

# phyCORE<sup>®</sup>-XScale/PXA270 Development Kit (KPCM-027) Loading eBoot and a WinCE Image (Adeneo)

This Application Note provides instructions on how to start-up the phyCORE-PXA270 (part # PCM-027-251EXMGRI), mounted on the PHYTEC Carrier Board (PCM-990-P3), and how to download the **eBoot** boot loader and a **WinCE** binary image.

*Please refer to the phyCORE-PXA270 and phyCORE-PXA270 Carrier Board Hardware Manual for specific information on such board-level features as jumper configuration, memory mapping, and pinout.*

## 1 System Description

### 1.1 Hardware Description

The following PHYTEC hardware components are included in the phyCORE-PXA270 Development Kit (part # KPCM-027-LCDTP) and are necessary for completing the instructions in this Application Note:

- phyCORE-PXA270 (part # PCM-027-251EXMGRI)
- Carrier Board for phyCORE-PXA270 (PCM-990-P3)
- Interface Expansion Board (PCM-985)
- LPT–JTAG Adapter (JA-001-PXA)
- AC adapter supplying 12 VDC, 3.3A, center positive
- Parallel cable
- RS-232 null-modem cable
- Cross-over Ethernet cable<sup>1</sup>
- Host-PC running Microsoft Windows

All PHYTEC hardware components are included in the phyCORE-PXA270 LCD/Touch Panel Development Kit (part # KPCM-027-LCDTP).

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<sup>1</sup>: You may also use a straight Ethernet cable connected to a hub to establish network connection between the phyCORE-PXA270 hardware and the host-PC.

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## 1.2 Software Description and Requirements

This Application Note for the phyCORE-PXA270 requires a Windows host PC, the use of a terminal program on the host-PC, such as HyperTerminal, together with other tools provided on the PHYTEC Tool CD:

- This Application Note for the phyCORE-PXA270 requires the use of a DHCP server such as the one included on the Tool CD (**pC-PXA270\WinCE\DHCP Server\dhcpsrv.exe**).
- The **JFlash** (*jflash.exe*) utility, and associated **prog\_Adeneo.bat** batch file, required to download the **eBoot** boot loader. These tools can be found in the **pC-PXA270\WinCE\JFlash\_MM** folder on the included the Tools CD.
- The **eBoot** boot loader used for downloading the WinCE image should be pre-installed on the phyCORE-PXA270. This loader enables easy download of WindowsCE images via Ethernet. This boot loader resides in the on-board Flash memory from address 0 to 0x40000.
- The Microsoft Windows CE Debug Shell, **eShell**, is a tool for downloading WinCE images with the help of the **eBoot** loader that is installed on the target hardware. **eShell** is included in the **pC-PXA270\WinCE\JFlash\_MM** folder on the phyCORE-PXA270 Tools CD.

## 2 Getting Started

### 2.1 Interfacing the phyCORE-PXA270 to a Host-PC

- Copy the **pC-PXA270** folder from the included Tools CD to your PC. In this Application Note we will use the **PHYBasic** main folder<sup>1</sup>. The remainder of this application note assumes that the **pC-PXA270** folder was copied to target PC in the following path: **C:\PHYBasic\pC-PXA270**.
- Connect the JTAG adapter's 20-pin flat-band cable to the pin connector X29 on the Carrier Board. Please make sure that pin 1 on the connector mates with pin 1 (which is marked red) on the cable.
- Connect the JTAG adapter to the LPT interface on your PC using a parallel cable.
- Connect the RJ-45 socket at X23 on the Carrier Board to the host-PC using a cross-over Ethernet cable<sup>2</sup>.
- Connect the included RS-232 null-modem cable to an available COM port on your Windows PC and DB-9 (P1) of the phyCORE Carrier Board.
- Connect the included 12 VDC power adapter to socket X1 on the Carrier Board.

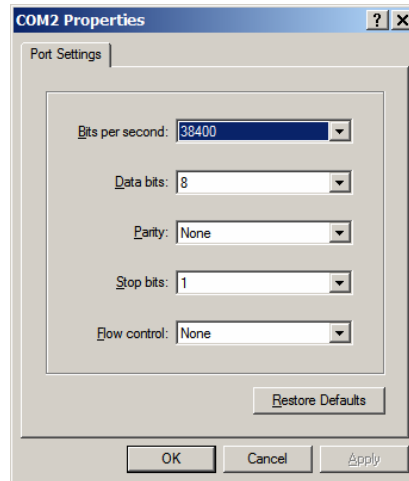
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<sup>1</sup>: Future phyCORE-PXA270 Kits will come with an automatic installation wizard using the same PHYBasic folder structure.

<sup>2</sup>: You may also use a straight Ethernet cable connected to a hub to establish network connection between the phyCORE-PXA270 hardware and the host-PC.

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- Create a new HyperTerminal session, indicate the correct COM setting for your system and set the parameters as follows: Bits per second = 38400; Data bits = 8; Parity = None; Stop bits = 1; Flow control = None.



**Note:** If eBoot is already installed on your phyCORE-PXA270, skip the following section and continue with section 2.3 and 2.4 for loading the WinCE image.

## 2.2 Downloading eBoot

- Browse to and open (double click) the file **prog\_Adeneo.bat** located in: **C:\PHYBasic\pC-PXA270\WinCE\JFlash\_MM**.

```
C:\WINDOWS\System32\cmd.exe
C:\PHYBasic\pC-PXA270\WinCE\JFlash_MM>jflashmm bulbcx EB00T_Adeneo.nb0 P 0 PAR

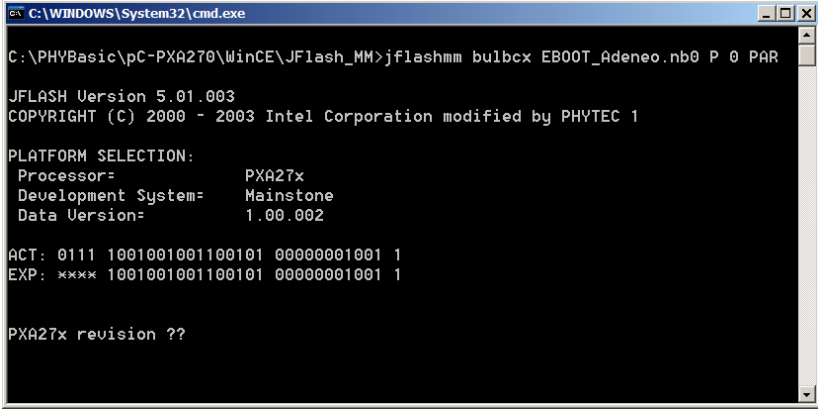
JFLASH Version 5.01.003
COPYRIGHT (C) 2000 - 2003 Intel Corporation modified by PHYTEC 1

PLATFORM SELECTION:
Processor=      PXA27x
Development System=  Mainstone
Data Version=   1.00.002

ACT: 0111 1001001001100101 00000001001 1
EXP: **** 1001001001100101 00000001001 1
```

- The batch file will invoke the **JFlash** program and show hardware recognition within the MS Command Prompt window.

- Check to make sure that the **ACT** (Actual) and **EXP** (Expected) values of the recognized PXA270 device are the same and then press <Enter>.



```
C:\WINDOWS\System32\cmd.exe
C:\PHYBasic\pC-PXA270\WinCE\JFlash_MM>jflashmm bulbcx EB00T_Adeneo.nb0 P 0 PAR

JFLASH Version 5.01.003
COPYRIGHT (C) 2000 - 2003 Intel Corporation modified by PHYTEC 1

PLATFORM SELECTION:
Processor=          PXA27x
Development System= Mainstone
Data Version=      1.00.002

ACT: 0111 1001001001100101 00000001001 1
EXP: **** 1001001001100101 00000001001 1

PXA27x revision ??
```

- Press <Enter> again.

- The **JFlash** utility will automatically recognize the Flash type installed on the phyCORE-PXA270. Enter "y" to skip programming of the last 43 percent of the image area.

```
C:\WINDOWS\System32\cmd.exe
C:\PHYBasic\pC-PXA270\WinCE\JFlash_MM>jflashmm bulbcx EB00T_Adeneo.nb0 P 0 PAR

JFLASH Version 5.01.003
COPYRIGHT (C) 2000 - 2003 Intel Corporation modified by PHYTEC 1

PLATFORM SELECTION:
Processor=          PXA27x
Development System= Mainstone
Data Version=      1.00.002

ACT: 0111 1001001001100101 00000001001 1
EXP: **** 1001001001100101 00000001001 1

PXA27x revision ??

Found flash type: 28F128J3A
The last 43 percent of image file is all zeros
Would you like to save time by not programming that area? [y/n]:
```

- **eBoot** download will take approximately 2-3 minutes, when complete the command window will close.

```
C:\WINDOWS\System32\cmd.exe
C:\PHYBasic\pC-PXA270\WinCE\JFlash_MM>jflashmm bulbcx EB00T_Adeneo.nb0 P 0 PAR

JFLASH Version 5.01.003
COPYRIGHT (C) 2000 - 2003 Intel Corporation modified by PHYTEC 1

PLATFORM SELECTION:
Processor=          PXA27x
Development System= Mainstone
Data Version=      1.00.002

ACT: 0111 1001001001100101 00000001001 1
EXP: **** 1001001001100101 00000001001 1

PXA27x revision ??

Found flash type: 28F128J3A
The last 43 percent of image file is all zeros
Would you like to save time by not programming that area? [y/n]: y
Erasing block at address 0
Starting programming
Using BUFFER programming mode...
Writing flash at hex address 7F80, 43.59% done
```

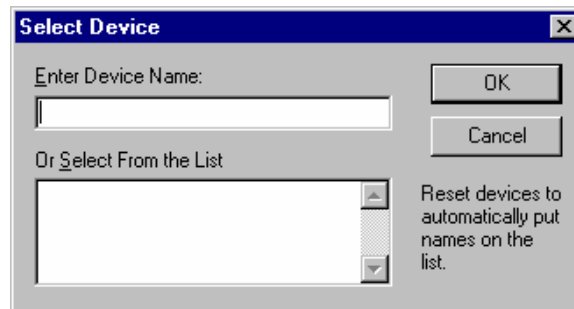
- Upon successful download of the **eBoot** loader, you may see several verify errors. These errors may be caused by possible timing issues with the **JFlash** utility and may be ignored. The command prompt window will close automatically when the download is complete.

The **eBoot** loader has now been successfully downloaded and resides in the phyCORE-PXA270 on-board Flash memory.



## 2.4 Downloading the WinCE Image

- Start **eShell** by double-clicking on the **eshell.exe** located in: **C:\pC-PXA270WinCE\Flash\_MM**.
- The *Select Device* dialog box will appear on the screen.



- Open the HyperTerminal session created in *section 2.1*.
- Reset the phyCORE-PXA270 module by disconnecting and re-connecting the power adapter to the power socket X1 on the Carrier Board<sup>1</sup>. Verify proper execution of the **eBoot** loader by looking at the HyperTerminal window messages.

```
XScale - HyperTerminal
File Edit View Call Transfer Help
[Icons]
31744
Call BP_ReadData. @=0x80100000 length=0xCE5464 (offset=0x0)
System ready!
Preparing for download...
INFO: Using device name: 'phyCore-PX0'
Download successful! Jumping to image at 0x80101000 (phINFO: DetectFlashDevice:
Flash device id is 18.
FMD_INIT : sparesize = 0 dwBaseCommand=0xbab00000 dwBaseAddress=0xbab40000 dw
NumBlocks=64 dwNumSectors=32768 Unused=0
Flash Info : dwBytesPerBlock = 262144 wSectorsPerBlock = 512 dwNumBlocks =
64 wDataBytesPerSector = 512
INFO: DetectFlashDevice: flash device id is 18.

Microsoft Windows CE Ethernet Bootloader Common Library Version 1.1 Built Aug 9
2006 17:17:36
Memory tests initialization succeeded (0xA403FF82)
Microsoft Windows CE Ethernet Bootloader 1.8 for the PXA27x-based Platform Built
Aug 21 2006
HARD reset detected
BSP ARGS initialized (0xA00FF000)

Press [ENTER] to launch image stored in flash or [SPACE] to cancel.

Initiating image launch in 1 seconds.

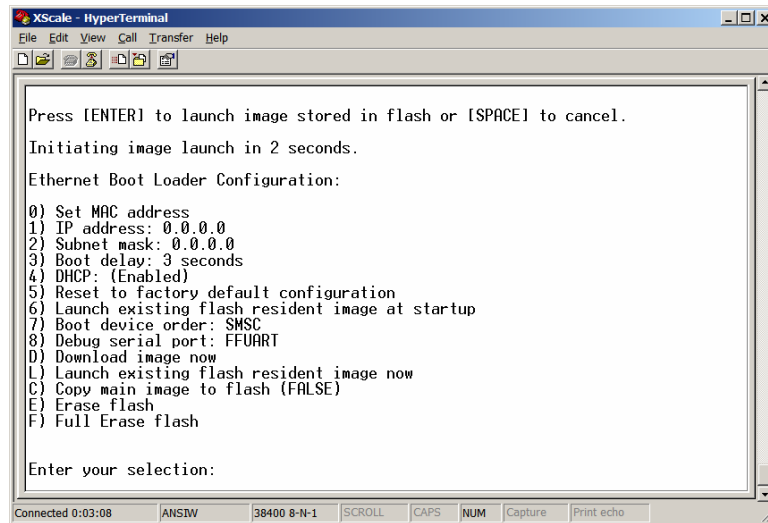
Connected 0:02:06 | ANSTW | 38400 8-N-1 | SCROLL | CAPS | NUM | Capture | Print echo
```

- Press **<SPACE>** to cancel auto launch of any WinCE image that might already be installed and enter the Boot Loader Configuration menu.

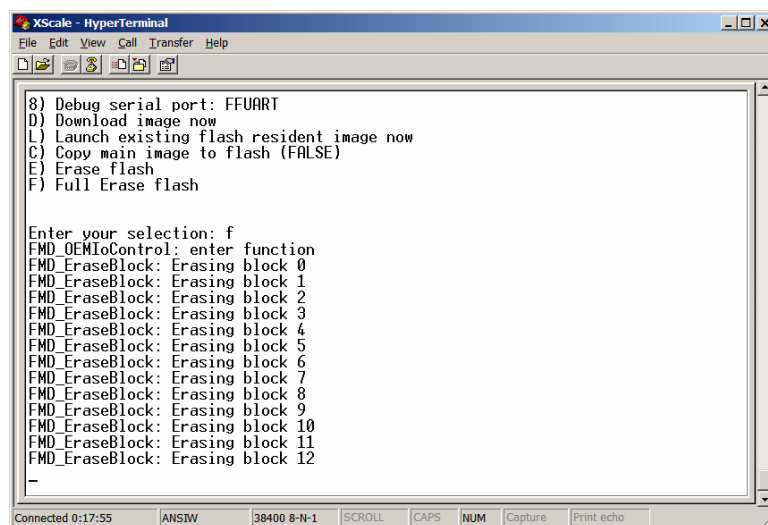
<sup>1</sup>: It is recommended to wait about 10 seconds between disconnecting the power adapter and reconnecting it.



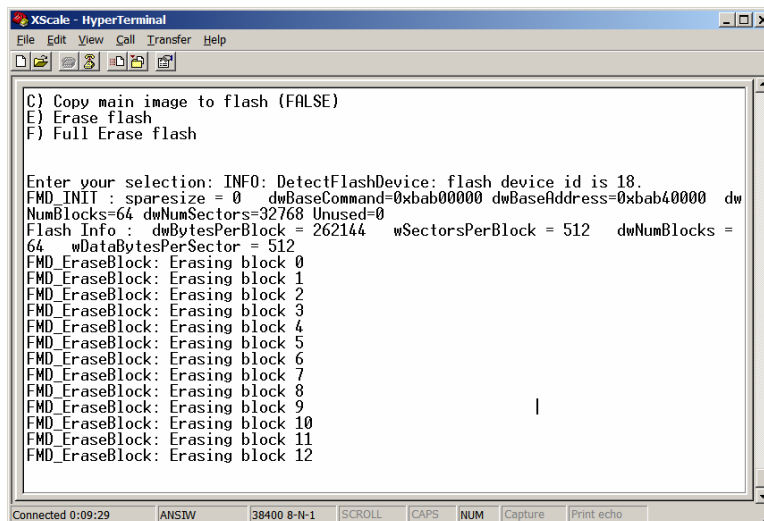
- The HyperTerminal window should now show the following messages and ask for a selection:



- At the *Enter your selection:* line type in "F" for "F) Full Erase flash". This will take a couple minutes to complete.



- After **eBoot** completes the Full Erase, reset the board by disconnecting and re-connecting power. Wait until the boot loader has finished the Flash formatting process. Several "FMD\_EraseBlock:" messages will display in the HyperTerminal window as **eBoot** formats the Flash memory blocks for the WinCE image and Flash space for file and application storage. This process will take approximately 2 minutes, during which the following messages will appear in the HyperTerminal window:

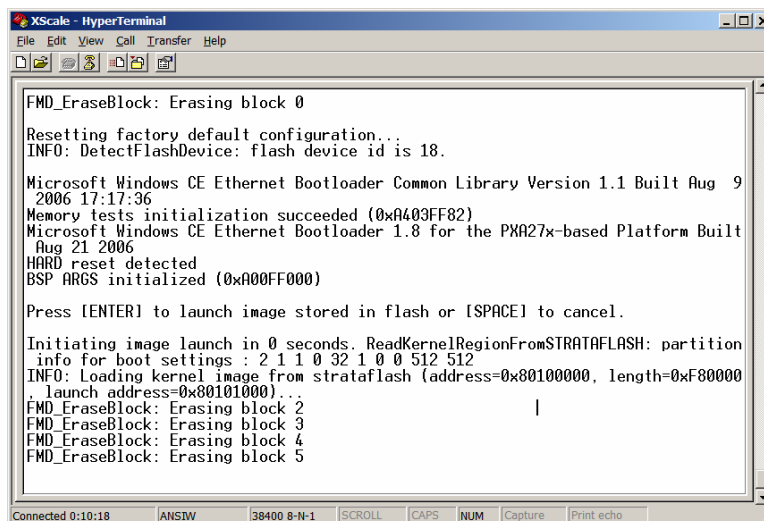


```
XScale - HyperTerminal
File Edit View Call Transfer Help

C) Copy main image to flash (FALSE)
E) Erase flash
F) Full Erase flash

Enter your selection: INFO: DetectFlashDevice: flash device id is 18.
FMD_INIT : sparesize = 0 dwBaseCommand=0xbab00000 dwBaseAddress=0xbab40000 dw
NumBlocks=64 dwNumSectors=32768 Unused=0
Flash Info : dwBytesPerBlock = 262144 wSectorsPerBlock = 512 dwNumBlocks =
64 wDataBytesPerSector = 512
FMD_EraseBlock: Erasing block 0
FMD_EraseBlock: Erasing block 1
FMD_EraseBlock: Erasing block 2
FMD_EraseBlock: Erasing block 3
FMD_EraseBlock: Erasing block 4
FMD_EraseBlock: Erasing block 5
FMD_EraseBlock: Erasing block 6
FMD_EraseBlock: Erasing block 7
FMD_EraseBlock: Erasing block 8
FMD_EraseBlock: Erasing block 9
FMD_EraseBlock: Erasing block 10
FMD_EraseBlock: Erasing block 11
FMD_EraseBlock: Erasing block 12

Connected 0:09:29 ANSIV 38400 8-N-1 SCROLL CAPS NUM Capture Print echo
```



```
XScale - HyperTerminal
File Edit View Call Transfer Help

FMD_EraseBlock: Erasing block 0

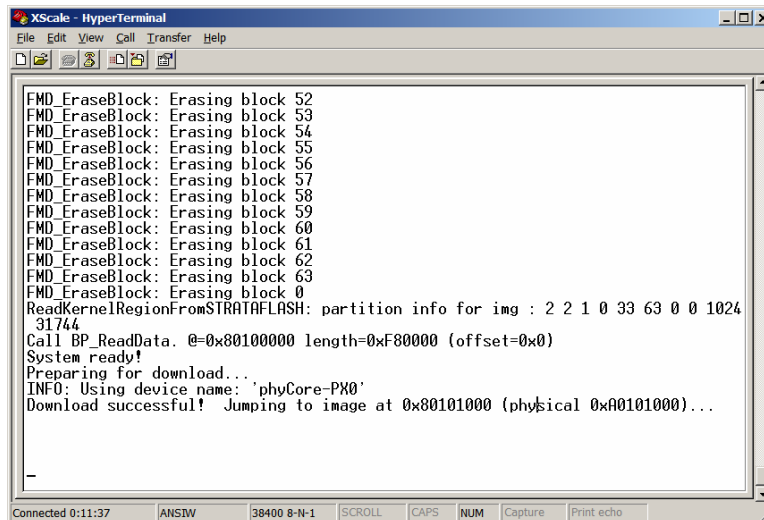
Resetting factory default configuration...
INFO: DetectFlashDevice: flash device id is 18.

Microsoft Windows CE Ethernet Bootloader Common Library Version 1.1 Built Aug 9
2006 17:17:36
Memory tests initialization succeeded (0xA603FF82)
Microsoft Windows CE Ethernet Bootloader 1.8 for the PXA27x-based Platform Built
Aug 21 2006
HARD reset detected
BSP ARGS initialized (0xA00FF000)

Press [ENTER] to launch image stored in flash or [SPACE] to cancel.

Initiating image launch in 0 seconds. ReadKernelRegionFromSTRATAFLASH: partition
info for boot settings : 2 1 1 0 32 1 0 0 512 512
INFO: Loading kernel image from strataflash (address=0x80100000, length=0xF80000
launch address=0x80101000)...
FMD_EraseBlock: Erasing block 2
FMD_EraseBlock: Erasing block 3
FMD_EraseBlock: Erasing block 4
FMD_EraseBlock: Erasing block 5

Connected 0:10:18 ANSIV 38400 8-N-1 SCROLL CAPS NUM Capture Print echo
```

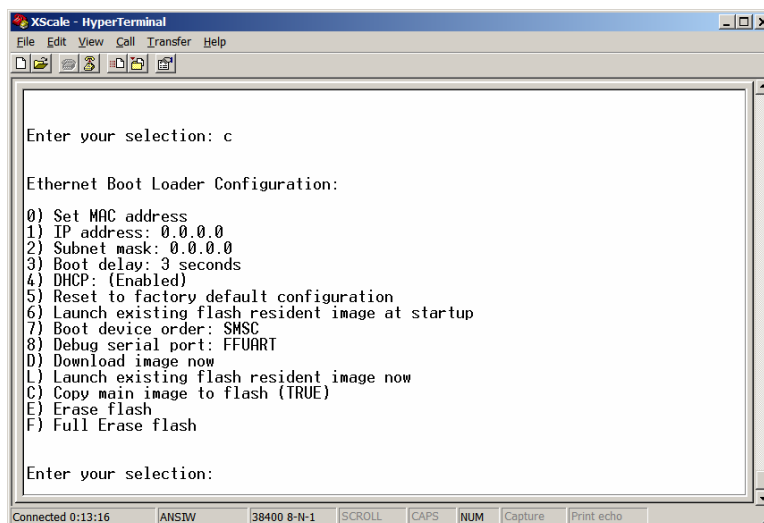


```
XScale - HyperTerminal
File Edit View Call Transfer Help
D [Icons]

FWD_EraseBlock: Erasing block 52
FWD_EraseBlock: Erasing block 53
FWD_EraseBlock: Erasing block 54
FWD_EraseBlock: Erasing block 55
FWD_EraseBlock: Erasing block 56
FWD_EraseBlock: Erasing block 57
FWD_EraseBlock: Erasing block 58
FWD_EraseBlock: Erasing block 59
FWD_EraseBlock: Erasing block 60
FWD_EraseBlock: Erasing block 61
FWD_EraseBlock: Erasing block 62
FWD_EraseBlock: Erasing block 63
FWD_EraseBlock: Erasing block 0
ReadKernelRegionFromSTRATAFLASH: partition info for img : 2 2 1 0 33 63 0 0 1024
31744
Call BP_ReadData. @=0x80100000 length=0xF80000 (offset=0x0)
System ready!
Preparing for download...
INFO: Using device name: 'phyCore-PX0'
Download successful! Jumping to image at 0x80101000 (physical 0xA0101000)...

Connected 0:11:37  ANSIV  38400 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

- When the Flash formatting is complete you will see “Download successful! Jumping to image at 0x801000 (physical 0xA0101000)...”.
- Reset the phyCORE-PXA270 module by disconnecting and re-connecting power and press <SPACE> to enter the Boot Loader Configuration menu.
- At the *Enter your selection:* line type in "C" to change the Boot Loader Configuration to show "C) Copy main image to flash (True)".



```
XScale - HyperTerminal
File Edit View Call Transfer Help
D [Icons]

Enter your selection: c

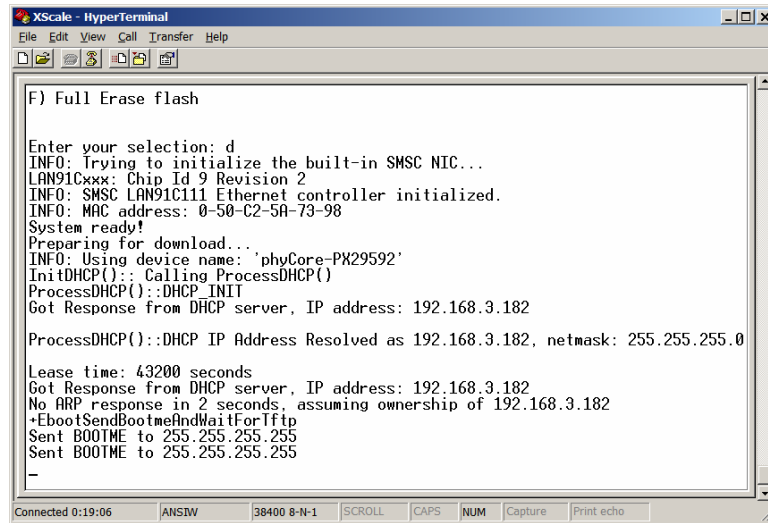
Ethernet Boot Loader Configuration:

0) Set MAC address
1) IP address: 0.0.0.0
2) Subnet mask: 0.0.0.0
3) Boot delay: 3 seconds
4) DHCP: (Enabled)
5) Reset to factory default configuration
6) Launch existing flash resident image at startup
7) Boot device order: SMSC
8) Debug serial port: FFUART
D) Download image now
L) Launch existing flash resident image now
C) Copy main image to flash (TRUE)
E) Erase flash
F) Full Erase flash

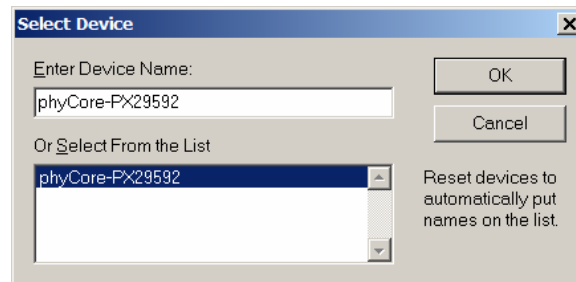
Enter your selection:

Connected 0:13:16  ANSIV  38400 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

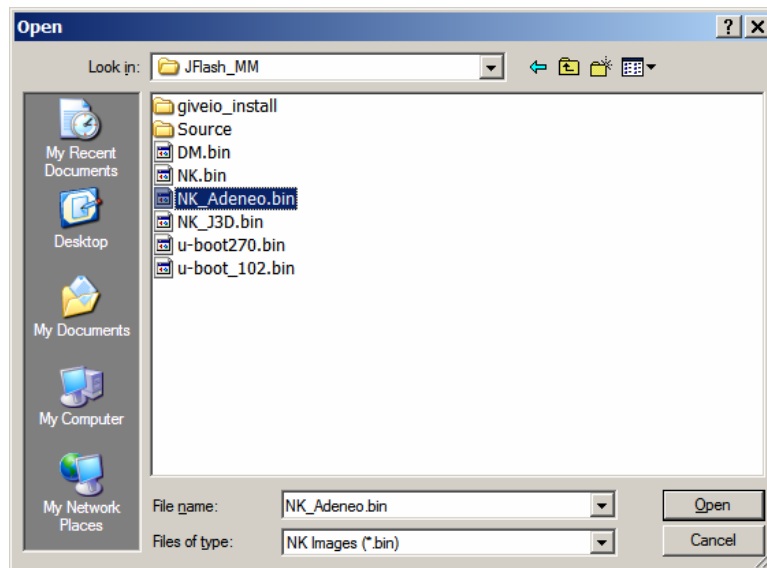
- Enter **D** to “Download image now”.



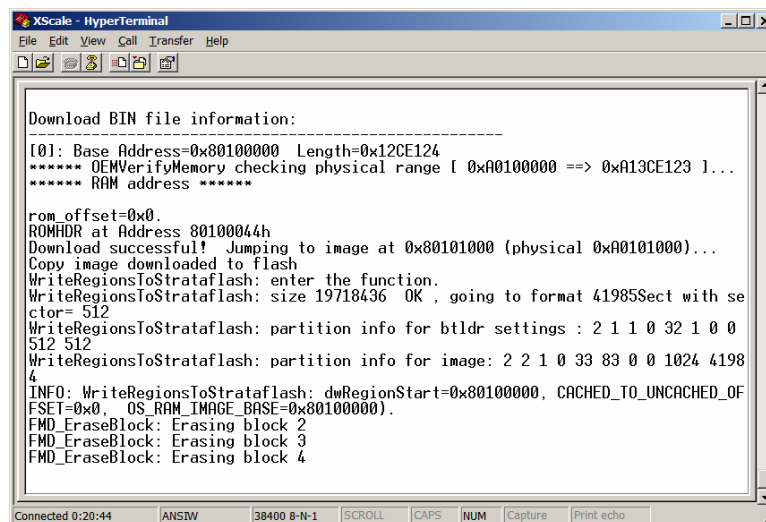
- Switch back to the "Select Device" dialog box in your **eShell** window. The name of the new module detected by the software will now appear in the dialog window. This may take several seconds to appear. Select the new name and confirm with the **OK** button.



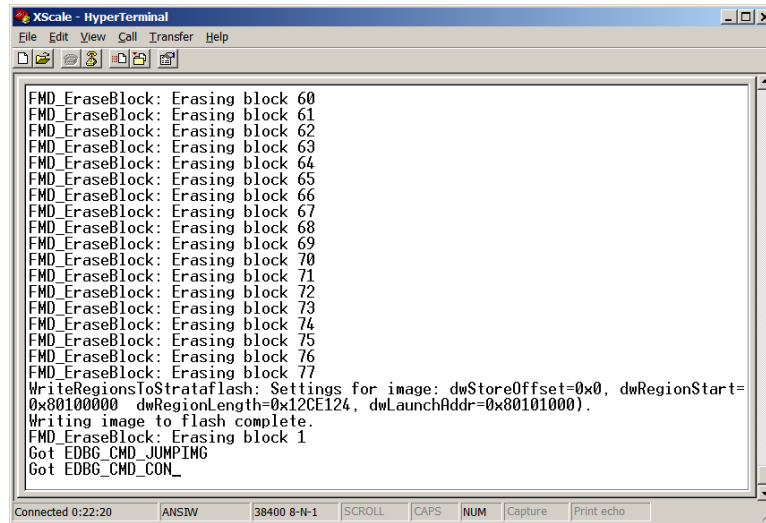
- Select **NK\_Adeneo.bin** in the following window and click **Open**. The WinCE image is located in:  
**C:\PHYBasic\pC-PXA270\WinCE\Flash\_MM**



- **eBoot** will display several “FMD\_EraseBlock:” messages while writing the WinCE image to memory. The download process takes approximately 2 minutes. The status is displayed in the HyperTerminal window.



- When complete, the following will appear:



```
XScale - HyperTerminal
File Edit View Call Transfer Help
FMD_EraseBlock: Erasing block 60
FMD_EraseBlock: Erasing block 61
FMD_EraseBlock: Erasing block 62
FMD_EraseBlock: Erasing block 63
FMD_EraseBlock: Erasing block 64
FMD_EraseBlock: Erasing block 65
FMD_EraseBlock: Erasing block 66
FMD_EraseBlock: Erasing block 67
FMD_EraseBlock: Erasing block 68
FMD_EraseBlock: Erasing block 69
FMD_EraseBlock: Erasing block 70
FMD_EraseBlock: Erasing block 71
FMD_EraseBlock: Erasing block 72
FMD_EraseBlock: Erasing block 73
FMD_EraseBlock: Erasing block 74
FMD_EraseBlock: Erasing block 75
FMD_EraseBlock: Erasing block 76
FMD_EraseBlock: Erasing block 77
WriteRegionsToStrataflash: Settings for image: dwStoreOffset=0x0, dwRegionStart=
0x80100000 dwRegionLength=0x12CE124, dwLaunchAddr=0x80101000).
Writing image to flash complete.
FMD_EraseBlock: Erasing block 1
Got EDBG_CMD_JUMPIMG
Got EDBG_CMD_CON_
Connected 0:22:20 ANSW 38400 8-N-1 SCROLL CAPS NUM Capture Print echo
```

- The "Got EDBG\_CMD\_CON" message will be displayed in HyperTerminal as shown above. It will then take about 2-3 minutes to finish reformatting the Flash and boot up. Once this is complete the WinCE 5.0 desktop will be displayed on the Sharp LCD screen mounted on the back of the phyCORE-PXA270 Carrier Board. The WinCE 5.0 boot procedure will only take this long after the initial image download. Subsequent start up will only take 15 to 20 seconds.

Congratulations! You have successfully downloaded the WinCE demo image to the phyCORE-PXA270 over Ethernet. PHYTEC also offers Full Adeneo WinCE 5.0 BSP as source or binary. *For more information please contact PHYTEC or your local PHYTEC representative.*