BOOT.bin  root@192.168.1.18:/mnt/
```

Figure 18 Copy command

Where BOOT.bin is the file to be copied, root is the user name in openbox, 192.168.1.18 table

It shows the IP of the management network port in openbox, and /mnt/ means copy it to the /mnt/ directory in openbox. ÿ

Step 3: Enter the password "123123"

Appendix 2: The method of using the serial port to log in to the **openbox_s4** running interface

1) Insert the serial cable into the PC end and the serial port of the openbox_s4 device, and then open the device manager of the computer, as shown below:

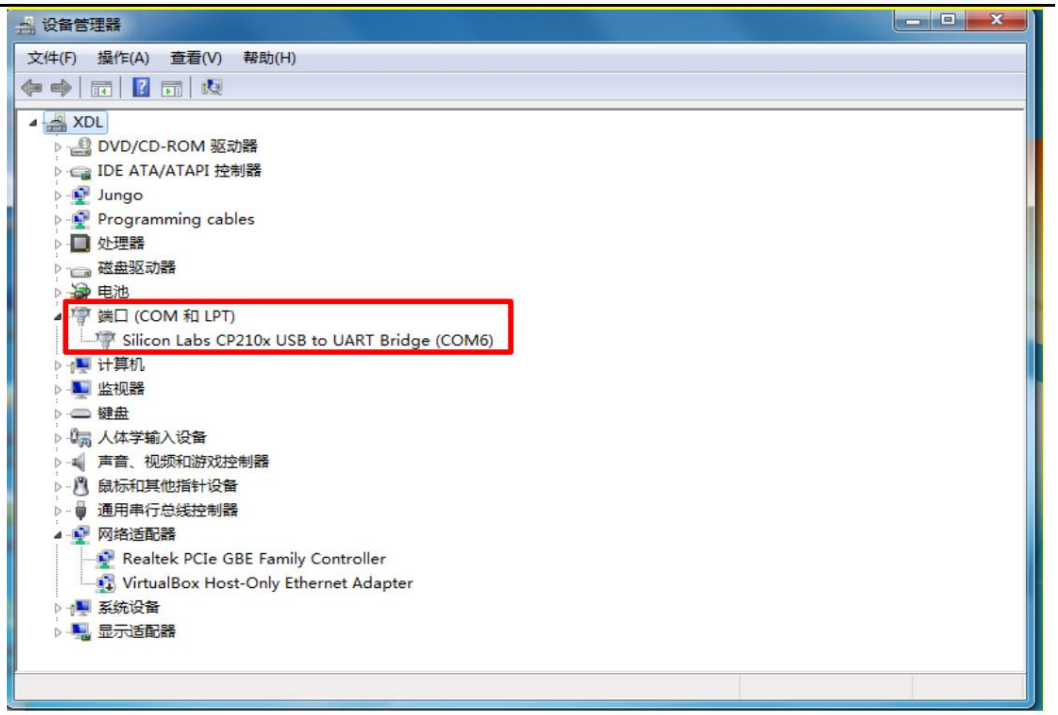

Figure 19 View Device Manager

2) Open the putty software, as shown below:

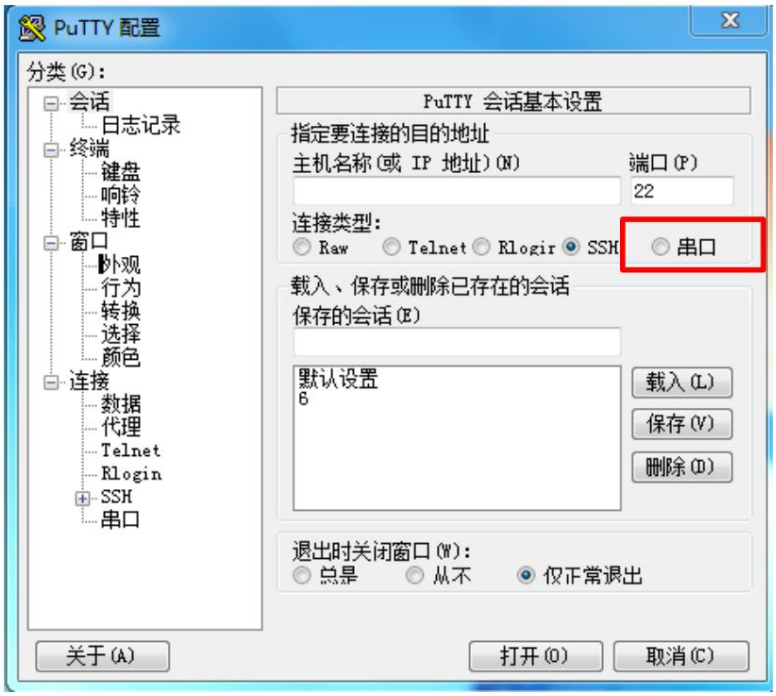

Figure 20 Choose to use serial port to log in on Putty

3) Click the serial port (as shown in the red box in the above picture) option, then the following picture will appear, and change the serial port to be the same as the port name in the device manager in picture 1 (for example: com6 in picture 1, the picture below should be change to com6); change the speed to 115200:

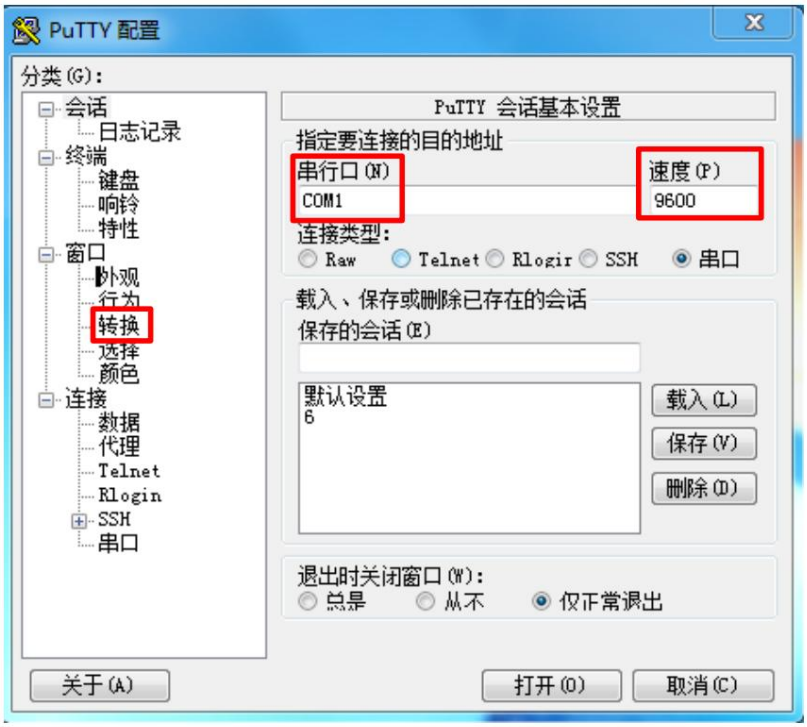

Figure 21 Configure serial port information

4) Then click "Convert" in the left frame of the above figure, and the following figure appears: Then click "Assume the character of the received data" Set", select "UTF-8", and click Open.

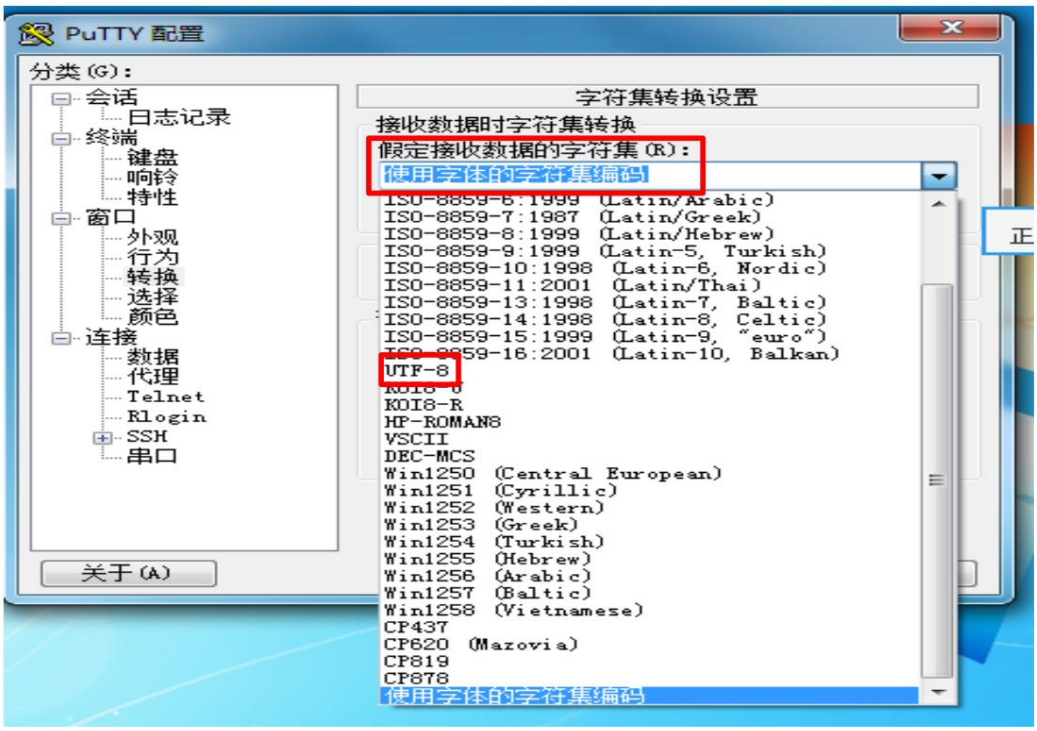

Figure 22 Select character set

Appendix 3: How to use the management network port to log in to the **openbox_s4** running interface

1 Log in to openbox_s4 under windows system

1) Modify the ipv4 address of the PC side to be in the same network segment as the management network port IP address of openbox_s4 (see Appendix IV for the management network port IP address of openbox_s4), for example: the management network port IP address of openbox_s4 is 192.168.1.18, then Modify the ipv4 address of the PC side to 192.168.1.98 on the same network segment, as shown in the following figure :

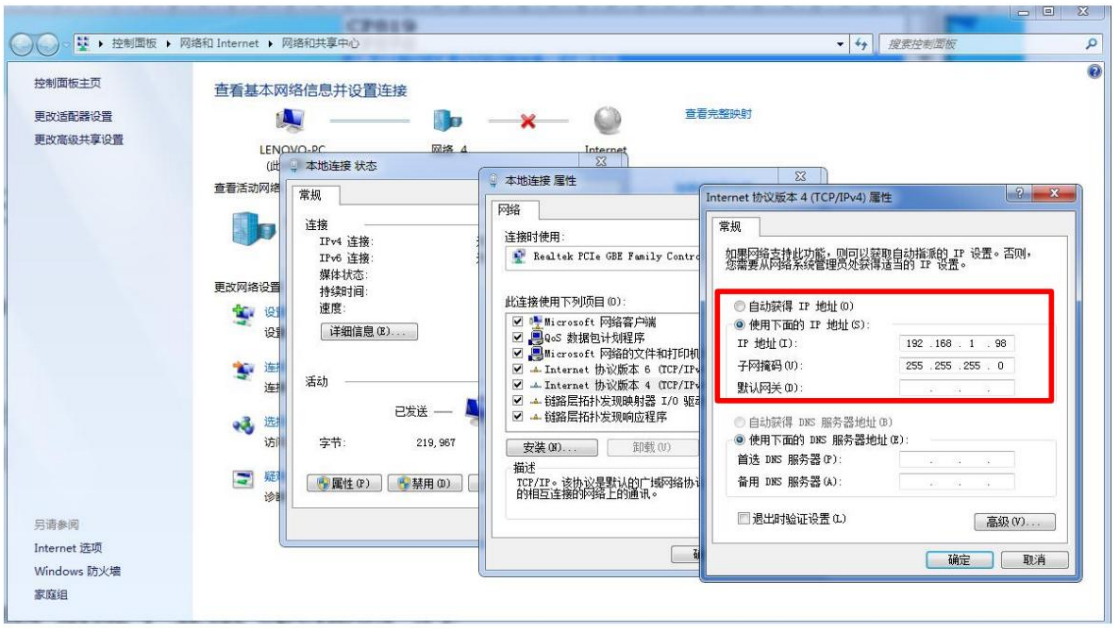

Figure 23 Modify the ip address of the

local device 2) Open the putty software, and output the ip address of openbox_s4 in the "host name (or IP address)" area in the figure below, such as the 192.168.1.18 mentioned above; then click Open to log in to on the running interface of openbox_s4.

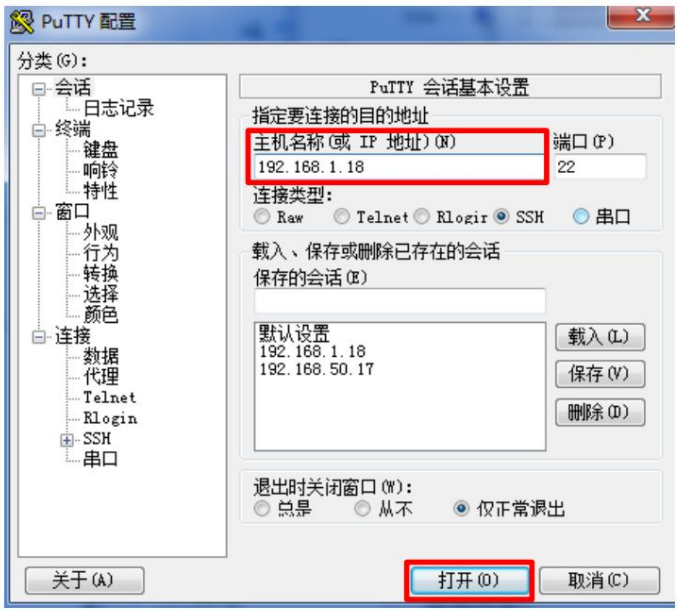

Figure 24 Log in to the ip address of openbox_s4

2 Log in to openbox_s4 under linux system

ÿ Step 1: Execute the following command, which must be executed in the root directory

```
root@ubuntu:~# ssh root@192.168.1.18
```

Figure 25 Execute the login command

ÿ Step 2: 192.168.1.18 is the IP of the management network port, and the interface for entering the password appears

```
root@ubuntu:~# ssh root@192.168.1.18
root@192.168.1.18's password:
```

Figure 26 Enter password

ÿ Step 3: Enter 123123.

Appendix 4: View the **ip** address of **openbox_s4**

ÿ Step 1: Use the serial port to log in to the running interface of openbox_s4, see Appendix 1 for details.

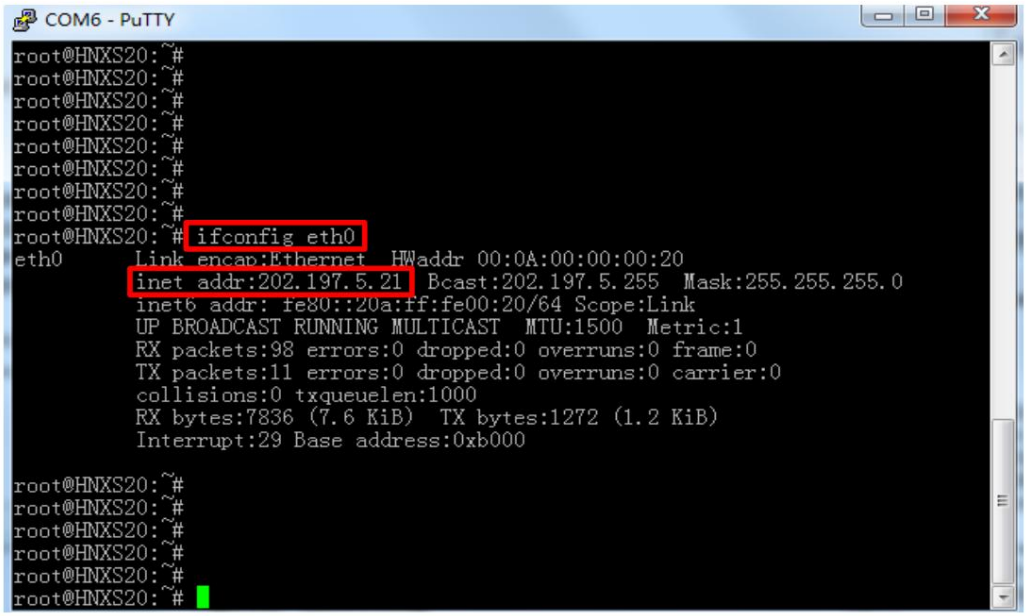

Figure 27 View the IP address of the management network port of openbox_s4 ÿ

Step 2: Enter the command "ifconfic eth0" to view the IP address of the management network port, such as the IP in the above figure

The address is 202.197.5.21.