syslogic

Microsoft Windows Embedded Standard 7

Syslogic User's Manual

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1.0	12.02.2015	F. Liechti	First Release
1.1	28.04.2015	F. Liechti	Corrected feature list, added documentation for system beep, volume control and monitor brightness control.

Content

General Remarks

The content and presentation of this document has been carefully checked. No responsibility is accepted for any errors or omissions in the documentation. Note that the documentation for the products is constantly revised and improved. The right to change this documentation at any time without notice is therefore reserved.

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Safety Recommendations and Warnings

The product is intended for measurement, control and communications applications in industrial environment. The products must be installed by specially trained people. The strict observation of the installation guideline is mandatory.

The use of the product in systems in which life or health of persons is directly dependent (e.g. life support systems, patient monitoring systems, etc.) is not allowed.

1   Introduction

Windows Embedded Standard 7 (WES7) is based on the same kernel and is the componentized version of Microsoft Windows 7. In fact, both Operating Systems are based on the same binaries.

WES7 is enhanced with special tools to target the needs of embedded systems that run continuously. While a desktop OS like Windows 7 is optimized for maximum user interaction, an embedded OS is the opposite. Embedded systems often run in environments where few user interactions are desired. Embedded systems often supervise safety critical facilities and thus need to be very robust, reliable and autonomous.

This user manual covers some tools and techniques that help to reduce possible software and hardware breakdowns concerning the operation of Windows Embedded Standard 7 on an IPC in an industrial environment. It details some embedded features that can be configured. Basic knowledge of Windows operating systems is required.

For detailed information refer to Microsoft documentation of Windows Embedded Standard 7.

http://www.microsoft.com/windowsembedded/en-us/windows-embedded-standard-7.aspx

1.1. Supported Hardware

This release of WES7 supports the following systems from Syslogic:

Syslogic products	Product features
COMPACT8	Syslogic Industrial Computer Series 8
PROTOUCH-8	Syslogic Projected Capacitive Display Series 8

Table 1 – Supported Hardware

1.2. Notation within this document

Keys to buttons to be selected are noted with square bracket.   [ctrl]   Press CTRL key

Commands to be entered somewhere are noted as followed: dir   Enter "dir" to the command shell

Input to be replaced by the user is noted with square brackets: [name]Enter your name instead of "[name]"

2   Getting Started

This chapter will give you a "quick start" on how to get WES7 running on an Intel Atom based system from Syslogic. The same procedure applies for all Systems.

2.1. Booting WES7

If you do not have a CompactFlash card with a fully installed WES7 image please read chapter 4 on how to install the system files.

Open the service cover of your industrial PC (IPC) and plug the flash card into the corresponding socket. Close the IPC and connect a USB keyboard, mouse and a monitor. Power the device and Windows Embedded Standard should start loading. If the device doesn't boot from the drive inserted press [DEL] while the BIOS is starting to select the correct drive or change the BIOS setting to boot from the flash.

2.2. User and Password Settings

The Syslogic WES7 image is configured for auto logon, i.e. if the system starts, there's no login screen showing up and the default user "Admin" is automatically logged on.

Default User:

WES7 auto logon User: Admin
WES7 auto logon Password: netipc
WES7 auto logon Group: Administrators

Backup User:

Do not use this user profile for daily use.
WES7 backup User: Administrator
WES7 backup Password: netipc
WES7 backup Group: Administrator

By default the user Administrator is disabled. To enable this user run the following command with elevated privileges:
net user Administrator /enable:yes

2.3.   Desktop

On the desktop the following items can be found:

- Icon Enable EWF   Enables EWF on drive c :
- Icon Disable EWF   Disable EWF on drive and commits changes to drive c :
- Icon EWF Status   Shows the status of the EWF.
- Icon Sysprep   Starts sysprep. Refer to chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**.

3   Windows Embedded Standard 7 Image Features

The software included in our Windows Embedded Standard 7 image is a subset of the software shipping with Windows 7 Professional or Ultimate Desktop edition. Windows Embedded Standard 7 is divided into packages called feature sets. Not all of this feature sets are included in our Windows Embedded Standard 7 image. An overview of the installed features is listed the next section. Refer to the Folder CURRENT_VERSION located in the UTILITIES folder on the target desktop.

If you are missing a feature set from Windows Embedded Standard 7 you can add it to your configuration by using Deployment Image Servicing and Management Tool (DISM). For more information about DISM please refer to: http://msdn.microsoft.com/en-us/library/dd371719%28v=VS.85%29.aspx

Some helpful commands:

Add a package: dism /online /add-package /packagepath:[Path and Filename]
                        [Path and File] has to be replaced by a Path and filename of a cab file or a directory containing a cab file. Make sure all depending packages are already installed.

Remove a package: dism /online /remove-package /packagename:[name of the package]
                        A list of installed Packages is located in the UTILITIES/CURRENT_VERSION/Packages.txt. Replace [Name] by the full name of the package to the console including revision index.

Help adding drives   dism /online /add-driver /?

Help removing drives   dism /online /remove-driver /?

3.1. Features Included

The following list is not complete.

- Windows 7 user interface, full desktop with taskbar and start menu
- Command shell
- Control panel
- Internet Explorer 11
- Windows file explorer
- Microsoft .NET Client Profile 4.5 and .net Framework 3.5, 4.5
- Microsoft installer
- Remote desktop connection
- Remote folder share, drive mapping, basic networking utilities
- Drivers for board hardware (mouse & keyboard PS/2 & USB, flash-memory-stick, video).

3.2. Features NOT included

- Java Virtual Machine
- Most user applications like Games, etc.
- Drivers for additional hardware devices

3.3. Default Configuration

- Firewall: enabled
- Auto logon: enabled
- EWF: installed on drive C:, disabled
- FBWF: installed for drive D:, disabled
- Languages: English language support
- DHCP: enabled
- Computer name: random
- Windows update: disabled
- Graphics driver: Intel HD Graphics Driver

3.4. Tools

A folder named "UTILITIES" is placed on the desktop and it contains a few useful tools:

- CURRENT_VERION   Contains a batch file to write the current configuration. Execute the file with elevated privileges and copy the file Driver.txt, features.txt and packages.txt from the folder c:\windows\system32\ containing all information about the installed drivers, features and packages.
- IPC_WLB_DRV   Driver required for IPC/WLB (GPS, UMTS and WiFi Modul)
- MSVCMON   Microsoft Visual Studio-Remote debug monitor
- PFMon_Windows*   Power Fail Monitor Example
- TouchDriver   Touch Driver for TFT/PROTOUCH-8
- WINIO_V2*   Modified WinIo library with functions for accessing peripherals.
- WINIO_V3*   Original WinIo library for accessing I/O and memory resources under Windows.

*: The example only work on 32Bit Systems and with elevated privileges.

3.5. Graphics Driver for COMPACT8 and PROTOUCH-8-Systems

Intel is modifying its graphic driver constantly. It's suggested to visit Intel's website from time to time for new driver versions.

Installed driver on the system is Intel HD Graphics Driver. To configure the drive use the desktop icon.

Embedded Media and Graphics Driver (EMGD for Atom E3800) drivers are available from Intel.

3.5.1. Backlight Control for Protouch-8 devices

The brightness of the displays can be controlled by the following options:

- Use slider located in control panel-> Power Options.

- Use standard Windows API for controlling backlight. There are several examples available on the web. A good example can be found here:

  http://www.codeproject.com/Articles/236898/Screen-Brightness-Control-for-Laptops-and-Tablets .

3.6. Security

To get a secure system it is required to configure the features provided properly. Main security features are a working firewall and antivirus software software.

3.6.1. Windows Firewall

Windows firewall is installed and activated by default. Two modifications have been made to speed up system development.

- Allow Ping   The system responds to ping commands from outside.
- Enable Remote Desktop   It is possible to connect to the device by remote desktop.

3.6.2. Antivirus software

Antivirus software is always an important subject of any Windows system. This is valid for Windows Embedded Standard 7 as well.

By default Syslogic Windows 7 Embedded Standard 7 systems do not have any antivirus protection installed. If required Syslogic recommends using Microsoft Security Essentials that can be downloaded from the web page of Microsoft for free.

> **There is no antivirus software installed by default:**
>
> Install Antivirus Software on the system if required.

If using an antivirus software and a write filter (EWF or FBWF) it is recommended to find solutions for the following issues :

- Typically antivirus software uses a daily growing database of virus definitions. Any change written to the file system is forwarded to RAM by the write filter. Is there enough RAM available?
- Embedded systems typically get quite old. How long will it be possible to get new virus definitions without any upgrade of the installed antivirus software? Who will upgrade the software if required?

If not using antivirus software make sure that the system remains safe and free of any unwanted modifications. Some important points are:

- Us a user with no elevated privileges as a default user.
- Remove not needed functionality from your system using DISM.
- Use write-filters as EWF or FBWF.
- Do not allow running any code from a device (any USB drives or similar) connected to the system or already installed software on the system using AppLocker.
- Do not allow any unwanted connection by any communication protocol (network vulnerability…) using firewall.
- If possible reboot the system regularly to reset unwanted changes.

3.7. Reliability

Windows Embedded Standard 7 gives some features to improve the reliability of the system. These features are the Enhanced Write Filter (EWF) and the File-Based Write Filter (FBWF). Both filters improve the stability and prevent system crashes during power fail situations. The EWF is installed on the drive C: and the FBWF is installed on drive D:. Both are disabled by default.

Furthermore make sure the system is protected adequately. Especially if the system is connected to any network it is important to have a good concept. Install Anti-Virus and Firewall Software if required.

3.7.1. Enhanced Write Filter (EWF)

This filter is designed to protect a whole partition on sector level and provide the ability to write-protect a run-time image by redirecting all write requests to an overlay located in RAM. For the user the drive appears as a regular drive and allows all write operations. But after reboot all the operations are being set back to the last defined state. Like this the embedded system will always behave the same.

Syslogic recommends protecting the system partition using the EWF. For full documentation refer to:

http://msdn.microsoft.com/en-us/library/ms912906(v=winembedded.5).aspx

Remark: EWF is configured using RAM Reg Mode. To disable the EWF use the CommitAndDisable command or the Icon available on the desktop.

Some helpful commands:

- Ewfmgr   Shows the status of the EWF
- EWFmgr c: /enable   Enables the EWF Filter after the next restart
- Ewfmgr c: /CommitAndDisable   Disables the EWF Filter and applies the actual changes to the drive.
- Ewfmgr c: / commit   Applies the currently made changes to the disk by the next restart.

3.7.2. Recover Erros with EWF

In some cases it may occur that the EWF filter is not able to find the partition to be protected. This happens if enabling the Filter the first time with an USB-Drive connected or writing an image to another C-Fast card without running sysprep. To recover the EVW Assignment run the following commands:

- Rundll32 C:\Windows\System32\ewfcfg.dll,EwfSysprepCleanup
- Rundll32 C:\Windows\System32\ewfcfg.dll,EwfSysprepGeneralize
- Rundll32 C:\Windows\System32\ewfcfg.dll,EwfSysprepSpecialize

3.7.3. File-Based Write Filter (FBWF)

This filter is designed to protect a drive on file level. Compared to the EWF the FBWF is more flexible but does not support all features of NTFS file system. One important advantage of the FBWF is to allow files and folder to be modified. For detailed information refer to:

http://msdn.microsoft.com/en-us/library/aa940926(v=winembedded.5).aspx

Some helpful commands:

- Fbwfmgr displayconfig   Shows the status of the FBWF
- Fbwfmgr enable d: Enables the FBWF on the drive D :
- Fbwfmgr disable d: Disables the FBWF on the drive D :
- FBWFmgr addexclusion d: path   Allow writing to the specified path or file

Make sure the system partition (Drive C) is not write-protected to configuring this filter.

3.8. Audio Support

3.8.1. Audio Volume Control

Most of Syslogic Hardware does not support any audio outputs. Therefore audio volume control is disabled in the control panel. To enable audio control follow the procedure below:

- Copy the following commands to a text file and rename it to "enableAudio.reg".
  Windows Registry Editor Version 5.00
  [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer]
  "HideSCAVolume"=-
  [HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\Explorer]
  "HideSCAVolume"=-
- On the target system execute the file by double-clicking.
- Click on the up showing triangle of the notification area and select "customize…"
- Select Turn system icons on or off
- Set the dropdown menu of "Volume" to "on".
- Now the volume control will be visible as used.

3.8.2. System Beep

Syslogic COMPACT8 and PROTOUCH-8 products are equipped with a buzzer also known as a system beep. The buzzer uses the standard interface as being used for years. As Microsoft has cancelled the support for a system beep it is required to modify the system. Please refer to the following article:

http://blogs.msdn.com/b/larryosterman/archive/2010/01/04/what-s-up-with-the-beep-driver-in-windows-7.aspx

For a possible solution refer to beepx of www.waldbauer.com available for 32bit and 64bit systems.

3.9. Language Packages

By default only English is installed as a platform and desktop language.

3.9.1.   Selecting a Desktop Language

The desktop language can be selected by the control panel. Follow the dialog called "change display language" by executing "intl.cpl ,2" (Space between "cpl" and the comma). If no selection is available there is no other language installed. Follow the chapter 3.9.2 to install another language pack.

3.9.2.   Install Different Language Pack

If required follow the procedure to install other languages.

This procedure requires a language package of the desired language. Language packages are available from Microsoft.

- Run lpksetup. Dialog "Install or uninstall display language" will appear.

- Select "install display language".

- Select "Brows computer or network".

- Select "Navigate" to select the folder with the language packs "lp.cab" and select the desired language.

- Accept the licence agreement.

- The installation will start. When finished, press "next".

- Select the display language to be displayed.

- If changing the display language a restart is required.

4   Installing WES7

4.1.   Overview

Windows Embedded Standard 7 is delivered on your IPC or TFT if ordered. Please capture an image if desired using any third party imaging tool.

4.2.   Capturing a System Image

To capture an image of an actual system insert the flash disk to the computer and use a byte or file image tool. Before capturing an image it is important to run sysprep. Using sysprep before capturing the image will guarantee proper functionality of the FBWF, EWF and other features. To execute sysprep use the icon sysprep available from the desktop.

> **Run sysprep before capturing an image:**
>
> Run sysprep before capturing an image of a Windows Embedded Standard 7 image.
> Do not restart the image before capturing the image.

Run sysprep before sending Image for production

Run sysprep before sending an Image to Syslogic for production. If not executed, Syslogic will not be able to deploy the image correctly.

4.2.1.   Capture Image

After Sysprep has been executed and the system has stopped remove the flash drive from the target and capture an Image using either a File image or a Byte Image on any other personal computer.

4.2.2.   Deploy an Image

The IPC/WINSTD7-A8-xx provides two byte image of Windows Embedded Standard 7 configured for COMPACT8 and PROTOUCH-8 located in the folder /IMAGE_E or IMAGE_P. Deploy the image using any byte image tool on a standard computer.

- Remove the flash from the target device and connect it to a personal computer.

- Extract the Image File located on IPC/WINSTD7-A8 in the folder IMAGE.

- Write the extracted image using a byte image tool to the drive.

- Now you can configure the partitions. Especially check if the whole size of the flash is used.

- Remount the flash to the target device.

- Start the target device.

Using Windows Embedded 7 P features:

If using Windows 7 Embedded P features it is required to own for each system an adequate licence!
For details on packages refer to Microsoft web page:
http://www.microsoft.com/windowsembedded/en-us/windows-embedded-standard-7.aspx

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4.3.   Installing new Windows 7 or WES7

Most system drivers are provided through Windows or can be downloaded from the manufacturer's web page. For details on Hardware refer to the corresponding manual.

Some drivers that are not provided automatically are located on IPC/WINSTD7-A8-xx Memory drive in the folder DRIVERS. Keep in mind that drivers are updated and improved continuously. Therefore check for the manufacturers web page for the newest revisions.

5 WinIo Driver Library

5.1. WinIo Library Overview

WinIo is a driver that grants your application access to Windows XP/2000/NT/7 (only 32Bit) system resources that are normally not accessible. You can use WinIo to simply write a byte to the x86 IO port registers or access physical memory directly. WinIo is written and maintained by Yariv Kaplan (www.internals.com, see 5.5 for license details).

WinIo has the following function interface defined (listing not complete):

bool _stdcall InitializeWinIo()

> This function initializes the WinIo library

void _stdcall ShutdownWinIo()

> This function performs cleanup of the WinIo library.

bool _stdcall InstallWinIoDriver(PSTR pszWinIoDriverPath, bool IsDemandLoaded);

> This function installs the WinIo driver.

bool _stdcall RemoveWinIoDriver()

> This function removes the WinIo driver from the system.

bool _stdcall GetPortVal(WORD wPortAddr, PDWORD pdwPortVal, BYTE bSize);

> This function reads a BYTE/WORD/DWORD value from an I/O port.

bool _stdcall SetPortVal(WORD wPortAddr, DWORD dwPortVal, BYTE bSize);

> This function writes a BYTE/WORD/DWORD value to an I/O port.

5.2. NETIPC extensions to WINIO_V2

Syslogic has extended the original WinIo Library with some hardware-related functions. These extensions can be accessed like any other WinIo function after properly initializing the WinIo driver:

bool_stdcall GetTemp(float& value)

> This function returns the temperature from the on-board LM75 temperature sensor.

bool_stdcall WatchdogGetState(bool& Timeout)

> This function returns the state of the Watchdog. 1=Timeout occurred, 0=No Timeout

bool_stdcall WatchdogEnable()

> This function enables the watchdog. It will reset the board if not triggered by WatchdogTrigger.

bool_stdcall WatchdogTrigger()

> This function triggers the Watchdog.

bool_stdcall WatchdogHardReset()

> This function resets the watchdog by hard resetting the board.

bool_stdcall GetCpuFID(DWORD& FID)

bool_stdcall GetCpuOID(DWORD& OID)

bool_stdcall GetCpuRID(DWORD& RID)

> These functions return the board identifiers.

5.3. Using WinIo in a Visual C++ application

In order to use WinIo in a Visual C++ application, you should take the following steps (please also have a look at the the TestProg Sample Application found in the TestProg directory):

(1) Place winio.dll, winio.vxd and winio.sys in the directory where your application's executable file resides.

(2) Add winio.lib to your project file by right clicking on the project name in the Visual C++ workview pane and selecting "Add Files to Project...".

(3) Add the #include "winio.h" statement to your source file.

(4) Call InitializeWinIo.

(5) Call the library's functions to access I/O ports and physical memory.

(6) Call ShutdownWinIo.

5.4. TestProg Sample Application

The TestProg sample application demonstrates the use of the extended WinIo Library. After reading out the temperature and the board identifiers, it activates the watchdog and triggers it for about 10 seconds before letting the watchdog generate a timeout.

Copy the WINIO/Bin directory to the Windows WES7 device and run TestProg.exe (WinIo.dll and WinIo.sys must be in the same directory as TestProg.exe).

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5.5.   WinIO End User License Agreement

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6 References

- Microsoft Developer Network

   http://msdn.microsoft.com/en-us/library/ff795587%28v=WinEmbedded.0%29.aspx

- IPC/COMPACT8-SL user documentation

   (Document Order code: DOC/IPC_SL8-E), available at www.syslogic.com

- Microsoft Windows Sysinternals Tools & Website

   http://technet.microsoft.com/en-US/us-us/sysinternals/bb545021.aspx

- Enhanced Write Filter

   http://msdn.microsoft.com/en-us/library/ms912906(v=winembedded.5).aspx

- File-Based Write Filter

   http://msdn.microsoft.com/en-us/library/aa940926(v=winembedded.5).aspx

7 Contact

Our distributors and system integrators will gladly give you any information about our products and their use. If you want to contact the manufacturer directly, please e-mail a message containing a short description of your application and your request or use one of our request forms on our homepage.

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