Windows® Embedded CE 6.0 R2

Remote Desktop Protocol and Internet Explorer®

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Published: November 2007

Summary: Windows Embedded CE 6.0 R2 contains a number of improvements to the Remote Desktop Protocol and Internet Explorer components. This paper describes those improvements and how they impact the operating system

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Introduction

Microsoft's new release of Windows Embedded CE, Windows Embedded CE 6.0 R2, has introduced improvements in three of its network centric components; Terminal Services, Internet Explorer, and Windows Media Player®. This white paper discusses the improvements to these components and how they provide better solutions in these areas.

Remote Desktop Protocol / Terminal Server Client

Windows Embedded CE has supported Microsoft's Remote Desktop Protocol (RDP) for a number of generations of the operating system. RDP is the protocol that provides remote desktop capability to a client such that a user can use a lesser-powered device to log in to a Windows Server based system. The application that uses RDP is called the Terminal Server Client. Using the terminal services client, the remote session has the same look-and-feel of a standard Windows desktop complete with the Explorer shell and applications except that all the processing is performed by the Windows Server system.

In addition to logging in to Windows Server systems, the TS client can also be used to log in to a Windows desktop system. This allows a user to interact with their system as if they were sitting in front of the machine even though they are operating remotely. When logged in remotely via RDP, the local user is logged out preventing two users from using the desktop machine at the same time.

A Terminal Server Client, based on RDP has been bundled with Windows Embedded CE since 3.0. With the latest update to the operating system, both the RDP architecture as well as the terminal server client have been updated with new features.

RDP 6.0

The big news for RDP in Windows Embedded CE 6.0 R2 is the change from using the old RDP 5.2 protocol to the newer 6.0 protocol. 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. Below is a list of the various versions of RDP that have been supported on the server side as well as on Windows Embedded CE as a client.

Server	**Protocol**
Windows NT Terminal Server	RDP 4.0
Windows 2000 Terminal Services	RDP 5.0
Windows XP Professional Edition	RDP 5.1
Windows Server 2008	RDP 6.0

Windows Embedded CE Client	**Protocol**
Windows Embedded CE 5.0	RDP 5.2
Windows Embedded CE 6.0	RDP 5.2
Windows Embedded CE 6.0 R2	RDP 6.0

Since all versions of the RDP protocol are backward compatible, the move to RDP 6.0 does not prevent a Windows Embedded CE 6.0 R2 client from logging into a Windows XP system.

When porting to RDP 6.0 a significant amount of effort went into bringing the 6.0 client to feature parity with the earlier product. This means that all the features available on the Windows Embedded CE 6.0 client are available on the new client. While not a complete list, some of the ported features include:

- **Clipboard redirection:** RDP provides clipboard sharing. With clipboard sharing, the client clipboard becomes a part of the clipboard viewer chain in the remote session. This lets the

user copy and paste files between applications that are running on both the remote session and on the local client.

- **Local audio playback:** RDP enables server applications to direct audio output to the client device.
- **Local drive redirection:** RDP enables server applications to access the file system of the client device.
- **File redirection:** RDP supports a file redirection filter that exposes only specific directories on the local device to be accessible to the server application.
- **Local port redirection:** RDP supports local port redirection so that server applications can use the parallel ports and COM ports on the client device.
- **Printer redirection:** RDP provides printer redirection so that server applications can print to a printer connected to the client device.

New RDP Display Support

All of these features have been ported to the new terminal services client. In addition to the features listed above, 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. 32 bpp display support is handy when running high end graphics or imaging programs remotely. Previous versions of RDP only supported pixel depths of up to 24 bpp.

Continuing on the topic of video support, 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 a 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. For example, the two displays could both have a resolution of 1024 by 768 or the two displays could both have a resolution of 1600 by 1200. Very large virtual desktops are quite handy in areas where thin clients may be used but the users need a large display surface such as trading terminals.

In addition to multiple display support, RDP 6.0 also enables custom display resolutions. The older RDP versions restricted the clients to a specific set of display formats such as 1024 by 768 or 1280 by 1024. RDP 6.0 supports custom display resolutions where the client is free to specify their own resolutions, even those that don't conform to the TV style 4:3 ratio. This means that RDP 6.0-based clients can have wide screen resolutions where the width to height ratio is 16:9.

In addition, RDP 6.0 is not just being used by the new terminal services client; it has also been ported to be used by the *Pictor* or remote projector example project within Windows Embedded CE. This means that Pictor devices can also take advantage of wide screen resolutions on their devices if needed.

Upgraded RDP Security

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. To use SSL and TLS, the server must also support these protocols. Windows Server 2003 SP1, Windows Server 2008, Windows XP, and Windows Vista support SSL/TSL for RDP 6.0.

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.

Network Level Authentication has a number of advantages. First, because the client authentication takes place before full session is established, the connection process is a more efficient use of server resources and is more secure since the full session isn't established until the credentials. From a user perspective, NLA is transparent since the user is presented with the same dialog prompt for credentials.

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.

From a client perspective, server authentication is enabled by default. To change the settings, a new tab has been added to the terminal server client connection manager. The new tab is shown below.

Figure 1. The Server Authentication dialog in the terminal server client

The options presented in the combo box are:

- Always connect even if authentication fails
- Warn me if authentication fails
- Don't connect if authentication fails

When the "warn me" option is set and the user connects to a server that can't be authenticated, the following message box is displayed.

Figure 2. The warning dialog that is displayed when connecting to a server that can't be authenticated

As can be seen in the dialog, the user has the option of connecting anyway or abandoning the connection.

Internet Explorer Improvements

RDP isn't the only network component to be upgraded for CE 6.0 R2. Internet Explorer 6.0 for Windows Embedded CE has also been significantly improved. While still a port of the Internet Explorer 6.0 product (not IE 7) IE has been updated to provide better security, better performance, and to make it better suited for scenarios often seen in embedded situations.

The first feature of the revised Internet Explorer is better performance. 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 rich pages using Western European languages. While performance values will vary from machine to machine, a 50% improvement in page rendering performance is not unusual for the new version.

In addition to better performance, the improved Internet Explorer also supports RTE (Rich Text Editing). Previously, IE for Windows Embedded CE only supported simple text fields. The new RTE fields allow 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.

Kiosk Support

One of the major uses of Internet Explorer for Windows Embedded CE is in kiosk situations where Internet Explorer is the user interface to a stand-alone system that is used to browse the web or some predefined set of web pages. Kiosks may be used to provide a console for user interaction or simply as a stand-alone browser for public access to the Internet.

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. The figure below shows the new dialog configuration that allows the user to better manage cookies.

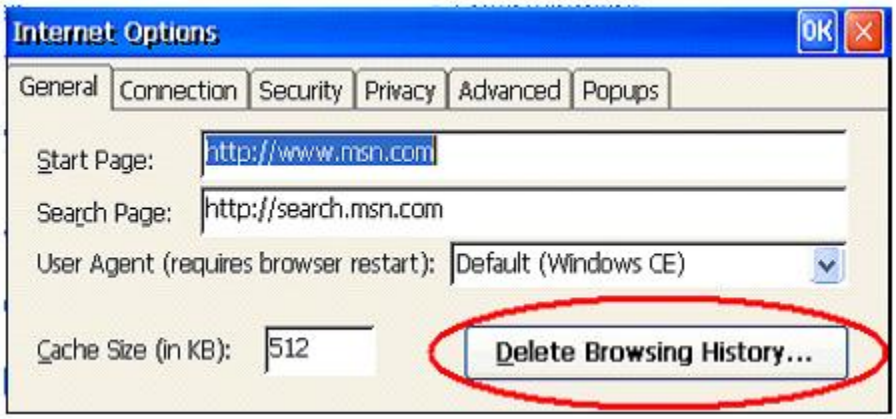

Figure 3. The new Internet Options dialog in Internet Explorer

With the new version of IE, the button "Delete Browsing History" displays the dialog below that can be used to delete temporary files, cookies and the site history for the browser.

Figure 4. Browsing history, data, and cookies can be deleted from the Delete Browsing History dialog

Of course, depending on users to reset their browser history is not practicable. That is why the new version of Internet Explorer also provides for a remote browser reset that enables system administrators to reset the browser to a known state over the network. This feature should make it easier to manage remote kiosks that need to be reset to provide a uniform experience for each new user.

Auto-Config File Support

The new version of Internet Explorer for Windows Embedded CE also 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 must contain at least one function, *FindProxyForURL* which is called 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.

Proxy auto-config files are specified in IE using the Connection tab of the Internet Options dialog. As shown below, the new version of IE has a new check box and edits control for enabling and specifying the auto-config file.

Figure 5. The new Connection tab of the Internet Options dialog allows users to select a proxy configuration script

Finally, this version of Internet Explorer has been updated with all the security and bug fixes that have been applied via QFEs since the release of Windows Embedded CE 6.0. This makes the new version of IE not only faster, but more secure. And, with the addition of remote reset, along with the history and cookie deletion should make Internet Explorer easier to use in kiosk environments.

New Media Player OCX

Accompanying the updated Internet Explorer in the new release is a new version of the 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.

The Media Player 7 OCX exposes the 11 interfaces shown below

Interface	Description
IWMPCore	Factory" interface that exposes other interfaces such as IWMPControls
IWMPControls	Exposes standard, Stop, Play, Rewind, etc methods
IWMPControls3	Allows query and set of position via timecode
IWMPError	Allows querying of the error state of the OCX
IWMPErrorItem	Provides additional error information
IWMPEvents	Provides a way for application to field events originated by the OCX.
IWMPMedia	Sets and retrieves the information about a media item.
IWMPPlayer	Allows control over the user interface of the control.
IWMPPlaylist	Manages playlists.
IWMPSettings	Sets and queries settings such a volume and balance.
IWMPSettings2	Sets and queries the current audio language.

Developers familiar with the interfaces supported by Media Player 11 will notice that the interfaces provided by the OCX on Windows Embedded CE are a subset of those provided on the desktop. The differences are mainly due to features of the full media player application that have not been ported to Windows Embedded CE. So interfaces that, for example, control media streaming from a PC aren't supported on Windows Embedded CE since the OCX is a player control and doesn't support *serving* media files across a network.

In addition to the new, more powerful interface, the inclusion of the media player OCX will provide better web compatibility for Windows Embedded CE since browsing to sites that require the media player 7 OCX is now supported. To maintain backward compatibility for systems that depend on the older media player 6.4 controls, Windows Embedded CE 6.0 R2 also includes the older 6.4 media player control.

Conclusion

The update to the network features is a welcome one for users of Windows Embedded CE. Developers will be able to take advantage of the new features of Internet Explorer and the Media Player OCX, while users will see more features in IE and the terminal server client. All in all, a welcome addition to the feature set of Windows Embedded CE.

For more information:

Windows Embedded Web site:
http://www.microsoft.com/windows/embedded/default.mspx