Windows Embedded Compact 7 Multimedia Features

Windows Embedded Compact 7 Technical Article

Writers: Dion Hutchings

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Abstract

The Windows Embedded Compact 7 operating system helps developers like you to build devices that can seamlessly interact with the world of Windows. Windows Embedded Compact 7 is a high-confidence platform that provides the tools and foundational operating system to facilitate the implementation of compelling user experiences for embedded devices.

Windows Embedded Compact 7 also works with Digital Living Network Alliance (DLNA)-based devices.

This paper discusses these primary elements:

- DirectShow multimedia pipeline
- Media Library
- Media Player

Introduction

The Windows Embedded Compact 7 operating system helps developers like you to build devices that can seamlessly interact with the world of Windows. Windows Embedded Compact 7 provides a high-performance, highly reliable platform for developers to create powerful, connected devices that take advantage of the latest hardware platforms, including support for the ARM7 processor, hardware graphics acceleration, and symmetric multiprocessing (SMP) support. Familiar tools like Microsoft Visual Studio, Microsoft Silverlight, and Microsoft Expression Blend provide you with a seamless designer experience to create and deliver rich, intuitive UI frameworks and connected user experiences.

> **Note**   If you can develop with Silverlight, you can rapidly extend and customize device UIs by using the rich ecosystem available through [Silverlight for Windows Embedded](http://go.microsoft.com/fwlink/?LinkID=197185) (http://go.microsoft.com/fwlink/?LinkID=197185).

Windows Embedded Compact 7 aides in the development of rich user experiences. You can implement high fidelity browsing experiences that include rich features, such as:

- An updated Windows Internet Explorer 7 browsing engine.
- Desktop browsing that supports tabs, panning, and zooming navigation, as well as multitouch capabilities.
- Access to rich multimedia content with support for Adobe Flash 10.1.

You can create immersive experiences with natural input characteristics, for example:

- Support for touch input.
- Multitouch browser integration for mobile device experiences.
- Support for custom user gestures.

You can construct connected experiences that include the ability for devices to connect, consume, and play back rich media using features such as:

- The Microsoft DirectShow multimedia pipeline that provides richer media streaming support with updated MPEG-4, HTTP, and high-definition support.
- Simplified media management with the new Media Library.
- A flexible plug-in architecture that supports third-party content.

Your devices can provide seamless connection to the Windows 7 operating system, and take advantage of these features:

- Simplified device management through intregration with Windows Device Stage.
- Transfer of user data and media using Windows 7 with Media Transfer Protocol (MTP) support.
- Play-to functionality to move multimedia to and from your Windows 7 personal computer.

Windows Embedded Compact 7 also works with Digital Living Network Alliance (DLNA)–based devices. As such, developers can now use Windows Embedded Compact 7 to create devices that offer users the ability to control how they want to send and receive content between Digital Media Controllers (DMCs), as with personal computers; Digital Media Renderers (DMRs), such as set-top boxes attached to television sets; Digital Media Players (DMPs), such as an MP3 media player; and Digital Media Servers (DMSs), as with a server on a home network.

> **Note**   Using Windows Embedded Compact 7 does not guarantee a pre-certified DLNA compatibility solution. To certify any devices built using Windows Embedded Compact 7, your company must first join the DLNA Consortium, and then submit your devices to testing by the Consortium to obtain DLNA certification.

Windows Embedded Compact 7 contains many elements for you to use in making compelling user experience an integral part of your device. The "Windows Embedded Compact 7 Features" section of this paper discusses the following primary features:

- The DirectShow multimedia pipeline, which provides robust playback possibilities using customizable filters and a building-block approach to device creation with Windows Embedded Compact 7.

- The Media Library, which provides users with the means to acquire, organize, manage, and retrieve media content.

- The Media Player, which can play local and streaming multimedia files, both on a specific device and across networks.

Figure 1 illustrates the architecture and interoperability that Windows Embedded Compact 7 provides.
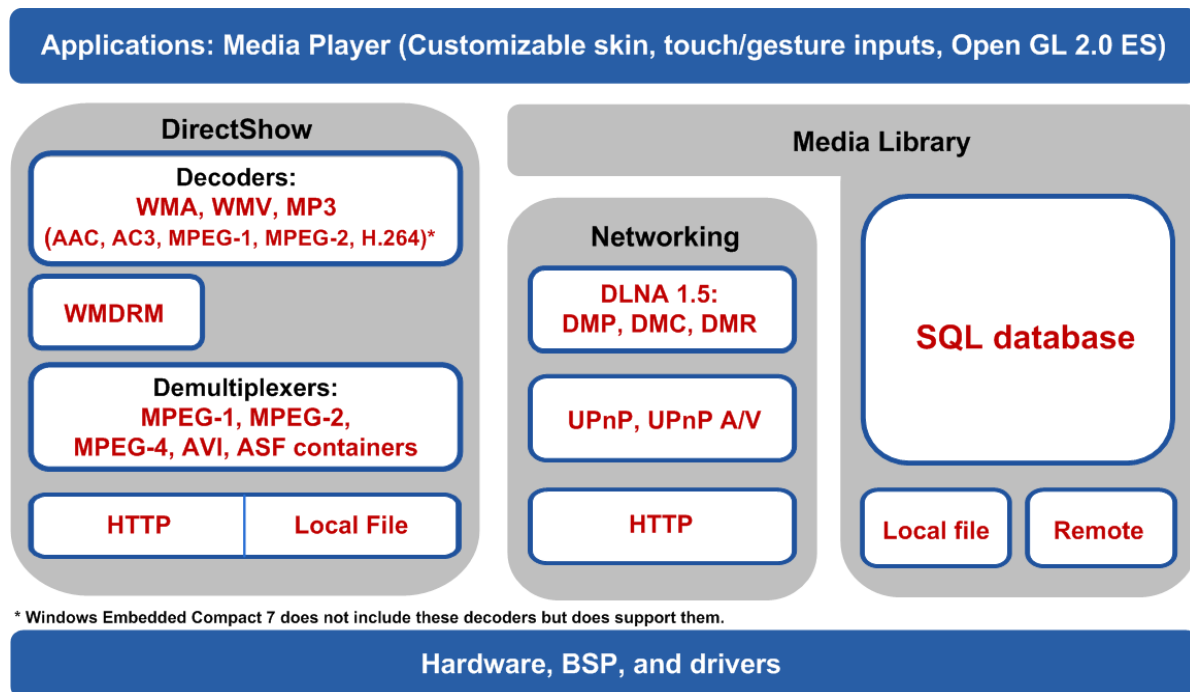

Figure 1 - Windows Embedded Compact 7 Architecture

Windows Embedded Compact 7 Features

Windows Embedded Compact 7 comes with features designed to help you to build devices that provide robust, rich, and connected user experiences. This section discusses three primary features that comprise vital parts of the new Windows Embedded Compact 7 architecture: the DirectShow multimedia pipeline, the Media Library, and the Media Player.

DirectShow Multimedia Pipeline

The DirectShow multimedia pipeline available in Windows Embedded Compact 7 comes with new capabilities that provide you with more robust playback possibilities. DirectShow includes a new, robust, and customizable source filter built with:

- A new buffering filter. The buffering filter allocates memory as required and releases it when it is no longer needed. In doing so, the filter makes efficient use of memory.

- A new HTTP source filter with non-ASF HTTP filtering capability. The HTTP source filter supports HTTP 1.0 and 1.1 on-demand streaming for content that is not in Advanced System Format (ASF). The filter can connect to any HTTP server compliant with World Wide Web Consortium (W3C) HTTP specifications.

- A new video mixing renderer. This renderer filter replaces the DirectShow Video Renderer filter as the default video renderer. The filter uses DirectDraw to provide the following features:

    - True alpha blending of up to 16 input streams.

    - Access to the composited image before it is rendered.

    - A plug-in that you can use to create custom video effects.

- New MPEG-2 and MPEG-4 demultiplexers.

    The MPEG-2 filter splits MPEG-2 transport and program streams delivered to the filter in pull mode.

    The MPEG-4 filter is a pull-mode filter that requests data from an upstream buffering filter and pushes the demultiplexed streams to down-level decoders. This filter parses MPEG-4 presentation streams for local file playback and streaming over HTTP.

    Note AAC, AC3, MPEG-1, MPEG-2, and H.264 decoders are not included with Windows Embedded Compact 7. MPEG-2 and MPEG-4 decoders are also not supported out of the box. A third-party software decoder or the decoder capability of the platform you are already using is required to render MPEG-2 and MPEG-4 content.

Each of the source filter components is customizable. You can pick and choose what you want to use and how you want to use them, as well as how you want to incorporate your own technologies into the components. Consider the components as versatile, nimble building blocks that you can add plug-ins to (both Microsoft and third-party created), and that you can subtract functionality from. You can then combine these building blocks to create the desired customization for your device, such as the ability to play and stream MPEG-2 and MPEG-4 content.

Windows Embedded Compact 7 supports MPEG-2 and MPEG-4 formats. Based on these formats, you can build devices that:

- Render and play back local MPEG-2 and MPEG-4 container files.

- Stream MPEG-2 and MPEG-4 container files over HTTP.

Media Library

The Media Library in Windows Embedded Compact 7 provides users with the means to acquire, organize, manage, and retrieve their media content. The Media Library addresses a number of key user scenarios. For example, with the Media Library, users can use a device to:

- Browse and discover local media content. The Media Library can be used to store and retrieve metadata information for content residing locally on a device.

- Browse and retrieve media content with the Media Player (acting as a DMS). The user can have tens of thousands of media items and still experience no delays in media playback and retrieval for music, videos, and photos.

- Gather metadata, such as artist name, date, and song name, from different file sources such as HTTP and local files. The metadata gathering runs as a background process, which does not affect the performance of the device as it gathers and parses metadata.

- Add, modify, and remove metadata from media files.

  A robust and reliable Microsoft SQL Server CE 3.5 SP1 database is used to store and retrieve metadata information on media content, regardless of where the content physically resides. This database has a size limit of 4 gigabytes (GB), which ensures excellent performance and a small memory/CPU footprint. Supported file types include:

  - Music: asf, wma, mp3

  - Videos: asf, wmv, avi

  - Photos: jpg, jpeg, png, tif, tiff, bmp, gif

  Note   You can also create your own parser plug-ins to extract metadata for a file type that is not natively supported, to make the user experience richer.

- Collect data both locally and from remote DLNA-based servers.

- Create, modify, and delete playlists, store and retrieve Media Player playlists, and query playlists and items in a playlist.

The Media Library also provides capabilities that are developer-friendly, including:

- An extensible architecture that supports content from a variety of sources, such as local, network, UPnP, and third-party services, so you can build next-generation experiences where content can come from any source (such as the Internet).

- Nimble and easy-to-use programming-based UI and APIs that help you to create device UIs that are simple and intuitive for browsing and discovering content.

- A plug-in model that supports content from third-party services. You can add additional content providers in future releases of your product.

- The ability to create client-side applications that use MTP to transfer content onto the device.

A key strength of the Media Library is that your device can use the built-in Media Library component to provide applications that deliver great end-to-end experiences. You do not have to create a unique Media Library component, saving you time, money, and resources.

Media Player

The Media Player is a versatile feature in Windows Embedded Compact 7 that can play local and streaming multimedia files on both local devices and DLNA–compatible devices on a network. In combination with the DirectShow multimedia pipeline, the Media Player can stream these files from locally-stored locations and across networks with full DLNA functionality. The Media Player is a fully working, source-code available

component. You can either use it as-is on your device without any further development or customize it to meet your own specific needs.

Media Player provides the UI to locate, share, and play media content. For example, in a local DMP device situation, a user can employ Media Player to browse all the media content available on a DMS–based server in the user's house (including audio, video, and images), select multiple items, and play them on the user's device. The user can also perform different play-based interactivity options (such as scan, seek, and skip).

The Media Player controls for Windows Embedded Compact 7 are similar to those in Windows Media Player for Windows 7. This provides an advantage to users who can treat their personal computers as a gateway to their embedded devices. For example, the user can employ a personal computer (as a DMC) to browse content on a server (as a DMS), and then send that content to a set-top box running Windows Embedded Compact 7 (as a DMR). The Windows Media Player browses the server in the user's home network, and then pushes the content from the server into the Media Library on the user's set-top box. The user can then view the content on a television, which is connected to the user's set-top box, and use a personal computer to control several aspects of the playback experience including play, stop, pause, and volume control on the television.

Windows Embedded Compact 7 and the DLNA Standard

Digital Living Network Alliance (DLNA) is the industry standard for embedded devices and interoperability. It is used by consumer device manufacturers to allow devices in a home-based setting to share content with each other across a home network. The standard was formed to solve problems inherent in using digital media between different consumer devices.

Windows Embedded Compact 7 now works and interacts with DLNA–related devices, such as DMRs, DMPs, DMCs, and DMSs, to provide robust, predictable connectivity between devices across a home network.

This ensures that:

- Users have seamless experiences while accessing digital media.

- DLNA–related devices are interoperable with other connected DLNA devices in a home network.

This updated functionality in Windows Embedded Compact 7 provides seamlessness between these devices and the world of Windows.

> **Note**   Using Windows Embedded Compact 7 does not guarantee a pre-certified DLNA compatibility solution. In order to certify any devices built using Windows Embedded Compact 7, your company must join the DLNA Consortium, and then submit your devices to testing by the Consortium to obtain DLNA certification.

Windows Embedded Compact 7 now supports both the 2-Box and 3-Box Pull System Usages. The 2-Box Pull System Usage pulls DLNA-compliant content from a DMS to be rendered locally by the DMP pulling the content. The 3-Box Pull System Usage employs a DMC to browse and select content on a DMS, to then push that content to a DMR for playback. Support for both system usages provides more robust device interaction throughout the DLNA environment.

Conclusion

Windows Embedded Compact 7 provides a high-performance, highly reliable platform to create powerful, connected devices that can seamlessly interact with the world of Windows. Windows Embedded Compact 7 permits devices that run it to be a part of a compelling user experience.

Windows Embedded Compact 7 features include:

- The DirectShow multimedia pipeline, which provides robust playback possibilities using customizable filters, and a building-block approach to device creation with Windows Embedded Compact 7.

- The Media Library, which provides users with the means to acquire, organize, manage, and retrieve media content.

- The Media Player, which can play local and streaming multimedia files, both on a specific device and across networks. It can be customized to your needs or left as-is to provide a rich media experience for your device.

Windows Embedded Compact 7 now works with and interacts with DLNA-related devices (DMRs, DMPs, DMCs, and DMSs) to provide robust, predictable connectivity between devices across a home network.

Additional Resources

To learn more about Windows Embedded, see the following link.

- Windows Embedded website (http://go.microsoft.com/fwlink/?LinkId=197188).

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