



## **REALPRODUCER 11 USER'S GUIDE**

RealProducer 11 Powered by Helix™ DNA

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# INTRODUCTION

Welcome. This guide explains how to convert audio and video into streaming or downloadable media using RealProducer 11 Powered by Helix™ DNA. It teaches you how to create clips, or send a live stream to Helix Server for broadcast to RealPlayer viewers.

## How This Guide Is Organized

The guide contains the following chapters and appendices.

### Chapter 1: New Features

This chapter explains new and removed features in RealProducer 11.

### Chapter 2: Media Basics

If you are new to media production, refer to this chapter for explanations of media encoding options and the major features of RealProducer 11.

### Chapter 3: Installation

This chapter explains RealProducer requirements and describes how to install the product.

### Chapter 4: Producing Audio

For tips about producing high-quality audio content, refer to this chapter. This chapter also explains the properties of the various RealAudio codecs.

### Chapter 5: Producing Video

The information in this chapter will help you to create high-quality video content. This chapter also explains the RealVideo codecs and filtering options.

### Chapter 6: Encoding Clips

This chapter describes how to use the RealProducer graphical application to set up an encoding job.

#### **Chapter 7: Choosing Audiences**

This chapter describes the settings of the predefined audiences that you use to set clip and broadcast streaming speeds.

#### **Chapter 8: Monitoring a Job**

When you are ready to start encoding, refer to this chapter for information about kicking off and monitoring the encoding process.

#### **Chapter 9: Modifying Default Settings**

For information about changing the RealProducer preferences and audience settings, see this chapter.

#### **Chapter 10: Planning a Broadcast**

This chapter explains the basic issues around broadcasting live audio or video.

#### **Chapter 11: Running a Broadcast**

When you are ready to set up a live broadcast, refer to this chapter for explanations of how to perform a push or pull broadcast.

#### **Chapter 12: Editing RealMedia Files**

This chapter explains how to use the RealMedia Editor to edit RealAudio and RealVideo clips.

#### **Chapter 13: Defining Events and Image Maps**

The RMEvents utility allows you to encode clip information, create clickable image maps, and open Web pages automatically as a clip plays.

#### **Chapter 14: Using the Command-Line Application**

Refer to this chapter if you plan to encode clips or broadcasts using the RealProducer command-line application.

#### **Appendix A: XML File Basics**

This appendix describes the basic rules for editing the RealProducer XML-based files.

#### **Appendix B: Job File Syntax**

Job files can define the encoding settings used by the graphical application and the command-line application. This appendix describes the job file syntax.

**Appendix C: Audience File Syntax**

This appendix explains the syntax of audience files, which define the streaming speeds at which clips and broadcasts are encoded.

**Appendix D: Server File Syntax**

Server files define server destinations used in live broadcasts. This appendix describes the server file syntax.

**Appendix E: Preference File Syntax**

This appendix explains how to edit the RealProducer preferences file manually to set overall encoding preferences.

## Conventions Used in this Guide

The following table explains the typographical conventions used in this guide.

<b>Notational Conventions</b>	
Convention	Meaning
<b>emphasis</b>	Bold text is used for in-line headings, user-interface elements, URLs, and e-mail addresses.
<i>terminology</i>	Italic text is used for technical terms being introduced, and to lend emphasis to generic English words or phrases.
syntax	This font is used for fragments or complete lines of programming syntax (markup).
<b>syntax emphasis</b>	Bold syntax character formatting is used for program names, and to emphasize specific syntax elements.
<i>variables</i>	Italic syntax character formatting denotes variables within fragments or complete lines of syntax.
[options]	Square brackets indicate values that you may or may not need to use. As a rule, when you use these optional values, you do not include the brackets themselves.
choice 1 choice 2	Vertical lines, or “pipes,” separate values that you can choose between.
...	Ellipses indicate nonessential information omitted from examples.

## Additional Documentation Resources

In addition to this introductory guide, you may need the following resources, which are available for download at <http://service.real.com/help/library/encoders.html>:

- *Introduction to Streaming Media*

Start with this guide if you are new to streaming media or RealNetworks products. Written for the beginning user, it explains how to put together a basic presentation using different production techniques.

- *RealNetworks Production Guide*

This guide is the main reference manual for streaming media production. It expands on most of the topics presented in this introductory guide. Refer to it for instructions and tips on media production, as well as for complete information about using SMIL.

- *RealPlayer Scripting Guide*

If you are a Web programmer, refer to this guide for instructions about using Javascript or VBScript with RealPlayer. Using these scripting languages, you can customize RealPlayer to turn it into your own Internet jukebox, for example.

- *Helix Server Administration Guide*

The basic reference for the Helix Server administrator, this guide explains how to set up, configure, and run Helix Server to stream multimedia. You need this guide only if you are running Helix Server yourself. It is available at <http://service.real.com/help/library/servers.html>.

## Technical Support

To reach RealNetworks' Technical Support, you can contact their Web site by choosing **Help>Technical Support** from the RealProducer main menu. The information you provide in this form will help Technical Support personnel respond promptly. For general information about RealNetworks' Technical Support, visit <http://service.real.com>.



## **GETTING STARTED**

The following chapters introduce you to features new in RealProducer 11, as well as explain the basic issues for encoding a clip or broadcast. The installation chapter explains computer requirements, and walks you through the installation process.



## NEW FEATURES

This chapter describes new and removed features in RealProducer 11. It also discusses upgrade issues if you have used an earlier version of RealProducer or Helix Producer.

### New Features in RealProducer 11

RealProducer 11 introduces the following new features.

#### Low-Latency Broadcasts

RealProducer 11 provides three latency modes that can help you to reduce the end-to-end latency of a live broadcast. It also provides the ability to configure packet sizes and audio superblock sizes to optimize broadcast packets for your network.

**Note:** Low latency broadcasts function only when sending the live stream to Helix Server version 11 or later.

**For More Information:** Refer to “End-to-End Broadcast Latency” on page 180.

#### IP Version 6 Support

You can install and run RealProducer 11 on computers and operating systems that support version 4 IP addresses (IPv4), version 6 IP addresses (IPv6), or both. RealProducer 11 supports broadcasts to Helix Servers that use either IPv4 or IPv6 addresses.

**For More Information:** See “Version 6 IP Addresses” on page 169.

## Listen Address Default for Push Broadcasts

RealProducer 11 uses a new default method for sending its listen address to Helix Server in a push broadcast. In earlier versions of RealProducer, the listen address was automatically set to the default IP address on the RealProducer machine. Broadcasting successfully through a NAT firewall required changing the listen address manually. The new default causes Helix Server to determine the listen address from the IP packets it receives, providing easier traversal through a network address translation (NAT) firewall.

**For More Information:** See “Listen Address” on page 207.

## RealAudio and RealVideo File Extensions

RealProducer 11 can encode RealAudio clips with the file extension `.ra` or `.rm`. It can encode RealVideo clips with the file extension `.rv`, `.rm`, or `.rmvb`. In most cases, it chooses the file extension automatically based on the input media and your encoding choices.

**For More Information:** For more on these file extensions, refer to “Single and Multiple Destinations” on page 19.

## RealMedia Editor for RealProducer Basic

The RealMedia Editor described in Chapter 12 is now available with both RealProducer Basic and RealProducer Plus.

## Change to Default Audience

By default, RealProducer 11 encodes clips and live broadcasts using just the 256k DSL or Cable audience. In previous versions, RealProducer Plus included the 56k Dial-up and 28k Dial-up audiences by default. RealProducer Basic used just the 56k Dial-up and 28k Dial-up audiences by default. Using either RealProducer Plus or RealProducer Basic, you can change which audiences are used for any job, however.

**For More Information:** See “Choosing Audiences” on page 100.

## Features Removed from RealProducer 11

The following features, included with previous versions of RealProducer and Helix Producer, have been removed from RealProducer 11.

## Legacy Broadcast Support

Using RealProducer 11, you can broadcast only to Helix Server version 9 and higher. Support for legacy broadcasts to RealServer 8 and earlier has been dropped in the graphical application and command-line application (-sg option).

If a job file specifies a live broadcast using legacy broadcast mode, the RealProducer 11 graphical application automatically updates the job file to use account-based broadcasting instead. If you intend to broadcast using the RealProducer 11 command-line application, however, you need to update the job file manually to use account-based mode. Or, you can open the job file in the graphical application, save it, and then run the saved job file with the command-line application.

The following sections provide more information about specifying account-based broadcasts in job files:

- The section “Server Destinations” on page 333 explains how the job file defines live broadcast servers.
- See “Push Server Syntax” on page 362 for an explanation of how to create an account-based server destination.
- The section “Running an Account-Based Broadcast” on page 189 explains the basics of account-based broadcasting, describing the Helix Server requirements for receiving the broadcast stream.

## RealVideo G2 with SVT

The RealVideo G2 codec has been removed from RealProducer 10 and later. The RealVideo 8 codec is the oldest codec currently available in RealProducer, providing playback compatible with RealPlayer 8 and later.

## ATRAC3-Based Music Codecs

As described in “RealAudio 10 Stereo Music Codecs” on page 10, AAC-based codecs have replaced ATRAC3-based codecs for streaming bit rates above 64 Kbps for stereo and stereo surround music.

## Features Introduced with RealProducer 10

In 2004, RealProducer 10 succeeded Helix Producer as the primary tool for encoding RealMedia clips and live broadcasts. The following sections describe the features introduced with RealProducer 10 and included with RealProducer 11.

### RealVideo 10

RealVideo 10 provides significant quality advances over its predecessors, RealVideo 9 and RealVideo 8. Clips encoded with RealVideo 10 exhibit greater clarity and increased smoothness of motion, particularly in fast-action scenes. You can stream the RealVideo 10 format with RealServers version G2 through 8, as well as Helix Server. These servers do not require any plug-in updates to stream the new content.

**Tip:** The RealProducer Plus command-line application includes a `-vco` option that allows you to override the video codec selected in the audience file. For details, refer to “Video Codec Override (-vco)” on page 284.

**For More Information:** See “RealVideo 10 Codec” on page 62.

### RealAudio 10 Stereo Music Codecs

RealProducer 10 introduced new codecs for stereo music and stereo surround based on AAC encoding technology. These codecs replaced older codecs based on ATRAC3 technology. Within the RealProducer graphical user interface, these codecs are designated as “RealAudio 10”.

- 96 Kbps Stereo Music - RealAudio 10
- 128 Kbps Stereo Music - RealAudio 10
- 160 Kbps Stereo Music - RealAudio 10
- 192 Kbps Stereo Music - RealAudio 10
- 256 Kbps Stereo Music - RealAudio 10
- 320 Kbps Stereo Music - RealAudio 10
- 128 Kbps Stereo Surround - RealAudio 10
- 160 Kbps Stereo Surround - RealAudio 10
- 192 Kbps Stereo Surround - RealAudio 10

- 256 Kbps Stereo Surround - RealAudio 10
- 320 Kbps Stereo Surround - RealAudio 10

Many audience templates that formerly used the ATRAC3 codecs use the new RealAudio 10 stereo codecs at the same bit rates. The new codecs can encode any input acceptable to RealProducer, and can use any audio prefilter. You can use the encoded output for clips or live broadcasts. Note, however, that the RealAudio 10 codecs are compatible only with RealOne Player (an automatic codec update is required) and later. Listeners using older players are prompted to upgrade when they attempt to play the content.

**Note:** Stereo music codecs that encode at rates below 96 Kbps are not based on AAC technology. They are backwards-compatible to RealPlayer G2 or RealPlayer 8, depending on the precise codec used. For more information, refer to “Stereo Music Codecs” on page 41.

## RealAudio 5.1 Multichannel Codecs

RealProducer 10 added multichannel RealAudio codecs that preserve the discrete, multichannel sound data of input files as 5- or 6-channel audio. As found on DVDs, multichannel sound typically includes six discrete channels, commonly referred to as 5.1 channels. RealProducer includes the following predefined audience templates that use multichannel RealAudio:

- 5.1 Multichannel 450 Kbps VBR Download
- 5.1 Multichannel 700 Kbps VBR Download
- 5.1 Multichannel 1 Mbps VBR Download
- 5.1 Multichannel 1.5 Mbps VBR Download

**For More Information:** See “5.1 Multichannel Audio Codecs” on page 45 for details about multichannel encoding.

## RealAudio Lossless Codec

RealProducer 10 added a lossless RealAudio codec that faithfully reproduces the full dynamic frequency of the input audio file while compressing the output. The encoded clip, which is saved in the RealMedia variable bit rate format (.rmvb), is typically around half the size of the input file, though the compression rate varies with different types of input.

**For More Information:** See “Lossless Audio Codec” on page 47 for complete information.

## Audio Delay Compensation Prefilter

The audio delay compensation prefilter corrects audio shift when audio input is out of synchronization with a video's visual track. You must specify the use of this filter manually through a job file.

**For More Information:** See “Audio Delay Compensation Prefilter” on page 327.

## Video Resize Prefilter

Using a job file, you can resize a video before or after other video filters are applied. This gives you the flexibility to resize the video at any point during the prefiltering process.

**For More Information:** See “Video Resizing Methods” on page 319.

## Encoding Complexity

RealProducer 10 introduced encoding complexity modes of low, medium, and high that affect the RealVideo 9 and RealVideo 10 codecs, as well as the RealAudio lossless codec. The default value of high produces the best possible results, but also requires the most processing time. Lowering the complexity level to medium or low results in faster encoding times, but reduced quality (for video) or a larger file size (for lossless audio).

**For More Information:** See “Encoding Complexity Modes” on page 81.

## File Rolling for Large Clips

Through the RealProducer command-line application or job file, you can create multiple RealMedia files for a single output clip. This allows you to overcome limitations on the size of a single file, which is typically 2 to 4 Gigabytes, depending on the operating system. You can create a new output file based on the length of the encoding time, such as every 15 minutes, or on the size of the encoded file.



**For More Information:** See “File Destinations” on page 330 for information about adding file rolling to a job file. The section “Output and Destination Options” on page 271 explains how to set up file rolling through the command-line application.

## Multiple Outputs for a Single Encoding Job

Helix Producer 9 introduced the use of *multiple destinations*, which is the ability to write the same stream to more than one destination. This allows you to write to two separate files, for example, or to broadcast a stream to a server while simultaneously writing it to an archive file.

RealProducer 10 introduced *multiple outputs*, which builds on the multiple destinations feature. Using multiple outputs, you can vary the encoding properties of the various destinations during a single encoding session. There are many uses for multiple outputs, such as the following:

- You can encode clips with different properties for different bandwidths. For example, from the same input you can encode a clip for low-bandwidth connections using a small frame size, and a separate clip for high-bandwidth connections using a large frame size.
- You might broadcast a live stream at a relatively low bit rate to conserve bandwidth on your server. At the same time, you can archive the stream at a high bit rate to provide higher-quality, on-demand access to the event at a later point.

**For More Information:** You can define multiple outputs through the job file. For more information, refer to “File and Server Outputs” on page 329.

## Enhanced Load Management Capabilities

RealProducer 10 added enhanced load management capabilities that help to ensure that encoding processes for live streams do not lag behind the live input due to CPU constraints. This provides detailed feedback about how RealProducer changes the broadcast stream quality to manage the encoding load.

**For More Information:** See “Broadcast Load Management” on page 177.

## New Job File Format

With RealProducer 10, the syntax of the job file changed to make the file more extensible and robust. The new job file format uses generic XML tag names for inputs, prefilters, outputs, postfilters, and streams. For example, in an older job file, the black-level prefilter section looked like the following:

```
<blackLevelPrefilter>
  ...prefilter information...
</blackLevelPrefilter>
```

In the new job file, the black level prefilter section looks like the following:

```
<prefilter xsi:type="blackLevelPrefilter">
  ...prefilter information...
</prefilter>
```

**For More Information:** See also “Job File Versions” on page 14.

## Upgrade Issues

The following sections explain issues with upgrading to RealProducer 11 from an earlier version of RealProducer or Helix Producer.

### New Installation Directory

On Windows, RealProducer 11 installs by default in a new directory:

```
c:\Program Files\Real\RealProducer Plus 11
```

—OR—

```
c:\Program Files\Real\RealProducer Basic 11
```

RealProducer 11 does not overwrite previous installations of RealProducer or Helix Producer, and you can continue to use the older versions along with RealProducer 11.

### Job File Versions

RealProducer 11 uses the same job file format as RealProducer 10. This format differs from that introduced with Helix Producer 9, however. When it encounters an older job file, RealProducer 11 reads the file and saves it to the new format automatically. You can also update older job files as described in the section “Job File Syntax Update” on page 289.

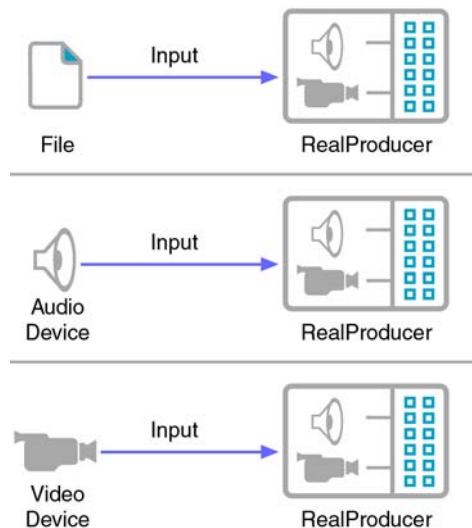
## MEDIA BASICS

This chapter introduces you to the steps for creating streaming or downloadable media. It describes the major features of RealProducer, and explains the procedures for encoding and delivering static clips or live broadcasts.

### Inputs and Sources

RealProducer encodes RealAudio and RealVideo clips and broadcasts from audio and video input. This input can be a file in a format such as WAVE, AVI, or MPEG. Or, the input may be live material that you have captured with a microphone or camera attached to an audio or video capture card on the RealProducer computer.

#### Files or Live Sources Used as Inputs



**For More Information:** For a list of acceptable input formats, refer to “Audio and Video Input Formats” on page 27.

## Audio and Video Editing Programs

Before you encode a clip with RealProducer, you can use the audio or video editing program of your choice to edit a digitized input file. Using this program, you can set a video's length, for example, cropping out any unnecessary parts. Although RealProducer provides some editing functions such as cropping, it does not provide all of the advanced features found in audio and video editing programs.

**Tip:** The quality of a streaming audio or video clip starts with the source file. The more you know about audio and video editing, the better you'll be able to produce a great streaming clip. For some pointers about preparing files for encoding, see Chapter 4 and Chapter 5.

## RealProducer Features

Once you have your audio or video input ready, you can encode the input as a RealVideo or RealAudio clip. Taken together, these clip types are called *RealMedia*. This section explains the aspects of RealProducer you use to encode a RealMedia clip or broadcast.

## Encoding Methods

On Windows, there are two ways to run RealProducer. You can use the RealProducer graphical application, or run the RealProducer command-line application. On Linux, you can use the command-line application.

### Graphical Application

The RealProducer *graphical application* provides an easy-to-use interface for encoding RealMedia clips and broadcasts. Using the graphical application, you can drag-and-drop input files, select your encoding options, and save the encoded output to a clip or send it to a server for broadcast. Chapter 6 explains the basic procedures for using the graphical application.

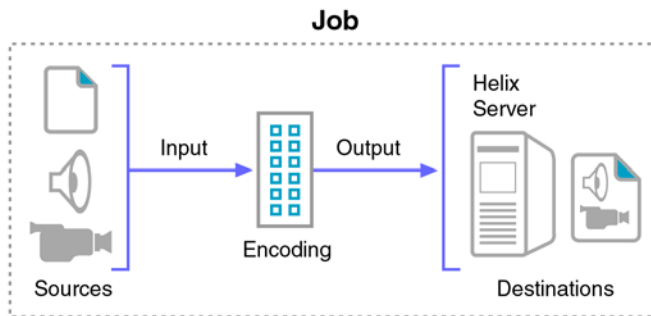
## Command-Line Application

You can run the *command-line application* from the command prompt on Windows or Linux. It provides all of the features of the graphical application, as well as a few advanced features not available through the graphical application. See Chapter 14 for information about running the command-line application.

## Jobs and Job Files

A *job file* is a central aspect of encoding RealMedia with RealProducer. The job defines how to encode your clip or broadcast. It selects the media inputs, sets the encoding properties, and defines the destinations, such as whether to save the encoded stream to a clip, forward it to a server for broadcast, or both.

### The Structure of a Job



Whether you use the graphical application or the command-line application, you can save your job settings in a *job file* for later use. You can also modify a job file's settings, either through RealProducer or by hand, to create a new job quickly. The job file uses an XML-based format to define all of the job's encoding settings.

**For More Information:** The section “Using Jobs” on page 85 explains how to define jobs through the graphical application. See “Job File Options” on page 259 for information about specifying jobs on the command line. Appendix B explains the job file syntax.

## Audiences

When you set up a job, you choose one or more *audiences*. An audience defines several aspects of the encoding job. Most importantly, it defines the bit rate at which a clip or broadcast streams. For a downloadable clip, the audience selection affects the clip's quality and file size. Selecting an audience is therefore one of the most important decisions you make when encoding a clip. RealProducer predefines a number of audiences designed for low-bandwidth streaming to modems and smartphones, high-quality download files, and many other uses.

**For More Information:** Chapter 7 describes the predefined audiences. “Choosing Audiences” on page 100 explains how to select audiences through the graphical application. The section “Audience Definitions or Audience Files (-ad)” on page 280 does the same for the command-line application. You can also create your own audiences, as explained in “Creating and Editing Audiences” on page 155.

### Constant Bit Rate and Variable Bit Rate Audiences

Each audience is either *constant bit rate* (CBR) or *variable bit rate* (VBR). The CBR audiences are designed for streaming. When you use them, you can encode multiple audiences into a clip or broadcast. For example, a single clip can stream to 56 Kbps modems and faster broadband connections when you use CBR encoding.

The VBR audiences are designed for downloadable clips, but can also be used for streaming in some instances. When you encode a downloadable clip, you select a VBR template according to how highly you want to compress the input, or how well you want to preserve the input's quality. Unlike CBR clips that can have multiple audiences, VBR clips can include just one audience.

**For More Information:** For background about CBR and VBR, refer to “Constant Bit Rate Video” on page 63 and “Variable Bit Rate Video” on page 66.

### Audience Files

RealProducer stores audience information in an XML-formatted *audience file* that you can edit by hand. You can also copy and modify an existing file to create your own audience definition. Appendix C explains the audience file

syntax. Refer to the section “Audiences Section” on page 340 for information about how to copy audience file information into a job file.

## Destinations and Outputs

Each job defines an *output*, which is the encoded media data and all of its properties. To define where RealProducer sends its output, you specify one or more *destinations*.

### Single and Multiple Destinations

A destination may be an encoded RealMedia clip, which is a file that uses one of the following file extensions:

- .ra – RealAudio

RealProducer automatically selects the .ra file extension if the input is audio-only. You can also select the .rm file extension for audio-only content.

**Tip:** Using the .ra file extension helps search engines identify the file as an audio-only clip.

- .rv – RealVideo

RealProducer uses the .rv file extension if the input is video-only or video-with-audio. You can also select the .rm file extension for video content.

**Tip:** Using the .rv file extension helps search engines identify the file as a RealVideo clip.

- .rm – RealAudio or RealVideo

RealProducer chooses the .rm file extension if it cannot determine the content of the input clip. You can use .rm file extension for any RealAudio or RealVideo clip, except for variable bit-rate clips.

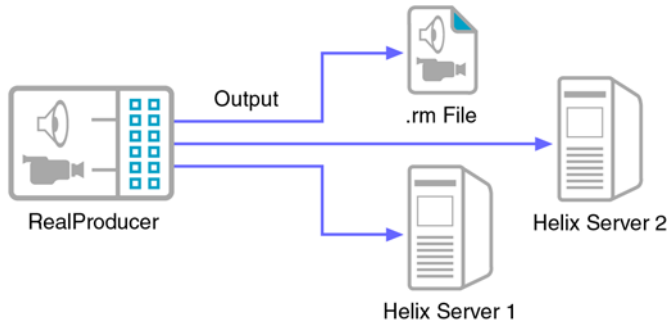
- .rmvb – variable bit-rate

RealProducer uses the .rmvb file extension if you choose a variable bit rate audience. You cannot use the .ra, .rv, or .rm extension when encoding a variable bit-rate clip.

**For More Information:** See “Variable Bit Rate Video” on page 66.

In addition to encoding a clip, you can define server destinations that send the encoded output to one or more Helix Servers for broadcast. All destinations receive the same output data. If network problems prevent encoded data from reaching a server destination, for example, a clip destination still records the data.

### Multiple Destinations for Job Output



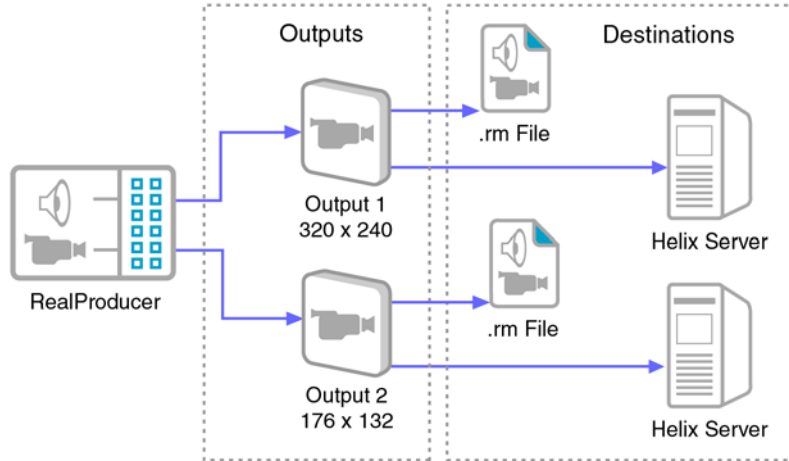
**For More Information:** You can encode multiple destinations for a single output through the graphical application as described in “Selecting Inputs and Destinations” on page 89. “File and Server Outputs” on page 329 explains how to define destinations within a job file.

### Multiple Outputs

RealProducer also lets you define *multiple outputs* that have different properties. From the same video input, for example, you might encode a large video clip for fast, broadband connections, and a smaller video clip for slow modem connections. Because each video has a different size, it is a separate output. Each of these outputs can have one or more destinations, whether saved as a clip or sent to a server. Encoding multiple outputs is possible when you define the outputs in a job file and run the job file through the command-line application.



### Multiple Outputs with Multiple Destinations



**For More Information:** For information about defining multiple outputs in a job file, see “File and Server Outputs” on page 329.

### Additional Encoding Settings

In addition to the audience selection, your job can define many additional encoding parameters.

#### Clip Information

Clips or broadcasts standardly encode information such as the presentation’s title, author, and copyright. The section “Adding Clip Information” on page 94 explains how to add clip information through the graphical application. Refer to the section “Clip Information Options” on page 266 for instructions about doing this through the command-line application. You can also add clip information directly to a job file, as described in “Clip Information” on page 305.

#### Video Filters

Video filters allow you to alter and improve the video input before encoding it. You can use these filters to remove artifacts such as video noise, as well as to crop and resize the video. The section “RealVideo Filters” on page 76 explains the filters. See the section “Filtering Video Input” on page 95 for information about applying filters through the graphical application. “Prefilter Options”

on page 268 explains how to specify filters on the command line, and “Prefilters” on page 317 covers the filter syntax used in the job file.

## Clip Modification

After you have encoded a RealMedia clip using RealProducer, you can move the clip to Helix Server for streaming, or place it on a download server. However, you may first want to use another application to edit or modify the encoded clip.

### RealMedia Editor

The *RealMedia Editor* allows you edit an encoded RealVideo or RealAudio clip. For example, you can use this application to change the clip information, remove a scene from a video, or combine several clips into a single clip. The RealMedia Editor is included with RealProducer Plus. You can run it as a graphical application on Windows, or a command-line application on Windows or Linux. Chapter 12 explains how to run the RealMedia Editor.

### Events Files

Using the *RealMedia Events* utility, you can encode clip information into an existing RealAudio or RealVideo clip. You can also add image maps or timed URLs to the clip. This allows viewers to click a video clip to open related Web pages in their browser. Or, an audio or video clip can open Web pages automatically when the clip reaches certain positions in its timeline. See Chapter 13 for information about defining clip events.

### Digital Rights Management

If you need to protect media assets, you can use RealNetworks' digital rights management technology. Using Helix DRM Packager, you can encrypt the contents of a RealMedia clip, then assign rights to that clip on an individual basis using Helix DRM License Server. Digital rights management is an optional and separate part of the media encoding process.

**Note:** For more about RealNetworks' DRM technology, visit <http://www.realnetworks.com/products/drm/index.html>.

## Presentations

Once you encode a clip, it is ready for streaming or downloading. Additionally, you can use various scripting or markup languages to combine multiple clips and Web pages into a media presentation. Other guides available from RealNetworks explain scripting and markup languages you can use with clips and broadcasts encoded by RealProducer.

**For More Information:** You can download RealNetworks' content creation guides in PDF or HTML format from <http://service.real.com/help/library/encoders.html>.

## Ram File

When your presentation is ready to stream, you may want to write a *Ram file*, which is so-named because it uses the file extension `.ram`, as in `movie.ram`. Also known as a *metafile*, the Ram file links your Web page to your media. Although a Ram file is not necessary when you stream a clip or broadcast using Helix Server, it is useful for passing simple parameters to RealPlayer. It might instruct RealPlayer to open the clip in full-screen mode, for example, or provide the URL to a Web page that displays as the clip plays.

**For More Information:** For information about writing a Ram file, refer to the Ram file chapter in *Introduction to Streaming Media*. The Ram file is also covered in the presentation delivery chapter of *RealNetworks Production Guide*.

## SMIL Presentations

You can also create a *Synchronized Multimedia Integration Language* (SMIL) file to integrate several clips into a single presentation. SMIL is the standard markup language for timing and controlling streaming media clips. Using a SMIL file, you can coordinate the layout and playback of multiple media clips in parallel (simultaneously) or in sequence. SMIL can also open HTML pages as a clip plays and provide interactive options, such as playing one of three different videos depending on which button the viewer clicks.

**Note:** For the basics of SMIL, see *Introduction to Streaming Media*. For a comprehensive look at SMIL, refer to *RealNetworks Production Guide*.

## Javascript Methods

RealPlayer supports Javascript and VBScript methods that you can use to play clips based on viewer interaction with forms or elements displayed in a Web page. If you are familiar with Web-based scripting, refer to *RealPlayer Scripting Guide* for more information.

## Media Delivery

Just as a Web server delivers Web pages to browsers, Helix Server serves streaming media to RealPlayer. Using Helix Server, you can stream clips that you have encoded using RealProducer. You can also set up live broadcasts in which RealProducer encodes live content in real-time, sending it to Helix Server for distribution to RealPlayer viewers.

### RealProducer, Helix Server, and RealPlayer



**For More Information:** For information about Helix Server features, refer to *Helix Server Administration Guide*, which you can browse or download from <http://service.real.com/help/library/servers.html>.

## On-Demand Clip Streaming

To deliver a streaming presentation, you need to have access to Helix Server. If you are not running Helix Server yourself, the Helix Server administrator can set up a method for you to deliver content. To stream a clip on-demand, you simply transfer the clip to a Helix Server content directory and add a link to the clip in a Web page.

## Live Broadcasts

Broadcasting a live event requires a closer coordination between RealProducer and Helix Server. The Helix Server administrator must set up certain server features to allow the broadcast stream. On RealProducer, you define certain server parameters that allow RealProducer to deliver the live stream. Chapter

10 explains the issues involved with broadcast. Refer to Chapter 11 for instructions about delivering a broadcast stream to Helix Server.



## INSTALLATION

This chapter describes the hardware and software requirements for RealProducer, and explains how to install the product. Instructions are given for Windows and Linux operating systems.

### Audio and Video Input Formats

It is better to work with uncompressed formats. Otherwise, you compress the source once when you digitize it and again when you encode it as RealVideo. This double compression can decrease the image quality. Use a compressed source format only if RealProducer supports the file as input.

**Tip:** Always keep copies of the video source files. You cannot convert RealVideo clips back to their original source formats or any other streaming formats.

### Uncompressed Input Formats

You can use the following file formats as input sources on any operating system that runs RealProducer. Using these formats does not require installing other audio and video software:

- Uncompressed QuickTime 3, 4, and 5 (.mov)
- WAV audio files (.wav)
- Uncompressed AVI (.avi)

### Formats Requiring DirectX

You can use the following file formats as inputs on Windows if you have DirectX 6 or higher installed. Some formats require DirectX 8:

- Compressed AVI (.avi)
- AIFF (.aif, .aifc, .aiff)

- MPEG (.mpg, .mpeg, .m1v, .mp3, .mpa, .mpe, .mpv2, .m3u)
- QuickTime 2 (.mov, .qt)

**For More Information:** For the latest version of DirectX, go to <http://www.microsoft.com>.

## Formats Requiring QuickTime

The following file formats can be used as sources on Windows if the latest version of QuickTime is installed:

- AU (.au, .snd, .ulw)
- Sound Designer II (.sd2)
- DV (.dif, .dv)
- QuickTime Flattened Movie (.mov, .qt)
- MPEG (.mpg, .mpeg, .m1v, .mp3, .mpa, .mpe, .mpv2, .m3u)

## Input Color Formats

The following color formats are supported for video captures:

- YUV12. This format is also known as I420. It is the native color format used by RealVideo codecs. Using I420 as input improves performance by removing the need to convert the color format before encoding.
- RGB 15, 16, 24, 32.
- BGR 15, 16, 24, 32. This is the Macintosh version of RGB.
- The following Windows YUV Formats: YUY2, YV12, YVU9, YVYU, CYUV, IYUV, UYNV, UYVY, V422, YUNV.
- The following Macintosh YUV Formats: 2VUY, YUVS, YVYU, YUVU, YVU9, YUV2, V210.



## System Requirements

The following table lists the minimum and the recommended requirements for using RealProducer 11.

System Requirements		
Requirement	Minimum	Recommended
Windows Version	Windows XP Windows 2000	Windows XP with the latest service pack
Linux Version	Linux 2.4 with glibc 2.1 or greater	Linux 2.6 (Red Hat 9 and SUSE 9 tested)
CPU	500 MHz	2.4 GHz or faster Pentium IV
RAM	128 MB	512 MB or more
Hard Disk Space	500 MB	1 GB
Color Display	16-bit	24-bit (TrueColor)
Sound Card	16-bit sound card or better	

- The minimum system configuration shown in the preceding table can encode the following job:

- command-line encoding of live data
- RealVideo 10 in high-complexity mode
- 240x180 pixel frame size
- 15 frames per second
- SureStream clip with the 28k Dial-up and 56k Dial-up audiences

Encoding through the graphical application, or encoding for additional, higher-bandwidth audiences results in a reduction of encoding complexity or frame rate.

**For More Information:** For information about frame rates and complexity modes, refer to “Encoded Frame Rates” on page 59 and “Encoding Complexity Modes” on page 81, respectively.

- The system configuration recommended in the preceding table can encode the following job without any degradation in encoding complexity or frame rate:
  - command-line encoding of live data
  - RealVideo 10 in high-complexity mode

- 320x240 pixel frame size
- 30 frames per second
- 768k DSL or Cable audience

## Chipset Optimizations

The following are CPU optimizations supported by RealProducer, along with the approximate performance increase each chipset provides:

- MMX—400 percent performance increase over non-MMX systems.
- SSE1—No performance increase.
- SSE2—20 percent performance increase in addition to MMX performance improvements.
- SSE3—6 to 7 percent performance above SSE2.
- Hyperthreading—Up to 20 percent performance improvement on top of other chipset improvements.

**Note:** On Windows, use of hyperthreading is recommended only with Windows XP. To be effective, hyperthreading requires a Level 2 CPU cache of at least 1 MB.

**For More Information:** Consult your hardware vendor's documentation to determine if your hardware supports these optimization instruction sets.

## Additional Basic Requirements

In addition to normal hardware and software requirements, RealNetworks recommends that you have the following products:

- latest version of RealPlayer
- speakers or headphones connected to your sound card

For recording from a media device, you should have any of the following connected to your computer:

- video capture card, if encoding live video
- S-VHS, Digi-Beta, or Beta-SP video player
- video camera

- microphone

To send audio and video directly to your computer, you will need the following:

- A media device such as a VCR, video camera, or microphone.
- For capturing live audio, a sound card.
- For capturing live video, a video capture card, unless you can connect a video device directly to your computer by IEEE -1394 (Firewire, iLink), or a USB port.

## Installing RealProducer on Windows

The following procedure explains how to install RealProducer onto a computer running Windows. See “System Requirements” on page 29 for computer and operating system requirements.

► To install RealProducer onto Windows:

1. Download the installation program or insert the CD-ROM into your drive.
2. Close any other applications that may be open and double-click on the installation program icon. The installer unpacks the required files and opens the License Agreement.
3. Read the terms and conditions carefully, and select **I accept the terms in the licence agreement** if you agree. You can click **Cancel** at any time to abort the installation.
4. Click **Next** to continue. The Serialization page opens.
5. Enter your name, company name, and serial number you received when you purchased RealProducer.
6. Click **Next** to continue. The Install Options page opens.
7. The default install directory that RealProducer will install to your computer is listed. You can change this default install directory by clicking the **Browse** button and selecting the new path.
8. You also have the options to select whether a shortcut to RealProducer will be created on the desktop and/or on the Quick Launch toolbar, and whether command line tools will be added to your PATH.

**Warning!** You must have enough disk space and write access to the location where you intend to install RealProducer. If not, you will not be able to continue the installation.

9. Click **Next** to continue. The install program installs all necessary files and opens the Finishing Up page.
10. Choose whether you want to launch RealProducer and/or the Readme file when you exit the install program.
11. Click **Finish** to exit.

## Installing RealProducer on Linux

The following procedure explains how to install RealProducer onto a computer running Linux. See “System Requirements” on page 29 for computer and operating system requirements.

► **To install RealProducer onto Linux:**

1. Download the installation program, or insert the CD-ROM into your drive.
2. Make sure your CD drive is mounted properly, if installing from a CD.
3. Copy the installer to your hard drive if you are getting it from a CD.
4. Start RealProducer installer by entering one of the following, depending on whether you have RealProducer Plus or RealProducer Basic:

```
./realproducer_plus_11_linux_setup.bin
```

```
./realproducer_basic_11_linux_setup.bin
```

The installer extracts the necessary files to the directory where the installer is located. It then installs all necessary programs and files. When complete, the installer shows the Software License agreement.

5. With RealProducer Plus, enter the serial number when prompted.



## ENCODING BASICS

The following chapters explain how to set up, start, and monitor an encoding job using the RealProducer graphical application. Chapter 7 describes audiences, which you can use with the graphical or command-line application.



## PRODUCING AUDIO

RealNetworks pioneered streaming audio with RealAudio, the first streaming media product for the Internet. Since its debut in 1995, RealAudio has become the standard for network audio, delivering stereo sound over 28.8 Kbps modems and CD-quality sound at high connection speeds. This chapter provides a reference for the RealAudio codecs, and gives pointers on how to prepare and encode your sound files for streaming or downloading.

**For More Information:** See also “Adjusting Audio Gain” on page 143 and “Audio Delay Compensation Prefilter” on page 327 for information about audio filters that you can use with RealProducer.

### Understanding RealAudio

Because RealAudio clips are compressed, you typically start with a sound file in an uncompressed format such as WAV or AIFF. Using RealProducer, you create a RealAudio clip from the source file. RealAudio clips typically use the file extension `.ra` or `.rm`, although clips may also end with `.rmvb` (variable bit-rate clip). The following sections explain how RealAudio encodes an audio file for streaming. This information will help you to produce high-quality streaming clips.

### Bandwidth and Audio Quality

One way that RealAudio codecs squeeze an audio file’s size down is by throwing out nonessential data. This makes it a *lossy* compression format. RealAudio doesn’t delete data indiscriminately, though. It first jettisons portions you cannot hear, such as very high and very low frequencies. Next, it removes as much data as needed while keeping certain frequencies intact.

Voice encoding favors frequencies in the normal human speaking range. Music encoding retains a broader frequency range.

Although RealAudio is savvy about what audio data it throws out, be aware that the lower the target streaming speed, the more data gets ejected, and the cruder the sound quality becomes. At low bandwidths, you get roughly the quality of an AM radio broadcast. With faster connections, you can encode music with FM-quality sound. And at the high speeds of DSL, cable modems, and LANs, RealAudio sound quality rivals that of CD or multichannel DVD playback. When creating RealAudio clips for any bandwidth, it's important to start with high-quality input, as described in "Audio Capture" on page 50, to attain good sound quality.

### RealAudio Bandwidth Characteristics

You create a RealAudio clip by using one or more RealAudio *codecs*. A codec is a coder/decoder. It tells RealProducer how to turn audio source files into RealAudio clips. On the receiving end, RealPlayer uses codecs to expand clips into audio data the computer can play. RealAudio employs a series of codecs, each of which creates an audio stream for a precise bandwidth. One codec compresses mono music for a 28.8 Kbps modem. Another one compresses stereo music for that same modem speed. This set of codecs is different from the set used to compress music for, say, DSL and cable modem connections.

A RealAudio clip consumes bandwidth at a relatively constant rate determined by the codec used to encode the clip. A RealAudio clip encoded with a 20 Kbps codec, for example, steadily consumes 20 Kbps of bandwidth as it plays. The following table lists the standard bit rates for RealAudio clips encoded for specific target audiences by RealProducer. Encoding a voice-only audio file for a 28.8 Kbps modem, for example, creates a 16 Kbps streaming clip. With mono music input, though, you get a 20 Kbps clip.

**RealAudio Standard Bit Rates**

Target Audience	Voice Only	Voice and Music	Mono Music	Stereo Music
28.8 Kbps modem	16 Kbps	20 Kbps	20 Kbps	20 Kbps
56 Kbps modem		32 Kbps	32 Kbps	32 Kbps
64 Kbps single ISDN	32 Kbps	44 Kbps	44 Kbps	44 Kbps

(Table Page 1 of 2)



**RealAudio Standard Bit Rates (continued)**

Target Audience	Voice Only	Voice and Music	Mono Music	Stereo Music
112 Kbps dual ISDN	64 Kbps	64 Kbps	64 Kbps	64 Kbps
Corporate LAN		96 Kbps		132 Kbps
256 Kbps DSL/cable modem	176 Kbps			
384 Kbps DSL/cable modem	264 Kbps			
512 Kbps DSL/cable modem	352 Kbps			

(Table Page 2 of 2)

**Tip:** In terms of bandwidth use, RealAudio is inflexible. The RealAudio codecs set streaming bit rates in a stairstep model: 20 Kbps, 36 Kbps, 44 Kbps, and so on, with no inbetween choices. Because RealAudio clips always stream at specific bit rates, consider their bandwidth needs first when you use them in multiclip presentations. Then create your other clips to stream within the remaining bandwidth.

**For More Information:** With SureStream technology, a single RealAudio clip can stream at many different speed. For the basics of SureStream, see “SureStream CBR Clips” on page 63.

## RealAudio Codecs

When you encode a RealAudio or RealVideo clip using RealProducer, you do not select the RealAudio codec directly. Instead, you choose your audience settings, as described in the section “Choosing Audiences” on page 100. You might select one audience, such as 256 Kbps DSL users, or encode multiple audiences into a single SureStream clip that can stream at different bit rates.

Unless you wish to change the audience defaults, you just need to select the right audience settings when you encode a clip to have RealProducer use the appropriate RealAudio codec. The audience templates presented in the RealProducer graphical user interface always indicate the target streaming speed, such as with the “384k DSL or Cable Modem” audience.

Note, though, that the type of audio input you use can affect your choice of audience. If you are using stereo surround audio as your source, you may want to encode using the “350k Surround Stereo” audience template instead of a template that encodes just standard, two-channel stereo audio. Or, if the input

is multichannel, you may want to choose the “350k Multichannel” audience setting. The following sections explain more about these audio types.

Additionally, you should note RealPlayer compatibility with the RealAudio codecs you use. Old versions of RealPlayer can play audio encoded with voice codecs, for example, but only RealOne Player and later can play audio encoded with certain stereo, stereo surround, and multichannel codecs. The sections that list the available codecs explain compatibility issues. Note, too, that all RealPlayers since 1998 have the ability to upgrade automatically to new audio codecs or a new player version if the user attempts to play an unsupported RealAudio format.

**Tip:** Chapter 9 explains how to determine, and change if necessary, the codec settings used with each audience setting. If you wish to change a default setting, be sure that you understand the codec properties described in the following sections.

## Understanding the RealAudio Codec Tables

The following sections describe the RealAudio codecs available through RealProducer. The codecs are listed in separate tables for voice, mono music, stereo music, stereo surround, multichannel, and lossless audio. Each table provides the following information.

### Codec

The Codec column describes the codec as it appears in the RealProducer interface. The name lists the streaming bit rate for the encoded audio, and indicates the type of audio input the codec is suited for.

### Type and Flavor

The Type and Flavor columns identify the codec for use with the command-line application. This information is not shown in the RealProducer graphical user interface.

### Sampling Rate

The sampling rate column lists the codec's optimum sample rate. If the input does not have the expected rate, RealProducer resamples the input without causing pitch shifting. For best results, the audio input should have the same or higher sampling rate than the codec's rate. For SureStream clips, the input

sampling rate should be equal to or greater than the largest sample rate of all codecs used. Although RealProducer accepts audio input at any sampling rate, it is optimized for the following rates:

- 4 kHz
- 8 kHz
- 11.025 kHz
- 16 kHz
- 22.05 kHz
- 24 kHz
- 32 kHz
- 44.1 kHz
- 48 kHz
- 96 kHz

**Tip:** After you load a clip as input, a process described in “Using a File as the Input” on page 89, you can click the **Source Properties** button to display the audio properties, including the sampling rate.

**For More Information:** RealProducer allows you to choose high-quality resampling (recommended) or fast resampling. The section “Setting Audio Parameters” on page 98 explains how to set this option in the graphical application. See “Audio Resampling Quality (-arq)” on page 282 and “Media Profile Properties” on page 335 for information about setting this option through the command-line application or job file, respectively.

## Voice Codecs

Voice codecs produce the best results for voice-only audio input. The lowest-speed voice codec normally used to encode a RealAudio clip streams data at 16 Kbps. The lower-speed codecs (5, 6.5, and 8.5 Kbps) are used as SureStream duress streams when the connection bandwidth drops. They’re also used to encode soundtracks for low-bandwidth RealVideo clips. The following table

lists the available voice codecs, which are compatible with RealPlayer G2 and later.

**RealAudio Voice Codecs**

Codec	Type	Flavor	Sampling Rate
5 Kbps voice	sipr	2	8 kHz
6.5 Kbps voice	sipr	0	8 kHz
8.5 Kbps voice	sipr	1	8 kHz
16 Kbps voice	sipr	3	16 kHz
32 Kbps voice	cook	7	22.05 kHz
64 Kbps voice	cook	14	44.1 kHz

## Mono Music Codecs

Music codecs are designed to encode audio with a larger frequency range than voice. You will capture a broader, fuller sound with codecs designed for higher bit rates. As with the voice codecs, the lowest-speed mono music codec normally used with RealAudio streams data at 16 Kbps. The lower-speed codecs (6, 8, and 11 Kbps) are used as duress streams in SureStream clips, and to encode soundtracks for low-bandwidth RealVideo clips. When there are two versions of a codec, RealProducer uses the higher-response version by default.

### About High-Response Codecs

The 20 kbps, 32 kbps, and 44 kbps music codecs come in two varieties. By default, RealProducer uses the “high response” versions, which are the better codecs for most situations. But you can also use the “normal response” versions by changing your audience templates, as described in Chapter 9.

The high response codecs cover a larger frequency range than the normal response versions. Sometimes, the high response version has twice the range as the normal codec. This means it provides crisper sound and is better at capturing high frequencies. With symphonic music, for example, the high response codec gets more of the flute and piccolo. It can produce more distortion than the normal response codec with voices and loud sounds such as drums, though.

If you are encoding music with a diverse range of frequencies, stick with the high response codecs. If you notice distortion, compare your results with a clip that uses the normal response codecs. The best tool for determining which

codec to use is your ear. Listen carefully for minute differences in how the clip sounds. It also helps to have other people listen. Our own ears have different frequency responses, too.

### Available Mono Music Codecs

You can use the following codecs to encode audio files as mono music. All mono music codecs are compatible with RealPlayer G2 and later.

Mono Music Codecs			
Codec	Type	Flavor	Sampling Rate
6 Kbps Music - RealAudio	cook	8	8 kHz
8 Kbps Music - RealAudio	cook	0	8 kHz
11 Kbps Music - RealAudio	cook	1	8 kHz
16 Kbps Music - RealAudio	cook	2	8 kHz
20 Kbps Music - RealAudio	cook	3	11.025 kHz
20 Kbps Music High Response - RealAudio	cook	15	22.05 kHz
32 Kbps Music - RealAudio	cook	4	22.05 kHz
32 Kbps Music High Response - RealAudio	cook	16	44.1 kHz
44 Kbps Music - RealAudio	cook	5	44.1 kHz
64 Kbps Music - RealAudio	cook	6	44.1 kHz

### Stereo Music Codecs

Use stereo music codecs for encoding traditional, two-channel stereo music. RealProducer also uses these codecs when you encode voice-with-music clips.

#### Types of Stereo Music Codecs

You can encode many different bandwidths of stereo music, using three different stereo codecs:

- The oldest stereo music codecs produce lower quality sound than newer codecs, but are compatible with RealPlayer G2 and later.
- Stereo music codecs listed as “RealAudio” in the following table provide high quality stereo sound compatible with RealPlayer 8 and later.

**Note:** At several bandwidths, you can choose between normal and high response versions of the stereo codecs. RealProducer uses the higher-response version by default. But you can

change to a normal response version as described in “Creating and Editing Audiences” on page 155.

**For More Information:** The section “About High-Response Codecs” on page 40 explains the difference between normal and high-response audio encoding.

- The codecs listed as “RealAudio 10” in the following table and the RealProducer interface are based on AAC technology. They are compatible with RealOne Player (a codec autoupdate is required) and later.

### Available Stereo Music Codecs

The following stereo music codecs are available in RealProducer 11.

Stereo Music Codecs			
Codec	Type	Flavor	Sampling Rate
12 Kbps Stereo Music - RealAudio	cook	26	11.025 kHz
16 Kbps Stereo Music - RealAudio	cook	17	22.05 kHz
20 Kbps Stereo Music	cook	9	11.025 kHz
20 Kbps Stereo Music - RealAudio	cook	18	22.05 kHz
20 Kbps Stereo Music High Response - RealAudio	cook	19	22.05 kHz
32 Kbps Stereo Music	cook	10	22.05 kHz
32 Kbps Stereo Music - RealAudio	cook	20	22.05 kHz
32 Kbps Stereo Music High Response - RealAudio	cook	21	44.1 kHz
44 Kbps Stereo Music	cook	11	22.05 kHz
44 Kbps Stereo Music - RealAudio	cook	22	44.1 kHz
44 Kbps Stereo Music High Response - RealAudio	cook	23	44.1 kHz
64 Kbps Stereo Music	cook	12	44.1 kHz
64 Kbps Stereo Music - RealAudio	cook	24	44.1 kHz
64 Kbps Stereo Music - RealAudio 10	raac	0	44.1 kHz
96 Kbps Stereo Music	cook	13	44.1 kHz
96 Kbps Stereo Music - RealAudio	cook	25	44.1 kHz
96 Kbps Stereo Music - RealAudio 10	raac	1	44.1 kHz
128 Kbps Stereo Music - RealAudio 10	raac	2	44.1 kHz
160 Kbps Stereo Music - RealAudio 10	raac	3	44.1 kHz
192 Kbps Stereo Music - RealAudio 10	raac	4	44.1 kHz

(Table Page 1 of 2)

**Stereo Music Codecs (continued)**

Codec	Type	Flavor	Sampling Rate
256 Kbps Stereo Music - RealAudio 10	raac	5	44.1 kHz
320 Kbps Stereo Music - RealAudio 10	raac	6	44.1 kHz

(Table Page 2 of 2)

**Stereo Surround Codecs**

Encode your audio using a stereo surround codec if you know that the source audio is matrixed, multiple-channel sound, and you wish to preserve the multiple channels for your listeners. Because stereo surround is compatible with conventional stereo systems, listeners who do not have stereo surround-enabled equipment will still be able to hear the two main channels. Stereo surround audio and video clips are suitable for streaming or download.

**What is Stereo Surround?**

Stereo surround audio includes more channels than traditional stereo, which uses just the left and right channels. These additional channels are mixed (or *matrixed*) using the conventional left and right stereo channels. This allows older receivers to play just the left and right channels, while newer receivers enabled for stereo surround can extract from the left and right channels the audio data for the additional speakers.

**For More Information:** You can find background about producing stereo surround input at the Dolby Laboratories Web site at <http://www.dolby.com/tech/>. See also <http://www.realnetworks.com/resources/index.html> for additional information.

**Channel Support for Stereo Surround Audio**

The RealAudio stereo surround codecs preserve the matrixed, multichannel surround audio in the audio input. RealProducer supports any number of matrixed channels. Because the audio input is standard stereo input, the computer running RealProducer does not require a special sound card or

cabling. The following table explains the common channel arrangements found in matrixed, stereo surround audio.

#### Common Channel Arrangements in Matrixed, Stereo Surround Audio

Channels	Description
4	To the standard left and right channels, this arrangement adds a front center and a rear center channel.
5.1	This type of matrixing uses five main channels: left, center, right, left surround, and right surround. The “.1” refers to a sixth, low-frequency effects (LFE) bass channel that covers a fraction of the frequency range of the main channels.
6.1	Building on the 5.1 arrangement, this type of matrixing adds two additional channels for playback on two additional speakers.
7.1	Also building on the 5.1 arrangement, this type of matrixing adds four additional channels for playback on two additional speakers.

#### Sources of Stereo Surround Audio

It is important to note that RealProducer does not mix the multichannel stereo surround into the left and right stereo channels itself. The source you are encoding, whether a static clip or live input, must be matrixed already. This type of audio content is typically created using encoders by Dolby (<http://www.dolby.com>), CRS Labs, or Digital Theater Systems (<http://www.dtsonline.com/>). These sources are prevalent on DVDs and television broadcasts. Although you can use non-digital surround sources, digital sources provide the best results.

#### Playback of Stereo Surround Audio

To hear the matrixed, surround sound, RealPlayer users can play the audio on an A/V receiver, such as a home theater system, that is equipped with stereo surround decoding, and that is connected to the surround channels and optional subwoofer. As well, some computer speakers will play stereo surround audio directly. Audio systems not enabled for stereo surround play just the standard left and right stereo channels.

#### Standard Stereo Codecs for Stereo Surround Audio

If you do not want to preserve the stereo surround information, you can encode your audio with an audience template that uses the conventional stereo codecs described in “Stereo Music Codecs” on page 41. The primary



reason to do this is to stream at bandwidths lower than those available for stereo surround. By using a SureStream clip, you can encode low-bandwidth streams in conventional stereo, and high-bandwidth streams that use stereo surround audio.

### Standard Stereo Input for Stereo Surround

If your audio source is traditional, two-channel stereo, do **not** encode the input using stereo surround audio codecs. Although traditional stereo encodes OK as stereo surround audio, RealProducer does not create the extra channels (it only preserves existing channels), so using stereo surround audio codecs does not enhance the listening experience. Additionally, the standard stereo codecs are more efficient at encoding two-channel stereo than the stereo surround audio codecs.

### Available Stereo Surround Codecs

RealProducer can encode stereo surround audio with any of the following codecs. The three “RealAudio” codecs are compatible with RealPlayer 8 and later. The “RealAudio 10” codecs, which are based on AAC technology, are compatible with RealOne Player (a codec autoupdate is required) and later.

**Stereo Surround Audio Codecs**

Codec	Type	Flavor	Sampling Rate
44 Kbps Stereo Surround Audio - RealAudio	cook	29	22.05 kHz
64 Kbps Stereo Surround Audio - RealAudio	cook	27	44.1 kHz
96 Kbps Stereo Surround Audio - RealAudio	cook	28	44.1 kHz
128 Kbps Stereo Surround - RealAudio 10	raac	7	44.1 kHz
160 Kbps Stereo Surround - RealAudio 10	raac	8	44.1 kHz
192 Kbps Stereo Surround - RealAudio 10	raac	9	44.1 kHz
256 Kbps Stereo Surround - RealAudio 10	raac	10	44.1 kHz
320 Kbps Stereo Surround - RealAudio 10	raac	11	44.1 kHz

## 5.1 Multichannel Audio Codecs

The multichannel RealAudio codecs preserve the discrete, multiple channels in the audio source. Use them if you know that the source audio includes multichannel sound, and your intended listeners have home theater systems

or other equipment able play all of the channels. Multichannel audio and video clips are suitable for streaming or download.

### What is Multichannel Audio?

Like stereo surround audio, multichannel audio includes channels in addition to the left and right stereo channels. Unlike stereo surround, however, multichannel audio encodes the additional channels separately, rather than mixing all channels into the signals for the left and right speakers. For this reason, multichannel audio is often called *discrete* multichannel, rather than the *matrixed* multichannel of stereo surround audio.

Using multichannel audio preserves the optimum sound quality of multichannel audio. With stereo surround, the matrixing process may replicate some audio data meant for one channel on another channel. (This is an artifact of the stereo surround mixing in the audio source, rather than the RealAudio encoding.)

### Sound System Requirements for Multichannel Audio Encoding

To use discrete, multichannel audio, your sound system must capture and preserve each channel. If you start with a prerecorded file, for example, that digitized file format must preserve the additional channels. A common audio format to use with multichannel audio is AC-3, which is also called *Dolby Digital*. For live capture, the sound card used with the RealProducer computer must support the multiple input channels. A standard sound card supporting only two-channel stereo input will not work for discrete, multichannel audio.

### Channel Support for Multichannel Encoding

RealProducer encodes all multichannel output as 5.1 channels (left, center, right, left surround, right surround, LFE bass) or 6 channels. It can accept fewer than six channels as input, upmixing as necessary to create the additional channels. The obsolete quadraphonic multichannel format, which uses two front and two back channels, is not supported.

### Multichannel Input Formats

RealProducer can encode multichannel input from a file but not from a live capture. You can use the following audio source formats as input for the RealAudio multichannel codecs:

- DirectShow (Windows Only)

- Uncompressed Wave (.wav)
- Uncompressed AVI (.avi)
- Uncompressed QuickTime (.mov)
- Compressed QuickTime (Windows Only)

### Playback of Multichannel Audio

To hear the different channels in discrete, multichannel audio, RealPlayer users on Windows can direct the audio to a multichannel-enabled sound card or home theater system. With traditional speaker systems, and on operating systems other than Windows, RealPlayer converts the audio signal to the standard stereo channels.

### Standard Stereo Codecs for Multichannel Audio

As with stereo surround audio, you can encode multichannel audio with standard stereo codecs. This does not preserve the multiple channels, however. For example, you might create a SureStream RealAudio clip that streams multichannel audio at high bandwidths and standard stereo at low bit rates. You should not encode standard stereo input with the multichannel codecs, however, as the quality will not be as high as when you use standard stereo codecs.

### Available Multichannel Codecs

The following codecs are available for high-bandwidth, multichannel recordings. All multichannel codecs are compatible with RealOne Player (a codec autoupdate is required) and later.

**Multichannel Audio Codecs**

Codec	Type	Flavor	Sampling Rate
96 Kbps 5.1 Multichannel - RealAudio 10	cook	30	44.1 kHz
132 Kbps 5.1 Multichannel - RealAudio 10	cook	31	44.1 kHz
184 Kbps 5.1 Multichannel - RealAudio 10	cook	32	44.1 kHz
268 Kbps 5.1 Multichannel - RealAudio 10	cook	33	44.1 kHz

### Lossless Audio Codec

RealProducer 11 includes a lossless RealAudio codec that faithfully reproduces the full dynamic frequency of the input audio file while

compressing the output. The encoded clip, which is saved in the RealMedia variable bit rate format (.rmvb), is typically around half the size of the input file, though the compression rate varies with different types of input.

### What is Lossless Encoding?

The RealAudio lossless codec is designed primarily for high-quality music downloads in mono or two-channel stereo format (multichannel output is not supported). It replicates CD-quality sound in a format that takes less time for the user to download.

The RealAudio lossless codec preserves the exact sound of the input audio while compressing the file size to about half the original size. Although the lossless audio codec is designed for high-fidelity music downloads, you can also use it with streaming clips and broadcasts in high-bandwidth environments.

**Note:** The lossless codec is not accessible through the graphical user interface. Use the command-line application as described in Chapter 14 to encode your files as lossless streams.

### Input Formats for Lossless Encoding

You can encode any audio or video format acceptable to RealProducer 11 with the RealAudio Lossless codec. The codec is optimized for 16-bit, 44.1 kHz audio used in audio CDs, but other sampling rates and bit depths are accepted as well. During encoding, you can apply the audio delay, audio gain, or audio meter prefilter.

### Output Formats for Lossless Encoding

The primary, intended output for lossless encoding is a single audio stream saved as a downloadable clip. However, you can also use lossless audio when encoding constant bit rate or variable bit rate video clips. You can also use lossless audio encoding for streaming clips or broadcasts.

### Player and Server Compatibility for Lossless Audio

Lossless audio clips can be streamed and downloaded for playback by RealOne Player (an automatic codec update is required) and later. You can stream or broadcast using lossless audio with Helix Server version 9 and later servers.

### Streaming Rates for Lossless Audio Clips

Although a lossless audio stream is intended for downloading, it can also be streamed. However, unlike audio streams encoded with other codecs, a lossless stream does not have a single target stream rate. Instead, the streaming rate is approximately the size of the audio data in Kilobits divided by the audio duration in seconds. For example, a lossless audio clip that is 6 Megabytes (49,152 Kilobits) and plays for 2 minutes (120 seconds) streams at a rate of 410 Kilobits per second. Use of lossless audio for streaming media is therefore recommended only for high-bandwidth situations.

**Tip:** If you use lossless audio in a streaming video clip, keep in mind that the visual track is compressed to fit within the remaining bandwidth of the overall target rate. If the audio uses up most of the streaming bandwidth, the video's visual quality will suffer.

### Lossless Audio Encoding Modes

RealProducer 11 provides three encoding modes—low, medium, and high—that affect video and lossless audio. All modes faithfully reproduce the full audio range of the input file. The higher compression modes perform more complex analysis on the input, however, resulting in longer encoding times but smaller file sizes. Because of the reduced file sizes, the higher compression modes create lossless audio clips that stream at lower bit rates.

### Limitations on Editing Lossless Clips

With one exception, a lossless audio clip cannot be modified:

- Using RealPlayer, users can convert a lossless audio clip to a .wav file, or to a lower-fidelity format (such as MP3) for transfer to portable devices.
- RealProducer cannot convert a lossless audio clip back to its original source format.
- RealProducer cannot re-encode a lossless clip using another audio codec. You should therefore always keep your source file if you plan to encode additional clips.
- You cannot edit a lossless audio clip using the RealMedia editor.

### Available Lossless Codec

Use the following lossless codec to encode perfect quality sound. The RealAudio lossless codec is compatible with RealOne Player (a codec autoupdate is required) and later.

RealAudio Lossless Codec			
Codec	Type	Flavor	Sampling Rate
RealAudio Lossless Audio	ralf	0	same as source material

## Audio Capture

A streaming clip reflects the quality of its audio source. Any quality problems within the source will affect the streaming clip as well. Because you cannot edit a broadcast, live Webcasting introduces several issues beyond those involved with delivering on-demand clips. This section will help you capture high-quality audio source files, or set up your sound equipment to deliver good broadcasts.

**For More Information:** For information about broadcasting live content, refer to Chapter 10.

## Source Media

If you plan to stream existing material, start with the best source possible. Use the cleanest recording with the least amount of unwanted noise. Compact discs (CDs) and digital audio tapes (DATs) are good source media, although well-recorded analog sources such as records, reel-to-reel tapes, and chrome (type II) cassettes can sound just as good. Try to avoid consumer-grade recording media such as Type I cassettes and VHS tapes.

## Recording Equipment

Every piece of equipment in the audio chain—microphone, mixer, sound card, and so on—affects sound quality. If you intend to provide professional-quality audio content, invest in professional-quality audio equipment and software. Lesser equipment can add hiss and distortion, degrading sound clarity.

## Shielded Cables

It is important to use high-quality, shielded cables. Using unshielded cables increases the likelihood of introducing line noise and radio frequency interference into recordings. Keep audio cables physically separated from power cords to minimize the introduction of noise. Also be sure to ground all equipment properly.

## Input Levels

Setting correct input levels is crucial. All audio equipment has a dynamic range, the ratio between the loudest possible sound the equipment can reproduce without distortion and its inherent “noise floor.” Also called “clipping,” distortion of this type is audible as a high-frequency crackling noise.

To get the best dynamic range, set the input level on each audio device in the signal chain so that it uses its full range of available amplitude without distortion during the program’s loudest sections. The signal chain typically includes a microphone, a mixing desk, a compressor, and a sound card. For each piece of equipment, set levels as close as possible to 0 decibels without going over that level.

Check for signal distortion at each point in the signal chain. Perform several test runs, and make sure that there are no peaks above maximum amplitude. Adjust the levels on your sound card mixer so that the input approaches but does not exceed the maximum. Be conservative, though. Levels might suddenly increase if, for instance, an interviewee suddenly speaks loudly or a crowd at a sports event roars.

## Volume Levels for Live Broadcasts

When broadcasting live audio streams, it is useful to have a dynamics compressor for gain compression (not data compression). This piece of audio equipment automatically adjusts the volume level. By providing a consistent volume level, it allows you to “set and forget” the input levels to RealProducer.

## Sampling Rates

Try to capture sound with a sampling width of 16 bits. RealAudio codecs have different sampling rates that produce the best sound, however. If your sound card allows it, capture audio content at the optimum sampling rate for the

codec you intend to use. RealProducer will convert the file to the optimum rate if necessary, but this is recommended only for static files. For live broadcasts, use a sound card that supports the optimum rate. This avoids the overhead entailed in converting the rate while encoding sound in real time.

**For More Information:** “RealAudio Codecs” on page 37 lists the optimum sampling rates for each codec.

**Tip:** You do not need to capture stereo sound if you plan to use a mono codec. However, many sound cards simply discard the right input channel in mono mode. If you have a mixing desk, pan all inputs to the center so that nothing is lost during the conversion to mono.

## Audio Optimization

If you are not broadcasting audio live, you work with digitized audio source files in supported formats such as WAV or AIFF. You then edit the audio files to optimize them. To do this, you need to be familiar with the features your editing program offers. This section gives you some optimization tips you can try with your editing software before encoding your clips with RealProducer.

**Tip:** Always keep copies of your audio source files. You cannot convert RealAudio clips back to their original source formats.

### DC Offset

DC offset is low-frequency, inaudible noise that results from equipment grounding problems. If you don't remove it, it can skew the results of subsequent sound editing. Use your sound editor's **DC Offset** function immediately after recording a digital audio file.

**Tip:** If your editing program has this option, remove DC offset during recording. This eliminates an editing step.

### Normalization

Set sensible input levels when recording, and then use normalization to maximize the levels after recording. Your streaming files sound best when your digitized source has the highest possible gain without clipping. Digital audio files that do not use their full amplitude range produce low-quality



streaming clips. If the amplitude range is too low, use your sound editor to adjust the range and increase the amplitude.

**Tip:** Most sound editors have a **Normalize** function that maximizes levels automatically. Because some systems have trouble with files normalized to 100 percent, normalize to 95 percent of maximum, or to -0.5dB.

## Dynamics Compression

Normalization maximizes the volume level of the audio file's loudest sections. Consequently, quiet sections may not encode as well. Dynamics compression evens out input levels by attenuating (turning down) the input when it rises above a specified threshold. Check your audio software for a **Compression** or **Dynamics** feature. You can control attenuation by specifying a compression ratio. This turns down the loudest sections, and you can readjust input levels accordingly.

**Tip:** For multipurpose dynamics compression, set the threshold to -10dB, the ratio to 4:1, and the attack and release times to 100ms. Adjust the input level to get approximately 3dB of compression and an output level of about 0dB.

## Equalization

Equalization (EQ) changes the tone of the incoming signal by “boosting” (turning up) or “cutting” (turning down) certain frequencies. Using EQ, you can emphasize certain frequencies and cut others that contain noise or unwanted sound. EQ can compensate for RealAudio codecs that do not have flat frequency responses (that is, codecs for which certain frequencies are not as loud after encoding). You can therefore use EQ to make a RealAudio clip sound as close as possible to the source recording.

**Tip:** For voice-only content, you can make the file more intelligible by cutting frequencies below 100 Hz and carefully boosting frequencies in the 1 to 4 kHz range.



## PRODUCING VIDEO

RealVideo provides the highest quality compressed video available, whether for streaming or downloading. This chapter explains how RealProducer encodes a source video. It covers video production techniques, providing tips for capturing high-quality input and working with digitized video source files. This information will help you to produce high-quality clips.

### Understanding RealVideo

A video consists of two parts: the visual track and the soundtrack. In a RealVideo clip, the soundtrack is encoded with RealAudio codecs, and the visual track is encoded with a RealVideo codec. RealProducer packages both tracks in a RealVideo clip that, like a RealAudio clip, uses the file extension .rm, .rv, or .rmvb (variable bit-rate clip). The following sections explain the basic aspects of creating a RealVideo clip.

### Factors for Creating a Good Streaming Video

The most important factor for creating a good streaming video is to start with good source material. The RealVideo encoding process does not improve the quality of the input, although filters can increase the visual contrast or remove certain imperfections. The more you compress video, the more its quality tends to degrade. So it's important to understand how the encoding choices you make affect the clip's final quality, and to follow good practices that keep the quality as high as possible throughout the video production cycle.

#### Data Budgets

As RealProducer converts a source video into a RealVideo clip, it compresses the video information so that the clip can stream at a certain bandwidth. Think of targeting a certain streaming audience as having a fixed data budget to spend. For low-bandwidth audiences such as users on 56 Kbps modems,

you have a smaller data budget (about 34 Kilobits a second) than when you target broadband audiences such as DSL and cable modem users (225 Kilobits or more per second). The following table lists some common target audiences, along with the maximum, recommended streaming speed (that is, your total data budget) for each.

**Maximum Streaming Rates**

Target Audience	Maximum Streaming Rate
14.4 Kbps modem	10 Kbps
28.8 Kbps modem	20 Kbps
56 Kbps modem	34 Kbps
64 Kbps ISDN	45 Kbps
112 Kbps dual ISDN	80 Kbps
Corporate LAN	150 Kbps
256 Kbps DSL/cable modem	225 Kbps
384 Kbps DSL/cable modem	350 Kbps
512 Kbps DSL/cable modem	450 Kbps
786 Kbps DSL/cable modem	700 Kbps

### Video Quality Factors You Control Directly

For a given data budget, you have to spend data on the following things, which are in your control:

- constant bit rate (CBR) or variable bit rate (VBR) encoding

CBR clips, which are described in “Constant Bit Rate Video” on page 63, are the safer choice for streaming video to any bandwidth. Explained in “Variable Bit Rate Video” on page 66, VBR clips produce higher-quality results, but are suited only for video downloads and certain high-bandwidth streaming environments.

- audio soundtrack

Most videos include a soundtrack that requires a fixed amount of bandwidth. If you give too much data to the soundtrack, the video’s visual quality suffers. Chapter 4 explains the RealAudio codecs used for RealVideo soundtracks. The section “Soundtrack Bandwidth” on page 57 provides details about the bandwidth division between a video’s soundtrack and visual track.

- video dimensions

You want to use the largest width and height for the video that you can. However, choosing too large of a video size takes too much data away from the other quality factors. The section “Video Capture” on page 71 provides recommended dimensions.

- video codec

The RealVideo codec choice, and its encoding complexity level, also affect the clip quality. By default, RealProducer produces the best results by using the highest-quality codec set to the highest complexity level. However, you may want to choose different settings to speed encoding or reach older versions of RealPlayer. See “RealVideo Codecs” on page 61.

### Video Quality Factors You Affect Indirectly

You do not set the following quality factors directly. Instead, other choices you make affect their outcomes in the encoded clip. In general, following good production practices and making smart choices with the factors that you can control result in good quality in these areas:

- frame rate

The frame rate affects how smoothly the motion flows in the video. If the frame rate encodes too low, the video will look jerky. For more on this, see “Encoded Frame Rates” on page 59.

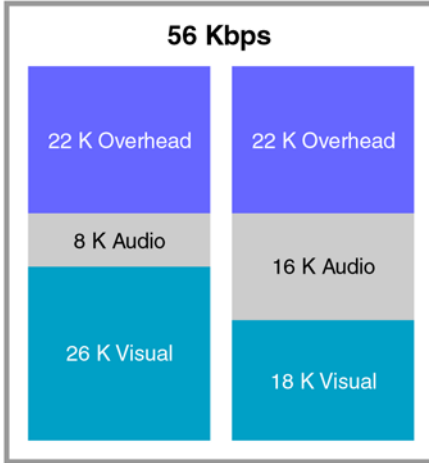
- visual clarity

If the visual quality comes out too low, the video will look fuzzy. For more information, see “Visual Clarity” on page 60.

### Soundtrack Bandwidth

Because RealVideo uses RealAudio to encode a video’s soundtrack, a chunk of the clip’s bandwidth first goes toward the audio. The visual track is then squeezed into the bandwidth that’s left. For 56 Kbps modems, for example, RealVideo clips stream at 34 Kbps, leaving 22 Kbps of modem bandwidth for overhead. How much bandwidth the visual track gets depends on how the audio is encoded. With an 8 Kbps RealAudio voice codec for the soundtrack, the visual track gets 26 Kbps. With a 16 Kbps music codec, though, the visual track gets just 18 Kbps.

**Possible Audio and Visual Tracks in a 56 Kbps RealVideo Clip**



At low bandwidths, how you encode the soundtrack greatly affects how the visual track looks. Music codecs typically consume more bandwidth than do voice codecs. Music's greater frequency range requires more data than does speech, so a music soundtrack consumes more bandwidth than a spoken one. A video with an audio narration might therefore look better than one accompanied by music, as there would be more bandwidth available for the visual track.

At higher bandwidths, the soundtrack consumes proportionally less of the available clip data, so differences in soundtrack encoding affect visual quality less. At speeds above 100 Kbps, you get high-quality sound that uses no more than a quarter of the clip's bandwidth. The following table lists the standard target audiences for constant bit rate RealVideo streams, giving the clip streaming speeds and the RealAudio codecs used for the soundtracks, broken out by audio type.

**Audio Codecs for Streaming RealVideo Clips**

Target Audience	Clip Speed	Voice Codec	Music Codec
28.8 Kbps modem	20 Kbps	6.5 Kbps voice	8 Kbps Music - RealAudio
56 Kbps modem	34 Kbps		
64 Kbps single ISDN	50 Kbps	8.5 Kbps voice	11 Kbps Music - RealAudio
128 Kbps dual ISDN	100 Kbps	16 Kbps voice	20 Kbps Music - RealAudio

(Table Page 1 of 2)

**Audio Codecs for Streaming RealVideo Clips (continued)**

Target Audience	Clip Speed	Voice Codec	Music Codec
Corporate LAN	150 Kbps	32 Kbps voice	32 Kbps Stereo Music High Response - RealAudio
256 Kbps DSL/cable	225 Kbps		44 Kbps Stereo Music High Response - RealAudio
384 Kbps DSL/cable	350 Kbps	64 Kbps voice	64 Kbps Stereo Music - RealAudio
512 Kbps DSL/cable	450 Kbps		96 Kbps Stereo Music - RealAudio
768 Kbps DSL/cable	700 Kbps		

(Table Page 2 of 2)

## Encoded Frame Rates

One way that RealProducer compresses clips is by reducing the input video's frame rate. Each RealProducer audience has a frame rate target, typically 15 or 30 frames per second (fps). Clips encoded at broadband rates usually meet their frame rate targets. At slower streaming speeds, RealProducer attempts to encode the target rate, but will scale the rate down as necessary depending on other factors such as video dimensions and audience bandwidth. So although you cannot control the frame rate precisely in these instances, using good production practices results in higher frame rates.

### Frame Rate and Motion

The higher the frame rate, the smoother the motion will appear in the video:

- The standard frame rate for full-motion video is 24 to 30 fps. At this speed, the human eye perceives movement as continuous—a phenomenon known as *persistence of vision*.
- A common rate for lower-speed streaming video that approximates full-motion video is 15 fps. To most people, a 15 fps video flows smoothly, though not quite as fluidly as one at a higher rate.
- Below 15 fps, a video looks jerky.
- Below 7 fps, a video looks very jerky.
- Below 3 fps, a video essentially becomes a slideshow.

## Factors that Affect Frame Rate

Most source videos start out at 15 to 30 fps. During encoding, RealVideo adjusts this frame rate downward as necessary. Thus, your encoded clip will not have just one frame rate, but a mix of frame rates that varies with its content. If you follow good production practices, your clips will typically stream over slow- to medium-speed connections at 7 to 15 fps. At higher speeds, you'll get the 15 to 30 fps maximum set in the audience. Other factors besides bandwidth, though, affect a RealVideo clip's frame rate:

- The video's dimensions greatly affect frame rate. If the dimensions are too large for your target bandwidth, you will not get a high frame rate. For more information, see "Video Capture" on page 71.
- RealVideo 10 provides video quality superior to that produced by older RealVideo codecs. Using an older codec may result in a lower frame rate.
- Visually complex videos that show many objects moving across the screen simultaneously are hard to encode and may lower the frame rate.
- RealProducer gives you an option for smoother motion. Choosing this option raises the clip's overall frame rate but reduces visual quality. This has the most effect on clips that stream at low bandwidths.
- In a video that has a mix of fast and slow scenes, variable bit-rate encoding (VBR) and two-pass encoding generally help the fast scenes achieve a higher frame rate. See "Variable Bit Rate Video" on page 66 and "Two-Pass Encoding" on page 80 for more information.
- During a live broadcast, RealProducer may lower the frame rate if the computer's processing power is too low to encode the input in real-time.

## Visual Clarity

In addition to lowering the frame rate, RealVideo compresses clips by throwing out pixel data. A video stores information about each pixel in the frame. RealVideo, on the other hand, stores data for pixel groups. When bandwidth is tight, RealVideo shoehorns pixels with slightly different RGB values into the same group. These pixels then look identical rather than nearly identical. This may result in a loss of detail if compression is too high. The following illustration compares a smooth video with one that has lost detail through too much compression.



### Smooth and Distorted Video



Bandwidth is the primary factor that affects a clip’s visual clarity. By using good production practices as described in this chapter, you can help keep the video’s clarity intact during encoding. Also note the following points:

- The video’s dimensions affect visual clarity. Using dimensions too large for target bandwidth can make the video blurry. For more information, see “Video Capture” on page 71.
- RealVideo 10 produces better visual clarity than RealVideo 9 or RealVideo 8.
- When you encode with RealProducer, you can choose an option for better image quality. The video may be jerkier, though, because increasing the pixel data reduces the frame rate. This option has the most effect on clips that stream at low bandwidths.
- Video with relatively low motion (“talking heads”) will have better visual quality than a video with rapid scene changes and a lot of movement.
- VBR clips using two-pass encoding generally provide superior visual quality to CBR clips. See “Variable Bit Rate Video” on page 66 and “Two-Pass Encoding” on page 80 for more information.

**Tip:** If you plan to launch a video in double- or full-screen mode, boost video clarity as much as possible during production and encoding. RealPlayer enlarges the clip by duplicating its pixels, which magnifies any defects.

### RealVideo Codecs

RealVideo 10 is the default RealVideo codec used with RealProducer 11. If you use RealProducer Plus, you can also encode with older RealVideo codecs. RealNetworks recommends using RealVideo 10 unless you need faster

encoding performance during broadcasts, or you need to stream video to RealPlayer 8.

**For More Information:** See also “Encoding Complexity Modes” on page 81 for information about how a video codec’s complexity mode affects video quality.

### RealVideo 10 Codec

The RealVideo 10 codec creates the highest quality compressed video possible. It offers improved visual quality over RealVideo 9 and RealVideo 8, especially with fast-action scenes and on-screen text. Because RealVideo 10 performs more complex analysis of video data than earlier codecs, encoding may take more than twice the time required with RealVideo 9. To help shorten the encoding time and improve the quality of live broadcasts, RealProducer provides the following features:

- RealVideo 10 is optimized for multiprocessor machines. RealProducer uses a second processor when the video height is greater than 180 pixels. When you encode a SureStream CBR clip for multiple audiences, RealProducer uses up to two processors for each audience. For example, encoding a RealVideo clip for a 56 Kbps modem audience and a 256 Kbps broadband audience can utilize up to four processors.
- When encoding pre-recorded clips, you can lower the codec complexity level. This reduces the clip’s visual quality, but decreases the encoding time. For more information, refer to “Encoding Complexity Modes” on page 81.
- For live broadcasts, RealProducer uses automatic load management features to compensate for the increased encoding demands of RealVideo 10. This helps to ensure that RealProducer does not fall behind the video input rate. See “Broadcast Load Management” on page 177.

RealVideo 10 is compatible with RealOne Player and later. Users of older RealPlayers are prompted to update to RealPlayer 11 when they attempt to play RealVideo 10 content. Playback of RealVideo 10 content consumes the same amount of system resources on the viewer’s computer as playback of RealVideo 9. Viewers, therefore, will not notice any performance slowdown when playing a RealVideo 10 clip compared to a RealVideo 9 clip.

### RealVideo 9 Codec

RealVideo 9 improves on RealVideo 8 with higher compression and improved visual quality. RealOne Player and later can play RealVideo 9 clips. Users who have older versions of RealPlayer are prompted to autoupdate to RealPlayer 11 when the viewer attempts to play a RealVideo 9 clip. RealVideo 9 is not available with RealProducer Basic.

### RealVideo 8 Codec

The RealVideo 8 codec is backwards-compatible to RealPlayer 8. The video quality is not as high as with RealVideo 9 and 10, but encoding is faster. Additionally, RealVideo 8 requires fewer resources on the RealPlayer machine to decompress. This makes it suitable for the slower processors of mobile, handheld devices. RealVideo 8 is not available with RealProducer Basic.

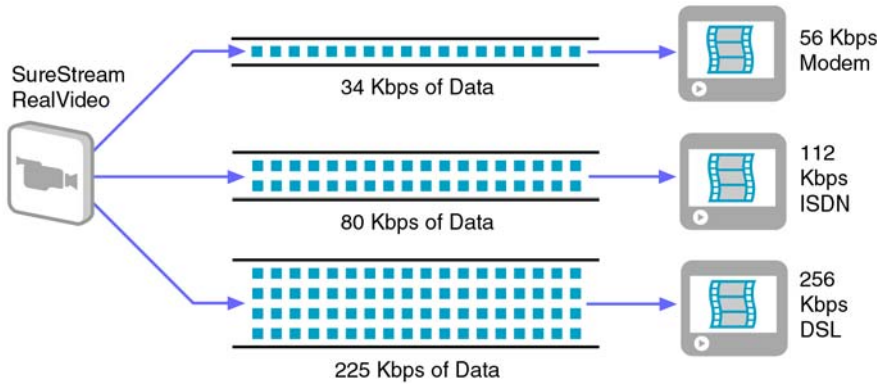
## Constant Bit Rate Video

When you create a RealVideo clip, you can choose constant bit rate (CBR) or variable bit rate (VBR) encoding. In RealProducer, each audience template is either CBR or VBR. CBR encoding is the more traditional method of encoding streaming video. It maintains a consistent bit rate for the stream, such as a constant 34 Kbps when streaming to 56 Kbps modems. You should generally use CBR video when streaming at bandwidths below 350 Kbps, and anytime you want to use SureStream to encode multiple bandwidths into the same clip or broadcast. At high bandwidths, however, you can use CBR or VBR video.

### SureStream CBR Clips

Using SureStream technology, you can encode a constant bit rate RealAudio or RealVideo clip for multiple bandwidths. For example, you can encode a single RealVideo clip for 56 Kbps modems, 112 Kbps dual ISDN, 256 Kbps DSL, and so on. The clip's playback quality improves with each faster speed. When a viewer clicks a link to a SureStream clip, RealPlayer and Helix Server determine which stream to use based on the available bandwidth, as shown in the following illustration.

### SureStream Clip Encoded for Multiple Bandwidths



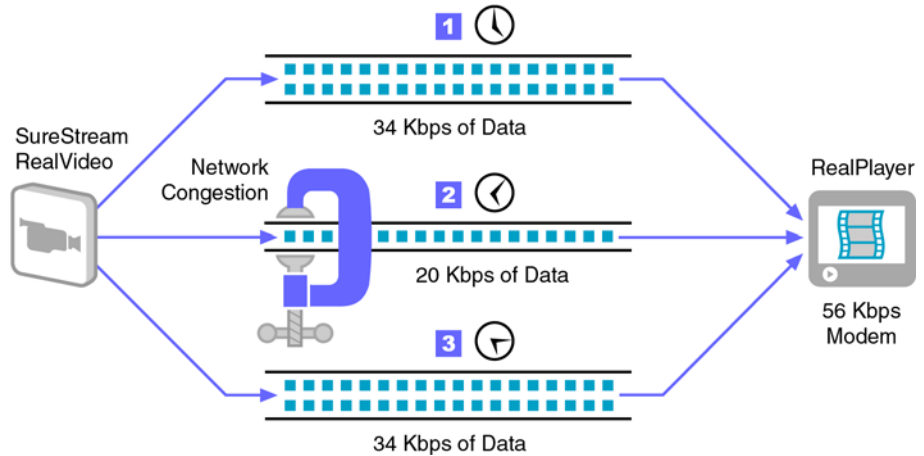
Each stream that you add to SureStream clip increases the clip's file size, as well as the encoding time. Streams for higher bandwidths increase the file size more than streams for lower bandwidth because high-bandwidth encodings include more data. As explained in "Broadcast Load Management" on page 177, the encoding time can become a critical issue during live broadcasts, so you need to choose the audiences you use carefully.

**Note:** The RealVideo codec you choose encodes all of a clip's SureStream streams. You cannot encode half the streams with the RealVideo 10 codec, for example, and the other half with the RealVideo 8 codec.

### Downshifting and Upshifting

Helix Server and RealPlayer can switch streams to compensate for network conditions. If a fast connection becomes bogged down because of high network traffic, Helix Server switches to a lower-bandwidth stream to prevent the presentation from stalling. When the congestion clears, Helix Server switches back to the higher-bandwidth stream. RealPlayer doesn't need to rebuffer data during this shifting.

### Switching Bandwidths During Network Congestion



**Note:** With the exception of the RealAudio lossless codec, all RealAudio codecs use constant bit rate encoding. Any audio stream other than a lossless stream can therefore be included in a SureStream clip, whether as a soundtrack to a video, or as audio-only voice or music.

### SureStream Substreams

Because SureStream can downshift during network congestion, it's a good idea always to include one or more substreams in a CBR clip. A substream is simply a stream encoded at a lower bandwidth than your target audience speed. RealProducer predefines three substream audiences, two for 28 Kbps modems and one for 56 Kbps modems:

- 12k Substream for 28k Dial-up
- 16k Substream for 28k Dial-up
- 26k Substream for 56k Dial-up

Substreams are particularly important for modem users because modem bandwidth can fluctuate widely. For a 56 Kbps modem audience, the 56 Kbps modem template encodes video at 34 Kbps. If the SureStream clip includes the 26 Kbps substream, the video downshifts to that stream if the user's available bandwidth falls below 34 Kbps. The clip can continue to downshift to slower substreams if needed. This ensures that the presentation can still stream during network congestion.

RealProducer labels certain audience templates as “substreams” because they are not intended to be the clip’s primary stream. Any CBR audience can act as a substream for a higher-bandwidth audience, however. You can include the 64k Single ISDN audience as a substream for your 150k LAN users, for example, even if you do not intend to stream the clip over ISDN. To be effective, however, a substream should be no more than 100 Kbps slower than the primary audience.

## Variable Bit Rate Video

Variable bit rate (VBR) encoding generally provides superior video quality to constant bit rate (CBR) encoding. It gives more bandwidth to scenes that are hard to compress, making the most visible difference in videos that have fast-moving, high-action scenes. Clips encoded with VBR use the file extension .rmvb. VBR is not compatible with SureStream technology, however, so you can encode a VBR clip only for a single bandwidth. VBR encoding is suited for bandwidths of 350 Kbps or higher.

### Single Bit Rate for a VBR Clip



Unlike a CBR clip, a VBR clip does not maintain a constant streaming rate. Instead, it has a target average bit rate (or quality) and a maximum bit rate. For example, RealProducer’s 450 Kbps VBR download audience averages 450 Kilobits of data per second. However, the audience has a maximum of 900 Kbps, meaning that the stream can, if necessary, consume up to 900 Kilobits of data a second. These data spikes typically occur during high-action sequences, resulting in greater video clarity and higher frame rates than CBR encoding.

**Tip:** In RealProducer, audience templates that use VBR encoding include “VBR” in the audience name. If the template does not say “VBR,” it is a CBR template.

**For More Information:** Two-pass encoding is an important component for creating a high-quality VBR file. For more information, refer to “Two-Pass Encoding” on page 80.

## VBR Clips for Download

VBR clips are better suited for downloading than are CBR clips. Because a viewer downloads the entire clip before playing it, the bandwidth spikes inherent in a VBR clip will not cause playback problems. As you encode clips for download, you can consider the VBR encoding speeds as a guide to quality and file size. For example, a 450 Kbps VBR download will generally have lower quality and a smaller file size than a 750 Kbps VBR download.

**Tip:** Quality depends on the source content. For a video that has relatively little action and small dimensions, for example, 750 Kbps VBR encoding may offer little improvement over 450 Kbps VBR encoding.

## VBR Clips for Streaming and Broadcasting

Although VBR audience templates are geared for video downloads, you can also use VBR encoding for streaming clips and broadcasting live events. The primary reason to do this is that VBR offers better quality than CBR. For example, depending on the content, a 350 Kbps VBR stream may have roughly the same visual quality as a CBR stream encoded at 450 Kbps.

To benefit from VBR, the streaming network must be able to accommodate bandwidth spikes. Local area networks (LANs) and cable modem users are good candidates for VBR streaming. Because all viewers in these networks share a large pool of bandwidth, a VBR clip's intermittent bandwidth spikes tend not to overload a single viewer's connection bandwidth. Connections in which bandwidth is not shared, such as DSL, can prove problematic. A 450 Kbps VBR clip has a maximum bandwidth of 900 Kbps, for instance. If a DSL connection has a maximum throughput of 500 Kbps, the VBR clip may stall.

When you stream a prerecorded VBR clip on demand, each viewer generally starts playback at a different time. This means that the bandwidth spikes inherent in the clip are spread out over time for all viewers. When you broadcast a VBR stream, however, bandwidth spikes occur for each viewer at the same time. When broadcasting, therefore, your network needs to handle higher cumulative spikes than when you stream prerecorded clips.

**Note:** Streaming a VBR clip requires that you use Helix Server version 9 or higher.

**Tip:** Multicasting, which is available on some intranets, helps to overcome the bandwidth spikes of standard unicasting by delivering one stream to all viewers, rather than a separate stream to each viewer. For more information, refer to the multicasting chapter of *Helix Server Administration Guide*.

## VBR Encoding Settings

For each VBR audience template, three settings affect how the clip or broadcast is encoded: maximum bit rate, average bit rate, and quality. Each VBR clip uses two of these three settings to determine how it encodes its data. To create a VBR clip appropriate for your needs, it's important to understand how these settings interact.

**For More Information:** The section “Creating and Editing Audiences” on page 155 explains how to change the VBR encoding settings through the graphical application.

**Tip:** In an audience file, you can define two additional variations of VBR encoding, `vbrUnconstrainedQuality` and `vbrUnconstrainedBitrate`. For information about setting VBR properties through an audience file, refer to “Video Stream Properties” on page 353.

### Average Bit Rate

A VBR clip's average bit rate value reflects the average bandwidth of the clip measured as the total number of Kilobits consumed divided by the timeline in seconds. The actual bandwidth at any point during clip playback may be lower or higher than this value. Through most of the video, however, the second-by-second bandwidth use will be close to this value.

### Maximum Bit Rate

A VBR clip's maximum bit rate caps the bandwidth that the clip can consume. It is typically set by default to twice the average bit rate. A 450 Kbps VBR clip has a maximum bandwidth of 900 Kbps, for example. So during a high-action scene, for example, a video encoded with this audience may have a bandwidth spike of up to 900 Kbps. These spikes are only occasional, however, and the overall clip playback rate stays close to the average bit rate.



Although you can set the maximum bit rate value higher or lower, a higher setting is unlikely to result in significantly greater quality. You can lower the setting if you want to reduce the bandwidth spikes on your network. Keep in mind, however, that lowering this maximum decreases the benefit of VBR encoding. The closer the maximum bit rate value approaches the average bit rate value, the more the clip behaves like a CBR clip.

**Tip:** Keep the maximum bit rate value between 50 percent to 100 percent greater than the average bit rate setting. For a 450 Kbps template, for example, the maximum rate should be 675 to 900 Kbps.

## Quality

The quality setting gears the encoding process to achieve a certain level of visual quality. With a quality of 100 percent, for example, RealProducer attempts to reproduce the visual quality of the input nearly perfectly. A lower quality, such as 90 or 80 percent, allows for more visual imperfections, but results in a smaller clip that uses less bandwidth. Keep in mind, however, that the quality setting does not guarantee a faithful reproduction of content. It only attempts to achieve the quality level within the input constraints, such as the video dimensions, target frame rate, content type, and maximum bit rate. Because encoding for quality can vary the average bit rate greatly, the average bit rate setting is ignored. (That is, the average bit rate and quality settings are mutually exclusive, and you can define only one of the values.) If you set a maximum bit rate of 900 Kbps and a quality of 100 percent, for example, the average bit rate may turn out to be close to 900 Kbps. At a lower quality target, such as 80 percent, the average bit rate will probably be lower. The actual, average bit rate depends greatly on content, though, and will vary for each clip.

Because the average bit rate can vary greatly, quality-based encoding is better suited for downloaded clips. However, you can stream or broadcast a quality-encoded stream as long as your network has the capacity to provide to each user the bandwidth indicated by the maximum bandwidth target. Typically, each stream will use less bandwidth than this, and you can compute the average bandwidth of a clip by dividing the file size in Kilobits by the number of seconds in the timeline. For a live broadcast, though, it is impossible to know the average bandwidth of a quality-encoded stream in advance.

**Tip:** By editing an VBR audience file, you can vary the relationships between bit rate and quality. See “Stream Encoding Types” on page 354.

## Video Recording Tips

If you intend to shoot a new video rather than use existing video content, this section provides tips for capturing high-quality input. Because video loses image quality if it's highly compressed, always start with the best video source available.

**For More Information:** For pointers on recording audio, see “Audio Capture” on page 50.

## Video Staging

Consider the video's final frame size before you shoot the first frame. Streaming over 56 Kbps modems requires a small video window, so you need to frame important visual elements well. For recommended clip dimensions, see “Video Encoding Dimensions” on page 73.

## Scene Changes and Movement

The fewer things that change from frame to frame, the sharper the image will appear in a low-bandwidth video. You can do the following to cut down on unnecessary movement:

- Use a mounted camera rather than hand-held one. This greatly reduces the movement you inadvertently introduce into the scene when recording.
- Don't have a rapidly moving object fill the entire frame. But you don't want to pull the camera back too far either. You need to find a happy medium between close-ups and panoramic shots.

Of course, you don't want to eliminate all dynamic elements. When you do include rapid movement, allow enough time for objects to resolve. Because of low frame rates and high compression, objects coming to rest may appear blurry at first. If you have a dialog box popping up on a computer screen, for example, have the box remain stationary for a few seconds so that the image resolves.

## Colors and Lighting

Bright lighting at a constant exposure keeps the foreground detail crisp. Use uniformly dark colors for backgrounds, and uniformly light colors (but not whites) for clothing. Complex textures such as paisley and stripes degrade the final image quality with unwanted visual effects.

## Video Output

Video playback devices commonly have at least two common output types—S-video and composite. Use S-video, as it produces better results. Professional-grade devices typically have other, high-quality output modes that can connect to a video capture card.

## Color Depth

Always use 24-bit or 32-bit color. Lower color resolution results in poor clips.

## Source Media Quality

Whether you shoot a video yourself or digitize existing material, start with high-quality video media. The following are common video formats, listed in order of descending quality:

1. HDV
2. Betacam SP, also known simply as Beta. This format is common among video production professionals.
3. DV, miniDV, DVCam, or DVCPro.
4. Super-VHS (S-VHS) or HI-8mm.
5. VHS, 8mm.

## Video Capture

The following sections provide recommendations on frame rates and video dimensions when capturing video input into a digitized file, and encoding the video into a streaming or downloadable clip. When you encode directly from a capture source, you do not create an input file first. However, it is still important to choose your encoded output dimensions correctly to produce a high-quality clip or broadcast.

**For More Information:** See “Factors for Creating a Good Streaming Video” on page 55 for background on the relationship between dimensions, bandwidth, frame rate, and visual clarity.

## Video Capture Dimensions

If you capture video to a digitized file format, such as AVI or MPEG, you can edit the video using video editing software before encoding it with RealProducer. In this case, digitize the video at 320 pixels wide by 240 pixels high unless you are short on disk space or your video capture card recommends different dimensions.

### Full-Screen Capture

You may want to capture full-motion video at the full-screen size of 640 by 480 pixels if all of the following are true:

- Your clips will stream at broadband speeds of 256 Kbps or higher.
- Your encoded clips will be larger than 320 pixels by 240 pixels.
- You have a video workstation capable of digitizing full-motion, full-screen video. Standard PCs typically cannot handle this large of a load.

## Video Capture Frame Rates

When you capture content to a source file first, digitize the video at 15 frames per second (fps) if you plan to stream the clip at less than 150 Kbps. For these low speeds, 15 fps is the maximum rate that the standard RealProducer audiences encode. Above speeds of 150 Kbps, RealProducer can encode up to 30 fps, so it is better to capture the source input at 30 fps.

**For More Information:** For more information about the frame rate for encoded clips, see “Encoded Frame Rates” on page 59.

## Computer Speed and Disk Space

Because video capture places a large burden on a computer's CPU and hard drive, use the fastest computer you have available. On Windows computers, you can use any video capture card that supports Video for Windows or DirectShow.

### Disk Space Requirements for Video Capture

Use the following formula to calculate the approximate size in megabytes of a digitized video file:

$$\frac{(\text{pixel width}) \times (\text{pixel height}) \times (\text{color bit depth}) \times (\text{fps}) \times (\text{duration in seconds})}{8,000,000}$$

Suppose you want to capture a three-minute video at 15 frames per second, with 24-bit color, in a window that is 320 by 240 pixels. As you can see from the following equation, your digitized source file would be approximately 622 MB:

$$(320) \times (240) \times (24) \times (15) \times (180) / 8,000,000 = 622 \text{ Megabytes}$$

If necessary, you can conserve disk space by decreasing the clip dimensions or lowering the frame rate, or both.

### Video Source File Size Limit

Some computer file systems limit a single file to 2 GB (2048 MB) in size. At a 320-by-240 size and 15 fps, this translates to about 9.5 minutes of video. Certain video production programs support the OpenDML (AVI 2.0) standard, which allows the creation of files larger than 2 GB. RealProducer may be able to accept a video source file larger than 2 GB as input, depending on the production software used to create the file.

If you plan to produce long videos or videos with large dimensions, check whether or not your video production software is limited to a 2 GB output file size. If it is not limited to 2 GB, create a video file larger than 2 GB and test to determine if RealProducer can accept the file as input.

**Tip:** If you are limited to 2 GB for the video source file and you need to produce a larger video, you can create separate video source files (each 2 GB or smaller) and encode them as separate RealVideo clips. Then, merge the clips using the RealMedia editor described in Chapter 12.

### Video Encoding Dimensions

When you capture video to a digitized input clip, you want to capture the largest size possible to preserve as much quality as you can. When you encode the file as RealVideo, however, you may need to reduce the video dimensions. Choosing dimensions too large for a given target bandwidth can result in a

low frame rate or a large number of visual artifacts, rendering the video jerky or fuzzy.

There are no specific rules for which video dimensions to use, other than to maintain the aspect ratio of the digitized source. The primary consideration for selecting encoding dimensions is bandwidth, though other factors can affect the quality. For example, to keep its frame rate higher, a fast-action clip may require smaller dimensions than a low-action clip.

**For More Information:** To resize a video, you can scale the source file with your video editing software. Or, you can crop or resize the RealVideo clip as you encode it. For more on resizing, see “Resize Filter” on page 77.

### Desktop Video Dimension Recommendations

Most videos encoded for streaming to a desktop media player use a 4:3 aspect ratio to fit the dimensions of standard computer monitors. The following are general recommendations for encoded video dimensions based on your target audience's bandwidth:

- For desktop audiences with bandwidth less than 256 Kbps, use a smaller size, such as 240 pixels wide by 180 pixels high or 176 pixels wide by 132 pixels high.

**Tip:** RealVideo 10 provides higher quality at high compression rates than older RealVideo codecs. When developing video for low-bandwidth audiences, using RealVideo 10 provides higher quality at larger dimensions.

- For desktop broadband connections of 256 Kbps or higher, encode your clip at 320 pixels wide by 240 pixels high.
- At very high bandwidths, you can choose larger dimensions, such as 640 by 480. To use these dimensions, however, the input should be of very high quality.

### Mobile Device Video Dimension Recommendations

Mobile devices such as personal digital assistants and smartphones may have different screen sizes, so it's useful to know the specifications for the devices you are targeting. A common screen resolution of most smartphones is 176 pixels by 144 pixels. This size does not have the 4:3 aspect ratio common to

television and desktop video. If you are starting with a larger, 4:3 source such as 320 by 240, you can do two things:

- Reduce the video to 176 pixels wide by 132 pixels high. This leaves 12 pixels of screen height unused.
- If the input video width is 320 pixels, crop out portions from one or both sides to create a width of 292 pixels. Then scale the video smaller to approximately 176 pixels by 144 pixels.

**For More Information:** For more about RealPlayer for mobile devices, visit <http://www.realnworks.com/industries/mobile/index.html>.

## High-Bandwidth and Low-Bandwidth Streaming Audiences

If you want to encode a video clip or broadcast for both low-bandwidth and high-bandwidth audiences, you can adopt two different strategies:

- Use the same clip or broadcast for all audiences.

Using SureStream technology, you can create a single RealVideo clip that streams at many bandwidths. However, if you create the video at a large size such as 320-by-240, the clip will not stream well to slow connections. Using a smaller size benefits modem users, but does not take full advantage of the greater bandwidth of faster connections.

- Create separate clips for low-bandwidth and high-bandwidth viewers.

Creating separate clips allows you to encode a larger clip for high-bandwidth audiences, and a smaller clip for low-bandwidth audiences. You can make the clips available through separate links, or use a SMIL <switch> tag to let RealPlayer choose which version to play.

**Note:** Using a job file, you can encode two separate clips at once, sizing each clip separately. This allows you to create a larger clip for high-bandwidth audiences, and a smaller clip for low-bandwidth audiences in a single encoding pass. For more information, see “Media Profile” on page 334.

**For More Information:** For information about using SMIL to select clips, refer to the switching chapter of *RealNetworks Production Guide*.

## RealMedia File Size

As noted in “Video Source File Size Limit” on page 73, file size limits imposed by an operating system’s file system are generally more of a problem when capturing video than when encoding it. A compressed RealVideo clip is often smaller than the input clip. However, there are some cases in which a RealVideo clip may exceed the operating system’s maximum:

- A SureStream clip, described in “SureStream CBR Clips” on page 63, can encode multiple streams for different audiences. If you include several high-bandwidth audiences, the encoded clip may exceed the source clip in size, even though each stream contains less data than the original input.
- If you encode a long video clip directly from a live source or capture device, the encoded clip may grow larger than the allowable file system limit.

When a clip reaches the operating system’s file size limit, RealProducer automatically creates, or *rolls*, a new clip. The new clip will have the same name as the original clip, but with a number added to the file name. For example, movie.rm rolls to movie1.rm when movie.rm reaches the operating system limit. The clip movie1.rm rolls to movie2.rm if it grows too large, and so on.

**For More Information:** By using the command-line application or editing a job file, you can set lower limits on file rolling, and roll files by time, such as every 15 minutes. For job file information, refer to “File Destinations” on page 330. The command-line options are explained in “Output and Destination Options” on page 271.

**Tip:** You can combine rolled files into a single sequence using a Ram file or a SMIL file. Transitions may not be seamless, and may contain audio and video gaps, however. For information about creating clip sequences, refer to *Introduction to Streaming Media* or *RealNetworks Production Guide*.

## RealVideo Filters

RealProducer includes video filters that can improve the appearance of the encoded clip. However, you should understand when to use each type of filter. Some filters can degrade the video quality when used incorrectly. As well, the use of some filters can significantly increase the encoding time.



**For More Information:** For information about using filters with the command-line application, refer to “Prefilter Options” on page 268. See “Prefilters” on page 317 for information about defining filters in the job file.

## Noise Filters

A by-product of poor quality in one or more links in the video production chain, video noise (which has nothing to do with the audio quality) can distort the encoded clip. These distortions are similar to the “snow” that often shows up in TV signals received over an antenna. The source of the noise is typically hardware, such as the video tape, capture card, or camera. Using professional-quality equipment and media helps eliminate video noise at the source. If your source video is high quality to start with, you won’t need the noise filters.

**For More Information:** The section “Video Noise” on page 97 explains how to apply this filter using the graphical application.

### Low Noise Filter

If your video input has a small amount of noise, turn on the low-noise filter. Because it has a small impact on processing power and won’t degrade a video’s appearance, the low noise filter is safe to leave on at all times. It’s better practice, though, to use it only when necessary.

### High Noise Filter

If noise greatly distorts the source video, try the high noise filter. Use it only if necessary, though, because it can add 30% or more to the encoding time. The high noise filter can also remove slight details, making highly textured surfaces look more smooth, which may not be desirable in all cases.

## Resize Filter

RealProducer’s resizing filter allows you to crop or resize the video as you encode it. You can select whether to do this as a fast resize or a high-quality resize. These resize options affect the video only when you make it smaller. The minimum size for a resized or cropped video is 32-by-32 pixels. The width and height of a resized or cropped video must be a multiple of 4, such as 160 pixels, 240 pixels, and so on.

RealProducer can resize content using a quick method (fast resize), or through a complex analysis (high-quality resize). A fast resize has a small impact on encoding time, but the resulting image may have some distortion. A high-quality resize results in a superior image, but it may double or triple the encoding time because it carefully analyzes the video source before resizing. Because of its impact on speed, the high-quality resize filter is not recommended for broadcasts.

**Tip:** If you are encoding a letterbox clip for display on computer screens that use a traditional 4:3 aspect ratio, crop out the black bars at the top and bottom of the video image. This helps to improve the video quality.

**For More Information:** The sections “Cropping” on page 96 and “Resizing the Video” on page 100 explains how to crop and resize a video using the graphical application.

## Inverse-Telecine Filter

The Inverse-Telecine filter is for cinematic film that was transferred to NTSC video. Film is usually shot at 24 frames per second (fps), whereas the NTSC standard is 30 fps. The film-to-video conversion (called “telecine”) duplicates some fields to bring the film input up to the NTSC frame rate. American theatre-release films transferred to video, for example, undergo the telecine process.

Use the inverse-telecine filter when encoding NTSC video that was transferred from film and has a frame rate of 30 fps. The filter strips out redundant fields, letting RealProducer focus on image quality. This improves the clip’s overall look. Although the inverse-telecine filter is safe to use on all input, it slows performance marginally and should be used only when the source is NTSC video that originated from film.

**Note:** PAL video, which is widely used in Europe, does not require the inverse-telecine filter because the conversion from 24 fps film to 25 fps PAL does not use the telecine process.

**For More Information:** The section “De-Interlace and Inverse-Telecine” on page 97 explains how to apply this filter using the graphical application.

## De-interlace Filter

The de-interlace filter removes jaggedness in interlaced NTSC or PAL video. A video camera running at 30 frames per second captures the odd-numbered lines of a field in 1/60th of a second, and the even-numbered lines in the next 1/60th of a second. It then interlaces the two to create the frame. Because half the field's lines are captured a fraction of a second later than the other half, fast-moving objects may appear jagged, the result of the object advancing slightly within 1/60th of a second. The following figure illustrates this jaggedness in a detail of an interlaced video.

### Jaggedness in an Interlaced Video (detail)



The next figure shows the jaggedness removed with the de-interlace filter.

### Jaggedness Removed with the De-interlace Filter (detail)



The de-interlace filter has a modest impact on encoding speed, but is useful only for interlaced source video that is 240 lines or higher. Typical source video used for television is 480 lines high. If you digitize the video with a video capture card that captures at 240 lines high or less, the card throws out either the odd or the even lines, de-interlacing the video itself. The de-interlace filter is safe to leave on, though, because RealProducer never applies it to a video less than 240 lines high.

**For More Information:** The section “De-Interlace and Inverse-Telecine” on page 97 explains how to apply this filter using the graphical application.

## Black-Level Correction Filter

The black-level correction filter improves a video's contrast by making near-black pixels pure black and near-white pixels pure white. This improves the video's appearance if it looks “washed out” because of a lack of contrast. Using this filter improves the RealVideo codec efficiency by increasing the number of pixels that have the same color value. Applying this filter has only a modest impact on encoding speed.

**For More Information:** The section “Black-Level Correction” on page 97 explains how to apply this filter using the graphical application.

## RealVideo Options

The RealVideo options allow you to modify how RealProducer encodes RealVideo clips. You can generally change these options separate for each audience template. As with the RealVideo filters, you should understand how each options works before changing the default values. Setting an option incorrectly can degrade the video quality.

## Two-Pass Encoding

With two-pass encoding, which is used only when encoding from a digitized source file, RealProducer runs through the entire source video once to gather information about how best to encode the streaming clip. It then makes a second pass to encode the streams. Two-pass encoding can substantially increase clip quality, but it requires more encoding time. The first pass takes about as long as it would to encode the source file for one target audience.

Although two-pass encoding helps when you use constant bit rate encoding, it provides greater benefit for variable bit rate (VBR) encoding, described in “Variable Bit Rate Video” on page 66. With two pass encoding, RealProducer can analyze the entire video file to determine how best to vary the playback bit rate through the length of the clip. Without two-pass encoding, RealProducer sequentially analyzes small sections of the source file during encoding, creating a string of VBR sections within the clip.

**Tip:** Use two-pass encoding whenever you encode from a digitized file. Turn it off only if you must decrease the encoding time. When you use live input, RealProducer deactivates two-pass encoding automatically.

**For More Information:** The section “Using Two-Pass Encoding” on page 99 explains how to disable two-pass encoding through the graphical application. See “Job Properties” on page 304 for information about setting this feature directly in the job file. The section “Disable Two-Pass Encoding (-dt)” on page 281 explains how to override this feature using the command-line application.

## Encoding Complexity Modes

RealProducer uses encoding complexity modes of low, medium, and high that affect the RealVideo 9 and RealVideo 10 codecs, as well as the RealAudio lossless codec. The default value of high produces the best possible results, but also requires the most processing, resulting in the longest encoding times. Lowering the complexity level to medium or low results in faster encoding times, but reduced visual quality (for video) or a larger file size (for lossless audio).

With RealProducer Plus, the complexity mode for video encoding is user-definable for each audience template through the template’s advanced video options. You can also set the complexity for video or lossless audio through the command line, and capture the complexity setting to a job file. Note the following about the encoding complexity settings:

- RealVideo 10 set to the low encoding complexity is generally equivalent in quality and encoding time to RealVideo 9 set to the high encoding complexity.
- For live broadcasts, the load management feature reduces the encoding complexity automatically as needed, so you can keep the encoding complexity set to the default value of high. See “Broadcast Load Management” on page 177.
- The RealProducer 11 command-line application includes an -eco option that allows you to override the video or lossless audio encoding complexity mode selected in the audience file. See “Encoding Complexity Override (-eco)” on page 284.

- The encoding complexity mode affects the file size and streaming rate of lossless audio clips. For details, refer to “Streaming Rates for Lossless Audio Clips” on page 49.

**For More Information:** The section “Creating and Editing Audiences” on page 155 explains how to edit audience templates to change the RealVideo complexity mode. See “Video Stream Properties” on page 353 for information about setting this feature directly in the audience file.

## Video Startup Latency

Each RealVideo clip has a maximum startup latency that determines how long video requires to display after RealPlayer begins to receive the stream. The default value of 4 ensures that the video requires no more than four seconds of buffering once the stream begins. This four-second latency does not include the time it takes to launch RealPlayer, find the host Helix Server, send the request, and receive the server's response, however.

If necessary, you can increase the startup latency in whole values up to 60 seconds. This may be particularly useful for videos that stream at low bit rates and start out with high action sequences. The longer latency creates a larger data buffer for the starting sequence, and generally improves the video's appearance. Bear in mind, however, that a long latency time may cause restless viewers to stop the presentation before it begins playback.

**Note:** The startup latency does not affect how quickly a downloaded clip begins to play. Increasing the latency value, however, can improve the visual quality in downloaded clips that begin with fast-action sequences.

**For More Information:** The section “Creating and Editing Audiences” on page 155 explains how to edit audience templates to change this RealVideo option. See “Video Stream Properties” on page 353 for information about setting this feature directly in the audience file.

## Maximum Time Between Keyframes

An uncompressed video records all data for each frame of the video. At 15 to 30 frames per second, the amount of data quickly escalates to a very large file size. When creating a RealVideo clip, RealProducer encodes the full frame data

for only certain frames, called *keyframes*. The frames that follow a keyframe encode just the data that describes how that frame varies from the preceding frame. How often keyframes occur depend on the video contents. The first frame of a new scene typically requires a new keyframe. A fast-action video typically requires more keyframes than a slow-moving video.

**For More Information:** The section “Creating and Editing Audiences” on page 155 explains how to edit audience templates to change this RealVideo option. See “Video Stream Properties” on page 353 for information about setting this feature directly in the audience file.

### Benefits of Lowering the Maximum Keyframe Time

As an option for each audience template, you can set the maximum time between keyframes, which is 10 seconds by default for every audience template. This means that RealProducer adds a keyframe at least every 10 seconds. Most videos will have more frequent keyframes than this anyway, depending on the video contents. Under most circumstances, you should not change this default value. You may want to lower it, though, to provide certain benefits. Adding more frequent keyframes does the following:

- Reduces distortion when streaming in a lossy environment. Distortion results when a frame packet is lost. Using more frequent keyframes helps to shorten the stretch of video that may be distorted.
- Reduces the video startup latency during a live broadcast when broadcasting with Helix Server version 10 or earlier. For more information, refer to “Video Startup Latency” on page 169.
- Improves RealPlayer’s ability to seek to specific points in the RealVideo timeline.
- Adds flexibility for editing RealVideo clips through the RealMedia editor. You can cut a RealVideo clip only at a keyframe, for example. Adding keyframes means more precise control over where the cut occurs.

### Costs of Lowering the Maximum Keyframe Time

Because keyframes encode much more data than other frames, lowering the maximum time between keyframes can either increase the clip file size, or lower the clip’s image quality. In short, lowering the maximum keyframe rates provides more resilience against data loss, but degrades the overall compression efficiency. You should therefore change the keyframe rate only

after careful consideration and testing to determine if the change produces the desired results.

## Loss Protection

RealProducer's loss-protection feature adds error-correction data to RealVideo packets, helping them maintain quality when they are streamed in lossy environments. You'll get more benefit from loss protection when streaming across the Internet than over an intranet. The feature is turned off by default, but is safe to turn on for all encoded content because RealProducer adds only as much error-correction data as it can without lessening the video quality.

**Note:** For most types of live broadcasts, RealProducer can also generate error correction packets to protect the stream as it is delivered to Helix Server. For more information, see "Forward Error Correction" on page 207.

**For More Information:** The section "Creating and Editing Audiences" on page 155 explains how to edit audience templates to change this RealVideo option. See "Video Stream Properties" on page 353 for information about setting this feature directly in the audience file.



## ENCODING CLIPS

This chapter describes how to use the RealProducer graphical application to encode media clips. It explains how to define a job, choose audio and video inputs, set encoding options, and select encoding audiences. Chapter 7 provides details about each audience, and Chapter 8 explains how to start and monitor the encoding process.

**For More Information:** You can also encode clips using the command-line application, which Chapter 14 describes. For instructions on sending an encoded stream to a server for broadcast, refer to Chapter 11.

### Using Jobs

Each time you encode a clip or broadcast, RealProducer creates a *job* that records the encoding settings. The bottom portion of the RealProducer graphical application is a job manager that shows the current jobs, and allows you to perform actions with these jobs, such as running them in sequence.

Optionally, you can save each job to a separate job file, which is an XML-formatted text file that you can manually edit as described in Appendix B. Once you have saved a job file, you can reload it to apply the same settings to another clip or broadcast. Although using a job file is optional, you'll find job files highly effective if you encode a lot of clips or broadcasts.

### Creating a New Job File

Whenever you encode a clip or broadcast, RealProducer creates a job automatically, letting you choose whether or not to save the job settings to a file. You can also create a job file without actually encoding any streams. This allows you to define job profiles to use later. The following steps describe the basic procedure for creating, editing, and saving a job file.

► To create a new job:

1. Start a new job file by choosing **File>New Job** or selecting an audio or video input to encode, as described in “Selecting Inputs and Destinations” on page 89. A new, untitled job appears in the job manager, which is described in “Using the Job Manager” on page 88.
2. Define your encoding settings as described in this chapter. You can set up your audiences, define clip information, turn on video filters, create input and output file names, and so forth.
3. If you use RealProducer Plus, you can save your job by choosing **File>Save Job** or pressing **Ctrl+s**. Or, close RealProducer Plus and click **Save** when prompted to save the job file.

**Note:** RealProducer Basic does not allow you to save job files.

4. Using the **Save** dialog, save your job file anywhere on your computer or network. The job file is automatically saved with the file extension `.rpjf`.

**Tip:** Give the job file a descriptive title that will help you to remember the purpose of the job. For example, you might name a job file `GeneralVideoForDialUpModems.rpjf`.

**Note:** You can share a saved job by giving the job file to another RealProducer user. If you defined inputs and outputs, the user needs access to those same sources and destinations to run the job.

## Using and Modifying Existing Jobs

Once you have saved a job file using RealProducer Plus, you can use it as the basis for additional encoding jobs. When you load a saved job file, you can override the job settings on a case-by-case basis. Suppose that a certain job file has all the basic settings you want, but for a certain clip you also want to turn on the video noise reduction filter. You just load the job file, turn on the noise reduction filter through the graphical application, and encode the clip. When you're done, you can discard the changes, save them, or write the job to a new job file.

**Tip:** RealProducer supplies a number of predefined job files that are stored in the `samples/jobs` subdirectory under the RealProducer main directory. You can use these files as

templates for your own jobs, or create your own jobs from scratch using the graphical user interface.

► **To open and modify an existing job file:**

1. If you have recently used the job you want to reuse, choose **File>Recent Jobs>...** and select from the list of jobs. Otherwise, give the **File>Open Job** command and select the job file.
2. Make any necessary changes, which may include the following:
  - If you defined inputs and outputs in the job file, RealProducer uses these same inputs and outputs. You can easily change this by deleting the input and output names and defining new ones, as described in “Selecting Inputs and Destinations” on page 89.
  - It’s a good idea to double-check the audience settings for the job to ensure that you are encoding the output properly. For more information, see “Choosing Audiences” on page 100.
  - A job file can record specific clip information, as described in “Setting Basic Encoding Parameters” on page 97. You may need to add or change this information each time you encode with an existing job file.
3. When you finish making necessary changes, choose **File>Save Job (Ctrl+s)** to save the changes to the existing job file. If you want to create a new job file, choose **File>Save Job As... (Ctrl+Shift+s)** and save the file under a new file name.

**Note:** RealProducer Basic does not allow you to save job files.

## Changing the Overall Default Settings

RealProducer predefines many default settings, such as the audience used. You can change the overall defaults to those set in the current job by choosing **Settings>Default Settings>Save Current as Default**. This is useful if you encode a lot of clips the same way. By saving your job settings as the default, you do not have to open a job file to use those settings. To restore the original, default settings, select **Settings>Default Settings>Restore Original Default**.

**For More Information:** The section “Default Audience and Options” on page 101 lists the audiences and encoding options used with the standard, default settings.

## Running Multiple Jobs

RealProducer Plus can run multiple jobs in batch mode, processing one output after another. Batch encoding is useful when you have a number of clips that you want to encode with similar settings. RealProducer Basic can open just one job file at a time, however.

► **To encode a batch of jobs:**

1. Open or create multiple jobs. Each job appears in the Job Manager, which is described in “Using the Job Manager” on page 88.

**Tip:** To create a number of jobs with the same settings, open a job, then drag-and-drop media files into RealProducer. For each input file, RealProducer creates a new job with the same settings as the open job. You can also duplicate a job's settings by right-clicking on a job title in the job manager and selecting **Duplicate** from the context menu. In this case, you may need to change the input and output clips.

2. In the job manager, select the jobs that you want to encode. To do this, click each job while holding down the **Ctrl** key. You can also select a group of contiguous jobs by clicking the first job, then clicking the last job while you hold down the **Shift** key.

**Tip:** To remove a job from the batch encoding run, highlight the job in the job manager and choose **Edit>Delete**.

3. Encode the batch of jobs by clicking the **Encode** button. Each job runs in order.

**For More Information:** For more about encoding and monitoring a job, refer to Chapter 8.

**Tip:** You don't have to wait for a job to finish encoding to perform other tasks with RealProducer. While one job runs, you can add a job or create a new job.

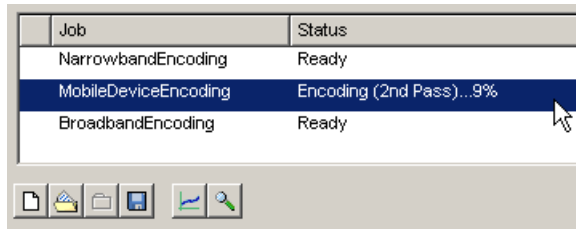
## Using the Job Manager

The job manager, which appears at the bottom of the RealProducer main window, keeps track of the encoding jobs you are using in the current session.

Through this manager, you can quickly control more than one job at a time. The job manager display four information fields for each job:

- Job**        This is the job file name. Until you save the job file, the job name is Untitled. To change settings for a job, click its job name, then make your changes.
- Status**    This field provides a description of the job status, such as Ready, Not Ready, Analyzing, Encoding, and Done.
- Start**      This field indicates the time that the job began encoding.
- End**        This field records the time the job stopped encoding.

### Job Manager (detail)



**Tip:** When you right-click a selected job in the job manager, RealProducer displays a context menu that allows you to perform basic functions with the job, such as starting the encoding, saving the job, and so on.

## Selecting Inputs and Destinations

For the media input, you can use digitized files or data from an audio or video capture device. For outputs, you can specify an encoded clip, a live broadcast to a server, or both. Chapter 11 explains how to choose a server as a destination to create a live broadcast.

**For More Information:** For information about acceptable audio and video input formats, refer to “Audio and Video Input Formats” on page 27.

### Using a File as the Input

Source files are digitized media files on your hard disk, network, or input medium such as CD or DVD. If you have video editing software, you can use that software to edit and optimize the file before encoding it.

**Tip:** For tips about producing high quality input files, refer to “Audio Optimization” on page 52 and “Video Recording Tips” on page 70.

► To use a digitized file as the encoding input:

1. If you have multiple jobs open, click the appropriate job file name in the job manager.
2. In the RealProducer main window, click the **Input File** radio button. Then click the **Browse** button to display a standard browsing dialog in which you can find the file you want to add as the input. You can also display the browsing dialog by giving the menu command **File>Open Input File** or the keyboard shortcut **Ctrl+I**. By default, the browse dialog shows only the media files that have acceptable input formats.

**Note:** You cannot re-encode a RealMedia clip. If you need to encode a clip for a different audience, for example, you must use as input the original, digitized file.

3. When you have located the input file through the browsing dialog, click **Open**. The field next to the **Input File** button displays the path and file name. If you have not already loaded a job file, an untitled job opens in the job manager.
4. Once you have selected a source, you can click **Source Properties** to display information about the input, including the file size and duration, audio sampling rate and bit depth, and video dimensions and frame rate.

## Using Live Audio or Video as the Input

Another source for media input is live or prerecorded audio or video sent to your computer's audio or video capture card. You can encode these media inputs as clips, or send the encoded stream to a server for broadcast.

► To capture from an audio device:

1. If you have multiple jobs open, click the appropriate job file name in the job manager.
2. In the RealProducer main window, click the **Devices** radio button.
3. Select the audio capture device from the pull-down list. This list provides the names of all audio captures devices, such as “SoundBlaster,” that RealProducer has detected.

4. If you want to adjust the sound recording capabilities of your audio device, click the **Settings** button next to the listed audio device. A submenu lists the available settings dialogs, which may include vendor-specific controls that differ for each audio capture device. For instructions about using vendor-specific controls, consult the device's user manual.
5. Select the **Recording Mixer** menu option. This opens the recording control window in which you can specify how audio is mixed from different audio sources.
6. Select which recording inputs to use by checking the **Select** box for each input.
7. Adjust the sound level by moving the sliders up or down. When you have finished setting the values, close the recording control window.

**Tip:** If the volume is too high, the recorded sound may be clipped and appear distorted. If the volume is too low, it will be difficult to hear. Use the audio meter described in “Monitoring Audio” on page 142 to monitor the level during encoding.

8. If you want to encode the input for a specific amount of time, click the **Duration** box and enter the number of hours, minutes, and seconds in the timing fields. The timer begins when you start the encoding process, and automatically stops the process when the specified time elapses. Otherwise, encoding stops when you click the **Stop** button.
  9. Once you have selected a source, you can click **Source Properties** to display information about audio properties that will be captured.
- **To capture from a video device:**
1. If you have multiple jobs open, click the appropriate job file name in the job manager.
  2. In the RealProducer main window, select the **Devices** radio button.
  3. Select the video device for your computer from the pull-down list. This list provides the names of all video captures devices that RealProducer has detected.
  4. If you want to adjust the video recording capabilities, click the **Settings** button next video device name. This displays a submenu of available settings dialogs, which can vary with each capture device. For information about vendor-specific controls, consult the device's user manual.

5. For most video capture devices, you can select the video dimensions in pixels. This will determine how large your input video will be. Select the same size you want for your encoded output clip. For more information, refer to “Video Encoding Dimensions” on page 73.
6. Select the video format to determine how the capture card converts the video into digital video. Some common formats include RGB, YUY2, BTYUV, YUV9, and YUV12.

**Tip:** Use YUV12 if it is available. This is the native color format for RealVideo codecs. Choosing this option improves performance by removing the need to convert the color format before encoding.

7. Select the video source. Some video capture devices allow you to plug in various sources, such as an S-video input from a video camera, a cable television cable, or a Web camera. When you have finished setting the options, close the window.
8. If you want to encode the input for a specific amount of time, click the **Duration** box and enter the number of hours, minutes, and seconds in the timing fields. The timer begins when you start the encoding process, and automatically stops the process when the specified time elapses. Otherwise, encoding stops when you click the **Stop** button.
9. Once you have selected a source, you can click **Source Properties** to display information about video properties that will be captured.

## Creating a Destination Clip

You can save your encoded output to a clip, as the following sections describe. Or, you can send the output to a server for broadcast as described in Chapter 11. A clip or server output is called a *destination*, and you can save your encoded input to multiple destinations. For example, you send live input to a server for broadcast, and simultaneously write it to a clip for archive purposes. The encoded data sent to each destination is identical.

**Note:** When you use RealProducer Plus, you can encode any number of clip and server destinations for the output. With RealProducer Basic, you can define one clip destination and one server destination in each job.



**Tip:** When you use a job file with the command-line application, you can specify *multiple outputs*, which can have different encoding settings. For example, one output might be a clip with large dimensions for broadband connections, while the second output is a clip with smaller dimensions for dial-up connections. See “Media Profile” on page 334 for more information.

### Modifying a Clip Destination

By default, RealProducer automatically defines an output clip when you select an input file. The output clip uses the input’s base file name and the appropriate extension. For example, if you choose `movie.mpeg` as your input, RealProducer sets up `movie.rv`, `movie.rm`, or `movie.rmvb` (depending on your encoding choices) as the output destination, creating the clip in the same directory as the input.

To modify a clip’s properties, such as its name or output location, double-click the clip icon in the destinations area. You can also highlight the clip name, and click the pencil icon below the destinations window. Either action displays a browse dialog in which you can navigate to the directory where you want to save the clip. If you rename the clip, you can enter just the base file name. RealProducer appends the appropriate file extension (`.ra`, `.rv`, or `.rm` for CBR clips; `.rmvb` for VBR clips), based on your encoding choices.

**For More Information:** Through the RealProducer preferences, you can change the directory where the clip is created, or turn off the automatic destination feature. See “Changing the File Location Preferences” on page 151.

### Creating a New Destination Clip

The following procedure describes how to create a new RealAudio or RealVideo clip as a destination for an encoded input file or live capture. It is generally necessary to encode just one destination clip. All destinations for a job have identical encoding settings. You can therefore create a second clip by duplicating the output clip through your operating system.

► **To define a clip as a destination:**

1. If you have multiple jobs open, click the appropriate job file name in the job manager.

2. Select **File>Add File Destination**. You can also click the RealPlayer icon in the destinations area. This opens a save dialog.
3. Browse to the directory where you want to save the output clip.
4. Enter the base file name. RealProducer automatically adds the correct file extension (.ra, .rv, or .rm for CBR clips; or .rmvb for VBR clips), based on your encoding choices.

**For More Information:** For background on the possible file extensions, see “Single and Multiple Destinations” on page 19.

5. Click **Save**. Your new destination appears in the destinations area. If a destination already exists for the job, the new destination appear below it.

### Deleting a Destination Clip

To delete a destination clip, select the job in the job manager if multiple jobs are open. Next, click the clip name in the destination window to highlight it. Then, either press **Delete** on your keyboard or click the trash can icon below the destination window.

## Adding Clip Information

RealProducer can encode clip information directly into a clip or broadcast. This is highly recommended for all jobs because the clip information tells the viewer about the stream and can help search engines categorize clip. If you are running multiple jobs, first choose the job you want by clicking the job name in the job manager. Then, either choose **Settings>Show Clip Information** or click the **Clip Information** button. You can then enter the following information:

Title	In this field, enter the title of the clip or broadcast. Because this title appears in the RealPlayer interface, it is best to use a short title.
Author	This field holds the name of the person or organization that created the clip.
Copyright	Here, enter the copyright string, such as (c) 2004 ABC Corporation.
Keywords	The keywords field holds words that certain audio and video search engines can read to categorize the clip. Add a few words that will help your audience search for your clip. Separate each term with spaces. Unless you are adding a proper name, use lowercase for each term. Avoid overly generic terms such as video or music.

Description	This field holds a description of the clip that appears when the viewer displays extended clip information. This allows you to describe the clip in detail without creating a long title.
Rating	<p>Selecting a rating in the pull-down list is highly recommended for any content not intended for all age groups. You can choose one of the following. No Rating is the default:</p> <ul style="list-style-type: none"> <li>-No Rating</li> <li>-All Ages</li> <li>-Older Children</li> <li>-Younger Teens</li> <li>-Older Teens (15 and up)</li> <li>-Adult Supervision Recommended</li> <li>-Adults Only</li> </ul>

**Tip:** Using the **RMEvents** utility described in Chapter 13, you can add information to a clip that has already been encoded. You can also specify clip information through a Ram file, as described in *Introduction to Streaming Media*.

## How Clip Information Displays in RealPlayer

RealNetworks highly recommends that you always include a title. If a title is not encoded in the clip or specified through other means (such as a Ram file), RealPlayer displays the clip's file name, which is of less use to the viewer than the title. The clip information appears in the following areas of RealPlayer:

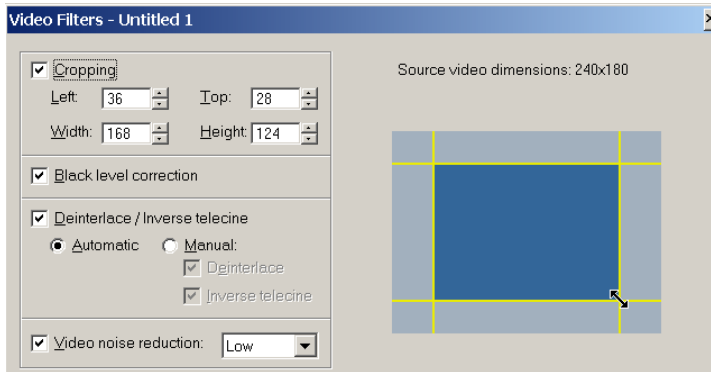
- The title appears in the title bar above the RealPlayer playback controls.
- Title and author information appears in the “Now Playing” list, which is part of the RealPlayer media browser pane. Viewers can double-click a clip title to play that clip.
- Title information appears in the recent clips list at the bottom of the RealPlayer **File** menu.
- Extended clip information appears when the viewer chooses **File>Clip Properties>View Clip Info (Ctrl+i)**.

## Filtering Video Input

When you encode video input, you can use a number of filters that can improve the quality of the video that comes from your source. All video filters are optional. If you are working with multiple jobs, select the appropriate job

in the job manager. Then, display the video filters palette by clicking the **Video Filters** button or selecting **Settings>Show Video Filters (Ctrl+f)**.

### Video Filters



**Tip:** Changes to the video filters are recorded immediately. You do not need to close the palette to save your changes for the job. You can leave the palette open as you continue to set up a job or switch to another job.

## Cropping

The cropping feature, available only on RealProducer Plus, allows you to crop out portions along the edge of a video. Cropping removes any unwanted areas, and can reduce the amount of data encoded, boosting clip quality.

To crop a video, check the **Cropping** box. You can then set the cropping borders by clicking and dragging the yellow lines on the source video image. Or, enter cropping pixel values directly into the following boxes:

- Left** Represents the number of pixels from the left edge of the video to start the cropping. You can specify up to 32 pixels less than the total width.
- Width** Defines the total width of the cropped video, measured from the point set by the Left property. If the width value is not a multiple of 4, the next lower multiple is used. For example, a value of 162 results in a video 160 pixels wide.
- Top** Sets the number of pixels from the top edge of the video to start the cropping. You can specify up to 32 pixels less than the total height.
- Height** Indicates the total height of the video, measured from the point set by the Top property. If the value is not a multiple of 4, the next lower multiple is used. For example, a value of 127 results in a video 124 pixels high.

**For More Information:** You can scale a cropped or non-cropped video smaller or larger as described in “Resizing the Video” on page 100. Refer to “Video Encoding Dimensions” on page 73 for recommended video sizes.

## Black-Level Correction

Check the **Black level correction** box to increase the video contrast by making black areas darker. This filter is useful if the source video appears washed out.

## De-Interlace and Inverse-Telecine

The de-interlace and inverse-telecine filters remove artifacts that may occur in videos larger than 320-by-240, and NTSC-format video transferred from film, respectively. If you need to use them, click the **Automatic** radio button to have RealProducer apply the filters only if needed. To use just one of the filters, check the **Manual** button and select the filter you want.

**For More Information:** The sections “De-interlace Filter” on page 79 and “Inverse-Telecine Filter” on page 78 explain these filters.

## Video Noise

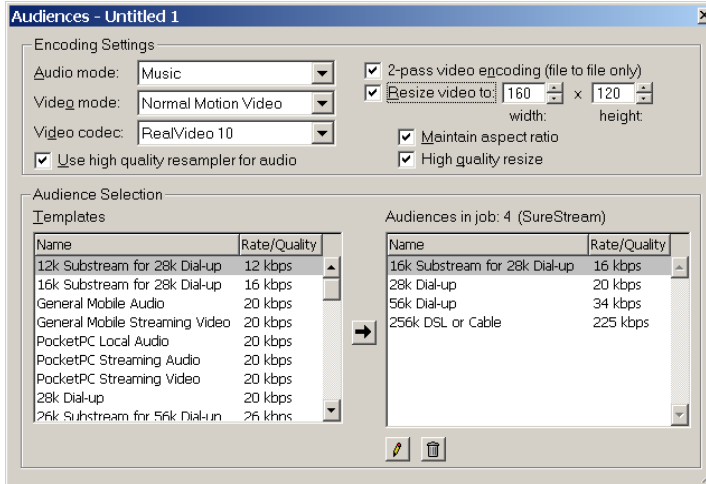
Video noise appears as static (“snow”) in your input video. The noise filter removes these artifacts prior to encoding. Do not apply this filter if the input does not contain noise because the filter can degrade the quality of undistorted video. You can choose the Low setting if the static is light, or the High setting if it is more pronounced.

**For More Information:** For more on the difference between low and high noise settings, refer to “Noise Filters” on page 77.

## Setting Basic Encoding Parameters

When you create a new job, you should set a few basic parameters that affect the overall encoding. If you have multiple jobs open, select the appropriate job in the job manager as described in “Using the Job Manager” on page 88. After you set your input, click the **Audiences** button or choose **Settings>Show Audiences (Ctrl+e)**. This opens the **Audiences** palette. You set the basic parameters in the top half of the palette. In the bottom half, you select your audiences as described in “Choosing Audiences” on page 100.

## Encoding Settings on Upper Half of Audiences Palette



**Tip:** Changes to the basic settings are recorded immediately. You do not need to close the palette to save your changes for the job. You can leave the palette open as you continue to set up a job or switch to another job.

## Setting Audio Parameters

The **Audio Mode** setting indicates the type of audio being encoded: Voice, Music, or No Audio. You should ensure that this is set correctly for each job. For example, using the Voice setting for a musical soundtrack can degrade the music quality because a voice codec does not capture the wider frequency range found in music.

In general, you should leave the **Use high quality resampler for audio** box checked. This provides the best results if the audio input does not have the correct sampling rate for the codec, as described in “Sampling Rate” on page 38. Unchecking this box speeds processing time, which may be necessary during a live broadcast. Doing so may lower the quality of the audio, though.

**Tip:** If your audio content is mixed, use the Music setting to capture the greatest frequency range. If you are encoding at a bit rate of 256 Kbps or higher, you may want to choose Music even for voice-only content. This generally provides more bandwidth for the soundtrack, improving the quality. It takes away bandwidth from the visual track, however.

## Choosing Video Options

The **Video Mode** pull-down list on the **Audiences** palette affects how video is encoded. The default value of Normal Motion Video produces the best results for most audiences. You can leave this value set even when you encode an audio-only clip because RealProducer automatically detects that no visual track is present. You should select the No Video option only if you want to encode just the audio portion from the video input.

At slow streaming rates for modem audiences, you can choose one of the following options when encoding a video. These options primarily affect fast-action videos:

- Choose Sharpest Image if you want to encode the crispest image. The frame rate will be lower, though, making the video jerkier. For more information, see “Visual Clarity” on page 60.
- Choose Smoothest Motion if you want to keep the frame rate as high as possible. The image may become more blurry, however. For details, refer to “Encoded Frame Rates” on page 59.
- If you have a large video (320-by-240 or larger), you can resize the video smaller when streaming at low bandwidths. Or, you can choose Slide Show to encode a frame every few seconds. This creates a slide show with no motion, but the highest possible image quality.

### Selecting a RealVideo Codec

In the **Video codec** pull-down list, you select the RealVideo codec to use. The section “RealVideo Codecs” on page 61 explains the codec differences. The default is RealVideo 10, which provides the highest possible video quality and is compatible with RealOne Player and later. RealVideo 10 is the only option on RealProducer Basic. With RealProducer Plus, you can choose RealVideo 9 or RealVideo 8.

**Tip:** Use RealVideo 8 to create videos that are compatible with RealPlayer 8 and later on desktop machines, as well as with RealPlayer for mobile devices such as smartphones and personal digital assistants.

### Using Two-Pass Encoding

In the **Audiences** palette, you can turn off two-pass encoding, which the section “Two-Pass Encoding” on page 80 describes. RealNetworks

recommends that you keep two-pass encoding enabled, turning it off only if you need to decrease your encoding time. Video quality will decline, however.

**Tip:** Two-pass encoding cannot be used with live broadcasts and is automatically disabled. You therefore do not need to uncheck this option when broadcasting.

## Resizing the Video

Normally, the encoded video uses the same height and width dimensions as the video input. If you use RealProducer Plus and you want to change the size of the encoded video, check the **Resize video to** box and enter a pixel value for the new height and width. You can scale the video smaller, which may be necessary when streaming to slow bandwidths, as described in “Video Capture” on page 71. Note that if you scale the output video much larger than the input size, it may appear blurry.

If you keep the **Maintain aspect ratio** box checked, you can enter just the height or width value for the resize. RealProducer automatically calculates the other value to maintain the ratio between the two dimensions. By unchecking this box, you can enter width and height values independently. If you do not maintain the aspect ratio, however, the output will be distorted.

RealNetworks recommends that you keep the **High quality resize** box checked. This produces superior results, but significantly increases the encoding time. Uncheck the box only if you need to decrease the encoding time. Note that the video quality will decline, however. The section “Resize Filter” on page 77 provides background information about resizing.

**Note:** You can also crop out portions of the video input before resizing the video. See “Filtering Video Input” on page 95 for more information. Refer to “Video Encoding Dimensions” on page 73 for recommended video sizes.

## Choosing Audiences

Before you encode a clip or broadcast, you choose the audience or audiences to use. For each audience, RealProducer encodes a separate stream based on the speed of the network connection or a certain level of quality that you want to preserve. For example, RealProducer encodes video at 34 Kbps for 56 Kbps dial-up modem users, and at 225 Kbps for 256 Kbps DSL or Cable Modem



users. RealProducer predefines a variety of audience templates. The following sections explain how to add audiences to encoding jobs.

**For More Information:** Chapter 7 provides details about each audience that you can choose. See “Creating and Editing Audiences” on page 155 for information about creating your own audience templates.

## Default Audience and Options

If you do not choose your own audiences for an encoding job, RealProducer uses a set of default encoding values designed for broadband connections. The clip or broadcast will be compatible with RealOne Player and later. The following are the default values:

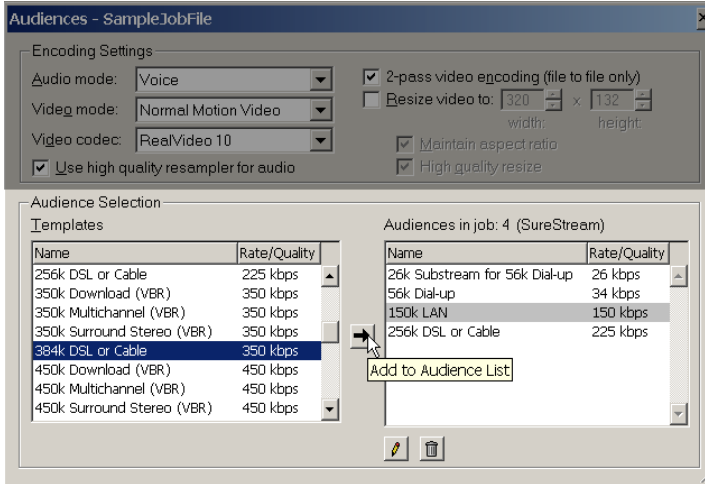
General settings:	SureStream CBR clip for multiple audiences Two-pass encoding No predefined clip information
Audience:	256k DSL or Cable
Audio encoding:	Music codecs (codec used depends on the audience) High-quality audio resampling
Video encoding:	RealVideo 10 Normal motion video No video resizing No video prefilters High encoding complexity Maximum start-up latency of 4 seconds

**Tip:** The section “Changing the Overall Default Settings” on page 87 explains how to change these default settings.

## Adding an Audience to a Job

If you have multiple jobs open, select the appropriate job in the job manager as described in “Using the Job Manager” on page 88. Then click the **Audiences** button or choose **Settings>Show Audiences (Ctrl+e)**. This opens the **Audiences** palette. In the top half of this palette, you choose basic encoding settings as described in “Setting Basic Encoding Parameters” on page 97. In the bottom half, you select your audiences.

## Audience Selection on Lower Half of Audiences Palette



The left-hand section of the **Audiences** palette lists the available audience templates. Each template has a name that describes the audience, such as **56k Dial-up**, and lists the template's average bandwidth usage. The right-hand section of the palette lists the audiences chosen for the job. By default, RealProducer uses the audience described in the section “Default Audience and Options” on page 101 to create a SureStream clip.

To add an audience to the job, click the audience name in the left-hand windows and click the right arrow button. To add multiple audiences to the same job, you can choose only the audiences **not** listed as variable bit rate (VBR) audiences. To delete an audience from the job, highlight the template name in the right-hand section, and click the trash can icon or press your keyboard's **Delete** key.

**Note:** Using RealProducer Plus, you can add any number of CBR audiences to a SureStream clip. With RealProducer Basic, you are limited to three audiences.

**Tip:** To view the properties for an audience added to the job, double-click the audience name. Or, highlight the name and click the pencil icon. Chapter 7 lists the properties for each audience.

## CHOOSING AUDIENCES

This chapter lists the properties of the predefined audiences. This information will help you to choose which audiences to use when encoding a clip or broadcast with the graphical application, as described in “Choosing Audiences” on page 100. You can also use audience files when encoding with the command-line application, which Chapter 14 explains. Appendix C describes the syntax of the audience files, which you can edit manually.

### Understanding Audiences

A single audience defines a range of parameters used to encode a clip or broadcast. It defines the audio codecs, the video codec, the maximum frame rate, and the maximum streaming bandwidth, for example. You can use the same audience to encode a video clip or an audio-only clip.

### Audio Encoding for Audiences

Each audience setting defines four possible audio codecs. RealProducer uses one of those codecs depending on the type of audio used as the input:

- For a voice-only audio clip, an audience uses a voice codec. If the input is stereo surround or 5.1 multichannel audio, however, it uses a stereo surround or multichannel music codec to preserve audio data in the extra channels. RealProducer uses this codec when the clip is audio-only and you select Voice as the audio mode.
- For a video with voice-only narration, an audience uses a voice, stereo surround, or multichannel codec as appropriate. Because a video clip uses the majority of its bandwidth for its visual track, RealProducer generally uses a lower-bandwidth audio codec than when it encodes an audio-only clip. RealProducer uses this codec with a video clip when you select Voice as the audio mode.

- For a music audio clip, an audience uses a mono music, stereo music, stereo surround, or 5.1 multichannel codec depending on the input and the streaming bandwidth. RealProducer uses this codec when the clip is audio-only and you select Music as the audio mode.
- For a video with music, an audience uses a mono music, stereo music, stereo surround, or 5.1 multichannel codec depending on the input. The chosen codec is generally geared for a lower streaming speed than with a music-only clip, though, to preserve bandwidth for the visual track. RealProducer uses this codec with a video clip when you select Music as the audio mode.

**For More Information:** The section “Setting Audio Parameters” on page 98 explains how to set the Voice or Music audio mode through the graphical application. For the command-line application, you use the `-am` option, described in the section “Audio Mode (-am)” on page 281. See “Media Profile” on page 334 for information about how the stream context is set in a job file.

**Note:** The audio codecs partially determine which versions of RealPlayer can play your clip or broadcast. The tables in this chapter summarize player compatibility. For specific information on a codec-by-codec basis, refer to “RealAudio Codecs” on page 37.

## Video Encoding for Audiences

The audience defines a default video codec, which is RealVideo 10 for desktop streaming and download audiences, and RealVideo 8 for mobile device audiences. However, you can use RealVideo 8, 9, or 10 with any audience. To change the video codec choice, you can do one of the following:

- Edit the audience file manually as described in Appendix C.
- Override the codec default when encoding with the graphical-application, as described in “Selecting a RealVideo Codec” on page 99.
- Override the codec default when encoding with the command-line application, as described in “Video Codec Override (-vco)” on page 284.

**Note:** The video codec partially determines which versions of RealPlayer can play your clip or broadcast. The tables in this

chapter summarize player compatibility. For specific information on a codec-by-codec basis, refer to “RealVideo Codecs” on page 61.

## Which Audiences Should I Use?

RealProducer provides a number of predefined audiences designed to fit a variety of streaming and downloading requirements. The following sections guide you to the appropriate set of audiences to use. As you explore the audience choices, keep two important points in mind:

- With variable bit rate (VBR) audiences, you can choose only one audience for each job. All audiences not marked as “VBR” are constant bit rate (CBR) templates. You can use multiple CBR audiences in a job.
- As described in “Creating and Editing Audiences” on page 155, you can modify existing audiences or define your own audiences. Before doing this, however, verify that the predefined audiences do not meet your needs. You should also be familiar with the audio and video issues described in Chapter 4 and Chapter 5, respectively.

### Streaming to Low Bandwidth (Modem) Audiences

The audiences described in “Low-Bandwidth Streaming Audiences” on page 106 are designed to stream to low-bandwidth viewers, such as RealPlayer users connecting to the Internet through modems. Because these audiences are SureStream-compatible, you can encode several of them into a single clip. You can also add audiences from the set listed in “High-Bandwidth Streaming Audiences” on page 113.

### Creating Streaming or Downloadable Clips for Broadband Audiences

The audiences described in “High-Bandwidth Streaming Audiences” on page 113 are designed for broadband streaming connections such as digital subscriber line (DSL) and cable modems. Like the audiences described in “Low-Bandwidth Streaming Audiences” on page 106, these audiences are SureStream-compatible, so you can encode several of them into a single clip. For a downloadable clip, a VBR audience is the best choice. You can use VBR audiences for high-bandwidth streaming clips, too. However, you can choose only a single audience for each clip or broadcast when you use an audience listed in one of the following sections:

- The audiences described in the section “Variable Bit Rate Download Audiences” on page 120 create the most general-purpose clips. The audio will be encoded as mono or stereo, depending on the input.
- You can encode downloadable clips based on a quality metric by using the audiences listed in the section “Quality Download Audiences” on page 125. These audiences also produce mono or stereo audio output.
- The audiences described in “Stereo Surround Audiences” on page 129 encode high-quality downloadable clips that preserve stereo surround information in the audio input.
- Use the audiences listed in the section “Multichannel Audio Audiences” on page 133 to create downloadable clips from input that includes discrete, multichannel audio.
- For faithful encoding of standard mono or stereo input in audio-only clips, use the lossless codec described in “Lossless Audio” on page 138.

### Streaming or Downloading to Mobile Devices

The audiences described in “Mobile Device Audiences” on page 117 are tailored to the needs of mobile devices such as smartphones and personal digital assistants.

## Low-Bandwidth Streaming Audiences

This set of audiences encodes audio or video for streaming to RealPlayer across low-bandwidth Internet and intranet connections. Because these audiences are SureStream-compatible, you can encode multiple audiences into a clip, as explained in “SureStream CBR Clips” on page 63. That same clip can also contain one or more high-bandwidth audiences listed in the section “High-Bandwidth Streaming Audiences” on page 113.

### Substream Audiences

The low-bandwidth streaming audiences include three substreams. These substreams are specifically intended as backups for dial-up modem audiences in cases where available bandwidth declines:

- 12k Substream for 28k Dial-up
- 16k Substream for 28k Dial-up
- 26k Substream for 56k Dial-up

**Primary Audiences**

You can choose any of the following audiences for your primary streams, or as backup streams for other higher-bandwidth, primary audiences:

- 28k Dial-up
- 56k Dial-up
- 64k Single ISDN
- 128k Dual ISDN
- 150k LAN

**12k Substream for 28k Dial-up**

This audience is used as a substream for the 28k Dial-up audience. You can include it, along with the 16k Substream for 28k Dial-up, when encoding a SureStream clip for modem users.

**12k Substream Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealPlayer G2 and later for audio-only voice or music
Total bandwidth	12 Kbps
Target video frame rate	15 fps
Average video bandwidth	6 or 7 Kbps depending on audio choice
Recommended video sizes	176-by-132
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	none
Audio input	mono or stereo voice or music
Audio output	mono voice, mono music
Voice codec for video	5 Kbps voice
Music codec for video	6 Kbps Music - RealAudio
Voice codec for audio-only	8.5 Kbps voice
Music codec for audio-only	11 Kbps Music - RealAudio

## 16k Substream for 28k Dial-up

This audience is a substream for the 28k Dial-up audience. You can include it, along with the 12k Substream for 28k Dial-up, when encoding a SureStream clip for modem users.

<b>16k Substream Audience</b>	
Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealPlayer G2 and later for audio-only voice or music
Total bandwidth	16 Kbps
Target video frame rate	15 fps
Average video bandwidth	10 or 11 Kbps depending on audio choice
Recommended video sizes	176-by-132
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	12k Substream for 28k Dial-up
Audio input	mono or stereo voice or music
Audio output	mono voice, mono music
Voice codec for video	5 Kbps voice
Music codec for video	6 Kbps Music - RealAudio
Voice codec for audio-only	16 Kbps voice
Music codec for audio-only	16 Kbps Music - RealAudio

## 26k Substream for 56k Dial-up

This is a substream for the 56k Dial-up audience.

<b>26k Substream Audience</b>	
Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealPlayer G2 and later for audio-only voice or music
Total bandwidth	26 Kbps
Target video frame rate	15 fps
Average video bandwidth	18 or 19 Kbps depending on audio choice

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**26k Substream Audience (continued)**

Setting or Property	Value
Recommended video sizes	176-by-132 to 240-by-180
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	16k Substream for 28k Dial-up
Audio input	mono or stereo voice or music
Audio output	mono voice, mono music
Voice codec for video	6.5 Kbps voice
Music codec for video	8 Kbps Music - RealAudio
Voice codec for audio-only	16 Kbps voice
Music codec for audio-only	20 Kbps Music - RealAudio

(Table Page 2 of 2)

**28k Dial-up**

The 28 Kbps dial-up audience is the primary audience for users connecting to the Internet on 28.8 Kbps modems.

**28k Dial-up Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealPlayer G2 and later for audio-only voice or music
Total bandwidth	20 Kbps
Target video frame rate	15 fps
Average video bandwidth	12 or 13 Kbps depending on audio choice
Recommended video sizes	176-by-132
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	12k Substream for 28k Dial-up, 16k Substream for 28k Dial-up
Audio input	mono or stereo voice or music
Audio output	mono voice, mono music
Voice codec for video	6.5 Kbps voice
Music codec for video	8 Kbps Music - RealAudio

(Table Page 1 of 2)

**28k Dial-up Audience (continued)**

Setting or Property	Value
Voice codec for audio-only	16 Kbps voice
Music codec for audio-only	20 Kbps Music - RealAudio

(Table Page 2 of 2)

**56k Dial-up**

The 56 Kbps dial-up audience is the primary audience for users connecting to the Internet on 56 Kbps modems. This audience setting encodes stereo music for an audio-only clip. Lower-bandwidth substreams, such as the 26k Substream for 56k Dial-up, encode all audio output as mono. So if a 56 Kbps modem user is listening to a stereo music clip, a drop in bandwidth causes a shift to mono music.

**56k Dial-up Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealPlayer G2 and later for audio-only voice or music
Total bandwidth	34 Kbps
Target video frame rate	15 fps
Average video bandwidth	26 or 27 Kbps depending on audio choice
Recommended video sizes	176-by-132 to 240-by-180
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	26k Substream for 56k Dial-up, 16k Substream for 28k Dial-up
Audio input	mono or stereo voice or music
Audio output	mono voice, mono music with video, stereo music for audio-only
Voice codec for video	6.5 Kbps voice
Music codec for video	8 Kbps Music - RealAudio
Voice codec for audio-only	32 Kbps voice
Music codec for audio-only	32 Kbps Stereo Music High Response - RealAudio

## 64k Single ISDN

This is the primary audience for single-line ISDN. Although DSL lines and cable modems are replacing ISDN use in many countries, this audience can act as a substream for higher-bandwidth encodings.

### 64k Single ISDN Audience

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealPlayer G2 and later for audio-only voice or music
Total bandwidth	50 Kbps
Target video frame rate	15 fps
Average video bandwidth	39 or 41 Kbps depending on audio choice
Recommended video sizes	176-by-132 to 240-by-180
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	56k Dial-up, 26k Substream for 56k Dial-up
Audio input	mono or stereo voice or music
Audio output	mono voice, mono music with video, stereo music for audio-only
Voice codec for video	8.5 Kbps voice
Music codec for video	11 Kbps Music - RealAudio
Voice codec for audio-only	32 Kbps voice
Music codec for audio-only	44 Kbps Stereo Music High Response - RealAudio

## 128k Dual ISDN

This is the primary audience for dual-line ISDN. Although DSL lines and cable modems are replacing ISDN use in many countries, this audience can act as a substream for higher-bandwidth encodings.

### 128k Dual ISDN Audience

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealPlayer 8 and later for audio-only music, RealPlayer G2 and later for audio-only voice
Total bandwidth	100 Kbps
Target video frame rate	15 fps
Average video bandwidth	79 or 84 Kbps depending on audio choice
Recommended video sizes	176-by-132 to 240-by-180
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	64k Single ISDN, 56k Dial-up
Audio input	mono or stereo voice or music
Audio output	mono voice, mono music with video, stereo music for audio-only
Voice codec for video	16 Kbps voice
Music codec for video	20 Kbps Music - RealAudio
Voice codec for audio-only	64 Kbps voice
Music codec for audio-only	96 Kbps Stereo Music - RealAudio

## 150k LAN

This audience is designed for a local area network (LAN) such as a corporate intranet. This is the lowest-speed audience that uses stereo music for video soundtracks, and that can encode more than 15 frames of video per second.

<b>150k LAN Audience</b>	
Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Total bandwidth	150 Kbps
Target video frame rate	30 fps
Average video bandwidth	118 Kbps
Recommended video sizes	176-by-132 to 240-by-180
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	128k Dual ISDN, 64k Single ISDN
Audio input	mono or stereo voice or music
Audio output	mono voice, stereo music
Voice codec for video	32 Kbps voice
Music codec for video	32 Kbps Stereo Music High Response - RealAudio
Voice codec for audio-only	64 Kbps voice
Music codec for audio-only	128 Kbps Stereo Music - RealAudio 10

## High-Bandwidth Streaming Audiences

This set of audiences encodes audio or video for streaming to RealPlayer across broadband Internet connections. Use any of the following audiences, or a combination of several audiences, to create general-purpose clips that stream at high bandwidths:

- 256k DSL or Cable
- 384k DSL or Cable
- 512k DSL or Cable
- 768k DSL or Cable

**Note:** Because these audiences are SureStream-compatible, you can also encode in the same clip the audiences listed under “Low-Bandwidth Streaming Audiences” on page 106. A single clip for narrowband and broadband streams works well for audio-only clips. With video, however, you may want to use different width and height dimensions for low-speed and high-speed audiences. For more information, refer to “Video Capture” on page 71.

**Tip:** Although you can also use these audiences when creating clips intended for download, the audiences described in the section “Variable Bit Rate Download Audiences” on page 120 are better suited for this purpose.

## 256k DSL or Cable

This audience targets 256 Kbps DSL and cable modem users. This is typically the lowest speed at which these services are offered.

**256k DSL or Cable Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Total bandwidth	225 Kbps
Target video frame rate	30 fps
Average video bandwidth	180 or 193 Kbps depending on audio choice
Recommended video sizes	320-by-240
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	150k LAN, 128k Dual ISDN
Audio input	mono or stereo voice or music
Audio output	mono voice, stereo music
Voice codec for video	32 Kbps voice
Music codec for video	44 Kbps Stereo Music High Response - RealAudio

(Table Page 1 of 2)

**256k DSL or Cable Audience (continued)**

Setting or Property	Value
Voice codec for audio-only	64 Kbps voice
Music codec for audio-only	256 Kbps Stereo Music - RealAudio 10

(Table Page 2 of 2)

**384k DSL or Cable**

This audience targets 384 Kbps DSL and cable modem users. It provides the highest-quality, audio-only encoding for a general streaming audience. Higher-speed audiences improve the video and audio-with-video quality, but will have the same audio-only quality.

**384k DSL or Cable Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Total bandwidth	350 Kbps
Target video frame rate	30 fps
Average video bandwidth	286 Kbps
Recommended video sizes	320-by-240
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	256k DSL or Cable, 150k LAN
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	64 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

## 512k DSL or Cable

This audience targets 512 Kbps (one-half Megabit) DSL and cable modem users. The music-with-video quality is better than the 384k DSL or Cable audience, but the audio-only quality is the same.

### 512k DSL or Cable Audience

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Total bandwidth	450 Kbps
Target video frame rate	30 fps
Average video bandwidth	353 or 386 Kbps depending on audio choice
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	384k DSL or Cable, 256k DSL or Cable
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	96 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

## 768k DSL or Cable

This audience targets 768 Kbps (three-quarters Megabit) DSL and cable users. For audio-only encoding, the audio quality is the same as the 384k DSL or



Cable audience. With video, the audio quality is the same as the 512k DSL or Cable audience.

#### 768k DSL or Cable Audience

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Total bandwidth	700 Kbps
Target video frame rate	30 fps
Average video bandwidth	603 or 646 Kbps depending on audio choice
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	yes
Recommended substreams	512k DSL or Cable, 384k DSL or Cable
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	96 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

## Mobile Device Audiences

The mobile device audiences are designed for streaming media to smartphones that include RealOne Player (or later) for mobile devices, as well as for creating download clips for personal digital assistants such as Palm devices and Pocket PC. These audiences have two features meant to accommodate the slower processors on these devices:

- The maximum frame rate for these audiences is lower than the frame rate for other streaming and download audiences. Decoding a high frame rate is processor-intensive. A lower frame rate is therefore recommended for mobile devices.
- RealVideo 8 is the preferred codec. It requires less processor power for decompressing video than RealVideo 9 and RealVideo 10.

**Warning!** When you encode with the graphical application, you will override the RealVideo 8 codec selection if you do not change the job's default setting from RealVideo 10. See "Selecting a RealVideo Codec" on page 99.

When encoding a destination, you can choose one of the following mobile device audiences:

- General Mobile Streaming Audience
- General Mobile Local Playback Audience
- Pocket PC Local Playback Audience

### General Mobile Streaming Audience

This audience is designed for streaming audio or video to smartphones.

**General Mobile Streaming Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later for mobile devices
Total bandwidth	20 Kbps
Target video frame rate	5 fps
Average video bandwidth	12 or 14 Kbps depending on audio choice
Recommended video sizes	176-by-144
RealVideo codec	RealVideo 8
SureStream compatible	yes
Recommended substreams	n/a
Audio input	mono or stereo voice or music
Audio output	mono voice or music
Voice codec for video	6.5 Kbps voice
Music codec for video	8 Kbps Music - RealAudio
Voice codec for audio-only	16 Kbps voice
Music codec for audio-only	16 Kbps Music - RealAudio

## General Mobile Local Playback Audience

This general-purpose audience produces audio or video clips suitable for download to most mobile devices.

**General Mobile Local Playback Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later for mobile devices
Total bandwidth	80 Kbps
Target video frame rate	7.5 fps
Average video bandwidth	64 to 72 Kbps depending on audio choice
Recommended video sizes	176-by-144
RealVideo codec	RealVideo 8
SureStream compatible	yes
Recommended substreams	n/a
Audio input	mono or stereo voice or music
Audio output	mono voice, mono music with video, stereo music for audio-only
Voice codec for video	16 Kbps voice
Music codec for video	16 Kbps Music - RealAudio
Voice codec for audio-only	32 Kbps voice
Music codec for audio-only	44 Kbps Stereo Music

## Pocket PC Local Playback Audience

This audience is suitable for audio or video clips downloaded to Pocket PC devices or any other mobile device with a higher-speed processor.

**Pocket PC Local Playback Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later for mobile devices
Total bandwidth	200 Kbps
Target video frame rate	15 fps
Average video bandwidth	168 Kbps
Recommended video sizes	176-by-144
RealVideo codec	RealVideo 8

(Table Page 1 of 2)

**Pocket PC Local Playback Audience (continued)**

Setting or Property	Value
SureStream compatible	yes
Recommended substreams	n/a
Audio input	mono or stereo voice or music
Audio output	mono voice, mono music with video, stereo music for audio-only
Voice codec for video	32 Kbps voice
Music codec for video	32 Kbps Music High Response - RealAudio
Voice codec for audio-only	32 Kbps voice
Music codec for audio-only	64 Kbps Stereo Music

(Table Page 2 of 2)

## Variable Bit Rate Download Audiences

This set of audiences encodes downloadable clips. You can also encode streaming clips or broadcasts using these audiences, as long as you understand the streaming characteristics described in “Variable Bit Rate Video” on page 66. For each job, you can choose one of the following VBR download templates:

- 350k Download (VBR)
- 450k Download (VBR)
- 750k Download (VBR)
- 1M Download (VBR)
- 2M Download (VBR)
- 5M Download (VBR)

**Tip:** If you are unsure about your network characteristics, stick with the audiences described in “High-Bandwidth Streaming Audiences” on page 113. Those audiences encode video at a lower quality, but make more conservative assumptions about available bandwidth.

**For More Information:** You can also create downloadable clips according to a quality metric. The section “Quality Download Audiences” on page 125 lists the audiences that you use for

this type of encoding. If your audio input is not mono or stereo, you may want to use a stereo surround or multichannel audience as described in “Stereo Surround Audiences” on page 129 and “Multichannel Audio Audiences” on page 133.

### 350k Download (VBR)

This is the lowest-speed VBR download audience.

#### 350k Download (VBR) Audience

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Average bandwidth	350 Kbps
Maximum bandwidth	700 Kbps
Target video frame rate	30 fps
Average video bandwidth	286 Kbps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	64 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

## 450k Download (VBR)

This audience offers improved music-with-video quality from the 350k Download (VBR) audience. Higher-speed audiences improve the video quality but not the audio quality.

### 450k Download (VBR) Audience

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Average bandwidth	450 Kbps
Maximum bandwidth	900 Kbps
Target video frame rate	30 fps
Average video bandwidth	353 to 386 Kbps depending on audio choice
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	96 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

## 750k Download (VBR)

This audience provides the same audio quality as the 450k Download (VBR) audience.

**750k Download (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Average bandwidth	750 Kbps
Maximum bandwidth	1500 Kbps
Target video frame rate	30 fps
Average video bandwidth	654 to 686 Kbps depending on audio choice
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	96 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

## 1M Download (VBR)

With this audience, audio quality is the same as with the 450k Download (VBR) and 750k Download (VBR) audiences.

**1M Download (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Average bandwidth	1 Mbps

(Table Page 1 of 2)

**1M Download (VBR) Audience (continued)**

Setting or Property	Value
Maximum bandwidth	2 Mbps
Target video frame rate	30 fps
Average video bandwidth	904 to 936 Kbps depending on audio choice
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	96 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

(Table Page 2 of 2)

**2M Download (VBR)**

This audience offers very high download quality for large video clips.

**2M Download (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Average bandwidth	2 Mbps
Maximum bandwidth	4 Mbps
Target video frame rate	30 fps
Average video bandwidth	1936 Kbps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice

(Table Page 1 of 2)



**2M Download (VBR) Audience (continued)**

Setting or Property	Value
Music codec for video	96 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

(Table Page 2 of 2)

**5M Download (VBR)**

This audience provides very high-quality playback for large video clips.

**5M Download (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Average bandwidth	5 Mbps
Maximum bandwidth	10 Mbps
Target video frame rate	30 fps
Average video bandwidth	4904 to 4936 Kbps depending on audio choice
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	96 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

**Quality Download Audiences**

The quality download audiences are similar to the VBR audiences described in “Variable Bit Rate Download Audiences” on page 120. You can use them if you wish to maintain a certain visual quality level in large, downloadable video clips. Because these audiences do not define an average bit rate, they are not

good choices for streaming. When encoding a destination, you can choose one of these VBR quality download templates:

- 70% Quality Download (VBR)
- 80% Quality Download (VBR)
- 90% Quality Download (VBR)
- 100% Quality Download (VBR)

**For More Information:** For background on the difference between VBR clips encoded for quality or bit rate, refer to “VBR Encoding Settings” on page 68.

**Note:** All quality-based download audiences provide the same audio quality, so you will notice quality improvements among the templates only with video clips.

## 70% Quality Download (VBR)

This audience template attempts to maintain a 70% quality level compared to the input video. You may notice a small number of imperfections added by the encoding process.

**70% Quality Download (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Quality target	70%
Maximum bandwidth	1400 Kbps
Target video frame rate	30 fps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	96 Kbps Stereo Music - RealAudio

(Table Page 1 of 2)

**70% Quality Download (VBR) Audience (continued)**

Setting or Property	Value
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

(Table Page 2 of 2)

**80% Quality Download (VBR)**

This audience improves on the 70% Quality Download (VBR) audience settings.

**80% Quality Download (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Quality target	80%
Maximum bandwidth	2000 Kbps
Target video frame rate	30 fps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	96 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

## 90% Quality Download (VBR)

This audience attempts to replicate the input video nearly perfectly, within the constraints set by the maximum bandwidth and the video dimensions.

**90% Quality Download (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Quality target	90%
Maximum bandwidth	4000 Kbps
Target video frame rate	30 fps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	96 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

## 100% Quality Download (VBR)

Choose this audience to replicate the input video as perfectly as possible, given the constraints set by the maximum bandwidth and the video dimensions.

**100% Quality Download (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only music, RealPlayer G2 and later for audio-only voice
Quality target	100%
Maximum bandwidth	10,000 Kbps

(Table Page 1 of 2)

**100% Quality Download (VBR) Audience (continued)**

Setting or Property	Value
Target video frame rate	30 fps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	mono or stereo voice or music
Audio output	mono or stereo voice, stereo music
Voice codec for video	64 Kbps voice
Music codec for video	96 Kbps Stereo Music - RealAudio
Voice codec for audio-only	96 Kbps Stereo Music - RealAudio
Music codec for audio-only	320 Kbps Stereo Music - RealAudio 10

(Table Page 2 of 2)

**Stereo Surround Audiences**

The stereo surround audiences are similar to the VBR audiences described in “Variable Bit Rate Download Audiences” on page 120. You can use them for downloadable or streaming clips. However, you should select one of the following stereo surround audiences only if your audio input is stereo surround:

- 350k Surround Stereo (VBR)
- 450k Surround Stereo (VBR)
- 750k Surround Stereo (VBR)
- 1M Surround Stereo (VBR)
- 2M Surround Stereo (VBR)

**For More Information:** For background, refer to “What is Stereo Surround?” on page 43. If you plan to stream a clip encoded with one of these audiences, see “VBR Clips for Streaming and Broadcasting” on page 67.

### 350k Surround Stereo (VBR)

This is the lowest-speed audience offering stereo surround encoding.

**350k Surround Stereo (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only clips
Average bandwidth	350 Kbps
Maximum bandwidth	700 Kbps
Target video frame rate	30 fps
Average video bandwidth	306 Kbps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	stereo surround voice or music
Audio output	stereo surround voice or music
Voice codec for video	44 Kbps Stereo Surround Audio - RealAudio
Music codec for video	44 Kbps Stereo Surround Audio - RealAudio
Voice codec for audio-only	192 Kbps Stereo Surround - RealAudio 10
Music codec for audio-only	320 Kbps Stereo Surround - RealAudio 10

### 450k Surround Stereo (VBR)

This audience offers the same audio quality as the 350k Surround Stereo (VBR) audience.

**450k Surround Stereo (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only clips
Average bandwidth	450 Kbps
Maximum bandwidth	900 Kbps
Target video frame rate	30 fps
Average video bandwidth	406 Kbps

(Table Page 1 of 2)

**450k Surround Stereo (VBR) Audience (continued)**

Setting or Property	Value
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	stereo surround voice or music
Audio output	stereo surround voice or music
Voice codec for video	44 Kbps Stereo Surround Audio - RealAudio
Music codec for video	44 Kbps Stereo Surround Audio - RealAudio
Voice codec for audio-only	192 Kbps Stereo Surround - RealAudio 10
Music codec for audio-only	320 Kbps Stereo Surround - RealAudio 10

(Table Page 2 of 2)

**750k Surround Stereo (VBR)**

For audio-only clips, this audience provides the same sound quality as the 350k Surround Stereo (VBR) and 450k Surround Stereo (VBR) audiences. The audio quality for video clips is higher, however.

**750k Surround Stereo (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later with RealVideo 9 or 10, RealPlayer 8 and later with RealVideo 8, RealOne Player and later for audio-only clips
Average bandwidth	700 Kbps
Maximum bandwidth	1400 Kbps
Target video frame rate	30 fps
Average video bandwidth	604 or 636 Kbps depending on audio choice
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	stereo surround voice or music
Audio output	stereo surround voice or music
Voice codec for video	64 Kbps Stereo Surround Audio - RealAudio
Music codec for video	96 Kbps Stereo Surround Audio - RealAudio

(Table Page 1 of 2)

**750k Surround Stereo (VBR) Audience (continued)**

Setting or Property	Value
Voice codec for audio-only	192 Kbps Stereo Surround - RealAudio 10
Music codec for audio-only	320 Kbps Stereo Surround - RealAudio 10

(Table Page 2 of 2)

**1M Surround Stereo (VBR)**

This audience offers high fidelity downloads, with improved audio quality over the 750k Surround Stereo (VBR) audience.

**1M Surround Stereo (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later
Average bandwidth	1 Mbps
Maximum bandwidth	2 Mbps
Target video frame rate	30 fps
Average video bandwidth	872 or 936 Kbps depending on audio choice
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	stereo surround voice or music
Audio output	stereo surround voice or music
Voice codec for video	64 Kbps Stereo Surround Audio - RealAudio
Music codec for video	128 Kbps Stereo Surround - RealAudio 10
Voice codec for audio-only	256 Kbps Stereo Surround - RealAudio 10
Music codec for audio-only	320 Kbps Stereo Surround - RealAudio 10



## 2M Surround Stereo (VBR)

This audience offers very high fidelity downloads, with improved audio quality over the 1M Surround Stereo (VBR) audience.

**2M Surround Stereo (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later
Average bandwidth	2 Mbps
Maximum bandwidth	4 Mbps
Target video frame rate	30 fps
Average video bandwidth	1840 or 1903 Kbps depending on audio choice
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	stereo surround voice or music
Audio output	stereo surround voice or music
Voice codec for video	96 Kbps Stereo Surround Audio - RealAudio
Music codec for video	160 Kbps Stereo Surround - RealAudio 10
Voice codec for audio-only	320 Kbps Stereo Surround - RealAudio 10
Music codec for audio-only	320 Kbps Stereo Surround - RealAudio 10

## Multichannel Audio Audiences

The multichannel audiences are similar to the VBR audiences described in “Variable Bit Rate Download Audiences” on page 120. You can use them for downloadable or streaming clips. However, you should select one of the following multichannel audiences only if your audio input has discrete, multichannel audio that you wish to preserve:

- 350k Multichannel (VBR)
- 450k Multichannel (VBR)
- 750k Multichannel (VBR)
- 1M Multichannel (VBR)
- 2M Multichannel (VBR)
- 5M Multichannel (VBR)

**For More Information:** For background, refer to “What is Multichannel Audio?” on page 46. If you plan to stream a clip encoded with a multichannel audience, refer to “VBR Clips for Streaming and Broadcasting” on page 67.

### 350k Multichannel (VBR)

This is the lowest-speed audience that preserves multichannel audio data.

**350k Multichannel (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later
Average bandwidth	350 Kbps
Maximum bandwidth	700 Kbps
Target video frame rate	30 fps
Average video bandwidth	254 Kbps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	discrete multichannel voice or audio
Audio output	discrete multichannel voice or audio
Voice codec for video	96 Kbps 5.1 Multichannel - RealAudio 10
Music codec for video	96 Kbps 5.1 Multichannel - RealAudio 10
Voice codec for audio-only	184 Kbps 5.1 Multichannel - RealAudio 10
Music codec for audio-only	268 Kbps 5.1 Multichannel - RealAudio 10

### 450k Multichannel (VBR)

The audio encoding rates for this audience are the same as the 350k Multichannel (VBR) audience. Its higher bandwidth improves video quality only.

**450k Multichannel (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later
Average bandwidth	450 Kbps

(Table Page 1 of 2)

**450k Multichannel (VBR) Audience (continued)**

Setting or Property	Value
Maximum bandwidth	900 Kbps
Target video frame rate	30 fps
Average video bandwidth	354 Kbps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	discrete multichannel voice or audio
Audio output	discrete multichannel voice or audio
Voice codec for video	96 Kbps 5.1 Multichannel - RealAudio 10
Music codec for video	96 Kbps 5.1 Multichannel - RealAudio 10
Voice codec for audio-only	184 Kbps 5.1 Multichannel - RealAudio 10
Music codec for audio-only	268 Kbps 5.1 Multichannel - RealAudio 10

(Table Page 2 of 2)

**750k Multichannel (VBR)**

This audience offers improved audio and video quality over the 450k Multichannel (VBR) audience.

**750k Multichannel (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later
Average bandwidth	700 Kbps
Maximum bandwidth	1400 Kbps
Target video frame rate	30 fps
Average video bandwidth	569 Kbps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	discrete multichannel voice or audio
Audio output	discrete multichannel voice or audio
Voice codec for video	132 Kbps 5.1 Multichannel - RealAudio 10
Music codec for video	132 Kbps 5.1 Multichannel - RealAudio 10

(Table Page 1 of 2)

**750k Multichannel (VBR) Audience (continued)**

Setting or Property	Value
Voice codec for audio-only	268 Kbps 5.1 Multichannel - RealAudio 10
Music codec for audio-only	268 Kbps 5.1 Multichannel - RealAudio 10

(Table Page 2 of 2)

**1M Multichannel (VBR)**

The audience offers improved video quality over the 750k Multichannel (VBR) audience. For audio-only clips, however, the audio quality is the same.

**1M Multichannel (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later
Average bandwidth	1 Mbps
Maximum bandwidth	2 Mbps
Target video frame rate	30 fps
Average video bandwidth	817 Kbps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	discrete multichannel voice or audio
Audio output	discrete multichannel voice or audio
Voice codec for video	184 Kbps 5.1 Multichannel - RealAudio 10
Music codec for video	184 Kbps 5.1 Multichannel - RealAudio 10
Voice codec for audio-only	268 Kbps 5.1 Multichannel - RealAudio 10
Music codec for audio-only	268 Kbps 5.1 Multichannel - RealAudio 10

## 2M Multichannel (VBR)

This audience provides the highest overall audio quality of the multichannel audiences.

**2M Multichannel (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later
Average bandwidth	2 Mbps
Maximum bandwidth	4 Mbps
Target video frame rate	30 fps
Average video bandwidth	1732 Kbps
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	discrete multichannel voice or audio
Audio output	discrete multichannel voice or audio
Voice codec for video	268 Kbps 5.1 Multichannel - RealAudio 10
Music codec for video	268 Kbps 5.1 Multichannel - RealAudio 10
Voice codec for audio-only	268 Kbps 5.1 Multichannel - RealAudio 10
Music codec for audio-only	268 Kbps 5.1 Multichannel - RealAudio 10

## 5M Multichannel (VBR)

This audience offers very high fidelity downloads. The audio encoding quality is the same as the 2M Multichannel (VBR) audience. You will notice improvements in the visual quality only.

**5M Multichannel (VBR) Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later
Average bandwidth	5 Mbps
Maximum bandwidth	10 Mbps
Target video frame rate	30 fps
Average video bandwidth	4732 Kbps
Recommended video sizes	320-by-240 or larger

(Table Page 1 of 2)

**5M Multichannel (VBR) Audience (continued)**

Setting or Property	Value
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	discrete multichannel voice or audio
Audio output	discrete multichannel voice or audio
Voice codec for video	268 Kbps 5.1 Multichannel - RealAudio 10
Music codec for video	268 Kbps 5.1 Multichannel - RealAudio 10
Voice codec for audio-only	268 Kbps 5.1 Multichannel - RealAudio 10
Music codec for audio-only	268 Kbps 5.1 Multichannel - RealAudio 10

(Table Page 2 of 2)

**Lossless Audio**

The lossless audio audience is intended primarily to encode audio-only clips in a lossless format, which the section “Lossless Audio Codec” on page 47 describes. You can use it to encode lossless audio with a video clip as well. However, the amount of bandwidth given to the video’s visual track can vary greatly depending on how much bandwidth is required to encode the audio losslessly.

**Lossless Audio Audience**

Setting or Property	Value
Player compatibility	RealOne Player and later
Average bandwidth	2 Mbps
Maximum bandwidth	4 Mbps
Target video frame rate	30 fps
Average video bandwidth	n/a
Recommended video sizes	320-by-240 or larger
RealVideo codec	RealVideo 10
SureStream compatible	no
Audio input	high-fidelity mono or stereo voice or audio
Audio output	high-fidelity mono or stereo voice or audio
Voice codec for video	RealAudio Lossless Audio
Music codec for video	RealAudio Lossless Audio

(Table Page 1 of 2)

**Lossless Audio Audience (continued)**

Setting or Property	Value
Voice codec for audio-only	RealAudio Lossless Audio
Music codec for audio-only	RealAudio Lossless Audio

(Table Page 2 of 2)

**Note:** Encoding with the lossless audio codec is supported only through the command-line application, which Chapter 14 covers. This audience is not available through the graphical application.

**For More Information:** The encoding complexity mode affects both the lossless audio codec and the video codec. For background, refer to “Encoding Complexity Modes” on page 81.





## MONITORING A JOB

This chapter shows you how to start an encoding job, and describes the different methods for monitoring a job. You will learn about encoding statistics, as well as the logging tool that displays errors and warnings about a job as it runs.

### Starting an Encoding Job

Once you have set up an encoding job, you can start and monitor the encoding process. The following procedure explains how to start and stop an encoding job.

► To start encoding a job:

1. If you are encoding from a live source, make sure that the capture equipment is functioning properly and is connected to the computer's capture card.
2. If you have multiple jobs open, select the job you want to encode in the job manager list.
3. Ensure that you have set the correct encoding parameters, such as clip information, Music or Voice audio choice, and audiences, as described in Chapter 6.
4. Click the **Encode** button. During encoding, you can use any of the monitoring tools described in this chapter.

### Stopping an Encoding Job

When you are finished encoding, click the **Stop** button. Or, if you have set a duration for the encode, you can wait until the duration is complete. Note that if you have defined multiple destinations, clicking **Stop** halts the encoding process for all destinations. You cannot stop the encoding process

for one destination (such as writing to a clip) while continuing the process for another destination (such as broadcast to a server).

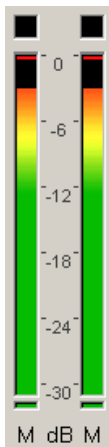
## Playing a Media Clip

After the encoding process has finished, you can play a destination clip as long as you have RealPlayer installed on the RealProducer machine. To do this, choose **File>Play RealMedia File (Ctrl+p)**, or click the RealPlayer play button below the destination window. Do not use this feature when encoding a live broadcast, however.

## Monitoring Audio

As you encode clips, you can monitor the audio levels for both the input audio and the encoded output audio. This helps to ensure that the audio levels are encoded in the optimal dynamic range. On an input or output audio meter, green for the left or right channel indicates a normal reading. Red warns that the audio is close to being over-modulated. If the audio registers above the possible dynamic range, the clipping indicator above the meter lights up to indicate that the audio has become distorted.

Audio Meter



## Disabling the Audio Meters

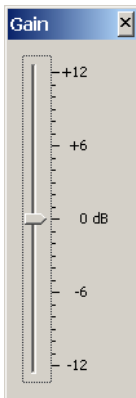
Optionally, you can disable the audio monitors. This helps to speed the encoding process, and is useful in live broadcasts in which you want to

conserve as much processing power as possible. To turn off a meter, select **View>Input Audio Meter**, **View>Output Audio Meter**, or both. Selecting these options again reinstates the audio meters.

## Adjusting Audio Gain

With RealProducer Plus, you can adjust the audio output using the **Gain** palette, which you can display with the **Settings>Show Audio Gain Control (Ctrl+r)** command. In this palette, you set a decibel gain from +12 (amplify the audio) to -12 (attenuate the audio). RealProducer saves the gain setting when you close the palette. The gain settings apply only to the current job.

### Audio Gain Palette



When you amplify the audio signal, RealProducer dynamically compresses the audio range if the output signal becomes overmodulated. Thus, the output audio is never clipped, even at the maximum gain level. A value of 6 doubles the audio level while a value of 12 quadruples it. A value of -6 reduces the level to half, while -12 reduces it to a quarter.

**For More Information:** Using a job file, you can specify a wider range. See “Audio Gain Prefilter” on page 326.

## Preventing Clipped Audio Input

When the input audio has an audio gain that causes distortion, the clipping indicators above the input audio meter light up. In this case, RealProducer’s gain control cannot eliminate the distortion. To eliminate the distortion, you may need to adjust the settings in your audio hardware or software that provides the audio input to RealProducer.

For example, the sound capture card may have its mixer levels set too high. In this case, adjust the analog gains leading to your sound card input so that the input audio meter on RealProducer never rises to the 0 dB level. If needed, modify audio gain through an external mixer board if the sound card's audio mixer does not provide adequate control.

With certain material and input sources, however, the external mixing may lead to sound levels that are too low on average. In this case, you can use the RealProducer gain control tool to bring the signal back up to acceptable levels. This is safe to do because the gain tool will not introduce clipping.

## Monitoring Video Output

When your encoding job contains video, you will see the source video play in the input preview window. The output displays in the output preview window. Optionally, you can disable the input or output video windows. This helps to speed the encoding process by eliminating the need for RealProducer to display the video onscreen. This is useful in live broadcasts in which you want to conserve as much processing power as possible. To turn off a window, select **View>Input Video**, **View>Output Video**, or both. Selecting these options again reinstates the video display.

## Monitoring Statistics

RealProducer displays a number of encoding statistics that you can monitor as you encode a clip or broadcast. These statistics provide an overview of the encoded output, showing you how well the encoding process meets your target settings. You can open the statistics window at any point before or during encoding by selecting **View>Show Statistics (Ctrl+y)**. The job title appears at the top of the window.

### Statistics Window

Audience	Total Bit Rate	Video Bit Rate	Audio Bit Rate	FPS	Min. FPS	Quality	Min. Quality	Pre-roll
16k Substream for	14 kbps	8 kbps	6 kbps	7.50	1.87	11	7	5.3
28k Dial-up	18 kbps	10 kbps	8 kbps	8.83	3.33	13	7	5.0
56k Dial-up	31 kbps	23 kbps	8 kbps	15.01	6.67	27	13	4.6
256k DSL or Cable	240 kbps	196 kbps	44 kbps	15.01	15.00	69	46	3.7

Total output bit rate: 303 kbps

Audience Properties Save To File...

## Encoding Statistics Phases

RealProducer displays three different sets of statistics during three phases of the encoding process.

### Job Configured but not Running

If you have configured an encoding job but not yet started it, the statistics window shows how the streams are configured. For a variable bit rate encoding (VBR), you'll see one audience. For a constant bit rate encoding (CBR), you'll see a separate line for each audience you've added. The statistics show the total bit rate for each stream, as well as the bit rates for the video and audio. They also show the maximum frames per second (FPS) for the video.

### Job Running

As you run an encoding job, the statistics window updates in real time to show how each stream is being encoded. Statistics do not display during the first pass of two-pass encoding, however.

### Job Finished

When the encoding completes, the statistics window shows you the actual statistics for the entire encoding job. Some statistics, such as frames per second (FPS), are listed as averages.

## Encoding Statistics Values

The following table summarizes the encoding statistics that RealProducer displays. During the encoding, some statistics update in real-time. After the encoding, some fields display average values.

**Statistics Summary**

Statistic	Description
Audience	Lists the audience template used to encode the stream.
Total Bit Rate	Indicates the total bit rate of the encoded audience stream, in the form of Kilobits per second (Kbps) with single decimal precision. If the rate is over 1 Megabit per second, the value is in Mbps with two decimal precision.
Video Bit Rate	Gives the bit rate of the video portion of the stream. If there is no video in the output, this displays as n/a.

(Table Page 1 of 2)

**Statistics Summary (continued)**

Statistic	Description
Audio Bit Rate	Lists the bit rate of the audio portion of the stream. If there is no audio in the output, this displays as n/a.
FPS	Lists the video's frames per second. If encoding has not started, the value is the maximum target. During an encoding, the value is the actual fps being encoded. After the encoding, this field gives the average frame rate. For an audio-only clip, the value is n/a.
Min. FPS	Gives the minimum frame rate, in frames per second, encoded into the stream. For an audio-only clip, or before video encoding has started, the value is n/a.
Quality	Lists the quality level of the output compared to the input after all video filters have been applied. A value of 100 percent represents equivalent quality to the input. For an audio-only clip, or before video encoding has started, the value is n/a. See "Video Quality Index" on page 146.
Min. Quality	Indicates the minimum quality level of the clip during encoding. For an audio-only clip, or before video encoding has started, the value is n/a.
Pre-roll	Lists the number of seconds of preroll (buffering) that the viewer will experience when beginning to play the encoded stream.

(Table Page 2 of 2)

**Video Quality Index**

The quality index indicates how well each RealVideo stream will play back:

- A value of 94 to 100 means that the clip will play back with excellent quality. You could even increase the video frame rate or window size and achieve high quality.
- A value of 60 to 93 represents the efficiency range of the RealVideo codec. Streams with these values will have good visual clarity and a high frame rate.
- A value of 40 to 59 indicates fair quality. These stream may have some visual artifacts and slow frame rates in some if not all sections. You'll achieve higher quality by shrinking the source video's window size.
- A value from 0 to 40 indicates poor quality playback with a slow frame rate and a high number of artifacts. You should shrink the video's window size if you intend to stream at this speed.

**Tip:** The purpose of SureStream substreams is to keep the presentation running during adverse network conditions. A poor quality level is therefore acceptable for these streams.

## Viewing Log Messages

RealProducer records messages about encoding tasks as they occur. Whereas the monitoring window provides statistics about the encoding job, the log file informs you about RealProducer performance, such as its CPU use. After a job has run, you can view the log files to find encoding errors or diagnostic messages. You can also use the log viewer to display encoding information on the screen in real-time, or after the job has finished.

**For More Information:** The RealProducer preferences set the log file location and features, and determine how many messages display in the log viewer. See “Changing Log File and Log Viewer Preferences” on page 153 for more information.

## Using the Log Viewer

The log viewer gives you a real-time view of the log messages as RealProducer generates them. It also provides the ability to filter the log to display just one type of message. Displaying the log viewer during encoding is particularly useful when you encode a live broadcast because the viewer can warn you about problems such as excess CPU consumption and lowered frame rates.

► **To open the log viewer:**

1. Select **View>Show Log Viewer (Ctrl+L)** to display the log viewer. The most recent messages display at the top of the window.
2. You can filter the types of information (errors, warnings, information, and diagnostic) that the log viewer lists by selecting the appropriate check boxes. The log viewer preferences determine which message types are actually recorded to the log.

**Tip:** You can select and deselect the message types during encoding to update the log viewer output in real-time.

3. You can also display messages according to the functional area, such as only the messages related to audio codecs. The default value of **Show all**

displays all functional area messages. “Filtering Messages by Functional Area” on page 148 describes these areas.

4. After a job runs, you can save the messages to a separate text file by clicking the **Save Messages** button and choosing a file name and location.
5. Click **Clear Messages** if you want to reset the log viewer before or after running a job.

## Filtering Messages by Functional Area

Choosing one or more functional areas allows you to display only certain types of messages, such as those related to RealAudio and RealVideo codecs. Each functional area may include errors, warnings, informational messages, and diagnostic messages. The following table describes these areas.

**Log Viewer Functional Areas**

Functional Area	Events Logged
ActiveX	Events specific to the ActiveX control used by Windows-based programs to encode media using RealProducer.
Audio Codec	Events involving one of the audio codecs used for the job.
Audio Prefilters	Events concerning the use of an audio prefilter. The section “Prefilters” on page 317 describes the prefilters.
Broadcast	Events that occur when transmitting a live stream to Helix Server. For an introduction to broadcast-related issues, refer to Chapter 10.
Capture	Events around the capture of input media. See “Using Live Audio or Video as the Input” on page 90 for capture set-up instructions.
Command Line	Events that occur when running the command-line application, which Chapter 14 describes.
File Output	Events involved with writing encoded media streams to a file. The section “Creating a Destination Clip” on page 92 explains how to set up a file as the output.
File Reader	Events related to reading an audio file or the audio component of a video file.
GUI	Events related to the use of the graphical application.
Job File	Events related to the use of a job file, which Appendix B describes.



**Log Viewer Functional Areas**

Functional Area	Events Logged
License	Events involving the license key for RealProducer Plus, such as an expired license.
Postfilters	Events related to post-filters added by the RealProducer SDK.
Remote Agent	Events related to the remote agent.
SDK Configuration	Events concernig the set up of jobs.
SDK Encoding	Events related to encoding activities.
SDK Core	Events specific to the core SDK.
SDK Generic Filter	General events about prefilters or postfilters.
Statistics	Events that affect statistics processing.
Video Codec	Events related to the RealVideo codec.
Video Pre-filters	Events concerning the use of a video prefilter. The section “Prefilters” on page 317 describes the prefilters.
Video Rendering	Events related to video preview, described in “Monitoring Video Output” on page 144.



## MODIFYING DEFAULT SETTINGS

In this chapter, you learn how to modify the RealProducer preferences, which determine where RealProducer stores files, and how it logs error and informational messages. This chapter also explains how to change the default audience settings, or create new audiences, to customize how RealProducer encodes streams.

### Adjusting RealProducer Preferences

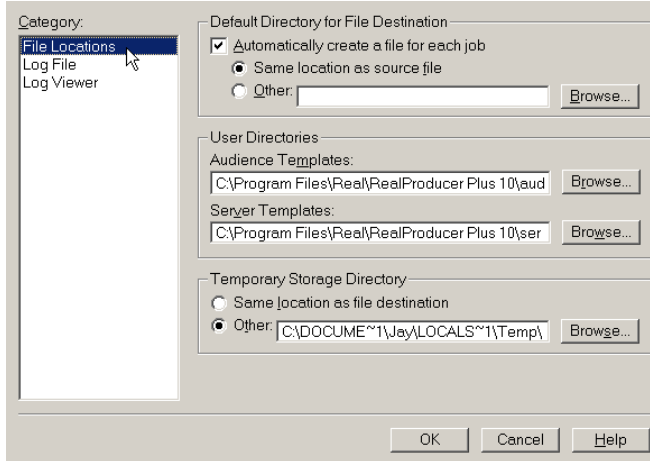
You can adjust the RealProducer preferences to determine how and where RealProducer stores support files. These preferences affect all jobs.

**For More Information:** You can modify the RealProducer preferences manually as described in Appendix E.

### Changing the File Location Preferences

You can change the default setting for where RealProducer creates the output files, as well as where it stores temporary files and its audience and server templates.

## File Location Preferences



► To change the default file locations:

1. Select **Edit>Preferences** to open the preferences dialog.
2. Choose the **File Locations** category.
3. The default selection of **Automatically create a file for each job** causes RealProducer to define an output clip that uses the same base file name as the input clip you select. When you use this feature, you can automatically save the output in one of the following locations:
  - **Same Location as Source File**—Save the encoded output clip in the same directory as the input media file.
  - **Other**—Save all encoded clips in the directory you specify. Either enter the full path to the directory, or click **Browse** and navigate to the directory you want to use.

**Note:** If you choose not to define an output clip automatically, you must always set up the output clip destination. When you use this automatic output feature, you can always change the name or location of the clip destination manually. For instructions, refer to “Modifying a Clip Destination” on page 93.

4. Under **User Directories**, you can choose where RealProducer stores its audience and server templates:

- In the **Audience Template** field, enter the full path name of the directory that stores audience files. Or, click the **Browse** button and navigate to the directory you want to use. Appendix C explains audience files.
- In the **Server Template** field, enter the full path name of the directory that stores server files. Or, click the **Browse** button and navigate to the directory you want to use. Appendix D explains server files.

**Note:** If you change the storage location of audience or server files, manually move any existing files that you want to continue using to the new location.

5. RealProducer uses a temporary directory to save data that it uses during encoding. To change this preference, select one of the following options in the **Temporary Storage Directory** section:

- **Same Location as File Destination**—Saves the temporary data in the same directory as the destination clip.
- **Other**—Saves temporary data in the directory you specify. Either enter the full path to the directory, or click **Browse** and navigate to the directory you want to use.

**Note:** If you use %TEMP% in this field, RealProducer uses the same directory specified by the Windows TEMP variable. After you close and restart RealProducer, this field lists the full path to the %TEMP% directory.

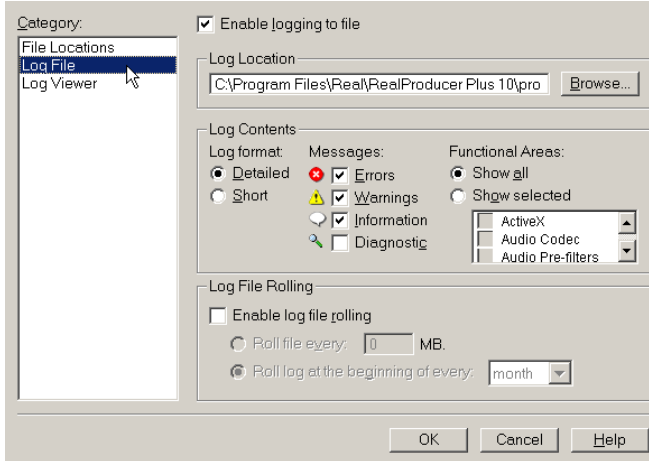
**Tip:** RealProducer operates faster if the temporary directory resides on the local RealProducer machine, rather than a network drive.

6. Click **OK** to save the preferences.

## Changing Log File and Log Viewer Preferences

RealProducer automatically logs information about encoding jobs in a text file. Through the preferences, you can turn off logging or modify the log file settings. You can display and filter log messages on-screen with the log viewer, which the section “Viewing Log Messages” on page 147 describes.

## Log File Preferences



### ► To modify log file settings:

1. Select **Edit>Preferences** to open the preferences dialog.
2. Choose the **Log File** category.
3. To disable logging, uncheck the **Enable logging to file** box. You can set the remaining preferences only if logging is enabled.
4. In the **Log Location** field, enter the full path name of the directory that stores the log file. Or, click the **Browse** button and navigate to the directory you want to use. Along with the path, choose a name for the log file, using .log as the file extension. The default location is the main RealProducer installation directory.
5. For **Log Contents**, you can specify the events that you want to log:
  - For the log format, you can choose **Short** to log only the job name and message. The **Detailed** format logs more information, such as the message category, functional area, time, and message number.
  - Under **Messages**, you can choose any combination of the following message types:
 

Errors	Error messages are severe problems that typically cause the encoding operation to fail.
Warnings	Warning messages indicate possible problems that did not cause the encoding to fail.

- |             |   |
|-------------|---|
| Information | Informational messages convey important messages about the encoding operation.  |
| Diagnostic  | Diagnostic messages convey non-critical messages about the encoding operation. An encoding operation may generate many diagnostic messages, so including this message type may cause your log file to grow quickly. |

- Under **Functional Areas**, the default is **Show all**, meaning that RealProducer logs messages from all areas of operation. If you want to log messages for just some areas, such as broadcasting or video codec operations, click **Show selected** and choose the appropriate functional areas.
6. By default, RealProducer logs all messages to the specified file, allowing the file to grow indefinitely. If you encode clips or broadcasts frequently, or you include diagnostic messages in the log, you should check **Enable log file rolling**. Then, choose a maximum log file size in Megabytes, or a time limit:
 

month	Create a new log file at midnight of the last day of each month.
week	Set up a new log file at midnight of Sunday of each week.
day	Write a new log file at midnight of each day.
hour	Roll the log file at the top of each hour.

RealProducer creates a new log file under a new name when the current log file reaches the size or time limit. The file extension includes a numeric designation to indicate the order of the log files. For example, if your log file is named `producer.log`, the first rolled file is named `producer.log1`, the second is `producer.log2`, and so on.

7. Click **Log Viewer** to change the number of messages from the log file that the log viewer displays. The default is 1000. The section “Viewing Log Messages” on page 147 explains how to use this viewer.
8. Click **OK** to save the preferences.

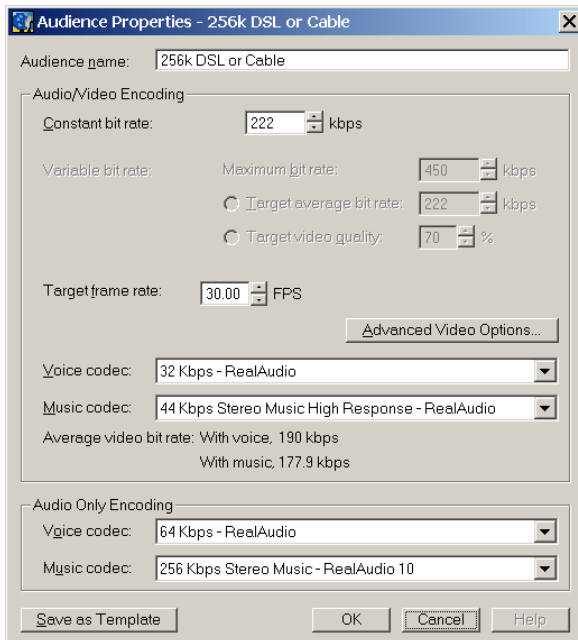
## Creating and Editing Audiences

You can fine-tune the audience templates installed with RealProducer. This section explains how to change audience settings for a single job, or all jobs. It also provides instructions and tips for creating your own audience templates.

## Changing Audience Values for the Active Job

Using RealProducer Plus, you can change the audience properties for an active job. First, add the audience to your job as described in “Choosing Audiences” on page 100. Then, click the audience name in the **Audiences** palette to display the **Audience Properties** dialog. You can then change the audience settings as described in the following sections. Optionally, you can click **Save as Template** to save the audience modifications permanently.

### Change Audience Properties for a Job



## Editing, Creating, or Deleting an Audience Template

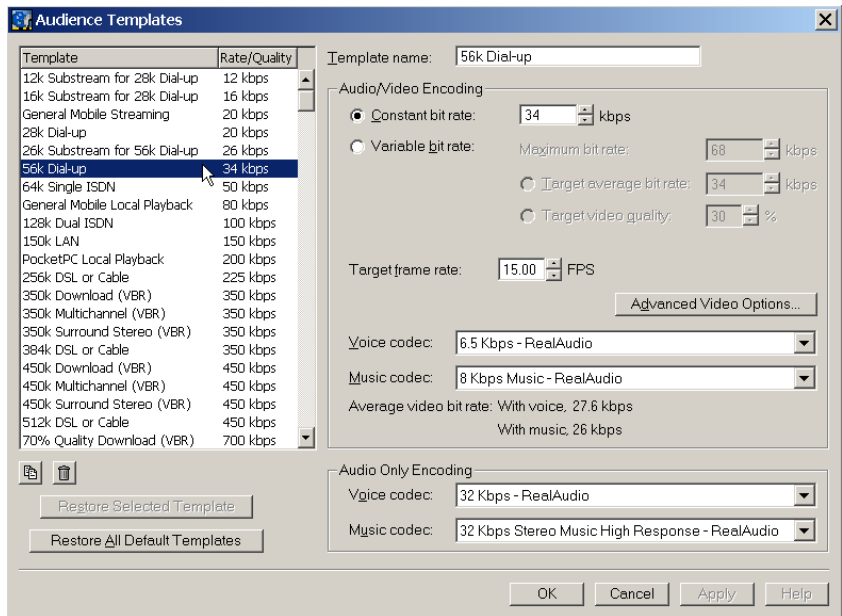
When you use RealProducer Plus, you can edit an audience template to change it permanently. You can also create new templates from existing ones to define your own audiences. Changes are recorded in the template and the active job, but not in any previous jobs that also used the audience template. To update an older job, edit the job file manually. Or, open the job in the graphical application, delete the existing audience or audiences, then add the new audiences.



**Note:** When you use RealProducer Basic, you cannot edit the existing audience templates. You are limited to creating one new template.

**For More Information:** The section “Choosing Audiences” on page 100 explains how to add and remove audiences from a job using the graphical application. See “Audiences Section” on page 340 for details about how a job file stores audience information.

### Edit Audience Templates



► **To edit or create an audience template:**

1. Select **Edit>Audience Templates** to list all available templates.
2. Select a template from the list. This displays the template’s settings in the right-hand side of the dialog.

**Tip:** Within the list, templates are ordered according to the audience’s average streaming speed or quality setting.

3. You can then perform any of the following actions:

- a. Edit the settings for the template as described in the following sections.
  - b. Click the “duplicate” icon at the bottom of the template list to copy the selected template. Then, edit the settings fields. This allows you to create a similar template quickly.
  - c. Click the trash icon to delete the selected template.
4. Click **Apply** to save changes to the template. Click **OK** to exit the dialog and save any changes.

**Tip:** If you have altered and saved an original, default template, you can restore the default values to the template by selecting the template clicking **Restore Selected Template**. Click **Restore All Templates** to reset default values to all predefined templates. These buttons have no effect on templates you have created.

## Choosing a Template Name

When you edit a template or create a new one, you specify a name in the **Template name** field. The graphical application uses this name to identify the template. You can also use this name to specify the audience with the command-line application, as described in “Audience Definitions or Audience Files (-ad)” on page 280. RealProducer uses the template name as the file name for the audience file, appending the .rpad extension automatically.

## Setting CBR or VBR Encoding

In an audience template, you can specify that the audience uses constant bit rate (CBR) or variable bit rate (VBR) encoding. For background on these choices, refer to “Constant Bit Rate Video” on page 63 and “Variable Bit Rate Video” on page 66. With the exception of the RealAudio Lossless codec, which you cannot select in the graphical application, you can use any RealAudio codec in a CBR or VBR template.

### CBR Maximum Bandwidth

For a CBR audience, you specify the total, maximum streaming speed. This should be less than the raw bandwidth of the connection type. For example, you should not set an audience template for 56 Kbps modems to stream at 56 Kbps. These modems do not actually provide that much usable bandwidth.

The following table lists maximum streaming rates for common Internet connections.

<b>Maximum Streaming Rates</b>	
Target Audience	Maximum Streaming Rate
14.4 Kbps modem	10 Kbps
28.8 Kbps modem	20 Kbps
56 Kbps modem	34 Kbps
64 Kbps ISDN	45 Kbps
112 Kbps dual ISDN	80 Kbps
Corporate LAN	150 Kbps
256 Kbps DSL/cable modem	225 Kbps
384 Kbps DSL/cable modem	350 Kbps
512 Kbps DSL/cable modem	450 Kbps
786 Kbps DSL/cable modem	700 Kbps

For any other connection speed, calculate the maximum streaming speed as:

- Approximately 75 percent of the connection bandwidth for analog connections such as dial-up modems.
- Or–
- Approximately 90 percent of the connection bandwidth for high-speed digital connections such as DSL or cable modems.

### VBR Settings

For a variable bit rate audience, you set a maximum bit rate along with an average bit rate or a quality target. The maximum bit rate should be 50 to 100 percent higher than an average bit rate. A VBR clip with an average bit rate of 300 Kbps should have a maximum bit rate of 450 to 600 Kbps, for example.

**For More Information:** The section “VBR Encoding Settings” on page 68 explains the relationship between maximum bit rate, average bit rate, and quality.

### Video Settings

The **Target frame rate** field sets the ideal maximum video frame rate for the audience, measured in frames per second (fps). A higher frame rate creates

smoother motion. Cinematic film uses 24 fps, for example, while NTSC video uses 30 fps. The section “Encoded Frame Rates” on page 59 explains frame rates and their relationship to visual clarity.

For bandwidths under 150 Kbps, RealNetworks recommends a maximum frame rate of 15 fps. This provides acceptably smooth motion without sacrificing too much visual clarity. At higher bit rates, you can select up to 30 fps. For mobile devices that have slower processors than desktop machines, you may want to choose a slower maximum rate, such as 5 to 7.5 fps.

**Note:** The frame rate setting specifies an ideal maximum only. Other factors, such as available bandwidth and video size affect the final frame rate. The monitoring utility, described in “Monitoring Statistics” on page 144, shows actual frame rate encoded into a stream.

### Advanced Video Stream Options

Click **Advanced Video Options** to change specific parameters about how RealProducer encodes video clips. In general, the default values work well for most audiences, and you should not change these settings unless you have specific reasons to do so and understand the possible, negative effects of your choices. For information about these options, refer to the following sections:

- “Encoding Complexity Modes” on page 81
- “Video Startup Latency” on page 82
- “Maximum Time Between Keyframes” on page 82
- “Loss Protection” on page 84

### Adjusting Audio Stream Settings

For audio encoding, you select four RealAudio codecs from the pull-down lists. For each clip that includes audio, RealProducer selects one of these codecs depending on the clip type, such as whether it is audio-only or video, and whether the audio track is voice or music. The section “Audio Encoding for Audiences” on page 103 explains these choices. For explanations of all RealAudio codecs, refer to “RealAudio Codecs” on page 37. Keep the following points in mind:

- When you set the RealAudio codecs used with a video clip, you must leave appropriate bandwidth for the visual track. For tips on balancing audio and video bandwidth use, refer to “Soundtrack Bandwidth” on page 57.

- When encoding a clip that uses voice, you typically use one of the voice codecs described in “Voice Codecs” on page 39. At higher bandwidths, however, you can use a music or stereo music codec to provide greater fidelity.
- Never use a voice codec for music.
- The audio codec should match the expected audio input. Do not use a multichannel codec for traditional stereo input, for example.
- Your choice of audio codec (as well as video codec) determines which versions of RealPlayer can play the clip. The codec descriptions in “RealAudio Codecs” on page 37 describe RealPlayer compatibility.





## **BROADCASTING LIVE EVENTS**

The following chapters cover the basic issues with delivering a live broadcast, and explain how to set up a live broadcast on both RealProducer and Helix Server.





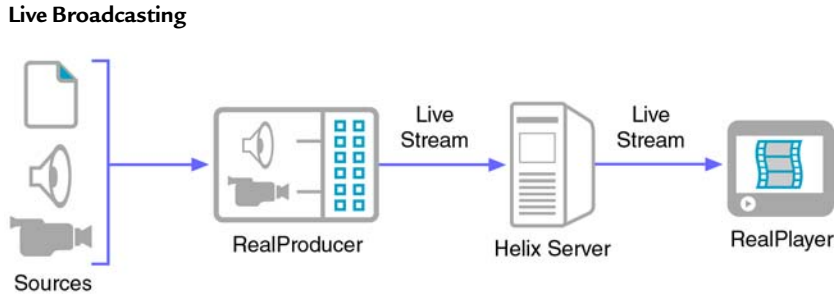
## PLANNING A BROADCAST

This chapter explains the issues and methods for broadcasting live content on a network, whether an intranet or the Internet. It introduces you to the types of broadcasts, explains broadcast options, and covers advanced broadcast features. When you are ready to broadcast, refer to Chapter 11 for instructions about using your chosen type of broadcast method.

**Tip:** If you are new to streaming media, familiarize yourself with the process for encoding static clips, which Chapter 6 describes. You should also review the audio and video issues described in Chapter 4 and Chapter 5. Broadcasting requires many of the same choices you make when encoding a clip, and introduces new issues of broadcast bandwidth and processor load.

### Broadcasting Basics

In a live broadcast, RealProducer takes live input from a capture card as described in “Using Live Audio or Video as the Input” on page 90, encodes it as RealAudio or RealVideo, and sends the stream to Helix Server for replication and distribution to RealPlayer viewers. You encode a broadcast stream using the same audiences you use when creating a static clip, as described in Chapter 7.



## The Role of Helix Server

Helix Server is required for a broadcast because RealProducer cannot broadcast directly to RealPlayers. Nor can you deliver a broadcast using a Web server. The Helix Server license, or practical considerations such as its outgoing bandwidth, determine how many RealPlayer viewers you can reach with a broadcast. Helix Server must be configured to accept the broadcast, and the server setup determines how the broadcast is distributed to RealPlayer viewers:

- unicasting—a separate stream to each RealPlayer
- multicasting—a common stream for all RealPlayers

To send a broadcast stream from RealProducer to Helix Server, you define a server destination in RealProducer. The destination records information such as the server's address and the password required for access. By saving a destination as a template, you can easily repeat a broadcast using the same parameters. When you run a broadcast, you can send the same stream to multiple servers by defining multiple server destinations in your job. You can also archive the broadcast as a clip by adding a clip destination to your job.

## Broadcasting Methods

RealProducer offers several broadcast methods. The method you choose with RealProducer affects only the delivery of the broadcast stream to Helix Server. The server, in turn, determines the method for broadcasting the live stream to individual RealPlayers. RealProducer-to-Helix Server broadcasting methods break down into the two general areas of push and pull:

- push broadcasting

In push broadcasting, RealProducer initiates the broadcast stream and delivers the stream to Helix Server when the broadcast begins. There are several methods of push broadcasting:

- account-based, push broadcast—This is the simplest broadcasting method to set up, requiring no configuration on Helix Server. RealProducer also receives statistical feedback from Helix Server. See “Running an Account-Based Broadcast” on page 189 for more information.
- password-only, push broadcast—This is similar to account-based broadcasting, but it is more efficient with bandwidth. It requires server set-up, but does not provide server feedback. The section “Setting Up a Password-Only Broadcast” on page 194 explains this broadcast method.
- multicast push—This method is available if you have a multicast-enabled network and you want to deliver the broadcast stream to several servers. See “Multicasting a Live Stream” on page 200.

- Pull

In pull broadcasting, RealProducer does not deliver the broadcast stream as soon as you start encoding. Rather, it waits for Helix Server to request the stream, which occurs when the first RealPlayer user requests the broadcast from Helix Server. For more information, refer to “Running a Pull Broadcast” on page 210.

## CBR Broadcasts

Broadcasting constant bit rate (CBR) audio or video allows you to reach the widest audience on the Internet. As described in “SureStream CBR Clips” on page 63, you can use SureStream to encode the broadcast stream for multiple audiences. Each primary stream or substream you choose increases the processor load during encoding, however, and adds to the outgoing bandwidth requirements.

If you choose the 56k Dial-up audience and the 128k Dual ISDN audience, for example, the encoding may require twice as much processing power. As well, the outgoing bandwidth available to RealProducer must be over 185 Kilobits per second.

**Note:** Except for those encoded with the lossless codec, all audio-only RealAudio streams are CBR and support the use of SureStream.

## VBR Broadcasts

If you broadcast variable bit rate (VBR) video, you can choose one VBR audience for each output. Your outgoing RealProducer bandwidth, as well as your RealPlayer viewers' network connections, should be able to handle the maximum bandwidth requirement for your selected audience, as listed in Chapter 7. For example, the 350k Download (VBR) audience has a maximum possible bandwidth of 700 Kilobits a second.

**Note:** If you plan to broadcast a VBR stream, be sure that you understand VBR characteristics. See “VBR Clips for Streaming and Broadcasting” on page 67 for background.

## Broadcast Transport Protocols

When you use a non-multicast, push broadcast method, you specify whether to use TCP or UDP when delivering the broadcast stream to Helix Server. UDP is the preferred protocol because of the lower network overhead. But you may want to use TCP when delivering the broadcast over a lossy environment.

**Note:** The monitoring connection of an account-based broadcast always uses TCP whether the data transport stream is UDP or TCP.

### UDP

When RealProducer uses the connectionless UDP protocol, it does not receive notice that broadcast packets have arrived or are missing. This generally reduces the network communications overhead and improves the quality of the broadcast. Helix Server notifies RealProducer if it requires data to be resent. Thus, using UDP enhances the performance of your broadcast.

A firewall between RealProducer and Helix Server may block UDP packets. The best solution is to configure the firewall to allow UDP packets through the ports that RealProducer and Helix Server use the broadcast transmission. These ports, which vary depending on the broadcast method, are described in the sections about setting up each type of broadcast in Chapter 11.

## TCP

If you select the TCP protocol when broadcasting, RealProducer and Helix Server establish a two-way connection. If a broadcast packet is lost in transmission, the network itself requests the packet to be resent. This makes TCP a highly reliable protocol for broadcast on a network prone to high packet loss. It is also more likely to pass through firewalls that you cannot configure to accept UDP communications.

Using TCP incurs a higher network and machine overhead, however, and can lead to inefficiencies. Helix Server does not need all stream packets to keep a broadcast flowing to RealPlayer. If a packet is lost, the network requests the packet again from RealProducer. That packet may no longer be available, however. Or, if it is available, it may arrive at Helix Server too late to be useful. Hence, both RealProducer and Helix Server must handle some network requests that do not benefit the broadcast.

## Version 6 IP Addresses

RealProducer supports DNS names, version 4 IP addresses (IPv4), and the newer version 6 IP addresses (IPv6) for delivering a broadcast stream to Helix Server. Note the following about using IPv6 addresses:

- The use of an IPv6 address as the server destination or as the RealProducer listen address requires the use of Helix Server version 11 or higher.
- Whenever possible, use a domain name instead of an IPv6 address.
- RealProducer supports full IPv6 syntax, such as the following:

- 1080:0:0:0:8:800:200C:417A

It also supports the use of a double colon (“::”) to compress leading or trailing fields containing only zeroes, as in the following:

- 1080::8:800:200C:417A

- RealProducer will not broadcast to a reserved multicast address. However, it will multicast to permanent or nonpermanent addresses, which always begin with FF, as in FF15:0:0:0:0:0:0:101.

## Video Startup Latency

Startup latency, also called stream acquisition latency, is the amount of time required for RealPlayer to display a live stream after the viewer clicks a link to

the broadcast. For a video, RealPlayer must receive a video key frame before it displays the visual image. With the standard RealProducer encoding settings, key frames can be up to 10 seconds apart, meaning that a RealPlayer user may need to wait up to 10 seconds for playback to begin. In this case, the user hears the soundtrack for several seconds until the video's visual track displays.

### **Automatic Startup Latency Reduction**

Broadcasting with Helix Server version 11 or later greatly reduces startup latency. Helix Server automatically buffers each new keyframe, sending it immediately to RealPlayer instead of waiting for RealProducer to transmit the next keyframe. This reduction in startup latency occurs whether or not you use the end-to-end latency reduction features described in “End-to-End Broadcast Latency” on page 180.

### **Manual Startup Latency Reduction**

Helix Servers earlier than version 11 do not reduce broadcast startup latency automatically. When you broadcast using these servers, RealPlayer viewers may have to wait several seconds for video images to display. As described in “Maximum Time Between Keyframes” on page 82, you can lower the maximum time between key frames to shorten this delay. However, this can reduce the compression gains of the RealVideo codec, resulting in lower visual quality.

## **SMIL in Broadcasts**

You can use SMIL 1.0 or SMIL 2.0 to add prerecorded content to a live broadcast. Within a SMIL file, you treat a broadcast like any other clip, furnishing a URL that points RealPlayer to the live stream instead of an on-demand clip. You can assign broadcast streams to SMIL regions to lay out the presentation, and play a broadcast sequentially or in parallel with on-demand clips.

SMIL can deliver an on-demand RealPix slide show along with live RealAudio, for example. It cannot synchronize the on-demand clip with the live stream, however. This is because the on-demand clip's timeline starts when the viewer requests the presentation, whereas the broadcast stream's timeline starts when the broadcast begins.

To illustrate this, suppose that viewer A requests the presentation 2 minutes after the broadcast begins, and viewer B requests it 4 minutes after the broadcast begins. At 10 minutes into the broadcast, both viewers hear the

same audio, but viewer A's RealPix clip is at its 8-minute mark, whereas viewer B's clip is at its 6-minute mark. Hence the relationship between the two timelines varies for each viewer.

**For More Information:** For more on SMIL, see *RealNetworks Production Guide*.

## Broadcast Trial Runs

When you broadcast live content, you don't get a second chance. It's good practice to perform a trial run to ensure that the equipment works properly and that the broadcast results are what you expect. Because you can't edit a live broadcast the way you can a prerecorded file, it's important to set your audio levels and plan your video shots carefully in advance.

During both the trial run and the live broadcast, view the broadcast with RealPlayer and confirm that the quality is good. When RealPlayer connects, check that the content begins to play in a reasonable time, such as less than 15 seconds for a push broadcast or 30 seconds for the first request of a pull broadcast. Display RealPlayer's playback statistics to verify that the frame rate is adequate, and that packet loss is not excessive.

When you broadcast using SureStream, you can change the RealPlayer bandwidth preferences to display different SureStream streams. If you experience problems during your trial run, you may need to reduce the number of streams. Or, you may need to run the encoder on a more powerful computer.

**For More Information:** See "Broadcast Load Management" on page 177 for additional points about managing processor load during a broadcast. Refer to Chapter 4 and Chapter 5 for tips about encoding audio and video in a live broadcast.

## Simulated Live Broadcasts

The broadcasting techniques described in this chapter apply only to the broadcasting of live content. Using the Simulated Live Transfer Agent (SLTA) of Helix Server, you can broadcast prerecorded clips as if they were live events. The effect is that of a radio station that broadcasts the same prerecorded song to every listener at the same time. SLTA even allows you to define playlists that you can update during the broadcast.

To use SLTA, you encode clips as described in Chapter 6. All clips used in an SLTA broadcast must be encoded for the same audience or audiences. You then transfer the clips to Helix Server, set up an SLTA playlist, and run the SLTA utility from the Windows or UNIX command line. The chapter on simulated live broadcasts in *Helix Server Administration Guide* explains how to do this.

## Broadcast Distribution

In the simplest method of broadcasting, you send a single stream to a single server through a push or pull broadcasting method. Or, you send a single stream to multiple computers through multicasting. RealProducer allows you to send multiple streams to multiple destinations, however. As well, Helix Server offers several features for forwarding streams to additional servers. The following sections describe methods for distributing broadcast streams to multiple points.

### Multiple Destinations

Using RealProducer, you can define multiple server destinations for a single encoded output. This allows you to forward the same broadcast to more than one Helix Server. In push broadcasting, you define each destination explicitly. In pull broadcasting, a new destination is created each time a Helix Server pulls the broadcast from RealProducer.

Each additional server destination that you define for an output adds to your outgoing bandwidth requirement. If your broadcast stream is 350 Kilobits, for example, sending it to a second destination increases the total bandwidth to at least 700 Kilobits. Because the same stream is sent to each destination, using multiple destinations does not increase the processor load for live encoding.

### Parallel Outputs

Using parallel outputs, you can encode two or more streams with different properties. For example, you might want to encode live audio as a low-bandwidth, SureStream CBR stream for dial-up modem users, and as a high-bandwidth VBR stream for cable modem users. Because the same encoded stream cannot be both CBR and VBR, you create two separate outputs.

As shown in “Destinations and Outputs” on page 19, you can send each encoded output to the same server destination, or to different server



destinations. If the same Helix Server broadcasts both streams, the streams must have different names. Your Web page then gives viewers the choice of a low-speed broadcast or a high-speed broadcast.

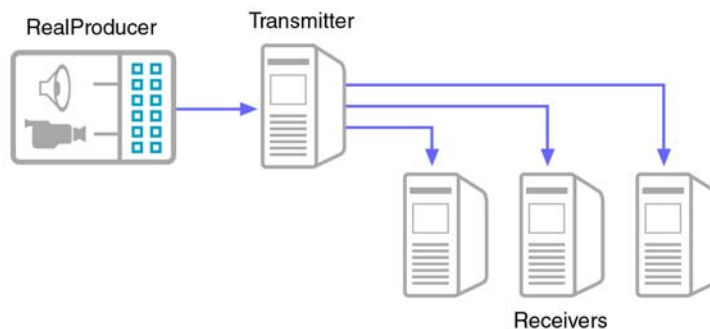
Each output that you add increases the amount of processing power that RealProducer requires, so you need to ensure that your computer is fast enough to handle the load. The processing power required for each output depends on the audiences selected. A multi-rate SureStream encoding requires more processing than encoding for a single audience. As well, encoding video requires much more processing power than encoding audio-only input.

**For More Information:** To set up parallel outputs, you create a job file as described in Appendix B. You then run the broadcast through the command-line application, which Chapter 14 covers.

## Server Splitting

Each Helix Server is limited in the number of viewers who can receive the broadcast. These limits are based on the server license, as well as practical constraints such as the amount of outgoing bandwidth. For a large broadcast, you may need to use multiple Helix Servers to reach your anticipated audience. Although RealProducer can send a broadcast stream to multiple server destinations, it is often more efficient to have the servers forward (or *split*) the broadcast stream themselves.

### One-to-Many Splitting



The preceding illustration shows a simple splitting arrangement in which RealProducer sends a broadcast stream to one Helix Server acting as a *transmitter*. This server then splits the stream to three additional Helix Servers

acting as *receivers*. The transmitter and receivers can each stream the broadcast to multiple viewers.

The method by which RealProducer delivers the stream to a transmitter is entirely independent of the manner in which the transmitter splits the stream. For example, RealProducer may use an account-based push to contact the transmitter, whereas the transmitter splits the stream by multicasting to the various receivers. As well, the receivers may be set up to pull the stream from the transmitter, even though RealProducer pushes the broadcast stream to the transmitter.

**For More Information:** Setting up a splitting arrangement requires the services of an experienced Helix Server administrator. For more information on available options, refer to the chapter on transmitters and receivers in *Helix Server Administration Guide*.

## Optional Broadcasting Features

The following sections describe optional features that you can use when broadcasting to Helix Server. In some instances, the Helix Server administrator must enable or configure the feature on the server.

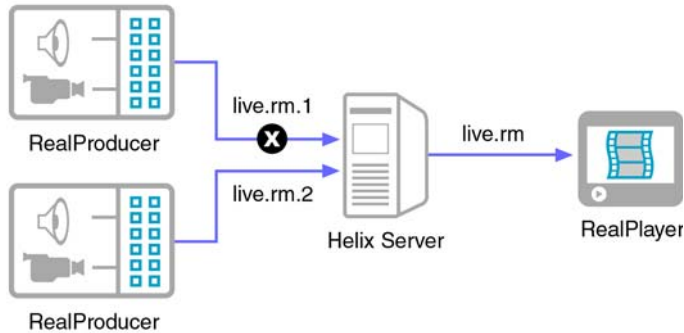
### Encoder Redundancy

When broadcasting through account-based or password-only push methods, you can provide encoder redundancy through two or more RealProducers encoding the same live event. When you start each broadcast stream, you specify the same stream name, but add a unique, numbered delimiter, such as .1 or .2. When the RealProducers connect to Helix Server, they form a queue based on connection order. Consider this example:

live.rm.2 connects first  
live.rm.3 connects second  
live.rm.1 connects third

Under normal circumstances all viewers receive the stream live.rm, and have no knowledge of which RealProducer encoded the stream. In the preceding example, live.rm originates as live.rm.2. If the RealProducer delivering live.rm.2 fails, RealPlayers connect to the next live.rm stream in the queue, which is live.rm.3. If live.rm.2 returns, it goes to the bottom of the queue. A subsequent failure of live.rm.3 causes media players to connect to live.rm.1, and so on.

### RealProducer Redundancy



**Note:** Encoder redundancy is enabled automatically on Helix Server. Its use changes the broadcast URL, though. The Helix Server administrator may also require the use of a different delimiter, such as a tilde (~), in the stream identifier. Confer with the administrator on these issues before using encoder redundancy.

**Tip:** To provide optimal redundancy, each encoder should be as independent as possible. For example, use multiple video cameras connected to separate RealProducer computers that use different power supplies and network connections.

**For More Information:** Refer to the unicasting chapter of *Helix Server Administration Guide* for information about encoder redundancy configuration options.

### Archiving

When you broadcast a live event, you can also record the event to a clip for later, on-demand streaming. You can archive the clip through RealProducer, Helix Server, or both. A primary consideration is disk space. Writing a long broadcast to a clip can consume considerable disk space depending on the broadcast bandwidth. The server may have more available space than your RealProducer computer. As well, creating the archive on the server eliminates the need to upload the archive clip later if you want to stream it on demand.

## RealProducer Archiving

To archive a broadcast on RealProducer, you define a clip destination along with the server destination. RealProducer automatically creates a new clip if the existing archive reaches the operating system limit (typically 2 or 4 Gigabytes). If you run the broadcast from the command-line, or manually create a job file for the broadcast, you can specify a different file rolling limit based on broadcast time or file size.

**For More Information:** The section “Creating a Destination Clip” on page 92 explains how to create an archive clip. For information on file rolling through the command line, see “Output and Destination Options” on page 271. The section “File Destinations” on page 330 explains how to define file rolling through a job file.

## Helix Server Archiving

The Helix Server administrator can turn on archiving for RealMedia broadcasts. Like RealProducer, Helix Server can create multiple archive files based on the broadcast time (such as a new file every 15 minutes), or file size (20 Megabytes per file, for example). The administrator can also set up selective archiving rules that archive only certain broadcast streams based on the presence of a virtual path in the stream name.

**For More Information:** See the unicasting chapter of *Helix Server Administration Guide* for information about archiving.

## Virtual Paths

When you encode a broadcast, you define a stream name such as `live.rm`. Optionally, you can precede the stream name with a virtual path, as in `news/live.rm`. The virtual path does not correspond to any physical directory or mount point. Rather, it serves as a flag to Helix Server to apply certain rules for archiving or splitting.

The Helix Server administrator can set up archiving rules based on the presence of virtual paths. For instance, the administrator may archive all broadcasts that include the `news/` path in a certain directory, and all broadcasts that use the `sports/` path in a different directory. A second use is with splitting, which the section “Server Splitting” on page 173 describes. The virtual path can define which broadcast streams are split to which receivers.

**Note:** Confer with the Helix Server administrator about the path name to use. When you include the virtual path with the broadcast stream name, URLs to the broadcast must include the virtual path as well.

**For More Information:** For information about server-side archiving rules, refer to the unicasting chapter in *Helix Server Administration Guide*. That manual's chapter on transmitters and receivers explains splitting rules.

## Broadcast Load Management

When you broadcast live content, it is crucial that your RealProducer machine encode the input audio or video in real-time. Otherwise, the encoding process falls behind the input media and the broadcast stalls. RealProducer provides several features that automatically lowers the processing load as necessary. The following sections explain these load management features, and discuss the encoding options that you may want to avoid because of the processing power they require.

**Note:** The number of SureStream audiences you choose for a constant bit broadcast greatly affects the processing requirements. See “CBR Broadcasts” on page 167 for more information.

**Tip:** You will get superior encoding results using a machine with two or more processors. The section “RealVideo Codecs” on page 61 explains how RealProducer manages multiple processors. No matter how fast of a machine you use, though, you should not run other, unnecessary applications or services on the RealProducer machine during a live broadcast.

## Broadcast Load Testing

Before running a broadcast, you can test your RealProducer computer to determine if it can handle the processing load.

### Testing Load Levels with a Trial Broadcast

The best way to do this is to run a test broadcast, as advised in the section “Broadcast Trial Runs” on page 171. During the broadcast, look for messages

about load reduction and frame dropping printed to the command-line application screen or displayed in the log viewer. After the broadcast trial has completed, check the statistics to ensure that the average video frame rate was acceptable.

**For More Information:** Refer to the sections “Viewing Log Messages” on page 147 and “Monitoring Statistics” on page 144.

### Testing Load Levels through Clip Encoding

If you do not have a Helix Server available for a broadcast load test, capture live input to a RealMedia clip as described in Chapter 6. Select the same options and audiences you plan to use in the broadcast. If RealProducer can encode the clip in less time than it takes the clip to play (for example, 45 seconds to encode a 60-second video file), it can typically handle the broadcast load.

**Tip:** When testing with a video clip, turn off two-pass encoding as described in “Choosing Video Options” on page 99.

## Video Codecs and Encoding Complexity

As noted in the section “Encoding Complexity Modes” on page 81, you can set a video complexity level of low, medium, and high. If you use the default setting of high, RealProducer automatically lowers the level if the encoding process cannot keep up with the video input. This scales down the video quality, but keeps the broadcast flowing. You therefore do not need to change the level manually when broadcasting unless you specifically want to reserve processing power for other applications on the RealProducer computer.

By default, RealProducer uses RealVideo 10, which provides the highest video quality, but also requires the most processing power. For best results, stick with RealVideo 10 and let RealProducer reduce the encoding complexity automatically. If you use RealProducer Plus and still lack processing power, you can switch to RealVideo 9, which requires less processing power. RealVideo 8, in turn, requires less processing power than RealVideo 9.

**Tip:** YUV12, also known as I420, is the native color format used by RealVideo codecs. Capturing video input as I420 improves performance by removing the need to convert the color format before encoding.

## Automatic Frame Rate Reduction

If necessary, RealProducer scales down the encoded frame rate to keep up with the media input stream. Most audience settings specify a preferred frame rate of 15 or 30 frames per second. RealProducer attempts to provide the preferred rate, but encodes at a slower rate if necessary if the encoding process begins to maximize the CPU usage. Check the log viewer for reductions in frame rates. To keep the frame rate encoding adequate, you may need to eliminate other, CPU-intensive features, or broadcast using a faster computer.

**Note:** RealProducer may also lower the encoded frame rate because of the bandwidth constraints of the chosen broadcast audience. The RealProducer log does not report these rate reductions because they do not result from CPU bottlenecks. The RealPlayer playback statistics panel lists the broadcast stream's frame rates, however.

## Video Filters, Resizing, and Cropping

The section “RealVideo Filters” on page 76 explains the video prefilters that you can use during a broadcast. The black-level, de-interlace, and low noise filters are relatively safe to use because of their low processing needs. Resizing a video is highly processor intensive and should **not** be used when broadcasting. However, cropping a video can speed the encoding process because it decreases the amount of video data that must be encoded.

**Tip:** When possible, use the video capture card to set the video input to the appropriate size. Resizing through hardware is generally faster than resizing through software. See “Video Encoding Dimensions” on page 73 for tips about selecting the video height and width.

## Audio Resampling

RealAudio codecs require audio input to have a certain sampling rate. If necessary, RealProducer resamples the audio to the necessary rate before encoding. It is helpful to avoid resampling by ensuring that your audio input uses a preferred sampling rate. See “Sampling Rate” on page 38 for details.

## Visual Monitoring

If you use the RealProducer graphical application to run the broadcast, RealNetworks highly recommends that you turn off the visual display of the input video and encoded output to lessen the processor load. Refer to the section “Monitoring Video Output” on page 144 for instructions.

## End-to-End Broadcast Latency

During a live broadcast, a viewer experiences a latency of approximately 10 seconds between the time events occur and when they display in RealPlayer. Although this amount of latency is acceptable in most circumstances, it may be too long in certain cases, such as video-conferencing or a Web broadcast synchronized to a television event. In these cases, you can lower the end-to-end broadcast latency to as low as two seconds. But if data packets are lost on the network, the broadcast is more likely to stutter.

**Note:** *Latency* in this context refers to the difference in time between when live events occur and when they appear in RealPlayer. There is also a separate, startup latency that occurs when a viewer clicks a link to a broadcast, as described in “Video Startup Latency” on page 169.

## Latency Modes

You cannot precisely control the amount of broadcast latency because network conditions are variable and unpredictable. However, RealProducer, Helix Server, and RealPlayer provide features that allow you to reduce broadcast latency significantly under stable network conditions. These



products support three separate latency modes, summarized in the following table.

**Summary of End-to-End Latency Modes**

Latency Mode	Expected End-to-End Latency	Preroll for CBR Video	Preroll for VBR Video	Preroll for Audio-Only Clips	Error Resiliency
0-normal	10 or more seconds	4 seconds	4 seconds	23 milliseconds to 2.3 seconds depending on the codec	high
1-reduced	4 or more seconds	2 seconds	2 seconds	500 milliseconds	moderate
2-minimal	2 or more seconds	1 second	0.5 seconds	23 to 480 milliseconds depending on the codec	low

**Note:** You can change the default video preroll from 4 seconds as described in “Video Startup Latency” on page 82. The new default then applies to a broadcast when latency reduction is not used (mode 0). The video prerolls of 2, 1, or 0.5 seconds remain effective for latency modes 1 and 2 regardless of the default video preroll, however.

## Encoding Latency

Encoding latency is the time that elapses from when RealProducer receives the raw audio and video input to when it transmits packets of encoded RealAudio or RealVideo data to Helix Server. When you choose a reduced latency mode, RealProducer does three things:

- RealProducer encodes a latency mode setting into the live stream. This allows Helix Server 11 and later, as well as RealPlayer 11 and later, to change their stream handling characteristics based on the desired latency. The following sections explain how Helix Server and RealPlayer respond to the latency setting.
- RealProducer lowers the streaming preroll for RealVideo. This buffers video data for a smaller amount of time and keeps the data displayed in RealPlayer more closely synchronized with the live input. The table

“Summary of End-to-End Latency Modes” on page 181 describes the preroll reduction.

- RealProducer reduces the size of, or completely eliminates, superblocks for RealAudio streams. This allows it to transmit the RealAudio data to Helix Server faster. The following section explains superblocking and the effects of reducing it.

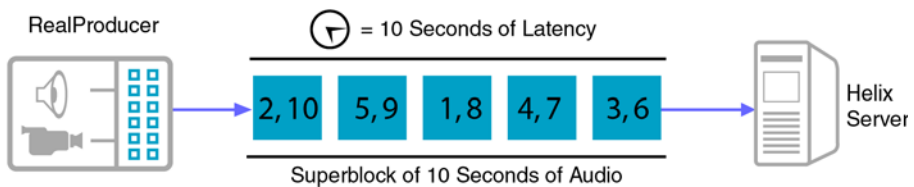
### RealAudio Superblocks and Latency Reduction

When RealProducer encodes a live audio stream, whether for an audio-only or a video broadcast, it does not create and transmit audio packets until it has enough packets to create a *superblock*. The use of audio superblocks reduces the effect of lost packets, but increases end-to-end latency in audio broadcasts. Therefore, low-latency broadcasts reduce the size of audio superblocks or eliminate them entirely.

#### Audio With Superblocks

Consider the simplified example depicted in the following illustration. When a listener tunes to an audio broadcast, the first superblock of data the listener receives consists of five data packets constituting the first ten seconds of the audio. (In reality, superblocks are smaller, ranging from about 20 milliseconds to a few seconds.) The audio does not play until RealPlayer has received all of the packets that constitute the superblock.

#### Broadcast Audio in Superblocks



In the preceding figure, the first data packet contains the audio for the third and sixth seconds of the audio, while the second block contains the fourth and seventh seconds of the audio. Suppose that the second packet is lost. Instead of a continuous, two-second gap in the audio, the listener hears a one-second gap at the fourth second, and a one-second gap at the seventh second. This is less disruptive to the listening experience. The superblock thereby minimizes broadcast disruption if packet loss occurs.

Because the superblock in the preceding figure contains 10 seconds of audio, RealProducer must encode the audio for 10 seconds before distributing the

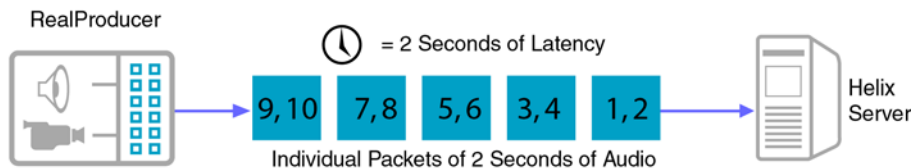
audio in the superblock's five distinct data packets. This introduces a latency of 10 seconds before RealProducer sends the data packets to Helix Server. So although the listening experience is enhanced if a packet is lost, the use of superblocks increases end-to-end latency.

**For More Information:** Choosing a latency mode setting automatically sets the superblock size. However, you can also use the `maxPacketInterleavingDuration` property to set a superblock size manually for a job file output as described in “Media Profile Properties” on page 335. Defined in the `packetizers` section of an audience file, this property sets the superblock size on a stream-by-stream basis, as described in “Maximum Superblock Size” on page 359.

#### Audio Without Superblocks

When superblocks are not used, RealProducer creates and transmits a packet of audio media to Helix Server as soon as it has encoded enough data to form the packet. The following figure illustrates RealProducer transmitting packets, each of which contains two seconds of audio data, to Helix Server as soon as it creates the packets. Because superblocks are not used, a lost packet results in a continuous, two-second gap of audio.

#### Broadcast Audio without Superblocks



**Note:** In an actual broadcast, packets are typically smaller than those illustrated in the preceding figure. Therefore, the encoding latency is generally much lower than two seconds, and a lost packet results in a significantly smaller audio gap.

### Helix Server Latency

When Helix Server version 11 or later receives a broadcast stream from RealProducer, it buffers the stream for a certain time before delivering the stream to RealPlayer. If you broadcast through a splitting arrangement in which the broadcast stream passes through a series of Helix Servers before

being viewed, each server in the chain buffers the stream before forwarding it to the next server, increasing the end-to-end latency at each server.

Helix Server 11 and later automatically adjust buffering times based on the latency mode set in the broadcast stream. This ensures that the server uses less buffering when reduced end-to-end latency is desired. The following table lists the default receiver buffering used with each latency mode.

**Receiver Buffering Based on Latency Mode**

Latency Mode	Receiver Buffering (Helix Server 11 and later)
0 – normal latency	1 second
1 – reduced latency	0.05 seconds
2 – minimal latency	none

**Note:** End-to-end latency reduction requires that all servers are Helix Server 11 or later. For more about using Helix Server in a low-latency broadcast, refer to the chapter on transmitters and receivers in *Helix Server Administration Guide*.

**Tip:** The amount of forward error correction (FEC) used by RealProducer also affects how much receiver buffering should be used. For low latency, you may want to reduce or turn off error correction. Although adding error correcting packets to a low-latency stream does not cause problems with latency reduction, the packets may arrive too late to be of use. For more information, see “Forward Error Correction” on page 207.

## RealPlayer Latency

Low latency broadcasts are recommended only when most viewers are using RealPlayer 11 or later. Based on the latency mode flag, these players do not pause a presentation momentarily to wait for resend requests or out-of-order packets. They also request fewer or no resends for lost packets. Earlier versions of RealPlayer may request resends of dropped packets, introducing unnecessary traffic into the network.

## Network Latency

In a live broadcast, each network router through which a media packet passes adds a small amount of latency, around 25 milliseconds per router. Hence, there is incremental, end-to-end latency the further a broadcast travels and the more routers it traverses. Additionally, a satellite uplink can add up to one second of latency. This latency is not configurable when broadcasting through the Internet. However, configuring the packet size optimally helps to make the network routing as efficient as possible.

Every packet-based network has a packet size limit known as a maximum transfer unit (MTU). If a data packet is larger than the MTU, a network router splits the packet. You therefore incur more network overhead if packets are so large that routers must split them. Conversely, a network runs less efficiently if packets are too small because routers must read the destination information in each packet before forwarding the packet. Smaller packets mean more packets, which results in more router reads.

### Common MTU Sizes

Although network MTUs are configurable, the following values are common:

- Most local area networks use an MTU of 1500 bytes.
- Mobile networks typically have an MTU of 1400 to 1500 bytes.

The following table lists the default, maximum packet size for video encoded by RealProducer. At high bit rates, the maximum packet size is close to the standard MTU for most networks. At lower streaming speeds, however, the default packet size is smaller. You may therefore raise the maximum packet size to gain some efficiency on the network.

**Default Maximum Packet Sizes for Video**

Target Bit Rate	Packet Size
Greater than 256 Kilobits	1352 bytes
Between 128 and 256 Kilobits	1000 bytes
Below 128 Kilobits	600 bytes

**Tip:** Because each router hop adds data to a packet, configure packet size to be lower than the MTU.

## Setting the Packet Size

For information about setting the maximum packet size through RealProducer, refer to the following sections:

- See “Changing the Maximum Packet Size” on page 217 for information about setting the broadcast packet size in RealProducer.
- The `-mtu` option sets the packet size for the command-line application, as described in “Maximum Packet Size (-mtu)” on page 279.
- In the job file media profile section, the `maxPacketSize` property sets the maximum packet size for an output. See “Media Profile Properties” on page 335.
- Defined in the packetizers section of an audience file, the `maxPacketSize` property sets the packet size on a stream-by-stream basis, as described in “Maximum Packet Size and Duration” on page 358.

## Tips For Creating Presentations with Lowered Latency

If your low-latency broadcast is part of a multimedia presentation that uses SMIL 2.0, you should reduce the latency caused by static clips. For example, if live audio streams along with a Flash presentation, tune the Flash presentation to use a low preroll.

You can also use the SMIL attribute and value `syncBehavior="independent"` with a static clip. This prevents RealPlayer from keeping the clip synchronized to the broadcast. A long clip preroll or rebuffering does not then affect the broadcast. The following is a sample SMIL 2.0 file that plays live audio in parallel with a RealPix slideshow:

```
<smil xmlns="http://www.w3.org/2001/SMIL20/Language">
  <body>
    <par>
      <audio src="rtsp://helixserver.example.com/broadcast/live.rm"/>
      <ref src="rtsp://helixserver.example.com/media/images.rp"
        syncBehavior="independent"/>
    </par>
  </body>
</smil>
```

**For More Information:** For more information, refer to the Flash chapter and SMIL groups chapter of *RealNetworks Production Guide*.

## Setting the Latency Mode

For information about setting the latency mode in RealProducer, see the following sections:

- The section “Reducing Broadcast Latency” on page 216 explains how to set the latency mode in the RealProducer graphical application.
- The `-lm` option defines the latency mode for the command-line application, as described in “Latency Mode (-lm)” on page 279.
- You can set the latency mode through the `latencyMode` property in the media profile section of the job file. See “Latency Reduction” on page 338.





## RUNNING A BROADCAST

This chapter explains how to set up a broadcast by defining server destinations and templates. The procedure differs depending on the type of broadcast you are performing. Refer to Chapter 10 for background about broadcasting options.

**Tip:** You can also encode the output as an archive clip during the broadcast. The section “Creating a Destination Clip” on page 92 explains how to do this.

### Running an Account-Based Broadcast

Account-based, push broadcasting provides easy set-up and reliable delivery of the broadcast stream. It allows you to send a stream to Helix Server version 9 or later. In this method, RealProducer maintains a monitoring connection to Helix Server. This connection allows it to pass a user name and password to authenticate access to the server. Helix Server uses this connection to send statistics about the broadcast stream back to RealProducer.

**For More Information:** Refer to the section “Running an Account-Based Broadcast” on page 189 for set-up instructions.

### Advantages of Account-Based Broadcasting

Because of its monitoring connection, account-based broadcasting is a good method to use if you do not have access to the monitoring pages on Helix Server. The feedback from the monitoring connection informs you if the access attempt failed because of an invalid password, for instance. It also informs you if the connection between RealProducer and the server was dropped and automatically restarted.

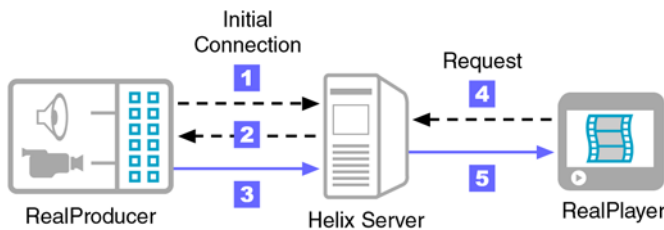
Setting up an account-based broadcast requires a minimal amount of knowledge about how Helix Server is configured. You need to know the server IP address, and have a valid user name and password for an encoder login

defined by the Helix Server administrator in the server's authentication database.

## Account-Based Broadcast Steps

The following figure illustrates the interaction between RealProducer, Helix Server, and RealPlayer in an account-based broadcast.

### Account-Based, Push Broadcast



1. RealProducer establishes its monitoring connection with Helix Server. Using this connection, RealProducer sends a user name and password that authenticates its attempt to access the server.
2. After Helix Server authenticates the broadcast, it informs RealProducer how to make the broadcast connection, telling it which server ports to use, for example.
3. RealProducer establishes the broadcast stream connection to Helix Server. It begins to send the encoded packets, whether or not any RealPlayer users have requested the broadcast yet.
4. A viewer typically requests the broadcast by clicking a link in a Web page. This launches RealPlayer, which requests a broadcast stream from Helix Server.
5. Helix Server streams the broadcast to RealPlayer.

## Preparing Helix Server for an Account-Based Broadcast

Helix Server requires minimal configuration to receive and distribute an account-based broadcast. Confer with the server administrator on the following issues, which are covered in the unicasting chapter of *Helix Server Administration Guide*:

- RealProducer requires a valid user name and password. These values are defined in the Helix Server authentication database under the SecureRBSEncoder realm. If you previously broadcasted using RealProducer 8.5 or earlier, your user name and password were defined under a different authentication realm and will not work with RealProducer 11.

**Tip:** If you are the Helix Server administrator, you can connect using the user name and password for Helix Administrator. For greater security, however, define a different user name and password for RealProducer.

- The broadcast requires at least two ports on Helix Server for the stream data, whether you use TCP or UDP. RealProducer and Helix Server negotiate which ports to use. Possible ports are in the range 50001 to 50050 unless the Helix Server administrator changes the range.

**Tip:** If you select UDP transport, ensure that any firewalls between RealProducer and Helix Server allow UDP data sent to Helix Server on the ports in the defined range. If you are broadcasting through a firewall performing network address translation (NAT), see “Listen Address” on page 207.

- If you want to archive or split the broadcast on Helix Server, you may need to apply archiving or splitting rules. This requires that the Helix Server administrator define the rules for a specific virtual path that precedes the stream name, as in news/live.rm. For background, refer to “Virtual Paths” on page 176.
- If you plan to use redundant encoders, verify the stream delimiter expected by Helix Server. This is typically a period, as in live.rm.1 and live.rm.2. For more on this topic, see “Encoder Redundancy” on page 174.
- Confer with the Helix Server administrator if you plan to lower the broadcast latency as described in “End-to-End Broadcast Latency” on page 180. Lowering the latency automatically reduces the receiver buffering on Helix Server version 11 and later, which may not be desirable. The Helix Server administrator can override the buffering value, however.
- The URL for the broadcast varies depending on the Helix Server features, such as viewer authentication, that you use. The section “Standard URL for a Push Broadcast” on page 219 explains the basic URL format.

- Although RealProducer receives statistics about the broadcast stream, it does not receive statistics about the actual broadcast, such as how many RealPlayer viewers connected and how long they watched. Depending on the method Helix Server uses to broadcast the stream to the players, as well as the server logging parameters, the server log files may record these statistics.

## Defining the Account-Based Server Destination

This section explains how to define the account-based broadcast on RealProducer. You can create the server destination anytime before the broadcast, and can save the settings to a template for future use. You'll need the following information about Helix Server:

- Helix Server IP address or DNS name
- Helix Server HTTP port number
- valid user name defined in the SecureRBSEncoder realm of the Helix Server authentication database
- valid password for the user name

► To set up an account-based server destination:

1. If you have multiple jobs open, click the appropriate job file name in the job manager.
2. Select **File>Add Server Destination** to display the server destination dialog. Or, click the server icon in the destinations area.
3. Enter a description of the server in the **Destination Name** field. This is for your reference only and does not affect the broadcast. If you save the destination as a template, this entry becomes the name of the template in the graphical application, as well as the file name of the server destination file.
4. In the **Stream Name** field, enter a name for the broadcast stream. This name resembles a clip name and should use the appropriate extension, either .ra, .rv, or .rm for a constant bit rate stream. It should be .rmvb for a variable bit rate stream. This name appears in the broadcast URL.

The stream name can include uppercase or lowercase letters, numbers, an underscore (\_), and a dash (-). Spaces are not allowed. If you are using encoder redundancy, include the appropriate stream delimiter and a unique number for this encoder:

live.rm.2

5. From the **Broadcast Method** pull-down list, select Push, Account-Based Login (Helix Server).
6. For **Server Address**, enter a version 4 IP address, version 6 IP address, or DNS name of the Helix Server used for the broadcast. The following are examples of each type of address:
  - 207.188.7.176
  - FEDC:BA98:7654:3210:FEDC:BA98:7654:3210
  - helixserver.example.com.
7. The optional **Path** field specifies a virtual path that can be used for archiving or splitting on Helix Server. Use a simple name followed by a forward slash, such as news/.
8. For **Port**, specify the HTTP port on Helix Server. The default value is port 80, which is the server's default HTTP port. For account-based broadcasting, RealProducer uses its monitoring connection to contact Helix Server on this port and deliver the broadcast stream information. RealProducer and Helix Server then negotiate which UDP or TCP ports to use for the broadcast data.
9. In the **Username** and **Password** fields, enter a valid encoder user name and password defined in Helix Server's authentication database. The broadcast connection fails if either value is incorrect. If you are saving the destination as a template, you can click **Remember password** to store the user name and password in the template file.
 

**Warning!** The password is saved as plain text in the job file or the server template. If you save the password, be sure that you maintain appropriate security on these files.
10. Under **Transport**, click the radio button for UDP or TCP to select the type of protocol to use for the broadcast stream. UDP is preferred, but may be blocked by firewalls. See "Broadcast Transport Protocols" on page 168 for descriptions of TCP and UDP.
11. You may want to set the advanced broadcast options by clicking the **Advanced Options** button. See "Changing Advanced Push Broadcast Parameters" on page 205 for more information.

12. To save the server destination as a template, click the **Templates** button and select **Save as Template**. You can then use this server destination for future broadcasts, as described in “Working with Server Templates” on page 217.
13. Click **OK** to save the server destination. The destination appears in the destinations section of the RealProducer main window. You can right-click the destination name to edit or delete the destination.
14. To lower the broadcast latency, follow the instructions in “Reducing Broadcast Latency” on page 216. Be sure that you first understand the issues and ramifications of latency reduction, which the section “End-to-End Broadcast Latency” on page 180 describes.

## Starting and Stopping an Account-Based Broadcast

When you have completed the server destination and have defined the live input as described in “Using Live Audio or Video as the Input” on page 90, you can start the broadcast by clicking the **Encode** button. RealProducer immediately begins to encode the live input, sending the broadcast stream to Helix Server.

If configured to do so, the account-based broadcast method automatically reconnects a dropped broadcast stream. Because of its monitoring connection, RealProducer receives broadcast statistics and notification if Helix Server has stopped the broadcast. If the server stops the broadcast, RealProducer terminates the stream and stops the encoding process. You can also terminate the broadcast by clicking the **Stop** button.

**For More Information:** See “Monitoring Statistics” on page 144 for information about monitoring a broadcast in progress.

## Setting Up a Password-Only Broadcast

Unlike account-based broadcasting, password-only broadcasting does not establish a monitoring connection. It therefore incurs less network overhead, but it receives no feedback from Helix Server. This broadcast method allows you to send a live stream to Helix Server version 9 or later. You must set up the server as a receiver in a splitting arrangement, however.

## Advantages of Password-Only Broadcasting

Because it sets up no monitoring connection between RealProducer and Helix Server, password-only broadcasting requires less bandwidth and processor power on the RealProducer machine. This makes the broadcast more efficient, especially if you have multiple server destinations. Password-only broadcasting also lightens the load on Helix Server because the server does not need to generate broadcast statistics for RealProducer.

A password-only broadcast re-establishes its connection automatically. If the broadcast connection fails for some reason, RealProducer continues to send the stream to Helix Server. It automatically encodes the broadcast metadata (such as the stream name) and password into the stream at regular intervals. This allows Helix Server to re-establish the broadcast once it begins to receive the stream data again.

**For More Information:** The section “Metadata Resend Interval” on page 206 explains the advanced parameter that affects how long it takes Helix Server to re-establish a dropped broadcast stream.

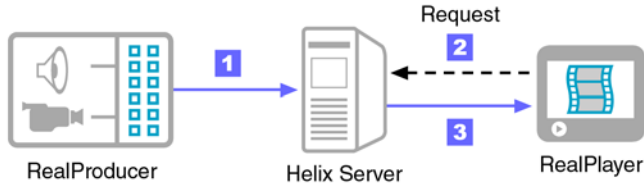
## Disadvantages of Password-Only Broadcasting

Password-only broadcasting is recommended only when you operate both RealProducer and Helix Server. Each broadcast stream protected by a unique password requires a separate receiver definition on Helix Server. This broadcasting method therefore requires more Helix Server configuration than does account-based broadcasting. Because the server provides no feedback, it is impossible to verify from RealProducer if the log-in attempt failed. You can use Helix Server’s monitor, however, to determine if the broadcast connection has been established.

## Password-Only Broadcast Steps

The following figure shows the interaction between RealProducer, Helix Server, and RealPlayer in a password-only broadcast.

### Password-Only, Push Broadcast



1. As soon as it starts encoding the broadcast stream, RealProducer sends the stream packets to the Helix Server address. It receives no feedback that the broadcast packets have been received, encoding the stream metadata and server login password into the stream at regular intervals.
2. A viewer typically requests the broadcast by clicking a link in a Web page. This launches RealPlayer, which requests a broadcast stream from Helix Server.
3. Helix Server delivers the broadcast to RealPlayer.

### Preparing Helix Server for Password-Only Broadcasting

In a password-only broadcast, RealProducer acts as a transmitter and Helix Server functions as a receiver in a splitting arrangement. This highly robust configuration requires coordinated set-up on both ends. The chapter on transmitters and receivers in *Helix Server Administration Guide* explains splitting, and shows how to set up the server as a receiver. Before running a password-only broadcast, confer with the server administrator on the following issues:

- To be configured as a receiver, Helix Server must be licensed for broadcast distribution. Clicking the **About** link in Helix Administrator displays the Helix Server licensing information.
- To connect to the Helix Server receiver, RealProducer transmits a password. Unlike with account-based broadcasts, this password is not defined in the Helix Server authentication database. Rather, the receiver configuration defines an authentication type of Basic and sets the password. The Helix Server administrator will need to supply you with the password to use.

**Note:** Optionally, the receiver can require no authentication. In this case, you leave the password field in RealProducer blank. Unsecured transmission should be used only if RealProducer



and Helix Server are on the same local network and a firewall blocks attempts by encoders outside the firewall to reach Helix Server.

- Both RealProducer and the receiver need to define the same range of ports on Helix Server used for stream data. Default ports for both machines are 30001 to 30020, but you may need to change this range depending on the receiver definition. When the broadcast begins, RealProducer and Helix Server negotiate which ports in this range to use.

**Tip:** If you use the UDP transport, ensure that any firewalls between RealProducer and Helix Server allow UDP data sent to Helix Server on the ports in the defined range. If you are broadcasting through a firewall performing network address translation (NAT), see “Listen Address” on page 207.

- The Helix Server receiver definition must specify the RealProducer IP address as the transmitter source, and indicate whether TCP or UDP is used. RealProducer must specify the same protocol in its server destination.
- Because this broadcast method does not provide feedback from Helix Server, there is no way to verify from RealProducer that the server has received the stream. Helix Server has a monitor that indicates encoder connections, however.
- If you want to archive or split the broadcast on Helix Server, you may need to apply archiving or splitting rules. This requires that the Helix Server administrator define the rules for a specific virtual path that precedes the stream name, as in `news/live.rm`. For background, refer to “Virtual Paths” on page 176.
- If you plan to use redundant encoders, verify the stream delimiter expected by Helix Server. This is typically a period, as in `live.rm.1` and `live.rm.2`. For more on this topic, see “Encoder Redundancy” on page 174.
- Confer with the Helix Server administrator if you plan to lower the broadcast latency as described in “End-to-End Broadcast Latency” on page 180. Lowering the latency automatically reduces the receiver buffering on Helix Server version 11 and later, which may not be desirable. The Helix Server administrator can override the buffering value, however.

- The URL for the broadcast varies depending on the Helix Server features, such as viewer authentication, that you use. The section “Standard URL for a Push Broadcast” on page 219 explains the basic URL format.
- Depending on the Helix Server logging parameters and the method it uses to broadcast the stream to RealPlayer viewers, broadcast statistics (such as the total number of viewers and how long each viewer watched) may be recorded in the server log files.

## Defining a Password-Only Server Destination

This section explains how to define a password-only broadcast on RealProducer. You can create the server destination anytime before the broadcast, and can save the settings to a template for future use. You'll need information about the Helix Server receiver configuration:

- Helix Server IP address or DNS name
- receiver port range
- UDP or TCP transport
- server log-in password defined in the receiver configuration

► **To define a password-only server destination:**

1. If you have multiple jobs open, click the appropriate job file name in the job manager.
2. Select **File>Add Server Destination** to display the server destination dialog. Or, click the server icon in the destinations area.
3. Enter a description of the server in the **Destination Name** field. This is for your reference only and does not affect the broadcast. If you save the destination as a template, this entry becomes the name of the template in the graphical application, as well as the file name of the server destination file.
4. In the **Stream Name** field, enter a name for the broadcast stream. This name resembles a clip name and should use the appropriate extension, either `.ra`, `.rv`, or `.rm` for a constant bit rate stream. It should be `.rmvb` for a variable bit rate stream. This name appears in the broadcast URL.  
The stream name can include uppercase or lowercase letters, numbers, an underscore (`_`), and a dash (`-`). Spaces are not allowed. If you are using

encoder redundancy, include the appropriate stream delimiter and a unique number for this encoder:

live.rm.2

5. From the **Broadcast Method** pull-down list, select Push, Password-Only Login (Helix Server).
6. For **Server Address**, enter a version 4 IP address, version 6 IP address, or DNS name of the Helix Server used for the broadcast. The following are examples of each type of address:
  - 207.188.7.176
  - FEDC:BA98:7654:3210:FEDC:BA98:7654:3210
  - helixserver.example.com.
7. The optional **Path** field specifies a virtual path that can be used for archiving or splitting on Helix Server. Use a simple name followed by a forward slash, such as news/.
8. For **Port Range**, indicate the range of ports on Helix Server where RealProducer sends the broadcast packets (either TCP or UDP). RealProducer and Helix Server negotiate the actual ports to use once the broadcast begins. The default range is 30001 to 30020.
9. In the **Password** field, enter the password set in the Helix Server receiver definition. The broadcast connection fails if the value is incorrect. If you are saving the destination as a template, you can click **Remember password** to store the password in the job file or server template file.
 

**Warning!** The password is saved as plain text in the job file or the server template. If you save the password, be sure that you maintain appropriate security on these files.
10. Under **Transport**, click the radio button for UDP or TCP to select the protocol used for the broadcast stream. UDP is preferred, but may be blocked by firewalls. See “Broadcast Transport Protocols” on page 168 for descriptions of TCP and UDP.
11. You may want to set the advanced broadcast options by clicking the **Advanced Options** button. See “Changing Advanced Push Broadcast Parameters” on page 205 for more information.
12. If you want to save the server destination as a template, click the **Templates** button and select **Save as Template**. You can then use this server

destination for future broadcasts, as described in “Working with Server Templates” on page 217.

13. Click **OK** to save the server destination. The destination appears in the destinations section of the RealProducer main window. You can right-click the destination name to edit or delete the destination.
14. To lower the broadcast latency, follow the instructions in “Reducing Broadcast Latency” on page 216. Be sure that you first understand the issues and ramifications of latency reduction, which the section “End-to-End Broadcast Latency” on page 180 describes.

## Starting and Stopping a Password-Only Broadcast

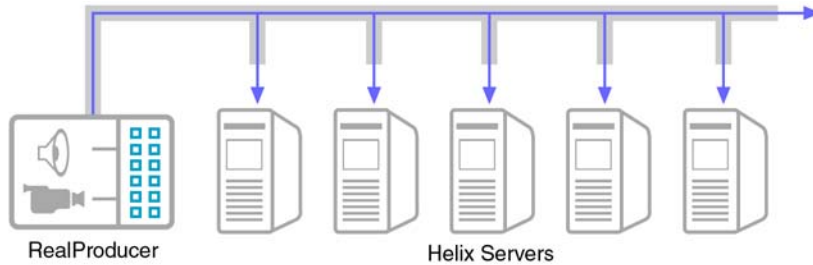
When you have completed the server destination and have defined the live input as described in “Using Live Audio or Video as the Input” on page 90, you can start the broadcast by clicking the **Encode** button. RealProducer immediately begins to encode the live input, sending the broadcast stream to Helix Server.

The password-based broadcast method automatically reconnects a dropped broadcast stream. Because it maintains no monitoring connection with Helix Server, however, RealProducer does not receive notice if Helix Server stops the broadcast. You can terminate the broadcast from RealProducer by clicking the **Stop** button.

## Multicasting a Live Stream

In a multicast, RealProducer Plus can deliver the same broadcast stream to any number of Helix Servers without increasing its outgoing bandwidth. In non-multicast delivery (multiple server destinations with password-only broadcasting, for example), each server receives a separate stream, adding to RealProducer's bandwidth requirement. The following figure illustrates multicasting, which is available with Helix Server version 9 and later. Multicasting is not available through RealProducer Basic.

### Multicast Push



Multicasting requires that your RealProducer, Helix Servers, and all network equipment such as routers be multicast-enabled, which is often possible on a local area network (LAN). Multicasting may not be possible if RealProducer or any of the Helix Servers needs to communicate to another broadcast component across the Internet. Confer with your network administrator and Helix Server administrator to determine if multicasting is available.

**Tip:** Multicast broadcasting can also be used for broadcasting across a one-way satellite network where two-way connections are not possible.

### Preparing Helix Server for a Multicast

In a multicast, RealProducer acts as a transmitter and the Helix Servers function as receivers in a splitting arrangement. This configuration requires coordinated set-up on both ends. The chapter on transmitters and receivers in *Helix Server Administration Guide* explains splitting, and shows how to set up each server as a receiver. Before configuring a multicast, confer with the server administrator on the following issues:

- To be configured as a multicast receiver, each Helix Server receiver must be licensed for broadcast distribution. Clicking the **About** link in Helix Administrator displays the Helix Server licensing information.
- A multicast requires the use of a continuous range of multicast addresses on your network. These addresses are in the range 224.0.0.0 to 239.255.255.255.
- To connect to the Helix Server receivers, RealProducer transmits a password. Unlike with account-based broadcasts, this password is not defined in the Helix Server authentication database. Rather, the receiver configurations define an authentication type of Basic and set the

password. The Helix Server administrator will need to supply you with the password to use.

**Note:** Optionally, the receivers can require no authentication. In this case, you leave the password field on RealProducer blank. Unsecured transmission should be used only if RealProducer and the Helix Servers are on the same local network and a firewall blocks attempts by encoders outside the firewall to reach the Helix Server receivers.

- Both RealProducer and the Helix Servers define the same range of ports on the receivers used for stream data. Default ports are 30001 to 30020, but you may need to change this range depending on the receiver definitions. When the broadcast begins, RealProducer and the Helix Server receivers negotiate which ports to use.

**Note:** Ensure that any firewalls between RealProducer and Helix Server allow multicast, UDP data sent to the Helix Servers on the ports in the defined range.

- The receiver definition on each Helix Server defines the RealProducer IP address as the transmitter source, and must specify that `udp/multicast` is used as the transport.
- If you want to archive or split the broadcast on Helix Server, you may need to apply archiving or splitting rules. This requires that the Helix Server administrator define the rules for a specific virtual path that precedes the stream name, as in `news/live.rm`. For background, refer to “Virtual Paths” on page 176.
- If you plan to use redundant encoders, verify the stream delimiter expected by Helix Server. This is typically a period, as in `live.rm.1` and `live.rm.2`. For more on this topic, see “Encoder Redundancy” on page 174.
- Confer with the Helix Server administrator if you plan to lower the broadcast latency as described in “End-to-End Broadcast Latency” on page 180. Lowering the latency automatically reduces the receiver buffering on Helix Server version 11 and later, which may not be desirable. The Helix Server administrator can override the buffering value, however.
- The URL for the multicast varies depending on the Helix Server features, such as viewer authentication, that you use. The section “Standard URL for a Push Broadcast” on page 219 explains the basic URL format.

- Depending on the Helix Server logging parameters and the method it uses to broadcast the stream to RealPlayer viewers, broadcast statistics (such as the total number of viewers and how long each viewer watched) may be recorded in the server log files.

## Defining a Multicast Server Destination

This section explains how to define a multicast server destination on RealProducer. You can create the server destination anytime before the multicast, and can save the settings to a template for future use. You'll need the following information about the Helix Server receivers and network multicast configuration:

- multicast address
- port ranges on the receivers
- password on the receivers

► **To define a multicast server destination:**

1. If you have multiple jobs open, click the appropriate job file name in the job manager.
2. Select **File>Add Server Destination** to display the server destination dialog. Or, click the server icon in the destinations area.
3. Enter a description of the server in the **Destination Name** field. This is for your reference only and does not affect the broadcast. If you save the destination as a template, this entry becomes the name of the template in the graphical application, as well as the file name of the server destination file.
4. In the **Stream Name** field, enter a name for the broadcast stream. This name resembles a clip name and should use the appropriate extension, either .ra, .rv, or .rm for a constant bit rate stream. It should be .rmvb for a variable bit rate stream. This name appears in the broadcast URL.

The stream name can include uppercase or lowercase letters, numbers, an underscore (\_), and a dash (-). Spaces are not allowed. If you are using encoder redundancy, include the appropriate stream delimiter and a unique number for this encoder:

live.rm.2

5. From the **Broadcast Method** pull-down list, select Push, Multicast (Helix Server).
6. For **Multicast Address**, enter the multicast address for the broadcast stream. It must be in the range 224.0.0.0 to 239.255.255.255.
7. The optional **Path** field specifies a virtual path that can be used for archiving or splitting on Helix Server. Use a simple name followed by a forward slash, such as news/.
8. For **Port Range**, indicate the range of ports on the Helix Server receivers where the broadcast packets will be sent. RealProducer and Helix Server negotiate the actual ports to use once the broadcast begins. The default range is 30001 to 30020.
9. In the **Password** field, enter the password defined in each Helix Server receiver definition. The broadcast connection fails if the value is incorrect. If you are saving the destination as a template, you can click **Remember password** to store the password in the job file or server template file.

**Warning!** The password is saved as plain text in the job file or the server template. If you save the password, be sure that you maintain appropriate security on these files.

10. You may want to set the advanced broadcast options by clicking the **Advanced Options** button. See “Changing Advanced Push Broadcast Parameters” on page 205 for more information.
11. If you want to save the destination as a template, click the **Templates** button and select **Save as Template**. You can then use this destination for future multicasts, as described in “Working with Server Templates” on page 217.
12. Click **OK** to save the server destination. The destination appears in the destinations section of the RealProducer main window. You can right-click the destination name to edit or delete the destination.
13. To lower the broadcast latency, follow the instructions in “Reducing Broadcast Latency” on page 216. Be sure that you first understand the issues and ramifications of latency reduction, which the section “End-to-End Broadcast Latency” on page 180 describes.



## Starting and Stopping a Multicast

When you have completed the server destination and have defined the live input as described in “Using Live Audio or Video as the Input” on page 90, you can start the multicast by clicking the **Encode** button. RealProducer immediately begins to encode the live input, sending the broadcast stream to Helix Server.

A multicast automatically reconnects a dropped broadcast stream based on the metadata resend interval. Because it maintains no monitoring connection with the Helix Server receivers, however, RealProducer does not receive notice if the receivers stop the broadcast. You can terminate the broadcast from RealProducer by clicking the **Stop** button.

## Changing Advanced Push Broadcast Parameters

In the **Server Destination** dialog, clicking the **Advanced Options** button displays a dialog in which you can configure the advanced settings for an account-based, password-only, or multicast push broadcast. These settings primarily affect how RealProducer attempts to reconnect to Helix Server if the broadcast stream is dropped, and how it protects the broadcast stream against lost data. You may want to leave these options set to their default values at first, modifying them only if you experience disconnects or lost data between RealProducer and Helix Server.

**Note:** For pull broadcasting, Helix Server defines the error correction and metadata rates. You can set a single advanced pull broadcasting parameter as described in “Defining a Pull Broadcast Server Destination” on page 213.

## TCP Reconnect

The TCP reconnection option is on by default. It affects the reconnection method for account-based broadcasts, which use a TCP monitoring channel. It also controls the reconnection method for password-only broadcasting if you have chosen TCP rather than UDP as the broadcast protocol. In the server definition file, the `enableTCPReconnect` property enables TCP reconnection.

The TCP reconnection interval sets the number of seconds that RealProducer waits before attempting to reconnect to Helix Server. The interval period begins when the operating system terminates the TCP connection because it has received no response from Helix Server. In the graphical application, you

set this value in the **Time between attempts** field. In the server destination file, the `TCPReconnectInterval` property sets the value. Choose a value in seconds of 1 second or higher. A value of 0 is not valid. The default value is 10.

## Metadata Resend Interval

The metadata resend interval affects how RealProducer and Helix Server re-establish a dropped broadcast stream in password-only and multicast broadcasts that use UDP as the transport. When RealProducer communicates to Helix Server solely through UDP, it does not receive feedback from the server and therefore cannot know if a broadcast stream has been dropped.

To protect against stream loss, RealProducer periodically encodes metadata into the broadcast stream. This provides the information that Helix Server needs to restart the stream, such as the stream name and the receiver password. Through the graphical application's **Metadata resend interval** field, or the server destination file's `metadataResendInterval` property, you specify how frequently RealProducer encodes metadata into the stream. This value determines the approximate, maximum time that viewers may need to wait for RealPlayer to reconnect to a dropped broadcast. The default is 30 seconds.

**Note:** The metadata resend interval has no effect on password-only broadcasts that use TCP transport. For these broadcasts, as well as for account-based broadcasts, the TCP reconnection values described in “TCP Reconnect” on page 205 control the reconnection characteristics.

## Statistics Update Interval

The statistics update interval determines how frequently Helix Server sends statistics reports to RealProducer during an account-based broadcast. It is not used with any other broadcast method. Set a value in seconds in the graphical application's **Server statistics update...** field or through the server destination file's `statisticsUpdateInterval` property. The default value is 10 seconds.

## Packet Resend Requests and Listen Address

If Helix Server does not receive broadcast packets, it first attempts to reconstruct the broadcast data using the forward error correction packets, as described in “Forward Error Correction” on page 207. If that fails, it can request RealProducer to resend the packets. There is no guarantee, however,

that RealProducer will still have the packets buffered or that they will arrive in time to be useful for the broadcast. The resend feature functions with account-based and password-only broadcasts that use the UDP transport. It is ignored for broadcasts that use a TCP transport, as well as multicasts.

### Packet Resends

The packet resend feature is turned on by default. Because the resend requests increase network overhead slightly, you may want to turn the resend feature off to keep tight control over network bandwidth use. To do so, uncheck the packet resend option in the graphical application, or set a value of `False` for the `allowResends` property in the server destination file.

**Note:** The Helix Server receiver configuration can turn off the feature for making resend requests. In this case, the RealProducer setting has no effect because the server will never make these requests.

### Listen Address

The listen address sets the version 4 or version 6 IP address that RealProducer uses to listen for packet resend requests from Helix Server. The default value of `Automatic` (you can also specify the value of `0`) causes all versions of Helix Server to gather the listen address from the IP packet headers. This works in most cases, including broadcasts that traverse a network address translation (NAT) firewall that masks the actual IP address of the RealProducer machine. If RealProducer cannot reach Helix Server using the default setting, you can specify the IP address explicitly using the graphical application's **Listen address** drop-down list. Or, enter the IP address manually. If you are working directly with server destination files, which Appendix D describes, add the IP address as the value of the `listenAddress` property.

**Tip:** Using an explicit IP address from the RealProducer machine typically does not work when you broadcast through a NAT firewall. If the default value of `Automatic` does not work with your NAT firewall, set the listen address to `0.0.0.0` instead.

### Forward Error Correction

When forward error correction (FEC) is used, RealProducer adds error correction packets to the broadcast stream. If packets containing broadcast data are lost, Helix Server can often reconstruct the data using the error

correction packets. You can include forward error correction with broadcasts that use the UDP transport. The setting is ignored for any broadcast that uses TCP for data transport.

If you use forward error correction, the value set in the graphical application's **Partial stream redundancy** field or through the server destination file's `fecPercent` field indicates the percentage of the broadcast stream dedicated to forward error correction. The greater the value, the higher the packet loss protection and the greater the bandwidth needed for the stream. A standard value of 20 percent means that one in five packets is for error correction. The stream also uses 20 percent more bandwidth than if error correction were turned off.

**Note:** Using FEC increases the bandwidth only for the stream between RealProducer and Helix Server. It does not affect the bandwidth of the broadcast streams delivered to RealPlayer viewers by Helix Server.

**Tip:** Forward error correction is most useful when sending a broadcast stream over a lossy network such as the Internet. If your RealProducer and Helix Server are on the same local area network, you may not need to use any error correction.

**For More Information:** If the packet reconstruction fails, Helix Server may request the lost packets to be sent again, as described in "Packet Resend Requests and Listen Address" on page 206.

### Redundant Stream Protection

You can turn FEC protection all the way up to 100%, effectively creating a redundant stream that provides maximum protection against packet loss. This doubles the outgoing bandwidth required for the broadcast stream, however. To do this through the graphical application, click the **Full stream redundancy** radio button. If you are editing the server destination file manually, set the value of the `fecPercent` property to 100.

When you use full stream redundancy, you can set an offset in seconds between each packet and its redundant packet. This reduces the chance that both packets will be lost. For example, an offset value of 2 means that after it transmits a certain packet to Helix Server, RealProducer waits two seconds before transmitting the redundant packet. To set this offset, enter a value in

seconds in the graphical application’s **Redundant packet latency** field. In the server destination file, the `fecOffset` property controls this setting.

**Note:** Implementing packet redundancy is not the same as using redundant RealProducers, which is described in “Encoder Redundancy” on page 174. Packet redundancy protects against losses due to network conditions, but it does not protect against the failure of the encoding process as does encoder redundancy.

### FEC Rates and Receiver Buffering

When you use forward error correction, the Helix Server administrator may need to increase the amount of time that the receiver buffers the broadcast stream. If an FEC packet arrives after the server broadcasts the portion of the stream that the FEC packet corrects, the packet is useless. The administrator may need to change the buffering whether you use partial or full stream redundancy:

- If you use full stream redundancy, Helix Server must buffer the stream at least as long as the redundant packet offset value. For example, if RealProducer transmits redundant stream packets five seconds after the initial stream packets, the Helix Server receiver needs to buffer the stream for a minimum of five seconds.
- When you use partial stream redundancy, broadcasting low-bandwidth RealVideo streams with an error correction rate lower than 20 percent may require raising the receiver buffering time. The chapter on transmitters and receivers in *Helix Server Administration Guide* explains how to set the receiver buffering based on the transmitter FEC rate.

### Multicast Time to Live

All multicast broadcasts include a “time to live” feature. As a multicast data packet passes through a multicast-enabled router, its time to live decreases by 1. When the value reaches 0, the router discards the data packet. When you set up a multicast, you specify a time to live of 0 to 255 in the **Multicast time to live** field or the server destination file’s `multicastTTL` property. The larger the value, the greater the distance a packet can travel. The default value of 16 typically

keeps multicast packets within an internal network. The following table summarizes possible values.

**Time to Live (TTL) Values**

TTL Value	Packet Range
0	local host
1	local network (subnet)
16	intranet
32	site
64	region
128	continent
255	world

## Running a Pull Broadcast

In pull broadcasting, RealProducer begins to generate broadcast packets as soon as you start the encoding. However, it does not deliver the broadcast stream until Helix Server requests the stream, which occurs when the first RealPlayer user requests the broadcast. Pull broadcasting thereby saves bandwidth between RealProducer and Helix Server when no one is viewing the broadcast. This broadcast method allows you to send a stream to Helix Server version 9 or later.

**For More Information:** See “Running a Pull Broadcast” on page 210 for set-up instructions.

## Advantages of Pull Broadcasting

Pull broadcasting conserves bandwidth between RealProducer and Helix Server when a broadcast stream is not needed. This is useful in many cases, such as the following:

- online radio stations

You might use multiple instances of RealProducer to encode multiple streams for different online radio stations. Using pull broadcasting, you send to Helix Server only the streams for the stations that listeners have requested.

- server redundancy

Helix Server can provide server redundancy by sending each RealPlayer a list of alternate servers to contact in case their connection to the primary server fails. If you use pull broadcasting, a backup server receives the broadcast stream only if a connection between a RealPlayer and a primary server is lost.

**For More Information:** See the chapter on multiple servers in *Helix Server Administration Guide* for more about redundancy servers.

## Disadvantages of Pull Broadcasting

Because a pull broadcast does not begin until the first RealPlayer user requests the broadcast, the first viewer may experience a longer than normal delay as Helix Server contacts RealProducer to acquire the broadcast stream. After the server acquires the stream, however, the broadcast is queued on Helix Server and subsequent viewers experience no additional delay.

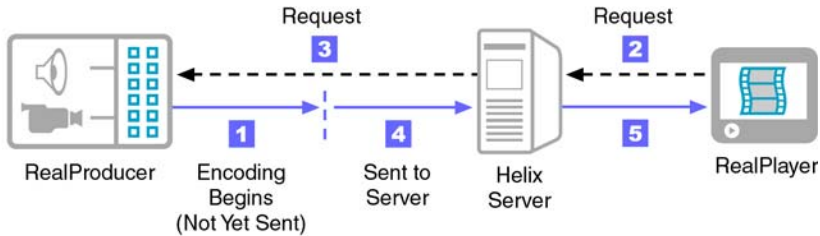
When you use pull splitting, you do not have control over how many Helix Servers pull the stream. Any server that knows the RealProducer address, stream name, and access password can request the stream. You therefore have less control over your outgoing RealProducer bandwidth than you do with push splitting, in which you define exactly which servers receive the stream.

**Note:** Each Helix Server that requests the broadcast receives a separate stream. Multicasting is not available with pull splitting.

## Pull Broadcast Steps

The following figure illustrates the interaction between RealProducer, Helix Server, and RealPlayer in a pull broadcast.

### Pull Broadcasting



1. RealProducer begins encoding live streaming media, but the output is not sent to Helix Server.
2. The first audience member requests the broadcast, typically by clicking a link in a Web page. This launches RealPlayer, which requests the broadcast stream from Helix Server.
3. Helix Server requests the broadcast stream from RealProducer, sending it information about the server address and ports to use. Once the connection is established, Helix Server sends “keep alive” requests as long as viewers are receiving the broadcast.
4. RealProducer sends the broadcast stream to Helix Server, terminating the stream when it receives no more keep alive messages.
5. Helix Server streams the broadcast to RealPlayer users.

### Preparing Helix Server for Pull Broadcasting

In a pull broadcast, RealProducer acts as a transmitter and Helix Server functions as a pull-enabled receiver in a splitting arrangement. This requires coordinated set-up on both ends. The chapter on transmitters and receivers in *Helix Server Administration Guide* explains splitting, and shows how to set up the server as a pull-enabled receiver. Before running a pull broadcast, confer with the server administrator on the following issues:

- To be configured as a receiver, Helix Server must be licensed for broadcast distribution and pull-splitting. Clicking the **About** link in Helix Administrator displays the Helix Server licensing information.
- RealProducer requires that Helix Server transmit a valid password to pull the stream. This password is defined in the RealProducer server destination and the server receiver configuration.



- The Helix Server receiver defines a range of ports it uses to receive the stream data. Default ports are 30001 to 30020. When the broadcast begins, RealProducer and Helix Server negotiate which ports to use. For best results, ensure that any firewalls between RealProducer and Helix Server allow UDP data sent to Helix Server on the ports in the defined range.
- The Helix Server receiver definition specifies RealProducer as a transmitter source through its IP address, and indicates whether TCP or UDP is used.
- In a pull broadcast, the Helix Server receiver defines the error correction parameters used for the broadcast stream. These parameters should be set in the pull-enabling section of the receiver configuration.
- If you want to archive or split the broadcast on Helix Server, you may need to apply archiving or splitting rules. This requires that the Helix Server administrator define the rules for a specific virtual path that precedes the stream name, as in `news/live.rm`. For background, refer to “Virtual Paths” on page 176.
- Confer with the Helix Server administrator if you plan to lower the broadcast latency as described in “End-to-End Broadcast Latency” on page 180. Lowering the latency automatically reduces the receiver buffering on Helix Server version 11 and later, which may not be desirable. The Helix Server administrator can override the buffering value, however.
- The URL for the broadcast varies depending on the Helix Server features, such as viewer authentication, that you use. The section “Standard URL for a Pull Broadcast” on page 220 explains the basic URL format.
- Depending on the Helix Server logging parameters and the method it uses to broadcast the stream to RealPlayer viewers, broadcast statistics (such as the total number of viewers and how long each viewer watched) may be recorded in the server log files.

## Defining a Pull Broadcast Server Destination

This section explains how to define a password-only broadcast on RealProducer. You can create the server destination anytime before the broadcast, and can save the settings to a template for future use.

► To define a pull server destination:

1. If you have multiple jobs open, click the appropriate job file name in the job manager.
2. Select **File>Add Server Destination** to display the server destination dialog. Or, click the server icon in the destinations area.
3. Enter a description of the server in the **Destination Name** field. This is for your reference only and does not affect the broadcast. If you save the destination as a template, this entry becomes the name of the template in the graphical application, as well as the file name of the server destination file.
4. In the **Stream Name** field, enter a name for the broadcast stream. This name resembles a clip name and should use the appropriate extension, either `.ra`, `.rv`, or `.rm` for a constant bit rate stream. It should be `.rmvb` for a variable bit rate stream. The stream name can include uppercase or lowercase letters, numbers, an underscore (`_`), and a dash (`-`). Spaces are not allowed.
5. From the **Broadcast Method** pull-down list, select Pull (Helix Server).
6. For **Local IP Address**, select the IP address used by RealProducer to listen for pull requests. If your computer has just one IP address, that address is selected by default in the pull-down list. The Helix Server receive must specify this address as the transmitter address.
7. The optional **Path** field specifies a virtual path that can be used for archiving or splitting on Helix Server. Use a simple name followed by a forward slash, such as `news/`.
8. For **Producer Listening Port**, indicate the port on RealProducer that it uses to listen for pull requests from Helix Server. By default, this port is 3031, but you can use any available port up to 65535. Firewalls should allow TCP communications through the chosen port. RealProducer and Helix Server then negotiate the ports to use for the data transfer.
9. In the **Password** field, enter the password that the receiver must transmit to pull the broadcast. The broadcast connection fails if the receiver supplies the wrong value. If you are saving the destination as a template, you can click **Remember password** to store the password in the job file or server template file.

**Warning!** The password is saved as plain text in the job file or the server template. If you save the password, be sure that you maintain appropriate security on these files.

10. You may want to change the server timeout, which is the amount of time that RealProducer waits for a response from Helix Server before assuming that Helix Server has finished broadcasting. At this point, RealProducer shuts down the broadcast stream. It does not discontinue the broadcast stream, however. This allows other servers to pull the stream.

The timeout value is 30 seconds by default. You can raise the value if previous pull broadcasts have timed out while RealPlayer viewers were still receiving the broadcast. RealNetworks does not recommend that you lower the value. Do the following to set the value:

- a. Click the **Advanced Options** button.
  - b. In the **Server connection timeout** field, set a new value in seconds.
  - c. Click **OK**.
11. If you want to save the server destination as a template, click the **Templates** button and select **Save as Template**. You can then use this server destination for future broadcasts, as described in “Working with Server Templates” on page 217.
  12. Click **OK** to save the server destination. The destination appears in the destinations section of the RealProducer main window. You can right-click the destination name to edit or delete the destination.
  13. To lower the broadcast latency, follow the instructions in “Reducing Broadcast Latency” on page 216. Be sure that you first understand the issues and ramifications of latency reduction, which the section “End-to-End Broadcast Latency” on page 180 describes.

## Starting and Stopping a Pull Broadcast

When you have completed the server destination and have defined the live input as described in “Using Live Audio or Video as the Input” on page 90, you can start the encoding process by clicking the **Encode** button. RealProducer begins to encode the live input, but does not send the broadcast stream to a Helix Server until the stream is requested.

Helix Server typically re-requests a broadcast stream if it is inadvertently lost. During the broadcast, it periodically sends “keep alive” messages to

RealProducer to indicate that it continues to need the stream. If the server notifies RealProducer that it no longer needs the stream, or the server connection times out, RealProducer stops transmitting the stream but does not stop the encoding process. This allows additional servers to pull the stream if necessary. You can terminate a broadcast stream and the encoding process by clicking the RealProducer **Stop** button.

## Reducing Broadcast Latency

For any live, push or pull broadcast, you can reduce the end-to-end broadcast latency, displaying events in RealPlayer as little as two seconds after they occur. Reducing latency is not desirable in all circumstances, however, because it provides RealPlayer with fewer means to recover from packet loss and other errors. A low-latency broadcast can therefore create a more erratic user experience when network errors occur.

**For More Information:** Before choosing latency reduction in a broadcast, be sure to read the background information in the section “End-to-End Broadcast Latency” on page 180.

## Setting the RealProducer Latency Mode

To set the RealProducer latency mode, create a new job or open an existing job and click **Settings>Network Settings**. Using the radio buttons, you can choose one of three latency modes: Normal, Moderate, or Low. The default value is Normal, which creates the highest end-to-end latency, but offers the best error correction. The value of Low provides the lowest end-to-end latency, but network errors are propagated to the viewer. The latency mode is saved when you save the job file.

**Warning!** Use the Moderate or Low latency setting only when delivering a live stream to Helix Server version 11 or later. Earlier versions of Helix Server do not handle the stream properly.

**For More Information:** The table “Summary of End-to-End Latency Modes” on page 181 lists the expected latency reduction for each mode.

## Changing the Maximum Packet Size

RealProducer's packet sizing feature allows you to set the maximum packet size for live broadcasts. Packets may still be smaller than this size, however. You should change these values only if you are familiar with the maximum transfer unit (MTU) for the network you use. To set a packet size, choose **Settings>Network Settings**, click the **Custom** radio button, and enter a size in bytes.

**For More Information:** For more about MTU sizes, refer to “Network Latency” on page 185.

## Working with Server Templates

When you create a server destination, the server information is written to the job file if you save the job. Optionally, you can save the server definition as a separate server template. This allows you to share the server definition or add it quickly to any other broadcast job. RealProducer stores the server template as an XML-based text file in the servers directory under its main installation directory. Using RealProducer Plus, you can save any number of server templates. With RealProducer Basic, you can save one server template.

**For More Information:** Appendix D explains how to edit a server file manually.

## Using a Server Template

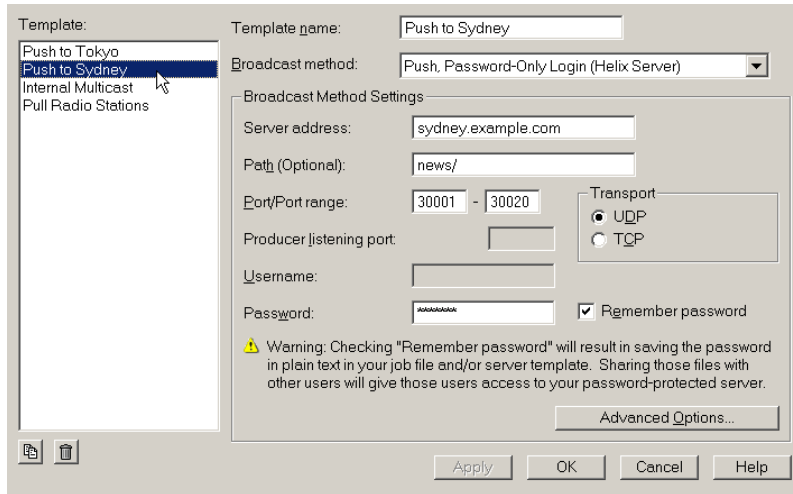
To save a server template, create a server destination as described in one of the broadcast set-up sections in this chapter. Then save the server definition as a template by clicking the **Templates** button and choosing **Save as Template**. To use that template in another job, select **File>Add Server Destination**, click **Templates**, and choose the template from the list. If you make changes to the template, you can change the destination name and save the changes as a new template by clicking **Templates** and choosing **Add to List**.

## Editing or Deleting a Server Template

You can edit any server template if you need to change it. These changes are recorded in the template and the active job, but not in any previous jobs that also used the server template. To update an older job, edit the job file

manually. Or, open the job in the graphical application, and replace the server destination in the output with the revised server destination.

### Server Templates



#### ► To edit a server template:

1. Select **Edit>Server Templates** to list all available templates.
2. Select a template from the list. This displays the template's settings in the right-hand side of the dialog.
3. You can then perform any of the following actions:
  - a. Edit the settings for the template as described in the various sections of this chapter.
  - b. Click the “duplicate” icon at the bottom of the template list to copy the selected template. Then, edit the settings fields. This allows you to create a similar template quickly.
  - c. Click the trash icon to delete the selected template.
4. Click **Apply** to save changes to the template. Click **OK** to exit the dialog and save any changes.

## Broadcast URLs

The following sections provide a general guide to URLs used by RealPlayer viewers to play a broadcast. Confer with the Helix Server administrator about

the actual URL to use, as URLs can vary from the standard forms described below for many reasons:

- An HTTP URL in a Web page includes a `/ramgen/` mount point, whereas an RTSP URL in a Ram or SMIL file does not.
- The Helix Server administrator can change the mount point (typically `/broadcast/`, `/encoder/`, or `/redundant/`) used with any broadcast method.
- Using the splitting feature, the Helix Server administrator can route the broadcast stream to multiple receivers. This lengthens the broadcast URL, and the URL to the stream on each receiver will differ.
- Including features such as user name and password authentication for viewers adds additional mount points to the URL.
- The Helix Server administrator may shorten long broadcast URLs by substituting an alias for parts of the URL.

### Standard URL for a Push Broadcast

For a basic push broadcast that the viewer accesses by clicking a link in a Web page, the URL looks like the following:

`http://helixserver.example.com/ramgen/broadcast/news/live.rm`

- The `/ramgen/` mount point launches RealPlayer when the viewer clicks the link in a Web page. If the URL is in a Ram file (`.ram` or `.rpm`) or SMIL file (`.smil`), the `/ramgen/` mount point is omitted and the protocol is `rtsp://`.
- The `/broadcast/` mount point is the default mount point used by Helix Server for an account-based or password-only broadcast. If redundant encoders are used with any broadcast method, the mount point is `/redundant/`.
- A virtual path such as `news/` is optional. It is included in the URL only if RealProducer specifies this path along with the stream name.
- You define the stream name, shown as `live.rm` above, through the RealProducer server destination.

**Note:** If you use encoder redundancy, RealProducer defines delimiters in the stream name, such as `.1` and `.2`. These delimiters are not included in the URL.

## Standard URL for a Pull Broadcast

The URL to a pull broadcast is longer than a URL to a push broadcast because it includes information about both the Helix Server receiver and the RealProducer transmitter. The following example shows the general format for a basic pull broadcast that the viewer accesses by clicking a link in a Web page. For convenience, the example is displayed on two lines. The first line gives the receiver information. The second line supplies the transmitter parameters:

```
http://receiver.example.com/ramgen/broadcast/pull/  
realproducer.example.com:3031/news/live.rm
```

- The /ramgen/ mount point launches RealPlayer when the viewer clicks the link in a Web page. If the URL is in a Ram file (.ram or .rpm) or SMIL file (.smil), the /ramgen/ mount point is omitted and the protocol is rtsp://.
- The /broadcast/ mount point is the default mount point used by Helix Server for a pull broadcast. Following the broadcast mount point is a path that indicates pull splitting is used, as in /pull/. The Helix Server receiver defines this path.
- The link's transmitter portion lists the RealProducer IP address or host name, along with its listen port, as in realproducer.example.com:3031.
- A virtual path such as news/ is optional. It is included in the URL only if RealProducer specifies this path along with the stream name.
- You define the stream name, shown as live.rm above, through the RealProducer server destination.



## MEDIA TOOLS

In addition to the RealProducer graphical application, you can use the command-line application, media editor, and event encoding tool described in the next set of chapters.



## EDITING REALMEDIA FILES

RealMedia Editor allows you edit RealAudio and RealVideo clips. You can shorten a clip, for example, but cutting it at its beginning or end. You can change the title, author, and other clip information. You can also can merge image maps or interactive events into a RealMedia file. You can use a command-line editor on Windows and Linux, and a graphical editor on Windows.

### Using the Graphical Editor

RealMedia Editor is installed automatically in the RealMediaEditor directory under the main RealProducer installation directory. On Windows, you can use the `rmeditgui` graphical editor program. To open the graphical editor, give the **File>Edit RealMedia File** command on RealProducer. The menu items at the top of the window allow you to access different functions of the editor:

- Use **File** to open, save or append to a RealMedia clip.
- Use **Navigate** to jump to key frames and edit points.
- Use **Tools** to access clip and stream information, merge image maps and events, and edit your preferences.
- Use **Help** to locate information about running the editor.

The editor also has these functional areas:

- The clip viewer is a video window that shows the video portion of the clip.
- The timeline provides a graphical representation of the input file. You can move the slider to any keyframe or edit point. The current time position is also shown here.
- The zoom tool zooms in or out of the timeline.

- The clip info area allows you to change the title, author, copyright, keywords, and description of a clip. You can also view the clip's stream information this area.

## Opening a RealMedia Clip

Once you have opened a RealMedia clip, you can play it, navigate through it, and edit it.

► To open a clip:

1. In the main window, choose **File>Open RealMedia File**.
2. Navigate to the directory where the RealMedia file (extension .ra, .rv, .rm, or .rmvb) is located and select it. You can edit RealMedia clips that are under 2 Gigabytes in file size.
3. Click **Open** to display the clip in the main window. If it is a RealVideo clip, the first frame appears in the viewer.

**Tip:** You can also drag a clip into the RealMedia Editor main window to open that clip instantly.

## Navigating Through a Clip

RealMedia Editor gives you different methods to navigate through a clip to find the points to edit. You can use the slider on the timeline, click the **Play** and **Stop** buttons, use edit points, or use keyframes.

### Using the Timeline

Using the timeline is the easiest way to navigate along your clip. The red line marks the current position in the clip. To move the line, either click on it and drag it to a new position, or click with the mouse button at a desired point in the timeline. This displays the video frame at that point.

### Using Buttons

Using the navigation buttons is another way to find part of a clip. Click the **Play** button to start playback. Click **Stop** when you reach the desired point in the clip.

### Using Keyframes for Video Clips

Keyframes are video frames that are encoded pixel-for-pixel. A RealVideo clip consists of a number of keyframes. The frames between keyframes are based on the keyframes, and a video clip must have at least one keyframe. Navigating with keyframes allows you to jump to a main section of a clip, such as the start of a new scene. Click the >> button to go to the next keyframe in the clip. Click << to go to the previous keyframe.

### Using Edit Points for Audio Clips

Edit points are possible points at which you can edit a clip. These points are designated by the smallest block of audio data that a clip can be split into. There are no edit points in a video-only clip, so you can edit the clip at any point. Click the > button to go to the next edit point in the clip. Click the < button to go to the previous edit point in the clip.

## Editing with the RealMedia Editor

This section shows you how use the RealMedia Editor to edit a RealMedia clip. You will learn how to edit out the beginning or end of a clip, how to change clip information, how to merge either an image map or an interactive event to a clip, and how to append another clip to the current clip.

### Editing a Clip's Beginning or End

Using RealMedia Editor, you can remove portions from the beginning or end of a clip. This section shows you how to mark the points for editing, and gives you tips on editing a clip.

► **To edit the beginning or end of a clip:**

1. Open the clip and navigate to the point that will be the clip's new beginning.
2. Click the **In** button. On the timeline, the beginning of this section is marked by a bracket ( [ ). The following parts on the timeline display in a darker grey color.

**Tip:** You can also modify the beginning of your clip by changing the current time within the **In** field.

3. Navigate to the point that will be the end of the new clip.

4. Click the **Out** button. On the timeline, the end of the clip is marked by a bracket ( ] ). The portion of the timeline between the two brackets shows in a darker grey color. The new ending time of the clip is also shown.

**Note:** You can modify the end of your clip by changing the current time within the **Out** field.

5. Click **Play Selection** to play the marked section of the clip and verify that you have selected the appropriate parts.

**Note:** You cannot change the beginning and end marks until the clip has stopped playing.

6. When you are satisfied with the new clip, select **File>Save RealMedia File As** and choose a new name for the edited clip.

### Editing Tips

The following tips will help edit clips:

- If you set a selection point between keyframes, the cutting may not be precisely accurate. The resulting video may have a black or frozen image, or it may simply begin at the next keyframe.
- A video clip must contain at least one keyframe. If you create a clip without a keyframe, you will be unable to save it.
- You can type time values directly for current clip position using the format days:hours:minutes:seconds.milliseconds.

### Changing Clip Information

Clip information tells the audience about a clip and allows the audience to find a clip more easily. With RealMedia Editor, you can add clip information if none exists or you can change clip information that is attached to a file.

- To change clip information:

1. Open a RealMedia file.

2. In the **Clip Info** area, enter new information for the clip:

Title	In this field, enter the title of the clip or broadcast. Because this title appears in the RealPlayer interface, it is best to use a short title.
Author	This field holds the name of the person or organization that created the clip.
Copyright	Here, enter the copyright string, such as (c) 2004 ABC Corporation.
Keywords	The keywords field holds words that certain audio and video search engines can read to categorize the clip. Add a few words that will help your audience search for your clip. Separate each term with spaces. Unless you are adding a proper name, use lowercase for each term. Avoid overly generic terms such as video or music.
Description	This field holds a description of the clip that appears when the viewer displays extended clip information. This allows you to describe the clip in detail without creating a long title.

3. To enter rating information, click the **Clip Info** button. In the dialog, you can enter any clip information described previously, and also set a rating:

- No Rating
- All Ages
- Older Children
- Younger Teens
- Older Teens (15 and up)
- Adult Supervision Recommended
- Adults Only

4. Click **OK** to return to the main window.

5. To save the new clip, select **File>Save RealMedia File As** and save the clip under a new file name.

## Merging Image Maps or Events

Image maps are text files that create clickable fields within a RealVideo clip. When clicked by a viewer, the image map causes a specific action, such as opening a Web page in the viewer's browser. Events are similar to image maps,

except that actions happen automatically without audience interaction. Using RealMedia Editor, you can merge these files into a RealMedia clip.

**For More Information:** Chapter 13 explains how to write an image or event file.

- ▶ To merge an image or event file into a RealMedia clip:
  1. Open the RealMedia clip.
  2. Select **Tools>Merge Image Maps** or **Tools>Merge Events**. This opens a file dialog.
  3. Locate the image map or event file that you want to merge and click **Open**. RealMedia Editor merges the file information with the clip, creating a new, untitled clip and closing the original clip.
  4. To save the new clip, select **File>Save RealMedia File As** and save the clip under a new file name.

## Appending Clips

RealMedia Editor allows you to combine one RealMedia clip with another. Appending works only when the number and type of streams in each file are identical. Therefore, this feature works best when the source files are all encoded with RealProducer using the same settings.

**Note:** The total size of the appended clips cannot exceed the editor's 2 Gigabyte file size limit.

- ▶ To append one clip to another:
  1. Open the first RealMedia clip.
  2. Select **File>Append RealMedia File**.
  3. Locate the clip you want to append and click **Open**. RealMedia Editor the appends the selected clip to the open clip. This process can take some time, depending on the size of the second clip.
  4. When the appending process completes, you can edit the combined files and save it as a new clip. The editor closed the original clips.



## Using Advanced Editing Features

RealMedia Editor provides advanced features that can help you with the editing process. You can view information about all streams within a clip. Plus, you can decide how fast RealMedia Editor previews a clip.

### Viewing Stream Information

Every RealMedia clip contains a number of streams. Single rate VBR files contain only one stream, whereas SureStream CBR files can contain multiple streams depending on the number of target audiences. RealMedia Editor allows you to view information about each encoded stream. However, if your file does not contain any recording information, the corresponding field will be blank.

► **To view stream information:**

1. Open a RealMedia file.
2. Select **Tools>Stream Info**. This opens a dialog that provides the following information:
  - **Audio Mode**—the type of audio for the encoded clip (such as music or voice)
  - **Video Mode**—the quality of the encoded video (such as normal or smooth motion)
  - **Video Size**—the size and width, in pixels, of the encoded video
  - **File Type**—either single rate or SureStream
  - **Audiences**—the audience bandwidth you have selected.

This dialog also gives you the following information about each stream within the clip:

- **Bit Rate**—the amount of bandwidth necessary to view the stream
  - **Preroll**—the amount of bits needed to download before the stream can play
  - **Frequency**—the frequency response of the encoded audio for the stream
  - **Codec**—the compression/decompression algorithm used to encode the stream.
3. Click **Close** to return to the main window.

## Changing Editor Preferences

RealMedia Editor allows you to change how it previews a clip you open. You view a clip quickly, or more accurately. The accurate view takes more time to render if the clip is large.

► To change RealProducer preferences:

1. Select **Tools>Preferences** to open the preferences dialog.
2. Select a method for opening clips:
  - **Quick**—Plays back the selection without delay. However, audio and video may not play exactly as they do in the saved clip. For example, frames of video at the beginning of a clip may appear different. And audio may not stop precisely at the end of a clip.
  - **Accurate**—saves the selection to a temporary file. This can take a significant time for long clip. The preview, however, will look and sound exactly like the saved clip.
3. Click **OK** to return to the main window.

## Running the Command Line Editor

The `rmeditor` executable program in the `RealMediaEditor` directory runs RealMedia Editor from the command line on Windows and Linux. There are three main functions that this program performs:

- It extracts information about a RealMedia clip (also called a “dump”).
- It changes metadata, such as title, author, keywords, and copyright information in a clip.
- It cuts clips and can paste clips together.

The following table summarizes the `rmeditor` options, which have both long and short option flags.

Flag (long and short)	Value	Function
-input	-i <i>filename.ext</i>	Indicates path to the input file.
-output	-o <i>filename.ext</i>	Specifies path to the output file.
-title	-t <i>text</i>	Gives the title text.
-author	-a <i>text</i>	Specifies the author name.

(Table Page 1 of 2)

**RealMedia Command-Line Editor Options (continued)**

Flag (long and short)	Value	Function
-copyright	-c <i>text</i>	Provides the copyright text.
-comment	-C <i>text</i>	Any comments about the clip.
-startTime	-s <i>dd:hh:mm:ss.xyz</i>	Sets clip start time.
-endTime	-e <i>dd:hh:mm:ss.xyz</i>	Sets clip end time.
-logFile	-l <i>filename.log</i>	Gives path to the log file.
-dumpFile	-d <i>filename.txt</i>	Sets the path to the dump file.
-description	-q <i>text</i>	Describes the file contents.
-keywords	-n <i>text</i>	Provides a list of keywords.
-rating	-R 0=No rating 1=All ages 2=Older children 3=Younger teens 4=Older teens 5=Adult supervision recommended 6=Adults only	Allows you to rate the content.

(Table Page 2 of 2)

**Getting Information from a RealMedia Clip**

Use the following syntax to create a text-based dump file that contains information about an encoded RealMedia clip:

```
rmeditor -inputFile filename.rm -dumpFile filename.txt
```

**Editing Metadata**

The following syntax shows how to edit clip information:

```
rmeditor {-inputFile filename} {-outputFile filename}  
[-t | -title title] [-a | -author author] [-c | -copyright copyright]  
[-q | -description description] [-n | -keyword keywords] [-r | -rating rating]
```

**Cutting and Pasting Files**

Use the following syntax to cut files and paste two files together:

```

rmeditor {-i | -input | -inputFile input [-s | -startTime dd:hh:mm:ss.xyz] [-e |
-endTime dd:hh:mm:ss.xyz] }
[-i | -input | -inputFile input [-s | -startTime dd:hh:mm:ss.xyz] [-e |
-endTime dd:hh:mm:ss.xyz] ]
...
{-o | -output | -outputFile filename} [-t | -title title] [-a | -author author]
[-c | -copyright copyright] [-q | -description description]
[-n | -keyword keywords]

```

## Common RealMedia Editor Command Line Operations

The following are frequently used operations.

- View the current title, author, copyright, comments, mobile playback and selective record setting:

```
rmeditor -i input.rm
```

- Change the current title of a .rm file:

```
rmeditor -i input.rm -t "new title text" -o output.rm
```

- Enable the allow recording flag:

```
rmeditor -i input.rm -r 1 -o output.rm
```

- Disable the allow recording flag:

```
rmeditor -i input.rm -r 0 -o output.rm
```

- Trim the duration of a file:

```
rmeditor -i input.rm -s 0:0:3:2.20 -e 0:0:4:2.20 -o output.rm
```

**Note:** The start and end times will be adjusted so the clip starts and ends on keyframe boundaries. Use 0 as the end time to specify the end of the file.

- Paste multiple RealMedia files together:

```
rmeditor -i input.rm -i input2.rm -i input3.rm -o output.rm
```

**Note:** If more than one input file is specified, any start and end time arguments are ignored.

- Add a description to the file:

```
rmeditor -i input.rm -q "This file contains audio and video of the 1/1/99
meeting" -o output.rm
```

- Add keywords to the file:

```
rmeditor -i input.rm -n "travel Fiji resorts" -o output.rm
```

- Enable the allowing indexing flag:

```
rmeditor -i input.rm -IN 1 -o output.rm
```

- Disable the allowing indexing flag:

```
rmeditor -i input.rm -IN 1 -o output.rm
```



## DEFINING EVENTS AND IMAGE MAPS

When you produce RealAudio or RealVideo clips using RealProducer, you can use a utility that embeds clip information and HTML URLs directly in the clip. For RealVideo clips, you can also create clickable image maps. This chapter explains how to write markup that creates these features, and how to run the utility that merges the markup with the encoded clips.

### Understanding Events and Maps

Event files and map files are text files that use a simple markup language. An event file defines URLs that open automatically in a the viewer's browser as the audio or video clip plays. This allows you to create a presentation in which HTML pages are timed to display at certain points as the clip plays. The events file can also encode extended clip information beyond the standard title, author, and copyright.

The map file can define image maps that overlay a RealVideo clip and open when the viewer clicks a predefined hot spot. These hot spots can be the entire video, or a smaller area in the shape of a circle, rectangle, or irregular polygon. So whereas the event file URLs open automatically, the map file URLs open only on user interaction.

Once you define your event file or map file, you merge the file with your encoded clip using the **RMEvents** utility. This creates a copy of your clip that has the event or map information permanently encoded into it. To change the events or maps, you must create a new version of the clip by merging the original clip with a new event file or map file.

**Tip:** Using a map file or event file is just one way to open URLs and add extended clip information. Ram files and SMIL files also provide these capabilities. Because these latter techniques do not encode information directly into the clip, they allow

you to change the information more readily. For a comparison of all available production techniques, refer to the first chapter of *Introduction to Streaming Media*.

## Writing an Events File

The events file is a plain text file that uses the standard extension of .txt. Within this file, you describe events that will occur as the clip plays. You write each event on a separate line, and you can use a pound sign (#) to start a comment line. Each event line follows this format:

```
flag start_time end_time event_syntax
```

The flag indicates the type of event, which can be either to display clip information, or to open a URL in an HTML pane automatically. The following table summarizes the possible flags.

**Events File Flags**

Flag	Action	Reference
a	Add author information to the clip.	page 238
c	Include copyright information in the clip.	page 238
i	Add title information or include extended clip information.	page 238 page 239
u	Open a URL automatically as the clip plays.	page 236

The starting time and ending time are relative to the start of clip playback. You indicate the time value with the following format, in which only the seconds field is required:

```
dd:hh:mm:ss.xyz
```

After you create your event file, you encode it into the clip as described in “Running the RMEvents Utility” on page 248.

**Note:** Define each event on a single line within the events text file. Do not press **Enter** to wrap long lines manually.

## Specifying URL Events

When opening a URL automatically in an HTML pane, you use the u event flag. The event syntax looks like this:

```
u start_time end_time &&target&&URL?parameters
```



## Browser Target

The URL must be a fully qualified HTTP URL. For *target*, you specify one of the HTML panes found in RealOne Player and later. Earlier versions of RealPlayer, which do not handle HTML pages natively, display the URL in the viewer's default browser. If you plan to embed the clip in a Web page, you can specify an HTML frame name. You can use one of the following values.

<i>frame_name</i>	Display the URL in the designated browser frame.
<i>_rpcontextwin</i>	Display the URL in the RealPlayer related info pane.
<i>_rpbrowser</i>	Display the URL in the RealPlayer media browser pane.
<i>_rpexternal</i>	Display the URL in a secondary RealPlayer browsing window.

**For More Information:** If you are unfamiliar with the RealPlayer HTML windows, refer to the first chapter of *Introduction to Streaming Media*. For information about playing a clip in a Web page, refer to the web page embedding chapter of *RealNetworks Production Guide*.

## Related Info Pane Sizing

If you use *\_rpcontextwin* to open the URL in the related info pane, you can use either of the following parameters to set the size of the pane:

<i>rpcontextheight=pixels</i>	Sets the pixel height of the related info pane. If no height is specified, RealPlayer uses the height of the media clip.
<i>rpcontextwidth=pixels</i>	Sets the pixel width of the related info pane. If no width is specified, a default of 330 pixels is used.

## Events File URL Examples

The following is a sample events file that opens two URLs in the related info pane at different times, and two URLs in the media browser pane at different times:

```
# Open a URL in the related info pane when the clip starts, and size the pane.
u 00:00:00.0 00:01:59.9 &&_rpcontextwin&&
http://www.example.com/info1.html?rpcontextheight=250&rpcontextwidth=280
#
# Open a URL in the media browser pane at the 1-minute mark.
u 00:01:00.0 00:01:59.9 &&_rpbrowser&&http://www.example.com/index.html
#
# Open a second URL in the related info pane at the 2-minute mark.
```

```
u 00:02:00.0 00:04:00.0 &&_rpcontextwin&&http://www.example.com/info2.html
#
# Open a second URL in the media browser pane at the 3-minute mark.
u 00:03:00.0 00:04:00.0 &&_rpbrowser&&http://www.example.com/index2.html
```

Note the following about this sample:

- When you open multiple URLs, list the events in ascending order according to the start times.
- The related info pane size is set for the duration of the clip by the first URL that opens in that pane. Any subsequent URLs that target the related info pane therefore do not require sizing information.
- The end times indicate a point past which the URL should not open. In the second event defined above, the URL is scheduled to open at 1:00 minutes, but no later than 1:59.9 minutes. If a viewer starts the clip and immediately seeks to its 3-minute mark, for example, the URL doesn't display because the clip never plays at any point between the URL's start and end times.

## Adding a Title, Author, and Copyright

When you encode a clip, you have the option of including clip information values as described in “Adding Clip Information” on page 94. Using the events file, you can override the existing title, author, and copyright values, or add them if you did not include them during the encoding process. The events file does not allow you to add other values such as keywords and a description, however.

To add the title, author, or copyright, you include the *i*, *a*, or *c* event flag in the events file, respectively. The format is the same for specifying URLs:

*flag start\_time end\_time value*

Values do not need to be quoted. The following are examples:

```
i 00:00:00.0 00:00:10.0 2004 Music Awards
a 00:00:00.0 00:00:10.0 Brilliant Media Limited
c 00:00:00.0 00:00:10.0 2004 Brilliant Media Limited
```

For clip information flags, you can specify the start time as the clip's starting time (00:00:00.0). Specifying an end time is required, but the actual end time doesn't matter because the clip information will display throughout the length of the clip playback. In the example above, the end times are set to 10 seconds after the clip starts.

## Adding Extended Clip Information

Using an events file, you can also encode several clipinfo parameters. Geared for online music, these parameters allow you to add information such as the artist name, album, genre, and so on, which displays when the viewer chooses the **File>Clip Properties>View Clip Info** command, or presses **Ctrl+i**. This information displays in RealOne Player or later, and is ignored by earlier RealPlayers. It can include the title, author, and copyright, so you do not need to include those separately, as described in “Adding a Title, Author, and Copyright” on page 238.

The clipinfo parameter uses the *i* event flag and one long value surrounded by double quotation marks. Within the quotes, you separate the subvalues with vertical lines, or “pipes,” as shown here:

```
i 00:00:00.0 00:00:10.0 clipinfo:title=My Presentation|artist name=Pat Morales|...
```

For clip information, you can specify the start time as the clip’s starting time (00:00:00.0). Specifying an end time is required, but the actual end time doesn’t matter because the clip information will display throughout the length of the clip playback. In the example above, the end time is set to 10 seconds after the clip starts.

### Clip Information Parameters

The following table describes the name and value pairs that you can use with clipinfo. You can use any set of values, and list them in any order. Most text values can be over 100 characters long.

**clipinfo Parameter Values**

Name and Value	Function
<code>title=<i>text</i></code>	Gives the clip title.
<code>artist name=<i>text</i></code>	Indicates the artist name.
<code>album name=<i>text</i></code>	Gives the album name. If you specify an album name and do not also display an HTML page in the related info pane, RealPlayer displays in that pane a standard page that lists the artist, album, year, and genre values. The viewer can hide this information, though, with <b>View&gt;Album Info&gt;Hide</b> .
<code>genre=<i>text</i></code>	Indicates the clip genre, such as Rock or Jazz.
<code>copyright=<i>text</i></code>	Gives the copyright notice.
<code>year=<i>text</i></code>	Indicates the year the content was released.

(Table Page 1 of 2)

**clipinfo Parameter Values (continued)**

Name and Value	Function
<code>cdnum=number</code>	Supplies the CD track number.
<code>comments=text</code>	Provides any additional comments.

(Table Page 2 of 2)

**Text Escape Characters**

To use certain text characters in a value for the clipinfo parameter, you must use the character's corresponding escape code. This is because certain characters represent syntax components. A pipe (|) represents the start of a new value, for example, so to use a pipe within a value, you must use the escape code %7C. The following table lists some common text characters that you can add through escape codes.

**Text Character Escape Codes**

Name	Character	Escape Code
ampersand	&	%26
apostrophe	'	%27
backslash	\	%5C
carat	^	%5E
double quote	"	%22
greater than sign	>	%3E
left bracket	[	%5B
less than sign	<	%3C
percent sign	%	%25
pipe		%7C
pound sign	#	%23
right bracket	]	%5D

You can enter other common text characters, such as commas, periods, and colons directly into clipinfo parameter. Conversely, you can display *any* text character, including letters and numbers, by using an escape code that starts with % followed by the character's ASCII hexadecimal value. You can create an asterisk (\*) with the escape code %2A, for example.

**For More Information:** Visit <http://www.asciitable.com> for a full list of ASCII codes.

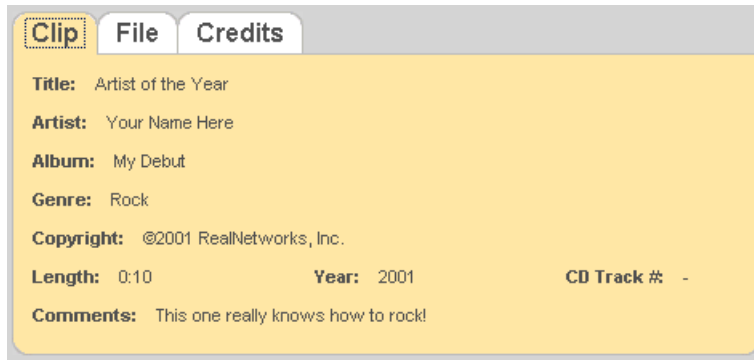
## Clip Information Example

This example sets the clipinfo parameter for an audio clip:

```
i 00:00:00.0 00:00:10.0 clipinfo:title=Artist of the Year|
artist name=Your Name Here|album name=My Debut|genre=Rock|
copyright=2001|year=2001|comments=This one really knows how to rock!
```

The following figure illustrates how this information appears in the clip information panel (**Ctrl+i**).

### Clip Information



## Creating Image Maps

For a RealVideo clip, you can write a map file to create image maps that open a URL or issue a RealPlayer command when clicked. The image map can provide one or more clickable hot spots that are active for the entire duration of the clip, or only during certain periods. You can create these hot spots in the shapes of rectangles, circles, or polygons. Clicking the left half of a video might take the viewer to one Web page, for example, while clicking the right half opens a different page.

You can create a map file using any text editor that can save output as plain text. The map file uses a simple markup similar to HTML that defines the hot spot locations, durations, and actions. Once you define your map file, you merge the map coordinates into the RealVideo clip using the **RMEvents** utility, as described in “Running the RMEvents Utility” on page 248.

**Tip:** You can also use SMIL to create clickable image maps that overlay a video or multclip presentation. The advantage to using SMIL is that the map coordinates are not merged into

the clip, and are therefore easier to change. However, you must always stream the clip through the SMIL file to make the hot spots available. For more information, see the hyperlinking chapter of *RealNetworks Production Guide*.

## Setting a Duration

The map file begins with a mandatory DURATION parameter that defines the total amount of time that the hot spots are active, using a time value in the following format:

```
dd:hh:mm:ss:xxx
```

In this time format, you must specify all fields. The last field, which indicates milliseconds, is separated from the seconds field by a colon, not a period as in other time formats. The following example sets the entire duration of the hot spots to five minutes, 30 seconds:

```
DURATION=0:0:5:30:0
```

## Creating the Overall Map

Following the DURATION parameter, you define the overall area that can contain a hot spot between <MAP> and </MAP> tags. The <MAP> tag uses START and END parameters that define when the map area is active, relative to the start of clip playback. Like DURATION, the START and END parameters have values in the following format:

```
dd:hh:mm:ss:xxx
```

The following map area becomes active 30 seconds after the start of the clip, and stays active for one minute:

```
<MAP START=0:0:0:30:0 END=0:0:1:30:0 ...>...</MAP>
```

The COORDS parameter, which must follow the START and END parameters, defines a rectangle for the map. It uses four values, separated by commas, that set the map's size and placement, measured from the upper-left corner of the clip in the following order:

1. distance of the map's left edge from the clip's left edge (left-x)
2. distance of the map's top edge from the clip's top edge (top-y)
3. distance of the map's right edge from the clip's left edge (right-x)
4. distance of the map's bottom edge from the clip's top edge (bottom-y)

The COORDS parameters allows you to create a map area from any rectangular portion of the clip area. The simplest way to define the map is to create it at the same size as the clip. If the clip is 360 pixels wide by 240 pixels high, for example, you use a map tag such as the following:

```
<MAP START=0:0:0:30:0 END=0:0:1:30:0 COORDS=0,0,360,240>...</MAP>
```

**Tip:** You can define more than one map area. Typically, each map area is active at a different point during the clip timeline. If map areas are active at the same time, the map areas or the hot spots that each map defines should not overlap.

## Defining Hot Spot Areas

To create a hot spot, you use an <AREA> tag with a SHAPE attribute that defines the hot spot's shape, and a COORDS attribute to define the hot spot's size and placement. You define the SHAPE and COORDS attributes just as you do in HTML 4.0. The following example defines a rectangular hot spot:

```
<AREA SHAPE=RECTANGLE COORDS=20,40,80,120 ...>
```

How you specify the coordinate values depends on what shape—rectangle, circle, or polygon—you want, as explained in the following sections. In all hot spots, the coordinates are measured from the upper-left corner of the area defined by the <MAP> tag.

### Creating a Rectangular Hot Spot

Use SHAPE=RECTANGLE to create a rectangular hot spot. You then specify four COORDS pixel values to set the hot spot's size and placement, measured from the upper-left corner of the map in the following order:

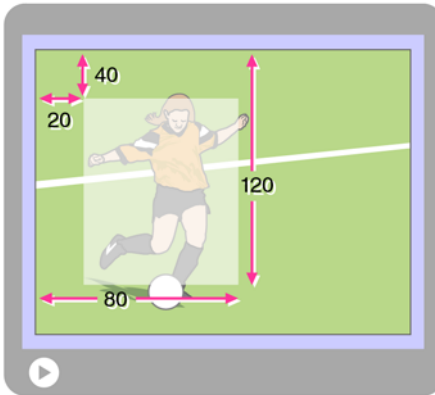
1. distance of the hot spot rectangle's left edge from the map's left edge (left-x)
2. distance of the hot spot rectangle's top edge from the map's top edge (top-y)
3. distance of the hot spot rectangle's right edge from the map's left edge (right-x)
4. distance of the hot spot rectangle's bottom edge from the map's top edge (bottom-y)

Coordinate values are separated by commas, as shown in the following example:

```
<AREA SHAPE=RECTANGLE COORDS=20,40,80,120 ...>
```

The preceding example defines a hot spot 60 pixels wide (80 pixels minus 20 pixels) and 80 pixels high (120 pixels minus 40 pixels). It creates a hot spot like that shown in the following illustration.

### Rectangular Hot Spot



**Tip:** Think of the first pair of values as defining the x and y coordinates of the hot spot's upper-left corner, and the second pair of values as defining the x and y coordinates of the hot spot's lower-right corner.

### Defining a Circular Hot Spot

You can use `SHAPE=CIRCLE` to create a circular hot spot. Three `COORDS` pixel values specify the circle's center placement and radius in the following order:

1. distance of the hot spot circle's center from map's left edge (center-x)
2. distance of the hot spot circle's center from the map's top edge (center-y)
3. the hot spot circle's radius

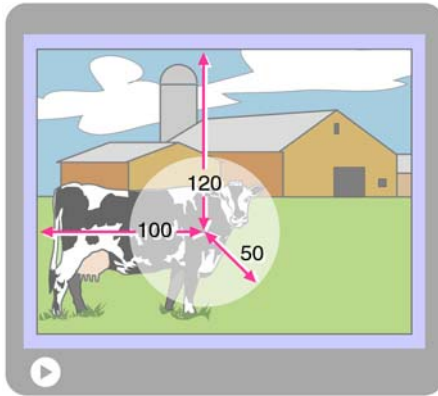
The coordinate values are separated by commas, as shown in the following example:

```
<AREA SHAPE=CIRCLE COORDS=100,120,50 ...>
```

The preceding example places the circular hot spot's center 100 pixels in from the clip's left edge, and 120 pixels down from the clip's top edge. The hot spot has a radius of 50 pixels. The following figure illustrates this example.



### Circular Hot Spot



**Tip:** The last value, which sets the circle's radius, should not be more than the smaller of the other two values. If the first two values are 40 and 20, for example, the third value should not be more than 20. Otherwise, part of the circle extends beyond the clip boundaries and is cut off.

### Making a Polygonal Hot Spot

Use `SHAPE=POLYGON` to make a polygonal hot spot with any number of sides. You might create a triangle or an octagon, for example. For every  $n$  sides of the polygon you want to create, you must specify  $2n$  values in the `COORDS` attribute. To create a triangle, for example, you need to specify six `COORDS` values. Each pair of coordinate values indicates the placement of a corner of the polygon in this order:

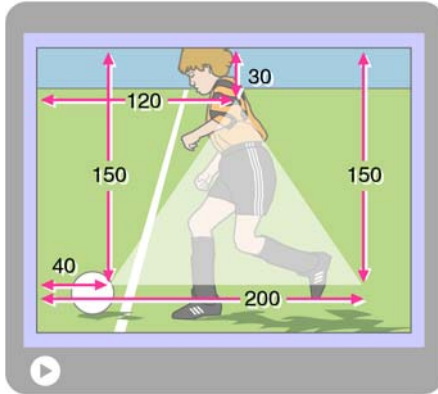
1. distance of the polygon corner from the map's left edge (corner-x)
2. distance of the polygon corner from the map's top edge (corner-y)

The following example defines a triangular hot spot:

```
<AREA SHAPE=POLYGON COORDS=40,150,120,30,200,150 ...>
```

The following figure illustrates the preceding example. The first value pair for the `COORDS` attribute defines the triangle's lower-left corner. The `COORDS` value pairs then proceed clockwise, defining the top corner, followed by the lower-right corner.

### Polygonal Hot Spot



**Tip:** When defining a polygon, you can start with any corner, specifying the placement of additional corners by going around the polygon either clockwise or counter-clockwise.

#### Tips for Defining Hot Spots

- A viewer may resize a presentation manually by, for example, clicking and dragging a RealPlayer corner. In these cases, hot spots scale with clips.
- Values such as `COORDS=30,30,10,10` for a rectangular hot spot are ignored, and the hot spot will not function. Here, the hot spot's left side is defined as being farther to the right than its right side. As well, the top is defined to be below the bottom.
- A hot spot defined to extend beyond the source clip is cropped at the clip's edge. For example, if a rectangular hot spot uses `COORDS=50,50,300,300` but the source clip is 200 by 200 pixels, the hot spot's effective coordinates are 50,50,200,200.
- If multiple hot spots overlap on a clip, the link for the hot spot defined first in the file is used when the viewer clicks the overlapping area.
- Many programs, including shareware and freeware, can generate HTML image maps. You can use one of these programs to define the coordinates for a hot spot. Simply create an HTML image map over an image that is the same size as your clip, view the HTML source, and copy the image map coordinates into your `<AREA>` tag.

## Setting the Action

The <AREA> tag for a hot spot can define one of three actions that occur when the viewer clicks the hot spot. The action parameter should follow the COORDS parameter in the <AREA> tag:

- PLAYER** Play a different clip. The URL should be a quoted, fully-qualified streaming media URL.
- SEEK** Seek to a different part of the timeline. The time value uses the same format as the DURATION element, as described in “Setting a Duration” on page 242.
- URL** Open the HTML page in the viewer’s browser. The value should be a quoted, fully-qualified HTTP URL. In RealOne Player and later, this URL opens in a secondary browsing window rather than one of the main player panes.

The following are examples:

```
<AREA ... PLAYER="rtsp://helixserver.example.com/movie2.rm" ...>
<AREA ... SEEK=0:0:2:15:0 ...>
<AREA ... URL="http://www.example.com/page2.html" ...>
```

## Defining Alternate Text

The last parameter in the <AREA> tag must be an ALT attribute that uses short, descriptive text as its value. When the viewer moves the screen pointer over the hot spot, the alt text displays in the status line above the RealPlayer media playback pane, indicating what action clicking the hot spot will perform. In the following example, the text “Visit RealNetworks” is used for the ALT value:

```
<AREA ... URL="http://www.realnetworks.com" ALT="Visit RealNetworks">
```

## Map File Example

The following example defines an image map that is active for five minutes. The map creates two clickable map areas, each of which covers the entire, 360-pixel-by-240-pixel video. The first map area is active for the first half of the clip. Clicking it fast-forwards to the second half of the clip’s timeline. As the second half of the timeline plays, clicking the image map displays a Web page in the viewer’s browser.

```
DURATION=0:0:5:0:0
<MAP START=0:0:0:0:0 END=0:0:2:30:0 COORDS=0,0,360,240>
<AREA SHAPE=RECTANGLE COORDS=0,0,360,240 SEEK=0:0:2:30:0
ALT="Click to fast-forward to part 2.">
</MAP>
```

```
<MAP START=0:0:2:30:1 END=0:0:5:0:0 COORDS=0,0,360,240>
<AREA SHAPE=RECTANGLE COORDS=0,0,360,240 URL="http://www.example.com"
ALT="Visit our Web site.">
</MAP>
```

## Running the RMEvents Utility

After you write your event or image file, you use the **RMEvents** utility to merge the file with your clip. This creates a new clip that includes the events or maps. The utility is named `rmevents.exe` on Windows and `rmevents` on Linux. You can find it in the `RealMediaEditor` subdirectory of the RealProducer installation directory.

**Tip:** The utility needs access to the libraries in its directory, so you should run it from this directory, or add its directory to your `PATH` environment variable.

**For More Information:** You can also use the graphical RealMedia editor to merge event and image files with your clip. See “Merging Image Maps or Events” on page 227.

## Using RMEvents Option Flags

The following table describes the options that you use on the command line when running **RMEvents**.

**RMEvents Options**

Option	Value	Function
-?	(none)	Displays help. Do not use this with any other options.
-d	name	Dumps events or image map information into text files.
-e	file name	Provides the path and file name of the event file.
-i	file name	Gives the path and file name of the input clip.
-m	file name	Indicates the path and file name of the map file.
-o	file name	Specifies the path and file name of the output clip.

## Merging an Event or Map File with the Clip

When your event and map files are complete, you use **RMEvents** to merge them with your encoded RealAudio or RealVideo clip. Open a command-line

prompt and navigate to the directory that holds the **RMEvents** utility. Then give the following command, which uses four flags to indicate the input clip, output clip, events file, and map file. If you are not encoding a map file, for instance, leave out the `-m` command and value:

```
rmevents -i input.ext -o output.ext -e events.txt -m maps.txt
```

where:

- *input.ext* is the path and name of the input clip
- *output.ext* is the path and name of the output clip
- *events.txt* is the path and name of the events file
- *maps.txt* is the path and name of the map file

**Tip:** Always choose a new output name so that you can save your original clip without any encoded events or maps. You cannot delete image map or events information once you have encoded it into a clip. You can override the information with new information, however.

## Extracting Map and Events Information

Using the `-d` flag, you can extract map and event file information encoded into a clip, writing it to text files. This action does not remove the information from the clip, however. You specify the input clip with the `-i` option and a dump file base name along with the `-d` option:

```
rmevents -i movie.rm -d movie
```

In this example, event information is written to the file `movie_evt.txt`. Map information is written to the file `movie_imap.txt`.



## USING THE COMMAND-LINE APPLICATION

This chapter explains how to run the RealProducer command-line application, which can encode media as both clips and live broadcasts. The command-line application can perform the same encoding functions as the RealProducer graphical application, and provides additional features not found in the graphical application.

### Encoding From the Command Line

The command-line application is an executable file named `producer.exe` on Windows and `producer` on Linux. It provides the same encoding capabilities as the RealProducer graphical application, and allows you to perform batch encoding on any number of media files. You can run the application from the command line manually, or tie the application into any production or scripting system that can use your operating system's command line.

### Using Job Files or Command Options

There are two basic ways to use the command-line application. You can enter all of the encoding information on the command line when you run the application. Or, when you use RealProducer Plus, you can define the encoding options in a job file, as described in Appendix B, and process the job file through the command line. Both methods allow you to specify the same general encoding options, but each method provides its own advantages:

- When you use a job file, you can define multiple inputs and outputs that are encoded in parallel. Without a job file, you can define a single input and single output for each encoding session. A single output can have multiple destinations, however. For example, you can send an encoded output to a broadcast server as well as save it to a local file.
- If you do not use a job file, you can use batch encoding. This allows you to process multiple clips one after the other, all with the same encoding

settings. This is useful if you need to encode a lot of clips using the same settings.

## Running the Command-Line Application

The command-line application uses the command name `producer`. This executable file is located in the main RealProducer installation directory. On Windows, the RealProducer installer adds this directory to your Path environment variable, so you can run the application from any directory. On Linux, you can add this directory to your path through your login shell. The RealProducer installer can also create a symbolic link to the command-line application.

### File Locations and Temporary Directory

RealNetworks recommends that you run the command-line application from a directory other than the RealProducer installation directory. Your media files can be located anywhere on your network, but it is easiest to encode them from the directory in which you run the command-line application. For fastest operation, encode output on the same disk that holds input files, preferably the local RealProducer disk. Also, set the temporary directory to a directory on the same disk used for output.

**For More Information:** The section “Changing the File Location Preferences” on page 151 explains how to set the temporary directory through the graphical application. You can also define the temporary directory in the preferences file, which Appendix E describes.

### Command Line Syntax

To run the application, open a command line prompt and navigate to your content directory. Then enter the `producer` executable name along with your options, as shown in the following example:

```
producer -i movie.avi -o movie_streaming.rm ...additional options...
```

### Notes About the Command-Line Syntax

Note the following about the command syntax:

- Each option is preceded by a dash, as in `-i`. Options are from one to three characters long.



- Some options, such as `-i` and `-o` require values, as shown above. Other options do not take values.
- An option's value immediately follows the option. Separate the two with a space.
- If an option value uses multiple words separated by spaces, enclose the entire option string in double or single quotation marks. Do not include the option flag itself with in the marks.
- If you do not include an option on the command line, the option's default value applies to the encoding job.
- The order of options on the command line does not matter.
- The command-line application supports cross-platform file naming, as described in "File and Directory Paths" on page 312.

## Stopping the Command-Line Application

You can stop an encoding session and save the resulting clip by pressing **Ctrl+c**. With SureStream clips, however, some merging time is required before the final output is written. To cancel encoding and delete the output and temporary files, press **Ctrl+\** on Linux or **Ctrl+Break** on Windows (**Break** is on the upper-right row of the keyboard).

## Sending Signals to the Linux Command-Line Application

On Linux, the command-line application listens to and responds to signals that notify it of important events. The kill command can use signal names or numbers as arguments to send the application a signal. The kill command takes two arguments: the signal name or number and the process ID:

```
kill signal process_id
```

### Signals and Actions

The following table defines the signals to which the command-line application responds.

**Linux Signals and Actions**

Signal Name	Signal Number	Action
SIGINT	2	Stop
SIGTERM	15	Stop

(Table Page 1 of 2)

**Linux Signals and Actions (continued)**

Signal Name	Signal Number	Action
SIGQUIT	3	Cancel
SIGABRT	6	Cancel

(Table Page 2 of 2)

**Note:** No action results from sending a SIGHUP signal to the command-line application.

**Process IDs**

The kill command's second argument is the process ID. A single instance of RealProducer runs under several process IDs, but only one ID will accept a signal. To identify the correct ID, use the Process ID File (-pid) option (see page 286) to get the process ID. The following is an example:

```
producer -ac 0 -o out.rm -pid /tmp/producer.pid
```

**Stop and Cancel Signals**

To stop encoding but save the encoded output, use the kill command with a SIGINT signal as shown in the following example:

```
kill -SIGINT $(cat /tmp/producer.pid)
```

To cancel encoding and delete the output, use the kill command with a SIGQUIT signal as follows:

```
kill -SIGQUIT $(cat /tmp/producer.pid)
```

**Tip:** RealProducer includes a sample command-line utility, signalproducer, that sends signals to a running command-line application. This utility is available in source and binary formats in the samples/utilities/producer\_signal\_generator directory.

**Sending Signals to the Windows Command-Line Application**

On Windows, the RealProducer command-line application listens for window messages sent to its window handle. When the application starts, it registers a window handle based on the process ID (PID). You can obtain the PID from the Windows Task Manager. Or, you can record the PID using the Process ID File (-pid) option (see page 286), as shown in the following example:

```
producer -ac 0 -o out.rm -pid "c:\pid.txt"
```

With the PID, you can send a stop or cancel request to the application by using a utility available as source and in binary form (`signalproducer.exe`) in the following directory under the main RealProducer installation directory:

```
samples\utilities\producer_signal_generator
```

The `signalproducer.exe` utility uses the following syntax, in which the stop option saves the output and cancel option discards it:

```
signalproducer.exe {-p PID|-P PIDFILE} [-a stop|cancel] [-q]
```

The following example shows how to send a cancel signal to the command-line application using a PID file:

```
signalproducer.exe -P c:\pid.txt -a cancel
```

You can also pass the PID directly using a lowercase `-p` option, as shown in the following example:

```
signalproducer.exe -p 2096 -a cancel
```

## Monitoring the Return Value

You can use the command-line application's return value to detect if an error occurred if you run the application from a script. The application returns a value of 0 if no errors occurred during encoding. If errors occurred, the application returns a value of 1.

### Getting the Return Value on Linux

On Linux, you can access the return code by assigning the function call to a variable, then testing that variable's value. The return value is stored in a special shell variable ( `$?` ). The following sample script checks the contents of the  `?`  variable for an error. If the variable has a value of 1 or higher, the script prints an error string:

```
producer -i movie.mpeg
if [ $? -ge 1 ]; then echo "Encoding error occurred."
```

### Getting the Return Value on Windows

DOS stores the return value of a command-line program in an environment variable called  `ERRORLEVEL` . This following example checks the contents of  `ERRORLEVEL`  and prints an error string if  `ERRORLEVEL`  has a value of 1 or more:

```
producer -i movie.avi
IF ERRORLEVEL 1 echo Encoding error occurred.
```

## Command-Line Functional Areas

The following tables summarize the major functional areas and options for using the RealProducer command-line application.

### Job File Options

Option	Value	Default	Function	Reference
-j	job file	(none)	Indicates the job file to use.	page 259
-cj	new job file	input file name	Creates a new job file.	page 259
-duc	(none)	(none)	Disables codec updating.	page 261

### Input Options

Option	Value	Default	Function	Reference
-ac	integer string device name	(none)	Specifies the audio capture input device ID.	page 263
-ap	integer string device name	capture card default	Indicates the port of the audio capture input.	page 263
-cm	(none)	stereo capture	Forces mono audio capture. Linux only.	page 264
-cs	<i>WidthxHeight</i>	capture card default	Defines the input video dimensions.	page 266
-i	file name	(none)	Sets the input file name.	page 262
-vc	integer string device name	(none)	Specifies the video capture input device ID.	page 264
-vf	NTSC NTSC-JP PAL PAL-M PAL-N PAL-NC SECAM integer	NTSC	Specifies the video format of the video capture device. Linux only.	page 265
-vp	integer string device name	capture card default	Indicates the port of the video capture input.	page 265

### Clip Information Options

Option	Value	Default	Function	Reference
-a	string	(none)	Encodes an author name.	page 267
-c	string	(none)	Sets the encoded copyright.	page 267
-de	string	(none)	Adds a clip description.	page 267

(Table Page 1 of 2)

**Clip Information Options (continued)**

Option	Value	Default	Function	Reference
-k	string	(none)	Adds keywords.	page 267
-r	0 to 6	0	Rates the content of the output.	page 268
-t	string	(none)	Adds a title.	page 267

(Table Page 2 of 2)

**Prefilter Options**

Option	Value	Default	Function	Reference
-ag	-48 to 48	0	Adjusts the audio gain.	page 268
-bl	(none)	(none)	Increases video contrast.	page 269
-cr	<i>Left, Top, Width, Height</i>	(none)	Sets cropping parameters in pixels.	page 270
-daw	(none)	(none)	Disables audio tests.	page 269
-di	auto both d i	(none)	Applies de-interlace or inverse-telecine filters.	page 269
-nf	low high	(none)	Removes video noise.	page 271

**Output and Destination Options**

Option	Value	Function	Reference
-drs	Megabytes	Starts a new output file by size.	page 272
-drt	dd:hh:mm:ss	Starts a new output file by encoding time.	page 272
-lm	0 1 2	Sets the broadcast latency mode.	page 279
-mtu	bytes	Sets a broadcast's maximum packet size.	page 279
-o	file name	Specifies the output file name and path.	page 271
-sd	broadcast string	Creates any type of broadcast using a server destination template or file.	page 277
-si	broadcast string	Starts encoding a broadcast stream in pull mode.	page 275
-sp	broadcast string	Creates an account-based, password-only, or multicast push broadcast.	page 272

**Encoding Options**

Option	Value	Default	Function	Reference
-ad	audience name   file name	system defaults	Specifies the encoding audiences.	page 280
-am	voice music	music	Sets the audio mode.	page 281
-arq	fast high	high	Sets the audio resampling quality.	page 282
-da	(none)	(none)	Disables audio from the input.	page 282
-dt	(none)	(none)	Disables two-pass encoding	page 281
-dv	(none)	(none)	Disables video from the input.	page 283
-eco	low medium high	high	Sets the video or lossless audio encoding complexity.	page 284
-rq	fast high	high	Determines the resize quality.	page 284
-rs	<i>WidthxHeight</i>	0x0	Sets the resizing dimensions.	page 283
-vco	rv8 rv9 rv10	rv10	Chooses the RealVideo codec.	page 284
-vm	normal sharp smooth slideshow	normal	Affects the video's visual quality, primarily at lower bandwidths.	page 282

**Logging Options**

Option	Value	Function	Reference
-dlf	(none)	Disable logging to the standard log file.	page 285
-dls	(none)	Disable logging to the screen.	page 286
-lc	e w i d	Determine the types of messages logged.	page 285
-pid	file name	Create a process ID file.	page 286
-q	(none)	Display no information on the screen.	page 286

**Help Options**

Option	Function	Reference
-h	Displays a list of available commands.	page 286
-m	Provides full help for command line operation.	page 287
-pa	Prints audience definitions for use with the -ad option.	page 287
-pd	Prints device information for use with live capture.	page 287
-ps	Prints server definitions for use with the -sd option.	page 287
-v	Displays the RealProducer version number.	page 287

## Job File Options

Job files, which use the file extension `.rpjf`, are XML-formatted files that specify the inputs, outputs, and encoding operations to perform. Appendix B explains the job file syntax. This section explains the options for using and creating job files with the command-line application of RealProducer Plus.

**Note:** Job file processing is not available with the command-line application of RealProducer Basic.

### Job File Name (-j)

Use the `-j` option to specify the path and file name of the job file to use. You can use either a relative path from the current directory, or an absolute path. For example:

```
-j MyJob.rpjf
```

When you encode with a job file, the job file defines the input and output, as well as the encoding options. You therefore cannot use most other options on the command line. The following options are allowable, however, along with the `-j` option:

- Create Job File (`-cj`) option (see page 259)
- Disable Codec Updates (`-duc`) option (see page 261)
- Disable Audio Watchdogs (`-daw`) option (see page 269)
- Logging Category (`-lc`) option (see page 285)
- Process ID File (`-pid`) option (see page 286)
- Video Codec Override (`-vco`) option (see page 284)
- Encoding Complexity Override (`-eco`) option (see page 284)

**For More Information:** See “Job File Examples” on page 289 for samples of command-line syntax for encoding clips or broadcasts with job files. “Job File Syntax Update” on page 289 shows how to update earlier job files to the RealProducer 11 format.

### Create Job File (-cj)

If you have RealProducer Plus, you can use the `-cj` option to generate a job file from the command line options you provide. This allows you to capture

command-line settings into a job file without encoding any content. You can later run the job file you created and perform the encoding by using the `-j` option. For instance, you may want to create a basic job file using the `-cj` option, then modify it manually as described in Appendix B before running it on the command line.

The value for the `-cj` option is a file name and path, which can be absolute or relative to your current directory. For example:

```
-cj NewJob.rpjf
-cj c:\Jobs\NewJob.rpjf
-cj /usr/realproducer/jobs/NewJob.rpjf
```

**Warning!** Job file properties are not validated until the job runs. You can create an invalid job file by specifying a non-existent audience, for example. In this case, you do not receive an error until you encode a job using the file.

### Input and Output Options

The simplest way to create a job file is to specify an input file, a job file name, and the other encoding options on the command line. The following example creates the job file `movie.rpjf`. This file specifies `movie.avi` as the job input. It automatically sets the job output to `movie.ra`, `movie.rv`, `movie.rm`, or `movie.rmvb` depending on the audiences chosen as part of the encoding options:

```
-i movie.avi -cj movie.rpjf ...encoding options...
```

To set the output clip to a different name, you include the `-o` option on the command-line:

```
-i movie.avi -o streaming_movie.rm -cj movie.rpjf ...encoding options...
```

**For More Information:** For more on defining inputs, refer to “Input File or Directory (-i)” on page 262. The section “Output File or Directory (-o)” on page 271 describes outputs.

### Batch Job File Creation

You can create job files in batch mode by specifying an existing directory as the value of the `-cj` option. For example, you can create a job file for every AVI clip in a directory. In the following example, an input named `movie.avi` results in a job file named `movie.rpjf` in the `jobfiles` directory:

```
-i c:\media\videos\*.avi -cj c:\media\jobfiles
```



You can also specify just the input directory, as shown in the following example. RealProducer creates a job file for every media file in an acceptable input format, such as AVI, WAVE, or MPEG, that it finds in the input directory. It ignores files in other formats, such as .rm and .txt files:

```
-i /usr/producer/media/videos -cj /usr/producer/media/jobfiles
```

## Disable Codec Updates (-duc)

When you have job or audience files created with the older Helix Producer, RealProducer 11 automatically updates the audience settings to use new audio and video codecs. This is the recommended action. Job or audience files that formerly specified the RealVideo G2 with SVT codec are updated to use RealVideo 8. The following table lists the RealAudio codecs substituted for older audio codecs.

**Automatic RealAudio Codec Updating**

Previous RealAudio Codec	New RealAudio Codec
66 Kbps Stereo Music - RA8	64 Kbps Stereo Music
94 Kbps Stereo Music - RA8	96 Kbps Stereo Music
105 Kbps Stereo Music - RA8	96 Kbps Stereo Music
132 Kbps Stereo Music - RA8	128 Kbps Stereo Music - RealAudio 10
146 Kbps Stereo Music - RA8	128 Kbps Stereo Music - RealAudio 10
176 Kbps Stereo Music - RA8	160 Kbps Stereo Music - RealAudio 10
264 Kbps Stereo Music - RA8	256 Kbps Stereo Music - RealAudio 10
352 Kbps Stereo Music - RA8	320 Kbps Stereo Music - RealAudio 10
132 Kbps Surround Audio	128 Kbps Stereo Surround - RealAudio 10
146 Kbps Surround Audio	128 Kbps Stereo Surround - RealAudio 10
176 Kbps Surround Audio	160 Kbps Stereo Surround - RealAudio 10
264 Kbps Surround Audio	256 Kbps Stereo Surround - RealAudio 10
352 Kbps Surround Audio	320 Kbps Stereo Surround - RealAudio 10

If you want your audience or job files to retain the older codec information, however, you can include the -duc option on the command line:

```
-duc
```

**Warning!** RealProducer 11 no longer includes the RealVideo G2 codec, or RealAudio codecs based on ATRAC3 technology. If your existing audience or job files specify these codecs and you

include the `-duc` option, RealProducer 11 will not be able to encode the job.

**Tip:** You can modify how RealProducer updates older codecs by modifying the settings of the `codecmapping.txt` file located in the resources directory under the RealProducer installation directory. You will need to know the codec names and flavors, which are listed in the codec tables in the section “RealAudio Codecs” on page 37.

## Input Options

This section describes the input options that allow you to specify a file or live capture as the input to be encoded. Note that you can specify just one input through the command line. In a job file, however, you can specify multiple inputs that are run in parallel, as described in “Audio and Video Inputs” on page 309.

### Input File or Directory (-i)

Use the `-i` option to indicate a digitized file on the network or local drive to be encoded. For the file path, you can specify either a relative path from the current directory, or an absolute path. The input file name is ignored if the Audio Capture Device ID (`-ac`) option (see page 263) or Video Capture Device ID (`-vc`) option (see page 264) is specified.

**For More Information:** For a list of supported input file types, refer to “Audio and Video Input Formats” on page 27. For information about specifying output file locations and names, see “Output File or Directory (-o)” on page 271.

#### Single File Input Examples

```
-i movie1.mpg
-i ../media/movie1.mpg
-i c:\files\media\movie1.avi
-i /home/encoder/media/movie1.mpg
```

### Batch File Encoding

With RealProducer Plus, you can specify multiple files that are encoded serially. You can specify the directory that contains the source files, or use one

or more asterisks (\*) as wildcards in file names. You cannot use a wildcard in a directory path, however. If you do not specify output paths and names, the encoded clips are written to the input directory, using each input's base file name and the .ra, .rv, .rm, or .rmvb extension, depending on the encoding type.

#### Batch File Input Examples

```
-i *.mpg
-i ../media/
-i c:\files\media\
-i c:\files\media\trailer*.avi
-i /home/encoder/media/*.mpg
-i /home/encoder/media/
```

### Audio Capture Device ID (-ac)

The -ac option specifies the audio device ID for the input audio device. Using this option overrides the -i option for a file input. You can use one of the following values:

- Integer of value 0 or higher identifying a specific device number, such as:  
-ac 0
- String matching an existing device name:  
-ac "Sound Blaster Live!"
- String with a wildcard (\*) matching an existing device name, such as:  
-ac "Sound Blaster \*"
- UNIX device name or symbolic link to a device name, such as:  
-ac /dev/audio

**For More Information:** Use the Print Device Information (-pd) option (see page 287) to list values for your system.

### Audio Capture Device Port (-ap)

Use -ap to specify the port for the audio device used for audio capture. You must specify the audio device ID as well. Using the -ap option overrides the -i option for a file input. If you omit the audio port, the current mixer settings are used. You can use one of the following values:

- Integer of value 0 or higher identifying a specific port number, such as:  
-ap 0

- String matching an existing port name:  
-ap "Line In"
- String with a wildcard (\*) matching an existing port name, such as:  
-ap "Mic\*"

**Note:** This option is not available on Windows or on Linux distributions that use the free OSS audio drivers. Instead, set the audio capture port using the Windows Recording Control Panel. On Linux, use mixer software specific to your Linux distribution.

**For More Information:** Use the Print Device Information (-pd) option (see page 287) to list values for your system.

### Capture Mono Audio (-cm)

The Linux-only -cm option forces the audio card to record a single, mono audio channel. Omitting the option enables stereo capture. The option does not require any values:

-cm

**Tip:** When capturing mono-only, you'll get best results when using one of the mono codecs listed in "Voice Codecs" on page 39 or "Mono Music Codecs" on page 40.

### Video Capture Device ID (-vc)

Use -vc to set the device ID for the input video device. Using this option overrides the -i option for a file input. You can use one of the following values:

- Integer of value 0 or higher identifying a specific device number:  
-vc 1
- String matching an existing device name:  
-vc "Osprey Capture Card 1"
- String with a wildcard (\*) matching an existing device name, such as:  
-vc "Osprey\*"
- UNIX device name or symbolic link to a device name, such as:  
-vc /dev/video3

**For More Information:** Use the Print Device Information (-pd) option (see page 287) to list values for your system.

## Video Device Port (-vp)

The -vp option sets the port for the video capture device. If you use -vp, you must specify the video device ID as well. Using the -vp option overrides the -i option for a file input. If you omit the port, the current mixer settings are used. You can use one of the following values:

- Integer of value 0 or higher identifying a port number, such as:  
-vp 1
- String matching an existing port name:  
-vp "S-Video"
- String with a wildcard (\*) matching an existing port name, such as:  
-vp "Composite\*"

**Note:** This option is not available with Video for Windows (VFW) devices. Instead, use the graphical application to set the port through the capture card dialog. See "Using Live Audio or Video as the Input" on page 90 for instructions.

**For More Information:** Use the Print Device Information (-pd) option (see page 287) to list values for your system.

## Video Format (-vf)

The -vf option defines the video format on Linux only. It specifies the video format of the video capture device. On Windows, use the driver dialog to set the video format. This option is ignored if you do not also use the Video Capture Device ID (-vc) option. The default is NTSC. The following are the possible values:

- NTSC
- NTSC-JP
- PAL
- PAL-M
- PAL-N
- PAL-NC

- SECAM
- integer (specifies a format understood by your video driver)

Here are some examples:

```
-vf SECAM  
-vf 8
```

## Capture Frame Size (-cs)

The `-cs` option sets the size of the video capture when you use the Video Capture Device ID (`-vc`) option (see page 264). It is ignored for audio-only and file-to-file encoding. If you do not specify this size, the dimensions set in the video capture card are used. The value specifies pixel dimensions in the form *WidthxHeight*, as shown in the following example:

```
-cs 320x240
```

**Note:** The RealVideo codec rounds each dimension down to the nearest 4 pixels. If you specify a height of 183 pixels, for example, the output clip has a height of 180 pixels.

**For More Information:** You can resize any video output, whether from a capture or with file-to-file encoding. See “Resize Video (-rs)” on page 283.

## Capture Duration (-d)

The `-d` option sets the duration that the audio or video capture lasts. This is not used when encoding from a file. The duration timer begins when you start the encoding. If you omit this option, encoding lasts until you stop it manually. The section “Duration Syntax” on page 298 explains how to specify time values. Here are some examples:

```
-d 90           Encode for 90 seconds.  
-d 10:30       Encode for ten hours and 30 seconds.  
-d 1:00:00     Encode for one hour.
```

## Clip Information Options

The following clip information options are available through the command-line application. Adding clip information is highly recommended. For

background on the information values, refer to “Adding Clip Information” on page 94.

### **Title (-t)**

The -t option defines a title for the clip or broadcast. The value can be any string up to 255 characters. For example:

```
-t "2004 Music Awards"
```

### **Author (-a)**

Use the -a option to define the author of the clip or broadcast. The value can be any string up to 255 characters. For example:

```
-a "Brilliant Media Limited"
```

### **Copyright (-c)**

The -c option defines the copyright owner and date for the recorded clip. The value can be any string up to 255 characters. For example:

```
-c "2004 Brilliant Media Limited"
```

### **Keywords (-k)**

Using the -k option, you can define keywords that help search engines index your clip. The value can be any string up to 255 characters. For example:

```
-k "awards 2004 music"
```

### **Description (-de)**

Using the -de option, you can set a description of the clip that is longer and more informative than the title. The value can be any string up to 64 Kilobytes in size. For example:

```
-de "An encore presentation of the 2004 music awards."
```

## Content Rating (-r)

The -r option defines the age range for which the content is applicable. Use one of the following integer values (0 is the default):

- 0 No rating
- 1 All ages
- 2 Older children
- 3 Younger teens
- 4 Older teens
- 5 Adult supervision recommended
- 6 Adults only

For example:

```
-r 1
```

## Prefilter Options

The following prefilter options are available through the command-line application. A prefilter modifies the audio or video input before it is encoded. Because all prefiltering is optional, no prefilters are applied by default.

**Note:** You cannot apply the audio compensation prefilter, which adjusts audio that is out of synchronization with video, through the command line. You can specify this prefilter in a job file, however. See “Audio Delay Compensation Prefilter” on page 327.

## Audio Gain Filter (-ag)

Available with RealProducer Plus, the -ag option applies the audio gain filter to amplify or attenuate the input audio. This can boost the audio signal or decrease it to prevent it from clipping. The value is a number from -12.0 (attenuation) to 12.0 (amplification). For example:

```
-ag -5.0
```

**For More Information:** For background on audio gain, refer to “Monitoring Audio” on page 142.



## Disable Audio Watchdogs (-daw)

The `-daw` option disables the audio watchdogs, which are a set of tests that RealProducer runs on the audio input to detect audio problems. You can use them when encoding from a file or a live capture, but they are most useful when capturing live media because you may be able to correct the problem through the capture equipment. Any audio problems discovered are logged periodically (typically every five seconds) while the problem persists. After logging 20 messages for the same problem, RealProducer suspends logging of that message for 16 hours. The following table describes the watchdog tests.

Audio Watchdog Tests	
Test	Test Condition
Out-of-Phase	Indicates that the audio signal has been out of phase for more than 10 seconds.
Clipping	Warns that the audio is being clipped heavily, moderately, or lightly.
Silence	Detects if the audio input signal has been below -60dB for longer than 10 seconds.
Channel Imbalance	For stereo input, indicates that one channel has been 6dB lower than the other channel for more than 10 seconds.

The option does not require a value, as shown here:

```
-daw
```

## Black Level Filter (-bl)

This filter increases contrast in videos by making dark colors pure black and off-white colors pure white. The option does not require a value:

```
-bl
```

**For More Information:** The section “Black-Level Correction Filter” on page 80 describes this filter.

## Inverse-Telecine and De-interlace Filters (-di)

The `-di` option specifies the use of the inverse-telecine or de-interlace filter on the video input. The de-interlace filter is generally needed only on videos

larger than 320 by 240. The inverse-telecine filter is for videos that were transferred from film. The following are the values that you can specify.

- auto Autodetect and apply both filters only if needed. This is recommended.
- d Apply the de-interlace filter only.
- i Apply the inverse-telecine filter only.
- both Apply both the de-interlace and inverse-telecine filters.

Here is an example:

```
-di auto
```

**For More Information:** The sections “Inverse-Telecine Filter” on page 78 and “De-interlace Filter” on page 79 explain how these filters operate.

## Crop Video Input (-cr)

Available with RealProducer Plus, the -cr option applies the cropping prefilter, which crops out areas from the sides of the input video. The option uses four pixel values, separated by commas and no spaces. In order, these values indicate the values for Left, Top, Width, and Height.

- Left Represents the number of pixels from the left edge of the video to start the cropping. You can specify up to 32 pixels less than the total width.
- Top Sets the number of pixels from the top edge of the video to start the cropping. You can specify up to 32 pixels less than the total height.
- Width Defines the total width of the cropped video, measured from the point set by the Left property. If the width value is not a multiple of 4, the next lower multiple is used. For example, a value of 162 results in a video 160 pixels wide.
- Height Indicates the total height of the video, measured from the point set by the Top property. If the value is not a multiple of 4, the next lower multiple is used. For example, a value of 127 results in a video 124 pixels high.

In the following example, the cropping starts 10 pixels to the right of the video's left edge and 20 pixels down from the top edge. The resulting video is then 320 pixels wide by 240 pixels high.

```
-cr 10,20,320,240
```

**Tip:** As described in “Resize Video (-rs)” on page 283, you can also resize a video. Because cropping occurs first, the final two

numbers of the `-cr` value indicate the input size for the resizing operation.

## Video Noise Filter (`-nf`)

As described in “Noise Filters” on page 77, the noise filters can remove small distortions in the video image. Use a value of `low` for small distortions, a value of `high` if the noise is more pronounced. You should not apply these filters to video input that is free of distortion. Here is an example:

```
-nf high
```

## Output and Destination Options

This section describes the output and destination options. Using the RealProducer Plus command-line application, you can encode a single output, but can send that output to any number of destinations, whether files or servers. With RealProducer Basic you can define one file destination and one server destination for each encoding session.

**For More Information:** If you create a job file, you can specify multiple outputs, each of which may have different encoding options and destinations. See “File and Server Outputs” on page 329.

## Output File or Directory (`-o`)

The `-o` option sets the output clip’s file name and path to an existing directory. The path can be absolute or relative to the current directory. You must supply a file name for captured input. With file-to-file encoding, you can omit the `-o` option to encode the clip using the input file’s base file name and the appropriate extension, either `.ra`, `.rv`, or `.rm` for constant bit rate clips, or `.rmvb` for variable bit rate clips. In this case, the output clip is saved to the directory that holds the input file. The following examples specify output paths and file names:

```
-o C:\Movies\movie1.rm
-o /usr/producer/output/movie2.rmvb
```

### Batch Output Encoding

As described in “Batch File Encoding” on page 262, you can encode multiple input files using wildcards. In this case, you do not need to specify the outputs

to save the encoded clips in the directory that holds the input files. The outputs will use the input files' base file names along with the .ra, .rv, .rm, or .rmvb extension. You can use the -o option to specify an output directory, however, if you want to save the clips in a different directory:

```
-o C:\Movies  
-o /usr/producer/output/
```

### Archive Clips

If you specify the name of clip that exists already in the output directory, RealProducer does not overwrite the existing clip. Instead, it archives the existing clip by appending `_archNNN` to the base file name. Hence, `movie.rm` becomes `movie_arch001.rm` before the new `movie.rm` clip is saved. If you encode the output again, the existing `movie.rm` becomes `movie_arch002.rm`. Higher numbers therefore represent newer archives.

### Destination File Roll Size (-drs)

Use the -drs option to set an file size limit in Megabytes that causes RealProducer to create a new output file. The section “File Rolling” on page 332 explains how file rolling works. The following example sets a roll size of 20 Megabytes:

```
-drs 20
```

### Destination File Roll Time (-drt)

The -drt option sets an encoding duration after which RealProducer creates a new output file. The section “File Rolling” on page 332 explains how file rolling works. See “Duration Syntax” on page 298 for information about timing values you can use. The following example creates a new file archive after RealProducer has encoded the output for 15 minutes:

```
-drt 15:00
```

### Push Server Destination (-sp)

The -sp option defines a push broadcast with Helix Server version 9 or later as the destination. You can perform an account-based push, password-only push, or multicast (RealProducer Plus only). Before running a push broadcast, review the broadcast issues described in Chapter 10 and be sure that you

understand the broadcast features and server set-up requirements for your chosen type of broadcast, as described in one of the following sections:

- “Running an Account-Based Broadcast” on page 189
- “Setting Up a Password-Only Broadcast” on page 194
- “Multicasting a Live Stream” on page 200

### Push Server Syntax

This broadcasting method uses the following syntax:

```
-sp username:password@address:port/path/stream
```

-or-

```
-sp :password@address:port/path/stream
```

As the following table explains, you may not need to define every component in the broadcast stream, depending on the broadcast type and the server settings.

#### Push Destination Components

Component	Value
<i>username</i>	User name defined in the Helix Server authentication database. Used only with account-based broadcasts. If no server authentication is required for account-based push, omit both the user name and the password. Note that a colon must precede and follow the user name.
<i>password</i>	Password defined in the Helix Server authentication database (account-based) or the receiver definition (password-only, multicast). If you supply only the password preceded by a colon, RealProducer assumes a password-only broadcast or multicast. The Helix Server receiver must be set to use the Basic authentication method.
<i>address</i>	Valid IPv4 address, IPv6 address, or domain name for the Helix Server destination. For multicasts, the value must be a class-D multicast address.
<i>port</i>	Server port that receives the stream. For account-based broadcasts, the default is 80, which is typically the server’s HTTP port. Use a different value if the server uses a different HTTP port. For password-only and multicasts, the receiver typically accepts connections on ports 30001 through 30020. The default value for these broadcast types is 30001.

(Table Page 1 of 2)

**Push Destination Components**

Component	Value
<i>path</i>	Optional, virtual path used to define server-side archiving or stream splitting. For background, refer to “Virtual Paths” on page 176.
<i>stream</i>	The name of the broadcast stream. Include the .ra, .rv, .rm, or .rmvb file extension, as in live.rm. The name can <b>not</b> contain the following characters: @ : /

(Table Page 2 of 2)

**Default Broadcast Values**

The `-sp` broadcasting option does not allow you to set advanced broadcast parameters such as the transport type and error correction features, which the section “Changing Advanced Push Broadcast Parameters” on page 205 describes. Nor can you set the listen address if you are broadcasting through a firewall performing network address translation (NAT). Instead, this broadcasting option uses the default values for these features.

**For More Information:** If you need to change default values for advanced broadcast features, use the Server Template or Server File (`-sd`) option (see page 277), or define the broadcasting options in a job file.

**Push Broadcast Examples**

The following examples show how to perform one of the three possible broadcast types using the `-sp` option.

**Account-Based Broadcast Example**

The presence of a user name and password causes RealProducer to start an account-based broadcast. In the following example, the port value is included because the server does not use port 80 for HTTP requests. No virtual path is given, and the stream name is `news.rm`.

```
-sp remote_encoder:as45er897@helixserver.example.com:8080/news.rm
```

If authentication is not required on the server, you can omit the user name, password, and `@` sign:

```
-sp helixserver.example.com:8080/news.rm
```

**Password-Only Broadcast Example**

The presence of just a password preceded by a colon, along with a non-multicast IP address or DNS name, starts a password-only broadcast. In the

following example, the port value is not given, so RealProducer delivers the stream to the default port 30001. A virtual path used by the server is provided, along with the stream name live.rm.

```
-sp :TY45poi@helixserver.example.com/sports/live.rm
```

#### Multicast Example

The presence of a password but no user name, along with a multicast IP address, starts a password-only multicast. In the following example, the port value of 30011 is supplied. No virtual path is used with the stream name.

```
-sp :569ad42k@224.0.0.1:30011/playoffs.rm
```

## Pull Server Destination (-si)

The `-si` option defines a pull broadcast accessible by Helix Server version 9 or later. Before running a pull broadcast, review the broadcast issues described in Chapter 10 and be sure that you understand the broadcast features and server set-up requirements described in “Running a Pull Broadcast” on page 210.

### Pull Server Syntax

This broadcasting method uses the following syntax:

```
-si password@listenAddress:listenPort/path/stream
```

As the following table explains, you may not need to define every component in the broadcast stream, depending on the server settings.

**Pull Destination Components**

Component	Value
<i>password</i>	Password used by RealProducer to authenticate server pull requests. The Helix Server receiver must supply this password. If you omit this, any pull-enabled server can connect to the stream.
<i>listenAddress</i>	Valid version 4 or version 6 IP address to which RealProducer binds. The default of 0 uses the default IP address on the default network interface card. See “IP Address Values” on page 276 for information about displaying the IP addresses.
<i>listenPort</i>	Port that RealProducer uses to listen for pull requests. The default is 3031,

(Table Page 1 of 2)

### Pull Destination Components

Component	Value
<i>path</i>	Optional, virtual path used to define server-side archiving or stream splitting. For background, refer to “Virtual Paths” on page 176.
<i>stream</i>	The name of the broadcast stream. Include the .ra, .rv, .rm, or .rmvb file extension, as in live.rm. The name can <b>not</b> contain the following characters: @ : /

(Table Page 2 of 2)

### Default Broadcast Values

With pull broadcasting, the server that pulls the stream defines most of the advanced stream features, such as error correction. RealProducer defines a few advanced parameters, however, which the section “Defining a Pull Broadcast Server Destination” on page 213 describes. When you use the `-si` option, the command-line application uses the default settings.

**For More Information:** If you need to change default values for advanced broadcast features, use the Server Template or Server File (`-sd`) option (see page 277), or define the broadcasting options in a job file.

### IP Address Values

RealProducer can reside on machines that use either version 4 or version 6 IP addresses. To find the listen address of the RealProducer machine on which the command-line application is running, do the following:

- On the Linux command line, type the following to display the IP address on the screen:  

```
ifconfig
```
- On Windows NT/2000/XP, open a command prompt and type the following to display the IP address on the screen:  

```
ipconfig
```
- On Windows ME/98SE, open a command prompt and type the following to open a dialog that allows you to select different network cards and view their IP addresses:  

```
winipcfg
```



## Pull Broadcast Examples

The following example shows how to start a pull broadcast using the `-si` option and specifying all possible values, including a virtual path name:

```
-si dkgy435ty@192.168.224.221:3031/rock/radio.rm
```

To use the RealProducer default IP address and listen port, you would use a value such as the following. This example does not include a virtual path with the stream name:

```
-si dkgy435ty@0/radio.rm
```

## Server Template or Server File (`-sd`)

Available with RealProducer Plus, the `-sd` option allows you to broadcast in pull or push mode using a predefined server destination. When you use this option, a server destination template or file sets the necessary broadcast parameters, such as the server's IP address, transport method, and advanced parameters like error correction. This is the most flexible means of broadcasting, but requires the use of a separate, server destination template or file.

**For More Information:** Chapter 11 covers the different broadcasting methods and explains how to create a server destination using the graphical application. Appendix D explains the server file syntax.

### Server Destination Syntax

This broadcasting method uses the following syntax:

```
-sd username:password@definition,path/stream
```

As the following table explains, you may not need to define every component in the `-sd` option's value, depending on the broadcast type.

**Server Definition Broadcast Components**

Component	Value
<i>username</i>	User name required by the broadcasting method. If no user name is required, as with password-only broadcasting, omit this value.
<i>password</i>	Password required by the broadcasting method. If no password is required, omit this value.

(Table Page 1 of 2)

### Server Definition Broadcast Components

Component	Value
<i>definition</i>	Name of a server definition stored in the default server destination directory. Or, the path and file name of a server definition file stored anywhere on your network. See “Locating Server Definitions” on page 278
<i>path</i>	Optional, virtual path used to define server-side archiving or stream splitting. For background, refer to “Virtual Paths” on page 176.
<i>stream</i>	The name of the broadcast stream. Include the .ra, .rv, .rm, or .rmvb file extension, as in live.rm. The name can <b>not</b> contain the following characters: @ : /

(Table Page 2 of 2)

### Locating Server Definitions

As explained in Appendix D, a server destination file is an XML-formatted file that uses the extension .rpsd. To use a destination file, provide the full file name and extension, along with a relative or absolute path as the *definition* component. Relative paths are relative to the directory from which you run the command-line application.

You can also specify a server template, which is a server destination file stored in the servers directory under the main RealProducer installation directory. To use a template, you provide the template name, which is the value of the destination's name property. You can abbreviate the template name down to a unique set of letters.

**Tip:** Use the Print Servers (-ps) option (see page 287) to display a list of available server templates.

**For More Information:** You can change the location of the server templates by editing the preferences file as described in Appendix E.

### Server Definition Examples

The following example specifies the absolute path to a server destination file that sets up an account-based broadcast. Both a user name and password are supplied, as required by the account-based, push broadcast method:

```
-sd remote_encoder:as45er897@/usr/encoder/pushbroadcast.rpsd,football.rm
```

The next example provides the relative path to a server destination file that defines a password-only push broadcast. Accordingly, the -sd option value

supplies just a password. A virtual path of `hourly/` is included with the stream name:

```
-sd yop563sdf@../definitions/SydneyReceiver.rpsd,hourly/news.rm
```

The following example indicates a server destination template named `Rock Radio Pull Broadcast` stored in the default template directory. When you specify a template, you can abbreviate the name down to a unique set of characters, such as `Rock` in the following example:

```
-sd 567dlopf212@Rock,livefeed.rm
```

## Latency Mode (-lm)

The `-lm` option affects the latency mode of a live broadcast. Omitting it, or using a value of `0`, produces a broadcast that is resilient against packet loss, but introduces the most latency. You can use a value of `1` to reduce latency, or `2` to broadcast with the smallest possible latency. These values make packet loss more noticeable to the viewer, however. For example:

```
-lm 1
```

**Warning!** Use a low latency setting only when delivering a live stream to Helix Server version 11 or later. Earlier versions of Helix Server will not handle the stream properly.

**For More Information:** For background on broadcast latency, refer to “End-to-End Broadcast Latency” on page 180.

## Maximum Packet Size (-mtu)

The `-mtu` option allows you to set the maximum packet size in bytes for live broadcast streams. This helps you optimize the broadcast if you are familiar with your network’s maximum transfer unit (MTU). For example:

```
-mtu 1275
```

**For More Information:** The section “Network Latency” on page 185 provides more information about setting a maximum packet size.

## Encoding Options

This section lists the general encoding options that affect the output, whether a clip or a broadcast stream. Use these options to select the video codec, for example, or specify the encoding audiences.

### Audience Definitions or Audience Files (-ad)

The -ad option defines the audiences for which the output is encoded. You can use the Print Audiences (-pa) option (see page 287) to display the available audience definitions. You can abbreviate an audience name to a unique set of characters. For example, you can specify the 28k Dial-up audience by using 28k. When you use just the audience name, RealProducer looks for the audience file in the location specified by the RealProducer preferences.

If an audience file does not reside in the default location, you can provide the location of the audience file, using a full or relative path along with the file name, including the extension (.rpad). Using either the audience name or file name, you can specify multiple, constant bit rate (CBR) audiences using a quoted, comma-separated list. With variable bit rate (VBR) video or RealAudio lossless encoding, you can specify only one audience. Here are examples:

```
-ad 150k  
-ad "28k,56k"  
-ad "28k Dial-up,56k Dial-up,256k DSL/Cable Modem"  
-ad "C:\settings\ModemGeneralAudience.rpad"  
-ad "/files/28k.rpad,/files/56k.rpad"
```

### Tips for Using Audience Definitions

Note the following about selecting audiences:

- Using RealProducer Plus, you can add any number of CBR audiences to a SureStream clip. With RealProducer Basic, you are limited to three audiences.
- If you specify no audiences with the -ad option and you do not use a job file that defines audiences, RealProducer encodes the output for the default audience, which is described in the section “Default Audience and Options” on page 101.
- Chapter 7 describes the encoding settings of the predefined audiences.

- If you create your own audience definitions, you set the audience name through the name property, as described in “Audience Properties” on page 345.
- RealProducer 11 automatically updates older audience files to use the latest codecs. You can disable this, however, with the Disable Codec Updates (-duc) option (see page 261).
- The section “Adjusting RealProducer Preferences” on page 151 explains how to find the default location of audience files.

### Disable Two-Pass Encoding (-dt)

By default, RealProducer reads an input file in two passes. The first pass analyzes the data, the second pass encodes it. The -dt option disables two-pass encoding so that all actions occur in a single pass. This speeds encoding time, but lowers the encoded quality. Use the option without any values:

```
-dt
```

#### Automatic Disabling of Two-Pass Encoding

Two-pass encoding is automatically disabled when you specify the following options for live capture:

- Audio Capture Device ID (-ac)
- Video Capture Device ID (-vc)

It is also disabled if you send output to a server using any of the following options:

- Push Server Destination (-sp)
- Pull Server Destination (-si)
- Server Template or Server File (-sd)

### Audio Mode (-am)

Use the -am option to describe the basic audio content of the input, either voice or music. This determines whether a voice or audio codec is used to encode the audio. Values are voice or music. Because the default is music, you need to include this option only if encoding voice-only audio:

```
-am voice
```

**For More Information:** The actual codecs used are defined in the audience template. Each codec expects a certain type of input, such as mono, stereo, or discrete multichannel. For information about how an audience defines codecs, refer to “Audio Stream Context” on page 348.

## Disable Audio (-da)

The -da option strips the audio from the input source. Typically, you use this when encoding file-to-file or capturing video input for which you do not want to encode audio. The option does not require a value. For example:

```
-da
```

**Tip:** Do not use the -da option when capturing audio with the Audio Capture Device ID (-ac) option (see page 263). Instead, omit the -ac option.

## Audio Resampling Quality (-arq)

As explained in “Sampling Rate” on page 38, RealProducer resamples audio if the input does not match the sampling rate expected by the chosen RealAudio codec. The -arq option determines the resampling quality. The default value of high produces the best results, but uses more processing power than the fast value, shown here:

```
-arq fast
```

**Note:** Neither the fast nor the high value causes pitch shifting.

## Video Mode (-vm)

The -vm option influences the visual quality of the encoded video. It helps you to balance visual clarity against frame rate, and generally has more effect on videos encoded for low bandwidths. You can use it to help heighten the visual clarity or increase the encoded frame rate. You can use one of the following values:

- |        |  |
|--------|--|
| normal | The default value of normal attempts to balance frame rate and visual clarity. This is the best choice for most content.                 |
| sharp  | The sharp value creates the sharpest image possible. Consequently, the encoded frame rate may be lower and the video may appear jerkier. |

- smooth** The smooth value produces the smoothest motion possible by increasing the frame rate. As a result, the video may be blurrier due to decreased visual clarity.
- slideshow** The slideshow value encodes a frame every few seconds to create a slideshow. The video will have very little motion, but a high degree of visual clarity. You may want to use this value if you are encoding a video with large dimensions at a low bandwidth.

For example:

```
-vm sharp
```

### Disable Video (-dv)

The `-dv` option strips the video out of the input source. Typically, you use this when encoding file-to-file and want to capture only the audio portion of a video clip. The option does not require a value. For example:

```
-dv
```

**Tip:** Do not use the `-dv` option with the Video Capture Device ID (`-vc`) option (see page 264). Instead, omit the `-vc` option.

### Resize Video (-rs)

If you have RealProducer Plus, you can use the `-rs` option to set the output video's width and height in pixels. This option uses a value *WidthxHeight*, in which each component is an integer from 0 to 2048. The default value of `0x0` performs no resizing. If you set a single value to 0, that dimension scales in proportion to the other dimension, maintaining the input clip's aspect ratio. The following are examples:

- `-rs 320x240` Resize the video to 320 pixels wide by 240 pixels high.
- `-rs 180x0` Resize the width to 180 pixels and scale the height proportionally, maintaining the input video's aspect ratio.
- `-rs 0x160` Resize the height to 160 pixels and scale the width proportionally, maintaining the input video's aspect ratio.

**Note:** The RealVideo codec rounds each dimension down to the nearest 4 pixels. If you specify a height of 183 pixels, for example, the output clip has a height of 180 pixels.

**For More Information:** The Capture Frame Size (-cs) option (see page 266) can resize video capture input. This allows you to resize the encoded output by overriding the default video capture dimensions.

## Resize Quality (-rq)

When you resize the encoded video using the -rs option, the -rq option affects the resulting quality. Using the default high value results in a higher-quality output, but requires considerably more processing power during encoding. The fast value uses less processor power, but results in lower quality:

-rq fast

## Video Codec Override (-vco)

Using RealProducer Plus, you can choose a video codec other than the default RealVideo 10. This allows you to use RealVideo 9 or RealVideo 10 for faster encoding, or backwards-compatibility with RealPlayer 8. The selected codec encodes all video streams for the output. Acceptable values are rv10, rv9, and rv8, as shown here:

-vco rv8

## Encoding Complexity Override (-eco)

With RealProducer Plus, you can set a complexity mode, which the section “Encoding Complexity Modes” on page 81 explains. This mode affects RealVideo 9 or 10 clips, as well as RealAudio lossless clips. The default value of high produces the best results, but requires the most processing power. A value of medium or low speeds processing time, but results in lower quality for video clips or a larger file size for lossless audio clips. Here is an example:

-eco medium

**Note:** When you use a server as a destination, RealProducer automatically scales down the encoding complexity as needed. You therefore do not need to use this option when producing a broadcast. See “Broadcast Load Management” on page 177 for more information.



## Logging Options

The following options affect the messages that RealProducer creates as it encodes a job. The log file location is set through the RealProducer preferences, as described in “Adjusting RealProducer Preferences” on page 151.

### Logging Category (-lc)

The `-lc` option determines the level of logging messages used, overriding the logging category set in the preferences. These messages are written to the log file or printed to the screen, depending on the other logging options you use. For the value, use a comma-separated string that includes any of the following:

error	Error messages are severe problems that typically cause the encoding operation to fail.
warning	Warning messages indicate possible problems that did not cause the encoding to fail.
info	Informational messages convey important messages about the encoding operation.
diagnostic	Diagnostic messages convey non-critical messages about the encoding operation. Because an encoding operation may generate many diagnostic messages, the log file can grow rapidly when you include this category.

You can abbreviate each value down to the first letter, as shown in the following examples:

```
-lc "error,warning,info"
-lc "err,warn,info,diag"
-lc "e,w,i,d"
```

**For More Information:** The section “Changing Log File and Log Viewer Preferences” on page 153 explains how to set logging preferences through the graphical application. You can also set these preferences manually, as described in Appendix E.

### Disable Logging to File (-dlf)

The `-dlf` option disables logging to the log file. Messages may still display on the screen. The option takes no value:

```
-dlf
```

## Disable Logging to Screen (-dls)

The `-dls` option disables logging to the screen. Log messages may still be written to the log file, however. The option takes no value:

```
-dls
```

## Quiet Mode (-q)

The `-q` option prevents any information, including log messages, from being printed to the screen. Use this option if you are running the command-line application from another application that will fail if output is written to the standard output device. The option takes no value:

```
-q
```

## Process ID File (-pid)

The `-pid` option writes a file that holds the process ID of the current encoding section. This ID is useful for shutting down the command-line application remotely, as described in “Stopping the Command-Line Application” on page 253. The option uses as a value a file name and path, which can be absolute or relative to the current directory. Here are some examples:

```
-pid ..\Jobs\job18.pid  
-pid /usr/log/job34.pid
```

## Help Options

The following sections explain the help options that you can display through the RealProducer command-line application.

### Display Help (-h)

Use the `-h` option without any other options to display a list of commands that you can use with the command-line application. The option does not require a value, as shown here:

```
-h
```

## Display Detailed Help (-m)

Use the `-m` option without any other options to display full information about the commands that you can use with the command-line application. The option does not require a value, as shown here:

```
-m
```

## Print Device Information (-pd)

The `-pd` option extracts audio and video capture device information. Use only this option without a value on the command line:

```
-pd
```

You can use the returned device information with the following options:

- Audio Capture Device ID (`-ac`) option (see page 263)
- Audio Capture Device Port (`-ap`) option (see page 263)
- Video Capture Device ID (`-vc`) option (see page 264)
- Video Device Port (`-vp`) option (see page 265)

**Tip:** If the `-pd` option does not return audio port information on Linux, use mixer software to adjust the input audio port.

## Print Audiences (-pa)

This option prints a list of acceptable audiences that you can use with the Audience Definitions or Audience Files (`-ad`) option (see page 280). Use only this option on the command line. It does not require a value:

```
-pa
```

## Print Servers (-ps)

Use the `-ps` option alone on the command line to list the accepted server definitions for use with the Server Template or Server File (`-sd`) option (see page 277). No value is required. Example:

```
-ps
```

## Print Version (-v)

The `-v` option displays version and copyright information for RealProducer. No value is required:

-v

## Command Line Usage Examples

The following sections provide examples of how to run the RealProducer command-line application.

### Basic Encoding Examples

The following examples illustrate the most basic uses of the command-line application.

#### Simple Encode

The following example is the simplest possible encoding of a media clip. Because no audiences are specified, RealProducer encodes using the default audience described in “Default Audience and Options” on page 101. Because no output is specified, the encoded clip is named `movie.rm`. The `.rm` extension is used because the default audience is a constant bit rate audience:

```
producer -i movie.avi
```

To save the clip to a different directory or file name, you can include the `-o` option:

```
producer -i movie.avi -o c:\videos\movie_streaming.rm
```

#### Variable Bit Rate Encoding

To encode for any audience other than the default ones, you need to include the `-ad` option. When using a variable bit rate audience, the output uses the `.rmvb` file extension. You can select only one VBR audience per encoding:

```
producer -i movie.avi -o movie.rmvb -ad "450k Download"
```

#### Batch Encoding with a Wildcard

The following example encodes a batch of files using a wildcard to designate all MPEG clips in the specified input directory. The output clips are placed in the `movies` directory:

```
producer -i C:\source\*.mpeg -o C:\movies\
```

#### Clip Information

The following example encodes clip information into the clip:

```
producer -i myfile.mov -o output.rm -t "Summer Vacation" -a "John Doe"
-k "Cape Cod Summer Vacation 2004"
-de "Video from summer vacation in Cape Cod."
```

## Job File Examples

The next set of examples demonstrate how to create and encode with job files.

### Job File Encoding

The following example shows how to run a job file from the command line. The job file specifies the inputs, outputs, and general encoding options. It may specify one input and output, parallel inputs, or multiple outputs:

```
producer -j GenericStreamingSettings.rpjf
```

### Job File Creation

Using the `-cj` option, you can capture the command line settings to a job file:

```
producer -cj ModemSettings.rpjf -i movie.avi -o movie.rm vb ...additional options...
```

Next, you can edit the job file as described in Appendix B if necessary, and run it on the command line:

```
producer -j ModemSettings.rpjf
```

### Batch Job File Creation

If you specify multiple file inputs, as described in “Batch File Encoding” on page 262, you can specify an output directory with `-cj` to create multiple job files. For example, you might use the following command:

```
producer -cj c:\Jobs\ -i *.avi ...additional options...
```

In this case, RealProducer creates a new job file for each AVI file in the current directory. The job file for `movie1.avi` is `c:\Jobs\movie1.rpjf`, the job file for `movie2.avi` is `c:\Jobs\movie2.rpjf`, and so on.

### Job File Syntax Update

RealProducer 11 uses a different job file syntax than Helix Producer. The RealProducer 11 graphical user interface and command-line application read the older file syntax, but save job files using the new syntax. This new job file syntax is not compatible with Helix Producer, so you cannot use a job saved by RealProducer 11 with the older Helix Producer.

You can update existing job files to the new syntax by processing them through the command-line application, reading the job with the `-j` option and writing a new job file with the `-cj` option, as shown in the following example. The inputs and outputs specified in the job do not need to be available when you run the update:

```
producer -j oldjob.rpjf -cj newjob.rpjf
```

**Note:** The command-line application supports the updating of a single job file at a time. Batch mode is not currently available.

## Audio Encoding

The following examples show how to encode audio-only clips.

### RealAudio Lossless

You can encode an audio or video clip with the RealAudio lossless codec using the command-line application only. Use the `-ad` option to specify the lossless audience:

```
producer -i music.wav music.rmvb -ad Lossless
```

### Voice-Only Clip

Audio encoding selects music encoding by default. If an audio clip or video soundtrack is voice-only, use the `-am` option to specify voice:

```
producer -i lecture.mpeg -am voice ...additional options...
```

### Audio From a Video

If you want to encode just the audio portion of a video file, you can use the `-dv` option to disable video:

```
producer -i movie1.avi -dv ...additional options...
```

## Live Capture Examples

The following examples demonstrate how to capture live input and encode it to a file or send it to a server for broadcast.

### Live Input Capture to File

The following example captures input from the video card and the sound card, writing the output to a clip named `capturefile.rm`:

```
producer -vc 0 -ac "Sound Blaster *" -o c:\capturefile.rm
```

### Live Input Capture for Broadcast

The following example captures audio and video, delivering the encoded stream to Helix Server using the account-based, push method of broadcasting. This broadcast method requires a user name (encoder in this example) and password:

```
producer -v 0 -ac 0 -sp encoder:as45er897@helixserver.example.com/news.rm
```

### Capture with Audience Targets

The following example captures audio and video and streams, sending the output to both a server and a file destination. The server broadcast uses the password-only push method. The encoding targets the 56k and 150k audiences:

```
producer -vc 0 -ac 0 -sp :TY45poiu@helixserver.example.com/sports/live.rm  
-o archive.rm -ad "56k,150k"
```

## Input Modification Examples

The next set of examples shows how to modify the input by applying prefilters and resizing.

### Prefiltering

This example applies the audio gain prefilter with a value of 4, applies black-level correction and performs auto-detection of de-interlace and inverse-telecine:

```
producer -i vacation.mov -o vacation.rm -ag 4 -bl -di auto
```

### Cropping and Resizing

The next example assumes an input in wide screen format (2.35:1 ratio), with a width of 564 pixels and a height of 240 pixels. First, 102 pixels are cropped from both the left and right sides to create an input that is 360 by 240 (4:3 ratio). Then, the video is resized down to approximately 240 by 180 pixels:

```
producer -i widescreen.avi -o normal.rm -cr 102,0,320,240 -rs 240x0
```





## FILE FORMATS

RealProducer uses a set of XML-formatted files to define encoding options, audiences, and destinations. The following appendixes explain the file syntax so that you can edit the files by hand.



## XML FILE BASICS

The text files that RealProducer uses when encoding streams—job file, audience file, and server file—use XML (eXtensible Markup Language) syntax. This appendix covers the basics of editing these files, explaining tags, lists, and namespaces. Subsequent appendixes cover the specific syntax for each file type in detail.

### XML File Rules

This section explains the basics of XML markup, introducing you to the rules you need to follow when editing an XML file. If you are familiar with other Web-based markup languages, such as HTML, you will pick up XML quickly. You need to be careful, though, because XML is less forgiving than HTML. Lapses that may not matter in HTML markup, such as missing quotation marks or end tags, will prevent an XML file from working properly.

**Tip:** You can edit an XML file with any text, HTML, or XML editor that can save the file as plain text with the proper extension. On Windows, some text editors may automatically include .txt as the extension. Disable this feature when saving by choosing All Files for **Save as type**, or change the saved file's .txt extension through the operating system.

### The XML Tag and Namespaces

XML files begin with an `<?xml>` version tag:

```
<?xml version="1.0" encoding="UTF-8"?>
```

Following the version tag, markup consists of one or more elements. An audience file, for example, uses an `<audience>` element that contains all additional markup:

```
<?xml version="1.0" encoding="UTF-8"?>
<audience xmlns="http://ns.real.com/tools/audience.2.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://ns.real.com/tools/audience.2.0
  http://ns.real.com/tools/audience.2.0.xsd">
  ...audience information...
</audience>
```

Each xmlns attribute shown above defines an *XML namespace*. This namespace tells RealProducer how to handle the markup contained within the file. The namespace identifier is in the form of a URL only to ensure uniqueness. RealProducer does not contact the URL.

**Note:** If you edit an XML file, do not change the namespaces. When creating a new XML file, be sure to use the appropriate namespaces for the file type.

## Tags, Attributes, and Values

Elements within an XML file take the following form:

```
<tag type="type">value</tag>
```

The following are the basic parts to an XML element:

<i>tag</i>	The tag name comes just after a left angle bracket. Some tags may consist of just the name, as in the <stream> tag. Other tags may have attributes. Except for the XML version tag and the comment tag, all tags in an XML file have a corresponding end tag. For example, the <audience> tag has the end tag </audience>.
<i>type</i>	The type attributes defines the type of data that the element provides. For more information, see “Data Type Values” on page 297.
<i>value</i>	The value is a character string, integer, time value, or so on that defines the feature.

### Lowercase or Camel Case for Tags and Attributes

In RealProducer markup, single-word tags and attributes are lowercase. When a tag, attribute, or predefined value consists of a compound word, the first letter of all words after the first word is generally capitalized, as in encodingComplexity. This is referred to as “camel case.”

## Attribute Values Enclosed in Double Quotation Marks

Attribute values, such as string in type="string", must be enclosed in double quotation marks. Do not add any blank spaces between the quotation marks and the value they enclose.

## Data Type Values

Most XML elements within the RealProducer files must include a type attribute that indicates the type of value.

<b>Value Types</b>		
Type	Value	Notes
type="bag"	group	Indicates a group of properties.
type="bool"	true false	True or false values use this type, which stands for "Boolean." You can also use 1 for true and 0 for false.
type="double"	decimal values	A double type is used for very large values, values that include a decimal point, and values that may be negative.
type="duration"	time value	A duration type indicates a time value in the format [d:][h:][m:]s[.xyz].
type="string"	text string	A string can include letters and numbers. Do not use double quotation marks within the value string. Maximum lengths may vary, but are typically at least 256 characters
type="uint"	unsigned integer	Values that are positive integers, including 0, use this type.
xsi:type="value"	customized value	An xsi: prefix allows for customized value types.

## Value Type Examples

The following examples illustrate the use of the type attribute in RealProducer XML files:

```
<outputWidth type="uint">360</outputWidth>
<maxFrameRate type="double">15.000000</maxFrameRate>
<streamContext type="bag">
  ...stream context elements...
</streamContext>
```

```

<stream xsi:type="audioStream">
  ...audio stream elements...
</stream>

<deinterlace type="bool">true</deinterlace>

<pluginName type="string">rn-prefilter-deinterlace</pluginName>

```

### Duration Syntax

The format for the value of a parameter that specifies a duration is the following:

```
[d:][h:][m:]s[.xyz]
```

Only the seconds value is required. If a value is omitted, it is assumed to be zero. You must specify intermediate values. To indicate hours, for example, you must include the minutes and seconds field. Here are some sample values:

30	30 seconds
45.5	45-1/2 seconds
5:35	5 minutes, 35 seconds
1:0:0	1 hour
1:22:30:0	1 day, 22 hours, 30 minutes

### File Names and Paths Observe Letter Cases

In tags that specify files or other input, paths and file names can be uppercase, lowercase, or mixed case, corresponding to their actual names on the operating system. All of the following path and file name examples are allowable, for example:

```

<filename type="string">C:\media\video\video1.rm</filename>
<filename type="string">C:\media\video\Video1.rm</filename>
<filename type="string">C:\media\video\VIDE01.rm</filename>

```

**Note:** On operating systems that are not case-sensitive, such as Windows, these tags all specify the same file. On a case-sensitive operating system such as Linux, these tags indicate different files.

## XML Recommendations

Although not strict rules, the following recommendations will help you keep your XML markup organized and understandable.

## XML Comments

As in HTML, XML has a comment tag that starts with these characters:

```
<!--
```

and ends with these characters:

```
-->
```

There is no corresponding end tag:

```
<!-- This is a comment -->
```

A comment can be any number of lines long. It can start and end anywhere in a XML file. Multiple comments cannot be nested, though. Use comments to describe what various sections of your XML file are meant to do. This helps other people understand your file more easily.

## Indentation Between Elements

Although indenting XML markup is not required, it helps you to keep track of the XML file's structure. You typically indent markup by pressing the **Tab** key once for each level of indentation. In a stream section, for example, the element tags are indented one level from the `<stream>` tag. The two tags that make up the stream context are indented one level from the `<streamContext>` tag:

```
<stream xsi:type="audioStream">
  <codecFlavor type="uint">25</codecFlavor>
  <codecName type="string">cook</codecName>
  <encodingComplexity type="string">high</encodingComplexity>
  <pluginName type="string">rn-audiocodec-realaudio</pluginName>
  <streamContext type="bag">
    <audioMode type="string">voice</audioMode>
    <presentationType type="string">audio-only</presentationType>
  </streamContext>
</stream>
```





## JOB FILE SYNTAX

A RealProducer job file records a range of encoding settings so that you can quickly re-encode clips or broadcasts using the same properties. This appendix describes the job file syntax. Using this information, you can edit a job file without relying on the RealProducer graphical application.

**Note:** If you are not familiar with XML syntax, refer to Appendix A for information about XML namespaces, tags, attributes, and values.

### Understanding Job Files

A job file records the full range of RealProducer settings used to encode a clip or broadcast. It defines the audio and video codecs used, for example, and specifies the use of filters and other options. When you save a job through the graphical application—a process described in Chapter 6—RealProducer updates the file automatically to record your encoding changes. You can also create job files, which use the file extension `.rpjf`, through the command-line application and edit them manually. This allows you to change job information using a text editor or any automated process that can modify XML files.

**For More Information:** The section “Job File Options” on page 259 explains how to create a job file through the command-line application.

### Features Exclusive to the Job File

You can set up a few RealProducer encoding features only through a job file or command line. The following features are not available through the graphical user interface. If your job file includes them, you must encode the jobs using the command-line application:

- RealAudio Lossless Codec

To encode audio using the lossless codec, you need to specify the lossless codec in an audience definition. The section “Audiences Section” on page 340 illustrates the audience section in the job file. Appendix C covers the audience syntax.

- Multiple Outputs

A job file can define multiple outputs that are encoded in parallel. Multiple outputs might be two separate clips, one of which is encoded for a lower bandwidth and resized smaller. For more information, see “File and Server Outputs” on page 329.

- Parallel Inputs

Using a job file, you can merge parallel inputs into a single output. For example, you might merge a video stream from a digitized file with audio that you capture live. For more information, see “Single and Multiple Inputs” on page 309.

- Audio Delay Compensation Prefilter

This prefilter allows you to resynchronize an audio soundtrack with video. This is useful if you are capturing audio and video separately as parallel inputs. Refer to “Audio Delay Compensation Prefilter” on page 327.

- Prefilter Resizing

Through the job file, you can resize the video input before or during the encoding. See “Video Resizing Methods” on page 319 for an explanation of the available resizing options.

- File Rolling

File rolling normally occurs when an encoded clip reaches the file size limit set by the operating system. With the file rolling parameters, you can specify other sizes or time limits for file rolling. See “File Rolling” on page 332.

## Tips for Creating Job Files

The following are some tips to keep in mind when using job files:

- When creating a new job file, RealNetworks recommends that you start with an existing job file that you have renamed. RealProducer provides a

number of predefined job files that are stored in the `samples/jobs` subdirectory under the RealProducer main directory. You can use these files as templates for your own jobs.

- You can override most job file settings through the RealProducer graphical application, then save or discard your changes after encoding. If a certain clip could benefit from noise filtering, for instance, you can apply that filter during the encoding, even though the job file does not specify the use of that filter. This gives you the ability to create job files with general settings that you change on a case-by-case basis.
- When encoding through the command-line application, you cannot override or add to the settings in the job file, except in the specific cases described in “Job File Options” on page 259.
- Prefilters, which are described in “Prefilters” on page 317, have parameters that enable or disable them. This allows you to define a prefilter within a job without activating it. If you think that you may want to use a certain prefilter with a job, it’s a good idea to add the prefilter syntax to the job file and leave the filter disabled until you need to use it.
- A job can define specific input and output files. You can override a specific input and output during encoding. Or, you can create a job file that has blank input and output values. If you do this, include the appropriate syntax, but leave the value blank, as in the following example:  

```
<filename type="string"></filename>
```
- A job file defines encoding audiences, as described in “Audiences Section” on page 340. An output’s media profile, described in “Media Profile” on page 334, determines which audiences the output uses, though. This allows you to define all the audiences you think that you might use within the audiences section, then apply those audiences to various outputs through their the media profiles.
- RealProducer Plus supports the full range of job file capabilities. If you use RealProducer Basic, however, you are limited by the following restrictions:
  - no cropping, resize, or audio gain filter
  - RealVideo 10 codec only
  - maximum of three audiences in a SureStream CBR clip
  - one customized audience

- one file and one server destination
- no multicast broadcasting

## Job Section

The <job> and </job> tags encapsulate all job information within a job file. The <job> tag follows directly after the XML declaration tag. Be sure to include the namespaces shown in the following example, and add any namespaces required by customized RealProducer components:

```
<?xml version="1.0" encoding="UTF-8"?>
<job xmlns="http://ns.real.com/tools/job.2.0"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:schemaLocation="http://ns.real.com/tools/job.2.0
      http://ns.real.com/tools/job.2.0.xsd">
    ...all job parameters...
</job>
```

## Job Properties

The following table describes the main properties within the <job> list.

Job Properties		
Property	Value	Function
enableTwoPass type="bool"	true false	Enables two-pass encoding, as described in "Two-Pass Encoding" on page 80. The default is true. This property is ignored for live broadcasts.
disableLoadManagement type="bool"	true false	Disables RealProducer's ability to reduce encoding complexity during live encodes to keep up with the input stream. The default value of false should generally <b>not</b> be changed. For background, refer to "Broadcast Load Management" on page 177.
clipInfo	list	Defines clip information, as described in "Clip Information" on page 305.
inputs	list	Sets the inputs used for encoding the clip or broadcast, as described in "Audio and Video Inputs" on page 309.

(Table Page 1 of 2)

**Job Properties (continued)**

Property	Value	Function
parOutputs	list	Determines the encoding outputs, as described in “File and Server Outputs” on page 329.
audiences	list	Selects the encoding audiences, as described in “Audiences Section” on page 340.

(Table Page 2 of 2)

**Job File Example**

The following abstract example shows the major structure of a job file. The order of the lists within the <job> section does not matter. For example, the <audiences> list can precede the <clipInfo> list. The hierarchy does matter, however. The <audiences> list cannot fall within the <clipInfo> list, for instance:

```
<?xml version="1.0" encoding="UTF-8"?>
<job xmlns="http://ns.real.com/tools/job.2.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://ns.real.com/tools/job.2.0
  http://ns.real.com/tools/job.2.0.xsd">
  <enableTwoPass type="bool">true</enableTwoPass>
  <clipInfo>
    ...clip information such as title, author, and copyright...
  </clipInfo>
  <inputs>
    ...inputs used to encode the clip or broadcast contents...
  </inputs>
  <parOutputs>
    ...outputs for the encoded content, such as a clip or broadcast server...
  </parOutputs>
  <audiences>
    ...audiences for the content, defining bandwidths and the codecs used...
  </audiences>
</job>
```

**Clip Information**

The optional clip information section defines metadata properties that are encoded into static clips and live broadcasts. The values are typically provided for the benefit of the viewer, and do not affect the encoded content. For example, a metadata value can provide a clip title that displays in the media

player's title bar. The following abstract example demonstrates clip information within the job file structure:

```
<clipInfo>
  <entry>
    <name>Metadata Name</name>
    <value type="type">Metadata Value</value>
  </entry>
  ...additional metadata entries...
</clipInfo>
```

### Clip Information Values

Each metadata entry falls between <entry> and </entry> tags. A <name> element and <value> element define each metadata property.

**Clip Information Tags**

Tag	Value	Function
name	string up to 255 characters	Defines the type of metadata. A media player must recognize the name to handle the metadata value properly. The value cannot be left blank.
value	integer or string up to 64 Kilobits	Supplies the value for the metadata field. The value can be blank. The default is an empty string.

### Metadata Values for RealPlayer

RealPlayer supports a number of metadata values. If you do not specifically add metadata values, no metadata is encoded into the stream.

**Standard Metadata Properties for RealPlayer**

Property	Value	Function
Author type="string"	string up to 255 bytes	Indicates the clip author.
Content Rating type="uint"	integer from 0 to 6	Defines an age range for ratings systems: 0-No Rating (this is the default) 1-All Ages 2-Older Children 3-Younger Teens 4-Older Teens (15 and up) 5-Adult Supervision Recommended 6-Adults Only

(Table Page 1 of 2)

**Standard Metadata Properties for RealPlayer (continued)**

Property	Value	Function
Copyright type="string"	string up to 255 bytes	Provides the clip copyright.
Description type="string"	string up to 1023 bytes	Gives a clip description that is generally longer and more informative than the title.
Keywords type="string"	string up to 255 bytes	Adds keywords for search engines that can read RealMedia clips.
Title type="string"	string up to 255 bytes	Adds a clip title.

(Table Page 2 of 2)

**For More Information:** The section “Adding Clip Information” on page 94 explains the values you should use for the clip metadata properties.

**Separate Clip Information for Outputs**

If you define information within a single <clipInfo> list at the start of the job file, that information is used for all clips or broadcasts created with the job file. As described in the section “File and Server Outputs” on page 329, you can also define clip information within each output section. This allows you to define separate information for each output when encoding multiple outputs. You can also mix the two methods. In this case, clip information defined for an output overrides the corresponding information defined for the job.

**Tip:** You can define the same basic information, such as title, author, and copyright for all outputs by setting these values for the job. You can then add specific information, such as unique descriptions, for each output.

**Clip Information Examples**

The following example defines several metadata properties used for all outputs created through the job file:

```
<job...>
  <clipInfo>
    <entry>
      <name>Title</name>
      <value type="string">2003 Football Highlights</value>
```

```

</entry>
<entry>
  <name>Copyright</name>
  <value type="string">(C) 2004</value>
</entry>
<entry>
  <name>Keywords</name>
  <value type="string">sports, football</value>
</entry>
<entry>
  <name>Description</name>
  <value type="string">A year-end review of the highlights in the 2003
    fall football season.</value>
</entry>
<entry>
  <name>Content Rating</name>
  <value type="uint">1</value>
</entry>
</clipInfo>
...all other job file information...
</job>

```

The next example defines basic clip information such as title, author, and copyright for all outputs, but a separate description for each output. In this example, one output is a live broadcast and another output is an archive clip that will be available on-demand after the broadcast ends:

```

<job...>
  <clipInfo>
    <entry>
      <name>Title</name>
      <value type="string">2003 Football Highlights</value>
    </entry>
    ...other clip info such as author and copyright...
  </clipInfo>
  ...other job file information...
  <parOutputs>
    <output>
      ...output information for the live broadcast...
      <clipInfo>
        <entry>
          <name>Description</name>
          <value type="string">A live, year-end review of the highlights in
            the 2003 fall football season.</value>
        </entry>

```



```

    </clipInfo>
  </output>
<output>
  ...output information for the archive clip...
  <clipInfo>
    <entry>
      <name>Description</name>
      <value type="string">Archived highlights of the 2003 fall
        football season.</value>
    </entry>
  </clipInfo>
</output>
</parOutputs>
  ...additional job file information...
</job>

```

## Audio and Video Inputs

The `inputs` section defines the audio or video input for the job. Inputs can be either digitized files or output from capture devices such as cameras attached to a video capture card. The `<inputs>` and `</inputs>` tags encapsulate the inputs section. Within this list, you can define a single input or multiple inputs.

**For More Information:** The section “Audio and Video Input Formats” on page 27 lists acceptable file and color formats for encoding.

### Single and Multiple Inputs

To define a single input, you add `<input>` and `</input>` tags within the `<inputs>` element:

```

<inputs>
  <input ...>
    ...single input defined here...
  </input>
</inputs>

```

To define multiple inputs, you add `<parInputs>` and `</parInputs>` tags within the `<inputs>` element. Then, you define each input between `<input>` and `</input>` tags:

```

<inputs>
  <parInputs>
    <input ...>
      ...audio input defined here...
    </input>
    <input ...>
      ...video input defined here...
    </input>
  </parInputs>
</inputs>

```

Using parallel inputs, you can encode one audio and one video stream simultaneously, using any combination of sources. For example, you might encode into a single clip the audio from one file and the video from a different file. Or, you might combine the audio from a file with video images captured live.

**Tip:** To encode audio and video from the same live event, you capture the audio and video as a single input. You use parallel inputs only when the audio and video come from different sources.

**Note:** When a job includes parallel inputs, you must encode the job through the command-line application rather than the graphical application.

**For More Information:** With parallel inputs, you can use the audio delay compensation prefilter to synchronize the audio and video inputs. See “Audio Delay Compensation Prefilter” on page 327.

## Input Tag

The `<input>` tag defines each input. It uses an `xsi:type` attribute with a value of `avFileInput` or `captureInput`, respectively, to indicate whether the input comes from a digitized file or a capture device. The following example shows a single input for a digitized file:

```

<inputs>
  <input xsi:type="avFileInput">
    ...input values for the digitized file...
  </input>
</inputs>

```

The next example defines the single input as live or prerecorded material coming from an audio or video capture device:

```
<inputs>
  <input xsi:type="captureInput">
    ...input values for the capture...
  </input>
</inputs>
```

## Digitized File Input

When the input is a digitized file, the input type is `avFileInput`. You can then specify the following properties. You can leave the file name value blank if you want to specify the file name through the graphical application, as described in “Using a File as the Input” on page 89. The file name value is required when you process the job file through the command-line application, however.

**File Input Properties**

Property	Value	Function
<code>disableAudio</code> <code>type="bool"</code>	<code>true false</code>	Disables the audio for all outputs that use this input when set to true. This enables you to capture video only. The default is false. You can also disable audio output-by-output. See “Media Profile Properties” on page 335.
<code>disableVideo</code> <code>type="bool"</code>	<code>true false</code>	Disables the video for all outputs that use this input when set to true. This enables you to capture audio only. The default is false. You can also disable video output-by-output. See “Media Profile Properties” on page 335.
<code>filename</code> <code>type="string"</code>	file name and path	Indicates the path and name of the input file. You cannot use wildcards. See “File and Directory Paths” on page 312.
<code>name</code> <code>type="string"</code>	string	Assigns a name to the source, such as <code>source1</code> , <code>source2</code> , and so on. This is optional, but strongly recommended when using parallel inputs.

(Table Page 1 of 2)

**File Input Properties (continued)**

Property	Value	Function
pluginName type="string"	rn-avfile-aviuncompressed rn-avfile-directshow rn-avfile-movuncompressed rn-avfile-qt rn-avfile-wavuncompressed	Provides the name of the file system plug-in used to read the input file. If you omit this property, RealProducer scans available plug-ins and uses the first one it finds that can read the input format.
prefilters	list of filters	Indicates one or more prefilters to use with the input. For more information, refer to "Prefilters" on page 317.

(Table Page 2 of 2)

**File and Directory Paths**

For an input's filename value, you list the path and file name when encoding through the command-line interface. When using the graphical application, you can specify the name, or leave the value blank and provide the file name when encoding. The file name and path should use the standard conventions for your operating system. However, RealProducer observes the following conventions to help keep the job file portable across platforms:

- You can specify a relative or absolute path to a file. Relative paths are relative to the current working directory, which is the directory from which the command-line application is run or the graphical application was started. If you start RealProducer by double-clicking a job file, the working directory is the directory that holds the job file.
- On Windows, forward slashes in paths are interpreted as backslashes, so "/" is read as "\".
- On Linux, backslashes are interpreted as forward slashes, so "\" is read as "/".
- If an absolute path starts with a single slash, RealProducer on Windows assumes that the path occurs on the system's default drive. For example, if C:\ is the default drive, the path /home/media/video.mpeg is interpreted as C:\home\media\video.mpeg.
- On Linux, absolute paths that start with a drive letter such as C:\ cause an error because no logical translation is possible.

## Capture Input

When the input comes from a capture device, such as a camera, microphone, or CD player, the input type is `captureInput`. You can then specify the following properties. Only the capture device ID is required.

**Capture Input Properties**

Property	Value	Function
<code>audioCaptureMono</code> type="bool"	true false	Linux only. If set to true, forces capture of a single, mono audio channel. Required for Linux audio devices not configured as stereo pairs. The default value of false enables stereo capture.
<code>audioDeviceID</code> type="string"	integer string  device name	Sets the audio device used for recording. See "Devices and Ports" on page 314
<code>audioDevicePort</code> type="string"	integer string  device name	Specifies the audio port used for recording. You must also provide the device ID. See "Devices and Ports" on page 314
<code>duration</code> type="duration"	[d:][h:][m:]s[.xyz]  infinite	The length of time to capture from the device. If no value is used, the default is infinite. You can specify down to a fraction of a second, but the timing is accurate only to the packet size of the stream. For audio this is about 200 milliseconds. For video the size varies with the bit rate. For information about duration values, see "Duration Syntax" on page 298.
<code>name</code> type="string"	string	Assigns a name to the source, such as <code>source1</code> , <code>source2</code> , and so on. This is necessary only if you have multiple inputs and multiple outputs. Unique names are recommended.
<code>pluginName</code> type="string"	rn-capture-av	Provides the name of the plug-in used to read the input. If you omit this property, RealProducer scans available plug-ins and uses the first one it finds that can read the input format.
<code>prefilters</code>	list of filters	Indicates one or more prefilters to use. For more information, refer to "Prefilters" on page 317.

(Table Page 1 of 2)

**Capture Input Properties (continued)**

Property	Value	Function
videoDeviceID type="string"	integer   string   device name	Sets the video device used for the input. See "Devices and Ports" on page 314
videoDevicePort type="string"	integer   string   device name	Specifies the video port used for the input. You must also provide the device ID. See "Devices and Ports" on page 314
videoFormat type="string"	NTSC   NTSC-JP   PAL   PAL-M   PAL-N   PAL-NC   SECAM   integer	Linux only. Indicates the video format. Use one of the predefined strings or an integer representing a format understood by your driver. On Windows, use the video driver dialog to set the video format. The default is NTSC.
videoFrameHeight type="uint"	integer	Sets an optional video height in pixels. Use any positive integer divisible by 4, and not greater than 2048. The default value of 0 uses the capture device's default size.
videoFrameWidth type="uint"	integer	Sets an optional video width in pixels. Use any positive integer divisible by 4, and not greater than 2048. The default value of 0 uses the capture device's default size.

(Table Page 2 of 2)

**Devices and Ports**

The required audioDeviceID and videoDeviceID parameters select the capture card or cards used for the input. The optional audioDevicePort and videoDevicePort parameters set the ports used for audio and video capture, respectively. You can use any of the following values:

- Integer of value 0 or higher identifying a specific device or port number. A value of 0 always selects the first device or port. Here is an example:  

```
<audioDeviceID type="uint">1</audioDeviceID>
```
- String matching an existing device or port name. The following are examples:  

```
<audioDeviceID type="string">Sound Blaster Live!</audioDeviceID>
<audioDevicePort type="string">Line In</audioDevicePort>
<videoDeviceID type="string">Osprey Capture Card 1</videoDeviceID>
<videoDevicePort type="string">S-Video</videoDevicePort>
```
- String with a wildcard (\*) matching an existing device or port name, such as:

```
<audioDeviceID type="string">Sound Blaster *</audioDeviceID>
<audioDevicePort type="string">Mic*</audioDevicePort>
<videoDeviceID type="string">Osprey Capture Card *</videoDeviceID>
<videoDevicePort type="string">Composite*</videoDevicePort>
```

- UNIX device name, such as one of the following:

```
/dev/audio
/dev/video
```

The following are tips for setting the audio and video device IDs and ports:

- If you use a single video card to capture both video and audio, you must specify both the `audioDeviceID` and `videoDeviceID` parameters.
- Using numbers for the device IDs maximizes the portability of the job file so that you can transfer it to another machine.
- The pull-down lists in the **Devices** section of the graphical application supply the names of audio and video devices on your RealProducer computer. For more information, see “Using Live Audio or Video as the Input” on page 90.
- The command-line application’s `-pd` option displays audio and video device information. See “Print Device Information (`-pd`)” on page 287.
- The video card’s settings define the captured frame rate. During encoding, RealProducer uses the largest frame rate among all selected audiences as the maximum frame rate target. See “Video Stream Properties” on page 353.

## Input File and Capture Examples

The following examples illustrate the syntax for encoding input from files and live captures.

### Single Input File

The following example defines a single input for a digitized file. A single prefilter is used with the input. For more on prefilters, refer to “Prefilters” on page 317.

```
<inputs>
  <input xsi:type="avFileInput">
    <filename type="string">C:\media\videos\video1.avi</filename>
    <prefilters>
      <prefilter xsi:type="audioGainPrefilter">
```

```

        <enabled type="bool">true</enabled>
        <gain type="double">-5</gain>
        <pluginName type="string">rn-prefilter-audiogain</pluginName>
    </prefilter>
</prefilters>
</input>
</inputs>

```

### Single Capture Input

The following example captures audio and video input for 15 minutes. A single prefilter is used to attenuate the audio input. For more on prefilters, refer to “Prefilters” on page 317.

```

<inputs>
  <input xsi:type="captureInput">
    <audioDeviceID type="string">Sound Blaster *1</videoDeviceID>
    <audioDevicePort type="string">Mic*</videoDevicePort>
    <videoDeviceID type="string">Osprey Capture Card 1</videoDeviceID>
    <videoDevicePort type="string">S-Video</videoDevicePort>
    <pluginName type="string">rn-capture-av</pluginName>
    <duration type="duration">15:00.000</duration>
    <prefilters>
      <prefilter xsi:type="audioGainPrefilter">
        <enabled type="bool">true</enabled>
        <gain type="double">-5</gain>
        <pluginName type="string">rn-prefilter-audiogain</pluginName>
      </prefilter>
    </prefilters>
  </input>
</inputs>

```

### Parallel Inputs

Using parallel inputs, you can encode one audio stream and one video stream from separate sources. The following example captures the visual track from a digitized video file. It combines this stream with five minutes of audio from the audio capture device. The black-level filter increases the video contrast. The audio delay compensation prefilter advances the audio one-half second to synchronize it with the video. For more on prefilters, refer to “Prefilters” on page 317.



```

<inputs>
  <parInputs>
    <input xsi:type="avFileInput">
      <name type="string">VideoInput</name>
      <filename type="string">c:\media\promo.avi</filename>
      <disableAudio type="bool">>true</disableAudio>
      <prefilters>
        <prefilter xsi:type="blackLevelPrefilter">
          <pluginName type="string">rn-prefilter-blacklevel</pluginName>
          <enabled type="bool">>true</enabled>
        </prefilter>
      </prefilters>
    </input>
    <input xsi:type="captureInput">
      <name type="string">AudioInput</name>
      <audioDeviceID type="string">Sound Blaster *1</videoDeviceID>
      <audioDevicePort type="string">Mic* </videoDevicePort>
      <pluginName type="string">rn-capture-av</pluginName>
      <duration type="duration">5:00.000</duration>
      <prefilters>
        <prefilter xsi:type="audioDelayCompPrefilter">
          <pluginName type="string">
            rn-prefilter-audiodelaycomp</pluginName>
          <enabled type="bool">>true</enabled>
          <advance type="double">0.5</advance>
        </prefilter>
      </prefilters>
    </input>
  </parInputs>
</inputs>

```

## Prefilters

An optional `prefilters` section can appear within each `<input>` list to define the audio and video filters that are applied to the input before it is encoded. The `prefilters` appear within a list defined by `<prefilters>` and `</prefilters>` tags (note the plural “prefilters”). Each `prefilter` uses `<prefilter.../>` and `</prefilter>` tags (note the singular “prefilter”) to enclose the `prefilter` properties. An `xsi:type` attribute within a `<prefilter>` tag determines the type of `prefilter` used. The following example shows the audio gain `prefilter` defined within an input section:

```

<input xsi:type="avFileInput">
  ...additional input information...
  <prefilters>
    <prefilter xsi:type="audioGainPrefilter">
      <enabled type="bool">true</enabled>
      <gain type="double">0.000000</gain>
      <pluginName type="string">rn-prefilter-audiogain</pluginName>
    </prefilter>
  </prefilters>
</input>

```

The following table summarizes the available prefilters.

Available Prefilters		
Prefilter	Function	Reference
Cropping	Crops out portions of the input video.	page 320
De-interlace and Inverse-Telecine	Removes unnecessary frames from NTSC videos and corrects line shifting in videos more than 240 pixels high.	page 322
Video Noise Reduction	Reduces artifacts in the input video.	page 323
Black Level Correction	Improves contrast by making black areas darker and light areas whiter. This increases the encoding efficiency.	page 324
Resize	Resizes the input video and corrects pixel aspect ratios.	page 324
Audio Gain	Amplifies or attenuates the audio signal.	page 326
Audio Delay Compensation	Corrects audio that is not synchronized with the video.	page 327

**Note:** You can also define prefilters within the media profile section, which is described in “Media Profile” on page 334. This is recommended if you are defining multiple outputs and want to use different filters for each output.

## Prefilter Order

RealProducer applies prefilters in the order they are specified within the job file. Because a prefilter alters video data before the data is passed to the next filter, specifying prefilters in the wrong order can degrade the output. For example, reducing noise can make a video impossible to de-interlace. The following is the recommended order for using prefilters on video input:

1. Cropping
2. Inverse-Telecine
3. De-interlace
4. Video Noise Reduction
5. Black Level Correction
6. Resize

**Note:** You can apply audio prefilters at any point in the filtering chain.

## Video Resizing Methods

The following sections describe the two methods for resizing a video. In either case, video resizing during encoding is processor-intensive and should be avoided for a live broadcast. If you need to resize a live broadcast, the best method is to perform resizing in hardware on the video capture device before sending the input to RealProducer.

**Tip:** You can also crop an input video to remove unnecessary portions. This is done through the cropping prefilter, as described in “Input Cropping Prefilter” on page 320.

### Prefilter Resizing

The video resize prefilter, which is described in “Video Resizing Prefilter” on page 324, alters the size of the video before it is encoded. This prefilter is useful for correcting non-square pixel aspect ratios. If the input video has a non-square pixel aspect ratio (such as DV), you can shorten the video horizontally to convert non-square pixels to square pixels. Resizing the video before the actual encoding may also speed the rest of the encoding process because less source material needs to be encoded. All outputs use the resized input.

### Codec Resizing

Through an output’s media profile, which is described in “Media Profile” on page 334, you can also specify a new video height and width. In this resizing method, the RealVideo codec resizes the content during the encoding. Because codec resizing is more efficient, it is generally preferable to prefilter resizing unless you need to correct for non-square pixels. This is the mode used when

you resize content through the graphical application or command-line application.

**Tip:** Always use codec resizing when making a video larger. Expanding the video through the resizing prefilter adds extra pixels, which makes the clip larger and harder to compress. In contrast, resizing the output larger through the codec encodes instructions that tell RealPlayer how to increase the video dimensions during playback. This keeps the clip size smaller.

### Width and Height Values for Resizing

For the video resize prefilter, the `videoResizeWidth` and `videoResizeHeight` properties set the video's new size. When you resize through the codec, the media profile's `outputWidth` and `outputHeight` properties resize the video. Both sets of properties work the same way.

For any resize property, the value must be at least 32, and be a multiple of 4, such as 120, 240, 360, and so on. Values not divisible by 4 are rounded down. For example, a value of 123 is rounded down to 120. If both height and width are set to 0, no resizing occurs. The maximum height or width is 2048 pixels.

To preserve an input video's aspect ratio, set the height or width to the desired size, then set the other value to 0. If the input video is 640 pixels wide by 480 high, for example, you can set the width to 320 and the height to 0. This automatically scales the height to 240. If you do not preserve the input video's height-to-width ratio when resizing, the output video will appear distorted.

### Input Cropping Prefilter

The input cropping filter contains several settings for cropping the video source. You can use it to cut out unnecessary parts of a video, such as the black bars at the top and bottom of a letterboxed, widescreen clip. The prefilter uses the type value of `xsi:type="inputCroppingPrefilter"`.

**Note:** The cropping prefilter does not scale the video larger or smaller. For information about resizing, see "Video Resizing Methods" on page 319.

## Input Cropping Properties

The following table describes the cropping properties.

Input Cropping Prefilter Properties		
Property	Value	Function
pluginName type="string"	rn-prefilter- inputcropping	Optionally sets the plug-in to use. If omitted, RealProducer selects the plug-in based on the xsi:type value.
enabled type="bool"	true false	Enables the filter when set to the default value of true.
left type="uint"	integer	An integer representing the number of pixels from the left of the video to start the cropping. You can specify up to 32 pixels less than the total width. The default is 0.
width type="uint"	integer	An integer indicating the total width of the cropped video, measured from the value set by the left property. The default is the input video width minus the pixels cropped by the left property. If the value is not a multiple of 4, the next lower multiple is used. For example, a value of 162 results in a video 160 pixels wide.
top type="uint"	integer	An integer representing the number of pixels from the top of the video to start the cropping. You can specify up to 32 pixels less than the total height. The default is 0.
height type="uint"	integer	An integer indicating the total height of the cropped video, measured from the value set by the top property. The default is the input video height minus the pixels cropped by the top property. If the value is not a multiple of 4, the next lower multiple is used. For example, a value of 127 results in a video 124 pixels high.

**Tip:** If you perform a horizontal or vertical resizing on the video first, the cropping offsets are measured from the video's new size, not its original size.

## Input Cropping Example

The following example demonstrates the cropping prefilter syntax. Applying this prefilter creates a video that is 320 pixels wide by 240 pixels high. The output video's top border begins 12 pixels down from the top border of the

input video. As well, its left border begins 24 pixels in from the left border of the input video.

```
<prefilter xsi:type="inputCroppingPrefilter">
  <pluginName type="string">rn-prefilter-inputcropping</pluginName>
  <enabled type="bool">true</enabled>
  <left type="uint">24</top>
  <width type="uint">320</top>
  <top type="uint">12</top>
  <height type="uint">240</top>
</prefilter>
```

## De-Interlace and Inverse-Telecine Prefilter

The optional de-interlace filter is useful for videos larger than 240 pixels high. The inverse-telecine filter is for NTSC videos that have been transferred from film. For an explanation of these filters, refer to “Inverse-Telecine Filter” on page 78 and “De-interlace Filter” on page 79. The prefilter uses the type value of `xsi:type="deinterlacePrefilter"`.

### De-Interlace and Inverse-Telecine Properties

The following table describes the de-interlace and inverse-telecine properties.

**De-Interlace and Inverse-Telecine Prefilter Properties**

Property	Value	Function
<code>pluginName type="string"</code>	<code>rn-prefilter- deinterlace</code>	Optionally sets the plug-in to use. If omitted, RealProducer selects the plug-in based on the <code>xsi:type</code> value.
<code>enabled type="bool"</code>	<code>true false</code>	Enables the filter when set to the default value of <code>true</code> .
<code>manual type="bool"</code>	<code>true false</code>	If this property is set to the default of <code>false</code> , RealProducer applies the de-interlace and inverse-telecine filters only if it determines they are needed. This allows you to leave the filter enabled for all content and have RealProducer use it only if necessary.

(Table Page 1 of 2)

**De-Interlace and Inverse-Telecine Prefilter Properties (continued)**

Property	Value	Function
deinterlace type="bool"	true false	Applies the de-interlace filter when its value is set to the default of true. Used only if manual is also set to true.
inverseTelecine type="bool"	true false	Applies the inverse-telecine filter when its value is set to the default of true. Used only if manual is also set to true.

(Table Page 2 of 2)

**De-Interlace and Inverse-Telecine Example**

The following syntax provides an example of the de-interlace and inverse telecine filters:

```
<prefilter xsi:type="deinterlacePrefilter">
  <pluginName type="string">rn-prefilter-deinterlace</pluginName>
  <enabled type="bool">true</enabled>
  <manual type="bool">>false</manual>
  <deinterlace type="bool">true</deinterlace>
  <inverseTelecine type="bool">true</inverseTelecine>
</prefilter>
```

**Video Noise Reduction Prefilter**

This filter can reduce video noise. It has high and low settings, which are described in the section “Noise Filters” on page 77. The prefilter uses the type value of `xsi:type="videoNoiseReductionPrefilter"`.

**Noise Reduction Properties**

The following table describes the noise reduction filter properties.

**Noise Reduction Prefilter Properties**

Property	Value	Function
pluginName type="string"	rn-prefilter-video noisereduction	Optionally sets the plug-in to use. If omitted, RealProducer selects the plug-in based on the <code>xsi:type</code> value.
enabled type="bool"	true false	Enables the filter when set to the default value of true.
level type="string"	low high	Indicates whether to use low or high noise filtering.

### Noise Reduction Example

The following is sample syntax for the low noise reduction prefilter:

```
<prefilter xsi:type="videoNoiseReductionPrefilter">
  <pluginName type="string">rn-prefilter-videonoisereduction</pluginName>
  <enabled type="bool">true</enabled>
  <level type="string">low</level>
</prefilter>
```

### Black-Level Prefilter

This filter increases the video contrast and improves the RealVideo codec efficiency. For more information, refer to “Black-Level Correction Filter” on page 80. The prefilter uses the type value of `xsi:type=blackLevelPrefilter`.

#### Black-Level Properties

The following table describes the black level properties.

**Black-Level Correction Prefilter Properties**

Property	Value	Function
pluginName type="string"	rn-prefilter-blacklevel	Optionally sets the plug-in to use. If omitted, RealProducer selects the plug-in based on the xsi:type value.
enabled type="bool"	true false	Enables the filter when set to true.

#### Black-Level Example

The following is sample syntax for the low noise reduction prefilter:

```
<prefilter xsi:type="blackLevelPrefilter">
  <pluginName type="string">rn-prefilter-blacklevel</pluginName>
  <enabled type="bool">true</enabled>
</prefilter>
```

### Video Resizing Prefilter

The video resize prefilter resizes the video input before encoding. You should generally run it last, as noted in “Prefilter Order” on page 318, because vertical resizing can adversely affect the use of other prefilters. The prefilter uses the type value of `xsi:type="videoResizePrefilter"`.



**Tip:** Refer to “Video Resizing Methods” on page 319 to determine if the resize prefilter or codec resizing is the better method to use for your content.

## Video Resizing Properties

The following table describes the video resizing filter properties.

**Video Resizing Prefilter Properties**

Property	Value	Function
pluginName type="string"	rn-prefilter- videoresize	Optionally sets the plug-in to use. If omitted, RealProducer selects the plug-in based on the xsi:type value.
enabled type="bool"	true false	Enables the filter when set to the default value of true.
videoResizeWidth type="uint"	integer in multiples of 4, from 32 to 2048	Sets the video width in pixels. See “Width and Height Values for Resizing” on page 320.
videoResizeHeight type="uint"	integer in multiples of 4, from 32 to 2048	Sets the video height in pixels. See “Width and Height Values for Resizing” on page 320.
videoResizeQuality type="string"	fast high	Determines the type of resizing to perform if the video is resized. The default high value results in better quality, but uses more CPU.

## Video Resizing Examples

The following example demonstrates the video resize filter syntax reducing the video size to 176 pixels wide by 132 pixels high:

```
<prefilter xsi:type="videoResizePrefilter">
  <pluginName type="string">rn-prefilter-videoresize</pluginName>
  <enabled type="bool">true</enabled>
  <videoResizeWidth type="uint">176</videoResizeWidth>
  <videoResizeHeight type="uint">132</videoResizeHeight>
  <videoResizeQuality type="string">high</videoResizeQuality>
</prefilter>
```

If you are running the de-interlace filter on a large video, you may be able to decrease the encoding time by first resizing the video’s width, running the other prefilters, then resizing the video’s height. The initial, horizontal resize decreases the amount of video data that other prefilters must process. Only

vertical resizing needs to be performed after other prefilter operations because it can affect de-interlacing.

The following example resizes a video from 320-by-240 pixels to 176-by-132 pixels in two steps. Note that in the first resizing, the height is reduced. Here, the original width is specified because leaving the `videoResizeHeight` set to its default value automatically reduces the height to keep it in the same aspect ratio with the video. In the second resizing, the height is reduced:

```
<prefilters>
  <prefilter xsi:type="videoResizePrefilter">
    <pluginName type="string">rn-prefilter-videosize</pluginName>
    <enabled type="bool">true</enabled>
    <videoResizeWidth type="uint">176</videoResizeWidth>
    <videoResizeHeight type="uint">240</videoResizeHeight>
    <videoResizeQuality type="string">high</videoResizeQuality>
  </prefilter>
  ...other prefilters, such as de-interlacing...
  <prefilter xsi:type="videoResizePrefilter">
    <pluginName type="string">rn-prefilter-videosize</pluginName>
    <enabled type="bool">true</enabled>
    <videoResizeWidth type="uint">176</videoResizeWidth>
    <videoResizeHeight type="uint">132</videoResizeHeight>
    <videoResizeQuality type="string">high</videoResizeQuality>
  </prefilter>
</prefilters>
```

## Audio Gain Prefilter

The audio gain prefilter amplifies or attenuates audio. When the prefilter is enabled in the job file, it applies to all audio inputs. The audio gain prefilter does not support multichannel audio and should not be used when encoding multichannel input. This prefilter uses the type value of `xsi:type="audioGainPrefilter"`.

## Audio Gain Properties

The following table describes the audio gain filter properties.

Audio Gain Prefilter Properties		
Property	Value	Function
pluginName type="string"	rn-prefilter-audiogain	Optionally sets the plug-in to use. If omitted, RealProducer selects the plug-in based on the xsi:type value.
enabled type="bool"	true false	Enables the filter when set to the default value of true.
gain type="double"	Number from -12 to 12	Sets the audio gain level in dB. Use a minus sign to indicate negative values. A low value effectively mutes the video. High values do not introduce clipping. For background, refer to "Monitoring Audio" on page 142.

## Audio Gain Example

The following example demonstrates the audio gain filter syntax:

```
<prefilter xsi:type="audioGainPrefilter">
  <pluginName type="string">rn-prefilter-audiogain</pluginName>
  <enabled type="bool">true</enabled>
  <gain type="double">5.000000</gain>
</prefilter>
```

## Audio Delay Compensation Prefilter

The audio delay compensation prefilter corrects audio shift when audio input is out of synchronization with a video's visual track. It shifts the audio by the number of specified seconds, eliminating the need to correct the delay through video preprocessing. This is useful when you encode audio and video from separate, parallel inputs.

You can specify this filter only through the job file. It is not available through the graphical user interface or command-line application. When the prefilter is included in the job file, it applies to all audio inputs. Using this filter, which has a type value of `xsi:type="audioDelayCompPrefilter"`, does not increase the encoding time.

**Tip:** Some video editing tools, such as DVD ripping software, provide information about how much delay exists between audio and video.

**For More Information:** For more on separate, parallel inputs used to encode audio and video, refer to “Single and Multiple Inputs” on page 309.

### Audio Delay Compensation Properties

The following table describes the audio delay compensation filter properties.

**Audio Delay Compensation Prefilter Properties**

Property	Value	Function
pluginName type="string"	rn-prefilter-audiodelaycomp	Optionally sets the plug-in to use. If omitted, RealProducer selects the plug-in based on the xsi:type value.
enabled type="bool"	true false	Enables the filter when set to the default value of true.
advance type="duration"	time value	The time by which to advance the audio stream if it runs behind the video. For information about time values, see “Duration Syntax” on page 298.
delay type="duration"	time value	The time by which to delay the audio stream if it runs ahead of the video. For information about time values, see “Duration Syntax” on page 298.

**Note:** You typically specify either advance or delay. If you specify both, the applied delay value is the difference between the two values. For example, if you set advance to 0.2 seconds and delay to 0.5 seconds, the applied audio compensation is a delay of 0.3 seconds.

### Audio Delay Compensation Example

The following example demonstrates the audio gain filter syntax:

```
<prefilter xsi:type="audioDelayCompPrefilter">
  <pluginName type="string">rn-prefilter-audiodelaycomp</pluginName>
  <enabled type="bool">true</enabled>
  <delay type="duration">0.1</delay>
</prefilter>
```

## File and Server Outputs

The outputs section defines the output for the job, which is either an encoded clip or a broadcast stream sent to Helix Server. The `<parOutputs>` and `</parOutputs>` tags encapsulate the outputs section. Within this list you can define one or more outputs between `<output>` and `</output>` tags. All outputs defined in this section are encoded simultaneously when the job file runs.

The `<output>` tag defines each output within the `<parOutputs>` list. An `<output>` section is itself a container for separate sublists that define the output's destination, media profile, and optional clip information. The following example shows the structure for defining a single output for a digitized file:

```
<parOutputs>
  <output>
    <destinations>
      ...output destinations for the clip or broadcast...
    </destinations>
    <mediaProfile>
      ...profile for the output, such as the audiences it uses...
    </mediaProfile>
    <clipInfo>
      ...optional clip information for the output...
    </clipInfo>
  </output>
  ...additional outputs...
</parOutputs>
```

**Note:** When you define more than one output, the output streams are encoded simultaneously. You must use the command-line application to process a job file that includes multiple outputs, however. For live captures, it is important that your RealProducer machine has sufficient processing power for parallel outputs.

**For More Information:** For instructions about defining clip information for each output, refer to “Clip Information” on page 305. For background on broadcast requirements, refer to Chapter 10.

## Destinations Section

The destinations section defines the destination for each output, which can either be a clip or a broadcast stream sent to a server. The `<destinations>` and `</destinations>` tags encapsulate the destinations section within an `<output>` list. Within this list you can define one or more destinations between `<destination>` and `</destination>` tags. All destinations defined for the output are encoded simultaneously when the job file runs.

### Destination Tag

A `<destination>` tag defines each destination within the `<destinations>` list. It uses a `type` attribute with one of the following values to encode the output as a file or a broadcast stream:

`xsi:type="fileDestination"` Encode as a file.  
`xsi:type="pushServer"` Encode a broadcast stream that is pushed to a server.  
`xsi:type="pullServer"` Encode a broadcast stream that is pulled by a server.

### File Destinations

When the output destination is a digitized file, the destination type is `xsi:type="fileDestination"`. You can then specify the properties described in the following table. A file name parameter is required, but you can leave the value blank if you want to specify the name through the graphical application, as described in “Creating a Destination Clip” on page 92. When you use the command-line application, you must include the file name. If you specify more than one output file, you must run the job through the command-line application.

**File Output Properties**

Property	Value	Function
<code>destinationRollSize</code> <code>type="uint"</code>	integer	Sets the size in Megabytes at which to create a new output clip. See “File Rolling” on page 332.
<code>destinationRollTime</code> <code>type="duration"</code>	time value	Sets the time at which to create a new output clip. See “File Rolling” on page 332.

(Table Page 1 of 2)

**File Output Properties (continued)**

Property	Value	Function
filename type="string"	file name and path	Indicates the path and name of the out file. You cannot use wildcards. See "Output File Names" on page 331.
name type="string"	string	Assigns a handle to the output. This is not related to the file name and is typically used only by graphical applications to identify the output.
pluginName type="string"	rn-file-realmedia	Provides the name of the file system plug-in that writes the file. Required only if you are not created a RealMedia clip.

(Table Page 2 of 2)

**File Destination Example**

The following example shows a single input for a digitized file:

```
<destination xsi:type="fileDestination">
  <filename type="string">C:\media\movie.rm</filename>
</destination>
```

**Output File Names**

An output file name is required when encoding through the command-line application. It is optional when using the graphical application, however, and you can add the name through the graphical application before you encode, as described in "Creating a Destination Clip" on page 92.

Whether you use the command-line application or graphical application, you can omit the file name value as long as you encode from an input file. The output then uses the same base file name as the input, along with the appropriate extension (.ra, .rv, .rm, or .rmvb). For example, a constant bit rate clip encoded from movie.avi becomes movie.rv or movie.rm. A variable bit rate version becomes movie.rmvb.

If you specify the name of clip that exists already in the output directory, RealProducer archives the existing clip by appending *\_archNNN* to the base file name. Hence, movie.rm becomes movie\_arch001.rm before the new movie.rm clip is saved. If you encode the output again, the existing movie.rm becomes movie\_arch002.rm. Higher numbers therefore represent newer archives.

## File Rolling

File rolling allows you to create multiple RealMedia files for a single output clip. Each new file is appended with a number. The output clip `movie.rm` might be saved as `movie.rm`, `movie1.rm`, `movie2.rm`, and so on. Rolling happens automatically when the clip reaches the RealMedia file format limit (4 GB), or the maximum size allowed by the operating system:

- 2 or 4 Gigabytes on Windows
- 2 Gigabytes on Linux

You can also specify limits to the file size using the `destinationRollSize` property. A value of 30, for example, creates a new output clip from the file or live input when the current clip reaches 30 Megabytes in size.

### Rolling Files By Time

The `destinationRollTime` property rolls new files based on the amount of time that RealProducer has encoded the output. For example, if you set a file destination time of 15 minutes when encoding a broadcast named `live.rm`, the first 15 minutes is encoded as `live.rm`, the second 15 minutes is saved as `live1.rm`, and so on.

Because this time-rolling method is based on encoding time rather than the input media's timeline, it can produce clips of various lengths when you encode an input file. With a roll time of 15 minutes, each rolled clip may play for 20 minutes, for example, if RealProducer was able to encode the input faster than real-time.

Time values are accurate to the minute, but should include a seconds designation using the syntax described in "Duration Syntax" on page 298. For example, the following sets a roll time of 10 minutes:

```
<destinationRollTime type="duration">10:00</destinationRollTime>
```

**Tip:** You can specify both a file rolling time and a file rolling size. In this case, the new file is created when the first specified limit is reached.

### Combining Archives

Using the RealMedia Editor described in Chapter 12, you can combine rolled files into a single output, up to the file size limit of your operating system. You can also play the individual clips in sequence through a Ram file or a SMIL file. With either method, though, that file transitions may not be seamless, and may contain audio and video gaps. If you stream the clips in



sequence, each new clip may require buffering that temporarily pauses playback on RealPlayer.

**Tip:** Refer to *Introduction to Streaming Media* or *RealNetworks Production Guide* for information about combining rolled clips into a single sequence using a Ram file or a SMIL file.

## Server Destinations

When the output destination is a server, the destination type is one of the following, depending on the server type and the broadcast method:

<code>xsi:type="pushServer"</code>	Encodes a broadcast stream that is pushed to a server. For background, refer to the push broadcasting sections of Chapter 11. The section "Push Server Syntax" on page 362 explains the markup for this broadcast type.
<code>xsi:type="pullServer"</code>	Creates a broadcast stream that is pulled by a server. For background, refer to "Running a Pull Broadcast" on page 210. The section "Pull Server Syntax" on page 367 explains the markup for this broadcast type.

If you plan to encode using the graphical application, you can include the server destinations in the job file. Or, you can leave the server destination section empty, and define server destinations through the graphical application as described in Chapter 11. When you broadcast using the command-line application and a job file, your job file must define the server destination.

**Tip:** The easiest way to define a server destination is to create a server file as described in Appendix D. Then, incorporate the server file syntax into the job file.

### Incorporating a Server File into a Job File

You can add server destination information from a server file into a job file manually, as described in the following procedure.

- To create a job file server destination from a server file:
  1. Create a `<destinations>...</destinations>` section for the output if one does not exist already.
  2. Copy everything from the selected server file between its `<destination>` and `</destination>` tags, and paste this markup into the `<destinations>` element.

This is everything in the server file, except for the XML declaration tag on the first line.

3. Delete the namespaces from the <destination> tag. The job file requires only the namespaces defined in the <job> tag.
4. If you wish to use the job file in the graphical application, include the server's name property.
5. If you set up multiple broadcast outputs sent to the same server, ensure that each stream name, as defined by the streamname property, is unique.

## Media Profile

Within an output section, a media profile section defines the output settings, such as which audiences are used. Because you define the media profile separately for each output, you can create multiple outputs that have different properties, such as two clips encoded at different dimensions. A list created by the <mediaProfile> and </mediaProfile> tags defines these settings between each output's <output> and </output> tags, as shown in the following example:

```
<parOutputs>
  <output>
    ...output information...
    <mediaProfile>
      ...media profile settings for this output...
    </mediaProfile>
  </outputs>
</parOutputs>
```

## Media Profile Properties

The following table describes the properties defined in an output's media profile section. The audience references section is required. All other elements are optional.

Media Profile Properties		
Property	Value	Function
audienceRefs	list	Indicates the audiences to use when encoding the output. See “Media Profile Audience References” on page 337.
audioMode type="string"	voice music	Describes the type of audio content. The default is music. The chosen audiences should have an audio stream that corresponds to this setting, whether the clip is audio-only or audio-video. See “Audio Stream Context” on page 348.
audioResamplingQuality type="string"	fast high	Affects the quality of audio resampling, which must be done if the codec sample rate differs from the input sample rate. The default high resampling results in better quality, but uses more CPU. With either value, there is no pitch shift. For background, refer to “Sampling Rate” on page 38.
disableAudio type="bool"	true false	Disables the audio output if set to true. The default is false. You can also disable the audio for each input, as described in “Digitized File Input” on page 311.
disableVideo type="bool"	true false	Disables the video output if set to true. The default is false. You can also disable the video for each input, as described in “Digitized File Input” on page 311.
latencyMode type="uint"	0 1 2	Reduces latency for live broadcasts. The default is 0, which is the highest latency but also the highest error resiliency. See “Latency Reduction” on page 338.

(Table Page 1 of 2)

**Media Profile Properties (continued)**

Property	Value	Function
maxPacketDuration type="duration"	any duration	Defines the maximum time that RealProducer can encode a stream before writing a packet. This can also be defined in the stream properties as described in "Maximum Packet Size and Duration" on page 358.
maxPacketInterleaving Duration type="duration"	duration from 0 to 60.000	Sets the superblock size for audio packetization. This can also be defined in the stream properties as described in "Maximum Superblock Size" on page 359.
maxPacketSize type="uint"	value in bytes from 0 to 15000	Sets the maximum size for an audio or video packet. This can also be defined in the stream properties as described in "Maximum Packet Size and Duration" on page 358.
outputHeight type="uint"	integer in multiples of 4, from 32 to 2048	Sets the video height in pixels. See "Width and Height Values for Resizing" on page 320.
outputWidth type="uint"	integer in multiples of 4, from 32 to 2048	Sets the video width in pixels. See "Width and Height Values for Resizing" on page 320.
prefilters	list of filters	Indicates one or more prefilters to use with the input. You can also define prefilters in the inputs section to apply the same filters to all outputs. For more information, refer to "Prefilters" on page 317.
resizeQuality type="string"	fast high	Determines the type of resizing to perform if the video is resized. The default high value results in better quality, but uses more CPU.
videoMode type="string"	sharp normal smooth slideshow	Sets the video mode. This setting is ignored for quality-based VBR encoding. The default is normal. For background, refer to "Choosing Video Options" on page 99.

(Table Page 2 of 2)

## Media Profile Audience References

The `<audienceRefs>` list contains one or more `<audienceRef>` elements that select which audiences are used with the output. The audience defines the audio and video codecs used, and sets the output's streaming bandwidth. The audiences are defined elsewhere in the job file, as described in “Audiences Section” on page 340. The value enclosed by the `<audienceRef>` element must correspond to an audience name, which is described in “Audience Properties” on page 345.

### Multiple Audience References Example

The following example shows four audiences used when encoding an output:

```
<parOutputs>
  <output>
    ...output information...
    <mediaProfile>
      ...media profile information...
      <audienceRefs>
        <audienceRef>16k Substream for 28k Dial-up</audienceRef>
        <audienceRef>28k Dial-up</audienceRef>
        <audienceRef>56k Dial-up</audienceRef>
        <audienceRef>256k DSL or Cable</audienceRef>
      </audienceRefs>
    </mediaProfile>
  </output>
</parOutputs>
```

### Combining Multiple Audiences

As shown in the preceding example, you can encode multiple streams into a single output using SureStream. When you do this, you must choose audiences appropriately for the encoding to work:

- Using more than one audience requires that all audiences use constant bit rate encoding. Attempting to include a variable bit rate stream in the output causes the encoding to fail. In each audience definition, the `encodingType` value should be `cbr`. For more information, refer to “Video Stream Properties” on page 353.
- All video streams must use the same video codec. You cannot encode some streams as RealVideo 10 and some streams as RealVideo 8, for example. If audiences specify different RealVideo codecs, the newer codec is used. For

information on selecting the video codec, see “Video Stream Properties” on page 353.

- To make good use of SureStream, streams should use significantly different bandwidths, as determined by the audience’s avgBitrate element:
  - If two video streams have average bit rates within five percent of each other, RealProducer encodes both streams but logs a warning.
  - If two or more audio streams use different audio codecs that differ in bit rate by 1 Kbps or less, RealProducer logs an error and stops the encoding. Different audiences can specify the same audio codec, however. To conserve file size and processing time, RealProducer encodes the audio stream only once.

**For More Information:** For more on avgBitrate, see “Audience Properties” on page 345.

## Latency Reduction

The latencyMode property can decrease the end-to-end latency for live broadcasts, as described in the section “End-to-End Broadcast Latency” on page 180. The default value of 0 sets the default system latency mode. Setting a value of 1 decreases latency. A value of 2 provides the lowest possible latency, but also creates more noticeable errors if broadcast packets are lost.

Setting a value for latencyMode automatically sets the maxPacketDuration and the maxPacketInterleavingDuration values for the stream. (If you also define the maxPacketDuration and maxPacketInterleavingDuration values in the media profile section of the job file or the stream packetizer section of the audience file, their values override the latencyMode setting.) The following table lists the values set for the packet properties based on the latency mode setting. The mode has no effect on maxPacketSize.

**Effect of Latency Mode on Packets and Superblocks**

Latency Mode	maxPacketDuration	maxPacketInterleaving Duration
0	Default packet size of 23 to 480 milliseconds, depending on the codec.	Default superblock duration. Varies with each codec.
1	50 milliseconds (8 packets per superblock)	400 milliseconds
2	100 milliseconds	0 (no superblocks)

**Warning!** Use a low latency setting only when delivering a live stream to Helix Server version 11 or later. Earlier versions of Helix Server will not handle the stream properly.

**For More Information:** See “Maximum Packet Size and Duration” on page 358 and “Maximum Superblock Size” on page 359 for explanations of the `maxPacketDuration` and the `maxPacketInterleavingDuration` properties, respectively.

## Media Profile Example

The following example shows media profile settings defined for two output clips. The first clip is meant for dial-up modem connections, so it specifies dial-up modem audiences, and resizes the input to make it smaller. This helps to increase the frame rate and clarity when streaming over slow connections. The second output is for broadband connections. It specifies several DSL and cable modem audiences, keeping the encoded video the same size as the input:

```
<parOutputs>
  <output>
    ...output information for the first file...
    <mediaProfile>
      <audioMode type="string">voice</audioMode>
      <disableAudio type="bool">>false</disableAudio>
      <disableVideo type="bool">>false</disableVideo>
      <outputHeight type="uint">132</outputHeight>
      <outputWidth type="uint">176</outputWidth>
      <resizeQuality type="string">high</resizeQuality>
      <audienceRefs>
        <audienceRef>16k Substream for 28k Dial-up</audienceRef>
        <audienceRef>28k Dial-up</audienceRef>
        <audienceRef>56k Dial-up</audienceRef>
      </audienceRefs>
    </mediaProfile>
  </output>
  <output>
    ...output information for the second file...
    <mediaProfile>
      <audioMode type="string">voice</audioMode>
      <disableAudio type="bool">>false</disableAudio>
      <disableVideo type="bool">>false</disableVideo>
      <outputHeight type="uint">0</outputHeight>
      <outputWidth type="uint">0</outputWidth>
```

```

<resizeQuality type="string">high</resizeQuality>
<audienceRefs>
  <audienceRef>256k DSL or Cable</audienceRef>
  <audienceRef>512k DSL or Cable</audienceRef>
  <audienceRef>768k DSL or Cable</audienceRef>
</audienceRefs>
</mediaProfile>
</output>
</parOutput>

```

**For More Information:** For information about the relationship between video dimensions, bandwidth, and output quality, see “Factors for Creating a Good Streaming Video” on page 55.

## Audiences Section

The audiences section defines one or more audiences that are used within the job file. Because a job file can define multiple audiences, the audience section starts and ends with `<audiences>` and `</audiences>` tags (note the plural “audiences”). Within this section, one or more sublists defined between `<audience>` and `</audience>` tags (note the singular “audience”) create each audience setting. The following example shows the structure of the audience section within a job file:

```

<job...>
  ...additional job file information...
  <audiences>
    <audience>
      ...first audience definition...
    </audience>
    <audience>
      ...second audience definition...
    </audience>
    ...additional audience definitions...
  </audiences>
</job>

```

**For More Information:** Refer to Appendix C for an explanation of the audience syntax.



## Working with Audiences

Each job file should have an audiences section defined between `<audiences>` and `</audiences>` tags. If you plan to encode using the graphical application, you can include the audiences in the job file. Or, you can leave the audiences section empty, and select your audiences through the graphical application as described in “Choosing Audiences” on page 100.

When you use a job file with the command-line application, your job file must define the audiences. The easiest way to create the audience definitions is to import the syntax from an audience file, as described in “Incorporating an Audience File into a Job File” on page 341.

It’s important to keep in mind that not every audience listed in the job file must be used when encoding. The audience definitions within the `<audiences>` list provide the reference information necessary to encode for a particular audience. An output’s media profile section determines which audiences are used for that output, however, as described in “Media Profile” on page 334.

## Incorporating an Audience File into a Job File

You can add audience information from an audience file into a job file manually, as described in the following procedure.

► **To create a job file audience section from an audience file:**

1. Create an `<audiences>...</audiences>` section within the job file if one does not exist already. This list falls within the `<job>...</job>` list, and typically appears at the end of the job file. Note the plural “audiences” in the tag names.
2. Copy everything from the selected audience file between the `<audience>` and `</audience>` tags. This is everything in the file, except for the XML declaration tag on the first line.
3. Delete the namespaces from the `<audience>` tag. The job file requires only the namespaces defined in the `<job>` tag.
4. Ensure that the audience definition includes a name attribute, which is described in “Audience Properties” on page 345.
5. For each output in the job file that uses these audience settings, modify the output’s media profile to refer to the audience by way of the audience name value. For more information, refer to “Media Profile Audience References” on page 337.



## AUDIENCE FILE SYNTAX

This appendix describes the RealProducer audience syntax. Each audience file or job file records settings about how clips and broadcasts are encoded. The information in this appendix allows you to edit audience information to modify encoding settings without using the RealProducer graphical application.

**Note:** If you are not familiar with XML syntax, refer to Appendix A for information about XML namespaces, tags, attributes, and values.

### Understanding Audiences

Each audience section within an audience file or job file defines a single audience for which a clip or broadcast is encoded. RealProducer predefines a number of audiences that appear within the graphical user interface when you click the **Audiences** button. For example, one audience is for 56 Kbps dial-up modems while another is for 256 Kbps DSL and cable modem users. Each audience specifies the streaming rates at which audio and video clips are encoded, along with other settings.

#### Audience Files

The audience files are stored in the audiences subdirectory under the main RealProducer installation directory, although you can change this location through the RealProducer preferences. Audience files use the file extension `.rpad`, and their file names correspond directly to the audience name in the graphical application. For example, the **56k Dial-up** audience in the graphical user interface stores its information in the file named `56k Dial-up.rpad`.

If you edit an audience through the graphical application—a process described in “Creating and Editing Audiences” on page 155—RealProducer updates the corresponding audience file to record the changes. You can also edit audience

files manually. This allows you to change audience information used by the graphical application or command-line application using a text editor or any automated process that can modify text files.

**Tip:** When creating a new audience file, RealNetworks recommends that you start with an existing audience file that you have renamed.

## Audiences in Job Files

A job file, which Appendix B explains, can also hold information about audiences. For example, if you use the RealProducer graphical application to create a new job and add the **56k Dial-up** audience to this job, RealProducer copies the audience information from the 56k Dial-up.rpad audience file into the job file. Unlike an audience file, which defines just a single audience, a job file can define multiple audiences. This is necessary for using SureStream technology, which encodes a single clip with multiple streams targeting different audiences.

When you encode a clip using a job file, RealProducer gathers the audience information from the job file, rather than the original audience file. This allows you to change the audience settings for the job without affecting the audience default settings. For instance, you might change an audio codec used for your 56 Kbps dial-up audience within a job. That change affects only the clips encoded using that job file.

The syntax for defining an audience within an audience file and a job file is the same, except for the following differences:

- The main <audience> tag in an audience file requires a namespace, whereas an <audience> tag within a job file does not use a namespace.
- Within a job file, an audience definition requires a name value. A job allows multiple outputs, such as encoding to two separate files. Using the name values, you can specify which audiences each output uses. One output might use a high-bandwidth audience, for example, while another output encodes for a low-bandwidth audience.
- Because a job file supports multiple audiences, each <audience> section falls within a list that begins with an <audiences> tag and ends with </audiences>. The audience file, which defines only one audience, does not use the <audiences> container list.

**For More Information:** Refer to “Audiences Section” on page 340 for an explanation of how audiences appear within a job file.

## Audience Section

The <audience> and </audience> tags encapsulate an audience section within an audience file or job file. The audience section then uses separate <streams> sections to define the video stream, the audio stream, and so on. For a standalone audience file that defines a single audience, the <audience> tag follows directly after the XML declaration tag. Be sure to include the namespaces shown in the following example, and add any namespaces required by customized RealProducer components:

```
<?xml version="1.0" encoding="UTF-8"?>
<audience xmlns="http://ns.real.com/tools/audience.2.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://ns.real.com/tools/audience.2.0
  http://ns.real.com/tools/audience.2.0.xsd">
  ...all audience parameters...
</audience>
```

**For More Information:** For information about defining an audience within a job file, refer to “Audiences Section” on page 340.

## Audience Properties

The following table describes the properties of an <audience> element.

Audience Properties		
Property	Value	Function
avgBitrate type="uint"	positive integer from 1 to 999999	Defines the average bit rate for this audience in bits per second (bps). This is ignored if the encoding type is set to vbrQuality, or you are encoding audio without video. For more on encoding types, refer to “Stream Encoding Types” on page 354.

(Table Page 1 of 2)

**Audience Properties (continued)**

Property	Value	Function
maxBitrate type="uint"	positive integer from 1 to 999999	Limits the total bit rate for this audience to a maximum number in bits per second (bps). The value, which must be more than the value for avgBitrate, applies only if the encoding type is vbrBitrate or vbrQuality, as described in "Stream Encoding Types" on page 354.
name type="string"	string	Creates a user-defined name that identifies the audience template. This name appears in the graphical user interface. The job file uses the name to determine which audiences each output uses.
streams	list	Defines each stream in the audience, as described in "Streams Section" on page 346.

(Table Page 2 of 2)

**Audience Properties Example**

The following example shows a template for an audience using 256 Kbps DSL or cable modem connections. The average bit rate is set to 225 Kbps, which allows approximately 10 percent of the total bandwidth for network overhead. If variable bit rate encoding is used, bandwidth spikes can reach 450 Kbps:

```
<audience>
  <avgBitrate type="uint">225000</avgBitrate>
  <maxBitrate type="uint">450000</maxBitrate>
  <name type="string">256k DSL or cable</name>
  <streams>
    ...streams defined here...
  </streams>
</audience>
```

**Streams Section**

Each audience template has a streams section that defines the encoded streams. This section starts and ends with <streams> and </streams> tags (note the plural "streams"). Within this list, one or more sublists defined between <stream> and </stream> tags (note the singular "stream") define each stream setting.

Each <stream> section can define an audio or video stream. All stream types are optional. You can omit the video stream from audio-only encodings, for

example. You define each video stream once within the audience section. For audio, however, you can define up to four streams for four separate audio contexts:

- music in an audio-only clip
- voice in an audio-only clip
- music in a video clip
- voice in a video clip

The various `<stream>` sections use an `xsi:type` attribute to indicate the type of the stream. The following example shows the five possible streams defined within an audience section:

```
<audience>
  ...other audience properties...
  <streams>
    <stream xsi:type="audioStream">
      ...audio stream for music in an audio-only clip...
    </stream>
    <stream xsi:type="audioStream">
      ...audio stream for voice in an audio-only clip...
    </stream>
    <stream xsi:type="audioStream">
      ...audio stream for music in a video clip...
    </stream>
    <stream xsi:type="audioStream">
      ...audio stream for voice in a video clip...
    </stream>
    <stream xsi:type="videoStream">
      ...video stream...
    </stream>
  </streams>
</audience>
```

## Audio Stream Properties

The following table describes the properties that the various audio streams can contain. Each audio stream section begins with a `<stream`

`xsi:type="audioStream">` tag and ends with a `</stream>` tag. The `codecName` and `codecFlavor` properties are required.

#### Audio Stream Properties

Property	Value	Function
<code>codecFlavor</code> <code>type="uint"</code>	number	Sets the encoding speed used with the chosen codec. For a list of the flavor numbers, refer to the tables in the section "RealAudio Codecs" on page 37.
<code>codecName</code> <code>type="string"</code>	<code>sipr cook ralf raac</code>	Defines the type of codec used to encode the stream. For a list of the codec names, refer to the tables in the section "RealAudio Codecs" on page 37.
<code>encodingComplexity</code> <code>type="string"</code>	<code>low medium high</code>	Sets the complexity for the lossless codec, as described in "Encoding Complexity Modes" on page 81. This value is ignored for all other codecs. The default is high.
<code>encodingType</code> <code>type="string"</code>	<code>cbr vbrUnconstrainedQuality</code>	Determines the encoding type. The default is <code>vbrUnconstrainedQuality</code> for the RealAudio lossless codec, <code>cbr</code> for all other codecs. Omit this to choose the encoding type automatically. For background, refer to "Stream Encoding Types" on page 354.
<code>pluginName</code> <code>type="string"</code>	<code>rn-audiocodec-realaudio rn-audiocodec-lossless</code>	Optionally sets the plug-in to use. If omitted, RealProducer selects the plug-in based on the <code>xsi:type</code> value.
<code>streamContext</code> <code>type="bag"</code>	list	Determines the audio context for which the codec is used. Refer to "Audio Stream Context" on page 348.

### Audio Stream Context

Each audience can have up to four audio streams that define which audio codec is used based on the presentation type (audio-only or audio-video) and audio mode (voice or music). This creates four possible audio stream contexts:

- voice in an audio-only clip
- music in an audio-only clip
- voice in a video clip



- music in a video clip

These contexts exist because you should use different codecs when encoding music or voice. As well, the audio typically receives more bandwidth in an audio-only clip than in a video clip. When RealProducer encodes a clip using the audience information, it selects just one of the audio contexts, based on other audio settings you have defined in the job file, graphical application, or command line.

**For More Information:** For background on audio contexts, refer to the section “Audio Encoding for Audiences” on page 103.

### Stream Context Element

Each audio stream uses the `streamContext` sublist to define one of the four possible audio contexts. For example, the following markup instructs RealProducer to use this audio stream when encoding voice audio for a video clip or broadcast:

```
<stream xsi:type="audioStream">
  ...audio codec information...
  <streamContext type="bag">
    <audioMode type="string">voice</audioMode>
    <presentationType type="string">audio-video</presentationType>
  </streamContext>
</stream>
```

### Stream Context Properties

The following table describes the stream context properties.

**Stream Context Properties**

Property	Value	Function
<code>audioMode type="string"</code>	music voice	Indicates that the audio is music or voice, causing RealProducer to encode with a music or voice codec. The default is music.
<code>presentationType type="string"</code>	audio-video audio-only	Specifies if the stream is audio and video, or audio-only. If audio-only is selected, RealProducer generally uses a higher bit-rate codec for the audio. The default is audio-video.

**For More Information:** The section “Setting Audio Parameters” on page 98 explains how to set the audio mode through the graphical application. For the command line, see the section

“Audio Mode (-am)” on page 281. See “Media Profile” on page 334 for information about how the stream context is set in a job file.

## Using Fewer than Four Audio Stream Contexts

Unless you are an advanced user, RealNetworks recommends that you always define four separate audio streams for the four possible stream contexts. This ensures that the audience information is valid for all possible audio contexts. However, you can define fewer than four audience contexts depending on your encoding needs. Improperly defining these audio contexts, however, may cause errors.

If you encode only music videos, for example, you can define just one audio stream that uses the appropriate music codec for your audience streaming speed. In this case, you do not need to include a <streamContext> list. RealProducer uses the single, defined stream for any audio encoded for the audience.

If you define a single audio stream, though, you may inadvertently create unstreamable clips, or clips that do not use available bandwidth effectively. Suppose that you create a 56 Kbps modem audience and use a 32 Kbps music codec as the only audio stream. The total streaming speed for this audience is approximately 34 Kbps. As long as you encode audio-only files, you are using bandwidth effectively. But if you encode a video with this audience setting, the visual track gets only 2 Kbps of bandwidth, rendering the video useless.

Conversely, you might define a 6 Kbps music clip for your 56 Kbps modem audience. This leaves about 28 Kbps of usable bandwidth for a video's visual track, which is a good division. However, if you encode an audio-only clip with this audience, it still uses just 6 Kbps of the bandwidth for the audio, letting the other 28 Kbps of bandwidth go unused. For an audio-only clip, you want to select a higher-bandwidth codec that uses bandwidth more effectively and improves the sound quality.

When you define multiple audio streams for different stream contexts, you need to ensure that a context fits your audio encoding settings. Suppose that you set RealProducer to encode a video sound track with music, and your audience file specifies just two streams:

- a stream for audio-only music
- a stream for audio-only voice

In this case, RealProducer does not encode the clip because no context for audio-video with music exists.

## Audio Context Examples

The following sections explain the codec choices and show the markup used for defining audio streams for a 56 Kbps dial-up modem audience. Because this type of modem connection rarely achieves a sustained throughput of 56 Kbps, the avgBitrate value for the audience is set at 34 Kbps. The audio (or audio and video together) cannot use more than this amount of bandwidth.

**For More Information:** The section “RealAudio Codecs” on page 37 lists the audio codecs along with the values you use for codecName and codecFlavor.

### Voice for Audio-Only Clips

For audio-only with voice, choose a voice codec that uses as much of the available bandwidth as possible. For a 34 Kbps target speed, for example, the best choice is 32 Kbps voice, which has a codec name of cook and a flavor of 7:

```
<stream xsi:type="audioStream">
  <pluginName type="string">rn-audiocodec-realaudio</pluginName>
  <codecName type="string">cook</codecName>
  <codecFlavor type="uint">7</codecFlavor>
  <encodingComplexity type="string">high</encodingComplexity>
  <streamContext type="bag">
    <presentationType type="string">audio-only</presentationType>
    <audioMode type="string">voice</audioMode>
  </streamContext>
</stream>
```

### Music for Audio-Only Clips

For audio-only music, choose a music codec that has a bit rate as close to the available bit rate without going over. For a 34 Kbps target speed, for example, a good choice is 32 Kbps Stereo Music High Response - RealAudio. This codec has a name of cook and a flavor of 21:

```
<stream xsi:type="audioStream">
  <pluginName type="string">rn-audiocodec-realaudio</pluginName>
  <codecName type="string">cook</codecName>
  <codecFlavor type="uint">21</codecFlavor>
  <encodingComplexity type="string">high</encodingComplexity>
  <streamContext type="bag">
```

```

    <presentationType type="string">audio-only</presentationType>
    <audioMode type="string">music</audioMode>
  </streamContext>
</stream>

```

### Voice Audio for Video Clips

For audio with video, it's generally advisable to allocate only 20 percent of a video's bandwidth for audio. A good choice when streaming at 34 Kbps is 6.5 Kbps voice. This codec has a name of `sipr` and a flavor of 0:

```

<stream xsi:type="audioStream">
  <pluginName type="string">rn-audiocodec-realaudio</pluginName>
  <codecName type="string">sipr</codecName>
  <codecFlavor type="uint">0</codecFlavor>
  <encodingComplexity type="string">high</encodingComplexity>
  <streamContext type="bag">
    <presentationType type="string">audio-video</presentationType>
    <audioMode type="string">voice</audioMode>
  </streamContext>
</stream>

```

### Music Audio for Video Clips

As with voice, a music codec for a video stream should consume only about 20 percent of the total bit rate. A good choice is either 6 Kbps Music - RealAudio, or 8 Kbps Music - RealAudio if you want better sound quality. The following illustrates the 8 Kbps codec, which has a name of `cook` and a flavor of 0:

```

<stream xsi:type="audioStream">
  <pluginName type="string">rn-audiocodec-realaudio</pluginName>
  <codecName type="string">cook</codecName>
  <codecFlavor type="uint">0</codecFlavor>
  <encodingComplexity type="string">high</encodingComplexity>
  <streamContext type="bag">
    <presentationType type="string">audio-video</presentationType>
    <audioMode type="string">music</audioMode>
  </streamContext>
</stream>

```

## Video Stream Properties

The following table describes the properties that a video stream can contain. Each video stream section begins with a `<stream xsi:type="videoStream">` tag and ends with a `</stream>` tag.

Video Stream Properties		
Property	Value	Function
codecName type="string"	rv8 rv9 rv10	Defines the specific video codec used. The default is rv10 for RealVideo 10. See "RealVideo Codecs" on page 61 for more information.
enableLossProtection type="bool"	true false	Determines if error correction packets are added. The default is false. See "Loss Protection" on page 84.
encodingComplexity type="string"	low medium high	Sets the encoding complexity, as described in "Encoding Complexity Modes" on page 81. The default is high.
encodingType type="string"	cbr  vbrBitrate  vbrQuality  vbrUnconstrainedQuality  vbrUnconstrainedBitrate	Sets constant bit rate encoding or a type of variable bit rate encoding. The default is cbr. Refer to "Stream Encoding Types" on page 354.
maxFrameRate type="double"	positive number from 0-60.000	Sets the maximum target frame rate. The default is 30. See "Encoded Frame Rates" on page 59.
maxKeyFrameInterval type="double"	positive number from 0 to 60.000	Sets the maximum number of seconds between video key frames. The default is 10. See "Maximum Time Between Keyframes" on page 82.
maxStartupLatency type="double"	number of seconds between 4.0 and 60.0	Determines how long the clip buffers. The default is 4.0. See "Video Startup Latency" on page 82.

(Table Page 1 of 2)

**Video Stream Properties (continued)**

Property	Value	Function
pluginName type="string"	rn-videocodec-realvideo	Optionally defines the plug-in that encodes the stream. You use the same value for RealVideo 8, 9, or 10. If omitted, RealProducer selects the plug-in based on the xsi:type value.
quality type="uint"	positive integer from 1 to 100	Sets a quality target for VBR clips. A value of 100 represents the highest possible quality. For background, refer to "VBR Encoding Settings" on page 68. See also "Stream Encoding Types" on page 354.

(Table Page 2 of 2)

**Stream Encoding Types**

The `encodingType` attribute for an audio or video stream uses one of the values described in the following table. The value you select determines whether RealProducer ignores or adheres to other audience settings. This attribute primarily affects video streams, but can be used with audio as well. If you do not define it for an audio stream, RealProducer uses `vbrUnconstrainedQuality` for the RealAudio lossless codec and `cbr` for all other audio codecs.

**Audio and Video Encoding Type Values**

encodingType Value	Output
cbr	Constant bit rate stream based on the audience's <code>avgBitrate</code> . The audience <code>maxBitrate</code> and the video stream quality values are ignored. Use this setting for all audio codecs other than the RealAudio lossless codec, which uses <code>vbrUnconstrainedQuality</code> . This is the only setting you can use for a video stream when packaging multiple streams into a single clip using SureStream technology.

(Table Page 1 of 2)

**Audio and Video Encoding Type Values (continued)**

encodingType Value	Output
vbrBitrate	Variable bit rate stream based on the audience's avgBitrate and maxBitrate settings. The video stream quality value is ignored. This is the standard setting for most variable bit rate clips. RealProducer may encode certain sections at speeds up to the maxBitrate setting, but attempts to encode an overall bit rate consistent with the avgBitrate value. The resulting average rate may be somewhat higher than the avgBitrate value, however. The vbrUnconstrainedBitrate encoding type generally encodes very close to the specified average bit rate, but has an unconstrained maximum bit rate.
vbrQuality	Variable bit rate stream based on the audience's maxBitrate setting and the video stream's quality setting. The audience's avgBitrate setting is ignored. Use this value if you want to try to maintain the encoding quality at a certain level and it is not necessary to maintain a consistent, average bit rate. The quality level may be constrained by the maximum bit rate, however, particularly during fast-action scenes.
vbrUnconstrainedQuality	Variable bit rate stream based on the video stream's quality setting. The audience's avgBitrate and maxBitrate values are ignored. Use this value to maintain the encoding quality at a certain level when it is not necessary to maintain a consistent, average bit rate or adhere to a maximum bit rate. This is the only setting allowed for the RealAudio lossless codec.
vbrUnconstrainedBitrate	Variable bit rate stream based on the audience's avgBitrate setting. The audience maxBitrate property and video stream quality setting are ignored. The resulting file may therefore have large bandwidth spikes, but the average bit rate will be close to the avgBitrate value. This is a better choice than vbrBitrate for creating a download clip at a specific file size. The final size will be the avgBitrate setting multiplied by the clip timeline. For example, a 60-second clip with an average bit rate of 450 Kbps is approximately 27,000 Kbits, or 3.3 Megabytes.

(Table Page 2 of 2)

**For More Information:** For background on variable bit rate encoding, see “Variable Bit Rate Video” on page 66.

## Video Stream Bit Rate

When you define a video stream, you do not set its bit rate directly. To determine the rate, take the audience's avgBitrate value and subtract the rates for the selected audio stream.

For a 256 Kbps audience, for example, the average bit rate may be 225 Kbps. If a 44 Kbps music audio codec is used for the sound track, the video's visual track has an average bit rate of 181 Kbps (225 minus 44). If the video uses a voice sound track that consumes 32 Kbps, the visual track has an average bit rate of 193 Kbps (225 minus 32).

For a variable bit rate clip, the same calculation using the audience's maxBitrate value reveals the video's maximum rate. If the maximum rate is 450 Kbps, for instance, the video's visual track can use a maximum bandwidth of 406 Kbps (450 minus 44) when a music codec is used, or a maximum bandwidth of 418 Kbps (450 minus 32) if a voice codec is used.

**For More Information:** The section "Audience Properties" on page 345 describes the audience values. For background on the division between the sound track and the visual track in a video clip, refer to "Soundtrack Bandwidth" on page 57.

## Video Stream Example

The following example shows a video stream defined for a relatively low bandwidth, such as a dial-up modem. Because of the slow streaming speed, constant bit rate encoding is used with a maximum frame rate of 15 frames per second:

```
<stream xsi:type="videoStream">
  <codecName type="string">rv10</codecName>
  <enableLossProtection type="bool">>false</enableLossProtection>
  <encodingComplexity type="string">high</encodingComplexity>
  <encodingType type="string">cbr</encodingType>
  <maxFrameRate type="double">15.000000</maxFrameRate>
  <maxKeyFrameInterval type="double">10.000000</maxKeyFrameInterval>
  <maxStartupLatency type="double">4.000000</maxStartupLatency>
  <pluginName type="string">rn-videocodec-realvideo</pluginName>
  <quality type="uint">30</quality>
</stream>
```



## Stream Packetization

The optional packetizers section defines how RealProducer writes network packets for audio and video output. You can change the default packetizing settings to reduce the latency of live broadcasts and to optimize the packet size for your network. The `<packetizers>` and `</packetizers>` tags encapsulate the packetizers section. Within this list, you can define a single packetizer.

**Tip:** The `latencyMode` property in the media profile section of a job file provides a simpler means of reducing broadcast latency without explicitly setting packet durations and superblock sizes. For details, refer to “Latency Reduction” on page 338.

### Packetizer Tag

To define a packetizer, you add `<packetizer>` and `</packetizer>` tags within the `<packetizers>` element. The `<packetizer>` tag uses an `xsi:type` attribute with a value of `audioPacketizer` or `videoPacketizer`, respectively, to indicate whether the packetization is for an audio or video stream, respectively. The following example shows the syntax for defining an audio stream packetizer:

```
<stream xsi:type="audioStream">
  ...stream information...
  <packetizers>
    <packetizer xsi:type="audioPacketizer"...>
      ...audio stream packetizer defined here...
    </packetizer>
  </packetizers>
</stream>
```

## Packetizer Properties

The following table describes the properties that you can define for an audio or video packetizer.

Packetizer Properties		
Property	Value	Function
<code>maxPacketDuration type="duration"</code>	any duration	Defines the maximum time that RealProducer can encode a stream before writing a packet. See “Maximum Packet Size and Duration” on page 358.
<code>maxPacketInterleavingDuration type="duration"</code>	duration from 0 to 60.000	Sets the superblock size for audio stream packetization. This value does not apply to video. See “Maximum Superblock Size” on page 359.
<code>maxPacketSize type="uint"</code>	value in bytes from 0 to 15000	Sets the maximum size for an audio or video packet. See “Maximum Packet Size and Duration” on page 358.

## Maximum Packet Size and Duration

The `maxPacketDuration` and `maxPacketSize` properties set the maximum time in milliseconds or size in bytes, respectively, that RealProducer encodes an audio or video stream before creating a packet. You can use `maxPacketDuration` along with `maxPacketInterleavingDuration` described in “Maximum Superblock Size” on page 359 to lower audio broadcast latency. The `maxPacketSize` property helps to optimize packets for transmission across a network.

When you use these properties together, the first limit reached determines the packet size. For example, you might specify the following:

```
<maxPacketSize type="uint">1450</maxPacketSize>
<maxPacketDuration type="duration">0.500</maxPacketDuration>
```

These properties instruct RealProducer to create a packet for the stream when one of the following criteria is met:

- The encoded stream data reaches 1,450 bytes (approximately 1.4 Kilobytes) in size.
- RealProducer has encoded the stream for 500 milliseconds since creating the last packet.

## Notes about Setting the Packet Size

Note the following about setting the audio or video packet size:

- You should not set `maxPacketSize` higher than the maximum transfer unit (MTU) for your network. If you omit `maxPacketSize` from the `packetizers` section, a default value applies. For more information, see “Network Latency” on page 185.
- If `maxPacketSize` is larger than half of the stream preroll, `RealProducer` logs a warning and sets the size to half of the preroll.
- Setting the `maxPacketDuration` value higher than the video preroll results in an increased latency.
- If the value of `maxPacketDuration` for an audio stream is larger than `maxPacketInterleavingDuration`, the maximum packet duration is set to the same value as the interleaving duration.
- Setting a value for `maxPacketDuration` overrides the packet duration specified in the `latencyMode` attribute of the job file. Therefore, do not specify `maxPacketDuration` if you want to use `latencyMode`. For more information, see “Latency Reduction” on page 338.
- You can also include these attributes in the media profile section of a job file. This defines the values for all streams in the output. If you define the properties in both the `packetizers` section and the job file’s media profile section, the values from the `packetizers` section are used. For information about using these values in a job file, refer to “Media Profile” on page 334.

## Maximum Superblock Size

The `maxPacketInterleavingDuration` property, which functions only for audio streams, sets the maximum superblock size. Although setting a small superblock size lowers the latency for a live audio broadcast, it makes packet loss in the stream more noticeable to the listener. For an explanation of this issue, refer to “RealAudio Superblocks and Latency Reduction” on page 182.

Omitting `maxPacketInterleavingDuration` from the `packetizer` section varies the superblock size with the codec used to encode the stream. If you add `maxPacketInterleavingDuration` to the `packetizer` section, you can set any duration value from 0 to 60.000 seconds. Choosing 0 or a value lower than the video frame duration disables audio interleaving, creating no superblocks.

The following example sets a packet duration of one-quarter second and an interleaving (superblock) duration of two seconds. This means that a superblock contains eight packets and causes approximately two seconds of latency before RealProducer transmits the superblock packets to Helix Server:

```
<maxPacketDuration type="duration">0.250</maxPacketDuration>  
<maxPacketInterleavingDuration type="duration">2.00</maxPacketInterleavingDuration>
```

The next example sets a packet size of 250 milliseconds and turns off superblocking. This creates a lower latency than the preceding example, but creates more noticeable audio gaps if packets are lost:

```
<maxPacketDuration type="duration">0.250</maxPacketDuration>  
<maxPacketInterleavingDuration type="duration">0</maxPacketInterleavingDuration>
```

## SERVER FILE SYNTAX

This appendix explains how to create and edit a server destination file, which records settings used to transmit a live stream to Helix Server for broadcast to RealPlayers.

**Note:** If you are not familiar with XML syntax, refer to Appendix A for information about XML namespaces, tags, attributes, and values.

### Understanding Server Destination Files

A server destination file specifies the IP address or DNS name of a Helix Server used to broadcast a live stream. For a multicast, the server destination file indicates the multicast address. The destination file also defines properties required by the server, such as error correction parameters and authentication passwords. These properties can vary by broadcast type. For example, error correction parameters are set in the server destination file for push broadcasts but not for pull broadcasts.

After you create a server destination file, copy it to the servers directory under the main RealProducer installation directory. You then use the destination with the graphical application, as described in “Working with Server Templates” on page 217, or when running the command-line application, as explained in “Output and Destination Options” on page 271. Server destination files use the file extension `.rpsd`.

**For More Information:** Before you create or modify a server destination file, be sure that you understand the broadcasting issues described in Chapter 10.

**Tip:** RealProducer includes sample server destination files for all broadcast types in the `samples/servers` directory under the main RealProducer installation directory. You can use one of these files as the basis for creating your own server destination

file. Or, you can create files through the graphical application, as described in Chapter 11.

## Push Server Syntax

A push server file can set up an account-based broadcast, a password-only broadcast, or a multicast. Following the XML declaration tag, you define all properties within a single list starting with a <destination> tag and ending with a </destination> tag. The pushServer value for the xsi:type property identifies the server destination as a push broadcast:

```
<?xml version="1.0" encoding="UTF-8"?>
<destination xsi:type="pushServer" xmlns="http://ns.real.com/tools/server.2.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.real.com/tools/server.2.0
http://ns.real.com/tools/server.2.0.xsd">
    ...all push server properties...
</destination>
```

The following sections in Chapter 11 provide background about how the broadcast properties function for the various types of push broadcasts:

- “Running an Account-Based Broadcast” on page 189
- “Setting Up a Password-Only Broadcast” on page 194
- “Multicasting a Live Stream” on page 200
- “Changing Advanced Push Broadcast Parameters” on page 205

## Push Server Properties

The following table lists the possible push server properties. You define each property as a separate tag within the <destination> list.

Push Server Properties		
Property	Value	Function
address type="string"	IP address or DNS name	Provides the server's version 4 IP address, version 6 IP address, or DNS name. Ignored for multicasts.
allowResends type="bool"	true false	Accepts the server's packet resend requests when set to the default value of true. This is ignored if transport is tcp or udp/multicast.

(Table Page 1 of 4)

**Push Server Properties (continued)**

Property	Value	Function
authType type="string"	account-based  single-password	Sets the authentication type used. The default is account-based, which requires a user name and password. The single-password type requires only a valid password. Use single-password for password-only broadcasts and multicasts.
enableTCPReconnect type="bool"	true false	Re-establishes a dropped broadcast stream when set to the default value of true. Used only if transport is tcp.
endPort type="uint"	port number	Defines the last port in the port range the server uses to receive broadcast data. The value can be 1 to 65535. The default is 30020. This property is ignored for account-based broadcasts.
fecOffset type="uint"	seconds	Offsets redundant packets by the specified number of seconds if fecPercent is 100. The default is 0.
fecPercent type="uint"	0-50 100	Allocates a percentage of the stream for error correction packets. The value can be any integer from 0-50 or 100. Values from 51 to 99 are assumed to be 100. The default is 0.
listenAddress type="string"	IP address	Sets the version 4 or version 6 IP address that RealProducer uses to listen for packet resend requests. The default value of 0 causes Helix Server to gather the listen address from the IP headers, which works for most broadcasts. This property is ignored for multicasts.
metadataResendInterval type="uint"	seconds	Defines the number of seconds between metadata resends when transport is udp. Ignored if transport is tcp. The default is 30.
multicastAddress type="string"	multicast IP address	Indicates the version 4 or version 6 multicast address to use. Ignored if transport is not udp/multicast.

(Table Page 2 of 4)

**Push Server Properties (continued)**

Property	Value	Function
multicastTTL type="uint"	router hops	Sets the number of router hops allowed for a multicast. Valid values are 1 to 255. The default is 16. Ignored for other types of broadcasts.
name type="string"	name	Names the server destination for use by the graphical application. Used only in a job file. With a server destination file, the file name is used as the destination name.
password type="string"	string	Validates the server connection. For account-based broadcasts, the server's authentication database defines the password. For password-only broadcasts or multicasts, the receiver definition sets the password.
path type="string"	path name	Defines an optional, virtual path used for server features such as archiving or splitting. Include a trailing forward slash, as in news/. The value appears in the URL ahead of the stream name, as in news/live.rm.
pluginName type="string"	rn-server-rbs	Identifies the plug-in that handles the stream connection.
port type="uint"	port number	For an account-based broadcast, this defines the HTTP port on the server, which is typically 80. For a password-only broadcast or multicast, this defines the first port in the port range the server uses to receive broadcast data. The value can be 1 to 65535. The default is 30001.
savePassword type="bool"	true false	Saves the password as plain text in the server destination file when set to true. The password is used only with the graphical application. With the command-line application, you must enter the password on the command line. The default is false.

(Table Page 3 of 4)



**Push Server Properties (continued)**

Property	Value	Function
statisticsUpdateInterval type="uint"	1 to 604800	Sets the number of seconds between statistics updates from the server in account-based broadcasts only. The default is 10.
streamname type="string"	stream name	Defines the stream name used in the broadcast URL. This should use the appropriate extension: .ra, .rv, .rm, or .rmvb.
TCPReconnectInterval type="uint"	1 to 3600	Indicates the number of seconds to wait before attempting to re-establish an account-based broadcast or a password-only broadcast that uses TCP transport. The default is 10.
transport type="string"	udp/unicast  udp/multicast  tcp	Defines the broadcast transport and mode. The default is udp/unicast. For password-only broadcasts and multicasts, this value must match the setting on the receiver.
username type="string"	name	Validates the broadcast. The server defines the user name and password in its authentication database. Used only with account-based broadcasts.

(Table Page 4 of 4)

**Push Server Examples**

The following sections provide examples of the three standard types of push broadcasting: account-based, password-only, and multicast.

**Account-Based Example**

The following example defines an account-based broadcast. The `authType` property sets the broadcast type. The `username` and `password` properties supply log-in credentials for the Helix Server authentication database.

```
<?xml version="1.0" encoding="UTF-8"?>
<destination xsi:type="pushServer" xmlns="http://ns.real.com/tools/server.2.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.real.com/tools/server.2.0
http://ns.real.com/tools/server.2.0.xsd">
  <pluginName type="string">rn-server-rbs</pluginName>
```

```

<authType type="string">account-based</authType>
<address type="string">helixserver.example.com</address>
<port type="uint">80</port>
<endPort type="uint">0</endPort>
<username type="string">realmedia-encoder</username>
<password type="string">453ERP098zu</password>
<savePassword type="bool">true</savePassword>
<transport type="string">udp/unicast</transport>
<listenAddress type="string">0</listenAddress>
<fecPercent type="uint">20</fecPercent>
<fecOffset type="uint">10</fecOffset>
<metadataResendInterval type="uint">30</metadataResendInterval>
<allowResends type="bool">true</allowResends>
<statisticsUpdateInterval type="uint">2</statisticsUpdateInterval>
</destination>

```

### Password-Only Example

The following example defines a password-only broadcast, as shown in the `authType` property value. There is no user name, and the log-in password is defined in the Helix Server receiver configuration. The `metadataResendInterval` property defines how long it may take Helix Server to re-establish a dropped broadcast stream.

```

<?xml version="1.0" encoding="UTF-8"?>
<destination xsi:type="pushServer" xmlns="http://ns.real.com/tools/server.2.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.real.com/tools/server.2.0
http://ns.real.com/tools/server.2.0.xsd">
  <pluginName type="string">rn-server-rbs</pluginName>
  <authType type="string">single-password</authType>
  <address type="string">helixserver.example.com</address>
  <port type="uint">30001</port>
  <endPort type="uint">30020</endPort>
  <savePassword type="bool">true</savePassword>
  <password type="string">546zRGW23</password>
  <transport type="string">udp/unicast</transport>
  <listenAddress type="string">172.23.104.188</listenAddress>
  <fecPercent type="uint">20</fecPercent>
  <fecOffset type="uint">10</fecOffset>
  <metadataResendInterval type="uint">30</metadataResendInterval>
  <allowResends type="bool">true</allowResends>

```

```

    <enableTCPReconnect type="bool">true</enableTCPReconnect>
    <TCPReconnectInterval type="uint">10</TCPReconnectInterval>
    <statisticsUpdateInterval type="uint">2</statisticsUpdateInterval>
</destination>

```

### Multicast Example

The next example illustrates a server destination file for a multicast. The `authType` property is set to `single-password` because the password defined in the Helix Server receiver configurations is required. The `transport` property creates the multicast through its `udp/multicast` value. The `multicastAddress` property defines the multicast address monitored by all Helix Server receivers.

```

<?xml version="1.0" encoding="UTF-8"?>
<destination xsi:type="pushServer" xmlns="http://ns.real.com/tools/server.2.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.real.com/tools/server.2.0
http://ns.real.com/tools/server.2.0.xsd">
    <pluginName type="string">rn-server-rbs</pluginName>
    <authType type="string">single-password</authType>
    <port type="uint">30001</port>
    <endPort type="uint">30020</endPort>
    <savePassword type="bool">true</savePassword>
    <password type="string">3542zdf22</password>
    <transport type="string">udp/multicast</transport>
    <multicastAddress type="string">225.229.1.1</multicastAddress>
    <multicastTTL type="uint">16</multicastTTL>
    <fecPercent type="uint">20</fecPercent>
    <fecOffset type="uint">10</fecOffset>
    <metadataResendInterval type="uint">30</metadataResendInterval>
    <statisticsUpdateInterval type="uint">2</statisticsUpdateInterval>
</destination>

```

## Pull Server Syntax

A pull server file defines a broadcast in which Helix Server requests the broadcast stream from RealProducer. Following the XML declaration tag, you define all properties within a single list starting with the `<destination>` tag and ending with the `</destination>` tag. The `pullServer` value for the `xsi:type` property identifies this server definition as a pull broadcast:

```
<?xml version="1.0" encoding="UTF-8"?>
<destination xsi:type="pullServer"
xmlns="http://ns.real.com/tools/server.2.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.real.com/tools/server.2.0
http://ns.real.com/tools/server.2.0.xsd">
    ...all pull server properties...
</destination>
```

**For More Information:** Refer to “Running a Pull Broadcast” on page 210 for background information about pull broadcast properties.

### Pull Server Properties

The following table lists the possible pull broadcast properties. You define each property as a separate tag within the <destination> list.

Pull Server Properties		
Property	Value	Function
listenAddress type="string"	IP address	Defines the version 4 or version 6 IP address that RealProducer uses to listen for pull requests. Do not use a DNS name. A value of 0 indicates the default address on the RealProducer computer's network interface card.
listenPort type="uint"	port number	Sets the port that RealProducer monitors for pull requests. The value can be 1 to 65535. The default is 3031. You can use the same port for multiple broadcasts running on the same machine.
name type="string"	name	Names the server destination for use by the graphical application. Used only in a job file. With a server destination file, the file name is used as the destination name.
password type="string"	string	Validates the broadcast. The serve password in the receiver configuration must match this value.
path type="string"	path name	Sets an optional, virtual path used for server features such as archiving or splitting. Include a trailing forward slash, as in news/. The value appears in the URL ahead of the stream name, as in news/live.rm.
pluginName type="string"	rn-server-rbs	Identifies the plug-in that handles the stream connection.

(Table Page 1 of 2)

**Pull Server Properties (continued)**

Property	Value	Function
savePassword type="bool"	true false	Saves the password as plain text in the server destination file when set to true. The default is false.
serverTimeout type="uint"	0 to 86400	Sets the number of seconds that RealProducer waits before stopping the broadcast packets after it receives no more "keep alive" messages from the server. The default is 30.
streamname type="string"	stream name	Defines the stream name used in the broadcast URL. This should use the appropriate extension: .ra, .rv, .rm, or .rmvb.

(Table Page 2 of 2)

**Pull Server Example**

The following example defines a pull broadcast. RealProducer listens on the IP address and port defined by listenAddress and listenPort, respectively, for broadcast requests by Helix Server. The password property verifies access to the stream. In a pull broadcast, the initiating receiver specifies many of the broadcast parameters, such as whether forward error correction is used.

```
<?xml version="1.0" encoding="UTF-8"?>
<destination xsi:type="pullServer" xmlns="http://ns.real.com/tools/server.2.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.real.com/tools/server.2.0
http://ns.real.com/tools/server.2.0.xsd">
  <pluginName type="string">rn-server-rbs</pluginName>
  <listenAddress type="string">172.23.104.188</listenAddress>
  <listenPort type="uint">3031</listenPort>
  <savePassword type="bool">true</savePassword>
  <password type="string">WEPO342zqd</password>
  <serverTimeout type="uint">30</serverTimeout>
</destination>
```



## PREFERENCE FILE SYNTAX

This appendix describes the properties of the RealProducer preferences file, which affect the operation of both the graphical application and the command-line application. You can edit this file manually if you need to change the preferences settings.

**Note:** If you are not familiar with XML syntax, refer to Appendix A for information about XML namespaces, tags, attributes, and values.

### Editing RealProducer Preferences

RealProducer records application preferences in the file `producer.pref`, located in the main installation directory. This XML-formatted text file specifies values such as the path to audience and server files. It also sets the location of the temporary directory used when encoding clips. You can change most preference properties using the graphical application, as described in “Adjusting RealProducer Preferences” on page 151. If you are using the command-line application, edit the preferences using any text or XML editor.

**Note:** This appendix does not describe how to change the `applicationState` properties, which record the graphical application’s display state. Under normal circumstances, you should not need to edit these properties.

## File Path Preferences

The <paths/> tag contains three properties that set the paths to files used by RealProducer.

Path Preferences		
Property	Value	Function
audiences	path	Provides the full path to the directory that stores audience files, which are described in Appendix C. Relative paths are not allowed. The default is the audiences directory under the main installation directory.
servers	path	Specifies the full path to the directory that stores server files, which are described in Appendix D. Relative paths are not allowed. The default is the servers directory under the main installation directory.
tempDir	path %TEMP% %OUTPUTDIR%	Indicates the directory used to store temporary files during encoding. See “Temporary Directory” on page 372.

## Temporary Directory

For tempDir, you can enter the full path name of the directory to use as the temporary directory. Or, you can use one of the following variables:

- If you use %TEMP% as the value, RealProducer uses the same directory specified by the Windows TEMP or Linux TEMPDIR variable. If the Linux TEMPDIR variable is not set, RealProducer uses the /tmp directory.
- Use a value of %OUTPUTDIR% to set the temporary directory for each job to the same directory used to store the job's output clip.

**Tip:** RealProducer operates faster if the temporary directory resides on the local RealProducer machine, rather than a network drive.

**Note:** After you restart the RealProducer graphical application, the graphical preferences dialog lists the full path to the directory specified by the %TEMP% or %OUTPUTDIR% variable.



## File Path Example

The following example illustrates the <paths/> tag:

```
<paths audiences="C:\Program Files\Real\RealProducer Plus 10\audiences\"
  servers="C:\Program Files\Real\RealProducer Plus 10\servers\"
  tempDir="%TEMP%"/>
```

## Log File Preferences

The <fileLogging/> tag uses the properties described in the following table to set the RealProducer logging preferences.

Log File Preferences		
Property	Value	Function
category	error warning info diagnostic	Sets the logging category. Choose any combination of categories, separating them with commas. For more information on categories, refer to “Logging Category (-lc)” on page 285.
disable	true false	Turns off logging when set to true. The default is false.
enableRolling	true false	Enables the creation of multiple log files ( <i>log rolling</i> ) when set to true. The default is false.
filename	file name	Sets the log file name. You can use a full path or a path relative to the installation directory.
filterFunctionalArea	true false	Filters the log according to functional area when set to true. The default is false, which captures all logging areas.
format	detailed short	Determines the log format. You can choose short to log only the job name and message. The default detailed format logs more information, such as the message category, functional area, time, and message number.
formatSeparator	character	Defines the character used to separate entries on a line within the log. The default is \t for a tab.

(Table Page 1 of 2)

**Log File Preferences (continued)**

Property	Value	Function
functionalArea	all list	Defines which functional areas are logged. The default value all logs all areas. Otherwise, enter a comma-separated list of specific areas.
previousFilename	file name	Indicates the file name of the last log created if log rolling is used. The file extension includes a numeric designation to indicate the order of the logs. For example, for a log named producer.log, the first rolled file is named producer.log1, the second is producer.log2, and so on.
rollTimeIntervalType	hourly daily weekly monthly	Determines how frequently the log file is rolled if time-based rolling is turned on. The default is monthly.
rollType	size time	Determines if log files are rolled according to size or preset time if log rolling is enabled. The default is time.
sizeRollSize	1-99999	Sets the size of the log file in Megabytes when log files are rolled according to size. Use any integer up to 99999.

(Table Page 2 of 2)

**Log File Example**

The following example illustrates the <fileLogging/> tag:

```
<fileLogging format="detailed"
  formatSeparator="\t"
  disable="false"
  filename="producer.log"
  previousFilename="C:\Program Files\Real\RealProducer Plus 10\producer.log"
  enableRolling="false"
  rollType="time"
  sizeRollSize="5"
  rollTimeIntervalType="monthly"
  filterFunctionalArea="false"
  functionalArea="all"
  category="error,warning,informational"/>
```

## Log Viewing Properties

The log viewer is available through the graphical application, as described in “Viewing Log Messages” on page 147. The `<screenLogging/>` tag uses the properties described in the following table to set the log viewer preferences.

Log Viewing Preferences		
Property	Value	Function
<code>disable</code>	<code>true false</code>	Turns off log viewing when set to true. The default is false.
<code>filterFunctionalArea</code>	<code>true false</code>	Filters log viewing according to functional area when set to true. The default is false, which displays all logging areas.
<code>functionalArea</code>	<code>all list</code>	Defines which functional areas are displayed. The default value all displays all areas. You can also create a comma-separated list of specific areas.
<code>category</code>	<code>error warning info diagnostic</code>	Sets the logging category. Choose any combination of categories, separating them with commas. For more information on categories, refer to “Logging Category (-lc)” on page 285.

### Log File Example

The following example illustrates the `<screenLogging/>` tag:

```
<screenLogging disable="false"
  filterFunctionalArea="false"
  functionalArea="all"
  category="error,warning,info"/>
```



## GLOSSARY

### **A** **artifact**

A visual imperfection in an encoded video clip. Too many artifacts can make the video look blocky.

### **B** **bandwidth**

The upper limit on the amount of data, typically expressed as Kilobits per second (Kbps), that can pass through a network connection.

### **binary tag**

An XML tag that comprises opening and closing tags, such as <List> and </List>.

### **bit**

The smallest unit of measure of data in a computer. A bit has a binary value, either 0 or 1.

### **bit rate**

A measure of bandwidth, expressed as the number of bits transmitted per second. A 28.8 Kbps modem, for example, can transmit or receive around 29,000 bits per second.

### **broadcast**

To deliver a presentation, whether live or prerecorded, in which all viewers join the presentation in progress. Contrast to *on-demand*.

### **buffering**

The receiving and storing of data before it is played back. A clip's initial buffering is called *preroll*. After this preroll, excessive buffering may stall the presentation.

### **byte**

A common measurement of data. One byte consists of 8 bits.

**C cable modems**

Devices that allow rapid transmission and reception of data over television cable. They are digital devices, unlike dial-up modems, which transmit analog data.

**CBR**

Constant Bit Rate. A type of RealVideo encoding in which all parts of the video play back at the same bit rate. Contrast to *VBR*.

**client**

A software application that receives data from a server. A Web browser is a client of a Web server. RealPlayer is a client of Helix Server.

**clip**

A media file within a presentation. Clips typically have an internal timeline, as with RealAudio and RealVideo.

**codec**

Coder/decoder. Codecs convert data between uncompressed and compressed formats, reducing the bandwidth a clip consumes.

**D download**

To send a file over a network with a nonstreaming protocol such as HTTP. Contrast to *stream*.

**DSL**

Digital Subscriber Line. A technology for transmitting digital data over a regular telephone line much faster than through dial-up modems.

**duress stream**

A low-bandwidth SureStream audio or video stream that Helix Server uses if a connection's available bandwidth drops greatly.

**E encoding**

Converting a file into a compressed, streaming format. For example, you can encode WAV files as RealAudio clips.

**F fps**

Frames Per Second. The number of video frames that displays each second in a streaming video clip.

**frequency response**

A measure of audio clip quality. The higher a clip's frequency response, the more frequencies it can faithfully reproduce.

- H**    **Helix Server**  
RealNetworks server software used to stream multimedia presentations to RealPlayer.
- Helix Server administrator**  
The person in charge of setting up and running Helix Server.
- HTTP**  
Hypertext Transport Protocol. The protocol used by Web servers to communicate with Web browsers. In contrast, Helix Server streams clips to RealPlayer with RTSP.
- I**    **ISDN**  
Integrated Services Digital Network. Technology that makes digital data connections at 64 or 112 Kbps possible over telephone lines.
- ISP**  
Internet Service Provider. A company that provides access to the Internet. Many ISPs have Helix Server available to stream media clips.
- K**    **kilobit (Kb)**  
A common unit of data measurement equal to 1024 bits. A kilobit is usually referred to in the context of bit rate per unit of time, such as Kilobits per second (Kbps).
- kilobyte (KB)**  
A common unit of data measurement equal to 1024 bytes or 8 Kilobits.
- L**    **LAN**  
Local Area Network. A computer network confined to a local area, such as a single building. LANs vary in speed, with bandwidth shared among all networked devices.
- lossy**  
A compression scheme that lowers clip size by discarding nonessential data from the source file. Both RealAudio and RealVideo are lossy.
- M**    **metafile**  
Another name for a Ram file.
- mouseover**  
The action of moving a computer screen pointer over an interactive area. An animated button may change appearance on a mouseover, for example.

**N namespace**

An XML declaration that identifies the features used in a SMIL presentation. For SMIL 2.0 and higher, the <smil> tag must declare a namespace.

**O on-demand**

A type of streaming in which a clip plays from start to finish when a user clicks a link. Most clips are streamed this way. Contrast to *broadcast*.

**P PNA**

A proprietary protocol Helix Server uses for backward compatibility with RealPlayer 3 through 5. URLs using PNA start with pnm://.

**port**

A connection to a server, designated by a number such as 8080. Helix Server uses different ports for the RTSP, HTTP, and PNA protocols.

**preroll**

Buffering that occurs just before a clip plays back. Preroll should be no more than 15 seconds.

**presentation**

A group of clips coordinated through SMIL and streamed from Helix Server to RealPlayer.

**R Ram file**

A text file that uses the file extension .ram or .rpm. It launches RealPlayer and gives it the URL to a streaming clip or presentation.

**RDT**

RealNetworks Data Transport. The proprietary data package Helix Server uses (along with RTSP) when communicating with RealPlayer. Contrast to *RTP*.

**RealAudio**

A clip type for streaming audio over a network. RealAudio clips use the .ra or .rm extension.

**RealPix**

A clip type (file extension .rp) for streaming still images over a network. RealPix uses a markup language for creating special effects such as fades and zooms.



**RealPlayer**

The RealNetworks desktop software for playing RealAudio and RealVideo. RealPlayer combines streaming and digital download technologies.

**RealProducer**

A RealNetworks tool for encoding RealAudio and RealVideo clips.

**RealText**

A clip type (file extension .rt) for streaming text over a network. It uses a markup language for formatting text.

**real-time**

Delivered as it occurs. For example, a live event is streamed across a network in a real-time broadcast.

**RealVideo**

A clip type for streaming video over a network. RealVideo clips use the extension .rm, .rv, or .rmvb.

**rebuffering**

An undesirable state in which RealPlayer must pause a presentation to wait for streaming data to arrive. Rebuffering can result from network conditions, or a poorly produced presentation.

**RTP**

Real-Time Transport Protocol. The open, standards-based data package Helix Server uses (along with RTSP) to communicate with RTP-based clients. Contrast to *RDT*.

**RTSP**

Real-Time Streaming Protocol. An open, standards-based control protocol that Helix Server uses to stream clips to RealPlayer or any RTP-based client. Contrast to *HTTP*.

**S server**

1. A software application, such as a Web server or Helix Server, that sends requested data over a network.
2. A computer that runs server software.

**SMIL**

Synchronized Multimedia Integration Language. A markup language for specifying how and when each clip plays within a presentation. SMIL files use the extension .smil.

**stream**

1. To send a media clip over a network so that it begins playing back as quickly as possible.
2. A flow of a single type of data, measured in Kilobits per second (Kbps). A RealVideo clip's soundtrack is one stream, for example.

**SureStream**

A RealNetworks technology that enables a RealAudio or RealVideo clip to stream at multiple bit rates.

**U unary tag**

An XML tag that includes a closing slash, as in `<ref/>`.

**URL**

Uniform Resource Locator. A location description that enables a Web browser or RealPlayer to receive a clip stored on a Web server or Helix Server.

**V VBR**

Variable Bit Rate. A type of RealVideo encoding that enables RealPlayer to play different parts of the video at different bit rates, even though the video is streamed at a constant rate. Contrast to *CBR*.

**X XML**

Extensible Markup Language. The parent language for SMIL. XML allows one to develop flexible, standardized languages for any purpose.

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