

第一章 wifi 开发环境配置

注意：本教程所用开发环境为 ubuntu 16.04 LTS

所使用的串口通信线为 pl2303, ch340 不可用

1. Minicom 配置

Minicom 为 linux 下类似“超级终端”的应用程序，其在 ubuntu 下的安装配置步骤如下

(1) 下载安装 minicom

打开终端，输入 `sudo apt-get install minicom`

(2) 配置 minicom

插入 pl2303 串口线，在终端输入 `dmesg |grep tty` 查找设备名

```
yushan@yushan-Lenovo-ideapad-Y700-15ISK:~$ dmesg |grep tty
[ 0.000000] console [tty0] enabled
[ 6.289591] usb 1-2: pl2303 converter now attached to ttyUSB0
yushan@yushan-Lenovo-ideapad-Y700-15ISK:~$
```

可以看出 pl2303 接入了 ttyUSB0

(3) 进入主界面后按 **Ctrl+A** 然后再按 **Z**

```

yushan@yushan-Lenovo-ideapad-Y700-15ISK: ~
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)

Welco+-----+
|                                     Minicom Command Summary                                     |
|                                                                                                     |
| OPTIO|                                                                                                     |
| Compi|                                                                                                     |
| Port  |                                                                                                     |
|                                                                                                     |
| Press |                                                                                                     |
|                                                                                                     |
| Dialing directory..D | run script (Go)....G | Clear Screen.....C |
| Send files.....S   | Receive files.....R | cOnfigure Minicom..0 |
| comm Parameters....P | Add linefeed.....A | Suspend minicom....J |
| Capture on/off....L | Hangup.....H       | eXit and reset....X |
| send break.....F   | initialize Modem...M | Quit with no reset.Q |
| Terminal settings..T | run Kermit.....K   | Cursor key mode....I |
| lineWrap on/off...W | local Echo on/off..E | Help screen.....Z |
| Paste file.....Y   | Timestamp toggle...N | scroll Back.....B |
| Add Carriage Ret...U |                                                                 |
|                                                                 |
| Select function or press Enter for none.█ |
+-----+

CTRL-A Z for help | 115200 8N1 | NOR | Minicom 2.7 | VT102 | Online 0:0 | vUSB0

```

(4) 按 **O** 进入配置界面, 选择 **Serial port setup**

```
yushan@yushan-Lenovo-ideapad-Y700-15ISK: ~
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)

Welcome to minicom 2.7

OPTIONS: I18n
Compiled on Feb  7 2016, 13:37:27.
Port /dev/ttyUSB0, 16:17:31

Press CTRL-A Z for help on special keys

+-----[configuration]-----+
| Filenames and paths         |
| File transfer protocols     |
| Serial port setup           |
| Modem and dialing           |
| Screen and keyboard         |
| Save setup as dfl           |
| Save setup as..             |
| Exit                         |
+-----+

CTRL-A Z for help | 115200 8N1 | NOR | Minicom 2.7 | VT102 | Online 0:0 | yUSB0
```

(5) 按如图所示配置

```
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)

Welcome to minicom 2.7

)PTI+-----+
Comp| A - Serial Device       : /dev/ttyUSB0
Port| B - Lockfile Location   : /var/lock
Pres| C - Callin Program      :
     | D - Callout Program     :
     | E - Bps/Par/Bits        : 115200 8N1
     | F - Hardware Flow Control : Yes
     | G - Software Flow Control : No
     | Change which setting? █
+-----+
| Screen and keyboard         |
| Save setup as dfl           |
| Save setup as..             |
| Exit                         |
+-----+

CTRL-A Z for help | 115200 8N1 | NOR | Minicom 2.7 | VT102 | Online 0:0 | yUSB0
```

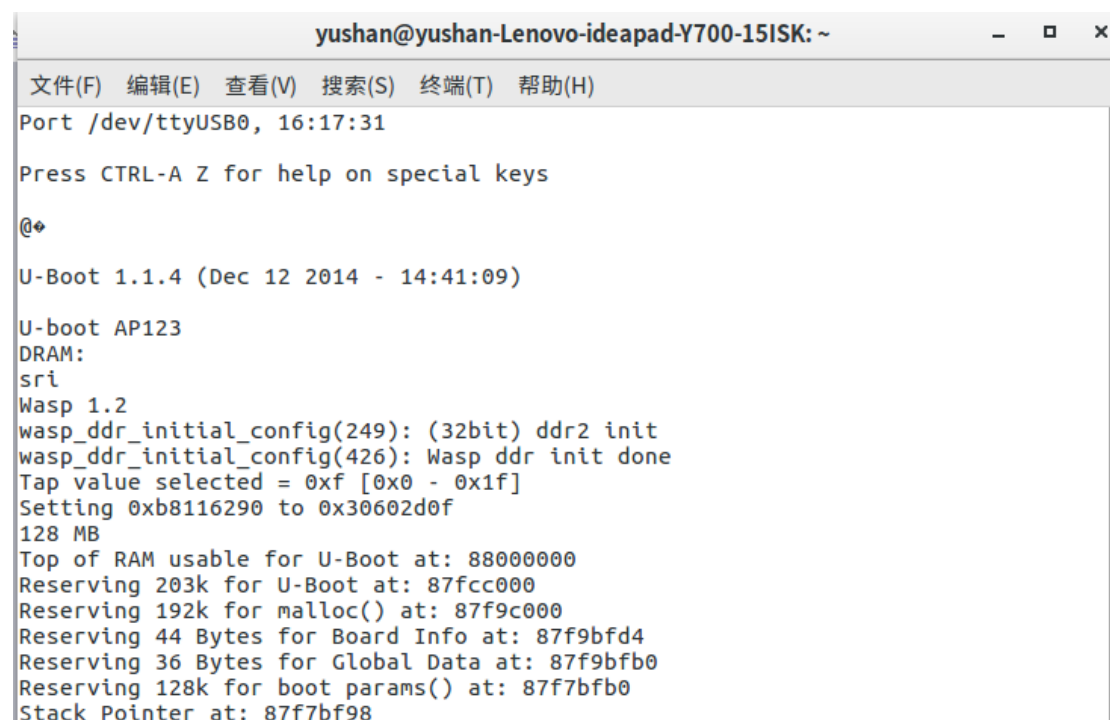
(6) 选择 save as dfl 即可

```
IONS: I18n
filed on Feb  7 2016, 13:37:27.
: /dev/ttyUSB0, 16:17:31
```

Press CTRL-A Z for help on special keys

```
+-----[configuration]-----+
| Filenames and paths          |
| File transfer protocols      |
| Serial port setup           |
| Modem and dialing           |
| Screen and keyboard         |
| Save setup as dfl            |
| Save setup as..             |
| Exit                         |
+-----+-----+-----+-----+
```

(7) 将串口线与开发板相连，开发板上电后可以看到在终端里看到启动信息，如下图所示



The screenshot shows a terminal window titled 'yushan@yushan-Lenovo-ideapad-Y700-15ISK: ~'. The terminal output includes the following text:

```
Port /dev/ttyUSB0, 16:17:31
Press CTRL-A Z for help on special keys
@@
U-Boot 1.1.4 (Dec 12 2014 - 14:41:09)
U-boot AP123
DRAM:
sri
Wasp 1.2
wasp_ddr_initial_config(249): (32bit) ddr2 init
wasp_ddr_initial_config(426): Wasp ddr init done
Tap value selected = 0xf [0x0 - 0x1f]
Setting 0xb8116290 to 0x30602d0f
128 MB
Top of RAM usable for U-Boot at: 88000000
Reserving 203k for U-Boot at: 87fcc000
Reserving 192k for malloc() at: 87f9c000
Reserving 44 Bytes for Board Info at: 87f9bfd4
Reserving 36 Bytes for Global Data at: 87f9bfb0
Reserving 128k for boot params() at: 87f7bfb0
Stack Pointer at: 87f7bf98
```

2. tftp 服务器搭建

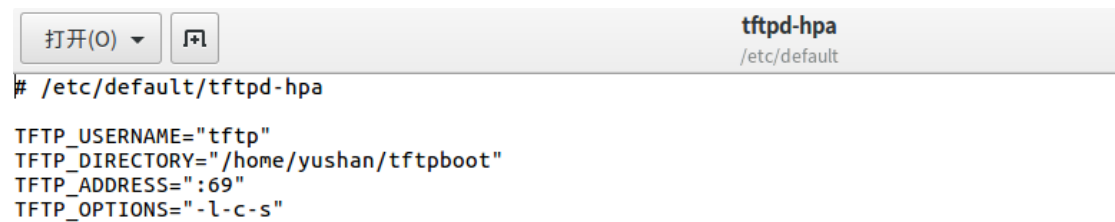
tftp 服务器是一个轻量级的文件传输服务器，我们通过该服务器和开发板通过网口传输文件。

(1).安装 tftp-server

```
sudo apt-get install tftpd-hpa
```

(2)配置 TFTP 服务器

```
sudo vim /etc/default/tftpd-hpa
```



```
# /etc/default/tftpd-hpa

TFTP_USERNAME="tftp"
TFTP_DIRECTORY="/home/yushan/tftpboot"
TFTP_ADDRESS=":69"
TFTP_OPTIONS="-l-c-s"
```

第二行是 tftp 服务器的文件存储地址，可按自己实际需求更改

(3)重启 tftp 服务器

3.openwrt 编译环境配置

本开发板需使用 openwrt 12.09 attitude adjustment 版本

(1)安装 git 版本控制工具

```
sudo apt-get install git
```

(2)下载 openwrt

```
git clone -b attitude_adjustment git://github.com/openwrt/openwrt.git
```

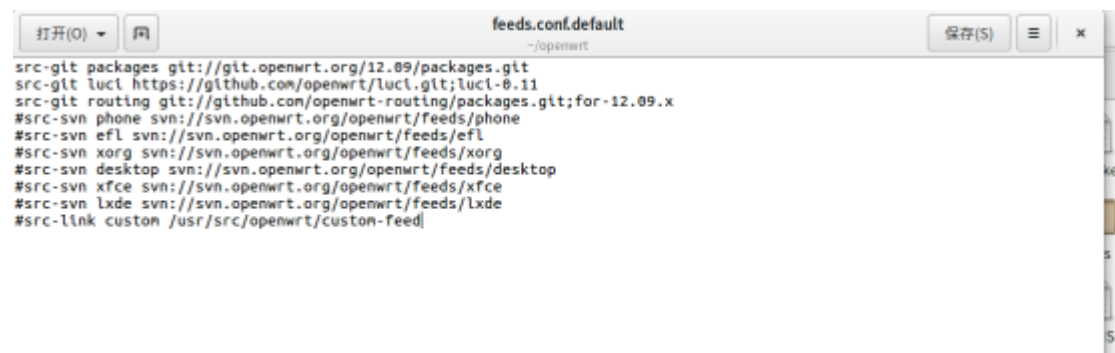
(3)安装依赖包

```
sudo apt-get install g++
sudo apt-get install libncurses5-dev
sudo apt-get install zlib1g-dev
sudo apt-get install bison
sudo apt-get install flex
sudo apt-get install unzip
sudo apt-get install autoconf
sudo apt-get install gawk
sudo apt-get install make
sudo apt-get install gettext
sudo apt-get install gcc
sudo apt-get install binutils
sudo apt-get install patch
sudo apt-get install bzip2
sudo apt-get install libz-dev
sudo apt-get install asciidoc
sudo apt-get install subversion
```

(4) Luci 等软件的安装

12.09 里的软件源已经失效，需要手动更新。

编辑 `openwrt/feeds.conf.default` 改成如下图所示



更改内容如下

```
src-git packages git://git.openwrt.org/12.09/packages.git
```

```
src-git luci https://github.com/openwrt/luci.git;luci-0.11
```

```
src-git routing git://github.com/openwrt-routing/packages.git;for-12.09.x
```

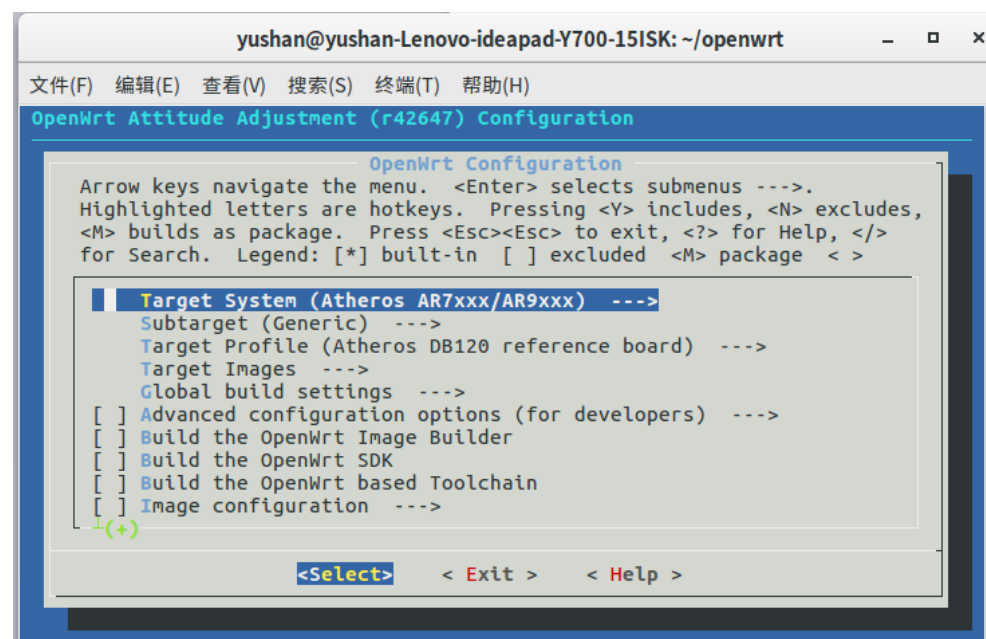
打开终端，`cd` 进入 `openwrt` 文件夹，输入

```
./scripts/feeds update -a
```

```
./scripts/feeds install -a
```

(5)配置 openwrt

在终端输入 `make menuconfig`，配置如下图所示



将 Target System, Subtarget, Target Profile 配置成如图所示

```
yushan@yushan-Lenovo-ideapad-Y700-15ISK: ~/openwrt
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)
OpenWrt Attitude Adjustment (r42647) Configuration

OpenWrt Configuration
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> builds as package. Press <Esc><Esc> to exit, <?> for Help, </>
for Search. Legend: [*] built-in [ ] excluded <M> package < >

^(-)
Package features --->
Base system --->
Network --->
[*] LuCI --->
Kernel modules --->
Multimedia --->
Administration --->
Sound --->
Languages --->
Utilities --->
+(<+)

<Select> < Exit > < Help >
```

进入 Luci，在 collections 目录下选择安装 luci

```
yushan@yushan-Lenovo-ideapad-Y700-15ISK: ~/openwrt
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)
OpenWrt Attitude Adjustment (r42647) Configuration

1. Collections
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> builds as package. Press <Esc><Esc> to exit, <?> for Help, </>
for Search. Legend: [*] built-in [ ] excluded <M> package < >

<*> luci
< > luci-ssl..... Standard OpenWrt set with HTTP

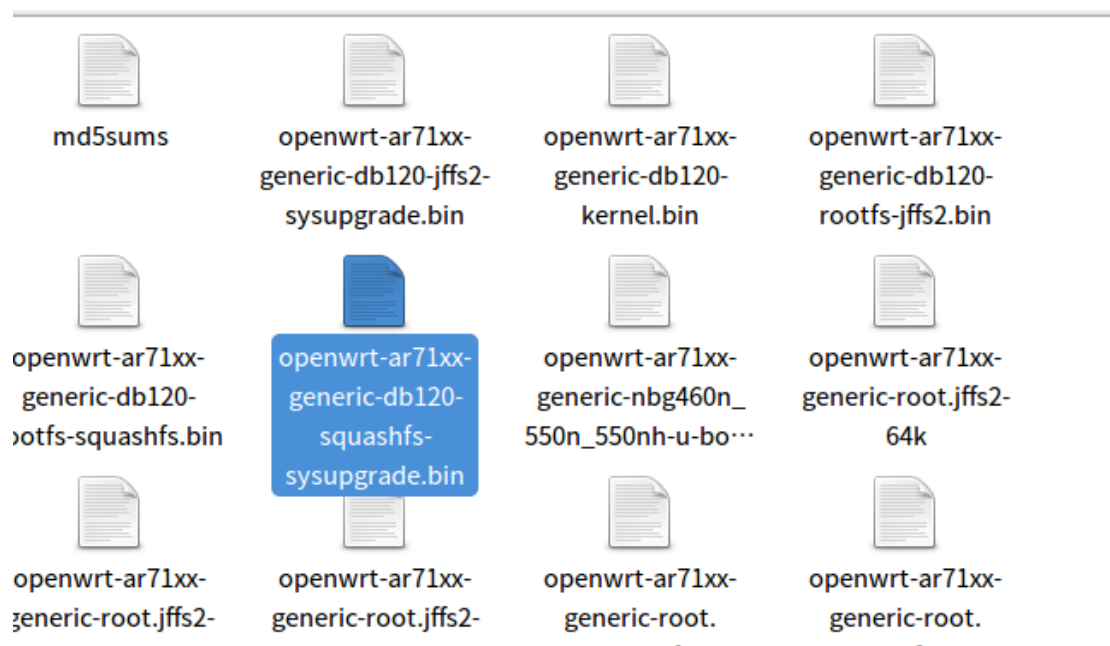
<Select> < Exit > < Help >
```

(6)编译 openwrt

在终端里输入 `sudo make V=s -j1`

第一次编译会下载一些软件耗时会较长，且会出现链接失效情况，这时需自己下载软件将其放入 `openwrt/dl` 文件夹中。

编译好的文件在 `openwrt/bin/`下



4、通过 Uboot 烧写入 openwrt

(1)进入 minicom 用串口连接 wifi 开发板，给开发板上电

(2)因开发板自带 uboot，开机时会倒数 10s，这时候按下空格键进入 uboot，如下图所示

```
yushan@yushan-Lenovo-ideapad-Y700-15ISK: ~
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)
: cfg1 0x80000000 cfg2 0x7114
eth0: 00:03:7f:09:0b:ad
s27 reg init
athrs27_phy_setup ATHR_PHY_CONTROL 4 :1000
athrs27_phy_setup ATHR_PHY_SPEC_STAUS 4 :10
eth0 up
WASP ----> S27 PHY
: cfg1 0xf cfg2 0x7214
eth1: 00:03:7f:09:0b:ad
s27 reg init lan
ATHRS27: resetting s27
ATHRS27: s27 reset done
athrs27_phy_setup ATHR_PHY_CONTROL 0 :1000
athrs27_phy_setup ATHR_PHY_SPEC_STAUS 0 :10
athrs27_phy_setup ATHR_PHY_CONTROL 1 :1000
athrs27_phy_setup ATHR_PHY_SPEC_STAUS 1 :10
athrs27_phy_setup ATHR_PHY_CONTROL 2 :1000
athrs27_phy_setup ATHR_PHY_SPEC_STAUS 2 :10
athrs27_phy_setup ATHR_PHY_CONTROL 3 :1000
athrs27_phy_setup ATHR_PHY_SPEC_STAUS 3 :10
eth1 up
eth0, eth1
Hit any key to stop autoboot: 0
ar7240>
```

进入后可以看到 ar7240> 的示例。

(3)把编译后的名中带有 sysupgrade 的 bin 文件放入 tftp 服务器设定的文件夹中，将电脑和开发板用网线相连，将电脑 IP 改为 192.168.11.11

(4)在 minicom 里输入 tftp 0x80060000 name.bin && erase 0x9f050000 +\$filesize && cp.b \$fileaddr 0x9f050000 \$filesize && reset

name.bin 是编译得到的二进制文件

(5)待开发板重启后可以看到开发板正常启动，进入 openwrt 系统

openwrt 的 jffs2 和 squashfs 两个版本的区别

官方下载的都分 jffs2 和 squashfs 两种格式,jffs2 文件系统格式是适合于断电的系统,不像 FAT 那样容易丢文件,因为路由器一般都容易突然断电。官方的 jffs2 格式刷到路由器后就是一个 jffs2 分区,ROM 本身和以后安装的软件都在这个分区里都可以读写。而 squashfs 格式则是把 ROM 压缩到了一个文件刷进路由器,然后剩下的空间格式化成 jffs2 并且优先于 ROM 文件,有点像 WM 手机上的情况。ROM 只读分区挂在 /rom 下,而另一个可读写 jffs2 分区挂到 /overlay,当 /overlay 下有和 /rom 同名的文件就优先读这个,相当于覆盖了 ROM 文件,实际上并没有覆盖。这种情况的优点是 ROM 压缩率高,可写分区就更大一点,其次只要备份 /overlay 就可以把 ROM 以为的所有文件都备份下来,以后全部还原就可以不用重新配置了。格式化 /overlay 分区就相当于恢复 openwrt 出厂设置了。官方推荐 squashfs,因为这种格式就算配置乱了还可以恢复刷机后的出厂设置,二是压缩后节省空间。jffs2 格式搞乱了就只能重刷了。