Installation Manual for SMDK6410 (Windows Embedded CE 6.0)

S3C6410

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S3C6410 RISC Microprocessor
Installation Manual

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NOTE: REVISED PARTS ARE WRITTEN IN BLUE.

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1 Overview

This Installation Manual guides you to install the Samsung SMDK6410 Windows Embedded CE 6.0 BSP.

The manual explains the following topics:

- Copying BSP and Setting up Platform Builder
- Creating a New OS Design
- Building OS Image – Without KITL
- Running NK.nb0 Image
- Fusing WinCE Image on NAND Flash via USB

The detail information of each topic is explained in the following chapters.

2 Copying BSP and Setting up Visual Studio 2005

In this chapter, you can understand how to copy the Samsung SMDK6410 Windows Embedded CE 6.0 BSP and setup the Platform Builder. There are two distribution types. One is MSI (MS installer) distribution, another one is old-style zip-archived distribution. With MSI, you can just run the MSI file, and then follow the instruction on installer. Here are contents only for old-style zip-archived.

1. To start the BSP installation, Extract zip-archived file into $(WINCEROOT)\PLATFORM. See the picture describes folder structure. In archives, PLATFORM folder has two sub folders. One is SMDK6410, and another one is COMMON/SRC/SOC/S3C6410_SEC_V1.
   For example, copy extracted **SMDK6410_WinCE60_XX_XX\PLATFORM** BSP folder to **X:\WINCE600\PLATFORM** directory on your host PC. Make sure that catalog file and batch file in **X:\WINCE600\PLATFORM\SMDK6410** directory has the same name as that of the BSP, i.e. **SMDK6410.pbcxml** and **SMDK6410.bat**.

Note: About PQOAL & SOC Folder Structure, Please refer to porting guide, If you don't know the difference between PQOAL and non-PQOAL structure, read first porting guide.

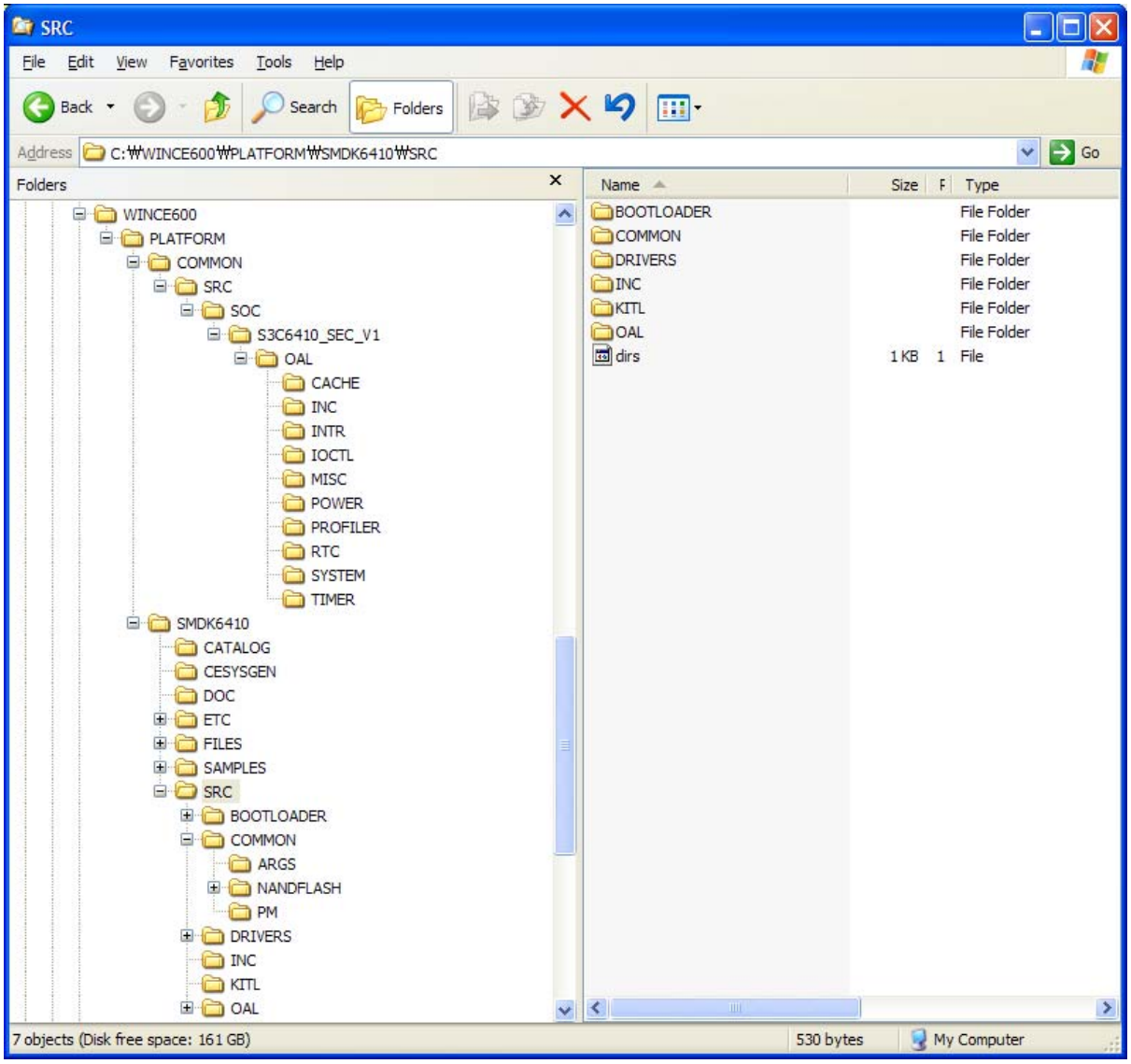

Figure 2-1 SMDK6410 BSP Files

2. To start SMDK6410 Windows Embedded CE 6.0 BSP Porting, on your host PC click **Start**, point to **All Programs**, point to **Microsoft Visual Studio 2005** and then click on **Microsoft Visual Studio 2005.** The following window appears on your screen.

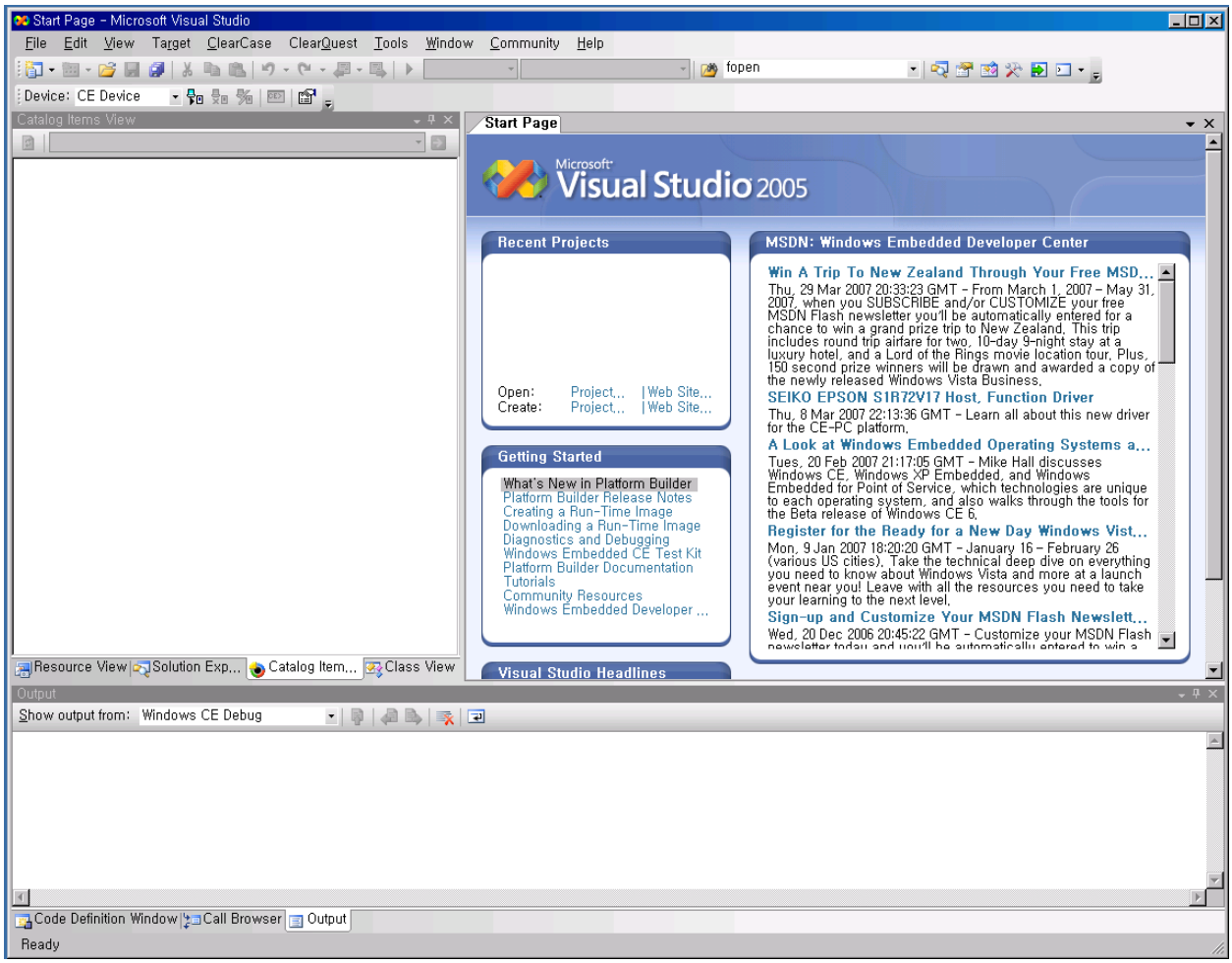

Figure 2-2 Visual Studio 2005 Window

3 Creating a New OS Design

In this chapter, you can understand how to create a new OS Design using the Visual Studio 2005.

1. On the **File** menu in the **Visual Studio 2005** window, click **New /Project** as shown in figure 3-1.

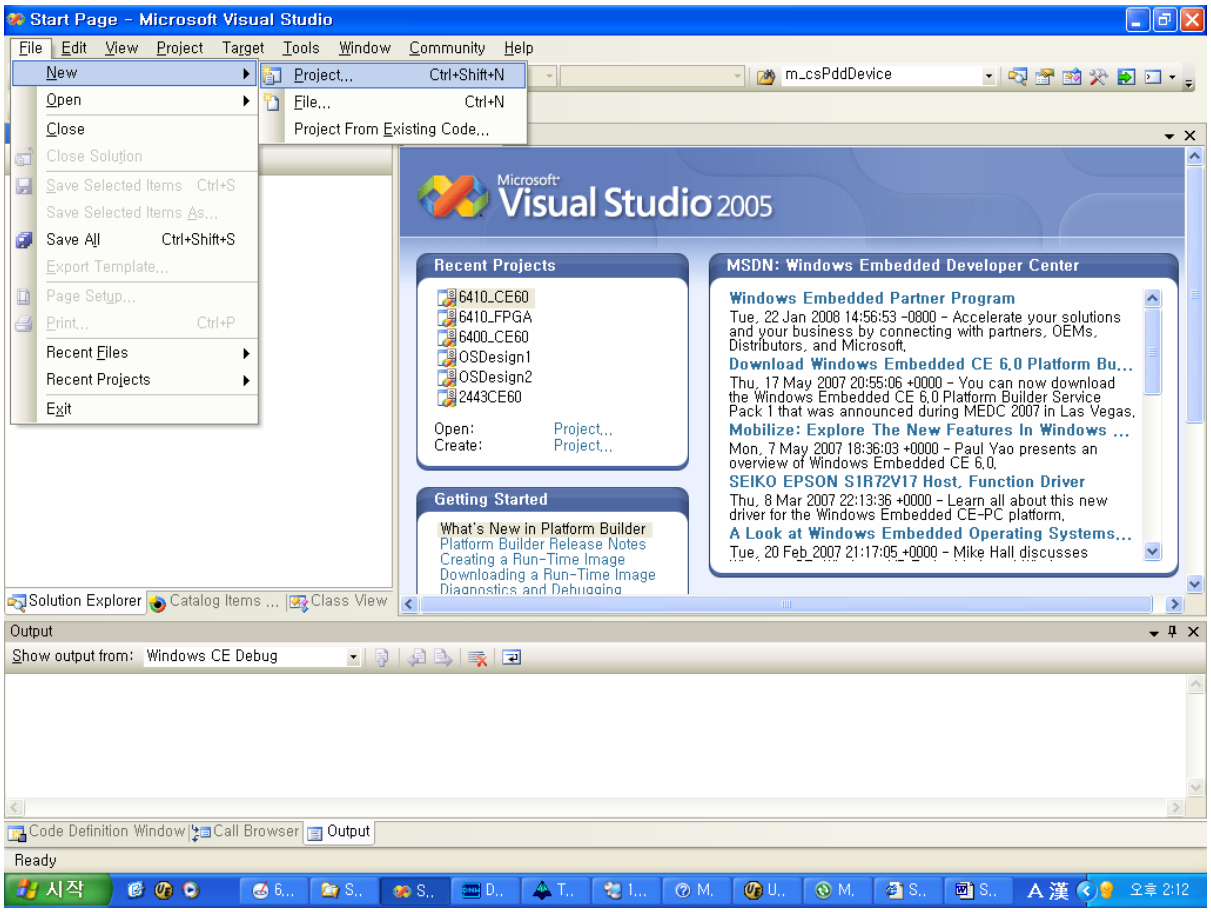

Figure 3-1 Creating New Project

2. The following window appears on your screen. Click **OK** button to continue.

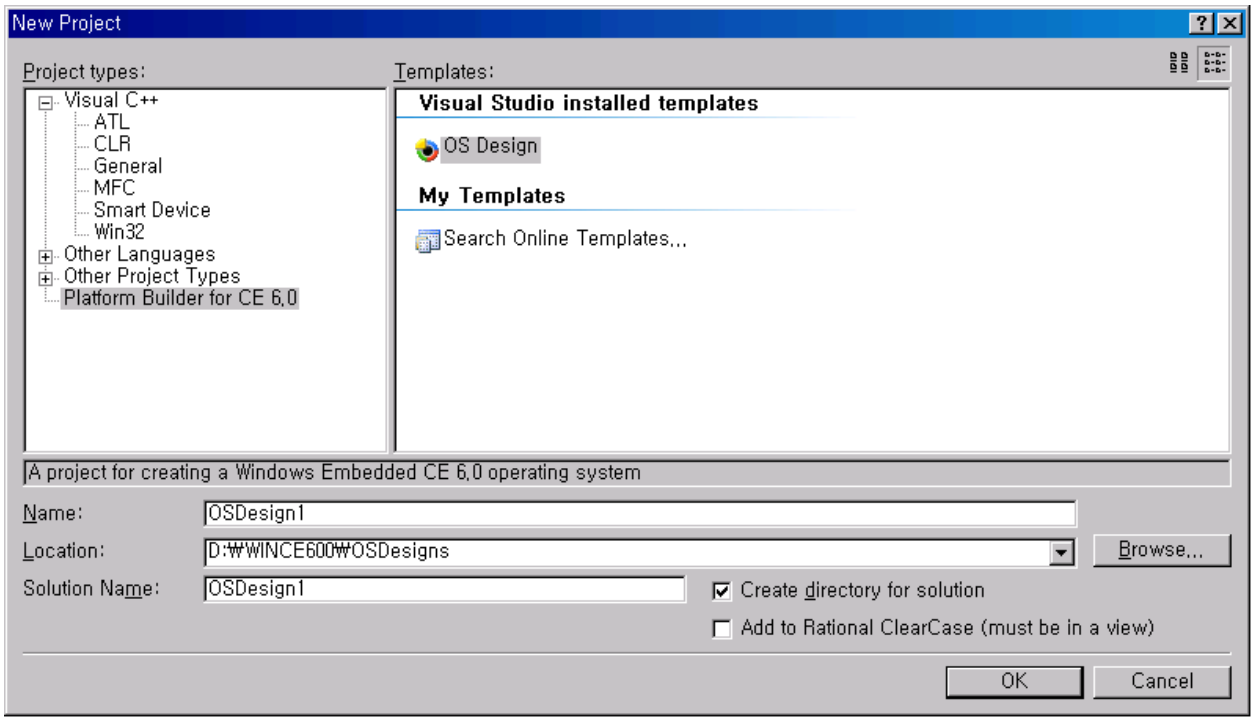

Figure 3-2 New Project for WinCE6.0

3. The **Windows Embedded CE 6.0 OS Design Wizard** appears on your screen as below figure. Click **NEXT** button to continue .

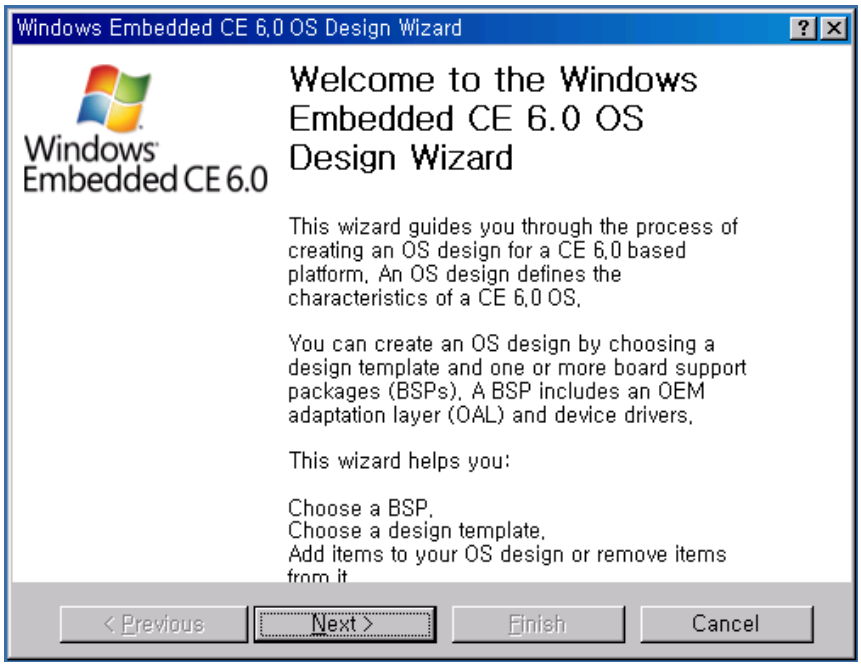

Figure 3-3 Windows Embedded CE 6.0 OS Design Wizard

4. The **Board Support Packages (BSPs)** window appears on your screen. Select **SMDK6410: ARMV4I** and then click **Next** button.

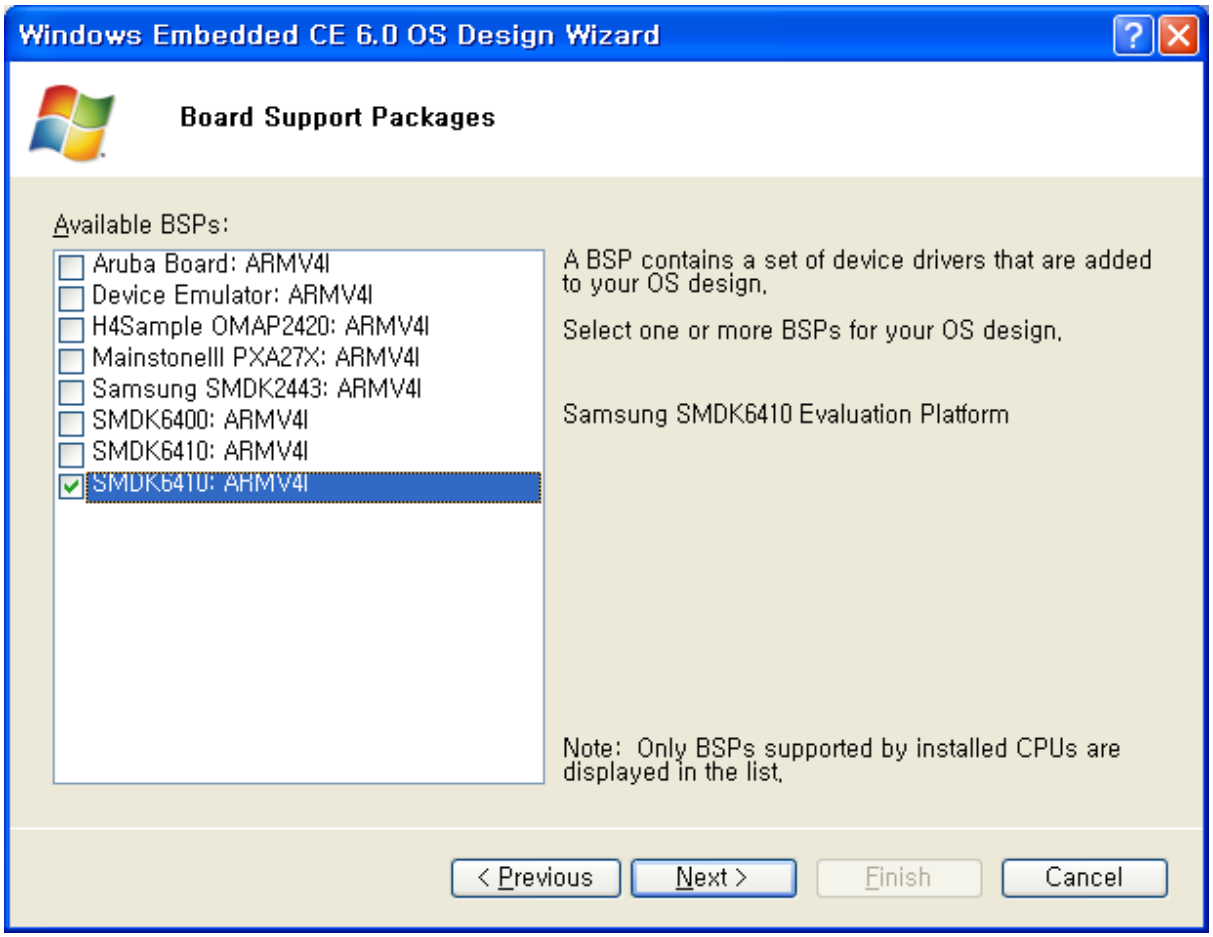

Figure 3-4 Windows Embedded CE 6.0 OS Design Wizard – Step 1

5. The **Design Template Wizard** window appears on your screen. Please select **PDA Device** from **Available design templates** list and then click **Next** button.

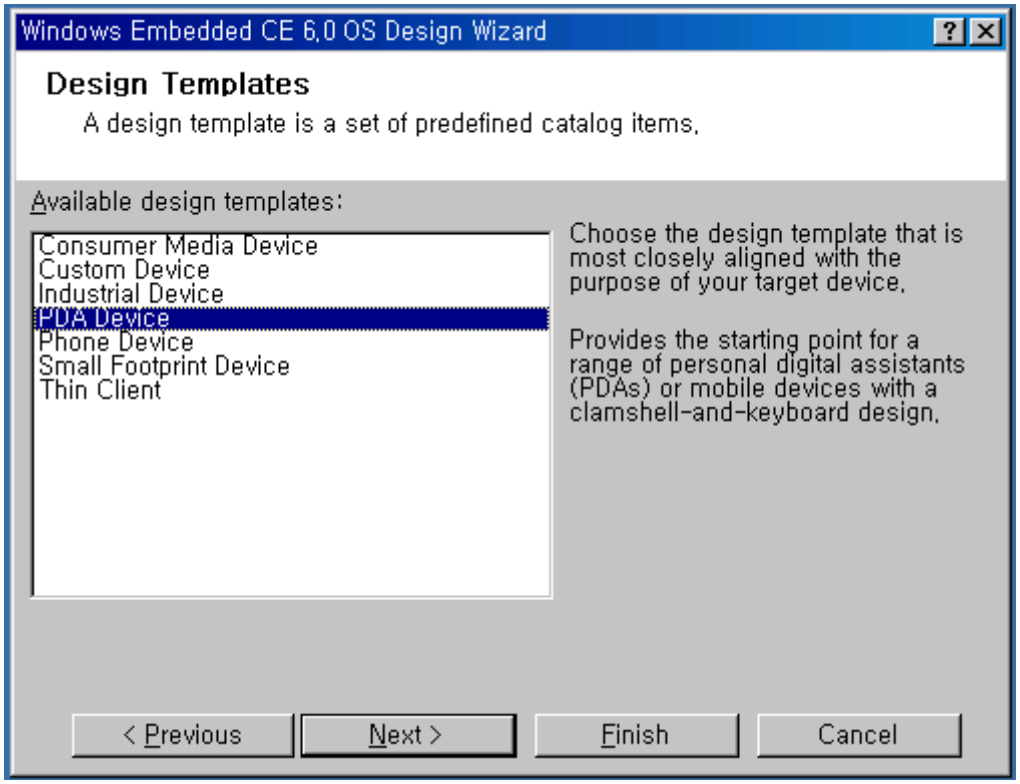

Figure 3-5 Windows Embedded CE 6.0 OS Design Wizard - Step 2

6. The **Design Template Variants** window appears on your screen. Please select **Mobile Handheld** from **Available design Variants** list and then click **Next** button.

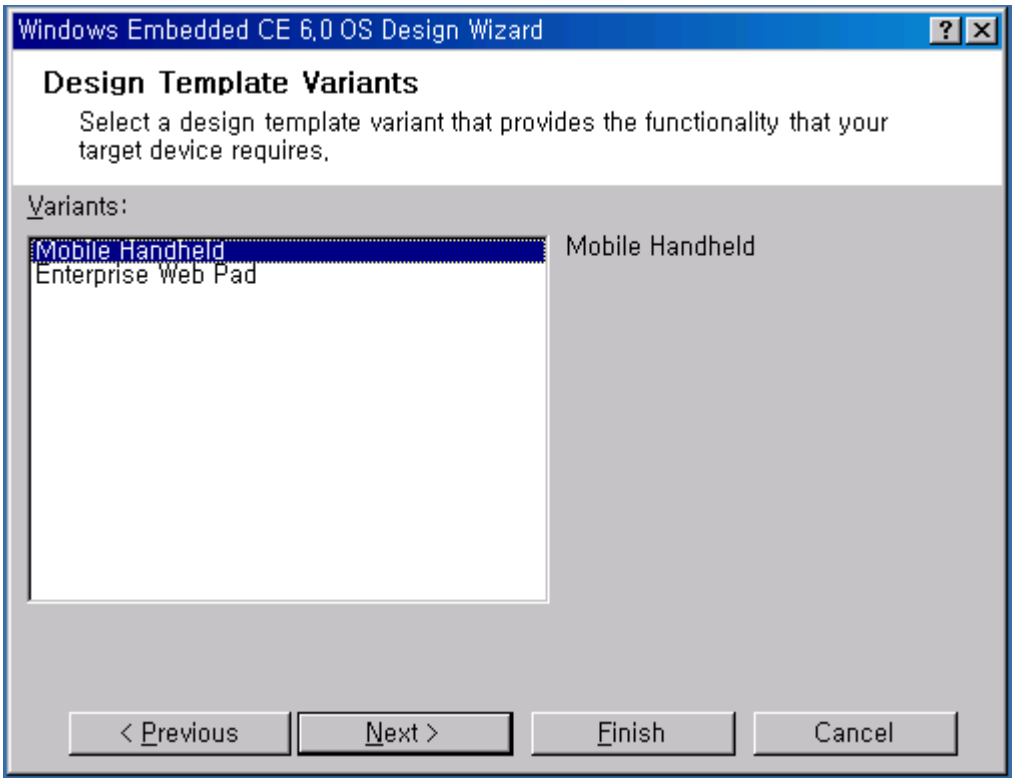

Figure 3-6 Windows Embedded CE 6.0 OS Design Wizard – Step 3

7. The following window appears on your screen. Here you can select the **Application & Media** you want to include in your platform and then click **Next** button.

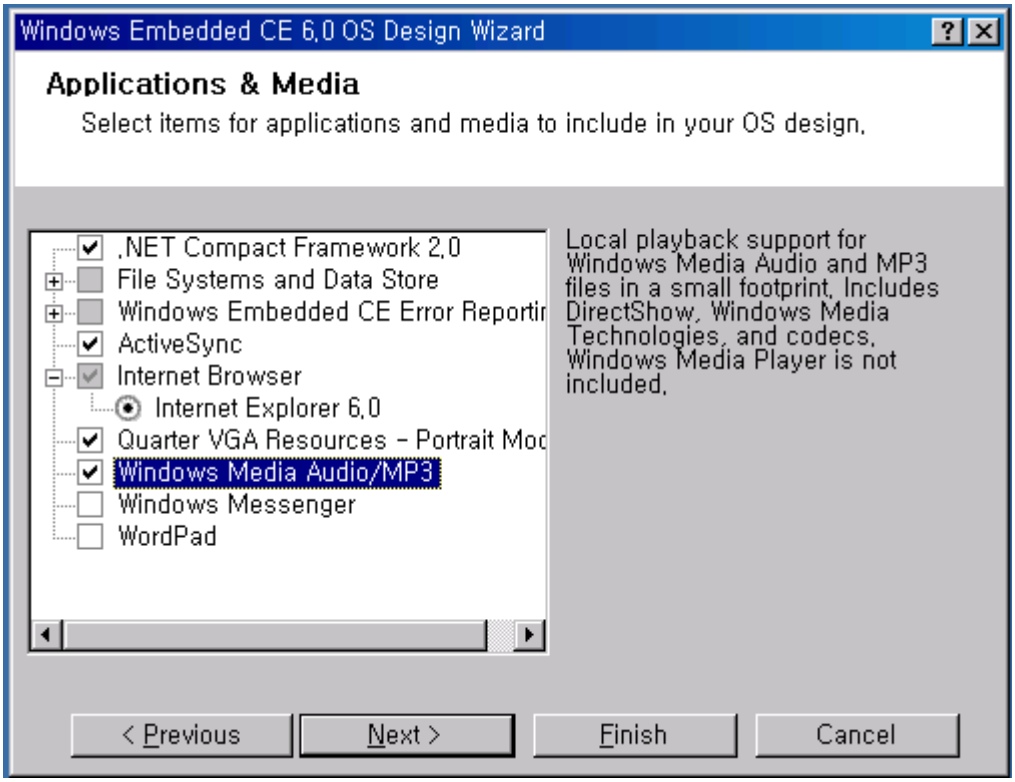

Figure 3-7 Windows Embedded CE 6.0 OS Design Wizard - Step 4

8. The **Networking & Communications** wizard window appears on your screen. Click **Finish** button.

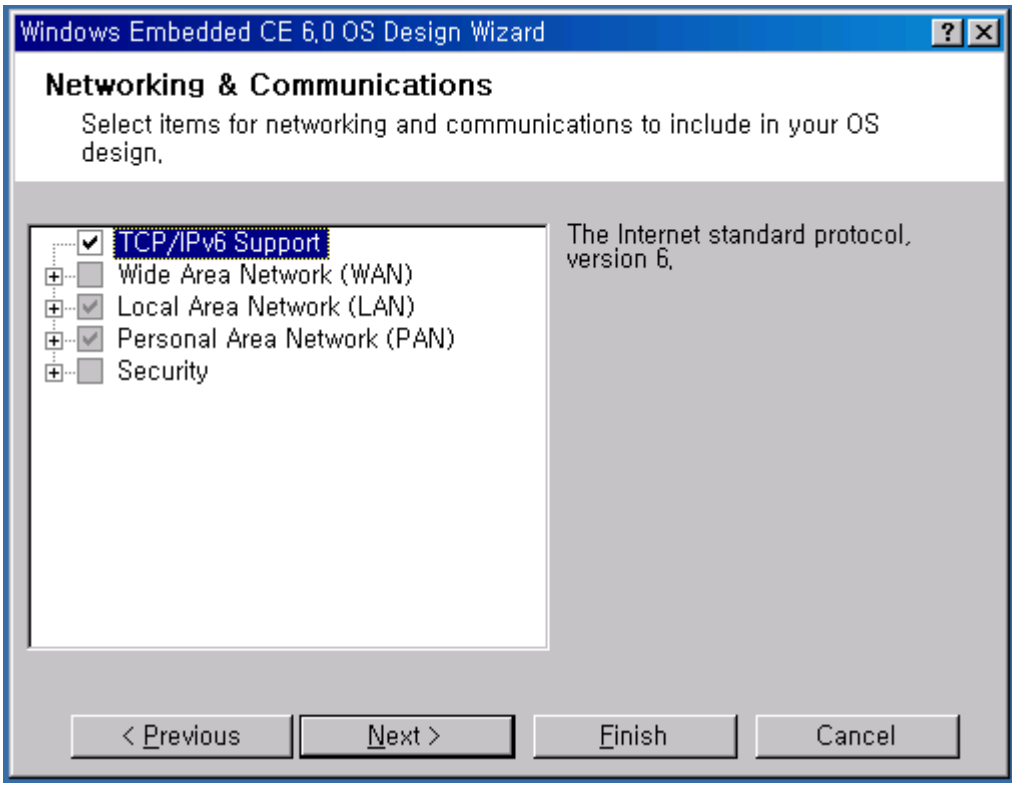

Figure 3-8 Windows Embedded CE 6.0 OS Design Wizard – Step 5

9. The following window appears on your screen. Please read all the security warnings and then click **Acknowledge** button.

Figure 3-9 Windows Embedded CE 6.0 OS Design Wizard - Step 6

4 Building OS Image – Without KITL

1. In the **Visual Studio 2005** window on your host PC, you can see the new OS Design along with its various sub-directories on the left hand side **Catalog Items View** as shown in figure 4-1. Here, you can choose items what you want to include in your OS design. The chosen items in this instruction are only for sample purpose.

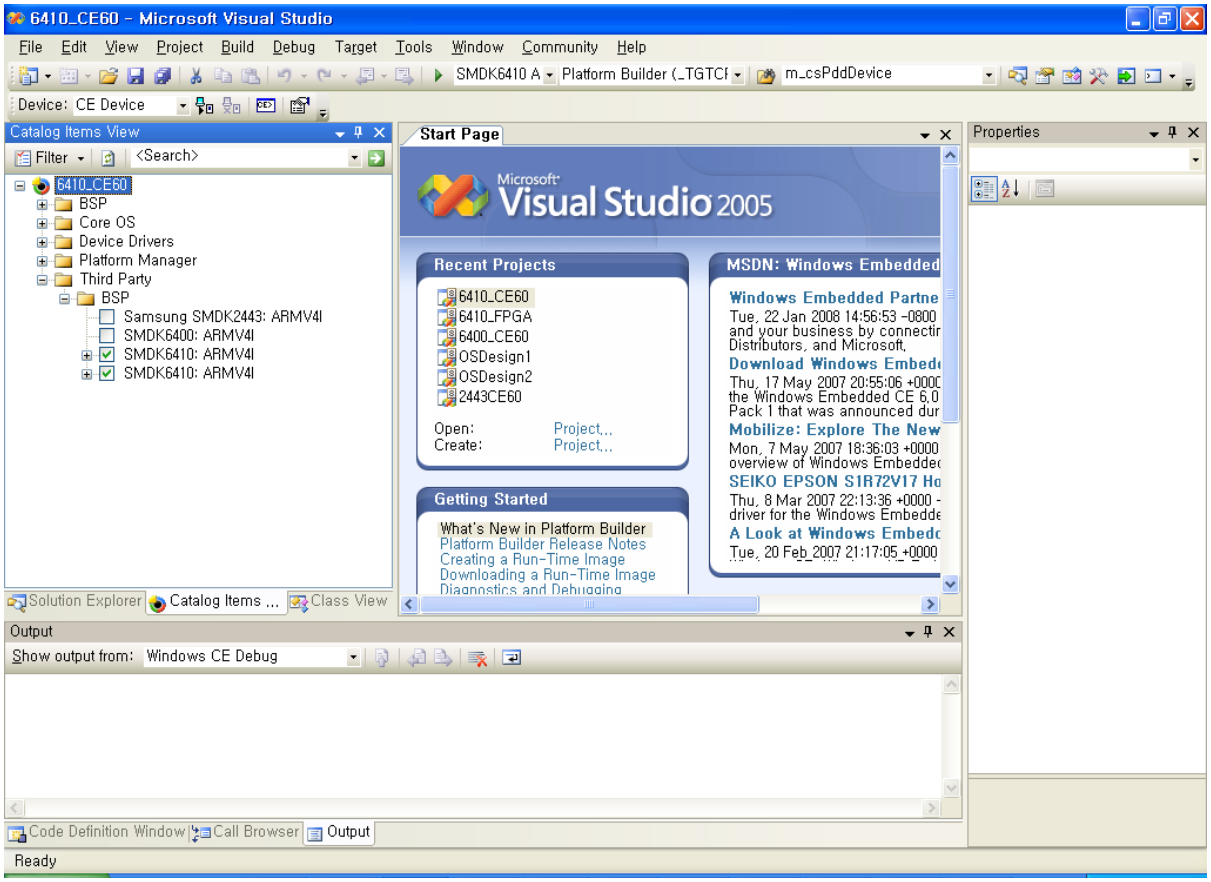

Figure 4-1 Catalog Items View

2. You can change build mode (release or debug mode) as below figures. Select **SMDK6410_ARMV4I Release**.

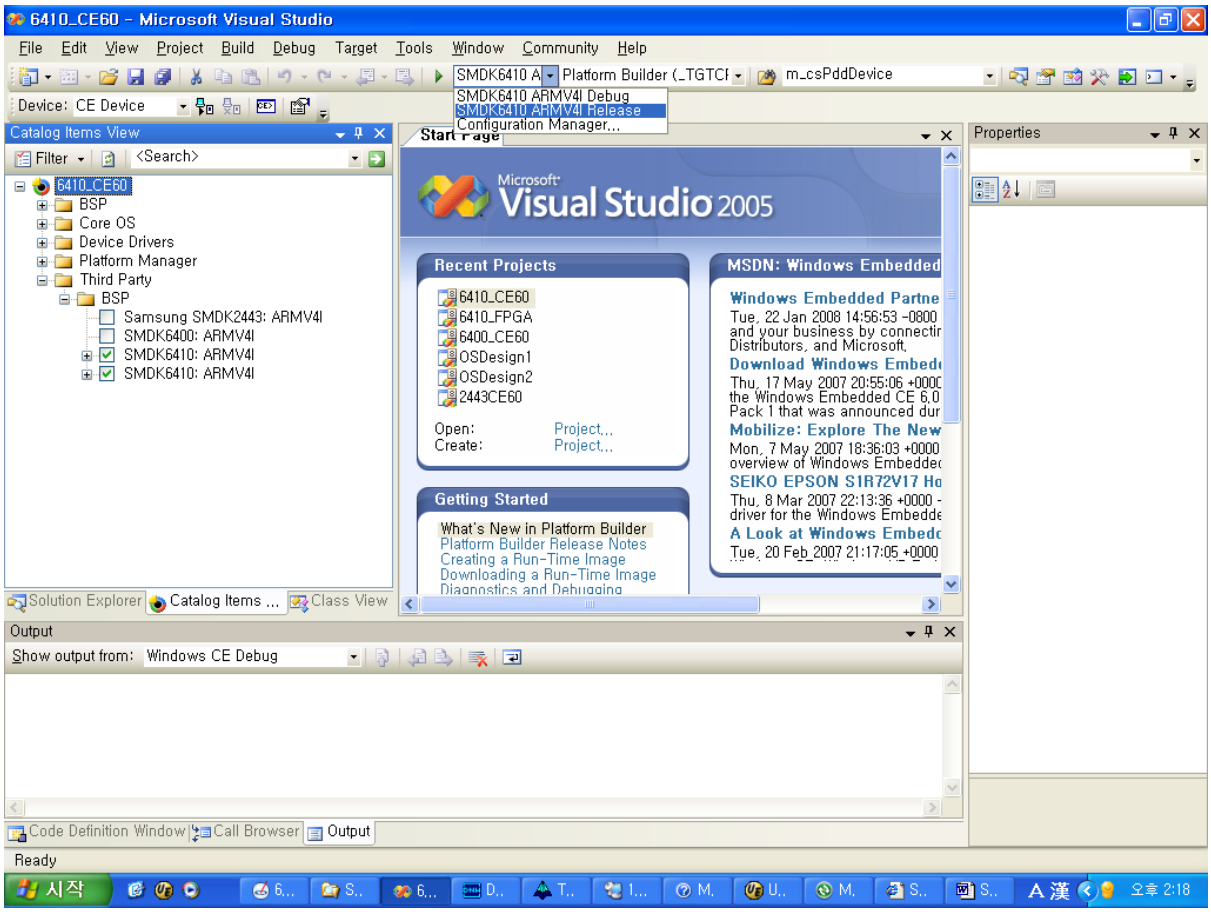

Figure 4-2 Build Mode in Visual Studio 2005

3. Expand **File Systems and Data Store** node in the Core OS node in **Catalog Items View**, then select some items as shown in the figure below.

File System-RAM and ROM File System

Registry Storage-Hive-based Registry(recommended) **or RAM-based Registry**

Storage Manager-Binary Rom Image file System

Storage Manager-exFAT File System

Storage Manager-Storage Manager Control Panel Applet

Storage Manager-TFAT File System

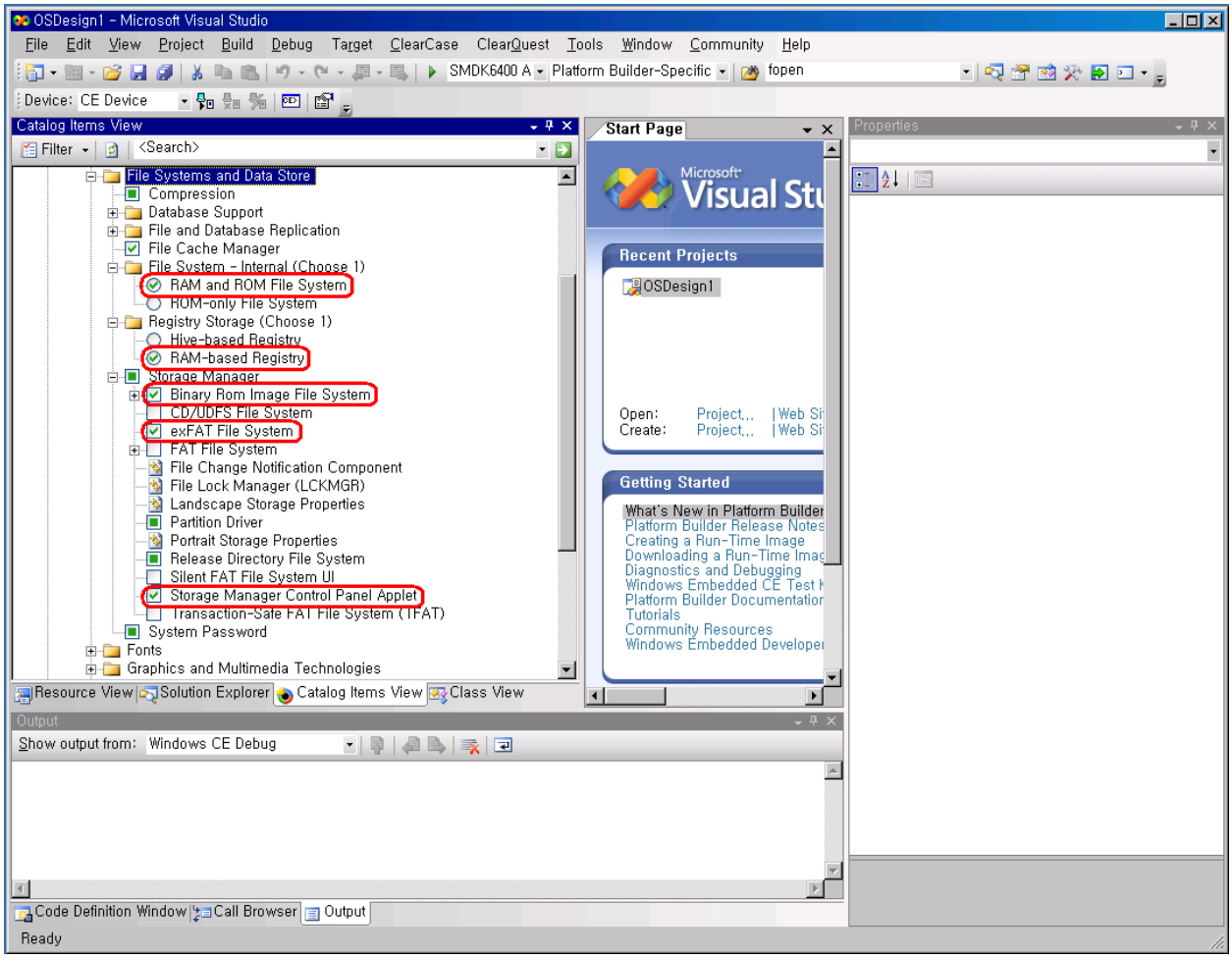

Figure 4-3 Adding File System and Data store Item to OS Design

4. Expand **Core OS** node in **Catalog Items View window,** then expand **Graphics and Multimedia Technologies.** Select some items as shown in the figure below.

Graphics-Direct3D Mobile

Graphics-DirectDraw (Required for Display Driver)

Media-Video Codecs and Renderers-WMV/MPEG-4 Video Codec (Required for MFC)

Media-Windows Media Player (Required for MFC)

Media-DirectShow Video Capture (Required for Camera)

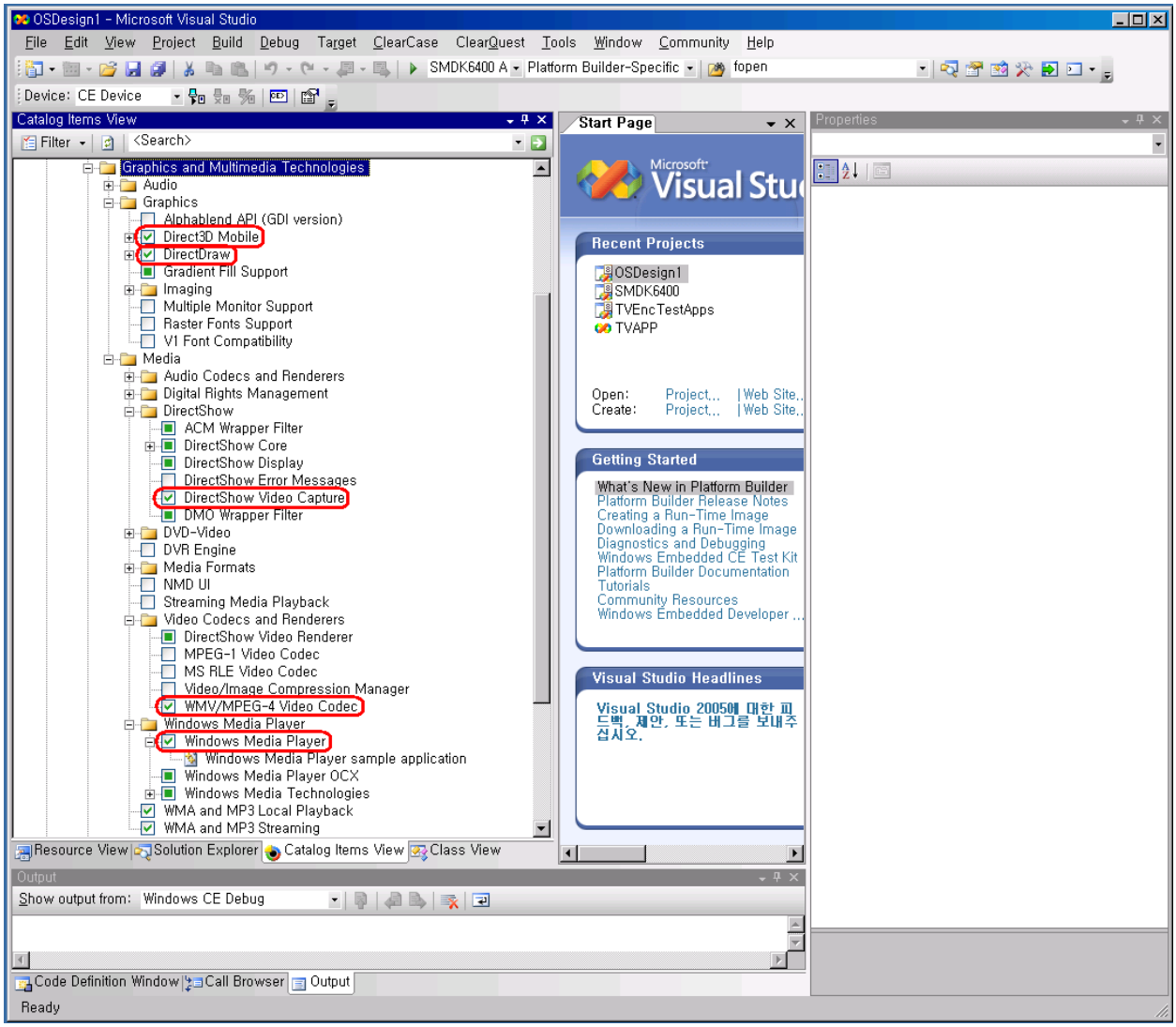

Figure 4-4 Adding Graphics and Multimedia Technologies Item to OS Design

5. Expand **Core OS Services** node in the Core OS node in **Catalog Items View**, then expand **USB Host Support**. Select some items as shown in the figure below.

USB Function Driver

USB Host Support

USB Human Input Device(HID) Class Driver (recommended)

USB HID Keyboard and Mouse

USB Storage Class Driver

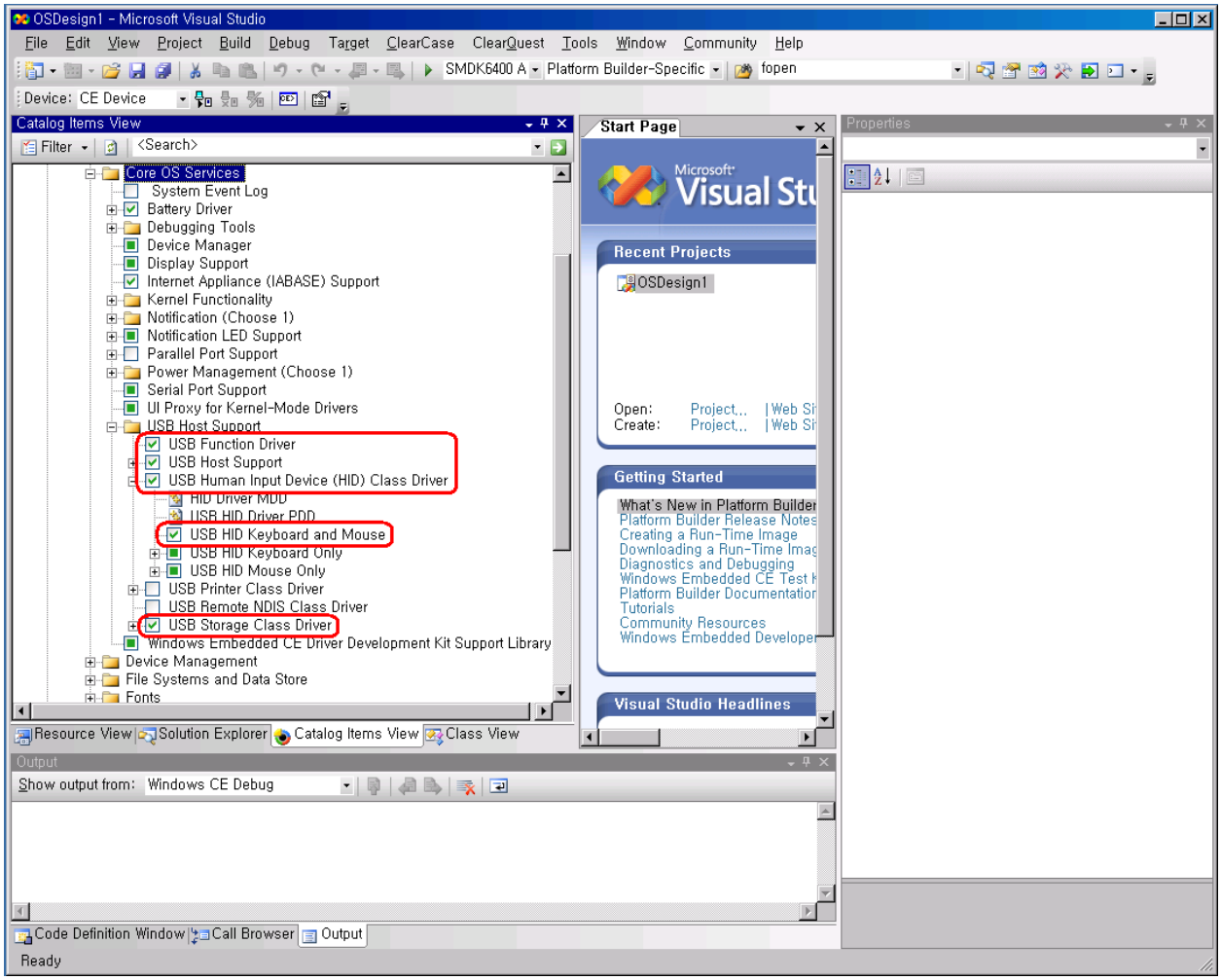

Figure 4-5 Adding Core OS Services Item to OS Design

6. Expand **Applications and Services Development** node in **Catalog Items View window,** then expand **OBEX Server.**

   Select **OBEX File Brower** and **OBEX Inbox**.

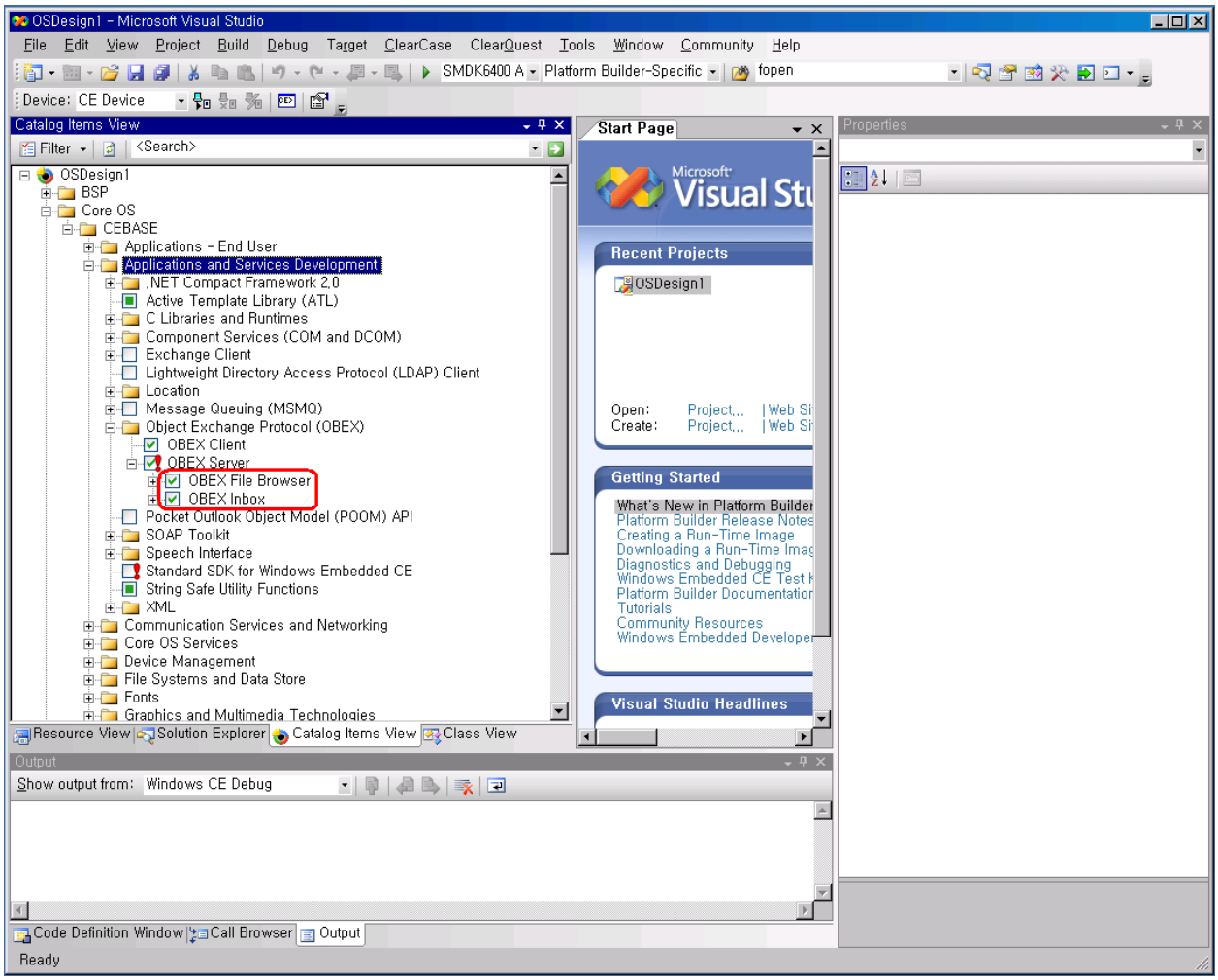

Figure 4-6 Adding Core OS Services Item to OS Design

7. Expand **Device Drivers** node in **Catalog Items View window,** then expand **USB Function.** Select Some Items as shown in the figure below.

   USB Function Clients-Mass Storage

   USB Function Clients-serial

   Select **SD Bus Driver in SD**, **SD Memory in SDIO and Windows Embedded CE Test Kit**.

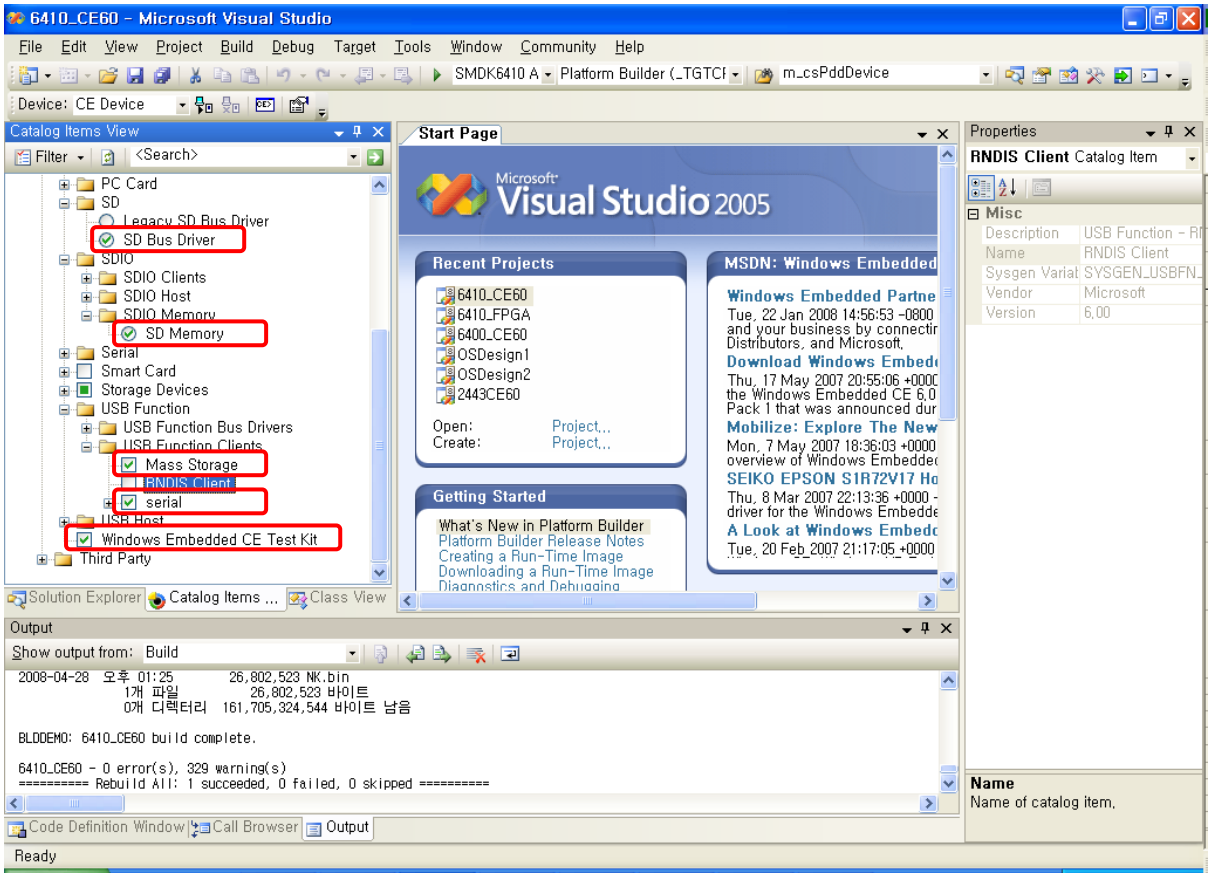

Figure 4-7 Adding Device Drivers Item to OS Design

8. Expand **Device Drivers** node in **Catalog Items View window,** then expand **Networking.** Select **Serial Infrared (SIR)** as shown in the figure below.

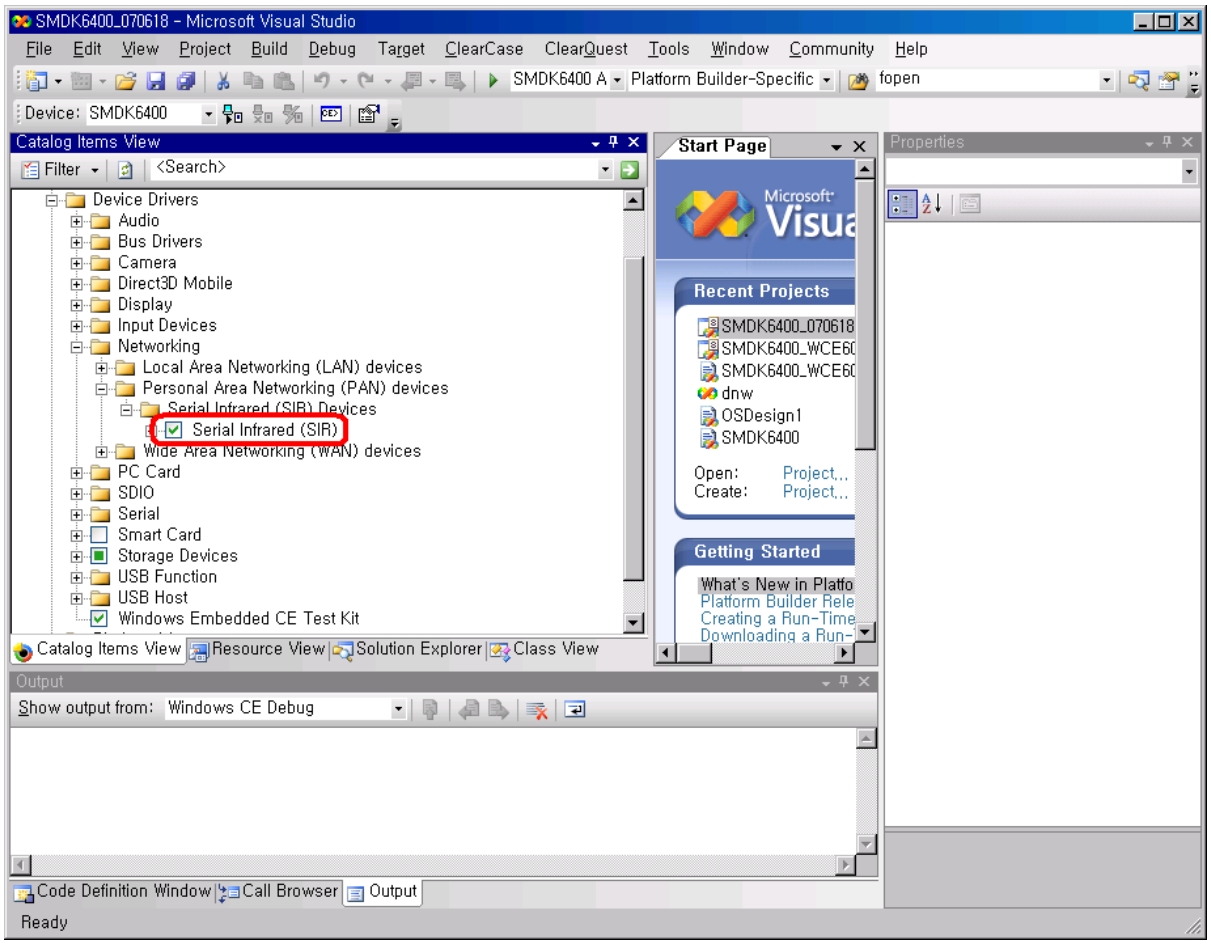

Figure 4-8 Adding Networking Item to OS Design

9. On the top of **Visual Studio 2005,** You can see the Project menu as below figure. And then select **Properties...**

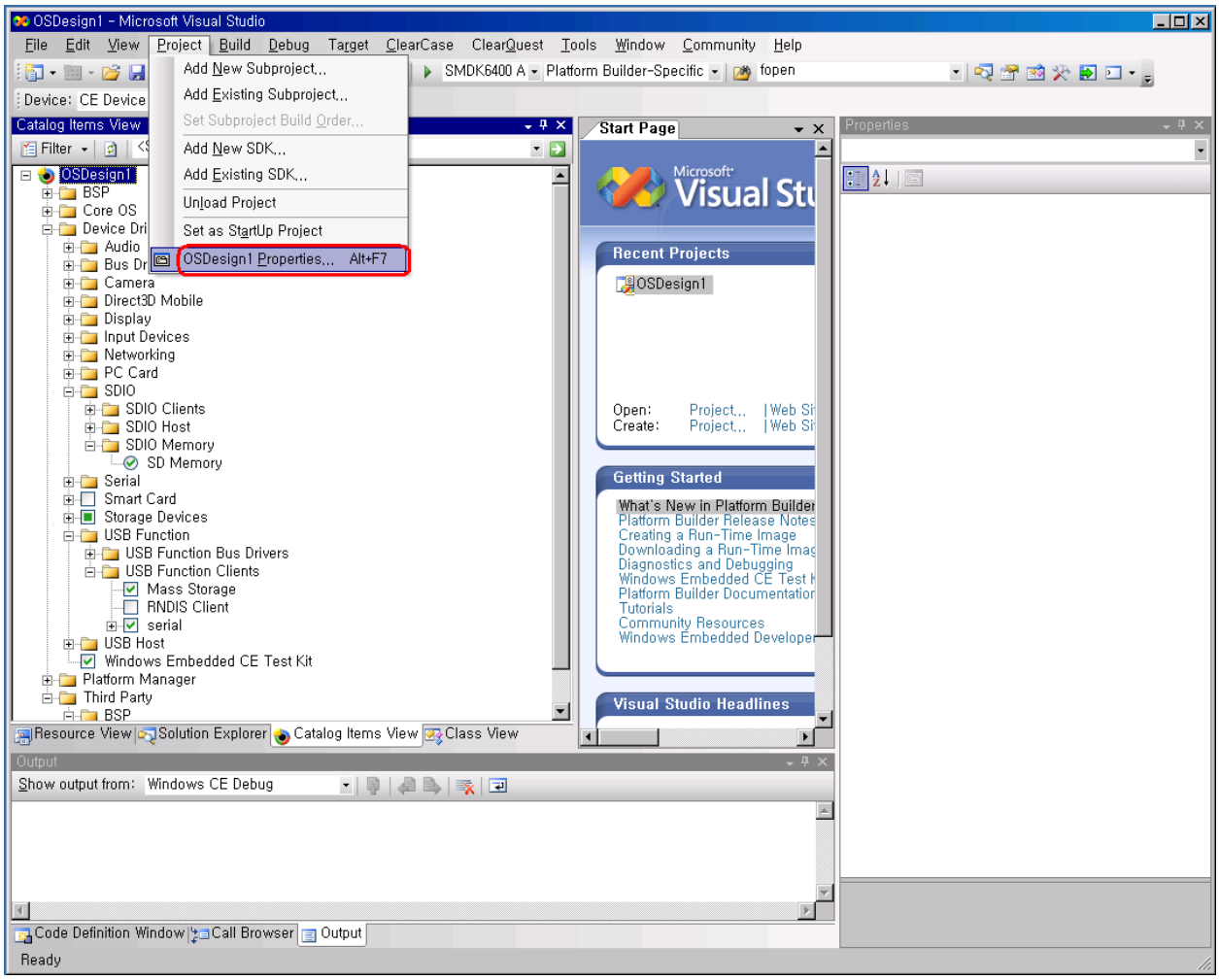

Figure 4-12 Properties of OS Design

10. The **OS Design Properties Pages** window appears on your screen. Select **Locale** tab and click **Clear All** button. It clears all the language settings in your platform. Now select **English (United States)** as shown in figure 4-10.

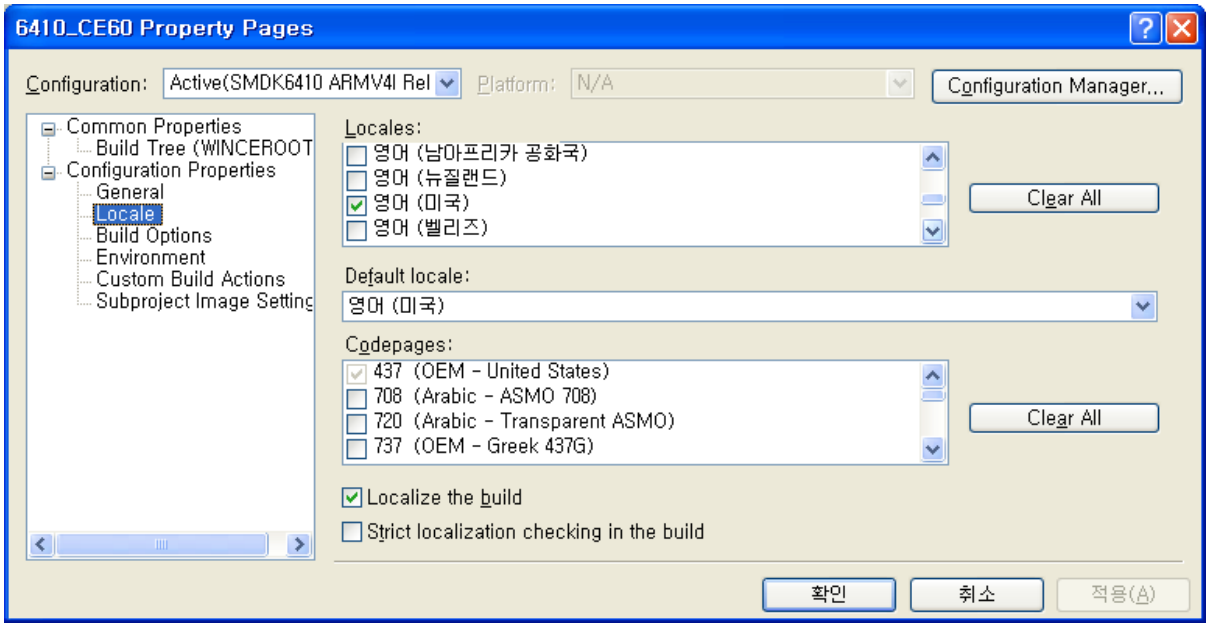

Figure 4-13 Selecting Language in the Property Pages Window

11. Now please uncheck the square boxes **Enable KITL (no IMGNOKITL=1)** in the **Build Options Properties** in **OS Design Properties Pages** window and then click **OK** button.

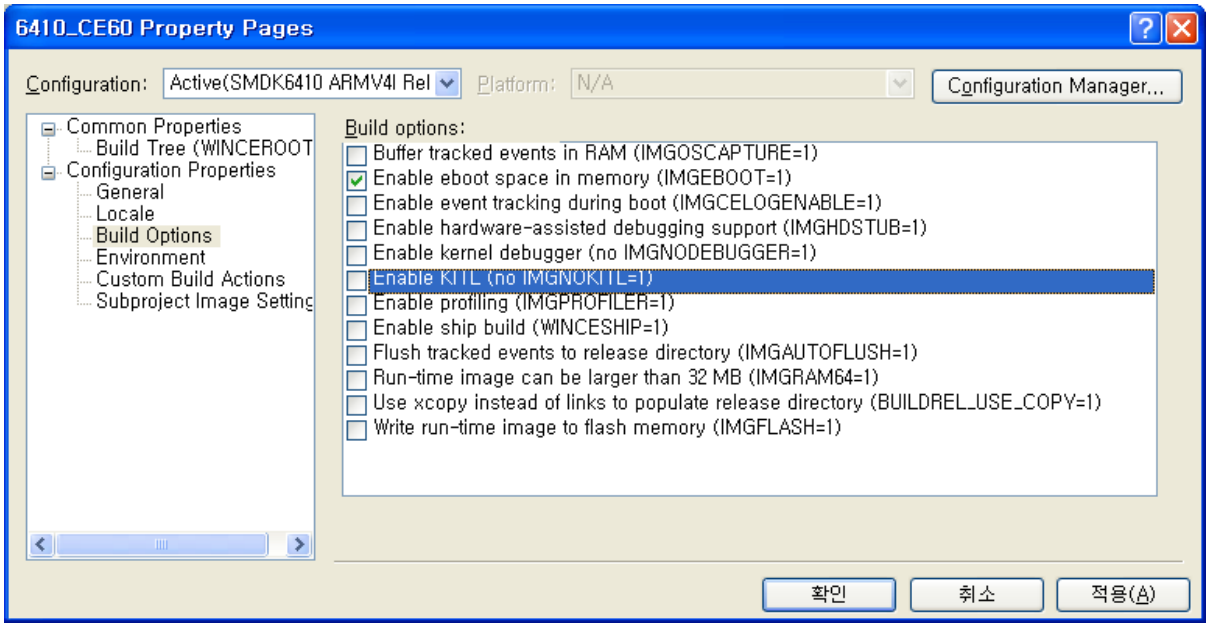

Figure 4-14 Removing KITL Setting in OS Design Properties Window

12. On the **Build** menu, click **Build OSDesign1** as shown in figure 4-12 to build the **Eboot** and **OS image**.

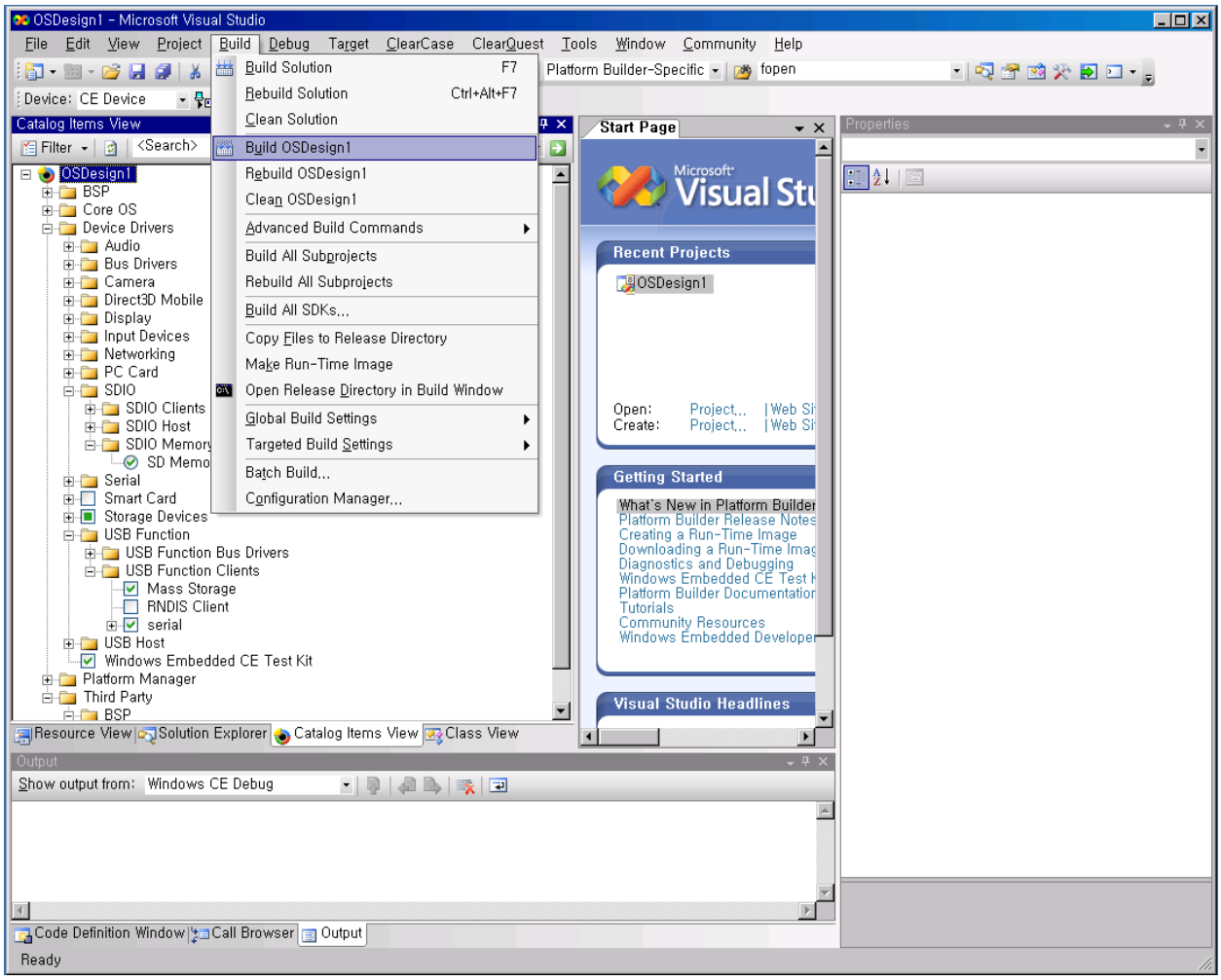

Figure 4-15 Build OS Design

13. The arrow pointing to the icon in the following figure indicates the **Building process**.

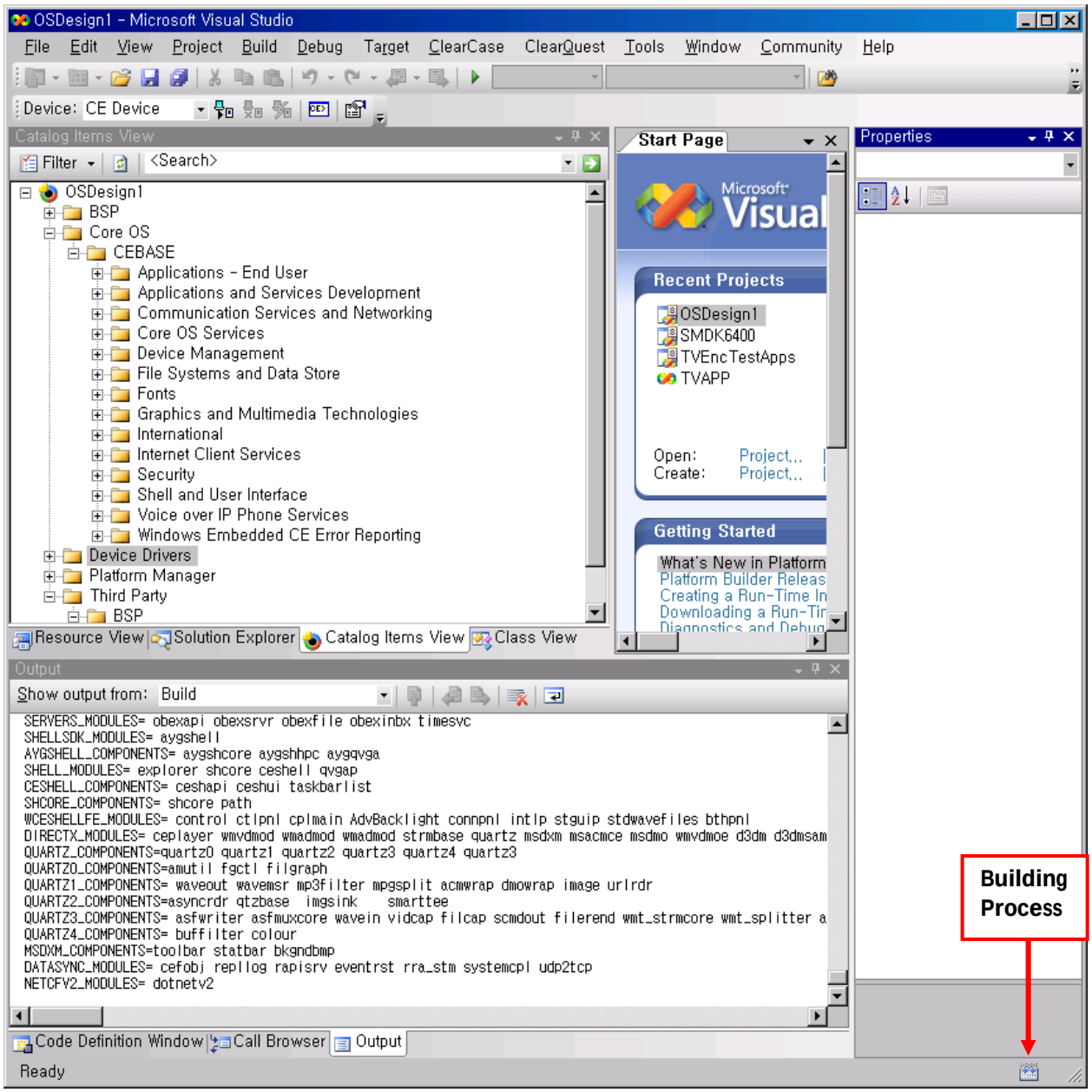

Figure 4-16 Building Process

Note: Building process may take some time depending on your system capability. So, please wait for the build process to be completed. It might take around 1 hour.

14. After completion of build process, following messages appear as shown in figure 4-12. **EBOOT.nb0, EBOOT.bin, STEPLDR./nb0, NK.bin** and **NK.nb0** are now available in **X:\WINCE600\OSDesigns \[OS Design Name]\ [OS Design Name]\RelDir\SMDK6410_ARMV4I_Release** directory.

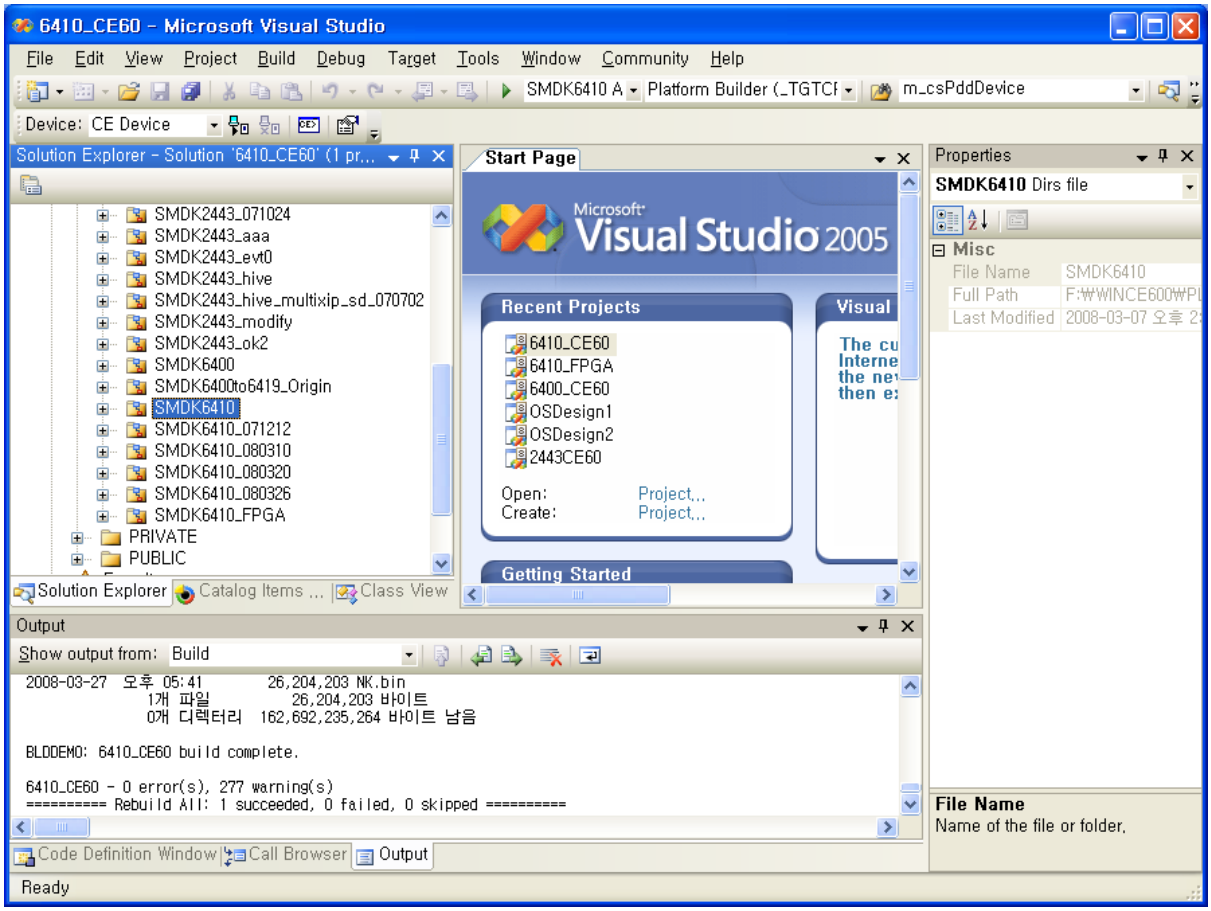

Figure 4-17 After Building the OS Image

5 Running NK.nb0 Image

In this chapter, you can understand how to download and run the NK.nb0 image.

1. Before you download the WinCE Image through the USB, you must have **6410_OtgMon.bin** image on your AMD Flash. (The image was already fused on your AMD Flash in the board before release)

2. Configure DIP switch CFG0 on the CPU Board and CFGB1 on the CPU board properly for booting from AMD Flash. (For more information, Read SMDK6410 Board User's Manual in Document folder…)

3. Please install the USB Driver and DNW application on your host PC.

4. After installing the USB driver, run **dnw.exe** on the host PC. The following window appears on your screen.

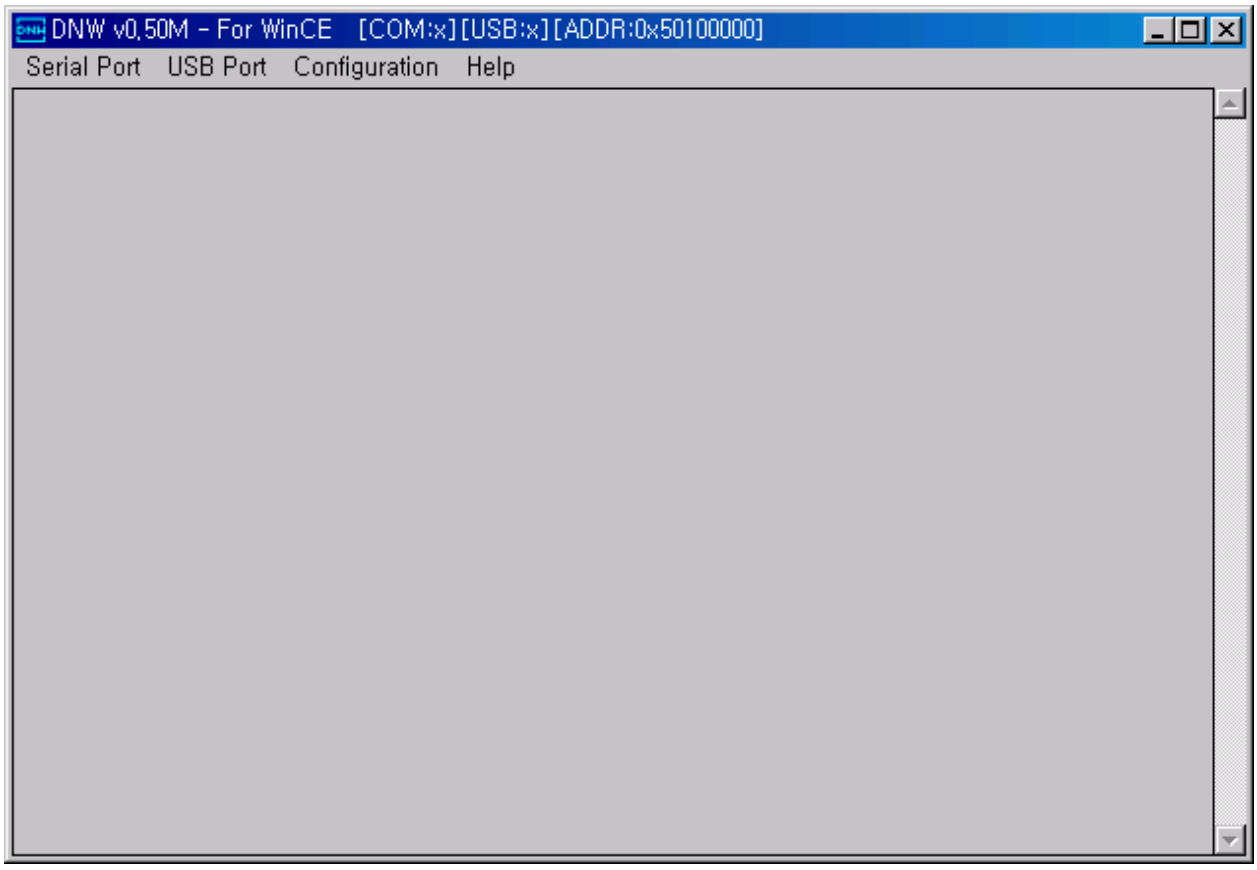

Figure 5-1 DNW Window

5. On the **Configuration** menu, click **Options** to set the UART/USB options. The following window appears on your screen. Select Baud Rate and COM Port as shown in figure 5-2, enter the download address as **0x50100000** and then click **OK** button.

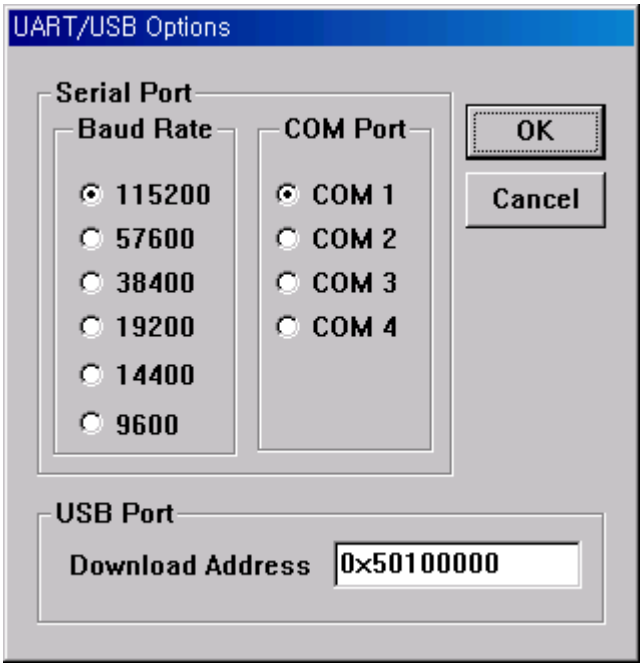

Figure 5-2 UART/USB Options

6. On the **Serial Port** menu, click **Connect**. Switch **ON** the board and then press any key. The DNW window appears as shown in figure 5-3.

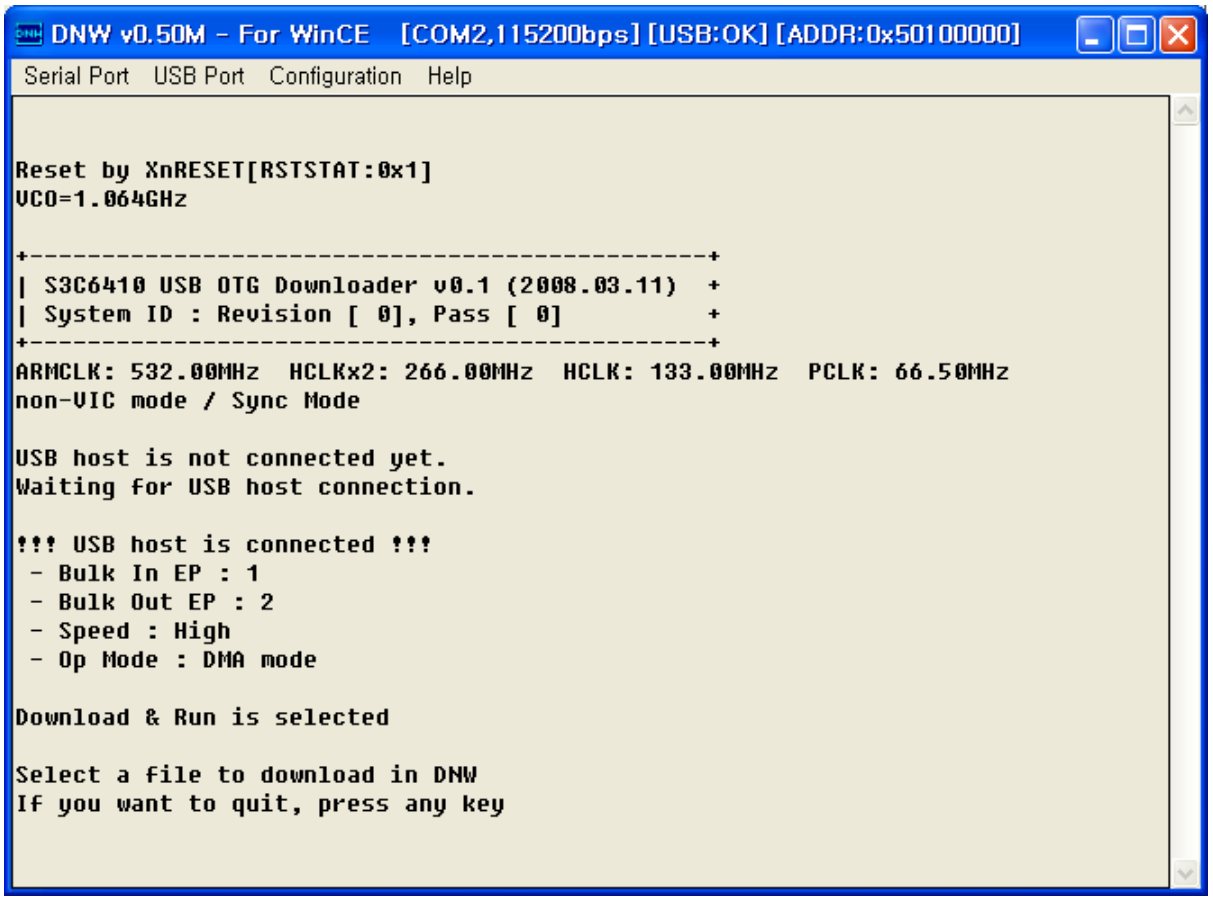

Figure 5-3 DNW Window after Board Power ON

7. Press any key to see USB OTG Mon menu. Now DNW window appears as shown below.

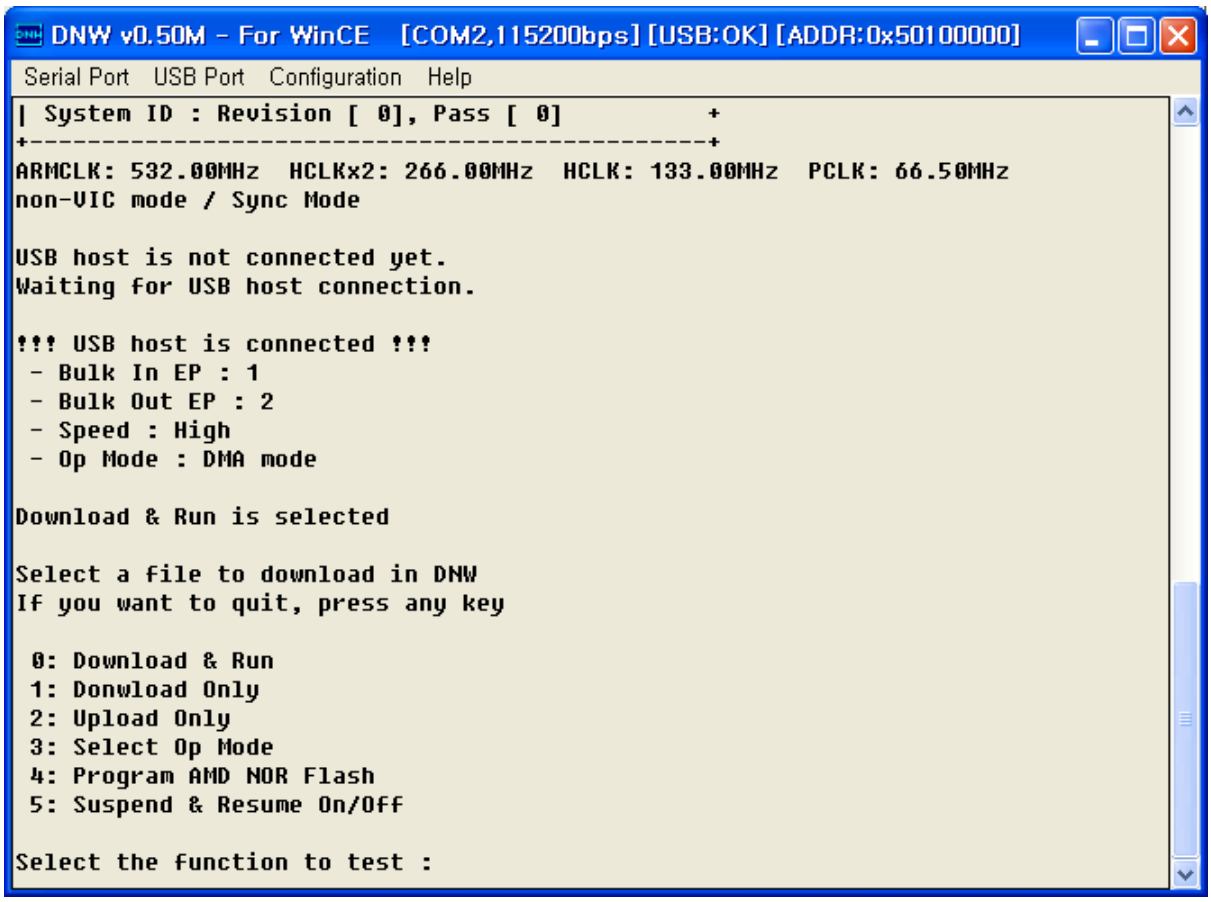

Figure 5-4 USB OTG Mon Menu

8. Enter **0** to download and run the Image on the board. DNW window appears as shown in figure 5-5.

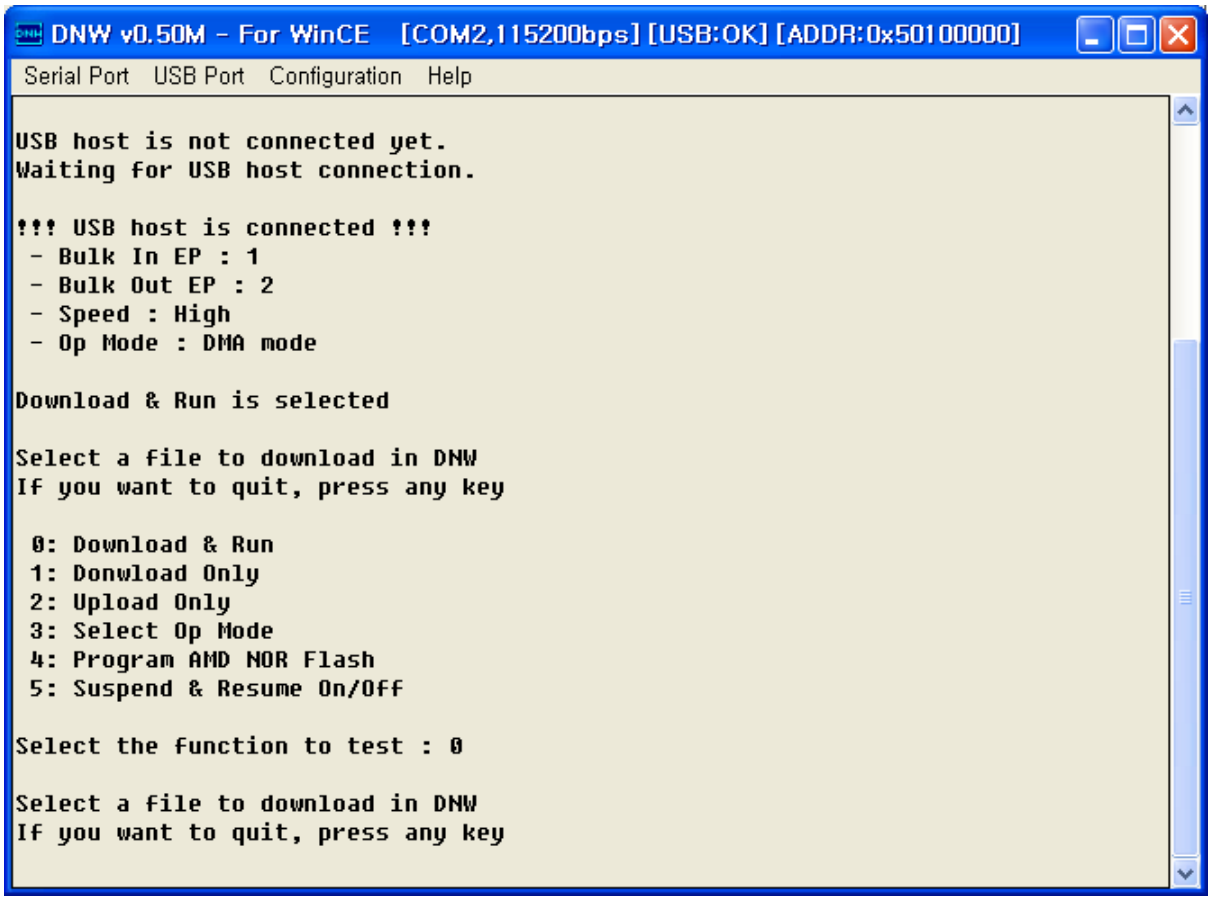

Figure 5-5 Download & Run

9. On the **USB Port** menu, click **Transmit** and the following window appears on your screen. Select **NK.nb0** from **X:\WINCE600\OSDesins\[OS Design name]\[OS Design name]\RelDir\SMDK6410_ARMV4I_Release** directory and then click **Open** button.

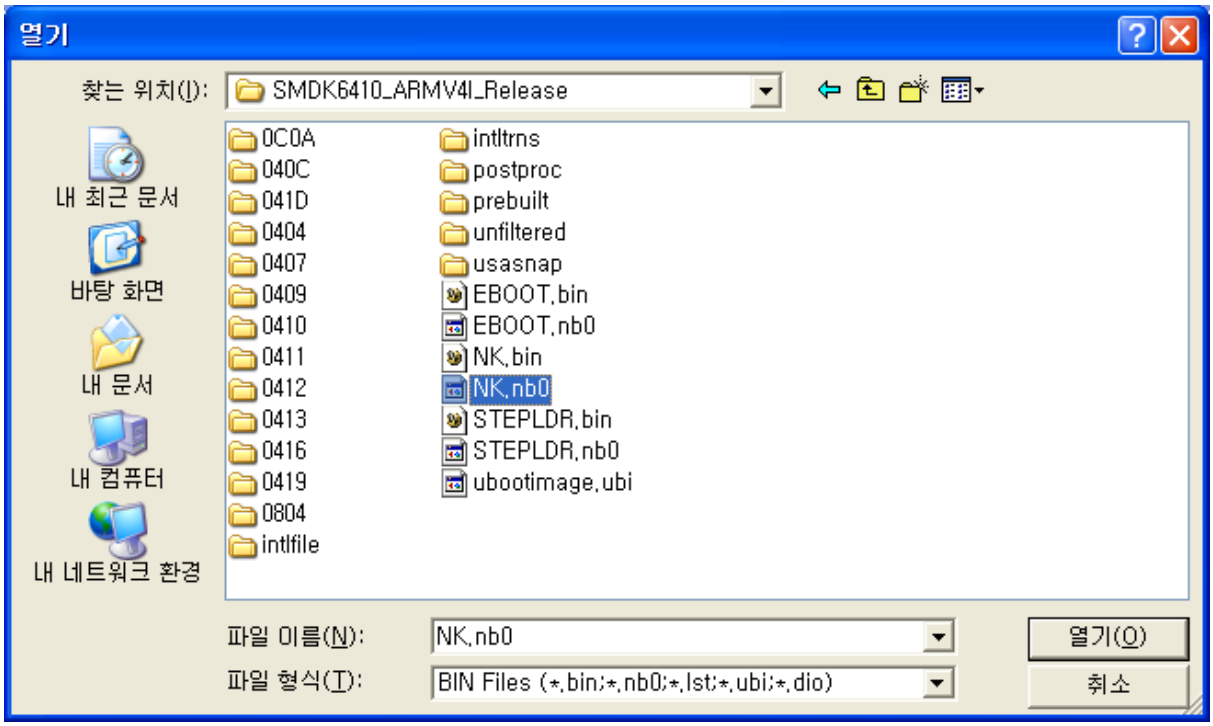

Figure 5-6 Selecting NK.nb0 for Download

10. Once download begins, a download status bar appears on your screen as shown in figure 5-7. After **NK.nb0** download is over, **Windows Embedded CE 6.0** boots on the target Board

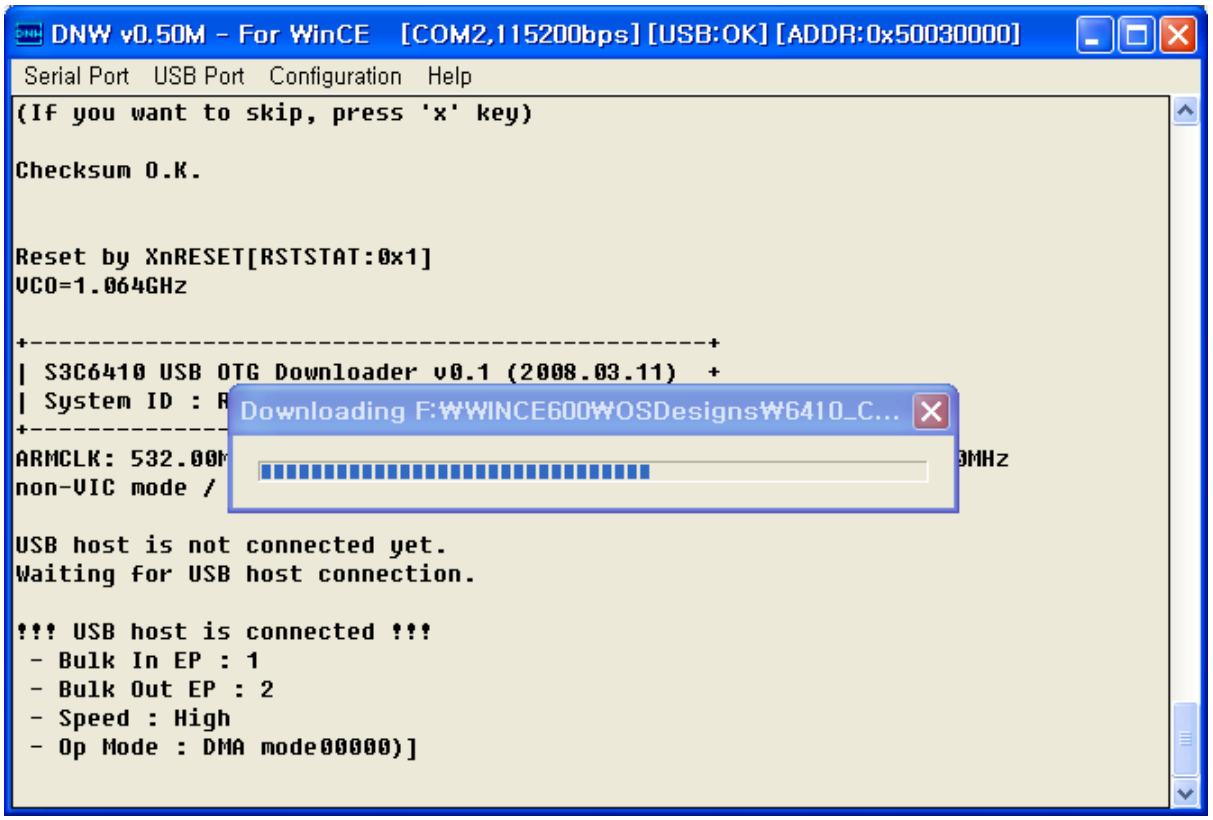

Figure 5-7 Downloading Status of NK.nb0

6 Fusing WinCE Image to NAND Flash via USB

In this chapter, you can understand how to fuse WinCE image to NAND Flash via USB.

1. Before you download the WinCE Image through the USB, you must have **6410_OtgMon.bin** image on your AMD Flash. (The image was already fused on your AMD Flash in the board before release)

2. Configure CFG0 DIP switch on the CPU Board and CFGB1 on the CPU board properly for booting from AMD Flash. (For more information, Read SMDK6410 Board User's Manual in Document folder…)

3. Please install the USB Driver and DNW application on your host PC.

4. Run **dnw.exe** on the host PC. The following window appears on your screen.

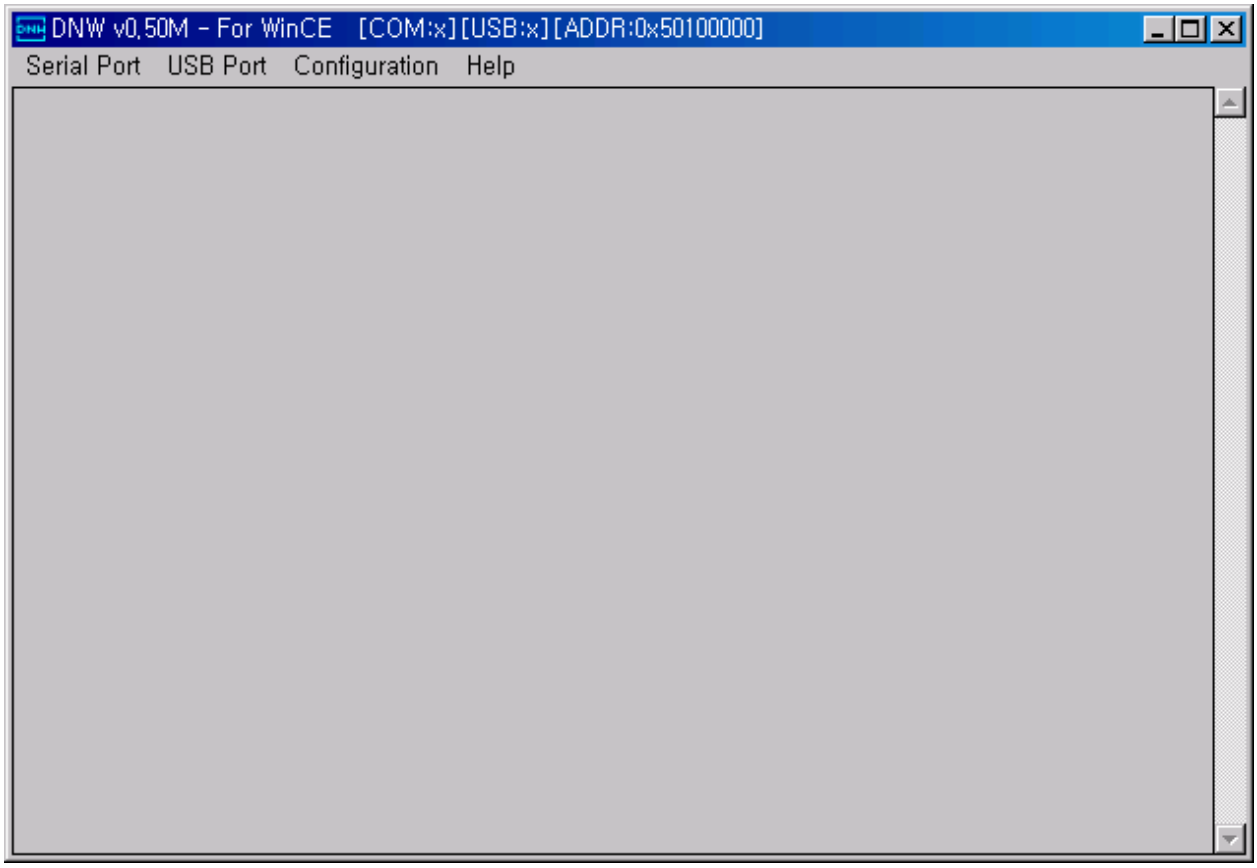

Figure 6-1 DNW Window

5. On the **Configuration** menu in the DNW window, click **Options** to set the UART/USB options. The following window appears on your screen. Select Baud Rate and COM Port as shown in figure 7-4, enter the download address as **0x50030000** and then click **OK** button.

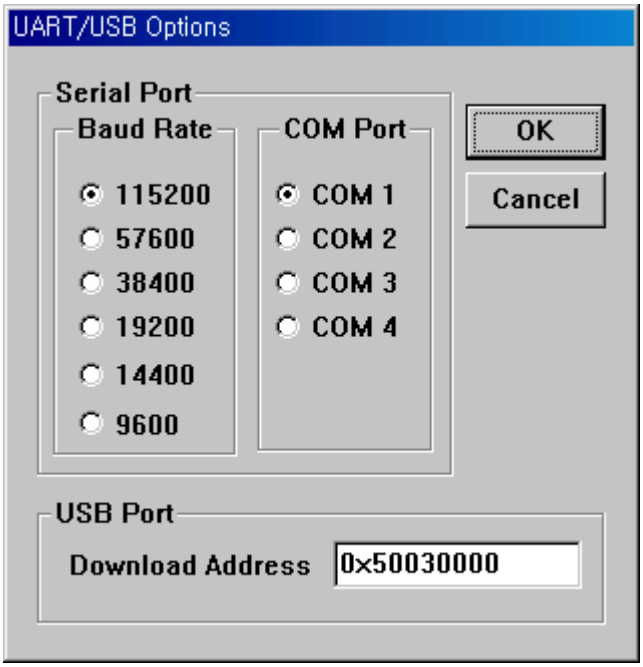

Figure 6-2 UART/USB Options

6. On the **Serial Port** menu, click **Connect**. Switch **ON** the board and then press any key. The DNW window appears as shown in figure 6-3.

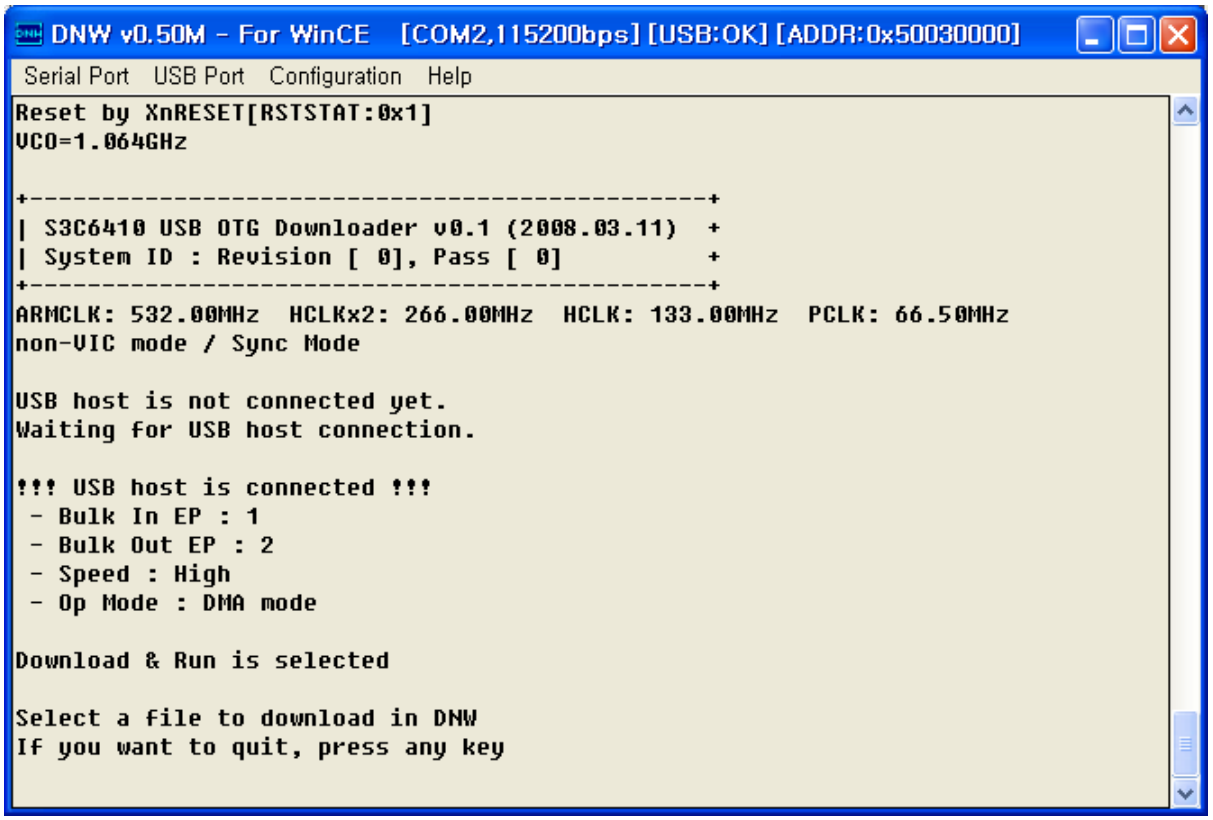

Figure 6-3 DNW Window after Board Power ON

7. Press any key to see USB OTG Mon menu. Now DNW window appears as shown below.

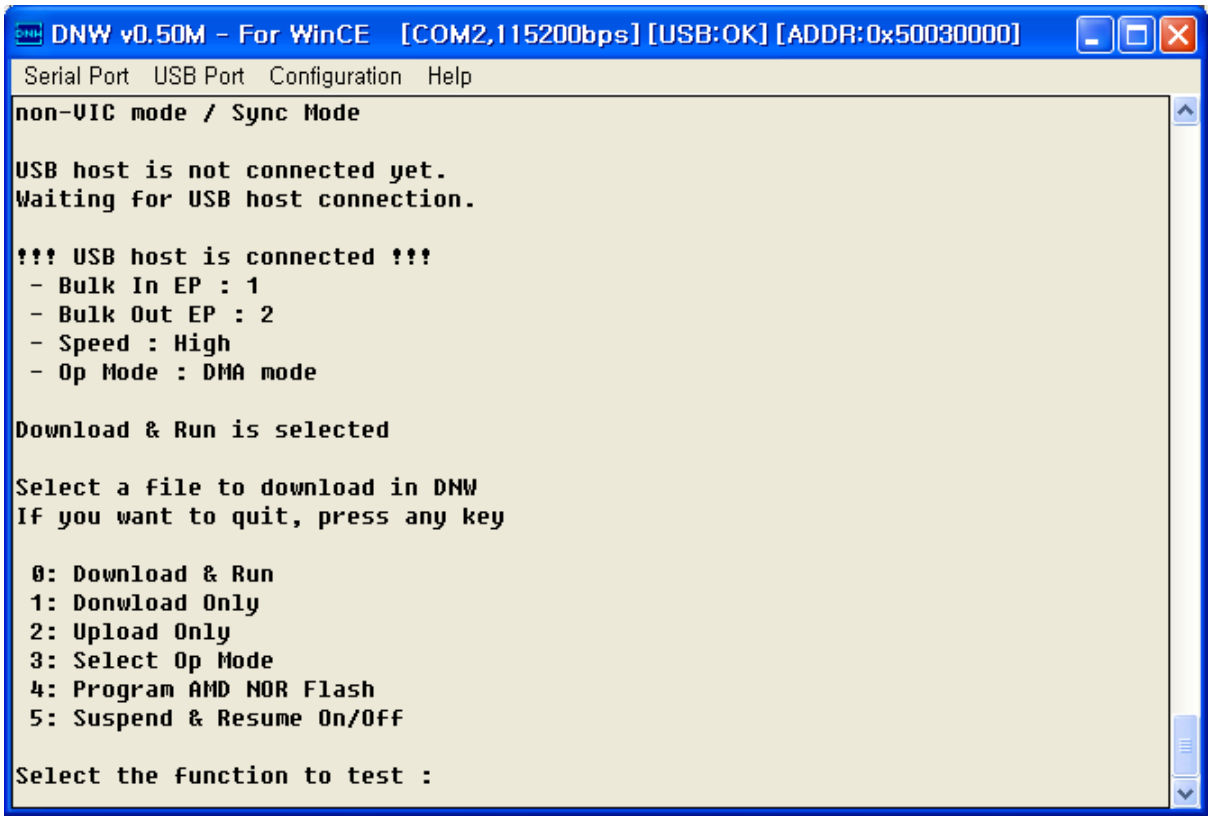

Figure 6-4 usb OTG Mon menu

8. Enter **0** to download and run the Image on the board. DNW window appears as shown in figure 6-5.

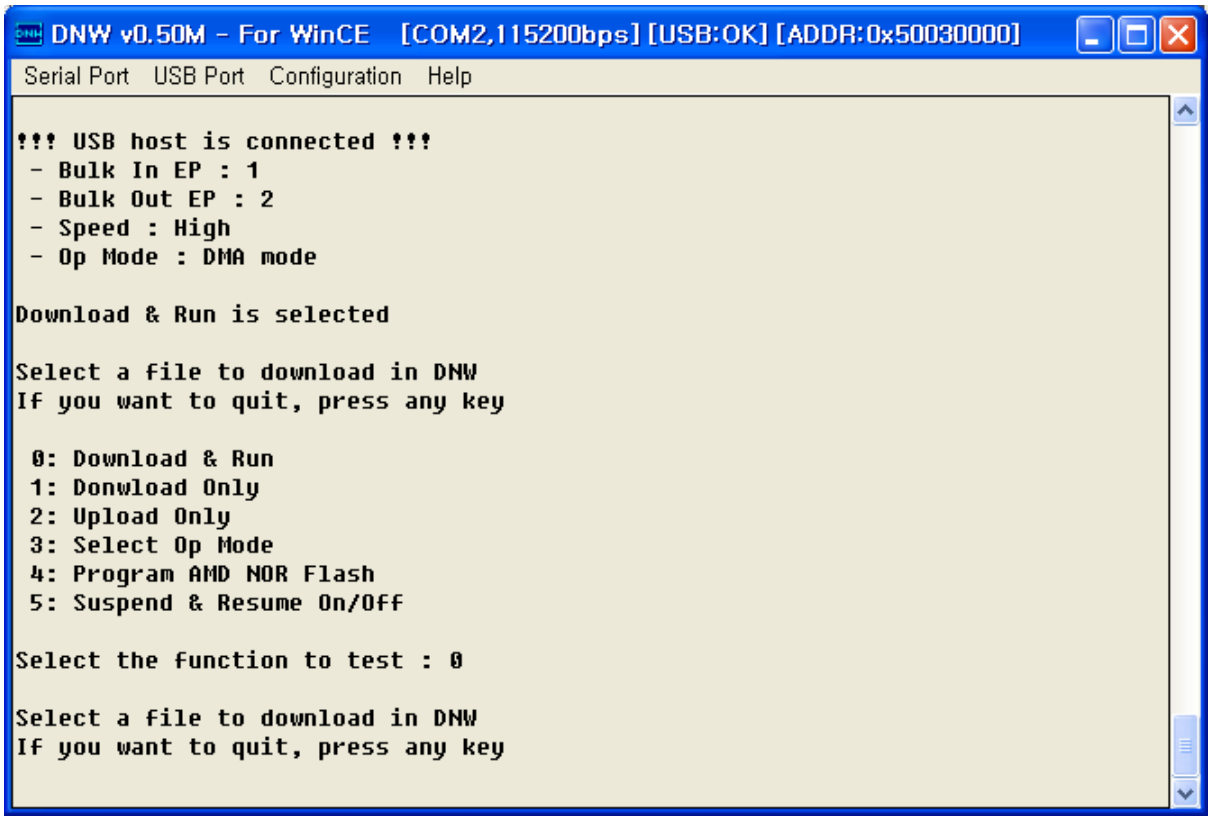

Figure 6-5 Download & Run

9. On the **USB Port** menu, click **Transmit** and the following window appears on your screen. Select **EBOOT.nb0** file from **X:\WINCE600\OSDesigns\[OSDesign name] \[OSDesign name]\RelDir\SMDK6410_ARMV4I _Release** directory and then click **Open** button.

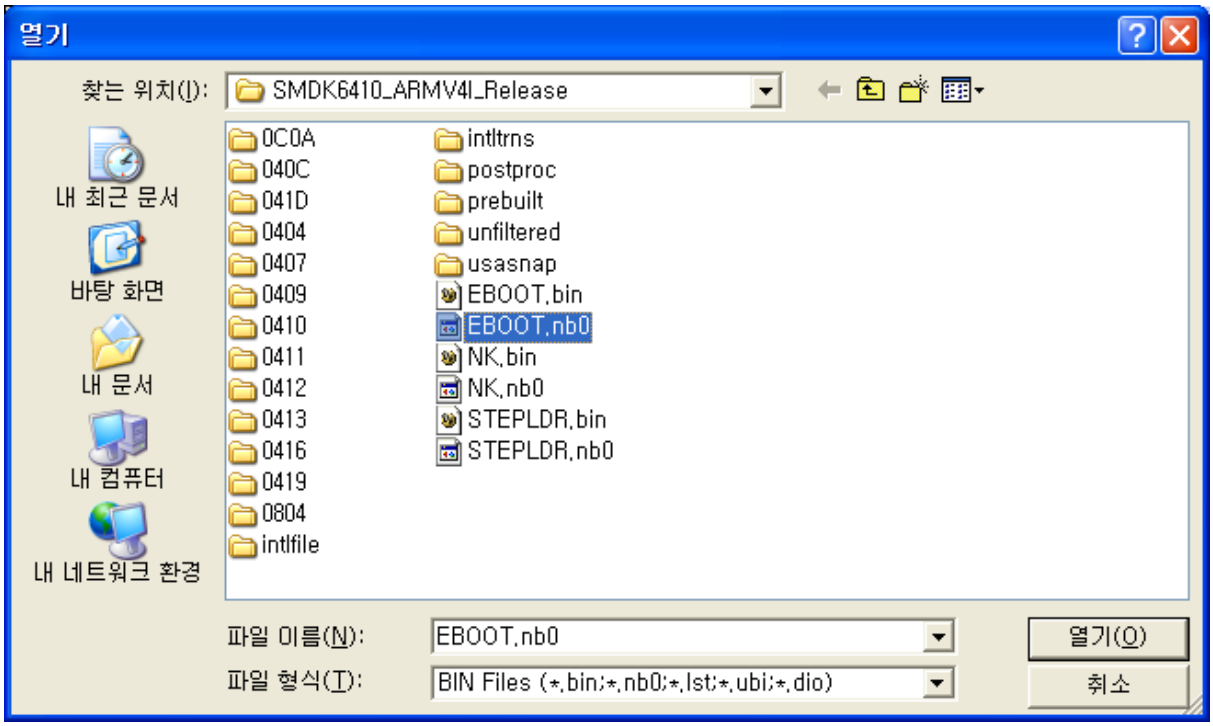

Figure 6-6 Selecting EBOOT.nb0 for Download

10. As soon as **EBOOT.nb0** download is over, the following messages appear in the DNW window**.**

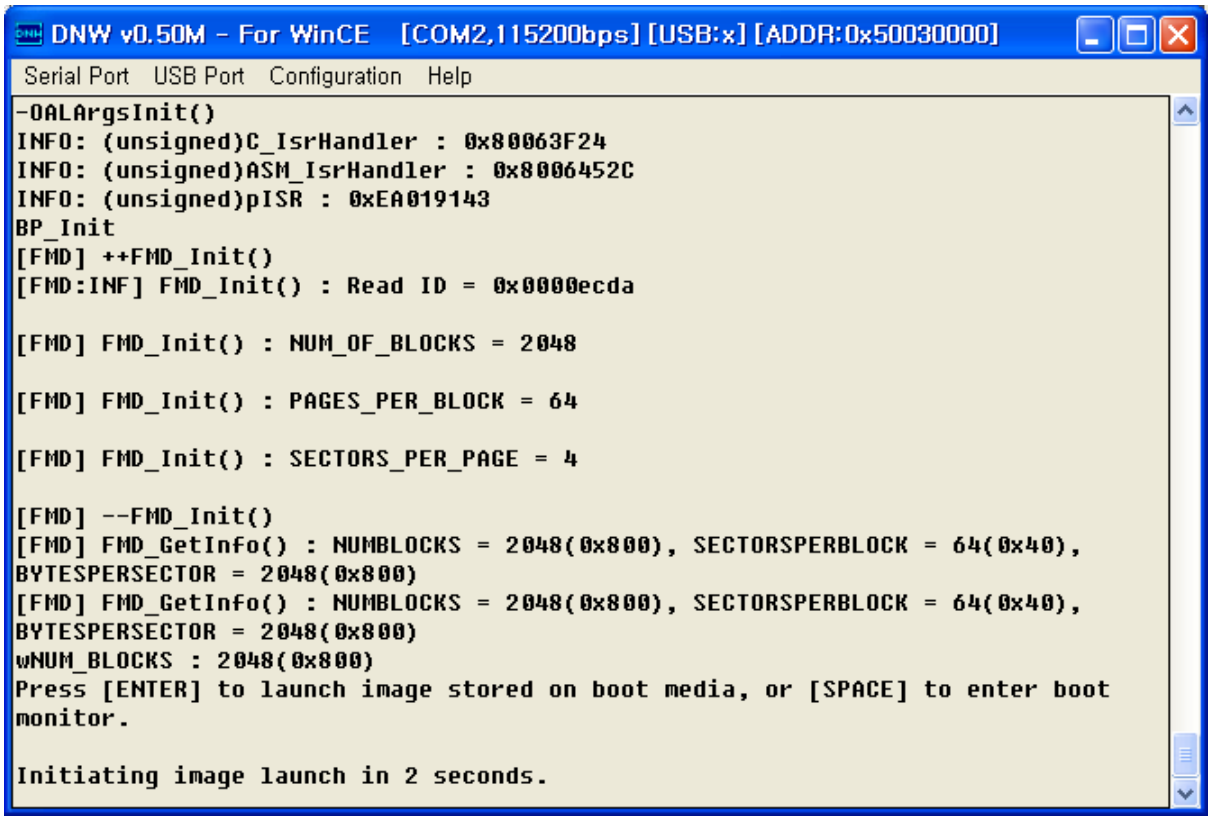

Figure 6-7 After EBOOT.nb0 Download

11. Please hit the **SPACE BAR** key to view the current Ethernet Boot Loader Configuration.

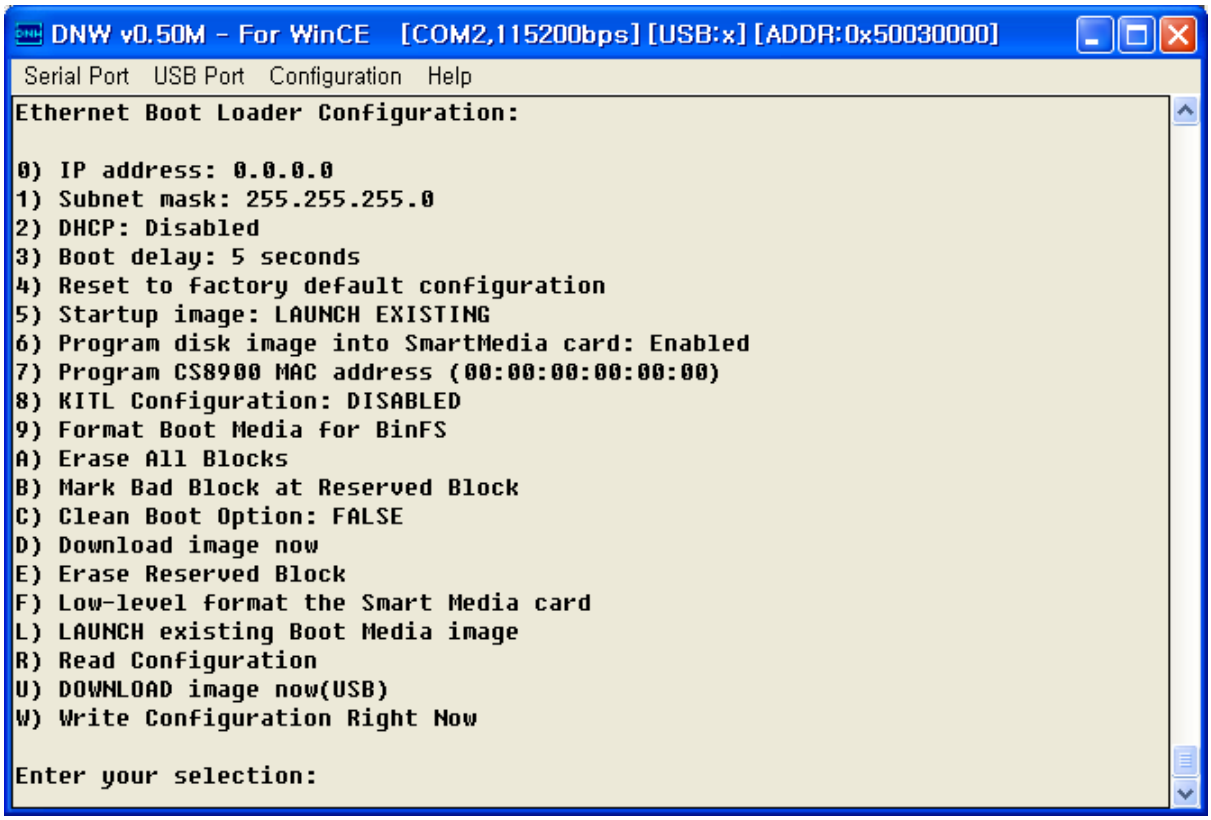

Figure 6-8 Ethernet Boot Loader Configuration - Before

12. Configure the Ethernet Boot loader as follows by entering the respective options:

- Enter **[0]** to enter SMDK6410 Board **IP address**
- Enter **[1]** to enter SMDK6410 Board **Subnet mask**
- Keep **DHCP:** DISABLED
- Keep **Startup image: LAUNCH EXISTING**
- Keep **Program disk image:** ENABLED
- Enter **[7]** to enter SMDK6410 Board **MAC Address**
- Keep **KITL Configuration:** DISABLED
- Enter **[W]** to **Write Configuration Right Now**
- Enter **[E]** to **Erase Reserved Blocks in NAND Flash**
- Enter **[F]** to do **Low-level format the NAND Flash** and wait for few seconds
- Enter **[9]** to **Format Boot Media for BinFS**
- After entering **[9]**, please wait for few minutes.
- Enter **[U]** to **Download image now(USB)**

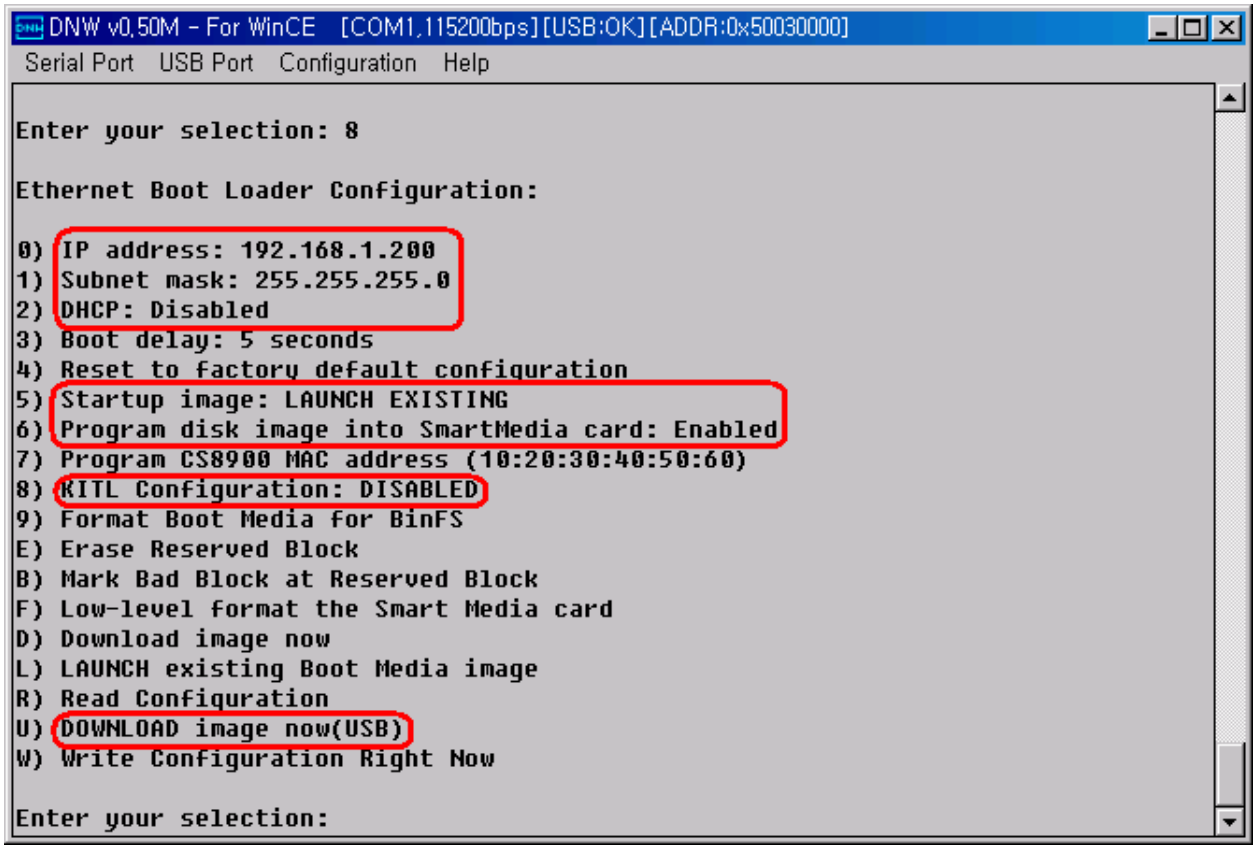

Figure 6-9 Ethernet Boot Loader Configuration - After

13. Change the **IP address** and **Subnet Mask** manually on your **Host PC** in **TCP/IP properties** before you start to download the OS image to the target board. For example, if the Target Board IP Address is 192.168.1.200, then set Host PC IP address as 192.168.1.100. Set the subnet mask as 255.255.255.0 **(You can skip this step for downloading via USB)**

And **then Enter [U]** for download image. If so, You can see the below window.

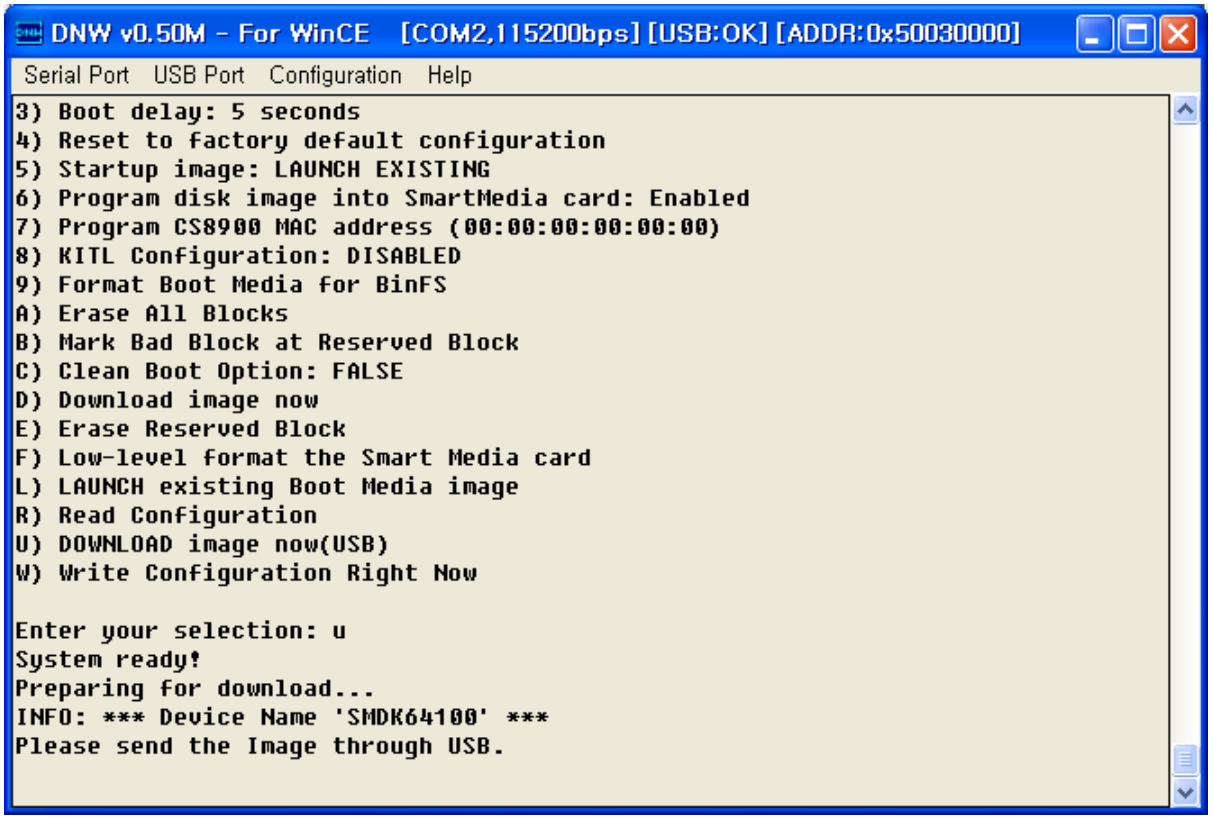

Figure 6-10 Preparing to download image through USB

14. On the **USB Port** menu click **UBOOT** and the following window appears on your screen. Select **STEPLDR.nb0** from **X:\WINCE600\OSDesigns\[OSDesign name]\[OSDesign name]\ RelDir\SMDK6410_ARMV4I _Release** directory and then click **Open** button.

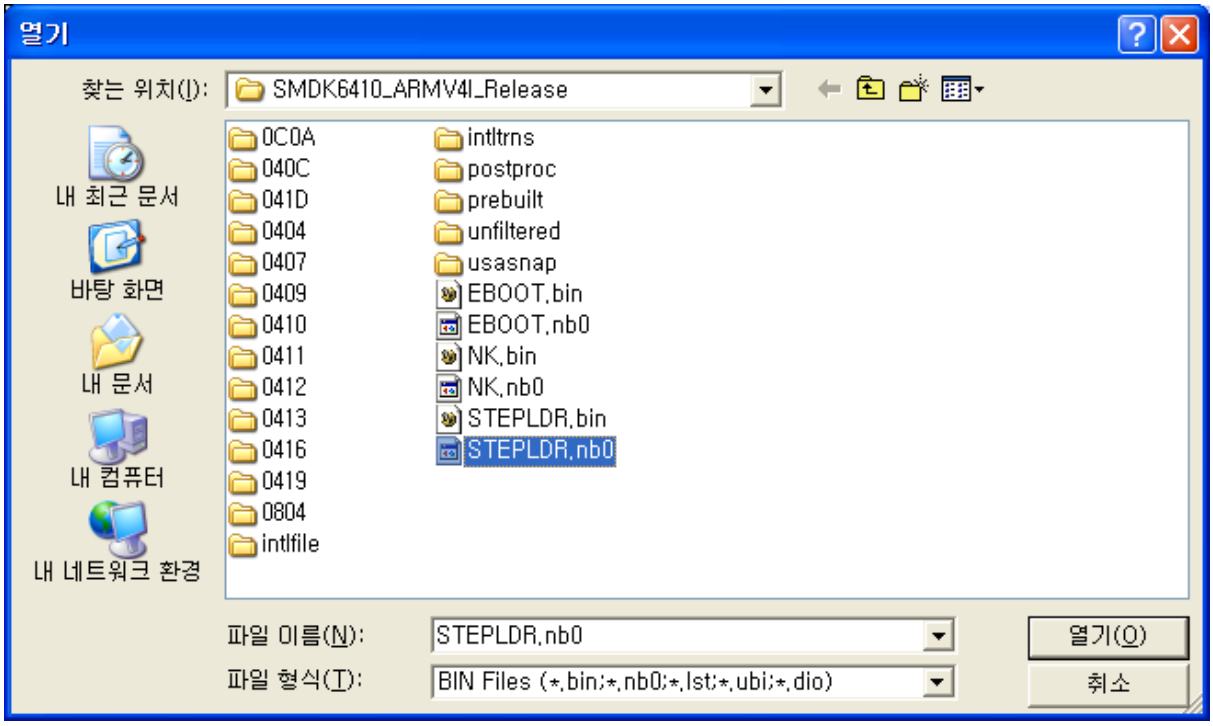

Figure 6-11 Selecting STEPLDR.nb0 for Download

15. You can see the following messages on the DNW window after **STEPLDR.nb0** download is over.

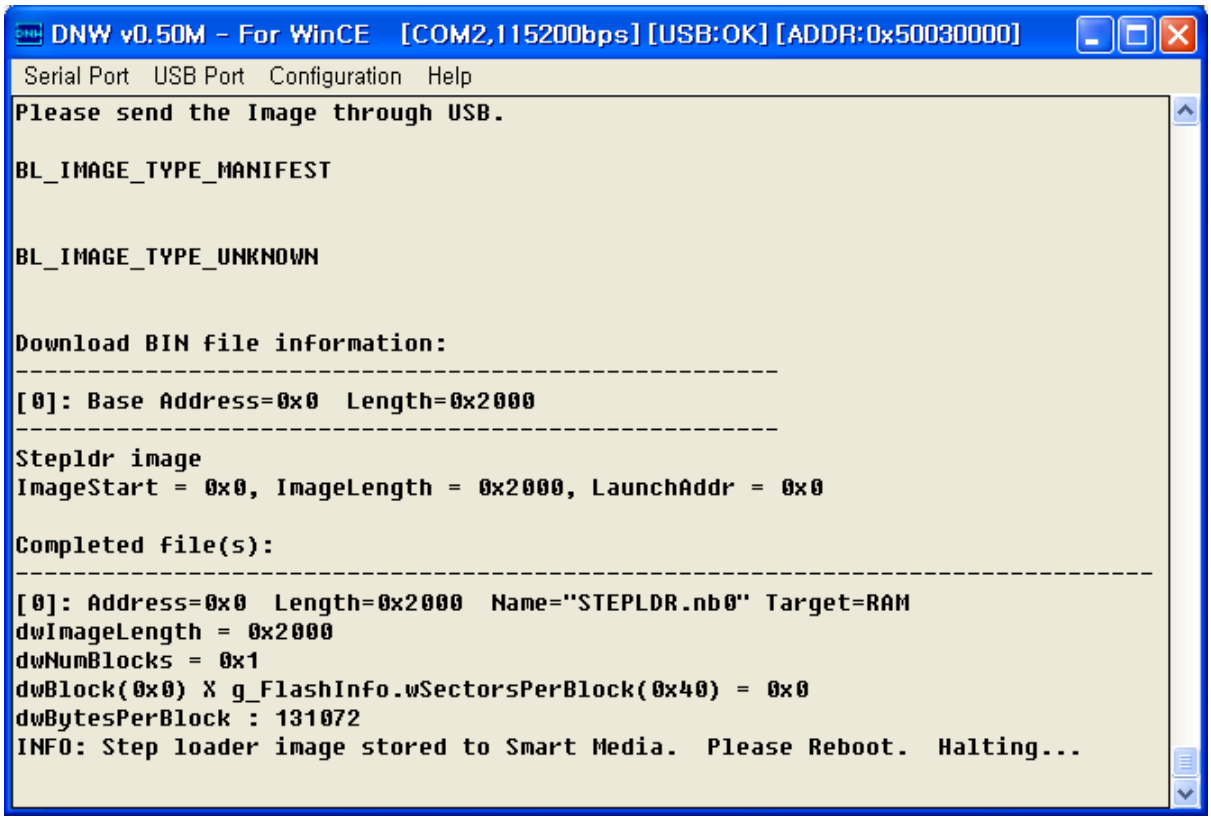

Figure 6-12 Messages via UART Port after STEPLDR.nb0 Download

16. Reset the board. DNW window appears as shown in figure 6-13.

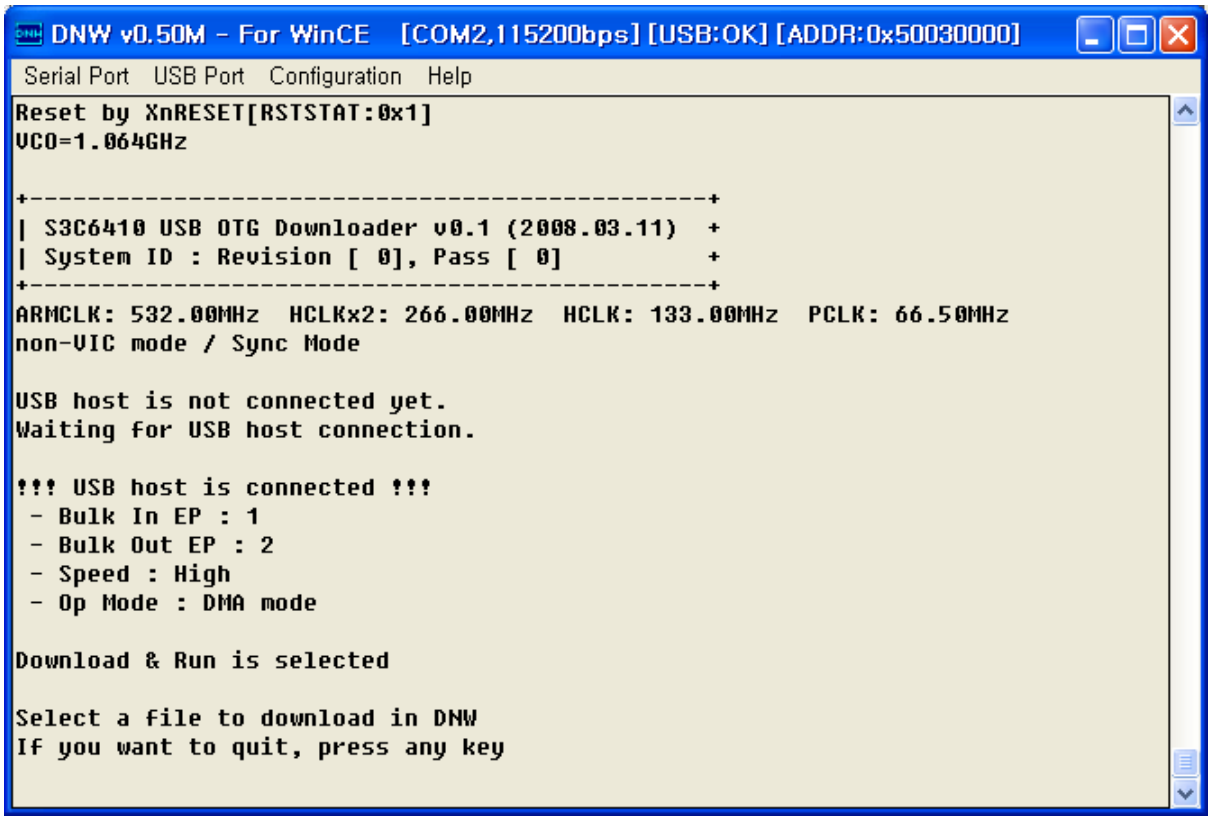

Figure 6-13 DNW Window after reset

17. On the **USB Port** menu, click **Transmit** and the following window appears on your screen. Select **EBOOT.nb0** file from **X:\WINCE600\OSDesigns\[OSDesign name] \[OSDesign name]\RelDir\SMDK6410_ARMV4I _Release** directory and then click **Open** button.

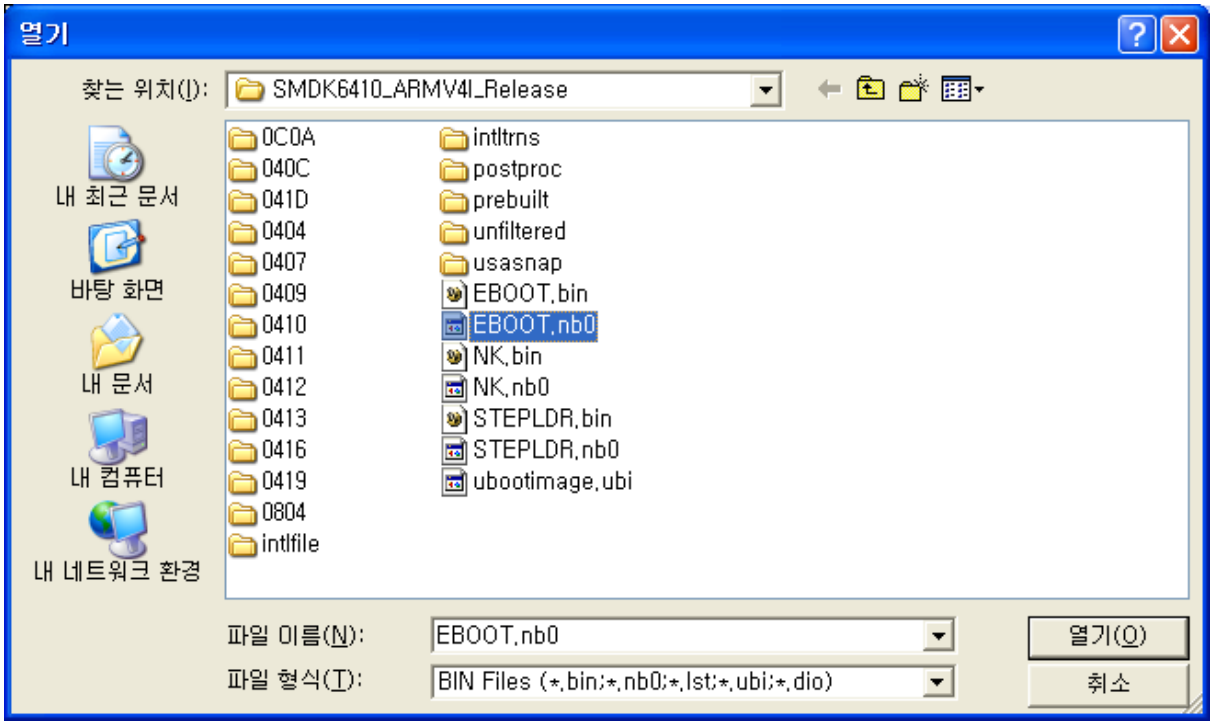

Figure 6-14 Selecting EBOOT.nb0 for Download

18. As soon as **EBOOT.nb0** download is over, the following messages appear in the DNW window.

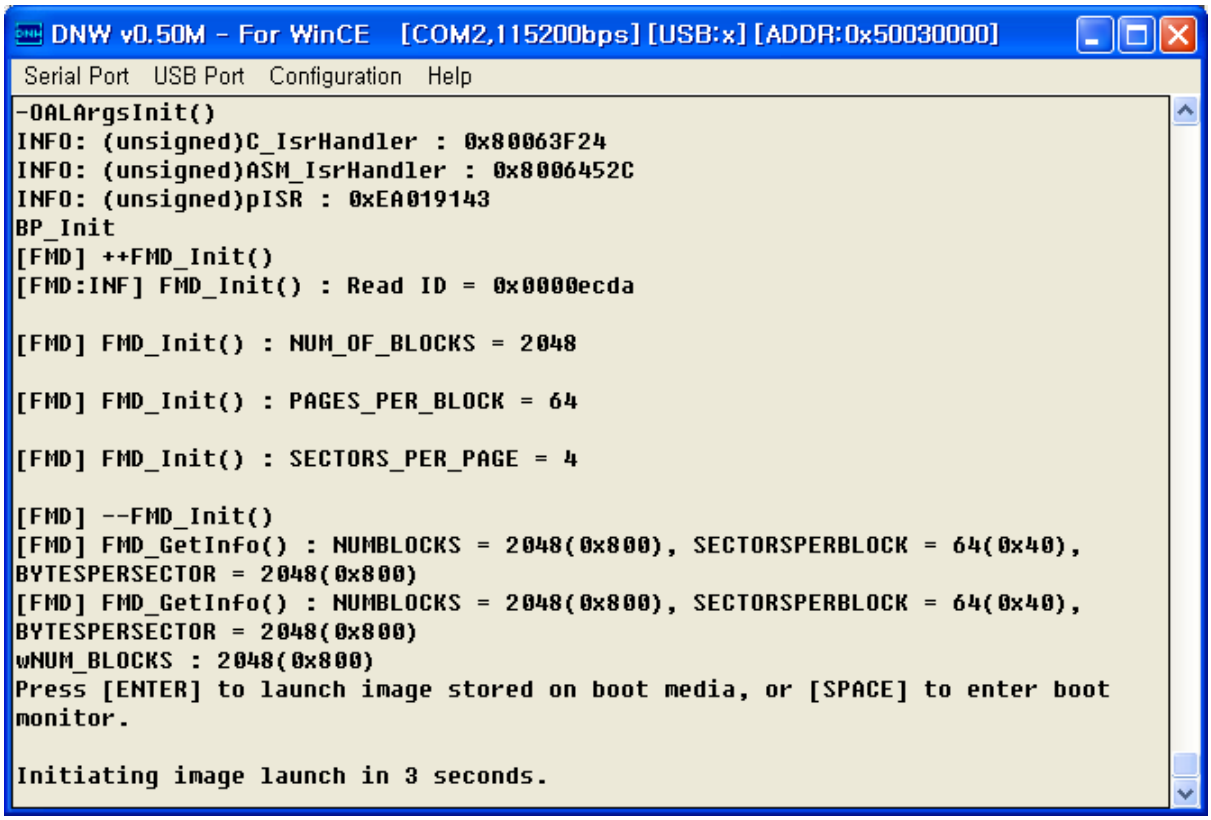

Figure 6-15 After EBOOT.nb0 Download

19. Please hit the **SPACE BAR** key to view the current Ethernet Boot Loader Configuration.

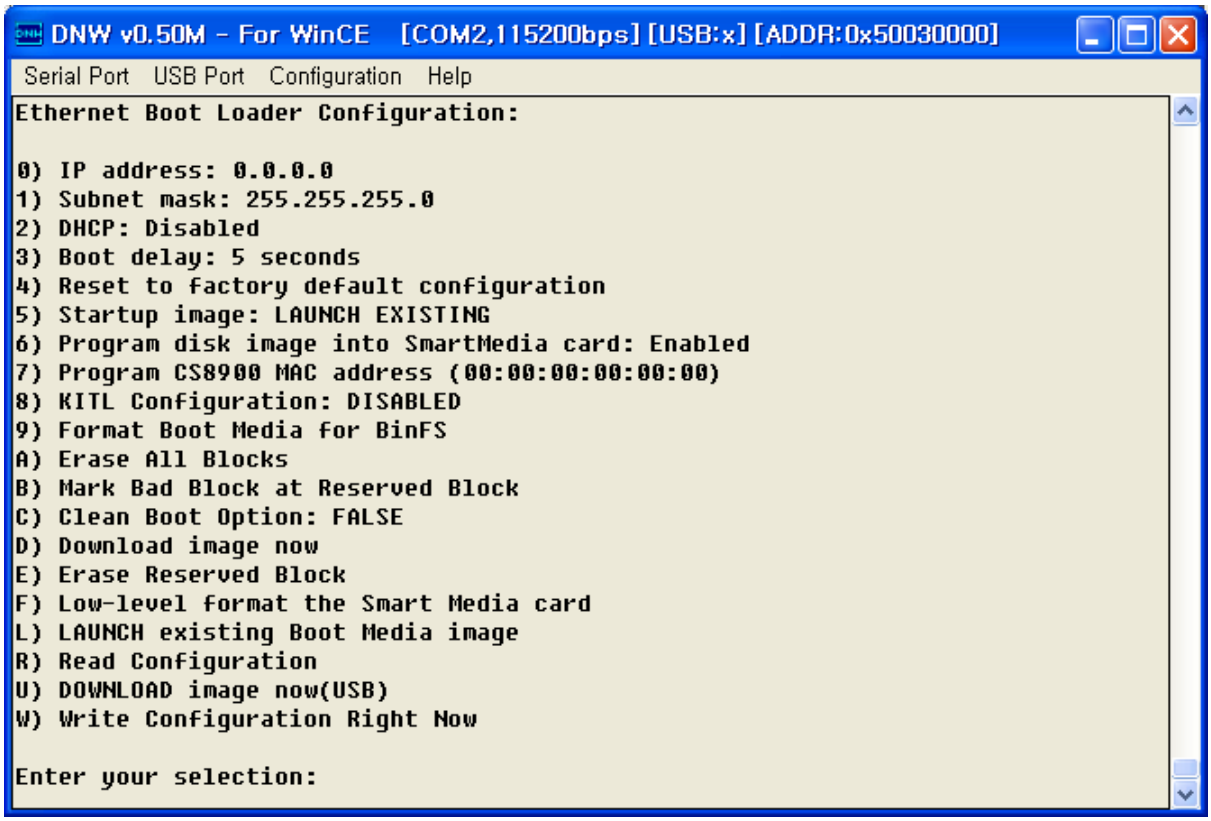

Figure 6-16 Ethernet Boot Loader Configuration

20. Enter **[U]** to **Download image now(USB),** the following messages appear in the DNW window.

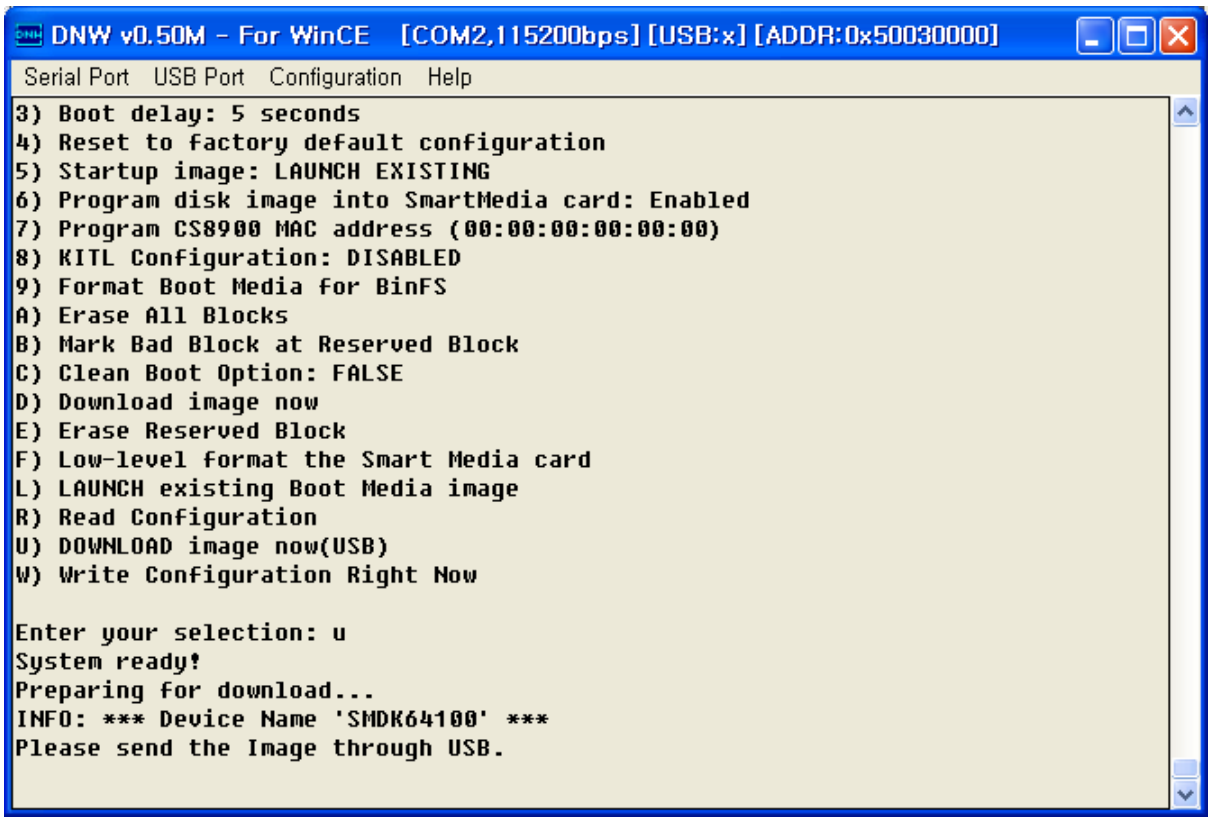

Figure 6-17 Preparing to download image through USB

21. On the **USB Port** menu click **UBOOT** and the following window appears on your screen. Select **Eboot.bin** from **X:\WINCE600\OSDesigns\[OSDesign name]\[OSDesign name]\ RelDir\SMDK6410_ARMV4I _Release** directory and then click **Open** button.

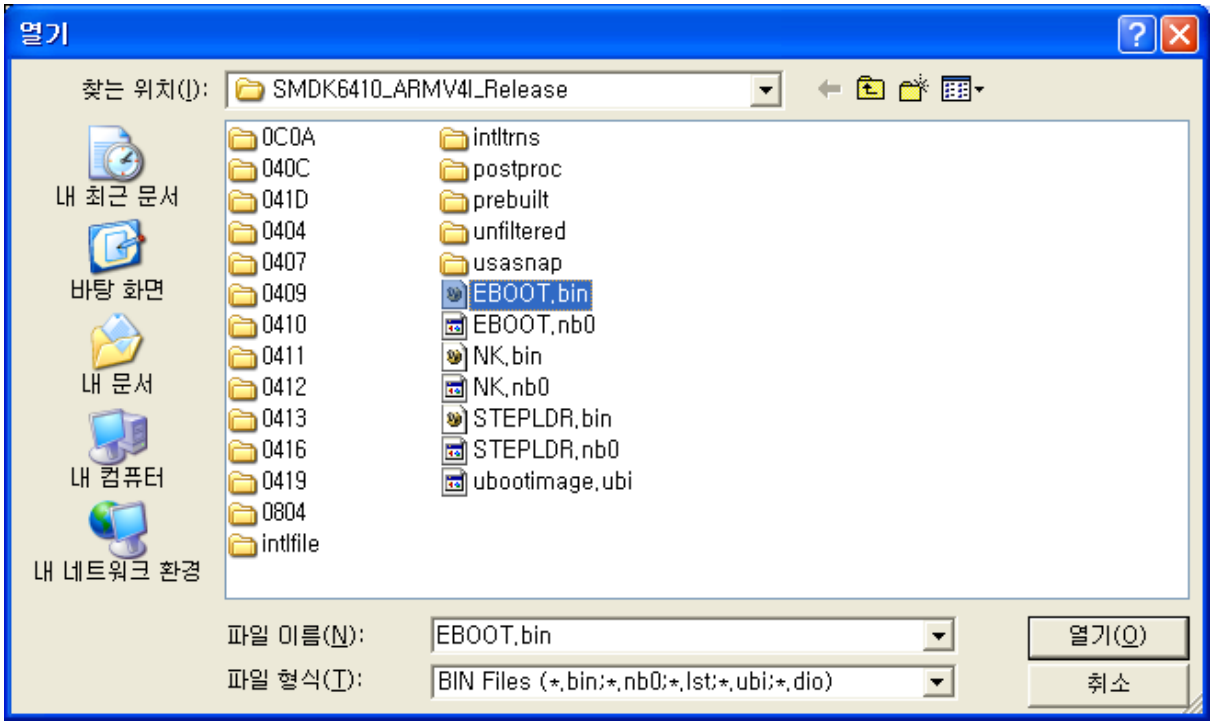

Figure 6-18 Selecting EBOOT.bin for Download

22. You can see the following messages on the DNW window after **EBOOT.bin** download.

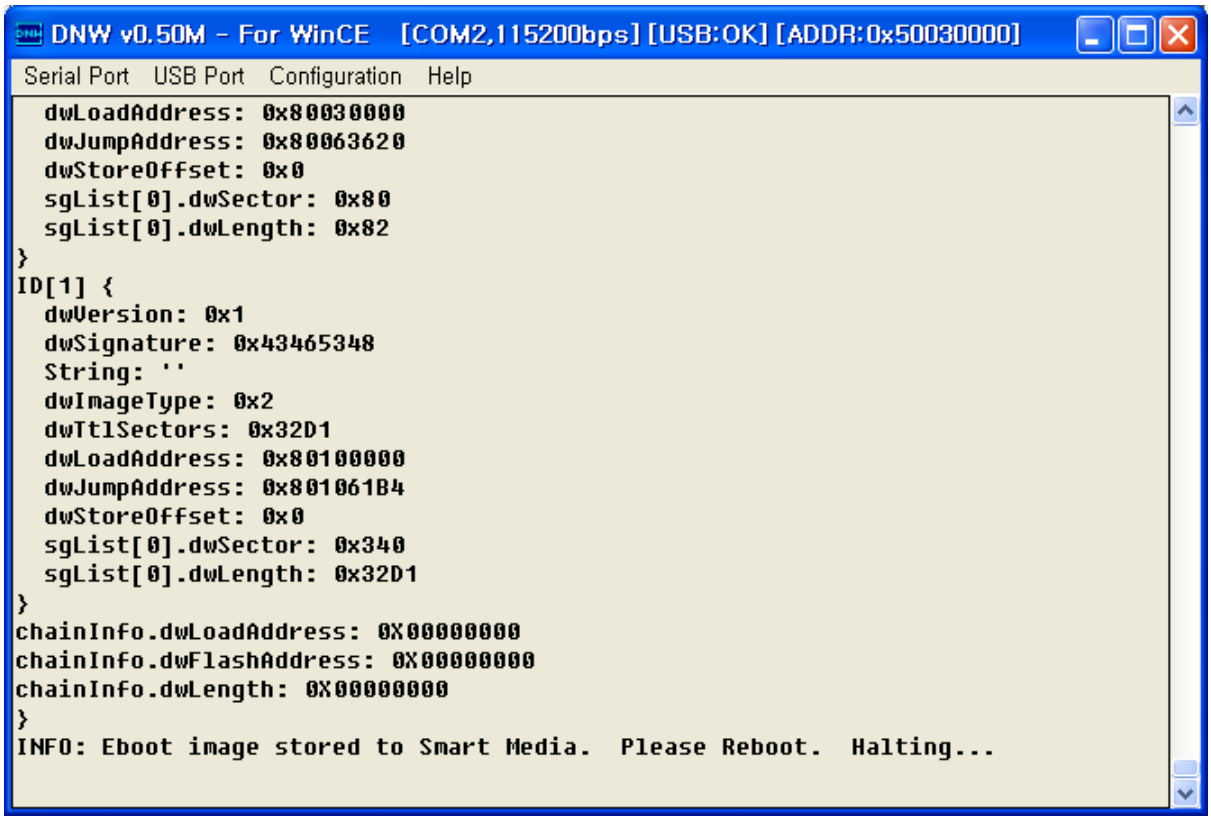

Figure 6-19 Messages via UART Port after EBOOT.bin Download

23. Reset the board. DNW window appears as shown in figure 6-20.

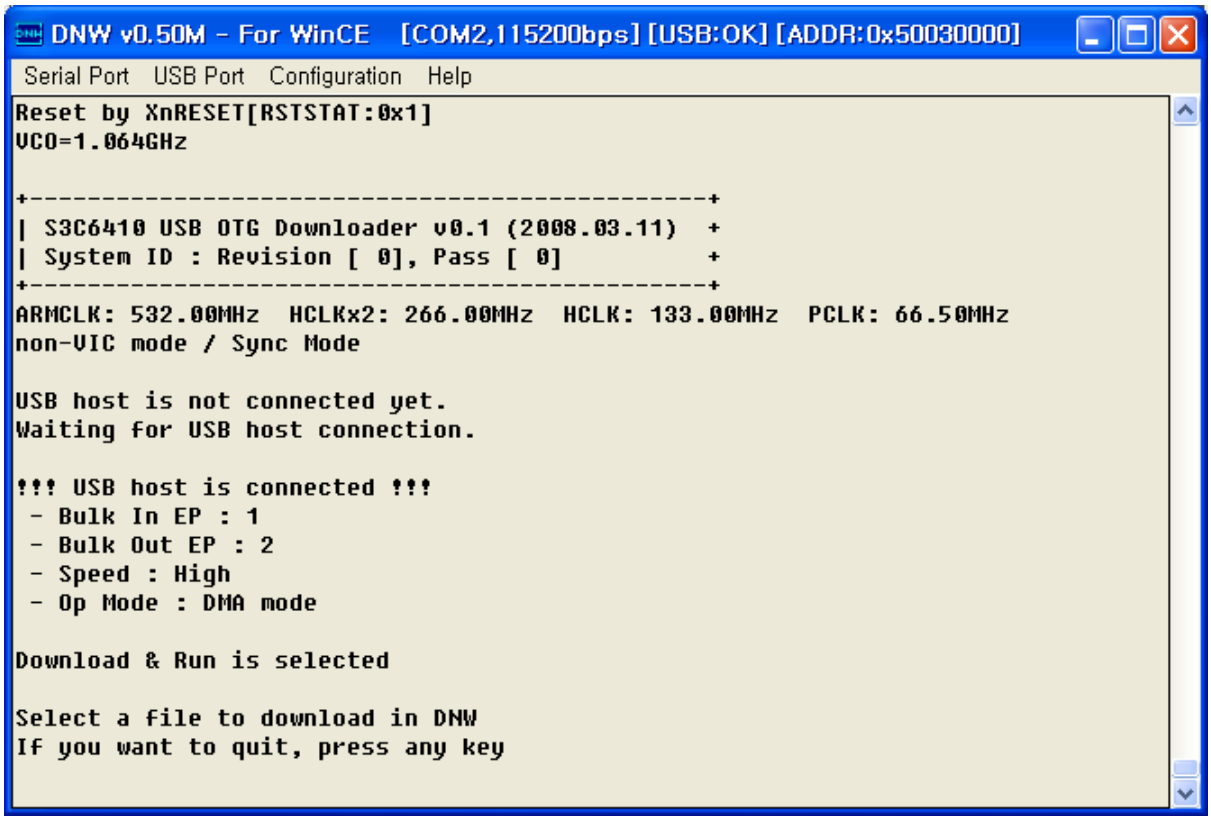

Figure 6-20 DNW Window after reset

24. On the **USB Port** menu, click **Transmit** and the following window appears on your screen. Select **EBOOT.nb0** file from **X:\WINCE600\OSDesigns\[OSDesign name] \[OSDesign name]\RelDir\SMDK6410_ARMV4I _Release** directory and then click **Open** button.

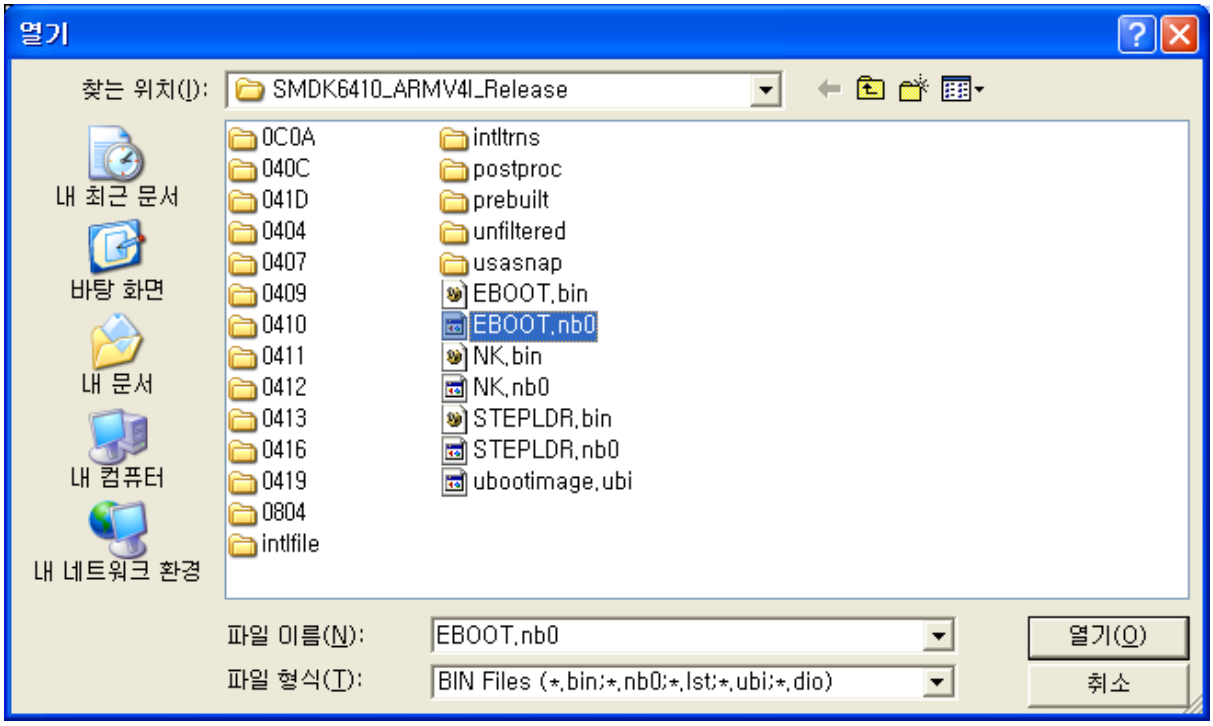

Figure 6-21 Selecting EBOOT.nb0 for Download

25. As soon as **EBOOT.nb0** download is over, the following messages appear in the DNW window.

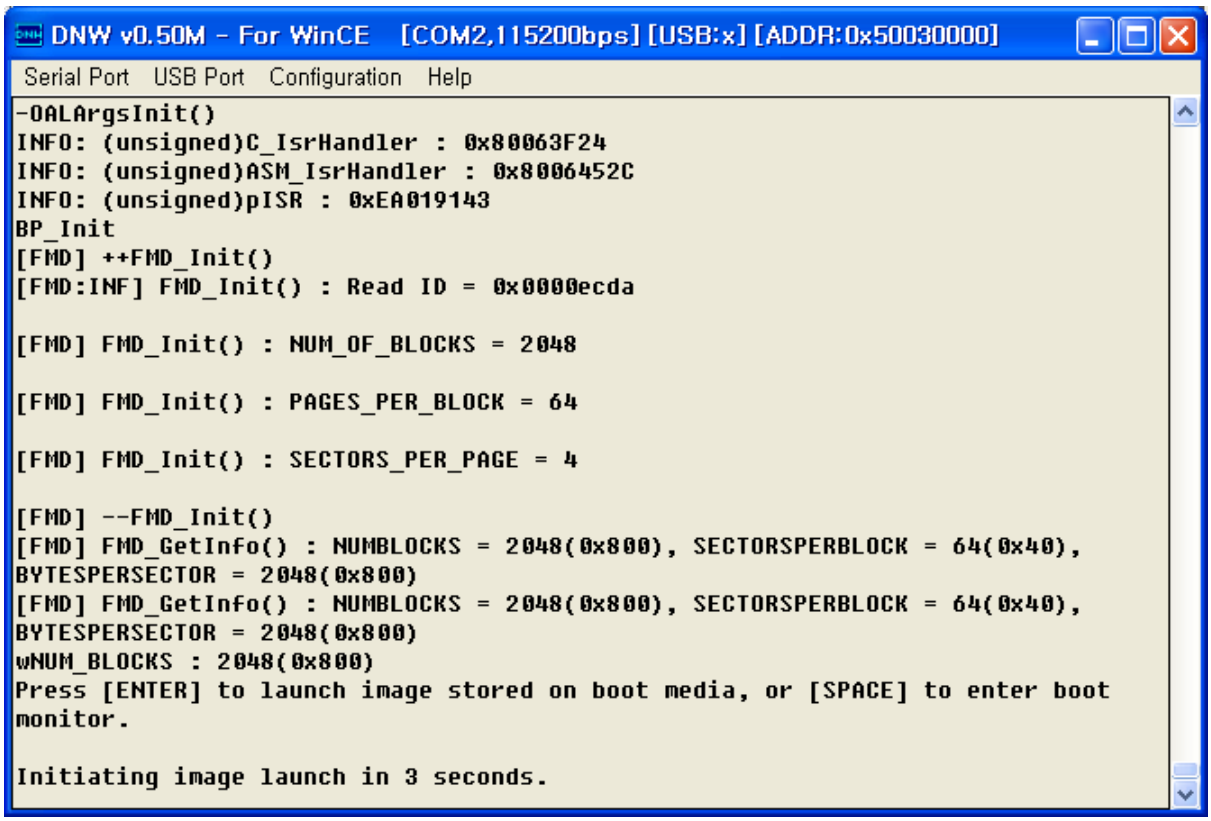

Figure 6-22 After EBOOT.nb0 Download

26. Please hit the **SPACE BAR** key to view the current Ethernet Boot Loader Configuration.

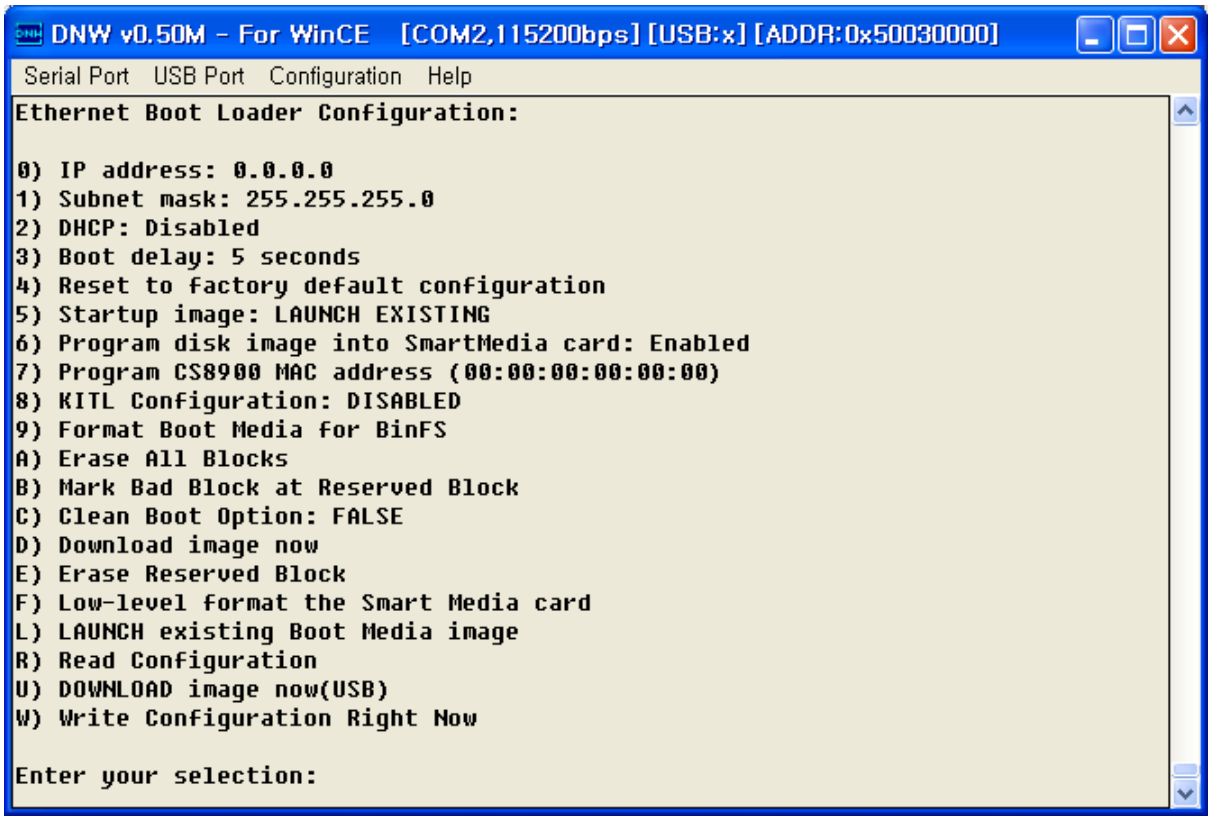

Figure 6-23 Ethernet Boot Loader Configuration

27. Enter **[F] to Reserve for Blocks of Stepldr.nb0 and Eboot.bin, and format other blocks**

28. Enter [9] to make BinFS on other blocks,

29. Enter **[U]** to **Download image now(USB),** the following messages appear in the DNW window.

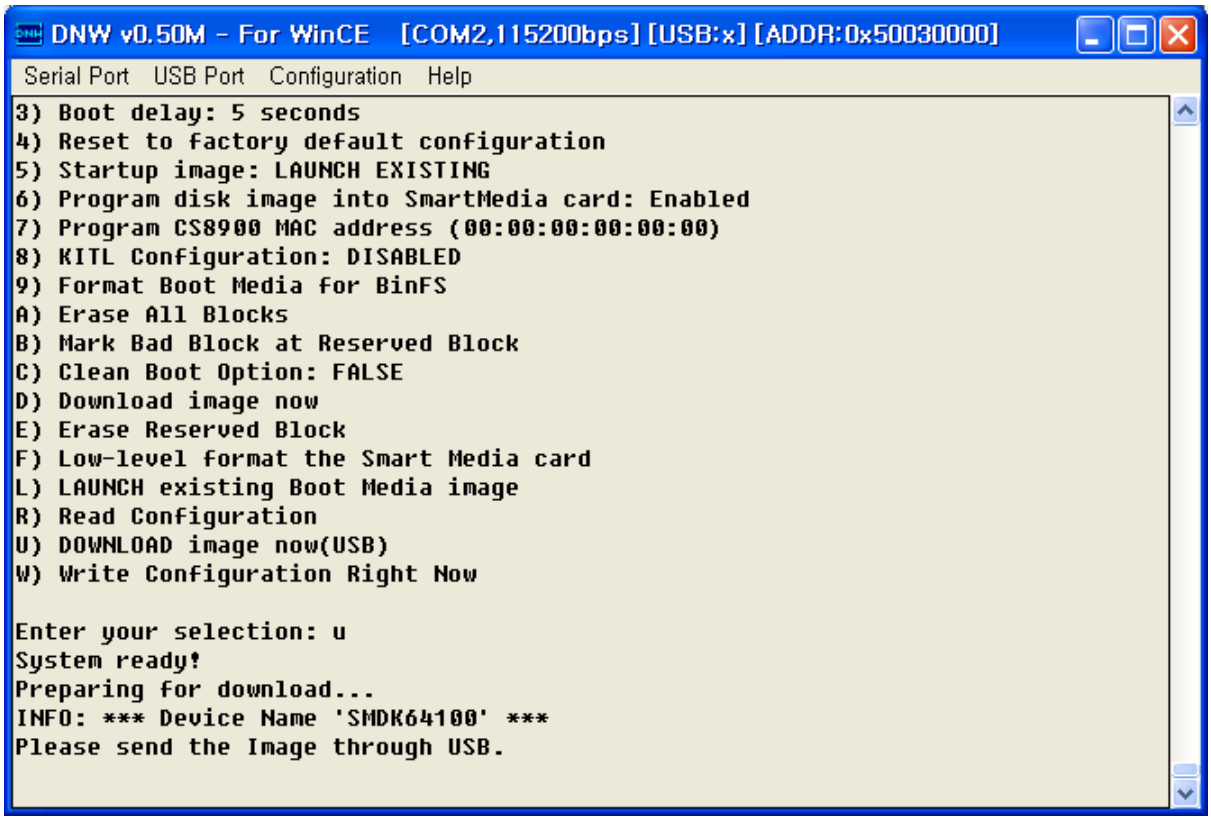

Figure 6-24 Preparing to download image through USB

30. On the **USB Port** menu click **UBOOT** and the following window appears on your screen. Select **NK.bin** from **X:\WINCE600\OSDesigns\[OSDesign name]\[OSDesign name]\ RelDir\SMDK6410_ARMV4I _Release** directory and then click **Open** button.

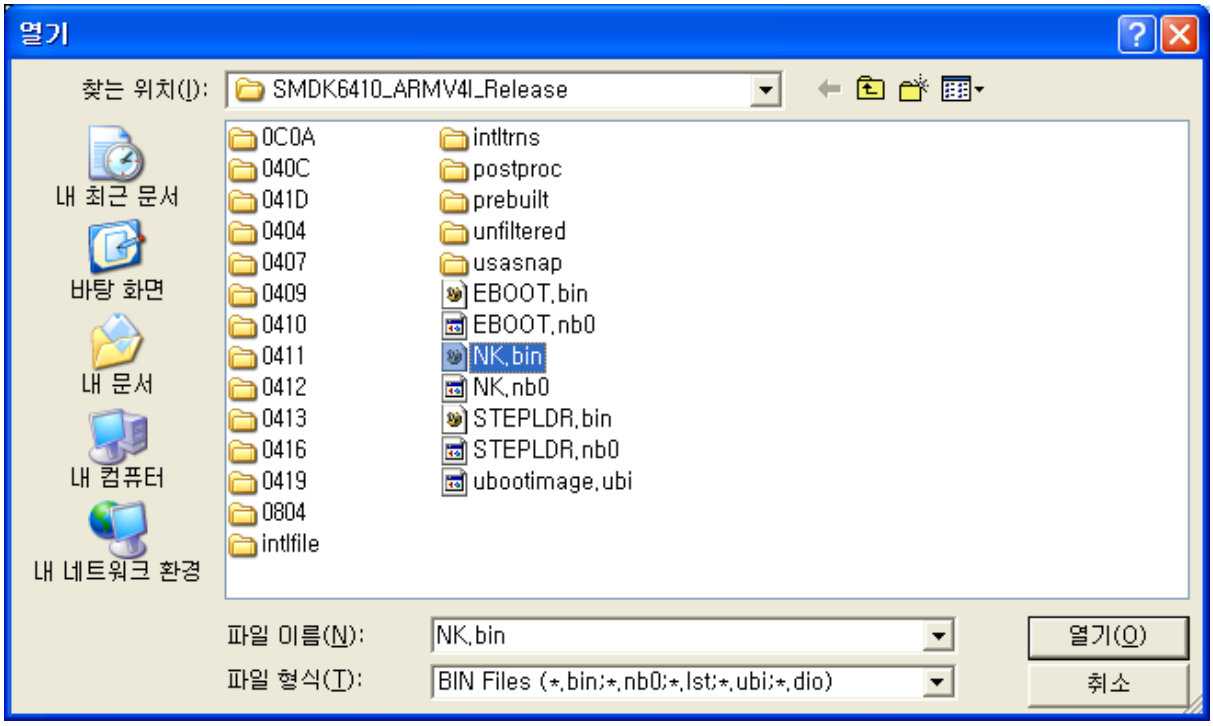

Figure 6-25 Selecting NK.bin for Download

31. You can see the following messages on the DNW window after **NK.bin** download.

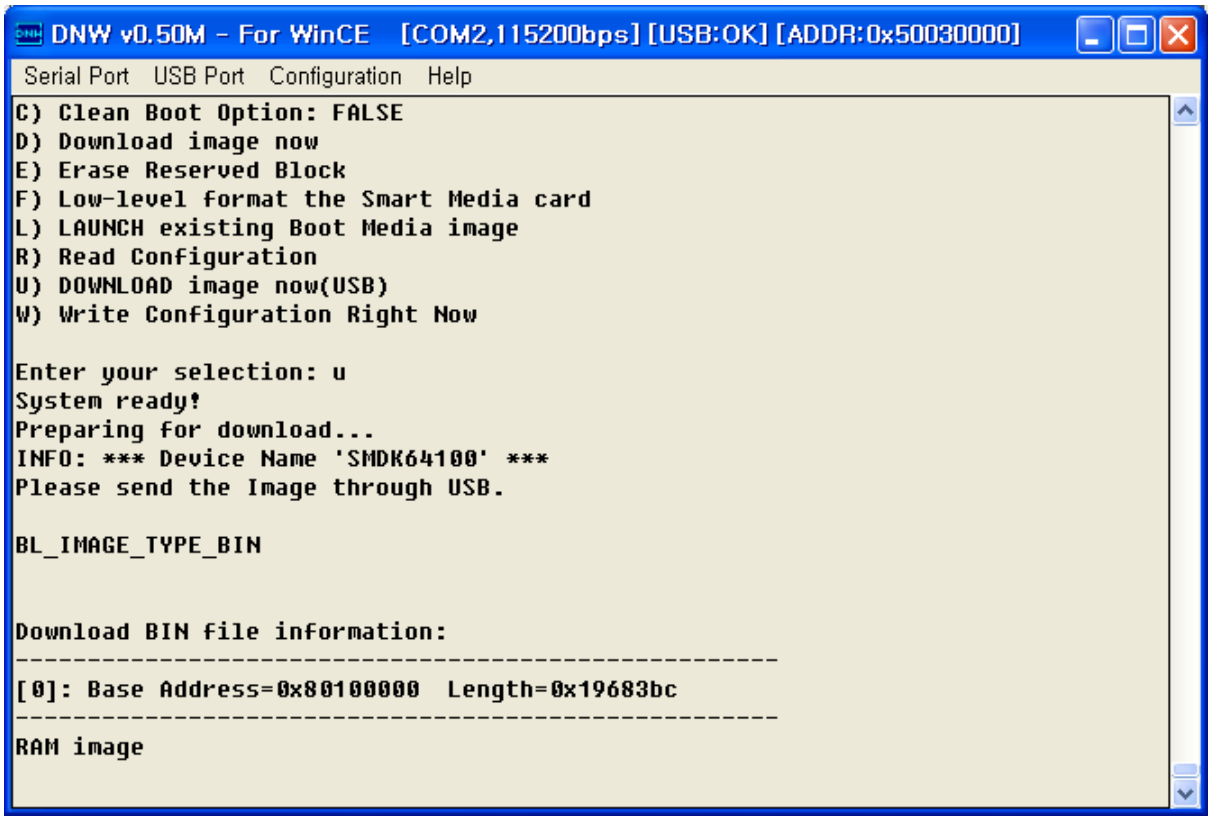

Figure 6-26 Messages via UART Port during NK.bin Download

32. After **NK.bin** download is over, **Windows Embedded CE 6.0** boots on the target Board.

33. Power **OFF** the board and Configure DIP switch CFG0 on the CPU Board and CFGB3 on the base board properly for booting from NAND Flash. (For more information about board configuration, Read SMDK6410 Board User's Manual in Document folder)

34. Power **ON** the board. You can see **Windows Embedded CE 6.0** boots on the target board.

7 Building and Running OS Image – With KITL

In this chapter, you can understand how to build, download and run the OS image with KITL.

1. To enable KITL, on the left side of **Visual Studio 2005,** You can see the Solution Explorer as below figure. And then right click on OSDesign1 and select **Properties**.

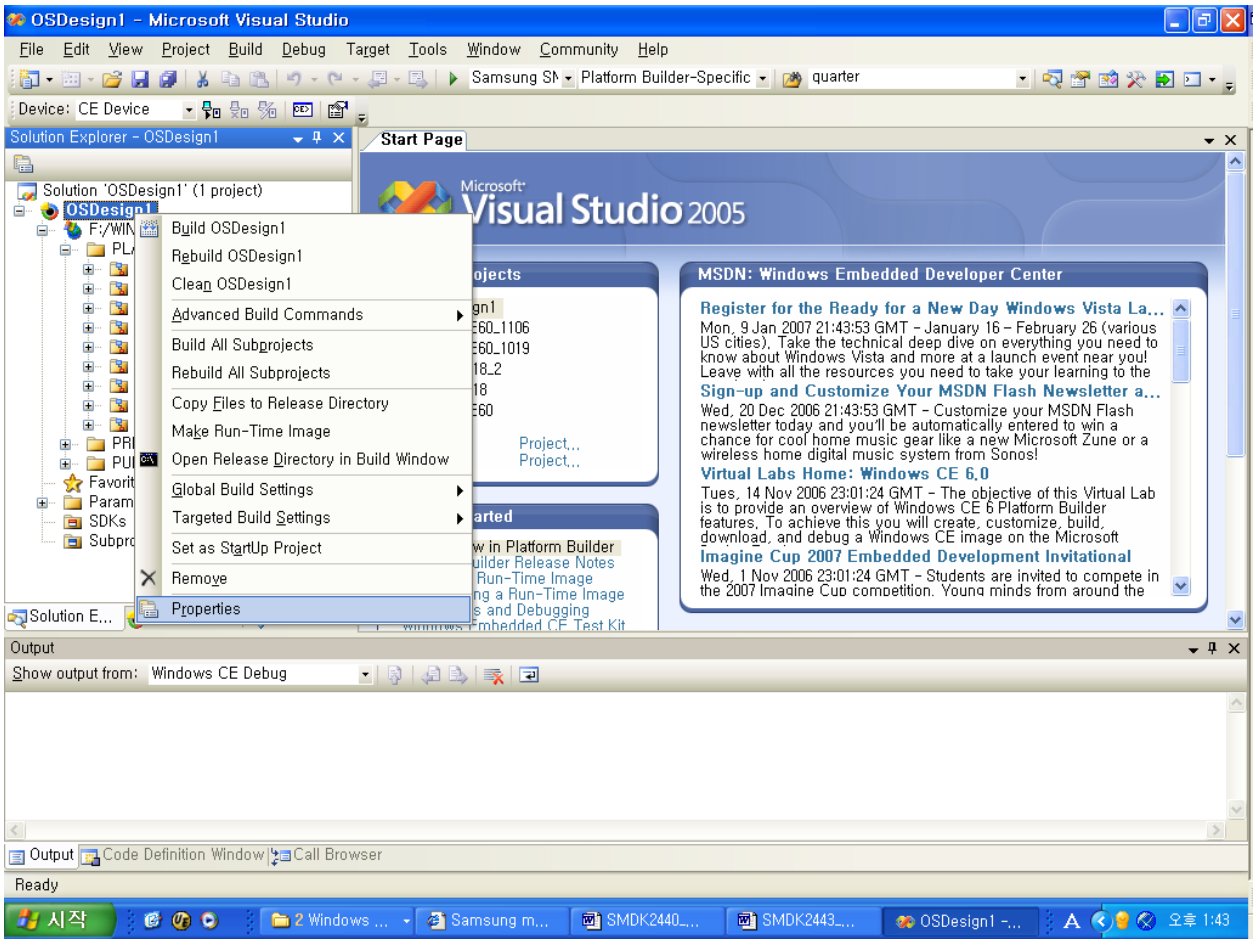

Figure 7-1 OSDesign Properties

2. OSDesign1 Property Pages winow appears on your screen. Check square **boxes Enable kernel debugger(no IMGNODEBUGGER=1)** and **Enable KITL (no IMGNOKITL=1)** in the **Build Options** and then click **OK** button.

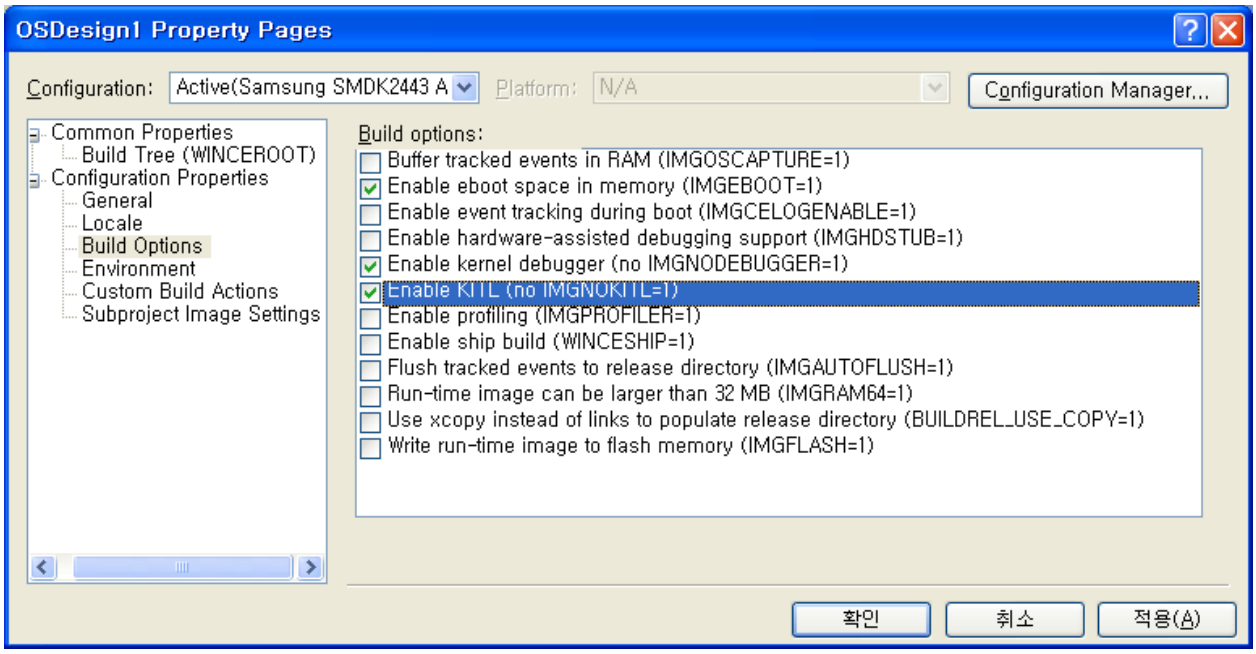

Figure 7-2 Property Pages for KITL

7.1 USB Serial KITL

1. To enable WinCE image with **USB Serial KITL,** you must do the following:

➢ **X:\WINCE600\PLATFORM\SMDK6410\smdk6410.bat** file must have the following settings.

```
set BSP_NOSERIAL=
set BSP_NOUSBFN=1

rem set BSP_KITL=NONE
rem set BSP_KITL=SERIAL_UART0
rem set BSP_KITL=SERIAL_UART1
rem set BSP_KITL=SERIAL_UART2
rem set BSP_KITL=SERIAL_UART3
set BSP_KITL=USBSERIAL
```

2. On the **Build** menu, click **Build OSDesign1** as shown in figure 7-16 to build the **Eboot** and **OS image.**

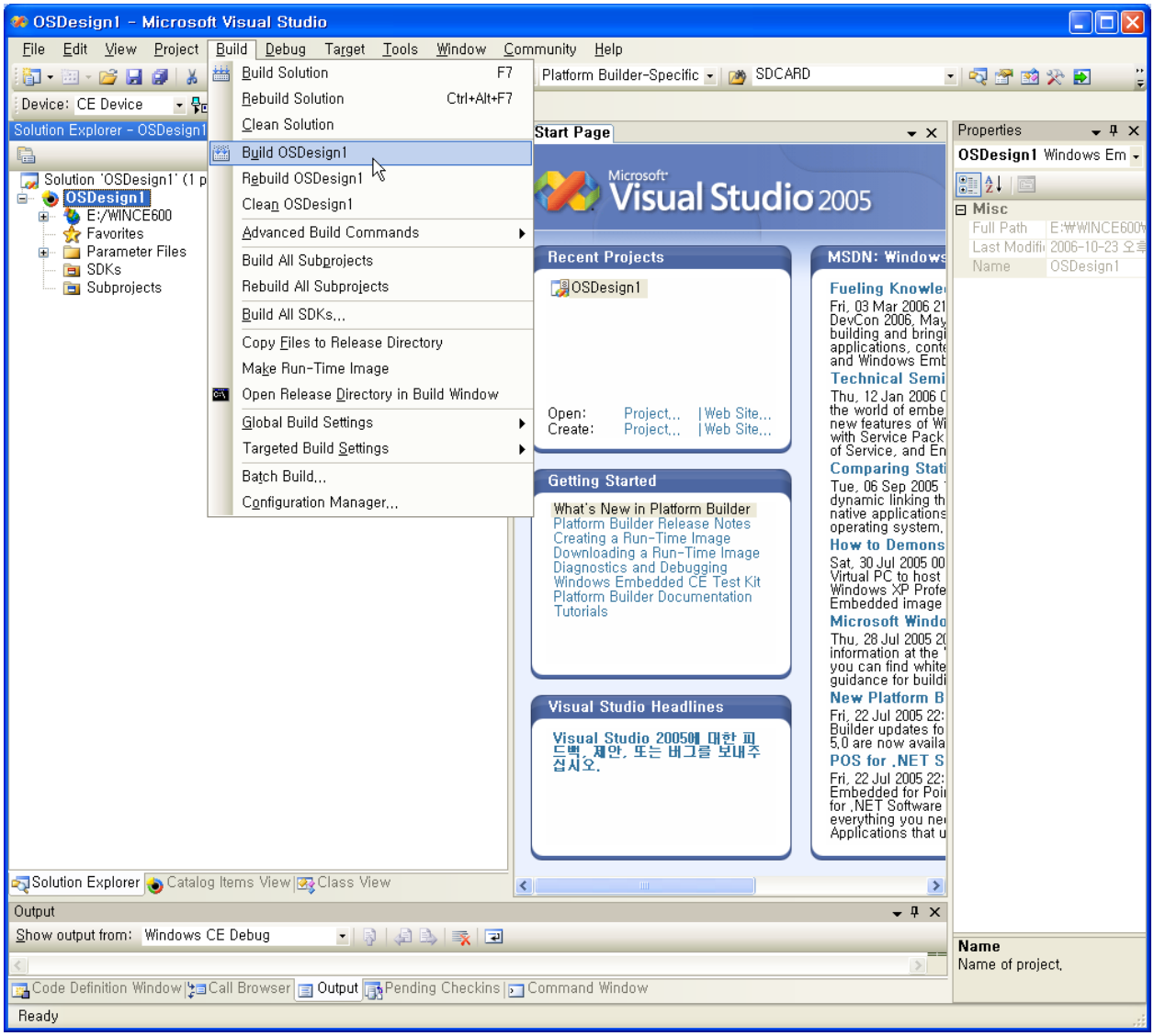

Figure 7-3 Build OSDesign

Note: Building process may take some time depending on your system capability. So, please wait for the build process to be completed. It might take around 1 hour.

3. After completion of build process, . **EBOOT.nb0, EBOOT.bin, STEPLDR.bin, NK.bin** and **NK.nb0** are now available in **X:\WINCE600\OSDesigns \[OS Design Name]\ [OS Design Name]\RelDir\smdk6410_ARMV4I_Release** directory.

4. Please install the USB Driver and DNW application on your host PC if it is not installed before.

5. Please refer to chapter 6 Fusing WinCE image to SMC via USB in this documentation. And fuse to SMC along to Steps in Chapter 6.

6. Reset the board. DNW window appears as shown in figure 7-17.

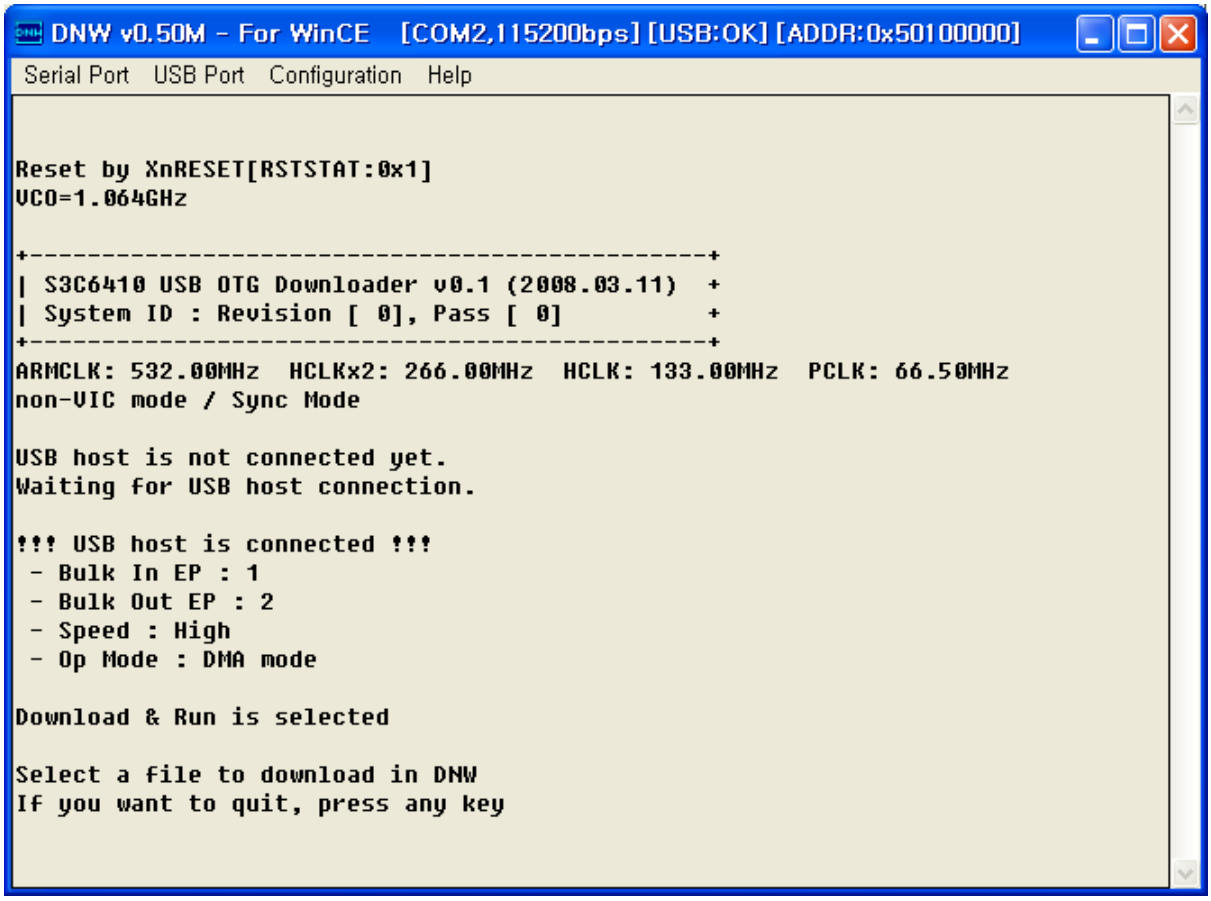

Figure 7-4 DNW Window after reset

7. On the **USB Port** menu, click **Transmit** and the following window appears on your screen. Select **EBOOT.nb0** file from **X:\WINCE600\OSDesigns\[OSDesign name] \[OSDesign name]\RelDir\smdk6410_ARMV4I _Release** directory and then click **Open** button.

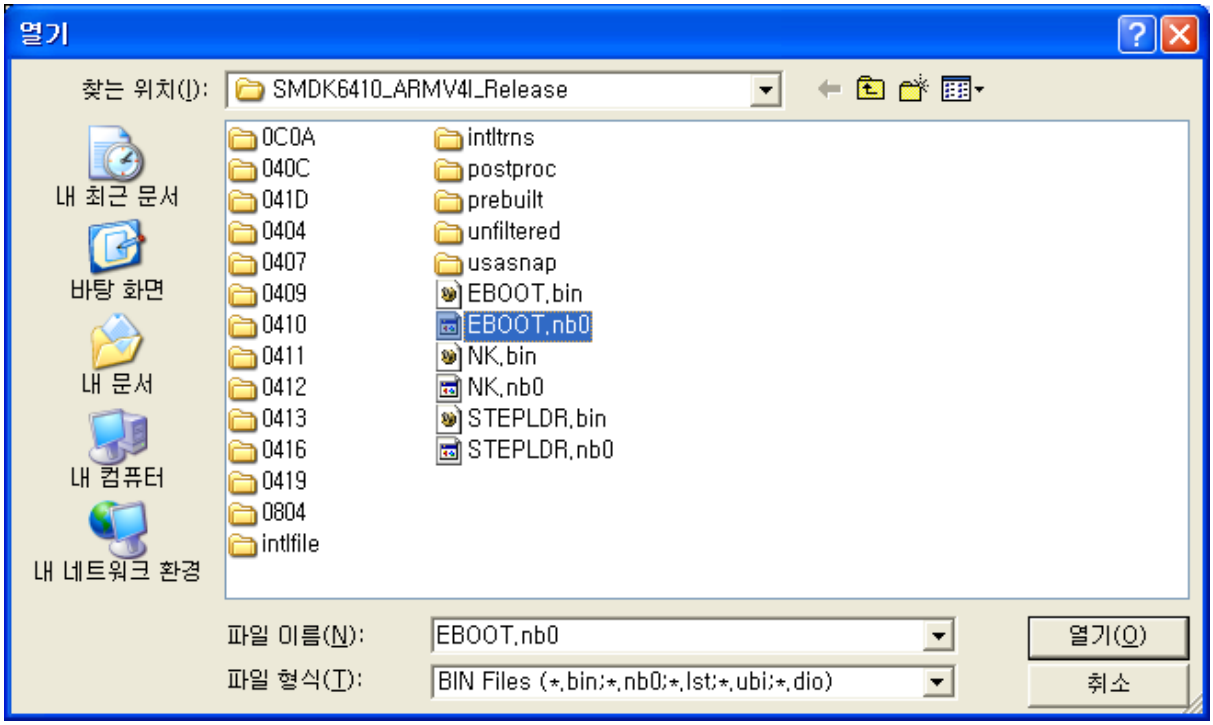

Figure 7-5 Selecting EBOOT.nb0 for Download

8. As soon as **EBOOT.nb0** download is over, the following messages appear in the DNW window**.**

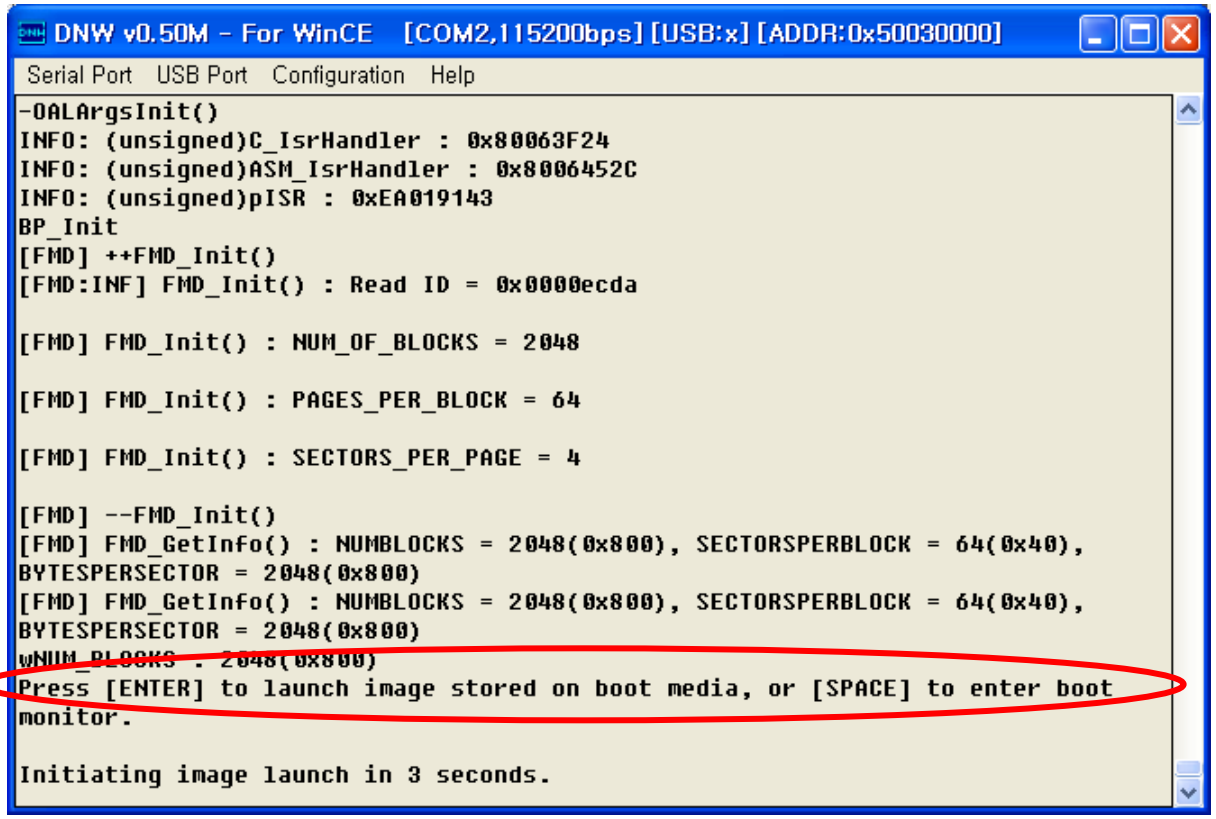

Figure 7-6 After EBOOT.nb0 Download

9. Please hit the **SPACE BAR** key to view the current Ethernet Boot Loader Configuration. Configure the Ethernet Boot Loader as follows by entering the respective options:

- Keep **KITL Configuration:** ENABLED
- Enter **[L]** to **LAUNCH existing Boot Media image**

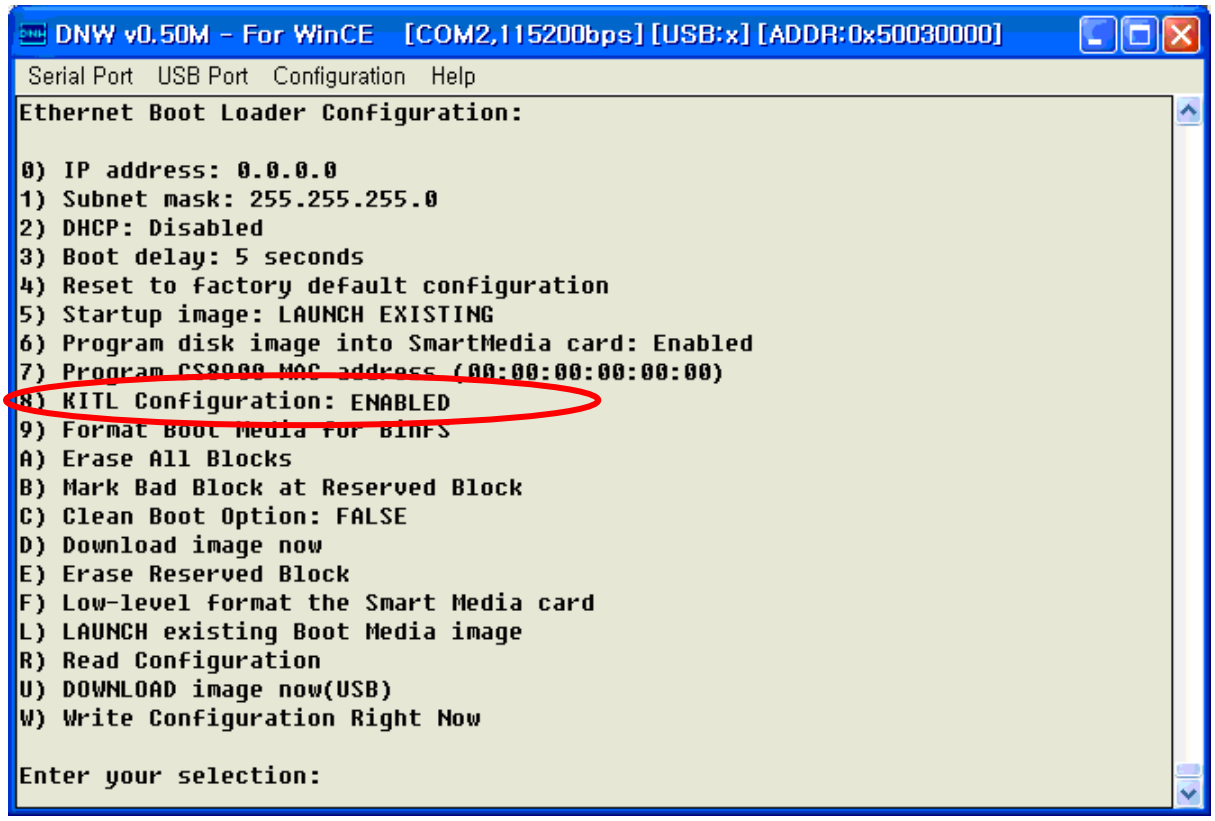

Figure 7-7 Ethernet Boot Loader Configuration

10. On the **Target** menu in the **Visual Studio 2005** window, click **Connectivity Options…** as shown below. **Target Device Connectivity Options** window appears on your screen as shown in figure 7-22.

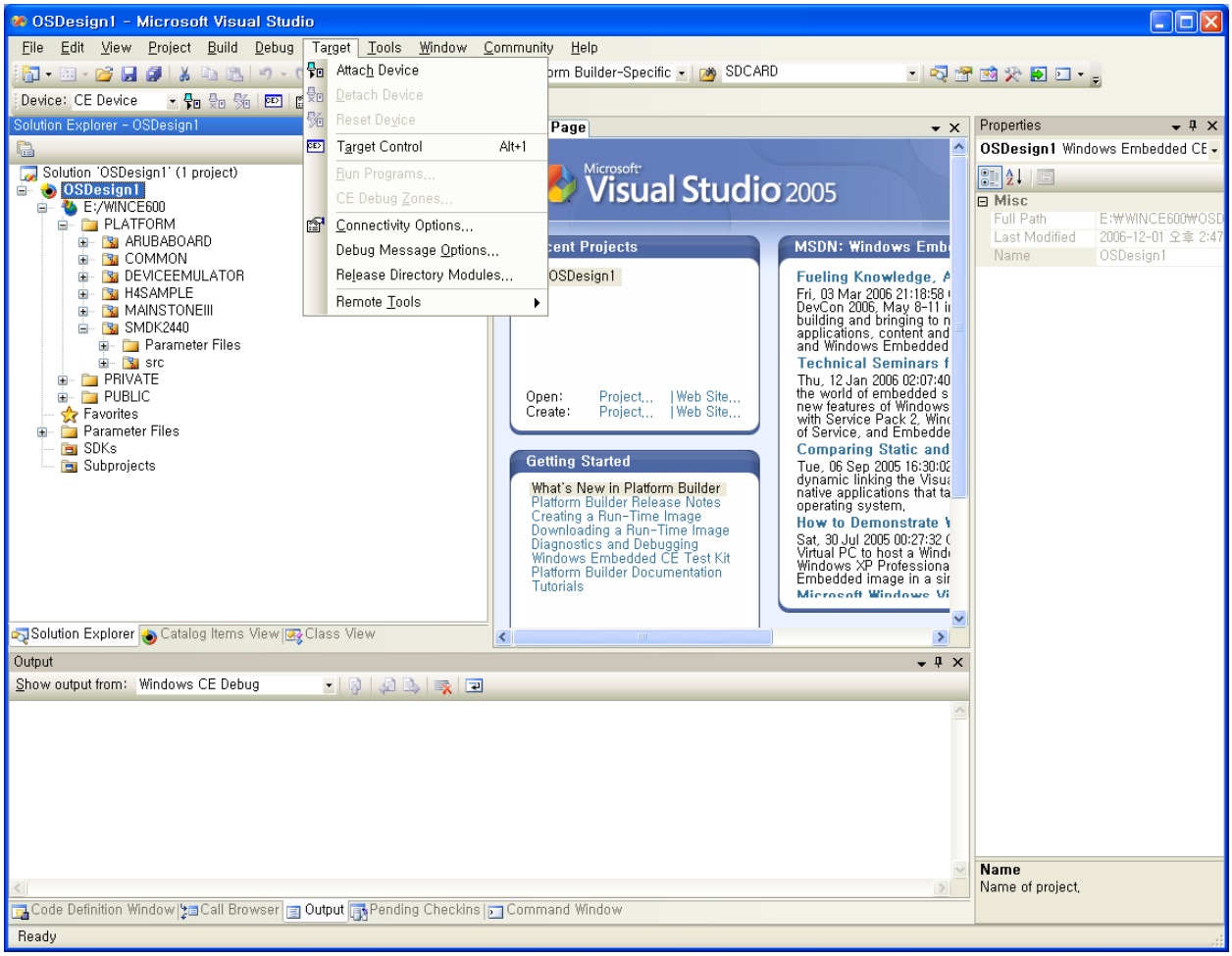

Figure 7-8 Target Connectivity Option

11. On the **Target Device Connectivity Options** window, select **USB** option from **Transport** drop down menu box.

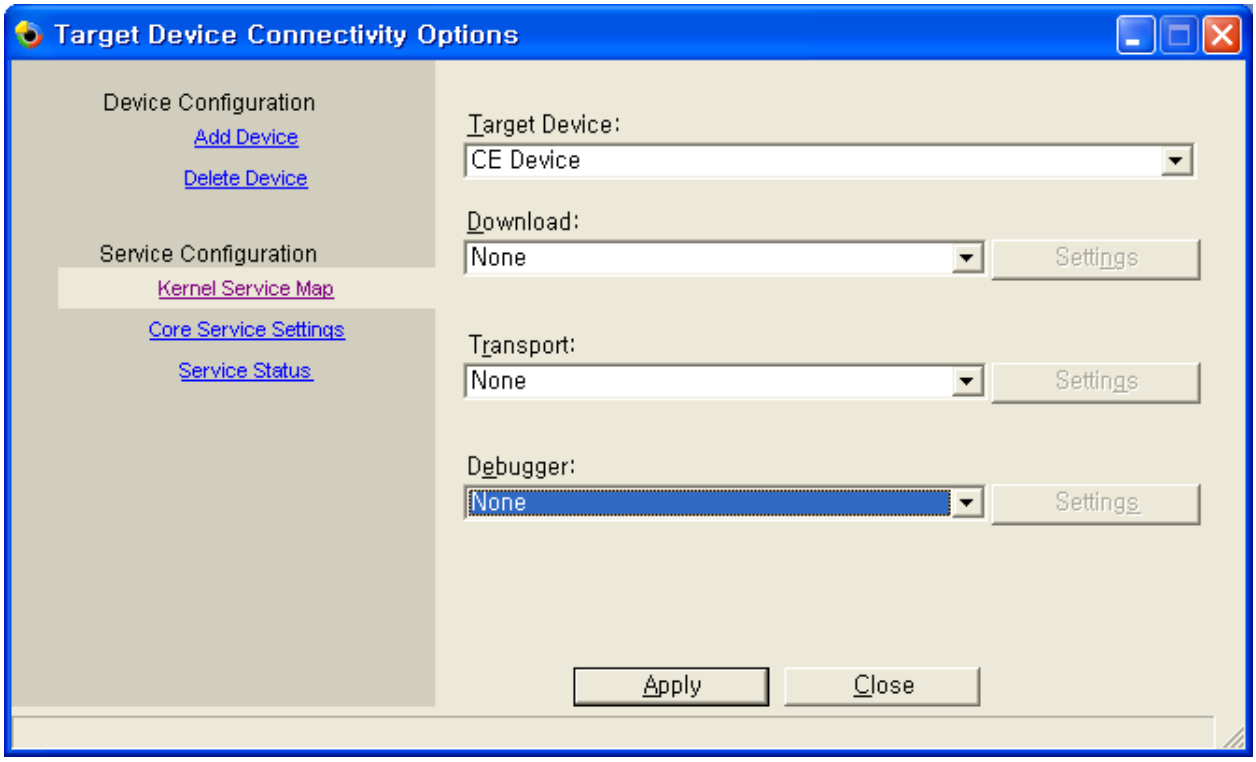

Figure 7-9 Target Device Connectivity Options Window Before Transport Select

12. Configure the **KdStub** option in **Debugger** drop down menu box.

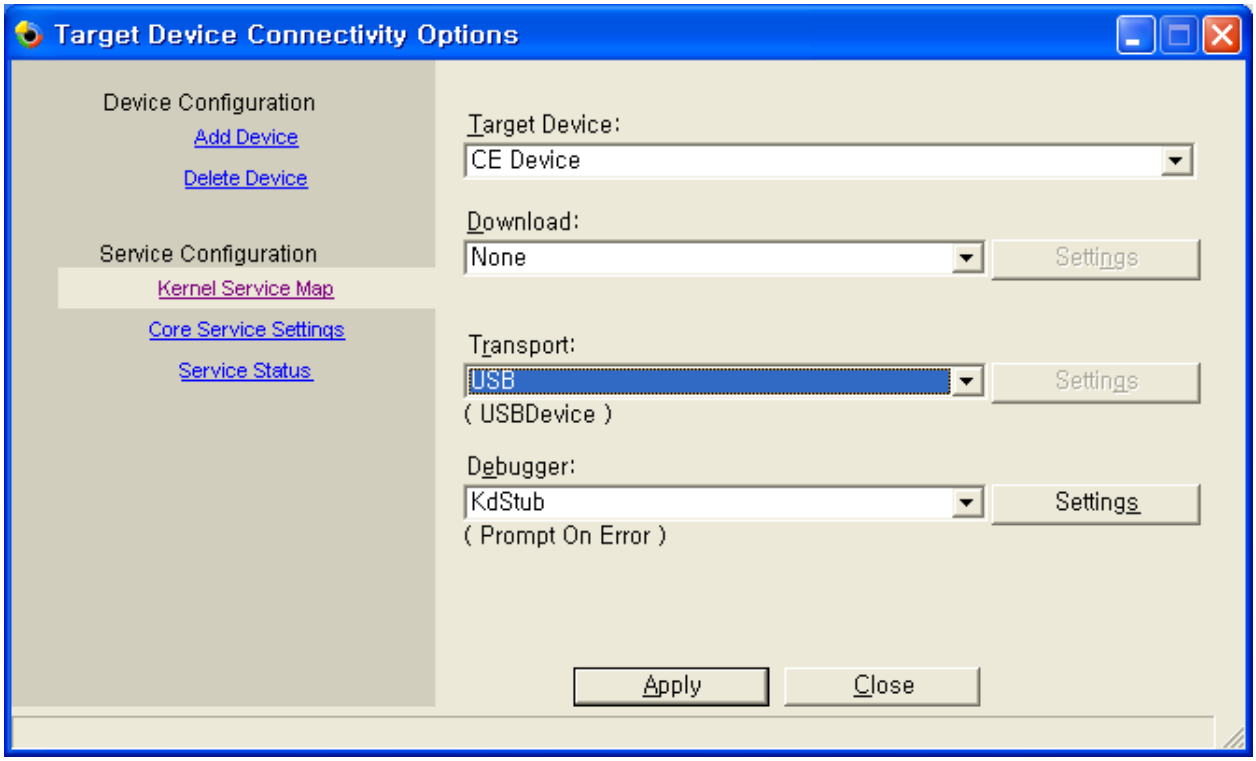

Figure 7-10 Target Device Connectivity Options Window After Transport Select

13. On the **Target** menu in **Visual Studio 2005** window, click **Attach Device** as shown below.

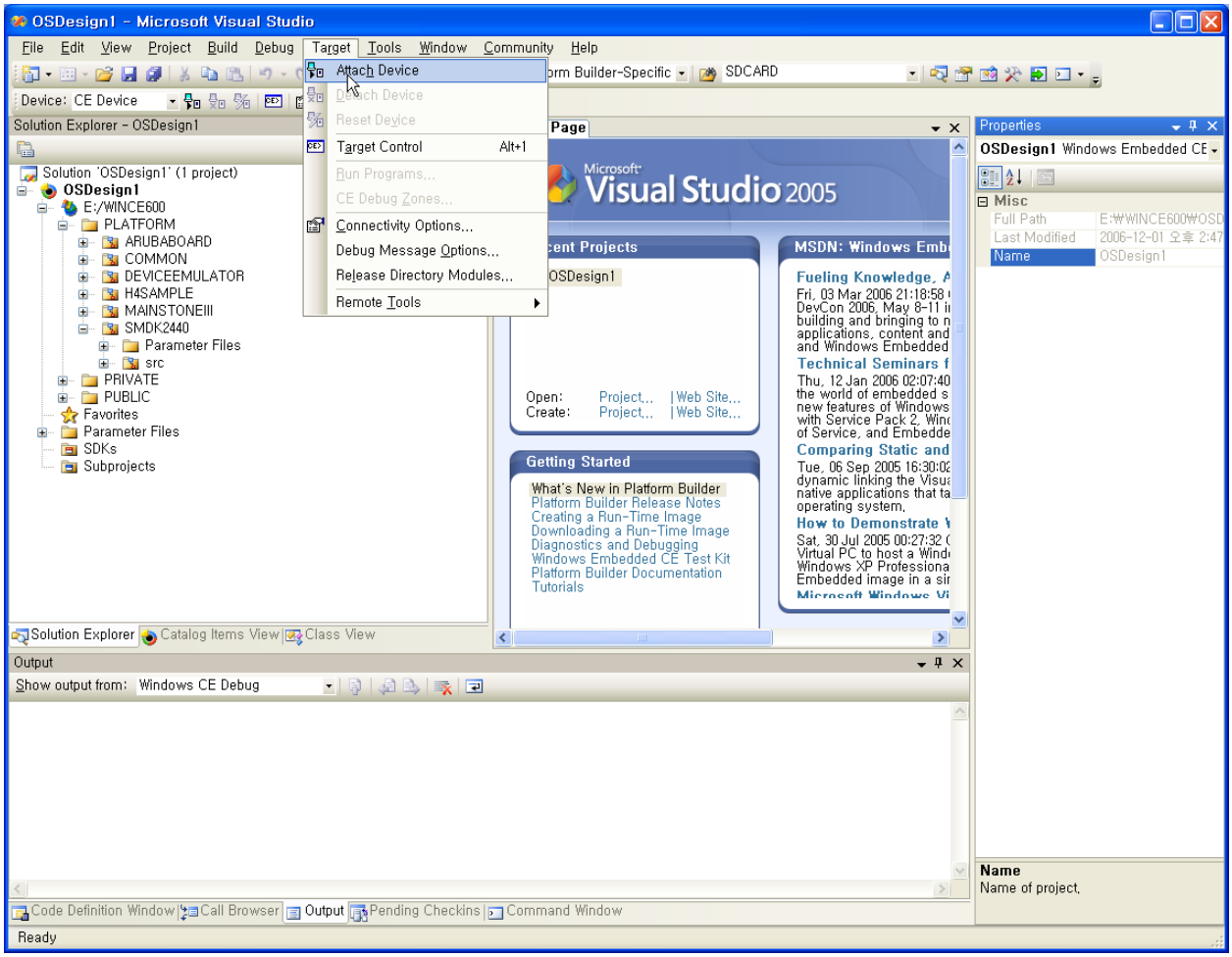

Figure 7-11 Attach Device

14. You can see the following messages on the DNW window.

Figure 7-12 Messages via UART Port

15. **Windows Embedded CE 6.0** boots on the target board and platform builder window appears as shown below.

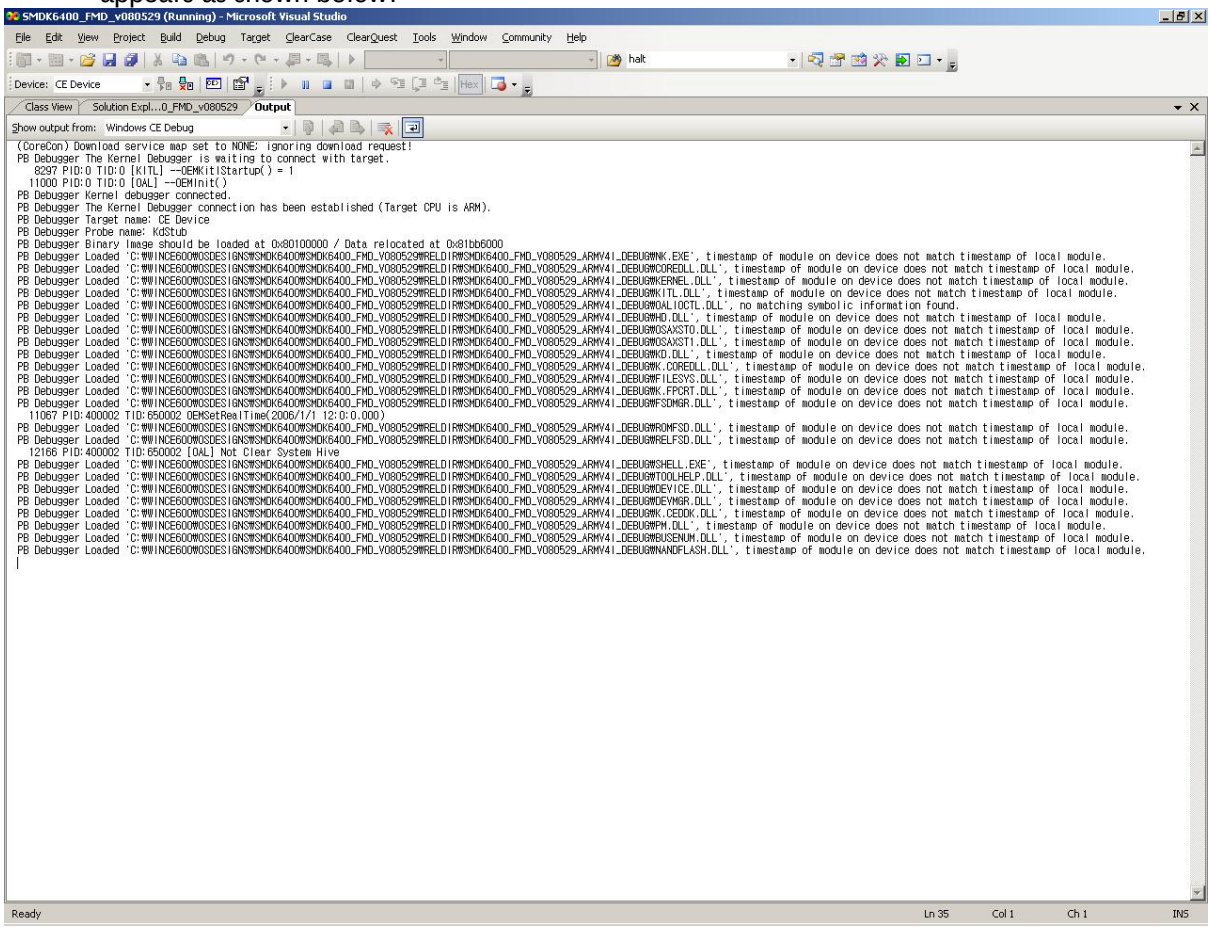

Figure 7-13 Visual Studio 2005 Window after USB Serial KITL connected

8 Appendix I – DIP Switch Settings for Booting Mode

Table 8-1 and 8-2 explains the DIP Switch configuration on the SMDK6410 board for Booting mode.

AMD NOR/SROM Boot

Description	CFG3[6:1]				
	[6]	[5]	[4]	[3]	[2]
NOR Boot (8bit Data Width)	Don't Care	OFF	**ON**	OFF	OFF
NOR Boot (16bit Data Width)	Don't Care	OFF	**ON**	OFF	**ON**

Table 8-1 DIP Switch setting for AMD Flash Boot (NOR Flash)

NAND Boot

Description	CFG3[6:1]				
	[6]	[5]	[4]	[3]	[2]
Normal NAND, 512-byte page, 3 addr. Cycle	**ON**	OFF	OFF	OFF	OFF
Normal NAND, 512-byte page, 4 addr. Cycle	**ON**	OFF	OFF	OFF	**ON**
Advanced NAND, 2K-byte page, 4 addr. Cycle	**ON**	OFF	OFF	**ON**	OFF
Advanced NAND, 2K-byte page, 5 addr. Cycle	**ON**	OFF	OFF	**ON**	**ON**

Description	CFGB3[4:1]			
	[4]	[3]	[2]	[1]
Connected NandFlash to Xm0CSn2	OFF	OFF	OFF	**ON**
Connected XD Picture Card to Xm0CSn2	OFF	OFF	**ON**	OFF

Table 8-2 DIP Switch setting for NAND Flash Boot

Note: For more information about board configuration, Check SMDK6410 Board Manual in DOC folder