

#### ISP176x Windows CE 5.0 User Installation Guide

Rev 01 — 18 October 2005

User manual

#### **Document information**

Info	Content
Keywords	usb; universal serial bus; isp1760; isp1761
Abstract	This document describes the Platform Builder setup for the ISP176x Universal Serial Bus (USB) Host Controller Driver. The document covers the installation of software for the ISP176x on the Microsoft Windows CE platform version 5.0.
	<b>Remark</b> : The ISP176x denotes the ISP1760 and ISP1761 Hi-Speed Universal Serial Bus controllers, and any future derivative.





#### **Revision history**

Rev	Date	Description
01	20051018	First release.

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**Remark**: The ISP176x denotes the ISP1760 and ISP1761 Hi-Speed Universal Serial Bus controllers, and any future derivative.

#### 1. Introduction

This document describes the Platform Builder setup for the ISP176x Universal Serial Bus (USB) Host Controller Driver (HCD). The document covers the installation of software for the ISP176x on the Microsoft Windows CE platform Ver. 5.0.

The software architecture supports the PCI and GPIO bus. The software is tested and proven on the PCI platform using the PLX9054 bridge.

**Remark**: It is assumed that the reader is well versed with the Windows CE development environment and fully understands the driver development for Windows CE Ver. 5.0.

### 2. Installing the ISP176x host software

- 1. Install the ISP176x host software on the PC using the setup utility.
- Under the WINCE500 root directory, create directory 3rdParty. Under 3rdParty create directory Philips.
- 3. Copy directories PhISP1761HCD and PhISP1761Bus from the eval kit disk to directory \WINCE500\3rdParty\Philips\.
- 4. Copy CEC files Ph1761Host.cec and PCIKit.cec from the eval kit disk to folder \WINCE500\PUBLIC\COMMON\OAK\CATALOG\CEC.

### 3. ISP176x HCD Windows CE Ver. 5.0 operating system design

This section explains the steps involved in adding Windows CE Ver. 5.0 ISP176x HCD and its dependent modules for x86 processor.

1. Install Windows CE Ver. 5.0 with your selected BSP.

After installing Windows CE Ver. 5.0, follow the steps to add the ISP176x HCD and its dependent modules.

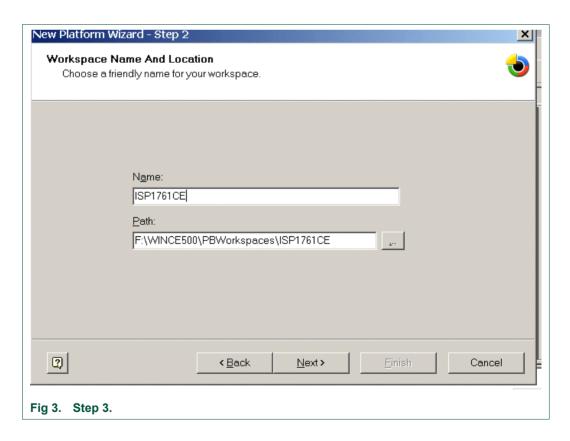
2. Create a platform workspace with your BSP.

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2	Manage Catalog Items	S	
	License Run-Time Ima	ge	
	E⊻it		
Fig 1. Step 1.			

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	New Platform Wizard - S	tep 1		×	
) () ile Ec 2 2			Welcome to the New Platform Wizard This wizard guides you through the process of creating an OS design for a Windows CE-based platform. An OS design defines the characteristics of a Windows CE OS. You can create an OS design by choosing a design template and one or more board support packages (BSPs). A BSP includes an OEM adaptation layer (OAL) and device drivers.		
			This wizard helps you: Choose a BSP. Choose a design template. Add items to your OS design or remove items from it. To continue, click Next.		
	Q		< Back Next > Finish Cancel		
Fig 2	. Step 2.				



New Platform Wizard - Step 3 X Board Support Packages (BSPs) A BSP contains a set of device drivers that are added to your OS design.				
Available BSPs: AMD GEODE: X86 CEPC: X86 EMULATOR: X86 INTEL PXA27X DEV PLATFORM:ARMV41 PHILO DEVELOPMENT BOARD: ARMV41 SAMSUNG SMDK2410: ARMV41	Select one or more BSPs for your OS design.			
<     Compared and a second and	Note: Only BSPs supported by installed CPUs are displayed in the list.   Next> Finish			
Fig 4. Step 4.				

New Platform Wizard - Step 3  Board Support Packages (BSPs)  A BSP contains a set of device drivers that are added to your OS design.				
Available BSPs:				
AMD GEODE: X86	Select one or more BSPs for your OS design.			
CEPC: X86     EMULATOR: X86     INTEL PXA27X DEV PLATFORM:ARMV4I     PHILO DEVELOPMENT BOARD: ARMV4I     SAMSUNG SMDK2410: ARMV4I	A BSP for a Windows CE PC-based hardware reference platform. The platform uses the OS based on the x86 architecture. Note: Only BSPs supported by installed CPUs are displayed in the list.			
(2) < Back	Next > Finish Cancel			
Fig 5. Step 5.				

## UM10067 ISP176x Win CE 5.0 User Installation Guide

New Platform Wizard - Step 4 Design Template A design template is a pre-defined selection of (	Catalog items.
Available design templates: Custom Device Digital Media Receiver Enterprise Terminal Enterprise Web Pad Gateway Industrial Controller Internet Appliance IP Phone Mobile Handheld Set-Top Box Tiny Kernel Windows Thin Client	Choose the design template that is most closely aligned with the purpose of your target device. Provides the starting point for a range of Web Pad-based devices with touch display and wireless networking.
(2) < Back	Next > Finish Cancel

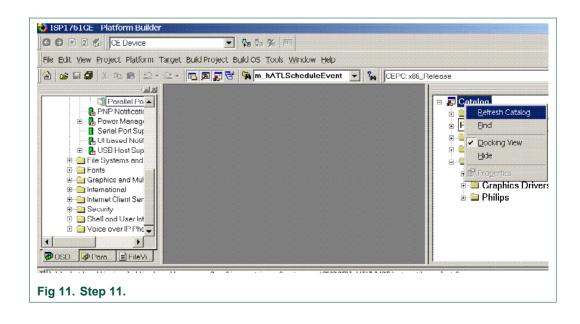
New Platform Wizard - Step 5				
Applications & Media Select items for applications and media to include in your OS design.				
Items:				
NET Compact Framework     ActiveSync     DCOM     Lightweight Directory Access Protocol (LDAP)     Standard SDK for Windows CE     VBScript support     VBScript support     Windows Media Audio/MP3     Windows Media Video/MPEG-4 Video     Windows Messenger     WordPad     Internet Browser     Microsoft File Viewers     Windows CE Error Reporting	Support for applications and services designed for the .NET Compact Framework.			
	Estimated size of these items: 10063 KB			
(2) < Back	Next > Finish Cancel			
-ig 7. Step 7.				

New Platform Wizard - Step 6				
Networking & Communications Select items for networking and communications to include in your OS design.				
Items: OBEX Server TCP/IPv6 Support Cocal Area Network (LAN) Personal Area Network (P. Personal Area Network (P. Wide Area Network (WAN) Wide Area Network (WAN)	AN) ion	The foundation of the OBEX Application Framework that provides support for both standard and user-defined services.		
		Estimated size of these items: 10924 KB		
2	< Back	Next > Finish Cancel		
Fig 8. Step 8.				

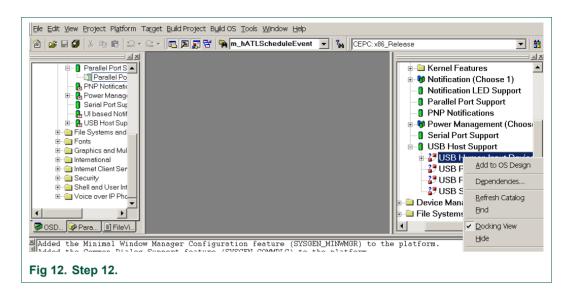
New Platform Wizard - Step 7				3	×
OBEX Server					
Security Warning					
Under certain circumstances, the Object Exchange Protocol (OBEX) catalog item can compromise the security of your platform. This catalog item poses the following potential security risks:					
If proper security and authinterferes with services.ex			t used, a service	that	
If proper encryption techniques are not used, OBEX running over Bluetooth could expose data packets to third parties.					
To learn more about potential OBEX security risks, as well as the best practices for using this catalog item more securely, see the following topics:					
OBEX Security					
Enhancing the Security of a Device					
					-
3	< Back	Next >	Finish	Cancel	
Fig 9. Step 9.					

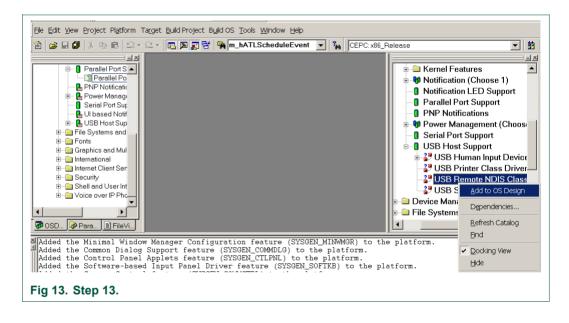
New Platform Wizard - Step 8			×			
Completing the Wizard	New Platform					
You have successfully completed the New Platform Wizard.						
based platform. By def provides a Debug conf	You have created an OS design for a Windows CE- based platform. By default, Platform Builder provides a Debug configuration and a Release configuration of this OS design.					
Options: • <u>Modify build options for the Debug and Release</u> <u>configurations of your OS design without closing this wizard.</u>						
To close this wizard, click <i>Finish</i> .						
2	<back next=""></back>	Finish	Cancel			
Fig 10. Step 10.						

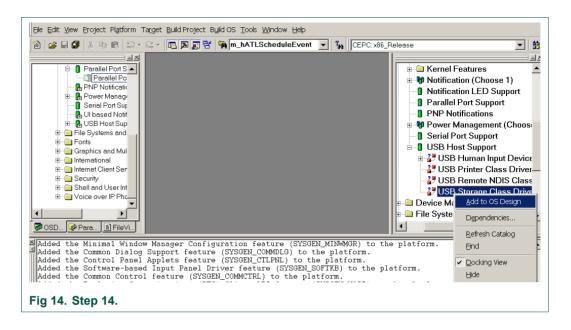
3. Refresh the catalog items.

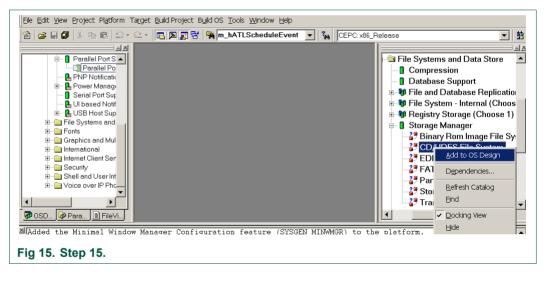


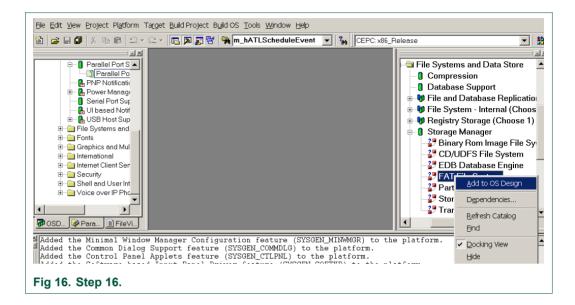
#### ISP176x Win CE 5.0 User Installation Guide

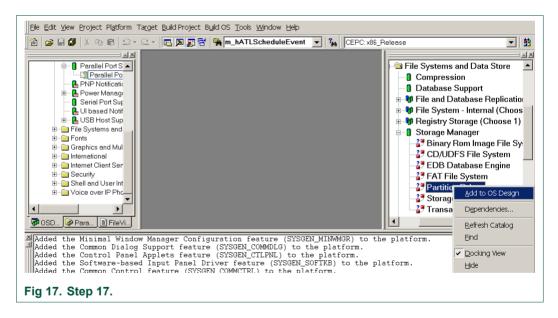


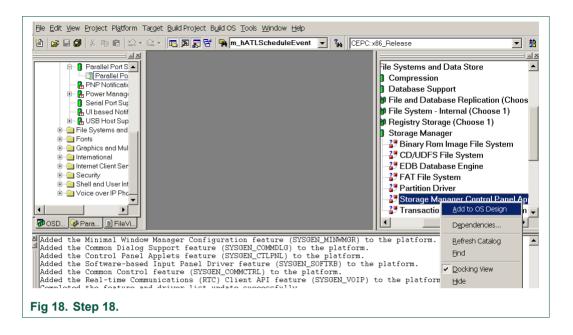


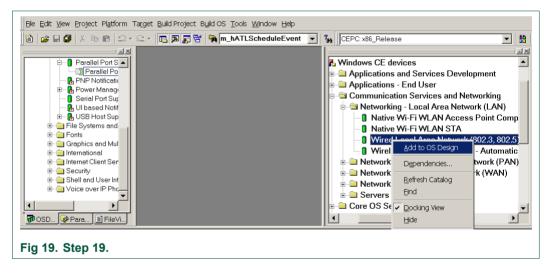




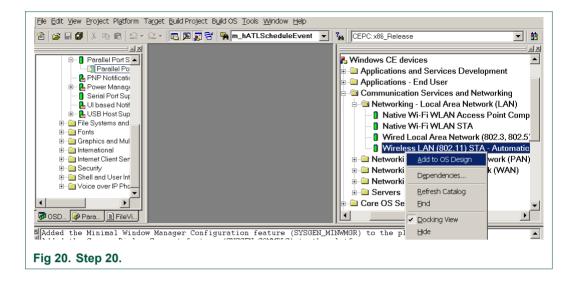


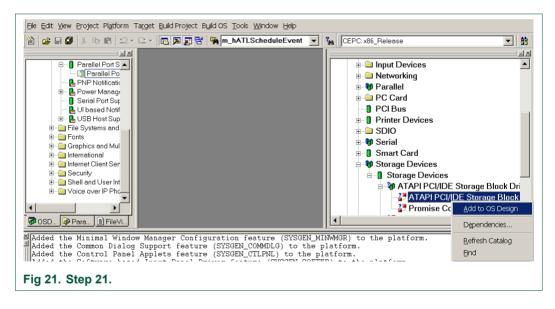


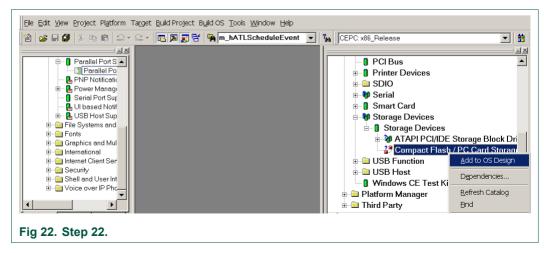




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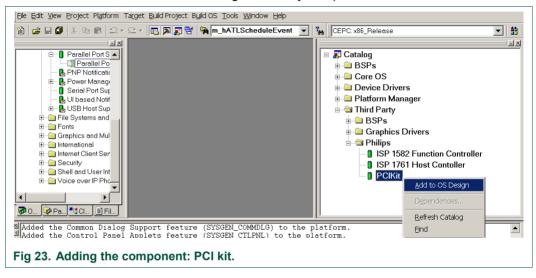


User manual

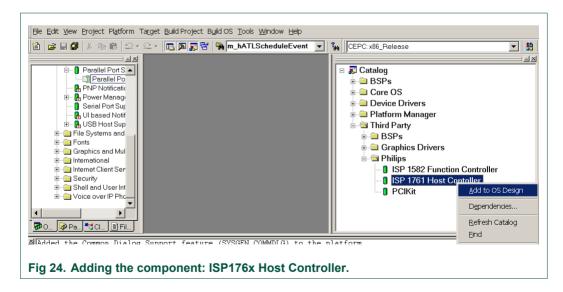
### 4. Adding the ISP176x project to the platform

In this section, you will learn to add the ISP176x Host Controller catalog items to the operating system design view. It is assumed that the platform is already created and the ISP176x catalog files have been imported.

If you are working on the PCI bus, you need to add the PCI bus driver to route the PCI interrupt to the ISP176x. If you are using the GPIO bus, you can ignore this step. To add the PCI bus driver, add module Catalog\ThirdParty\Philips\ PCIKit.



To add the ISP176x module to the platform, add module Catalog\ThirdParty\Philips\1761HostController.

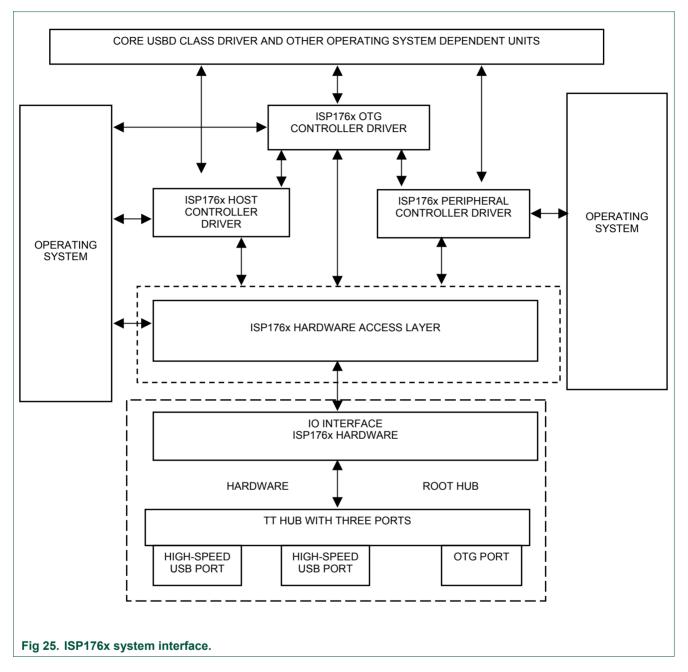


### 5. Interfacing routines

The ISP176x Host Controller module is located below Microsoft defined USBD. The ISP176x Host Controller module interacts with the ISP176x hardware located at the bottom level and with the USBD located above this module.

Fig 25 shows interfacing the blocks of the ISP176x to an operating system.

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## 6. Customizing the software

The software architecture supports PCI and GPIO modes. In PCI and GPIO modes, read and write registers of the ISP176x can be memory mapped. You can configure the interrupt for the ISP176x as either edge-triggered or level-triggered using the Hardware Mode Control register. To customize the ISP176x, refer to the ISP176xHCDConfig.h file, located under the 'WINCE500\3rdparty\Philips\phISP176xHCD\phISP176xCOM' directory.

#### 6.1 PCI bus mode

The software is tested and proven on the PLX9054 bridge. PCI bridge chip PLX9054 in the ISP176x PCI kit is used for the PCI host to transparently access the ISP176x. PLX9054 requests PCI bus resources, such as I/O ports, interrupt line, on behalf of the ISP176x. PLX9054, however, can only request one interrupt line for the ISP176x.

If required, customize file P1761bus.reg under WINCE500\3rdparty\Philips\PhISP176xbus\.

Change the following, depending on your PCI bridge settings:

- VendorID
- DeviceID
- SubVendorID
- SubsystemID
- Class
- SubClass
- ProgIF

#### For example, the P1761bus.reg file looks as follows:

```
; USB - P1761 Bus PCI Bus Driver for PCI kit only
; ------
; HC : 1: support Host Controller. 0: none
; DC : 1: support Device Controller. 0: none
[HKEY LOCAL MACHINE\Drivers\BuiltIn\PCI\Template\P1761BUS]
  "Dll"="p1761bus.dll"
  "Order"=dword:0
  "Class"=dword:06
  "SubClass"=dword: 80
  "ProgIF"=dword:00
  "VendorID"=multi sz:"10b5"
  "DeviceID"=multi sz:"5406"
  "SubVendorID"=multi sz:"10b5"
  "SubsystemID"=multi sz:"9054"
  "HC"=dword:1
 "DC"=dword:0
  ; USB - Philips ISP17161 driver Instance to create DCD or HCD
; Used to create P1761HCD instance
[HKEY LOCAL MACHINE\Drivers\ISP176x\Instance]
```

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```
"Dll"="RegEnum.dll"
```

```
; -----
```

```
; USB - Philips ISP176xHCD driver template
```

```
; -----
```

[HKEY\_LOCAL\_MACHINE\Drivers\ISP176x\Template]

"InstanceIndex"=dword:0

The driver will not be loaded, if these parameters do not match bridge settings.

#### 6.2 GPIO bus mode

If working in GPIO mode, change registry settings of P1761HCD.dll.

Open registry file P1761HCPDD.reg under WINCE500\3rdparty\Philips\phISP176xHCD\phISP176xPDD.

For example, the registry should look as follows, if you are working in GPIO mode. Change 'SysIntr', 'Irq' and 'MemBase', according to your platform.

[HKEY\_LOCAL\_MACHINE\Drivers\BuiltIn\P1761HCD]

```
; "Prefix"="PEHCD"
  "Dll"="P1761HCD.dll"
  "Order"=dword: 2
  "Class"=dword:Oc
  "SubClass"=dword:03
  "ProgIF"=dword: 20
  "IsrDll"="giisr.dll"
  "IsrHandler"="ISRHandler"
  "HcdCapability"=dword:4
                               ;HCD_SUSPEND_ON_REQUEST
  "SysIntr"=dword:1f ; decimal 31 ; you change your interrupt line here
  "MemBase"=dword:08000000 ;you change your Memory Base Address here
  "MemLen"=dword:100000
  "InterfaceType"=dword:0
                             ; Internal
  "Irg"=dword:3 ;you change your IRQ number here
```

#### 6.3 Driver loading sequence in Windows CE Ver. 5.0

After switching on the Windows CE system with the ISP176x PCI kit, PCI BIOS initializes the PCI kit and assigns I/O resource and PCI interrupt lines as requested by PLX9054.

Windows CE Ver. 5.0 PCI bus driver PCIbus.dll is then invoked. PCIbus.dll gets I/O resource and PCI interrupt line of the ISP176x PCI kit and obtains an interrupt ID. PCIbus.dll searches the registry, finds the ISP176x registry template by matching registry key 'Class', 'Subclass', 'VendorID', 'DeviceID', 'SubsystemID' and 'SubvendorID', then loads P1761Bus.dll.

To ensure that PCI bus driver PCIBus.dll loads P1761 bus driver P1761Bus.dll, porting engineer should verify that the above-mentioned registry key matches with the PLX9054 setting in the P1761bus.reg file located under directory Philips\PhISP176xBus.

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Once P1761Bus.dll is loaded and the system loads Host Controller stack P1761hcd.dll by checking registry setting in P1761bus.reg under directory Philips\PhISP176xbus.

This loading sequence will be different if you are working in GPIO mode. P1761Bus.dll will not be loaded in GPIO mode.

#### 6.4 I/O address translation in Windows CE Ver. 5.0

As soon as Host Controller stack p1761hcd.dll is loaded, its platform dependent PDD code, system.c, (under Philips\PhISP176xHCD\PhISP176xPDD) gets the hardware resources, I/O port and interrupt ID, from the registry. These I/O port addresses are in the form of physical address.

Direct hardware accesses by using the physical address from user mode device drivers or applications are prohibited by Windows. Physical addresses must be translated into virtual addresses using either MemMaploSpace () or VirtualAlloc () / Virtual Copy. The translation can also be done by new Windows CE Ver. 5.0 function BusTransBusAddrToVirtual ().

## 7. Building an image

To build an image, select BuildOS -> Build and Sysgen.

Eile Edit View Project Platform Target Build Project	Build OS Tools Window Help				
12   2 - 2   3   3   2 + 2 +   ■ ■ 3   3		C:x86_Release			
Parallel Port S      Parallel Port S      Prover Manage     Prover Manage     Serial Port Sup     Bergener Sup     Berge	Build and Sysgen         Build and Sysgen Current BSP         glean Before Building         ✓ Cgpy Files to Release Directory After Build         ✓ Make Run-Time Image After Build         Copy Files to Release Directory         Make Run-Time Image         ▲ Stop Build         Bgtch Build         Image Open Release Directory         Set Active Configuration         Configurations	Catalog BSPs Core OS Device Drivers Platform Manager Third Party BSPs Graphics Drivers Graphics Drivers SP 1582 Function Controller ISP 1761 Host Contoller PClKit			
Fig 26. Building an image.					

### 8. Creating boot disk for x86 SDB

To create a boot floppy disk for an x86 SDB:

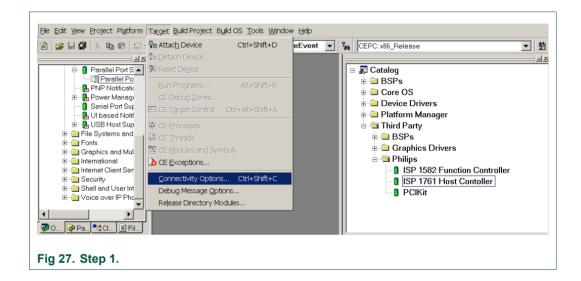
- Navigate to the %ProgramFiles%\Windows CE Platform Builder\5.00\CEPB\Utilities directory, and then run WebSetup.exe to install utility programs to the default Microsoft Windows directory on your PC. You only need to install WebSetup.exe once.
- 2. On your PC, insert a blank 3.5-inch floppy disk in the floppy disk drive.
- From the %ProgramFiles%\Windows CE Platform Builder\5.00\CEPB\Utilities directory, run CEPCBoot.144. You can also run CEPCBoot.144 from the command line.
- 4. If your floppy disk is not blank and formatted, check format before making disk box in the Web Image NT window. This causes WebSetup.exe to format the boot floppy

disk with MS-DOS 6.22 before copying the CEPCBoot.144 disk image to the boot floppy disk.

- 5. In the Web Image NT window, choose the A: drive. This copies the CEPCBoot.144 disk image to the boot floppy disk.
- 6. Choose Cancel to close the Web Image NT window.

#### 9. Connecting to x86 SDB target

1. On the Target menu, select Connectivity Options.



2. If you want to download the image through Ethernet and want the debugger to be KdStub, set Debugger to KdStub, Download and Transport to Ethernet.

Eile Edit View Project Platform	Target Build Project Build OS Tools Window Help	
🎦 😅 🖬 🕼 👗 🖻 🖻 🗠	🗸 🗠 🔻 🖪 🛐 🚰 🐂 m_hATLScheduleEvent 💌 🐐 DEPC: x86_Release	▼   #
Parallel Port S	Image: Control of Contro	
🍓 Target Device Connectivity	Options	>
Device Configuration Add Device Delete Device Service Configuration Kernel Service Map	Target Device: [CE Device Download: [Ethermet (PHILO291)	▼ Settings
<u>Core Service Settings</u> <u>Service Status</u>	Transport Ethernet (PHILO291) Debugger: KdStub	Settings Settings
Fig 28. Step 2.		

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3. Choose your device boot name or IP address.

<u>File E</u> dit <u>Vi</u> ew <u>P</u> roject Pl <u>a</u> tform	Target Build Project Build OS Tools Window Help	
🏠 🚅 🖬 🕼 👗 🛍 🖻 🕰	🕶 🗠 💌 🛐 🚰 🙀 m_hATLScheduleEvent 💌 🙀 CE	PC:x86_Release
Parallel Port S     Parallel Port S     Power Manage     PNP Notificativ     Power Manage     Sarial Port Sur     Target Device Connectivity     Device Configuration     Add Device     Delete Device	Sevice Boot Name:	Catalog BSPs Core OS Device Drivers
Service Configuration	Ether	✓ Settings
Kernel Service Map Core Service Settings Service Status	Trans Ether	▼Settings
	(PHIL <u>QK</u> <u>Cancel</u>	
	Debu	▼ Settings
		<u> </u>
Fig 29. Step 3.		

4. Select Attach Device to download the image to the target.

Eile Edit <u>V</u> iew Project Pl <u>a</u> tform		uild OS <u>T</u> ools <u>W</u> indo	ow Help			
Constant of the second se	Attach Device       Regetach Device       Reset Device       Run Programs       CE Debug Zones       CE Target Control       CE Processes	Ctrl+Shift+D Alt+Shift+R		CEPC: x86_Release	_	
File Systems and Fonts Fonts fortes and Mul International International fortenet Client Ser Security Security Voice over IP Phc Voice over IP Phc Security Secur	CE Threads CE Modules and Sym CE Exceptions Connectivity Options Debug Message Qpti Release Directory Mo	Ctrl+Shift+C ons	-	<ul> <li>BSPs</li> <li>Graphics Drivers</li> <li>Philips</li> <li>ISP 1582 Function Controller</li> <li>ISP 1761 Host Contoller</li> <li>PClKit</li> </ul>		
Fig 30. Step 4.						

## **10. References**

- Universal Serial Bus Specification Rev. 2.0
- ISP1760 Hi-Speed Universal Serial Bus host controller for embedded applications datasheet
- ISP1761 Hi-Speed Universal Serial Bus On-The-Go controller data sheet
- Enhanced Host Controller Interface Specification for Universal Serial Bus Rev. 1.0.

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## 11. Glossary

Table 1: Abbreviati	ons
Acronym	Description
API	Application Programming Interface
BIOS	Basic Input Output System
BSP	Board Support Package
GPIO	General Purpose Input/Output
HAL	Hardware Abstraction Layer
HCD	Host Controller Driver
IP	Internet Protocol
MSI	Microsoft Installer
PC	Personal Computer
PCI	Peripheral Component Interconnect
USB	Universal Serial Bus
USBD	Universal Serial Bus Driver

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