phyBOARD-WEGA-AM335x
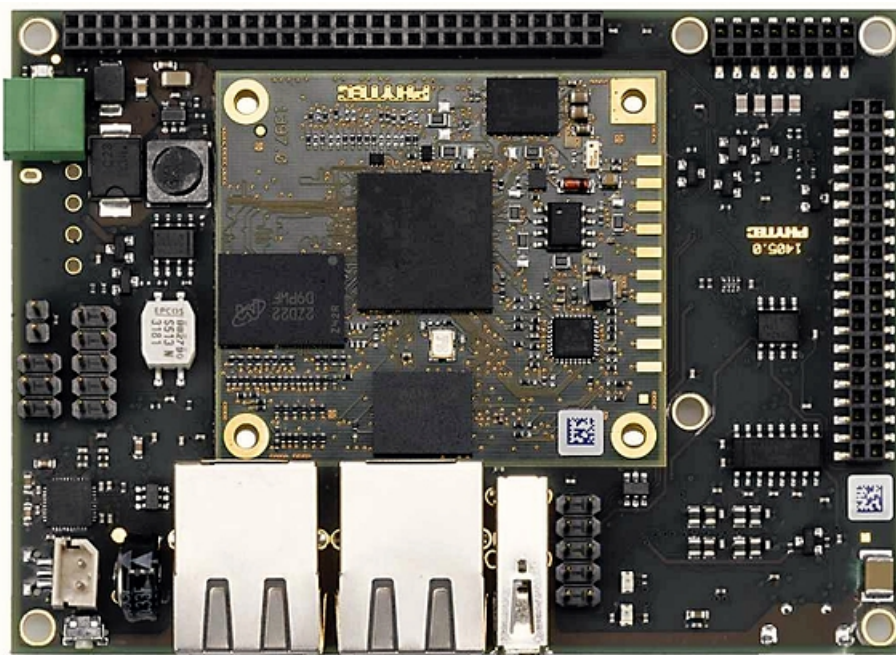
WEGA-Board_bring_up

SOM Product No: PCM-051

Carrier Board Product No: POB-002

Release 1.0
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	India	Europe	North America
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Table of Contents:

1. Introduction:

This document is prepared as reference to boot Windows Embedded Compact 7 image on WEGA board. All the three methods, i.e boot from SD-Card, Boot from NAND and Internal EMAC(Ethernet) are documented here.

Visual Studio provides various options for developing applications for Windows Embedded Compact 7, here, reference is provided to code a sample application using Visual Studio 2008 Professional Edition and then deploy on the WEGA board.

1.1. Target Setup:

Before starting with the boot process, first do necessary hardware setup for the WEGA Board i.e establish UART connection between Host Computer and device, select power adapter of +5 volts and 2 amperes to power up WEGA Board.

1.2. Host Setup:

1.2.1 Putty Console:

In order to carry boot operations on WEGA Board we need serial console to get boot messages from device. Here we are using console software known as "**Putty**".
Download "**Putty**" from the below link.

http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe

■ Go to the folder where the file is saved and double click on **putty.exe** file to start executing it.
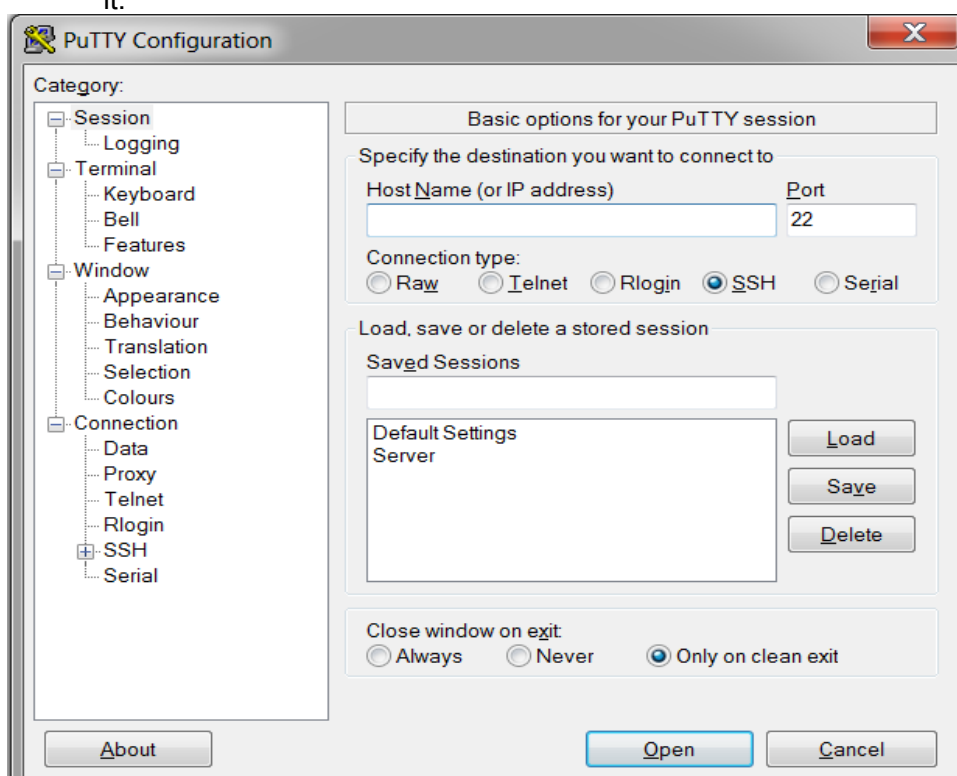
■ Click on "**Serial**" radio button to use putty as serial console.
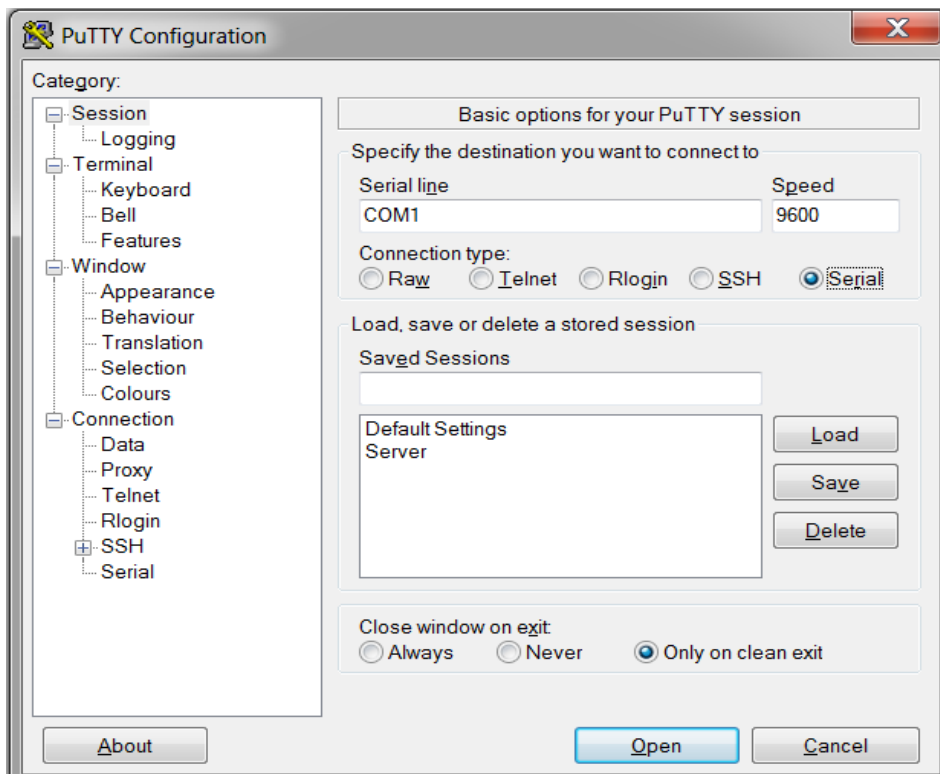
■ Modify the defualt "**COM1**" to the COM port that you are using to communicate with the device. Also, change the default baud rate to "**115200**". Here for the demo purpose the COM selection is done for "**COM10**" since it is the port currently used for communication.
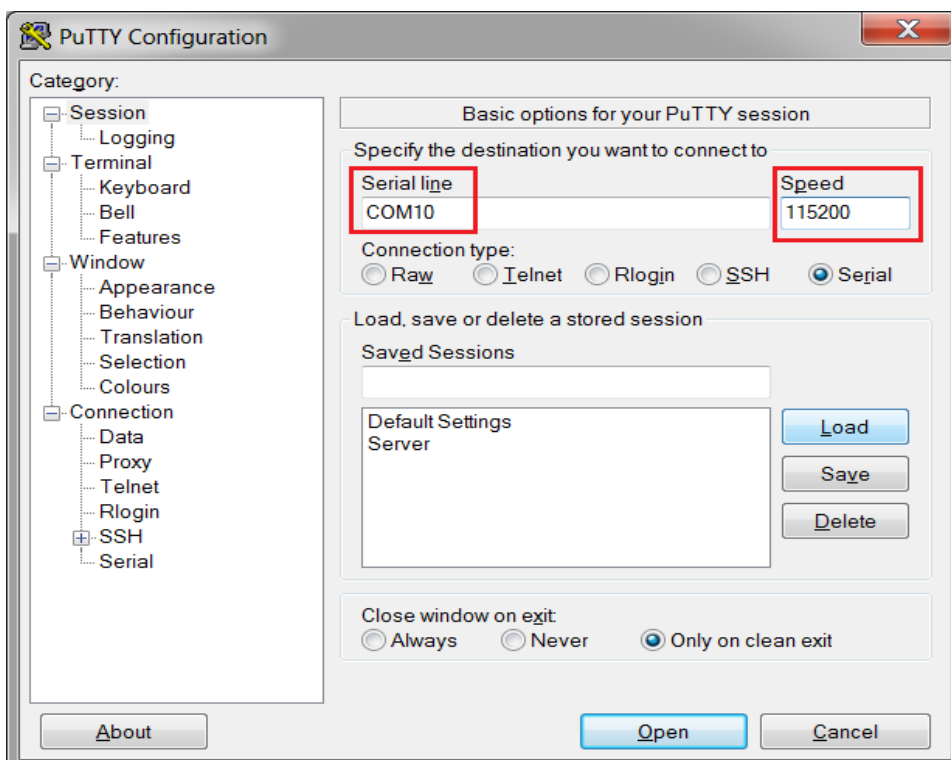
■ After the changes has been done click on button "**Open**" to open the serial console.
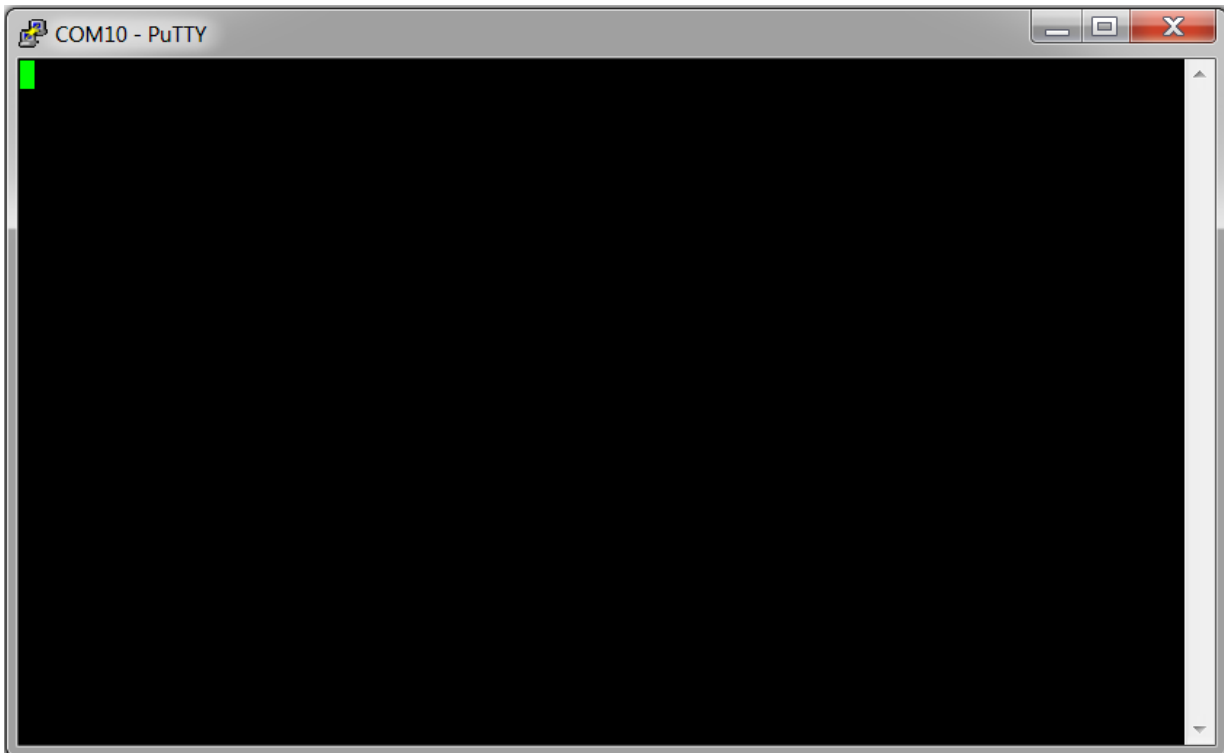
2. Boot from SD-Card:

2.1. Software Requirements:

Bootable SDCard preloaded with the following files:
- MLO
- EBOOTSD.nb0
- NK.bin
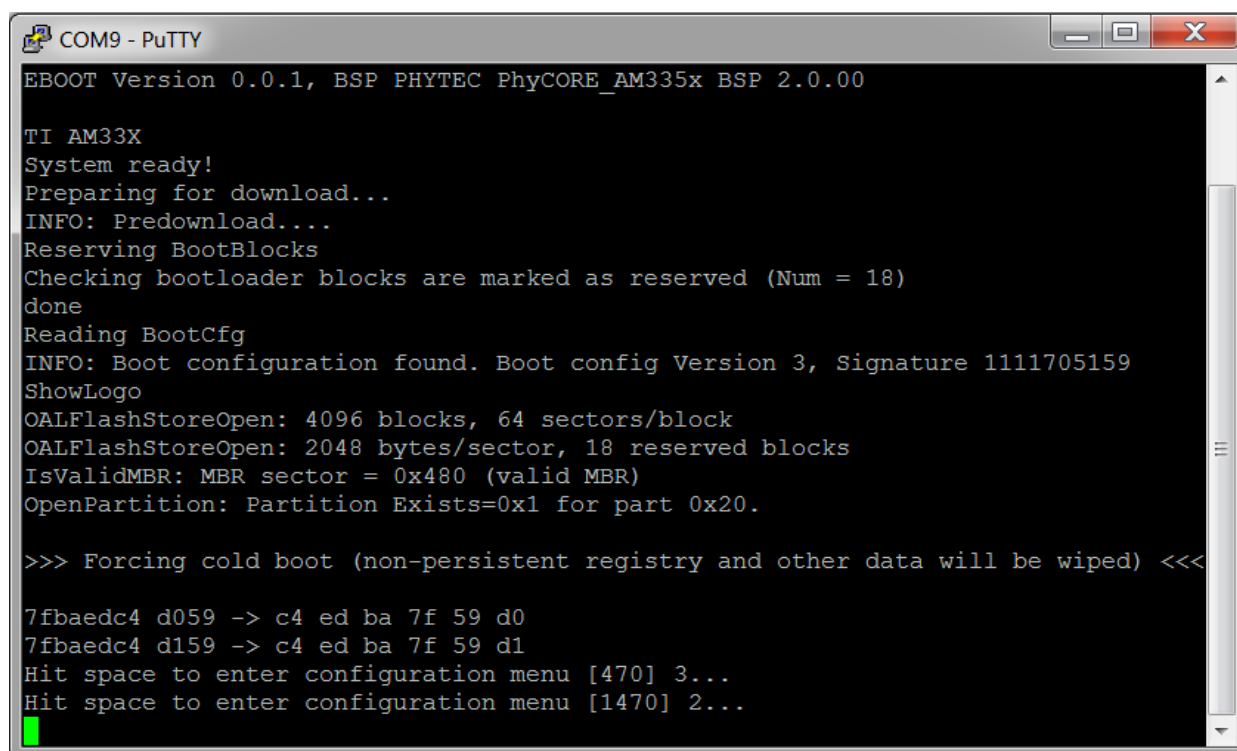
2.2. Hardware Requirements:
- WEGA Board
- Serial Cable (as communication channel between board and computer)
- Power Adapter (to power-up board)
- SDCard.

Firstly do the necessary hardware setup to carry out this operation, like setting the jumper settings (for WEGA Board pins 3-4 of jumper JP5 should be connected to boot from SDCard) and insert the SDCard in respective slot provided on the board. Thereafter plug in the power cable to the board and start with the procedure as below.

2.3. Procedure:

- Hit spacebar before the counter expires to get "**Main Menu**", if you fail to press spacebar, then press "**Reset**" button on board and repeat the same procedure again.

```
COM9 - PuTTY

EBOOT Version 0.0.1, BSP PHYTEC PhyCORE_AM335x BSP 2.0.00

TI AM33X
System ready!
Preparing for download...
INFO: Predownload....
Reserving BootBlocks
Checking bootloader blocks are marked as reserved (Num = 18)
done
Reading BootCfg
INFO: Boot configuration found. Boot config Version 3, Signature 1111705159
ShowLogo
OALFlashStoreOpen: 4096 blocks, 64 sectors/block
OALFlashStoreOpen: 2048 bytes/sector, 18 reserved blocks
IsValidMBR: MBR sector = 0x480 (valid MBR)
OpenPartition: Partition Exists=0x1 for part 0x20.

>>> Forcing cold boot (non-persistent registry and other data will be wiped) <<<

7fbaedc4 d059 -> c4 ed ba 7f 59 d0
7fbaedc4 d159 -> c4 ed ba 7f 59 d1
Hit space to enter configuration menu [470] 3...
Hit space to enter configuration menu [1470] 2...
```

■ Once you hit spacebar you will get "**Main Menu**" as shown

```
7fbaedc4 d059 -> c4 ed ba 7f 59 d0
7fbaedc4 d159 -> c4 ed ba 7f 59 d1
Hit space to enter configuration menu [470] 3...
Hit space to enter configuration menu [1470] 2...
Hit space to enter configuration menu [2470] 1...

------------------------------------------------------------------
 Main Menu
------------------------------------------------------------------
 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] Flash Management
 [6] Set Device ID
 [7] Save Settings
 [8] Enable/Disable OAL Retail Messages
 [9] Select Display Resolution
 [a] Select OPP Mode
 [b] Aux Functions
 [0] Exit and Continue

 Selection:
```

■ Before starting with the procedure it is important to enable the flashing of "**NK.bin**" image. To perform this task press "**5**" to select option "**[5] Flash Management**".

```
 [9] Select Display Resolution
 [a] Select OPP Mode
 [b] Aux Functions
 [0] Exit and Continue

 Selection: 5


------------------------------------------------------------------
 Flash Management
------------------------------------------------------------------
 [1] Show flash geometry
 [2] Dump flash sector
 [3] Erase flash
 [4] Erase block range
 [5] Reserve block range
 [6] Set bad block
 [7] Format flash
 [8] Enable flashing NK.bin
 [9] Set ECC mode
 [a] Write NAND Block
 [b] Read NAND Block
 [0] Exit and Continue

 Selection:
```

- Press "**8**" to select option "**[8] Enable flashing NK.bin**" and then press "**y**" when asked for conformation.

```
[b] Read NAND Block
[0] Exit and Continue

Selection: 8
Enable Flashing NK.bin [y/-]: y
Flashing NK.bin is enabled


------------------------------------------------------------------
Flash Management
------------------------------------------------------------------

[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Enable flashing NK.bin
[9] Set ECC mode
[a] Write NAND Block
[b] Read NAND Block
[0] Exit and Continue

Selection:
```

- Press "**2**" to select option "**[2] Select Boot Device**" option as Selection. After selecting option [2] you will get menu to select boot device as shown below.

```
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 2


------------------------------------------------------------------
Select Boot Device
------------------------------------------------------------------

[1] Internal EMAC
[2] NK from SDCard FILE
[3] NK from NAND
[0] Exit and Continue

Selection (actual Internal EMAC):
```

■ Press "**2**" to select option "**[2] NK from SDCard FILE**" to enable SDCard as booting device. On successful selection, a message "**Boot device set to NK from SDCard FILE**" will be displayed on the screen, and you will be directed back to "**Main Menu**".

```
[3] NK from NAND
[0] Exit and Continue

Selection (actual Internal EMAC): 2
Boot device set to NK from SDCard FILE


-----------------------------------------------------------------
Main Menu
-----------------------------------------------------------------
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection:
```

■ Save your settings by pressing "**7**" to select option "**[7] Save Settings**".

```
[0] Exit and Continue

Selection (actual Internal EMAC): 2
Boot device set to NK from SDCard FILE


-----------------------------------------------------------------
Main Menu
-----------------------------------------------------------------
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 7
Do you want save current settings [-/y]?
```

- Once you press "**7**" you will be asked to confirm your selection. Here press "**y**". On successful selection, a message "**Current settings have been saved**" will be displayed on the screen, and you will be directed back to "**Main Menu**".

```
COM9 - PuTTY
[0] Exit and Continue

Selection: 7
Do you want save current settings [-/y]? y
Current settings has been saved


------------------------------------------------------------
Main Menu
------------------------------------------------------------
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection:
```
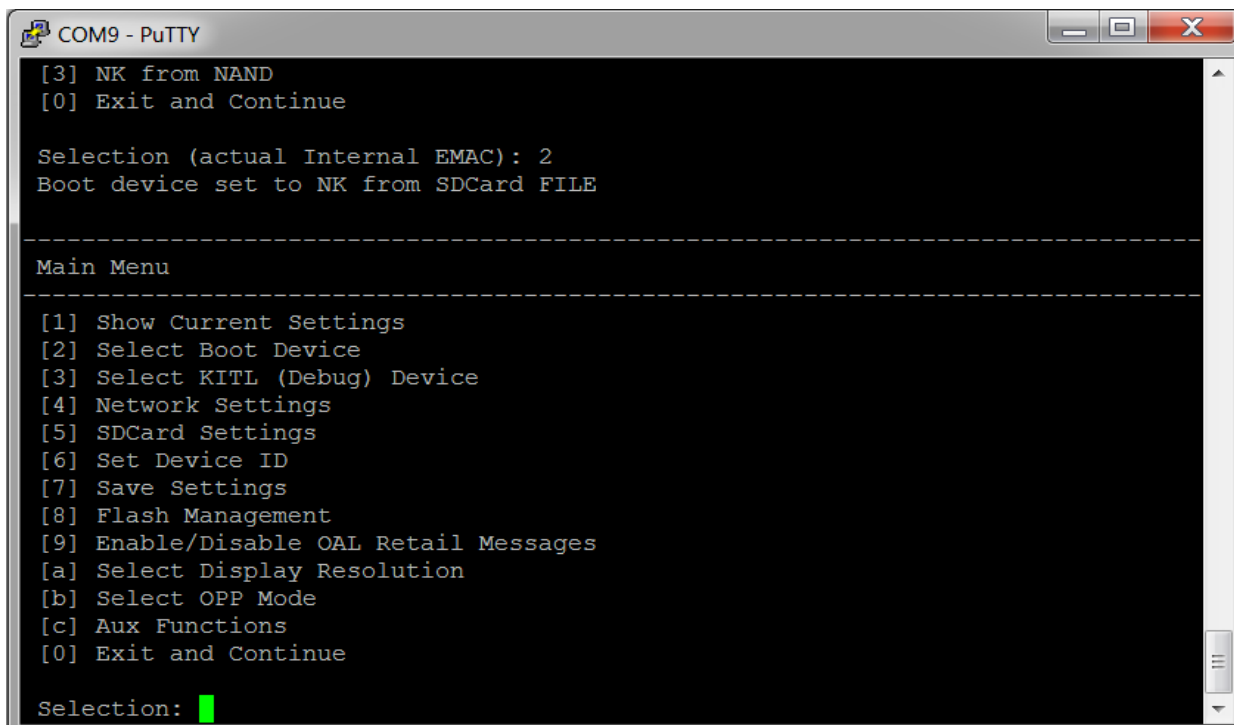
- Press "**0**" to select option "**[0] Exit and Continue**", after this the booting process will start automatically.

NOTE: *Booting process will take some time, please do not disconnect power supply or reset the board, since this will cause booting process to terminate*.

Below is shown the series of screen shots of booting process, last screenshot shows the booting process completed successfully.

```
Kernel Flags        : 0x00000000
FileSys RAM Percent : 0x80808080
Driver Glob Start   : 0x00000000
Driver Glob Length  : 0x00000000
CPU                 :     0x01c2
MiscFlags           :     0x0002
Extensions          : 0x80003020
Tracking Mem Start  : 0x00000000
Tracking Mem Length : 0x00000000
------------------------------------------------

IsValidMBR: MBR sector = 0x480 (valid MBR)
OpenPartition: Partition Exists=0x1 for part 0x20.
BP_SetDataPointer at 0x5596974
BP_SetDataPointer at 0x0
WriteData: Start = 0x0, Length = 0x5596974.
NK image written
ROMHDR at Address C0002044h

Load NK image from flash memory
IsValidMBR: MBR sector = 0x480 (valid MBR)
OpenPartition: Partition Exists=0x1 for part 0x20.
BP_SetDataPointer at 0x0
```

```
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

 Selection: 0
OEMPreDownload: Filename nk.bin

BL_IMAGE_TYPE_BIN

+OEMMultiBinNotify(0x8feb24d8 -> 1)
Download file information:
--------------------------------------------------------
[0]: Address=0xc0002000  Length=0x05596974  Save=0x80002000
--------------------------------------------------------
Download file type: 6
..................................................................
..................................................................
..................................................................
..................................................................
```

```
Copy Entries Offset : 0x80986f50
Prof Symbol Length  : 0x00000000
Prof Symbol Offset  : 0x00000000
Num Files           :         226
Kernel Flags        : 0x00000000
FileSys RAM Percent : 0x80808080
Driver Glob Start   : 0x00000000
Driver Glob Length  : 0x00000000
CPU                 :      0x01c2
MiscFlags           :      0x0002
Extensions          : 0x80003020
Tracking Mem Start  : 0x00000000
Tracking Mem Length : 0x00000000
-----------------------------------------------


NK Image Loaded
Launch Windows CE image by jumping to 0x80002000...

Windows CE Kernel for ARM (Thumb Enabled)
CPU CP15 Control Register = 0xc5387f
CPU CP15 Auxiliary Control Register = 0x42
+OALTimerInit(1, 24000, 200)
--- High Performance Frequecy is 24 MHz---
```

This completes the booting process from SDCard.

3. Boot from NAND:

3.1. Software Requirements:

Bootable SDCard with the following images:
- MLO
- EBOOTSD.nb0
- XLDRNAND.bin
- EBOOTND.bin
- NK.bin

3.2. Hardware Requirements:

- WEGA Board.
- SDCard (with above mentioned files)
- Power cable (to power up the board)

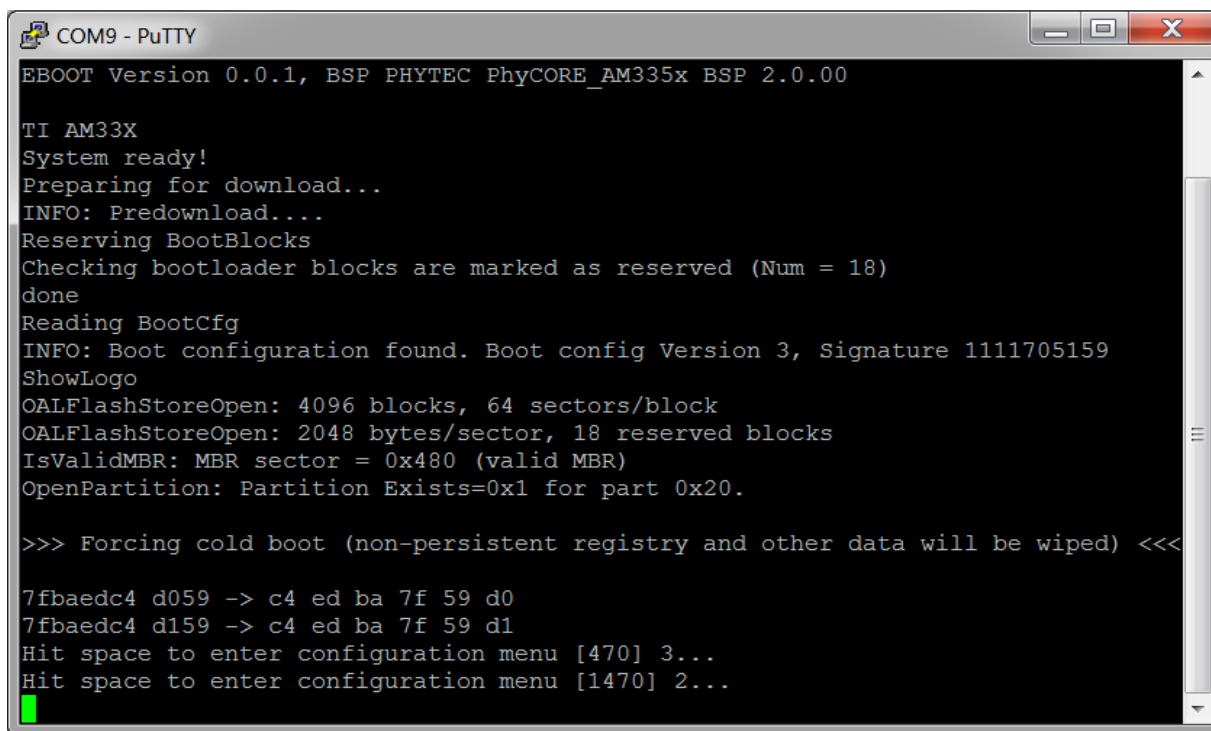This process consists of two parts, Downloading images from SDCard to NAND and then Booting from NAND.

3.3. Procedure:

3.3.1. Downloading images from SDCard to NAND:

For the first part of this process, since images from SDCard has to be downloaded in NAND, hence required setup for SDCard needs to be done (for WEGA Board short pins 3-4 of jumper JP5 and then insert SDCard in the respective slot on board.)

3.3.1.1 Download "**xldrnand.bin**":

■ Hit spacebar before the counter expires to get "**Main Menu**", if you fail to press spacebar, then press "**Reset**" button on board and repeat the same procedure again.

```
COM9 - PuTTY

EBOOT Version 0.0.1, BSP PHYTEC PhyCORE_AM335x BSP 2.0.00

TI AM33X
System ready!
Preparing for download...
INFO: Predownload....
Reserving BootBlocks
Checking bootloader blocks are marked as reserved (Num = 18)
done
Reading BootCfg
INFO: Boot configuration found. Boot config Version 3, Signature 1111705159
ShowLogo
OALFlashStoreOpen: 4096 blocks, 64 sectors/block
OALFlashStoreOpen: 2048 bytes/sector, 18 reserved blocks
IsValidMBR: MBR sector = 0x480 (valid MBR)
OpenPartition: Partition Exists=0x1 for part 0x20.

>>> Forcing cold boot (non-persistent registry and other data will be wiped) <<<

7fbaedc4 d059 -> c4 ed ba 7f 59 d0
7fbaedc4 d159 -> c4 ed ba 7f 59 d1
Hit space to enter configuration menu [470] 3...
Hit space to enter configuration menu [1470] 2...
```
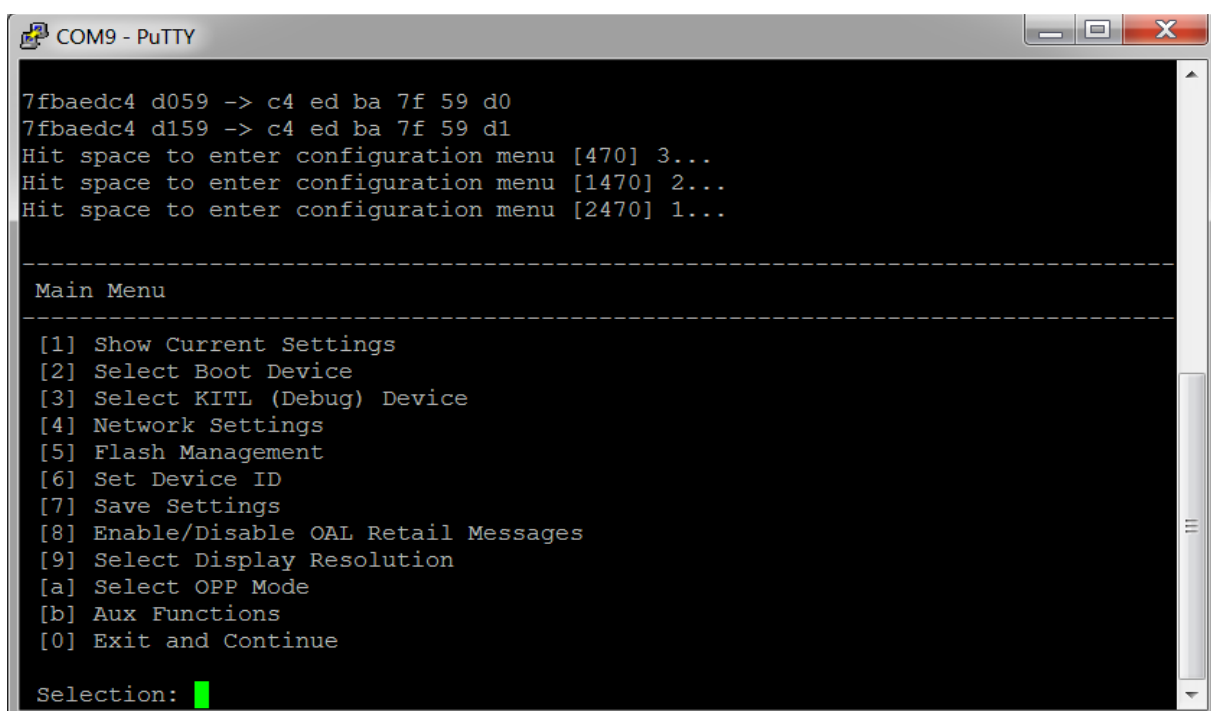
■ Once you hit spacebar you will get "**Main Menu**" as shown.

```
COM9 - PuTTY

7fbaedc4 d059 -> c4 ed ba 7f 59 d0
7fbaedc4 d159 -> c4 ed ba 7f 59 d1
Hit space to enter configuration menu [470] 3...
Hit space to enter configuration menu [1470] 2...
Hit space to enter configuration menu [2470] 1...

------------------------------------------------------------------
 Main Menu
------------------------------------------------------------------

 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] Flash Management
 [6] Set Device ID
 [7] Save Settings
 [8] Enable/Disable OAL Retail Messages
 [9] Select Display Resolution
 [a] Select OPP Mode
 [b] Aux Functions
 [0] Exit and Continue

 Selection:
```
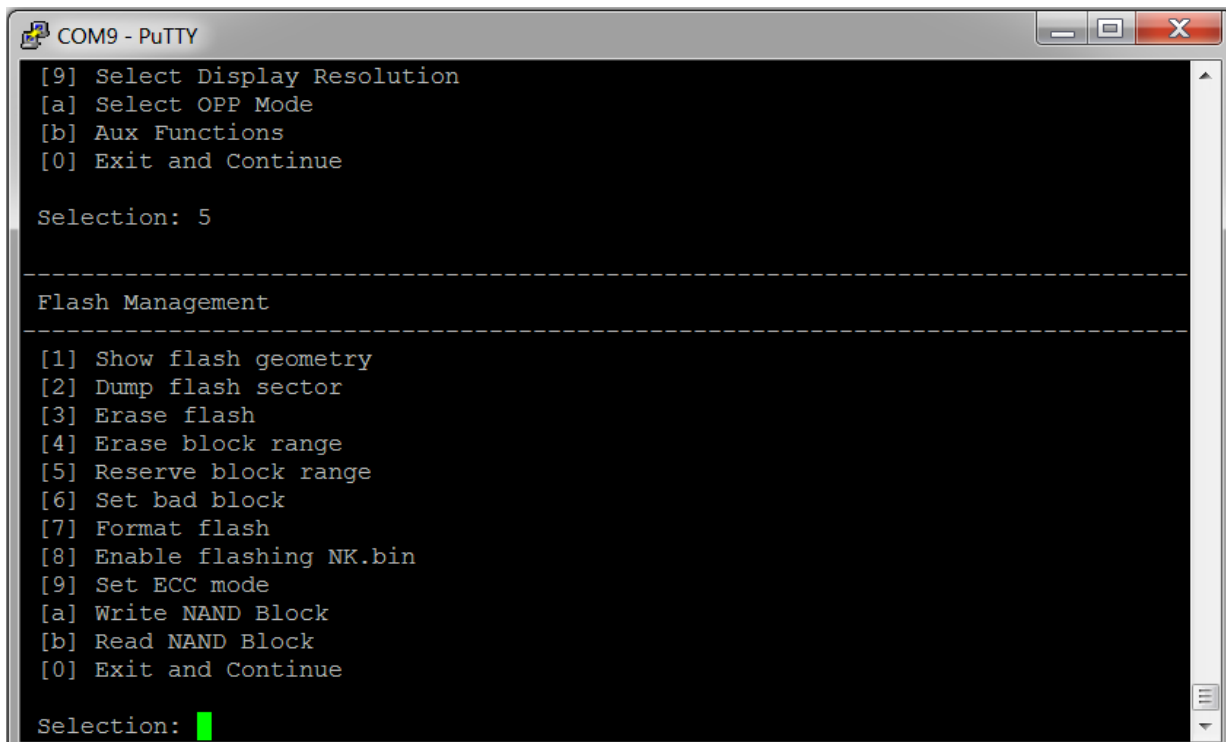
- Before starting with the procedure it is important to enable the flashing of "**NK.bin**" image. To perform this task press "**5**" to select option "**[5] Flash Management**".

```
[9] Select Display Resolution
[a] Select OPP Mode
[b] Aux Functions
[0] Exit and Continue

Selection: 5


---------------------------------------------------------------
Flash Management
---------------------------------------------------------------

[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Enable flashing NK.bin
[9] Set ECC mode
[a] Write NAND Block
[b] Read NAND Block
[0] Exit and Continue

Selection:
```

- Press "**8**" to select option "**[8] Enable flashing NK.bin**" and then press "**y**" when asked for conformation.

```
[b] Read NAND Block
[0] Exit and Continue

Selection: 8
Enable Flashing NK.bin [y/-]: y
Flashing NK.bin is enabled


---------------------------------------------------------------
Flash Management
---------------------------------------------------------------

[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Enable flashing NK.bin
[9] Set ECC mode
[a] Write NAND Block
[b] Read NAND Block
[0] Exit and Continue

Selection:
```
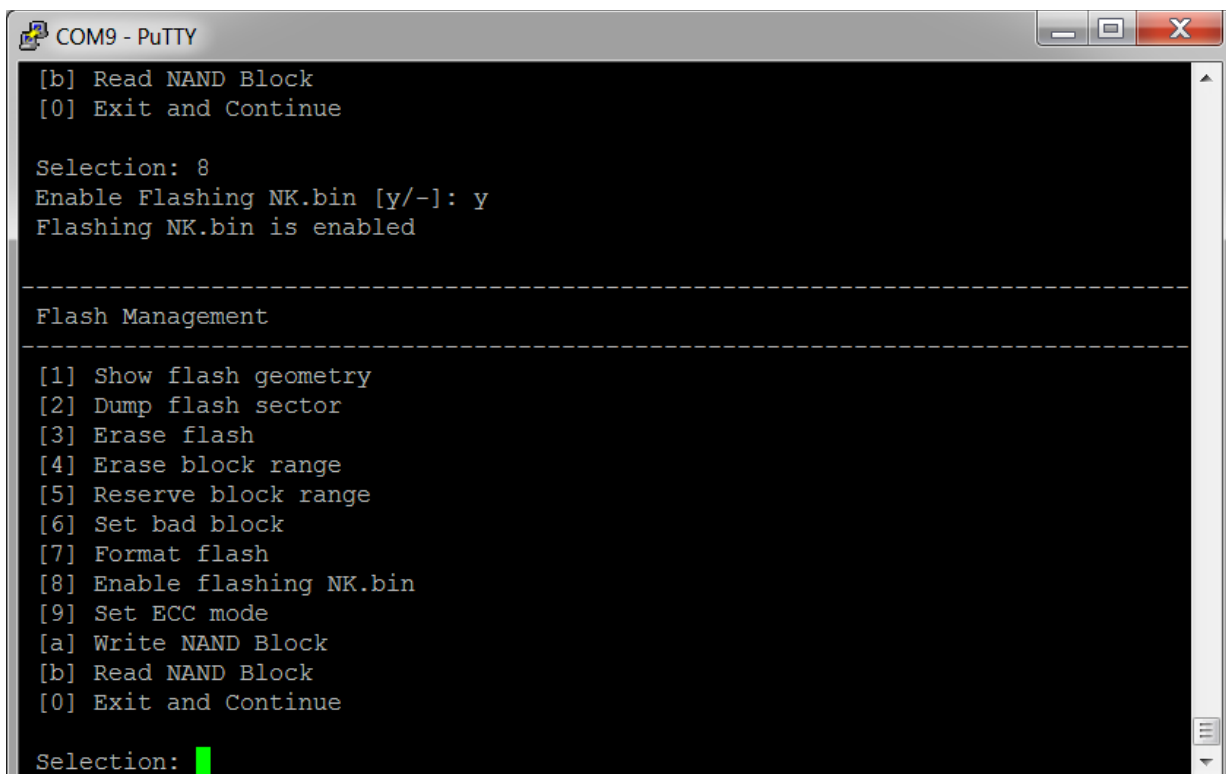
■ Press "**5**" to select option "**[5] Flash Management**" to start with the procedure of downloading first file to NAND. After you press "**5**" you will get menu "**SDCard Settings**" as follows.

```
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 5

------------------------------------------------------------

SDCard Settings
------------------------------------------------------------

[1] Show Current Settings
[2] Enter Filename
[0] Exit and Continue

Selection:
```
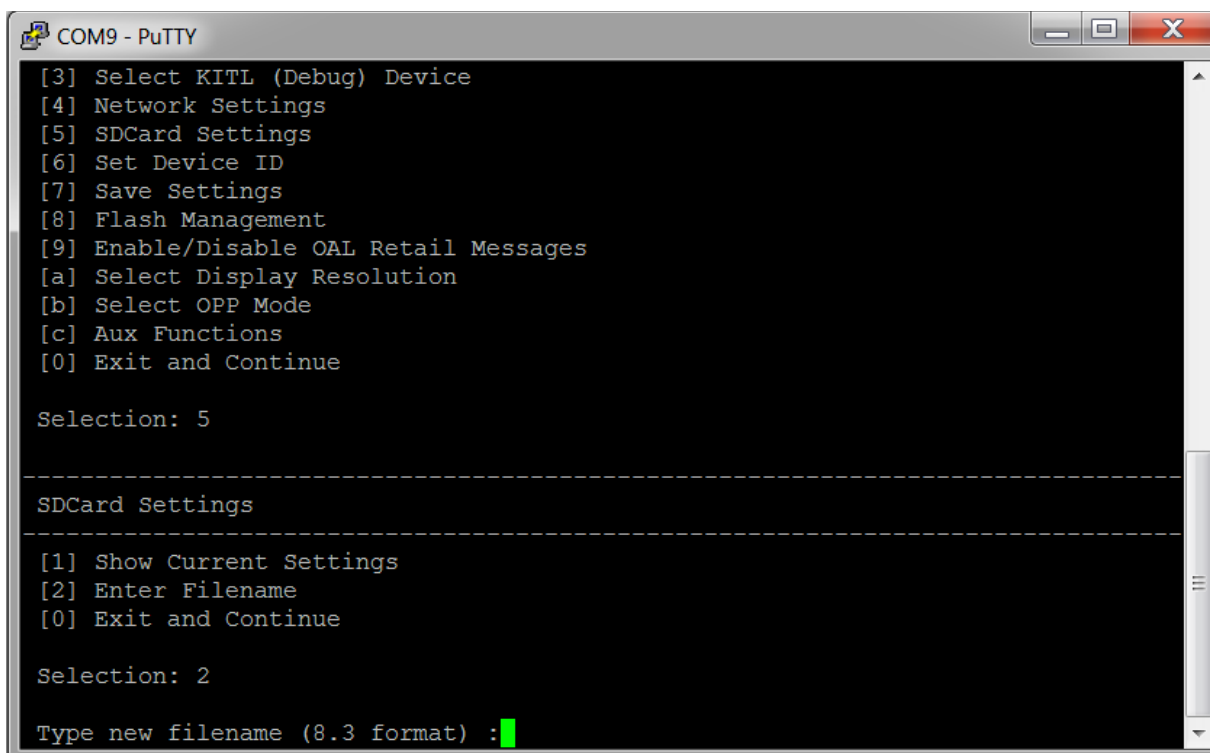
■ Press "**2**" to select option "**[2] Enter Filename**" to specify the name of first file to be downloaded in the NAND.

```
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 5

------------------------------------------------------------

SDCard Settings
------------------------------------------------------------

[1] Show Current Settings
[2] Enter Filename
[0] Exit and Continue

Selection: 2

Type new filename (8.3 format) :
```

■ Now type "**xldrnand.bin**" to specify the respective file and hit "**Enter**".
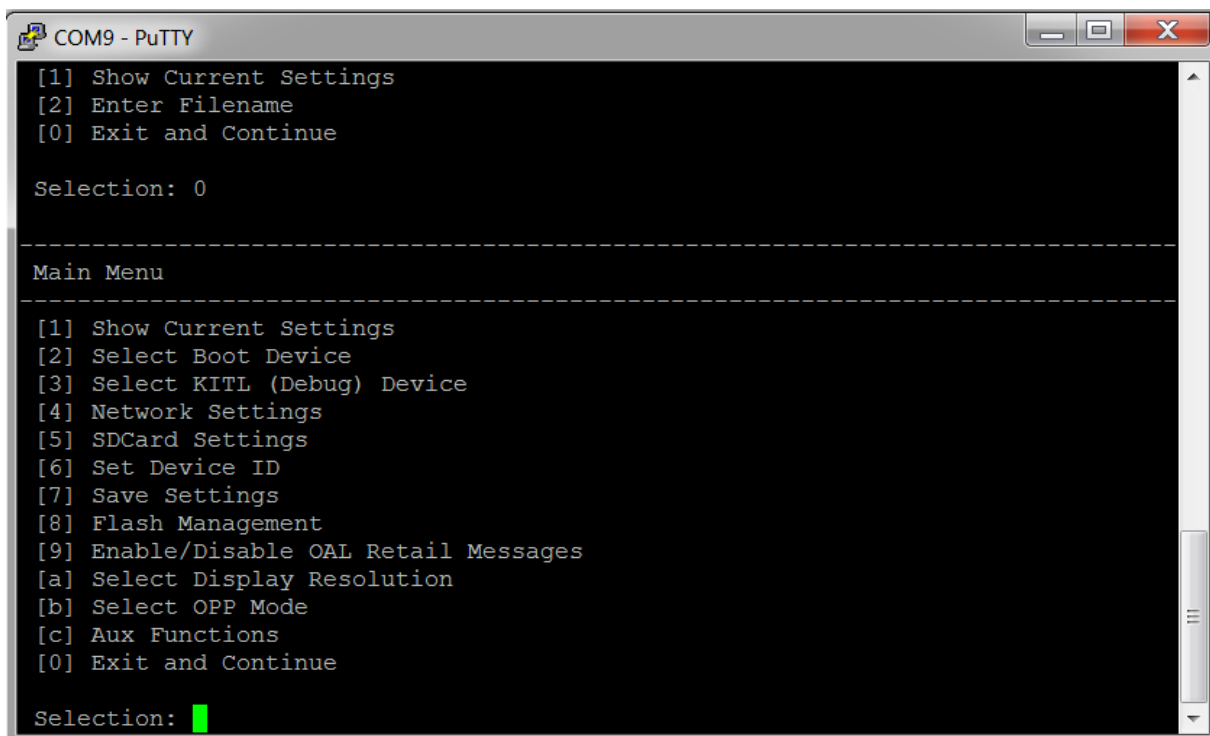
```
COM9 - PuTTY                                                    _ □ X

[c] Aux Functions
[0] Exit and Continue

Selection: 5


---------------------------------------------------------------
SDCard Settings
---------------------------------------------------------------

[1] Show Current Settings
[2] Enter Filename
[0] Exit and Continue

Selection: 2

Type new filename (8.3 format) :xldrnand.bin


---------------------------------------------------------------
SDCard Settings
---------------------------------------------------------------

[1] Show Current Settings
[2] Enter Filename
[0] Exit and Continue

Selection: █
```

■ Press "**0**" to select "**[0] Exit and Continue**".
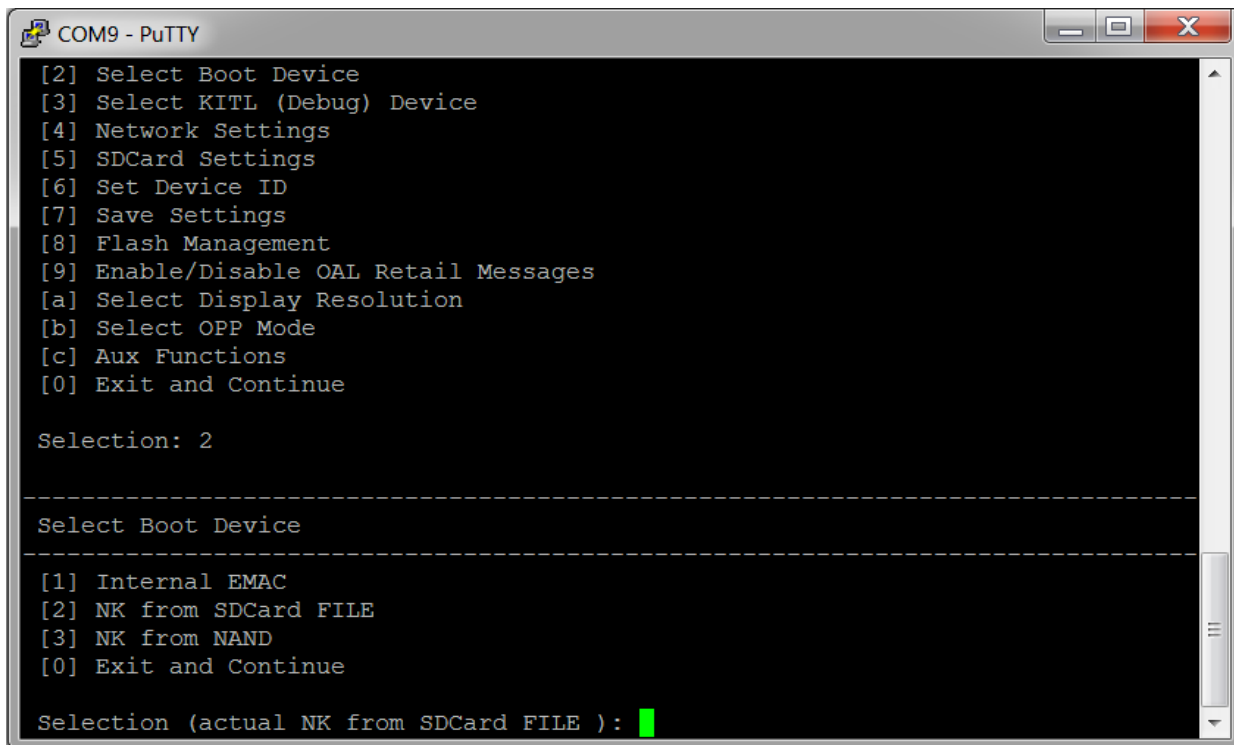
```
COM9 - PuTTY                                                    _ □ X

[1] Show Current Settings
[2] Enter Filename
[0] Exit and Continue

Selection: 0


---------------------------------------------------------------
Main Menu
---------------------------------------------------------------

[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: █
```
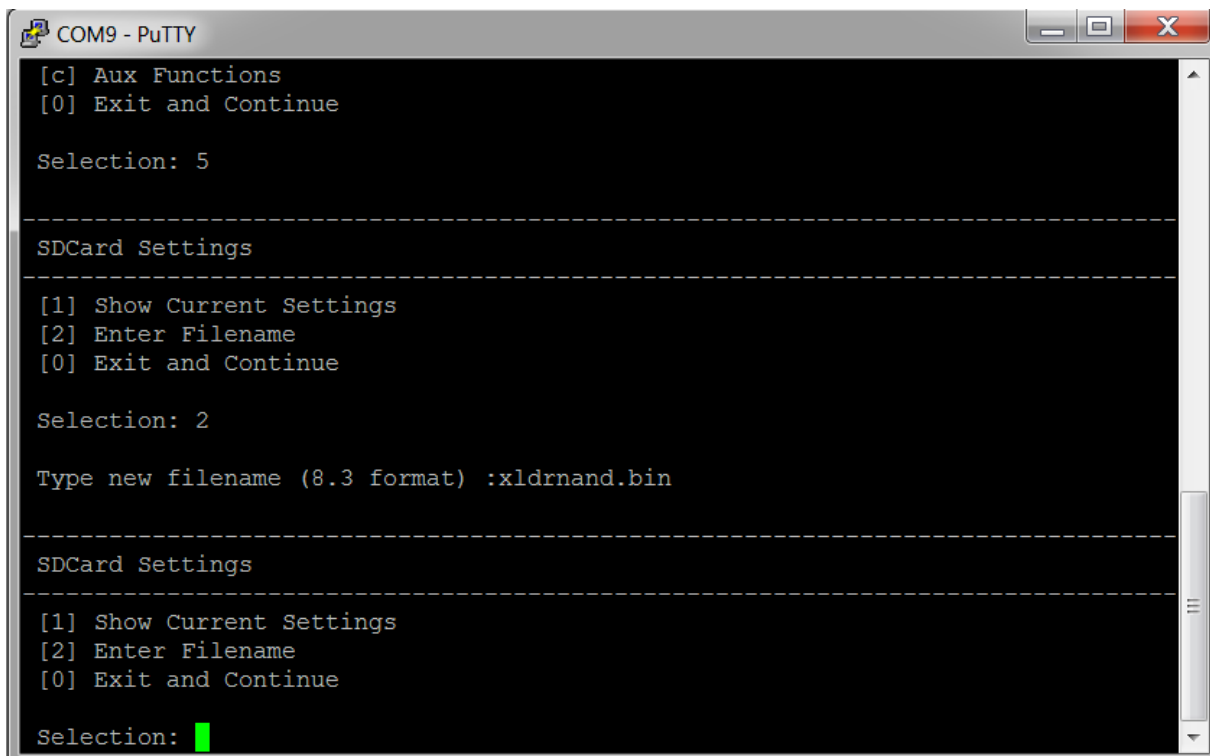
■ Now that the name of image to be downloaded in NAND is specified, next we need to specify the device to locate the required file. Hence press "**2**" to select option "**[2] Select Boot Device**".

```
COM9 - PuTTY                                                    ─ □  X

[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 2

-----------------------------------------------------------------------
Select Boot Device
-----------------------------------------------------------------------

[1] Internal EMAC
[2] NK from SDCard FILE
[3] NK from NAND
[0] Exit and Continue

Selection (actual NK from SDCard FILE ): █
```

■ Press "**2**" to select option "**[2] NK from SDCard FILE**".

```
COM9 - PuTTY                                                    ─ □  X

[3] NK from NAND
[0] Exit and Continue

Selection (actual NK from SDCard FILE ): 2
Boot device set to NK from SDCard FILE


-----------------------------------------------------------------------
Main Menu
-----------------------------------------------------------------------

[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: █
```
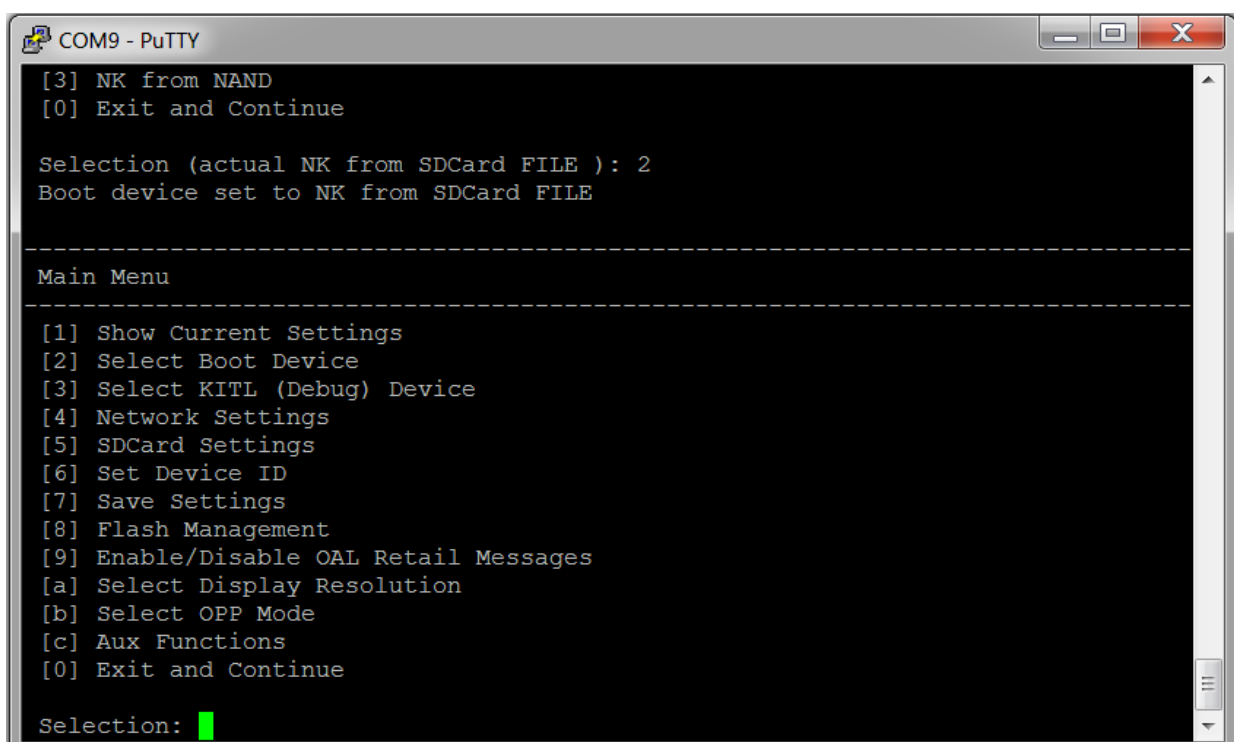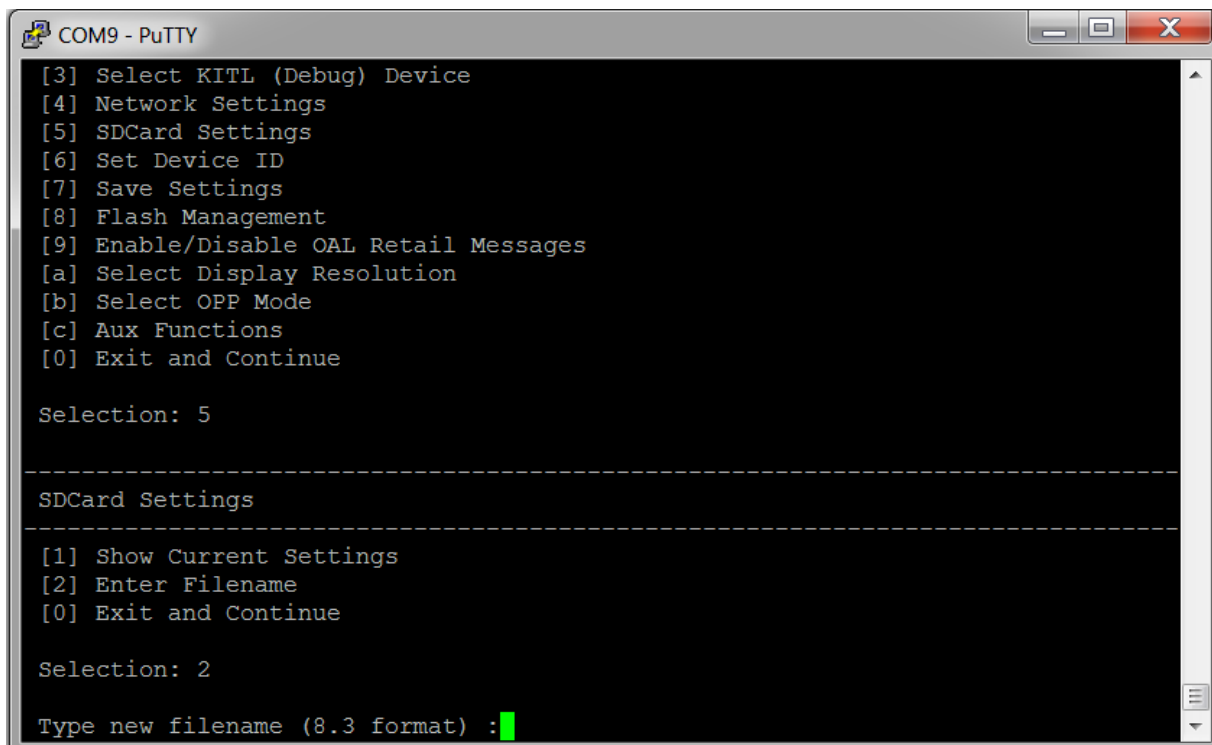
■ Save your settings by pressing "**7**" to select option "**[7] Save Settings**".

```
COM9 - PuTTY                                             [_][□][X]
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection: 5


 ----------------------------------------------------------------
 SDCard Settings
 ----------------------------------------------------------------

 [1] Show Current Settings
 [2] Enter Filename
 [0] Exit and Continue

 Selection: 2

 Type new filename (8.3 format) :█
```

■ Once you press "**7**" you will be asked to confirm your selection. Here press "**y**". On successful selection, a message "**Current settings have been saved**" will be displayed on the screen, and you will be directed back to "**Main Menu**".

```
COM9 - PuTTY                                             [_][□][X]
 [0] Exit and Continue

 Selection: 7
 Do you want save current settings [-/y]? y
 Current settings has been saved


 ----------------------------------------------------------------
 Main Menu
 ----------------------------------------------------------------
 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection: █
```
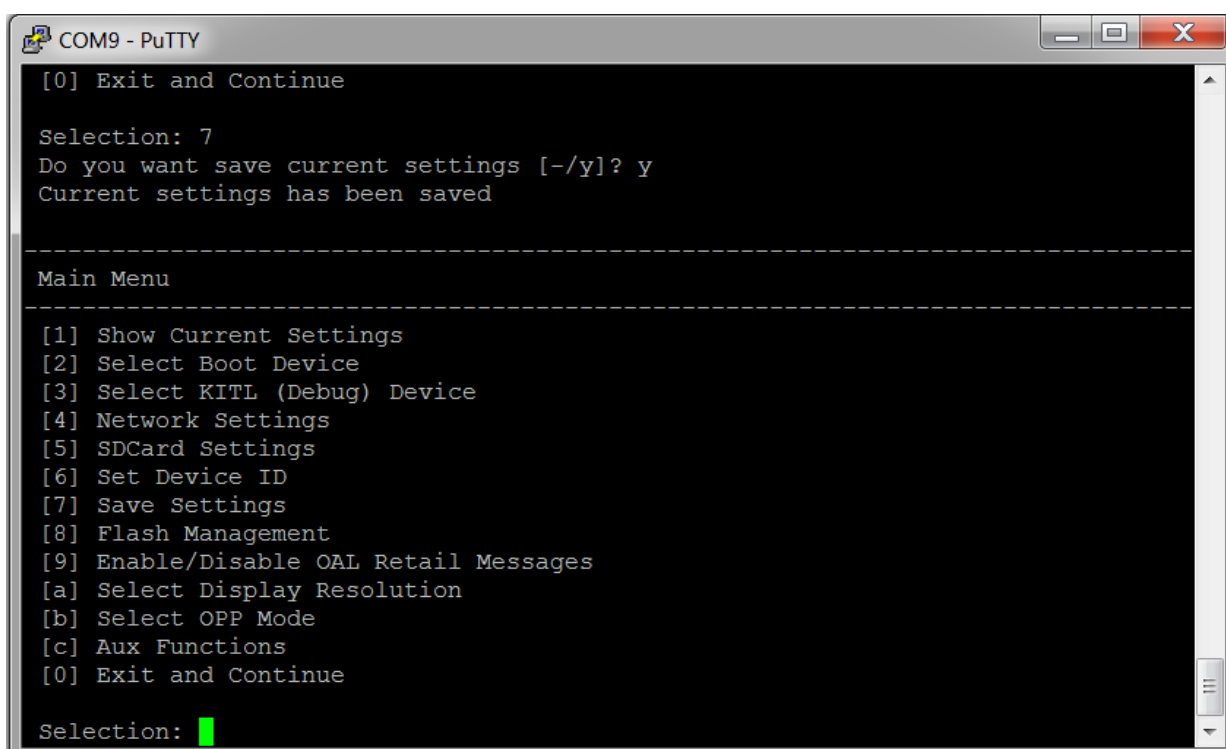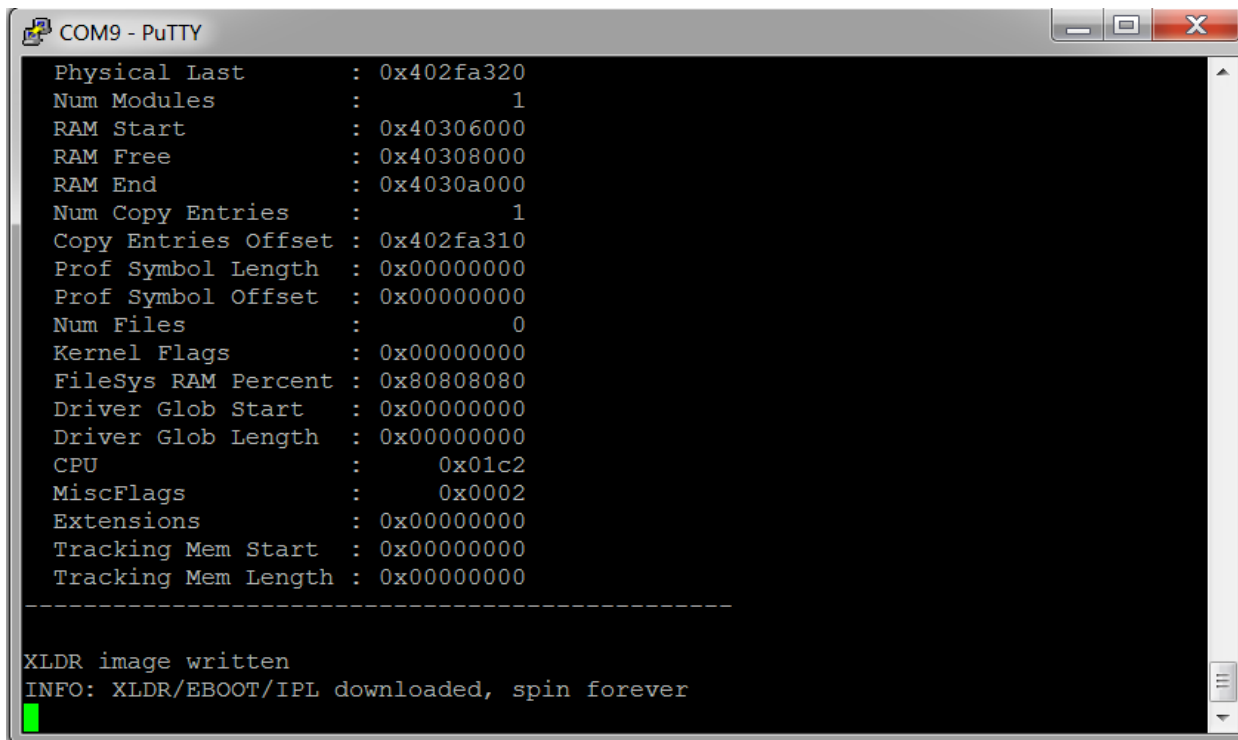
- Press "**0**" to select option "**[0] Exit and Continue**", after this the downloading process from SDCard to NAND will start automatically and after successfully download you will get message "**INFO: XLDR/EBOOT/IPL downloaded, spin forever**".

```
COM9 - PuTTY
    Physical Last     : 0x402fa320
    Num Modules       :          1
    RAM Start         : 0x40306000
    RAM Free          : 0x40308000
    RAM End           : 0x4030a000
    Num Copy Entries  :          1
    Copy Entries Offset : 0x402fa310
    Prof Symbol Length : 0x00000000
    Prof Symbol Offset : 0x00000000
    Num Files         :          0
    Kernel Flags      : 0x00000000
    FileSys RAM Percent : 0x80808080
    Driver Glob Start  : 0x00000000
    Driver Glob Length : 0x00000000
    CPU               :     0x01c2
    MiscFlags         :     0x0002
    Extensions        : 0x00000000
    Tracking Mem Start  : 0x00000000
    Tracking Mem Length : 0x00000000
    ------------------------------------------------

XLDR image written
INFO: XLDR/EBOOT/IPL downloaded, spin forever
```
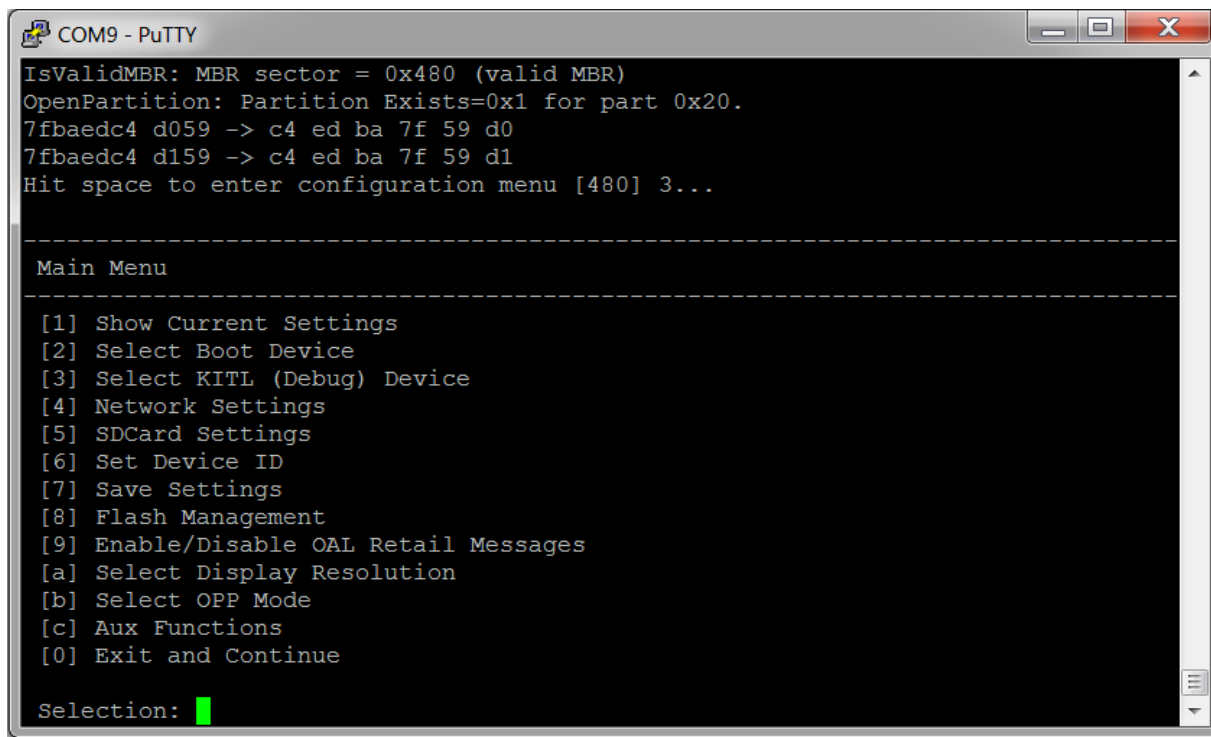
This completes the download process for first file "**xldrnand.bin**" from SDCard to NAND.

*Procedure of downloading remaining two files namely "**ebootnd.bin**" and "**nk.bin**" is exactly similar as mentioned above, below provided are the screenshots for the downloading process of these two files*.

3.3.1.2. Download "**ebootnd.bin**":

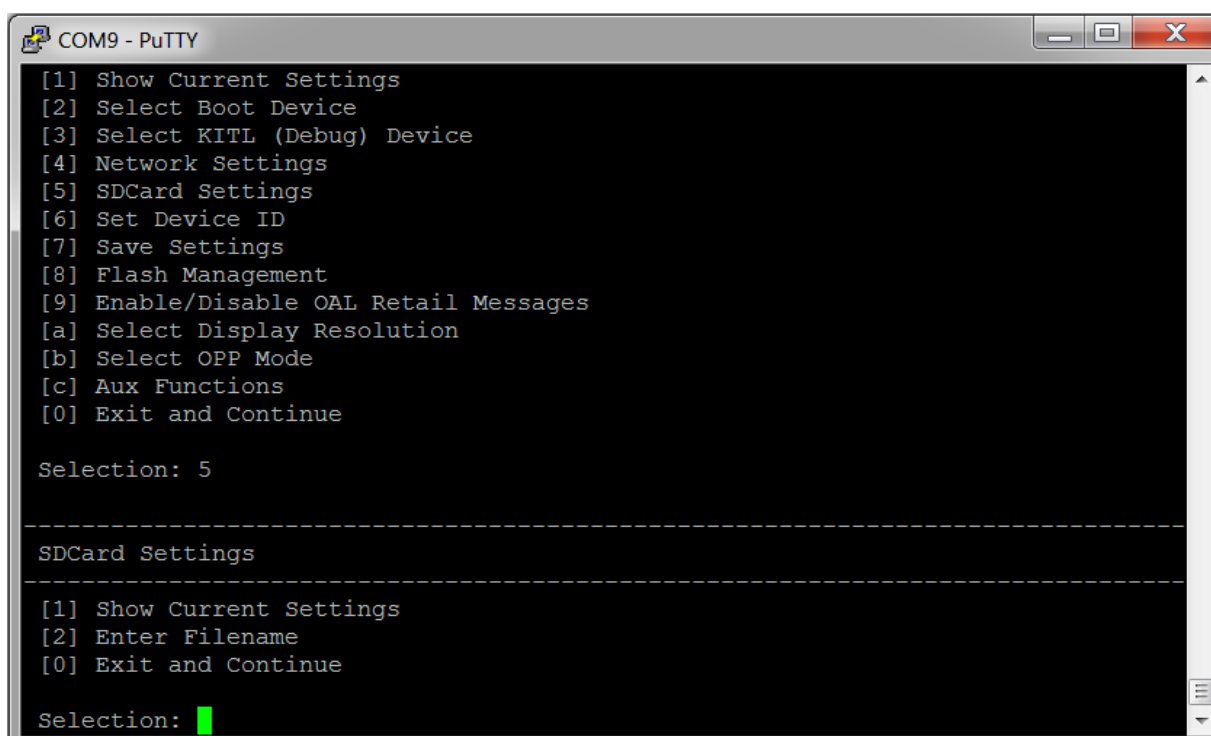■　　　Reset board and hit spacebar before counter expires.

```
COM9 - PuTTY

IsValidMBR: MBR sector = 0x480 (valid MBR)
OpenPartition: Partition Exists=0x1 for part 0x20.
7fbaedc4 d059 -> c4 ed ba 7f 59 d0
7fbaedc4 d159 -> c4 ed ba 7f 59 d1
Hit space to enter configuration menu [480] 3...


-------------------------------------------------------------------
 Main Menu
-------------------------------------------------------------------

 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection:
```

■　　　Select option "**[5] SDCard Settings".**

```
COM9 - PuTTY

 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection: 5


-------------------------------------------------------------------
 SDCard Settings
-------------------------------------------------------------------

 [1] Show Current Settings
 [2] Enter Filename
 [0] Exit and Continue

 Selection:
```
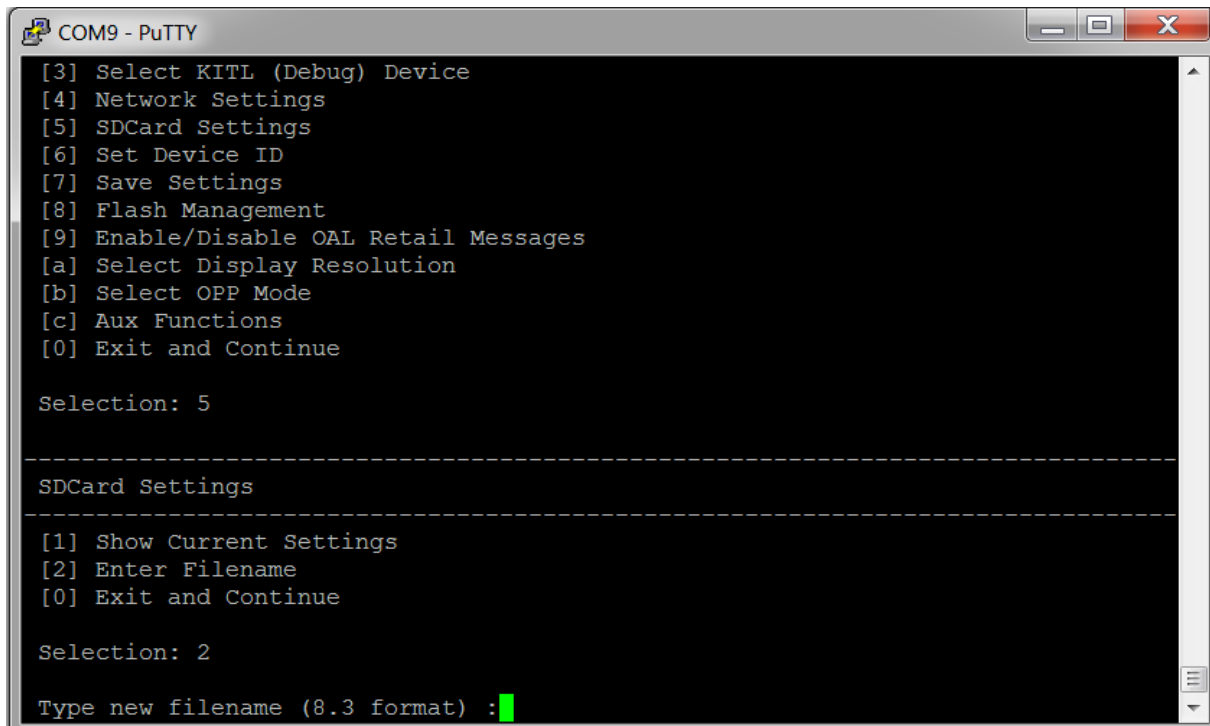
■ Select option "**[2] Enter Filename**".

```
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 5


---------------------------------------------------------------

SDCard Settings
---------------------------------------------------------------

[1] Show Current Settings
[2] Enter Filename
[0] Exit and Continue

Selection: 2

Type new filename (8.3 format) :
```
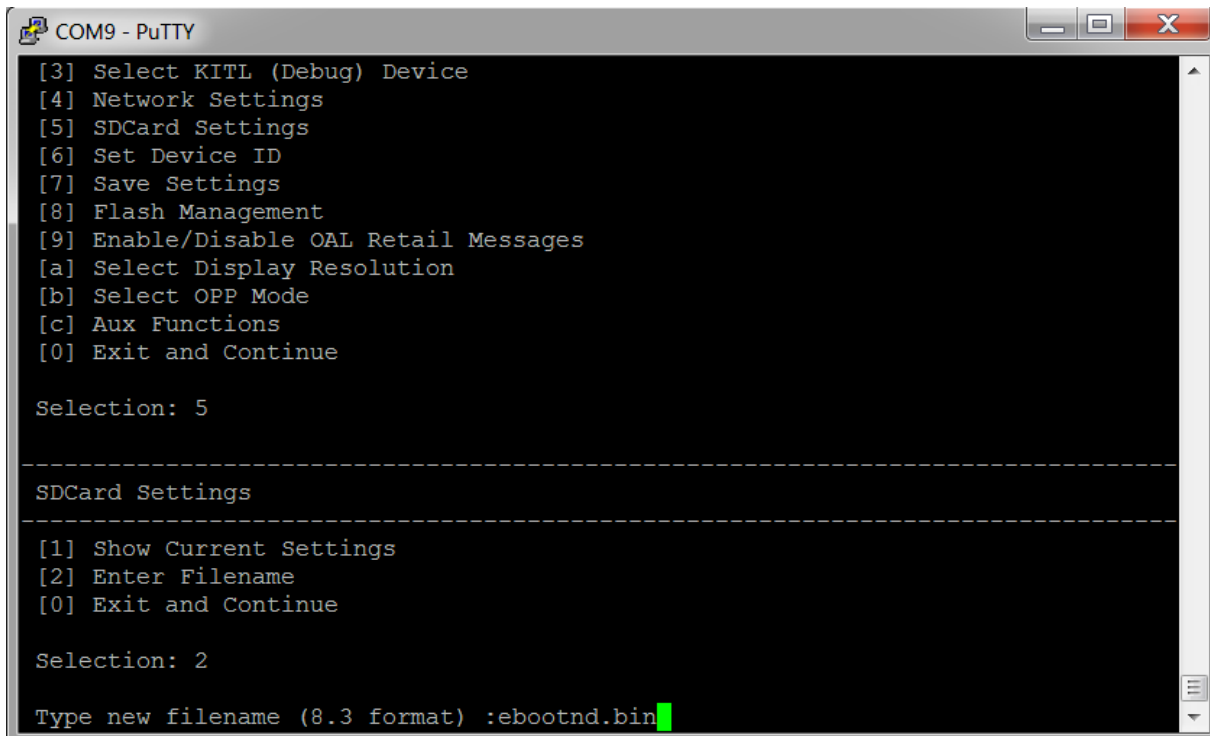
■ Enter filename as "**ebootnd.bin**" and press "**Enter**".

```
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 5


---------------------------------------------------------------

SDCard Settings
---------------------------------------------------------------

[1] Show Current Settings
[2] Enter Filename
[0] Exit and Continue

Selection: 2

Type new filename (8.3 format) :ebootnd.bin
```

■ Select option "**[0] Exit and Continue**".

■ Select option "**[2] Select Boot Device**".

■ Select option "**[2] NK from SDCard FILE**".

- Select option "**[7] Save settings**" and then press "**y**".

```
[0] Exit and Continue

Selection: 7
Do you want save current settings [-/y]? y
Current settings has been saved


-------------------------------------------------------------
Main Menu
-------------------------------------------------------------

[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection:
```
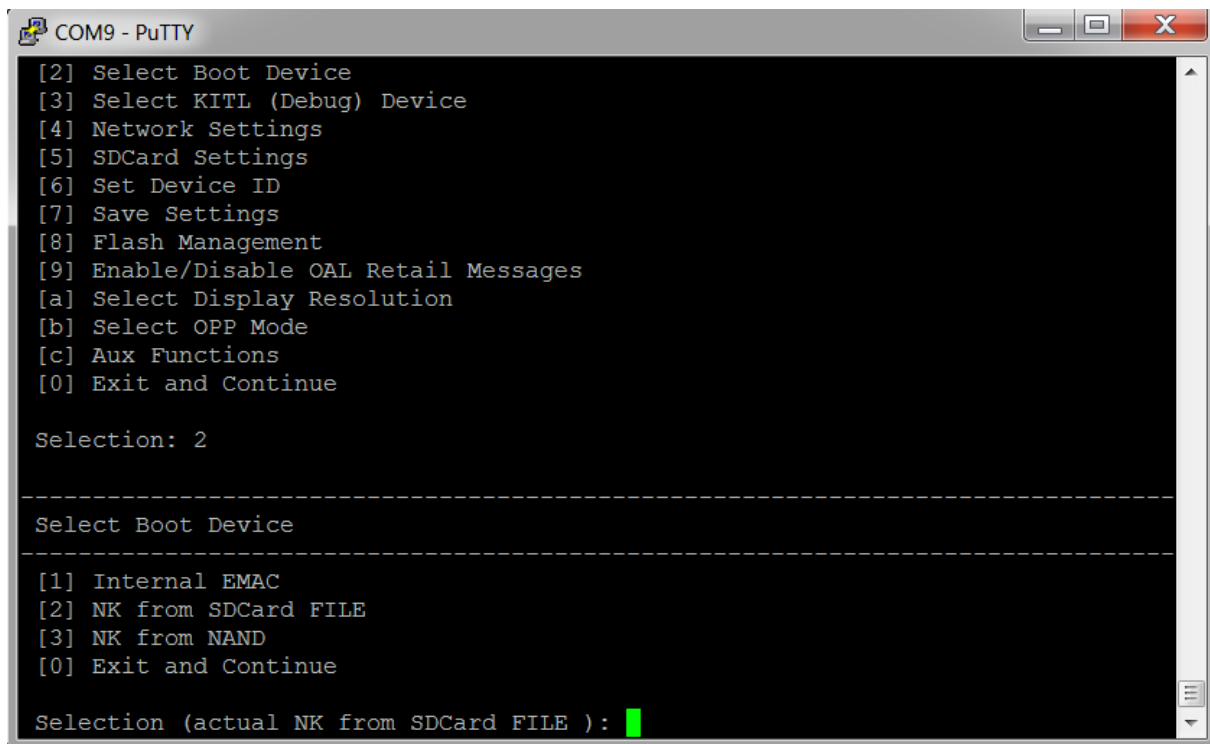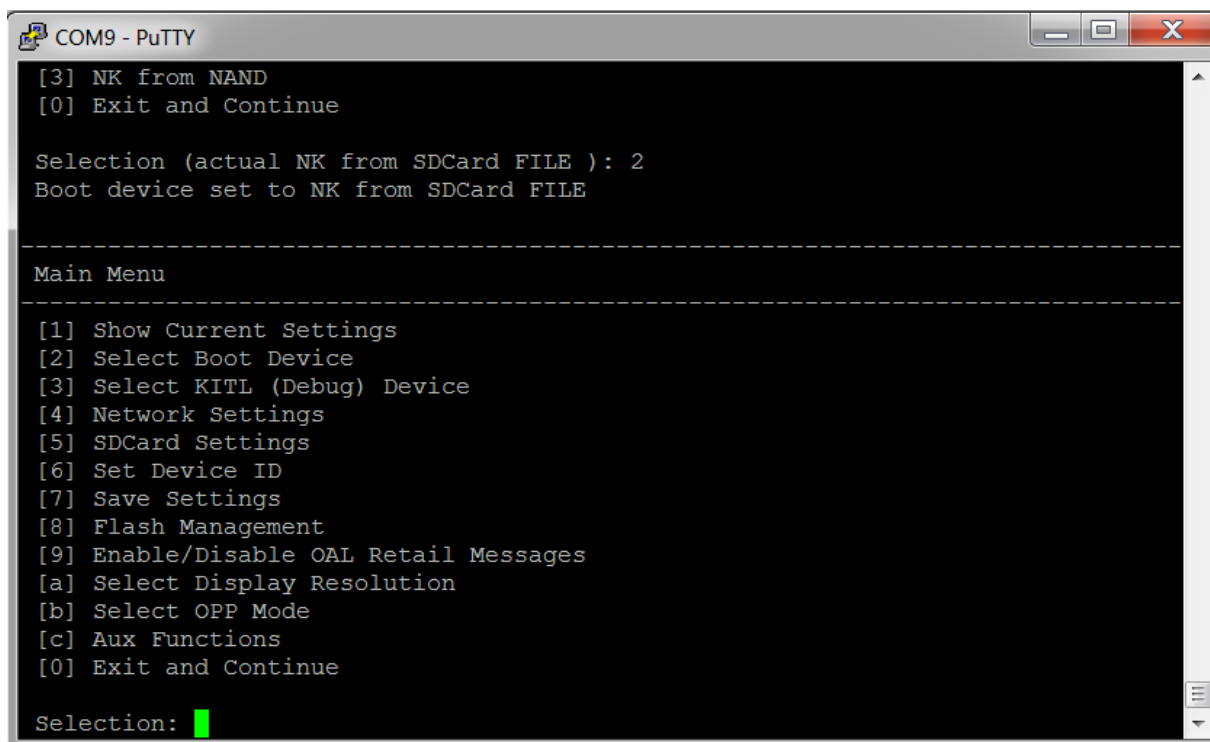
- Select option "**[0] Exit and Continue**" and downloading will complete.
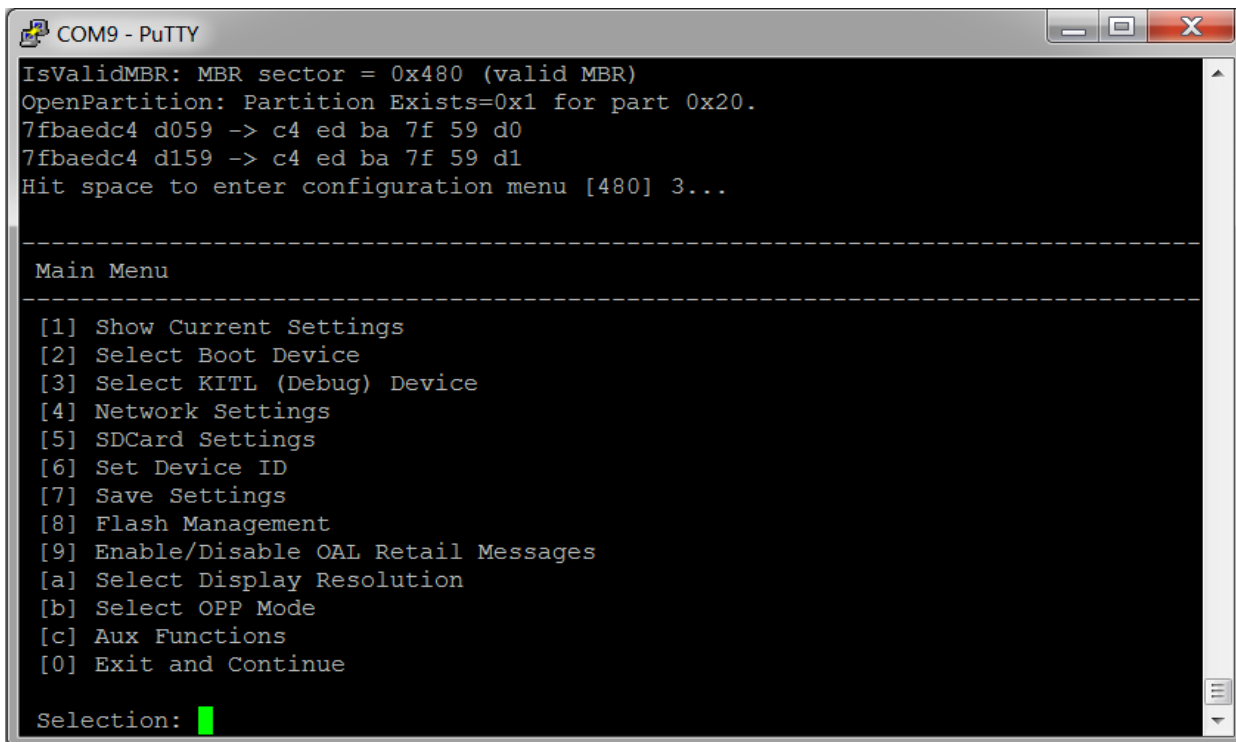
```
  Num Modules       :          1
  RAM Start         : 0x8fe80000
  RAM Free          : 0x8feb9000
  RAM End           : 0x8fed0000
  Num Copy Entries  :          1
  Copy Entries Offset : 0x8fe2adac
  Prof Symbol Length  : 0x00000000
  Prof Symbol Offset  : 0x00000000
  Num Files         :          0
  Kernel Flags      : 0x00000000
  FileSys RAM Percent : 0x80808080
  Driver Glob Start : 0x00000000
  Driver Glob Length : 0x00000000
  CPU               :     0x01c2
  MiscFlags         :     0x0002
  Extensions        : 0x00000000
  Tracking Mem Start  : 0x00000000
  Tracking Mem Length : 0x00000000
  ---------------------------------------------


EBOOT image written
ROMHDR at Address 8FE00044h
INFO: XLDR/EBOOT/IPL downloaded, spin forever
```

This completes with downloading of file "**ebootnd.bin**" from SDCard to NAND.

3.3.1.3. *Download "NK.bin"*:

■ Reset board and hit spacebar before counter expires.

```
IsValidMBR: MBR sector = 0x480 (valid MBR)
OpenPartition: Partition Exists=0x1 for part 0x20.
7fbaedc4 d059 -> c4 ed ba 7f 59 d0
7fbaedc4 d159 -> c4 ed ba 7f 59 d1
Hit space to enter configuration menu [480] 3...

---------------------------------------------------------------
 Main Menu
---------------------------------------------------------------

 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection:
```
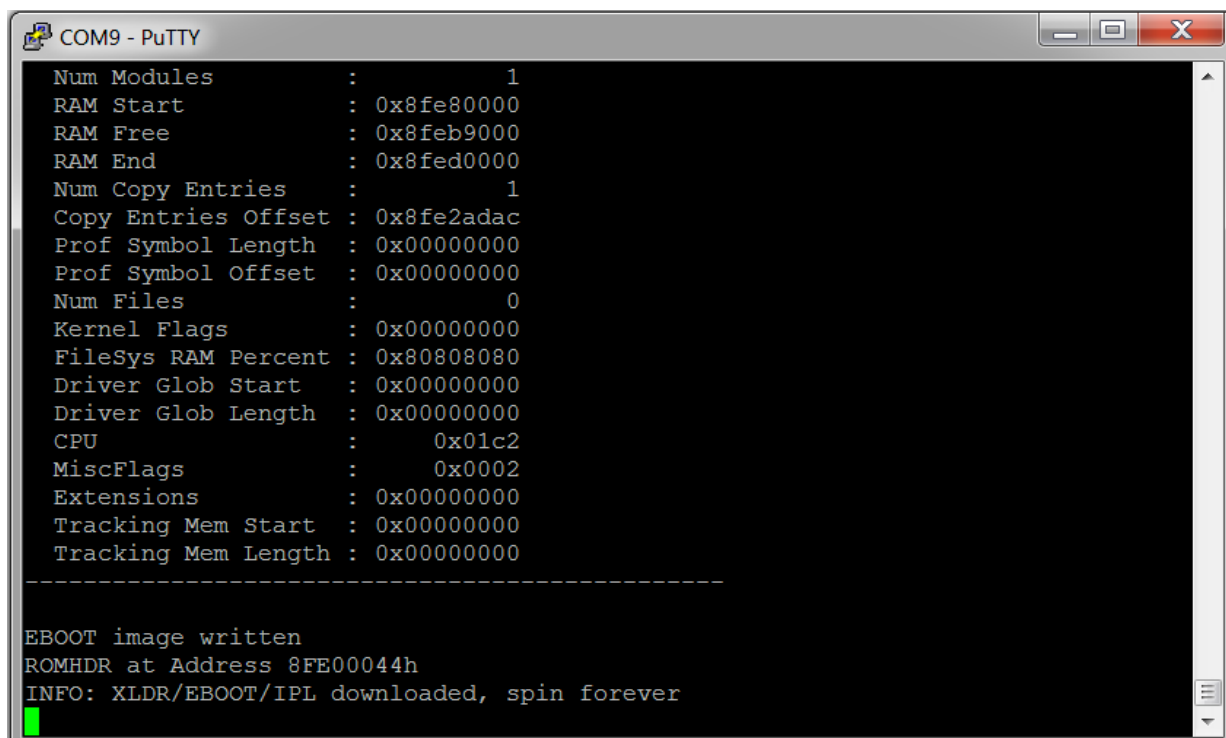
■ Select option "**[5] SDCard Settings**".

```
 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection: 5

---------------------------------------------------------------
 SDCard Settings
---------------------------------------------------------------

 [1] Show Current Settings
 [2] Enter Filename
 [0] Exit and Continue

 Selection:
```

■ Select option "**[2] Enter Filename".**

```
COM9 - PuTTY

[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 5

---------------------------------------------------------------

SDCard Settings
---------------------------------------------------------------

[1] Show Current Settings
[2] Enter Filename
[0] Exit and Continue

Selection: 2

Type new filename (8.3 format) :
```

■ Enter filename as "**nk.bin**" and press "**Enter**".

```
COM9 - PuTTY

[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 5

---------------------------------------------------------------

SDCard Settings
---------------------------------------------------------------

[1] Show Current Settings
[2] Enter Filename
[0] Exit and Continue

Selection: 2

Type new filename (8.3 format) :nk.bin
```

■ Select option "**[0] Exit and Continue**".

```
[1] Show Current Settings
[2] Enter Filename
[0] Exit and Continue

Selection: 0


------------------------------------------------------------
Main Menu
------------------------------------------------------------
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection:
```
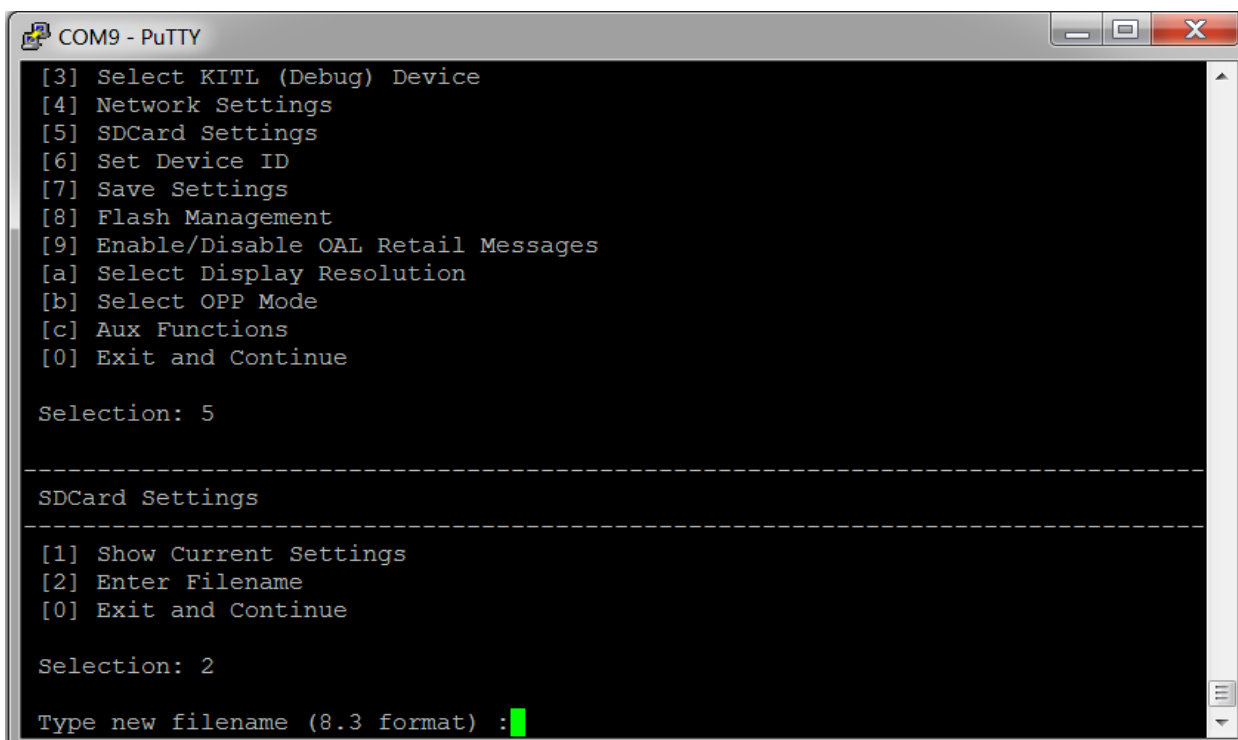
■ Select option "**[2] Select Boot Device**".

```
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 2


------------------------------------------------------------
Select Boot Device
------------------------------------------------------------
[1] Internal EMAC
[2] NK from SDCard FILE
[3] NK from NAND
[0] Exit and Continue

Selection (actual Internal EMAC):
```
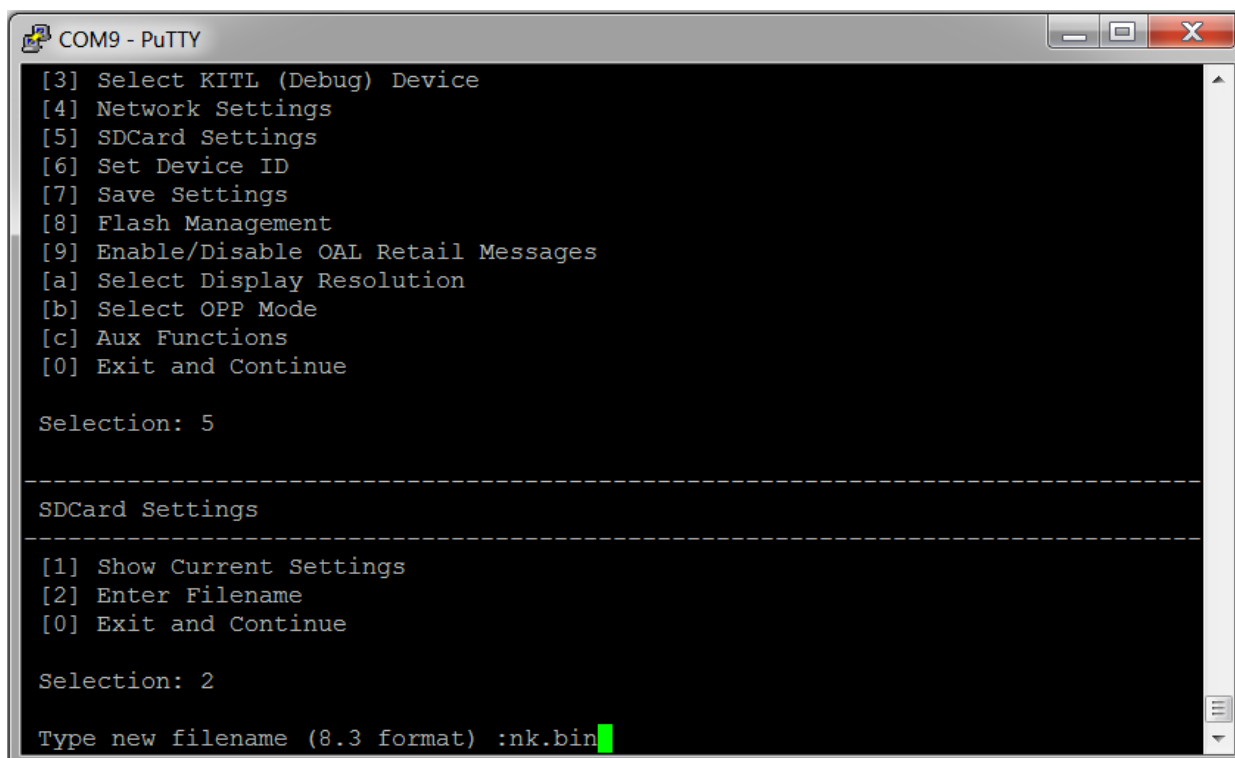
■ Select option "**[2] NK from SDCard FILE**".
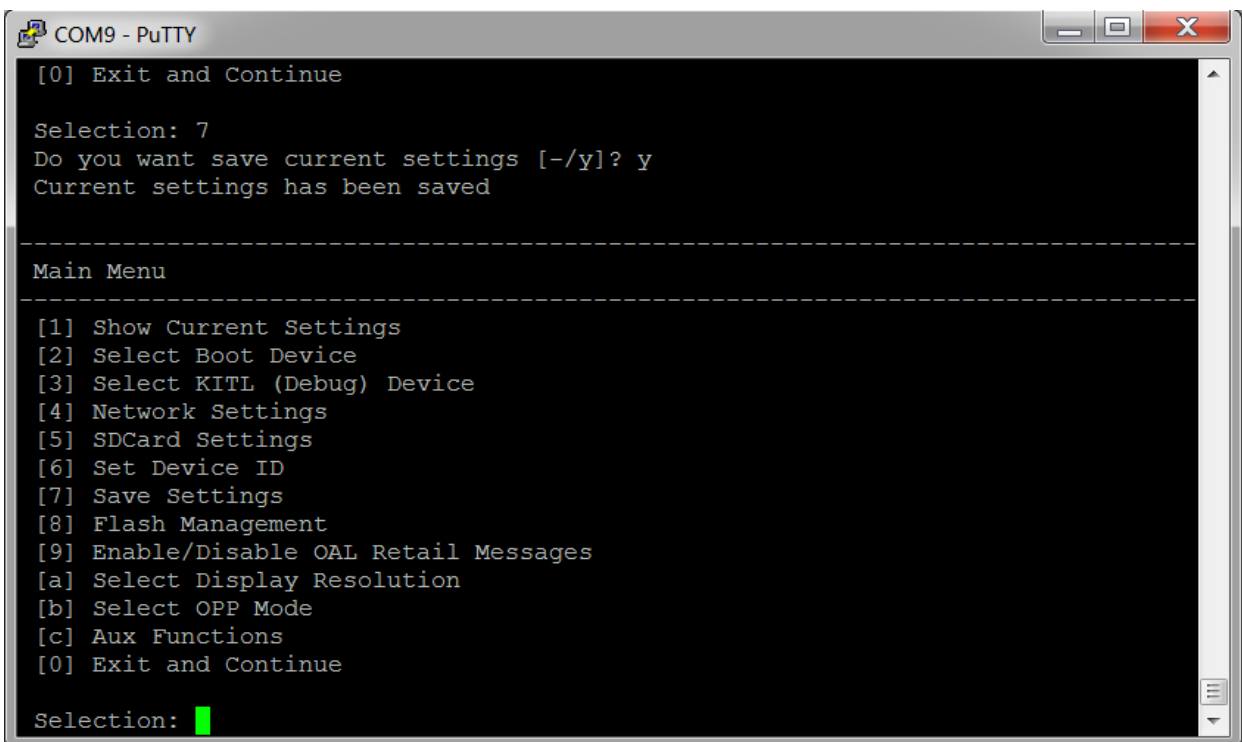
```
COM9 - PuTTY                                                    — □ ✕

 [3] NK from NAND
 [0] Exit and Continue

 Selection (actual Internal EMAC): 2
 Boot device set to NK from SDCard FILE


 --------------------------------------------------------------
 Main Menu
 --------------------------------------------------------------

 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection: █
```
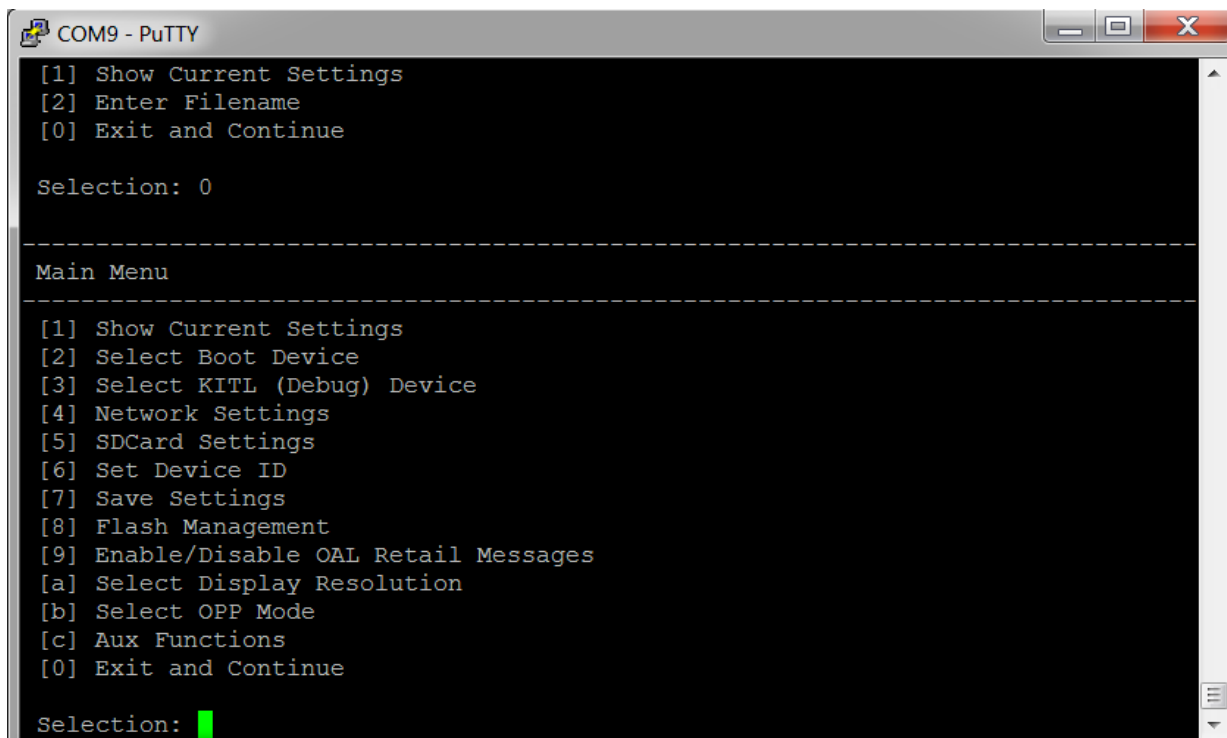
■ Select option "**[7] Save Settings**" and press "**y**".

```
COM9 - PuTTY                                                    — □ ✕

 [0] Exit and Continue

 Selection: 7
 Do you want save current settings [-/y]? y
 Current settings has been saved


 --------------------------------------------------------------
 Main Menu
 --------------------------------------------------------------

 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection: █
```
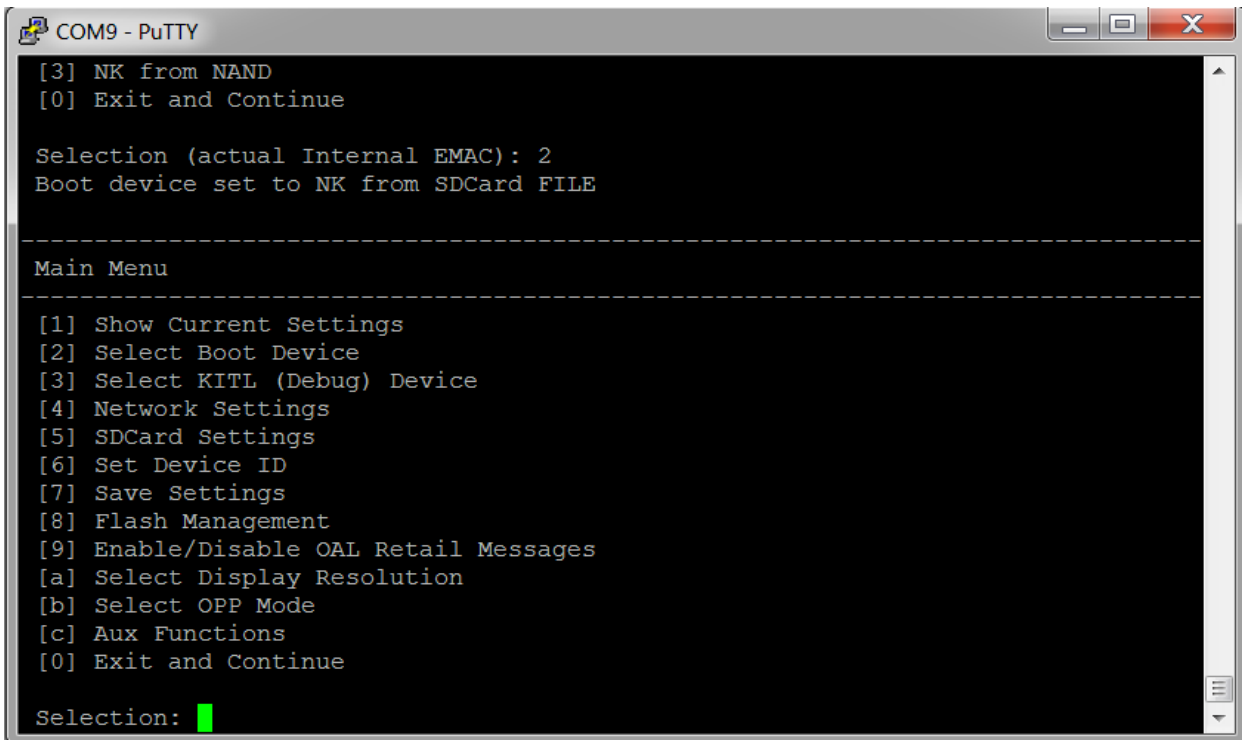
- Select option "**[0] Exit and Continue**" and the downloading process of file "**nk.bin**" will start automatically, wait till the download is completed successfully.


```
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

 Selection: 0
OEMPreDownload: Filename nk.bin

BL_IMAGE_TYPE_BIN

+OEMMultiBinNotify(0x8feb24f8 -> 1)
Download file information:
-----------------------------------------------------------
[0]: Address=0x80002000  Length=0x02c5caf8  Save=0x80002000
-----------------------------------------------------------
Download file type: 1
.........................................................
.........................................................
.........................................................
```



```
 Copy Entries Offset : 0x80986f50
 Prof Symbol Length  : 0x00000000
 Prof Symbol Offset  : 0x00000000
 Num Files           :          226
 Kernel Flags        : 0x00000000
 FileSys RAM Percent : 0x80808080
 Driver Glob Start   : 0x00000000
 Driver Glob Length  : 0x00000000
 CPU                 :       0x01c2
 MiscFlags           :       0x0002
 Extensions          : 0x80003020
 Tracking Mem Start  : 0x00000000
 Tracking Mem Length : 0x00000000
-----------------------------------------------------

NK Image Loaded
Launch Windows CE image by jumping to 0x80002000...

Windows CE Kernel for ARM (Thumb Enabled)
CPU CP15 Control Register = 0xc5387f
CPU CP15 Auxiliary Control Register = 0x42
+OALTimerInit(1, 24000, 200)
--- High Performance Frequecy is 24 MHz---
```

This completes with downloading of file "**NK.bin**" from SDCard to NAND.

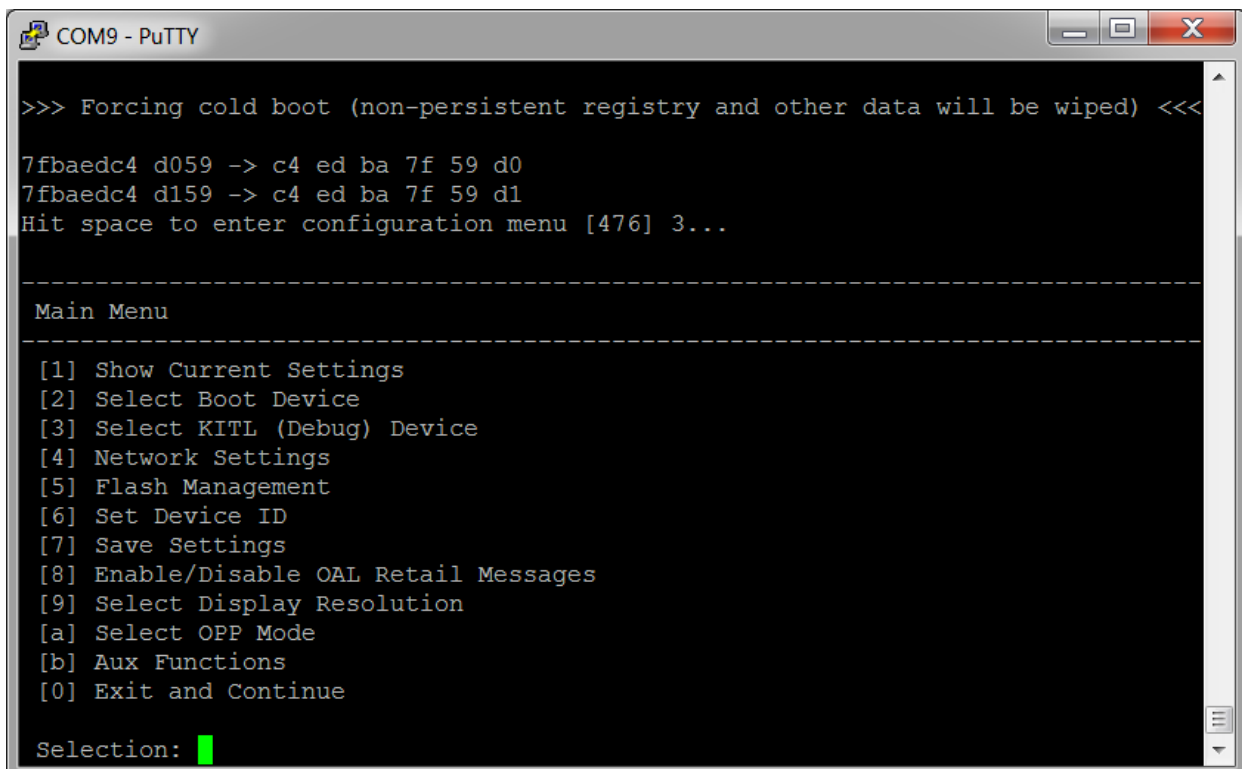
Once all of the three files:
1. *xldrnand.bin*
2. *ebootnd.bin*
3. *nk.bin*

are downloaded successfully in NAND, then disconnect the power cable of your board, do the necessary jumper settings for NAND booting (for WEGA Board – to boot from NAND remove the jumper 1-2 and 3-4) and detach the SDCard from the board. After these settings are been done, then plug in the power cable to board to start with procedure of Booting from NAND.

1.2.2. Boot from NAND:

■ After power plug in hit the spacebar before the counter expires, if you fail to do so, then perform hardware resetting of board and do the same process again.
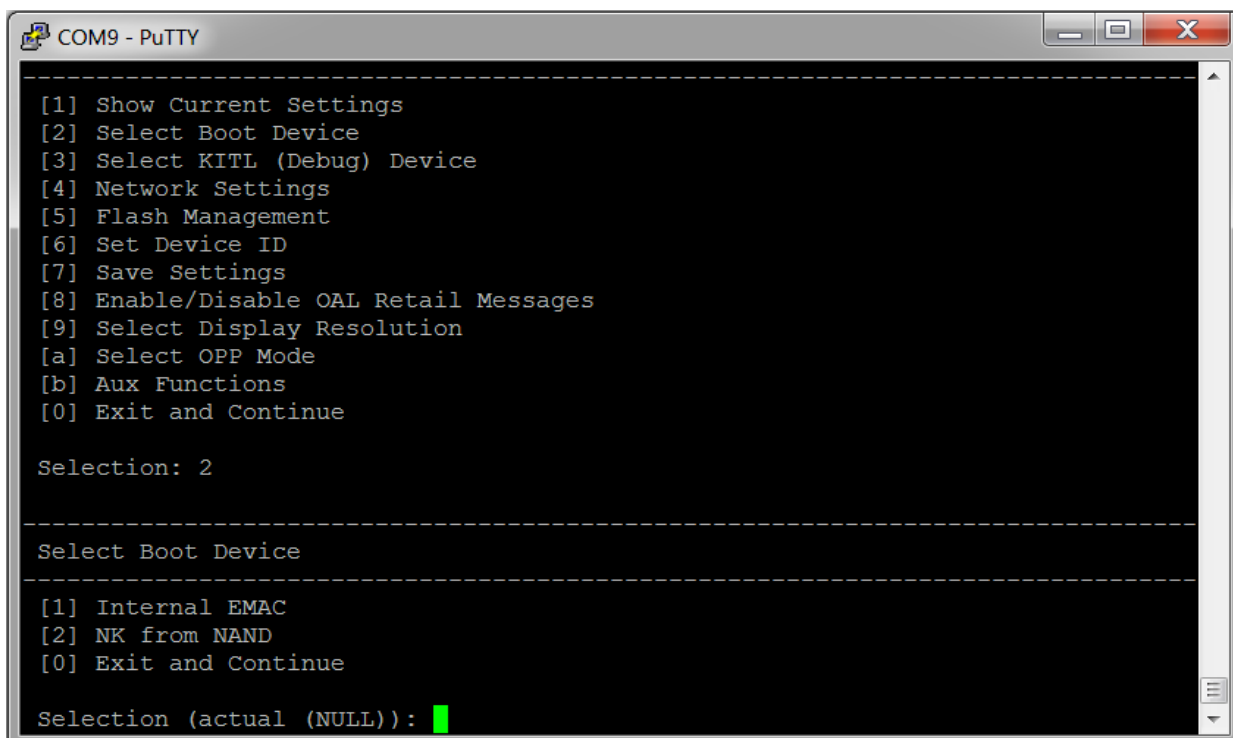
```
COM9 - PuTTY

>>> Forcing cold boot (non-persistent registry and other data will be wiped) <<<

7fbaedc4 d059 -> c4 ed ba 7f 59 d0
7fbaedc4 d159 -> c4 ed ba 7f 59 d1
Hit space to enter configuration menu [476] 3...


------------------------------------------------------------------------
 Main Menu
------------------------------------------------------------------------
 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] Flash Management
 [6] Set Device ID
 [7] Save Settings
 [8] Enable/Disable OAL Retail Messages
 [9] Select Display Resolution
 [a] Select OPP Mode
 [b] Aux Functions
 [0] Exit and Continue

 Selection:
```

■ Press "**2**" in order to select option "**[2] Select Boot Device**" to specify where to find OS Image "**NK.bin**" to start with booting process.

```
COM9 - PuTTY
------------------------------------------------------------
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] Flash Management
[6] Set Device ID
[7] Save Settings
[8] Enable/Disable OAL Retail Messages
[9] Select Display Resolution
[a] Select OPP Mode
[b] Aux Functions
[0] Exit and Continue

Selection: 2


------------------------------------------------------------
Select Boot Device
------------------------------------------------------------
[1] Internal EMAC
[2] NK from NAND
[0] Exit and Continue

Selection (actual (NULL)):
```

■ Press "**2**" to select option "**[2] NK from NAND**" so as to specify the NAND as location to find OS Image.
NOTE: *Since we have modified the jumper settings and detached the SDCard, "**NK from SDCard FILE**" will not be available*.

```
COM9 - PuTTY
[1] Internal EMAC
[2] NK from NAND
[0] Exit and Continue

Selection (actual (NULL)): 2
Boot device set to NK from NAND


------------------------------------------------------------
Main Menu
------------------------------------------------------------
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] Flash Management
[6] Set Device ID
[7] Save Settings
[8] Enable/Disable OAL Retail Messages
[9] Select Display Resolution
[a] Select OPP Mode
[b] Aux Functions
[0] Exit and Continue

Selection:
```
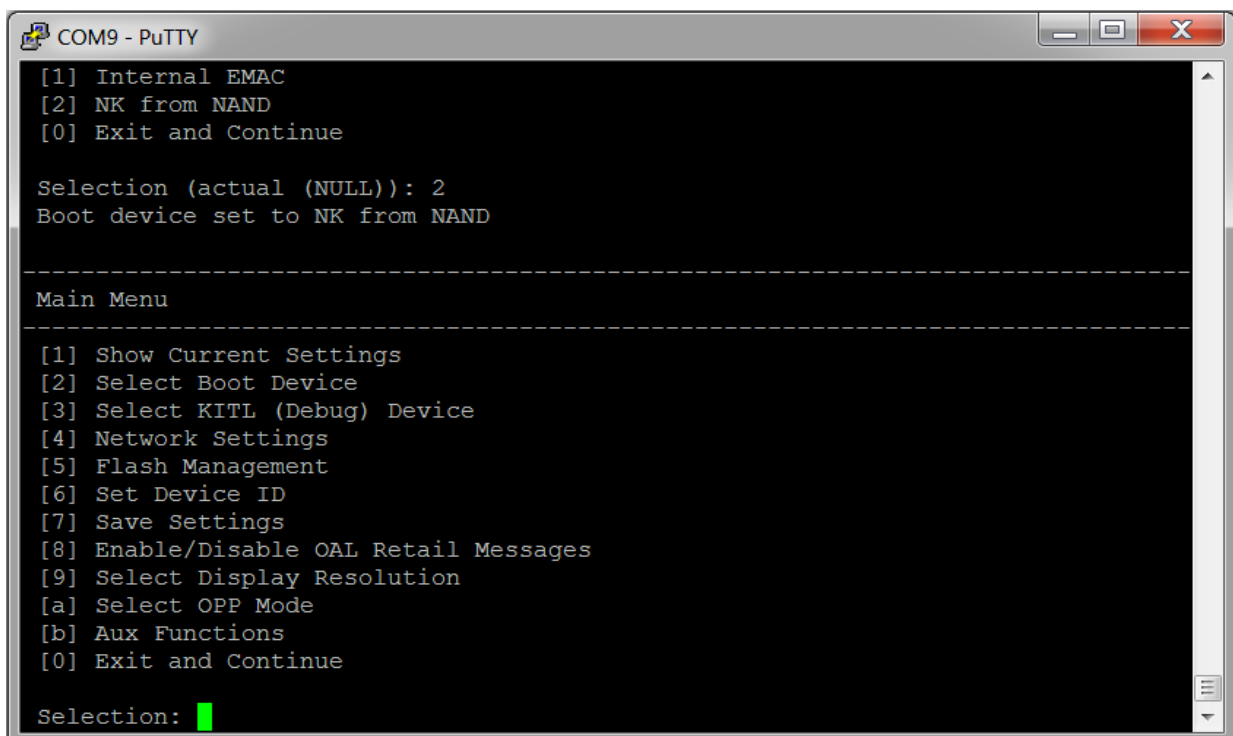
■ Press "**7**" to select option "**[7] Save Settings**" so as to save the modified settings, and then press "**y**".

```
[2] NK from NAND
[0] Exit and Continue

Selection (actual (NULL)): 2
Boot device set to NK from NAND


-------------------------------------------------------------------
Main Menu
-------------------------------------------------------------------
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] Flash Management
[6] Set Device ID
[7] Save Settings
[8] Enable/Disable OAL Retail Messages
[9] Select Display Resolution
[a] Select OPP Mode
[b] Aux Functions
[0] Exit and Continue

Selection: 7
Do you want save current settings [-/y]?
```

```
[b] Aux Functions
[0] Exit and Continue

Selection: 7
Do you want save current settings [-/y]? y
Current settings has been saved


-------------------------------------------------------------------
Main Menu
-------------------------------------------------------------------
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] Flash Management
[6] Set Device ID
[7] Save Settings
[8] Enable/Disable OAL Retail Messages
[9] Select Display Resolution
[a] Select OPP Mode
[b] Aux Functions
[0] Exit and Continue

Selection:
```

- ■ Press "**0**" to select option "**[0] Exit and Continue**" so as to exit "**Main Menu**" and start with the booting process.

NOTE : *Boot process will start automatically, please wait till the boot process is completed, do not plug out the power cable or "Reset" the board, since this would cause the boot process to terminate.*

```
COM9 - PuTTY                                                    _  □  X

 Current settings has been saved


 -----------------------------------------------------------------------
 Main Menu
 -----------------------------------------------------------------------
 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] Flash Management
 [6] Set Device ID
 [7] Save Settings
 [8] Enable/Disable OAL Retail Messages
 [9] Select Display Resolution
 [a] Select OPP Mode
 [b] Aux Functions
 [0] Exit and Continue

 Selection: 0

Load NK image from flash memory
IsValidMBR: MBR sector = 0x480 (valid MBR)
OpenPartition: Partition Exists=0x1 for part 0x20.
BP_SetDataPointer at 0x0
```
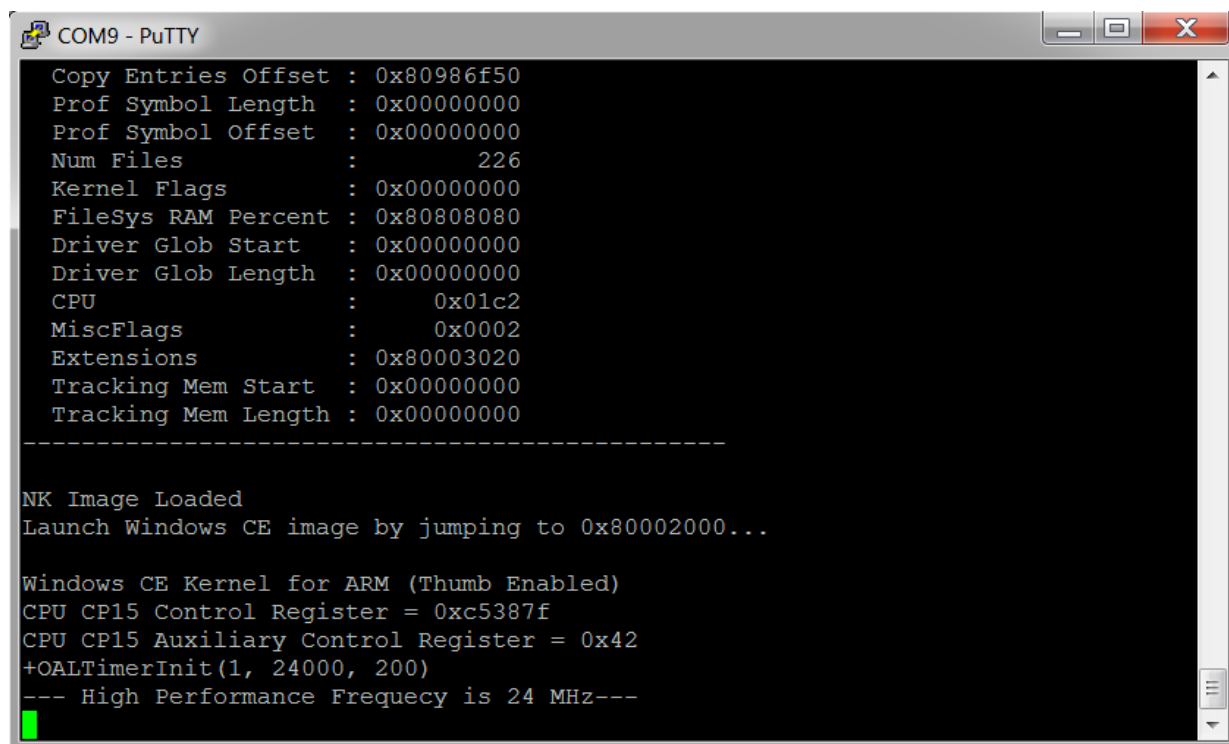
```
COM9 - PuTTY                                                    _  □  X

   RAM Free            : 0x82cb5000
   RAM End             : 0x8d000000
   Num Copy Entries    :        3
   Copy Entries Offset : 0x8098bf98
   Prof Symbol Length  : 0x00000000
   Prof Symbol Offset  : 0x00000000
   Num Files           :       95
   Kernel Flags        : 0x00000000
   FileSys RAM Percent : 0x80808080
   Driver Glob Start   : 0x00000000
   Driver Glob Length  : 0x00000000
   CPU                 :     0x01c2
   MiscFlags           :     0x0002
   Extensions          : 0x80003020
   Tracking Mem Start  : 0x00000000
   Tracking Mem Length : 0x00000000
   -----------------------------------------------

NK Image Loaded
Launch Windows CE image by jumping to 0x80002000...

Windows CE Kernel for ARM (Thumb Enabled)
CPU CP15 Control Register = 0xc5387f
CPU CP15 Auxiliary Control Register = 0x42
```

```
                                                                    [_][□][X]
  COM9 - PuTTY
  Copy Entries Offset : 0x80986f50
  Prof Symbol Length  : 0x00000000
  Prof Symbol Offset  : 0x00000000
  Num Files           :          226
  Kernel Flags        : 0x00000000
  FileSys RAM Percent : 0x80808080
  Driver Glob Start   : 0x00000000
  Driver Glob Length  : 0x00000000
  CPU                 :       0x01c2
  MiscFlags           :       0x0002
  Extensions          : 0x80003020
  Tracking Mem Start  : 0x00000000
  Tracking Mem Length : 0x00000000
------------------------------------------------

NK Image Loaded
Launch Windows CE image by jumping to 0x80002000...

Windows CE Kernel for ARM (Thumb Enabled)
CPU CP15 Control Register = 0xc5387f
CPU CP15 Auxiliary Control Register = 0x42
+OALTimerInit(1, 24000, 200)
--- High Performance Frequecy is 24 MHz---
```

This completes the boot process from NAND.

4. Boot from Ethernet :

NOTE: Here the explanation is provided, assuming that precompiled NK.bin is available with you, this section does not include procedure for compilation of source bsp to generate NK.bin.

4.1. Software Requirements:
1. NK.bin file
2. Visual Studio 2008 Professional Edition.
3. Service Pack 1 for Visual Studio 2008.
4. Windows Embedded Compact 7.

4.2. Hardware Requirements:
1. WEGA Development Board.
2. Ethernet Wire.
3. SDCard preloaded with image of "**ebootsd.nb0**" and "**MLO**".

Before starting with the process, establish connection between board and host computer via Ethernet cable. Insert SDCard in the respective slot on board. Short pins 3-4 of jumper JP5, and then connect power cable to power up the board.
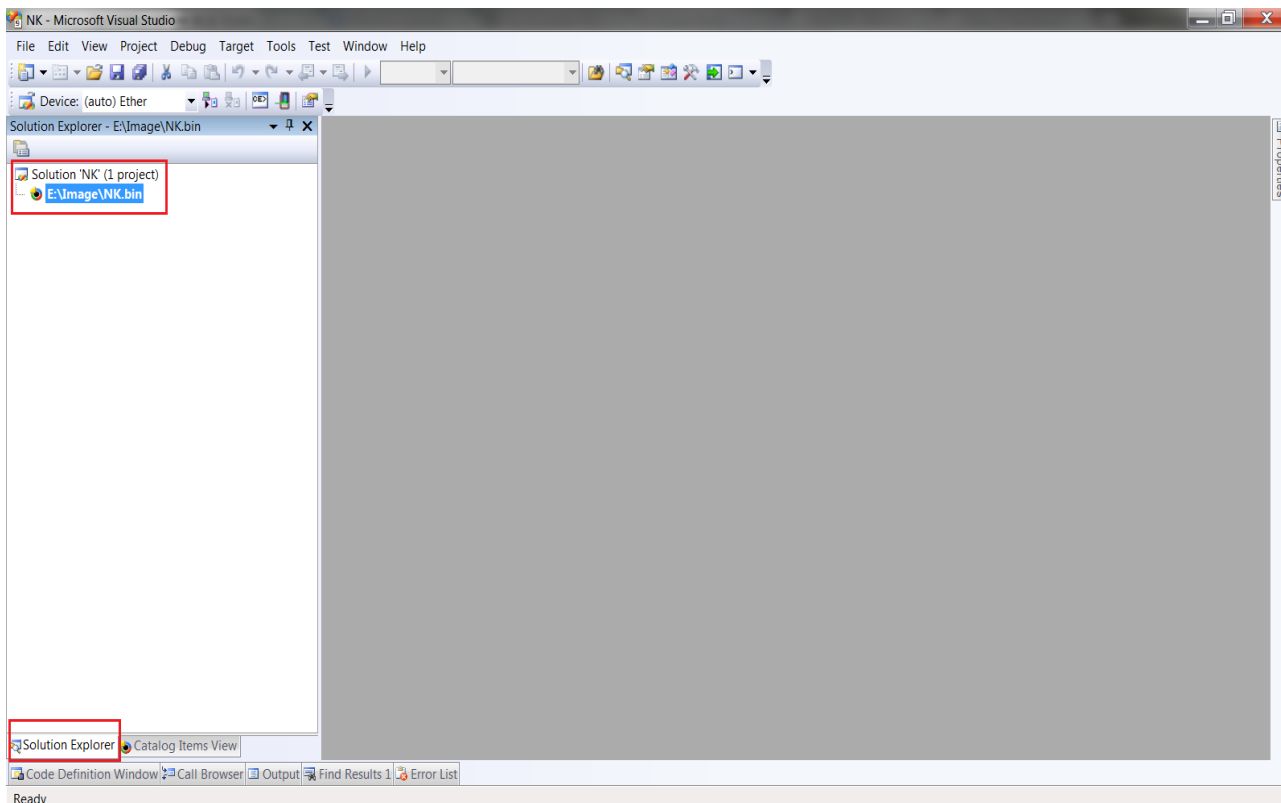
■ Open new instance of Visual Studio, and then click
**File → Open → Project/Solution**
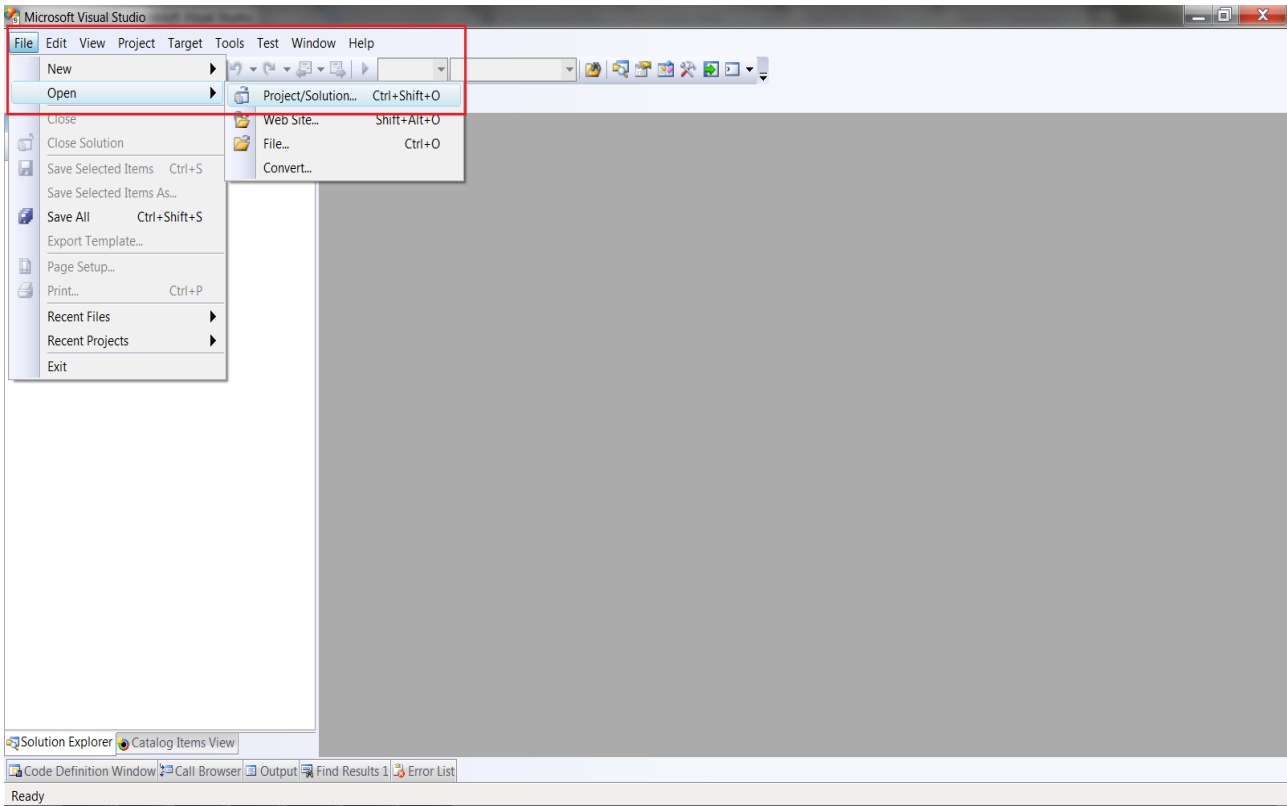
■ Browse to the folder containing "**NK.bin**" file, select the file, and click "**Open**".
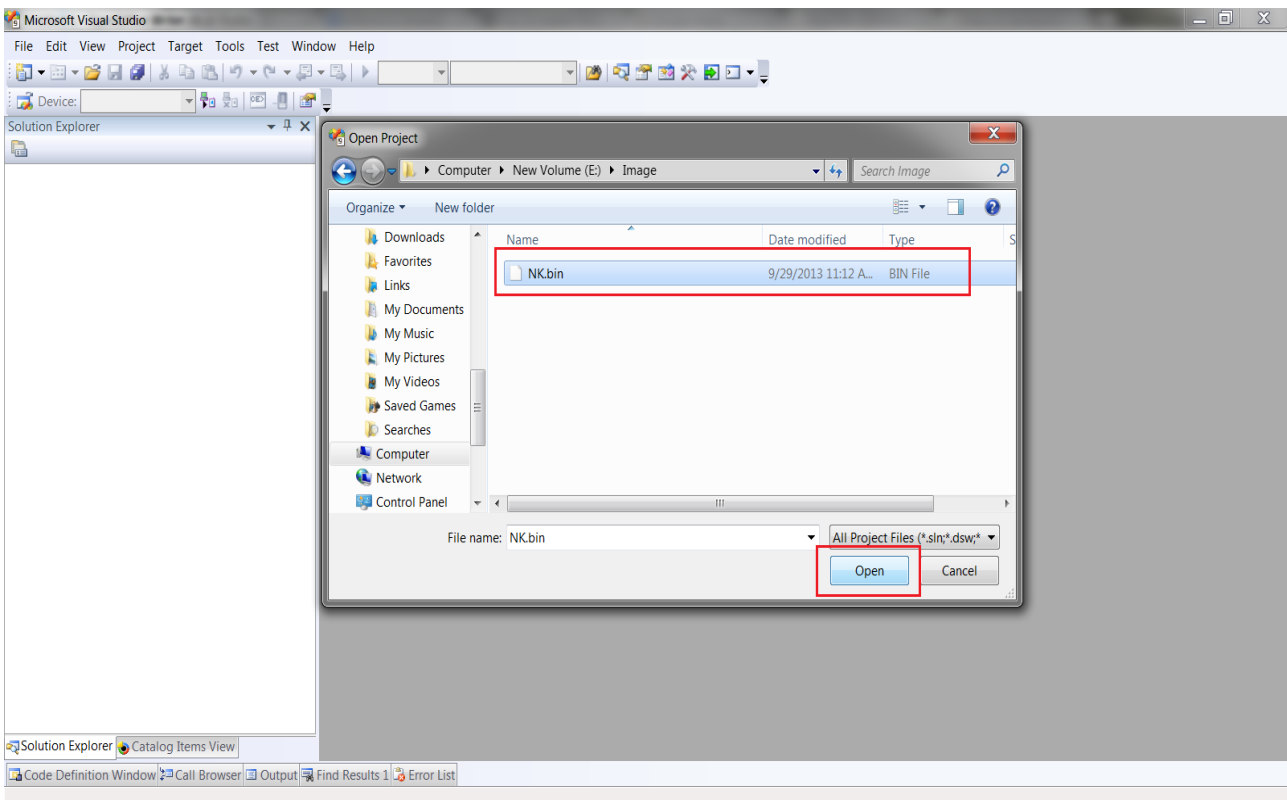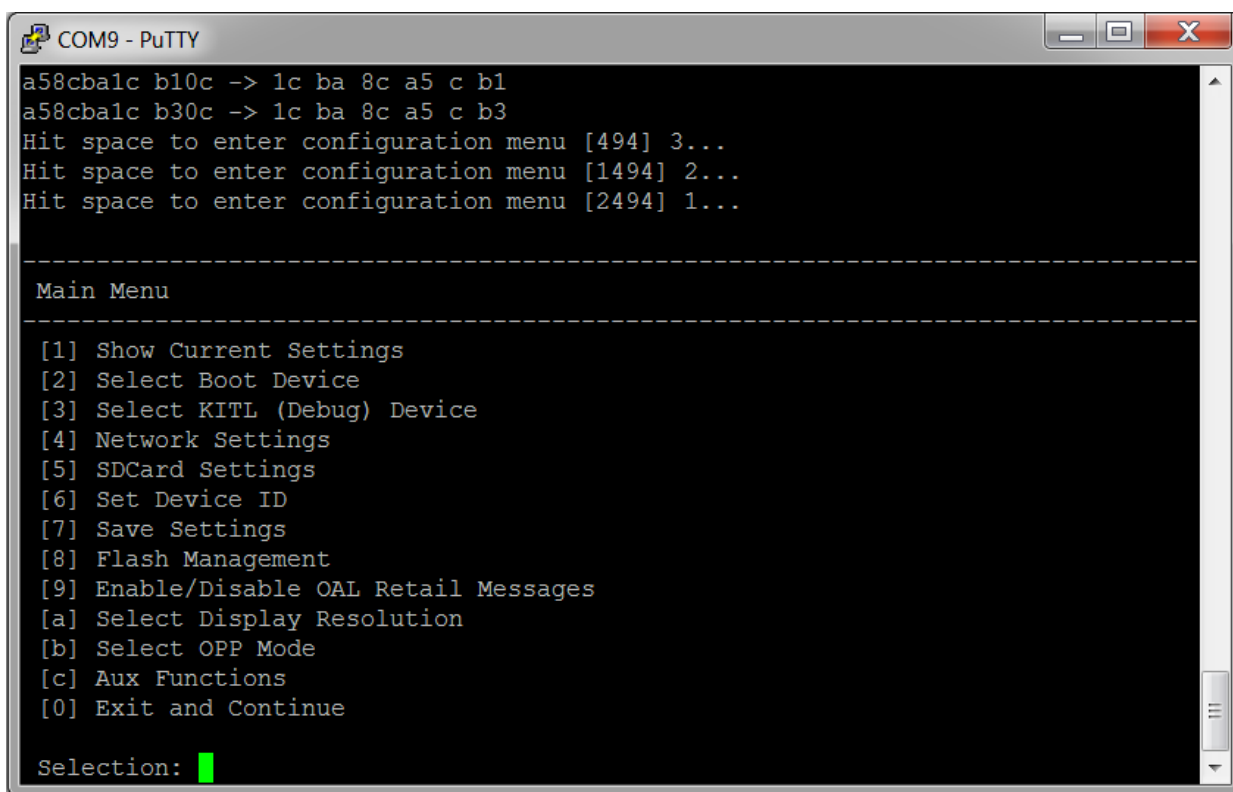
■ Upon the successful selection, you will find selected image in "**Solution Explorer**" window.

■ Now before starting with the process, the ip address of host machine and device needs to be changed so as they fall in same domain.
Hence change the host ip address respectively, example is shown below
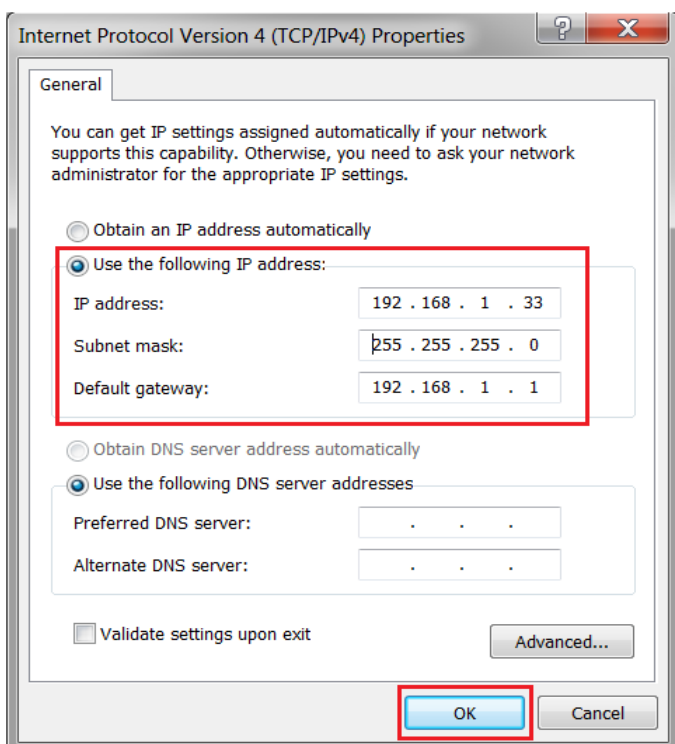
■ Once the host ip address is set it is also important to set device ip address. Open putty serial console and hit spacebar before the counter expires.
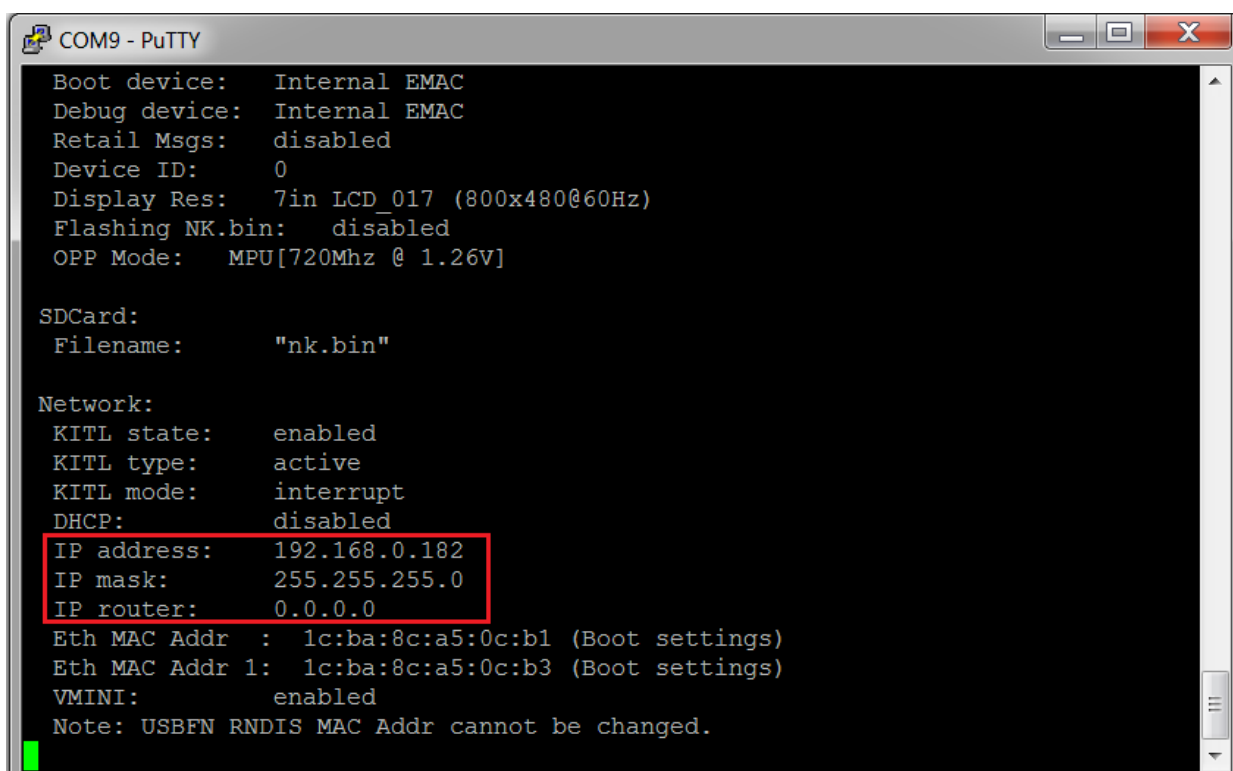
```
a58cba1c b10c -> 1c ba 8c a5 c b1
a58cba1c b30c -> 1c ba 8c a5 c b3
Hit space to enter configuration menu [494] 3...
Hit space to enter configuration menu [1494] 2...
Hit space to enter configuration menu [2494] 1...


----------------------------------------------------------------
 Main Menu
----------------------------------------------------------------

 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection:
```

■ In order to see the device ip address and other information of your device, after getting the "**Main Menu**" press "**1**" to select option "**[1] Show Current Settings**".
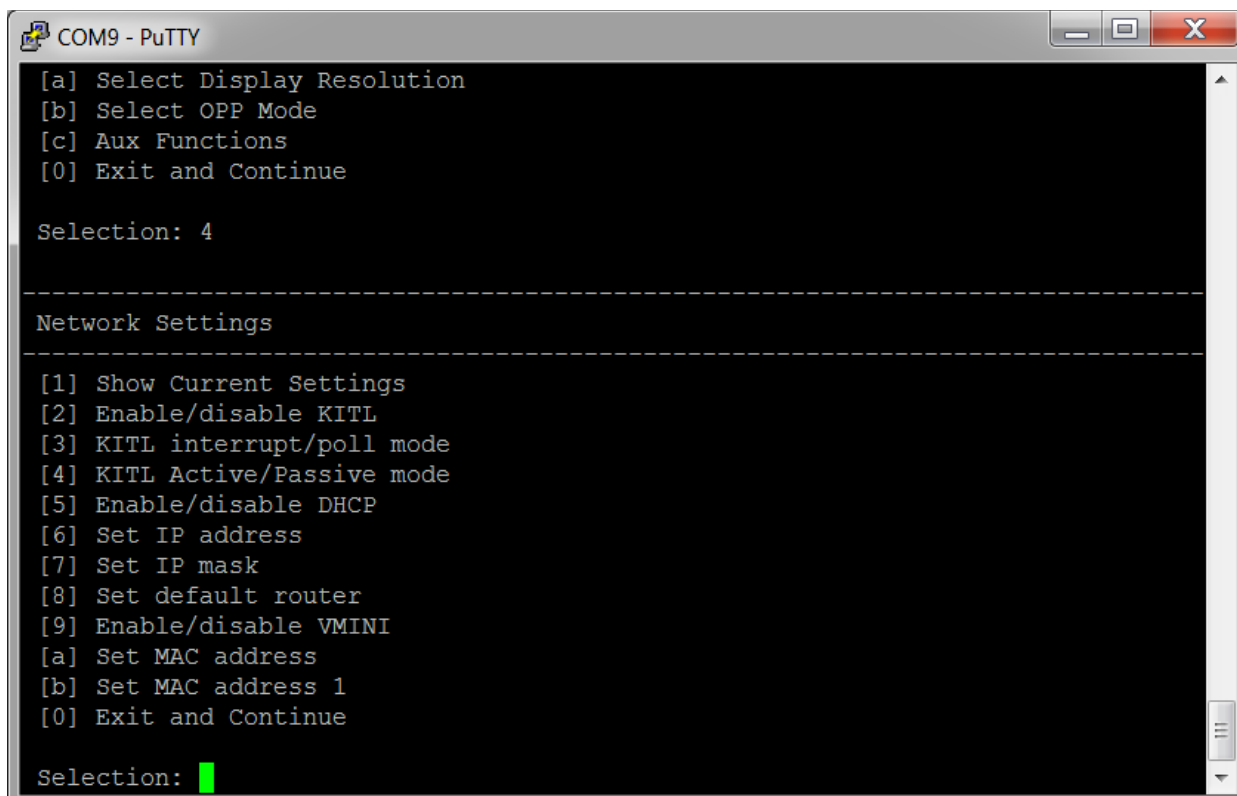
```
 Boot device:   Internal EMAC
 Debug device:  Internal EMAC
 Retail Msgs:   disabled
 Device ID:     0
 Display Res:   7in LCD_017 (800x480@60Hz)
 Flashing NK.bin:   disabled
 OPP Mode:   MPU[720Mhz @ 1.26V]

 SDCard:
  Filename:       "nk.bin"

 Network:
  KITL state:    enabled
  KITL type:     active
  KITL mode:     interrupt
  DHCP:          disabled
  IP address:    192.168.0.182
  IP mask:       255.255.255.0
  IP router:     0.0.0.0
  Eth MAC Addr : 1c:ba:8c:a5:0c:b1 (Boot settings)
  Eth MAC Addr 1: 1c:ba:8c:a5:0c:b3 (Boot settings)
  VMINI:         enabled
  Note: USBFN RNDIS MAC Addr cannot be changed.
```

■ Now to change the ip address of your device, hit "**Enter**" to return back to "**Main Menu**", and press "**4**" to select option "**[4] Network Settings**".

```
COM9 - PuTTY

[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 4


------------------------------------------------------------
Network Settings
------------------------------------------------------------

[1] Show Current Settings
[2] Enable/disable KITL
[3] KITL interrupt/poll mode
[4] KITL Active/Passive mode
[5] Enable/disable DHCP
[6] Set IP address
[7] Set IP mask
[8] Set default router
[9] Enable/disable VMINI
[a] Set MAC address
[b] Set MAC address 1
[0] Exit and Continue

Selection:
```
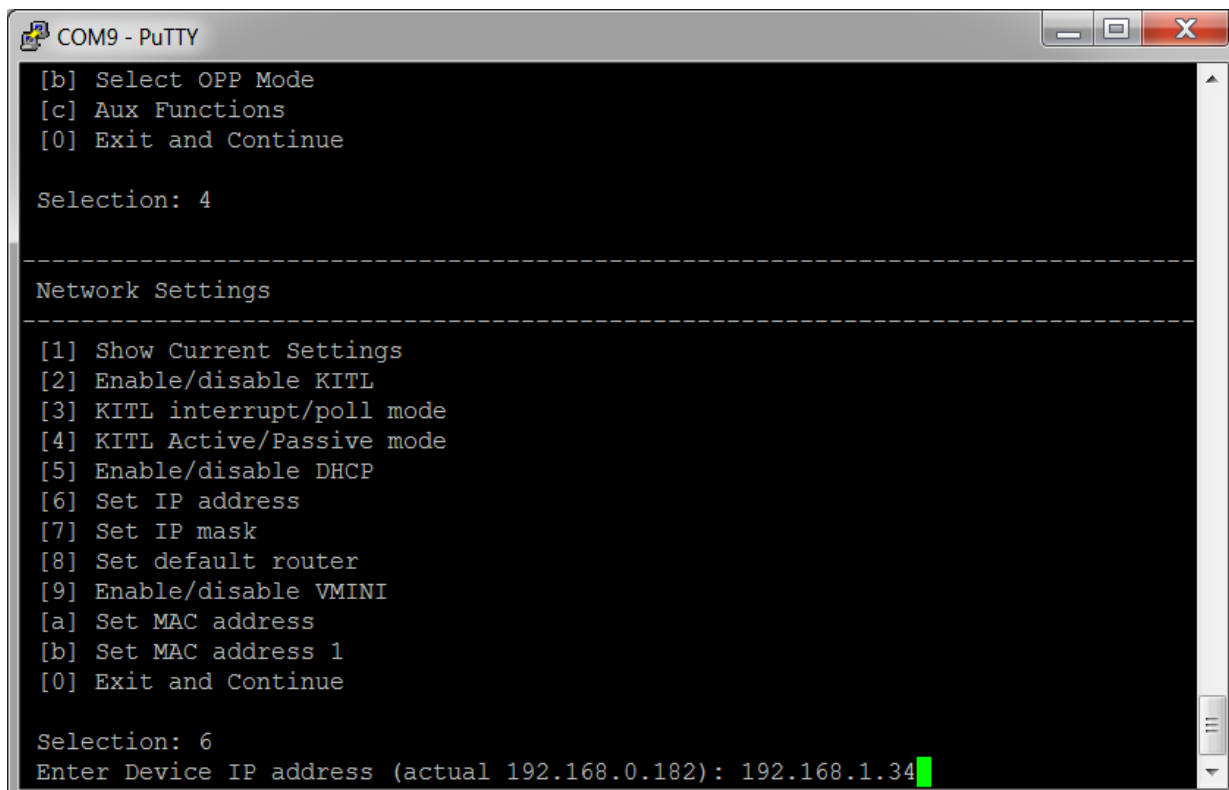
■ Press "**6**" to select option "**[6] Set IP address**" and enter the desired ip address.

```
COM9 - PuTTY

[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 4


------------------------------------------------------------
Network Settings
------------------------------------------------------------

[1] Show Current Settings
[2] Enable/disable KITL
[3] KITL interrupt/poll mode
[4] KITL Active/Passive mode
[5] Enable/disable DHCP
[6] Set IP address
[7] Set IP mask
[8] Set default router
[9] Enable/disable VMINI
[a] Set MAC address
[b] Set MAC address 1
[0] Exit and Continue

Selection: 6
Enter Device IP address (actual 192.168.0.182): 192.168.1.34
```
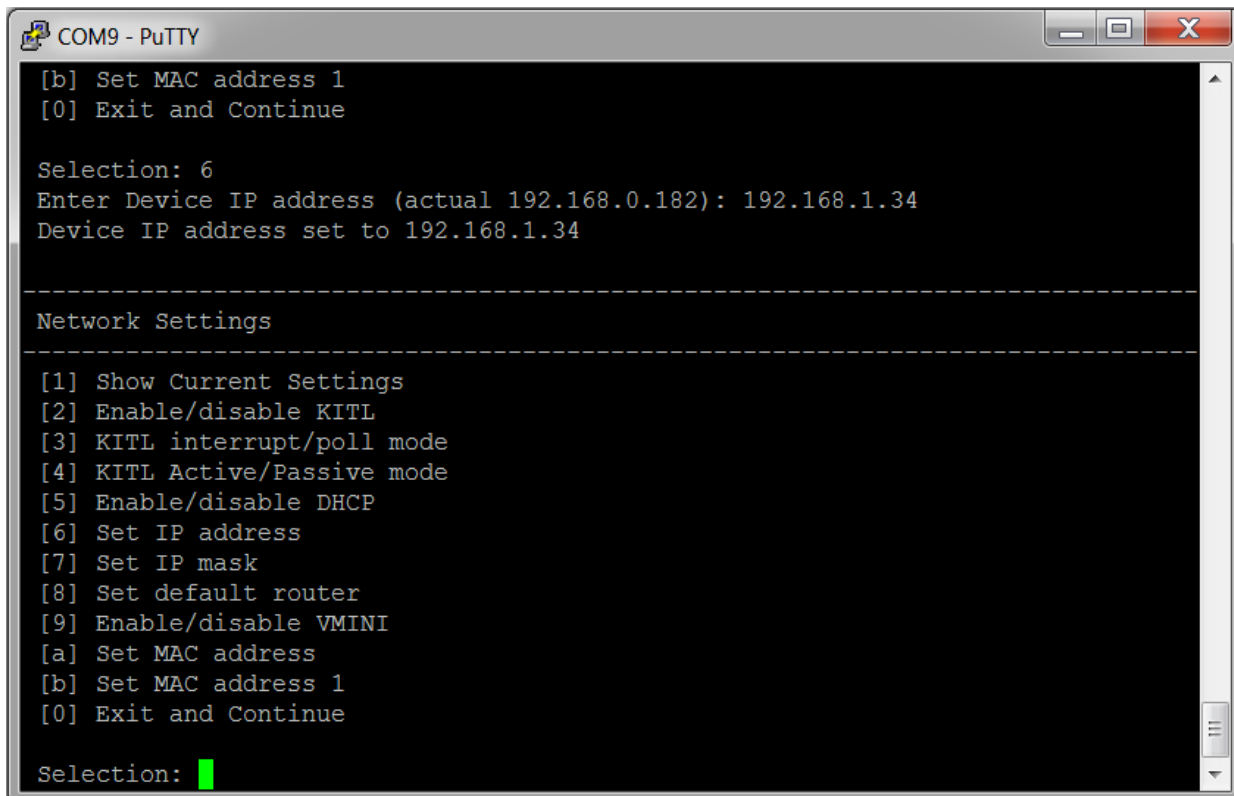
■ After entering the ip address, hit "**Enter**" to go back to "**Network Settings**" Menu.

```
COM9 - PuTTY

[b] Set MAC address 1
[0] Exit and Continue

Selection: 6
Enter Device IP address (actual 192.168.0.182): 192.168.1.34
Device IP address set to 192.168.1.34


-------------------------------------------------------------------
Network Settings
-------------------------------------------------------------------

[1] Show Current Settings
[2] Enable/disable KITL
[3] KITL interrupt/poll mode
[4] KITL Active/Passive mode
[5] Enable/disable DHCP
[6] Set IP address
[7] Set IP mask
[8] Set default router
[9] Enable/disable VMINI
[a] Set MAC address
[b] Set MAC address 1
[0] Exit and Continue

Selection: 
```
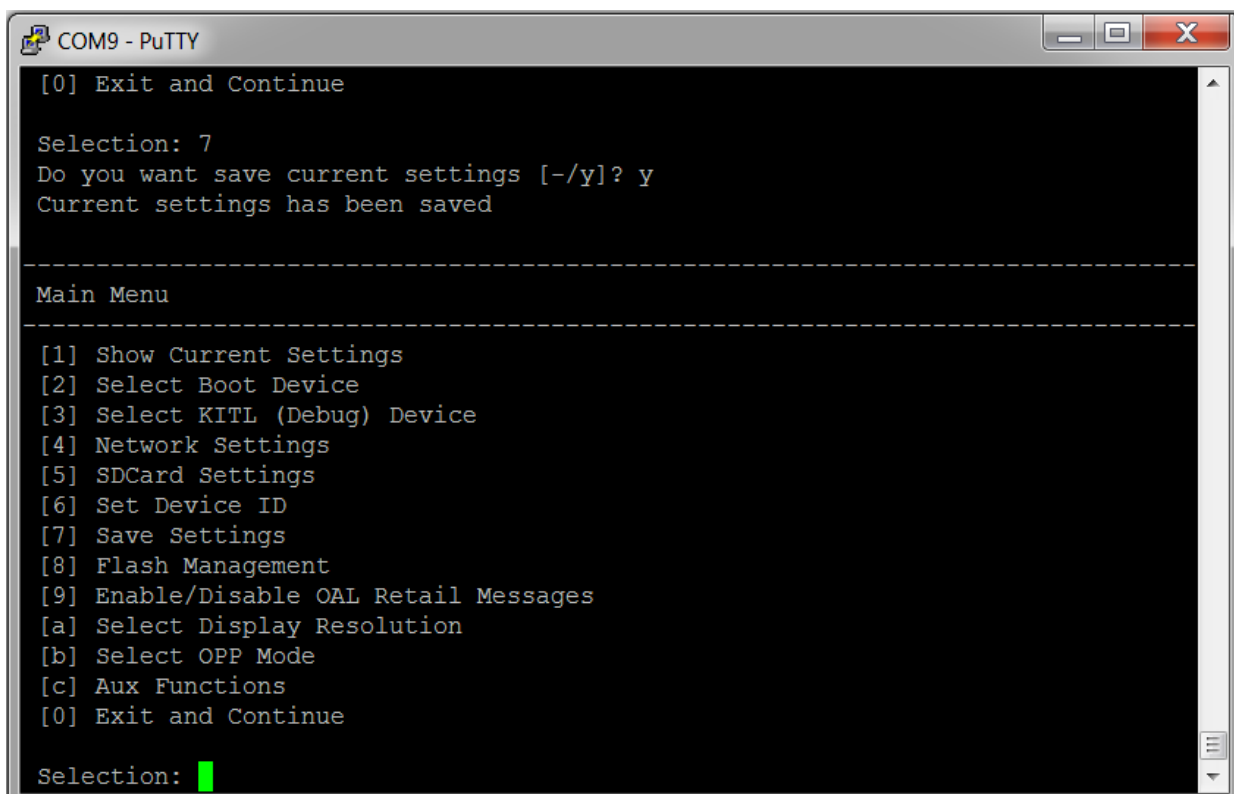
■ Press "**7**" to select option "**[7] Set IP Mask**" and then enter necessary IP mask, in this example we enter mask address as **255.255.255.0**.

```
COM9 - PuTTY

[0] Exit and Continue

Selection: 7
Do you want save current settings [-/y]? y
Current settings has been saved


-------------------------------------------------------------------
Main Menu
-------------------------------------------------------------------

[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 
```

```
COM9 - PuTTY

 [0] Exit and Continue

 Selection: 6
 Enter Device IP address (actual 192.168.0.182): 192.168.1.34
 Device IP address set to 192.168.1.34


 -----------------------------------------------------------------
 Network Settings
 -----------------------------------------------------------------

 [1] Show Current Settings
 [2] Enable/disable KITL
 [3] KITL interrupt/poll mode
 [4] KITL Active/Passive mode
 [5] Enable/disable DHCP
 [6] Set IP address
 [7] Set IP mask
 [8] Set default router
 [9] Enable/disable VMINI
 [a] Set MAC address
 [b] Set MAC address 1
 [0] Exit and Continue

 Selection: 7
 Enter Device IP mask (actual 255.255.255.0): 255.255.255.0
```
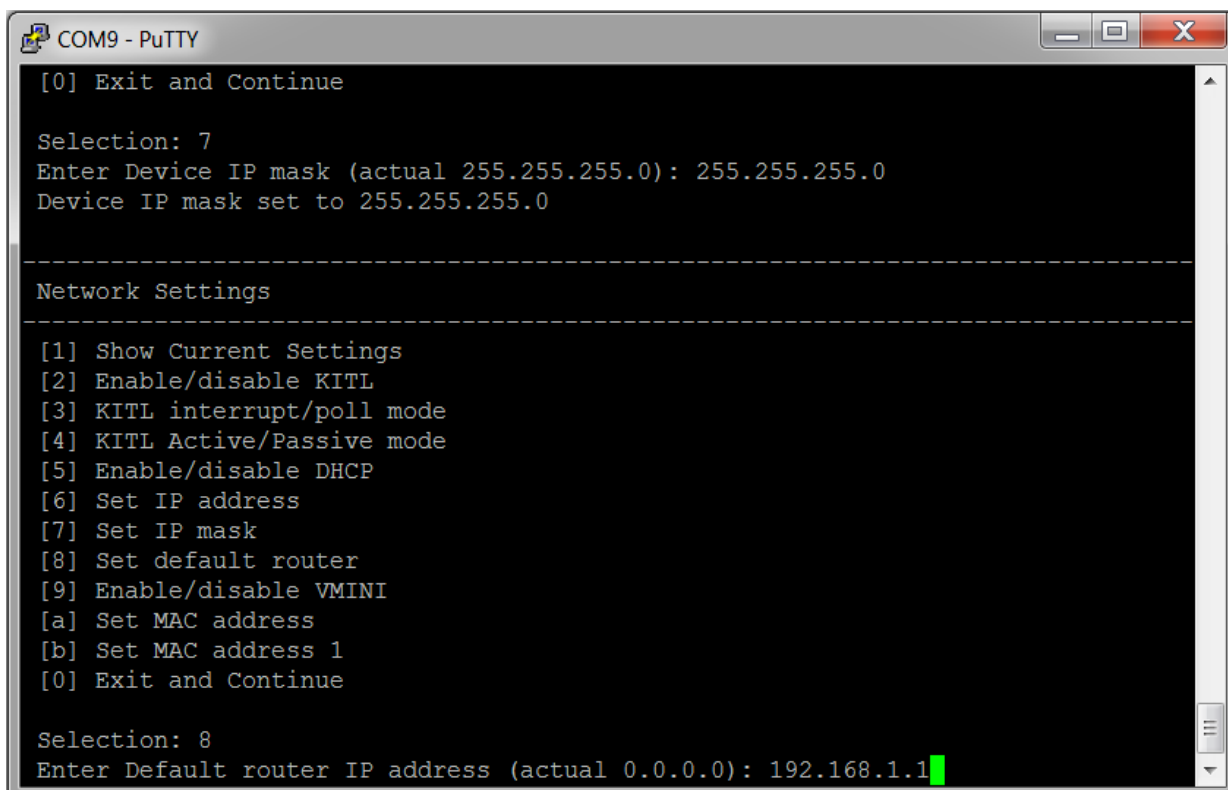
■   After entering ip mask address hit "**Enter**" to go back to "**Network Settings**" Menu.

```
COM9 - PuTTY

 [b] Set MAC address 1
 [0] Exit and Continue

 Selection: 7
 Enter Device IP mask (actual 255.255.255.0): 255.255.255.0
 Device IP mask set to 255.255.255.0


 -----------------------------------------------------------------
 Network Settings
 -----------------------------------------------------------------

 [1] Show Current Settings
 [2] Enable/disable KITL
 [3] KITL interrupt/poll mode
 [4] KITL Active/Passive mode
 [5] Enable/disable DHCP
 [6] Set IP address
 [7] Set IP mask
 [8] Set default router
 [9] Enable/disable VMINI
 [a] Set MAC address
 [b] Set MAC address 1
 [0] Exit and Continue

 Selection:
```

■ Press "**8**" to select option "**[8] Set default router**" and then enter default router address, in this example we enter router address as shown.

```
COM9 - PuTTY                                                     _ □ X

 [0] Exit and Continue

 Selection: 7
 Enter Device IP mask (actual 255.255.255.0): 255.255.255.0
 Device IP mask set to 255.255.255.0


 -----------------------------------------------------------------
 Network Settings
 -----------------------------------------------------------------

 [1] Show Current Settings
 [2] Enable/disable KITL
 [3] KITL interrupt/poll mode
 [4] KITL Active/Passive mode
 [5] Enable/disable DHCP
 [6] Set IP address
 [7] Set IP mask
 [8] Set default router
 [9] Enable/disable VMINI
 [a] Set MAC address
 [b] Set MAC address 1
 [0] Exit and Continue

 Selection: 8
 Enter Default router IP address (actual 0.0.0.0): 192.168.1.1
```
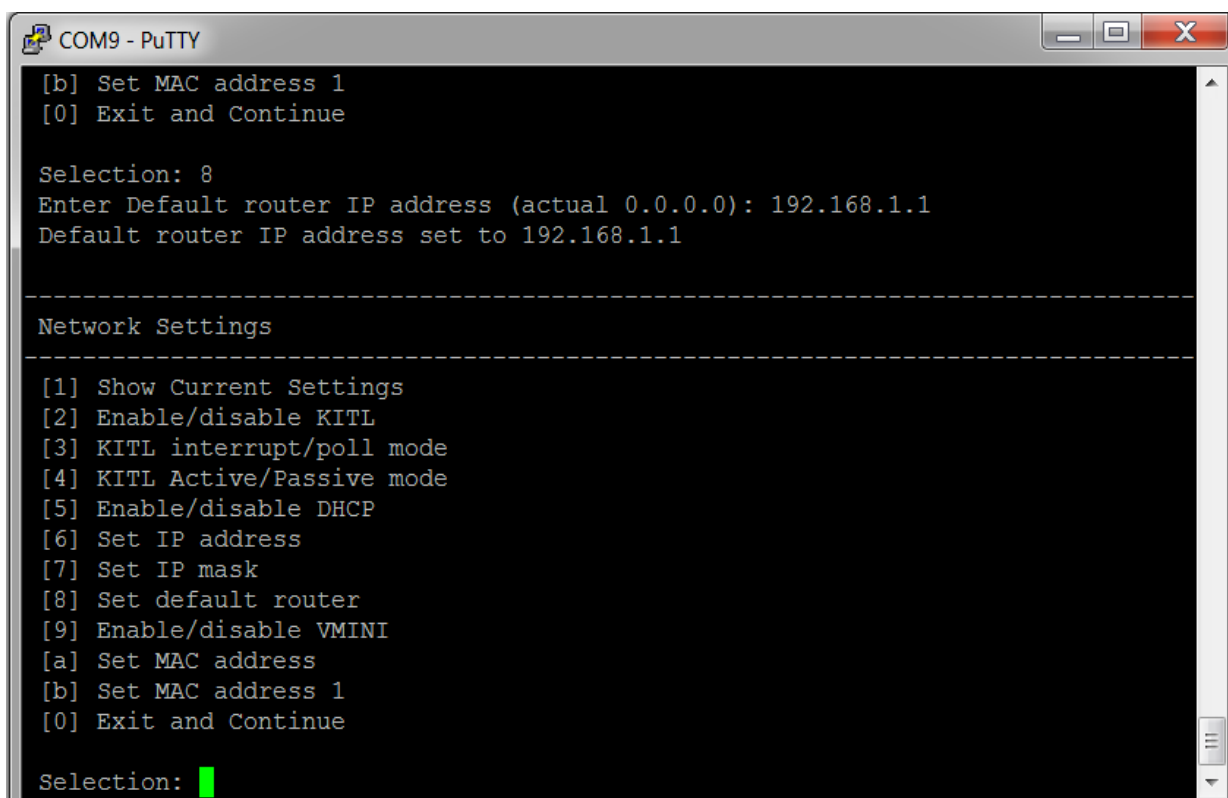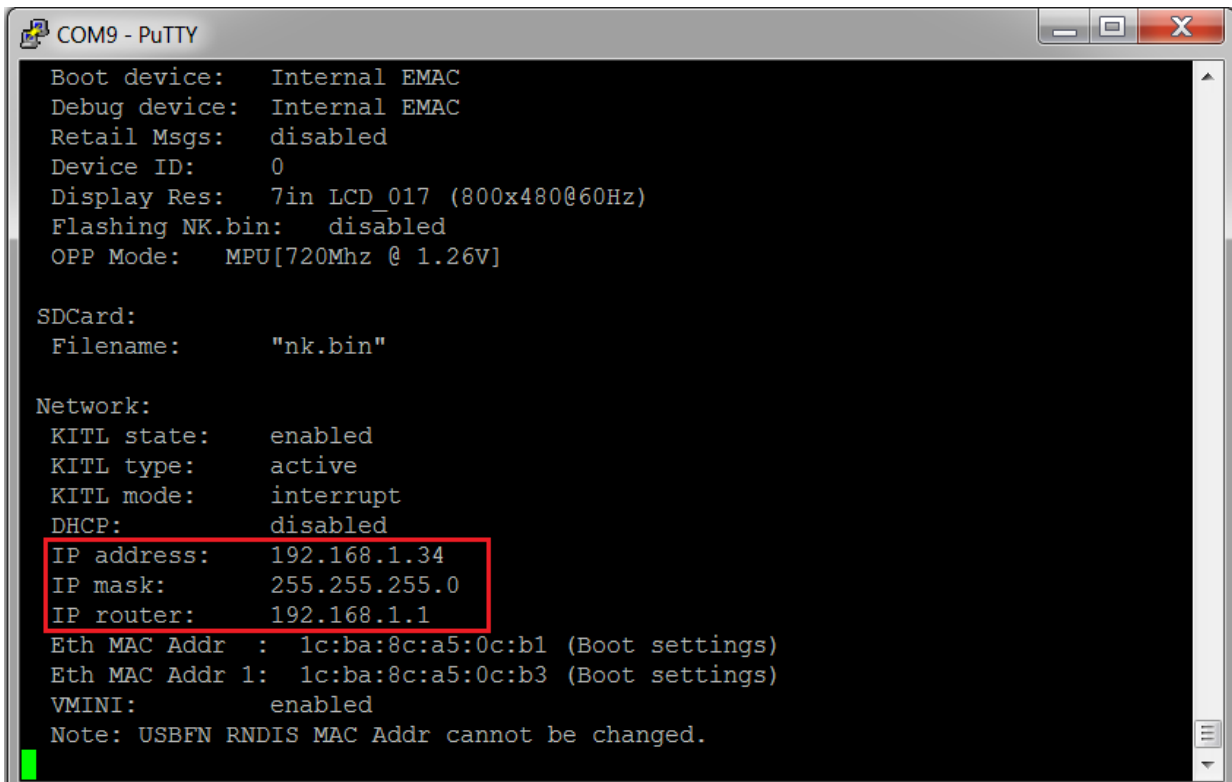
■ After entering default router address hit "**Enter**" to go back to "**Network Settings**" Menu.

```
COM9 - PuTTY                                                     _ □ X

 [b] Set MAC address 1
 [0] Exit and Continue

 Selection: 8
 Enter Default router IP address (actual 0.0.0.0): 192.168.1.1
 Default router IP address set to 192.168.1.1


 -----------------------------------------------------------------
 Network Settings
 -----------------------------------------------------------------
 [1] Show Current Settings
 [2] Enable/disable KITL
 [3] KITL interrupt/poll mode
 [4] KITL Active/Passive mode
 [5] Enable/disable DHCP
 [6] Set IP address
 [7] Set IP mask
 [8] Set default router
 [9] Enable/disable VMINI
 [a] Set MAC address
 [b] Set MAC address 1
 [0] Exit and Continue

 Selection:
```

■ Press "**1**" to select option "**[1] Show Current Settings**" so as to verify the changes.
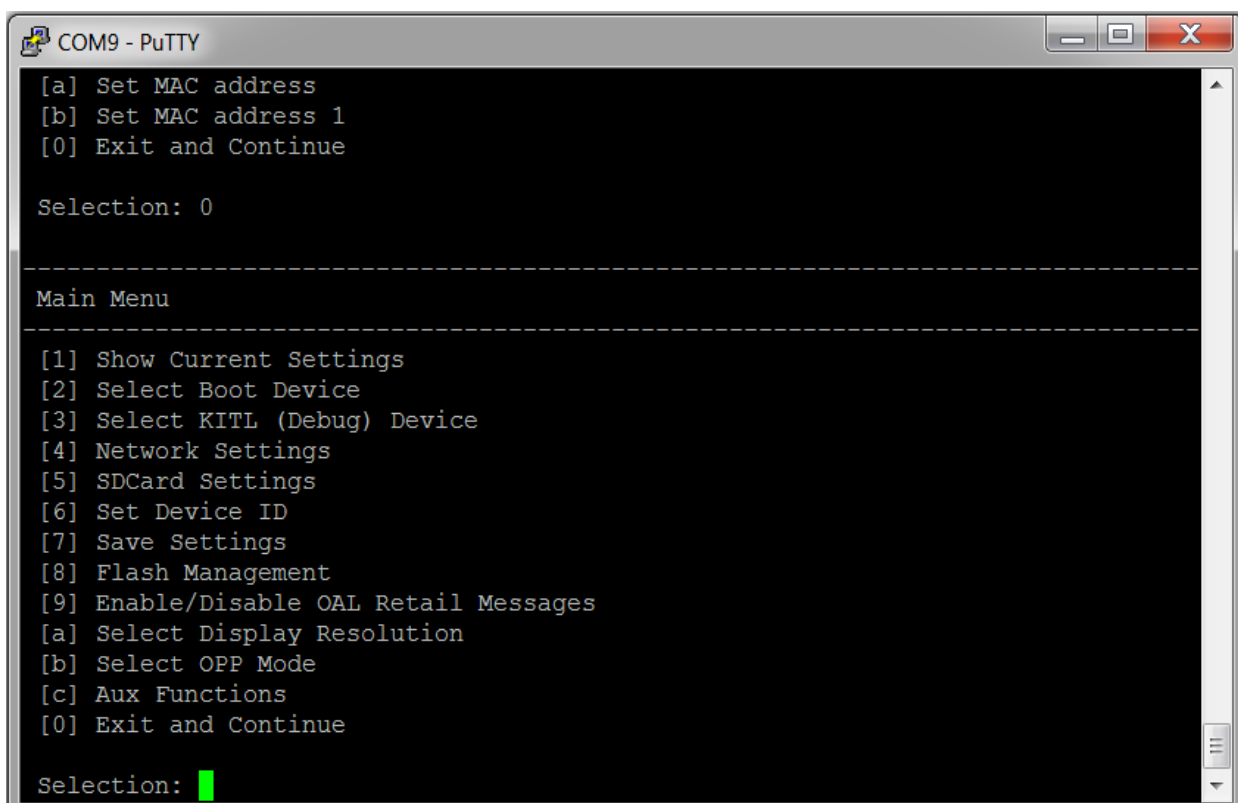
```
COM9 - PuTTY
 Boot device:   Internal EMAC
 Debug device:  Internal EMAC
 Retail Msgs:   disabled
 Device ID:     0
 Display Res:   7in LCD_017 (800x480@60Hz)
 Flashing NK.bin:   disabled
 OPP Mode:   MPU[720Mhz @ 1.26V]

SDCard:
 Filename:      "nk.bin"

Network:
 KITL state:    enabled
 KITL type:     active
 KITL mode:     interrupt
 DHCP:          disabled
 IP address:    192.168.1.34
 IP mask:       255.255.255.0
 IP router:     192.168.1.1
 Eth MAC Addr  :   1c:ba:8c:a5:0c:b1 (Boot settings)
 Eth MAC Addr 1:   1c:ba:8c:a5:0c:b3 (Boot settings)
 VMINI:         enabled
 Note: USBFN RNDIS MAC Addr cannot be changed.
```

■ Hit Enter to go back to "**Network Settings**" Menu and then press "**0**" to select option "**[0] Exit and Continue**" so as to exit current menu and go back to "**Main Menu**".

```
COM9 - PuTTY
 [a] Set MAC address
 [b] Set MAC address 1
 [0] Exit and Continue

 Selection: 0


 ------------------------------------------------------------
 Main Menu
 ------------------------------------------------------------
 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection:
```
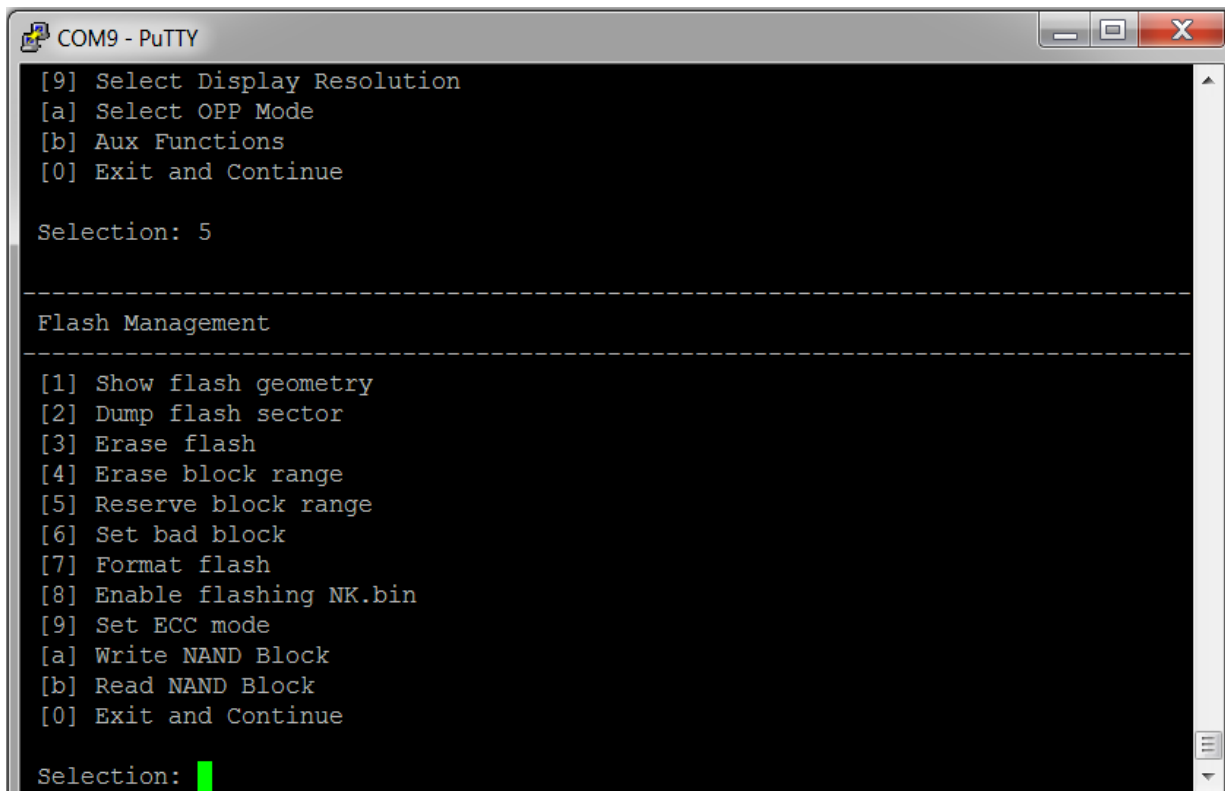
■ Press "**5**" to select option "**[5] Flash Management**".

```
COM9 - PuTTY                                                    ☐ ☐ ✕
[9] Select Display Resolution
[a] Select OPP Mode
[b] Aux Functions
[0] Exit and Continue

Selection: 5


--------------------------------------------------------------------
Flash Management
--------------------------------------------------------------------

[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Enable flashing NK.bin
[9] Set ECC mode
[a] Write NAND Block
[b] Read NAND Block
[0] Exit and Continue

Selection: █
```
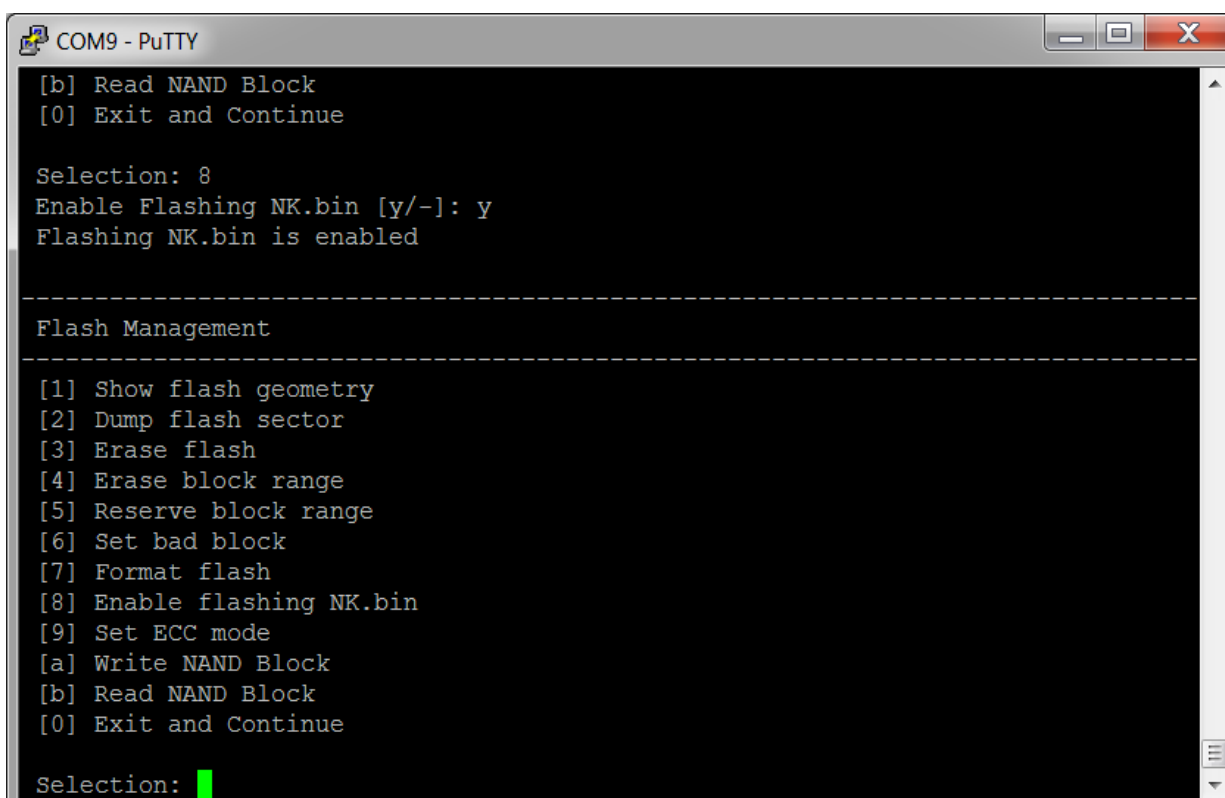
■ Press "**8**" to select option "**[8] Enable flashing NK.bin**" and then press "**y**" when asked for conformation.

```
COM9 - PuTTY                                                    ☐ ☐ ✕
[b] Read NAND Block
[0] Exit and Continue

Selection: 8
Enable Flashing NK.bin [y/-]: y
Flashing NK.bin is enabled


--------------------------------------------------------------------
Flash Management
--------------------------------------------------------------------

[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Enable flashing NK.bin
[9] Set ECC mode
[a] Write NAND Block
[b] Read NAND Block
[0] Exit and Continue

Selection: █
```
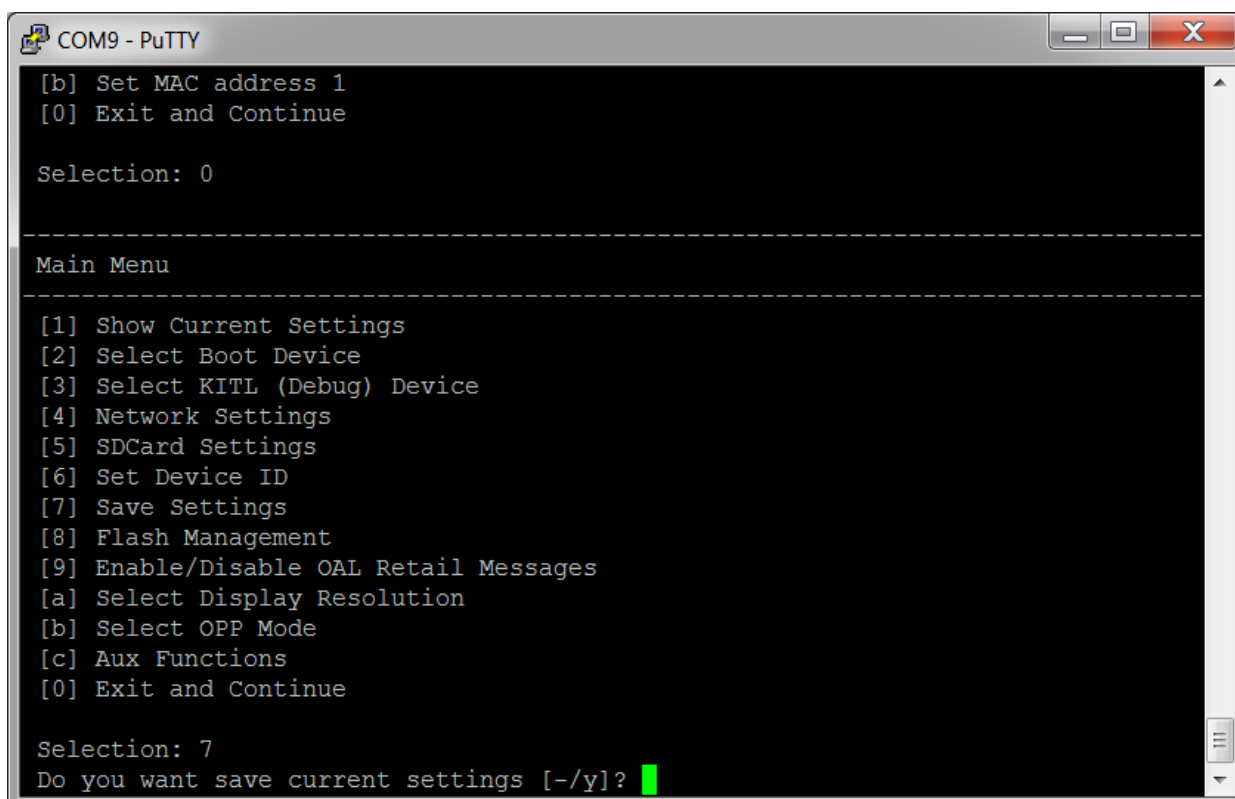
■ Now to save the changes, press "**7**" to select option "**[7] Save Settings**" and then press "**y**" as conformation of selection.

```
COM9 - PuTTY
[b] Set MAC address 1
[0] Exit and Continue

Selection: 0


------------------------------------------------------------------------
Main Menu
------------------------------------------------------------------------

[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 7
Do you want save current settings [-/y]?
```
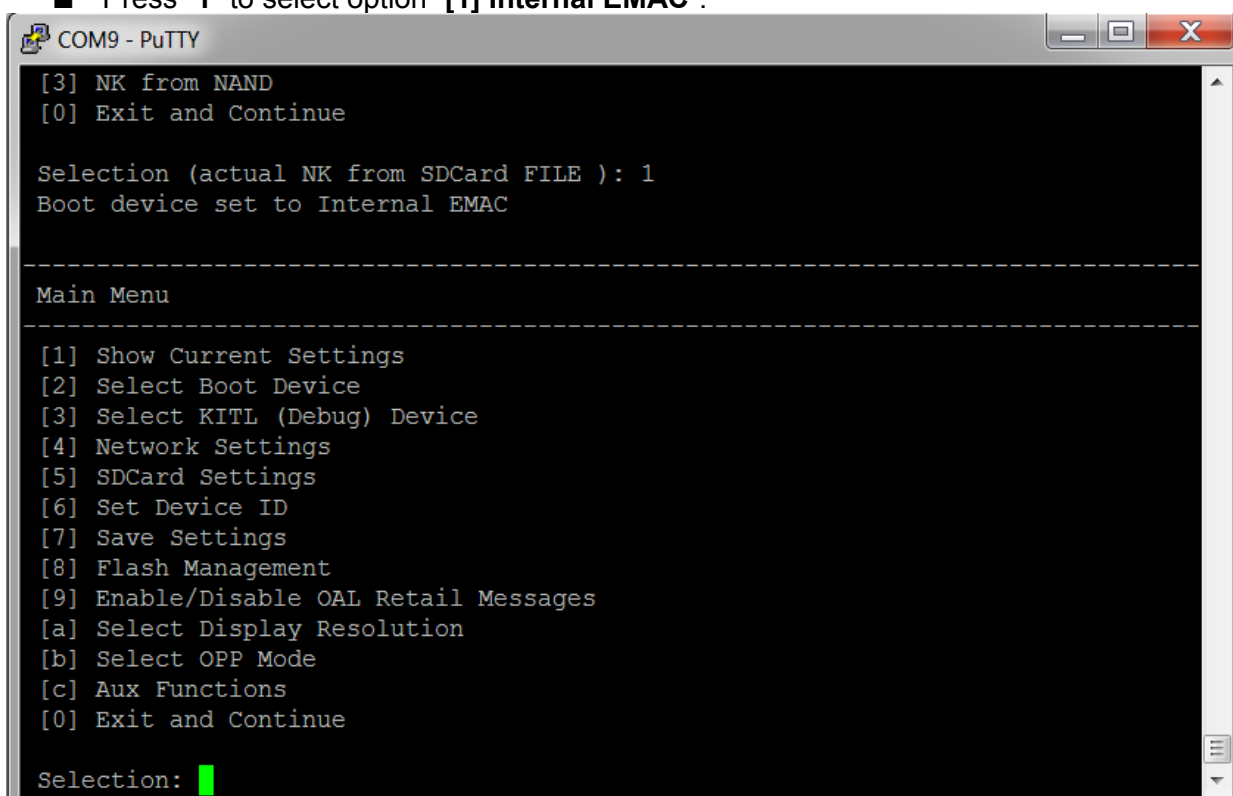
■ Now that the ip address of both host machine and device is set appropriately, the procedure for downloading NK.bin can be started. Go back to the Visual Studio window, click on "**Target**" and then select "**Connectivity Options**".
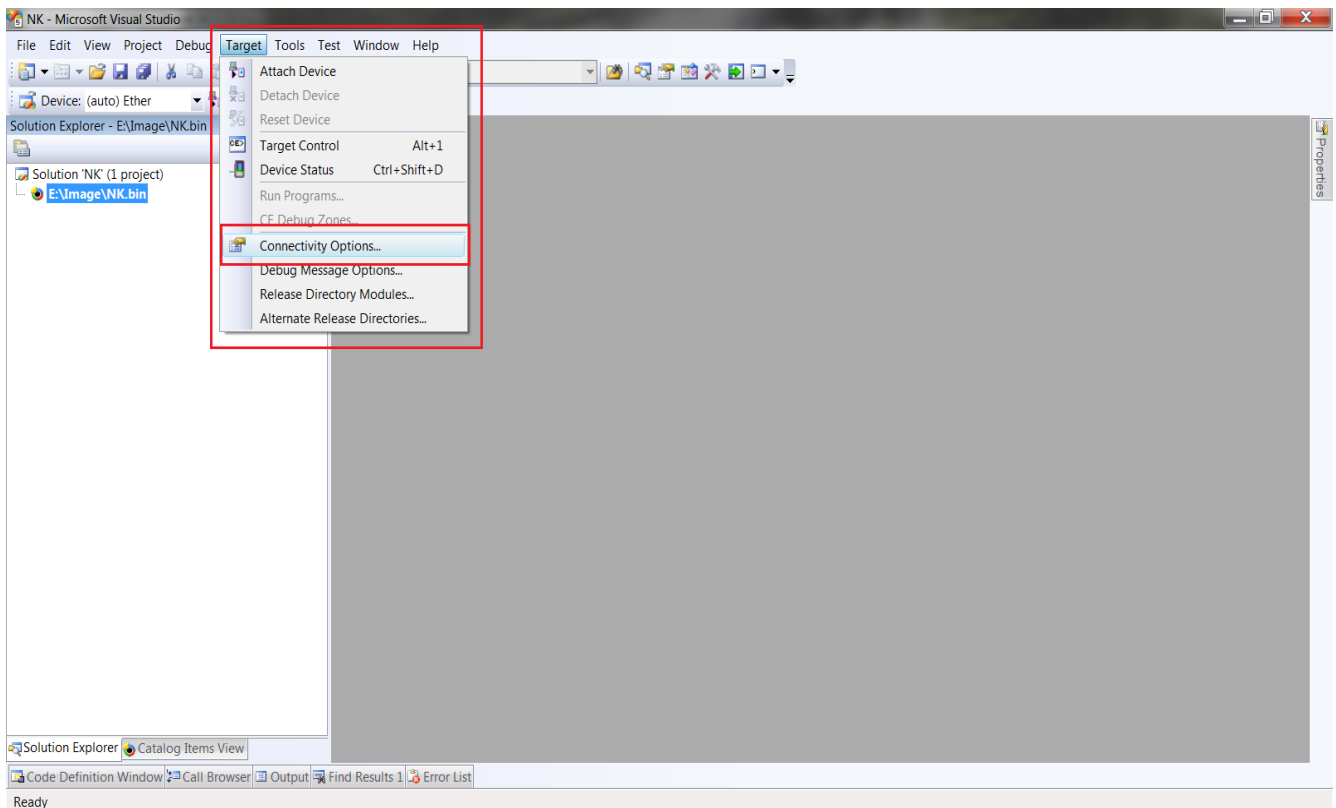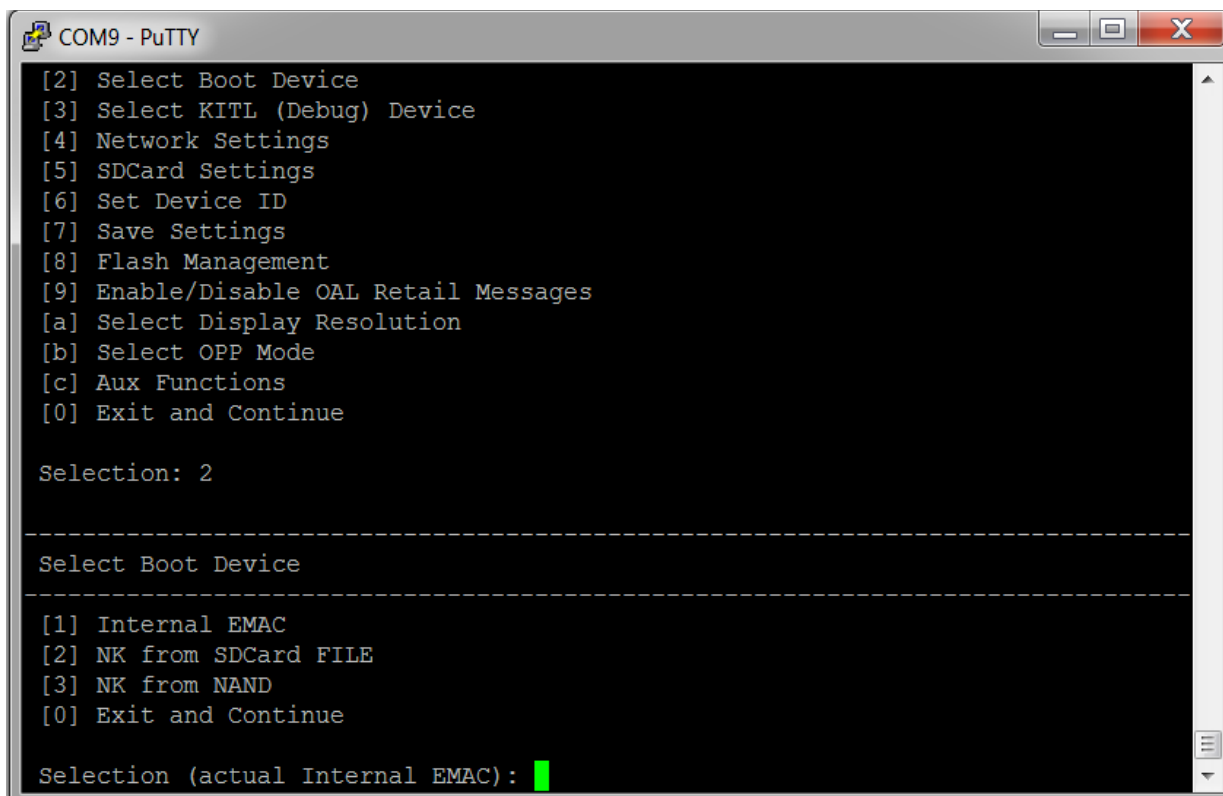
■ Clicking "**Connectivity Options**" in "**Target**" list will open window "**Target Device Connectivity Options**", in this window, under "**Device Configuration**" click "**Add Device**" to add new device. Enter desired name for device under "**New target device name**", also in the drop down list of "**Associated OS Designs/SDK (Optional)**" select "**Windows CE**". And then click "**Add**".
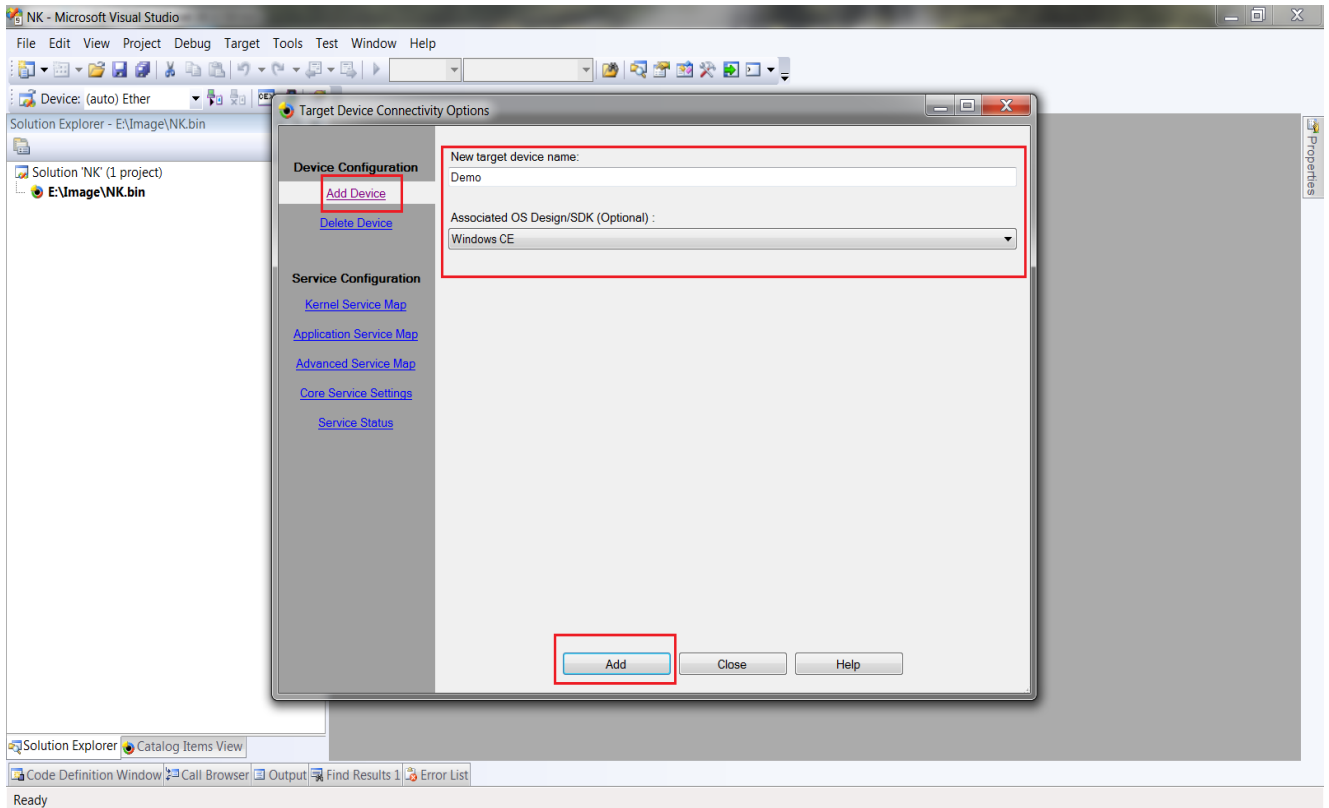
■   "**Target Device**" will be set with the provided name. Now click on the "**Settings**" button of "**Kernel Download**" column. This will open "**Ethernet Download Settings**" window.
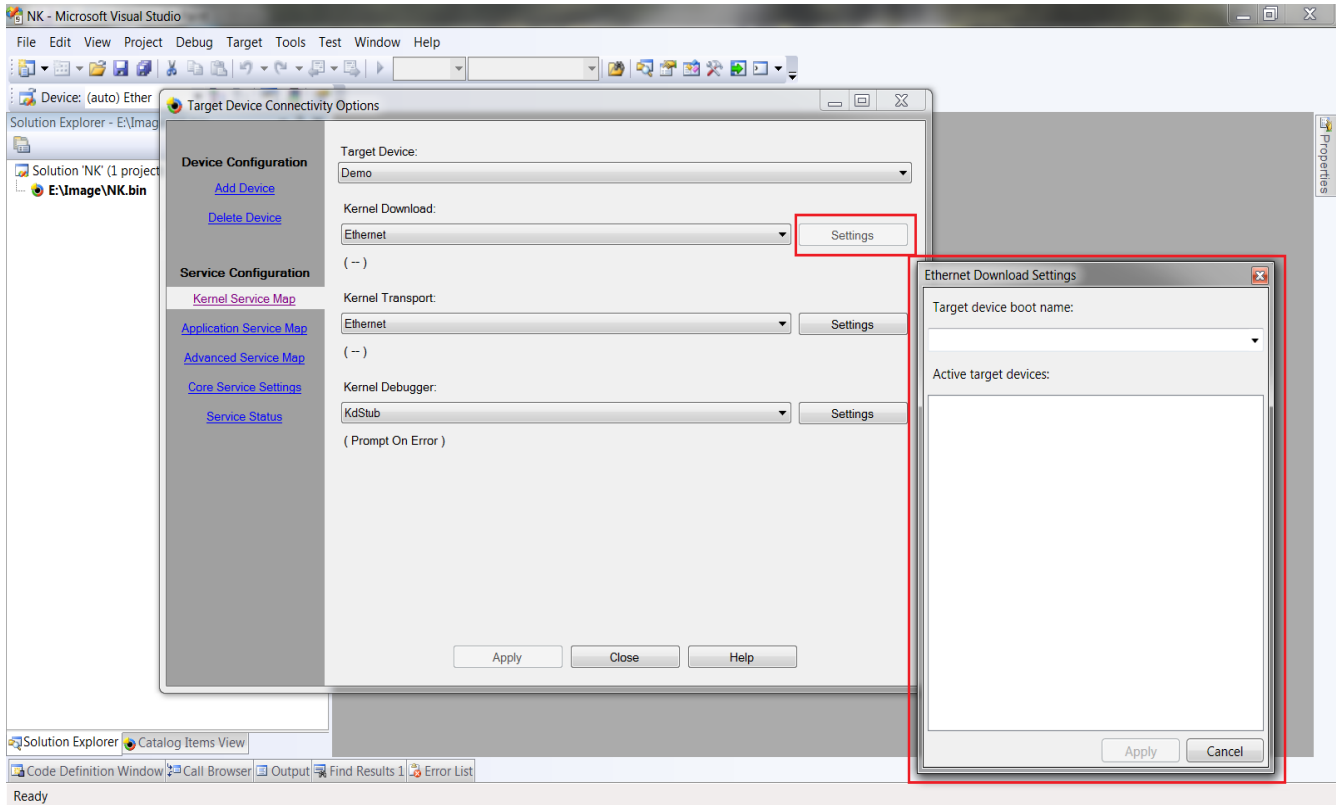
■ In order to establish connection between device and host, our device needs to be recognized by host application, i.e device name needs to be appear under the "**Active target devices** " in order to achieve this, go back to putty console, press "**2**" to select the option "**[2] Select Boot Device**".

```
COM9 - PuTTY                                                    _ □ ✕

[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: 2


------------------------------------------------------------------
Select Boot Device
------------------------------------------------------------------

[1] Internal EMAC
[2] NK from SDCard FILE
[3] NK from NAND
[0] Exit and Continue

Selection (actual Internal EMAC): █
```

■ Press "**1**" to select option "**[1] Internal EMAC**".
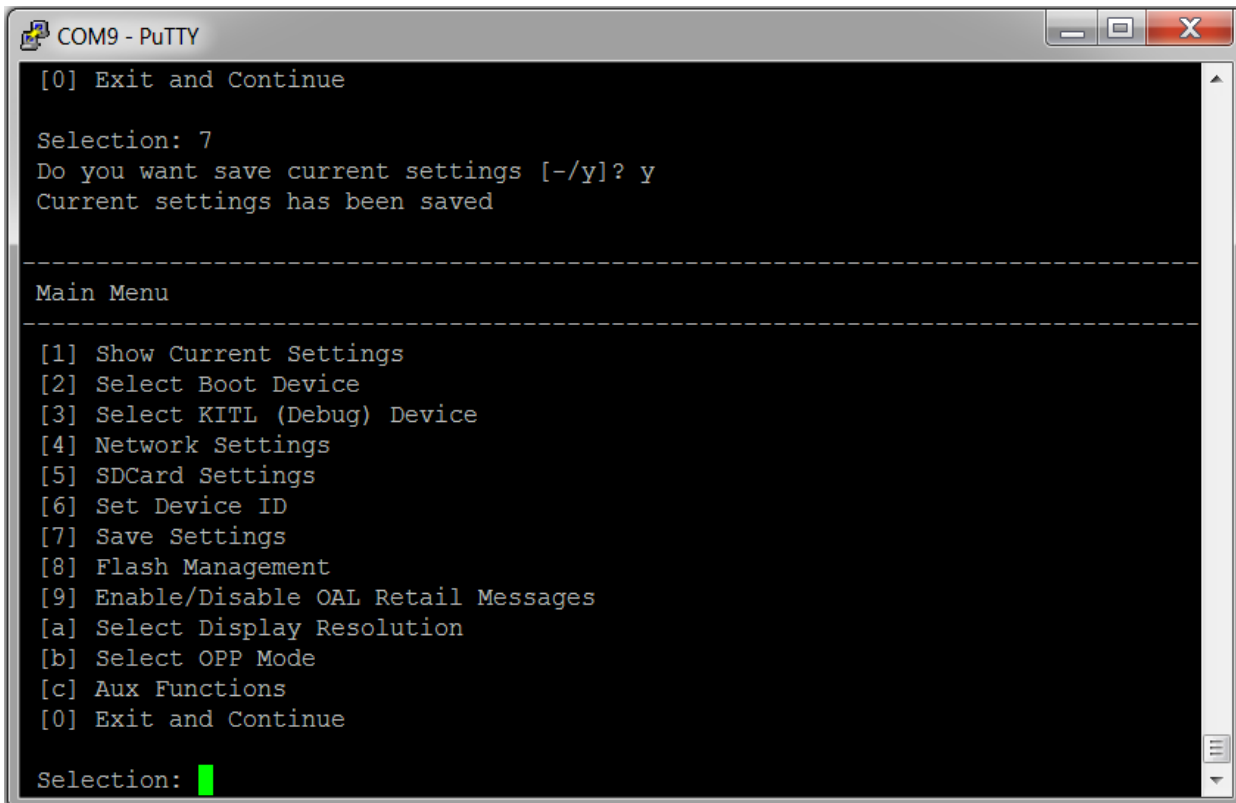
```
COM9 - PuTTY                                                    _ □ ✕

[3] NK from NAND
[0] Exit and Continue

Selection (actual NK from SDCard FILE ): 1
Boot device set to Internal EMAC


------------------------------------------------------------------
Main Menu
------------------------------------------------------------------

[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[b] Select OPP Mode
[c] Aux Functions
[0] Exit and Continue

Selection: █
```

- Then press "**7**" to select option "**[7] Save Settings**" and then press "**y**" when asked for conformation.
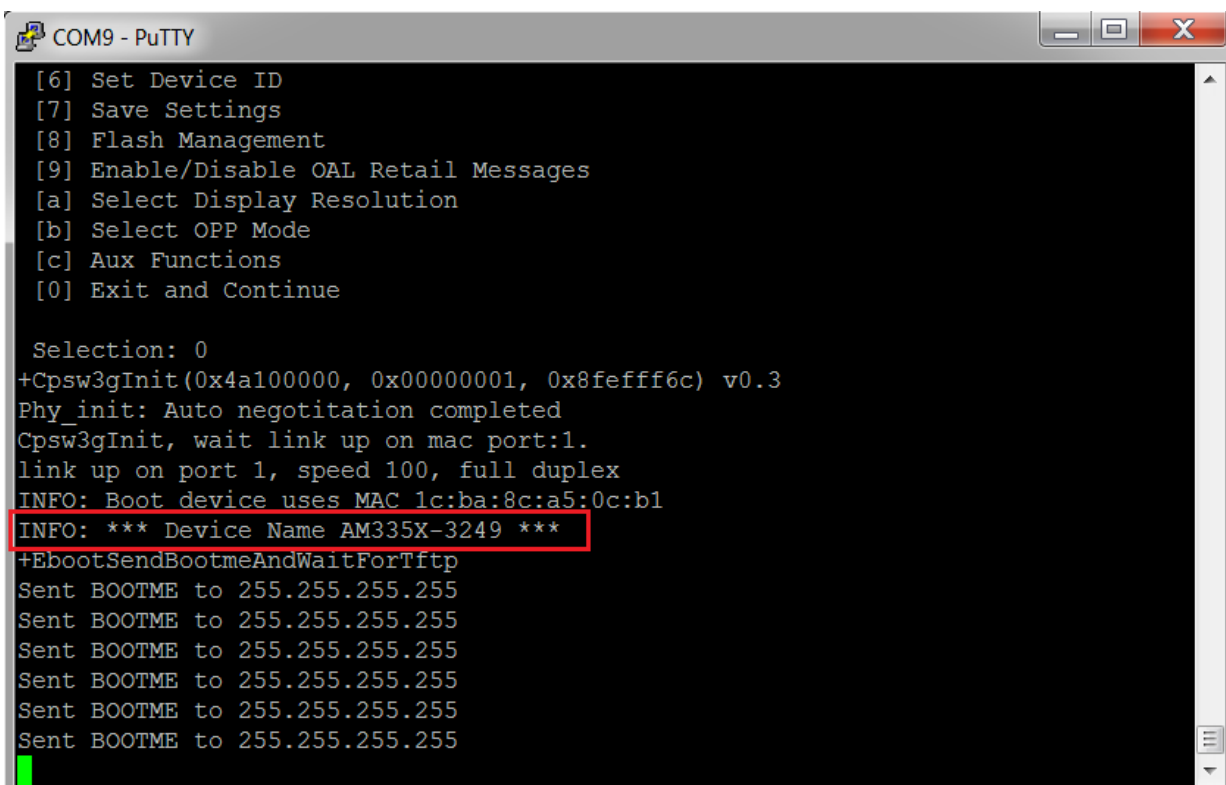
```
COM9 - PuTTY                                                        [_][□][X]

 [0] Exit and Continue

 Selection: 7
 Do you want save current settings [-/y]? y
 Current settings has been saved


 ----------------------------------------------------------------------
 Main Menu
 ----------------------------------------------------------------------
 [1] Show Current Settings
 [2] Select Boot Device
 [3] Select KITL (Debug) Device
 [4] Network Settings
 [5] SDCard Settings
 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection:
```

- Press "**0**" to select option "**[0] Exit and Continue**". Here in the log message device name would be displayed as shown below.

```
COM9 - PuTTY                                                        [_][□][X]

 [6] Set Device ID
 [7] Save Settings
 [8] Flash Management
 [9] Enable/Disable OAL Retail Messages
 [a] Select Display Resolution
 [b] Select OPP Mode
 [c] Aux Functions
 [0] Exit and Continue

 Selection: 0
+Cpsw3gInit(0x4a100000, 0x00000001, 0x8fefff6c) v0.3
Phy_init: Auto negotitation completed
Cpsw3gInit, wait link up on mac port:1.
link up on port 1, speed 100, full duplex
INFO: Boot device uses MAC 1c:ba:8c:a5:0c:b1
INFO: *** Device Name AM335X-3249 ***
+EbootSendBootmeAndWaitForTftp
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
```

■ Now go back to "**Ethernet Download Settings**" window. Here the entry with the device name will be displayed once the application receives the "**Sent BOOTME to 255.255.255.255**" from device. Upon receiving the device name entry, click on it so as to select it and then click "**Apply**".
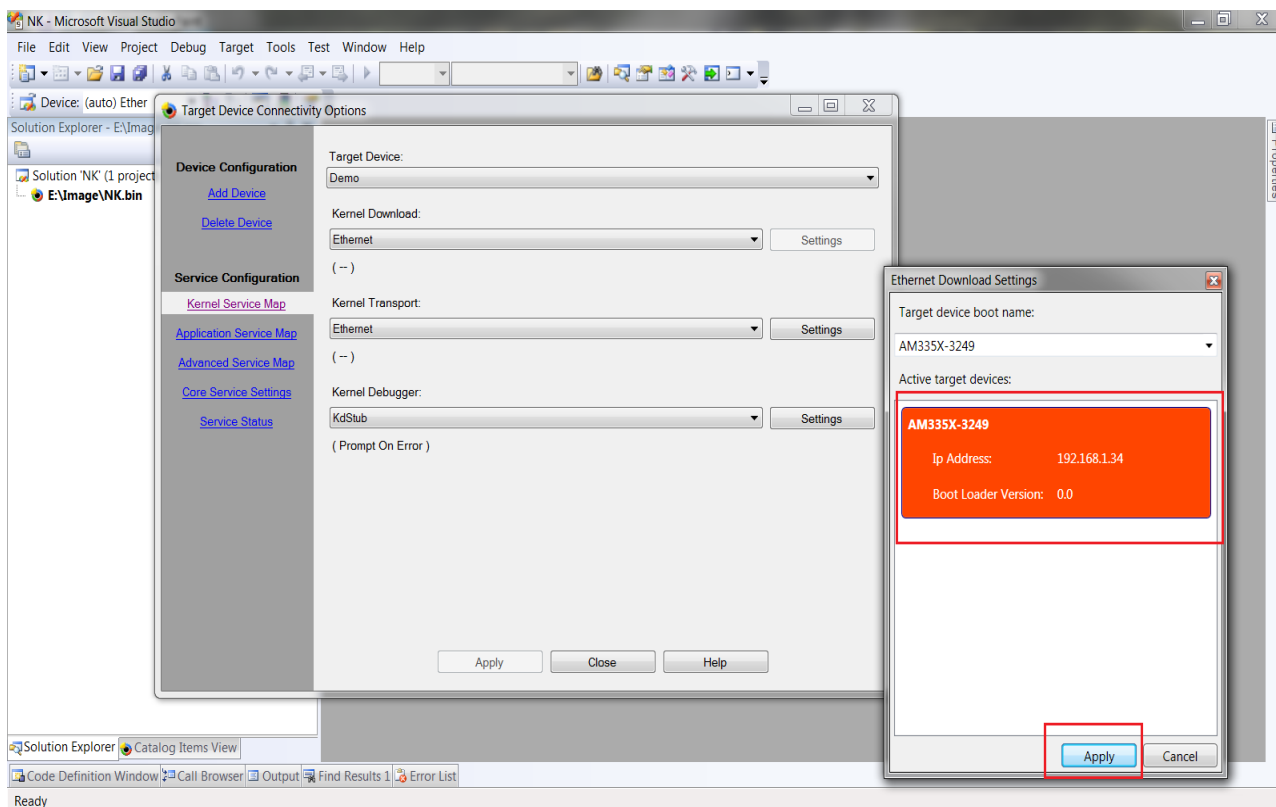
■ After click on "**Apply**" in "**Ethernet Download Settings**" window, the device name would appear under "**Kernel Download**" and "**Kernel Transpor**t" in "**Target Device Connectivity Options**" window.
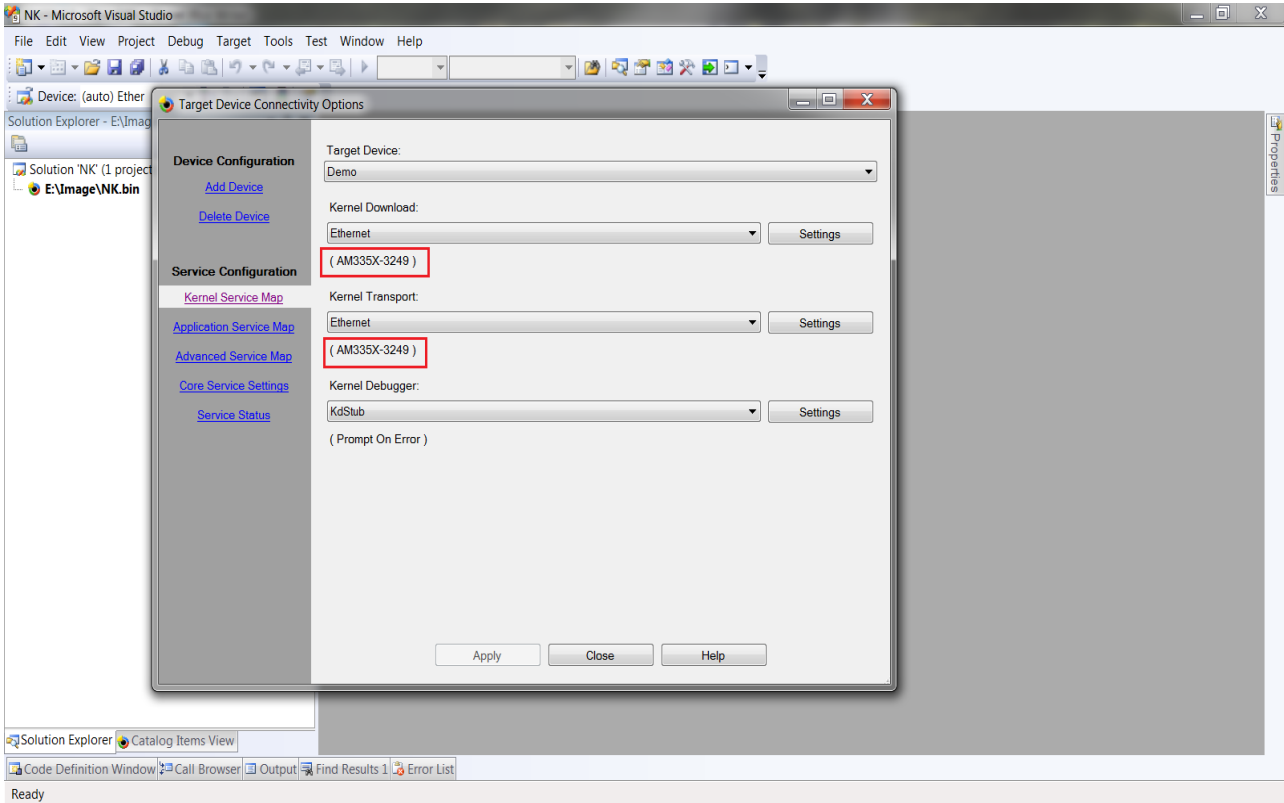
■ After the KITL connection is established, the downloading of "**NK.bin**" image can be started. To do this, click "**Target**" and then select "**Attach Device**" from the list. This will open "**Device Status**" window and the downloading will start automatically.
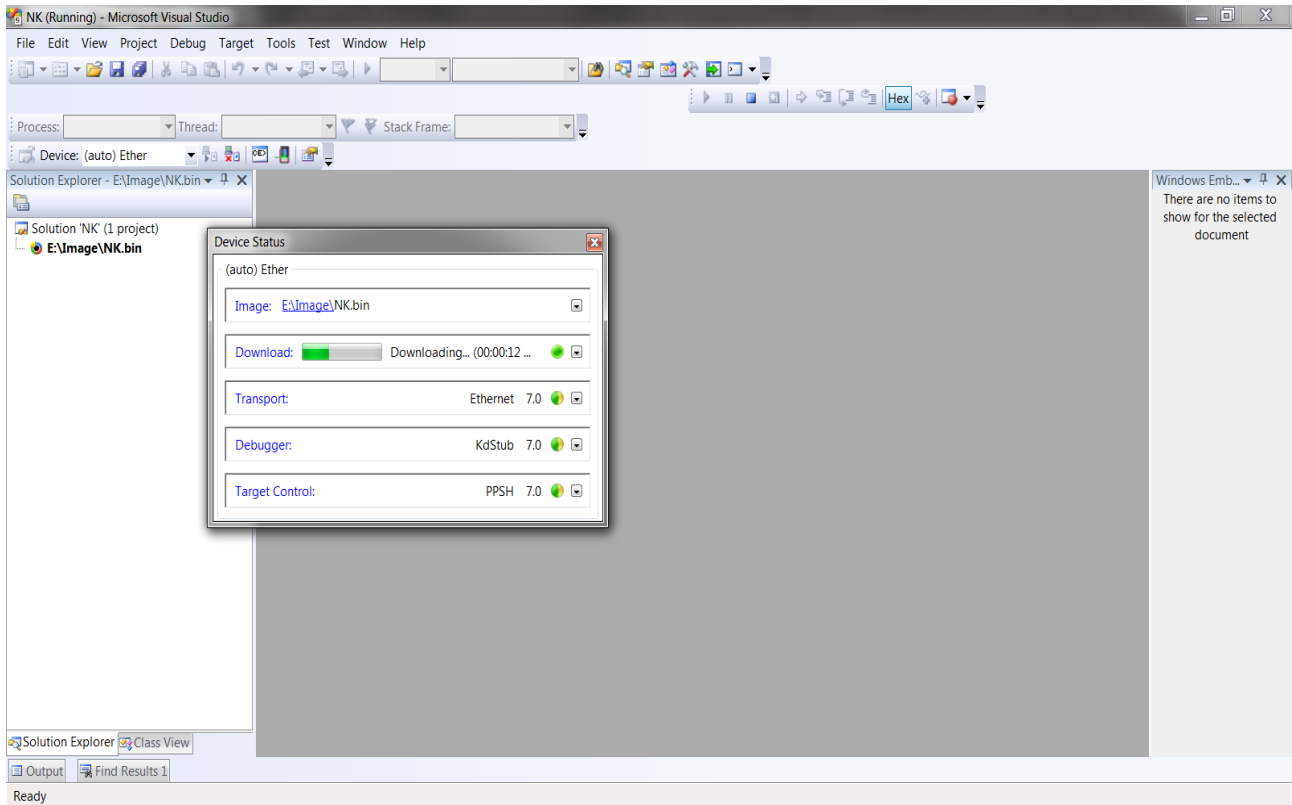
■ Log message of downloading "**NK.bin**" can also be seen in putty console while the downloading is going on. Wait for the download to complete.

```
COM9 - PuTTY
ROMHDR at Address 80002044h
Got EDBG_CMD_JUMPIMG
Got EDBG_CMD_CONFIG, flags:0x0

Writing NK image to OS partition

ROMHDR (pTOC = 0x82c5b460) --------------------
  DLL First           : 0x4001ef06
  DLL Last            : 0x428df000
  Physical First      : 0x80002000
  Physical Last       : 0x82c5eaf8
  Num Modules         :          351
  RAM Start           : 0x82c60000
  RAM Free            : 0x82cb5000
  RAM End             : 0x8d000000
  Num Copy Entries    :            3
  Copy Entries Offset : 0x8098bf98
  Prof Symbol Length  : 0x00000000
  Prof Symbol Offset  : 0x00000000
  Num Files           :           95
  Kernel Flags        : 0x00000000
  FileSys RAM Percent : 0x80808080
  Driver Glob Start   : 0x00000000
  Driver Glob Length  : 0x00000000
```

```
COM9 - PuTTY
  Copy Entries Offset : 0x80986f50
  Prof Symbol Length  : 0x00000000
  Prof Symbol Offset  : 0x00000000
  Num Files           :          226
  Kernel Flags        : 0x00000000
  FileSys RAM Percent : 0x80808080
  Driver Glob Start   : 0x00000000
  Driver Glob Length  : 0x00000000
  CPU                 :       0x01c2
  MiscFlags           :       0x0002
  Extensions          : 0x80003020
  Tracking Mem Start  : 0x00000000
  Tracking Mem Length : 0x00000000
--------------------------------------------------

NK Image Loaded
Launch Windows CE image by jumping to 0x80002000...

Windows CE Kernel for ARM (Thumb Enabled)
CPU CP15 Control Register = 0xc5387f
CPU CP15 Auxiliary Control Register = 0x42
+OALTimerInit(1, 24000, 200)
--- High Performance Frequecy is 24 MHz---
```

This completes Boot from Ethernet.

5. Accessing device contents through USB-OTG connection.

In order to access the contents of the device through USB-OTG, we need tool called "**Windows Mobile Device Center**".
Download and install from the link:

- for 32 bit Windows 7: http://www.microsoft.com/en-in/download/exe-validation.aspx?id=14
- for 64 bit Windows 7: http://www.microsoft.com/en-in/download/exe-validation.aspx?id=3182

■ After the software has been downloaded and installed. Then open the application by double clicking on it.

■ After the device has booted successfully, then connect device with the host computer through USB-OTG connection and you will get **Connecting** message as below:

■ After the connection has established successfully then application will show the "**Connected**" message.

■ Now click on option "**Connect without setting up your device**".

■ After previous click, you will get the below screenshot.

■ Select option "**File Management**" and click on option "**Browse the contents of your**

device" to access the device as drive.
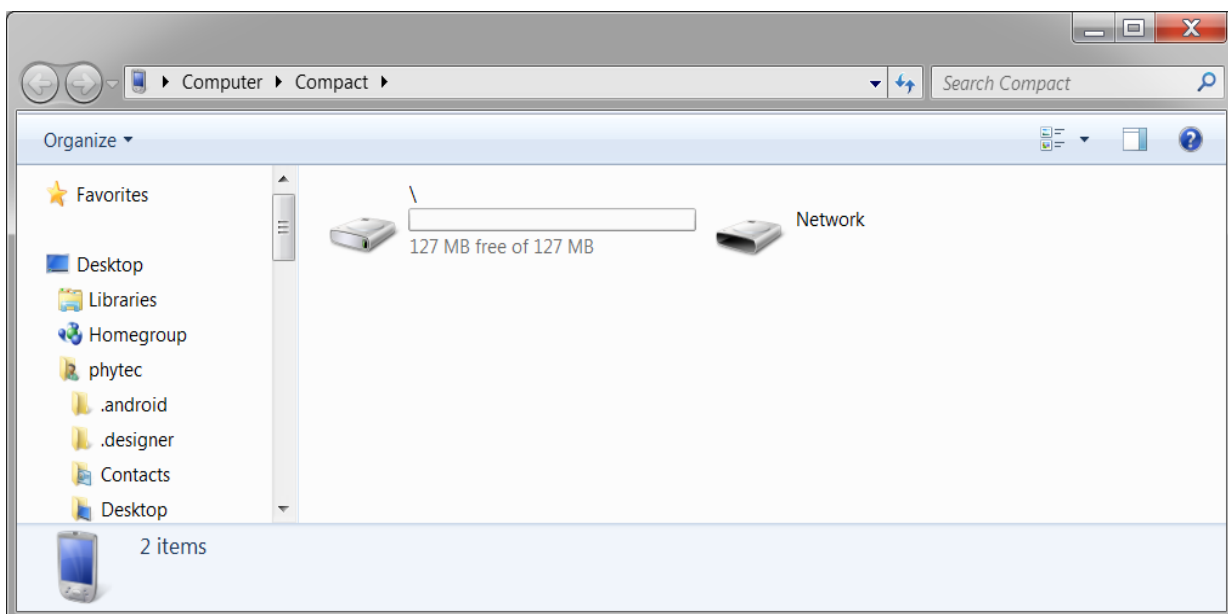
With this the USB-OTG connection with the device is completed, this connection would be used in further manual to download the application from Host to the device.

6. **Sample Application development**

6.1. Creating Project.

This section will guide you to develop the simple Visual Basic application that will send some string from target device to Host console over UART connection.

In order to develop the application **Visual Studio 2008 Professional Edition (full version)** is required to be installed on the development computer.

■   To begin with development, open the Visual Studio 2008.
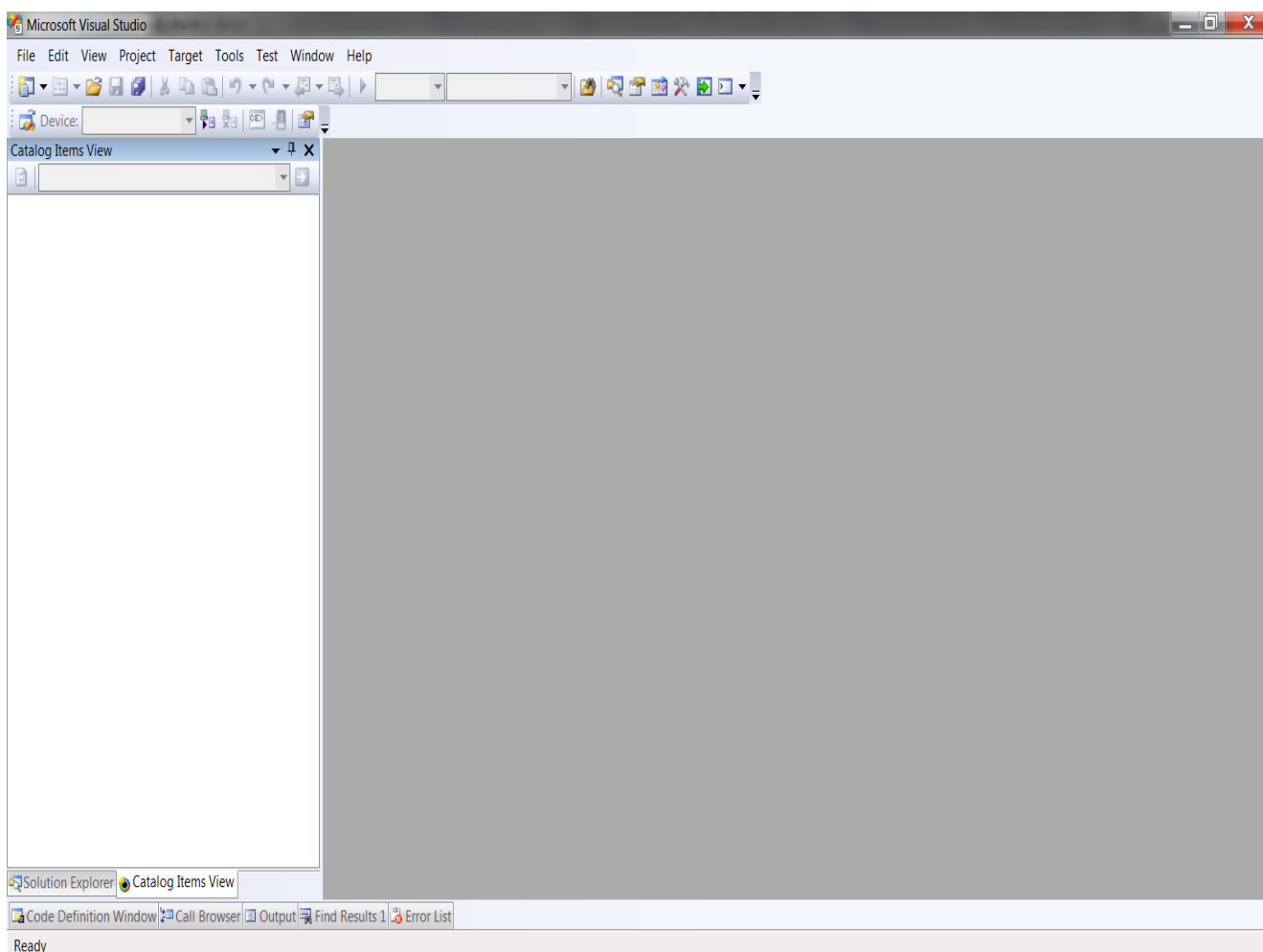
■   To develop application we need to first create new project. To create new project click on

File → New → Project
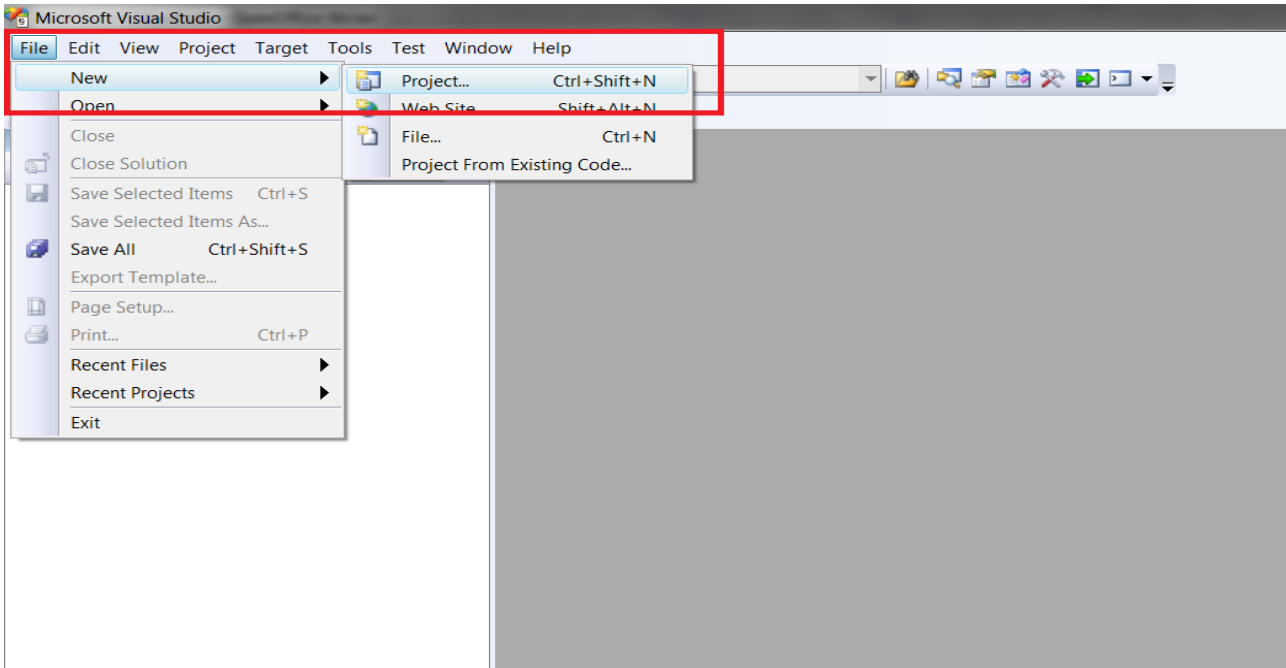
■ This is open the "**New Project**" window, here under "**Project types**" listbox expand the option "**Other Languages** → **Visual Basic** → **Smart Device**", after clicking on the option "**Smart Device**" select "**Smart Device Project**" in "**Templates**" window.
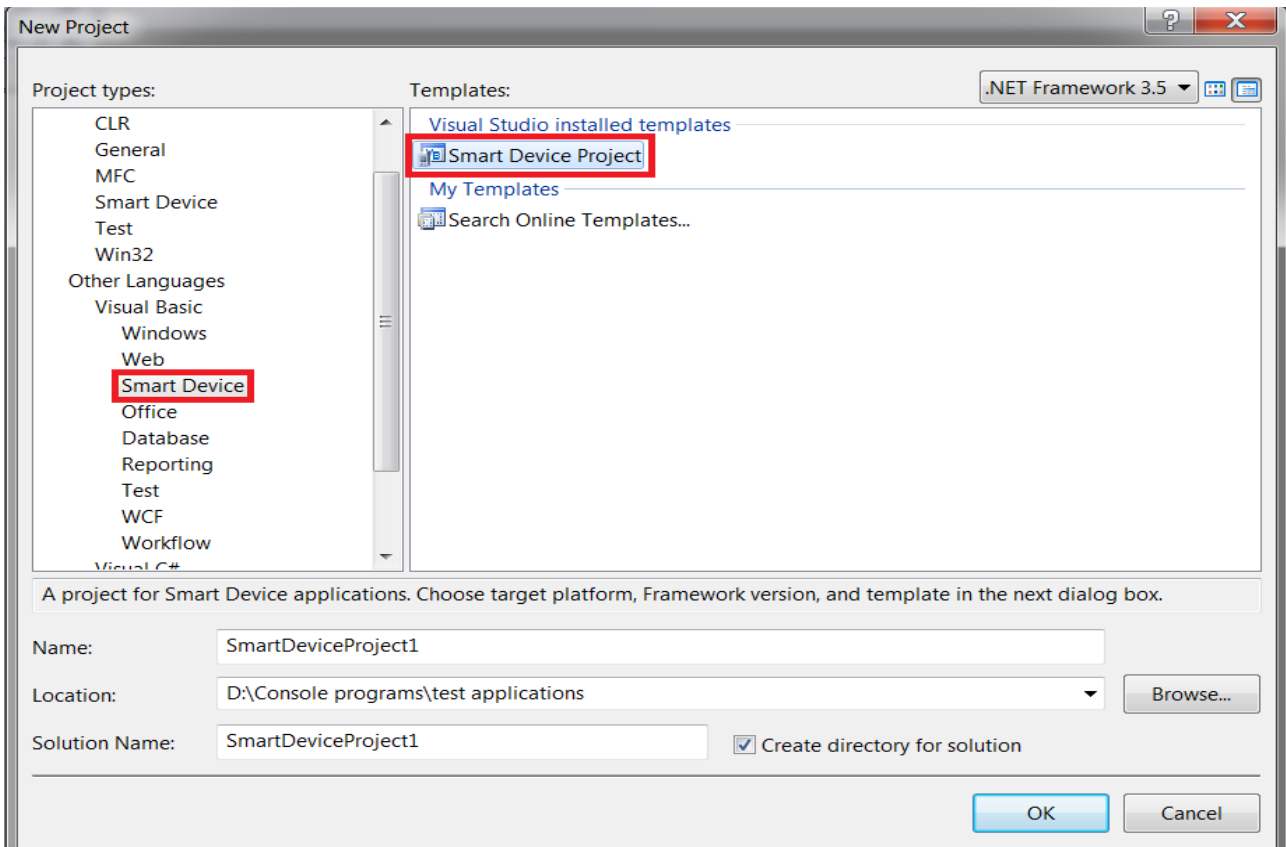
■ Provide any desired name for your application in the "**Name:**" textbox, browse to assign the folder where you want to keep application code and supporting files, and then click on button "**OK**".
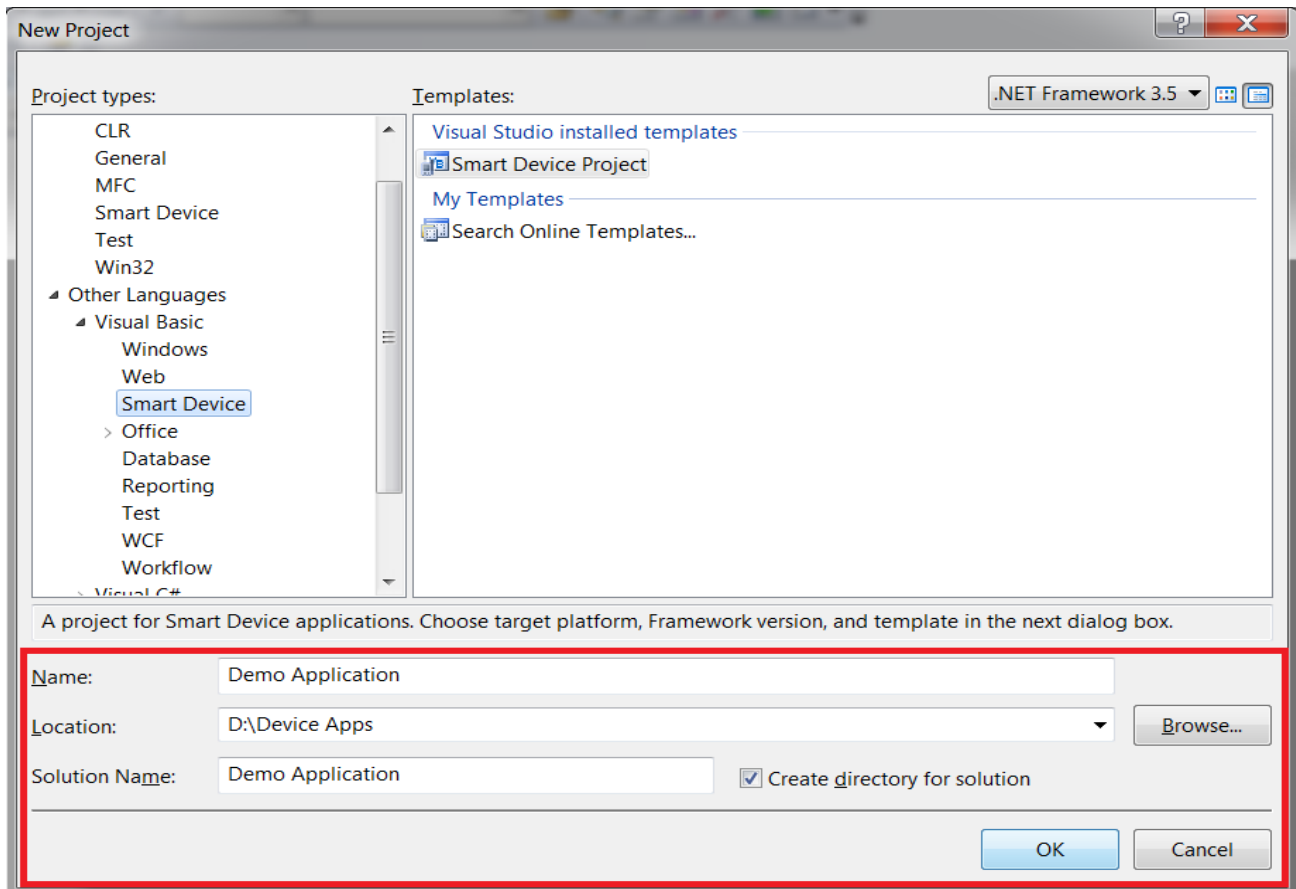
■ After clicking "**OK**" for "**New Project**" window, the "**Add New Smart Device Project**"

window would pop out, here in this window select the target platform for application as "**phyCORE-AM335x**".

■ Next, select the desired .NET Framework version for which you want to build the application, here in this application we are using ".**NET Compact Framework Version 3.5**".

■ Then in the "**Templates**" subwindow select "**Device Application**" by clicking on it, and then click button "**OK**".
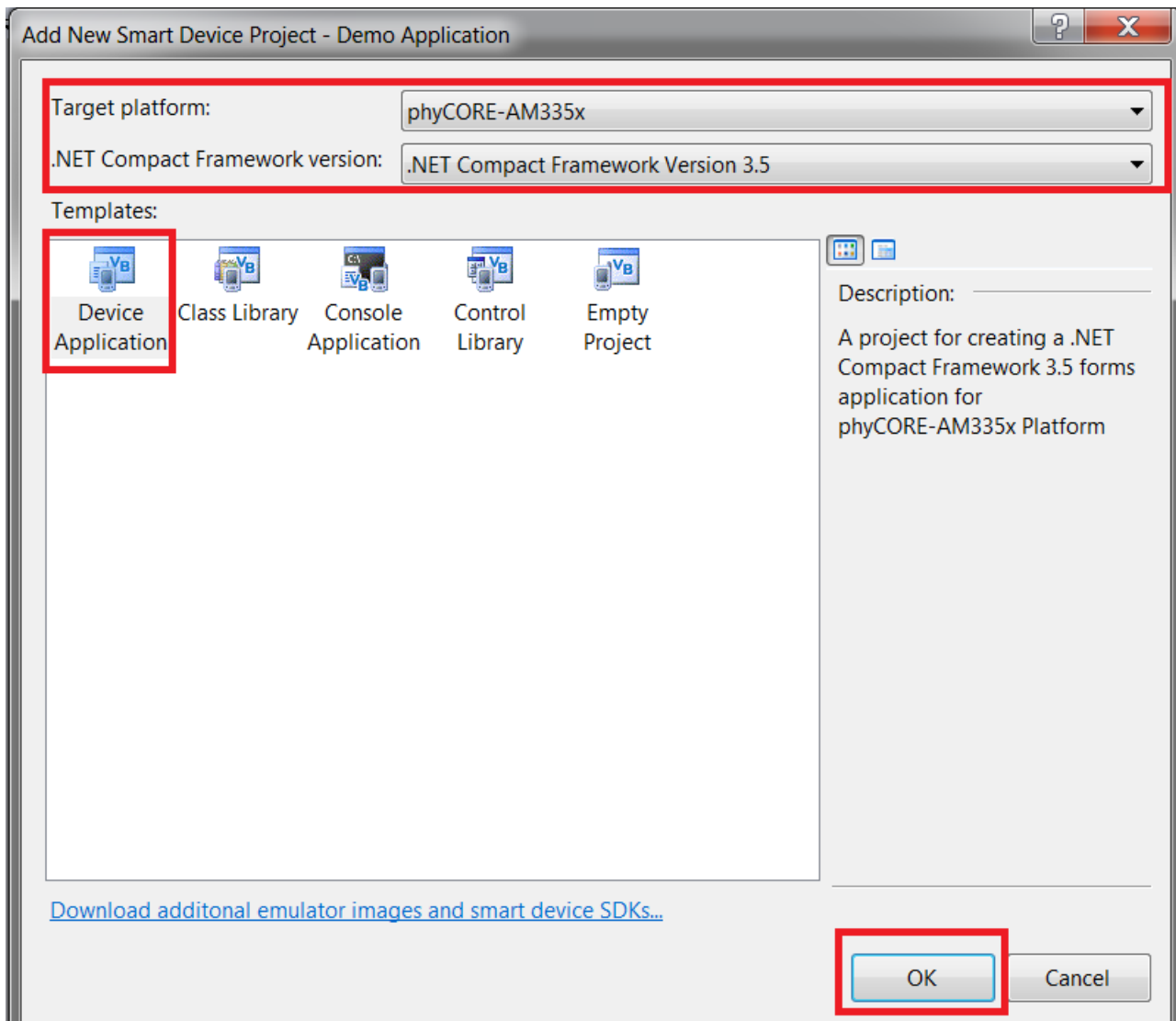
6.2. Developing project.

■ After clicking on "**OK**" in "**Add New Smart Device Project**" as in previous screenshot, your development enviroment would be ready for the development process.

■ As in the below screen, under the "**Solution Exporer**" window, your created application i.e "**Demo Application**" could be seen.
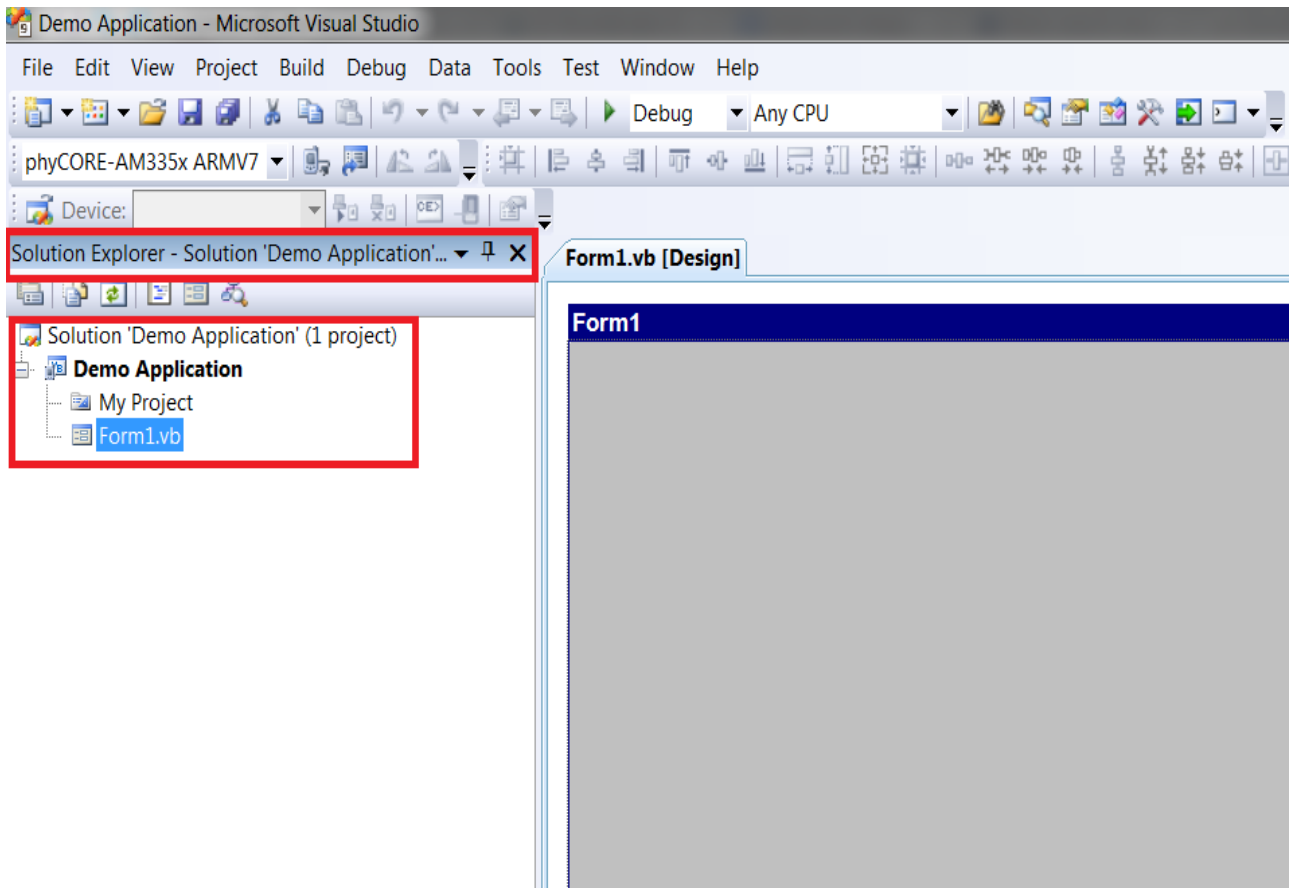
■ If "**Solution Explorer**" window is not visible, then click on "**View → Solution Explorer**",

similarly, if "**Toolbox**" window is not visible, then click on "**View → Toolbox**". Toolbox window provides the set of visual contents required to create and application through drag and drop functionality.
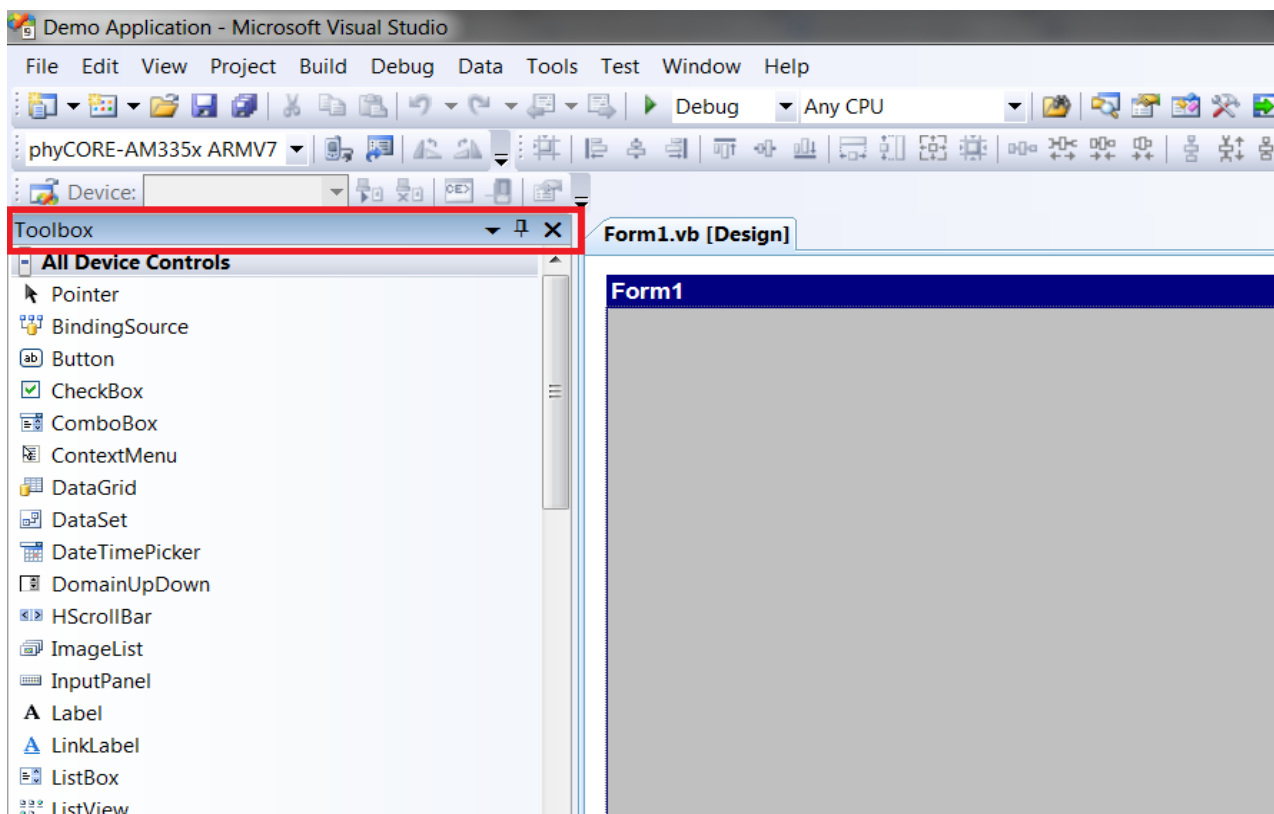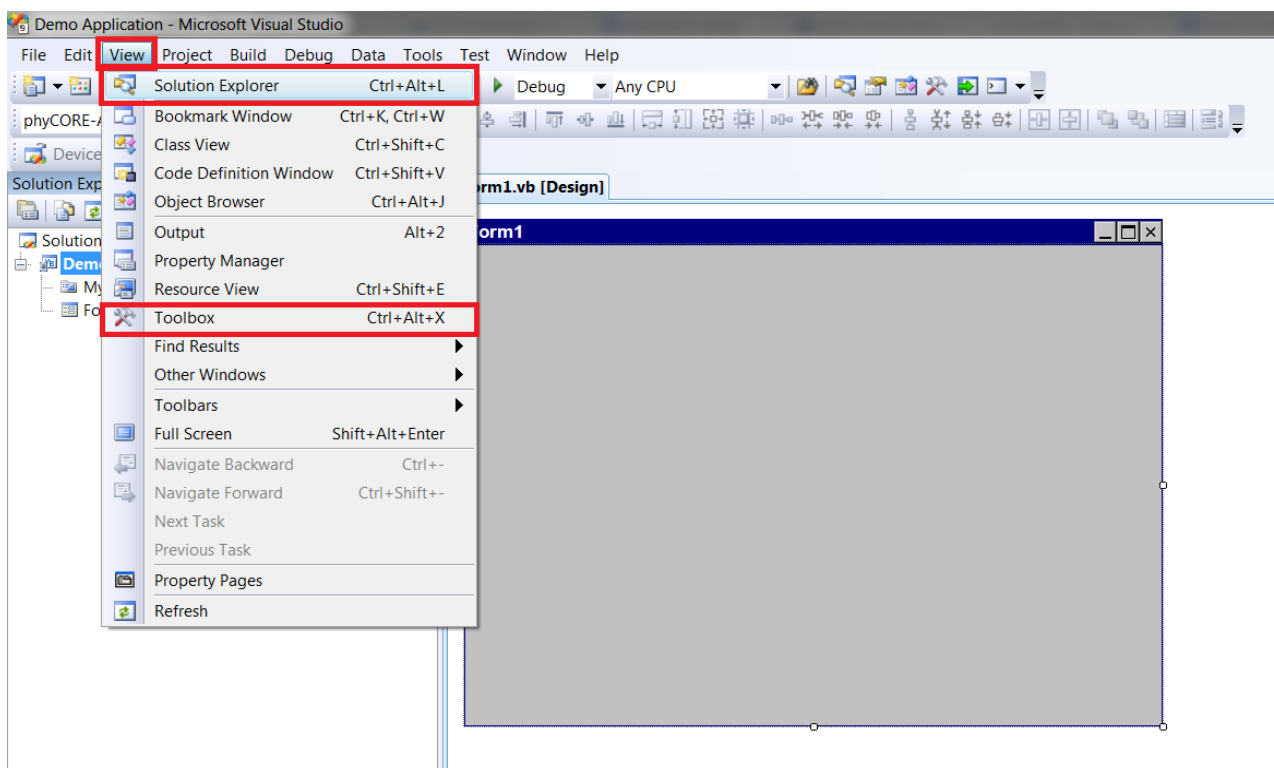
■ You can resize the **Form1** to make it more compact as shown. From the **Toolbox** search

for "**Button**", drag and drop the control in your form, you can then resize the shape of control and align it as per requirement. Right click on the control and select option "**Properties**", this will open the **Properties window.**
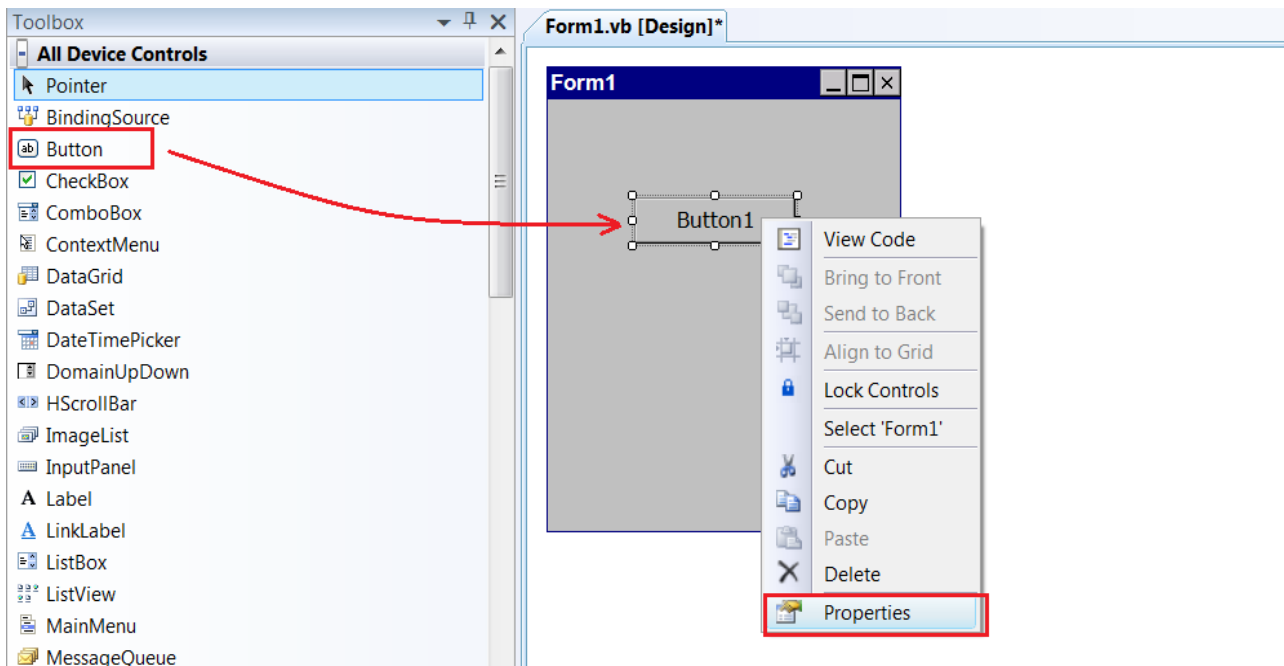
- ■ "**Properties**" window below provides properties of the particular control, which can be modified as per required.

- ■ Now, expand the "**Font**" and in the text option change the default text with "**Open Port**" and hit **Enter**. Once this is done the same text would be the text on Button1 control.
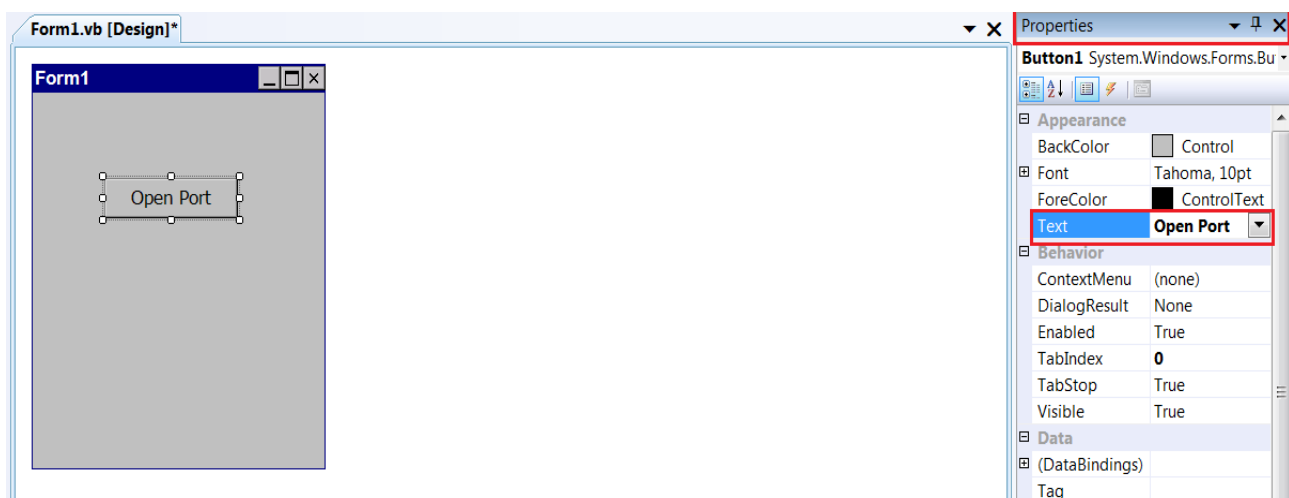
- ■ Follow the similar procedure to add two more buttons i.e **Button2** and **Button3** controls in
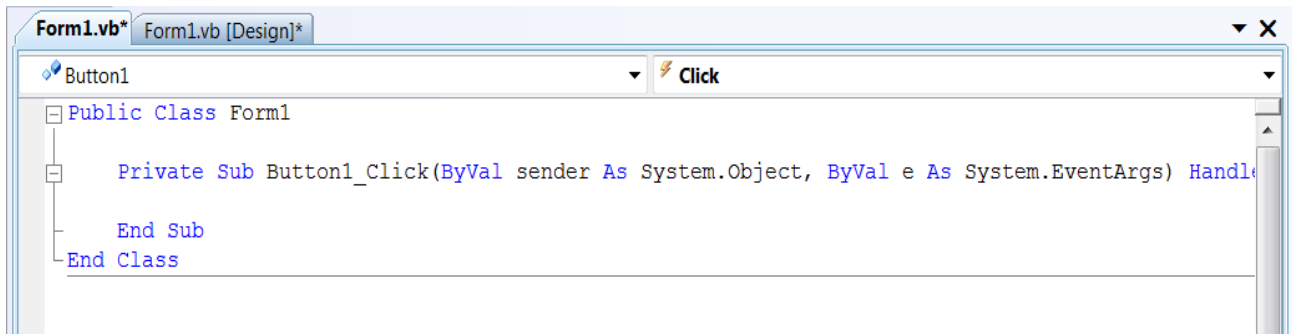
your form and edit there "**Text**" field in Properties windows with "**Send String**" and "**Close Port**" respectively.
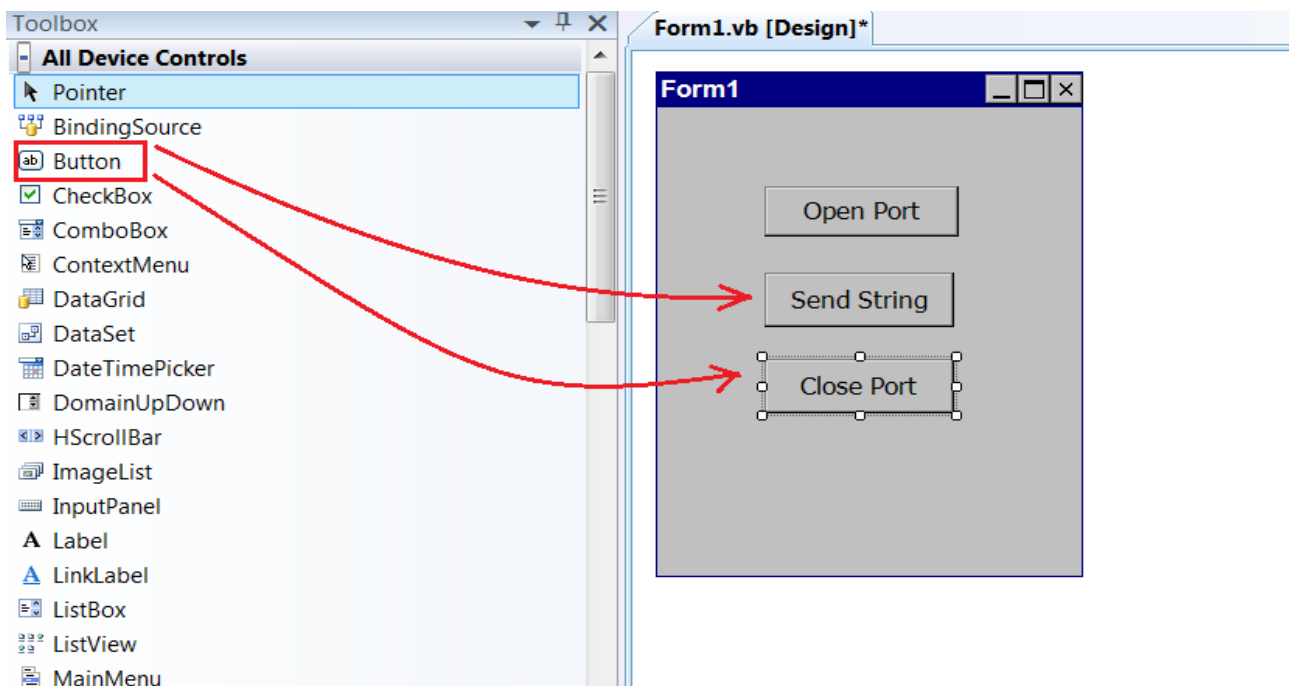
- Now search for "**SerialPort**" control from **Toolbox**, drag and drop it in the "**Form1**", control would appear at the bottom of "**Form1.vb[Design]**" with name "**SerialPort1**",

- If the "**Properties**" window does not appear, then right click on the "**SerialPort1**" and select "**Properties**".

- In this Properties window change the default **BaudRate** to "**115200**" and default **PortName** to "**COM0**". Once done with he changes hit Enter.
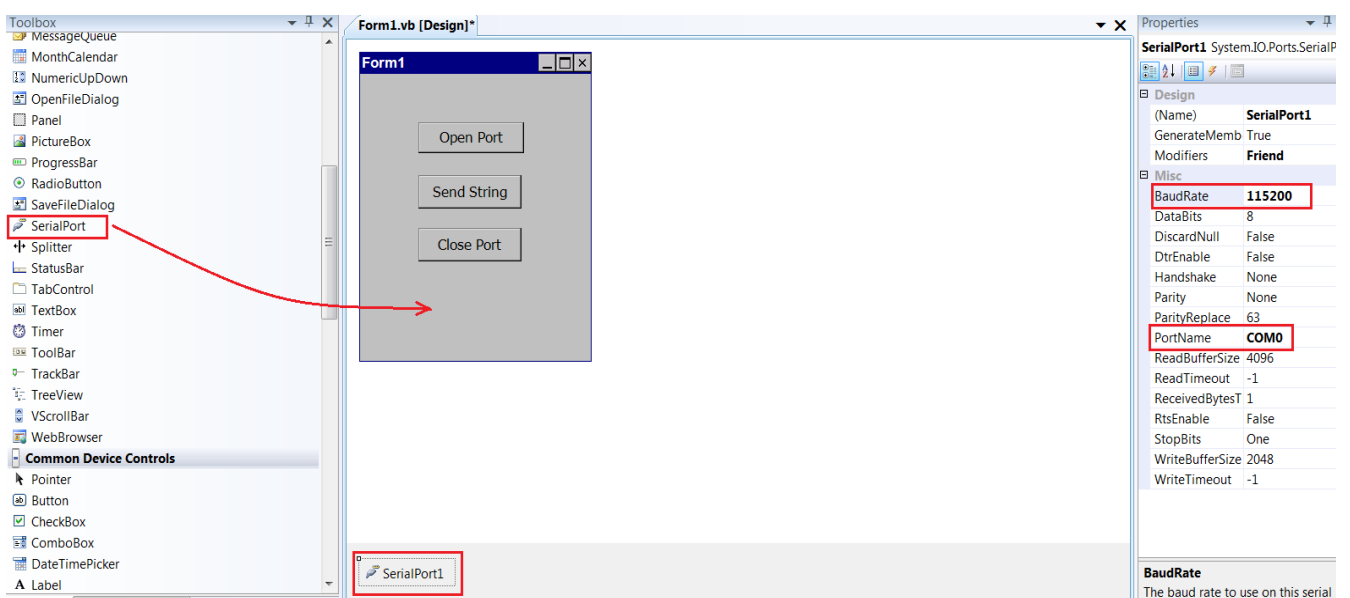
- Double click on the **Button1** control in "**Form1**", this will open the new window named "**Form1.vb**". In this window the "**Button1_Click**" function would be created by default, inside this function you need to provide the code to state the action that has to be taken when **Button1** is pressed.

- Now inside the function **Button1_Click()** add the following code:

```
If SerialPort1.IsOpen = True Then
        MsgBox("COM0 is already open", MsgBoxStyle.Exclamation)
    Else
        SerialPort1.Open()
    End If
```
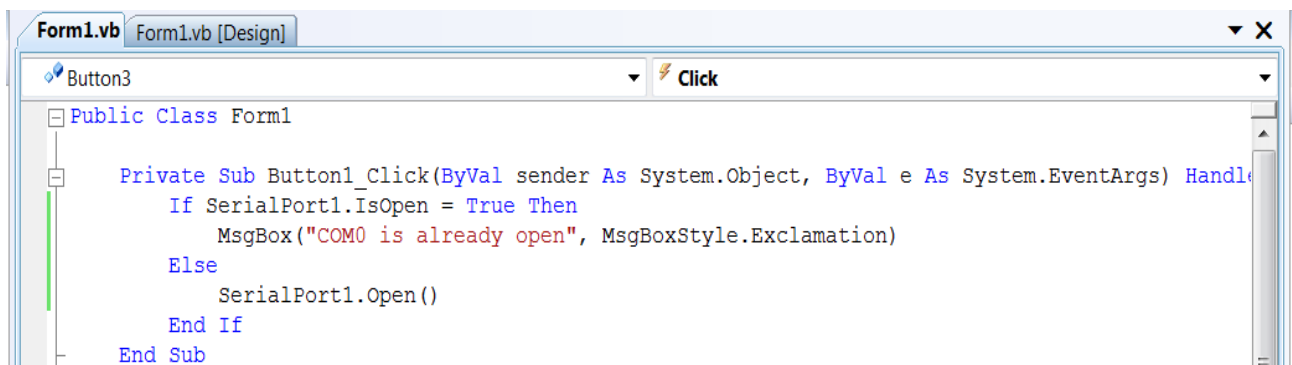

- Similarly add the code inside Button2_Click() function as:

```
SerialPort1.Write("Hello World")
```

- And, inside Button3_Click() function as:

```
If SerialPort1.IsOpen = False Then
        MsgBox("COM0 is already closed", MsgBoxStyle.Exclamation)
    Else
        SerialPort1.Close()
    End If
```

```
Form1.vb   Form1.vb [Design]
(General)                                    (Declarations)
  Public Class Form1

      Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handle
          If SerialPort1.IsOpen = True Then
              MsgBox("COM0 is already open", MsgBoxStyle.Exclamation)
          Else
              SerialPort1.Open()
          End If
      End Sub

      Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handle
          SerialPort1.Write("Hello World")
      End Sub

      Private Sub Button3_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handle
          If SerialPort1.IsOpen = False Then
              MsgBox("COM0 is already closed", MsgBoxStyle.Exclamation)
          Else
              SerialPort1.Close()
          End If
      End Sub
  End Class
```
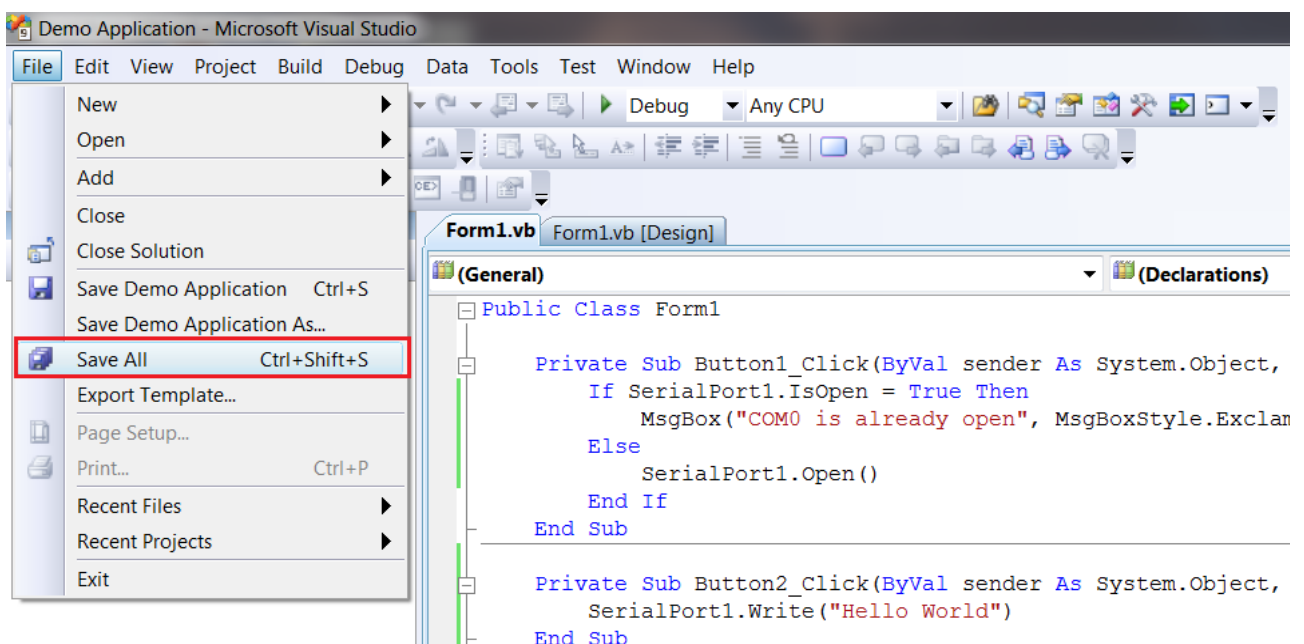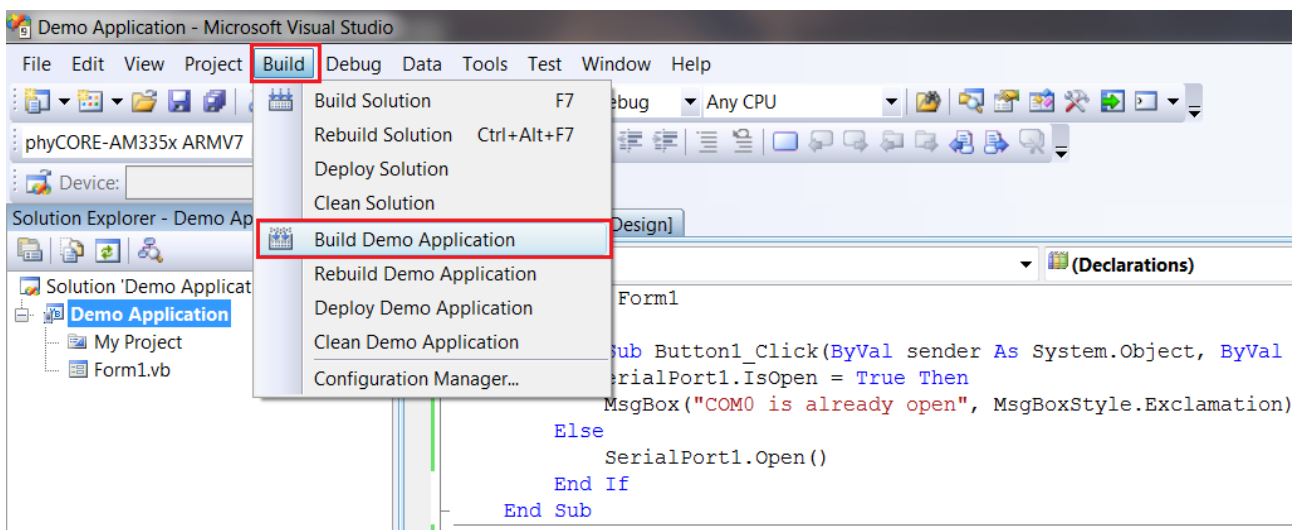
6.3. Build the Project

■   Before building the project it is important to save the work done. Click on **File → Save All** to all the changes done in the project.

■ Once all the work has been saved, then compiling can be started, for this, click on option **Build → Build Demo Application**

■ If the project is builded successfully i.e without any errors then notification will be shown on "**Output**" window as follows. **Output window** shows the build log which is used to view and locate errors or warnings in build process.
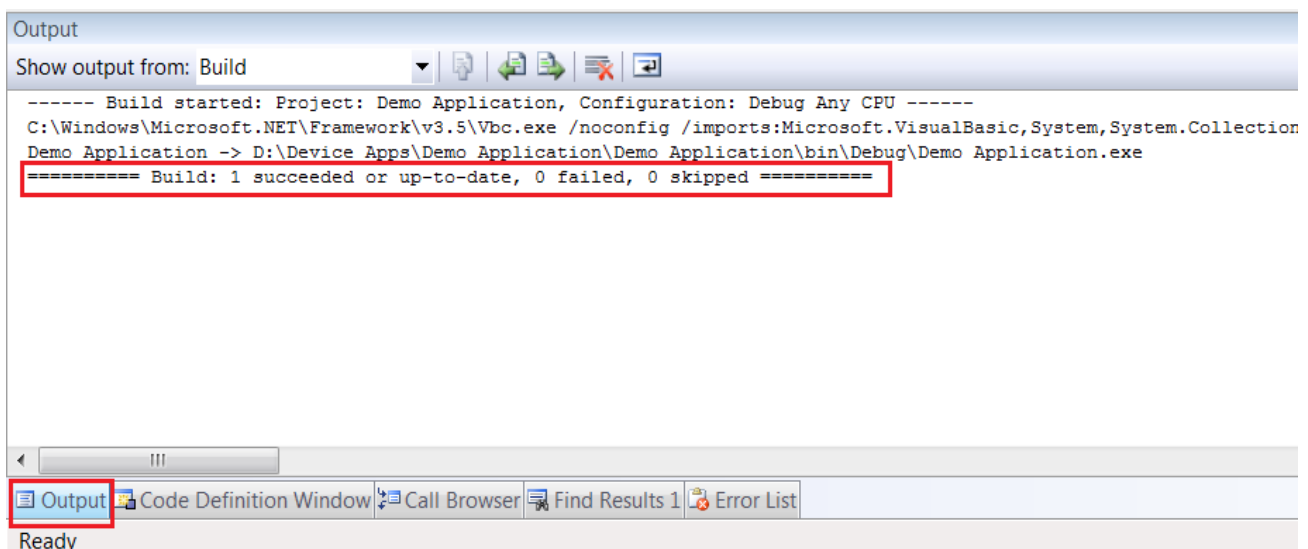
■ If the project is builded successfully then, the executable file of the same is generated. To locate the **.exe** file, go to the folder path which was choosen while creation of the project.

■ In this example, the project folder is located at path "**D:\Device Apps**". In this folder there would be another folder with same project name, track the **Debug** folder which contains **.exe** file of your project, with the path as follows:

> **D:\Device Apps\Demo Application\Demo Application\bin\Debug\Demo Application.exe**

6.4. Deploying and Executing your project on target device.

Before deploying the project on the device the device must be running **Windows Embedded Compact 7** on it.

Also the application requires the **LCD connection with the board** using which the application will be executed and tested.

For **board bring-up**, follow the documentation of Booting process,

After the board is booting successfully, and display on LCD, then connect device host with USB-OTG, refer the documentation on "**Accessing device contents using USB-OTG connection**".

This connection will be used primarily to copy the application from host to target device.

Once the connection is established, copy the executable from host and paste in "**Application Data**" folder.

While coying the file you might get warning window for copy operation, click on "**Yes**" to proceed with the copying.
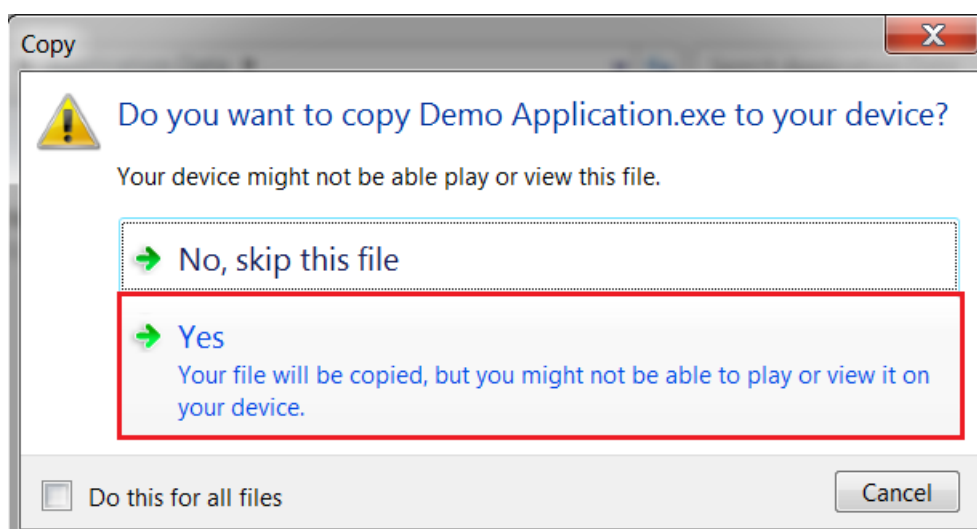
Connect the Device to Host with through UART connection, with **COM0** of device connected to any running COM port of Host. Open the serial terminal i.e Putty to get the string on serial console. Open the console on with baudRate set as "**115200**".
Now, manually go to the "**Application Data**" folder from LCD, double click on executable, this will open up the **Form1**. Click on Button "**Open Port**" from the form to open the port for communication, Then click button "**Send String**", with this the string "**Hello World**" would be visible on the console of Host.

This completes the simple application development from Windows Embedded Compact 7 using Visual Basic.

PHYTEC

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… and stay in touch

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...............................We are looking forward to hearing from you!...............................