

Comparing the Windows Embedded Standard and Windows XP Embedded Toolsets

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Abstract—Microsoft produces both Windows XP Embedded and Windows Embedded Standard 2009 operating system products. The differences between these embedded OSs are not immediately obvious. MPC Data has developed many embedded operating system images for its customers using these products.

This whitepaper is based on MPC Data's experience and compares the key differences between the two products so that informed decisions can be made as to which one may best suit a particular set of product requirements.

Index Terms—Windows Embedded Standard 2009, Windows XP Embedded

I. INTRODUCTION

This white paper discusses the differences in toolset functionality and types of embedded operating systems produced by Windows Embedded Standard (WES) 2009 and Windows XP Embedded (XPe) SP2 Feature Pack 2007.

II. PROCEDURE FOR PAPER SUBMISSION

This document is aimed at managers and technical professionals who have some experience with the Windows XP Embedded toolset. It is intended to provide assistance when they are:

- Deciding upon which of the two embedded operating systems best meets specific new project requirements.
- Considering the migration of existing projects from Windows XP Embedded FP2007 to Windows Embedded Standard 2009.

III. WINDOWS EMBEDDED STANDARD PRODUCT OVERVIEW

The Windows Embedded Standard 2009 toolset is an updated and enhanced version of the Windows XP Embedded SP2 FP2007 toolset. In addition to the new WES 2009 features and functionality it contains all the features and functionality of the XPe FP2007 toolset.

Why WES 2009 Was Released As A Separate Product?

The WES 2009 toolset has been released as a separate

product under Microsoft's published product lifecycle support policy instead of being released as an upgrade to XPe FP2007. The reasons for this are complex, but to quote Microsoft's Gina Bentley (Program Manager for Sustained Engineering and Support)

...In a nutshell Microsoft's OS product Lifecycle policy is ten years; five years Mainstream support and five years Extended support. A variant to this equation is based on the follow-on product release timing. A product will have five years Mainstream support, *or* two years Mainstream support following the follow-on product's General Availability Date, whichever period is longer.

For example, in the case of Embedded Windows, since there was not a follow-on product to Windows XP Embedded when the typical five year Mainstream support period would have ended, it continued in Mainstream support. With the release of Windows Embedded Standard 2009 as the follow-on product to Windows XP Embedded, the two year period of remaining Mainstream support for Windows XP Embedded commenced. When the Windows XP Embedded Mainstream support phase ends, the product will begin five years of Extended support.

A Service Pack is retired two years after the subsequent Service Pack is released, or it retires at the end of the product's Support Lifecycle, whichever comes first. A non-retired Service Pack will be supported at the product's current Lifecycle Phase, Mainstream or Extended, regardless of the age of that Service Pack.

Date Calculations:

- *General Availability* dates are loosely calculated to be when a new product is available to customers in the channel after the RTM date (about 90 days later), or they reflect the RTM date for Service Pack releases.
- *Retirement* dates are generally calculated as the first Patch Tuesday (2nd Tuesday of each month) of the quarter which follows the actual calculated date.

For example, Windows Embedded Standard 2009's General Availability Date is 12/14/2008. That date begins the two year countdown until Windows XP Embedded exits Mainstream Support and enters Extended Support. So, 12/14/2008 plus two years takes us to 12/14/2010. The following quarter begins January, 2011, and Patch Tuesday is the second

Tuesday in January. This brings us to the Windows XP Embedded Mainstream Support Retirement date of 1/11/2011.

The two product support lifecycles can be compared by looking at the following web pages:

XP Embedded SP2:

<http://support.microsoft.com/lifecycle/?p1=3320>

Embedded Standard 2009:

<http://support.microsoft.com/lifecycle/?p1+14106>

Note: A summary of the contents of the above web-pages is provided at the end of this document.

A. Toolset Feature Changes

With regard to the major features provided by the two products, the following table provides a simple side-by-side comparison.

Windows XP Embedded FP2007	Windows Embedded Standard 2009
Toolset is installed using 5 CDs (English language MUI only). Additional CDs contain non-English language MUI packs.	Toolset is installed from 1 DVD which contains the complete toolset and all the MUI packs.
Toolset will be supported and updates available from Microsoft until early 2011.	Toolset will be supported and updates available from Microsoft until mid 2018.
O/S images built by the toolset are based on XP Professional Service Pack 2 binaries. Optional SP3 support will be provided for XPe in Q1 2009.	O/S images built by the toolset are based on XP Professional Service Pack 3 binaries.
Hardware driver support as at release of XP Professional Service Pack 2.	Hardware driver support as at release of XP Professional Service Pack 3. Includes the latest Microsoft drivers including Intel Atom chipset support.
Internet Explorer 6 and 7	Internet Explorer 6 or 7
Windows Media Player 10	Windows Media Player 10 or 11
System Management Server Client	System Center Configuration Manager Client
.NET Framework 1.1, 2.0 and 3.0	.NET Framework 1.1, 2.0, 3.0 and 3.5
---	Silverlight

Windows XP Embedded FP2007	Windows Embedded Standard 2009
---	Windows Server 2008 support (RDP 6.1)
---	Updated application support macro components
---	Dr. Watson
---	MS Baseline Security Analyser
---	Sysprep (Windows System Preparation) tool.

Note: Most of the additional components incorporated into the WES 2009 database (at the launch of the toolset) will be supplied as optional updates to the XPe FP2007 toolset during 2009.

B. Toolset Functionality Changes

With regard to significant differences in toolset functionality between the two products, the major changes in Windows Embedded Standard 2009 are shown below:

- The toolset requires the .NET Framework 2.0 SP1 to be installed instead of the .NET Framework 1.1.
- The toolset uses the Microsoft SQLServer 2005 database engine instead of the older MSDE SQL database engine.
- Some component dependencies have been changed. These can make it simpler to build working embedded operating system images, but can also make it more difficult to optimise image size in some situations.
- WES 2009 resolves a few minor long standing XPe FP2007 component dependency bugs.
- The default database has all the latest Microsoft released hardware driver updates as at December 2008 including Intel Atom chipset support.

C. Toolset UI Changes

Users will notice very few changes when using the two toolsets. This means that if they are familiar with the operation of the XPe FP2007 toolset UI they will be able to use the WES 2009 toolset UI without requiring additional training or familiarisation time.

The most significant change to the toolset UI is the addition of a 'Community' section to some of the menu bars. This provides users with direct links to Microsoft community forums, Team blogs, Developer Center information and the directory of Microsoft partners.

IV. CHOOSING THE TOOLSET TO USE FOR NEW PROJECTS

When starting work on a new embedded project, the choice of toolset will depend heavily on what must be included in the embedded operating system and how long it needs to be maintained.

To help in that choice the following table outlines some of the major differences in the run-time support provided by each of the two toolsets. If any required feature is only supported by XPe FP2007, then that toolset is the one that must be used for the project.

Note: This table assumes that each toolset has been patched with all available updates as at 1st February 2009.

Run-Time Feature Required	Windows XP Embedded FP2007	Windows Embedded Standard 2009
Toolset supported by Microsoft until 2011		
Toolset supported by Microsoft until 2018	n/a	
Binaries based on XP Professional Service Pack 2		n/a
Binaries based on XP Professional Service Pack 3	n/a	
Internet Explorer 6 Technologies		
Internet Explorer 7 Technologies		
Windows Media Player 10		
Windows Media Player 11	n/a	
.NET Framework 1.1, 2.0 or 3.0		
.NET Framework 3.5	n/a	
System Management Server Client		n/a
System Center Configuration Manager Client (compatible with SMS).	n/a	
Silverlight	n/a	
Windows Server 2008 support (RDP 6.1)	n/a	
VirtualPC 2007 support	n/a	
Enterprise environment support (template component)	n/a	

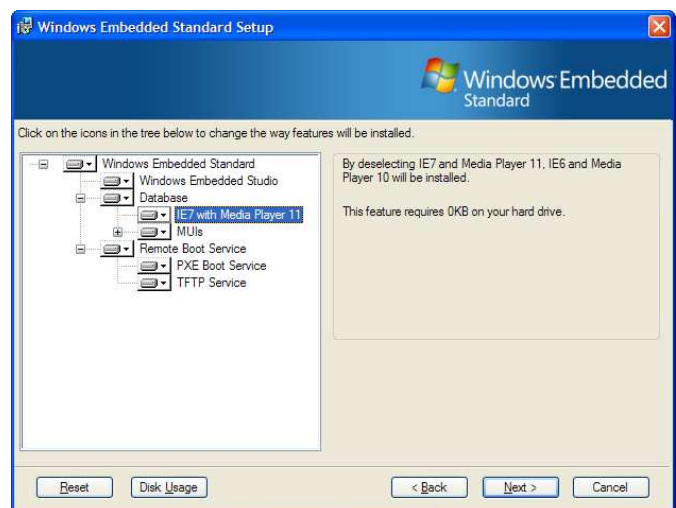
Run-Time Feature Required	Windows XP Embedded FP2007	Windows Embedded Standard 2009
'Thin Client' support (template component)	n/a	
MS Baseline Security Analyser	n/a	
Dr. Watson Postmortem Debugger	n/a	
Sysprep (Windows System Preparation) tool.	n/a	
Ready to use WinPE boot media (for rapid hardware analysis)		n/a

If after reviewing the above table the WES 2009 toolset is the most suitable for the project, there is still one more 'feature' to take into account:

When adding a component to a project configuration (or upgrading it), the WES 2009 toolset always uses the latest revision of that component.

A simple example of this issue occurs when adding Internet Explorer support to your project. If Internet Explorer 6 and Internet Explorer 7 are both in the component database, adding any form of Internet Explorer support will always cause Internet Explorer 7 support to be added (Internet Explorer 7 is the latest version of Internet Explorer in the database). Therefore the only way to build Internet Explorer 6 support into an embedded operating system is if Internet Explorer 7 is not in the database.

In view of the above issue it is worthwhile looking at the options available when installing the WES 2009 toolset.



This shows that there is an option provided that allowing

the installation of either a combination of Internet Explorer 7 and Media player 11, or Internet Explorer 6 and Media Player 10.

It is worthwhile looking carefully at the toolset install options rather than accepting the defaults as they could prevent the inclusion of required operating system features.

V. CHOOSING THE TOOLSET WHEN MAINTAINING EXISTING PROJECTS

This section outlines issues that need to be taken into account when deciding whether to migrate existing projects from XPe FP2007 to WES 2009.

A. Toolset Installation Issues

XPe FP2007 and WES 2009 are separate products and it may seem that they could both be installed on the same development machine. However, as some of the individual tools in WES 2009 (Target Designer etc.) use the same registry settings as the equivalent tools in XPe FP2007, only the last one to be installed will work correctly.

If the WES 2009 toolset is installed onto a machine where XPe FP2007 is already installed, the WES 2009 installer is not capable of updating the existing XPe FP2007 installation. The WES 2009 installation will always start with a 'clean' database and will not inherit any of the components in the existing XPe FP2007 database. The default installation directories for each toolset are the same. By accepting the default installation parameters for both toolsets, the XPe FP2007 database will be overwritten by the WES 2009 database. However, any existing custom repository directories may still be retained.

Therefore, to maintain XPe FP2007 build support for existing projects it is strongly recommended that the WES 2009 toolset be installed on a different computer (or in its own virtual machine).

B. Configuration Migration Issues

There are no Microsoft tools to assist in the migration of projects from XPe FP2007 to WES 2009. However, the process is fairly simple and comprises two basic steps ...

- Import all the custom component (SLD) files that are needed by the project configuration into the WES 2009 database.
- Open the XPe project configuration file (SLX) in the WES 2009 Target Designer.

However, for the migration to be successful it assumes that:

- A list of custom components needed by the project is available.
- All the relevant custom SLD files along with any files that should be placed into the repositories are available.
- WES 2009 provides the same Microsoft supplied component revisions that were provided by XPe FP2007.

If any of the above assumptions are not valid, it will not be possible to use the WES 2009 toolset to build exactly the same operating system image that was produced using the XPe FP2007 toolset.

When migrating a project to WES 2009 it will not be known if the migration was successful until the configuration (SLX) file has been opened in WES 2009 Target Designer. Looking at that configuration, the migration can only be considered successful if all the following criteria are met:

- There are no problems reported with the configuration.
- There is no need to upgrade any components.
- There is no need to perform dependency checks.
- It is possible to successfully build an image without changing the configuration in any way.

As before, if any of the above criteria are not met then it will not be possible to use the WES 2009 toolset to build exactly the same operating system image that was produced using the XPe FP2007 toolset.

C. Maintaining Migrated Configurations

Once a project configuration has been successfully migrated to the WES 2009 toolset, changes will almost certainly need to be made to that configuration. This process presents unique problems because of the following toolset 'features':

- When adding or upgrading a component, Target Designer always uses the latest revision of that component.
- Different revisions of the same component can have different dependencies.
- When upgrading a component, any custom settings that were made to it in Target Designer may be lost.

This means that if it is required to update or add a component, the WES 2009 toolset will ALWAYS insert the latest revision of that component into the configuration. That component can then introduce different dependencies into the configuration that may cause it to include other updated or new components (and so-on through the dependency tree).

This can mean that the original XPe project that was based on the XP SP2 binaries (which built identical images in both toolsets) could now be including a combination of Windows XP SP2 and SP3 binaries.

Having a combination of binaries can cause significant problems in an operating system built from that configuration. Therefore MPC Data recommends that entire configurations are always upgraded to the latest revisions of all Microsoft supplied components if future maintenance is required. However, this may cause some (or all) custom project settings to be lost so a backup should be made of all project files before starting any upgrade process.

To summarise:

- If there is a need to reliably rebuild existing embedded o/s configurations and perform minor updates, the same toolset under which it was originally built should be used.
- If significant changes to a project configuration can be accepted the first time it is updated, then migration from the XPe FP2007 to WES 2009 is practical.

VI. MANAGING MULTIPLE PROJECTS

Engineers may be required to work on several Windows Embedded projects at the same time. In this scenario there are several options:

A. Use the same computer and database for all projects

- Pros:
- Project setup time is reduced (only one instance of the toolset needed).
 - Creating new projects is quick and simple.
 - A basic hardware platform can support the toolset. (P4 or later CPU, 512MB of RAM, >15GB disk space).
- Cons:
- Using a single database means that maintaining a clean distinction between projects is very difficult.
 - Due to toolset limitations (only adding latest revision of a component) it may not be possible to build some combinations of projects.

B. Use a different development computer for each project.

- Pros:
- Each project is completely separate and cannot affect any other.
- Cons:
- Project setup time is increased (PC setup, software installation etc.).
 - Additional hardware cost.

C. Use a separate Virtual Machine for each project.

- Pros:
- Each project is completely separate and cannot affect any other.
 - Virtual machines can be easily copied and archived.
 - Lower hardware costs than using separate PCs for each project.
- Cons:
- A new virtual machine is required for each project.
 - Project setup time is increased (software installation etc.).
 - The Virtual Machine host computer needs to have a high specification (more CPU power and RAM needed).
 - Virtual machines are slower at performing tasks than the host on which they run.
 - Large amounts of disk space are required on the host (at least 7GB per VM that contains a basic WES 2009 toolset).

At MPC Data we use a new Virtual Machine for each WES 2009 or XPe FP2007 project we undertake so that we can guarantee no unwanted features are accidentally inherited from other projects. We maintain a set of 'template' VMs that have the appropriate toolsets pre-installed (complete with all the latest updates from Microsoft). At the start of a new project we take a copy of the relevant 'template' and use it for all subsequent development on that project. This keeps project setup time to a minimum and can allow us to start productive work within 30 minutes.

Whichever of the above methods are adopted when managing projects, engineers should always maintain some form of 'Process Documentation'. This will allow the project to be reconstructed if something goes wrong with the toolset or the development environment.

Products Released	General Availability Date	Mainstream Support Retired	Extended Support Retired	Service Pack Retired	Notes
Windows XP Embedded	30 Jan 2002	11 Jan 2011	12 Jan 2016	11 Jan 2005	---
Windows XP Embedded SP1	22 Oct 2002	Not Applicable	Not Applicable	10 Apr 2007	---
Windows XP Embedded SP2	18 Jan 2005	Not Applicable	Not Applicable	11 Jan 2011	This service pack 'Retired Date' is relevant for XP Embedded Service Pack 2, Feature Pack 2, 2007 and Update Rollup 1.0 as they are all Service Pack 2 releases.
Windows XP Embedded SP3	14 Nov 2008	See Notes	See Notes	See Notes	Support ends 24 months after the next service pack releases or at the end of the product's support lifecycle, whichever comes first.
Windows Embedded Standard 2009	14 Dec 2008	11 Jan 2011	8 Jan 2019	---	---

Note: The above table contains a summary of the information available on <http://support.microsoft.com/gp/lifeselectindex> as at 9th February 2009. For the latest information please visit that site.

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