# AX88772 WinCE 5.0 Driver Installation Guide

## 1. Product Information:

The AX88772 Controller is a single chip USB 2.0 to Fast Ethernet Controller. This is an AX88772 NDIS driver for WinCE 5.0 embedded system. It has been qualified under WinCE 5.0 CETK on an Intel Pentium II 300MHz system with a NEC D720100AGM USB 2.0 PCI Host adapter running WinCE 5.0 CEPC X86 Platform Image.

**Note: The default USB 2.0 HCD driver (EHCI) of Windows CE 5.0 Platform Builder has a USB 2.0 device Hot-Swap BUG. The EHCI driver should be updated to fix this bug. Please refer to Section 6 "Update WinCE 5.0 USB 2.0 HCD Driver (EHCI.DLL)" for the detail information.**

## 2. Files Descriptions:

The AX88772 WinCE driver package includes the files as described below,

| | |
|---|---|
| RELEASE.PDF | This file |
| AX88772.DLL | Driver file |
| EHCI.DLL | Updated EHCI Driver file |
| PROJECT.REG | Sample REG file |
| CETK_LOG\ 1C_TEST.LOG | CETK One Card Test log file |
| CETK_LOG\ 2C_TEST.LOG | CETK Two Card Test log file |
| CETK_LOG\ 1C_TEST.TXT | CETK One Card Test readme file |
| CETK_LOG\ 2C_TEST.TXT | CETK Two Card Test readme file |

## 3. Revision History:

| Revision | Author | Date | Description |
|---|---|---|---|
| v1.0.0.0 | Allan Chou | 2005/07/14 | 1. New release for WinCE 5.0. |
| v1.0.0.1 | Allan Chou | 2005/09/14 | 1. Modify to support external MII PHY. |
| v1.0.0.2 | Allan Chou | 2005/11/10 | 1. Modify to fix TX hang-up issue under MainStone II platform. |
| v1.0.0.3 | Allan Chou | 2006/01/23 | 1. Modify to fix RX hang-up issue under AU1200 platform for a long-time media stream test. |
| v1.0.0.4 | Allan Chou | 2006/05/18 | 1. Modify to fix the CETK test failure issue when the "NetworkAddress" parameter was set. |
| v1.0.0.5 | Francis | 2006/10/02 | 1. Add the "OID_ACCESS_EEPROM" OID to support SROM Programming Tool. |
| v1.0.0.6 | Francis | 2007/04/02 | 1. Support AX88772A chip. (Add wakeup frame and VLAN)<br>2. Modify to fix EHCI resume issue.<br>3. Change "Prefix" parameter from "NDS" to "ASX" in "project.reg" file. |

## 4. Driver Installation:

1. Add below AX88772 registry values into the $(_WINCEROOT)\PUBLIC\CEBASE \OAK\FILES\PROJECT.REG file.

```
; @CESYSGEN IF BSP_NIC_AX88772
;IF BSP_NIC_AX88772
 [HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\2965_30496\Default\Default\AX88772]
        "DLL"="AX88772.DLL"
        "Prefix"="ASX"
[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\2965_30506\Default\Default\AX88772]
        "DLL"="AX88772.DLL"
        "Prefix"="ASX"

[HKEY_LOCAL_MACHINE\Drivers\USB\ClientDrivers\AX88772]
        "DLL"="AX88772.DLL"
        "Prefix"="ASX"

[HKEY_LOCAL_MACHINE\Comm\AX88772]
        "DisplayName"="ASIX AX88772 USB 2.0 Fast Ethernet Driver"
        "Group"="NDIS"
        "ImagePath"="AX88772.dll"

[HKEY_LOCAL_MACHINE\Comm\AX88772\Linkage]
        "Route"=multi_sz:"AX887721"

[HKEY_LOCAL_MACHINE\Comm\AX887721]
        "DisplayName"="ASIX AX88772 USB 2.0 Fast Ethernet Driver"
        "Group"="NDIS"
        "ImagePath"="AX88772.dll"

[HKEY_LOCAL_MACHINE\Comm\AX887721\Parms]
        "BusNumber"=dword:0
        "BusType"=dword:1
;       "NetworkAddress"="02-12-34-56-78-9a"     ;Define an override MAC address 02-12-34-56-78-9a

;============================================================================
; AX88772 Driver Parameters:
;   "ConnectionType" ==> 0 = "AutoSense"; 2 = "10BaseT Half_Duplex"; 3 = "10BaseT Full_Duplex"
;                        8 = "100BaseTx Half_Duplex"; 9 = "100BaseTx Full_Duplex"
;   "FlowControl"   ==>  0 = "Disable"; 1 = "TX PAUSE"; 2 = "RX PAUSE"; 3 = "Enable"
;  "wakeup"         ==>  0 = "Disable"; 2 = "Link-up"; 4 = "Magic Packet"; 8 = "Wakeup Frame"
;                         6 = "Link-up" & "Magic Packet";
;                        10 = "Link-up" & "Wakeup Frame";
;                        12 = "Magic Packet" & "Wakeup Frame";
;                        14 = "All"
;                         ps: "Wakeup Frame" is only for AX88772A chip
;============================================================================
        "ConnectionType"=dword:0
        "FlowControl"=dword:3
        "WakeUp"=dword:0
;=====================================================
;the follow only for AX88772A chip
;=====================================================
        "WakeUpFrameType"=dword:3               ; 1 = "Ping"; 2 = "ARP"; 3 = "All";
        "VlanEnable"=dword:0                    ; 0 = "Disable"; 1 = "Enable";
        "VlanId"=dword:0                        ; 0 - 4095
```

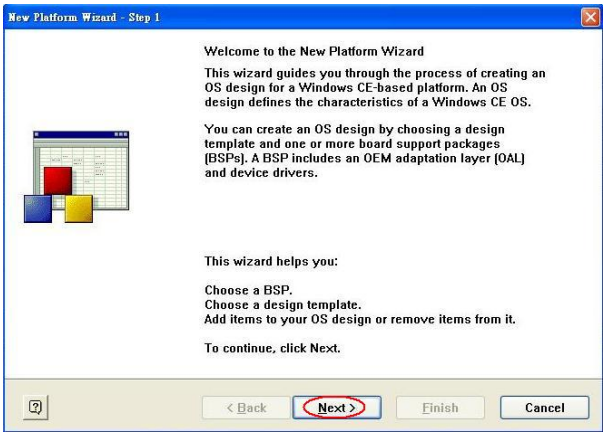
```
[HKEY_LOCAL_MACHINE\Comm\AX887721\Parms\TcpIp]
;       "EnableDHCP"=dword:0                    ;Disable DHCP function
;       "IpAddress"="xxx.xxx.xxx.aaa"           ;Define your IP address (xxx.xxx.xxx.aaa)
;       "Subnetmask"="255.255.255.0"            ;Define Submask IP address
;       "DefaultGateway"="xxx.xxx.xxx.bbb"      ;Define Gateway IP address
;       "DNS"="xxx.xxx.xxx.ccc"                 ;Define DNS server IP address

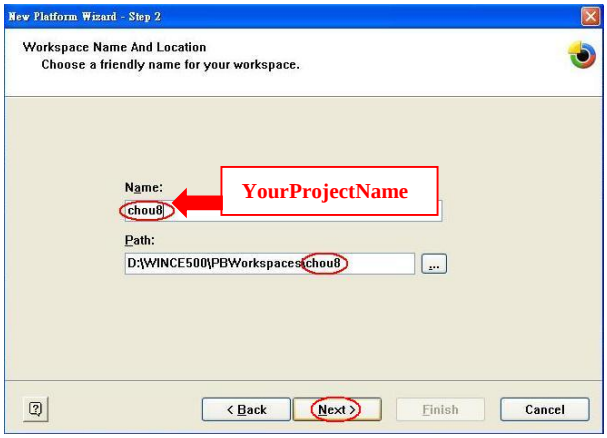
        "AutoCfg"=dword:1
        "EnableDHCP"=dword:1                    ;Enable DHCP function
        "UseZeroBroadcast"=dword:0              ;Use zero for broadcast address?

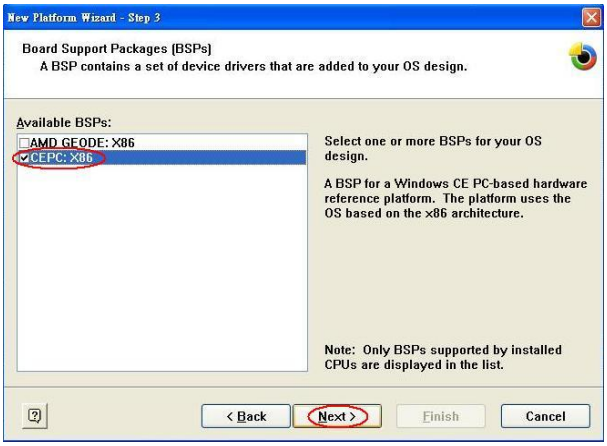
;ENDIF BSP_NIC_AX88772
; @CESYSGEN ENDIF BSP_NIC_AX88772
```

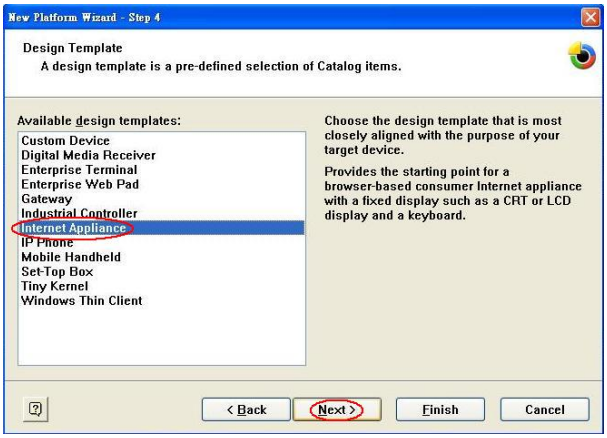
 

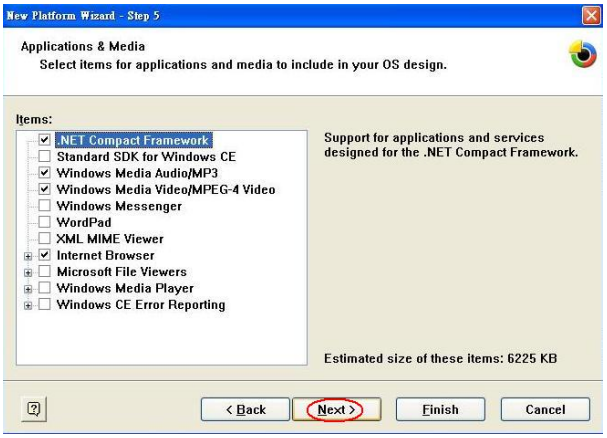
2. Install new platform for your project

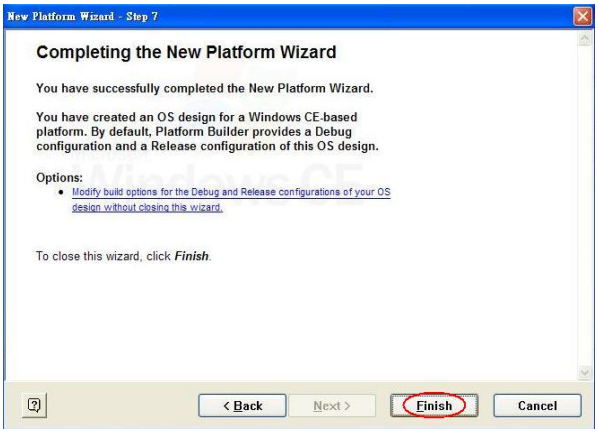


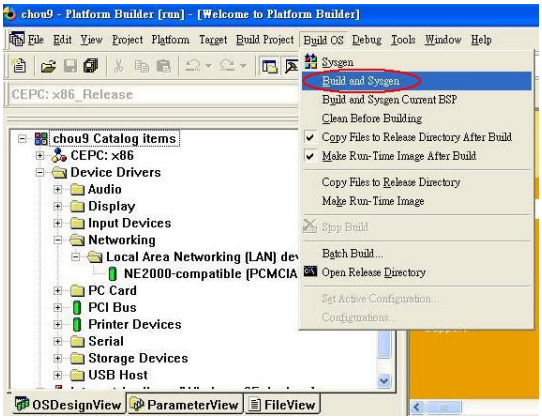




**Note: Please check if the PROJECT.REG file in $(_WINCEROOT)\PBWorkspaces \<YourProjectName>\WINCE500\CEPC_x86\OAK\files subdirectory is included all contents modified in Step 1.**

3. Copy AX88772.DLL and **EHCI.DLL** files into the $(_WINCEROOT)\PBWorkspaces \<YourProjectName>\WINCE500\CEPC_x86\OAK\files subdirectory.
4. Choose “Build and Sysgen” from the Build OS menu to build the platform image file (NK.BIN).





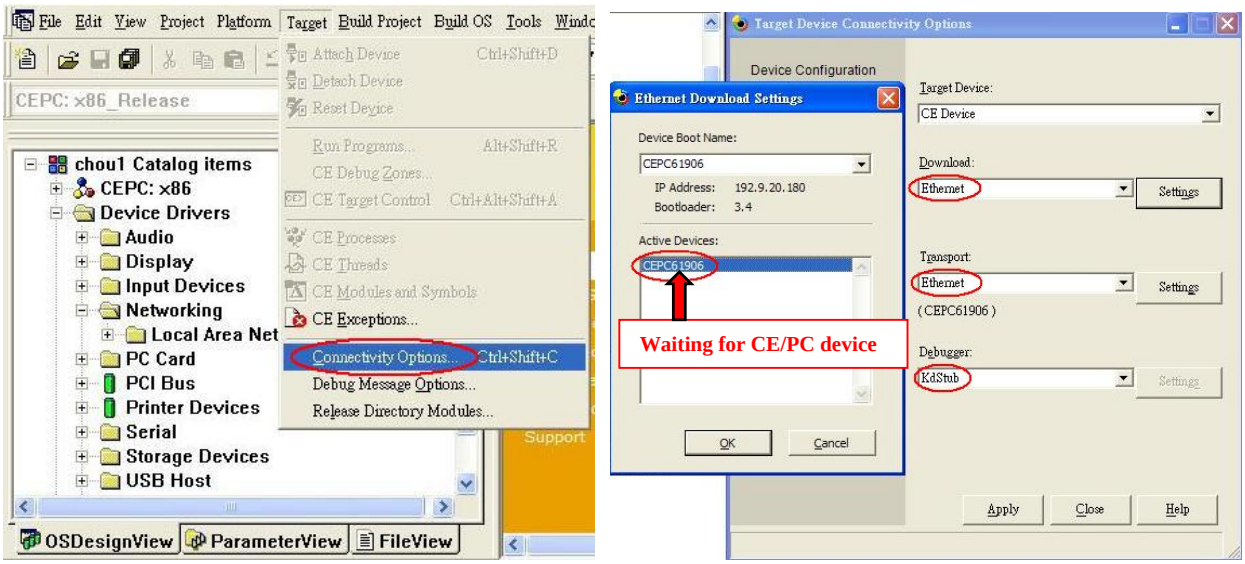
5. Startup your CE/PC to get the connection with the Platform Builder.
   5-1. Install a supported Ethernet adapter (like NE2000 ISA card or RTL8139 PCI card) for Ethernet Boot Loader (eboot.bin) and a ASIX AX88772 USB to Fast Ethernet adapter for tested WinCE driver.

> **Note 1: Please set a proper IRQ, IOBASE and IP address in the AUTOEXEC.BAT file of the CE/PC Boot Disk for the Ethernet Boot Loader adapter.**
> **(For PCI card: set to IRQ=0, IOBASE =0 for auto-detection.**
> **For ISA card: set to the same IRQ, IOBASE as the H/W setting.)**

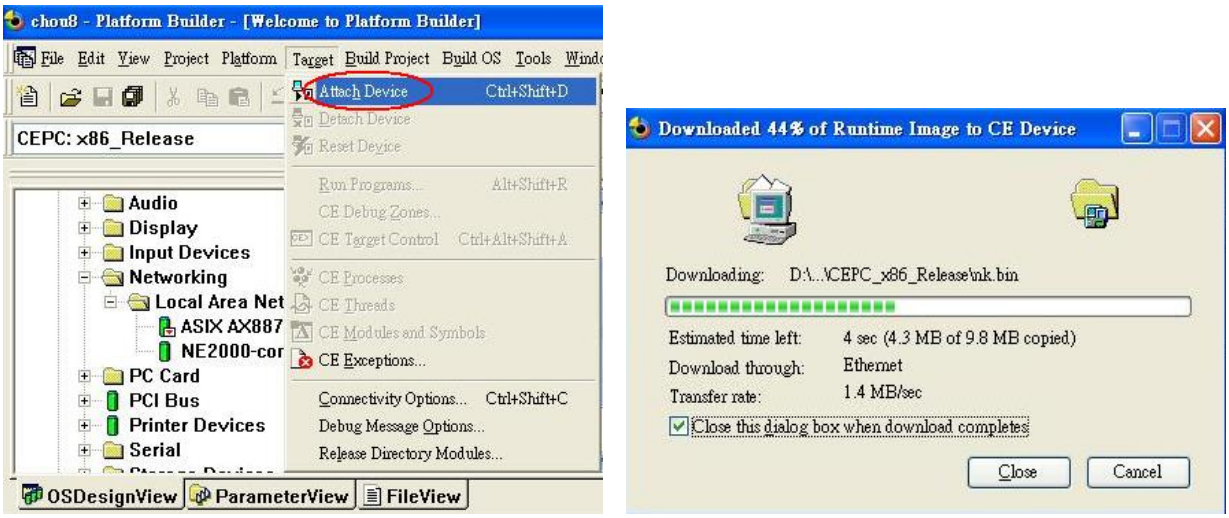
   5-2. Insert the CE/PC Boot Disk into your CE/PC.
   5-3. Power ON the CE/PC.
   5-4. Select “Boot CE/PC (ether via eboot.bin with /L:800x600x16)” from the boot menu.

6. Choose “Connectivity Options” from the Target menu to configure an Ethernet connection for downloading and debugging the image file.
   6-1. Select “Ethernet” in the drop-down menu titled “Download”.
   6-2. Select “Ethernet” in the drop-down menu titled “Transport”.
   6-3. Click “Settings” button associated with the “Download” option.
   This will open a new dialog to wait for the available CEPC devices.
   6-4. Select “KbStub” in the drop-down menu titled “Debugger”.




7. Choose “Attach Device” from the Target menu to start downloading the Platform Image file onto the CE/PC.




8. After the image file is downloaded successfully, the CE/PC will be booted up to WinCE operation system by running the Platform Image file.
9. Run Ping command to verify the network connection function.

## 5. Modify Driver Parameters:

1. Modify the AX88772 registry values from the $(_WINCEROOT)\PBWorkspaces \<YourProjectName>\RelDir\CEPC_x86_Release\PROJECT.REG file.

```
; @CESYSGEN IF BSP_NIC_AX88772
;IF BSP_NIC_AX88772
[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\2965_30496\Default\Default\AX88772]
        "DLL"="AX88772.DLL"
        "Prefix"="ASX"
[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\2965_30506\Default\Default\AX88772]
        "DLL"="AX88772.DLL"
        "Prefix"="ASX"

[HKEY_LOCAL_MACHINE\Drivers\USB\ClientDrivers\AX88772]
        "DLL"="AX88772.DLL"
        "Prefix"="ASX"

[HKEY_LOCAL_MACHINE\Comm\AX88772]
        "DisplayName"="ASIX AX88772 USB 2.0 Fast Ethernet Driver"
        "Group"="NDIS"
        "ImagePath"="AX88772.dll"

[HKEY_LOCAL_MACHINE\Comm\AX88772\Linkage]
        "Route"=multi_sz:"AX887721"

[HKEY_LOCAL_MACHINE\Comm\AX887721]
        "DisplayName"="ASIX AX88772 USB 2.0 Fast Ethernet Driver"
        "Group"="NDIS"
        "ImagePath"="AX88772.dll"

[HKEY_LOCAL_MACHINE\Comm\AX887721\Parms]
        "BusNumber"=dword:0
        "BusType"=dword:1
;       "NetworkAddress"="02-12-34-56-78-9a"     ;Define an override MAC address 02-12-34-56-78-9a

;============================================================================
; AX88772 Driver Parameters:
;   "ConnectionType" ==> 0 = "AutoSense"; 2 = "10BaseT Half_Duplex"; 3 = "10BaseT Full_Duplex"
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;   "FlowControl"   ==>  0 = "Disable"; 1 = "TX PAUSE"; 2 = "RX PAUSE"; 3 = "Enable"
;   "wakeup"        ==>  0 = "Disable"; 2 = "Link-up"; 4 = "Magic Packet"; 8 = "Wakeup Frame"
;                        6 = "Link-up" & "Magic Packet";
;                       10 = "Link-up" & "Wakeup Frame";
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;                       14 = "All"
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        "VlanEnable"=dword:0                    ; 0 = "Disable"; 1 = "Enable";
        "VlanId"=dword:0                        ; 0 - 4095
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```
[HKEY_LOCAL_MACHINE\Comm\AX887721\Parms\TcpIp]
;       "EnableDHCP"=dword:0                ;Disable DHCP function
;       "IpAddress"="xxx.xxx.xxx.aaa"       ;Define your IP address (xxx.xxx.xxx.aaa)
;       "Subnetmask"="255.255.255.0"        ;Define Submask IP address
;       "DefaultGateway"="xxx.xxx.xxx.bbb"  ;Define Gateway IP address
;       "DNS"="xxx.xxx.xxx.ccc"             ;Define DNS server IP address

        "AutoCfg"=dword:1
        "EnableDHCP"=dword:1                ;Enable DHCP function
        "UseZeroBroadcast"=dword:0          ;Use zero for broadcast address?

;ENDIF BSP_NIC_AX88772
; @CESYSGEN ENDIF BSP_NIC_AX88772
```

2. Choose “Make Run-Time Image” from the Build OS menu to build a new platform image (NK.BIN) to take effect the new settings.

## 6. Update WinCE 5.0 USB 2.0 HCD Driver (EHCI.DLL)

The default USB 2.0 HCD driver (EHCI) of Windows CE 5.0 Platform Builder couldn't handle the USB 2.0 device Hot-Swap event well while there is a pending transfer. It will cause the USB 2.0 device driver couldn't be loaded successfully after hot-swapping the device for a couple of times because the physical memory (TD buffers) resources are not released by the USB 2.0 HCD driver when the USB 2.0 device is unplugged while there is a pending transfer. This bug has been confirmed by Microsoft and will be fixed in the future version of Windows CE 5.0.

### Solution:

1. ASIX provides an updated EHCI.DLL file for standard X86 CE/PC platform.

   1-1. Copy the updated **EHCI.DLL** file into the $(_WINCEROOT)\PBWorkspaces \<YourProjectName>\RelDir\CEPC_x86_Release subdirectory.
   1-2. Run "Make Run-Time Image" to create the NK.BIN image file.

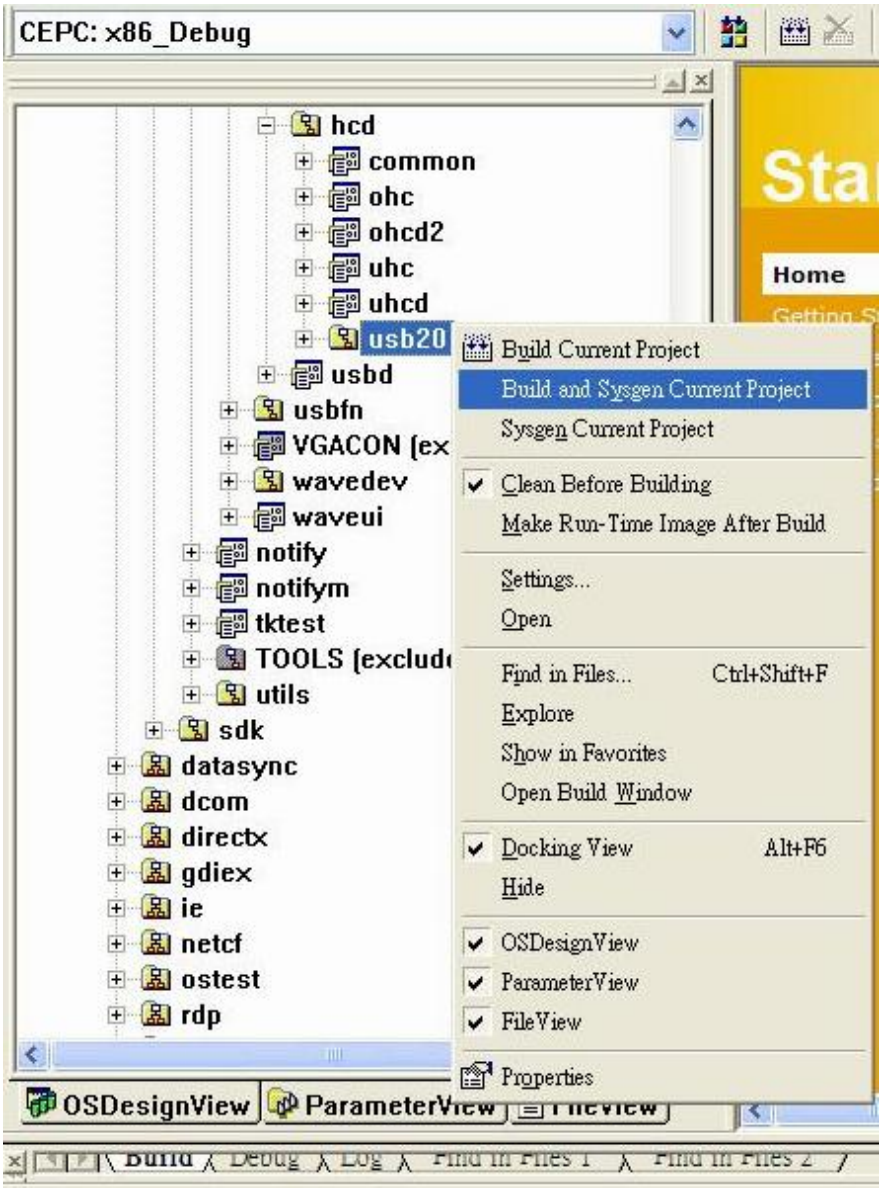
2. Customer manually modifies the **cpipe.cpp** file in the $(_WINCEROOT)\PUBLIC \COMMON\OAK\DRIVERS\USB\HCD\USB20\EHCI subdirectory and rebuild a new EHCI.DLL driver for their specific WinCE BSP platform.

   2-1. Modify the **cpipe.cpp** file in the $(_WINCEROOT)\PUBLIC\COMMON \OAK\DRIVERS\USB\HCD\USB20\EHCI subdirectory to remove below two statements.

**<<< In the cpipe.cpp file >>>**

```
void  CQueuedPipe::AbortQueue( void )
{
   ….
   ASSERT( m_pUnQueuedTransfer == NULL);
   if (m_pQueuedTransfer) {
      RemoveQHeadFromQueue();
//      m_pQueuedTransfer;                    //Remove this line
      m_pQueuedTransfer ->AbortTransfer();
      GetQHead()->InvalidNextTD();
      m_pCEhcd->AsyncBell();// Ask HC update internal structure.
      Sleep(2);// this sleep is for Interrupt Pipe;
      m_pQueuedTransfer->DoneTransfer();
//      m_pQueuedTransfer =  NULL;            //Remove this line
      delete m_pQueuedTransfer;
      m_pQueuedTransfer = NULL;
      InsertQHeadToQueue() ;
   }
   ASSERT(m_pQueuedTransfer == NULL);
   ….
}
```

2-2. Rebuild EHCI driver by select "Build and Sysgen Current Project" from **usb20** project menu. (See below picture)



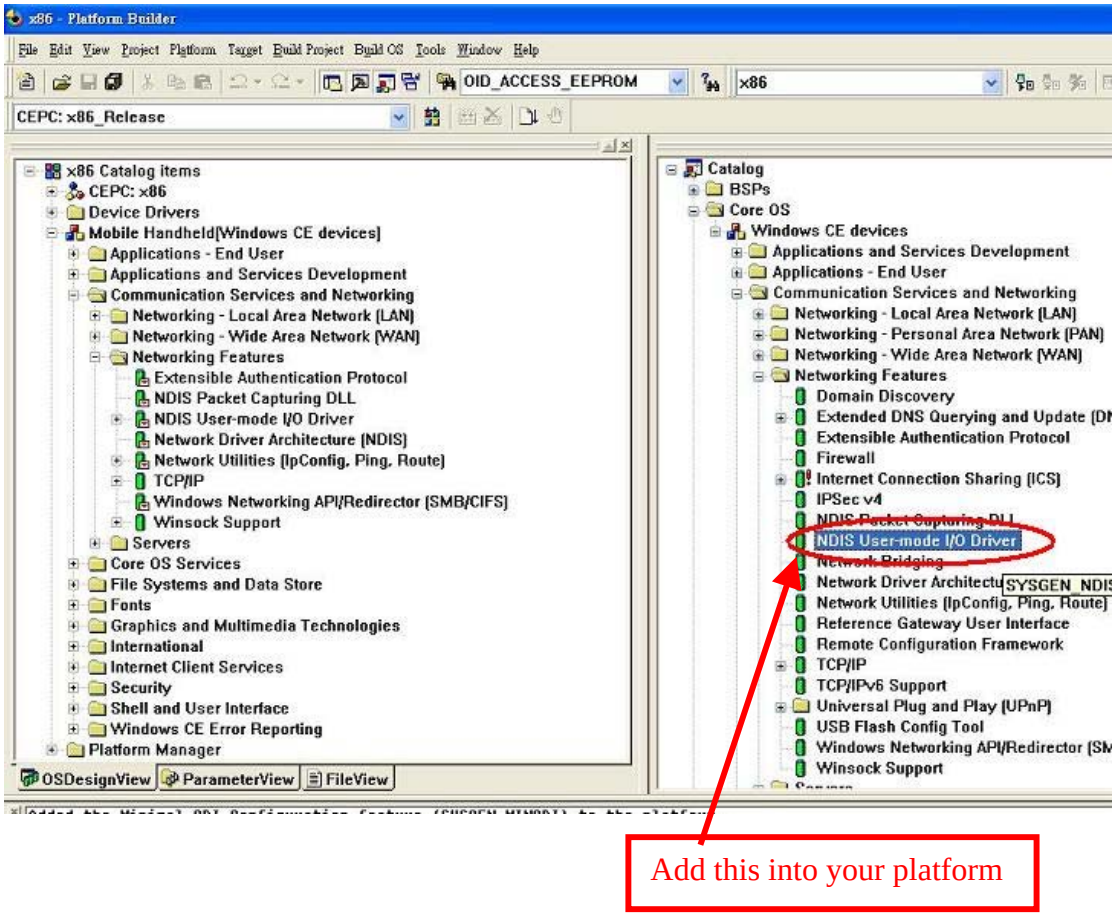

2-3. Check if the EHCI.DLL file in the $(_WINCEROOT)\PBWorkspaces \<YourProjectName>\RelDir\CEPC_x86_Release subdirectory is updated successfully or not.

2-4. Run "Make Run-Time Image" to create the NK.BIN image file.

## 7. How to configure WinCE 5.0 to run the SROM Programming Tool?

Before running AX88772 SROM Programming Tool (eeprom.exe), users need to add the "NDIS user mode I/O driver" in the WinCE 5.0 platform and then select "Build and Sysgen" from "Build OS" menu to rebuild the boot image file.




## 8. Known Errata:

None.