RAK410 Firmware Upgrade Manual

In order to facilitate user to quickly update firmware, RAK410 has a built-in boot program 'bootloader' to upgrade firmware by serial ports. The boot program data can be uploaded via XModem-CRC protocol, which can be supported by common terminal programs.

RAK410 comprises MCU chip and WIFI chip, each of which has a FLASH. The upgrade consists of two parts: the MCU firmware (MCU FW) and WIFI firmware (WIFI FW).

Here are the steps to upgrade firmware by bootloader:

I. Hardware connection instructions:

1. UART0: Pin 31(TX), Pin 32(RX);

2. UART1: Pin 22(TX), Pin 23(RX);

Note: the connection of the two pins is used to select a serial port for upgrade, and it is available only when the two pins are connected and then a serial port is selected. User should check if the serial port is connected when selecting the serial port.

II. Preparation:

2.1 HyperTerminal Setting:

Note: The following examples are for Windows XP system which comes with a serial port terminal. For Windows 7 system user can download serial port terminal and Install.

Start -> All Programs -> Accessories -> Communications -> HyperTerminal, open the HyperTerminal, the whole process is shown in Figure 1：
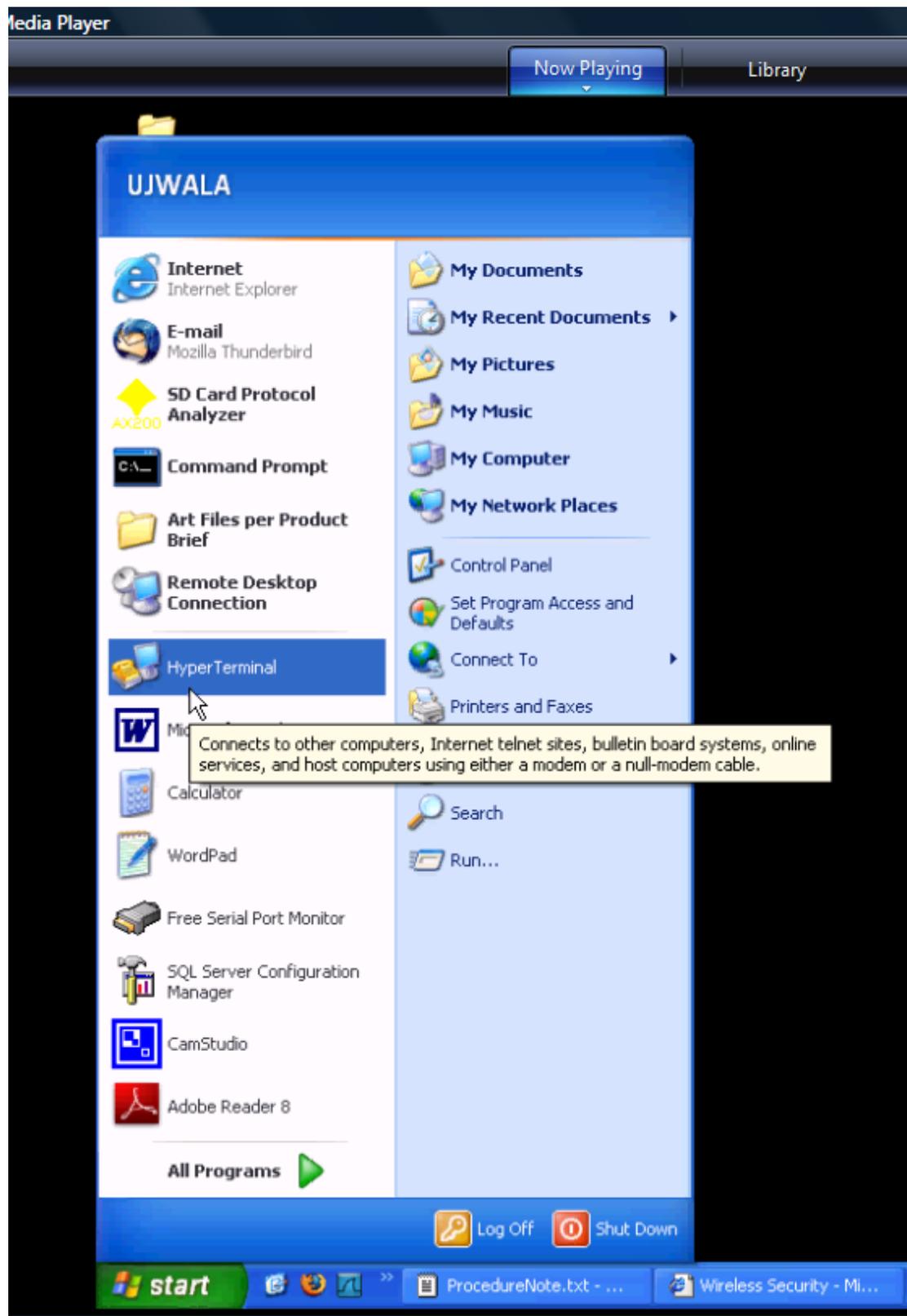
Figure 1: Open HyperTerminal

1. As the pop-up window shows in Figure 2, enter the name of HyperTerminal,

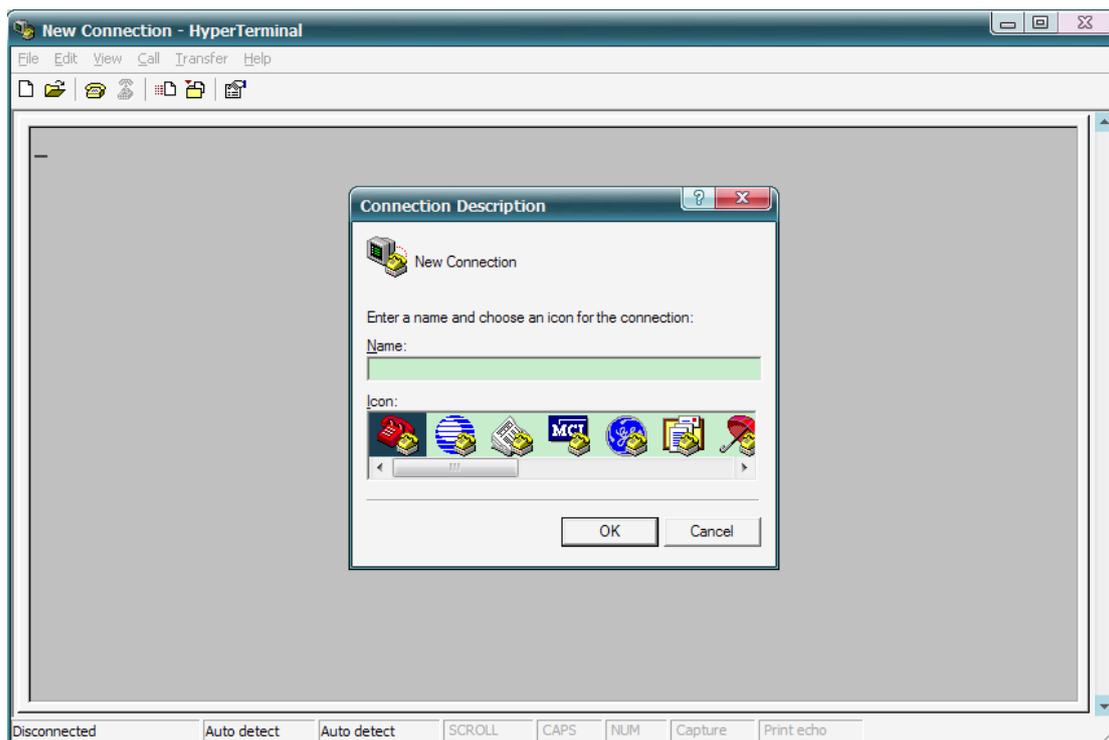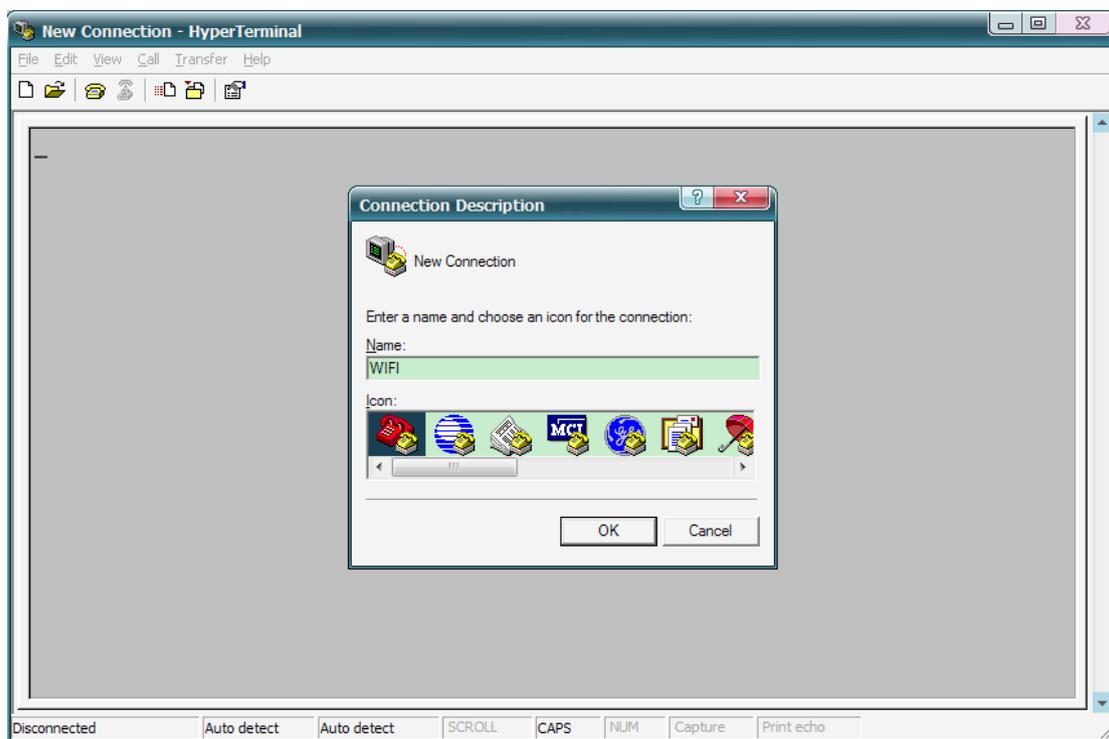such as WIFI, then click 'OK' as shown in Figure 3:
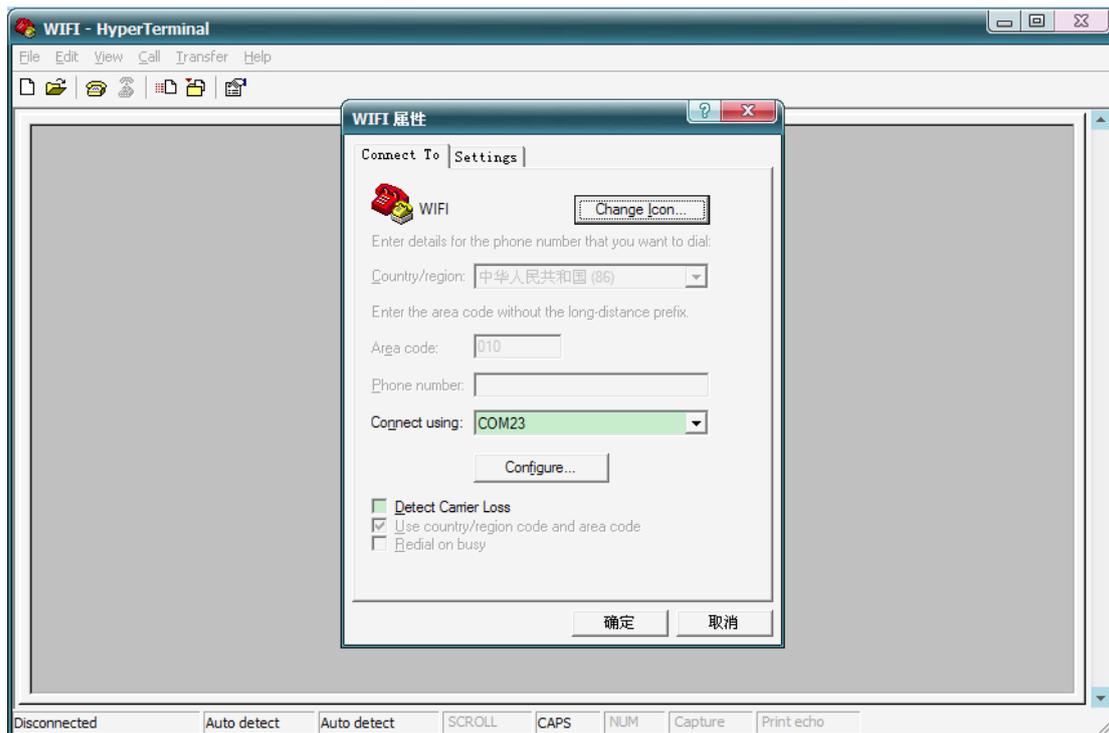

Figure 2

Figure 3

Figure 4

2. Modify the parameters in the pop-up window as shown in Figure 5. By default, RAK410 supports baud rate with 115200, 8 bits, no parity check, 1 stop bit, no data flow control, and click 'Apply' -> 'OK'

Figure 5

3. As the pop-up window shows in Figure 6, click 'Properties', select 'Settings' -> 'ASCII Code Settings', and set the relevant parameters as shown in Figure 7, click 'OK', then properties are set.
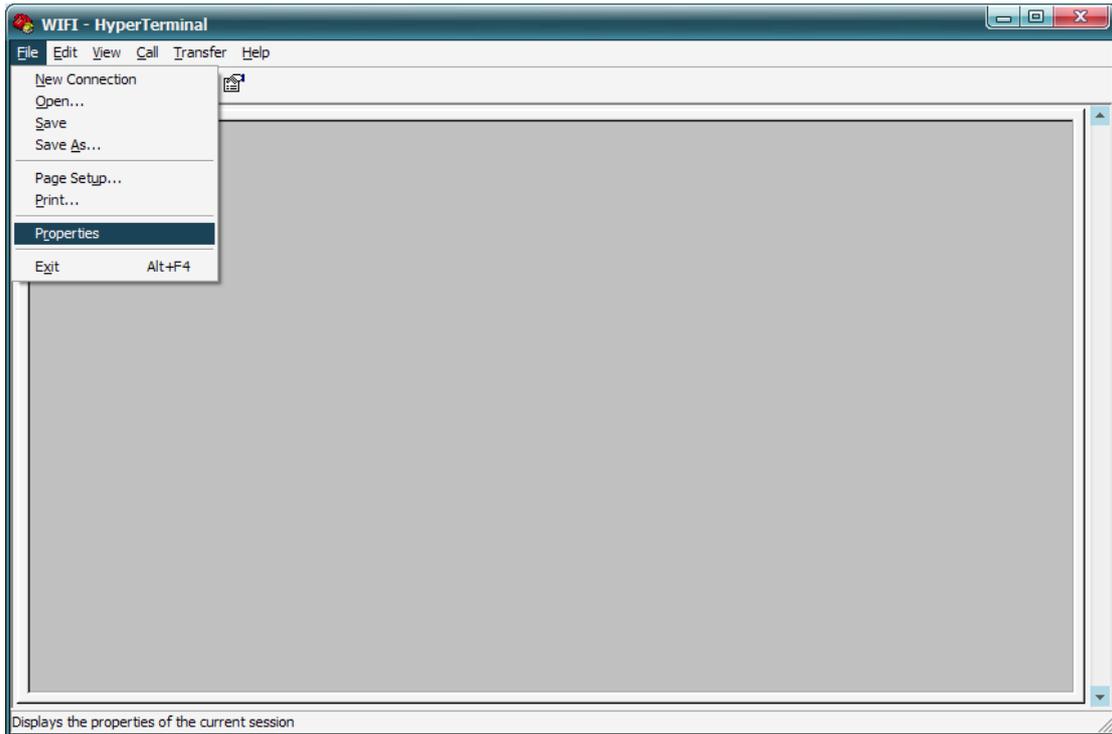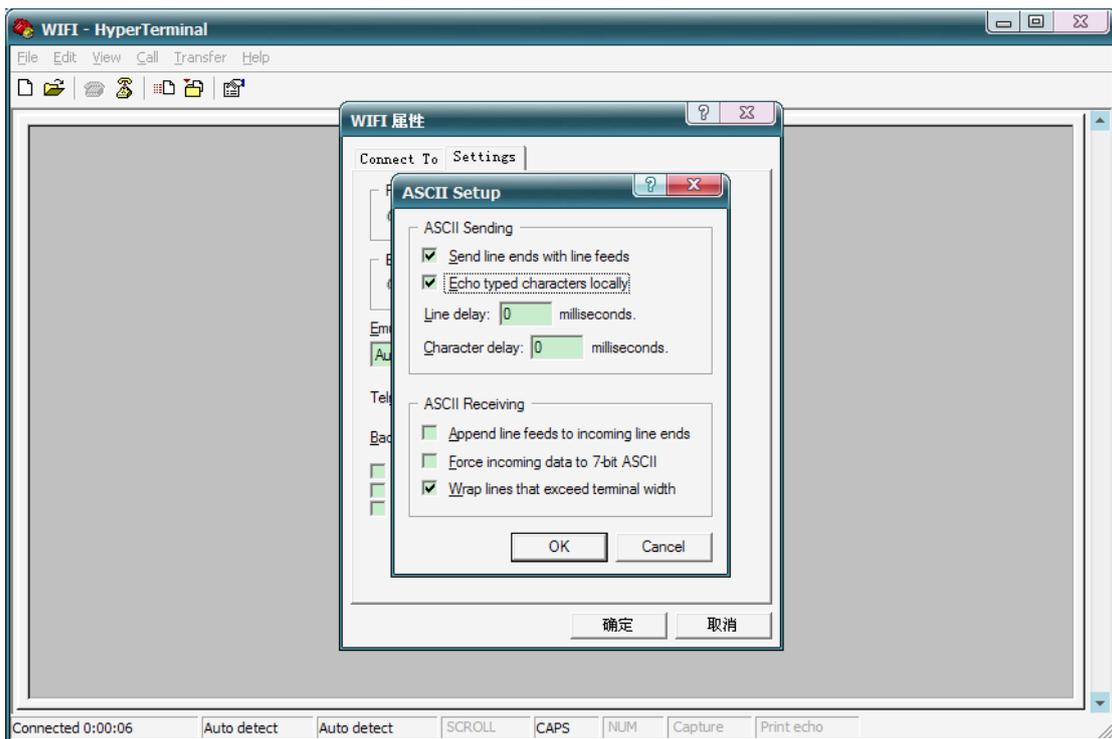
Figure 6

Figure 7

Starting Module RAK410:

Connect RAK410 with PC via Serial Interface and module power supply via USB Interface. The module directly executes user code after powered on, and enters into normal operation, displaying a string of 'WELCOME TO RAK410'.

2.2 Swith to bootloader

There are two ways to enter bootloader mode.

(1) The hardware enters into 'bootloader' mode, when pin 28 is pulled up. The operation afterwards is same as that of enter via command;

(2) In AT command mode, input "at+boot_mode" in a terminal and enter into 'bootloader' mode, then enable upgrade, the operation is as follows:

CMD:at+boot_mode=0

```
Welcome to RAK410
at+ascii=1
OK
at+boot_mode=0
0
Please chioce update interface(1/2)!
*1.UART0*
*2.UART1*

_
```

After RAK410 has entered into 'bootloader' mode, the terminal prompts you to select UART0 or UART1 serial port for upgrading. Input '1 ' for UART0 and input '2' for UART1, as shown in Figure 1.1.

```
Welcome to RAK410
at+ascii=1
OK
at+boot_mode=0
0
Please chioce update interface(1/2)!
*1.UART0*
*2.UART1*

_
```

Figure 1.1

After user has entered '1 'or '2', it prompts that if user is positive to do upgrade, as shown in Figure 1.2:

```
Welcome to RAK410
at+ascii=1
OK
at+boot_mode=0
0
Please chioce update interface(1/2)!
*1.UART0*
*2.UART1*
1
Upgrade firmware(y/n)?_
```

Figure 1.2 Enter into UART0 Mode

Figure 1.3 Enter into UART1 Mode

Note: when selecting UART0 or UART1 serial port, ensure that the pins in the hardware are connected.

2.3 Bootloader Commands Introduction

Enter 'y' to upgrade firmware, then the terminal displays the commands of the bootloader as shown in Figure 2.1:

Figure 2.1

f: upgrade WIFI FW. This command is used to update WIFI firmware

u: upgrade MCU FW. This command is used to upload a user program to flash, start address: 0x1000

b: start user program. This command starts a user program in bootloader mode.

d: delete the saved configuration parameters.

r: resets RAK410.

III.   Upgrading WIFI Firmware

The steps are as follows:

After the terminal has entered into 'bootloader' mode, upgrade WIFI FW via command 'f', then the bootloader enters into the data-receiving state, as shown in
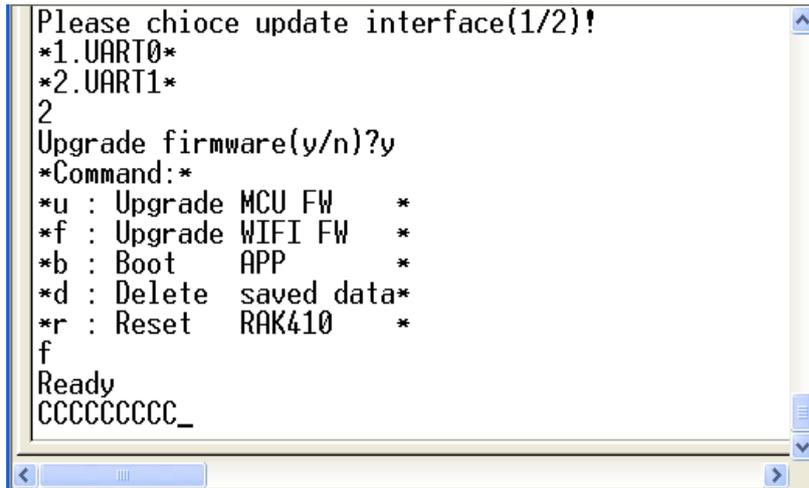
Figure 3.1:

Figure 3.1

Click 'Send' -> select 'Send File', then select the WIFI upgrade process in the pop-up dialog box, click 'Browse' as shown in Figure 3.2:
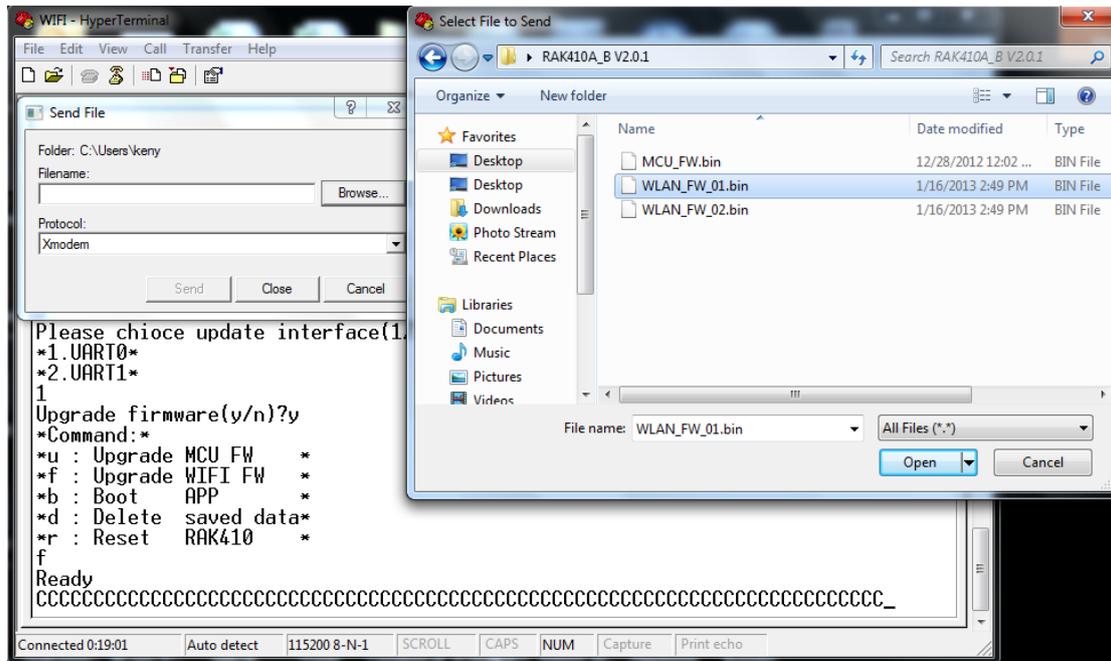

Figure 3.2

Select the 'Xmodem' transfer protocol as shown in Figure 3.3, and then click 'Send' to start transmission as shown in Figure 3.4:
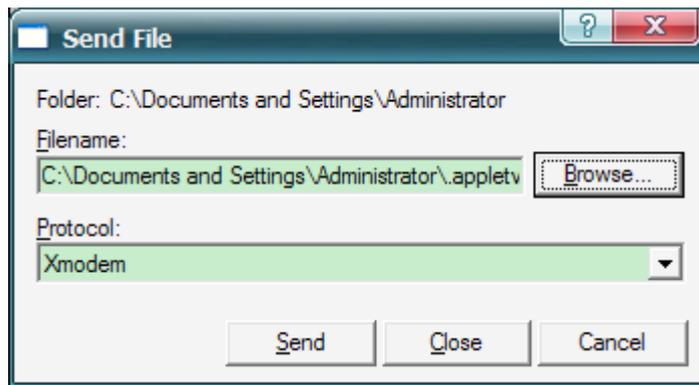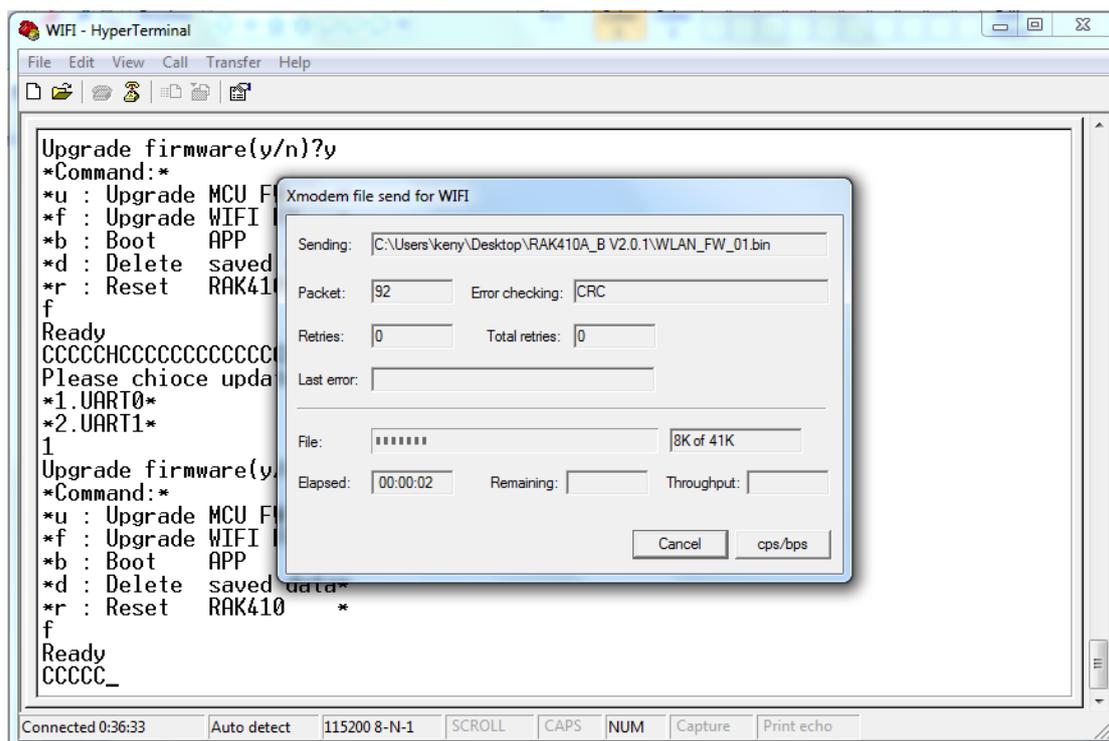
Figure 3.3

Figure 3.4

When the transfer is completed, RAK410 automatically runs WIFI_FW_01, in which state the terminal is constantly outputting 'C', waiting for serial port to transmit WIFI firmware. Then continue to click the 'Send' -> select 'Send File', select a path for WIFI firmware in the pop-up dialog box, click 'Browse' to select RAK410 WIFI firmware WIFI_FW_02.bin as shown in Figure 3.5：
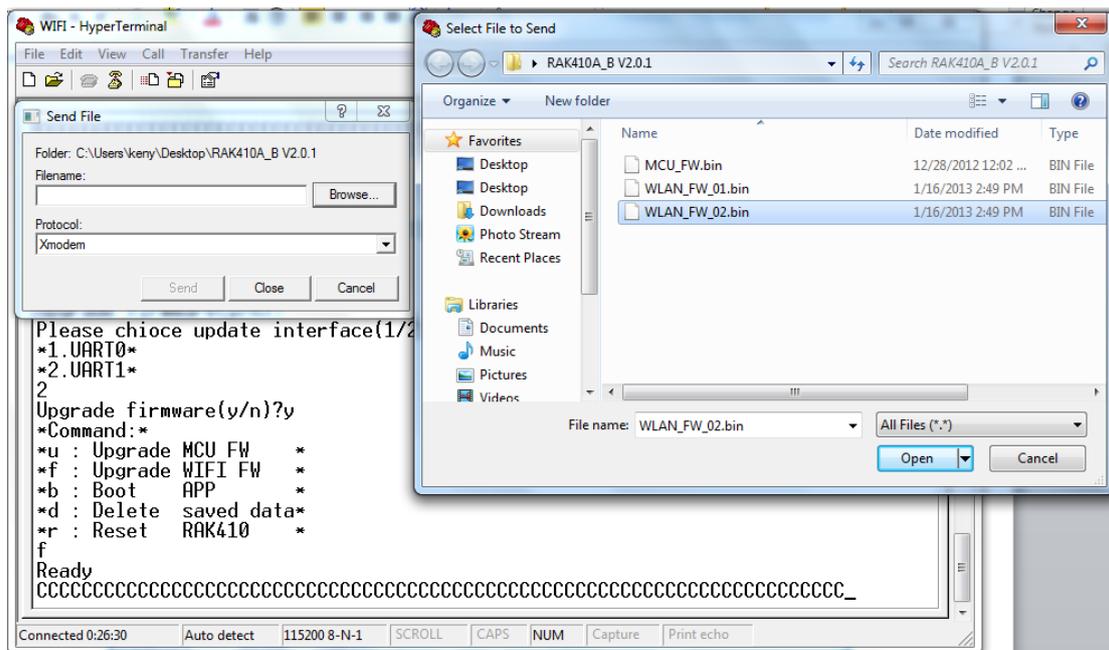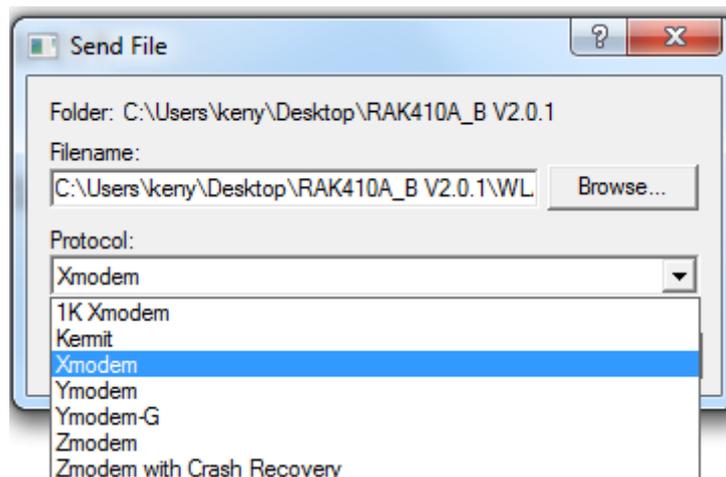
Figure 3.5

Select the 'Xmodem' transfer protocol as shown in Figure 3.6, then click 'Send' to start transmission as shown in Figure 3.7:
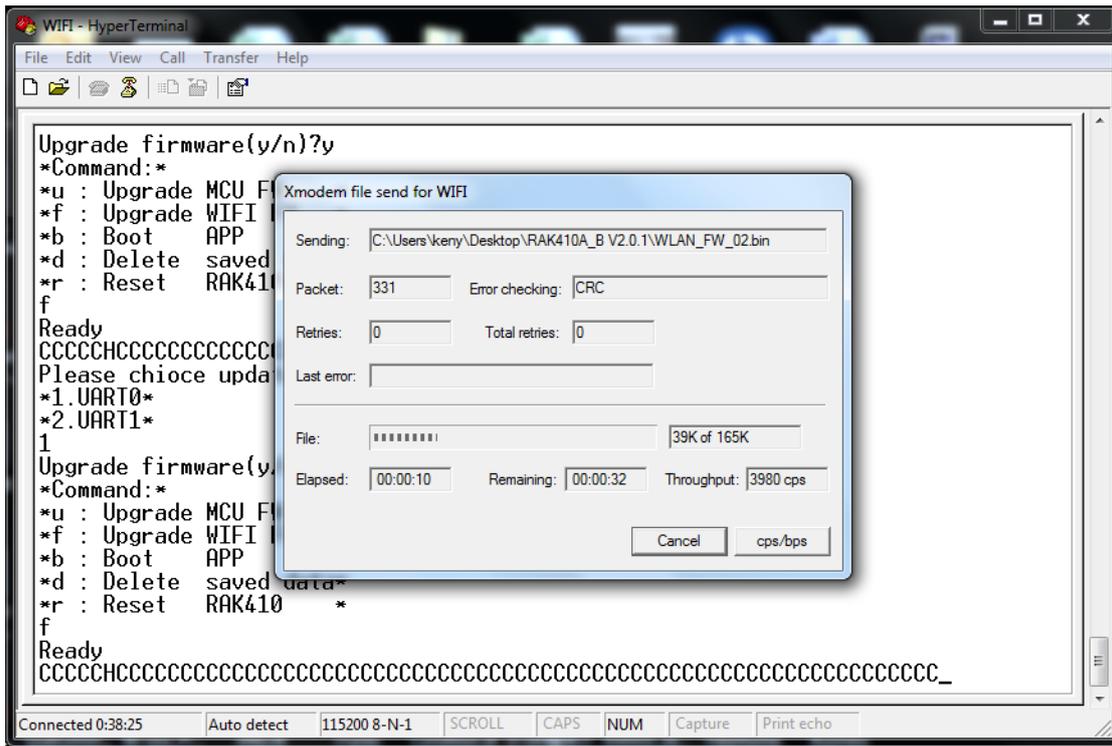

Figure 3.6

Figure 3.7

When the upgrade is completed, it prompts 'Pls upgrade MCU APP' as shown in Figure 3.8. If the upgrade is failed, it prompts 'program failed' as shown in Figure 3.9:
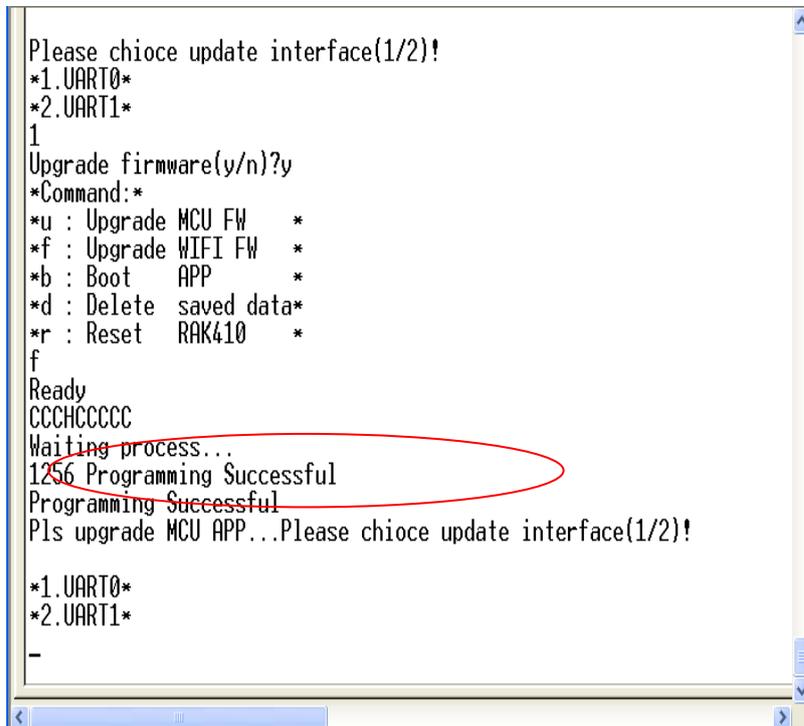

Figure 3.8

Figure 3.9

The above shows the steps for upgrading WIFI FW, the MCU FW has been changed when upgrading WIFI FW. Therefore, it is required to re-upgrade MCU firmware after WIFI has been upgraded. Please refer to Section IV for specific operation.

IV.   Upgrading MCU Firmware

In 'bootloader' mode, enter the command 'u' to upload MCU firmware on the terminal, then the bootloader enters into the data-receiving state as shown in Figure 4.1:

Figure 4.1

Click 'Send' -> select 'Send File', and in the pop-up dialog box, select a path for the bin file 'MCU_FW.bin' which is ready to be written into flash, then click 'Browse' as shown in Figure 4.2:
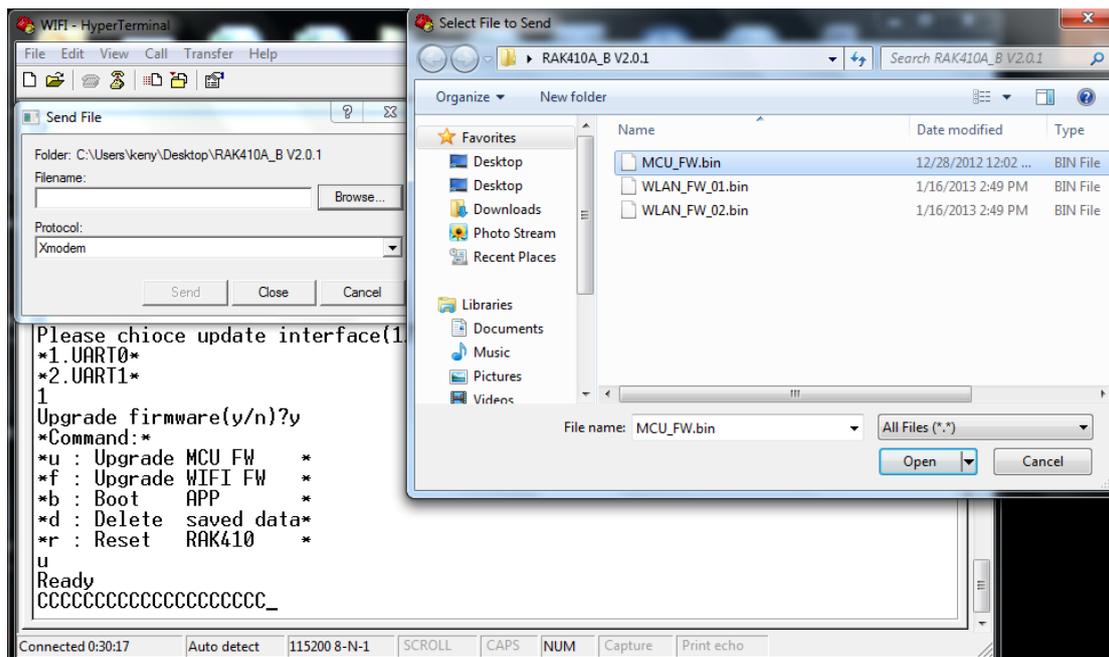
Figure 4.2

Select the 'Xmodem' transfer protocol as shown in Figure 4.3, and then click 'Send' to start transmission shown in Figure 4.4:
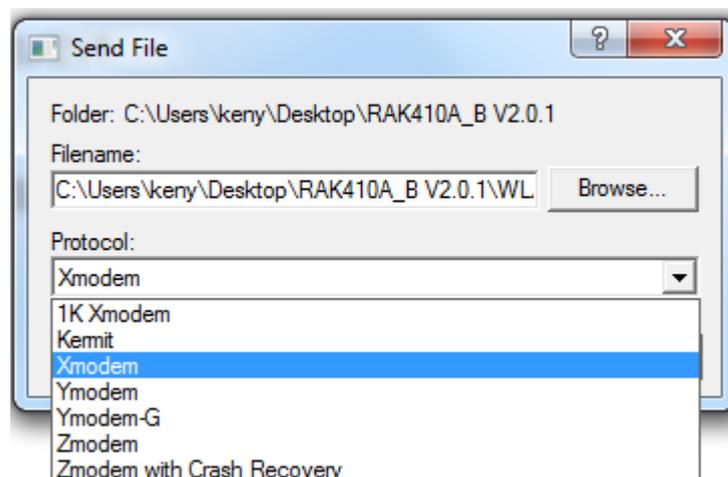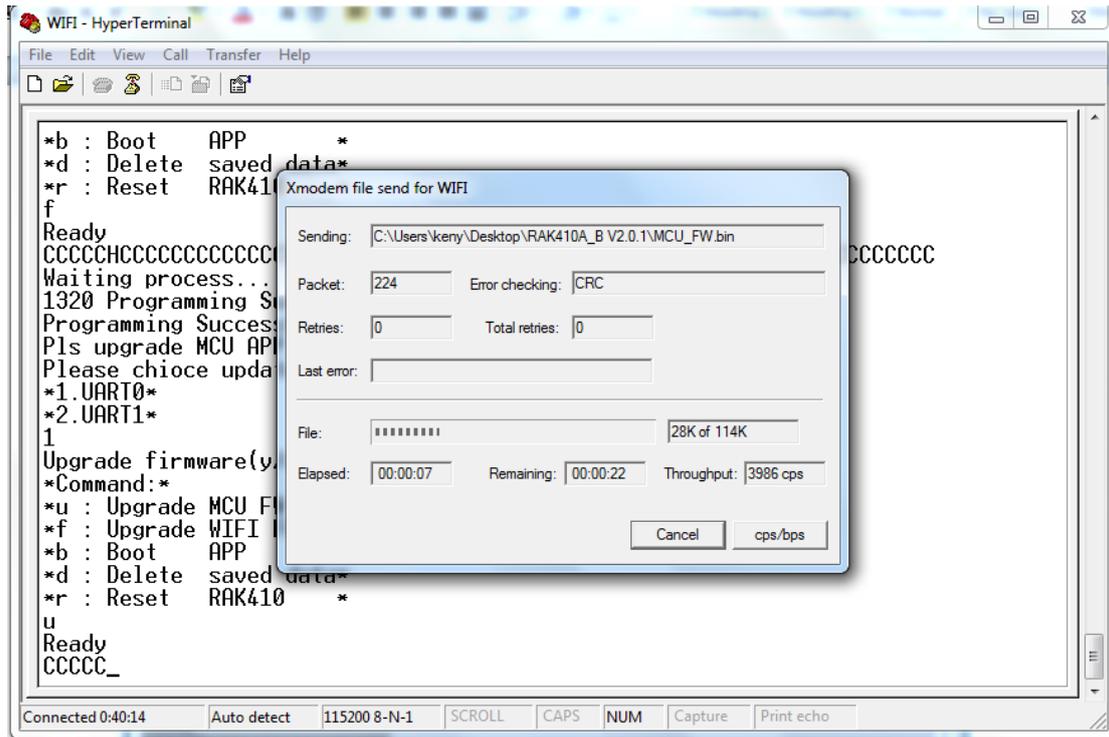

Figure 4.3

Figure 4.4

After the upgrade has completed, RAK410 automatically runs user program and displays the boot string of 'Welcome to RAK410' as shown in Figure 4.5:
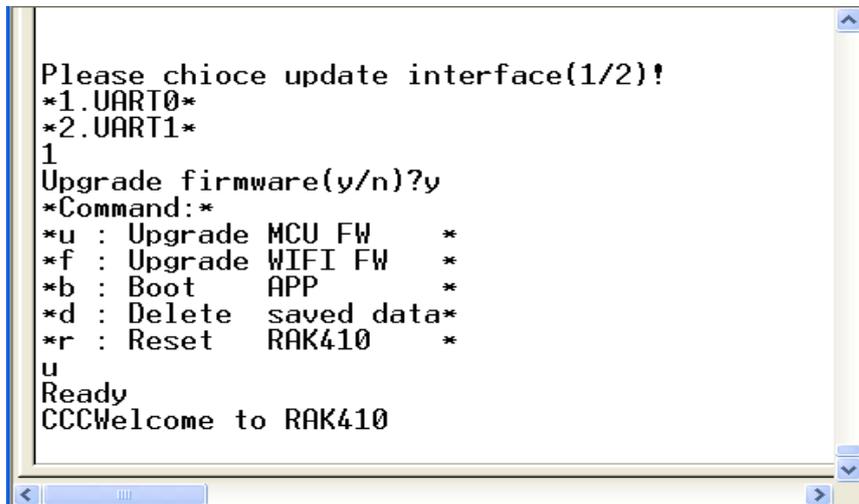

Figure 4.5

Note: If fail to upgrade, user can reset the module, and re-do the previous steps over again.