- DRAFT - 7/16/96

Microsoft ActiveMovie Backgrounder
ActiveMovie on the Internet with Microsoft Internet Explorer 3.0

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Overview

Multimedia is used on the Internet to enhance the experience of the user as they view web page content on worldwide web sites. The leading multimedia data types on the Internet are video and audio, bringing life to page content with rich sights and sounds. A variety of "helper" applications are available to enable playback of different video and audio formats on the Internet, however existing solutions are not very well integrated with Internet browsers, and a user typically needs to obtain several different applications to view the content they find on web sites. The integration of Microsoft's ActiveMovie™ with Internet Explorer 3.0 address this problem by providing a single browser solution that makes it quick and easy for users to view and hear the most popular video and audio content on the Internet, significantly simplifying and enhancing the experience for the user.

ActiveMovie is part of a rapidly expanding family of technologies from Microsoft that makes delivering interactive content easy for tool, title and Internet developers. ActiveMovie uses and is integrated with Microsoft's DirectX technology, automatically accelerating video playback on DirectDraw™ API-compatible graphics cards, and making stunning special effects and combinations of 2-D and 3-D elements with digital video possible. ActiveMovie will serve as the digital media architecture for future versions of Windows 95 and Windows NT.

Major Feature Areas

For the Internet, ActiveMovie delivers the following major features:

- **Integrated playback support for all popular video and audio formats on the Internet, including MPEG**: With ActiveMovie, Internet Explorer users have a single browser solution that simplifies the user experience by removing the need to download separate movie viewers or audio playback "helper" applications to access content in the most popular video and audio formats used on the Internet. ActiveMovie provides playback support for video and audio formats including Video for Windows, QuickTime, MPEG video, WAV, AU, AIFF, and MPEG audio. MPEG playback allows users to experience television-quality video and CD-quality audio, while minimizing the file size and download time compared to other video and audio formats. Microsoft Internet Explorer 3.0 is the first browser to offer built-in MPEG playback support.

- **Progressive playback of audio and video files**: ActiveMovie allows users of Internet Explorer to begin playback of video and audio files without having to wait for the entire file to be downloaded. This capability allows users to begin to see video and hear audio content more quickly than the traditional "download and play" mechanism commonly used by Internet browsers.

- **Support for streaming playback of video and audio content**: The ActiveMovie Streaming Format (ASF) provides an efficient data format specification for storing and streaming multimedia content, such as audio objects, video objects, still images, URLs, and HTML pages.

ASF stores content as a single, synchronized multimedia stream that can be stored on existing HTTP servers or used with the upcoming release of a specialized Microsoft streaming server. Because ASF is a streaming format, playback can begin immediately.

- **Transparent hardware acceleration for better playback performance**: ActiveMovie uses and is integrated with Microsoft's DirectX technology, automatically accelerating video playback on DirectDraw™ API-compatible graphics cards.

Key Features and Benefits

ActiveMovie provides a flexible solution for easy and quick playback of popular video and audio content over the Internet.

Easy Playback for Users

ActiveMovie and Internet Explorer 3.0 makes it easy for users to playback the most popular video and audio content on the Internet with a single browser solution.

- **Playback support for all popular video and audio formats on the Internet:** With ActiveMovie, Internet Explorer users have access to content in the most popular video and audio formats used on the Internet including Video for Windows, QuickTime, MPEG video, WAV, AU, AIFF, and MPEG audio. Support for these formats in a single solution simplifies the user experience by removing the need to download separate movie viewers or audio playback "helper" applications, thus making it easier for users to view or hear the content. In addition, support for all these formats in a single solution gives web site creators flexibility in choosing the appropriate content to add to their web site.

The video and audio formats supported by ActiveMovie are identified in the table below.

Video	
	Video for Windows
	MPEG
	QuickTime
Audio	
	WAV
	AU
	AIFF
	MPEG audio

ActiveMovie provides support for playback of most QuickTime movie content, however a small percentage of movie files that are created with proprietary Apple codecs aren't supported.

Users will find that the integration of Internet Explorer 3.0 and ActiveMovie will provide a comprehensive video and audio playback solution that will make the experience of browsing the Internet easier and more enjoyable.

Try it!

Some web sites with different types of video and audio clips to try with ActiveMovie and Internet

Explorer 3.0 include:

Site URL	Type of Content
http://www.microsoft.com/ie/most/howto/mediaaud.htm	Sample audio clips in different formats
http://www.microsoft.com/ie/most/howto/mediavid.htm	Sample MPEG video clip
http://www.hollywood.com	Sample video trailers and audio clips from movies
http://www.movies.com	Sample video trailers and audio clips from movies
http://www.mgmua.com	Sample video trailers and audio clips from movies
http://www.msnbc.com	Video and audio clips
http://www.mpmusic.com	Sample music clips
http://www.music.warnerbros.com	Sample music clips
http://www.atlantic-records.com	Sample music clips
http://www.geffen.com	Sample music clips

- **Built-in MPEG video and audio playback support:** The integration of ActiveMovie with Internet Explorer provides support for playback of MPEG video and audio files. MPEG playback allows users to experience television-quality video and CD-quality audio, while minimizing the file size and download time compared to other video and audio formats. Internet Explorer 3.0 is the first browser to include built-in support for MPEG playback.

The Motion Pictures Experts Group (MPEG) is an open, industry effort that works in conjunction with the International Standards Organization (ISO) to generate standards for digital video and audio compression. This standard involves a highly efficient compression technique to reduce the size of video and audio segments, while still retaining high quality. MPEG formats are an industry standard for digital video, and serves as the basis for the digital video and audio stream used by home digital satellite systems, as well as the emerging Digital Versatile Disc (DVD) player technology. The initial release of ActiveMovie delivers support for MPEG-1 video and audio playback, and Microsoft has conducted technology demonstrations of MPEG-2 playback.

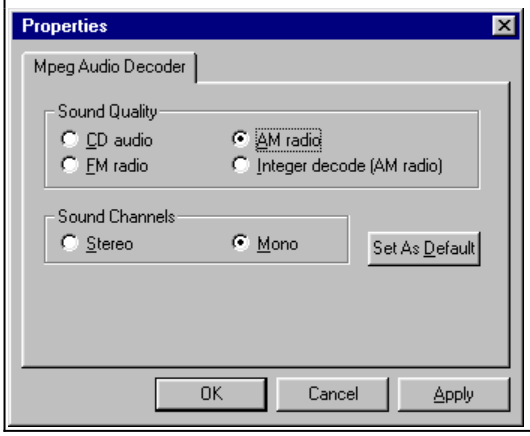
Unlike Video for Windows and QuickTime movie content, MPEG content is not pre-authored for a fixed playback frame rate allowing playback of MPEG content to be scaled – providing good quality playback on slower PCs, while increasing the playback quality on faster PCs producing better audio quality and fewer dropped video frames. Playback of Video for Windows and QuickTime movie files encoded with the common Cinepak or Indeo mechanisms remains at a fixed frame rate independent of the speed of the PC, so playback quality doesn't improve on faster PCs.

The support of MPEG by more web site creators will lead to better video and audio playback experiences for users.

Tip

MPEG decoding can be more processor intensive than decoding other formats like Cinepak or Indeo content (as used by Video for Windows and QuickTime), so the ActiveMovie MPEG audio codec defaults to a lower audio quality setting to ensure good MPEG video playback. On faster PCs, you can change the audio playback quality of MPEG video and audio by adjusting the properties for the MPEG Audio Decoder from the ActiveMovie Control Properties dialog.

To adjust the playback quality, right-click in the ActiveMovie control player window (accessible by opening any MPEG video or audio file), then click the Advanced tab, select the MPEG Audio Codec, and press the Properties button. The MPEG Audio Decoder property page is shown below and allows sound quality and sound channels options to be changed from their defaults. For Sound quality, CD audio refers to 44KHz sampling rate, FM radio refers to 22KHz sampling rate, and AM radio refers to 11KHz sampling rate. You can apply the changes for playback of the current audio or video clip, or you can press the "Set As Default" button to save the changes as the default playback settings. If you increase the quality settings and experience choppy MPEG video or audio playback, you may wish to decrease the settings.



Try it!

Some web sites with MPEG video and audio clips to try with ActiveMovie and Internet Explorer 3.0 include:

Site URL	Type of Content
http://www.microsoft.com/ie/most/howto/mediaaud.htm	Sample MPEG audio clip
http://www.microsoft.com/ie/most/howto/mediavid.htm	Sample MPEG video clip
http://www.mpmusic.com	Audio clips in MPEG formats
http://www.islandnet.com/~carleton/monster/monster.html	Sample MPEG video clips (note that many do not include audio)

Quick Playback of Video and Audio Files

ActiveMovie brings quick playback of Internet video and audio content to users, either by allowing them to see and hear the contents of video and audio files quicker, providing support for streaming multimedia content so playback begins almost immediately, or accelerating playback performance for improved playback quality.

- **Progressive playback of audio and video files:** ActiveMovie allows Internet Explorer users to simultaneously download and begin playback of video and audio files without having to wait for the entire file to be downloaded. This capability allows users to begin to see video and hear audio content more quickly than the traditional "download and play" mechanism commonly used by

Internet browsers.

Normally, video and audio files must be completely downloaded before playback can begin, however, with ActiveMovie users now can begin playback soon after a video or audio file has begun the download process. As the video or audio file is downloaded from the web site, a progress bar is shown to indicate status as shown in the following figure. Playback can begin as soon as enough information has been downloaded. While the user is playing the file, the remaining undownloaded portion of the file continues to be transferred in the background.

The benefits of progressive playback for users includes quicker viewing of video or listening to audio clips before download of the entire file is completed, and also giving the user the ability to sample a large video or audio file and cancel the download without wasting a lot of time to transfer an unwanted file if the contents are not what was expected.

Progressive playback of video and audio files differs from "streaming" in that playback is performed from a local cached version of the file being downloaded – the user can only play as much of the file as has been transferred to the local PC. In addition, progressive playback can be achieved with most existing video and audio content, whereas streaming of multimedia content requires the information to be stored in a different format to include additional information to leverage real-time playback.

The figure below shows a sample audio file being played progressively from a website. The figure shows the download progress bar as part of the slider area, indicating the relationship to playback status and download status. The download progress bar indicates the relative portion of the file that has been downloaded, the "00:28" time display indicates the total length of the audio clip, and the "00:04" time display indicates the current playback time position. If the media clip is being played and reaches the end of the downloaded portion of the file, playback will be paused and remaining portion of the file will continue to download – the user can continue playback by pressing the play button.

ActiveMovie provides progressive playback support for a wide range of files. The video and audio formats supported in the initial release of ActiveMovie for progressive playback are identified in the following table.

Video		
	MPEG	Yes
	Video for Windows	Yes (see below)
	QuickTime	Yes (see below)
Audio		
	WAV	Yes
	AU	Yes

	AIFF	Yes
	MPEG audio	Yes

Many of the existing video and audio files used on the Internet can be played progressively using ActiveMovie without modification, including files in formats including MPEG video, WAV, AU, AIFF, and MPEG audio. However, Video for Windows and QuickTime movie files need to be modified slightly to support progressive playback.

Video for Windows and QuickTime files normally have some content format information necessary to begin playback located at the end of the file – this poses a problem for initiating playback without first downloading the entire file. Local playback of the content works because the contents of the file can be accessed directly, rather than sequentially as over an HTTP server on the Internet. To solve this problem, Video for Windows and QuickTime video files need to be modified to place the necessary format information at the beginning of the file, thus supporting progressive playback without having to download the entire contents of the files. Microsoft will be releasing a utility for modifying Video for Windows files to support progressive playback. Video files in QuickTime movie format can be modified using a tool available from Apple Computer.

Try it!

Some web sites with different video and audio clips to demonstrate progressive playback with ActiveMovie and Internet Explorer 3.0 include:

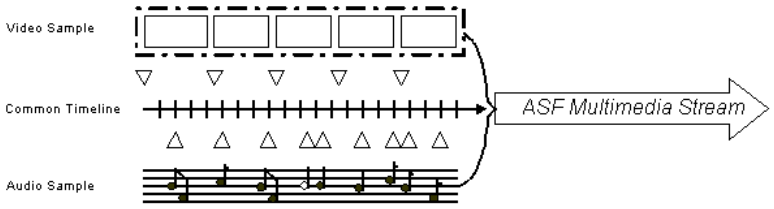
http://www.microsoft.com/ie/most/howto/mediaaud.htm	Sample audio clips in different formats
http://www.microsoft.com/ie/most/howto/mediavid.htm	Sample MPEG video clip
http://www.mpmusic.com	Audio clips in MPEG and WAV formats
http://www.islandnet.com/~carleton/monster/monster.html	Sample MPEG video clips
http://www.music.warnerbros.com	Sample music clips
http://www.geffen.com	Sample music clips
http://www.atlantic-records.com	Sample music clips

- **Support for streaming playback of video and audio content:** The ActiveMovie Streaming Format (ASF) provides an efficient data format specification for storing and streaming multimedia content, such as audio objects, video objects, still images, URLs, and HTML pages. ASF stores content as a single, synchronized multimedia stream that can be stored on existing HTTP servers or used with the upcoming release of a specialized Microsoft streaming server. Because ASF is a streaming format, playback can begin immediately.

The Microsoft ActiveMovie Add-on Toolkit for Streaming Media allows you to create streaming, synchronized, multimedia presentation files for delivery to client computers over the Internet or in a corporate local area network (LAN). The Toolkit introduces the ActiveMovie streaming format (.asf), a data-independent format for storing and transmitting multimedia information over a range of networks and transports. ASF is a streaming format; that is, it allows playback on the client to begin immediately, without requiring the user to download the entire file. This streaming functionality gives .asf files a major advantage over most audio and video files available on the Internet today.

An .asf file is a multimedia stream composed of a number of media streams that are rendered in a synchronized manner. Each media stream consists of samples of the same type of data, such as pictures,

sounds, charts, URLs, HTML documents, executable programs, or other kinds of data. Each sample in a given stream has a time stamp, which defines when the sample should be rendered.



As the figure above indicates, ActiveMovie streaming format allows media streams to be synchronized to a common timing mechanism, and then transported across a network without losing the synchronization and without altering the format of the underlying media. It interleaves the samples from the different media streams in such a way that samples from the different media streams arrive at regular intervals with little difference between when they arrive and when they need to be rendered.

ActiveMovie Streaming Format permits progressive rendering and image stacking; thus, even on slow networks, the first packet begins to materialize within moments of the client's request for data.

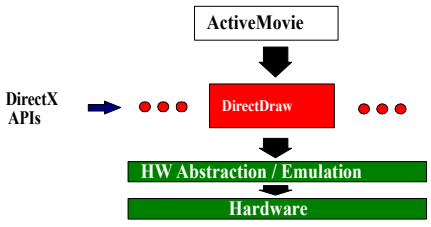
ActiveMovie Streaming Format enables new uses for multimedia content on the Internet including WAV audio files and BMP, JPG, DIB, Indeo and Cinepak images. ASF files can also incorporate URL flips in them so you can combine interesting multimedia content with synchronized changes to specific web pages.

Additional information about ActiveMovie Streaming Format is available on the Internet at http://www.microsoft.com/advtech/ActiveMovie/AMStream.htm.

Try it!

Sample ASF content is available on the ActiveMovie Streaming web site (you need to first download the ASF client software from the site):
http://www.microsoft.com/advtech/ActiveMovie/AMStream.htm

- **Transparent hardware acceleration for better playback performance:** ActiveMovie uses and is integrated with Microsoft's DirectX technology, automatically accelerating video playback on DirectDraw™ API-compatible graphics cards when the DirectX runtime components are installed on the PC. Most video graphics adapters that are included with PCs support DirectDraw. Support for DirectDraw provides for an increase in playback frame rate, improving the experience of video playback. DirectDraw exposes hardware acceleration features including double-buffering, hardware stretching, color space conversion, and hardware overlay support.



Flexible Solution for Web Site Creators

ActiveMovie provides a flexible solution for webmasters, giving them the freedom to add the video and audio content they desire because of the wide range of format support, allowing them to choose the appropriate HTML tags for including video and audio content on web pages, and enabling integrating with ActiveX scripting languages including Visual Basic Script and JScript, Microsoft's open implementation of the JavaScript(TM) language.

- **Support for all HTML tags for multimedia content:** ActiveMovie supports playback of video and audio content added to web pages with all HTML tags used for multimedia content including <A HREF>, <IMG DYNSRC>, <BGSOUND>, <OBJECT>, and <EMBED>, allowing users to gain access to all of the web page content. Support for these tags gives web site creators the ultimate in flexibility for choosing the tags they use based on the desired presentation to the user.

The following table summarizes the relevant HTML tags used for incorporating video and audio content on web pages, and identifies how the content is presented to the user. Support for all of these tags helps to make ActiveMovie the most complete solution for playback of video and audio content on web pages, and Internet Explorer the best way to browse it.

<A HREF … >	External file reference	Separate window
<IMG DYNSRC… >	In-line video	In-line on web page
<BGSOUND …>	Background sound	Embedded (in-line) on web page, automatically started when the page is first displayed
<OBJECT … >	ActiveX embedded object	Embedded (in-line) on web page
<EMBED … >	Apple QuickTime plug-in extensions for Netscape	Embedded (in-line) on web page

The use of the OBJECT tag provides the highest level of integration with Internet Explorer 3.0, and the most flexibility to web page creators. Support of the EMBED tag provides compatibility with contents added to web pages for use with the Apple QuickTime plug-in for Navigator.

- **ActiveX Scripting support enables programmatic control of video and audio content playback:** ActiveMovie is integrated with Internet Explorer as an ActiveX Control – a small, fast, full-featured software applet – enabling control of video and audio playback with ActiveX scripting using languages including Visual Basic Script and JScript, Microsoft's open implementation of the JavaScript(TM) language.

The ActiveMovie ActiveX control exposes a set of properties and methods that can be accessed from ActiveX scripting languages including Visual Basic Script and JScript. For example, web page creators can script the playback of video or audio to run, pause, or stop, using exposed methods. Properties including audio volume, name of file to play, display of user interface elements, and range of playback content can all be queried and modified from a script. The combination of ActiveMovie and ActiveX scripting language support offers a powerful solution for web site creators to enhance the experience of users of Microsoft Internet Explorer 3.0.

For Additional Information

For additional information about ActiveMovie, visit the Microsoft Interactive Media Technologies web site at http://www.microsoft.com/imedia.

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For online product information:

Microsoft Web site: http://www.microsoft.com
Microsoft Interactive Media Technologies site: http://www.microsoft.com/imedia

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