PFU
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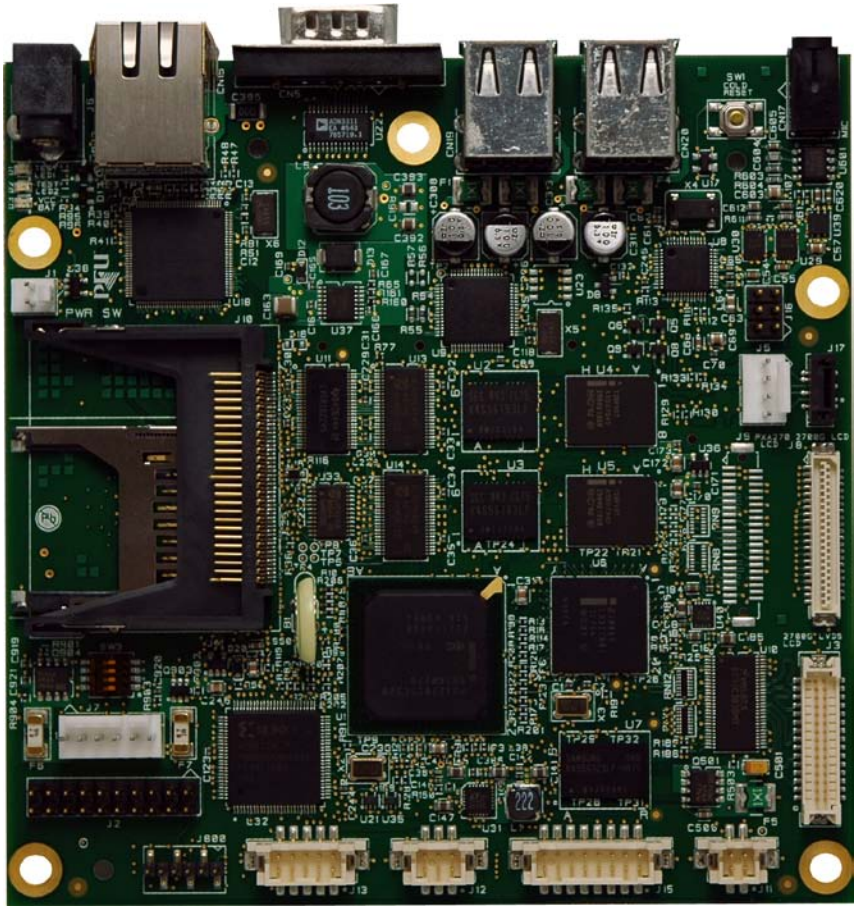
Media Engine Software User Manual



Introduction

Thank you for basing your system on our XScale based Media Engine™ Single Board Computer. We are confident that it will help you get your product to market quickly while reducing overall development cost.

This document, the Media Engine Windows CE User Manual, guides you through the procedure required to build a Window CE 5.0 Runtime Image for the PFU Systems Media Engine Single Board Computer. It includes requirements for the Media Engine Single Board Computer Board Support Package (BSP). Specifically, it describes the software architecture, the drivers included in the BSP, and the Application Programming Interface (API).

It is recommended that you review the information contained in this manual before using the Media Engine.

PFU Systems, Inc. November 2009

Trademarks:

Related Documents

Please consult the following documents for additional information on the Media Engine™.

Description	Type	Number
Media Engine User Manual	Manual	PS-XME-UM-xxx (*1)

Table 1: Related Documents

The status of PFU Systems documents can be obtained from PFU Systems' web site at www.PFUsystems.com or requested from a PFU Systems sales representative. Many PFU documents can be downloaded from this web site.

*1 xxx refers to the current version

Applicable Media Engine Board Products

This manual applies to the following Media Engine Boards:

Part No.	Description	DRAM	Flash	2700G Graphics	Installed OS
PSXME12864GW	Media Engine™ with Marvell PXA270 and 2700G Multimedia Accelerator with 128 MB DRAM, 64 MB Flash & Windows CE 5.0	128M	64M	Yes	Windows CE 5.0
PSXME6432GW	Media Engine™ with Marvell PXA270 and 2700G Multimedia Accelerator with 64 MB DRAM, 32 MB Flash & Windows CE 5.0	64M	32M	Yes	Windows CE 5.0

Table 2: Applicable Board Products

Related Products

The following Development Kit can be ordered together with the Media Engine product.

Development Kit

To get a head start, you may also want to order a Media Engine Development Kit for a complete set of accessories for the Media Engine. The Media Engine Development Kit contains the items listed below.

Part No.	Description
PSXMEKITA	Media Engine Development Kit
	12V/60W 100 ~ 240VAC AC Adapter with US AC power cable
	Stereo Speaker Assembly
	Registry Clear Plug
	4-Wire Touch Panel
	12.1 XGA 24bpp LVDS LCD Panel
	LVDS Data Cable
	Backlight Inverter
	Inverter Cable
	Printed version of this manual

Table 3: Development Kit Contents

Please check the kit contents, and contact your sales representative or PFU Systems if you are missing any of these items.

Other Components You May Need

In addition to the items included with the Media Engine board package, you may need some or all of the following components. These items can be ordered separately from PFU Systems.

Description
USB Flash Drive
USB Key Board
USB Mouse
Secure Digital (SD) Card
Compact Flash (CF) Card

Table 4: Other Components

Other Documents You May Need

These documents from other sources may be helpful in using the Media Engine.

Description	Source
Marvell PXA270 Processor Datasheet	www.marvell.com
Marvell PXA27x Processor Family Design Guide	www.marvell.com
Marvell PXA27x Processor Family Developer's Manual	www.marvell.com
Marvell 2700G Multimedia Accelerator Datasheet	www.marvell.com
Marvell 2700G Multimedia Accelerator Design Guide	www.marvell.com
CF+ and CompactFlash Specification Revision 3.0	www.compactflash.org
Secure Digital Card Specifications	www.sdcard.org
I2C Specifications	www.nxp.com
SPI Specifications	http://en.wikipedia.org/wiki/Serial_Peripheral_Interface

Table 5: Other Documents

About This Manual

This manual describes software requirements for the Media Engine XSCALE Single Board Computer produced by PFU System Inc. (PSI).

Abbreviations

Product Name	Abbreviations
Microsoft® Windows® CE 5.0	Windows CE or CE

Table 6: Abbreviations

Layout of This Manual

Introduction

The introduction provides an overview of package content and related materials.

Chapter 1 Component Overview

Describes how to install, configure, and set up the Media Engine and how to use the development kit.

Chapter 2 System Architecture

Provides a brief overview of the system architecture.

Chapter 3 Standard Device Driver Functions

Describes the implemented features of the Media Engine board.

Chapter 4 Software Enhancements

Describes important software enhancements and their use.

Chapter 5 API Reference

Describes Windows CE Applications Program Interfaces and use.

Chapter 6 Free Software Utilities

Describes software features and utilities that are provided for free without support.

Chapter 7 Windows CE 5.0 Operating System Runtime Image Overview

Describes the Windows CE runtime image and how to create it.

Chapter 8 Load Runtime Image to Target System

Describes how to install and operate a modified runtime image.

Appendix A Quick Fix Engineering List

Describes QFEs that have been applied to the delivered OS image.

Appendix B FlashLite 3.1 Release Notes

Release notes for the FlashLite 3.1 software enhancement.

Symbols Used In This Manual

The following symbols are used in this manual:

 Note	**Explains supplementary details. Read as necessary.**
 Caution	Draws attention to a precaution that should be observed. Alternately warns of an unacceptable or dangerous practice. Should always be read!
 Refer	References related information in a different area of this manual, or in another manual.

Figure 1: Symbols

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Chapter 1 – Component Overview

Software Components

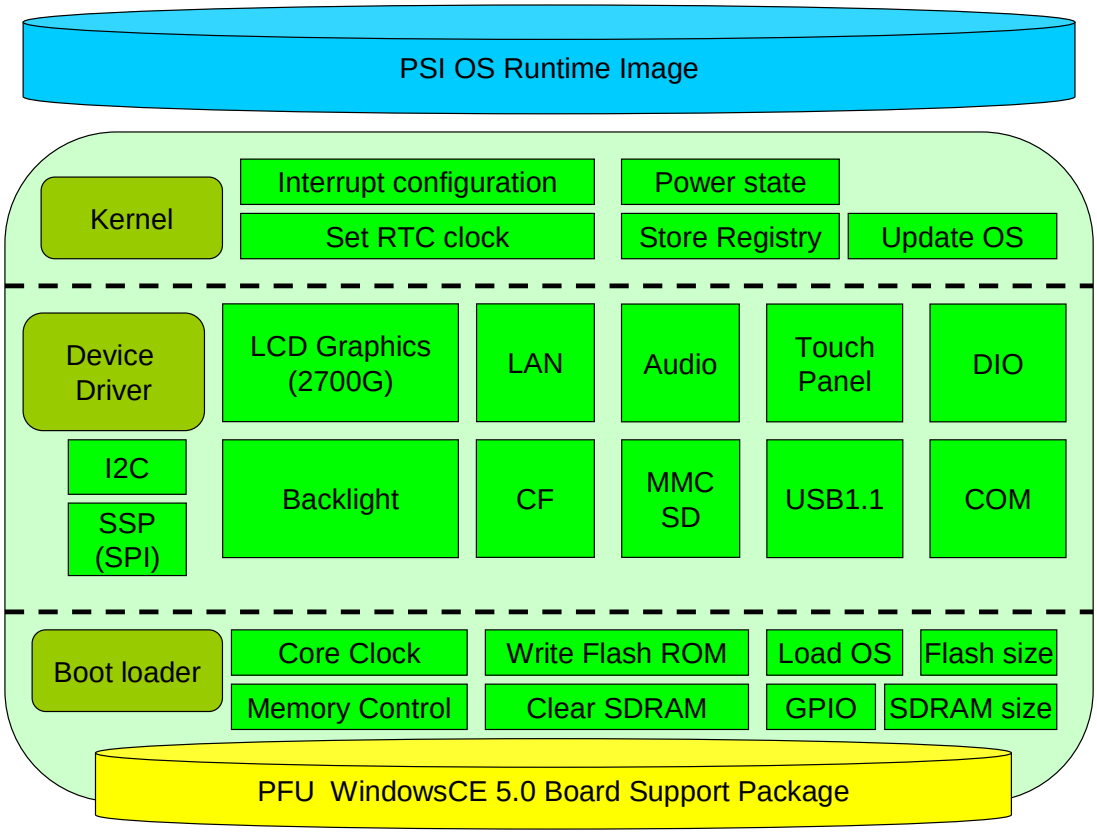

Figure 2: Software Components Block Diagram

Boot Loader Specification

Boot loader specification is as follow.

Parameter	Value
SDRAM size	64/128 MB
Flash-ROM size	32/64 MB
CPU core voltage	1.44 V
CPU clock configuration	520 MHz
Memory clock configuration	Flash-ROM 26 MHz
Main-SDRAM	104 MHz
CPU running mode	Turbo mode
GPIO configuration	See GPIO Initialization
Launching mode for the OS	RAM base (no XIP mode)
Other important configuration	See **Error! Reference source not found.**

Table 7: Boot Loader Specification

Boot Loader Menu

When you boot the computer, boot messages are accessible via the serial port (COM1). If you want to see the boot messages and boot menu, you must connect your host PC and the Media Engine using a NULL modem (crossover) cable. Boot messages then can be displayed using the HyperTerminal program running on the host PC.

You must use a null modem (crossover) cable between Media Engine and the host PC.

Host PC HyperTerminal Configuration

Name	Value
Transfer Rate (bps)	38400
Data bit	8
Parity	None
Stop bit	1
Flow control	None

Table 8:HyperTerminal Configuration

Boot Menu

When power is applied, press the SPACE key within one second to display the Boot Menu. If the space key is not depressed, the bootloader will auto launch the OS or auto download the OS image, depending on the selection within the boot menu.

```
Ethernet Boot Loader Configuration:
0) IP address: 133.164.152.108
1) Subnet mask: 255.255.255.0
2) Boot delay: 1 seconds
3) DHCP: (Disabled)
4) Reset to factory default configuration
5) Launch existing flash resident image at startup
6) Boot device order: SMSC -> NE2000(CF)
7) Program SMSC MAC address
D) Download image now
L) Launch existing flash resident image now
T) Test (Download image and don't write flash)
C) Clear Registry
Enter your selection:
```

Figure 3: Boot Menu

As needed, change the IP address, Subnet Mask, DHCP.
Selection 5 can be used to toggle between “Launch existing flash” or “Download new image”.
Press either the D or the L button to store the configuration in the Flash-ROM

Description of Boot Menu

Item	Name	Description	Default Value
0	IP address	Setting the target device’s IP Address (boot only. Not OS)	0.0.0.0
1	Subnet mask	Setting the target device’s Subnet Mask (boot only. Not OS)	0.0.0.0
2	Boot delay	Setting a boot delay time. (1 – 255 sec)	1
3	DHCP	Enable or disable DHCP mode.	Enable
4	Reset to factory default configuration	Reset to factory default configuration of boot parameter.	---
5	Launch existing flash resident image at startup	(1) You can auto launch the OS image. (2) You can auto download the OS image.	Launch existing flash resident image at startup
6	Boot device order	(1) SMSC (Ethernet) (2) CF (Compact Flash)	SMSC
7	Program SMSC MAC address	Setting the SMSC MAC address.	00.00.00.00.00.00
D	Download image now	Download new OS image.	---
L	Launch existing flash resident image now	Launch the OS image in Flash-ROM.	---

Item	Name	Description	Default Value
T	Test	Download image into RAM and don't write flash	
C	Clear registry	Clears registry data for the OS image	---

Table 9: Description of Boot Menu

Board Support Package Specification

Board support package (BSP) specification is as follow.

Parameter	Value
CPU	Marvell ARM PXA270
Operating System	Microsoft Windows CE 5.0
Maximum OS size	30 MB
Total time of launching OS	15.0 -- 20.0 sec
Software RAM size	35 MB -- 114 MB *This data is changed by OS image. This size will be changed by SDRAM size.*
File system	FAT
Power supply parts	Main power only. No Suspend/Resume No Battery.
Shell type	Microsoft standard shell with some customization by PFU Systems.
Main application	None

Table 10: Board Support Package Specification

Chapter 2 - System Architecture

Power Supply State Transition

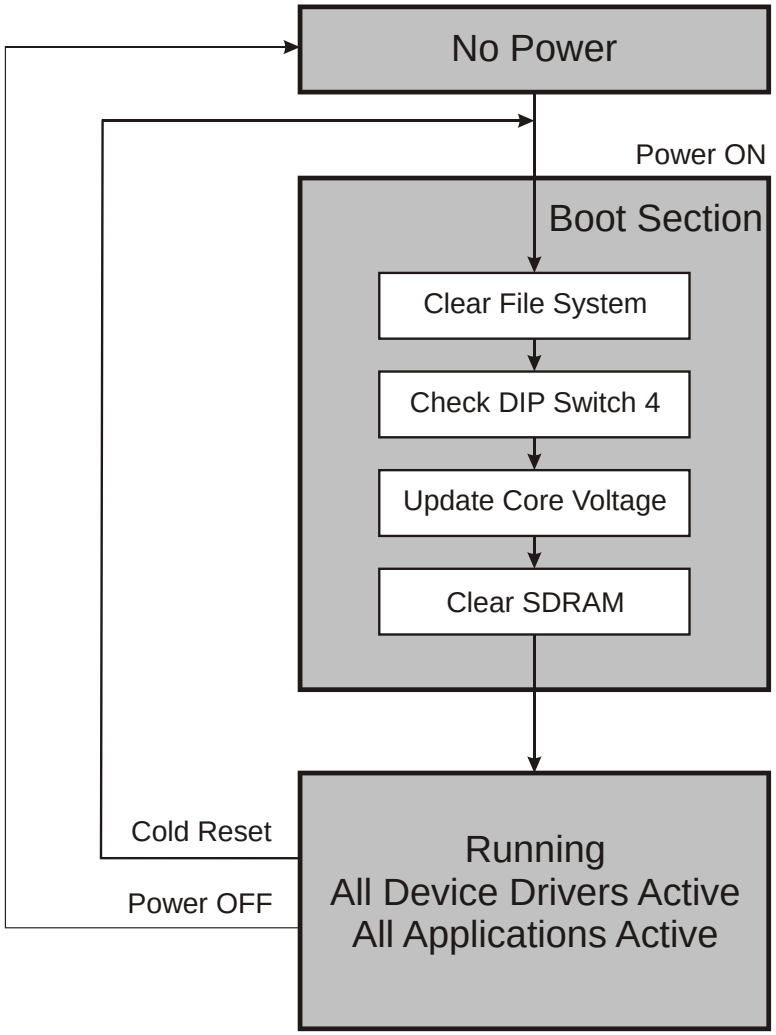

Figure 4: Power Supply State Transition Diagram

Note

The Media Engine does not support Suspend or Resume

Virtual Memory Map Assignment

Memory Map

Function	Chip Select	Size MBytes	Physical Base Address	Virtual Base Address
SDRAM	nSDCS0	64/128	0xA000_0000	0x8000_0000
Internal memory storage		1	0x5C00_0000	0x8800_0000
Internal memory control		1	0x5800_0000	0x8810_0000
USB Host		1	0x4C00_0000	0x8820_0000
Memory Control registers		1	0x4800_0000	0x8830_0000
LCD registers		1	0x4400_0000	0x8840_0000
Peripheral registers		32	0x4000_0000	0x8850_0000
Boot ROM flash memory	nCS0	32/64	0x0000_0000	0x8A50_0000
2700G (SRAM protocol W)	nCS1	64	0x0400_0000	0x8E50_0000
Ethernet Controller	nCS4	1	0x1000_0000	0x9250_0000
2700G (VLIO protocol R/W)	nCS5	64	0x1400_0000	0x9260_0000
Zero Bank		1	0xE000_0000	0x9660_0000
PCMCIA0 Memory		16	0x2C00_0000	0x9670_0000
PCMCIA0 Attribute		32	0x2800_0000	0x9770_0000
PCMCIA0 IO		1	0x2000_0000	0x9970_0000
PCMCIA1 Memory		16	0x3C00_0000	0x9980_0000
PCMCIA1 Attribute		32	0x3800_0000	0x9A80_0000
PCMCIA1 IO		1	0x3000_0000	0x9C80_0000

Table 11: Virtual Memory Map

Windows CE 5.0 OS design must set the memory less than 512 MB. The maximum memory (SDRAM128 MB and Flash 64 MB) configuration is 457 MB.

Memory Controller/CPU Clock Internal Registers

Register	Value	Register	Value
MDCNFG	0x00000AC9 0xA0000AD1	CCCR	0x00000290
MDREFR	0x2191A01E	CKEN	0x00C0D6E4
MSC0	0x26F115C2	OSCC	0x00000003
MSC1	0x00000000	CCSR	0x30000290
MSC2	0x3464FFF4		
MECR	0x00000002		
SXCNFG	0x40044004		
FLYCNFG	0x00010001		
MCMEM0	0x00014307		
MCMEM1	0x00014307		
MCATT0_VAL	0x0001C787		
MCATT1_VAL	0x0001C787		
MCIO0	0x0001430F		
MCIO1	0x0001430F		
MDMRS	0x00320032		
BOOT_DEF	0x00000008		

Table 12: Memory Controller/CPU Clock

Refer to the Marvell PXA27x Processor Family Developer's Manual

These values are set by the boot loader..

GPIO Initialization

Registry	Value
GPDR0	0xC3F3FA00
GPDR1	0xFCFFAB83
GPDR2	0x45EDFFFF
GPDR3	0x00020C88
GRER0	0x00000000
GRER1	0x00000000
GRER2	0x00000000
GRER3	0x00000000
GFER0	0x00000000
GFER1	0x00000000
GFER2	0x00000000
GFER3	0x00000000
GAFR0_L	0x80000000
GAFR0_U	0xA5000010
GAFR1_L	0x699A955A
GAFR1_U	0xAAA5A0AA
GAFR2_L	0x4AAAAAAA
GAFR2_U	0x0100A402
GAFR3_L	0x54000000
GAFR3_U	0x00001409
GPSR0	0xC1C38800
GPSR1	0x00CF0003
GPSR2	0x00218000
GPSR3	0x00020088
GPCR0	0x02307200
GPCR1	0xFC30AB80
GPCR2	0x45CC7FFF
GPCR3	0x00000C00

Table 13: GPIO Initialization

Note Refer to the Marvell PXA27x Processor Family Developer's Manual

Note These values are set by the boot loader.

Interrupt Configuration

Factor	SYSINTR	SYSINTR	IRQ
RTC	SYSINTR_REACHED	1	26
RTC_ALARM	SYSINTR_RTC_ALARM	13	31
USB1.1	SYSINTR_OHCI	17	11
Touch Panel	SYSINTR_TOUCH	18	36
	SYSINTR_TOUCH_CHANGED	19	27
Audio	SYSINTR_AUDIO	21	25
USBFN	SYSINTR_USBFN	22	11
COM1	SYSINTR_FFUART	23	22
COM2	SYSINTR_BTUART	24	21
COM3	SYSINTR_STUART	25	20
2700G Graphics	SYSINTR_MARATHON	26	40
LAN	SYSINTR_SMSC_LAN	27	35
MMC/SD	SYSINTR_MMC_SD	28	32
PCMCIA0 RDY	SYSINTR_PCCARD_CSC_S0	29	42
PCMCIA0 CD	SYSINTR_PCCARD_CD_S0	30	43

Table 14: Interrupt Configuration

RTC Initialization

The Media Engine uses an external RTC. The RTC specification is as follow.

Range of the date	
Min	1980/01/01 00 : 00 : 00
Max	2099/12/31 23 : 59 : 59

Table 15: RTC Initialization

- On January 1, 2100, the RTC is re-initialized to January 1, 2006, 00:00:00 after the Media Engine is next rebooted.
- The RTC is reset when the battery is discharged.

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Chapter 3 - Standard Device Driver Functions

Graphics

The 2700G Graphics driver supports the following functions.

- 2700G LCD and LVDS.
- Backlight control. For more information, see LCD Backlight Brightness Control.
- LCD panel configuration can be changed with a DIP-switch. For more information, see LCD Configuration (DIPSW 2 and DIPSW 3).
- Direct3DMobile.
- 2700G multimedia acceleration.
- DirectDraw.
- Dual-Display mode is not supported.

Display Configuration

Width	Height	Color
320	240	256 color
640	480	High color 16
800	600	High color 24
1024	768	High color 32

Table 16: Display Configuration

Touch Panel

Touch panel driver supports the following functions.

- Mouse emulation base
- Left Click
- Double Click
- Right Click
- Drag and Drop operation

If you have been using the touch panel for a long time and mouse pointer does not move with your touch, you should re-calibrate the touch panel.

- Mouse streaming style is not supported.

Mouse streaming style: While touch panel is pressed, mouse pointer pauses and drag operation is disabled.

Audio (Input/Output)

The Audio driver supports the following functions.

- Speaker output
- Mike input.
- Software support for Playing and Recording
- File formats: MP3, WAV, and WMA.

Record/Playback Parameters

Volume	Sample rate	Speaker type
0 (Mute) 0x33333333 0x66666666 0x99999999 0xCCCCCCCC 0xFFFFFFFF (MAX)	11025 22050 44100	Stereo Monaural

Table 17: Record/Playback Parameters

USB 1.1 (OHCI)

The USB driver supports the following devices.

- USB Mouse
- USB Keyboard
- USB Storage Device
- Up to four USB 2.0/1.1 devices.

Insert or eject only one USB device at a time.

Supported USB Devices

Manufacturer	Type
USB track ball type and Optical type mouse	
SANWA Supply	Track Ball
ELECOM	Track Ball
Microsoft	Optical
SONY	Optical
ELECOM	Optical
Logitech	Cordless Laser
USB Keyboard	
Mets	
ELECOM	
USB Storage disk (2.0/1.1)	
IO-DATA EasyDisk Cute	64 MB
CORSAIR USB Flash	128 MB
HAGIWARA UD-pure	256 MB
IO-DATA EasyDisk Platina	2GB

Table 18: Supported USB Devices

- Some mouse devices may not activate.
- Do not eject USB storage disk when read and writing data to the device.
- If USB device is not detected reboot the computer.

Local Area Networks

The LAN driver supports following functions.

Ethernet

- 10BASE-T and 100BASE-TX
- Establish link type: Auto negotiation
- 1000BASE-T networking is not supported.

Ethernet LED Specification

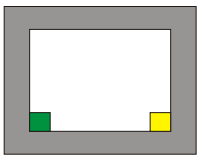

Figure 5: Ethernet LEDs

	Green (Left)	Yellow (Right)
10Base	OFF	ON
100Base	ON	ON

Table 19: Ethernet LED

Caution When the Ethernet-Packet Maximum-Transmission Unit (MTU) is more than 5913 bytes, a transfer data error occurs. Limit MTU to 5912 or less, or set to transfer speed to 10Base.

COM

COM port driver supports the following functions.

- COM1 FFUART Maximum Transfer rate 115200bit/sec
- COM2 BTUART Maximum Transfer rate 38400bit/sec
- COM3 STUART Maximum Transfer rate 115200bit/sec

COM Port Parameters

Port number	Baud rate	Parity	Byte size	Stop bit	Flow control
1 2 3	300 600 1200 2400 4800 9600 19200 38400 57600 115200	Even Mark No Odd Space	5 6 7 8	1 1.5 2.0	CTS DSR RING RLSD None

Table 20: COM Port Parameters

Caution Do not attempt to adjust the backlight brightness while COM2 is active.

Serial Synchronous Port (SPI)

The SSP (SPI -- Serial Peripheral Interface Bus) driver supports the following functions.

- Read/Write function for some SPI interface devices.
- Change the value of Timeout. For more information, see SSP (SPI).

Note If the Timeout value is too small, read/write sequence may fail.

I^2C

The I^2C driver supports the following functions.

- Read/Write function for some I^2C devices.
- Set the Slave Address.
- Change the value of Timeout. For more information, see I^2C.

Note If Timeout value is too small, read/write sequence may fail.

Secure Digital

The Secure Digital driver supports the following functions.

- SD memory card
- MultiMediaCards are not supported

When writing data fails, check write-protect mode in SD memory card.

Compact Flash (CF)

The Compact Flash driver supports the following functions.

- Compact flash card

Turn off the Media Engine before you eject or insert the Compact Flash card. The Compact Flash interface is not hot swappable.

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DIO (Digital Input/Output)

The DIO driver supports the following functions.

- Change the value used for chatter filtering.
- Change the value of polling mode.

When input signal is very noisy, change the registry value.

For more information, see DIO.

LCD Backlight

The Backlight driver supports the following functions.

- Adjust Backlight brightness
- Change the brightness level.

For more information, see LCD Backlight.

Do not allow activity on COM2 while adjusting the LCD brightness.

Chapter 4 – Software Enhancements

Two major enhancements have been made to the Windows CE Operating System image in the Media Engine and MEDIASTAFF DS products.

FlashLite 3.1 Implementation

The FlashLite 3.1 implementation of Adobe® Flash has been included in the Media Engine image. It should be noted that this feature has been implemented specifically to support web page features such as drop down menu items and simple animations. Acceptable rendering of Flash videos should not be expected. Flash files, such as .swf or .flv, that exceed 15MB in size should not be expected to function correctly. Refer to Appendix B for details of this implementation.

Video Acceleration Software

Enhancements have been added to the Media Engine OS image to improve video performance when Mpeg 1 videos are played through Microsoft Windows Media Player. Similar performance can be seen with applications that are programmed to use the 2700G Multimedia Accelerator. Applications that do not use the 2700G or video types that are not supported by these enhancements may not perform to expectations. In addition, it may be necessary to adjust frame rate and size and OS performance characteristics such as heap size to realize the best performance.

Video Playback

The appearance of video playback on the MEDIASTAFF DS is dependent on several factors.

1. The quality of the original video capture.
2. The load on the Media Engine CPU.
3. The resolution of the video.
4. The color depth (bpp) of the video.
5. The frame rate of the video.
6. The encoding method used for the video.
7. Whether the 2700G Multimedia Accelerator (Video Mode B) is enabled for video playback.
8. Whether the video file is on internal memory, Compact Flash, or USB storage.

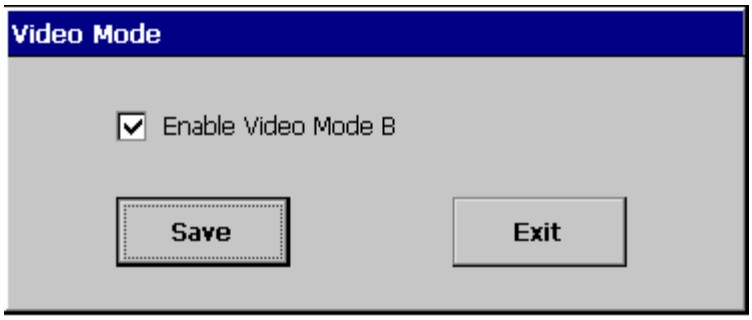
Factors 3, 4, 5, and 6 can be addressed when the video is created or later by conversion. Note that different conversion tools may encode a video differently even in the same format. Factors 7 and 8 can be controlled after the video is available. Because of these interactions, it may be necessary to try different combinations of these variables to obtain the best visual appearance.

Video Mode Selection

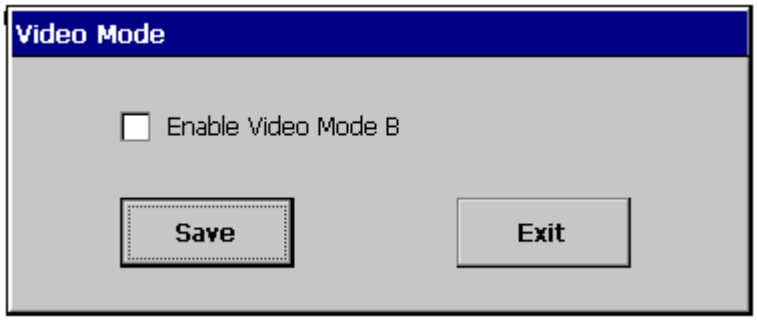
The 2700G Multimedia Accelerator can be enabled or disabled through a utility supplied with the Media Engine. Software drivers and Codecs that use the 2700G Multimedia Accelerator are capable of playing MPEG1 videos and are designed for best performance at higher (>2,000 fps) frame rates. Lower frame rates or other factors that may cause performance issues, may require disabling the 2700G for best visual appearance.

Use of the 2700G Multimedia Accelerator can be controlled by making a registry entry change. The Video Mode utility is supplied to simplify that process. To enable or disable the use of the 2700G Multimedia Accelerator (Video Mode B) take the following steps:

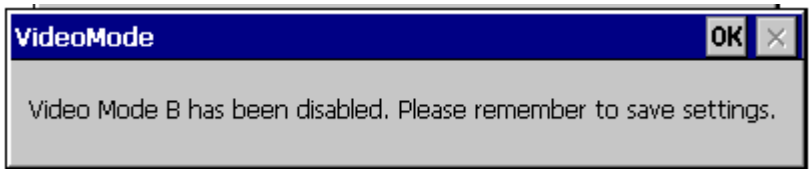
1. Execute the Video Mode Utility



2. Set the check box appropriately. Video Mode B is enabled by default.



3. Press the save button.



4. In order for the changes to persist after the system is restarted, use the Shutdown Utility to save the registry settings.

Chapter 5 - API Reference

Digital Input/Output (DIO Control)

Description

- The DIO_API can be used to get notification of events on the five DIO ports.
- The states can be read.
- The states can be set to ON/OFF for each of the five DIO channels.

Function

- GetDioState is used to get DIO data.
- SetDioState is used to set DIO data.
- StartDioCheck and StopDioCheck are used to start and stop event notification by changing DIO states.

Relation between Channel Number and GPIO Assign

Channel	Input	Output
1	GPIO84 (GPIO_EXPAND1)	GPIO83 (GPIO_EXPAND2)
2	GPIO81 (GPIO_EXPAND3)	GPIO82 (GPIO_EXPAND4)
3	GPIO19 (GPIO_EXPAND5)	GPIO14 (GPIO_EXPAND6)
4	GPIO93 (GPIO_EXPAND7)	GPIO94 (GPIO_EXPAND8)
5	GPIO95 (GPIO_EXPAND9)	GPIO106 (GPIO_EXPAND10)

Table 21: Relation between Channel Number and GPIO Assign

File name

- DioAPI.dll
- Dio.dll

DIO API Reference

The following six tables describe the functions used to access the DIO interface. There is a table for each function.

Start notifying the DIO event <method> (DI port)			
	HWND	Hwnd;	
	int	nRet;	
	nRet = StartDioCheck(hwnd);		
	parameter	hwnd	set a Window Handle
	return	0 : success non Zero : Error (System error code)	
	Note Attention	When DIO state has changed, Window Handle is notified to an application window. The number of registration is 10 at the Maximum. If registration data exceeds 10, old registration data is canceled.	

Table 22: Start notifying the DIO event <method> (DI port)

End notifying the DIO event <method> (DI port)			
	HWND	hwnd;	
	int	nRet;	
	nRet = StopDioCheck(hwnd);		
	parameter	hwnd	Set a Window Handle
	return	0 : success non Zero : Error (System error code)	
	Note Attention	If a non-registration Window Handle is selected, returning value is 0.	

Table 23: End notifying the DIO event <method> (DI port)

Event of DIO notification <event> (DI port)			
	WM_DIONOTIFY ChNum=wParam; ChStatus=lParam; (※WM_DIONOTIFY =WM_USER+10001)		
	parameter	ChNum	Channel number 1 - 5
		ChStatus	0 : OFF 1 : ON
	parameter	0 : success non Zero : Error (System error code)	
	Note Attention	WM_USER event is notified by DIO API When DIO state is changed. When an event has occurred, DIO-channel number is wParam, and DIO-state is lParam.	

Table 24: Event of DIO notification <event> (DI port)

Get DIO state <method> (DI port)			
	BYTE	bChNum;	
	BYTE	*pbBuf;	
	int	nRet;	
	nRet = GetDioState (bChNum, pbBuf);		
	parameter	bChNum	Channel number 1 - 5
		pbBuf	pointer of buffer of DIO state. 0 : OFF 1 : ON
	return	0 : success non Zero : Error (System error code)	
	Note Attention		

Table 25: Get DIO state <method> (DI port)

Set DIO state <method> (DO port)			
	BYTE	bChNum;	
	BYTE	bBuf;	
	int	nRet;	
	nRet = SetDioState (bChNum, bBuf);		
	parameter	bChNum	Channel number 1 - 5
		bBuf	Buffer of DIO state 0 : OFF 1 : ON
	return	0 : success non Zero : Error (System error code)	
	Note Attention		

Table 26: Set DIO state <method> (DO port)

Filtering GPIO Chatter

Signal chatter can be controlled by software using the Polling and the Chattering controls.

Name	Default	Remark
Polling	10	select X millisecond for polling DIO
Chattering	30	Select Y millisecond for filtering chattering

Table 27: Polling and the Chattering Controls

You can modify the polling and the chattering information using the registry data. Setting are found at **HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Dio**.

The following diagrams show the relationship between input signals and the effect that polling and chattering settings have on the input signals.

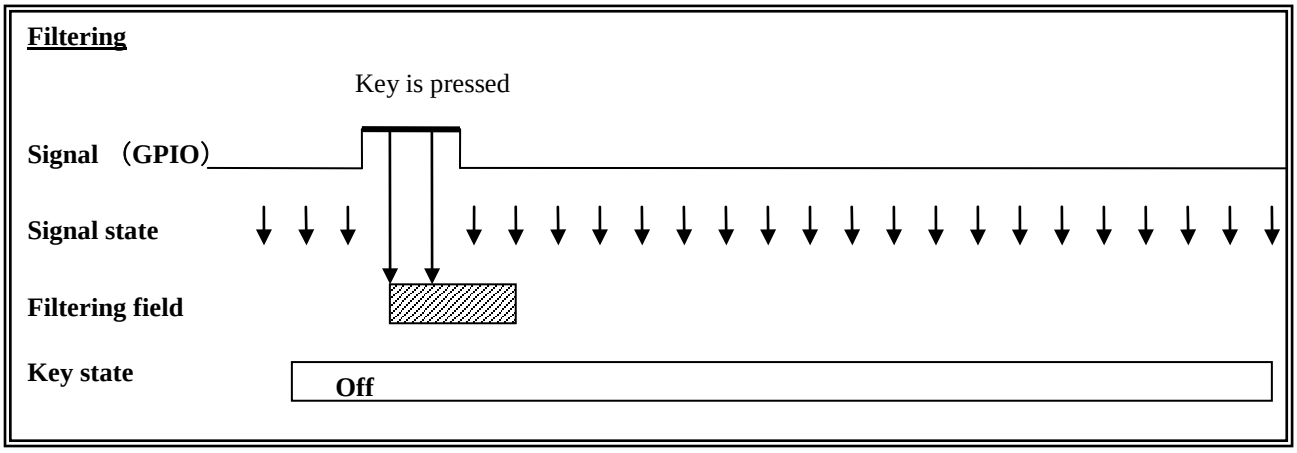


Figure 6: Filtering Timing Diagram

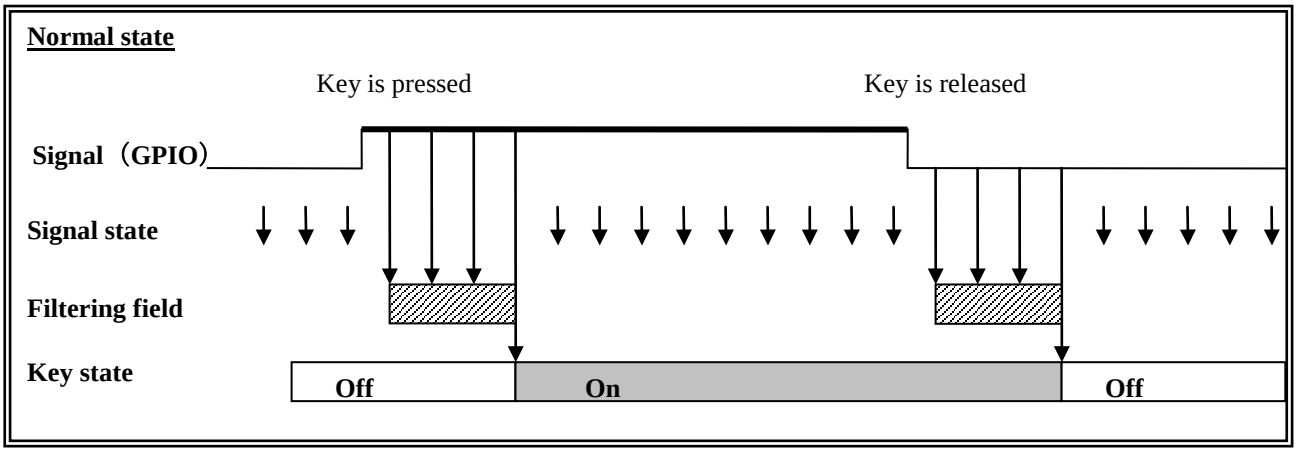


Figure 7: Normal State Timing Diagram

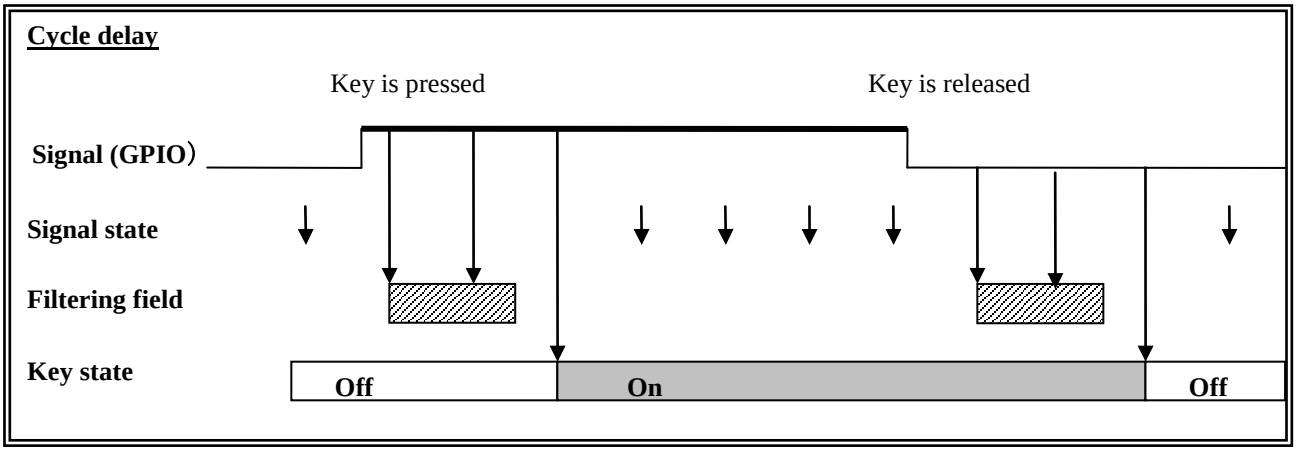


Figure 8: Cycle Delay Timing Diagram

LCD Backlight Brightness Control

Description

- LCD_Backlight API can get and set the LCD backlight brightness.

Function

- GetDisplayBrightness is used to get LCD backlight brightness level.
- SetDisplayBrightness is used to set LCD backlight brightness level.

File name

- BacklightAPI.dll
- Backlight.dll

API reference

Set the LCD backlight brightness <method>			
	BYTE	bValue;	
	int	nRet;	
	nRet = SetDisplayBrightness (bValue);		
	parameter	bValue	0 – 7: 0 mean that turn OFF the backlight. 7 mean that maximum brightness.
	return	0 : success non Zero : Error (System error code)	
	Note Attention		

Table 28: Set the LCD backlight brightness <method>

Get the LCD backlight brightness <method>			
	BYTE	bBuf;	
	int	nRet;	
	nRet = GetDisplayBrightness (&bBuf);		
	parameter	bBuf	Received buffer of LCD current level. 0 – 7
	return	0 : success Non zero (System error code)	
	Note Attention		

Table 29: Get the LCD backlight brightness <method>

Registry Settings

LAN

HKEY_LOCAL_MACHINE\Comm\LAN90001\Parms\Tcpip

Name	Value (Default)	Remark
IpAddress	0.0.0.0	
Subnetmask	0.0.0.0	
Default Gateway	0.0.0.0	
EnableDHCP	1	

Table 30: LAN Registry Setting

Sound

HKEY_CURRENT_USER\ControlPanel\Volume

Name	Value (Default)	Remark
Volume	0xFFFFFFFF	0x00000000 MIN 0x33333333 0x66666666 0x99999999 0xCCCCCCCC 0xFFFFFFFFMAX ↓
Mute	7	Combination Flag for mute Event Application Notification
Screen	0	ScreenTap Loud : 0x10002 Tiny : 0x1 None : 0x0
Key	0	KeyTap Loud : 0x10002 Tiny : 0x1 None : 0x0

Table 31: Sound Registry Setting

Touch Panel

HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\TOUCH

Name	Value (Default)	Remark
CalibrationData	314,315 473,161 475,465 152,467 152,164	

Table 32: Touch Panel Registry Setting

LCD

HKEY_LOCAL_MACHINE\Drivers\Display\PowerVR

Name	Value (Default)	Remark
Width1 Width2 Width3 Width4	0x400 0x320 0x280 0x140	1024 800 640 320
Height1 Height2 Height3 Height4	0x300 0x258 0x1e0 0x0f0	768 600 480 240
Frequency1 Frequency2 Frequency3 Frequency4	0x3DFD240 0x24953C0 0x18023D8 0x557300	65.0MHz 38.36Mhz 25.175MHz 5.6MHz
BitsPerPixel1 BitsPerPixel2 BitsPerPixel3 BitsPerPixel4	10 10 10 10	16bit color

Table 33: LCD Registry Setting

LCD Backlight

HKLM\SYSTEM\CurrentControlSet\Control\Backlight \Brightness

Name	Value (Default)	Remark
Level1	0x1	Relation between software level and hardware backlight brightness control potentiometer resistance: Minimum value : 0x0 Maximum value : 0x1E
Level2	0x2	
Level3	0x3	
Level4	0x4	
Level5	0x5	
Level6	0x6	
Level7	0x1E	

Table 34: LCD Backlight Registry Setting

DIO

HKEY_LOCAL_MACHINE\Drivers\BuiltIn\DIO

Name	Value (Default)	Remark
Polling	10	Polling interval
Chattering	30	Chattering exclusion time

Table 35: DIO Registry Setting

I²C

HKEY_LOCAL_MACHINE\Drivers\BuiltIn\I2C

Name	Value (Default)	Remark
SlaveAddress	0x50	Target device's slave address.
Timeout	100	timeout

Table 36: I²C Registry Setting

SSP (SPI)

HKEY_LOCAL_MACHINE\Drivers\BuiltIn\SSP

Name	Value (Default)	Remark
Timeout	100	timeout

Table 37: SSP (SPI) Registry Setting

Standard Disk Name

Device	Standard Name
SD memory card	SDCard
Compact flash card	CFDisk
USB storage device	USBFlash
	USBFlash2
	USBFlash3
	USBFlash4

Table 38: Standard Disk Name

Note

There is not relationship between physical USB ports and USB storage device naming. USB storage devices are named in the order that they are installed into the system.

Registry Store and Clear

This utility tool is contained in the BSP.

Description

If user changes registry data and OS has been shutdown, all registry data is restored to default values upon the next power on. You can save all registry data by using the program Regsave.exe. Regsave.exe writes all registry data in Flash-ROM. When the OS re-boots, it will read the registry data from Flash-ROM.

Program

- RegSave.exe

File directory

- \Windows

Note

This program is usually marked as a hidden file. To see this program in the \windows directory, go to the windows directory, Select "View/Options". A folder options dialog will be displayed. Uncheck "do not show hidden files and folders" and then select "OK".

Program image

Figure 9: Store Current Registry to Storage Dialog Box

- Store：Stores registry.
- Clear：Clears registry.

Note You must reboot the computer after a Registry Store or Registry Clear.

- Exit：Exit program.

When this program is launched with parameters, it executes either storing or clearing registry data without displaying a message box.

For example:

- RegSave.exe/s：Store registry without the message box.
- RegSave.exe/c ：Clear registry without the message box.

Caution When you erase or change registry data and then restore the data, the OS initialization process does not work. Subsequent launching of the OS will fail. When you change registry data, be careful. The registry can be reset to default using the registry clear plug.

Backup or Update OS and Boot Loader

These utilities are contained in BSP

When you backup or update the OS and boot loader image, follow these steps.

5. Confirm the use of an appropriate device type. The following storage devices can be used for OS and boot loader backup and update.
    - SD memory
    - Compact Flash card
    - USB storage device
6. For OS backup use the Dump-image program: (DumpCEI.exe).
   Execute DumpCEI.exe to save the current os/bootloader image.
7. For OS update use the Update-image program. (UpdateCEI.exe)
   Execute UpdateCEI.exe. When this program executes, all registry data is restored to default.
8. Reboot after the program executes.
   Turn off the computer, and reboot.

Program

- DumpCei.exe

File directory

- \Windows

  This program is usually marked as a hidden file. To see this program in the \windows directory, go to the windows directory, Select “View/Options”. A folder options dialog will be displayed. Uncheck “do not show hidden files and folders” and then select “OK”.

Program image

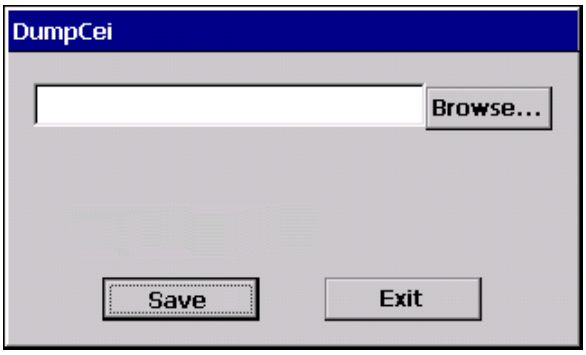


Figure 10 DumpCei Dialog Box

- The Browse… button selects the device folder where the Dump-image file will be stored. The file name for the Dump-image can also be entered here.
- The Save button creates the DUMP-image.
- The Exit button terminates DumpCei.exe.

Program

- UpdateCei.exe

File directory

- \Windows

  This program is usually marked as a hidden file. To see this program in the \windows directory, go to the windows directory, Select “View/Options”. A folder options dialog will be displayed. Uncheck “do not show hidden files and folders” and then select “OK”.

Program Image

Figure 11 UpdateCei Dialog Box

- The Browse… button selects the binary file to update boot loader and OS image.
- The Update button writes new boot loader image and new OS image by the binary image file selected by the text-box.
- The Exit button terminates UpdateCei.exe.

While this program is executing, do not turn off the power. If the power is turned off unexpectedly, the new image will may not be completely loaded. The system may be unable to recover.

All registry data is cleared and the default registry data is updated.

If the image is stored in USB storage or SD card, do not eject the device. If device is ejected during the update, this program shows an error message box. If this error message appears do not shutdown the OS, you must continue this program.

DIP-Switches

The Media Engine has four DIP-switches. We offer the following matters to SBC.

Function of the DIP-Switches

Signal name	Default	Default description
DIPSW 1	OFF	Reserved
DIPSW 2	OFF	LCD configuration (See Table 40)
DIPSW 3	OFF	
DIPSW 4	OFF	Switch SDRAM (64/128) (See Table 41)

Table 39: Function of the DIP Switches

LCD Configuration (DIPSW 2 and DIPSW 3)

Type	DIPSW 2	DIPSW 3	LCD size
1	OFF	OFF	XGA (1024 x 768)
2	ON	OFF	SVGA (800 x 600)
3	OFF	ON	VGA (640 x 480)
4	ON	ON	Reserved

Table 40: LCD Configuration (DIPSW 2 and DIPSW 3)

SDRAM Configuration (DIPSW 4)

State	Function
OFF	SDRAM 64 MB mode
ON	SDRAM 128 MB mode

Table 41: SDRAM Configuration (DIPSW 4)

Shutdown Menu

The Media Engine is provided the shutdown menu program.

1. Select the Start Menu.
2. Select Shutdown.
3. The Shutdown Menu Dialog Box opens.

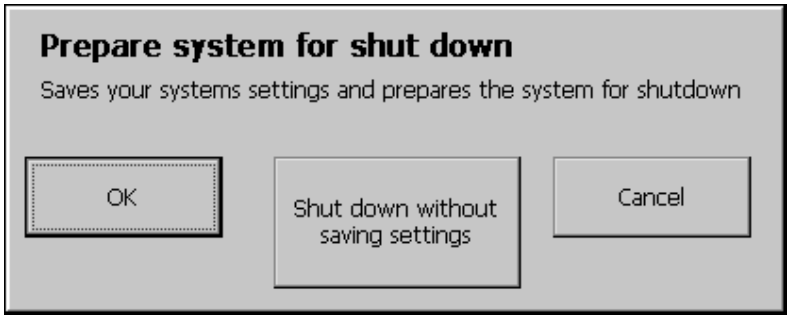


Figure 12 Shutdown Menu Dialog Box

There are three buttons or choices: OK, Shut down without saving settings, and Cancel.

- Selecting OK button executes a Registry Save. A message box that says it is now safe to turn off your computer appears.

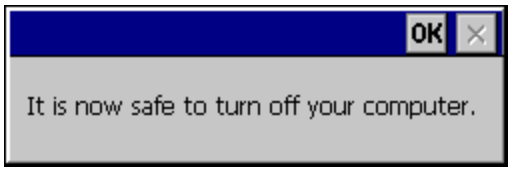


Figure 13 Safe to turn of your computer

- Selecting the Shut down without saving settings results in a message that says: "It is now safe to turn off your computer."

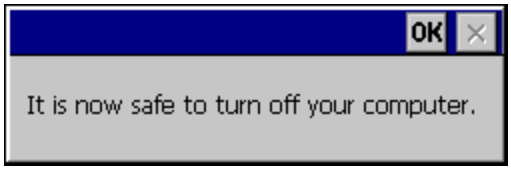


Figure 14 Safe to Turn OFF Computer Message

- Selecting the Cancel button clears screen and returns to the system without saving the Registry.

Using a Jumper to Clear the Registry

1. Shut down the Media Engine.
2. Insert the Registry Clear Plug into J12. If a Registry Clear Plug is not available, short together pins 4 and 6 of J12.

Figure 15: Registry Clear Plug

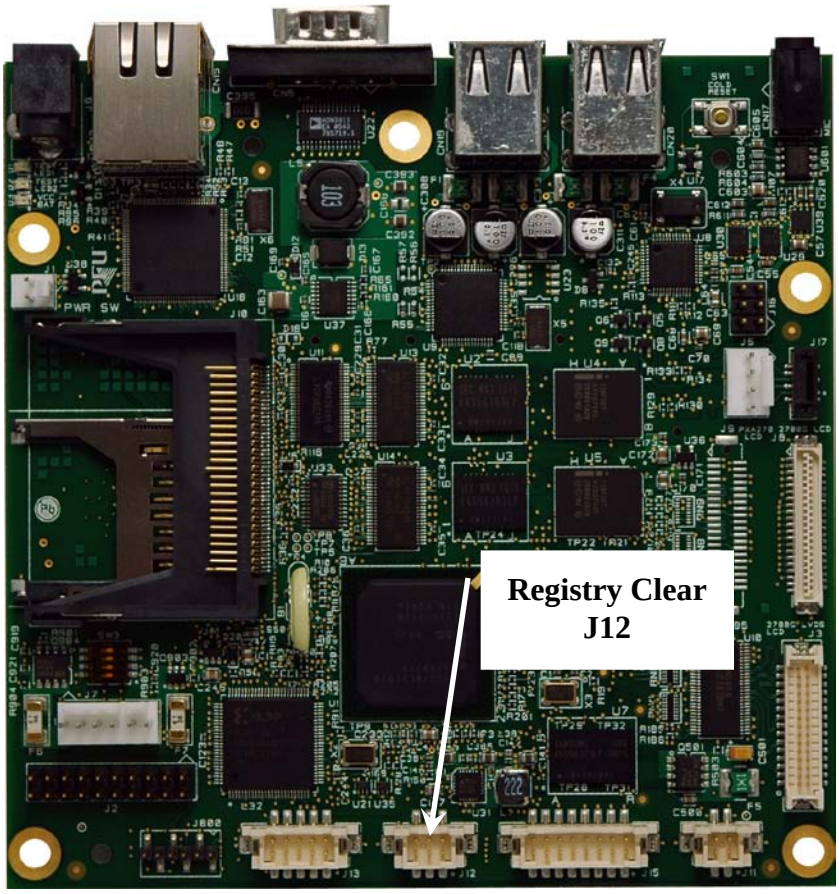


Figure 16: Set a Registry Clear Plug in the SPI connector

1. Turn on the computer. The registry will be set to default by the boot loader.
2. If the Media Engine is connected to a Host PC when the Registry Clear Plug is installed, the following information is displayed on the HOST PC console window.

```
LoopBack is detected. --> Auto clearing registry.
INFO: FlashErase: erasing flash AC440000 to AC4BFFFF. Please wait.....

Microsoft Windows CE Ethernet Bootloader Common Library Version 1.1 Built Oct 31 2007 10:30:07
Microsoft Windows CE Bootloader 1.0 for the Platform1 Development Built Oct 31 2007
Default Dip switch. --> standard lcd type XGA mode
Dip switch 4 is detected. --> SDRAM 128MB mode

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

Initiating image launch in
```

Figure 17: Registry screen capture from a PSXME12864GW configured with a XGA LCD

Chapter 6 – Free Software Utilities

Utilities described in this chapter are distributed as unsupported "Free Software."

Unsupported Free Software

PFU Systems, Inc. (PSI) and PFU Limited (PFU) DO NOT SUPPORT and have not performed complete testing with the Free Software provided with this disclaimer, on its hardware products, or from its web site. Free Software that has been developed by PSI will include source code to facilitate customer support. PSI is making the Free Software available for free and as a convenience to our customers without license or restriction.

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Auto Start Utility

The Media Engine auto start (Auto Start) feature allows customer applications that are stored on removable flash media to be executed on power-up.

Implementation

Auto Start is executed from the Windows CE \Windows\Start menu on Media Engine power-up. Auto Start will scan the attached memory devices, CompactFlash (CF), Secure Digital (SD), and USB flash for any executable program located in the \startup folder in the root of these devices. The attached memory devices are scanned in fixed order. Auto Start will execute any executable files found in the \startup folder of the highest priority memory device that it identifies.

- As some flash devices are not available immediately after startup, Auto Start will scan for up to 30 seconds for available devices. If no executable is found on any memory device within 30 seconds, the scan will terminate.
- The scan order will be CF, SD, USBDrive, USBDrive2, USBDrive3, and USBDrive4.
- If a device is found that contains a \startup directory but that directory does not contain an executable file, that device will not be considered for Auto Start.

Configuration

The Auto Start Utility is provided in the default Media Engine Windows CE 5.0 Operating System Image. However, Auto Start is disabled by default. This means that on original power-up or on subsequent power-ups with out enabling Auto Start, the auto start function will not occur.

To enable Auto Start and to disable Auto Start once it has been enabled, the Auto Start configuration program must be run. The Auto Start configuration program is located in the \windows directory of the Media Engine's file structure. To locate the Auto Start configuration program, navigate to the \windows directory and double click the EnableAutoStart icon. A pop-up window will appear that allows one to Enable or Disable Auto Start or to Exit from the EnableAutoStart program without changing the Auto Start settings.

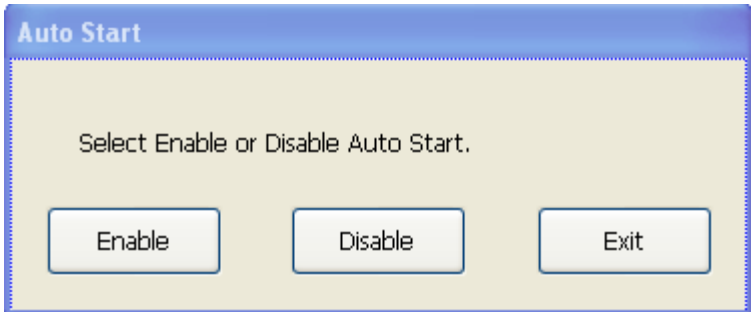

Figure 18: Auto Start Enable Window

After the program which controls this feature is executed, the shutdown utility needs to be run from the start menu to save the Auto Start configuration registry values to the registry.

Considerations

- If more than one executable program exists in the \startup folder of the highest priority memory device, all of the executables will be run. There is no method of determining execution order. It is possible to control execution order by using a batch file.
- It is possible to provide a stand-alone utility that can be used to adjust the scan time. Please contact your PFU Systems representative for information on how to obtain this utility.
- This utility will be provided as part of the PFU Systems Media Engine Windows CE 5.0 Board Support Package.

Full Screen Browser Utility – FSBrowser

PFU Systems has modified the IESimple browser provided by Microsoft in Platform Builder Version 5.0 to allow full screen operation. This is similar to the kiosk mode of Internet Explorer on other systems. This program is called FSBrowser.

FSBrowser is a standalone executable program intended to be run from expansion memory. FSBrowser is only intended to run on the Media Engine or the MEDIASTAFF DS.

Distribution Package

The distribution package consists of the following:

A soft copy of this User Manual: FSBrowser UM x.x.PDF (Note x.x is the current revision)

The FSBrowser executable: FSBrowser.exe

FSBrowser source code: FSBrowser.tbd

Operator Interface

The following table shows the keyboard shortcuts that are available to users when using FSBrowser.

Menu action	Keyboard shortcut
Refresh page	F5
View, Text Size, Smaller	F6
View, Text Size, Larger	F7
View, Internet Options	F10
Toggle between full-screen mode and window mode.	F11 or CTRL+L
Back	ALT + <
Forward	ALT + >
Stop	ESC
Go to Start page	CTRL+H
Go [opens text box]	CTRL+G
Find [opens text box]	CTRL+F

Figure 19: FSBrowser Keyboard Shortcuts

Configuration

The FSBrowser uses the following named registry values. They are the same as are used by the default Internet Explorer. Internet Explorer can be used to set these parameters, or they can be set directly into the registry. When changing any registry value, the shutdown utility needs to be run from the start menu to save the registry values.

Base registry settings for the FSBrowser are stored in the **KEY_CURRENT_USER\Software\Microsoft\Internet Explorer\Main** key.

Base Settings

Value : Type	Description
Start Page : REG_SZ	The URL for the default browser start page. The default URL is http://www.msn.com.
Search Page: REG_SZ	The URL for the default browser search page. The default URL is http://search.msn.com.
NoNewWindows : REG_DWORD	Default setting is 0. If set to 1, this entry blocks the window.open event. In this case, a new window event becomes an in-place navigation event and a window.close event executes a back command. This value may not be in the default registry. If not It may be added.
SBSizeV : REG_DWORD	The width of the vertical scrollbar. The valid range is 0 through 400. Setting the value to 0 hides the scrollbar. The default setting is the system metric value SM_CXVSCROLL, which can be obtained by calling the GetSystemMetrics function.
SmoothScroll: REG_DWORD	Default setting is 0. Specifies whether the window should scroll

Value : Type	Description
	smoothly when scrollbars are used. A non-zero number enables smooth scrolling; however, this may also increase response time.
RegBasedFavorites: REG_DWORD	Default value is set to 0. Specifies that favorites are stored in shell folders. Setting this value to 1 enables registry-based favorites. This value may not be in the default registry. If not, it may be added.

Table 42: FSBrowser Base Settings

Application Settings

The following table shows the settings in the **HKEY_CLASSES_ROOT\htmlfile** key that register the sample browser container for viewing Web pages. These settings are registered automatically at build time and should be changed only if the name of the browser application is changed.

[Subkeys] and Value : Type	Description
\shell\open\command : REG_SZ	Default setting is "iesample.exe".
\DefaultIcon : REG_SZ	Default setting is "iesample.exe".

Table 43: HKEY_CLASSES_ROOT\htmlfile Settings

The following table shows the settings in the **HKEY_CLASSES_ROOT\http** key that register the sample browser container for URL protocols. These settings are registered automatically at build time and should be changed only if the name of the browser application is changed.

[Subkeys] and Value : Type	Description
\http\DefaultIcon : REG_SZ	Default setting is "iesample.exe,0".
\http\Shell\Open\Command : REG_SZ	Default setting is "iesample.exe %1".
\https\DefaultIcon : REG_SZ	Default setting is "iesample.exe,0".
\https\Shell\Open\Command : REG_SZ	Default setting is "iesample.exe %1".
\ftp\DefaultIcon : REG_SZ	Default setting is "iesample.exe,0".
\ftp\Shell\Open\Command : REG_SZ	Default setting is "iesample.exe %1".

Table 44: HKEY_CLASSES_ROOT\http Settings

Chapter 7 – Windows CE 5.0 Operating System Runtime Image Overview

About the Windows CE 5.0 Operating System

The Windows CE 5.0 Operating System Runtime Image is constructed from several components. A module and source code of the component is stored in the PUBLIC folder. The PUBLIC folder can be modified by Microsoft® or someone else. The OS Runtime Image manufacturer also can modify it. (For example, you can change the standard shell, web browser, or sound player.) The OS Runtime Image manufacturer can also add original files to an OS. (For example: you can add a video player application, convenient tool, or special utility for SBC development.)

About Quick Fix Engineering

Quick Fix Engineering (QFE) is produced by Microsoft®. QFE modifies the PRIVATE and PUBLIC folders. In SBC development, it is recommended that you use QFE. After applying it, you must re-evaluate the OS. Refer to Appendix A for a list of applied QFEs.

- QFE is provided by Microsoft® for every month and collected into annual installments.
- You can get a QFE from the Microsoft U.S. download center.
- Please apply the QFEs in chronological order.
- If you have modified PUBLIC folder and then update it with a QFE, you must recheck PUBLIC folder. Look for changes that effect modifications made by you or by your board supplier. *Retesting for correct functionality is advised.*

About the PUBLIC Folder

The PUBLIC folder can be changed by Microsoft®, the OEM vender, or the OS image manufacturer. Therefore, the OS image manufacturer should manage the state of PUBLIC folder. The OEM vender does not necessarily manage this PUBLIC folder to suit the OS image manufacturer's environment because OS image manufacturer may make changes to the PUBLIC folder to suit their environment.

Constructing the PC Environment

This section explains the construction of the PC environment.

Install the Platform Builder 5.0

1. Install the Microsoft® Windows® CE with Platform Builder version 5.0.

- Select ARM for the CPU type.
- After installing Platform Builder, install Embedded Visual C++ 4.0.

Install the Board Support Package

This section explains the installing Board Support Package (BSP).

1. Run the PlatformONE.msi. The following screens are displayed.

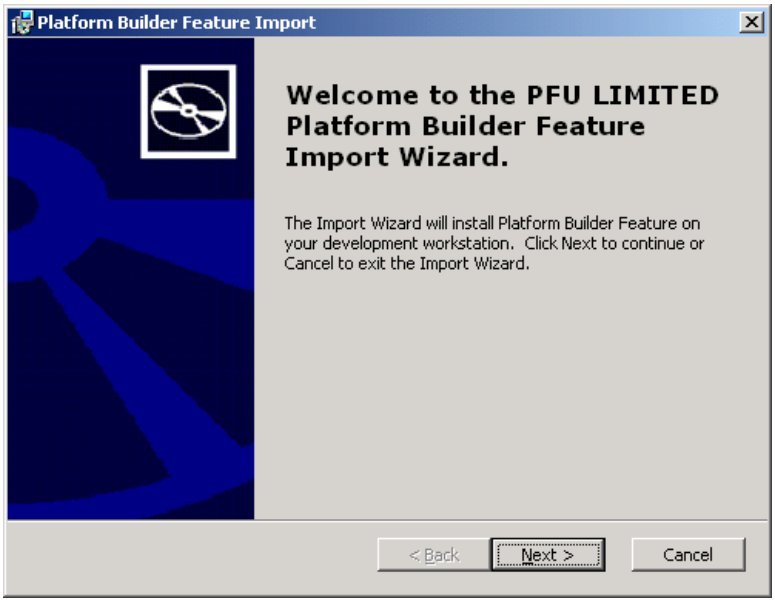

Figure 20: PFU Platform Builder Feature Import Wizard

2. Select the Next button.

The Platform Builder Feature Import dialog box opens.

3. Select the Install button.

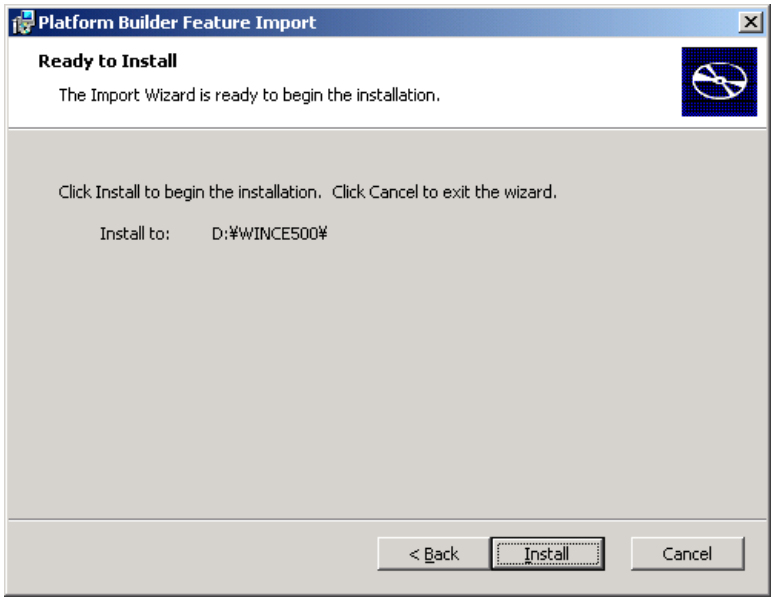

Figure 21: Ready to Install Platform Builder Feature Import

4. When the BSP installation has finished. The Completed the Platform Builder Feature Import Wizard dialog box opens.

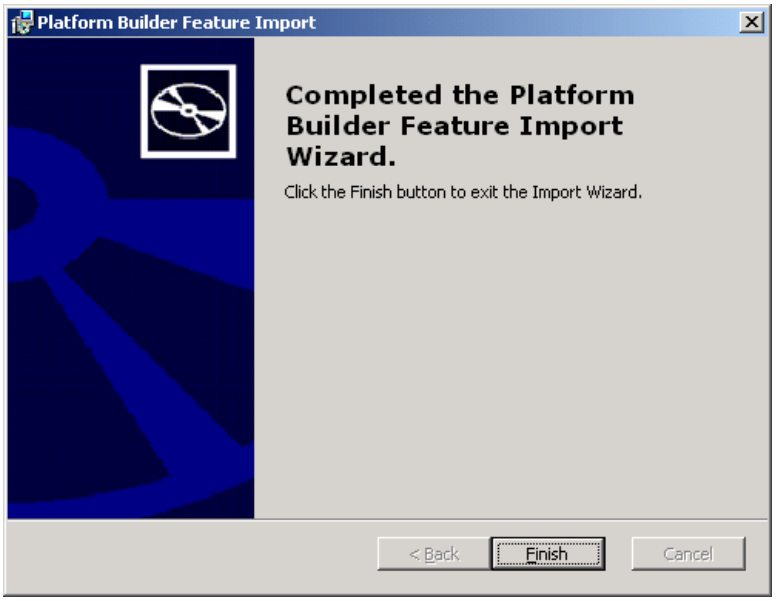

Figure 22: Complete the Platform Builder Feature Import Wizard

5. When the BSP installation has finished. Select the Finish button.

Start Platform Builder

1. Select Start -> Program -> Microsoft Windows CE 5.0 -> Platform Builder 5.0. Platform Builder 5.0 starts.

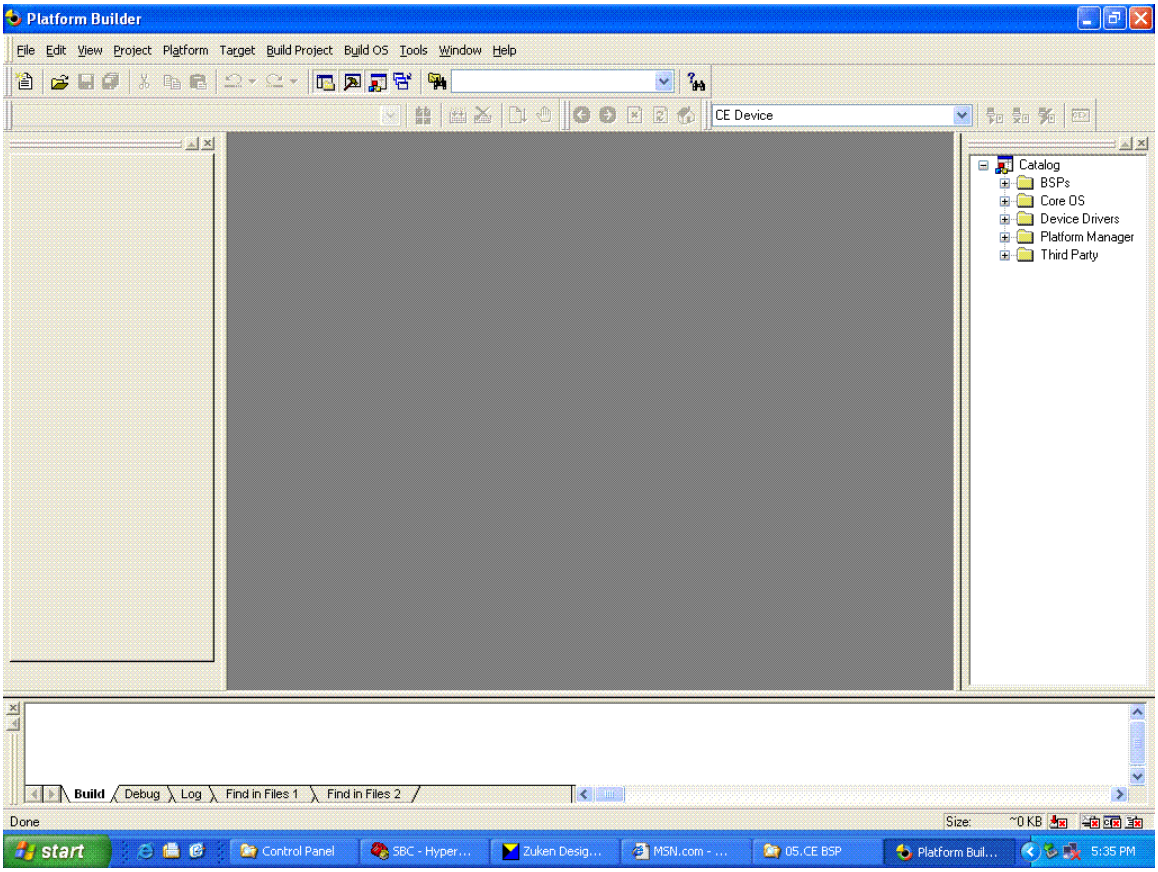

Figure 23: Platform Builder Initial Screen

3. Verify that the PlatformOne BSP has been installed.
4. Select File -> Manage Catalog Items. Verify that the imported file platformone.cec is listed.

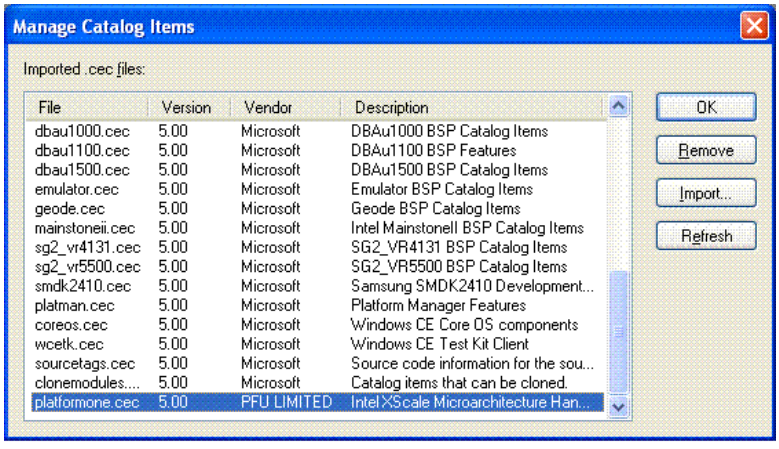

Figure 24: Manage Catalog Items Dialog Box

5. If you can see platformone.cec in the table, install the Board Support Package section has completed.

Build the OS Image

This section guides you through the process of creating the OS Runtime Image.

Create the Platform

1. Select File menu -> New Platform.
   The New Platform Wizard – Step 1 Welcome to the New Platform Wizard dialog box opens.
2. On New Platform Wizard – Step1 dialog box, select the Next button.

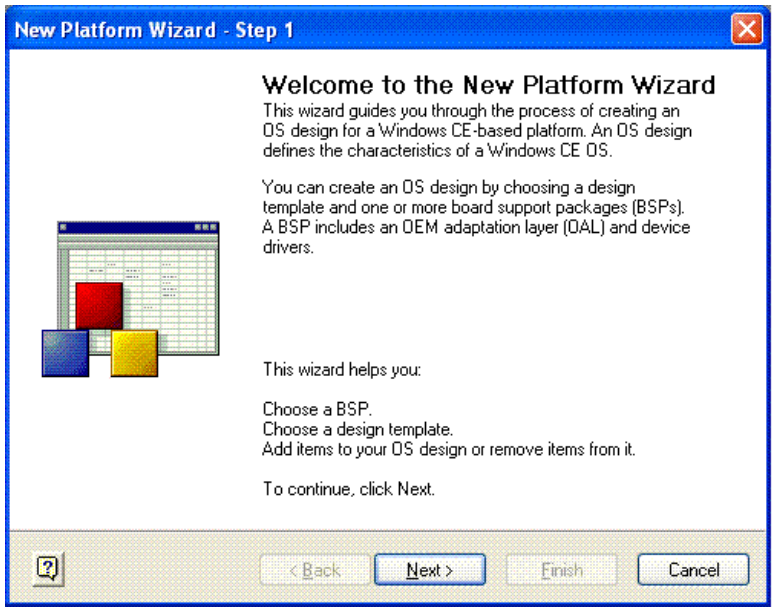

Figure 25: New Platform Wizard – Step 1 Welcome to the New Platform Wizard Dialog Box

The New Platform Wizard – Step 2 Workspace Name and Location dialog box opens.

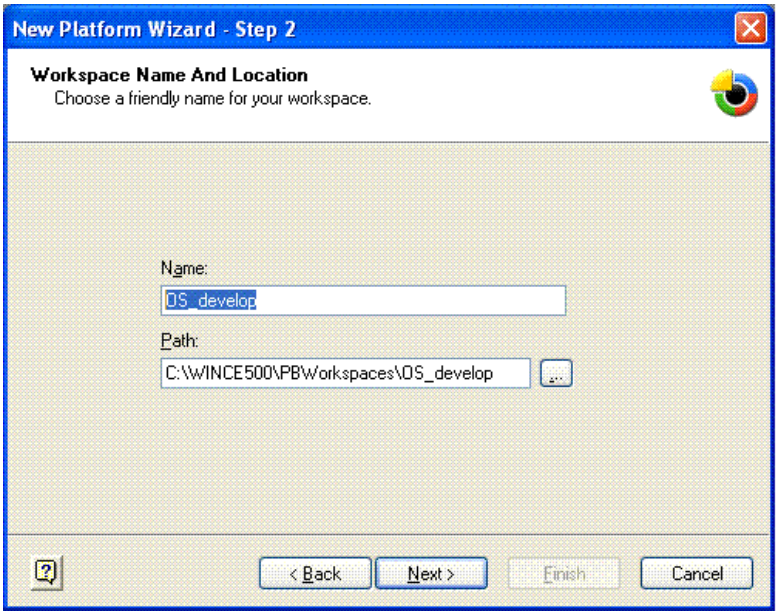

Figure 26: New Platform Wizard – Step 2 Workspace Name and Location Dialog Box

3. Enter a workspace name.
4. Select the Next button.
   The New Platform Wizard – Step 3 Board Support Packages (BSPs) dialog box opens.

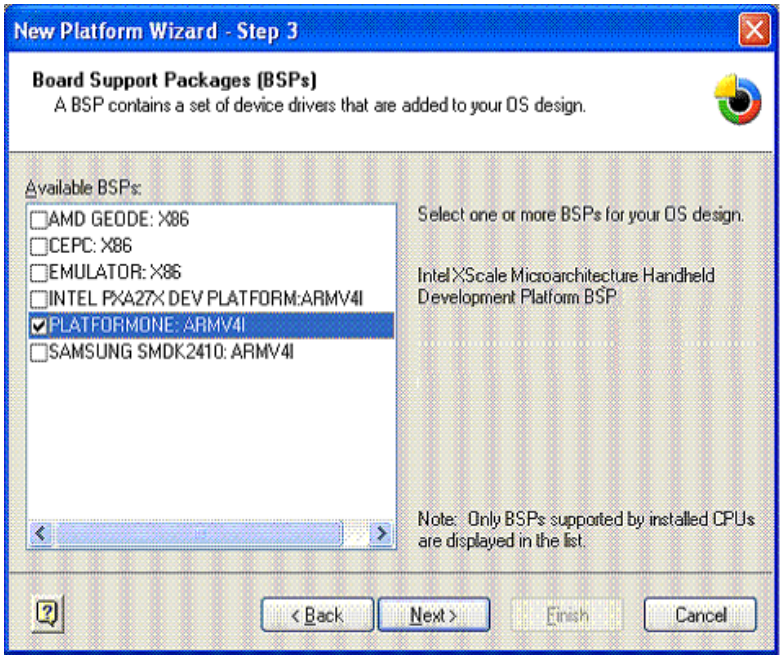

Figure 27: New Platform Wizard – Step 3 Board Support Packages (BSPs) Dialog Box

5. Choose PLATFORMONE: ARMV4I.
6. Select the Next button.
   The New Platform Wizard – Step 4 Design Template dialog box opens.

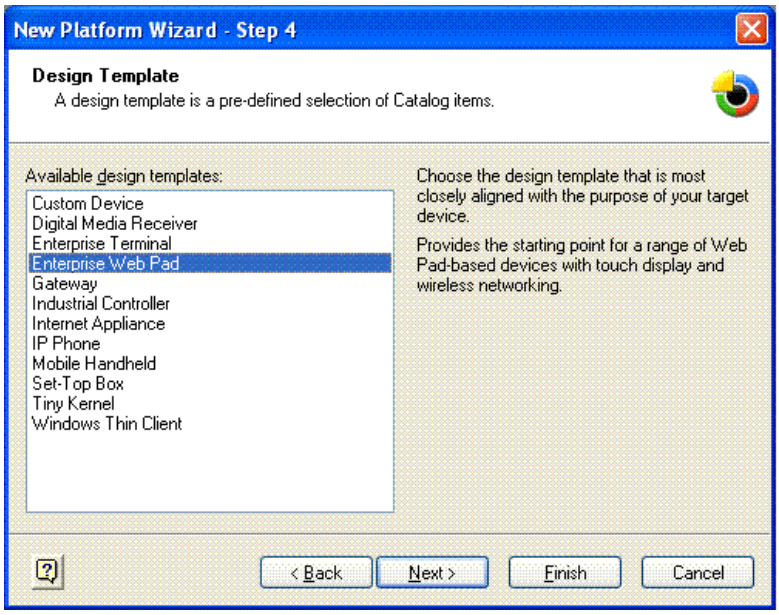

Figure 28: Design New Platform Wizard – Step 4 Design Template Dialog Box

7. Select Enterprise Web Pad., or any selection that best describes your application.

Note

You may use a different selection.

8. Select the Next button.
   The New Platform Wizard – Step 5 Application & Media dialog box opens.

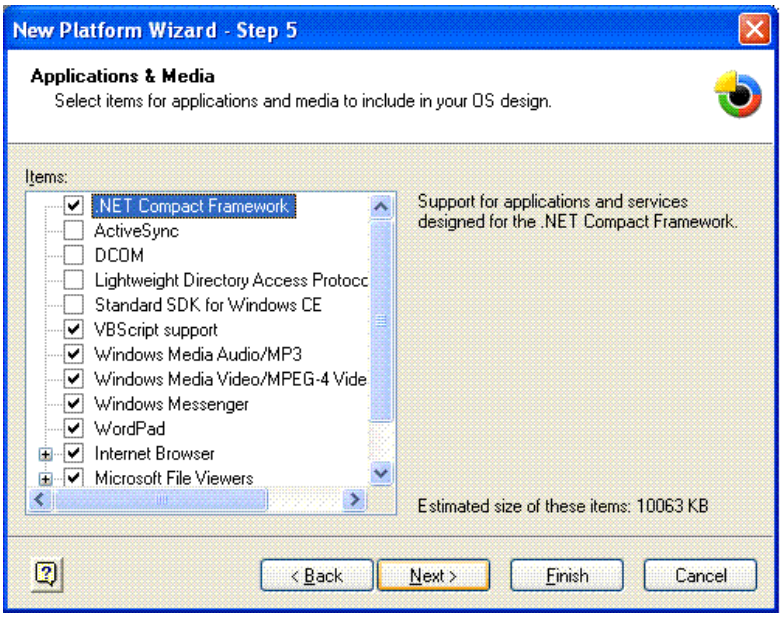

Figure 29: New Platform Wizard – Step 5 Application & Media Dialog Box

9. Accept default selections.

Note

This modification can be changed later. Item can be pulled from the catalog at any time if you forget something.

10. Push the Next button.
    The New Platform Wizard – Step 6 Network & Communications dialog box opens.

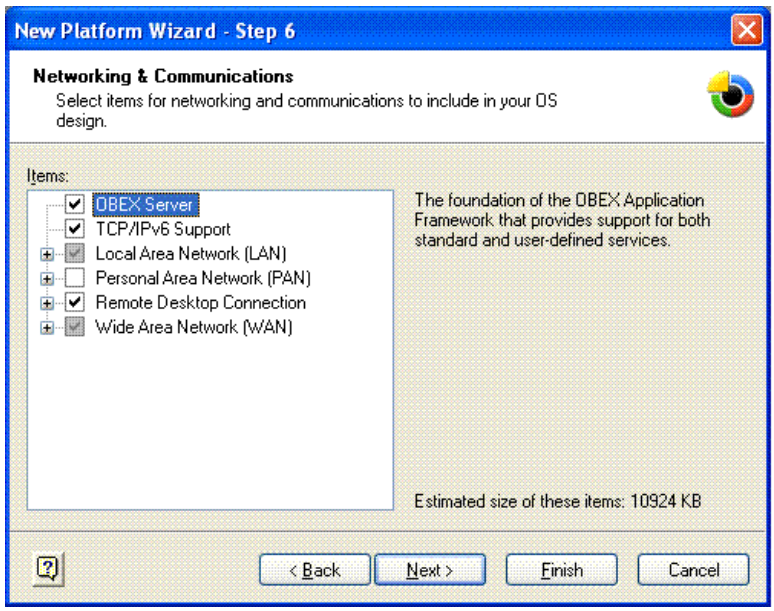

Figure 30: New Platform Wizard – Step 6 Network & Communications Dialog Box

11. Accept default selections.

Note This modification can be changed later.

12. Select the Next button.
    The New Platform Wizard – Step 7 OBEX Server dialog box opens.

Figure 31: New Platform Wizard – Step 7 OBEX Server Dialog Box

Note You should read this message once.

13. Select the Next button.
    The New Platform Wizard – Step 8 Completing the New Platform Wizard dialog box opens.

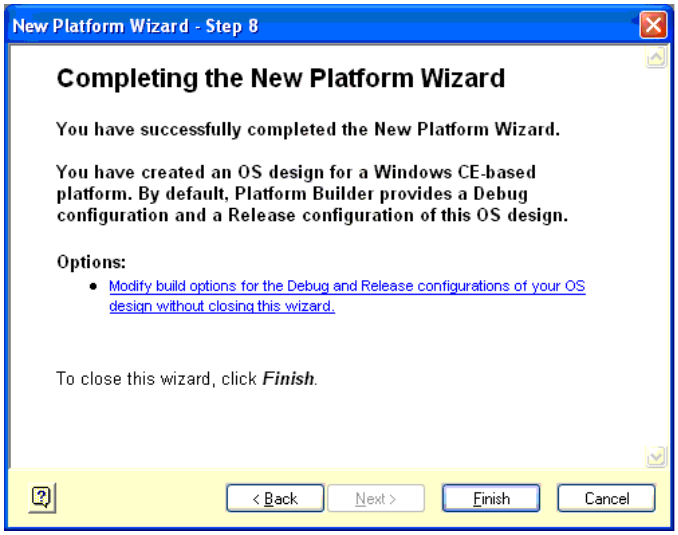

Figure 32: New Platform Wizard – Step 8 Completing the New Platform Wizard Dialog Box

14. The New Platform Wizard has completed.
15. Select the Finish button.

Setup Platform Configuration

1. Select Platform -> Settings
   The Platform Settings (General tab view) dialog box opens.

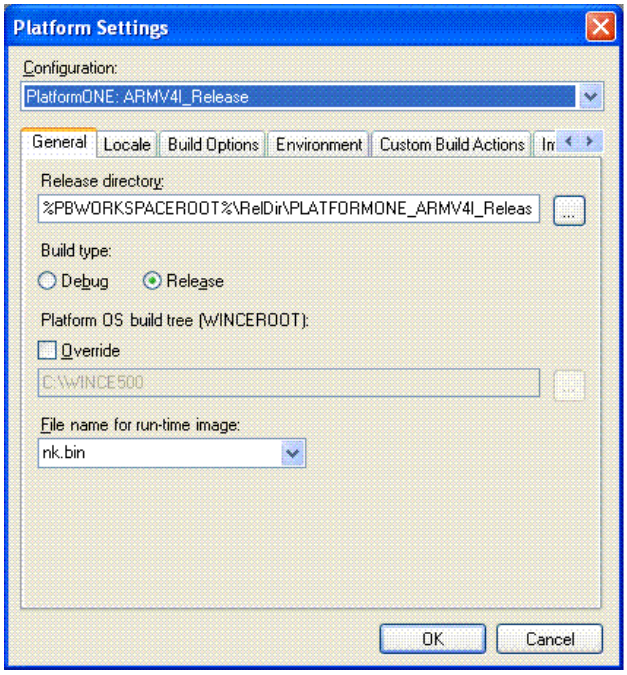

Figure 33: Platform Settings (General tab view) Dialog Box

2. Select Build type, Please select Release.
3. Select the Locale tab.
   The Platform Settings (Locale tab view) dialog box opens.

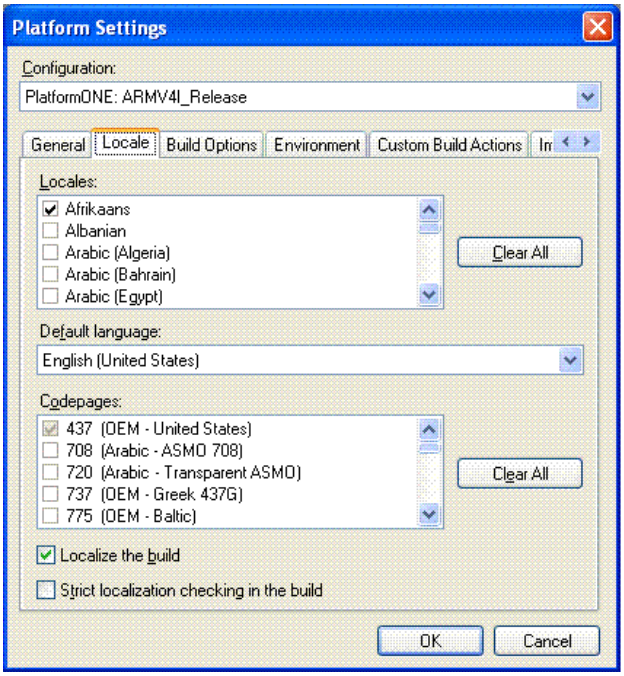

Figure 34: Platform Settings (Locale tab view) Dialog Box

4. Select English (United States) in the Default language list.
5. Select the OK button.
6. Select Build Options tab.
   The Platform Settings (Build Options tab view) dialog box opens.

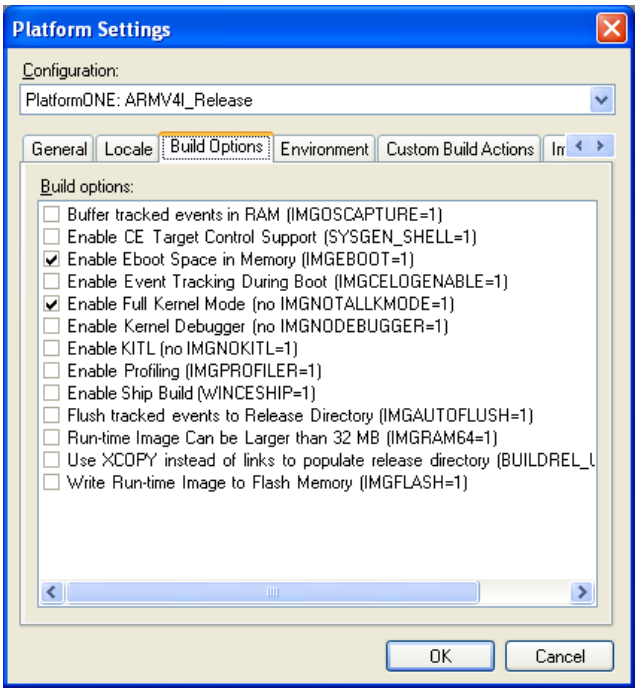

Figure 35: Platform Settings (Build Options tab view) Dialog Box

7. Remove check mark of the Enable CE Target Control Support (SYSGEN_SHELL=1)
8. Remove check mark of the Enable KITL mode (no IMGNOKITL=1)
9. Select the OK button.

Customize Catalog

You can add software and BSP components to the catalog. For more information, see the Platform Builder Help.

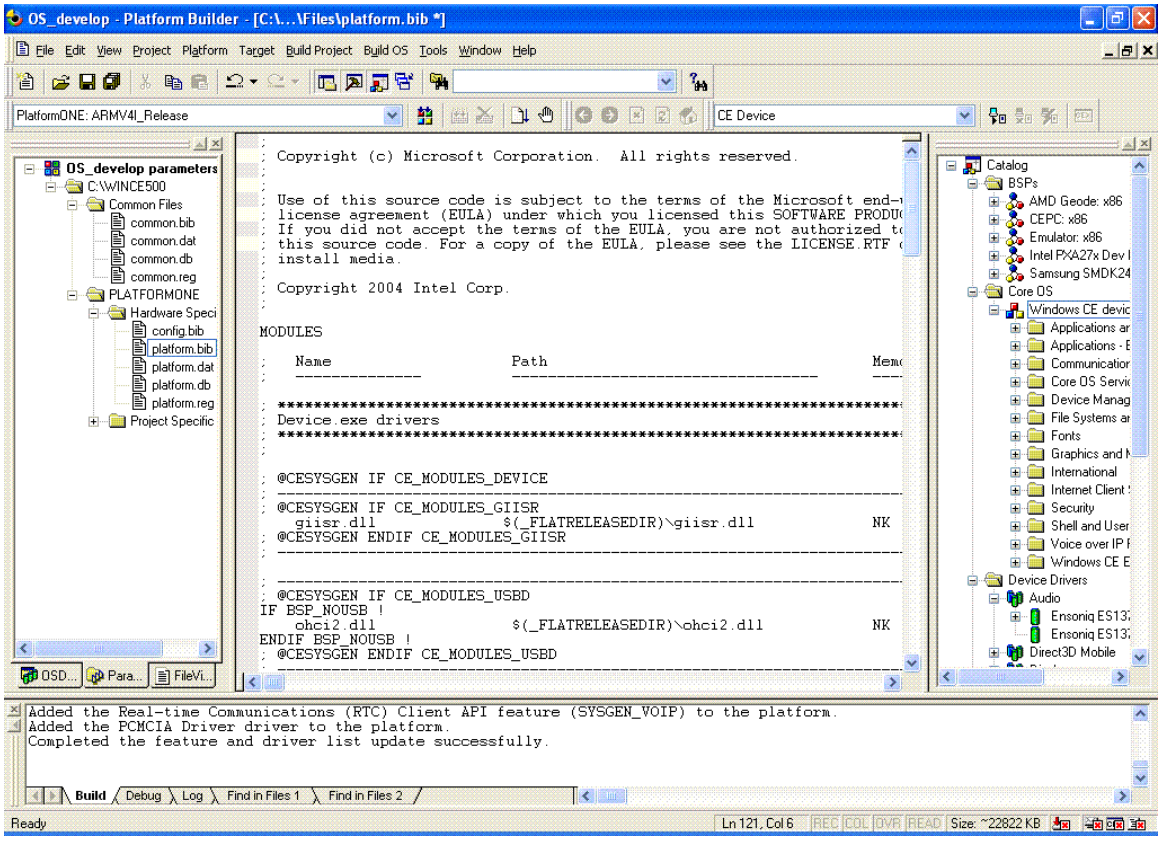

Figure 36: Platform Builder

File Changes in the OS Image

This section explains the file changes in the OS image.

1. Select tab Parameter View in workspace window.
2. Double click platform.bib
3. Edit platform.bib
   For more information, Please see Platform Builder's help.

4. Look to the end of the files for "FILES" and add the following line.

TestProgram.exe $(_FLATRELEASEDIR)\Sample.exe NK H

Left name points to a files name in target machine (SBC)
Center name point s file name in host PC (your PC).
File attribute NK must be written.
File attribute H is an option.
S: System file (cannot delete, cannot copy in Windows CE)
H: Hidden file (cannot see, can copy and delete in Windows CE)

5. Using windows explorer, open "X:\WINCE500\PLATFORM\PLATFORMONE\Files".
6. Add the TestProgram.exe to this directory. This could be any file, TestProgram.exe is used this as an example.

7. Build system. This program should now be included in image.
8. Install image and look in the \windows directory. Since we made the program hidden, you will have to select “View/Options” to display hidden files.
9. If this program is runable, you can select it and run it.

Customize Registry Settings

We can change default registry settings.

1. Select tab Parameter View in workspace window.
2. Double click platform.reg
3. Edit platform.reg. For more information, please see Platform Builder’s help.

If you want to change default registry for the SBC, please refer to the Registry section of this document..

Build

1. Select “Release” build type.
2. Select “Build OS” and execute “Build and sysgen”. Building time is about 15 – 30 minutes.

OS build process produces the directory.
X:\WINCE500\PBWorkspaces\<*workspacename*>\RelDir\PLATFORMONE_ARMV4I_Release
<workspacename> … See the Section Create the Platform Step 2.

PUBLIC Folder Update Information

This section explains updating the PUBLIC folder information. Normally, this will only have to be done once.

1. Close Platform Builder 5.0.
2. Update using QFE patches from Microsoft®.
3. Launch QFE checker and check QFE information.
   QFE check tool is supplied in folder

   X:\WINDOWS\system32\CEQFECheck\ceqfecheck.exe

   Everything does not need to be selected.

Refer to Appendix A for a list of the QFEs that PFU has applied.

4. Implement the PUBLIC customizers.
   Standard Windows CE shell in the PUBLIC folder is customized by PFU Systems as follows:
   - Delete the backlight tab in Display Properties.
   - Delete the password icon in Control Panel.
   - Suspend in start menu has been changed to Shutdown.
   - Suspend function is replaced with Shutdown.exe.
5. Update the following files when you want to reflect this.
   - X:\WINCE500\PUBLIC\CEBASE\OAK\MISC\wceshellfe.bat
   - X:\WINCE500\PUBLIC\SHELL\OAK\HPC\EXPLORER\MAIN\explorerbase.rc
   - X:\WINCE500\PUBLIC\SHELL\OAK\HPC\EXPLORER\TASKBAR\stmenu.cpp

   These sample files are provided by PFU.
   Note: Before updating these files, you must update Microsoft QFE.
6. Delete old object files.
   - X:\WINCE500\PUBLIC\SHELL\OAK\HPC\EXPLORER\MAIN\obj
   - X:\WINCE500\PUBLIC\SHELL\OAK\HPC\EXPLORER\TASKBAR\obj

Note: If these files are not deleted, the new versions will not be built.

7. Open folder X:\ WINCE500\PLATFORM\PLATFORMONE.
8. Launch clean.bat.
9. Delete current <workspace> folder and re-create it.
   <workspacename> … See the Section 2.3.1 Step 2.
10. Launch the Platform Builder 5.0.
11. Select "Release" build type.
12. Select "Build OS" and execute "Build and sysgen".
    Note: Total building time will be increased. Total time is about 40 – 60 minutes.

License runtime image

1. Select Files -> License Run-time image
2. Input the Binary image's license key.
3. Select the "Stamp Binary" license button.
4. Select the Close button.

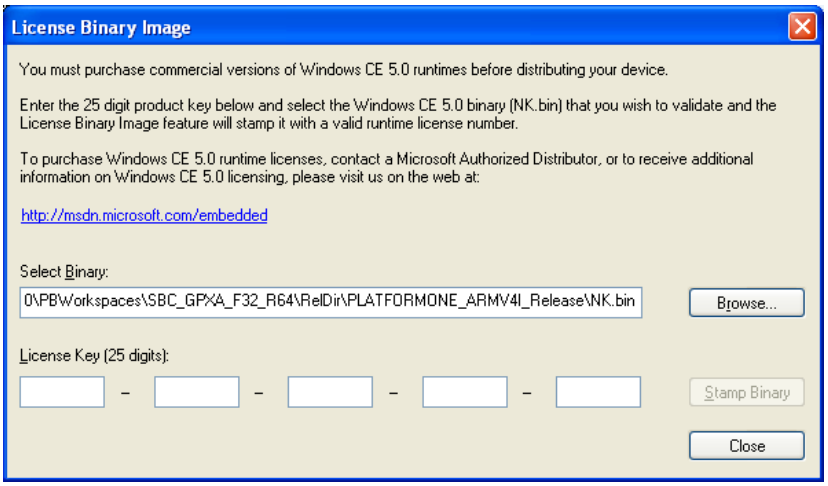

Figure 37: Runtime Image License Dialog Box

Chapter 8 – Load Runtime Image to Target System

Loading release runtime image

2. Disconnect power from the Media Engine.
3. Connect NULL Modem serial cable to the Media Engine and the PC.
4. Start Hyperterminal software on the Host PC.
5. Power up Media Engine.
6. Quickly hit the space bar (you have about 3 seconds).
7. Change the following setting using the boot-loader menu.
   a. Hit “0” to set the IP to a fixed IP within your network.
   b. Hit “1” to set the System Mask to 255.255.255.0
   c. Hit “3” until DHCP is set to DISABLED.
   d. Hit “5” to change to download at startup.
   e. Hit “D” to start download.

   At this point the Media Engine is looking to download the OS over the Ethernet.
8. Connect crossover Ethernet cable to the PC and the Media Engine.
9. Start the Platform builder software on the PC.
10. Do one of the following.
    a. Use File->Open to open the binary image you would like to load. This is usually located at C:\WINCE500\PBWorkspaces\<workspacename>\RelDir\PLATFORMONE_ARMV4I_Release\NK.bin
    b. If you have just built an image using the platform builder, that image will be used.
11. Select Target->connectivity options
12. If not already done create a new Target Device.
    a. Hit “Add Device”
    b. In the new dialog enter new target device name.
    c. The “Associated OS Design/SDK” field can be left as none.
    d. Hit Add to create new device interface.
    e. If you already have created a device, just select it.
    f. For “Download” select “Ethernet” and hit Settings.
    g. In the box titled “Active Devices: you should see a device address that could vary with the MAC address used in the Media Engine.
    h. Select the device and hit “OK”.
    i. Hit “Apply” and “Close”.
13. Select Target->Attach Device.
    This will start the download. This will take about 5 minutes. The CE display will come up when the OS has finished downloading.
14. Unplug the crossover Ethernet cable from the media engine.
15. Cycle power on the media engine (or hit reset) and hit space bar on Hyperterninal.

16. Change setting “5” to “Boot from Flash on Board”. And hit “D” to download the new setting.
17. The Media Engine is now fully loaded.
18. Reset or cycle power for normal operation.

Loading Debug runtime image

1. Disconnect power from the Media Engine.
2. Connect NULL Modem serial cable to the Media Engine and the PC.
3. Start Hyperterminal software on the PC.
4. Power up Media Engine.
5. Quickly hit the space bar (you have about 3 seconds)
6. Change the following setting using the boot-loader menu
   a. Hit “0” to set the IP to a fixed IP within your network
   b. Hit “1” to set the System Mask to 255.255.255.0
   c. Hit “3” until DHCP is set to DISABLED
   d. Hit “T” to start download. (If you do not have a “T” option, loading a debug image is not possible with the current boot-loader.)

   At this point the Media Engine is looking to download the OS over the Ethernet.
7. Connect crossover Ethernet cable to the PC and the Media Engine.
8. Start the Platform builder software on the PC.
9. Use the Platform Builder to build the debug image.
10. Select Target->connectivity options
11. If not already done create a new Target Device.
    a. Hit “Add Device”,
    b. In the new dialog enter new target device name.
    c. The “Associated OS Design/SDK” field can be left as none.
    d. Hit Add to create new device interface.
    e. If you already have created a device, just select it.
    For “Download” select “Ethernet” and hit Settings.
    f. In the box titled “Active Devices: you should see a device address that could vary with the MAC address used in the Media Engine.
    g. Select the device and hit “OK”.
    h. Hit “Apply” and “Close”.
12. Select Target->Attach Device.
    This will start the download. This will take about 5 minutes.
    The CE display will come up when the OS has finished downloading.
13. You can now debug using the Platform builder.
    See Platform builder help for more information.
14. If power is recycled the system will revert to the original configuration, because no information was changed on the Flash.

A

Appendix A – Quick Fix Engineering List

QFE Information

QFE shown below have been applied to the delivered OS image.
Last Update: 2009/09/30

list	QFE information
1	041231-Product-Update-Rollup
2	051231-Product-Update-Rollup
3	061231-Product-Update-Rollup
4	070131-2007M01
5	070208-KB931924
6	070228-2007M02
7	070331-2007M03
8	070430-2007M04
9	070531-2007M05
10	070630-2007M06
11	070731-2007M07
12	070831-2007M08
13	070930-2007M09
14	
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B

Appendix B – FlashLite 3.1 Release Notes

Release Date	September 23, 2008
FlashLite Version	3.1
OS	Windows CE 5.0
CPU	ARMV4I
Flash Players	Standalone and IE ActiveX plug-in
Internal Version Reference	Revision 19945

Description:

This release comprises the latest BSQUARE software for CE 5.0 FlashLite version 3.1.

Known Issues:

NOTE!!!: This release has a known issue with playing video via the Internet Explorer ActiveX plug-in.

Included Files:

- BSQUARE FlashLite 3.1 Release Notes.doc – This file
- WINCE_FL31_RTP (directory)
  - makefile – FlashLite project makefile
  - postlink.bat – FlashLite project post link commands (empty)
  - prelink.bat – FlashLite project pre link commands (empty)
  - ProjSysgen.bat – FlashLite project sysgen info
  - sources – FlashLite project sources file
  - WINCE_FL31_RTP.bib - FlashLite project bib file
  - WINCE_FL31_RTP.dat - FlashLite project dat file
  - WINCE_FL31_RTP.pbpxml - FlashLite project Platform Builder project file
  - WINCE_FL31_RTP.reg - FlashLite project registry entries
  - bits (directory)
    - flashlite.dll – Main FlashLite DLL
    - flashsnddec.dll – Sound decoder
    - flashviddec_on2_win32.dll – ON2 video codec
    - flashviddec_sorenson_win32.dll – Sorenson video codec
    - generic.hcf – FlashLite configuration file
    - IEActiveX.dll – IE ActiveX plug-in
    - saPlayerCE.exe – FlashLite standalone player
    - saPlayerCE.lnk – FlashLite standalone player desktop shortcut
    - si_impl.dll – FlashLite SI implementation DLL
  - content (directory)

- flashn.html – FlashLite HTML page for the ActiveX plug-in
- flashn.swf – FlashLite content file

Installation:

Standalone Player:

You can copy all binary files in the "bits" directory by hand to the \windows directory or you can include them in your build as described below.

The FlashLite standalone player is then executed by typing "saPlayerCE.exe [.swf filename]"

NOTE: flashn.swf has been included as a sample content file.

To integrate these binaries into your CE image, follow these steps:

- Place the decompressed WINCE_FL31_RTP directory under your PBWorkspace/<name> directory.
- Add the WINCE_FL31_RTP.pbpxml as an existing project to your platform builder workspace.
- Build and make image for the WINCE_FL31_RTP project.
- Load new image onto your target device.

Note: Your OS Design needs to include C++ exception handling, ATL, and COM/DCOM.

This new image will have the standalone and ActiveX evaluation binaries integrated into the image.

To use the ActiveX player, start Internet Explorer and open an HTML file with your flash content. The WINCE_FL31_RTP project integrates one sample flash file into your image under the \Windows directory. These sample files are called flashn.swf and flashn.html.

Running the Players:

Standalone Player:

- Double click on the "FlashLite 3.1 Player" link on the desktop. Then use the File -> Open menu to open your flash (swf) content.
- Type in saPlayerCE.exe [.swf filename] from the cmd prompt or "Run" menu item.

Internet Explorer ActiveX Plugin:

IMPORTANT NOTE: you may have to disable some ActiveX and script security settings in Internet Explorer for the flash content to properly run. For local content, you may have to put the directory you wish to run content from in the "local_trusted_dir" item in the generic.hcf file.

To run the Flash ActiveX Plugin, go to an http web site that has flash content, or:

- Enter the local flash file to run in the IE address box. Examples:
  - \windows\flashn.html Note: this file is included in the \windows directory as part of the project described above.
  - file://\windows\flasnh.html
  - Open IE and select Open from the File menu, then browse to the location where the html file resides.

Configuration (generic.hcf):

IMPORTANT NOTE: the generic.hcf file MUST be in the \windows directory.

You may need to alter some parameters in generic.hcf to suit your needs. Some of the parameters are as follows:

local_trusted_dir <directory>

Description:

This keyword is used to set the trusted folder for Local File Security. The swf files placed in this folder will have the same open privileges as all local files. Any swf files in the specified directory are set to “Local_Truted” Sandbox, which means that the files have no security restrictions.

Arguments:

directory: The directory where any swf files in the directory are granted as trusted.

Example:

local_trusted_dir \windows

container <container_width, container_height>

<Optional Keyword – This can be left out if a bitmap is specified, as the container size will be overridden by the bitmap's size. This keyword is really only useful for profiles where there is no bitmap (i.e. the "generic" profiles)>

Description:

container defines the size of the main window. This can be left out if a bitmap is specified, as the container size will be overridden by the bitmap's size.

Arguments:

container_width: main window width

container_height: main window height

Example:

container 230,330

app_player <x , y, app_width, app_height>

Description:

app_player sets the dimensions of the display rect for "not-fullscreen" mode. It specifies the x and y offset into the bitmap as well as the width and height of the display rect. The x and y offset can be zero in the no-bitmap case.

Arguments:

x : offset of the bitmap

y: offset of the bitmap

app_width: The display rectangle width

app_height: The display rectangle height

Example:

app_player 67,149,176,144

full_player <x,y, app_width, app_height>

Description:

full_player is the same as app_player, except it defines the offset and size of the display rect for fullscreen mode. If the profile doesn't have a distinct fullscreen and not-fullscreen size, the full_player keyword can be omitted.

Arguments:

x : bitmap offset
y: bitmap offset
app_width: The full screen display rectangle width
app_height: The full screen display rectangle height

Example:

full_player 67,117,176,208

staticheap <memory_size>

Description:

Set the device static memory size.

Arguments:

memory_size: The memory size in KB

Example:

staticheap 1024
The player will have 1MB static memory.

dynamicheap <memory_size>

Description:

Set the device dynamic memory size.

Arguments:

memory_size: The memory size in KB

Example:

dynamicheap 1024
The player will have 1MB dynamic memory.

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Index