

UM10067

ISP1760; ISP1761 Windows CE 5.0 user installation guide

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User manual

Document information

Info	Content
Keywords	usb; universal serial bus; isp1760; isp1761
Abstract	<p>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.</p> <p>Remark: The ISP176x denotes the ISP1760 and ISP1761 Hi-Speed Universal Serial Bus controllers, and any future derivative.</p>

Revision history

Rev	Date	Description
03	20091012	Rebranded to the ST-Ericsson template.
02	20090216	Rebranded to the ST-NXP Wireless template.
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.
2. Under the WINCE500 root directory, create directory 3rdParty. Under 3rdParty create directory ST-ERICSSON.
3. Copy directories PhISP1761HCD and PhISP1761Bus from the eval kit disk to directory \WINCE500\3rdParty\ ST-ERICSSON\.
4. Copy CEC files ISP1761Host.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.

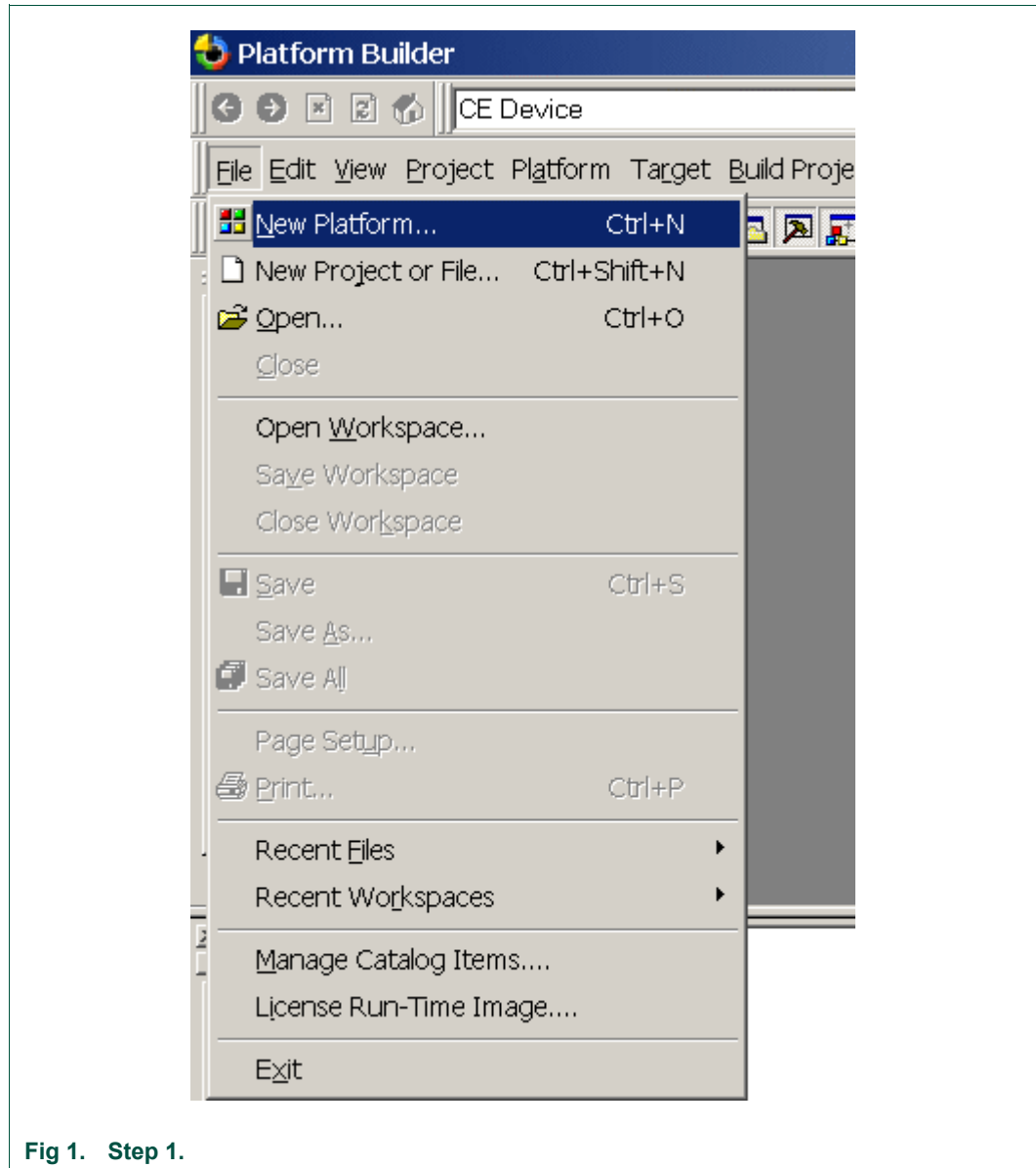


Fig 1. Step 1.

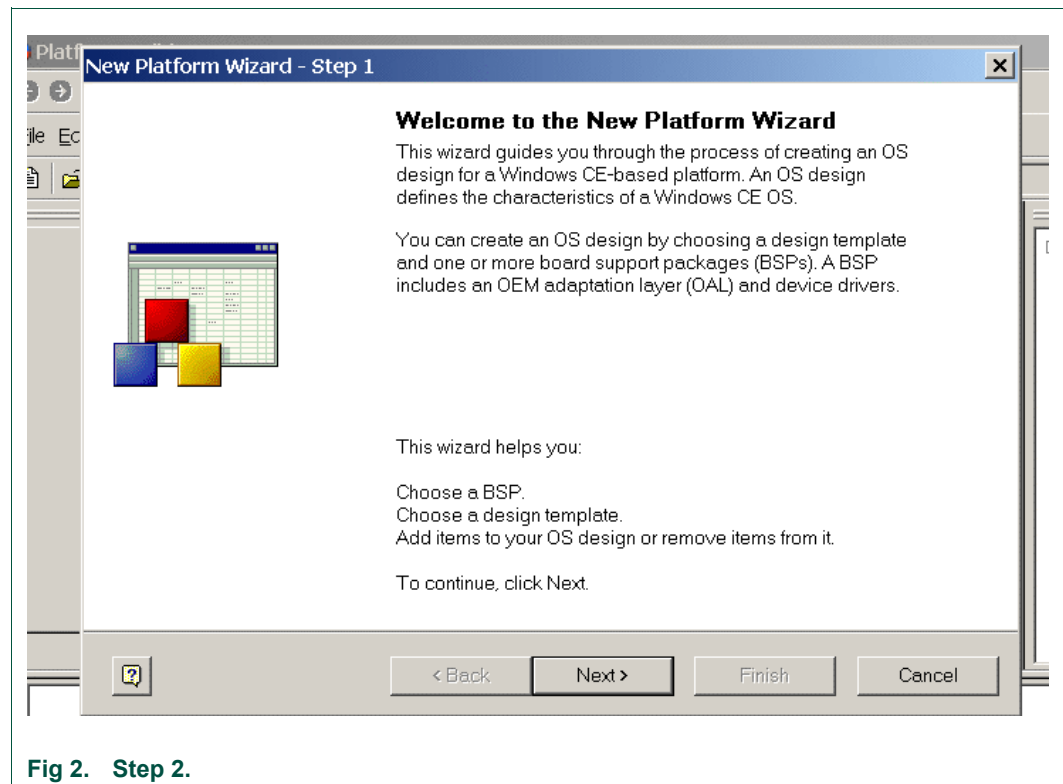


Fig 2. Step 2.

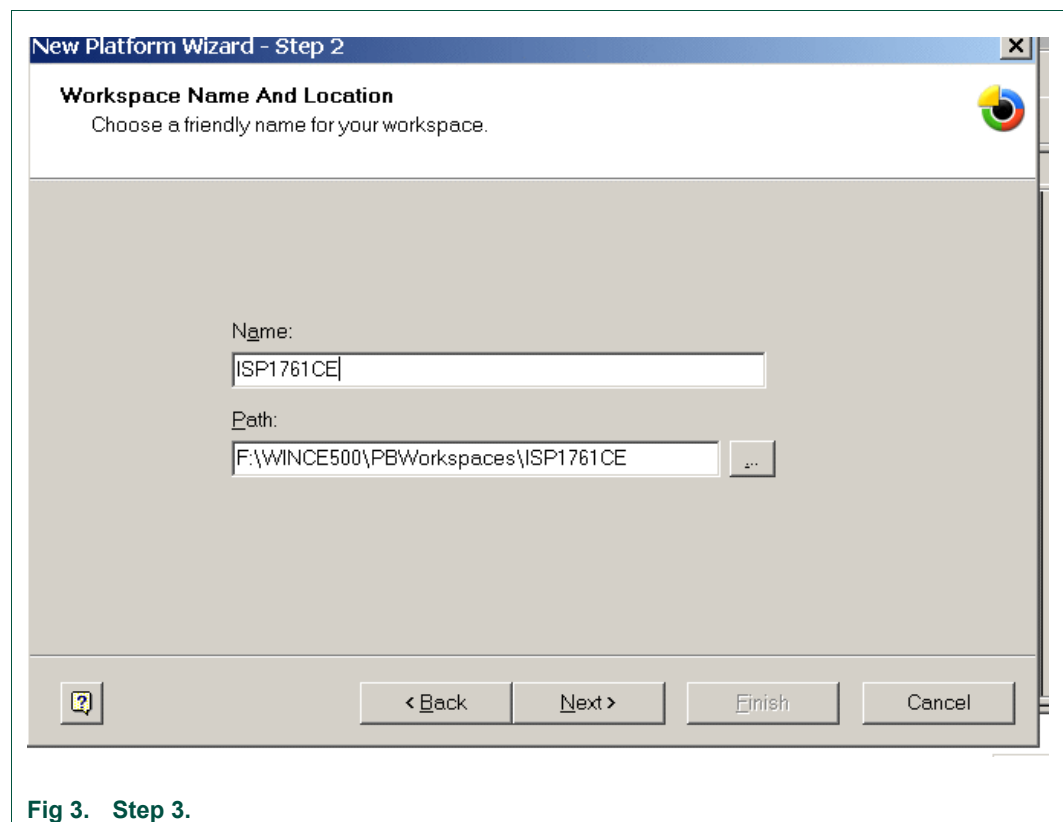


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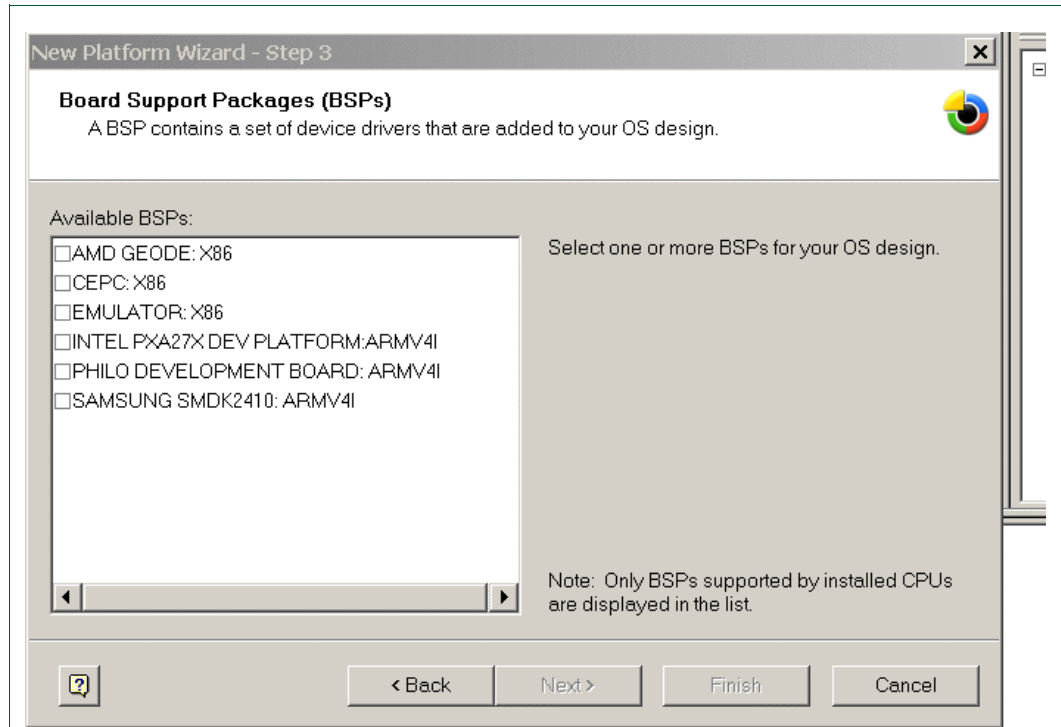


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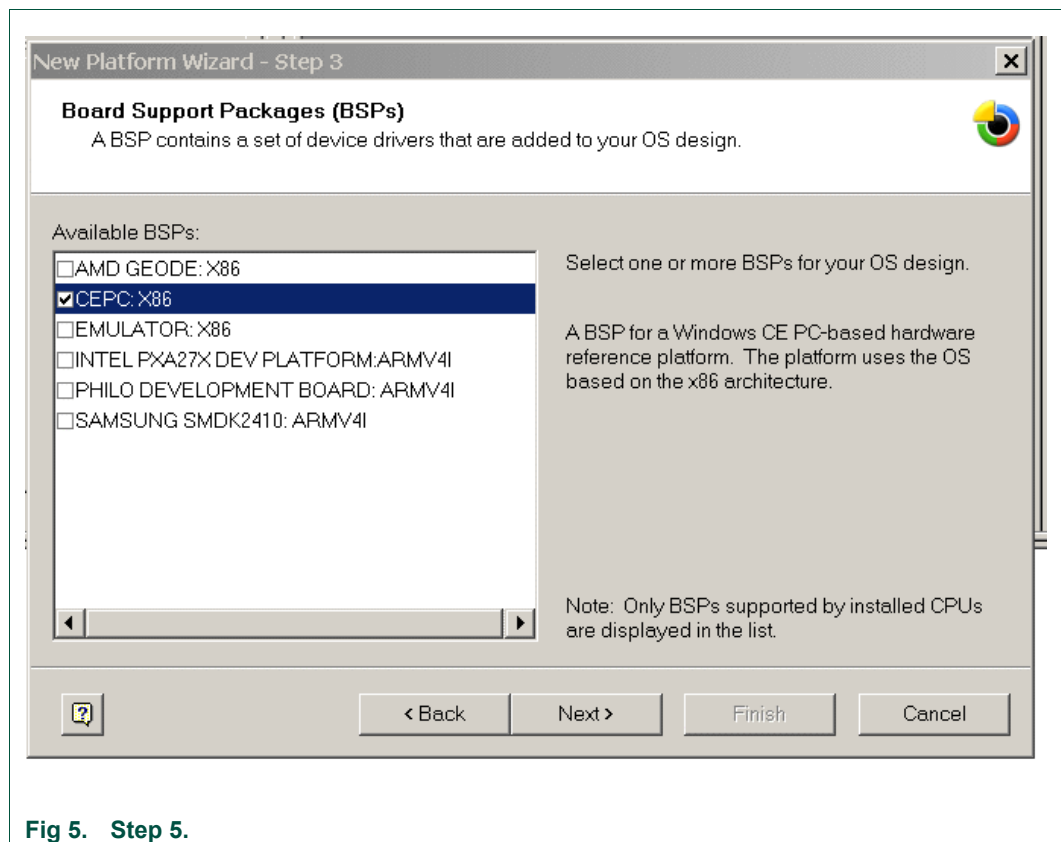


Fig 5. Step 5.

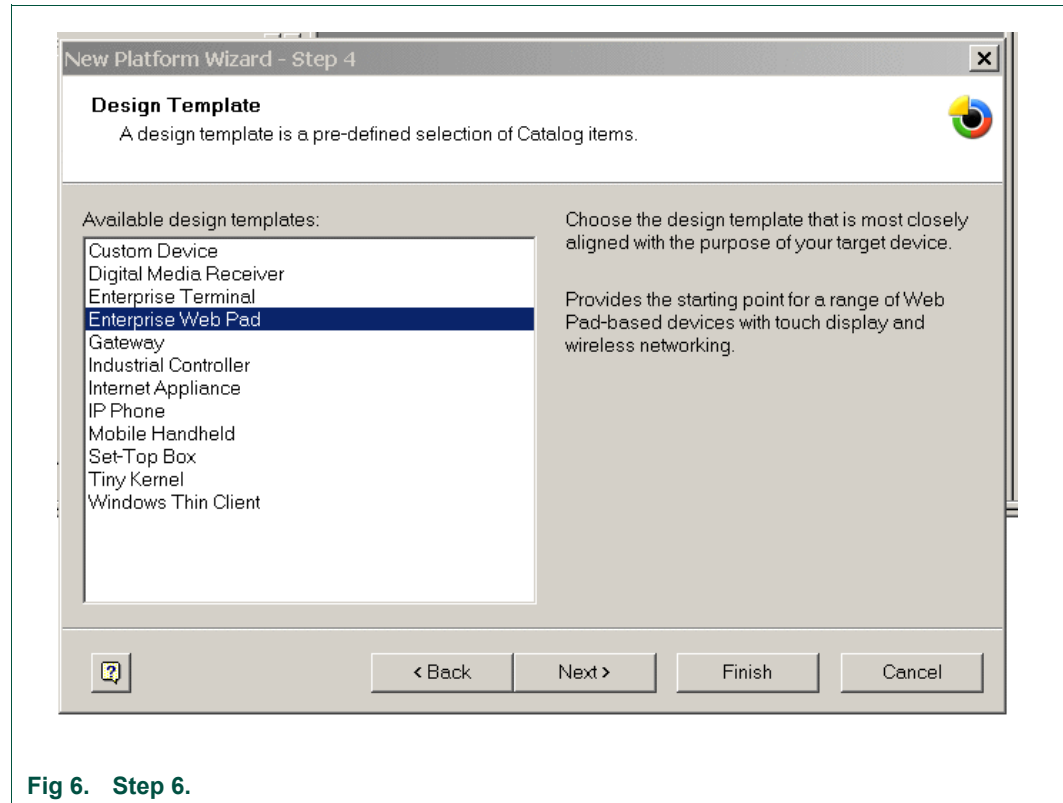


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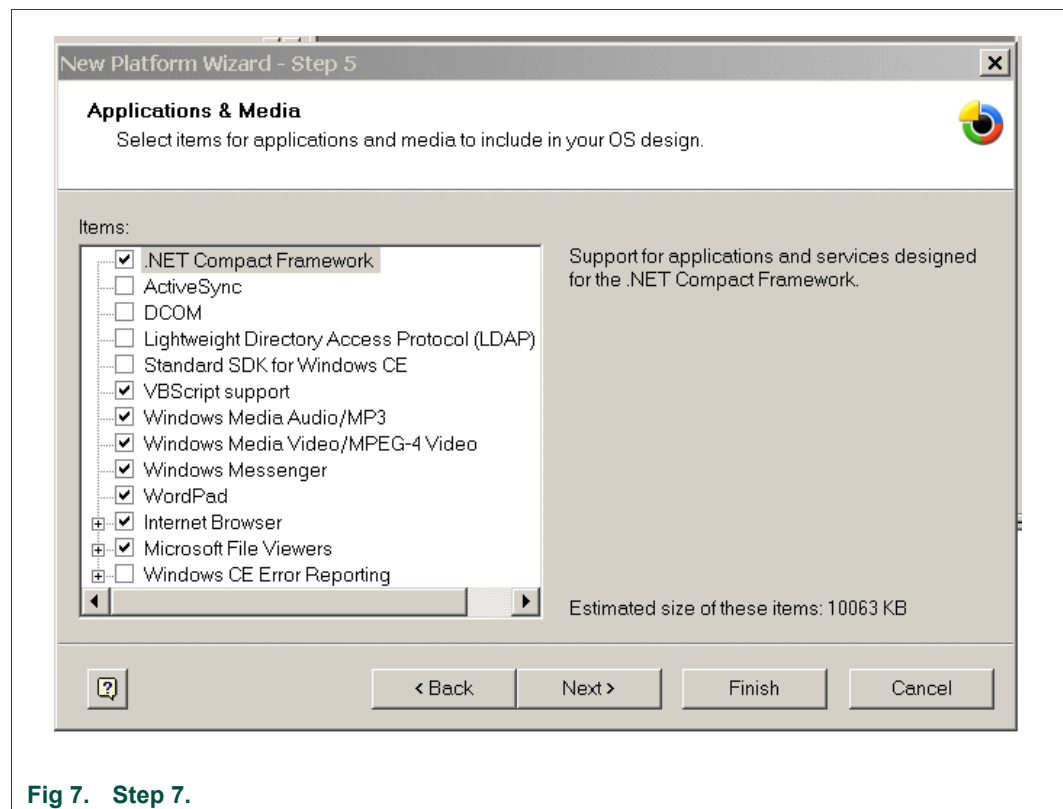


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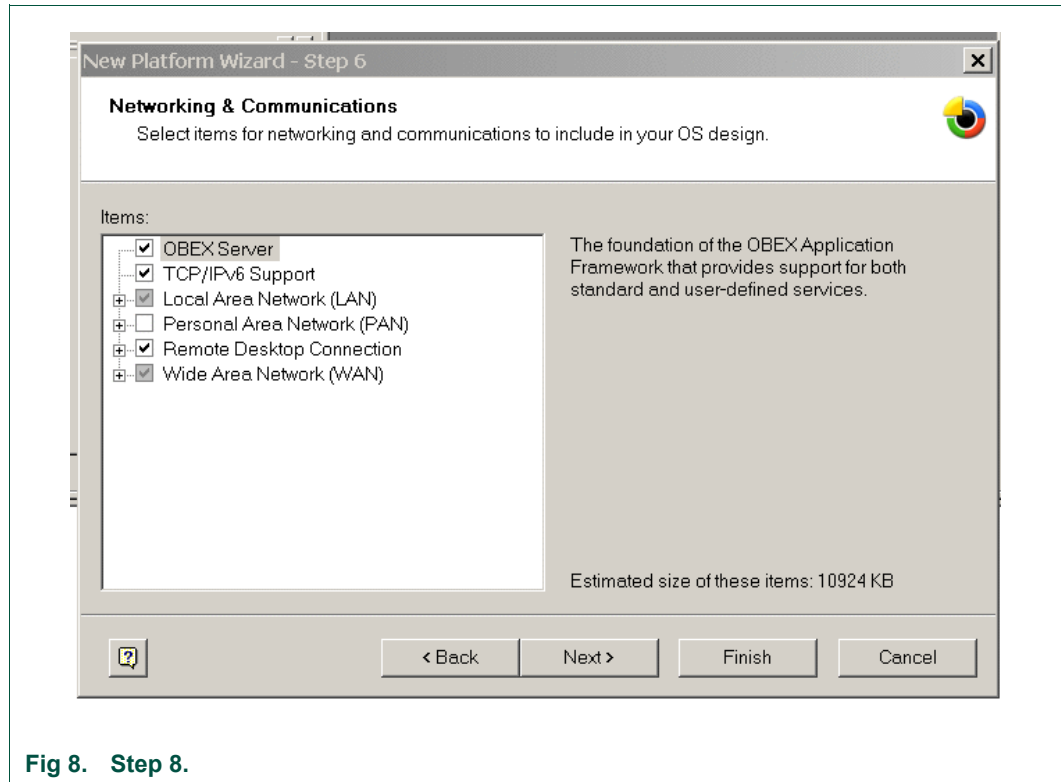


Fig 8. Step 8.

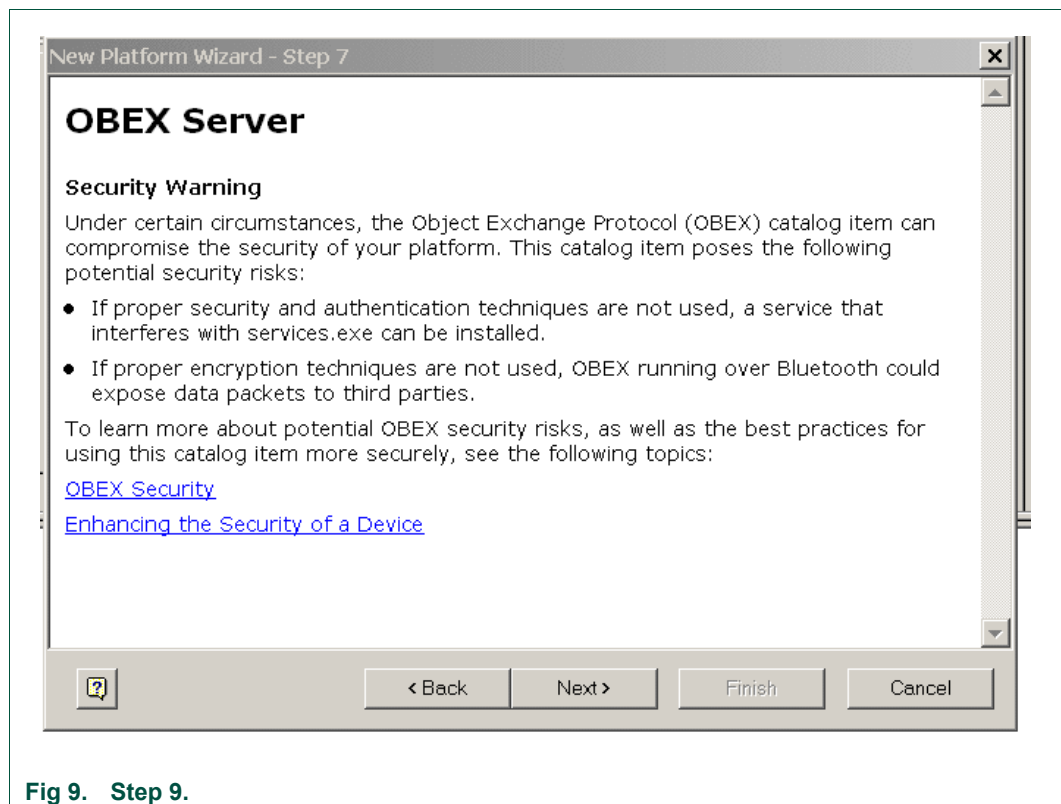


Fig 9. Step 9.

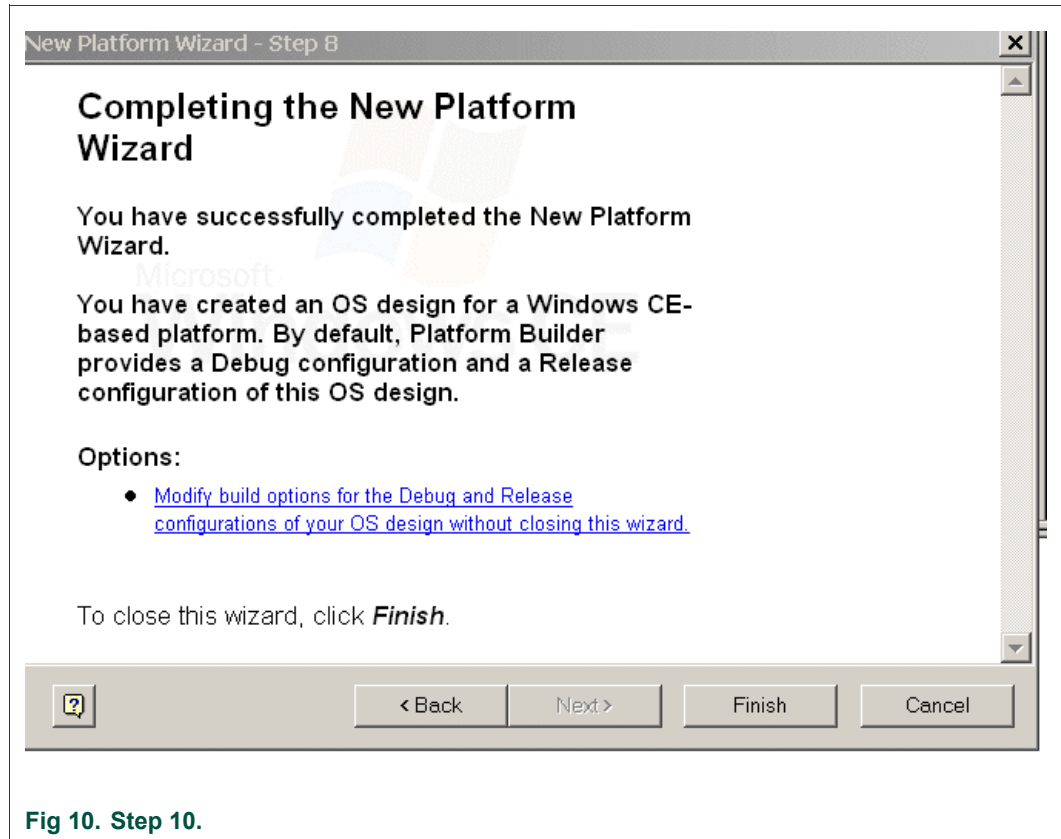


Fig 10. Step 10.

3. Refresh the catalog items.

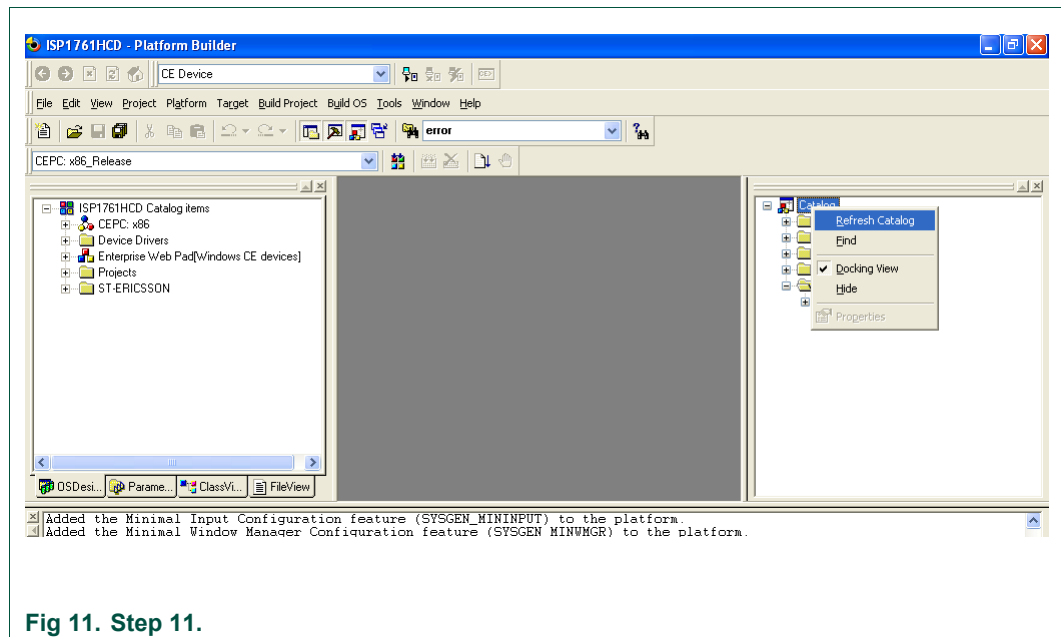


Fig 11. Step 11.

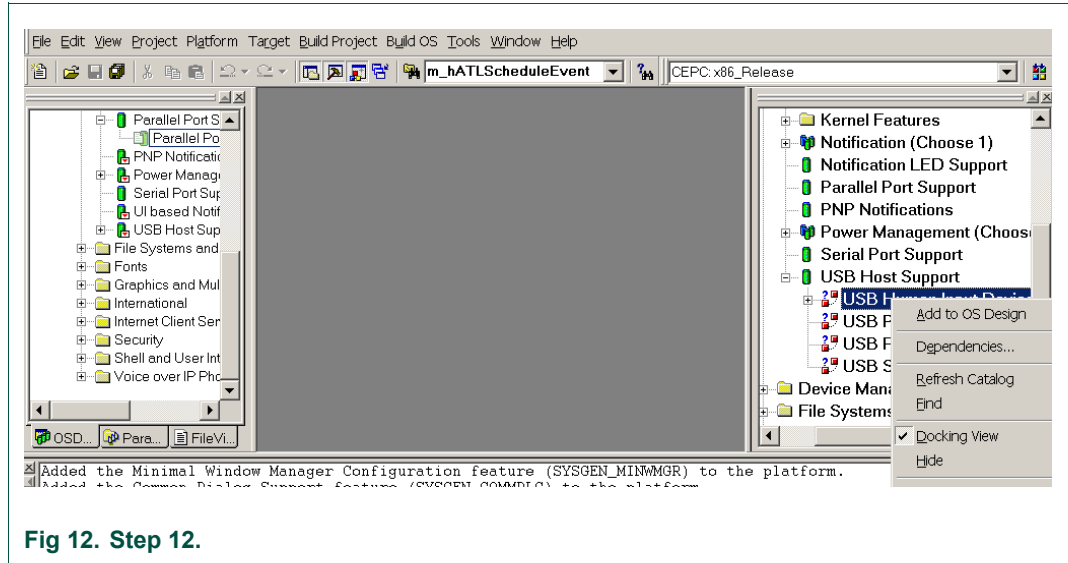


Fig 12. Step 12.

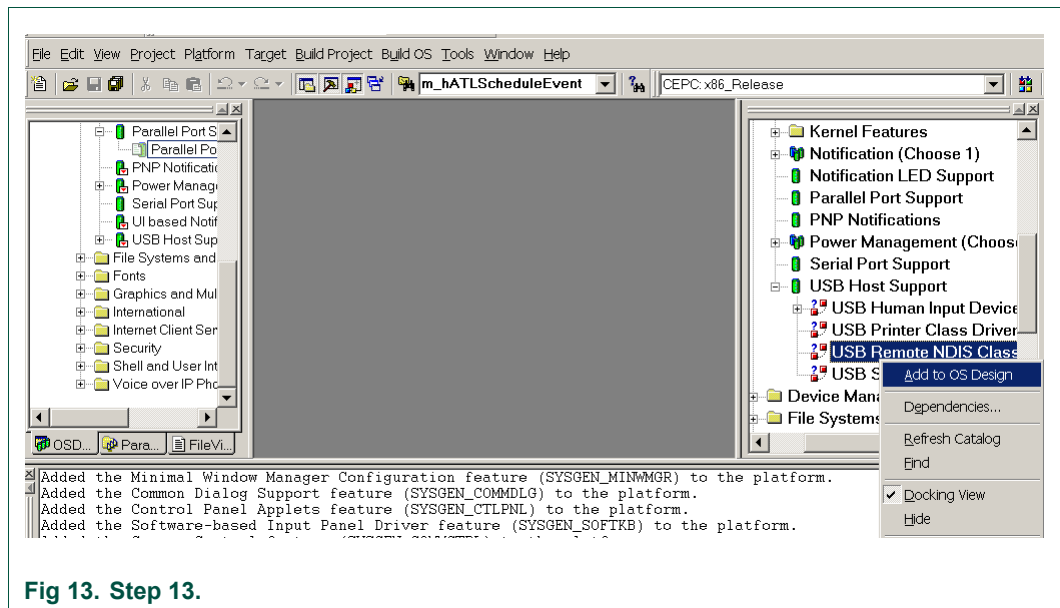


Fig 13. Step 13.

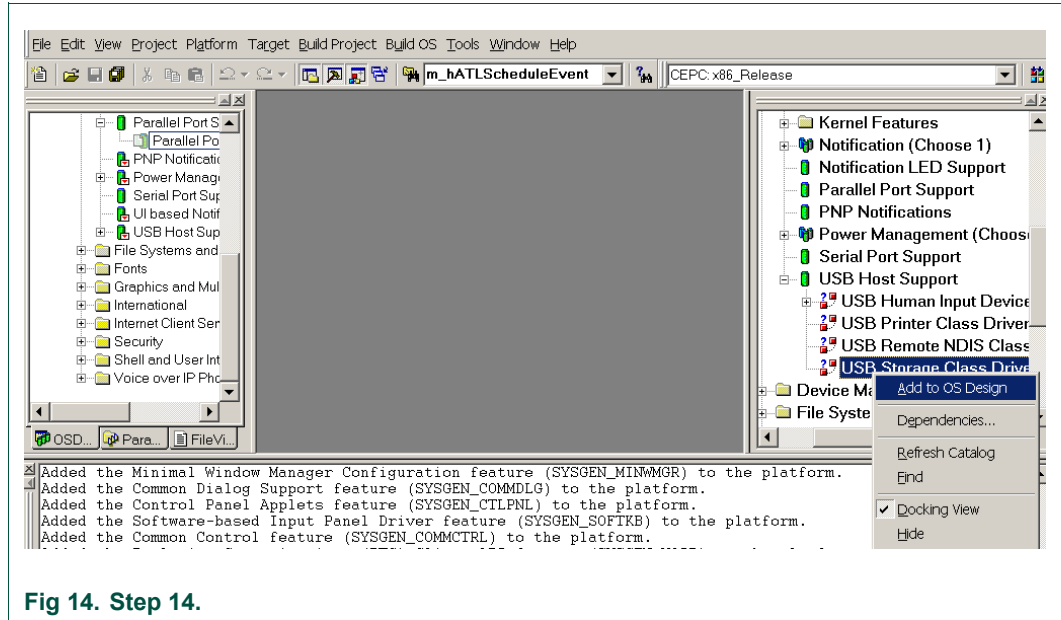


Fig 14. Step 14.

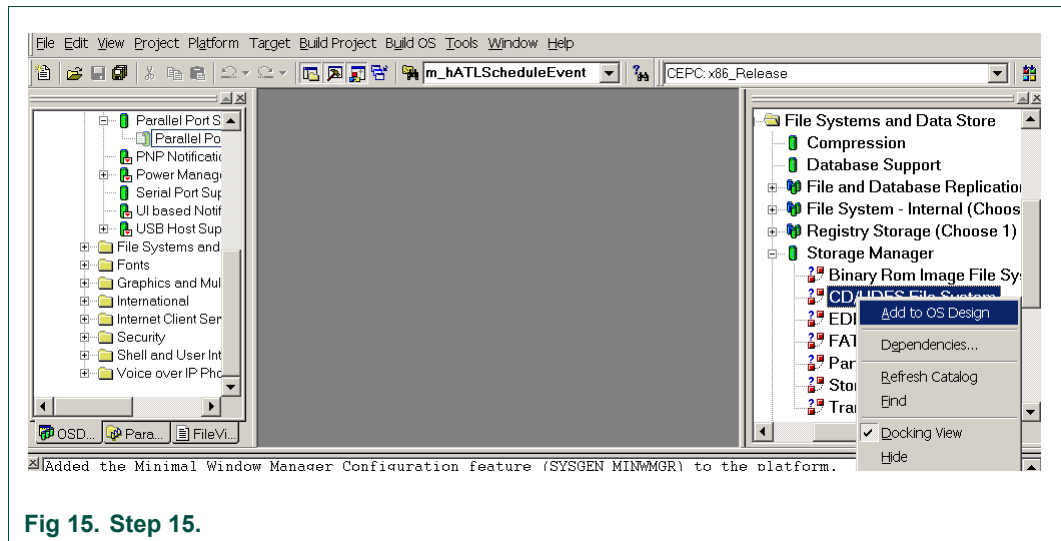


Fig 15. Step 15.

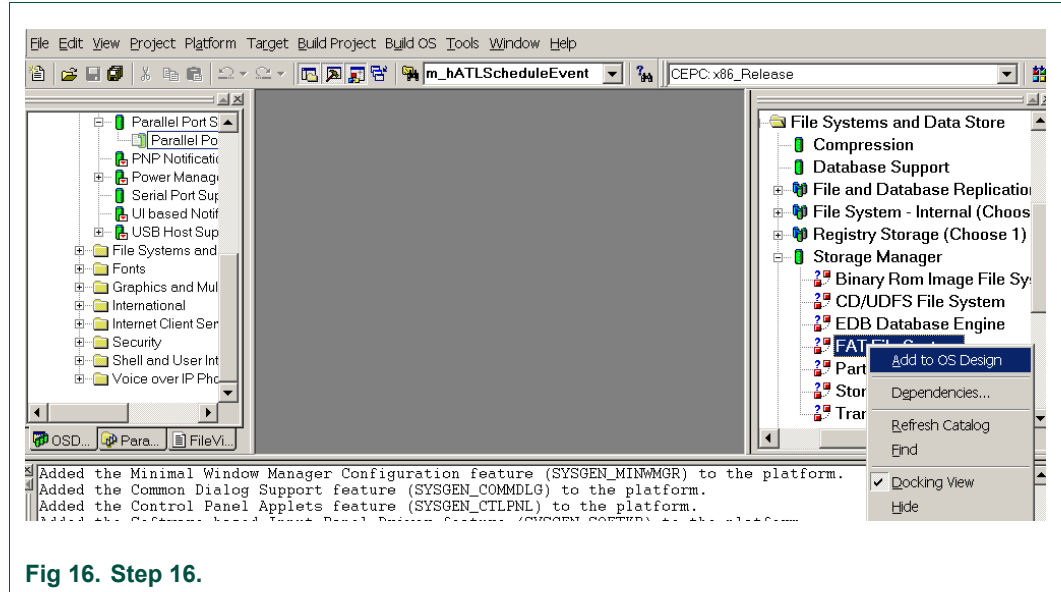


Fig 16. Step 16.

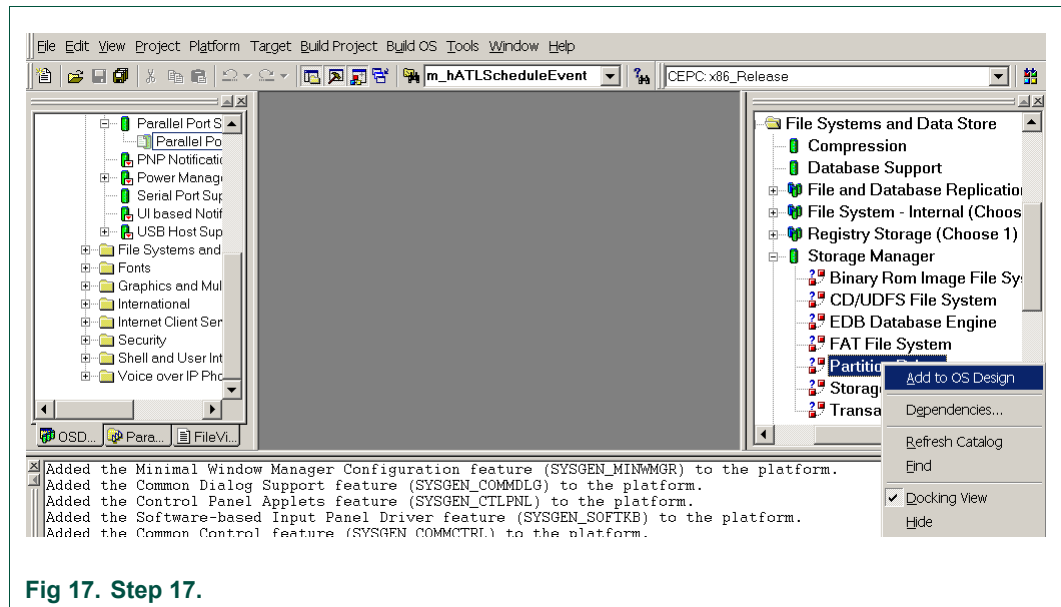


Fig 17. Step 17.

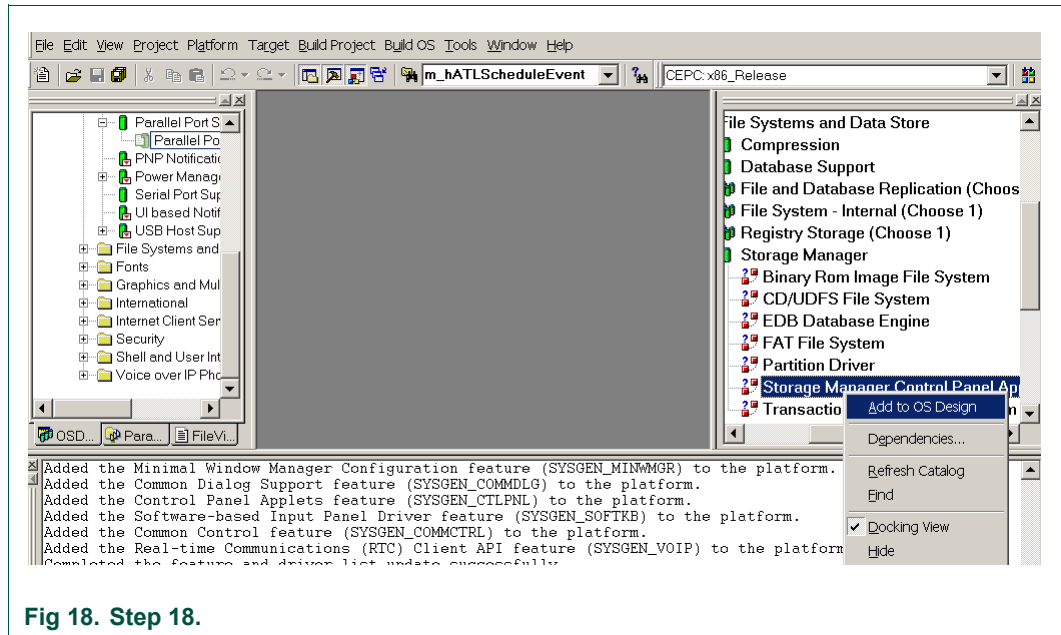


Fig 18. Step 18.

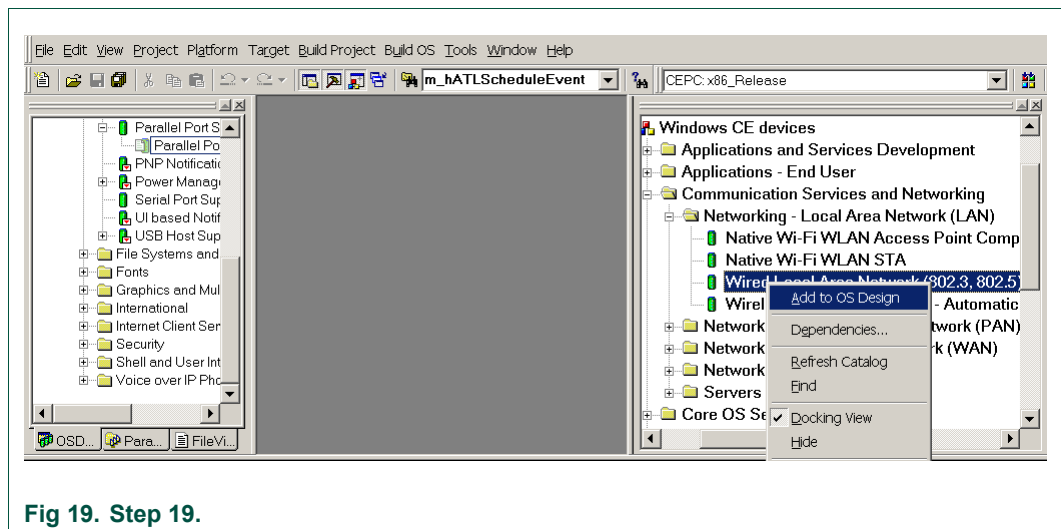


Fig 19. Step 19.

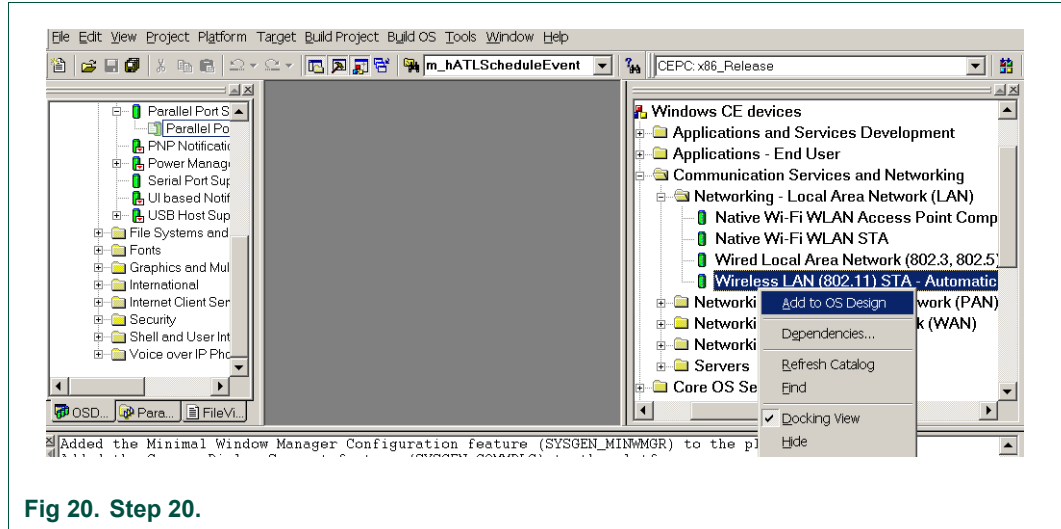


Fig 20. Step 20.

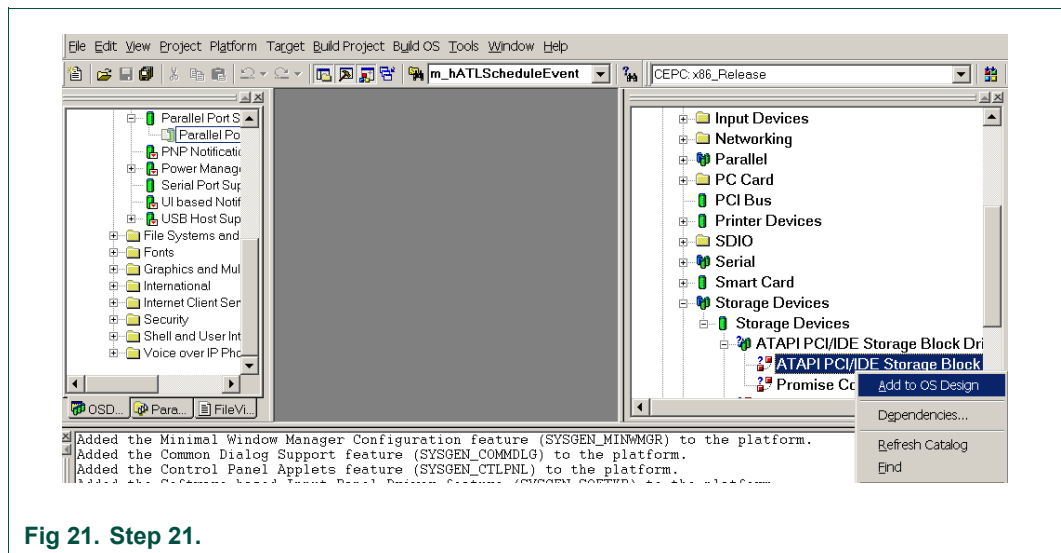


Fig 21. Step 21.

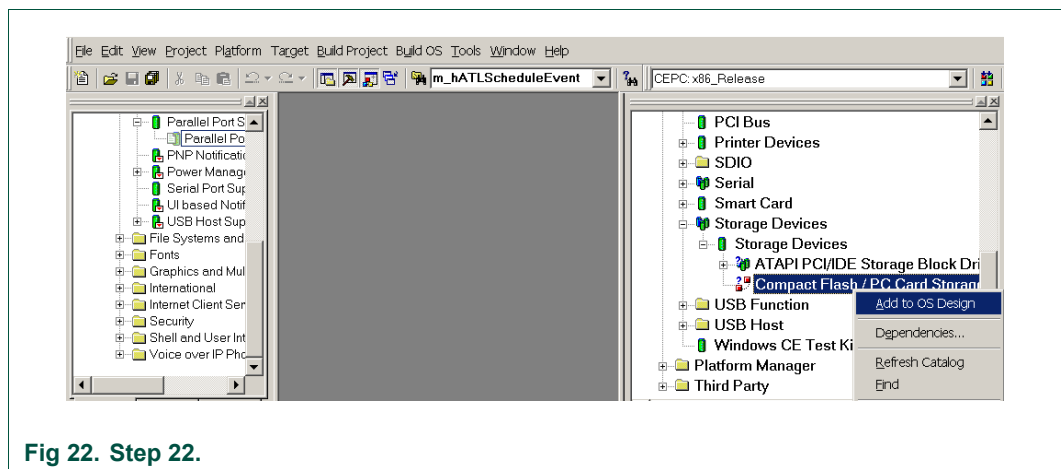


Fig 22. Step 22.

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\ST-ERICSSON \ PCIKit.

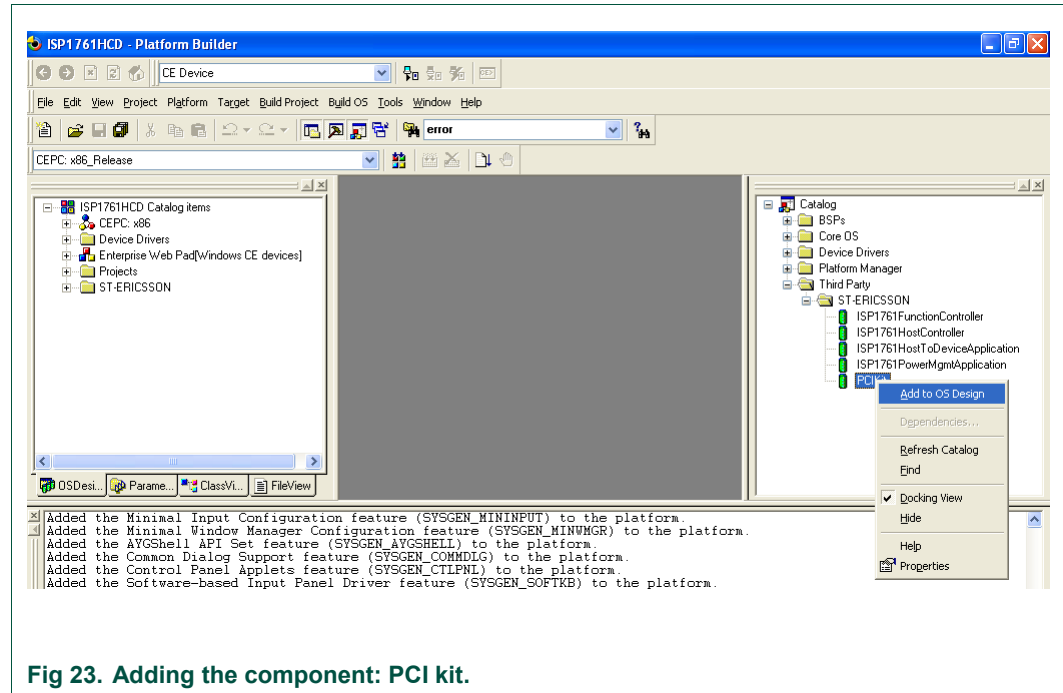


Fig 23. Adding the component: PCI kit.

To add the ISP176x module to the platform, add module Catalog\ThirdParty\ ST-ERICSSON\1761HostController.

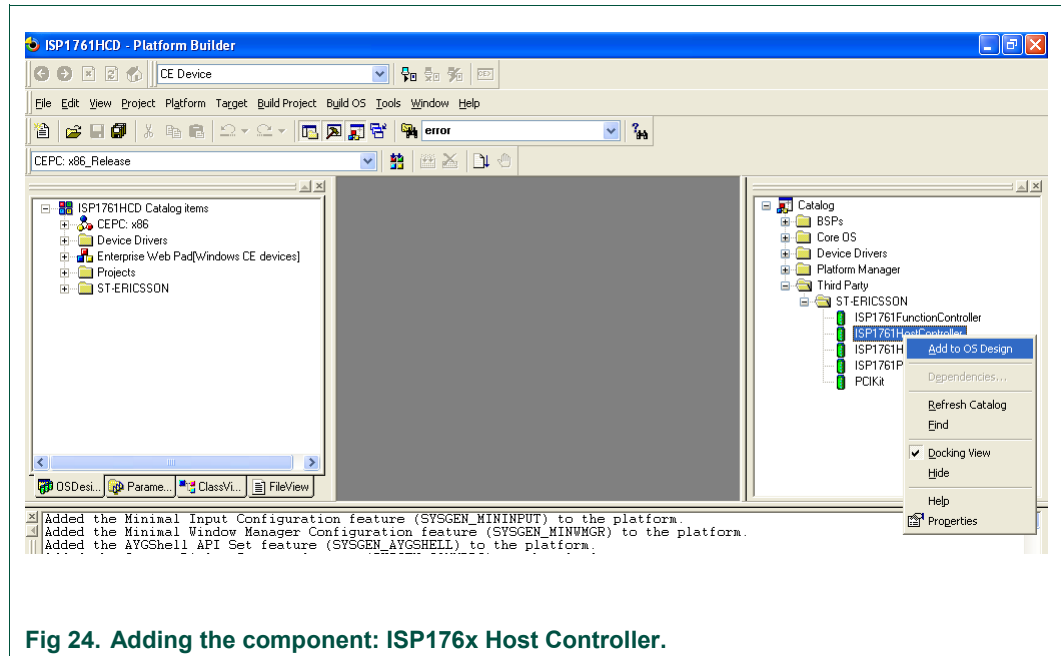


Fig 24. Adding the component: ISP176x Host Controller.

5. Interfacing routines

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

[Fig 25](#) shows interfacing the blocks of the ISP176x to an operating system.

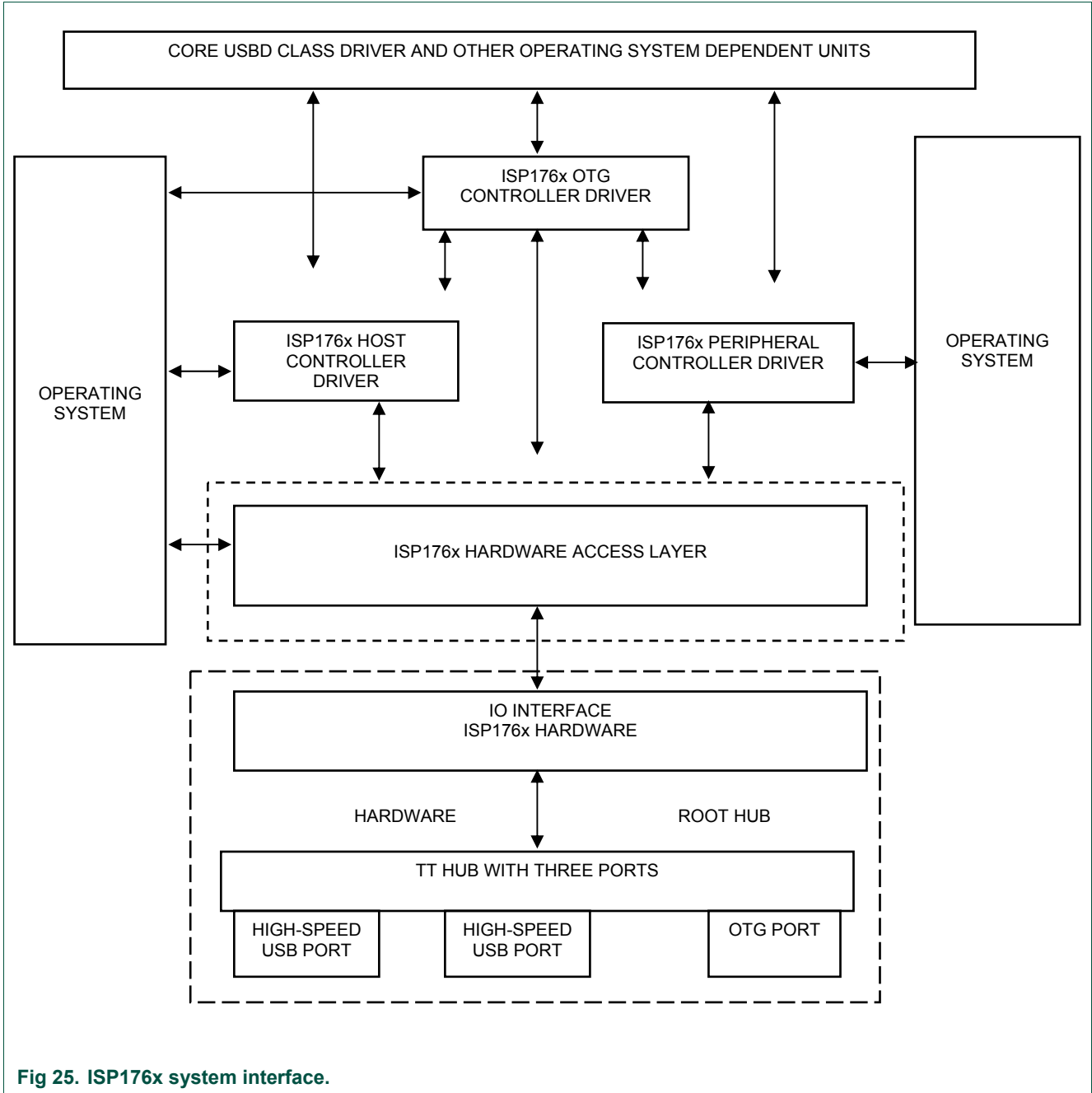


Fig 25. ISP176x system interface.

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\ST-ERICSSON\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\ST-ERICSSON\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 - ST-ERICSSON ISP17161 driver Instance to create DCD or HCD
; =====
; Used to create P1761HCD instance
```

```
[HKEY_LOCAL_MACHINE\Drivers\ISP176x\Instance]
    "Dll"="RegEnum.dll"
; =====
; USB - ST-ERICSSON 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\ST-ERICSSON\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:0c
    "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
    "Irq"=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 ST-ERICSSON\PhISP176xBus.

Once P1761Bus.dll is loaded and the system loads Host Controller stack P1761hcd.dll by checking registry setting in P1761bus.reg under directory ST-ERICSSON\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 ST-ERICSSON\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 MemMapIoSpace () 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.

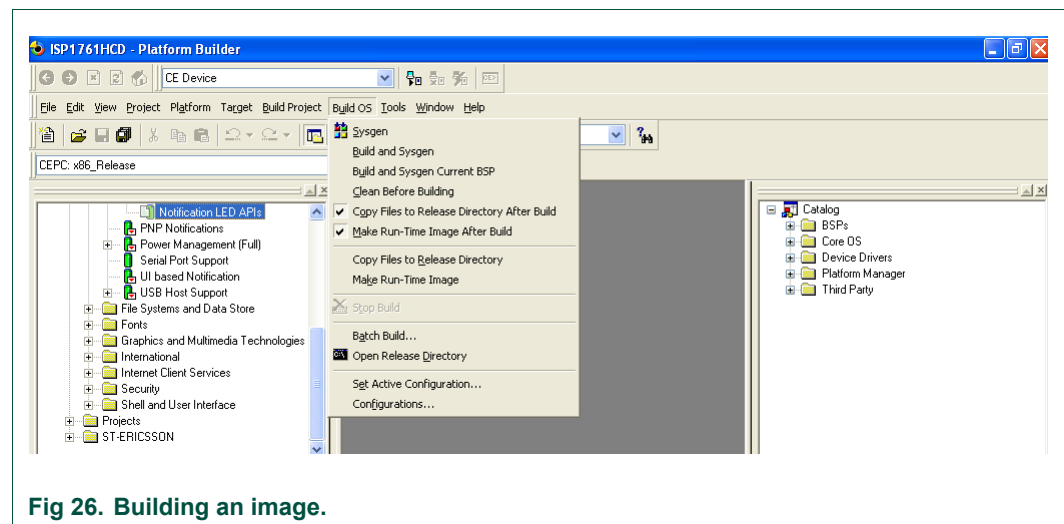


Fig 26. Building an image.

8. Creating boot disk for x86 SDB

To create a boot floppy disk for an x86 SDB:

1. 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.

3. 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.

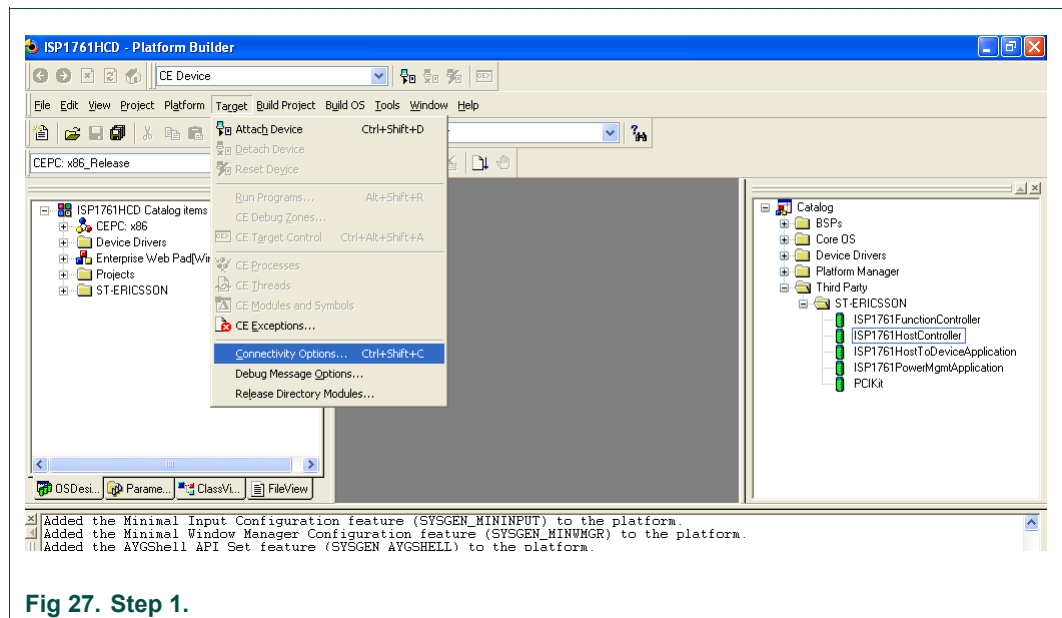


Fig 27. Step 1.

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.

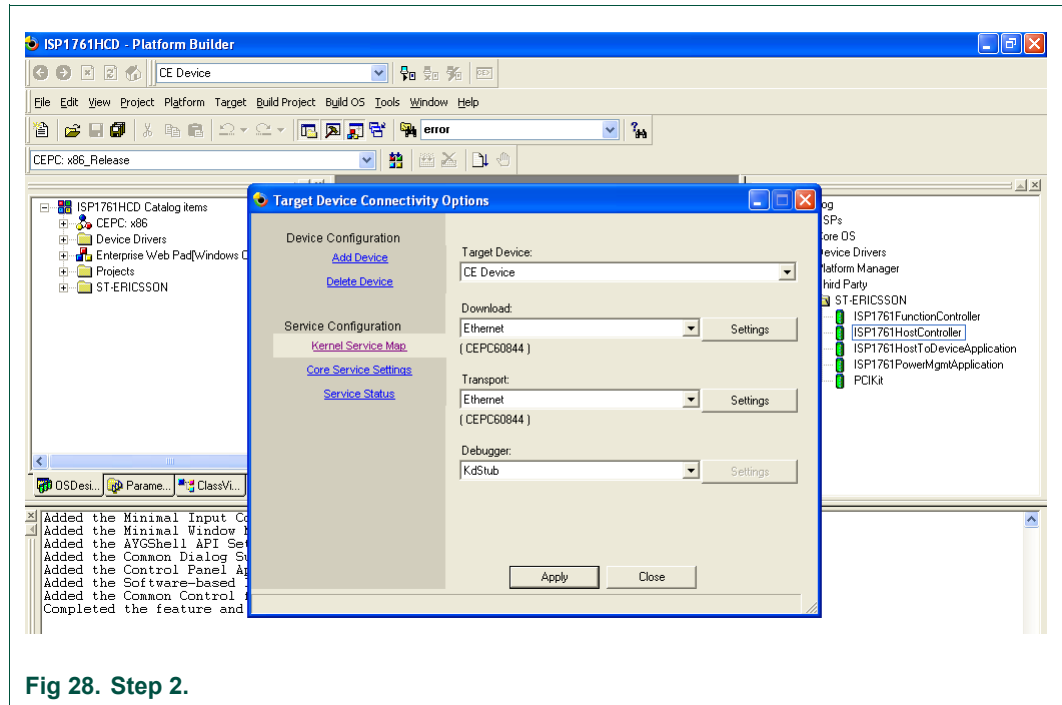


Fig 28. Step 2.

3. Choose your device boot name or IP address.

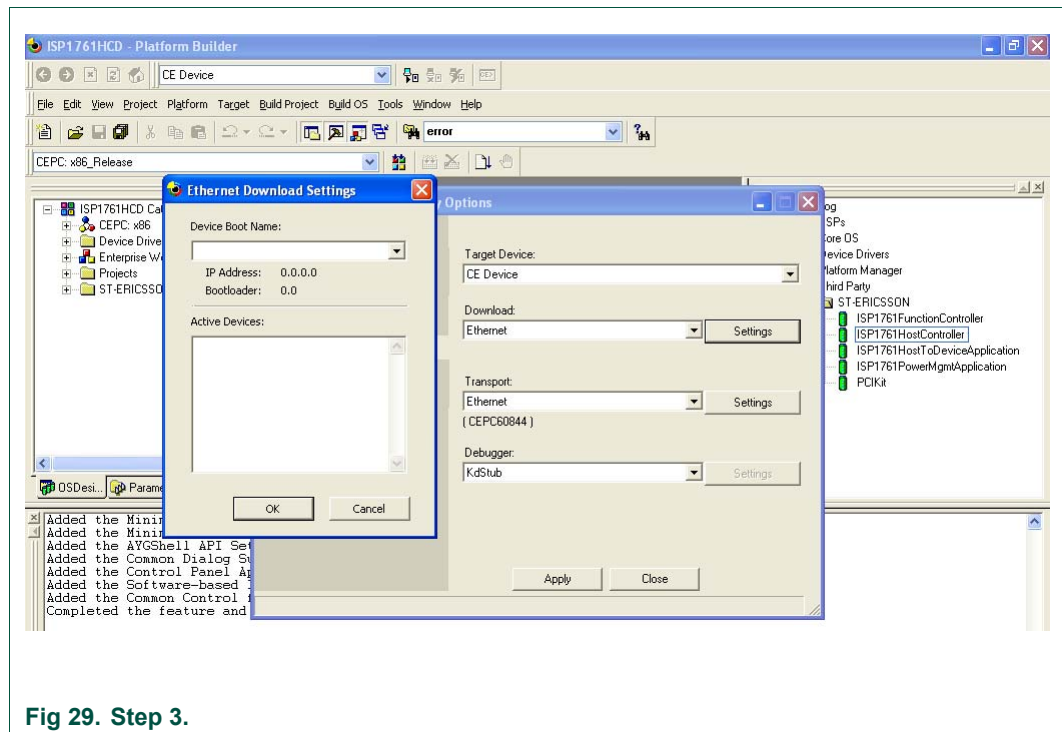


Fig 29. Step 3.

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

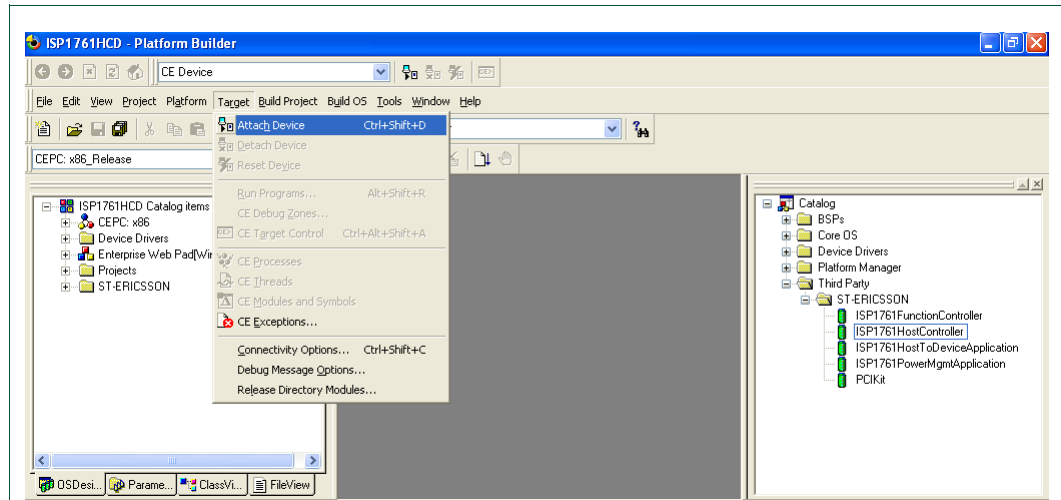


Fig 30. Step 4.

10. References

- [1] Universal Serial Bus Specification Rev. 2.0
- [2] ISP1760 Hi-Speed USB host controller for embedded applications data sheet
- [3] ISP1761 Hi-Speed USB On-The-Go controller data sheet
- [4] Enhanced Host Controller Interface Specification for Universal Serial Bus Rev. 1.0.

11. Glossary

Table 1. Abbreviations

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
USB D	Universal Serial Bus Driver

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