EMBEDDED SYSTEM

Mission：Connect to the ZJU network

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1. Device and Environment

- Devices: RPi, 5V power, net cable, micro USB, wireless LAN card
- Environments: Win 8.1 on PC, wheezy-raspbian on RPi

2. Configure the WLAN

Before setting the ZJUVPN, I have configured the RPi so that I can connect to it with my laptop WLAN. However, this process is of another mission. I will describe the method in the report of another mission--how to construct a WLAN router with the RPi.

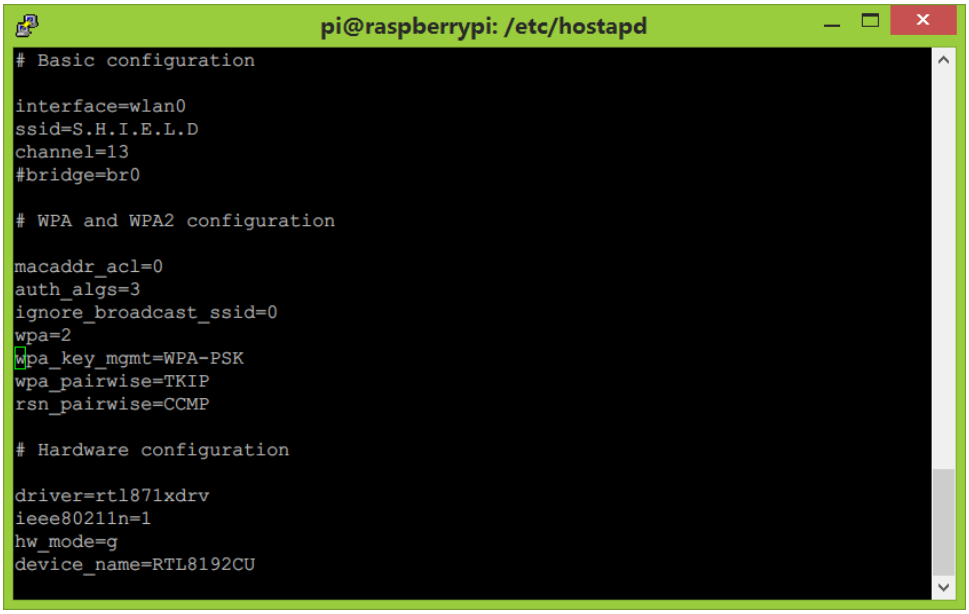

Figure 1 basic configuration of the host

Figure 2 WLAN detected on my laptop

Therefore, this report will concentrate on the ZJUVPN configuration and the connection.

3. Software Packages Preparation

First of all, to set up the ZJUVPN, the following 4 tools are need in the Linux system:

- ✓ libpcap 0.8
- ✓ ppp
- ✓ xl2tpd
- ✓ zjuvpn

Those packages can be downloaded through this link:

http://pan.baidu.com/share/link?shareid=335708&uk=2752223697

Use the web browser to download the tools. It will be more convenient to download the files with the PC, and then copy them to RPi. There are multiple methods to perform the copy process, mounting a disk etc. I chose to use the ftp server built in the native RPi system. Server address will be LAN address configured.

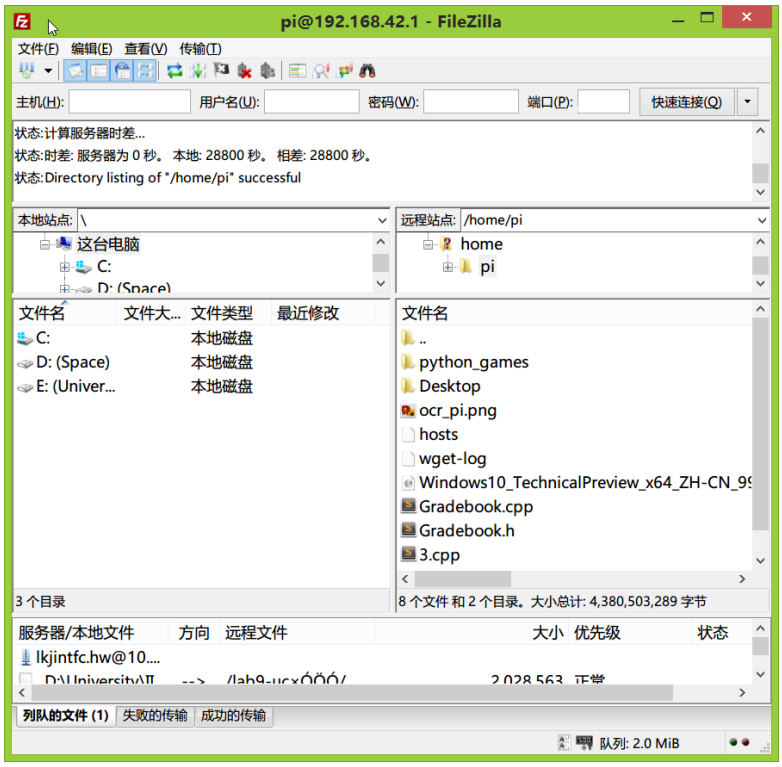

Figure 3 ftp tools to transmit the files

Just upload the files to the server, and they will be found in /home/pi, as the picture shows below.

Figure 4 find the files on RPi

4. Installation

The installation of the tools is sample, just stay at the path and execute the following commands. It is significant that the sequence of the 4 installation processes can't be scrambled. If the sequence changed, the mutual dependency relationship won't build up.

Commands as following:

```
sudo dpkg –i libpcap0.8_1.3.0-1_armhf.deb

sudo dpkg –i ppp_2.4.5-5.1_armhf.deb

sudo dpkg –i xl2tpd_1.3.1+dfsg-1_armhf.deb

sudo tar –zxvf zjuvpn-8.2.tar.gz –C /
```

5. Connection Configuration

In Yuquan campus ZJU, every student has his own net port with an IP address, and the address is bonded to a registered MAC address. We have to revise the MAC address of the ether net card so that the card will be permitted to access the ZJU network.

What you need to do is just typing some commands, and for convenience, edit the self-executed text so that the commands will be executed automatically when boot.

The file is /etc/rc.local, as following

```
#!/bin/sh -e
#
# rc.local
#
# This script is executed at the end of each multiuser runlevel.
# Make sure that the script will "exit 0" on success or any other
# value on error.
#
# In order to enable or disable this script just change the execution
# bits.
#
# By default this script does nothing.
# Print the IP address
_IP=$(hostname -I) || true
if [ "$_IP" ]; then
    printf "My IP address is %s\n" "$_IP"
fi
sudo ifconfig eth0 down hw ether 00:23:55:4C:19:40 #your MAC address here
sudo ifconfig eth0 up
sudo ifconfig eth0 10.110.92.251 netmask 255.255.255.0 up
```

```
sudo route add default gw 10.110.92.1
sudo /etc/init.d/networking reload
sudo service hostapd start
exit 0
```

The colored lines are needed for the ether card configuration, others will be discussed in corresponding mission report.

Another file is /etc/network/interfaces, as following. And the IP address and the gateway configurations blow have been set in the /etc/rc.local, but setting in the interfaces again makes a double insurance.

```
auto lo

iface lo inet loopback
auto eth0
iface eth0 inet static        #add static option for the ether
address 10.110.92.251     #your static address
gateway 10.110.92.001
netmask 255.255.255.0
network 10.110.92.000     #set the last 3bits 000, other bits are same as the IP
allow-hotplug wlan0
iface wlan0 inet static
   address 192.168.42.1
   netmask 255.255.255.0
up iptables-restore < /etc/iptables.ipv4.nat
```

The colored lines are needed for the ether card configuration

Now, the connection to the ZJU network will be automatically completed when booting the RPi. Test the connection with ping.

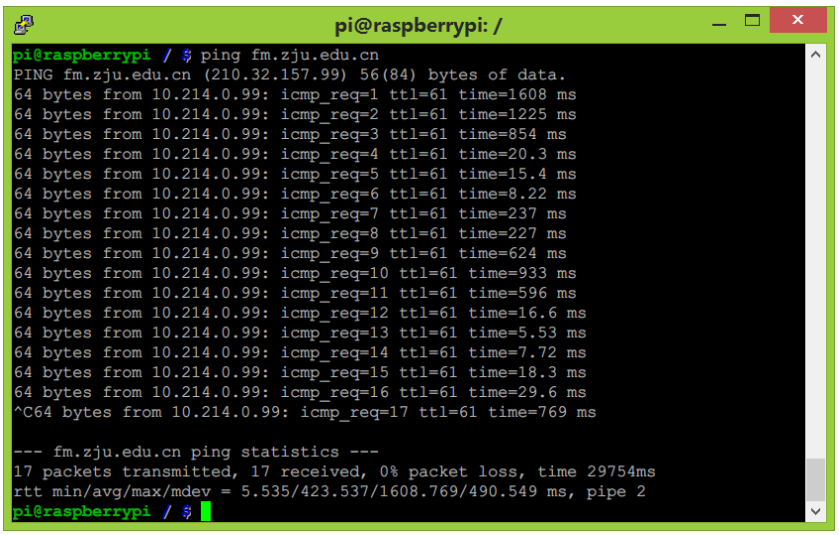

Figure 5 ping fm.zju.edu.cn

And now we can also connect to the Internet with ZJUVPN. Type the following command, then you can set the username and password.

```
sudo zjuvpn -c
```

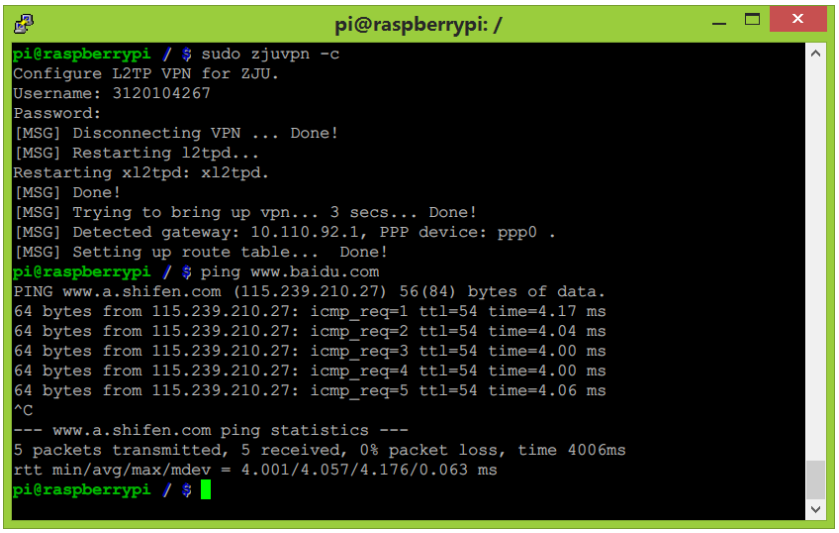

Figure 6 ping www.baidu.com

Now the RPi is connected to the Internet. We can see the connection status.

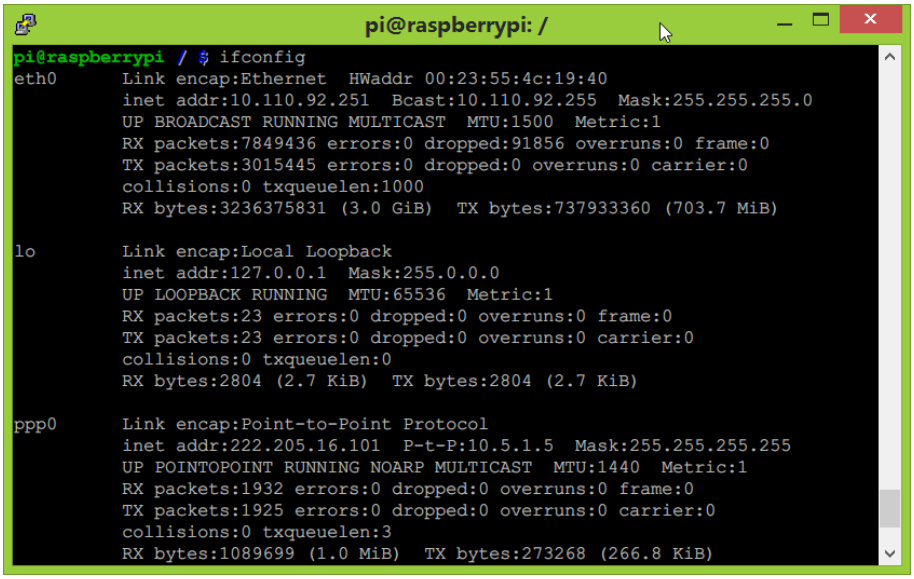

Figure 7 network status

So far, mission completed.