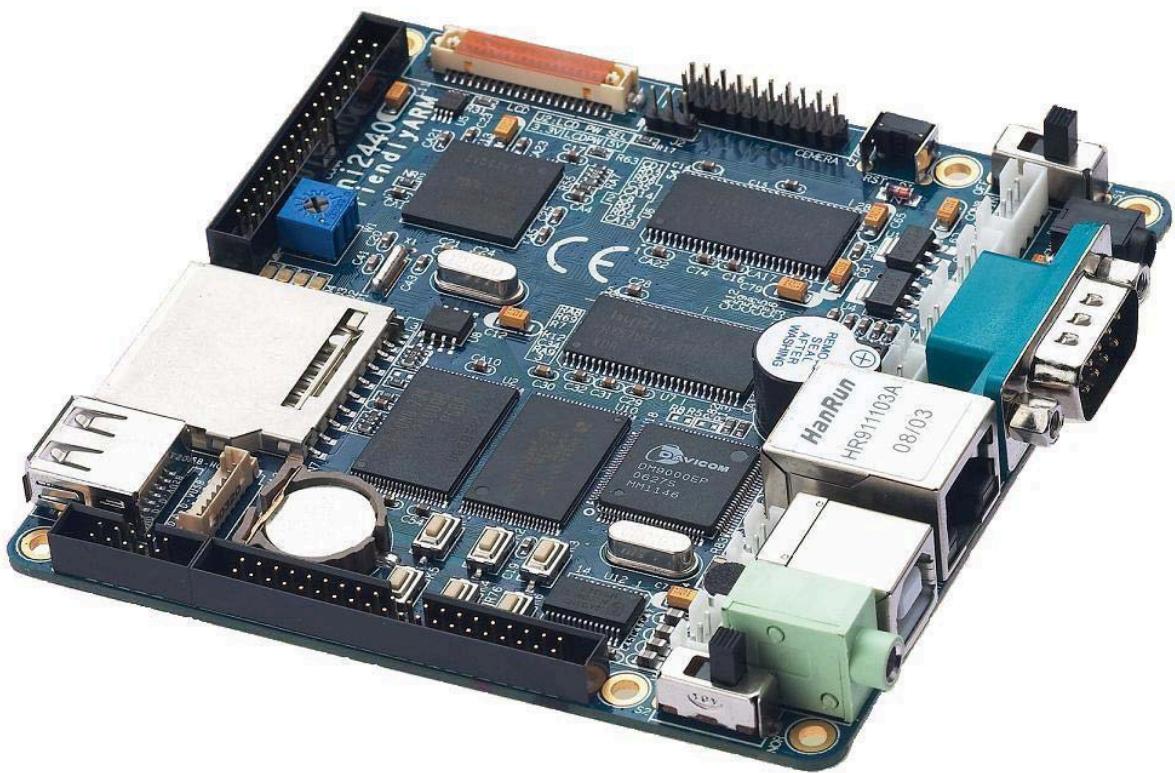


MINI2440 User Manual



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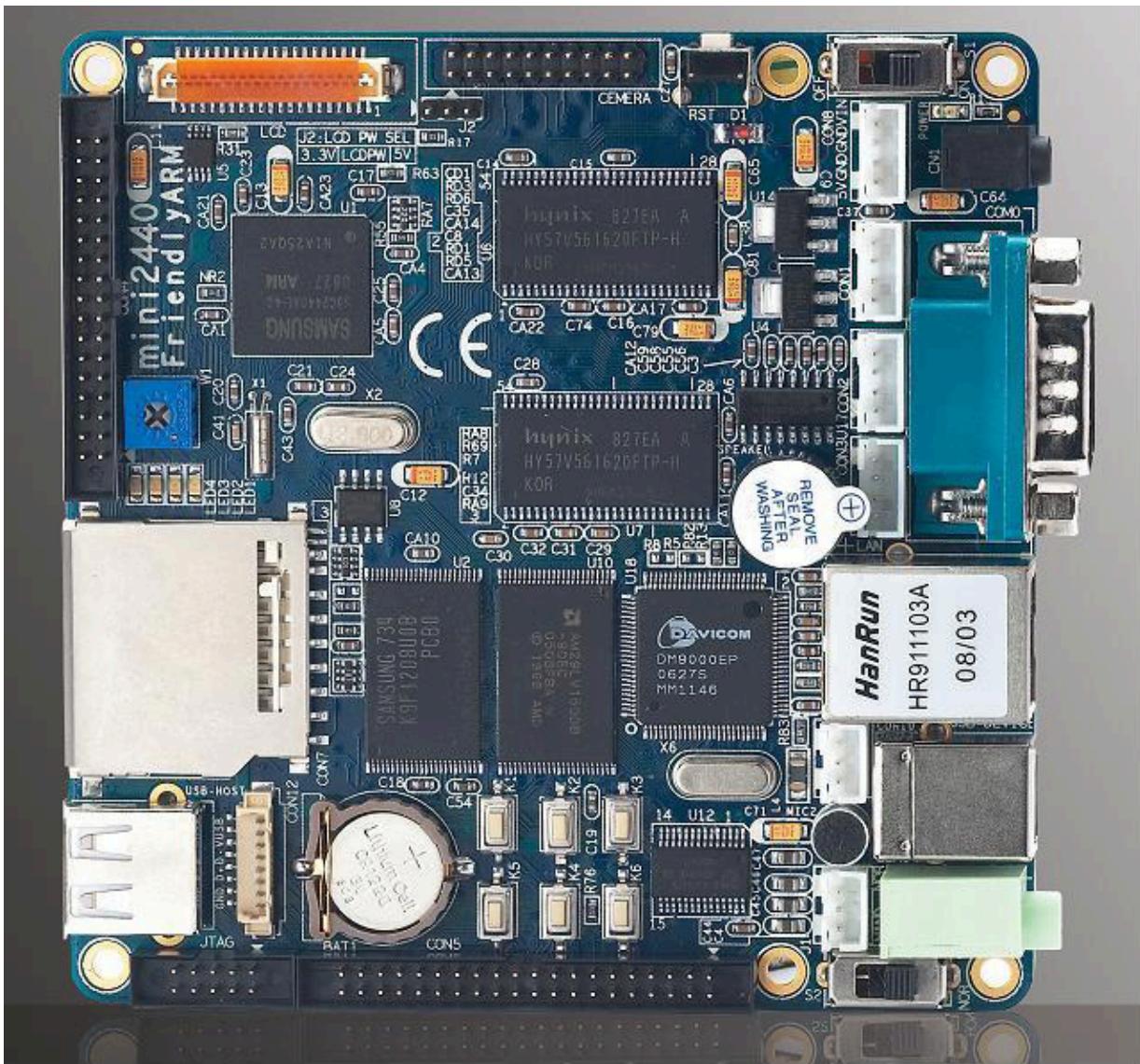
1. Overview

1.1 Description

MINI2440 is a single board computer based on Samsung S3C2440 microprocessor.



1.1.1 Topview of Board



Flash

- 64M Nand Flash,
- 2M Nor Flash, BIOS installed

LCD

- 4 wire resistive touch screen interface
- Up to 4096 color STN, 3.5 inches to 12.1 inches, up to 1024x768 pixels
- Up to 64K color TFT, 3.5 inches to 12.1 inches, up to 1024x768 pixels

Interface and Resource

- 1 10/100M Ethernet RJ-45(DM9000)
- 3 Serial Port
- 1 USB Host
- 1 USB Slave Type B
- 1 SD Card Interface
- 1 Stereo Audio out, 1 Micro In;
- 1 20-Pin JTAG
- 4 USER LEDs
- 6 USER buttons
- 1 PWM Beeper
- 1 POT can be used for A/D converter adjust
- 1 AT24C08 for I2C test
- 1 20-Pin Camera Interface
- 1 Battery for RTC
- Power In(5V), with switch and lamp

Oscillator Frequency

- 12MHz

RTC

- Internal

Expand Interface

- 1 34-Pin 2.0mm GPIO
- 1 40-Pin 2.0mm System Bus

Dimension

- 100 x 100(mm)

OS Support

- Linux 2.6.13
- Windows CE.Net 5.0

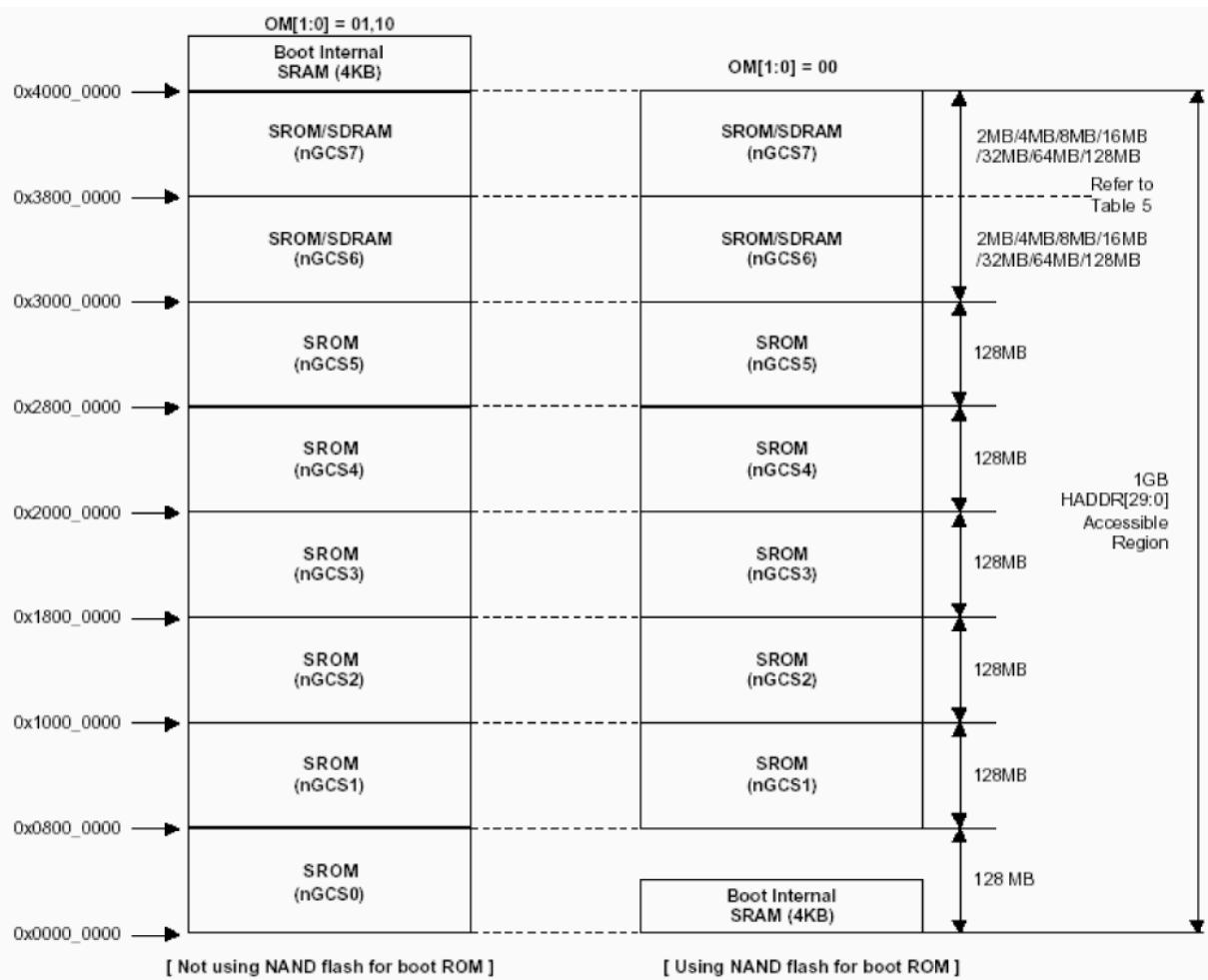
1.1.3 Material list on CD

- (1) H-JTAG Debugger
- (2) Windows Flash Programmer SJF2440
- (3) Linux Nand Flash Programmer Jflash-2440(source code included)
- (4) Serial tool CRT, dnw
- (5) Bitmap to C Language transfer tool
- (6) USB Driver(WindowXP/2000)
- (7) vivi source code(linux bootloader)
- (8) LED test program(ADS1.20 project)
- (9) 2440test program(ADS1.20 project), include :
key test, RTC test, ADC test, IIS Audio play(wav), IIS Audio record,
touch screen test, I2C test, Samsung 3.5"LCD, 640x480 TFT test
- (10) WindowsCE BSP and sample project file
- (11) Linux tool and kernel source code :
 - arm-linux-gcc-3.3.2 to compile Qtopia
 - arm-linux-gcc-3.4.1 to compile kernel
 - arm-linux-gcc-2.95.3 to compile vivi
 - yaffs file system image maker - mkyaffsimage
 - linux-2.6.13 for MINI2440 kernel source code(include DM9000,LCD driver, Audio, Touch screen, YAFFS Source code, SD Card, RTC, Expand serial driver, USB Camera,USB Mouse and Keyboard, U-Disk)
- (12) Qtopia source code, web browser source code
- (13) Schematic(Protel99SE/PDF)
- (14) User Manual(English)

1.2 Hardware Resource

1.2.1 Memory Map and Chip Selection

S3C2440 support 2 boot mode: Nand Flash boot and Nor Falsh boot. Memory map and chip selection is different based on different boot mode:



For Nand Flash Boot, 4k Bytes BootSram mapped to nGCS0 space

For Nor Flash Boot, Nor Flash mapped to nGCS0 space

SDRAM address space: 0x30000000-0x34000000

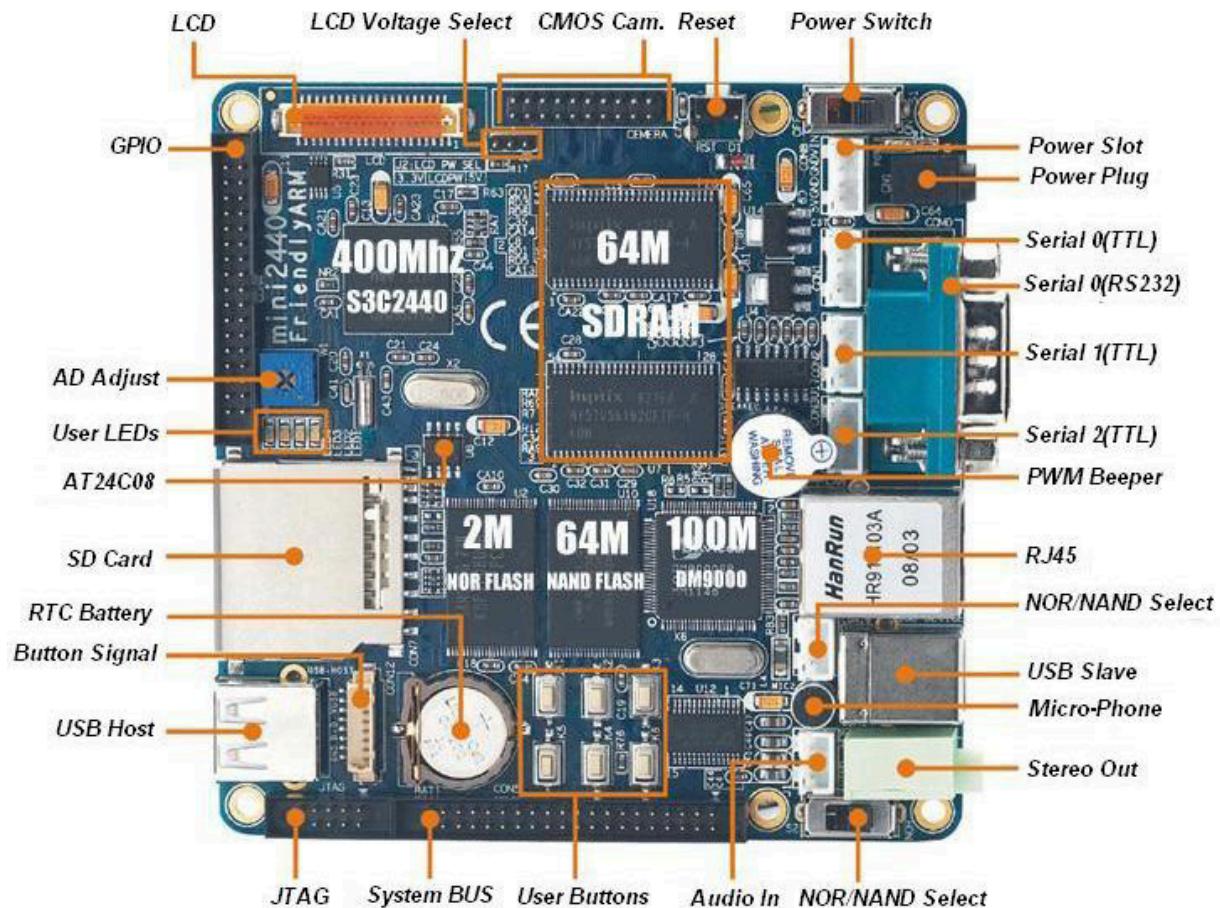
1.2.2 Jumpers

MINI2440 has 1 Jumper, J2:

(1) J2 Power voltage selection for LCD module

NEC LCD 3.5(240x320) : 5V

1.2.3 Interfaces



1.3 Linux Features

Version

- Linux 2.6.13

File system

- yaffs
- cramfs
- Ext2
- Fat32
- NFS

Basic driver(with source code)

- 3 serial driver
- DM9000 driver
- Audio driver
- RTC driver
- LED driver
- USB Host driver
- LCD driver

- Touch screen driver
- USB camera
- USB mouse, keyboard, U-disk, mobile-disk
- SD Card driver

Linux Application

- busybox1.2.0
- Telnet、Ftp、inetd
- boa(web server)
- madplay
- snapshot
- ishow
- ifconfig、ping、route

Embedded GUI(with source code)

- Qt/Embedded

1.4 Windows CE Features

Version

- WindowsCE.net 5.0

Features

- DM9000 driver(source code)
- USB keyboard、USB mouse、USB disk、mobile hard disk
- 3 serial port COM driver
- USB ActiveSync
- Audio driver
- SD driver
- Real time clock
- Registry saving
- Flash save when power lost
- Screen rotating

Default features(Simplify Chinese)

- XP style interface
- Windows Media Player 9.0(mp3, mpeg2, mpeg4, wmv, wav)
- Super Player
- Photo viewer, Note Pad
- IE6
- ftp,telnet,httpd server
- COM debugger

2. How to use MINI2440

Linux images were loaded before shipment (supervivi、zImage_n35、root_default.img), Note the procedures below will be run under Windows.

2.1 Hardware Setup

2.1.1 Boot Mode

Boot mode can be selected by S2, according words on silk screen:

S2 connect to Nor Flash side, system will boot from Nor Flash;
S2 connect to Nand Flash side, system will boot from Nand Flash.

BIOS which pre-loaded in Nor Flash and Nand Flash are the same in shipment. By default, S2 had been connected to Nand Flash.

2.1.2 External connection

1. Connect serial port 0 to PC COM port by a dummy modem cable
2. Connect Ethernet port to PC by a cross cable
3. Connect DC 5V power adapter to power supply in
4. Connect your phone set to stereo out(Green)
5. Connect your LCD module to LCD connector
6. Connect with PC by a USB cable

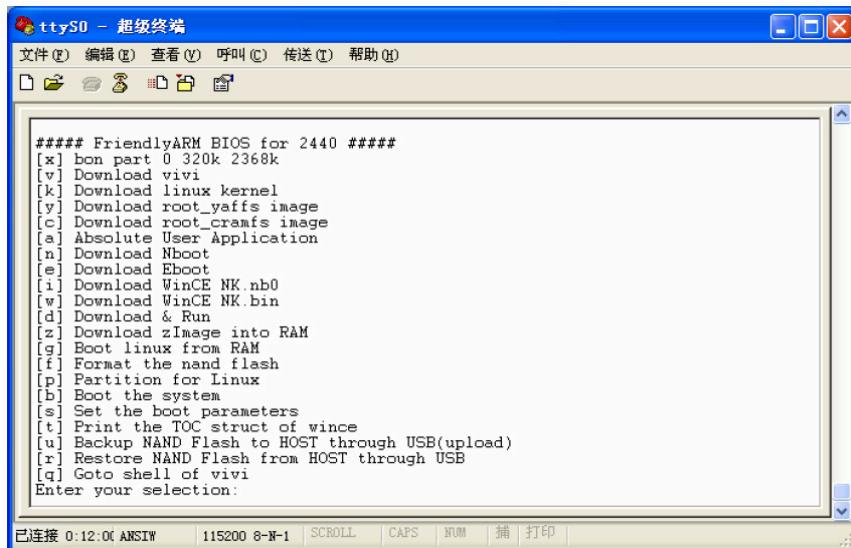
2.1.3 Hypterminal Setup



2.2 BIOS Function

2.2.1 Enter BIOS

Supervivi had been pre-loaded in Nor Flash before shipment. Set S2 to Nor Flash can enter BIOS main menu after power on:



About supervivi:

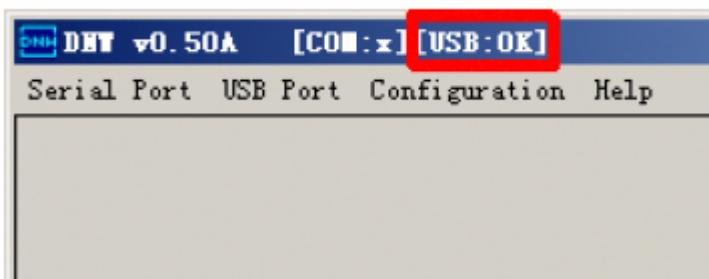
Supervivi is a bootloader based on Samsung open source vivi. It can be used as a tool to download and burn OS image to the flash on board. It can also be used to for parameters configuration. Supervivi download OS image file from PC by USB port.

Supervivi can be installed in either Nor Flash or Nand Flash. When Supervivi is booting from Nand Flash, user can hold down space bar in Hypterminal when board booting, to force supervivi enter main menu. Or supervivi will directly boot OS image by default.

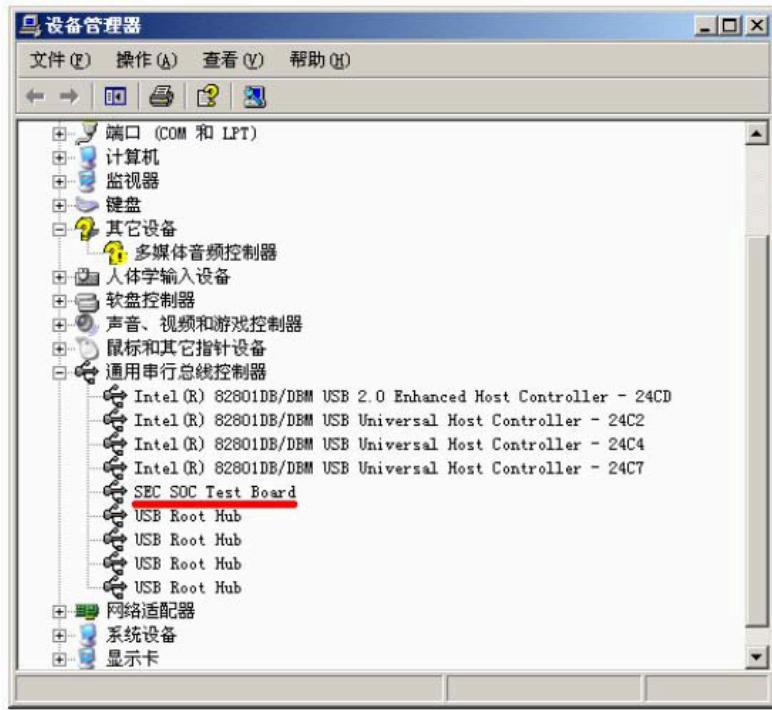
Supervivi also has a Download&Run feature which can run user image directly. There is a sample code 2440test on CD-ROM for this kind application.

2.2.2 Install USB Driver

DNW USB driver for windows is located on CD-ROM \windows\tool\usb. Install this driver when board connected to PC first time. Open DNW, “usb:ok” will indicated on DNW title bar if USB connection successfully:

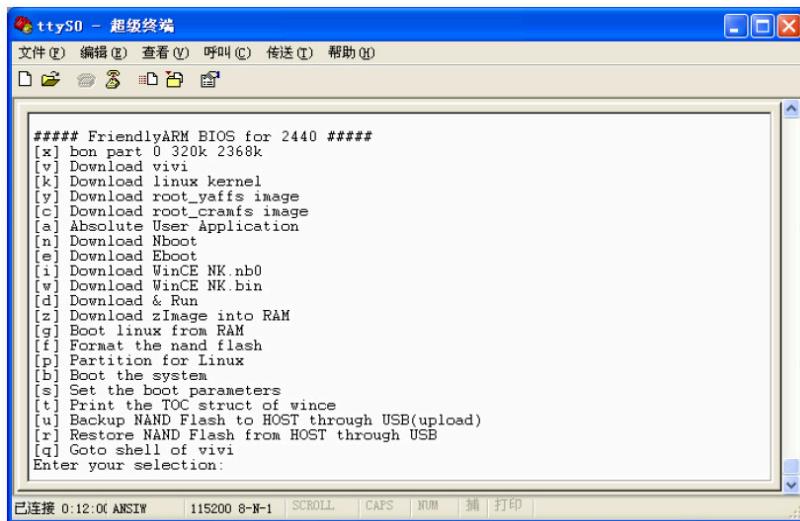


USB device list on PC after driver installation



2.2.3 Main Menu Function

Note: DNW is needed for all function related with image downloading through USB connection.



[X]: make default partition on Nand Flash

[V]: download vivi image to vivi partition on Nand Flash

[K]: download linux image to kernel partition on Nand Flash

[Y]: download yaffs file system image to root partition on Nand Flash

[C]: download cramfs file system image to root partition on Nand Flash

[A]: download user binary image to Nand Flash, like 2440test, uCos2, U-Boot

[N]: download Nboot image to block0 on Nand Flash

[E]: download Eboot to Eboot partition on Nand Flash

[I]: download NK.nb0 to Nand Flash

[w]: download NK.bin to Nand Flash

[d]: download exec image to specific memory address(Address is defined by DNW|Configuration|Option) and run it. The SDRAM address is 0x30000000 – 0x34000000. The memory size is 64Mbytes. The user available address space is 0x30000000 – 0x33DE8000.

[z]: download zImage to 0x30008000

[g]: run zImage image in memory, work together with command [z]

[f]: erase Nand Flash. The available address space for Nand Flash is 0x0 – 0x40000000

	Start Address	End Address
Vivi partition(block0-13)	0x0	0x50000
Linux kernel partition(block14-93)	0x50000	0x250000
File system partition(block94-4095)	0x250000	0x4000000
Whole Chip	0x0	0x4000000

[p]: make partition on Nand Flash for linux. Refer to sub menu function for details

[b]: boot OS

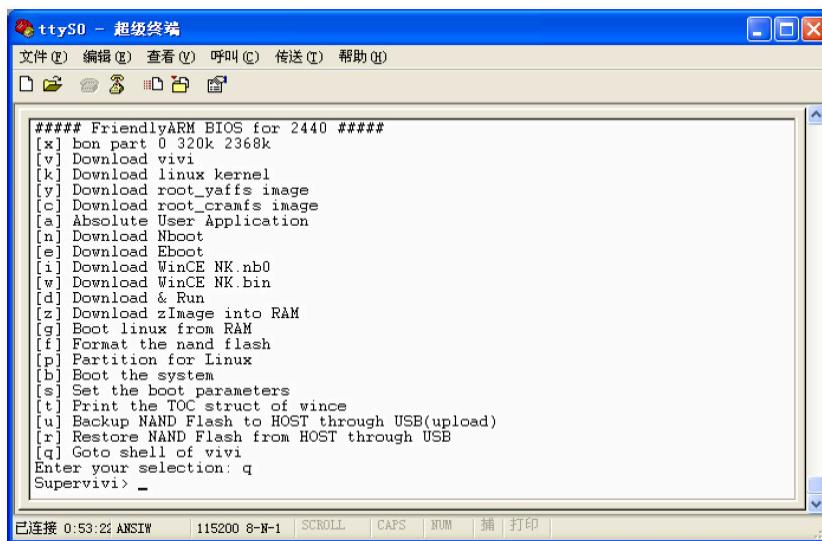
[s]: set linux start up parameters

[t]: display TOC of wince image

[u]: backup the whole content in nand flash and upload it to pc by dnw tool

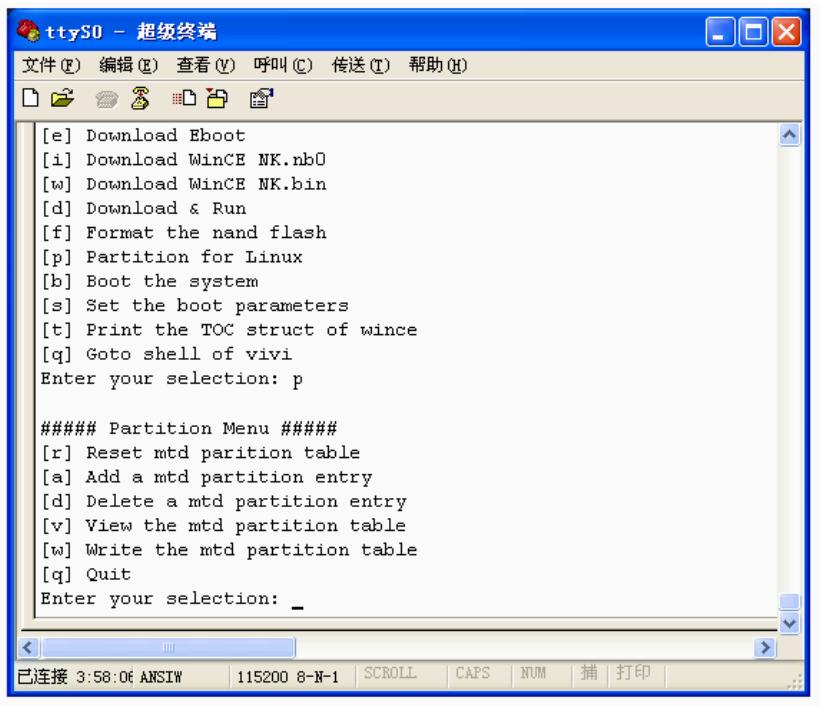
[r]: restore backup file to nand flash by dnw

[q]: go to regular command line interface for vivi



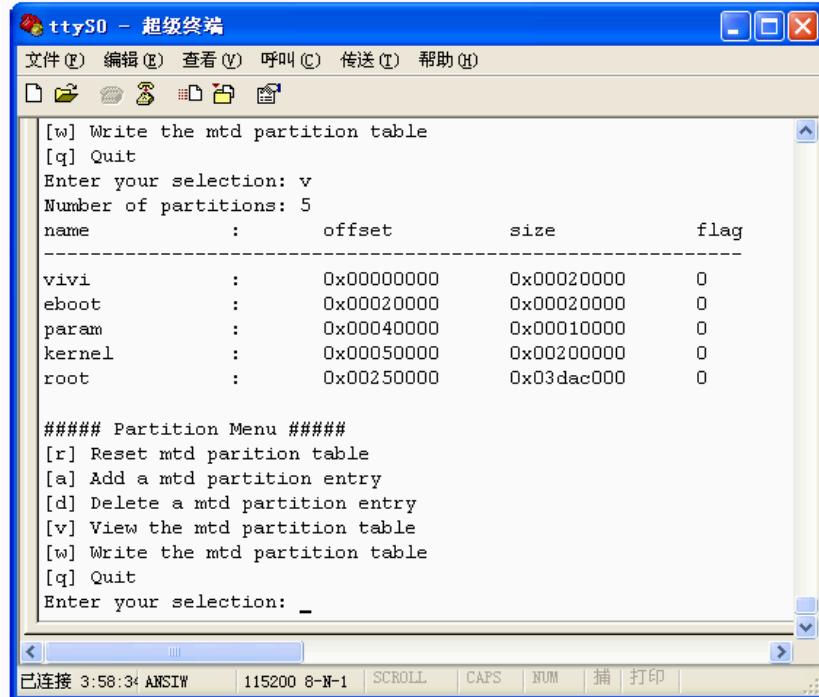
Type "menu" to return to main menu for supervivi

2.2.4 Partition Sub Menu Function



(1) View current partition

Type “v” to view current partition information. If Nand Flash is empty or new, default partition table will be displayed.



(2) Delete partition

```
param      : 0x00040000  0x00010000  0
kernel     : 0x00050000  0x00200000  0
root       : 0x00250000  0x03dac000  0

##### Partition Menu #####
[r] Reset mtd partition table
[a] Add a mtd partition entry
[d] Delete a mtd partition entry
[v] View the mtd partition table
[w] Write the mtd partition table
[q] Quit
Enter your selection: d
Enter partition name : vivi
deleted 'vivi' partition

##### Partition Menu #####
[r] Reset mtd partition table
[a] Add a mtd partition entry
[d] Delete a mtd partition entry
[v] View the mtd partition table
[w] Write the mtd partition table
[q] Quit
Enter your selection: _
```

Input "d" to delete specific partition. Input "vivi" if you want to delete "vivi" partition:

```
param      : 0x00040000  0x00010000  0
kernel     : 0x00050000  0x00200000  0
root       : 0x00250000  0x03dac000  0

##### Partition Menu #####
[r] Reset mtd partition table
[a] Add a mtd partition entry
[d] Delete a mtd partition entry
[v] View the mtd partition table
[w] Write the mtd partition table
[q] Quit
Enter your selection: d
Enter partition name : vivi
deleted 'vivi' partition

##### Partition Menu #####
[r] Reset mtd partition table
[a] Add a mtd partition entry
[d] Delete a mtd partition entry
[v] View the mtd partition table
[w] Write the mtd partition table
[q] Quit
Enter your selection: w
```

(3) Write Partition

Input "w" to write partition table. Partition modification can only take effect by write command.

```
deleted 'vivi' partition

##### Partition Menu #####
[r] Reset mtd partition table
[a] Add a mtd partition entry
[d] Delete a mtd partition entry
[v] View the mtd partition table
[w] Write the mtd partition table
[q] Quit
Enter your selection: w
Found block size = 0x0000c000
Erasing...    ... done
Writing...    ... done
Written 49152 bytes

##### Partition Menu #####
[r] Reset mtd partition table
[a] Add a mtd partition entry
[d] Delete a mtd partition entry
[v] View the mtd partition table
[w] Write the mtd partition table
[q] Quit
Enter your selection: _
```

(4) Append Partition

Input "a" to append a new partition. Supervivi will prompt you with some informations for the new partition like : name, offset, size and flag.

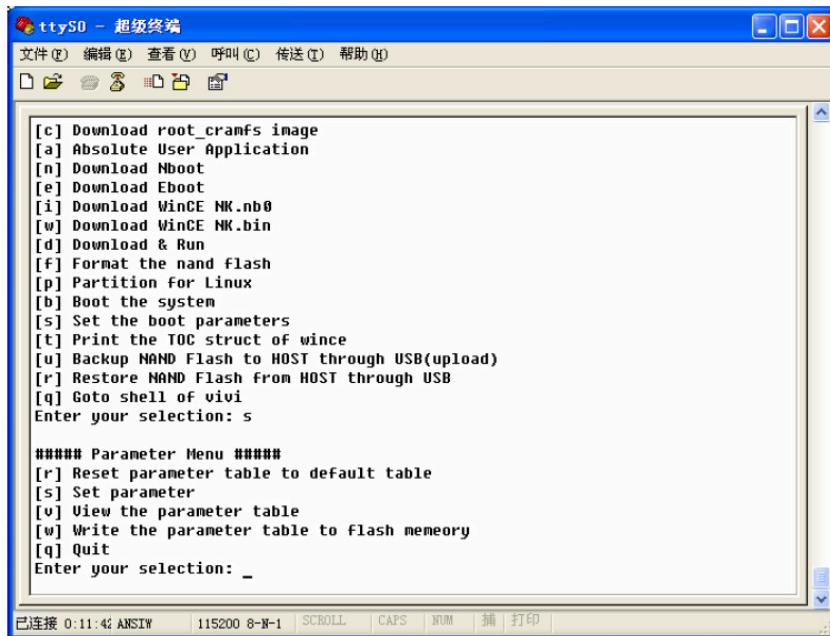
```
##### Partition Menu #####
[r] Reset mtd partition table
[a] Add a mtd partition entry
[d] Delete a mtd partition entry
[v] View the mtd partition table
[w] Write the mtd partition table
[q] Quit
Enter your selection: a
Enter partition name : vivi
Enter offset fo flash: 0x0
Enter size: 0x250000
Enter flag: 0
vivi: offset = 0x00000000, size = 0x00250000, flag = 0

##### Partition Menu #####
[r] Reset mtd partition table
[a] Add a mtd partition entry
[d] Delete a mtd partition entry
[v] View the mtd partition table
[w] Write the mtd partition table
[q] Quit
Enter your selection:
```

(5) Reset partition table

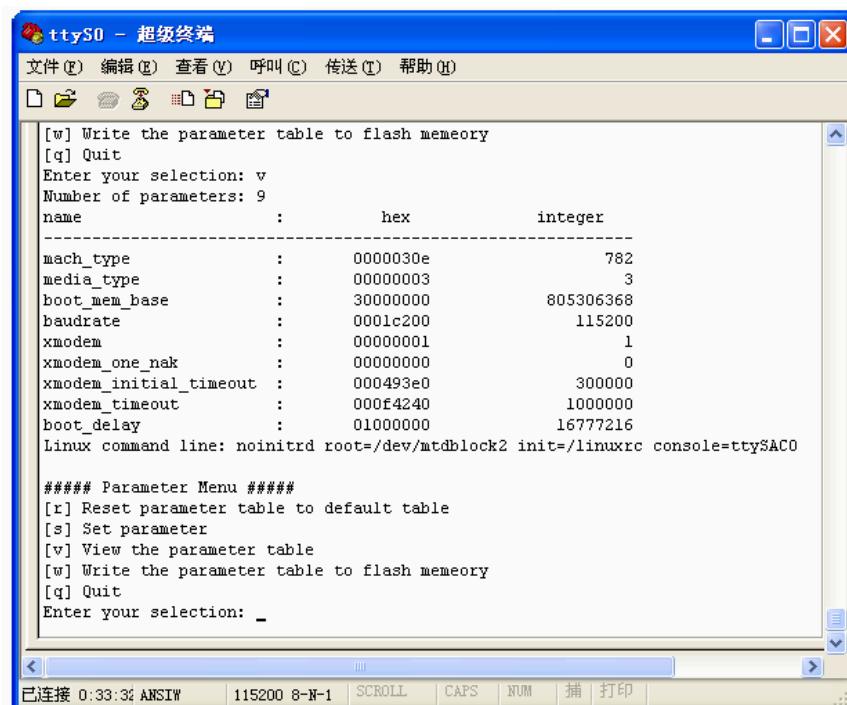
Input "r" to reset partition table with supervivi default parameter. Remember use "w" command to make your reset operation take effect.

2.2.5 Linux Parameter Setup



(1) View Parameter

Input "v" to view current parameters



(2) Set Parameter

Input "s" to set parameter.

How to set mach_type

The default mach_type is 782. You can change this parameter if you complier your kernel with MACH_TYPE 867.

The screenshot shows a Windows-style serial terminal window titled "COM1 (1) - CRT". The menu bar includes File, Edit, View, Options, Transfer, Script, Window, and Help. The toolbar contains icons for copy, paste, cut, find, and others. The main text area displays a command-line interface for setting parameters:

```
[w] Write the parameter table to flash memory
[q] Quit
Enter your selection: s
Enter the parameter's name(mach_type, media_type, linux_cmd_line, etc): mach_type
Enter the parameter's value(if the value contains space, enclose it with "): 867
Change 'mach_type' value. 0x00000363(867) to 0x00000363(867)

##### Parameter Menu #####
[r] Reset parameter table to default table
[s] Set parameter
[v] View the parameter table
[w] Write the parameter table to flash memory
[q] Quit
Enter your selection: w
Found block size = 0x0000c000
Erasing... ... done
Writing... ... done
Written 49152 bytes
Saved vivi private data

##### Parameter Menu #####
[r] Reset parameter table to default table
[s] Set parameter
[v] View the parameter table
[w] Write the parameter table to flash memory
[q] QUIT
Enter your selection: [
```

The status bar at the bottom indicates "Serial: COM1 | 27, 23 | 27 Rows, 88 Cols | Linux".

How to set linux command line

Linux_cmd_line is a very often used parameter for kernel startup. Here is an example for how to change default tty terminal from serial 0 to serial 1:

View current parameters:

Linux_cmd_line: noinitrd root=/dev/mtdblock2 init=/linuxrc console=ttySAC0

Input "s", and then input "linux_cmd_line", input "return", and then input:

"noinitrd root=/dev/mtdblock2 init=/linuxrc console=ttySAC1,115200"

The screenshot shows a Windows-style serial terminal window titled "COM1 (1) - CRT". The menu bar includes File, Edit, View, Options, Transfer, Script, Window, and Help. The toolbar contains icons for copy, paste, cut, find, and others. The main text area displays a command-line interface for setting parameters:

```
[q] Quit
Enter your selection: s
Enter the parameter's name(mach_type, media_type, linux_cmd_line, etc): linux_cmd_line
Enter the parameter's value(if the value contains space, enclose it with "): "noinitrd
root=/dev/mtdblock2 init=/linuxrc console=ttySAC1,115200"
Change linux command line to "noinitrd root=/dev/mtdblock2 init=/linuxrc console=ttySA
C1,115200"

##### Parameter Menu #####
[r] Reset parameter table to default table
[s] Set parameter
[v] View the parameter table
[w] Write the parameter table to flash memory
[q] Quit
Enter your selection: w
Found block size = 0x0000c000
Erasing... ... done
Writing... ... done
Written 49152 bytes
Saved vivi private data

##### Parameter Menu #####
[r] Reset parameter table to default table
[s] Set parameter
[v] View the parameter table
[w] Write the parameter table to flash memory
[q] Quit
Enter your selection: [
```

The status bar at the bottom indicates "Serial: COM1 | 29, 23 | 29 Rows, 87 Cols | Linux".

After parameter successfully saved, linux will startup and logon from serial 1

(3) Save Parameter

Input "w" to save parameters

(4) Recover Parameter

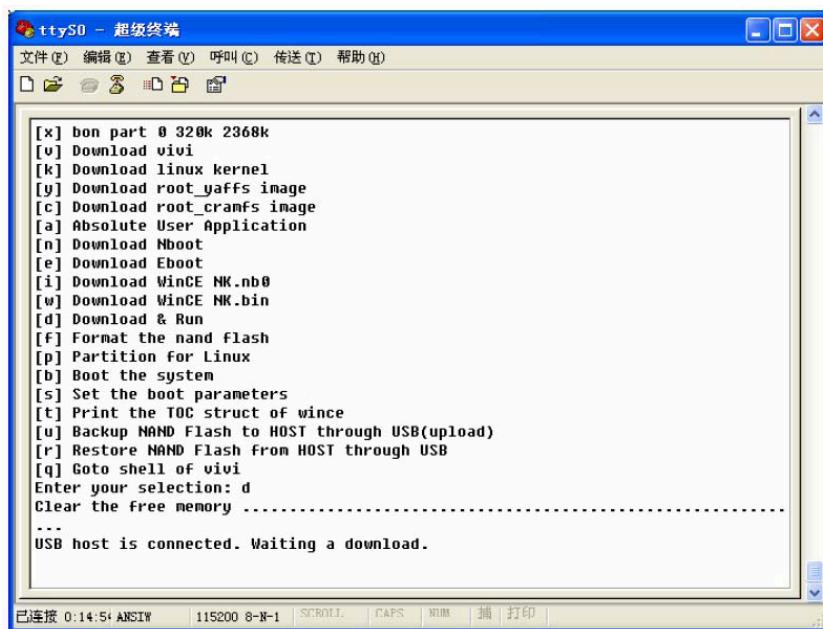
Input "r" to recover default kernel startup parameters

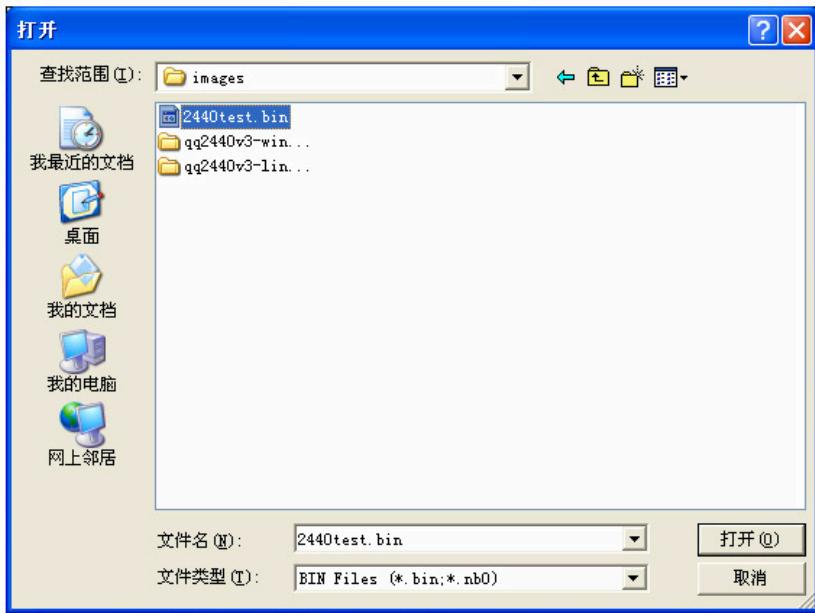
2.3 Test Program without OS

Test program 2440test can be used to test PWM beeper, RTC clock, AD converter, button, touch screen, LCD, infra, I2C bus, audio in, audio out, SD Card and CMOS Camera.

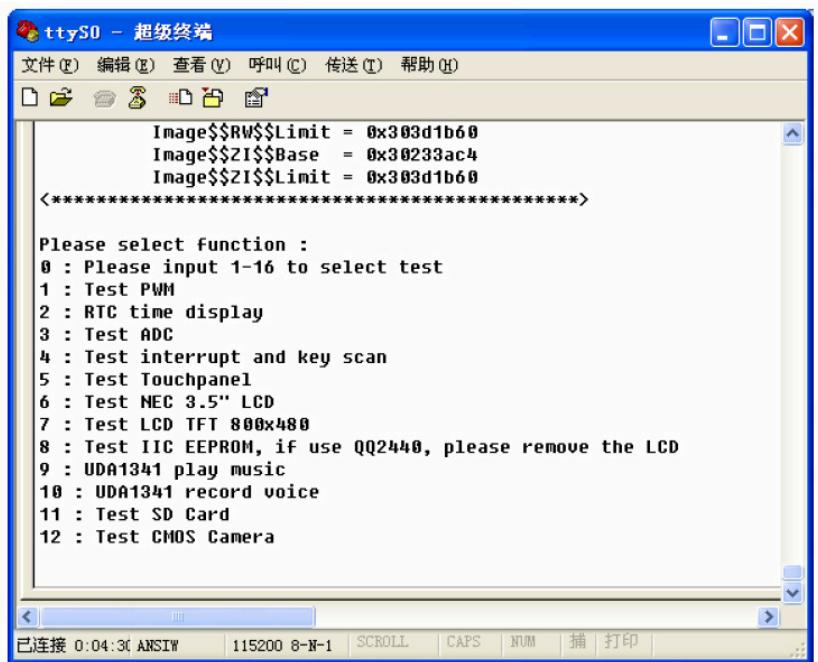
2.3.1 Download 2440test

Install USB driver on Windows and setup Windows Hypterminal for serial cable connection. Connect USB cable and launch DNW for 2440test binary image downloading. The USB download address in DNW should be 0x30000000.





2440test program will automatically run after successfully download:



2.3.2 Hardware Test

(1) Beeper Test

```
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test LCD LTV350QV-F04
7 : Test LCD TFT 640x480
8 : Test IIC EEPROM
9 : UDA1341 play music
10 : UDA1341 record voice
11 : Test SD Card
1
BUZZER TEST ( PWM Control )
Press +/- to increase/reduce the frequency of BUZZER !
Press 'ESC' key to Exit this program !

    Freq = 1010
    Freq = 1020
    Freq = 1030
    Freq = 1040
    Freq = 1050
```

已连接 0:02:43 ANSIW | 115200 8-N-1 | SCROLL | CAPS | NUM | 捕 | 打印 | .:.

(2) RTC clock test

```
Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test LCD LTV350QV-F04
7 : Test LCD TFT 640x480
8 : Test IIC EEPROM
9 : UDA1341 play music
10 : UDA1341 record voice
11 : Test SD Card
2RTC TIME Display, press ESC key to exit !
RTC time : 2005-06-19 15:21:30
RTC time : 2005-06-19 15:21:31
RTC time : 2005-06-19 15:21:32
RTC time : 2005-06-19 15:21:33
RTC time : 2005-06-19 15:21:34
RTC time : 2005-06-19 15:21:35
RTC time : 2005-06-19 15:21:36
```

已连接 0:03:04 ANSIW | 115200 8-N-1 | SCROLL | CAPS | NUM | 捕 | 打印 | .:.

(3) AD converter test

User can skew W1 on board for this AD converter test.

截图显示了一个名为“超级终端”的Windows命令行窗口。窗口标题为“rrr - 超级终端”。菜单栏包括：文件(F)、编辑(E)、查看(V)、呼叫(C)、传送(T)、帮助(H)。工具栏包含图标：剪切(C)、复制(C)、粘贴(P)、撤销(U)、重做(R)、全选(A)、另存为(S)、退出(X)。文本区域显示了以下内容：

```
5 : Test Touchpanel
6 : Test LCD LTV350QV-F04
7 : Test LCD TFT 640x480
8 : Test IIC EEPROM
9 : UDA1341 play music
10 : UDA1341 record voice
11 : Test SD Card
3ADC INPUT Test, press ESC key to exit !
ADC conv. freq. = 2500000Hz
PCLK/ADC_FREQ - 1 = 19
AINO: 0000
AINO: 0000
AINO: 0000
AINO: 0000
AINO: 0000
AINO: 0118
AINO: 0584
AINO: 1017
AINO: 1023
AINO: 1023
AINO: 0879
AINO: 0740
```

底部状态栏显示：已连接 0:03:26 ANSIW | 115200 8-N-1 | SCROLL | CAPS | NUM | 捕 | 打印 | .:.

(4) Button Test

截图显示了一个名为“超级终端”的Windows命令行窗口。窗口标题为“rrr - 超级终端”。菜单栏包括：文件(F)、编辑(E)、查看(V)、呼叫(C)、传送(T)、帮助(H)。工具栏包含图标：剪切(C)、复制(C)、粘贴(P)、撤销(U)、重做(R)、全选(A)、另存为(S)、退出(X)。文本区域显示了以下内容：

```
7 : Test LCD TFT 640x480
8 : Test IIC EEPROM
9 : UDA1341 play music
10 : UDA1341 record voice
11 : Test SD Card
4
Key Scan Test, press ESC key to exit !
Interrupt occur... K1 is pressed!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... K2 is pressed!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... K3 is pressed!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... K4 is pressed!
Interrupt occur... K4 is pressed!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
```

底部状态栏显示：已连接 0:03:49 ANSIW | 115200 8-N-1 | SCROLL | CAPS | NUM | 捕 | 打印 | .:.

(5) Touch Screen Test

```
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test LCD LTW350QW-F04
7 : Test LCD TFT 640x480
8 : Test IIC EEPROM
9 : UDA1341 play music
10 : UDA1341 record voice
11 : Test SD Card
5ADC touch screen test

Type any key to exit!!!

Stylus Down, please.....
count=000  XP=0654,  YP=0440
count=001  XP=0645,  YP=0461
count=002  XP=0672,  YP=0481
count=003  XP=0437,  YP=0271
count=004  XP=0439,  YP=0534
count=005  XP=0396,  YP=0544
count=006  XP=0653,  YP=0621
count=007  XP=0541,  YP=0227
count=008  XP=0534,  YP=0219
```

(6) LCD Test

```
Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test NEC 3.5" LCD
7 : Test LCD TFT 800x480
8 : Test IIC EEPROM, if use QQ2440, please remove the LCD
9 : UDA1341 play music
10 : UDA1341 record voice
11 : Test SD Card
12 : Test CMOS Camera
6
Test NEC3.5" (TFT LCD)!

LCD clear screen is finished! press any key to continue!
LCD clear screen is finished! press any key to continue!
LCD clear screen is finished! press any key to continue!
LCD clear screen is finished! press any key to continue!
bmp,Any Key To Next!
```

(8) I2C Test

11 : Test SD Card
8
IIC Test(Interrupt) using AT24C02
Write test data into AT24C02
Read test data from AT24C02
0 1 2 3 4 5 6 7 8 9 a b c d e f
10 11 12 13 14 15 16 17 18 19 1a 1b 1c 1d 1e 1f
20 21 22 23 24 25 26 27 28 29 2a 2b 2c 2d 2e 2f
30 31 32 33 34 35 36 37 38 39 3a 3b 3c 3d 3e 3f
40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f
50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f
60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f
70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f
80 81 82 83 84 85 86 87 88 89 8a 8b 8c 8d 8e 8f
90 91 92 93 94 95 96 97 98 99 9a 9b 9c 9d 9e 9f
a0 a1 a2 a3 a4 a5 a6 a7 a8 a9 aa ab ac ad ae af
b0 b1 b2 b3 b4 b5 b6 b7 b8 b9 ba bb bc bd be bf
c0 c1 c2 c3 c4 c5 c6 c7 c8 c9 ca cb cc cd ce cf
d0 d1 d2 d3 d4 d5 d6 d7 d8 d9 da db dc dd de df
e0 e1 e2 e3 e4 e5 e6 e7 e8 e9 ea eb ec ed ee ef
f0 f1 f2 f3 f4 f5 f6 f7 f8 f9 fa fb fc fd fe ff

Ready Serial: COM1 | 22, 1 | 22 Rows, 69 Cols | Linux

(9) Stereo Out Test

Connect your external phone set or speaker to MINI2440 stereo out socket(Green)

Please input 1-16 to select test!!!
Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test LCD LTV350QV-F04
7 : Test LCD TFT 640x480
8 : Test IIC EEPROM
9 : UDA1341 play music
10 : UDA1341 record voice
11 : Test SD Card
9
Sample Rate = 22050, Channels = 2, 16BitsPerSample, size = 243508
err = 0
Now playing the file
Press 'ESC' to quit, '+' to inc volume, '-' to dec volume, 'm' to mute
ause
-

已连接 0:02:04 ANSIW 115200 8-N-1 SCROLL CAPS NUM 插 打印

(10) Audio In Test

```
rrr - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
□ ☰ ☲ ✎
ause

Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test LCD LTV350QV-F04
7 : Test LCD TFT 640x480
8 : Test IIC EEPROM
9 : UDA1341 play music
10 : UDA1341 record voice
11 : Test SD Card
10
The Frequency of record is 48KHz

err = 0
Added 1024 buffer for record
Press any to Record
Now begin recording, Press 'ESC' to quit
-
```

(11) SD Card Test

```
COM1 (1) - CRT
File Edit View Options Transfer Script Window Help
□ ☰ ☲ ✎
10 : UDA1341 record voice
11 : Test SD Card
11
SDI Card Write and Read Test
Init. Frequency is 301204Hz
In idle
MMC check end??
In SD ready
End id
RCA=0xc734
SD Frequency is 25000000Hz
In stand-by
End Rx buffer flush
Block write test[ Polling write ]
Block read test[ Polling read ]
Check Rx data

The Tx_buffer is same to Rx_buffer!
SD CARD Write and Read test is OK!

CSD register :
SDIRSP0=0x260032
SDIRSP1=0x1f5980e0
SDIRSP2=0xecb5cff
SDIRSP3=0x9240409f

Please select function :
```

(12) CMOS Camera Test

This function can only be tested when LCD screen connected.



2.4 Linux Function

Linux was pre-loaded as default OS before shipment. This default linux image is root_default.img on CD-ROM. With support by linux, user can test the functionalities of almost all of hardware resources on the board.

2.4.1 MP3 Play

Madplay is MP3 player under console. It has several play modes and the simplest way to use is:

```
#madplay your.mp3
```

Please run "madplay -h" for help of this program.

2.4.2 Stop a Program

Press "Ctrl+c" to stop running of a program. Use "kill" to stop a program running on back ground.

2.4.3 Use U-Disk and Mobile Harddisk

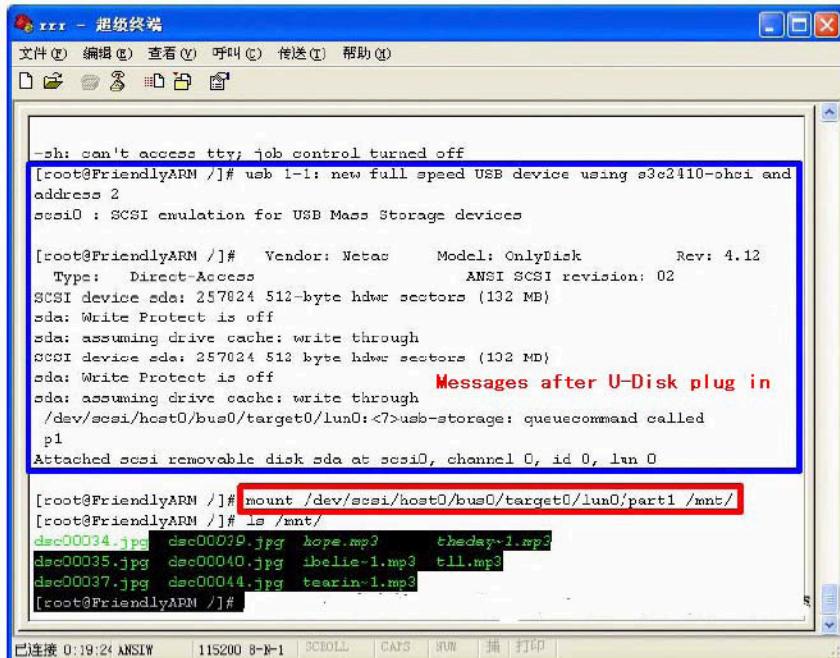
Mobile storage device file is /dev/scsi/host1/bus0/target0/lun0/part*. We create a link here in order to make compatible with standard linux U-Disk device name:

```
#ln -s /dev/scsi/host0/bus0/target0/lun0/part1/dev/sda1
```

Note: This command had been already in /etc/init.d/reS script. So user can use /dev/sda1 directly after system power up. Use the mount command as soon as a U-Disk plug in USB Host interface:

```
#mount /dev/sda1 /mnt
```

User can also mount U-Disk device directly after plugging in:



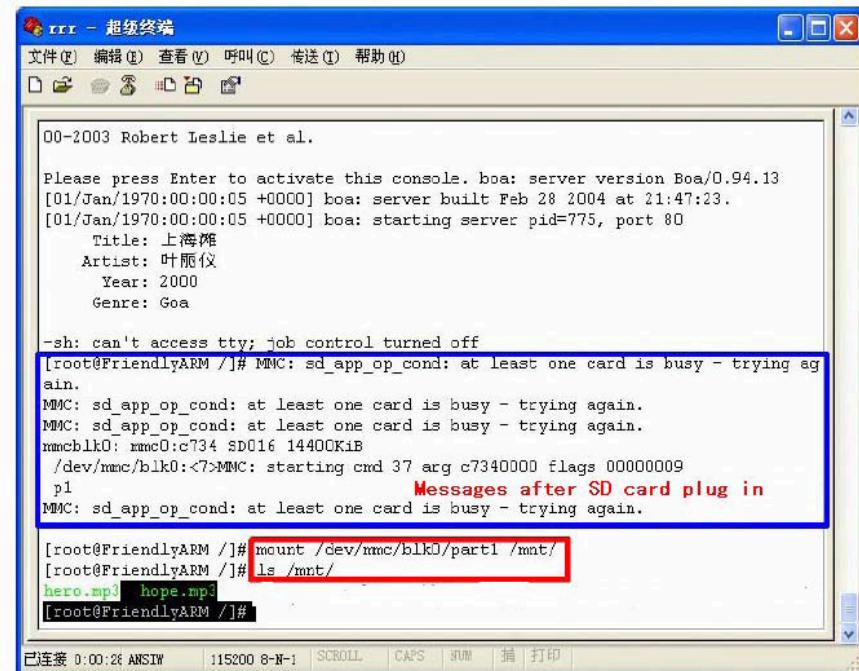
```
-sh: can't access tty; job control turned off
[root@FriendlyARM ~]# usb 1-1: new full speed USB device using s3c2410-ohci and
address 2
scsi0 : SCSI emulation for USB Mass Storage devices

[root@FriendlyARM ~]#   Vendor: Wetas      Model: OnlyDisk          Rev: 4.12
        Type: Direct-Access           ANSI SCSI revision: 02
SCSI device sda: 257024 512-byte hdwr sectors (132 MB)
sda: Write Protect is off
sda: assuming drive cache: write through
SCSI device sda: 257024 512 byte hdwr sectors (132 MB)
sda: Write Protect is off
sda: assuming drive cache: write through
Messages after U-Disk plug in
sda: assuming drive cache: write through
/dev/scsi/host0/bus0/target0/lun0:<7>usb-storage: queuecommand called
p1
Attached scsi removable disk sda at scsi0, channel 0, id 0, lun 0

[root@FriendlyARM ~]# mount /dev/scsi/host0/bus0/target0/lun0/part1 /mnt/
[root@FriendlyARM ~]# ls /mnt/
desc00034.jpg desc00039.jpg hope.mp3 theday-1.mp3
desc00035.jpg desc00040.jpg ibelie-1.mp3 tll.mp3
desc00037.jpg desc00044.jpg tearin-1.mp3
[root@FriendlyARM ~]#
```

2.4.4 Use SD Card

Mounting of SD Card device is similar with U-Disk.



```
00-2003 Robert Leslie et al.

Please press Enter to activate this console. boa: server version Boa/0.94.13
[01/Jan/1970:00:00:05 +0000] boa: server built Feb 28 2004 at 21:47:23.
[01/Jan/1970:00:00:05 +0000] boa: starting server pid=775, port 80
    Title: 上海滩
    Artist: 叶丽仪
    Year: 2000
    Genre: Goa

-sh: can't access tty; job control turned off
[root@FriendlyARM ~]# MMC: sd_app_op_cond: at least one card is busy - trying again.
MMC: sd_app_op_cond: at least one card is busy - trying again.
MMC: sd_app_op_cond: at least one card is busy - trying again.
mmcblk0: mmc0:c734 SD016 14400KiB
/dev/mmcblk0:<7>MMC: starting cmd 37 arg c7340000 flags 00000009
p1
Messages after SD card plug in
MMC: sd_app_op_cond: at least one card is busy - trying again.

[root@FriendlyARM ~]# mount /dev/mmcblk0/part1 /mnt/
[root@FriendlyARM ~]# ls /mnt/
hero.mp3 hope.mp3
[root@FriendlyARM ~]#
```

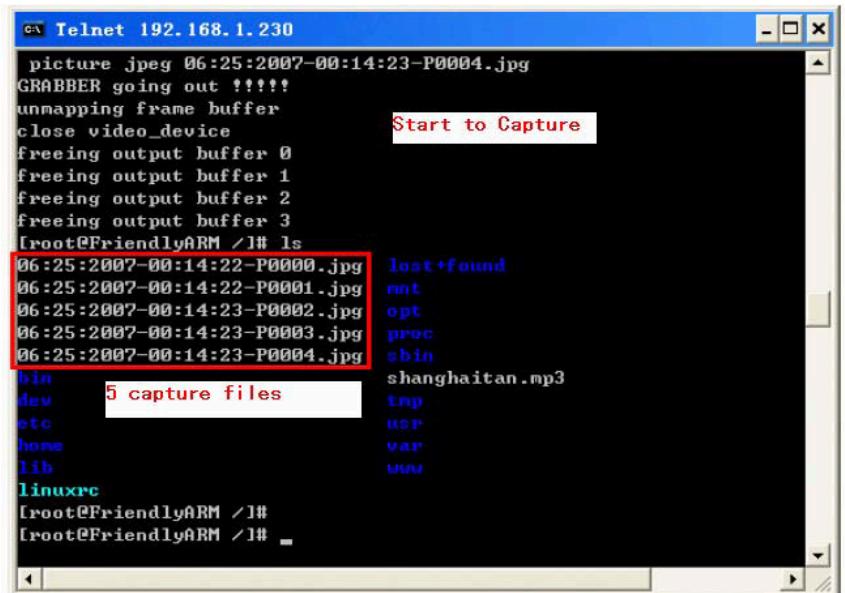
2.4.5 Use USB Camera

MINI2440 can support USB camera with vimicro chipset. As soon as USB camera plug in, the following device will automatically be installed:

```
[root@FriendlyARM /]# usb 1-1: new full speed USB device using s3c2410-ohci and
address 2
drivers/usb/media/gspca/gspca_core.c: USB SPCA5XX camera found. SONIX JPEG (sn9c
1xx)
[root@FriendlyARM /]# ls /dev/v4l/video0
/dev/v4l/video0
[root@FriendlyARM /]#
```

Use spcacat to capture the picture:

```
#spcacat -p 100ms -N 5
```



For a better quality of picture:

```
#spcacat -s 384x288 -p 100ms -N2 -o
```

2.4.6 Transfer file with PC

User can transfer(sz/rz) files with PC when he/she login linux by serial console.

2.4.7 Remotely display USB Camera

MINI2440 has an embedded web server:

<http://192.168.1.230>

There is a remote USB camera control and play function embedded in the main page.



2.4.8 LED Control

(1) LED Server

There is a automatically startup script(/etc/rc.d/init.d/leds) after system power on. This script call a server program named as led-player. Led-player will create pipe file at /tmp, so user can change flash ratio of the leds by sending different parameters to the piple.

```
#echo 0 0.2 > /tmp/led-control  
4 leds will flash as a flow with 0.2 seconds interval  
#echo 1 0.2 > /tmp/led-control  
4 leds will flash as a accumulating with 0.2 seconds interval  
#/etc/rc.d/init.d/leds stop  
4 leds will stop flashing
```

```
#/etc/rc.d/init.d/leds start  
4 leds will start to flash
```

(2) Separately control of LED

/bin/leds is a separately controller of leds. User need to stop led-player before leds
#/etc/rc.d/init.d/leds stop

```
[root@fa /]#led  
Usage: leds led_no 0|1  
Led_no is number of leds(0-3), 0 represent off, 1 represent on
```

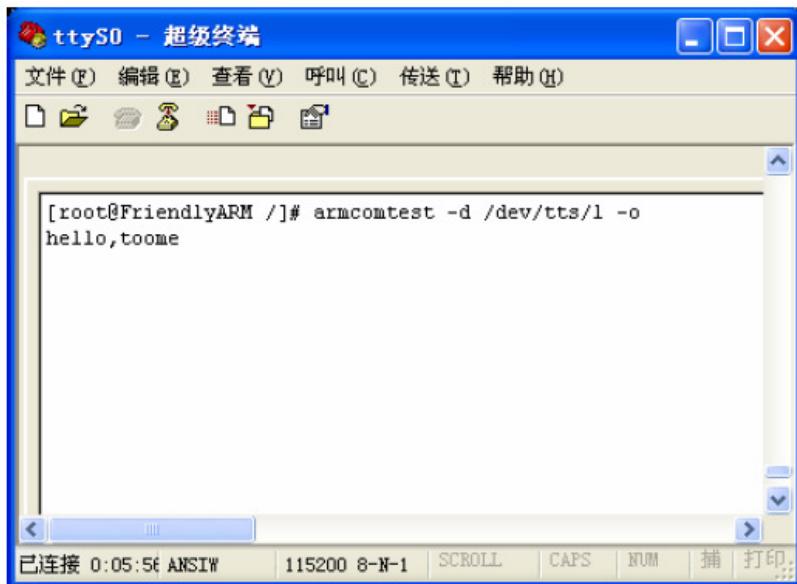
2.4.9 Button Test

Run “buttons” to test buttons on board

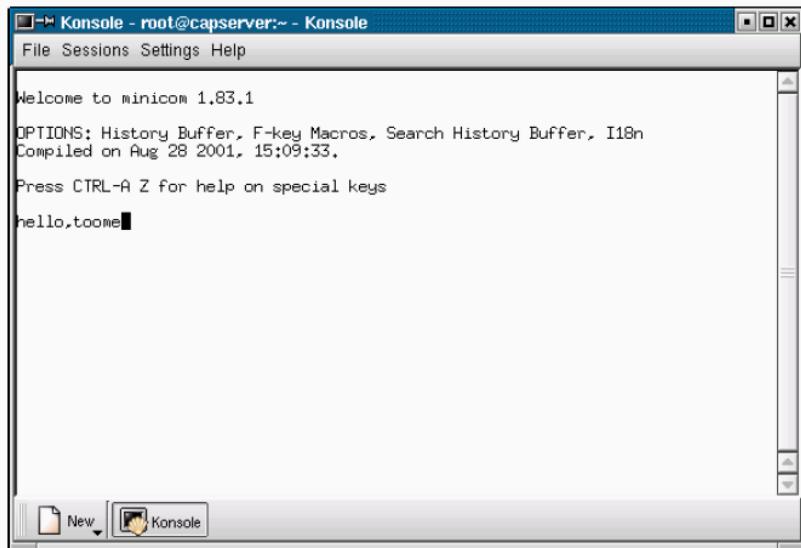
2.4.10 Serial 2 and 3 Test

User need an expand board for serial port 2 and serial port 3 test. Set Hypterminal on PC to 115200 Baudrate and no hardware flow control.

```
#armcomtest -d /dev/tts/1 -o  
#armcomtest -d dev/tts/2 -o
```



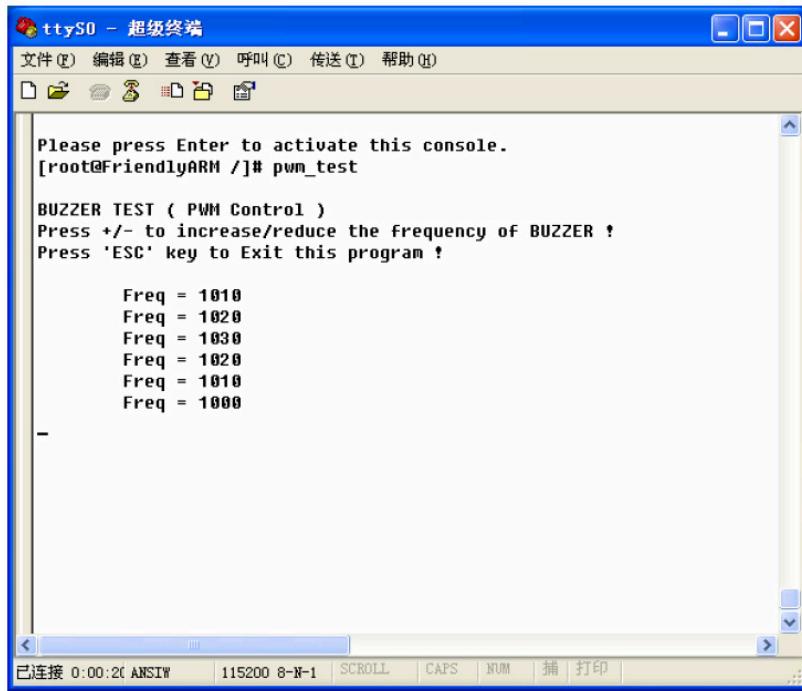
Result screen from serial port 2 or serial port 3:



2.4.11 Beeper test

Source code location:

Kernel-2.6.13/drivers/char/qq2440_pwm.c



2.4.12 LCD Backlight

Source code location:

Kernel-2.6.13/drivers/char/mini2440_backlight.c

[root@FriendlyARM/]#bl 0

Close LCD backlight

[root@FriendlyARM/]#bl 1

Open LCD backlight

[root@FriendlyARM/]#

2.4.13 I2C Test

Source code location:

Kernel-2.6.13/drivers/i2c/busses/i2c-s3c2410.c

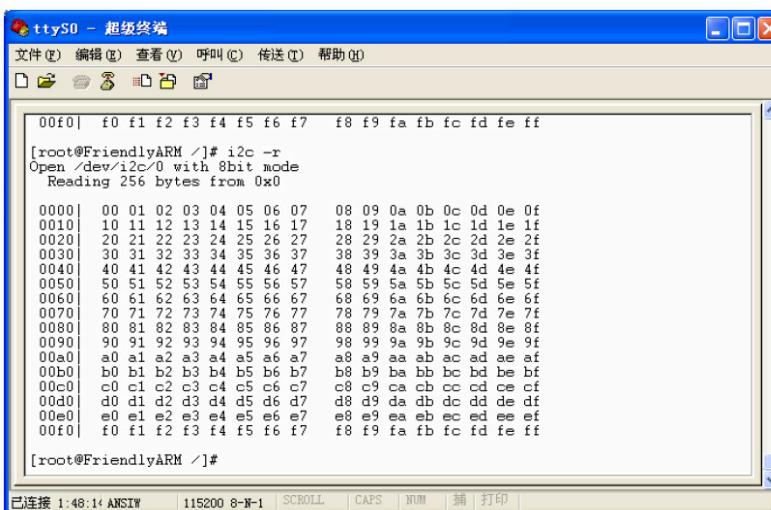


```
[root@FriendlyARM /]#
[root@FriendlyARM /]#
[root@FriendlyARM /]# i2c -w
Open /dev/i2c-0 with 8bit mode
Writing 0x00-0xff into 24C08

0000| 00 01 02 03 04 05 06 07  08 09 0a 0b 0c 0d 0e 0f
0010| 10 11 12 13 14 15 16 17  18 19 1a 1b 1c 1d 1e 1f
0020| 20 21 22 23 24 25 26 27  28 29 2a 2b 2c 2d 2e 2f
0030| 30 31 32 33 34 35 36 37  38 39 3a 3b 3c 3d 3e 3f
0040| 40 41 42 43 44 45 46 47  48 49 4a 4b 4c 4d 4e 4f
0050| 50 51 52 53 54 55 56 57  58 59 5a 5b 5c 5d 5e 5f
0060| 60 61 62 63 64 65 66 67  68 69 6a 6b 6c 6d 6e 6f
0070| 70 71 72 73 74 75 76 77  78 79 7a 7b 7c 7d 7e 7f
0080| 80 81 82 83 84 85 86 87  88 89 8a 8b 8c 8d 8e 8f
0090| 90 91 92 93 94 95 96 97  98 99 9a 9b 9c 9d 9e 9f
00a0| a0 a1 a2 a3 a4 a5 a6 a7  a8 a9 aa ab ac ad ae af
00b0| b0 b1 b2 b3 b4 b5 b6 b7  b8 b9 ba bb bc bd be bf
00c0| c0 c1 c2 c3 c4 c5 c6 c7  c8 c9 ca cb cc cd ce cf
00d0| d0 d1 d2 d3 d4 d5 d6 d7  d8 d9 da db dc dd de df
00e0| e0 e1 e2 e3 e4 e5 e6 e7  e8 e9 ea eb ec ed ee ef
00f0| f0 f1 f2 f3 f4 f5 f6 f7  f8 f9 fa fb fc fd fe ff

[root@FriendlyARM /]#
```

已连接 1:47:51 ANSIW | 115200 8-N-1 | SCROLL | CAPS | NUM | 插 | 打印 |

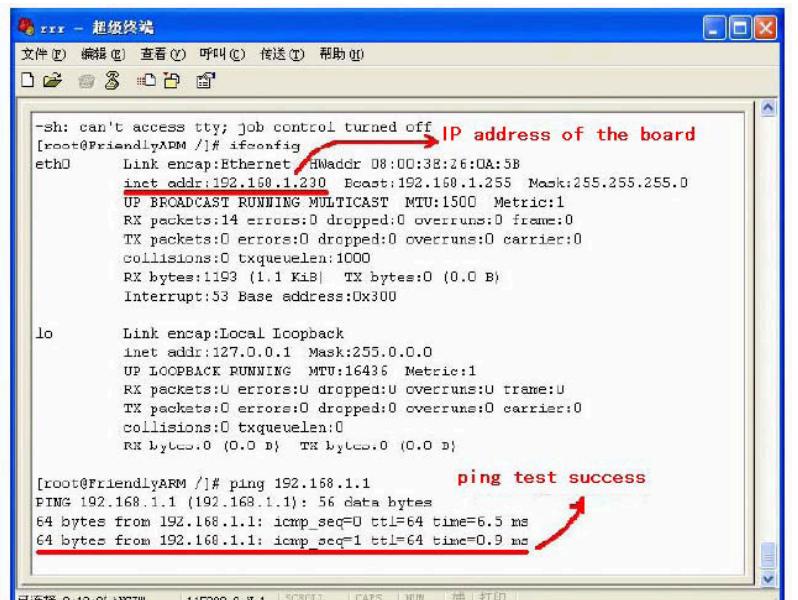


```
00f0| f0 f1 f2 f3 f4 f5 f6 f7  f8 f9 fa fb fc fd fe ff
[root@FriendlyARM /]# i2c -r
Open /dev/i2c-0 with 8bit mode
Reading 256 bytes from 0x0
0000| 00 01 02 03 04 05 06 07  08 09 0a 0b 0c 0d 0e 0f
0010| 10 11 12 13 14 15 16 17  18 19 1a 1b 1c 1d 1e 1f
0020| 20 21 22 23 24 25 26 27  28 29 2a 2b 2c 2d 2e 2f
0030| 30 31 32 33 34 35 36 37  38 39 3a 3b 3c 3d 3e 3f
0040| 40 41 42 43 44 45 46 47  48 49 4a 4b 4c 4d 4e 4f
0050| 50 51 52 53 54 55 56 57  58 59 5a 5b 5c 5d 5e 5f
0060| 60 61 62 63 64 65 66 67  68 69 6a 6b 6c 6d 6e 6f
0070| 70 71 72 73 74 75 76 77  78 79 7a 7b 7c 7d 7e 7f
0080| 80 81 82 83 84 85 86 87  88 89 8a 8b 8c 8d 8e 8f
0090| 90 91 92 93 94 95 96 97  98 99 9a 9b 9c 9d 9e 9f
00a0| a0 a1 a2 a3 a4 a5 a6 a7  a8 a9 aa ab ac ad ae af
00b0| b0 b1 b2 b3 b4 b5 b6 b7  b8 b9 ba bb bc bd be bf
00c0| c0 c1 c2 c3 c4 c5 c6 c7  c8 c9 ca cb cc cd ce cf
00d0| d0 d1 d2 d3 d4 d5 d6 d7  d8 d9 da db dc dd de df
00e0| e0 e1 e2 e3 e4 e5 e6 e7  e8 e9 ea eb ec ed ee ef
00f0| f0 f1 f2 f3 f4 f5 f6 f7  f8 f9 fa fb fc fd fe ff

[root@FriendlyARM /]#
```

已连接 1:48:14 ANSIW | 115200 8-N-1 | SCROLL | CAPS | NUM | 插 | 打印 |

2.4.14 Telnet



The screenshot shows two windows. The top window is titled '超级终端' (Super Terminal) and displays terminal output. It shows the root user running 'ifconfig' to view network interfaces. The 'eth0' interface is highlighted with a red arrow and labeled 'IP address of the board'. The output shows the IP address as 192.168.1.230. Below this, a 'ping' command is run to 192.168.1.1, with the output 'ping test success' highlighted with a red arrow.

```
-sh: can't access tty; job control turned off
[root@FriendlyARM ~]# ifconfig
eth0      Link encap:Ethernet HWaddr 08:00:3E:26:0A:58
          inet addr:192.168.1.230  Bcast:192.168.1.255  Mask:255.255.255.0
              UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
              RX packets:14 errors:0 dropped:0 overruns:0 frame:0
              TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
              collisions:0 txqueuelen:1000
              RX bytes:1193 (1.1 Kib)  TX bytes:0 (0.0 B)
              Interrupt:53 Base address:0x300

lo       Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
              UP LOOPBACK RUNNING  MTU:16436  Metric:1
              RX packets:0 errors:0 dropped:0 overruns:0 frame:0
              TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
              collisions:0 txqueuelen:0
              RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

[root@FriendlyARM ~]# ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1): 56 data bytes
64 bytes from 192.168.1.1: icmp_seq=0 ttl=64 time=6.5 ms
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=0.9 ms
```

The bottom window is titled 'COM1 (1) - CRT' and shows a telnet session to a BBS system. The session starts with route configuration and then connects to a BBS. The BBS login screen is displayed, featuring a star border and text about CERNET Southern Regional Center and its BBS services.

```
[root@FriendlyARM ~]# route add default gw 192.168.1.1
[root@FriendlyARM ~]# telnet 202.112.17.137  设置路由IP和登录外部bbs
华南木棉BBS 最近 (1,10,15) 分钟平均负荷为 1.32 1.22 1.19 [负荷正常]

Entering character mode
Escape character is '^]'.

★***** 欢迎光临 *****★
中国教育和科研计算机网(CERNET)华南地区网络中心
电子公告牌华南网木棉站

本站地址: bbs.gznet.edu.cn (202.112.17.137)
Warmly Welcome to Bulletin Board Service(BBS) of
CERNET Southern Regional Center
If you have any problems, please send email to
scutbbs@scut.edu.cn

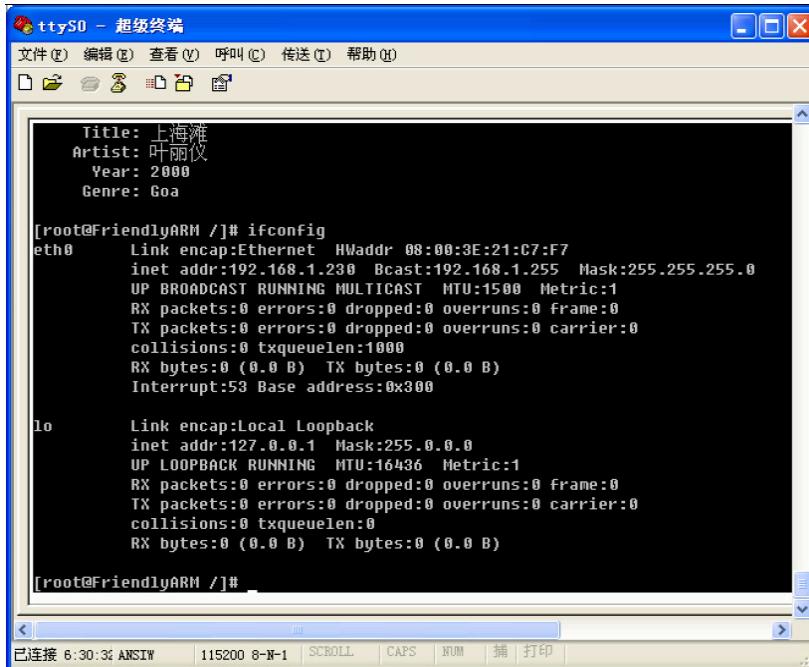
◎ 请用户遵守国家法律和CERNET用户守则, 谢谢合作! ◎
★***** 欢迎光临【华南木棉BBS】 [ Add '...' after YourID to login For BIG5 ] *****
目前上站人数: [537/25000], 最高人数记录: [12970].
请输入帐号(试用请输入 'guest', 注册请输入 'new'): 
```

2.4.15 Telnetd

User can telnet to MINI2440 board by root without password.

2.4.16 How to modify MAC address

#ifconfig



```
Title: 上海滩
Artist: 叶丽仪
Year: 2000
Genre: Goa

[root@FriendlyARM /]# ifconfig
eth0      Link encap:Ethernet HWaddr 08:00:3E:21:C7:F7
          inet addr:192.168.1.230 Bcast:192.168.1.255 Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
          Interrupt:53 Base address:0x300

lo        Link encap:Local Loopback
          inet addr:127.0.0.1 Mask:255.0.0.0
          UP LOOPBACK RUNNING MTU:16436 Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

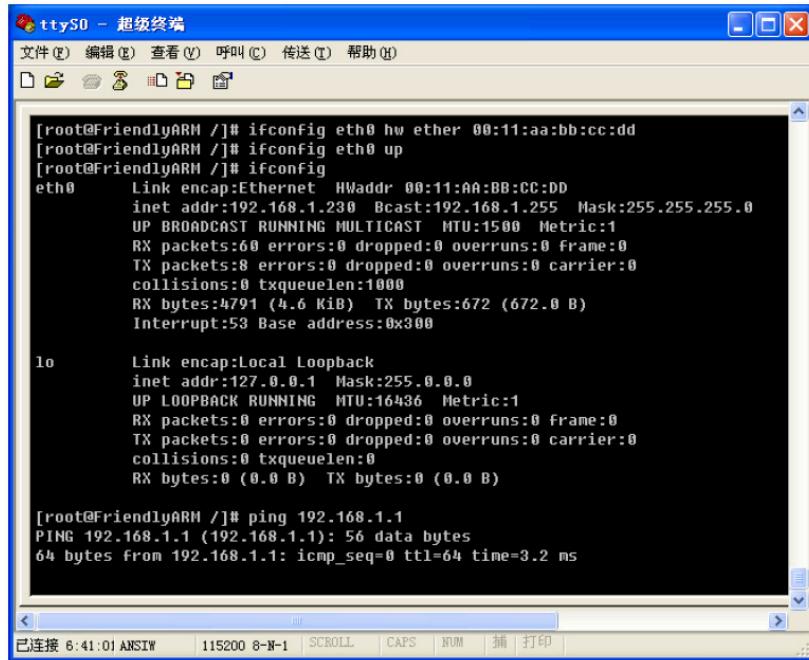
[root@FriendlyARM /]#
```

#ifconfig eth0 down

#ifconfig eth0 hw ether 00:11:AA:BB:CC:DD

#ifconfig eht0 up

#ifconfig

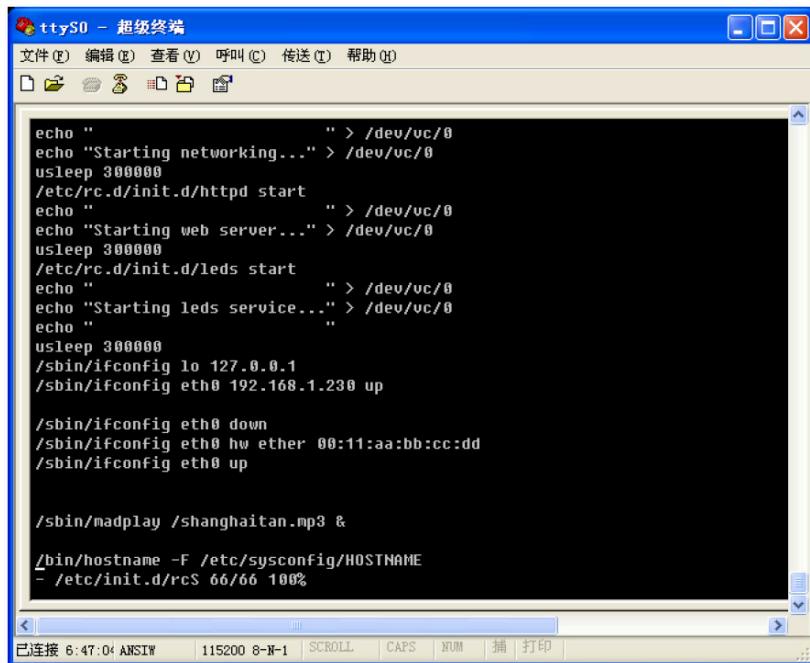


```
[root@FriendlyARM /]# ifconfig eth0 hw ether 00:11:aa:bb:cc:dd
[root@FriendlyARM /]# ifconfig eth0 up
[root@FriendlyARM /]# ifconfig
eth0      Link encap:Ethernet HWaddr 00:11:AA:BB:CC:DD
          inet addr:192.168.1.230 Bcast:192.168.1.255 Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:60 errors:0 dropped:0 overruns:0 Frame:0
          TX packets:8 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:4791 (4.6 Kib) TX bytes:672 (672.0 B)
          Interrupt:53 Base address:0x300

lo        Link encap:Local Loopback
          inet addr:127.0.0.1 Mask:255.0.0.0
          UP LOOPBACK RUNNING MTU:16436 Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

[root@FriendlyARM /]# ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1): 56 data bytes
64 bytes from 192.168.1.1: icmp_seq=0 ttl=64 time=3.2 ms
```

Change MAC address in startup script:



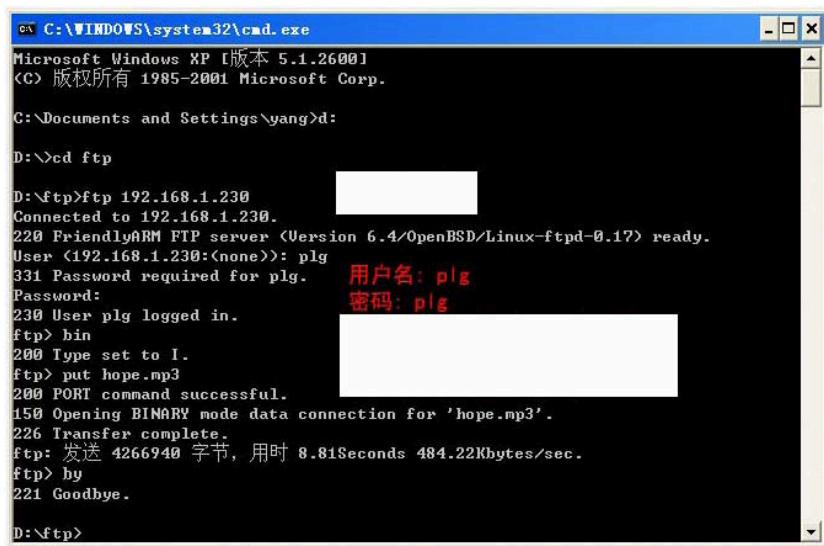
```
echo "" > /dev/uc/0
echo "Starting networking..." > /dev/uc/0
usleep 300000
/etc/rc.d/init.d/httpd start
echo "" > /dev/uc/0
echo "Starting web server..." > /dev/uc/0
usleep 300000
/etc/rc.d/init.d/leds start
echo "" > /dev/uc/0
echo "Starting leds service..." > /dev/uc/0
echo ""
usleep 300000
/sbin/ifconfig lo 127.0.0.1
/sbin/ifconfig eth0 192.168.1.230 up

/sbin/ifconfig eth0 down
/sbin/ifconfig eth0 hw ether 00:11:aa:bb:cc:dd
/sbin/ifconfig eth0 up

/sbin/madplay /shanghaitan.mp3 &

/bin/hostname -F /etc/sysconfig/HOSTNAME
- /etc/init.d/rcS 66/66 100%
```

2.4.17 Ftpd



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [版本 5.1.2600]
(C) 版权所有 1985-2001 Microsoft Corp.

C:\Documents and Settings\yang>d:
D:>>cd ftp
D:>ftp 192.168.1.230
Connected to 192.168.1.230.
220 FriendlyARM FTP server (Version 6.4/OpenBSD/Linux-ftp-0.17) ready.
User (192.168.1.230:(none)): plg
331 Password required for plg.      用户名: plg
Password:                         密码: plg
230 User plg logged in.
ftp> bin
200 Type set to I.
ftp> put hope.mp3
200 PORT command successful.
150 Opening BINARY mode data connection for 'hope.mp3'.
226 Transfer complete.
ftp: 发送 4266940 字节, 用时 8.81Seconds 484.22Kbytes/sec.
ftp> by
221 Goodbye.

D:>ftp>
```

2.4.18 Remote LED control



Stop web server:

```
#/etc/rc.d/init.d/httpd stop
```

Start web server:

```
#/etc/rc.d/init.d/httpd start
```

2.4.19 NFS

Assume NFS server is started on 192.168.1.111:

```
#mount -t nfs -o noblock 192.168.1.111:/opt/FriendlyARM/QQ2440V3/root_nfs /mnt
```

Unmount command:

```
#umount /mnt
```

The screenshot shows a terminal window titled "超级终端". The terminal is running on a FriendlyARM system. The user has mounted an NFS share from 192.168.1.111 at /opt/FriendlyARM/QQ2 to /mnt. They then changed directory to /mnt and played an MP3 file named "shanghaitan.mp3" using the madplay command. The terminal window includes a menu bar with Chinese options like "文件 (F)", "编辑 (E)", "查看 (V)", "呼叫 (C)", "传送 (T)", and "帮助 (H)". The bottom status bar shows connection information: 已连接 2:43:34 ANSIW | 115200 8-N-1 | SCROLL | CAPS | NUM | 插 | 打印 |.

```
[25/Jun/2007:  
[root@FriendlyARM /]# clearg server pid=274, port 80+<  
[root@FriendlyARM /]# mount -t nfs -o nolock 192.168.1.111:/opt/FriendlyARM/QQ2  
40/root_nfs /mnt [mount NFS server]  
[root@FriendlyARM /]# ls /mnt/  
bin lib proc sys  
dev linuxrcsbin var  
etc net shanghaitan.mp3 user  
home opt tmp  
[root@FriendlyARM /]# cd /mnt/  
[root@FriendlyARM /mnt]# madplay shanghaitan.mp3  
MPEG Audio Decoder 0.15.0 (beta) - Copyright (C) 2000-2003 Robert Leslie et al.  
Title: 上海滩  
Artist: 叶丽仪 [play mp3 file on NFS server]  
Year: 2000  
Genre: Goa
```

2.4.20 RTC Setup

Use hwclock command to connect linux clock with MINI2440 hardware RTC chip:

- (1) date -s 042916352007
- (2) hwclock -w
- (3) hwclock -s #this command had been put into /etc/init.d/rcS script for automatically run after power on.

2.4.21 Non-volatile Data in Flash

Yaffs file system will not lost any data in case system power failure.

2.4.22 Automatic Script When Power Up

Please check with /etc/init.d/rcS

2.4.23 How to do Screen Shoot

```
#snapshot pic.png
```

2.5 Windows CE Function



2.5.1 USB Keyboard Simulation

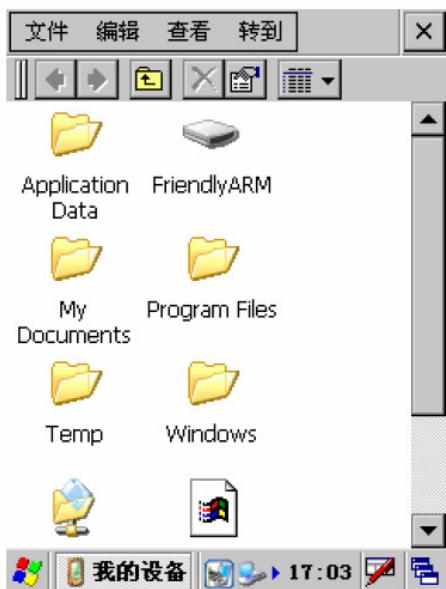
Source code location:
SMDK2440\DRIVERS\Userkey

This feature had been compiled in wince kernel by default, so it is available as soon as wince startup:

K1 - TAB
K2 - UP
K3 - ENTER
K4 - DOWN
K5 - LEFT
K6 - RIGHT



Enter "K3" to open "My Device"



2.5.2 LED Test

Double click on "QQ2440 test" to open LED test program



2.5.3 Screen Rotation



Source code location:
SMDK2440\DRIVERS\DISPLAY

2.5.4 COM Debugger

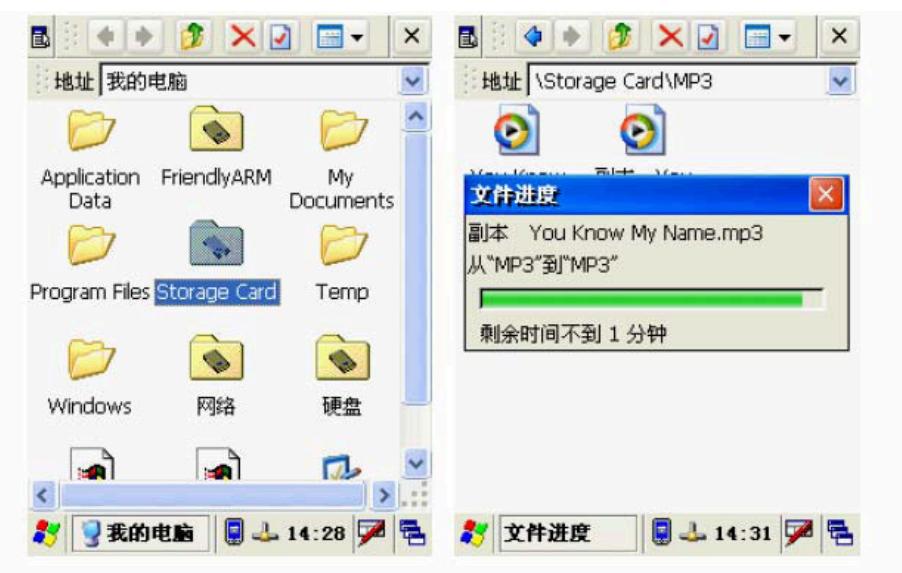


2.5.5 Use U-Disk





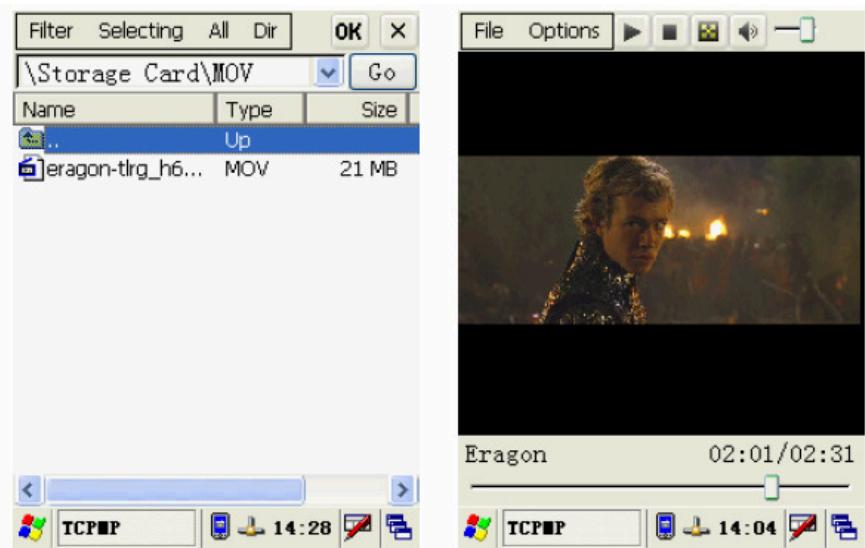
2.5.6 Use SD/MMC Card



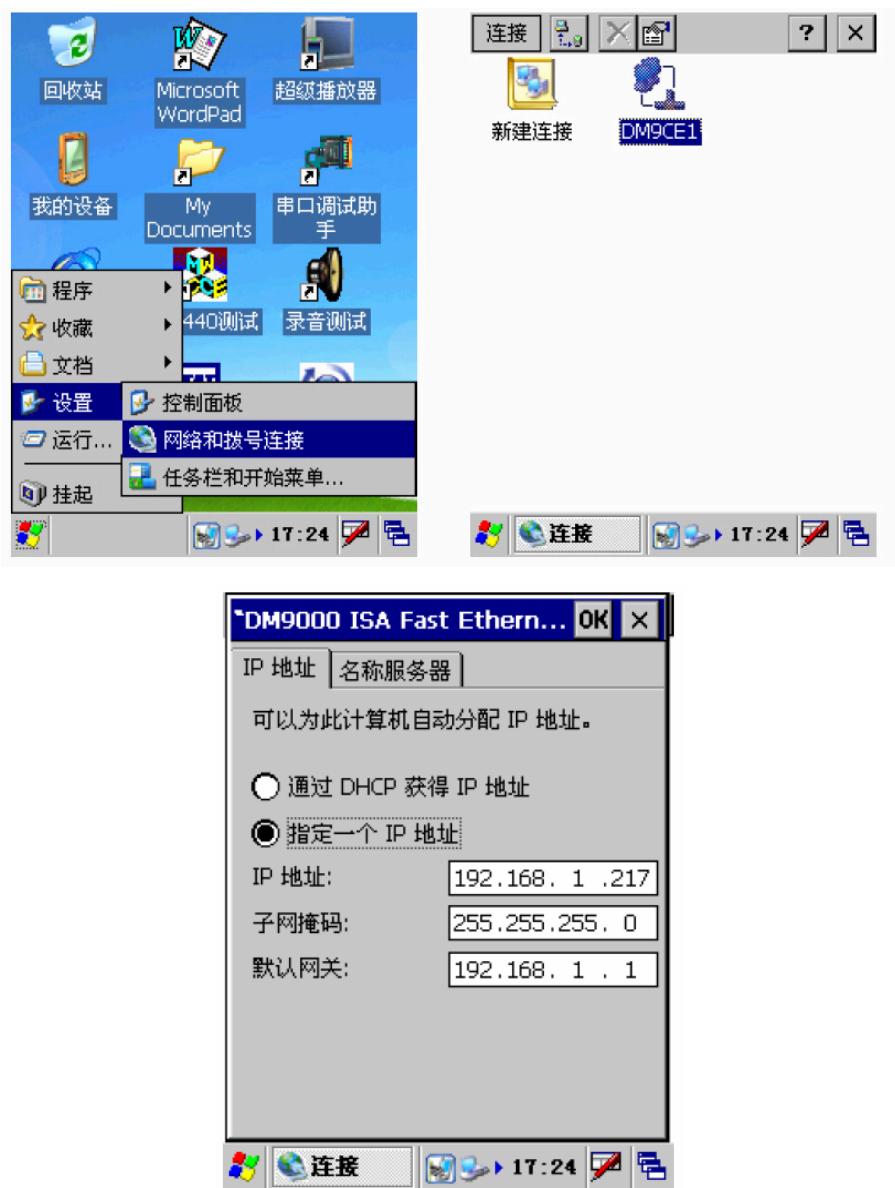
2.5.7 Use Windows Media Player



2.5.8 Use Super Player



2.5.9 Ethernet Test



2.5.10 Telnet

A telnet server is configured in WinCE. The default IP address of WinCE is 192.168.1.217. No password needed for telnet logon.

```
ex Telnet 192.168.1.216
Welcome to the Windows CE Telnet Service on QQ2440
Pocket CMD v 4.20
\> dir
    目录 \>

98/01/01 20:00      <DIR>          网络
98/01/01 20:00      <DIR>          FriendlyARM
07/05/27 15:15          13 PKTSNAP.DAT
07/05/27 15:15      <DIR>          Application Data
07/05/27 15:15          2000000 Printer.swap
07/05/27 23:15          23 控制面板.lnk
07/05/27 23:15      <DIR>          My Documents
07/05/27 23:15      <DIR>          Program Files
07/05/27 23:15      <DIR>          Temp
07/05/27 23:15      <DIR>          Windows

找到 10 个文件。总计 2000036 字节。
1 个目录 12915260 个可用字节。
\>
```

2.5.11 Ftp

A ftp server is configured in WinCE. The default IP address of Wince is 192.168.1.217. Account/password is ftp/ftp

```
ex C:\WINDOWS\system32\cmd.exe - ftp 192.168.1.216
Microsoft Windows XP [版本 5.1.2600]
(C) 版权所有 1985-2001 Microsoft Corp.

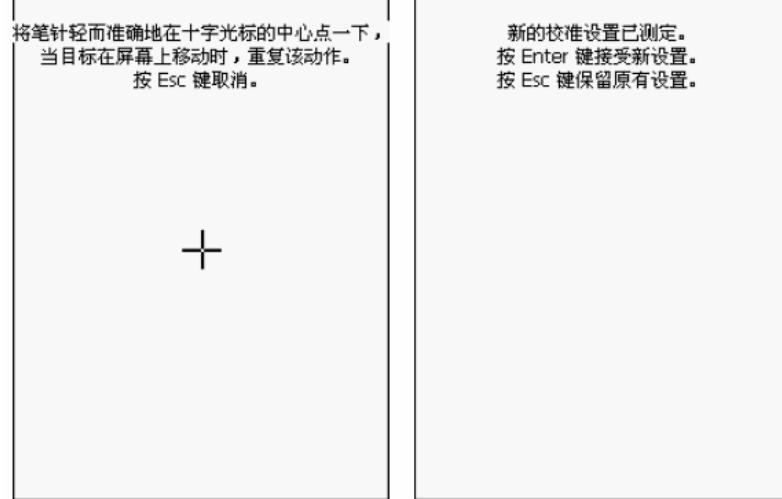
C:\Documents and Settings\yang>ftp 192.168.1.216
Connected to 192.168.1.216.
220 Service ready for new user.
User <192.168.1.216:<none>>: ftp
331 User name okay, need password.
Password:
230 User logged in, proceed.
ftp> ls
200 Command okay.
150 File status okay; about to open data connection.
网络
FriendlyARM
Application Data
Printer.swap
控制面板.lnk
My Documents
Program Files
Temp
Windows
226 Closing data connection.
ftp: 收到 109 字节, 用时 0.39Seconds 0.28Kbytes/sec.
ftp>
```

2.5.12 Web Server



2.5.13 Touch Screen Calibration





2.5.14 ActiveSync with PC

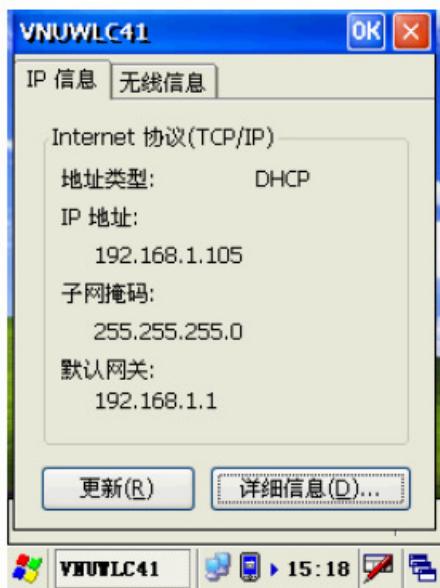


2.5.15 Wireless Lan Card Test

A wireless lan card driver is integrated in Wince(VNUWLC41).







2.6 Install BIOS by SJF2440

SJF2440 is a tool from Samsung to burn flash on development board. It can support K9F1208 Nand Flash, AMD29LV800BB Nor Flash, etc.

Note: We suggest to do these operations on a PC with intel chipset mother board. Sometime JTAG board with parallel port will fail on the mother board with chipset from other vendors

2.6.1 Install GIVEIO Driver

2.6.2 Burn BIOS

Note: The development board had been pre-loaded BIOS before shipment. We suggest you do not try the procedures in this section if you are not familiar with S3C2440 and low level details of the board.

First of all, connect JTag board to MINI2440 jtag port and connect other end of JTag board to your PC parallel port with GIVEIO driver already installed.

(1) Copy the folder \windows\tools\SJF2440 on CD-ROM to PC. Double click on SJF2440_supervivi.bat to start. Select function "2" and then select Nor Flash(AM29LV160) to start burn.

```
in C:\WINDOWS\system32\cmd.exe - sjf2440.exe /fsupervivi
C:\sb2440_img>sjf2440.exe /f:supervivi

+-----+
| SEC JTAG FLASH(SJF) v 0.1      |
| <S3C2440K & SMDK2440 B/D>      |
+-----+
Usage: SJF /f:<filename> /d=<delay>
> S3C2440X<ID=0x0032409d> is detected.

[SJF Main Menu]
0:K9S1208 prog    1:28F128J3A prog   2:AM29LU800 Prog   3:Memory Rd/Wr
4:Exit
Select the function to test:2

[AM29F800 Writing Program]
NOTE: AM29LU800BB needs 4 step sequences for 1 half-word data.
      So, the program time is twice of Starata flash(2 step sequences).
[Check AM29LU800]
Manufacture ID= 1, Device ID=2249

Image Size:0h~1c720h

Available Target Offset:
0x0, 0x4000, 0x6000, 0x8000, 0x10000, 0x20000, 0x30000, 0x40000,
0x50000, 0x60000, 0x70000, 0x80000, 0x90000, 0xa0000, 0xb0000, 0xc0000,
0xd0000, 0xe0000, 0xf0000
Input target offset:0

SectorOffset=0x0
SectorSize =0x4000
Erase the sector:0x0.
Sector Erase is started!
Start of the sector data writing.
0 100 200 300 400 500 600 700
```

- (3) With prompt of “Available Target offset”, input offset “0”, start to burn. Select “2” after burn success.

3. OS Installation

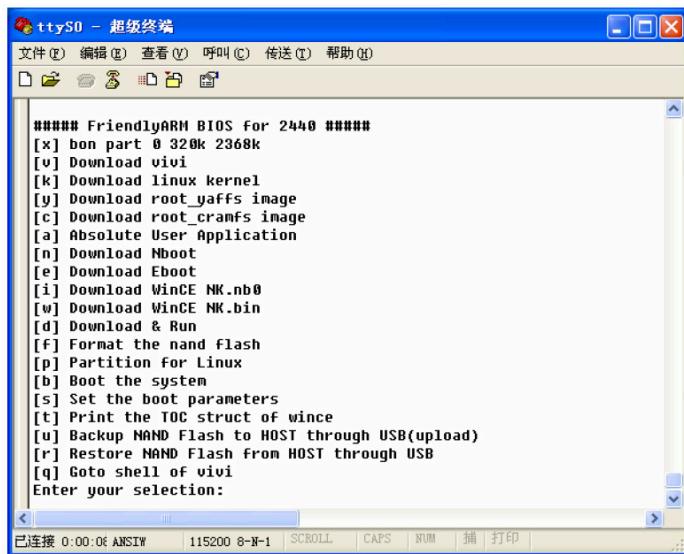
Note:

To avoid Windows “blue screen failure” during USB downloading:

1. Do not plug in USB cable before target board power on
2. Do not plug in USB cable when reset target board
3. Plug in USB cable after supervivi main menu appears
4. Plug out USB cable after programming success
5. Current Linux kernel does not support USB device
6. Plug in USB cable after wince startup

3.1 Backup and Restore System

Backup content in Nand Flash



ttyS0 - 超级终端

文件(F) 编辑(E) 查看(V) 呼叫(C) 传递(T) 帮助(H)

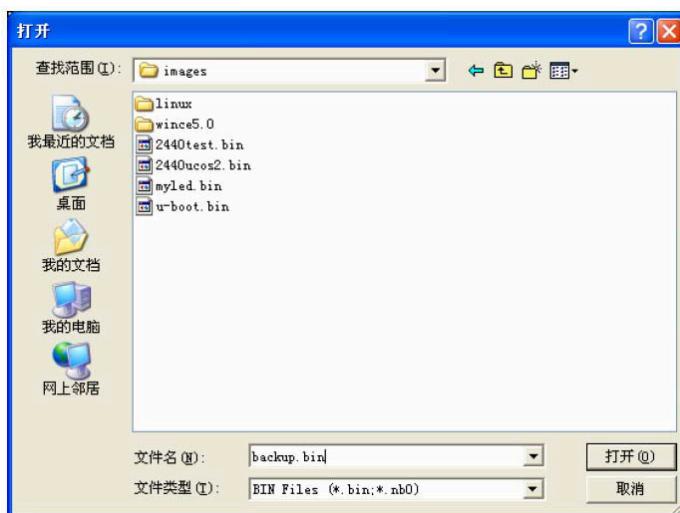
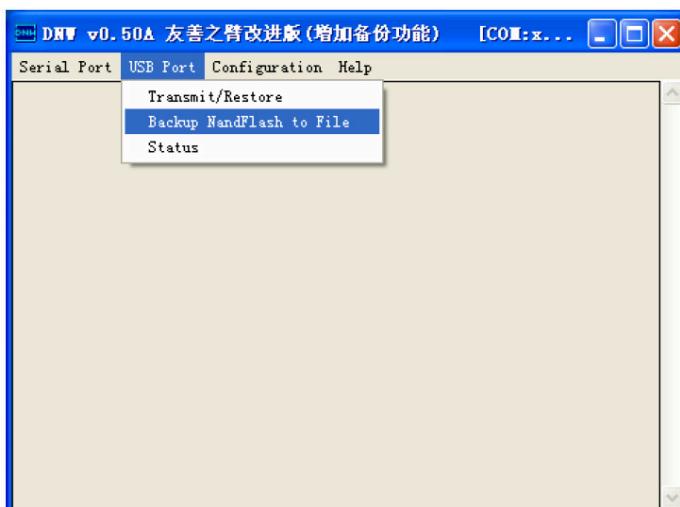
[n] Download Nboot
[e] Download Eboot
[i] Download WinCE MK.nb0
[w] Download WinCE MK.bin
[d] Download & Run
[f] Format the nand Flash
[p] Partition for Linux
[b] Boot the system
[s] Set the boot parameters
[t] Print the TOC struct of wince
[u] Backup NAND Flash to HOST through USB(upload)
[r] Restore NAND Flash from HOST through USB
[q] Goto shell of vivi
Enter your selection: u

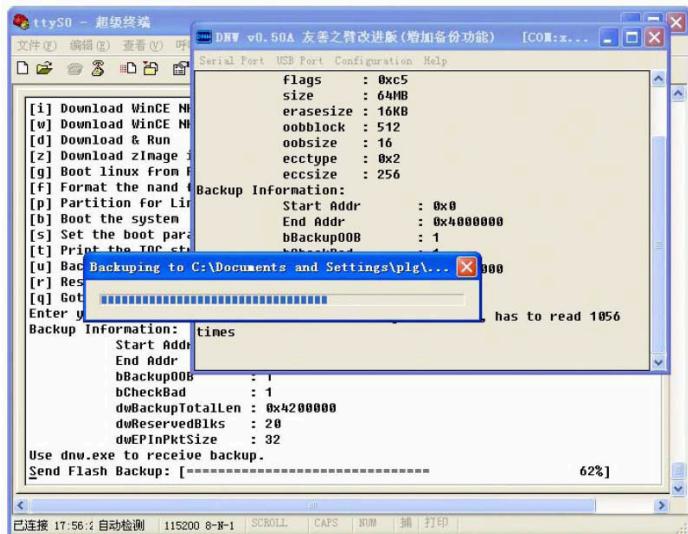
Backup Information:

Start Addr	:	0x0
End Addr	:	0x4000000
bBackup008	:	1
bCheckBad	:	1
duBackupTotalLen	:	0x4200000
duReservedBlks	:	20
duEPInPktSize	:	32

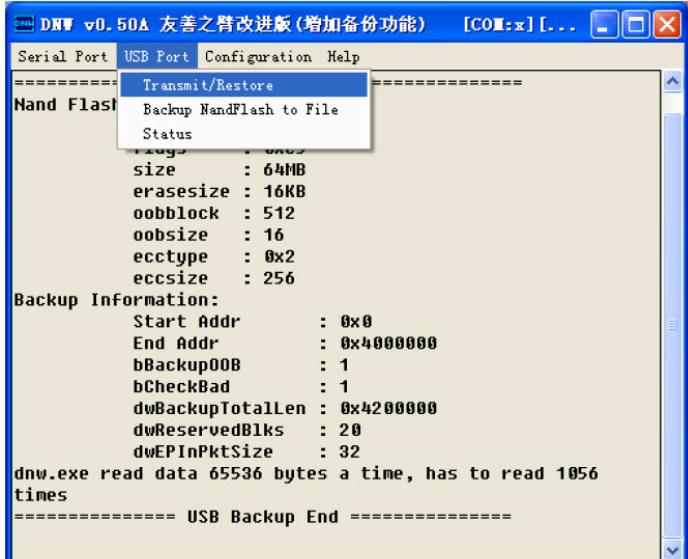
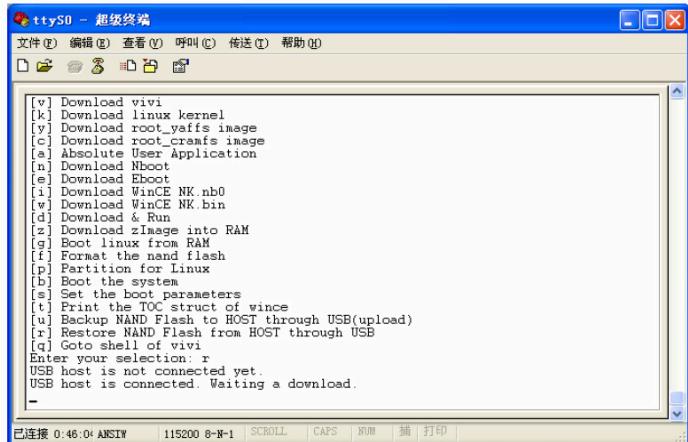
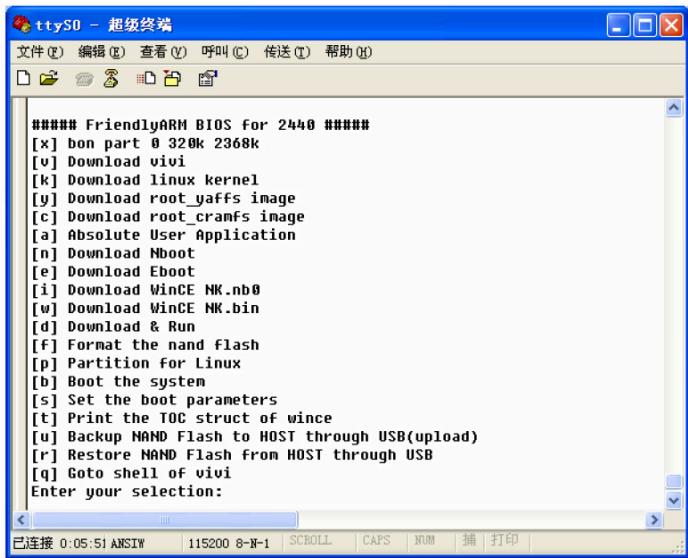
Use dnw.exe to receive backup.

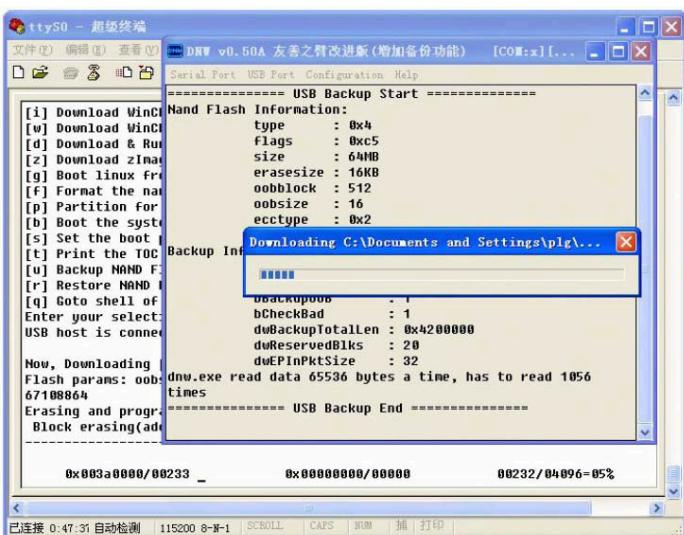
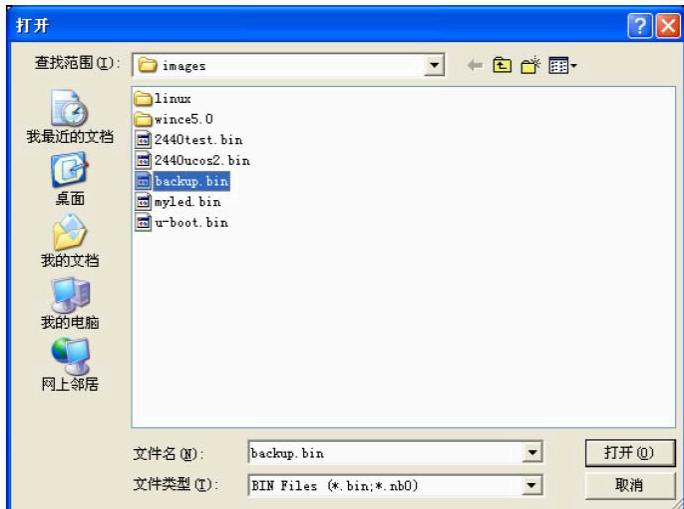
已连接 0:18:11 ANSIW 115200 8-N-1 SCROLL CAPS NUM 插 打印





Restore Nand Flash





3.2 Install Linux

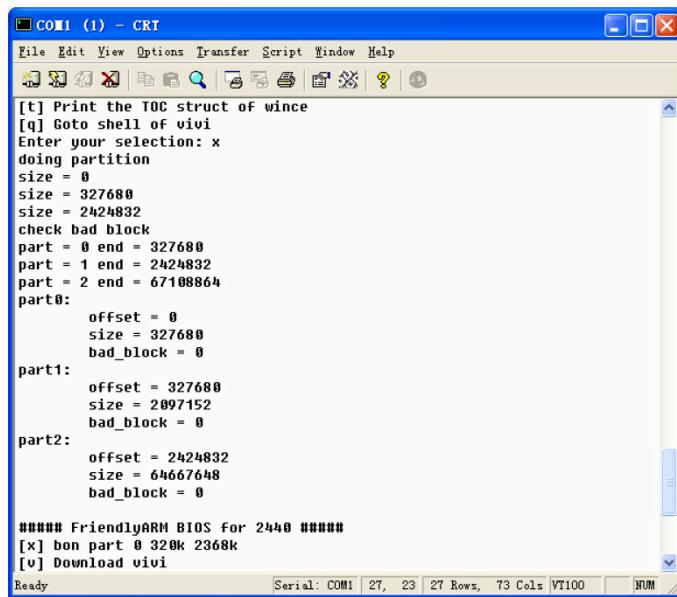
Linux binary image file is in image/linux folder. Connect MINI2440 board with USB cable and power on the board to enter supervivi main menu. Watch indicator on DNW title bar to check if USB connection success:



Major steps for linux installation:

- (1) format Nand Flash(make partition)
- (2) Install bootloader
- (3) Install kernel
- (4) Install file system

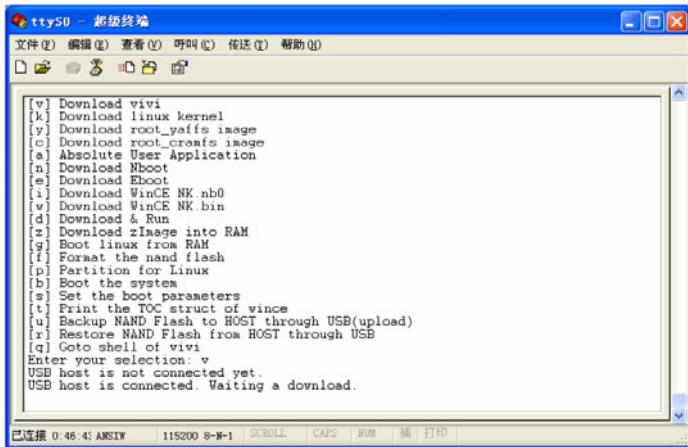
3.2.1 Nand Flash Make Partition



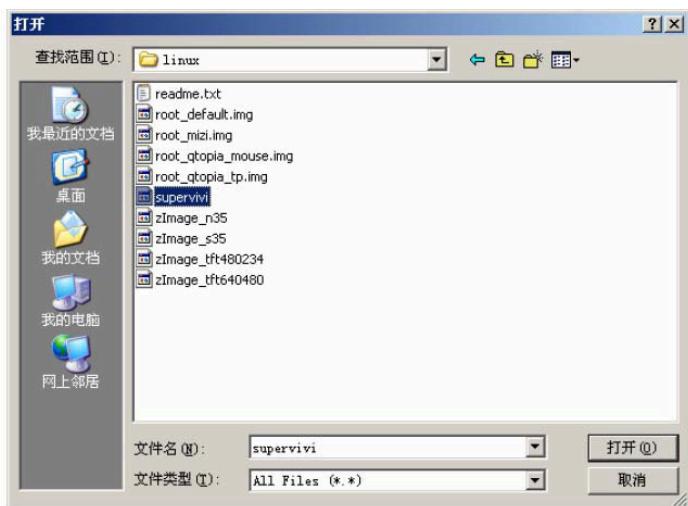
3.2.2 BIOS Recovery

Caution: The operations in section 3.2.1 will erase all data in Nand Flash. Please do not shut off the power or you will have to re-load supervivi in Nand Flash.

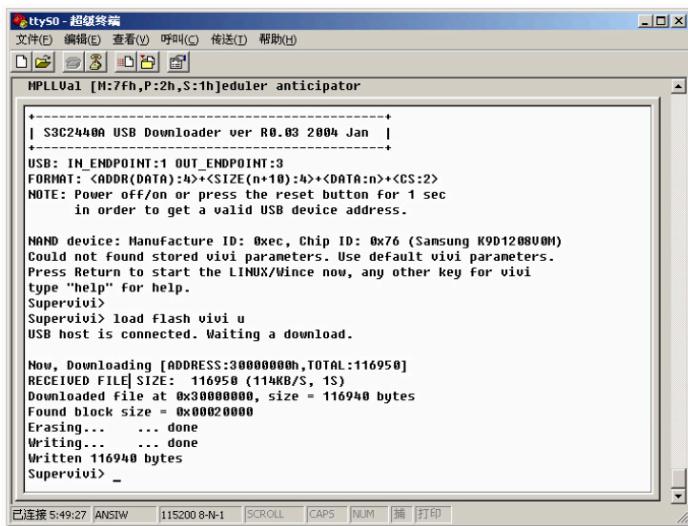




And then click USB Port->Transmit to download supervivi image file.



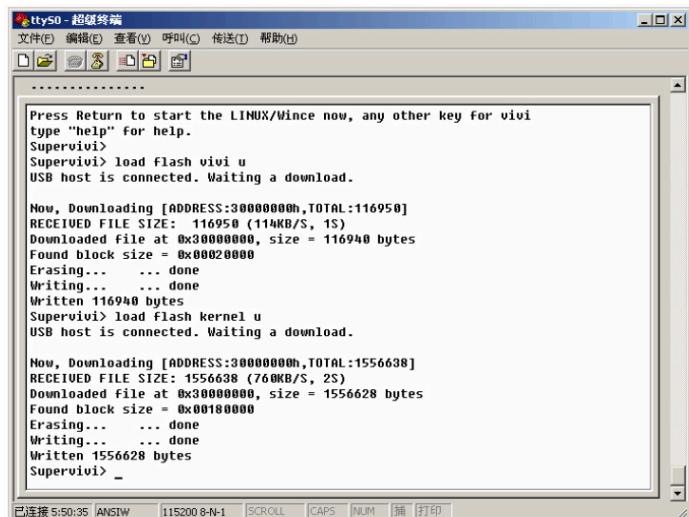
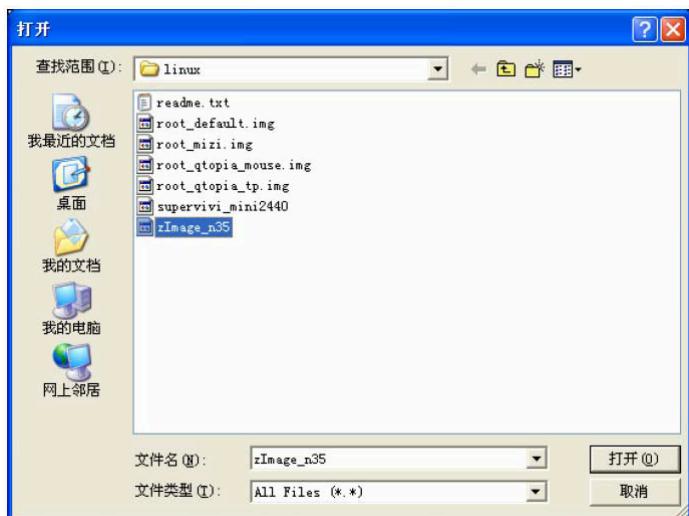
After successfully downloading, BIOS will update this new supervivi image to Nand Flash.



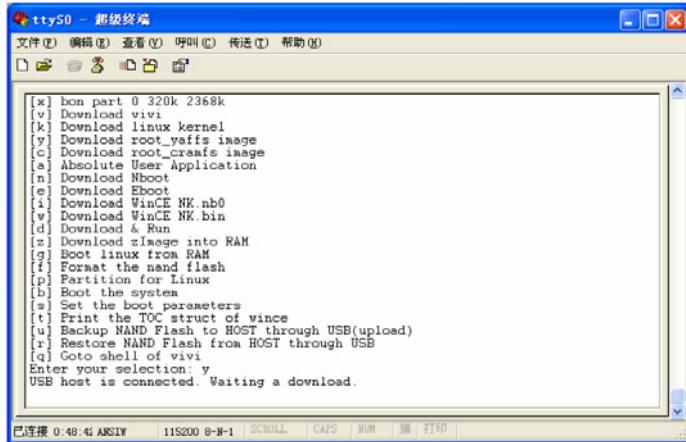
3.2.3 Install Kernel



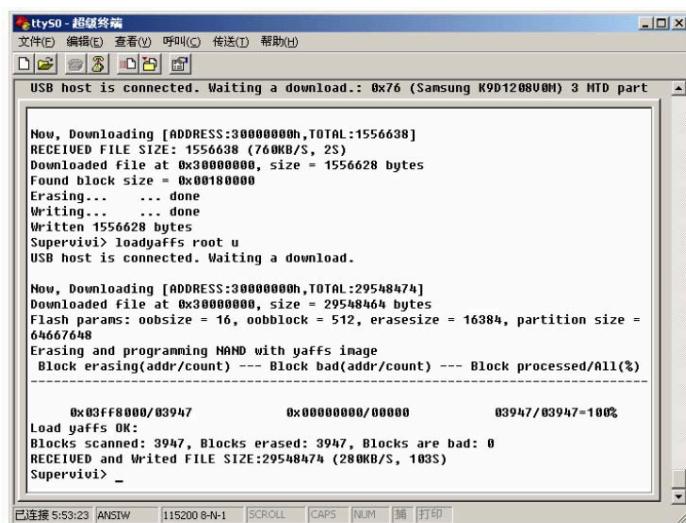
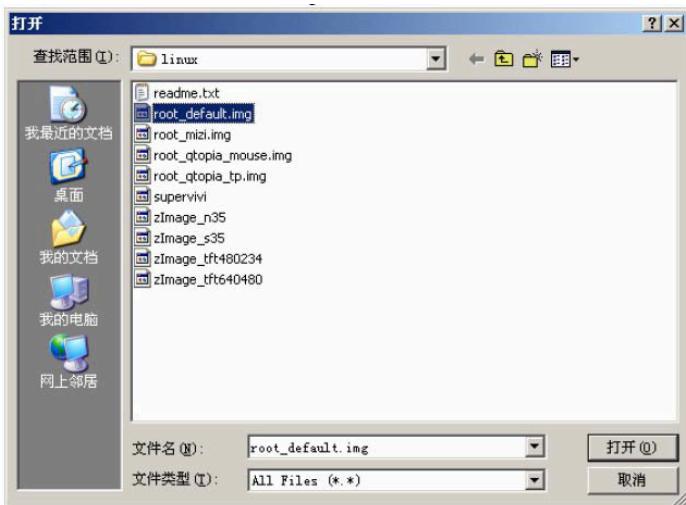
Click DNW USB Port->Transmit to select which kernel image file you want to download. Linux kernel image will be updated to Nand Flash after successfully downloading.



3.2.4 Install yaffs



Click DNW USB Port->Transmit to select which file system image file you want to download. Linux file system will be updated to Nand Flash after successfully downloading.



3.2.5 Start OS

Please un-plug USB cable after system successfully updated

Input [b] under BIOS or power cycle/reset the board. Supervivi will restart and boot linux automatically.

3.3 Install Wince

Wince binary image file is on image/wince folder. Connect MINI2440 board with USB cable and power on the board to enter supervivi main menu. Watch indicator on DNW title bar to check if USB connection success:



Major steps for Wince installation:

- (1) format Nand Flash(make partition)
- (2) Install bootloader
- (3) Install Eboot
- (4) Install Wince

3.3.1 Nand Flash Make Partition

```
#### FriendlyARM BIOS for 2440 #####
[x] bon part 0 320k 2368k
[v] Download vivi
[k] Download linux kernel
[y] Download root_yaffs image
[c] Download root_cramfs image
[a] Absolute User Application
[n] Download Nboot
[e] Download Eboot
[i] Download WinCE NK.nb0
[w] Download WinCE NK.bin
[d] Download & Run
[F] Format the nand flash
[p] Partition for Linux
[b] Boot the system
[s] Set the boot parameters
[t] Print the TOC struct of wince
[u] Backup NAND Flash to HOST through USB(upload)
[r] Restore NAND Flash from HOST through USB
[q] Goto shell of vivi
Enter your selection: _
```

The terminal window shows the supervivi main menu with various options for Nand Flash management. The menu includes options for downloading vivi, linux kernel, root_yaffs, root_cramfs, absolute user application, Nboot, Eboot, WinCE NB0, WinCE NB1, download and run, format, partition for Linux, boot the system, set boot parameters, print TOC, backup, restore, and goto shell.

```

COM1 (1) - CRT
File Edit View Options Transfer Script Window Help
[?] Print the TOC struct of wince
[q] Goto shell of vivi
Enter your selection: x
doing partition
size = 0
size = 327680
size = 2424832
check bad block
part = 0 end = 327680
part = 1 end = 2424832
part = 2 end = 67108864
part0:
    offset = 0
    size = 327680
    bad_block = 0
part1:
    offset = 327680
    size = 2097152
    bad_block = 0
part2:
    offset = 2424832
    size = 64667648
    bad_block = 0
##### FriendlyARM BIOS for 2440 #####
[x] bon part 0 320K 2368K
[v] Download vivi
Ready          Serial: COM1 | 27, 23 | 27 Rows, 73 Cols | VT100

```

3.3.2 BIOS Recovery

Caution: The operations in section 3.3.1 will erase all data in Nand Flash. Please do not shut off the power or you will have to re-load supervivi in Nand Flash.

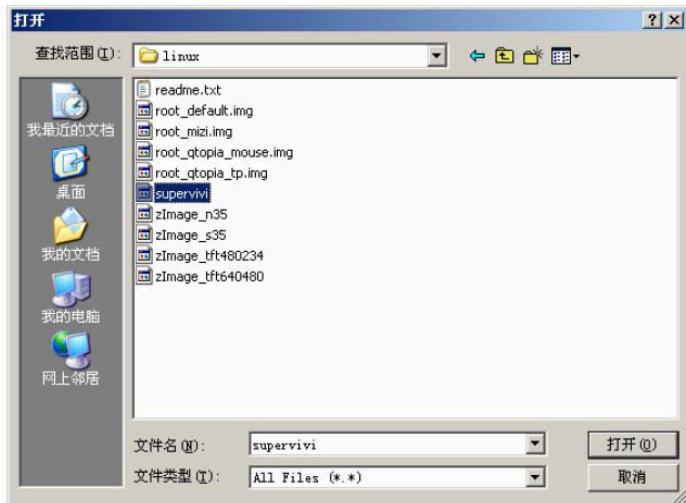


```

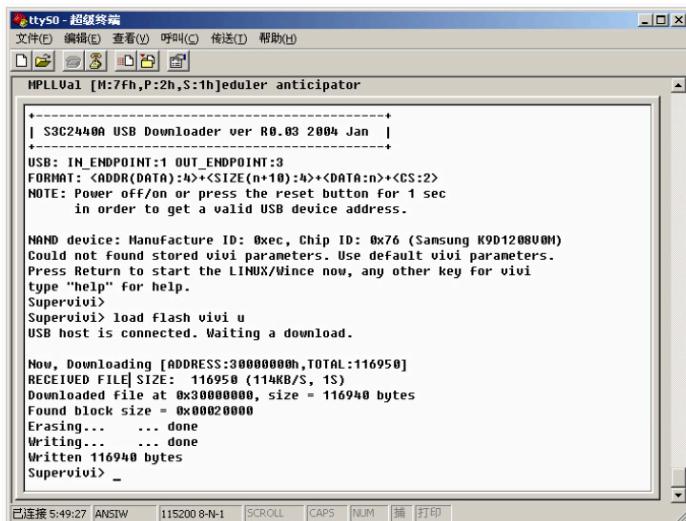
ttyS0 - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
[?] Print the TOC struct of wince
[q] Goto shell of vivi
Enter your selection: v
USB host is not connected yet.
USB host is connected. Waiting a download.

```

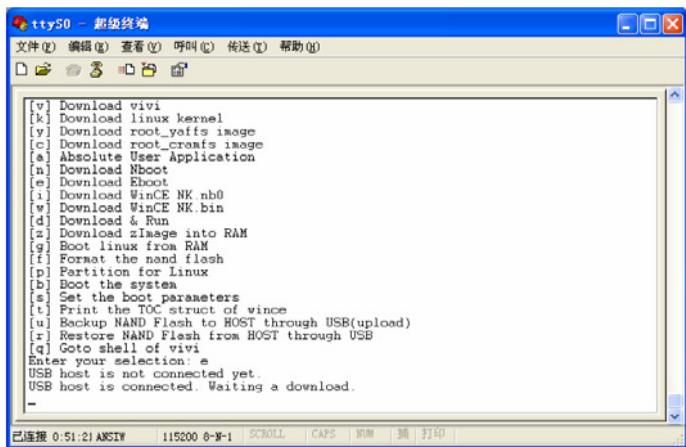
And then click USB Port->Transmit to download supervivi image file.

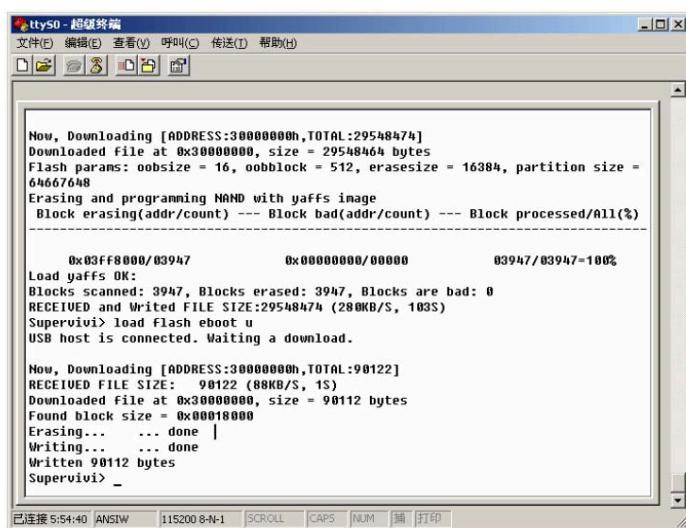
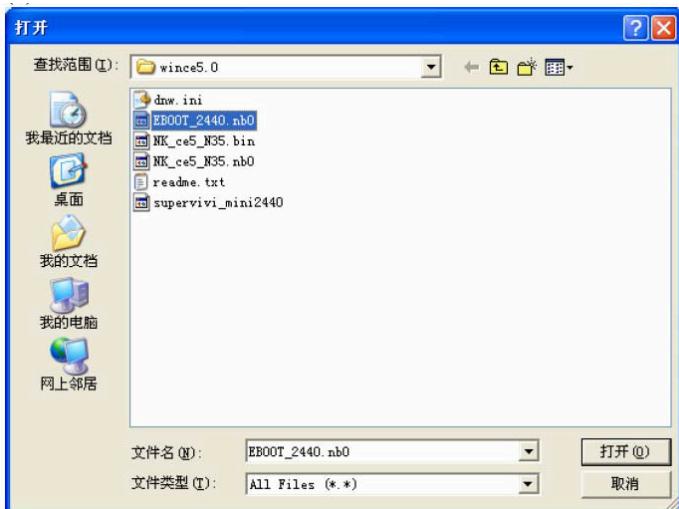


After successfully downloading, BIOS will update this new supervivi image to Nand Flash.

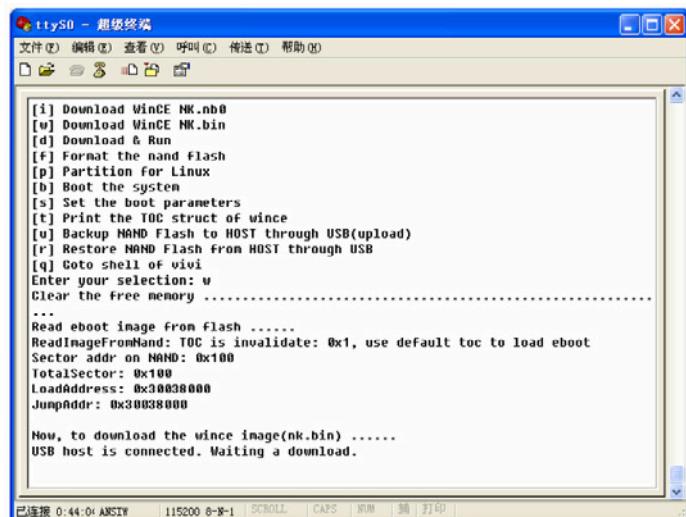


3.3.3 Install EBoot

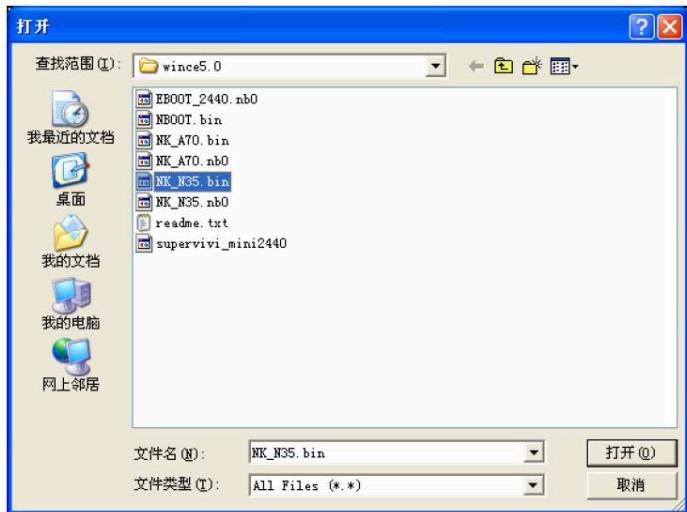




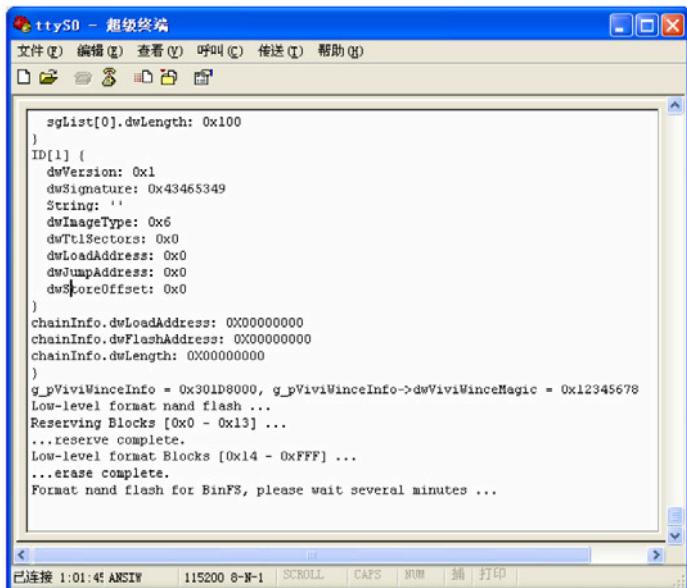
3.3.4 Install Kernel



Eboot will prompt user to download wince from USB. Click USB Port->Transmit to select Wince image file to start download.



Eboot will low level format Nand Flash and then convert BinFS. After formatting successfully done, Eboot will update windows CE image file to Nand Flash. WinCE will automatically start up finally.



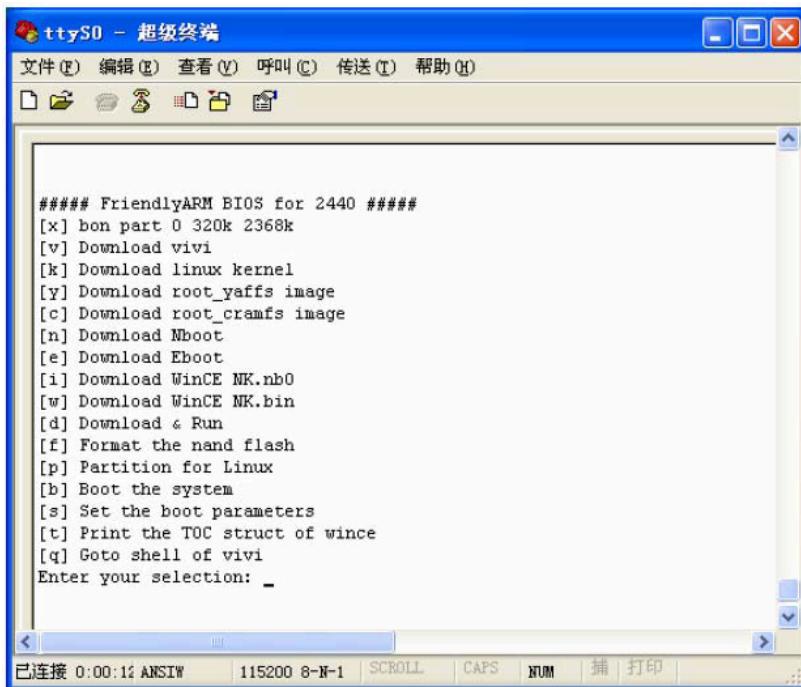
Appendix: OS Installation by Command Line

Note: We recommend you use supervivi main menu to update software but we still list command line commands here for your reference.

1. How to enter command line mode

Supervivi will enter main menu when board is set to Nor Flash boot mode. Select function [q] to enter command line mode

1.1 From BIOS main menu



1.2 From Nand Flash boot

User can also enter supervivi command line interface when board is booting from Nand Flash. Connect the board with PC by serial cable and USB cable. Open Windows hypterminal and DNW. Hold on space bar in Hypterminal. Power on MINI2440 and then you can enter command line interface:

```
Genre: Goa

VIVI version 0.1.4 (root@localhost.localdomain) (gcc version 2.95.3 20010315 (re
lease)) #0.1.4 Sat Jul 21 11:51:25 CST 2007
MMU table base address = 0x33DFC000
Succeed memory mapping.
DIOM_UPLL0
MPLL0al [M:7fh,P:2h,S:1h]
CLKDIUN:5h

+-----+
| S3C2440A USB Downloader ver R0.03 2004 Jan |
+-----+
USB: IN_ENDPOINT:1 OUT_ENDPOINT:3
FORMAT: <ADDR(DATA):4>+<SIZE(n+10):4>+<DATA:n>+<CS:2>
NOTE: Power off/on or press the reset button for 1 sec
      in order to get a valid USB device address.

NAND device: Manufacture ID: 0xec, Chip ID: 0x76 (Samsung K9D1288U0H)
Could not found stored vivi parameters. Use default vivi parameters.
Press Return to start the LINUX/Wince now, any other key for vivi
type "help" for help.
Supervivi> _
```

已连接 5:44:06 ANSIW 115200 8-N-1 SCROLL CAPS NUM 插 打印

2. Linux Installation

Linux binary image file is on image/linux folder. Connect MINI2440 board with USB cable and power on the board to enter supervivi command line mode. Watch indicator on DNW title bar to check if USB connection success:



Major steps for linux installation:

- (1) format Nand Flash(make partition)
- (2) Install bootloader
- (3) Install kernel
- (4) Install file system

2.1 Nand Flash Make Partition

Under BIOS: **bon part 0 320k 2368k**

Description: bon is command to make partition, the command above is to make 3 partition from Nand Flash address 0:

0-320k: size is 320k

320k-2368k: size is 2M

2368k-64M: size is 62M

```
Press Return to start the LINUX/Wince now, any other key for vivi
type "help" for help.
Supervivi> bon part 0 320k 2368k
doing partition
size = 0
size = 327680
size = 2424832
check bad block
part = 0 end = 327680
part = 1 end = 2424832
part = 2 end = 67108864
part0:
    offset = 0
    size = 327680
    bad_block = 0
part1:
    offset = 327680
    size = 2097152
    bad_block = 0
part2:
    offset = 2424832
    size = 64667648
    bad_block = 0
Supervivi> _
```

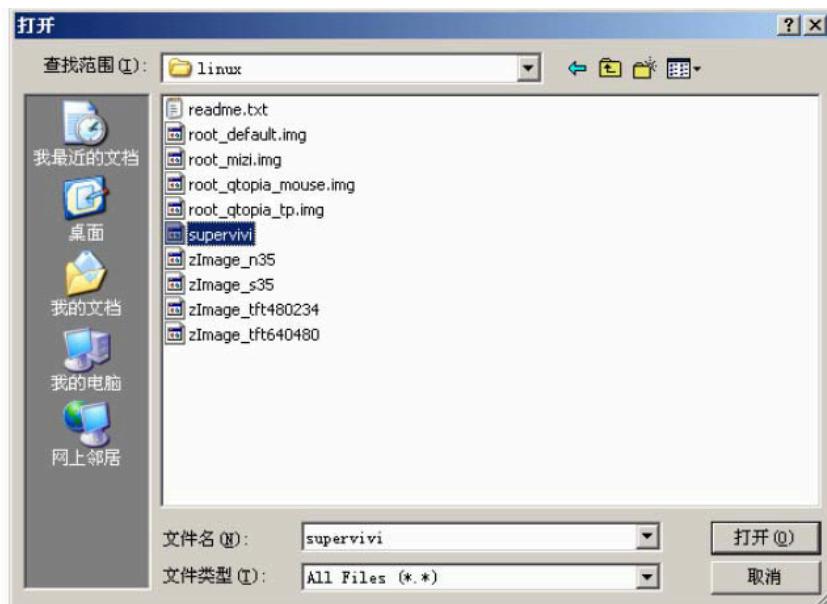
已连接 5:45:34 ANSIW 115200 8-N-1 SCROLL CAPS NUM 插 打印

2.2 BIOS Recovery

Caution: The operations in section 2.1 will erase all data in Nand Flash. Please do not shut off the power or you will have to re-load supervivi in Nand Flash.

Input: **load flash vivi u**

And then click USB Port->Transmit to download supervivi image file.



After successfully downloading, BIOS will update this new supervivi image to Nand Flash.

```
MPLLVal [M:7fh,P:2h,S:1h]eduler anticipator
+S3C2440A USB Downloader ver R0.03 2004 Jan |
+USB: IN_ENDPOINT:1 OUT_ENDPOINT:3
FORMAT: <ADDR(DATA):4>+<SIZE(n+10):4>+<DATA:n>+<CS:2>
NOTE: Power off/on or press the reset button for 1 sec
      in order to get a valid USB device address.

NAND device: Manufacture ID: 0xec, Chip ID: 0x76 (Samsung K9D1208U0M)
Could not found stored vivi parameters. Use default vivi parameters.
Press Return to start the LINUX/Wince now, any other key for vivi
type "help" for help.
Supervivi>
Supervivi> load flash vivi u
USB host is connected. Waiting a download.

Now, Downloading [ADDRESS:30000000h, TOTAL:116950]
RECEIVED FILE| SIZE: 116950 (114KB/S, 1S)
Downloaded file at 0x30000000, size = 116940 bytes
Found block size = 0x00020000
Erasing... ... done
Writing... ... done
Written 116940 bytes
Supervivi> _
```

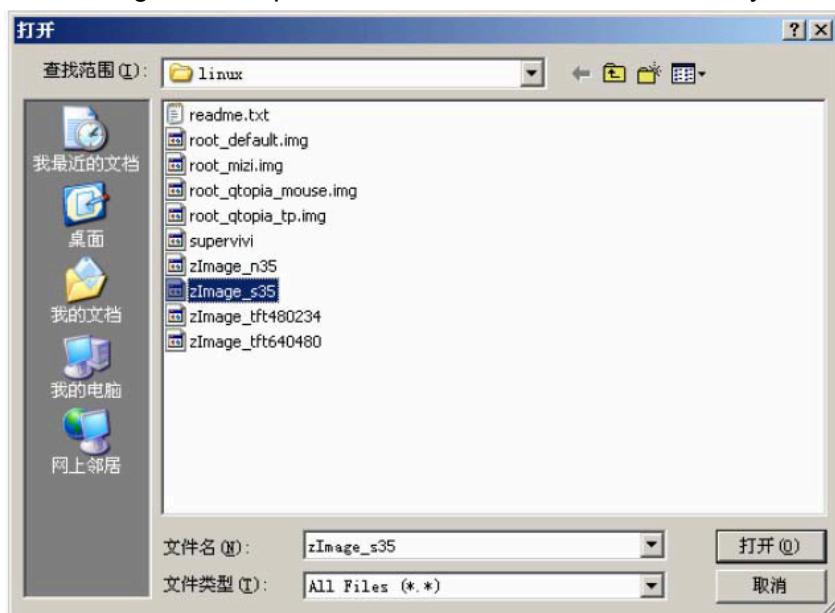
已连接 5:49:27 ANSIW 115200 8-N-1 SCROLL CAPS NUM 插 打印

Note: User can also use **load flash vivi x** command to download and update suervivi by xmodem prototype from hypterminal.

2.3 Install Linux

Input: **load flash kernel u**

Click DNW USB Port->Transmit to select which kernel image file you want to download. Linux kernel image will be updated to Nand Flash after successfully downloading.



```
Press Return to start the LINUX/Wince now, any other key for vivi
type "help" for help.
Supervivi>
Supervivi> load flash vivi u
USB host is connected. Waiting a download.

Now, Downloading [ADDRESS:30000000h, TOTAL:116950]
RECEIVED FILE SIZE: 116950 (114KB/S, 1S)
Downloaded File at 0x30000000, size = 116940 bytes
Found block size = 0x00020000
Erasing... ... done
Writing... ... done
Written 116940 bytes
Supervivi> load Flash kernel u
USB host is connected. Waiting a download.

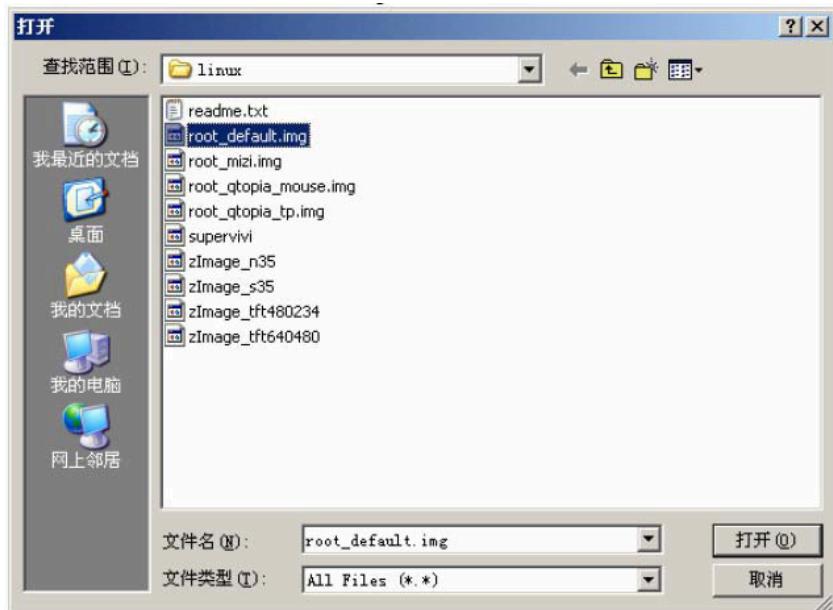
Now, Downloading [ADDRESS:30000000h, TOTAL:1556638]
RECEIVED FILE SIZE: 1556638 (760KB/S, 2S)
Downloaded File at 0x30000000, size = 1556628 bytes
Found block size = 0x00180000
Erasing... ... done
Writing... ... done
Written 1556628 bytes
Supervivi> _
```

Note: User can also use **load flash kernel x** command to download and update linux kernel by xmodem prototype from hypterminal.

2.4 Install yaffs

Input: loadyaffs root u

Click DNW USB Port->Transmit to select which file system image file you want to download. Linux file system image will be updated to Nand Flash after successfully downloading.



```

USB host is connected. Waiting a download.: 0x76 (Samsung K9D1208U0M) 3 MTD part

Now, Downloading [ADDRESS:30000000h, TOTAL:1556638]
RECEIVED FILE SIZE: 1556638 (760KB/S, 2S)
Downloaded file at 0x30000000, size = 1556628 bytes
Found block size = 0x00180000
Erasing... ... done
Writing... ... done
Written 1556628 bytes
Supervivi> loadyaffs root u
USB host is connected. Waiting a download.

Now, Downloading [ADDRESS:30000000h, TOTAL:29548474]
Downloaded file at 0x30000000, size = 29548464 bytes
Flash params: oobsize = 16, oobblock = 512, erasesize = 16384, partition size =
64667648
Erasing and programming NAND with yaffs image
Block erasing(addr/count) --- Block bad(addr/count) --- Block processed/All(%)

0x03FF8000/03947      0x00000000/000000      03947/03947=100%
Load yaffs OK:
Blocks scanned: 3947, Blocks erased: 3947, Blocks are bad: 0
RECEIVED and Writed FILE SIZE:29548474 (280KB/S, 103S)
Supervivi> -

```

已连接 5:53:23 ANSIW 115200 8-N-1 SCROLL CAPS NUM 插 打印

2.5 Start OS

Please un-plug USB cable after system successfully updated

Input “boot” under BIOS or power cycle/reset the board. Supervivi will restart and boot linux automatically.

3. Wince Installation

Wince binary image file is on image/wince folder. Connect MINI2440 board with USB cable and power on the board to enter supervivi command line mode. Watch indicator on DNW title bar to check if USB connection success:



Major steps for Wince installation:

- (1) format Nand Flash(make partition)
- (2) Install bootloader
- (3) Install Eboot
- (4) Install Wince

3.1 Nand Flash Make Partition

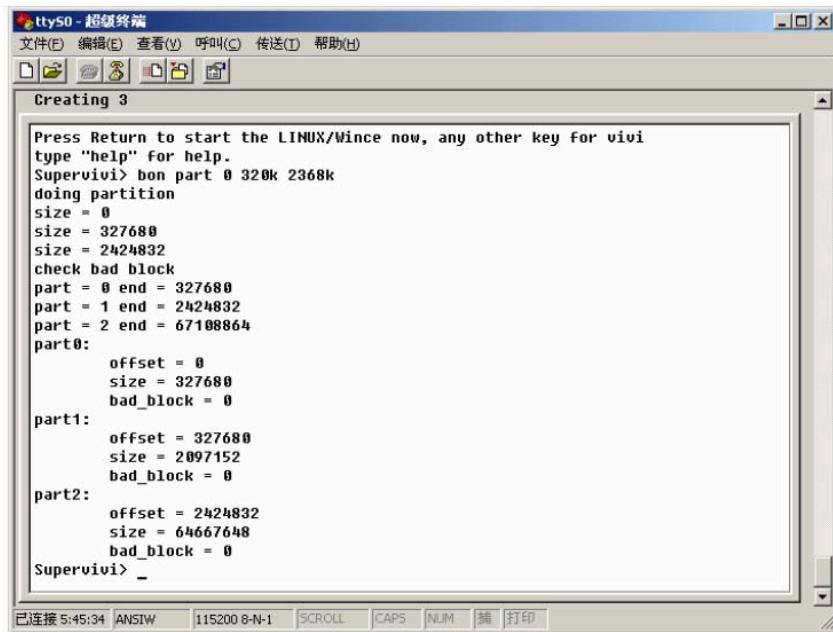
Under BIOS: **bon part 0 320k 2368k**

Description: bon is command to make partition, the command above is to make 3 partition from Nand Flash address 0:

0-320k: size is 320k

320k-2368k: size is 2M

2368k-64M: size is 62M



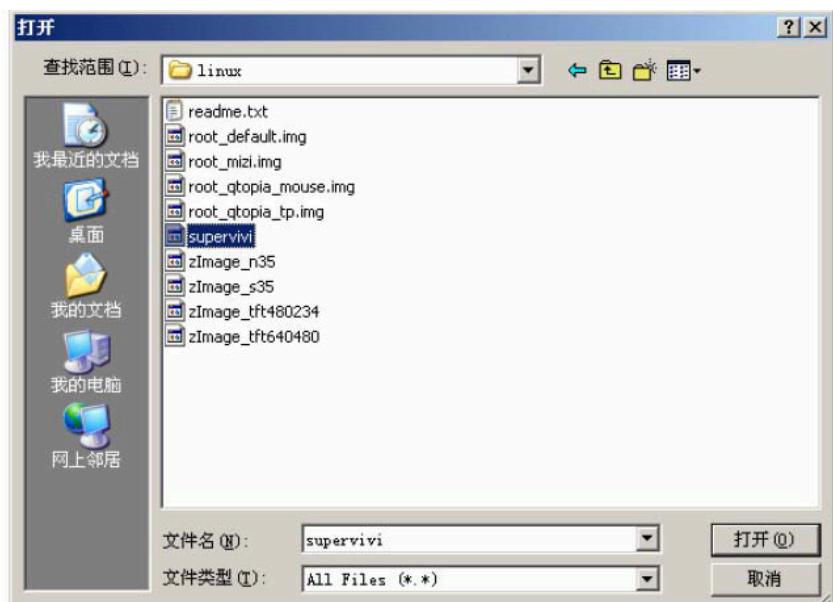
```
Press Return to start the LINUX/Wince now, any other key for vivi
type "help" for help.
Supervivi> bon part 0 320k 2368k
doing partition
size = 0
size = 327680
size = 2424832
check bad block
part = 0 end = 327680
part = 1 end = 2424832
part = 2 end = 67108864
part0:
    offset = 0
    size = 327680
    bad_block = 0
part1:
    offset = 327680
    size = 2097152
    bad_block = 0
part2:
    offset = 2424832
    size = 64667648
    bad_block = 0
Supervivi> _
```

3.2 BIOS Recovery

Caution: The operations in section 3.1 will erase all data in Nand Flash. Please do not shut off the power or you will have to re-load supervivi in Nand Flash.

Input: **load flash vivi u**

And then click USB Port->Transmit to download supervivi image file.



After successfully downloading, BIOS will update this new supervivi image to Nand Flash.

```
MPLLVal [M:7fh,P:2h,S:1h]eduler anticipator
+
| S3C2440A USB Downloader ver R0.03 2004 Jan |
+
USB: IN_ENDPOINT:1 OUT_ENDPOINT:3
FORMAT: <ADDR(DATA):4>+<SIZE(n+10):4>+<DATA:n>+<CS:2>
NOTE: Power off/on or press the reset button for 1 sec
      in order to get a valid USB device address.

NAND device: Manufacture ID: 0xec, Chip ID: 0x76 (Samsung K9D1208U0M)
Could not found stored vivi parameters. Use default vivi parameters.
Press Return to start the LINUX/Wince now, any other key for vivi
type "help" for help.
Supervivi>
Supervivi> load flash vivi u
USB host is connected. Waiting a download.

Now, Downloading [ADDRESS:30000000h,TOTAL:116950]
RECEIVED FILE| SIZE: 116950 (114KB/S, 1S)
Downloaded file at 0x30000000, size = 116940 bytes
Found block size = 0x00020000
Erasing... ... done
Writing... ... done
Written 116940 bytes
Supervivi> _
```

已连接 5:49:27 ANSIW 115200 8-N-1 SCROLL CAPS NUM 打印

Note: User can also use **load flash vivi x** command to download and update suervivi by xmodem prototype from hypterminal.

3.3 Install EBoot

Input: **load flash eboot u**

Click USB Port->Transmit to select eboot.nb0 to start download. Eboot will be automatically updated to Nand Flash after successfully downloading.

Note: User can also use **load flash eboot x** command to download eboot from hypterminal by xmodem prototype.

```
Now, Downloading [ADDRESS:30000000h,TOTAL:29548474]
Downloaded file at 0x30000000, size = 29548464 bytes
Flash params: oobsize = 16, oobblock = 512, erasesize = 16384, partition size =
64667648
Erasing and programming NAND with yaffs image
  Block erasing(addr/count) --- Block bad(addr/count) --- Block processed/All(%)

0x03FF8000/03947          0x00000000/000000          03947/03947=100%
Load yaffs OK:
Blocks scanned: 3947, Blocks erased: 3947, Blocks are bad: 0
RECEIVED and Writed FILE SIZE:29548474 (280KB/S, 103S)
Supervivi> load flash eboot u
USB host is connected. Waiting a download.

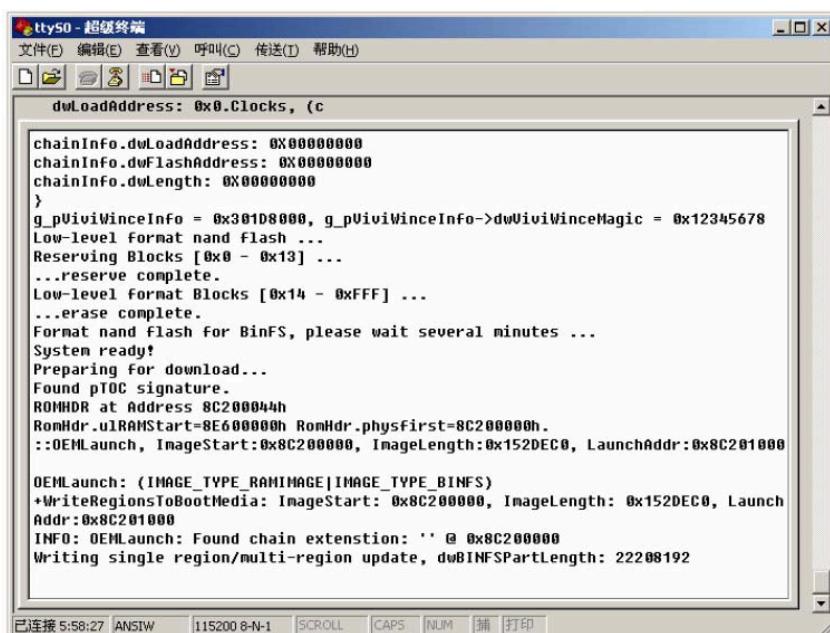
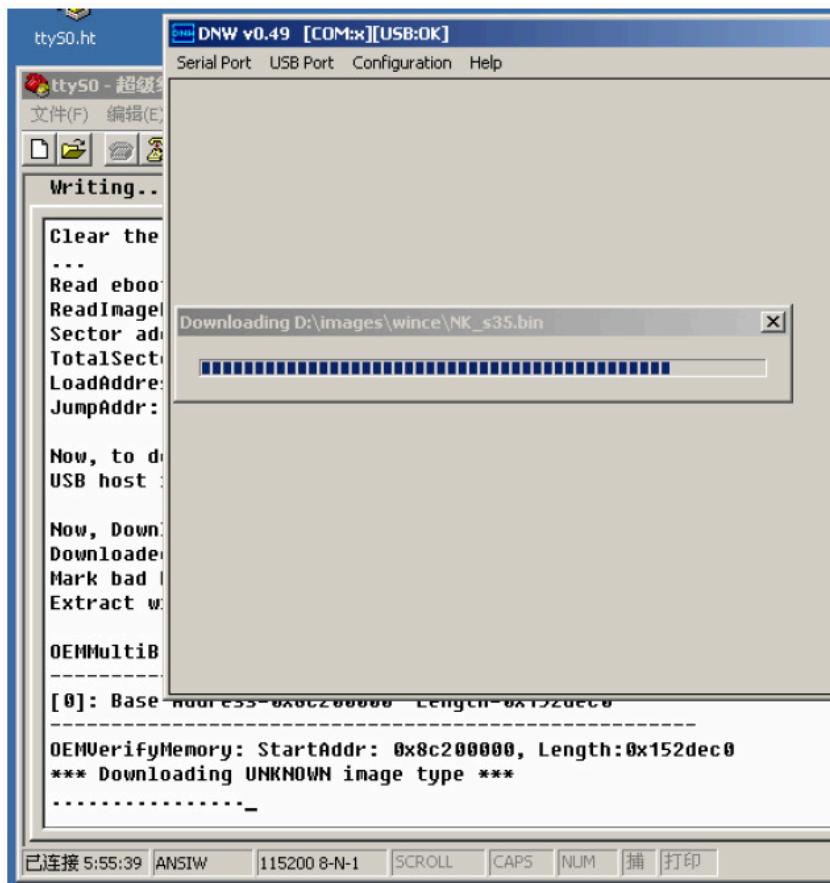
Now, Downloading [ADDRESS:30000000h,TOTAL:90122]
RECEIVED FILE SIZE: 90122 (88KB/S, 1S)
Downloaded file at 0x30000000, size = 90112 bytes
Found block size = 0x00018000
Erasing... ... done |
Writing... ... done
Written 90112 bytes
Supervivi> _
```

已连接 5:54:40 ANSIW 115200 8-N-1 SCROLL CAPS NUM 打印

3.4 Install Kernel

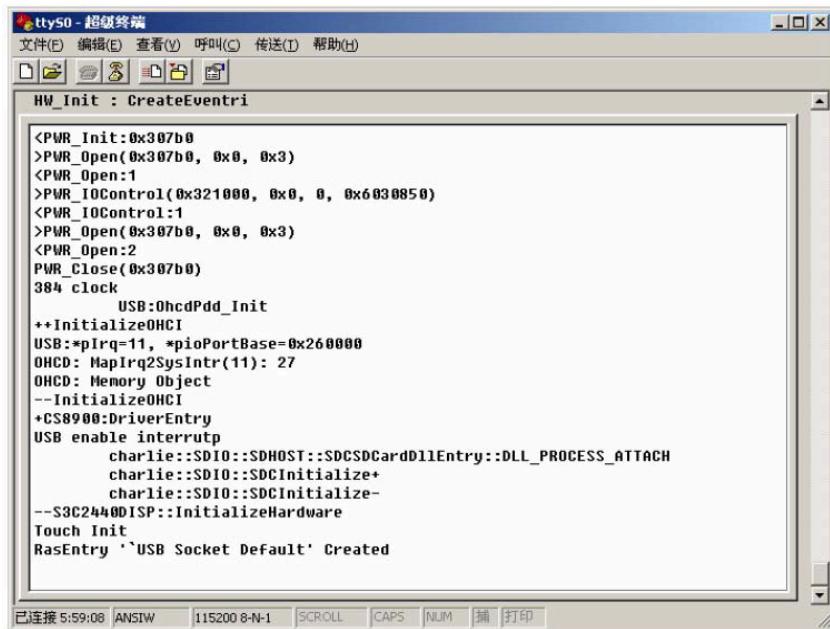
Input : load flash wince u

Eboot will prompt user to download wince from USB. Click USB Port->Transmit to select Wince image file to start download.



Eboot will low level format Nand Flash and then convert BinFS. After formatting successfully done,

Eboot will update windows CE image file to Nand Flash. WinCE will automatically start up finally.



The screenshot shows a terminal window titled "ttyS0 - 超级终端". The window contains a log of system initialization commands. The log starts with "HW_Init : CreateEventri" and continues with various driver initializations and configuration steps. Key entries include:

```
<PWR_Init:0x307b0
>PWR_Open(0x307b0, 0x0, 0x3)
<PWR_Open:1
>PWR_IOControl(0x321000, 0x0, 0, 0x6030850)
<PWR_IOControl:1
>PWR_Open(0x307b0, 0x0, 0x3)
<PWR_Open:2
PWR_Close(0x307b0)
384 clock
    USB:OhcdPdd_Init
++InitializeOHCI
USB:*pIrq=11, *pioPortBase=0x260000
OHCD: MapIrq2SysIntr(11): 27
OHCD: Memory Object
--InitializeOHCI
+CS8900:DriverEntry
USB enable interrupt
    charlie::SDIO::SDHOST::SDCSDCardDllEntry::DLL_PROCESS_ATTACH
    charlie::SDIO::SDCInitialize+
    charlie::SDIO::SDCInitialize-
--S3C2440ISP::InitializeHardware
Touch Init
RasEntry 'USB Socket Default' Created
```

At the bottom of the terminal window, there is a status bar with the following information:

已连接 5:59:08 ANSIW 115200 8-N-1 SCROLL CAPS NUM 插 打印