

浙江大学实验报告

课程名称：嵌入式系统

指导老师：翁凯

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实验名称：浙大校网 VPN

实验类型：嵌入式开发

学号：3120101111

一、实验目的和要求

搞定在校网上拨 VPN 出校。

二、实验内容和原理

1. 了解 Acadia 或 RPi 或 WRTnode 中如何对网络进行配置；
2. 了解 Acadia 或 RPi 或 WRTnode 中如何对 VPN 进行连接。

三、主要仪器设备

硬件

Acadia 或 RPi 或 WRTnode 板一块；

5V/1A 电源一个；

microUSB 线一根；

USB-TTL 串口线一根（FT232RL 芯片或 PL2303 芯片）。

以下为自备（可选）器材：

PC（Windows/Mac OS/Linux）一台；

声卡一个；

以太网线一根（可能还需要路由器等）。

软件

PC 上的 USB-TTL 串口线配套的驱动程序；

PC 上的串口终端软件，如 minicom、picocom、putty 等；

PC 上的 SSH 软件，如 putty 等。

四、操作方法和实验步骤

1. 对 Acadia 或 RPi 或 WRTnode 上的网卡进行配置；

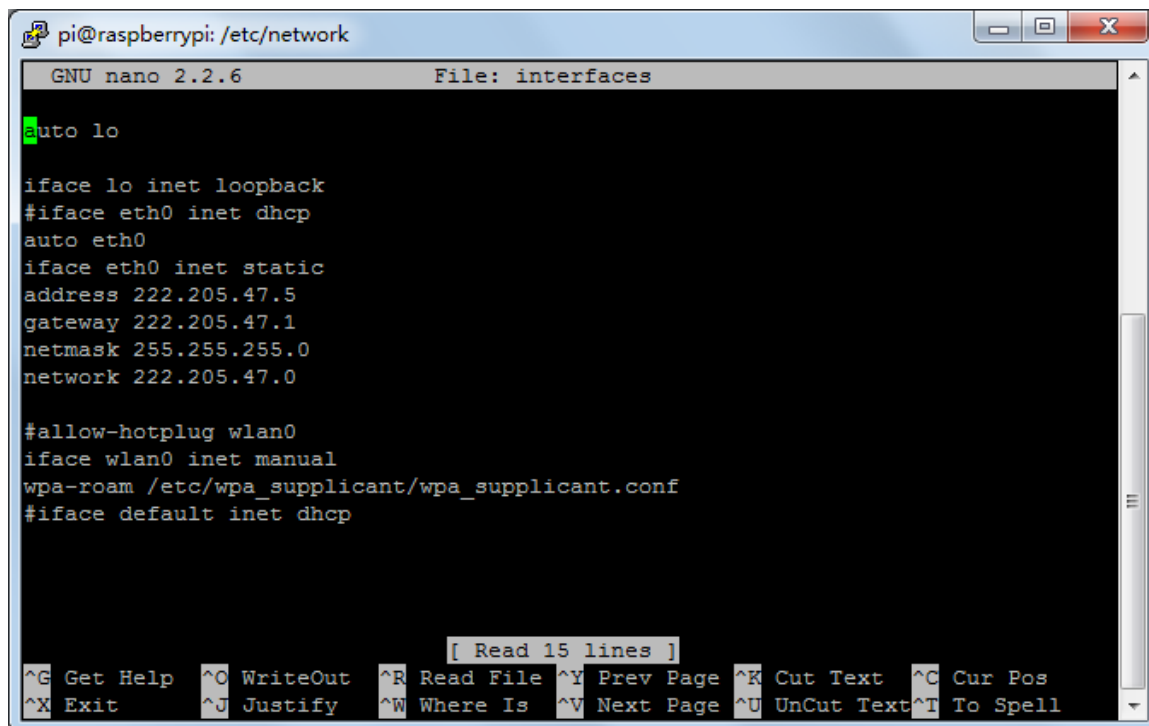
首先在学校公寓网上为树莓派申请一个静态 IP，完成 mac 地址和 IP 的绑定

 申请新IP  修改MAC地址  更换寝室IP  刷新  返回					
	IP地址	MAC地址	网络掩码	网关	ip段区域
1	222.205.47.5	B8-27-EB-1A-B7-62	255.255.255.0	222.205.47.1	玉泉校区30舍

Figure 1

实验名称: 浙大校网 VPN 姓名: 张腾 学号: 3120101111

配置树莓派的/etc/network/interfaces 文件, 设置静态 ip 以及掩码等:



```
pi@raspberrypi: /etc/network
GNU nano 2.2.6 File: interfaces

auto lo

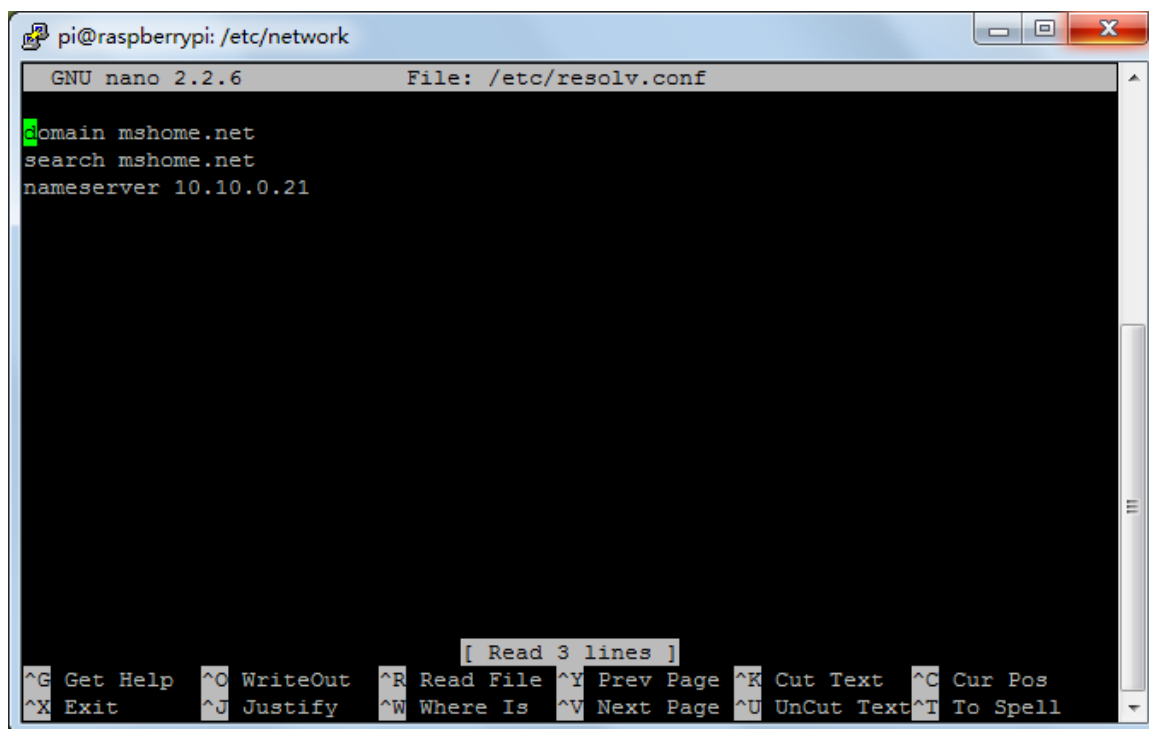
iface lo inet loopback
#iface eth0 inet dhcp
auto eth0
iface eth0 inet static
address 222.205.47.5
gateway 222.205.47.1
netmask 255.255.255.0
network 222.205.47.0

#allow-hotplug wlan0
iface wlan0 inet manual
wpa-roam /etc/wpa_supplicant/wpa_supplicant.conf
#iface default inet dhcp

[ Read 15 lines ]
^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Text ^T To Spell
```

Figure 2

进一步设置 dns



```
pi@raspberrypi: /etc/network
GNU nano 2.2.6 File: /etc/resolv.conf

domain mshome.net
search mshome.net
nameserver 10.10.0.21

[ Read 3 lines ]
^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Text ^T To Spell
```

Figure 3

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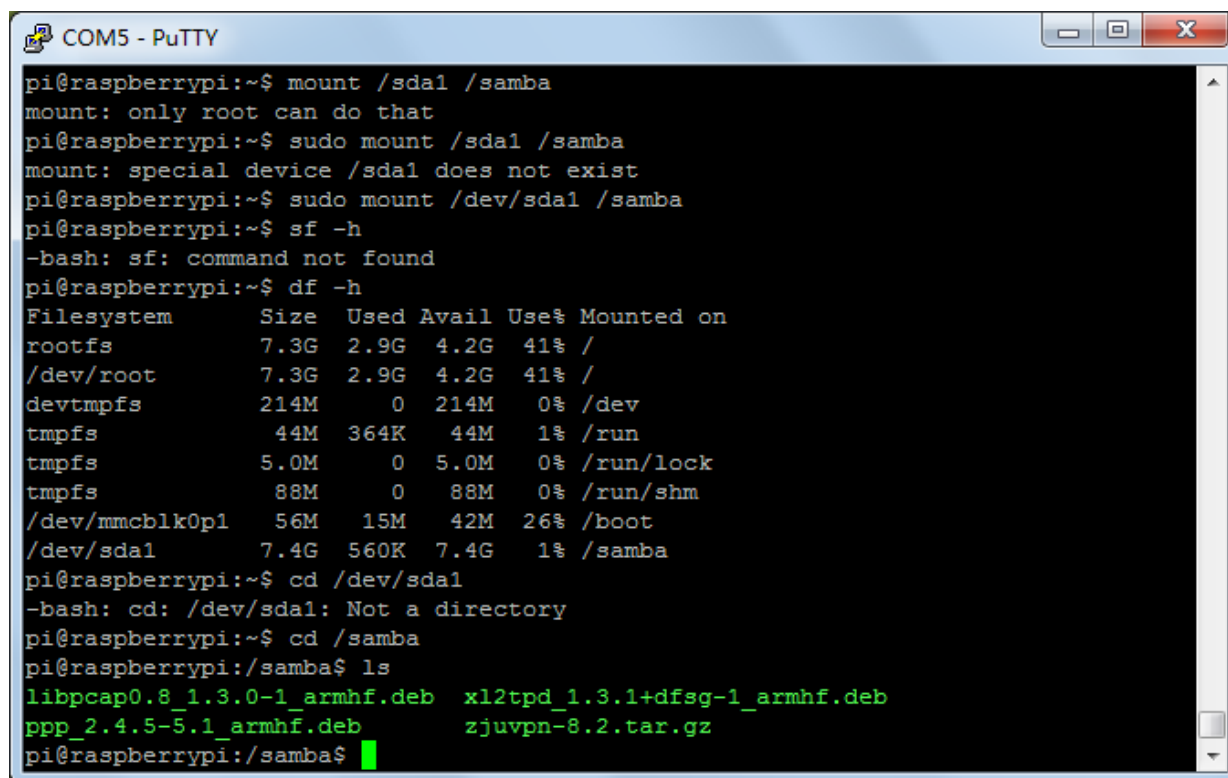
重启网络服务。

然后需要安装 vpn。

下载 libpcap0.8, ppp, xl2tpd, zjuvpn 四个软件包

(下载地址：<http://pan.baidu.com/share/link?shareid=335708&uk=2752223697>)

通过 sftp 传输到树莓派上



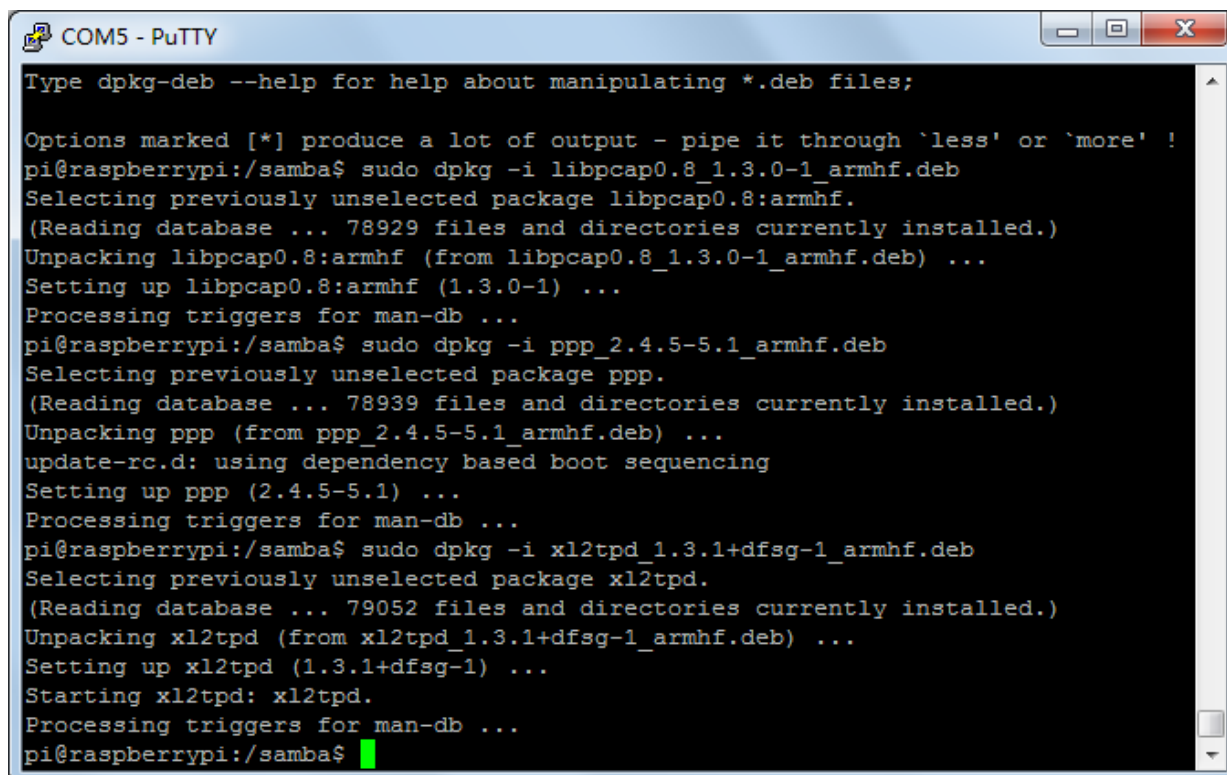
```
pi@raspberrypi:~$ mount /sda1 /samba
mount: only root can do that
pi@raspberrypi:~$ sudo mount /sda1 /samba
mount: special device /sda1 does not exist
pi@raspberrypi:~$ sudo mount /dev/sda1 /samba
pi@raspberrypi:~$ sf -h
-bash: sf: command not found
pi@raspberrypi:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
rootfs          7.3G  2.9G  4.2G  41% /
/dev/root       7.3G  2.9G  4.2G  41% /
devtmpfs        214M    0  214M   0% /dev
tmpfs           44M   364K   44M   1% /run
tmpfs           5.0M    0   5.0M   0% /run/lock
tmpfs           88M    0   88M   0% /run/shm
/dev/mmcblk0p1  56M   15M   42M  26% /boot
/dev/sda1       7.4G  560K   7.4G   1% /samba
pi@raspberrypi:~$ cd /dev/sda1
-bash: cd: /dev/sda1: Not a directory
pi@raspberrypi:~$ cd /samba
pi@raspberrypi:/samba$ ls
libpcap0.8_1.3.0-1_armhf.deb  xl2tpd_1.3.1+dfsg-1_armhf.deb
ppp_2.4.5-5.1_armhf.deb      zjuvpn-8.2.tar.gz
pi@raspberrypi:/samba$
```

Figure 4

安装软件：

```
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 /
```

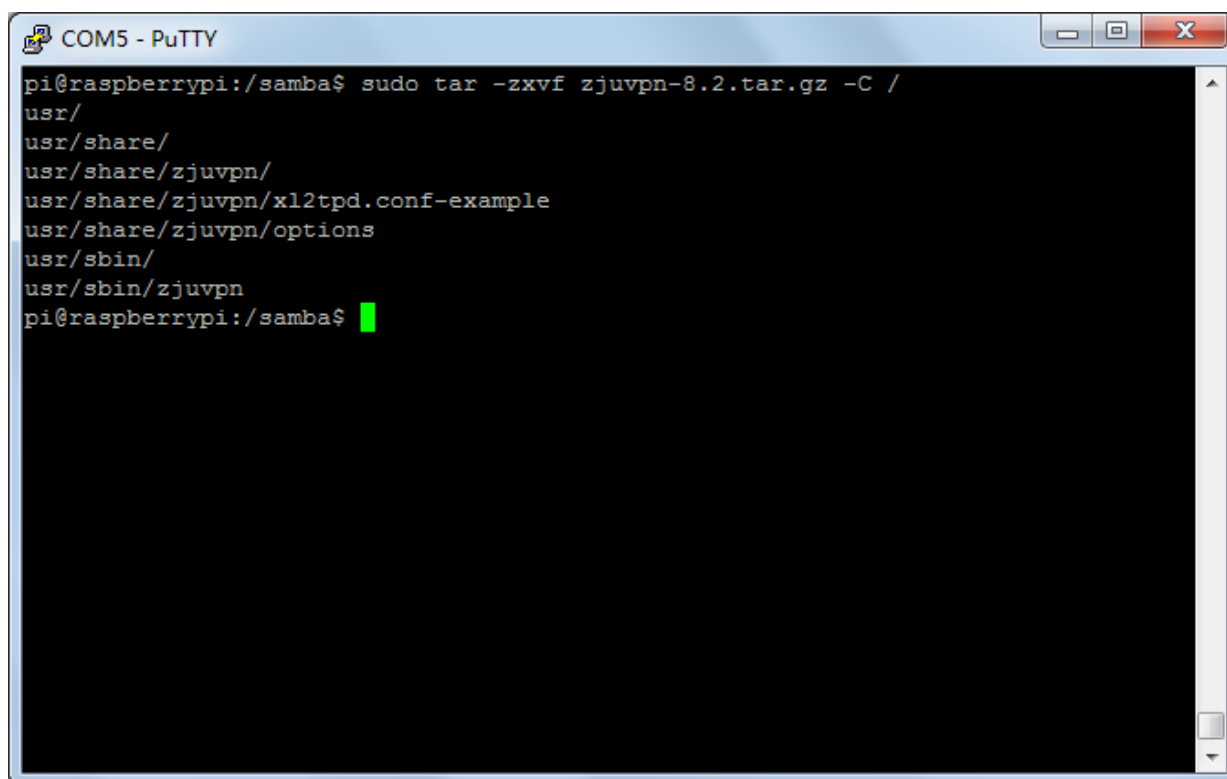
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```
COM5 - PuTTY
Type dpkg-deb --help for help about manipulating *.deb files;

Options marked [*] produce a lot of output - pipe it through `less' or `more' !
pi@raspberrypi:/samba$ sudo dpkg -i libpcap0.8_1.3.0-1_armhf.deb
Selecting previously unselected package libpcap0.8:armhf.
(Reading database ... 78929 files and directories currently installed.)
Unpacking libpcap0.8:armhf (from libpcap0.8_1.3.0-1_armhf.deb) ...
Setting up libpcap0.8:armhf (1.3.0-1) ...
Processing triggers for man-db ...
pi@raspberrypi:/samba$ sudo dpkg -i ppp_2.4.5-5.1_armhf.deb
Selecting previously unselected package ppp.
(Reading database ... 78939 files and directories currently installed.)
Unpacking ppp (from ppp_2.4.5-5.1_armhf.deb) ...
update-rc.d: using dependency based boot sequencing
Setting up ppp (2.4.5-5.1) ...
Processing triggers for man-db ...
pi@raspberrypi:/samba$ sudo dpkg -i xl2tpd_1.3.1+dfsg-1_armhf.deb
Selecting previously unselected package xl2tpd.
(Reading database ... 79052 files and directories currently installed.)
Unpacking xl2tpd (from xl2tpd_1.3.1+dfsg-1_armhf.deb) ...
Setting up xl2tpd (1.3.1+dfsg-1) ...
Starting xl2tpd: xl2tpd.
Processing triggers for man-db ...
pi@raspberrypi:/samba$
```

Figure 5



```
COM5 - PuTTY
pi@raspberrypi:/samba$ sudo tar -zxvf zjuvpn-8.2.tar.gz -C /
usr/
usr/share/
usr/share/zjuvpn/
usr/share/zjuvpn/xl2tpd.conf-example
usr/share/zjuvpn/options
usr/sbin/
usr/sbin/zjuvpn
pi@raspberrypi:/samba$
```

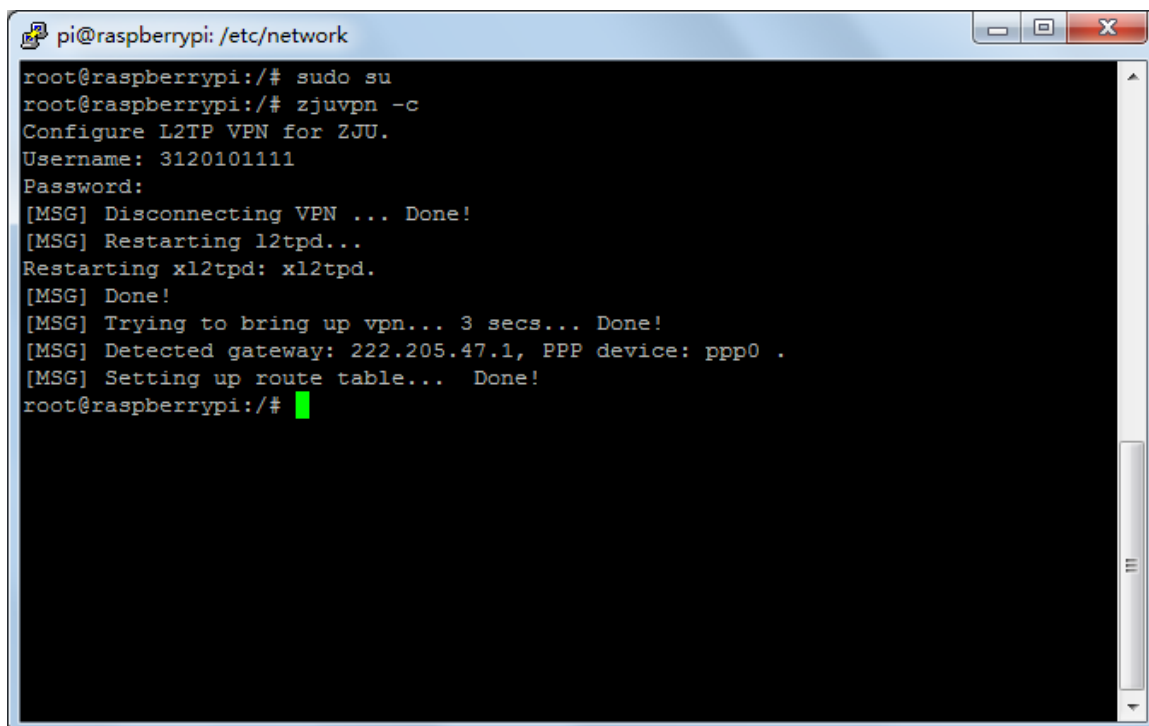
Figure 6

至此，浙大 vpn 已安装完毕。

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2. 拨通校网 VPN。

拨通 vpn



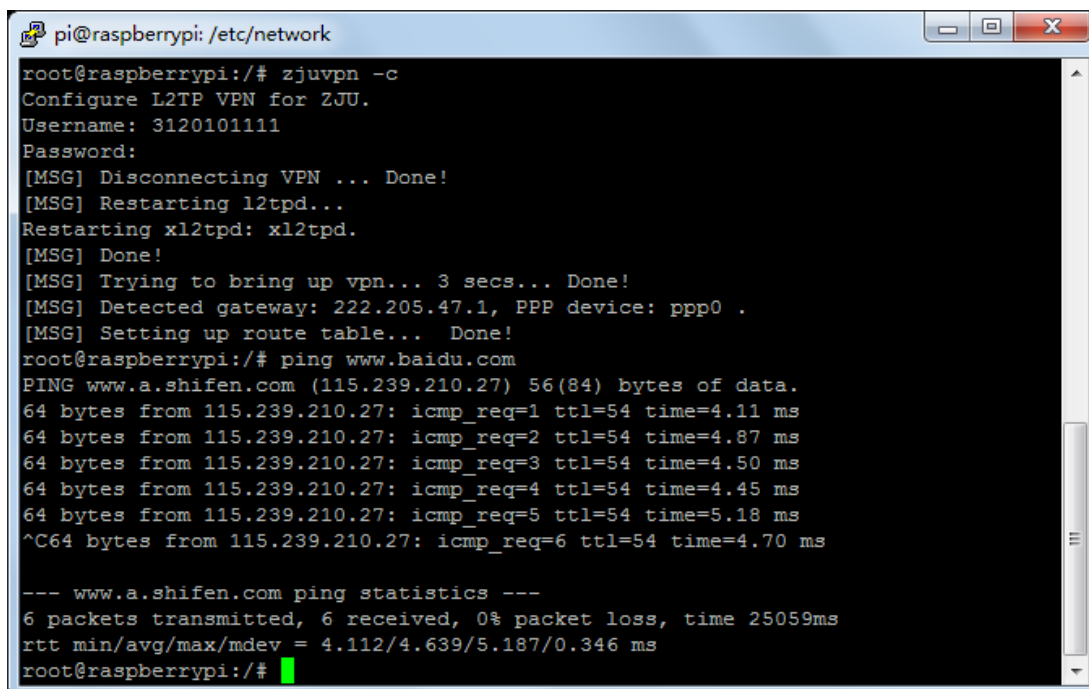
```

pi@raspberrypi: /etc/network
root@raspberrypi:/# sudo su
root@raspberrypi:/# zjuvpn -c
Configure L2TP VPN for ZJU.
Username: 3120101111
Password:
[MSG] Disconnecting VPN ... Done!
[MSG] Restarting l2tpd...
Restarting xl2tpd: xl2tpd.
[MSG] Done!
[MSG] Trying to bring up vpn... 3 secs... Done!
[MSG] Detected gateway: 222.205.47.1, PPP device: ppp0 .
[MSG] Setting up route table... Done!
root@raspberrypi:/#

```

Figure 7

Ping www.baidu.com



```

pi@raspberrypi: /etc/network
root@raspberrypi:/# zjuvpn -c
Configure L2TP VPN for ZJU.
Username: 3120101111
Password:
[MSG] Disconnecting VPN ... Done!
[MSG] Restarting l2tpd...
Restarting xl2tpd: xl2tpd.
[MSG] Done!
[MSG] Trying to bring up vpn... 3 secs... Done!
[MSG] Detected gateway: 222.205.47.1, PPP device: ppp0 .
[MSG] Setting up route table... Done!
root@raspberrypi:/# ping www.baidu.com
PING www.a.shifen.com (115.239.210.27) 56(84) bytes of data.
64 bytes from 115.239.210.27: icmp_req=1 ttl=54 time=4.11 ms
64 bytes from 115.239.210.27: icmp_req=2 ttl=54 time=4.87 ms
64 bytes from 115.239.210.27: icmp_req=3 ttl=54 time=4.50 ms
64 bytes from 115.239.210.27: icmp_req=4 ttl=54 time=4.45 ms
64 bytes from 115.239.210.27: icmp_req=5 ttl=54 time=5.18 ms
^C64 bytes from 115.239.210.27: icmp_req=6 ttl=54 time=4.70 ms

--- www.a.shifen.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 25059ms
rtt min/avg/max/mdev = 4.112/4.639/5.187/0.346 ms
root@raspberrypi:/#

```

Figure 8

证明可以访问外网。

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五、实验数据记录和处理

暂无实验数据

六、实验结果与分析

完成全部实验要求

七、讨论、心得

本次试验比较简单, 主要是进行静态 ip 的申请, 完成树莓派 mac 地址的绑定, 在参考别人的博客下, 下载了四个浙大 vpn 的安装包, 完成安装后, 就可以使用账号密码拨 vpn 出校了。