



华为WCDMA/CDMA模块设备在 Android系统的内核驱动集成指导文档



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华为技术有限公司

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2011-2-9	V1.0			初稿	方晓志 00110321
2011-8-25	V1.2.0			加入MC509在android下升级失败的解决方案	刘其峰 KF39449
2011-11-10	V1.2.2			根据USB协议规范, 加入零包机制。针对usb1.1协议不添加零包, 针对usb2.0协议及以上添加零包。以解决模块升级遇到零包法处理问题。	刘其峰 KF39449

华为模块的 Android内核驱动集成指导文档

Catalog 目 录

1	目的.....	3
2	范围.....	3
3	总体概述.....	3
3.1	Android系统的Linux内核支持华为模块设备的驱动架构	3
4	Android系统的Linux内核驱动集成方案	4
4.1	Android内核的USB串口驱动集成步骤	4
4.1.1	USB串口驱动集成的修改内容	5
4.1.2	USB串口驱动集成配置的操作步骤	5
5	附录.....	12
5.1	确认系统识别单板, 正确加载驱动的情况	12
5.2	获取单板当前的端口映射情况信息	13

1 目的

本文档主要是针对华为模块设备基于Android系统的内核驱动集成开发活动进行相关的指导说明。主要面向基于Android系统的产品开发商的驱动开发人员。

2 范围

本文档主要说明了在Android系统上支持华为模块设备的相关内核驱动开发工作，及其注意事项。

本文档主要针对华为WCDMA/CDMA制式的模块设备在Android系统上的内核驱动集成工作。

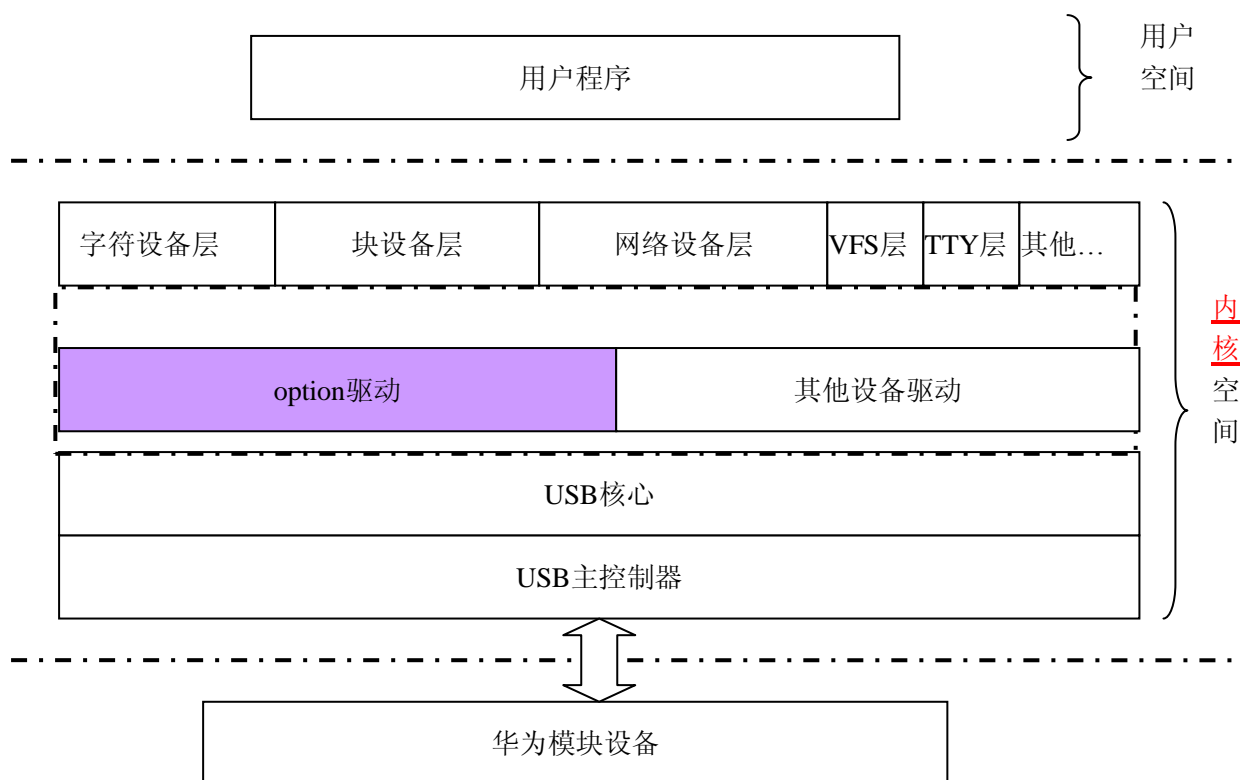
本文档主要针对于linux-2.6.29(包括29)-linux-2.6.35(不包括35)内核版本的android系统。

3 总体概述

3.1 Android 系统的 Linux 内核支持华为模块设备的驱动架构

对于华模块设备来说，不管是什么类型的接口，其上报的复合设备接口，最终均是加载为Android的Linux内核的 USB设备驱动层中的相关驱动模块。

对于华为模块设备的支持，Android系统的Linux内核相关USB驱动架构如下图所示：



如上图所示，在Linux系统中的USB驱动架构中，跟华为模块设备相关的驱动模块，主要是USB设备驱动程序层中的option串口驱动模块；因此本文档主要讲述跟该驱动相关的集成操作。

若集成过程中发现问题，请及时和华为集成支持人员取得联系。

4 Android 系统的 Linux 内核驱动集成方案

本章主要说明通过修改集成Android的内核驱动的方案来支持华为模块设备的集成方案。

我司提供的集成代码包为：

Android Driver x.xx.xx.xx.zip

4.1 Android 内核的 USB 串口驱动集成步骤

本集成方案涉及到的Linux内核源码文件主要有：

kernel/drivers/usb/serial/option.c

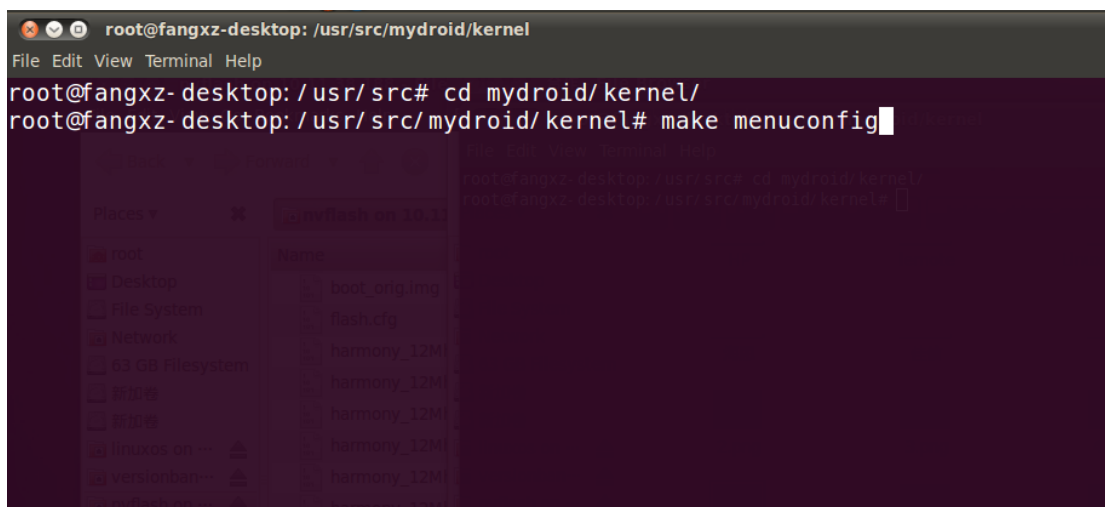


4.1.1 USB 串口驱动集成的修改内容

1. 从我司提供的集成代码包中获取option.c文件，然后使用该文件替换嵌入式Android内核中drivers/usb/serial目录中的原始的option.c文件。
2. 修改Android内核的编译配置，确保下面的配置项已经被选定(enabled)。
 - i. USB电源管理特性的相关配置项：
CONFIG_USB_SUSPEND=y
 - ii. USB串口驱动相关的配置项：
CONFIG_USB_SERIAL=y
CONFIG_USB_SERIAL_OPTION=y
 - iii. PPP拨号的相关配置项：
CONFIG_PPP=y
CONFIG_PPP_MULTILINK=y
CONFIG_PPP_FILTER=y
CONFIG_PPP_ASYNC=y
CONFIG_PPP_SYNC_TTY=y
CONFIG_PPP_DEFLATE=y
CONFIG_PPP_BSDCOMP=y

4.1.2 USB 串口驱动集成配置的操作步骤

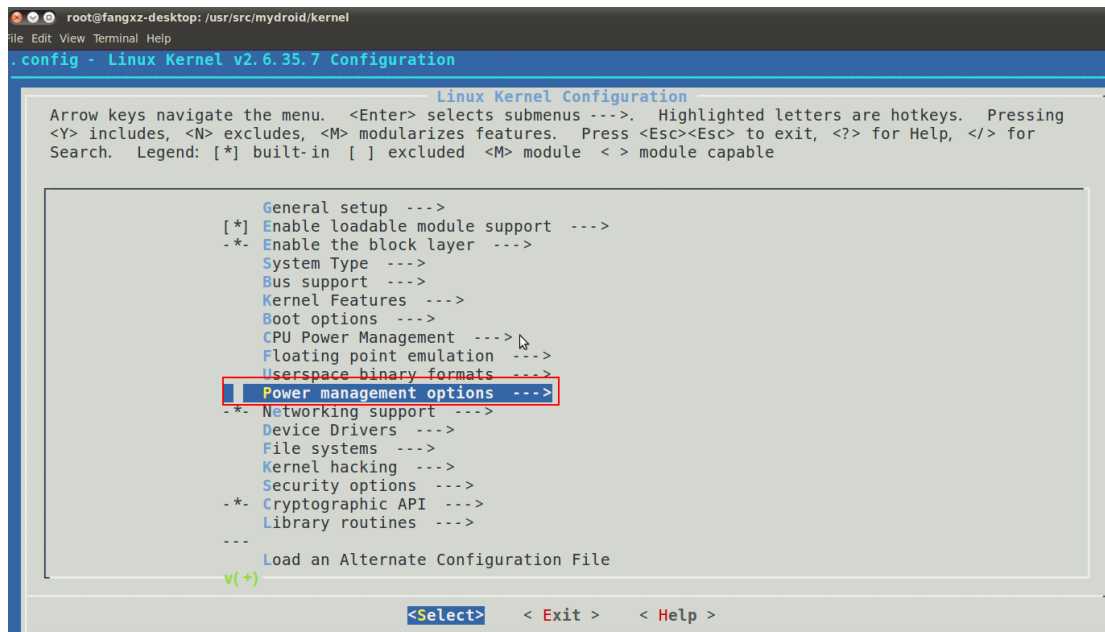
1. 打开Terminal工具，进入kernel目录（假定kernel在/usr/src/myandroid/目录下，即cd /usr/src/myandroid/kernel），然后执行make <configuration>命令（在本文中，假定使用标准的make menuconfig）。



2. 选择相关的配置项

1) USB电源管理特性的相关配置项:

- a) 如果Android的内核版本为2.6.33或以上版本, 请先进行下面的配置, 之后再执行b)步骤的配置。



```
root@fangxz-desktop: /usr/src/mydroid/kernel
.config - Linux Kernel v2.6.35.7 Configuration

Power management options
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing
<Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for
Search. Legend: [*] built-in [ ] excluded <M> module <> module capable

[*] Power Management support
[*]   Power Management Debug Support
[ ]   Extra PM attributes in sysfs for low-level debugging/testing (NEW)
[ ]   Verbose Power Management debugging
[*] Suspend to RAM and standby
[*]   Test suspend/resume and wakealarm during bootup
<> Advanced Power Management Emulation (NEW)
[*] Run-time PM core functionality

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

```
root@fangxz-desktop: /usr/src/mydroid/kernel
.config - Linux Kernel v2.6.32.9 Configuration

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

General setup --->
[*] Enable loadable module support --->
[*] Enable the block layer --->
System Type --->
Bus support --->
Kernel Features --->
Boot options --->
CPU Power Management --->
Floating point emulation --->
Userspace binary formats --->
Power management options --->
[*] Networking support --->
[*] Device Drivers --->
File systems ---->
Kernel hacking --->
Security options ---->
<> Cryptographic API ---->
Library routines ---->
---
Load an Alternate Configuration File

v(+)
```

b) 如果Android的内核版本低于2.6.33版本，请直接进行下面的配置。

```
root@fangxz-desktop: /usr/src/mydroid/kernel
.config - Linux Kernel v2.6.32.9 Configuration

Device Drivers
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing
<Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for
Search. Legend: [*] built-in [ ] excluded <M> module <> module capable

^(-)
Character devices --->
<*> I2C support --->
[*] SPI support --->
PPS support --->
-* GPIO Support --->
<> Dallas's 1-wire support --->
<*> Power supply class support --->
<> Hardware Monitoring support --->
<> Generic Thermal sysfs driver --->
[ ] Watchdog Timer Support --->
[ ] Sonics Silicon Backplane --->
Multifunction device drivers --->
[*] Voltage and Current Regulator Support --->
<*> Multimedia support --->
Graphics support --->
<> Sound card support --->
[*] HID Devices --->
[*] USB support --->
<> Ultra Wideband devices (EXPERIMENTAL) --->
<*> MMC/SD/SDIO card support --->
v(+)
```

```
root@fangxz-desktop: /usr/src/mydroid/kernel
.config - Linux Kernel v2.6.32.9 Configuration

USB support
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing
<Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for
Search. Legend: [*] built-in [ ] excluded <M> module <> module capable

^(-)
[ ] USB device class-devices (DEPRECATED)
[ ] Dynamic USB minor allocation
[*] USB selective suspend/resume and wakeup
[ ] Rely on OTG Targeted Peripherals List
[ ] Disable external hubs
USB Monitor
<*>
<> Enable Wireless USB extensions (EXPERIMENTAL)
<> Support WUSB Cable Based Association (CBA)
*** USB Host Controller Drivers ***
<> Cypress C67x00 HCD support
<> xHCI HCD (USB 3.0) support (EXPERIMENTAL)
<*> EHCI HCD (USB 2.0) support
-* Root Hub Transaction Translators
[ ] Improved Transaction Translator scheduling (EXPERIMENTAL)
<> OXU210HP HCD support
<> ISP116X HCD support
<> ISP 1760 HCD support
<> ISP1362 HCD support
<> OHCI HCD support
<> UHCI HCD (most Intel and VIA) support
v(+)
```

2) USB串口驱动相关的配置项



```
root@fangxz-desktop: /usr/src/mydroid/kernel
.config - Linux Kernel v2.6.32.9 Configuration

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

General setup --->
[*] Enable loadable module support --->
[*] Enable the block layer --->
System Type --->
Bus support --->
Kernel Features --->
Boot options --->
CPU Power Management --->
Floating point emulation --->
Userspace binary formats --->
Power management options --->
[*] Networking support --->
[*] Device Drivers --->
File systems --->
Kernel hacking --->
Security options --->
< > Cryptographic API --->
Library routines --->
Load an Alternate Configuration File
v(+)
```

```
root@fangxz-desktop: /usr/src/mydroid/kernel
.config - Linux Kernel v2.6.32.9 Configuration

Device Drivers
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing
<Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for
Search. Legend: [*] built-in [ ] excluded <M> module <> module capable

^(-)
Character devices --->
<*> I2C support --->
[*] SPI support --->
PPS support --->
-* GPIO Support --->
< > Dallas's 1-wire support --->
<*> Power supply class support --->
< > Hardware Monitoring support --->
< > Generic Thermal sysfs driver --->
[ ] Watchdog Timer Support --->
Sonics Silicon Backplane --->
Multifunction device drivers --->
[*] Voltage and Current Regulator Support --->
<*> Multimedia support --->
Graphics support --->
< > Sound card support --->
[*] HID Devices --->
[*] USB support --->
< > Ultra Wideband devices (EXPERIMENTAL) --->
<*> MMC/SD/SDIO card support --->
v(+)
```

```
root@fangxz-desktop: /usr/src/mydroid/kernel
File Edit View Terminal Help
.config - Linux Kernel v2.6.32.9 Configuration

                                USB support
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing
<Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for
Search. Legend: [*] built-in [ ] excluded <M> module <> module capable

^(-)
<>  Olympus MAUSB-10/Fuji DPC-R1 support
<>  Support OneTouch Button on Maxtor Hard Drives
<>  Support for Rio Karma music player
<>  SAT emulation on Cypress USB/ATA Bridge with ATACB
[ ]  The shared table of common (or usual) storage devices
***  USB Imaging devices ***
<>  USB Mustek MDC800 Digital Camera support
<>  Microtek X6USB scanner support
***  USB port drivers ***
<+> USB Serial Converter support --->
***  USB Miscellaneous drivers ***
<>  EMI 6|2m USB Audio interface support
<>  EMI 2|6 USB Audio interface support
<>  ADU devices from Ontrak Control Systems
<>  USB 7-Segment LED Display
<>  USB Diamond Rio500 support
<>  USB Lego Infrared Tower support
<>  USB LCD driver support
<>  USB BlackBerry recharge support
<>  USB LED driver support
v(+)

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

```
root@fangxz-desktop: /usr/src/mydroid/kernel
File Edit View Terminal Help
.config - Linux Kernel v2.6.32.9 Configuration

                                USB Serial Converter support
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing
<Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for
Search. Legend: [*] built-in [ ] excluded <M> module <> module capable

^(-)
<>  USB Moschip 7720 Serial Driver (NEW)
<>  USB Moschip 7840/7820 USB Serial Driver (NEW)
<>  USB Motorola Phone modem driver (NEW)
<>  USB Navman GPS device (NEW)
<>  USB Prolific 2303 Single Port Serial Driver (NEW)
<>  USB Ours Technology Inc. OTi-6858 USB To RS232 Bridge Controller (NEW)
<>  USB Qualcomm Serial modem (NEW)
<>  USB SPCP8x5 USB To Serial Driver (NEW)
<>  USB HP4x Calculators support (NEW)
<>  USB Safe Serial (Encapsulated) Driver (NEW)
<>  USB Siemens MPI driver (NEW)
<>  USB Sierra Wireless Driver (NEW)
<>  USB Symbol Barcode driver (serial mode) (NEW)
<>  USB TI 3410/5052 Serial Driver (NEW)
<>  USB REINER SCT cyberJack pinpad/e-com chipcard reader (NEW)
<+> USB Xircom / Entegra Single Port Serial Driver (NEW)
<+> USB driver for GSM and CDMA modems
<>  USB ZyXEL omni.net LCD Plus Driver (NEW)
<>  USB Opticon Barcode driver (serial mode) (NEW)
<>  USB Debugging Device (NEW)

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

3) PPP拨号的相关配置项

```
root@fangxz-desktop: /usr/src/mydroid/kernel
.config - Linux Kernel v2.6.32.9 Configuration

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

General setup --->
[*] Enable loadable module support --->
[*] Enable the block layer --->
System Type --->
Bus support --->
Kernel Features --->
Boot options --->
CPU Power Management --->
Floating point emulation --->
Userspace binary formats --->
Power management options --->
[*] Networking support --->
[ ] Device Drivers --->
File systems --->
Kernel hacking --->
Security options --->
<> Cryptographic API --->
Library routines --->
---
Load an Alternate Configuration File

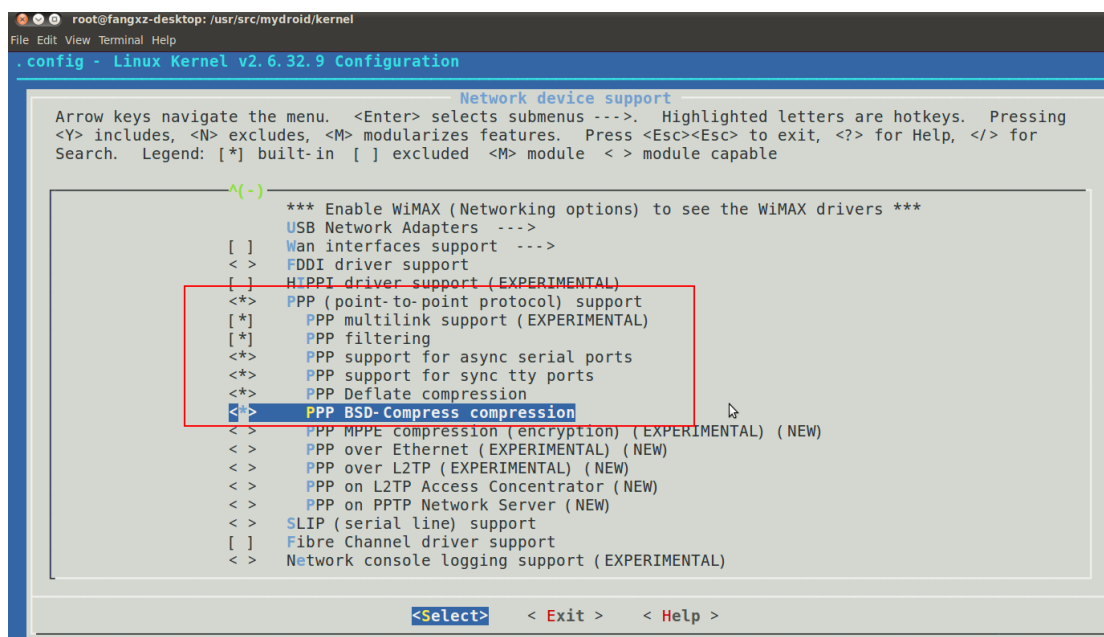
v(+)
```

```
root@fangxz-desktop: /usr/src/mydroid/kernel
.config - Linux Kernel v2.6.32.9 Configuration

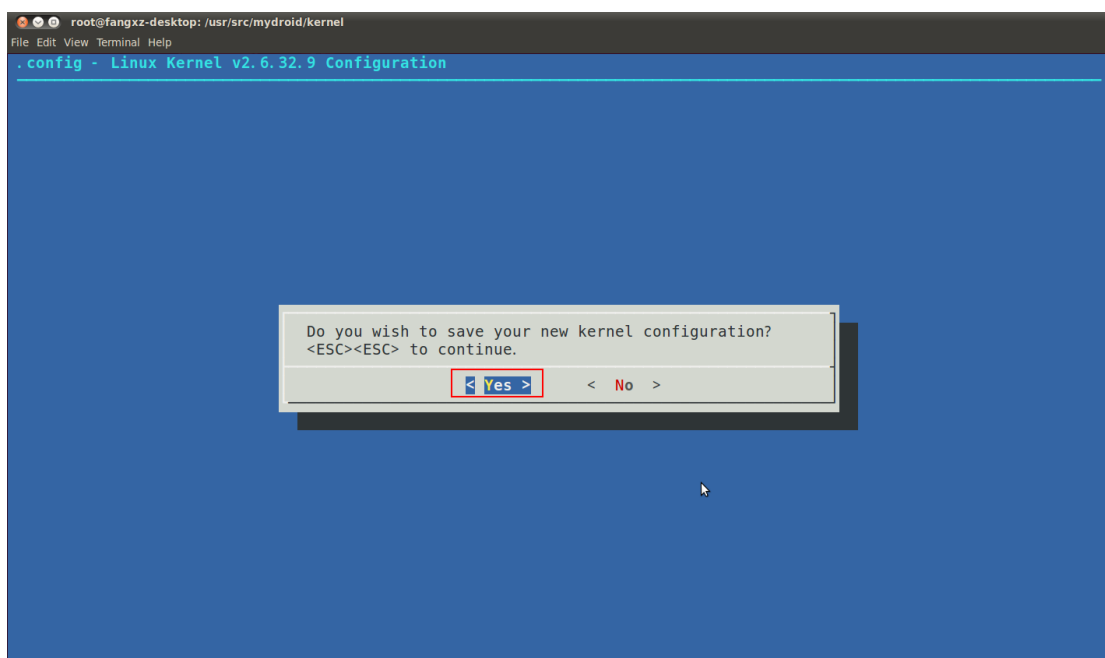
Device Drivers
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing
<Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for
Search. Legend: [*] built-in [ ] excluded <M> module <> module capable

^(-)
<> Parallel port support --->
[ ] Block devices --->
[*] Misc devices --->
<> ATA/ATAPI/MFM/RLL support --->
  SCSI device support --->
<> Serial ATA (prod) and Parallel ATA (experimental) drivers --->
[ ] Multiple devices driver support (RAID and LVM) --->
[ ] Fusion MPT device support --->
IEEE 1394 (FireWire) support --->
<> T20 device support --->
[*] Network device support --->
[ ] ISDN support --->
<> Telephony support --->
Input device support --->
Character devices --->
<*> I2C support --->
[*] SPI support --->
PPS support --->
-* GPIO Support --->
<> Dallas's 1-wire support --->

v(+)
```



3. 如上操作选完所需选项后，通过选择<Exit>按钮，逐层退出各个配置界面。最后在保存配置界面中，选择”Yes”选项并退出。



4. 完成配置后，即可运行 make 命令，编译修改后的内核版本。

5 附录

5.1 确认系统识别单板，正确加载驱动的情况

执行如下命令查看内核的log信息：

dmesg

假如内核的log信息中存在如下(或相似)的信息,则说明系统已经能够正确的识别单板设备,并在加载了驱动。

```
247 <6>[ 10.216991] yuv sensor_init
248 <6>[ 10.219958] usb 1-1: New USB device found, idVendor=12d1, idProduct=1404
249 <6>[ 10.219975] yuv sensor_probe
250 <6>[ 10.229758] usb 1-1: New USB device strings: Mfr=3, Product=2, SerialNumber=0
251 <6>[ 10.236963] usb 1-1: Product: HUAWEI MOBILE WCDMA EM770W
252 <6>[ 10.242426] usb 1-1: Manufacturer: HUAWEI Technology
253 <6>[ 10.257916] option 1-1:1.0: GSM modem (1-port) converter detected
254 <6>[ 10.270994] usb 1-1: GSM modem (1-port) converter now attached to ttyUSB0
255 <6>[ 10.282565] option 1-1:1.1: GSM modem (1-port) converter detected
256 <6>[ 10.295693] usb 1-1: GSM modem (1-port) converter now attached to ttyUSB1
257 <6>[ 10.322481] option 1-1:1.2: GSM modem (1-port) converter detected
258 <6>[ 10.328962] usb 1-1: GSM modem (1-port) converter now attached to ttyUSB2
259 <6>[ 10.345023] option 1-1:1.3: GSM modem (1-port) converter detected
260 <6>[ 10.345190] usb 1-1: GSM modem (1-port) converter now attached to ttyUSB3
```

5.2 获取单板当前的端口映射情况信息

- 当前数据卡/模块设备的modem、pcui等端口的设备文件名称 查询命令:

```
ls /dev/ttyUSB*
```