

Broadcasting over the Web

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Sorenson Media

There are several different ways of distributing audio and video content over the Internet. You can encode it offline in any number of formats (Windows Media, Real, QuickTime etc) and host it on a web server for people to watch at their leisure. There may also arise a situation where you would want to do a live broadcast over the Internet, somewhat like a conventional television broadcast.

There are many factors to consider when setting up for a live Internet broadcast – beginning with the available “live” encoding technologies. This article covers some of the many products available that will enable you to present a live audio and/or video broadcast over the Internet, with varying levels of complexity.

One of the first factors to consider when making a live Internet broadcast is the audience you wish to target and the details associated with them. Will they be on dial-up modems? Or will they have broadband connections? Or perhaps a combination of both? Will your audience be connected to a single LAN or will they be distributed throughout the world? And what media player do you want to deliver your content?

The answers to these questions will help to determine the level of complexity you will need to involve yourself in and, quite possibly, how much money you will need to spend. Encoding solutions range from the free to those costing multiple thousands of dollars.

Windows Media encoder

Windows Media Encoder is a free tool from Microsoft that allows live encoding from attached audio and/or video devices, to a local LAN audience and/or across the Internet. The resulting stream must be viewed in the free Windows Media Player from Microsoft and can vary in bit-rate from modem speeds (56 kbit/s) up to and beyond 1 Mbit/s. The stream, if sent across the Internet, will require you to bounce the encoded stream through a Windows Media server.

Live – as well as on-demand – Windows Media streams can include multiple bit-rate streams which allow for multiple video streams encoded in a single Windows Media stream. This is a very useful feature in that you can target a wide range of viewers (at connection speeds from 28.8 kbit/s through to 300 kbit/s) with a single computer that is running a single instance of the Windows Media Encoder producing a single outgoing stream.

As shown in *Fig. 1*, the main user-interface is fairly straightforward. It gives the user feedback reports on the audio and/or video sources, the encoding parameters that can be defined as well as the output port and connections. It also shows how long the broadcast has been running, including how well the encoding system resources are doing. There is also a VU meter that shows the audio levels and a button to access the Windows OS mixer.

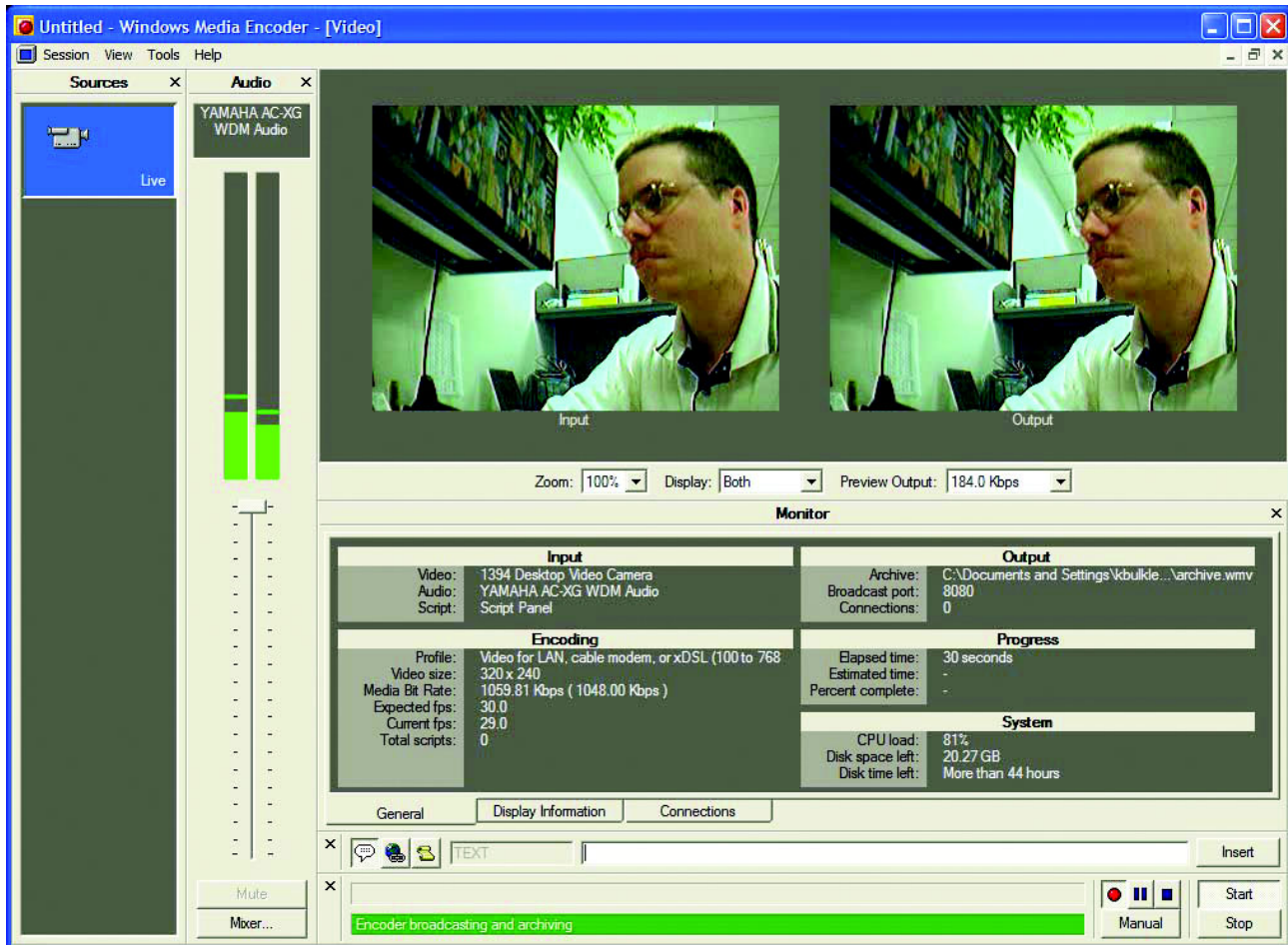


Figure 1
The user-interface of the Windows Media Encoder

Included in the Windows Media Encoder is a startup wizard that allows the user to walk through setting up a customized broadcast. You can select the audio and/or video sources, define the broadcast port and see your broadcast URLs for both local and Internet delivery. There is also an extensive encoding profile list that you can select from or you can define your own. These profiles include suggested target audiences and they specify the frame size, frame rate, data rate, as well as the different audio and video codecs available. If you choose to customize your own profile, you can name it and save it for use on later broadcasts. There is also an archiving feature that allows you to create a local encoded archive of the live broadcast that you are doing. You can specify a welcome, intermission and closing video file that you can play if you wish, or you don't have to use this feature. The wizard also allows the entry of metadata such as a title, author, copyright, rating and description. This information will be displayed in the user's (viewer's) Windows Media player.

While running the wizard, you are then presented with a summary of the settings selected, before you send the broadcast to the main user-interface. Here, you can start and stop the broadcast, view different settings of your input or output video (or both), review your metadata, check on your connections and, depending on your encoding options, switch between sources. You can also insert text or URLs into the stream, and start and stop your archive recording on the fly.

When the broadcast is finished, you are presented with a useful summary which includes the total bytes encoded (or expected) in the session as well as the average bit-rates for the session. The summary also breaks down the byte count into separate audio and video details, and reports on the expected and average frames per second (fps) and the frames encoded as well as the frames dropped. It reports the same information for audio – except, of course, for the number of frames per second – and shows the samples encoded and the samples dropped, instead of the frames encoded and dropped.

There are many options available to the user when configuring a broadcast. The Windows Media Encoder is flexible enough to allow for simple through to complex broadcasts, on a LAN or across the Internet with a simple setup procedure and at no cost to obtaining the encoding software. There are no software limits per-

taining to the number of viewers that can be supported. This is determined by the bandwidth available. The Windows Media Encoder is only available for the Windows operating systems but can be viewed on either the Windows or Macintosh operating systems through the Windows Media Player.

Real Networks

Real Networks offers the *Helix Producer* (formerly RealSystem Producer) which comes in two versions, Basic (free) and Pro (which retails for \$199). The principle is much the same as for the Windows Media Encoder but with some differences. There is no wizard to help you get started, there appeared to be an issue with the IEEE 1394 device that was used to test the system for this review, whereas Windows Media Encoder had no problems with it. Also, the Real Streaming Server that was used for this review was having some problems at the time.

The Helix Producer Basic version does allow for live broadcasting but only with the Real Video 9 video codec. If you wish to support legacy Real video formats, you need to upgrade to the Helix Producer Pro version. Likewise, Helix Producer does allow the sending of a live stream to several servers, and allows the creation of several archive files in various locations, but the Basic version only allows one streaming server and

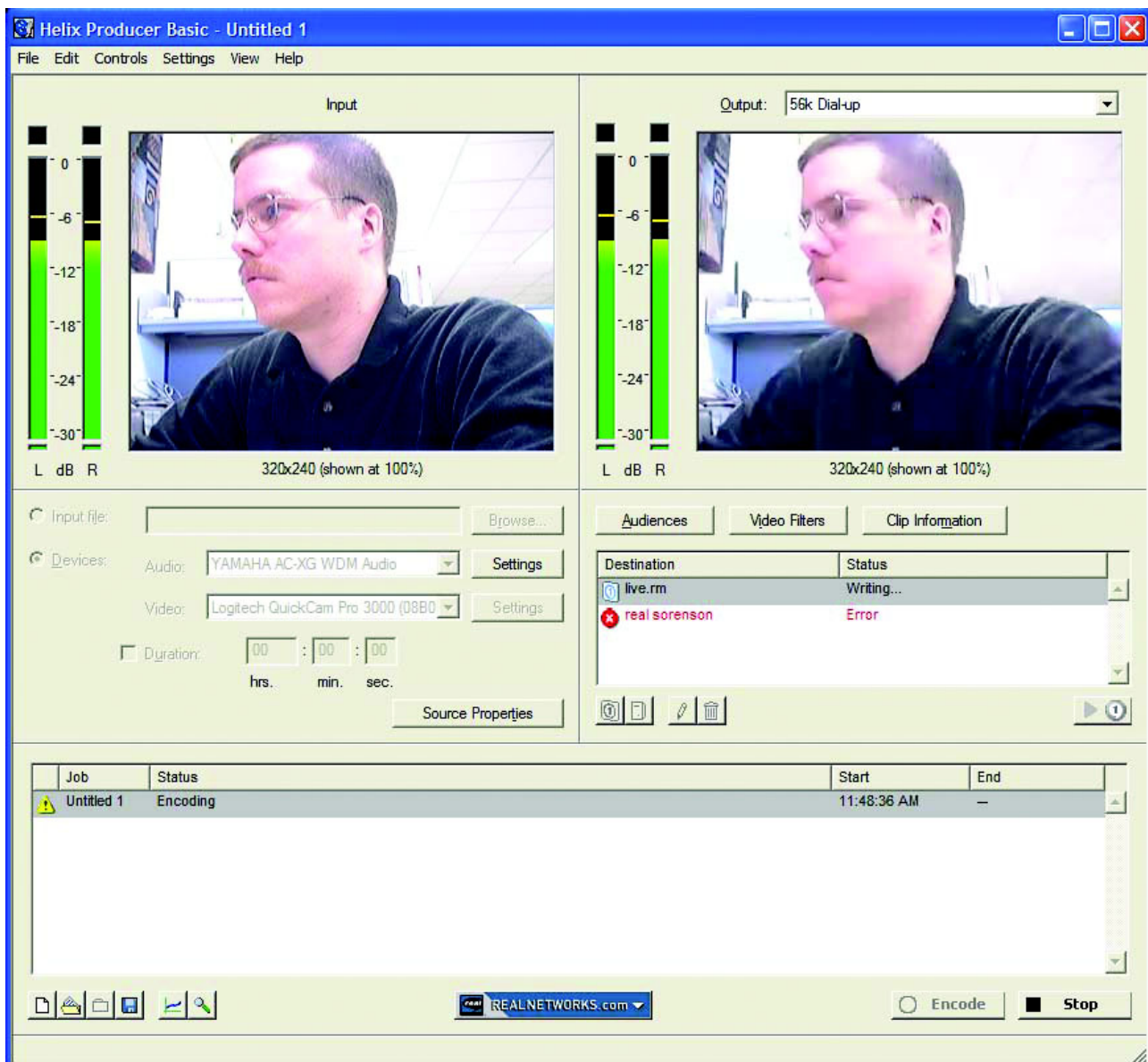


Figure 2
The user-interface of RealNetwork's Helix Producer Basic

one archive file to be used. Also, once the broadcast settings have been entered, you need to upgrade to the Pro version in order to save those settings.

Like the Windows Media Encoder, Helix Producer can perform offline encoding for existing content but, again, there is no wizard to help you get started. You are presented with the main user-interface (see Fig. 2) and then it is up to the broadcast user to select a source for live encoding or a file for offline encoding. Then, based on the choice here, other options may be available depending on whether it is a live broadcast or not. The “audiences” button contains several presets but the Basic version only allows for three audiences to be selected and these are not adjustable. The Pro version allows for more than 3 audience profiles and also allows you to change all the broadcasting values, including the frame rate, custom data rates as well as the audio and video codecs.

The Helix Producer is available for the Windows OS as well as the Linux platform. If you would like to use it on a Mac or Solaris platform, RealNetworks will still sell you RealSystem Producer Plus or you can download the RealSystem Producer Basic version for free. The resulting live streams from any of these products will need to be watched in the Real Player and, depending on the codecs chosen, in the RealOne Player. This free player is available for both Macintosh and Windows operating systems.

Apple QuickTime / Sorenson Broadcaster

Sorenson Media has a broadcasting application for Apple Computer’s QuickTime format. This “broadcaster” (in the streaming sense) is called *Sorenson Broadcaster* and is sold for both the Macintosh OS as well as the Windows operating system. The Macintosh version retails for \$199 and the Windows version for \$249. The resulting stream requires the viewer to watch the broadcast using Apple’s free QuickTime player, available for both the Macintosh and Windows operating systems.

Sorenson Broadcaster is similar to the other live encoding tools discussed above but with subtle differences. There are no options for offline or batch encoding of the existing content. However, Sorenson Broadcaster does include some presets for popular encoding situations – from modem broadcasts up to broadband situations – and does allow for customization of these presets.

From the main user-interface (see Fig. 3), a summary of the live broadcast can be seen at a glance. The elapsed time, overall average data rate, frame rate and the numbers of viewers connected to the stream are shown. There is also a graph representing the average audio, video and data rates. A mixer button is available on the Windows version that will launch the Windows audio mixer as well as a VU meter showing the audio input levels. There are recording controls that allow starting, stopping and pausing of an archive recording while the live stream is going on.

The announce button gives you the option to create a MOV announcement file to distribute to your potential viewers or a Session Description Protocol (SDP) announcement file to post to a QuickTime streaming server for broadcasting over a non-multicast-enabled network. Apple distributes the Darwin streaming server which is open source and can be run on a variety of systems.

The encoding-options settings (see Fig. 4 – left image) allow you to view and adjust the settings for a given broadcast. These settings can also be saved

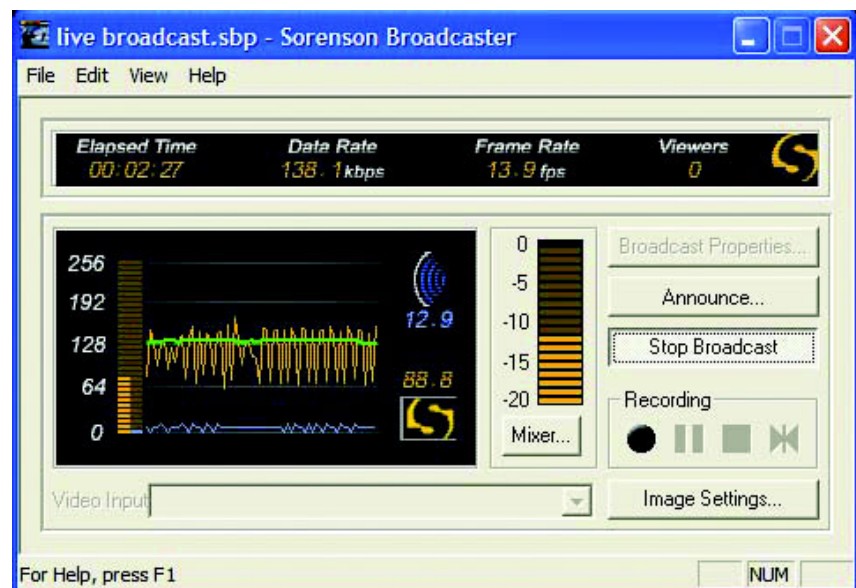


Figure 3
The user-interface of Sorenson Broadcaster for Apple QuickTime

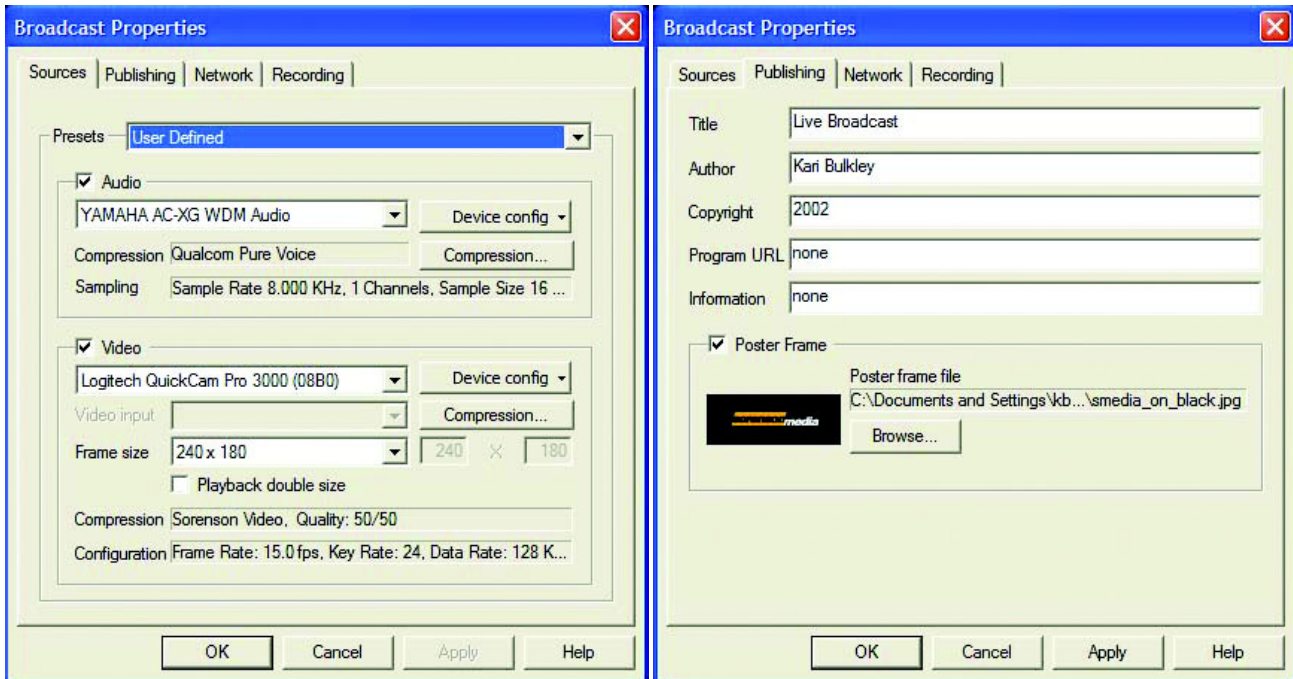


Figure 4
The Sources and Publishing properties of Sorenson Broadcaster

for use later. The publishing tab (*Fig. 4 – right image*) contains fields for entering metadata as well as an option for a poster frame. This frame is shown while the broadcast is buffering at the start of a connection or during the entire time an audio-only broadcast is running. The Network tab (*Fig. 5 – left image*) has the settings for multicast or unicast broadcasts, including the IP configuration, router hops, port settings and a buffer delay setting. The Recording tab (*Fig. 5 – right image*) sets the preferences for archiving the live broadcast.

Sorenson Broadcaster was the first live broadcasting application for QuickTime, but has since been joined by Channel Storm's Live Channel (<http://www.channelstorm.com>) as well as Apple Computer's own free QuickTime Broadcaster, which they offer for free, and which requires Mac OS X 10.1 or later and QuickTime 6. An advantage that Apple's QuickTime Broadcaster has over any other live broadcasting application is their

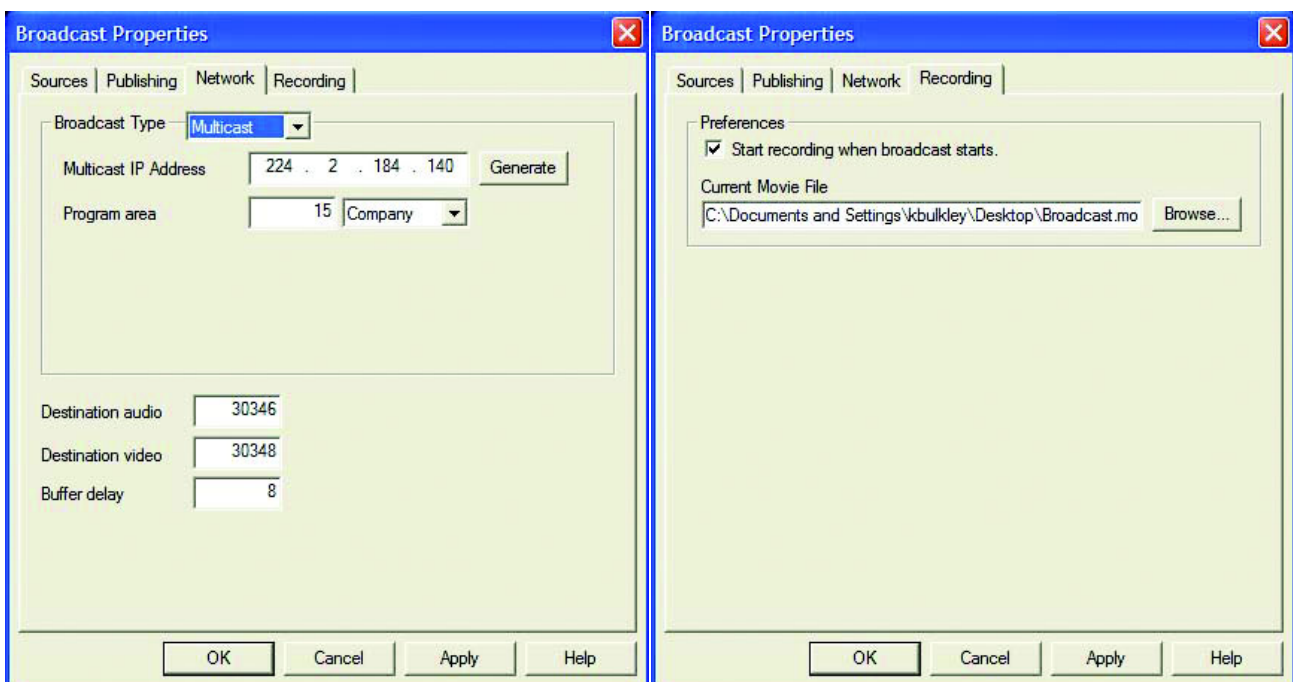


Figure 5
The Network and Recording properties of Sorenson Broadcaster



Kari Bulkley has been in the video industry since the early 1980s. His jobs have included public-access cable-television studio work, PBS television station traffic and operations, as well as studio news production from all technical positions up to directing.

Mr Bulkley has also worked on live college sports productions for the Blue and White Sports Network, freelanced for ESPN, and performed on-air operations for live sporting events. He was the Chief Video Editor for a video production house for several years which led him into the field of video compression for CD delivery. This made an easy transition to where he is currently employed – at Sorenson Media as the Product Manager for compression tools.

support for MPEG-4 encoding. To learn more about this product, visit <http://www.apple.com/quick-time/products/broadcaster/>.

Conclusions

There are many choices available for doing a live Web broadcast. This article has covered some of the more popular inexpensive software tools, but, also available are several hardware-based live encoding solutions that are beyond the focus of this article. Pinnacle is recognized as one of the leaders in the live hardware encoding area. For more information on what Pinnacle has to offer, visit <http://www.pinnaclesys.com> and link to the Streaming solutions under the Products heading.
