



New Features in Windows[®] Embedded CE 6.0 R2

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Summary: Windows Embedded CE 6.0 R2 contains a number of new features and operating system components. This paper describes those new features and components and how they impact the operating system

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Introduction

Slightly over one year after Microsoft released an overhaul of its Windows Embedded CE operating system, a new update, dubbed Windows Embedded CE 6.0 R2, has appeared that provides a number of improvements to the areas of networking, fonts, board support packages, and device drivers. This white paper is a quick tour through the improvements provided by this new release.

Windows Embedded CE 6.0 R2 is delivered as an overlay over the original Platform Builder 6.0 install. In addition to Platform Builder, systems need to have Visual Studio 2005 Service Pack 1 installed as well as Service Pack 1 for Platform Builder 6.0. Microsoft will be providing all of these installs packaged in one set of disks. For those who already have Platform Builder 6.0 installed, the R2 install will leave all the currently installed BSPs as well as the OS designs previously created. All that is necessary to take advantage of the new features is to add those components to a design and rebuild. R2 incorporates all the QFEs (Quick Fix Engineering) that have been released for Windows Embedded CE 6.0 since its inception.

New Device Drivers

The tour of the new features in R2 starts with a discussion of a set of new and improved device drivers. First on the list is the ATAPI hard disk driver which has been updated to provide support for serial ATA (SATA) controllers. This will help OEMs using the newer x86 motherboards that have an SATA controller instead of the older parallel ATA (PATA) controllers.

For more portable systems, the flash driver and Secure Digital controller drivers have also been improved. The new flash driver supports multi-layer cell support, where each flash cell stores more than one bit per cell. The flash driver has also been redesigned to change it from the old "Flash Abstraction Layer" / "Flash Media Driver" architecture that was unique to flash drivers to a more conventional Model Device Driver / Physical Device Driver layer driver design used by the other drivers in Windows Embedded CE.

The secure digital controller driver has been updated to support hardware that implements the SD 2.0 specification. Secure Digital 2.0 provides better performance in both 1 and 4 bit modes. In addition to faster speeds for SDIO Cards, SD 2.0 also supports high capacity memory cards up to 32 gigabytes up from the SD 1.1 limit of 4 GB.

A new USB smartcard reader driver has been added in R2. While Windows Embedded CE has supported a specific smart card reader previously, the driver works with USB card readers that support the USB Chip/Smart Card Interface Devices Specification. A number of smart card readers support this specification so this allows OEMs choices on card readers that previously didn't exist.

Windows Embedded CE has always supported raster (bitmap) and TrueType fonts. Starting with R2, the code that reads, interprets, and draws the fonts has been partitioned into a replaceable DLL. This "Pluggable Font" technology allows third parties to provide their own font drawing engines that can extend or replace the current font drawing code in Windows Embedded CE. A side effect of Pluggable Fonts is that Windows Embedded CE can now support both raster and TrueType fonts in the same image.

R2 includes three new board support packages. The x86-based HP/Compaq t5530 thin client BSP provides a complete set of drivers for its VIA chipset. The ST7109 BSP is an SH4-based BSP has some interesting drivers including a custom serial ATA disk driver. The Marvell PXA270 BSP is a Marvell board support package supporting their newly acquired ARM XScale line. This BSP also includes a driver for the Philips PCF50606 power management chip which is specifically designed for power management duties for the XScale PXA270 CPU.

Terminal Services Client Improvements

The terminal server client software in Windows Embedded CE has been upgraded for R2. The big news here is that the remote desktop protocol (RDP) used by the TS client has been upgraded from RDP 5.2 to RDP 6.0. This effort brings the Windows Embedded CE RDP stack in line with the stack used in Windows Vista. RDP 6.0 provides a better base architecture from which an improved terminal services client can be built.

All of these features have been ported to the new terminal services client. In addition to the existing features, the move to RDP 6.0 has enabled a new set of features that are now available on the Windows Embedded CE client. The first of these is the support for 32 bits per pixel displays. Previous versions of RDP only supported pixel depths of up to 24 bits per pixel.

RDP 6.0 also provides support for spanning a remote desktop session across multiple local displays. This enables thin client systems with multiple displays to support desktop of resolutions up to 4096 by 2048. The one limitation of this support is that the displays on the thin client device must be the same resolution. In addition to multiple display support, RDP 6.0 also enables custom display resolutions so the client is free to specify its own resolutions including wide screen resolutions where the width to height ratio is 16:9.

RDP 6.0 brings more than just an improvement in video support. There is also significant improvement in security for the client server link. RDP 6.0 supports Secure Socket Layer (SSL) and Transport Layer Security (TLS) protocols. These protocols encrypt the data sent through the RDP channel, decreasing the chance of eavesdropping and data tampering.

The Windows Embedded CE 6.0 R2 terminal services client also supports *Network Level Authentication*. Using NLA, a client is authenticated by the server or domain controller before a full remote desktop session is established. In previous versions of RDP, the session was first established, and then the credentials of the user were verified.

In addition to NLA, RDP 6.0 enables *Server Authentication*. Server authentication enables the terminal server client software to verify the identity of the server as the connection is established. The verification is accomplished using an exchange of certificates by the server to the client. Server Authentication is supported by Windows Vista and Windows Server 2008.

Internet Explorer®

Internet Explorer 6.0 for Windows Embedded CE has also been significantly improved for CE 6.0 R2. While still a part of the Internet Explorer 6.0 product (not IE 7.0) IE has been updated to provide better security, better performance, and improvements to better manage kiosk scenarios.

The IE team at Microsoft has taken some of the algorithms used to increase the performance of IE 7 and back ported them to IE 6.0 for Windows Embedded CE. These performance tweaks provide a noticeable improvement in page rendering for text centric pages using Western European languages. While performance values will vary from machine to machine, the improvement in page rendering should be quite noticeable in many situations.

The improved Internet Explorer now also supports rich text editing. Support for RTE fields allows changing of the font, color, and other aspects of the text within the rich edit control. RTE support allows rendering of websites such as Hotmail that use rich text editor fields to be rendered correctly on Windows Embedded CE systems.

For CE 6.0 R2, IE has been updated to better support kiosk situations. The new version of IE now supports better user history, temporary file, and cookie management compared to earlier versions. Now, users can delete cookies through the Internet Options dialog as well as configure IE to automatically delete any cookies when the browsing session ends.

Internet Explorer for Windows Embedded CE now supports using proxy auto-config files. A proxy auto-config file tells the browser how to choose the appropriate proxy server given the URL being accessed. The files, with a .PAC extension, and written in JavaScript is invoked when IE is about to fetch a page. Desktop browsers, both IE and others have supported .PAC files for years. Now, with CE 6.0 R2, Internet Explorer for Windows Embedded CE also supports .PAC files.

Accompanying the updated Internet Explorer in the new release is a new version of the Windows Media Player[®] ActiveX (OCX) control. This updated media player is not a minor tweak but a major update. It is the media player control used in Media Player 11 ported to Windows Embedded CE.

The new media player control is a vast improvement over the older 6.4 media player control that was provided in the original release of Windows Embedded CE 6.0. The older control exposed a simple interface that allowed applications to perform standard actions such as play, rewind, fast forward, pause, and stop. There are other methods and properties for the control, but compared to the newer 7.0 OCX, the old interface is rather simple.

VoIP Upgrades

Windows Embedded CE has supported VoIP functionality since Windows Embedded CE 4.2 with both a VoIP “stack” that provides the basic voice over IP communication as well as a predefined operating system configuration complete with the VoIP stack and a suite of applications created to provide a solution for a Windows Embedded CE powered VoIP phone. Over the years, the VoIP support has been upgraded to improve the features of the stack as well as improve the accompanying applications. This effort has continued in Windows Embedded CE 6.0 R2.

The VoIP updates in R2 are in both the basic “VoIP stack” and the suite of applications that provide a complete solution for OEMs building VoIP based products. Improvements to the VoIP stack are centered on added features to the phone software. The new release provides support for video calls, multiparty conferencing, and back-end server compatibility.

The VoIP application suite has been upgraded as well. The VoIP suite includes five applications; the home application, the phone application, the settings application, the information application, and finally a bootstrap application. Each of the applications in the suite also use a set of common code implemented as a set of stand-alone DLLs.

The effort to improve the VoIP functionality extends beyond just the Voice over IP project. Microsoft has provided the complete source code to the VoIP application suite. This source is in the \wince\public tree and therefore OEMs are free to modify and use this source code in any Windows Embedded CE based system whether it is a VoIP device or not. This suite of applications provides a great foundation for embedded application suites regardless of the type of system.

Web Services on Devices

Windows Embedded CE 6.0 R2 has added support for Web Services on Devices, which is a methodology for detecting network attached devices and the web services they provide. WSD is a Microsoft implementation of the “Devices Profile for Web Services” standard.

Web Services on Devices provide a method for a discovery protocol to take place between new devices plugged into a network and the devices currently on the network. As a device is attached to the network it broadcasts a “hello” message to announce its availability. Other devices and Vista-based PCs can detect these hello packets and then interrogate the new device to discover what web services it provides.

The Windows Embedded CE implementation of WSD allows it to provide web services through this method as well as detect and consume web services using WSD. The implementation depends on

the Windows Embedded CE web server. It provides the complete Web Services on Devices API (WSDAPI) that is provided on Windows Vista. The web services on Windows Embedded CE are still limited to native (not managed) code and there is no WSD client for Windows XP based PCs. However, this is a promising technology that opens the door to some interesting devices.

Conclusion

Windows Embedded CE 6.0 R2 provides some interesting and welcome improvements. The new drivers and BSPs are always welcome. The Internet Explorer upgrades bring improvements in performance, RTE support and improvements in manageability. The terminal services client is now more secure and provides better video configurability. Finally, the VoIP application suite is improved and support is added for web services on devices. All these improvements make Windows Embedded CE 6.0 R2 a significant upgrade to Microsoft's premiere embedded operating system.

For more information:

Windows Embedded Web site:

<http://www.microsoft.com/windows/embedded/default.aspx>