Windows Media 9 Series

# Introduction to Digital Media and Windows Media 9 Series

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**Applies to:**

Microsoft® Windows Media® Encoder 9 Series
Microsoft Windows Media Services 9 Series
Microsoft Windows Media Player 9 Series
Microsoft Windows Media Player 9 Series SDK
Microsoft Windows Media Rights Manager 9 Series SDK
Microsoft Windows® Movie Maker 2

**Summary:** Introduces the concept of digital media and explains how you can use the Windows Media 9 Series platform to create, distribute, and play digital media (7 pages).

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# Legal Notice

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# Introduction

Broadly speaking, *digital media* is a term used to describe any audio or video content, such as a song or a movie, which has been converted into a digital format so that you can use it on a personal computer or other electronic device. If you've ever played a music or video file on your computer (for example, a file with an .mp3, .wma, or .avi file name extension), you've used digital media.

Digital media has many advantages as compared to traditional analog media. For example:

- Digital media files take up much less storage space than their analog counterparts. If you have videos stored on VHS video cassettes, you can digitize and store them all on your computer instead.
- Digital media files can be edited more easily than their analog counterparts. After you've digitized your VHS videos, you can use your computer to edit out the undesirable parts, and then add professional-looking titles, transitions, and effects.
- Digital media files can be distributed more easily than their analog counterparts. You can upload your edited videos to a Web site so that anyone can play them on their computers. And to reach those people who don't have computers, you can transfer your videos to a CD or DVD instead so they can play them in the DVD player connected to their TV. Digital media files are also portable. Hundreds of portable audio and video players are available that let you play your favorite songs and videos wherever you go.

Microsoft has been developing digital media software for more than a decade. Our state-of-the-art digital media technology is known as Microsoft® Windows Media® 9 Series. This article provides an overview of how you can use the Windows Media 9 Series platform, a suite of software products and technologies, to create, distribute, and play digital media. And it briefly discusses how the platform can be used in specific consumer, corporate, and entertainment industry scenarios.

# Capturing and Converting Content

To create digital media, you must typically capture and convert content from its original format into a format that you can edit and distribute digitally. This process is known as *encoding*. This section discusses compression, codecs, and the Windows Media technologies that you can use to capture and convert your content.

If your content is in an analog format, you need to capture and convert it to a digital format. For example, if you have a training video that is recorded on a VHS cassette, and you want to let your employees view the video on their computers, you first need to convert the video from an analog format (VHS) to a digital format (a computer file). The analog-to-digital conversion process is typically performed by connecting a VHS playback device, such as a VCR, to an analog video capture card installed in a computer. You then use a software program, such as Microsoft Windows® Movie Maker 2 or Windows Media Encoder 9 Series, to capture the content as the tape plays.

If your content is already in a digital format, you might still need to capture and convert it to a format that is appropriate for your distribution method. For example, if your source material is on a digital video (DV) tape, you need to convert it from the DV format to another digital format (such as Windows Media Video), so that you can distribute your content over a network. The digital-to-digital conversion process is typically performed by connecting a DV camera to an IEEE 1394 capture card (such as a card with Apple FireWire or Sony i.LINK ports) installed in a computer. As with analog conversion, you use a software program, such as Windows Movie Maker or Windows Media Encoder, to capture the content as the tape plays.

The particular technology that you should use depends on how much control you want over the encoding process. Windows Movie Maker, for example, is a consumer-oriented program that has relatively few encoding options. Windows Media Encoder, on the other hand, is a professional-oriented tool that has many encoding options.

# Compressing Files

Although the cost of hard disk storage space continues to drop and private and public computer networks continue to support faster transmission speeds, in many cases, streaming uncompressed digital media files over a network is still not practical. To maximize storage space and accommodate slower networks, you must compress digital media files.

Files are typically compressed during the capture and conversion process. Technologies such as Windows Movie Maker and Windows Media Encoder let you decide how much compression is applied. A highly compressed file requires less storage space and transmits more quickly over a network. A minimally compressed file requires more storage space and transmits more slowly over a network.

So why shouldn't you always compress your files as much as possible? Because the more you compress a digital media file, the more you degrade the audio and video quality. To determine how much you should compress a given file, you need to know the limitations of your network and computer infrastructure and your desired playback quality.

For example, if you want to stream a training video to your employees over a high-bandwidth LAN, you should apply a minimal amount of compression so that your employees benefit from a large video window and very high audio and video quality. However, if you want to stream the video to your customers who access the Internet through slow dial-up connections, you should apply a large amount of compression. Although the resolution of the content will be degraded somewhat, your audience will experience smoother playback due to fewer dropped video frames and less network buffering.

# About the Windows Media 9 Series Codecs

The key to the compression (encoding) process is software known as a codec. *Codec* is an acronym for *compressor/decompressor*. As its name suggests, codecs are used to compress (encode) digital media files for efficient storage and transmission, and then decompress (decode) the files upon playback.

Codecs are based on complex mathematical formulas that usually attempt to minimize file size while maintaining sound and image quality. Many codecs are available—each with its strengths and weaknesses. Examples of some older, well-known codecs are the MP3 audio codec and the MPEG-2 video codec. Typically, files encoded by using these codecs have the file name extensions .mp3, mpg, or .mpeg.

Microsoft has developed several newer codecs that provide excellent audio and video quality over a broad range of compression levels. Collectively, these codecs are known as Windows Media 9 Series. They are the foundation of the Windows Media 9 Series platform, which includes programs such as Windows Media Player 9 Series, Windows Media Encoder 9 Series, Windows Media Services 9 Series, and Windows Movie Maker 2. By using either Windows Media Encoder 9 Series or Windows Movie Maker 2 to capture and convert your content, you reap the benefits of the latest Windows Media codecs.

Typically, files encoded by using the Windows Media codecs have the file name extensions .wma or .wmv. The former extension stands for Windows Media Audio; the latter stands for Windows Media Video.

Compared to competing codecs, the Windows Media 9 Series codecs typically provide equivalent or superior audio and video quality at significantly smaller file sizes. In practice, this means that the Windows Media 9 Series codecs can save you money by reducing your storage and network bandwidth costs. Because Windows Media Format is supported on operating systems such as Windows, Windows Mobile, and Macintosh, your audience can play back Windows Media-based content on a variety of devices, including Windows-based computers, Macintosh computers, Pocket PCs, Smartphones, portable audio players, car stereos, DVD players, and digital media receivers.

While Microsoft continues to improve the efficiency of its codecs for common encoding and playback scenarios, it is also breaking new ground in the encoding of extremely high-quality audio and video. For example, the new Windows Media Audio 9 Professional codec supports full-resolution audio (24-bit 96 kHz sampling) in stereo or multichannel surround sound (5.1 or 7.1 channel). And the Windows Media Video 9 Professional mode of the Windows Media Video codec supports high-definition video, which can look up to six times better than a standard DVD movie.

For more information about the Windows Media 9 Series codecs, see the Windows Media 9 Series Audio and Video Codecs page (http://www.microsoft.com/windows/windowsmedia/9series/codecs.aspx).

# About Windows Media Encoder 9 Series

Windows Media Encoder 9 Series is a powerful encoding tool that you can use to convert both live and prerecorded audio and video into Windows Media Format for secure streaming, as well as for download and play, or physical format delivery. Windows Media Encoder 9 Series has three primary functions:

- Capturing video from devices and compressing (encoding) it into Windows Media Format.
- Encoding and routing live video to a server running Windows Media Services 9 Series to broadcast a live event.
- Converting files from one format or bit rate into Windows Media Format.

By using Windows Media Encoder in conjunction with the Microsoft Windows Media Rights Manager 9 Series Software Development Kit (SDK), you can encrypt your on-demand or live content in real time to help secure it from unauthorized playback. Applying digital rights management (DRM) to your content is one of the best ways to protect your intellectual property and can be a key ingredient of a successful business model. For more information about Windows Media Encoder, see the Windows Media Encoder 9 Series page (http://www.microsoft.com/windows/windowsmedia/9series/encoder/default.aspx). For more information about the Windows Media Rights Manager SDK, see the Digital Rights Management page (http://www.microsoft.com/windows/windowsmedia/drm.aspx).

# About Windows Movie Maker 2

Windows Movie Maker 2 is a video editing tool that you can use to quickly capture and convert raw video footage, edit it, and then add professional-looking titles, shot transitions, and video effects. You can save your edited movies as Windows Media Video (WMV) files suitable for streaming from a server running Windows Media Services 9 Series, or burning to a DVD by using another provider's software.

For more information about Windows Movie Maker, see the Windows Movie Maker 2 page (http://www.microsoft.com/windowsxp/moviemaker/default.asp). For detailed information about capturing content by using Windows Movie Maker, see "Connecting Your Camera to Your Computer with Windows Movie Maker 2" on the Windows Movie Maker Getting Started page (http://www.microsoft.com/windowsxp/moviemaker/getstarted/cameratopc.asp).

# Distributing Content

After you've captured and converted your content, you're ready to distribute it. Windows Media 9 Series gives you several options:

- You can put the file on a server so your audience can either download or stream it to their computers.
- You can put the file on a physical storage medium, such as a CD or DVD, so your audience can play the disc on a computer or on a compatible DVD player connected to a TV.
- You can put the file on a high-end personal computer, connect it to a digital projector, and project the image onto a standard movie theater screen.

These distribution methods are discussed in the following sections.

## Downloading and Streaming Content

You can deliver digital media files from a server to a client by using one of two methods: downloading or streaming. Selecting a way to distribute your content will depend on factors such as how you want to administer your content and how you want your audience to experience it.

### Downloading

In a typical downloading scenario, digital media files are hosted on a Web server (for example, a Windows-based server running Internet Information Services (IIS)). The user navigates to a Web page and clicks a link to a digital media file. The file downloads completely to the user's computer, and then begins to play.

From an administration standpoint, downloading is usually very easy to set up and maintain. From a user experience standpoint, however, downloading can be frustrating because the user must wait for the entire file to download before he or she can play it.

### Streaming

In a typical streaming scenario, digital media files are hosted on a server running a streaming media service (for example, a Windows-based server running Windows Media Services 9 Series). The user navigates to a Web page and clicks a link to a digital media file. The file begins to play immediately as the file is streamed to the user's computer.

From an administration standpoint, streaming requires somewhat more time to set up; however, it has numerous advantages, including more efficient bandwidth usage and sophisticated playlist management. From a user experience standpoint, streaming provides instant gratification because the user doesn't have to wait for the entire file to download before he or she can play it.

By using the Windows Media 9 Series platform, you can also stream content from a server to low-cost consumer electronics devices, such as advanced set-top boxes. This lets network operators deploy new broadcasting services, such as Internet Protocol television (IPTV) and video-on-demand (VOD).

By taking advantage of the compression efficiencies of Windows Media 9 Series, network operators can deliver more content in less bandwidth. Windows Media 9 Series supports both standard-definition (SD) and high-definition (HD) video with multichannel audio.

# Distributing Content on CDs and DVDs

In addition to distributing your content by using a server, you can distribute Windows Media-based content on physical storage media, such as CDs and DVDs. Windows Media Player 9 Series, for example, lets you create three kinds of CDs:

- Audio CDs for playback in traditional CD and DVD players.
- Data CDs for playback on computers or Windows Media-compatible CD and DVD players.
- HighMAT™ (High-Performance Media Access Technology) CDs for playback on computers or HighMAT-compatible CD and DVD players.

Professional entertainment companies are also distributing Windows Media-based content on physical storage media—in a format called Windows Media Video High-Definition (WMVHD). For example, Artisan Home Entertainment released "Terminator 2: Judgment Day (Extreme Edition)," a two-disc DVD set that includes a standard DVD-Video disc, as well as a DVD-ROM that contains a high-definition (HD) version of the film in Windows Media Format. The WMVHD version, which is playable on a computer running Windows XP, has nearly three and a half times the resolution of standard DVD video.

For more information about HD video, see the High Definition Video page (http://www.microsoft.com/windows/windowsmedia/content_provider/film/HDVideo.aspx) and the WMVHD Web site (http://www.wmvhd.com/).

# Distributing Content in Digital Cinemas

You can use Windows Media 9 Series to encode a motion picture in Windows Media Format and digitally project it onto a standard movie theater screen. Encoding and screening digitally provides a very high-quality theater experience with much lower delivery costs than traditional film-based distribution. As a result, many film festivals and commercial theaters have elected to use Windows Media as a key component of new digital projection solutions.

You can also use Windows Media 9 Series to streamline the film and video production process. For example, Digital Dailies, a part of the Microsoft–Avanade Digital Content Services (DCS) framework, provides tools that enable producers to view, approve, annotate and distribute content securely over the Internet. It features a customizable Web portal that facilitates sharing and viewing of dailies, an integrated message board and document repository for annotations and related documents, an administrative interface to manage user accounts and permissions, and batch upload and download tools to rapidly and securely distribute large volumes of content.

For more information about digital cinema, see the Digital Cinema page (http://www.microsoft.com/windows/windowsmedia/content_provider/film/digitalcinema.aspx). For more information about Digital Dailies, see the Digital Dailies page (http://www.microsoft.com/windows/windowsmedia/content_provider/film/dmm/dailies.aspx).

# About Windows Media Services 9 Series

Windows Media Services 9 Series is a feature of the Microsoft Windows Server™ 2003 operating system that you can use to stream digital media to users within your enterprise or from a Web site. It lets you create playlists of your content that you can modify as needed and it also supports a wide variety of advertising types, including bumper, trailer, and interstitial ads. When used in conjunction with Windows Media Player 9 Series, Windows Media Services can provide instant-on/always on streaming for broadband users and a dramatic improvement in the streaming experience for dial-up users.

For more information about Windows Media Services, see the Windows Media Services 9 Series page (http://www.microsoft.com/windows/windowsmedia/9series/server.aspx).

# Playing Content

To play digital media, you need a device or software capable of decoding (decompressing) the content. Historically, personal computers have been used for this task. However, many consumer electronics devices now support digital media playback.

For example, more than 500 devices can play Windows Media-based content, including:

- Home and portable CD players
- Home and portable DVD players
- Portable digital audio players
- Car stereos
- Pocket PCs
- Smartphones
- Digital media receivers
- TV set-top boxes
- Video game players

For a complete list of devices, see the Cool Devices page (http://windowsmedia.com/9series/Personalization/CoolDevices.asp).

For someone to play your content on a personal computer, he or she will need to use player software, such as Windows Media Player 9 Series. If you have created a Web page with links to your content, visitors to your Web page will just have to click a link to start playback.

When you create your Web page, you can control whether your content will play inside the stand-alone version of the Player when a user clicks a link or whether your content will play inside of a Player that is embedded in your Web page. The former option gives your visitors greater control of the playback experience, including the speed at which the content plays. The latter option gives you the ability to make playback a more seamless experience for your audience.

# About Windows Media Player 9 Series

A variety of stand-alone players exist that customers can use to play back Windows Media-based content. One of the best players, not surprisingly, is Windows Media Player One key advantage of the Player is that it is available on a variety of operating systems, including Windows, Windows Mobile, and Macintosh.

Depending on how you have encoded your content, users of Windows Media Player 9 Series can use the variable-speed playback feature to play it more slowly in certain sections and more quickly in other sections—all without changing the pitch of the audio. In addition, if you have encoded your content with multiple language tracks, users can use the Player to switch between them as desired.

Windows Media Player also lets you easily copy (burn) music to a CD or transfer music and video to a portable device. It also functions as a digital jukebox, letting you play any song in your entire CD collection at the touch of a button. For more information about Windows Media Player, see the Windows Media Player page (http://www.microsoft.com/windows/windowsmedia/players.aspx).

In addition to being a stand-alone technology, Windows Media Player is an ActiveX® control that you can embed in a Web page. By embedding the Player in a Web page, you can provide your audience with an integrated playback experience that takes advantage of your corporate branding. For more information about the Windows Media Player ActiveX control, see the article "Introducing the Windows Media Player SDK" (http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnwmt/html/WMPlayer_9_SDK_Intro.asp).

# For More Information

- For general information about Windows Media Technologies, see the Windows Media page (http://www.microsoft.com/windows/windowsmedia/default.aspx).
- For detailed information about how to set up a streaming media system, see the Microsoft Windows Media Resource Kit (http://www.microsoft.com/mspress/books/6280.asp).
- For detailed information about how to create and display customized Web content within the Player, see the article "Creating Customized Web Experiences with Windows Media Player 9 Series" (http://www.microsoft.com/windows/windowsmedia/howto/articles/CustomizedExp.aspx).
- To download the Windows Media SDKs, see the Windows Media Downloads page (http://msdn.microsoft.com/library/default.asp?url=/downloads/list/winmedia.asp).
- For more information about the Windows Media 9 Series codecs, see the Windows Media 9 Series Audio and Video Codecs page (http://www.microsoft.com/windows/windowsmedia/9series/codecs.aspx).
- For more information about Windows Media Encoder, see the Windows Media Encoder 9 Series page (http://www.microsoft.com/windows/windowsmedia/9series/encoder/default.aspx).
- For more information about the Windows Media Rights Manager SDK, see the Digital Rights Management page (http://www.microsoft.com/windows/windowsmedia/drm.aspx).
- For more information about Windows Movie Maker, see the Windows Movie Maker 2 page (http://www.microsoft.com/windowsxp/moviemaker/default.asp).
- For more information about Windows Media Services, see the Windows Media Services 9 Series page (http://www.microsoft.com/windows/windowsmedia/9series/server.aspx).
- For more information about Windows Media-compatible devices, see the Windows Media page (http://windowsmedia.com/9series/Personalization/CoolDevices.asp).
- For more information about Windows Media Player, see the Windows Media Player page (http://www.microsoft.com/windows/windowsmedia/players.aspx).
- For more information about the Windows Media Player ActiveX control, see the article "Introducing the Windows Media Player SDK" (http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnwmt/html/WMPlayer_9_SDK_Intro.asp).