



## Appendix B: Streaming Media



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## **VIDEO TOASTER AND THE WEB**

With more consumers accessing the Internet through high bandwidth connections, video has become viable content on the Web. Now you can send your own video from Video Toaster to the Internet through a third-party encoder.

Video Toaster comes packaged with Windows Media Encoder, but you can use any encoders that accept Video for Windows devices as a source. The most widespread formats available are Real G2 for the Real Player, and the QuickTime format.

On the Web, you have two options for viewing video. One option is a file that you download to your hard drive and then play on your computer with the associated video player. The other option is streaming video, where you click on a link and the associated player launches and begins to load the file. As the file is buffered, it begins to play, so you don't need to wait for the whole file to download before you can watch it.

## **ENCODING**

Encoding a video file means that you compress the file into a specific format. When you use a progressive format, you save the file and users must download the entire file before they can view it. This is considered an on-demand file because it's available to users at any time. When you use a streaming format, users download only the beginning of the file and they can view it while the file is buffered. In real-time streaming, the video spins off of a server and viewers can immediately watch it on their desktops.

To encode a file, you launch your encoder and follow the instructions in the wizard. Usually, you just choose your source file, enter a name for the destination file, choose your audio and video codecs, choose a bit rate, and hit Start. The encoder compresses the file and then you upload that file to your Web site.

### **Downloadable Files**

The advantage of downloadable files is that the quality is pre-determined. Changes in line speed may delay the download but they won't cause fluctuations in frame rate, audio dropout, etc.

The following formats are typical for downloadable files:

- AVI is the video file for Windows.
- MOV is the QuickTime format, which works on Mac and Windows.
- MPEG works on all platforms and operating systems.

### **Streaming Video**

The advantage of streaming video is that users avoid the long wait, so they can view the video while it downloads. This is a big advantage, especially with videos that would take hours to download entirely. But the disadvantage is that quality can suffer; the quality depends on the data transmission channel. Some streaming software adjusts itself to the data rate as it plays, dropping as many frames as it has to in order to keep playing. Real-time streaming video tries to keep pace with the user's connection speed in so that you don't have dropped frames or pauses in the video.

Longer videos are most appropriate for streaming, where users can skip ahead to other parts of the clip and don't have to download a huge video file. Users cannot download streaming content to their hard drives; streaming video clips sit on the server until you remove them.

The following formats are typical for streaming files:

- ASF, WMV, and WMA are the Windows Media formats.
- MOV is the QuickTime format, which works on Mac and Windows.
- Rm is the format for Real, which works on all platforms.

### **Live Encoding**

Live encoding takes a little more work than encoding a file; the source going to the encoder comes from audio and video capture cards on your computer. Before you encode you should consider the following variables:

- What format will you use: Windows Media, QuickTime or Real?

- What data rate, frame rate, window size? These variables affect the final size of the file and its quality.
- Progressive download or real-time streaming?

## STREAMING AND VIDEO TOASTER

Before you can begin encoding for streaming, you must first install the encoder. For our purposes, we refer to the Windows Media Encoder. Information for installing Windows Media Encoder is available in the help file in the Windows Media directory, but all you need to do is click on the install file. Other encoders will provide information about installation and settings in their documentation.

The VTCap plug-in is the key to creating live streaming video from Video Toaster. It is automatically installed when you install the Video Toaster software. The VTCap plug-in monitors your video sources and communicates information to the encoder. So, while you switch between your sources on the switcher, the plug-in monitors Video Toaster and sends the info to Windows Media Encoder. So all you need to do is choose your settings in the encoder and get to work.

In Windows Media Encoder, you choose custom settings to specify a live source. You then set the bit rate for the stream that you are encoding. You can set a multiple bit rate, where you encode different bit rates in one file so that users with different connections can see the stream, or you can encode a single rate for the file. The following steps are basic steps for setting up your encoder. For more information on specific settings, see the documentation for Windows Media encoder.



### **WARNING**

When you work with Windows Media encoder, your files must be saved with audio. The encoder will not encode files without embedded audio.



### **WARNING**

You must have a sound card installed on your computer to work with Windows Media Encoder. The Video Toaster card will appear as your audio card when you choose your settings. You must choose the Video Toaster card as your video and audio card.

**Windows Media Encoder and Streaming Live Video from Video Toaster**

- 1 Open Windows Media Encoder. On the Start menu, point to Programs, point to Windows Media, and then click Windows Media Encoder.
- 2 In the Welcome window, select Custom settings. If the Welcome window does not appear when Windows Media Encoder opens, on the File menu, click New.
- 3 On the Input Source screen, select Live source.
- 4 On the Capture Source screen, use the default settings.
- 5 On the first Bandwidth Selection screen, select **Use multiple bit rate** video.
- 6 On the second Bandwidth Selection screen, select **Low Bandwidth** or **High Bandwidth**. The encoded live stream will contain multiple streams encoded at the bit rates shown in the lower list. You can Add, Remove, or Edit bit rates in the list, or accept the default settings.
- 7 On the Compression and Formats screen, select audio and video compression codecs for the bandwidth you are targeting. If you are encoding multiple bit rates, choose a video codec suitable for the highest bandwidth, and an audio codec suitable for the lowest bandwidth.

**NOTE**

Video Toaster is Windows Media certified; our capture card is certified to work with Windows Media software.

After you choose your settings, you can launch the encoder at any time from Video Toaster by clicking the **On Air Stream** button at the right of the main menu.



The On Air Stream button at the right of the main menu

## GETTING YOUR VIDEO ON THE WEB

If you are using an on-demand format, you can encode your video and FTP it to your web site or a media server. You can make a link to your video exactly as you do with a graphic or other file: `<a href="myVideo.avi">Watch a video</A>`

Your viewers must have the players installed for the type of format you use, so if you use Windows Media, they must have Windows Media Player, if you use QuickTime, they need the QuickTime player, and so on. You may want to include a link to download the player.

If you plan to distribute streaming video, you need a video server. The Windows Media and the QuickTime servers are both free. Apple's QuickTime Streaming Server uses RTSP, which is an open standard that is available for servers ranging from UNIX to NT. Real server starts at about \$295 for the software. With Real, you also must pay for traffic to your stream: the more people view your video, the more it costs you.

Video Toaster is bundled with Microsoft Windows Media. Windows Media is a common format for streaming video. The Windows Media Server runs a proprietary server protocol, but it's free and it works on Windows Server Platforms. The Windows 2000 Server and the Advanced Server come packaged with the Windows Media Server as part of the operating system. A panel appears when you install that takes you through the process of setting up the server step-by-step.

Note that when you use a live broadcast, you can upload streaming media to your Web site without a video server. Up to 50 people can connect to your computer to watch streaming video without the server, if you are attached via a constant, broadband connection. If more than 50 visitors will access your files, you will need a broadband distribution point, that is, a video server.

## GETTING YOUR FILES ON THE SERVER

Once you create and encode your streaming media and build the Web page for the media player and related data, you must post your files on the appropriate Web servers. The process for setting up a streaming media server is more complex than setting up the encoder, and you need to contact your Internet Service Provider (ISP) for specific details. If you run your own server, and you can get information about installing a media server from the documentation that comes with the server software. However the following list contains the information that you need to get when you're working with an ISP:

- a log-on identification number and password for the Internet servers where you will post your HTML pages and media
- the address for the HTML server where the layout and redirector files will be stored on the Web server; this is the directory path that you use to transfer files with a file transfer protocol (FTP) program
- the address for the video server where the streaming media will be stored; this is the directory path that you use to transfer the file with an FTP program

Before you upload your files, you must create a redirector file. As you may have noticed from the previous list, you use two servers to get your streaming video on the Web—one for HTML pages, and the other for streaming media. A user requests streaming media from the HTML server, and a redirector file on the HTML server redirects the request to the media server. This file is usually placed in the same folder as the HTML page. For examples of redirector files visit [www.msdn.microsoft.com](http://www.msdn.microsoft.com) and enter “asx” in the search function.

## **PREPARING FOR ENCODING**

Before you create video for the Web, whether it is streaming video or downloadable video, you need to make some preparations first. Of course, you should have an idea of how your final video will be assembled and you should have those elements—video, audio, graphics, effects and so on—ready before you start.

### **Audience for Web Video**

Your audience is the critical element when you create video for the Web. Your preparations and your final output will differ depending on whether you want a wide audience, which includes users with slow connections, or if you are willing to limit your audience to those with high bandwidth connections, and offer higher quality output.

### **Video Capture for the Web**

When you capture video for Web distribution, the best approach to ensure decent quality is usually to capture it at the size that you will use for final output. When video is compressed, as it must be for the Web, you lose lots of detail, and to compress a full-screen video down to a quarter or a sixteenth of its size is a lesson in humility. However, you still want to work with the highest resolution possible, so that you give good information for encoding.

However, when you work with Video Toaster, you should capture your video at full resolution. Then, when you activate the encoder, choose your compression settings to suit your intended audience.

### **Audio Capture for the Web**

You capture audio at the same time that you capture video. You want your audio to be CD quality, so it should be sampled at 44.1 KHz and 16 bits. The audio will be compressed as well, but again, you want to start off with the best quality possible.

### **Other Variables for Web Video**

Other variables to keep in mind when you're creating video for the Web are contrast and motion. Video doesn't handle contrast as well as film, and when you encode video for the Web, you lose even more information, so you need good lighting in your source video.

Web streaming doesn't handle transitions and motion well and it doesn't capture detail so your best shots should be close and without a lot of movement. Audio from cameras and camcorders is rarely as good as separate microphones, you should at least use a lavalier microphone and/or a directional or shotgun microphone so you hear only what you want.

In streaming video, you can give your viewers some control over the video—they can skip ahead to information, for example. You must encode metadata into your file, choose the right delivery platforms, and code HTML pages to provide access. Metadata can also be used to encode information such as author, copyright, rating, and a description of the video. This information can be displayed in the media player as the content is streamed.

One of the most useful functions of metadata is that you can use it to run commands that will open a Web page or launch a Java application. You can synchronize these events to specific times and events in the streaming content. For instance, as the streaming audio describes a product, metadata could launch the browser and open a related Web page. Instructions on how to encode metadata are included in the documentation for your encoding software.

### **TIPS FOR VIDEO ON THE WEB**

These tips refer to creating video for a wide range of users, they are meant as guideline for creating video that is accessible to low bandwidth users specifically. When you create video for users with fast connections, these issues are less of a concern, but are still good guidelines.

**Picture Size**

Depending on your audience, your picture size may need to be very small. Typical web-based videos use a half or a quarter of a screen; when you use the Video Toaster encoder, the lowest resolution available is 360 x 240.

**Frame Rate**

U.S. television (NTSC) delivers video at 29.97 frames per second (fps). The rate for European television (PAL) is 25 fps. Most computer video cuts the frame rate to 15 or 10 fps. If you expect your users to work on very slow connections, you should reduce frame rate down to five or six frames per second. However, the frame rate should always be a number that divides evenly into 30 fps (for NTSC) or 25 fps (for PAL).

**Limit Your Palette and Use Bright Colors**

Much like web graphics, web video looks best when you use bright and solid colors. Dark colors and patterns may not translate well over slow connections. 8-bit color (256 color palette) gives your video the best look for the widest range of viewers.

**Reduce Motion**

Fast motion and transition also do not translate well across slow connections; this also applies to special effects because they usually require motion and subtle colors.

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