disable the playlist through SMIL, encapsulate the <seq> group in a <par> tag. This also helps reduce the second clip's preroll. Here's an example:

```
<smil>
 <body>
  <par>
   <seq>
    <RealAdInsert/>
    <video src="rtsp://realserver.company.com/video/video.rm"/>
   </seq>
  </par>
 </body>
</smil>
```

Additional Information

For more on the RealPlayer playlist, see "Managing the Playlist" on page 92.

Playing Interstitial Ads

By using SMIL's clip timing commands, you can insert rich media ads within a requested clip. The following example inserts three rich media ads into a long video called news.rm. The effect is similar to a television program with commercial breaks:

```
<smil>
 <head>
  <layout>
   <root-layout width="240" height="180"/>
   <region id="videoregion" width="240" height="180"/>
  </layout>
 </head>
 <body>
  <par>
   <seq>
    <video src="news.rm" region="videoregion" clip-end="8.5min"/>
    <RealAdInsert region="videoregion"/>
    <video src="news.rm" region="videoregion" clip-begin="8.5min"
     clip-end="16.75min"/>
    <RealAdInsert region="videoregion"/>
    <video src="news.rm" region="videoregion" clip-begin="16.75min"
     clip-end="24.5min"/>
    <RealAdInsert region="videoregion"/>
    <video src="news.rm" region="videoregion" clip-begin="24.5min"/>
```

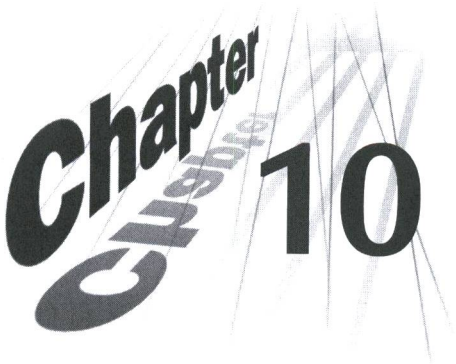
```
    </seq>
   </par>
  </body>
</smil>
```

As shown above, the three ad clips and the main video clip, `news.rm`, are in a `<seq>` group. The `news.rm` video begins at its normal beginning and plays for 8.5 minutes. It then stops while the first ad plays. The `news.rm` clip then resumes where it left off, breaking at later intervals for the second and third ads. Because the ad clips include no SMIL timing commands, they play from their normal beginnings to normal ends. RealServer delivers a new video ad for each `<RealAdInsert/>` tag.

Additional Information

For more on clip timing, see "Setting Internal Clip Begin and End Times" on page 86.

DELIVERING A PRESENTATION



When you finish building your RealSystem presentation, you place the clips on RealServer for streaming. This chapter explains how to link your Web page to your presentation. It also describes how a Web server can play back some RealSystem G2 presentations.

Using RTSP and HTTP in URLs

A RealSystem presentation served by RealServer G2 involves the HTTP and RTSP protocols. If you have experience creating Web pages, you know that HTTP is the standard protocol Web browsers and Web servers use to communicate. Most Web page URLs begin with `http://` to make the file download use the HTTP protocol.

As explained in "Hosting a Presentation on a Server" on page 21, RealServer G2 and RealPlayer G2 communicate primarily with RTSP, a new protocol designed specifically for streaming media. When you assemble a RealSystem presentation, it's important to understand clearly which URLs should begin with `http://` and which should begin with `rtsp://`.

Use `rtsp://` in URLs in which RealPlayer G2 requests clips from RealServer G2. These URLs occur in SMIL files (`.smil`) and Ram files (`.ram` or `.rpm`). Use `http://` in these URLs only if the clips are stored on a Web server instead of RealServer. Because a Web server doesn't use RTSP, you can't have `rtsp://` in a URL to a clip stored on a Web server.

Links to a Web server or RealServer within a Web page (`.htm` or `.html`) always start with `http://`. Like Web servers, Web browsers don't use RTSP and can't interpret streaming information sent by RealPlayer over RTSP. The Web browser can connect to RealServer through HTTP, though, because RealServer G2 can transmit data with HTTP or RTSP.

Additional Information

For more on SMIL file URLs, see "Linking to Clips on RealServer" on page 78 and "Linking to Clips on a Web Server" on page 80. See also "URL Reference" on page 170.

Streaming Clips from RealServer G2

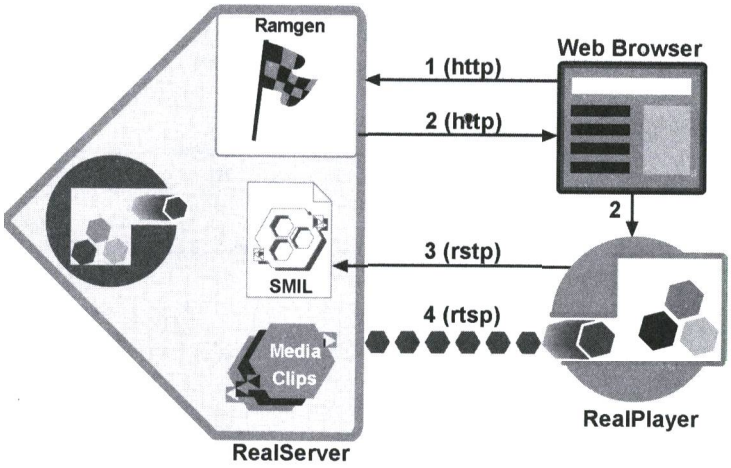
When you stream clips from RealServer, the RealServer administrator creates content directories and tells you the basic URLs to use. The administrator can also set up features such as password authentication and pay-per-view. When your media clips and SMIL file are ready, transfer them to RealServer and place them in the directories prepared by the administrator. Then link your Web page to your presentation as described below.

Tip

Because earlier versions of RealServer do not support SMIL and RTSP, ensure that RealServer G2 hosts your presentation. Also note that RealNetworks production tools can transfer files to RealServer automatically. See **http://www.real.com/products/tools/** for details.

When you use RealServer, the Ramgen feature can automatically launch RealPlayer, eliminating the need to write a separate Ram file. Your Web page URL simply points to your media clip or SMIL file on RealServer and includes a `ramgen` parameter. The next figure illustrates the process of requesting a presentation through Ramgen. This example uses a SMIL file that coordinates multiple clips, but you can also link to a single clip directly without using SMIL.

Requesting a Presentation from RealServer using Ramgen



1. Using the HTTP protocol, the Web browser requests the SMIL file from RealServer. The URL includes a parameter that invokes Ramgen.
2. RealServer's response causes the Web browser to launch RealPlayer as a helper application and give it the URL to the SMIL file.
3. RealPlayer requests the SMIL file from RealServer using the RTSP protocol.
4. With the information in the SMIL file, RealPlayer requests and receives the streaming media clips.

Linking your Web Page to RealServer

With your clips on RealServer, link your Web page to the SMIL file with an HTML hypertext link that looks like this:

```
<a href="http://realserver.company.com:8080/ramgen/sample.smil">...</a>
```

If the presentation plays back directly in the Web page through RealPlayer's Netscape plug-in, the URL occurs within an <EMBED> or <OBJECT> tag and looks like this:

```
SRC="http://realserver.company.com:8080/ramgen/sample.smil?embed"
```

The following table explains the components of these URLs. Contact your RealServer administrator to get the actual RealServer address, HTTP port, and Ramgen directory structure.

URL Components in a Web Page Link to RealServer G2

URL Component	Meaning
`http://`	This makes the browser contact RealServer through the HTTP protocol. (Web browsers do not use RTSP.)
`realserver.company.com`	This address varies for each RealServer. It typically uses an identifier such as `realserver` instead of `www`. It may also use a numeric TCP/IP address such as `204.71.154.5`.
`:8080`	This is the port RealServer uses for HTTP connections. Separate the port and address with a colon. You can leave the port number out if RealServer uses port 80 for HTTP connections. Include the port number if RealServer uses any port besides 80 for HTTP.
`/ramgen/`	As "Using Ramgen" explains, this parameter launches RealPlayer without the use of a separate Ram file.
`sample.smil`	This is the SMIL file for your presentation. If you have just one clip to stream, you can link directly to that clip instead of a SMIL file.
`?altplay=`*`file.ext`*	This Ramgen option specifies an alternate presentation created for older versions of RealPlayer. See "Listing Alternate Presentations" on page 149.
`?embed`	This Ramgen option embeds the presentation in a Web page. See Chapter 8 starting on page 117 for full information on Web page playback.

Using Ramgen

In your Web page hyperlink, the `/ramgen/` parameter causes the Web browser to launch RealPlayer without the use of a separate Ram file. This parameter designates a virtual directory on RealServer. It may be followed in the URL by actual directory listings, as in this example:

```
<a href="http://realserver.company.com:8080/ramgen/media/sample.smil">..</a>
```

You should use Ramgen even when linking to a single clip, such as a RealVideo (`.rm`) clip, that automatically launches RealPlayer. If you cannot use Ramgen, you can write the Ram file as described in "Creating a Ram File Manually" on page 153.

Listing Alternate Presentations

When you update content for RealSystem G2, you can keep existing content available for earlier versions of RealPlayer. Suppose you have a RealVideo 5.0 clip that you want to encode with a RealSystem G2 codec and lay out with SMIL. After re-encoding the source file with the new codec and writing the SMIL file, you change the link to the 5.0 Ram file to point to the SMIL file, using the Ramgen altplay option to list the older clip as an alternate:

```
<a href="http://.../ramgen/sample.smil?altplay=old_sample.rm">
```

This link instructs RealServer to point RealPlayer G2 to sample.smil. Earlier versions of RealPlayer receive the URL to the older old_sample.rm file. Note that the URL specifies the actual clip, not the old Ram file. The older clip must reside in the same directory as the new clip or SMIL file.

> **Tip**
>
> It is not necessary to keep older content available. If you do not use altplay, page visitors using older versions of RealPlayer are prompted to upgrade when they click the link to the SMIL file.

Combining Ramgen Options

The question mark operator ("?") separates Ramgen options from the main URL. To use multiple Ramgen options, you use a question mark before the first option, then separate the remaining options with ampersands ("&"). The order of options does not matter. For example, the following link uses altplay and embed:

```
<a href="http://.../ramgen/sample.smil?embed&altplay=old_sample.rm">
```

You can use the question mark operator to include earlier Ram file options when using altplay. If your Ram file URL for a RealVideo 5.0 presentation specified an end time, for example, include that option in the Ramgen URL after altplay. The following shows an end time set for old_sample.rm:

```
<a href="http://.../ramgen/sample.smil?altplay=old_sample.rm&end=7:45">
```

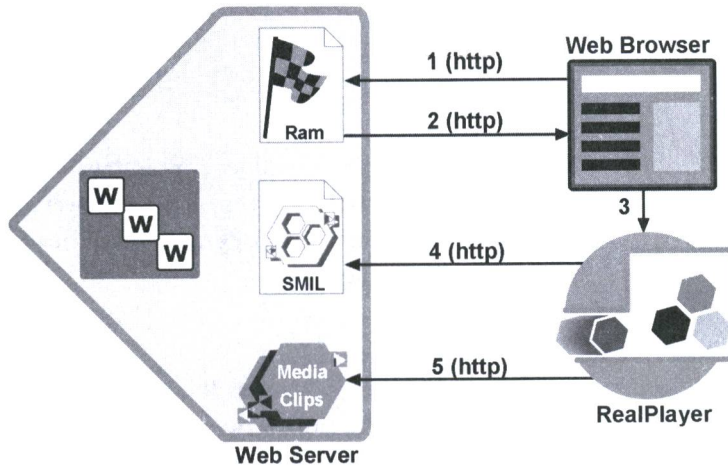
Playing Clips from a Web Server

If you do not have access to RealServer G2, you can host your presentation on a Web server. Although not as robust as RealServer streaming, Web server playback provides a reasonable method for sending simple presentations to a

small number of users. It is not recommended for lengthy or complicated presentations, however, or for clips viewed simultaneously by large groups.

As described in "Launching a Presentation" on page 22, a Ram file launches RealPlayer when the presentation plays back from a Web server. You therefore need to write the Ram file as described in "Creating a Ram File Manually" on page 153 and place it on the Web server. The following figure illustrates the process of requesting a presentation from a Web server. All network actions use the HTTP protocol.

Requesting a Presentation from a Web Server



1. The Web browser requests the Ram file from the Web server.
2. The Web server downloads the Ram file to the browser.
3. The Ram file extension (.ram or .rpm) causes the Web browser to launch RealPlayer. The .ram extension launches RealPlayer as a separate application. The .rpm extension plays the presentation within the Web page.

   Additional Information

   For more information on embedding a presentation in a Web page, see Chapter 8, starting on page 117.

4. RealPlayer receives the Ram file and requests the SMIL file from the Web server. Alternately, the Ram file can simply list a single clip or multiple clips played in sequence.

5. With the information in the SMIL file, RealPlayer requests and receives the clips from the Web server.

Limitations on Web Server Playback

As noted in "Hosting a Presentation on a Server" on page 21, a presentation downloaded from a Web server is more likely to stall than a presentation streamed by RealServer. Web servers are not designed to manage bandwidth or keep multiple clips synchronized.To ensure that a presentation hosted by a Web server plays as smoothly as possible, observe the following points.

No SureStream Clips Encoded for Multiple Bandwidths

A Web server cannot stream just one encoding from a SureStream clip encoded for multiple bandwidths. Instead, it downloads the entire clip file, causing an unacceptably high preroll. So you must encode each clip for just one bandwidth. To support multiple bandwidths, encode separate clips for various bandwidths and use SMIL to let RealPlayer choose which clip to play.

Additional Information

See "Choosing RealAudio Codecs" on page 45 for information on RealAudio and SureStream. For more on using SMIL to list clip choices, read "Setting Bandwidth Choices" on page 90.

Limited Ability to Keep Parallel Clips Synchronized

A Web server does not consider clip timelines when downloading data and does not receive feedback from RealPlayer. Web server playback therefore makes it harder for RealPlayer to keep clips synchronized. A presentation that plays clips in parallel may begin to stall and rebuffer data when the RealPlayer connection has little bandwidth to spare.

For this reason, it may be difficult to deliver RealFlash, which consists of synchronized animation and audio. You can, however, combine a large clip such as RealVideo with smaller clips, such as image clips or a RealText clip. Because RealText consumes little bandwidth, a Web server can download it to RealPlayer quickly without interfering with other clips.

RealPix Presentations Buffer Longer

When delivered by RealServer, images in a RealPix presentation stream at different times depending on their place in the RealPix timeline. This lets you structure a RealPix presentation to keep it flowing smoothly. When delivered

by a Web server, however, all RealPix images begin to download as soon as presentation playback begins. This causes a higher preroll.

Additional Information

RealPix Authoring Guide explains bandwidth usage when RealServer G2 streams RealPix. This guide is available at **http://service.real.com/help/library/encoders.html**.

SMIL File Optional

When delivering a single clip or a few clips played in sequence, you do not need a SMIL file. You can simply list the clips in order when writing your Ram file as described in "Creating a Ram File Manually" on page 153. You can, however, have your Ram file specify a SMIL file that lists the clip locations, creates a layout, times the presentation, and so on.

SMIL Internal Timing Commands not Usable

Although you can use SMIL to lay out and time your presentation, you should not use the `clip-begin` and `clip-end` attributes. A Web server cannot begin to download a clip at a certain point in its timeline. If you specify `clip-begin="5min"`, for example, RealPlayer must wait until it has received the first five minutes of clip data before it can begin to play the clip back. This creates an unacceptably long wait.

Additional Information

"Setting Internal Clip Begin and End Times" on page 86 describes these SMIL commands.

No Ad Insertion

The RealSystem ad insertion feature, described in Chapter 9 beginning on page 137, does not work with Web servers. Only RealServer can replace `<RealAdInsert.../>` tags in SMIL files with URLs to ad clips.

No RealPlayer Seeking

Because a Web server cannot jump to a new position in a clip timeline, the RealPlayer position slider cannot fast-forward the clip. If the user moves the slider forward, playback pauses as the clip continues to download at its normal rate. RealPlayer resumes playback once the clip data reaches the requested timeline position.

No RTSP URLs

Because Web servers do not support the RTSP protocol, all URLs in presentations hosted by a Web server should begin with http://. This includes all URLs in a SMIL file or Ram file.

No Live Broadcast

Live broadcast is not possible because Web servers can download only clips stored on disk.

Configuring Web Server MIME Types

To download a RealSystem presentation from a Web server, the server must be configured with the following MIME types. If you are using an ISP, ask the ISP's Web server administrator to configure the MIME types listed in the following table.

Web Server MIME Types for RealSystem Files

File Type	Extension	MIME Type
Ram	.ram	audio/x-pn-realaudio
Embedded Ram	.rpm	audio/x-pn-realaudio-plugin
SMIL	.smil and .smi	application/smil
RealAudio	.ra	audio/x-pn-realaudio
RealVideo	.rm	application/x-pn-realmedia
RealPix	.rp	image/vnd.rn-realpix
RealText	.rt	text/vnd.rn-realtext

Creating a Ram File Manually

Whenever possible, launch RealPlayer automatically with RealServer's Ramgen feature as described in "Using Ramgen" on page 148. In some cases, though, you may need to write a Ram file:

- Streaming from a RealServer not set up to use Ramgen.
- Streaming multiple SMIL files in sequence.
- Hosting a RealSystem presentation from a Web server.
- Playing back clips that reside on the user's local machine.

➤ **To create a Ram file:**

1. Open any editor or word processor that can save files as plain text. On the top line, enter the full URL of the SMIL file or the media clip. As shown below, URLs vary with the playback context.

   - RealServer Streaming

     The following example links to a SMIL file on a RealServer machine that does not use Ramgen:

     ```
     rtsp://realserver.company.com/media/sample1.smil
     ```

     To deliver a few clips or SMIL files in sequence, list the URLs in their playback order:

     ```
     rtsp://realserver.company.com/media/sample1.smil
     rtsp://realserver.company.com/media/video1.rm
     rtsp://realserver.company.com/media/sample2.smil
     ```

   - Web Server Playback

     For Web server playback, you specify the HTTP protocol and the Web server name, along with the SMIL file or media clip:

     ```
     http://www.company.com/media/video1.rm
     ```

     To deliver a few clips or SMIL files in sequence, list the URLs in their playback order:

     ```
     http://www.company.com/media/video1.rm
     http://www.company.com/media/video2.rm
     http://www.company.com/media/sample1.smil
     ```

   - Local Playback

     For local playback of clips residing on the user's machine, start the URL with file:// and list clips in their locations relative to the Ram file. For example, the following specifies a clip that resides one level below the Ram file in the media directory:

     ```
     file://media/video1.rm
     ```

     To deliver a few clips or SMIL files in sequence, list the URLs in their playback order:

     ```
     file://media/video1.rm
     file://media/video2.rm
     file://media/sample1.smil
     ```

Additional Information

These local URLs are like those used in a SMIL file to locate media clips. For more information on general URL syntax, see "Specifying Clip Locations" on page 77.

2. For a presentation played back from RealServer, you can support earlier versions of RealPlayer (such as RealPlayer 4.0 or 5.0) just as Ramgen does with the `altplay` option. To do this, add the marker `--stop--` after the RTSP URL. Then specify the URL for the older clip just as it appeared in your previous Ram file. Here's an example:

```
rtsp://realserver.company.com:554/sample.smil
--stop--
pnm://realserver.company.com:7070/old_sample.rm
```

The second URL specifies the older RealSystem protocol with `pnm://` and designates RealServer's PNA port. When RealPlayer connects, it chooses the URL based on its favored protocol. For this reason, you cannot list two URLS that both use the same protocol, whether `rtsp://`, `pnm://`, or `http://`.

3. Save the Ram file as plain text with a `.ram` extension (played in RealPlayer) or a `.rpm` extension (played in the Web browser).

4. Move your Ram file to RealServer or your Web server. Keep in mind that even if all your media clips are on RealServer, you can place the Ram file on your Web server. When the browser receives the Ram file from the Web server, it turns the file over to RealPlayer, which uses the full URLs in the Ram file to request the clips off RealServer. Hence the Ram file and the media clips do not need to reside on the same machine.

5. For `.ram` files, link your Web page to the Ram file with an HTML hyperlink such as this:

```
<a href="http://www.company.com/media/sample.ram">click for video</a>
```

For `.rpm` files, incorporate the link URL in the `<EMBED>` or `<OBJECT>` tag as described in "Setting Basic Parameters" on page 119. If the Ram file is on RealServer, the URL must not use the `ramgen` parameter.

Adding Comments to a Ram File

You can add a comment to a Ram file by using a pound sign ("#") as the first character on a line. The following example shows two lines commented out of a Ram file:

```
# Two videos and a SMIL presentation
# streamed from RealServer G2.
rtsp://realserver.company.com/media/video1.rm
rtsp://realserver.company.com/media/video2.rm
rtsp://realserver.company.com/media/sample2.smil
```

Testing your Presentation

The following are guidelines for making sure your presentation works well and reaches its target audience:

1. Test your presentation in "real world" conditions. If you target 28.8 Kbps connections, for example, request the presentation over a 28.8 Kbps modem.
2. Check that the presentation has a preroll (initial buffering) under 15 seconds. After preroll, the presentation should not rebuffer under normal network conditions.

   Additional Information

   "What is Preroll?" on page 28.

3. Verify that video and audio quality is acceptable.
4. For a multiclip presentation, verify that clips stay synchronized. Ensure that no stalling occurs because too many clips play at the same time or a single clip requires too much bandwidth. Test that clips introduced during a presentation in progress do not stall playback by requiring too much buffering when they start.

   Tip

   If clips introduced during a presentation in progress require too much buffering, see "Smoothing Transitions between Clips" on page 173.

5. Make sure that your presentation works well for an "average" CPU for your audience. For general Web delivery, test playback on both Pentium and Power Macintosh 90 MHz machines. Do not rely on MMX technology to enhance playback. Not all Web users have MMX machines.

Tip

If your presentation is CPU-intensive because, for example, it uses complex Flash animation or high-bandwidth video, note this in your Web page.

6. When streaming RealAudio, ensure that sound quality is acceptable. You may need to experiment with RealAudio codecs to find the best balance between clip bandwidth use and sound quality.
7. When embedding a presentation in a Web page, verify that the playback window has the correct location and controls.

Advertising on RealGuide

Every day, thousands of people visit RealGuide, RealNetworks' online guide for streaming media sites and live events (**http://realguide.real.com/**). If you regularly host RealAudio or RealVideo content of interest to the public, or you have a live event you want to advertise, you can submit your listing to RealNetworks. Simply complete an online form to list your site:

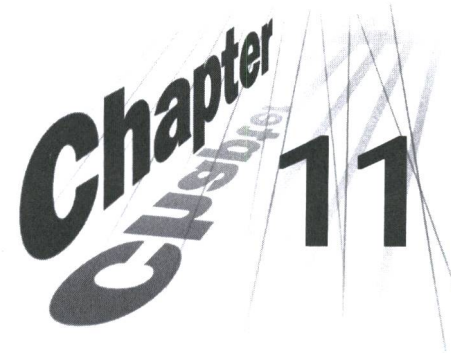
- **http://www.timecast.com/help/addsite.html**

or live event:

- **http://www.timecast.com/help/addevent.html**

In the form, you give the site or event name, URL, short description, and contact person. A staff member then verifies your site or event before including it on RealGuide. (RealNetworks reserves the right to refuse or edit submissions.) For live events, please submit your request at least one business day in advance. If you have questions or need to change a listing, please e-mail **timecast@timecast.com**.

BROADCASTING A PRESENTATION



The Internet is swiftly becoming the next great broadcast medium. RealSystem G2 lets you broadcast live or prerecorded presentations over the Internet or an intranet. This chapter provides background on using broadcast applications and RealServer G2 to broadcast media. Refer to your tools and RealServer manuals for explicit instructions on setting up a broadcast.

Broadcasting vs. On-demand Delivery

When a streaming presentation is delivered on demand, it starts from its beginning when the viewer clicks the presentation link in a Web page. Each viewer can receive the presentation at any time and use RealPlayer's controls to fast-forward or rewind through the presentation.

In a streaming broadcast, however, the user hosting the broadcast starts the presentation at a certain time. Viewers who click the presentation link join the broadcast in progress. Before the broadcast begins and after it completes, the presentation URL is not valid. During the broadcast the RealPlayer fast-forward and rewind controls do not function.

To make an analogy, on-demand content is like a movie on videotape. The viewer can see it at any time, skip forward, rewind, and pause. A streaming broadcast, though, is like a movie shown on a television channel. As with a TV broadcast, there are two types of streaming media broadcasts:

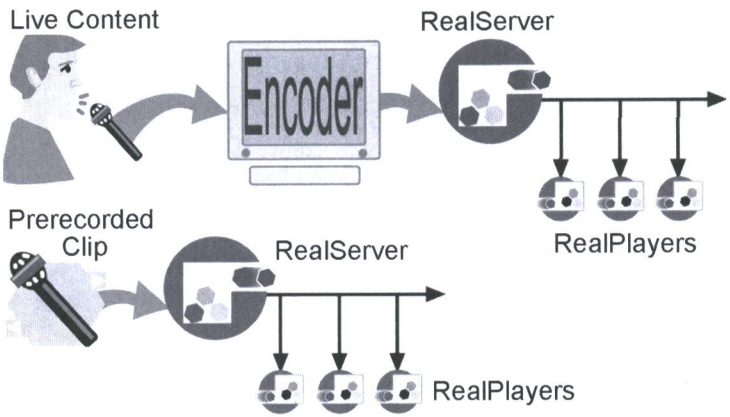
- Live content

  Live content is broadcast as it occurs. For example, you can broadcast the output of a video camera across the Internet or an intranet. RealSystem encodes the content as RealVideo in real-time without writing the content to a RealVideo clip first.

- Prerecorded content

  Prerecorded content consists of video or audio you record and write to a digitized clip. You can then edit the clip before converting it to a streaming format and broadcasting it across a network. To the viewer, the presentation looks just like a live broadcast.

Broadcasting Live or Prerecorded Content



Broadcasting Tools

To broadcast a presentation, you need the tools described in the following sections.

Source Capture Equipment

This equipment captures the broadcast content. It is typically a microphone or video camera connected to an audio or video capture card. For text it could be a live text feed coming in over a network.

Editing Equipment

When you broadcast prerecorded content, you first write the source to a digitized file. You can then use editing software to optimize the file for broadcast. Live content, however, goes directly from the capture equipment to the broadcast application.

Broadcast Application

The broadcast application takes the live source and encodes it in the appropriate streaming format, sending the output to RealServer. A RealVideo broadcast application, for example, encodes a camera's video output as

RealVideo in real-time. A broadcast application typically runs on a separate machine that has a network connection to the RealServer machine. To broadcast prerecorded content, you typically do not need a broadcast application because RealServer can broadcast the clips itself.

RealNetworks encoding tools have live broadcast capability for audio and RGB or YUV video. They guide you through the broadcast process and let you connect to RealServer easily. RealSystem's open architecture also lets you build a broadcast application to send RealServer any type of data for broadcast. To build a broadcast application, you need the RealSystem G2 Software Development Kit (SDK).

Additional Information

You can get RealAudio and RealVideo encoding tools from **http://www.real.com/products/tools/**. Sample RealText and RealPix broadcast applications are available in the RealSystem G2 Authoring Kit at **http://www.real.com/products/tools/authkit/index.html**. You can download the entire RealSystem G2 SDK from **http://www.real.com/devzone/**.

RealServer G2

RealServer streams the broadcast to RealPlayer. The RealServer administrator can give you the broadcast URL and parameters for connecting a broadcast application to RealServer. Because each RealServer has a limit on the number of streams it can produce, verify that the RealServer you intend to use has broadcast capabilities appropriate for your anticipated audience size.

Tip

Real Broadcast Network (RBN) provides full services for broadcasting small and large events. For details, see **http://www.real.com/rbn**.

Additional Information

For information on configuring a broadcast, get *RealServer Administration Guide*, available at **http://service.real.com/help/library/servers.html**.

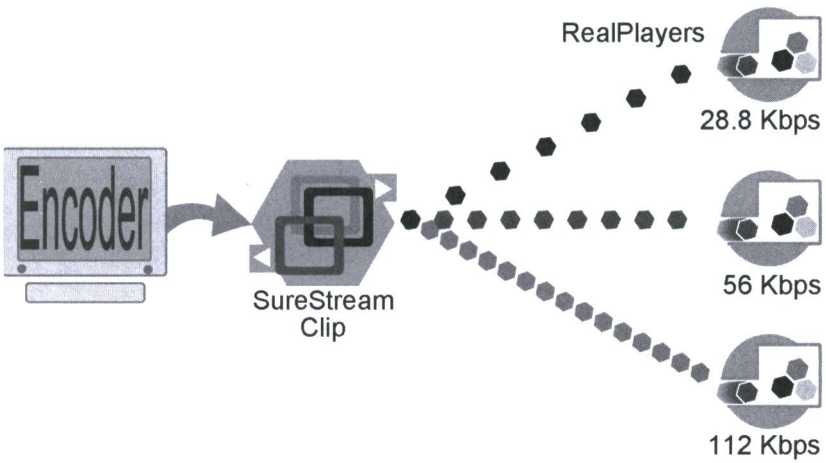
Preparing a Broadcast

The following are tips for preparing a live or prerecorded broadcast. See the manual or online help for your broadcast application for explicit instructions on how to encode and broadcast content.

Use SureStream with RealSystem G2 Codecs

SureStream technology and RealSystem G2 codecs let you broadcast RealAudio or RealVideo at multiple bandwidths. Each viewer's RealPlayer selects an encoding appropriate for its connection speed. RealNetworks encoding tools let you specify SureStream when you begin the broadcast.

Multiple-Bandwidth Broadcast through SureStream



To broadcast without using SureStream and the RealSystem G2 codecs, you need a separate broadcast application running on a separate computer for each bandwidth connection you intend to support. This is required because older codecs require more CPU for each encoding than do RealSystem G2 codecs. You then connect each broadcast application to RealServer and broadcast the different encodings under different URLs.

Additional Information

For more on codecs, see "Choosing RealAudio Codecs" on page 45 and "Choosing RealVideo Codecs" on page 57.

Verify that the Broadcast Machine has Enough CPU Power

RealNetworks tools can broadcast a SureStream clip for several different bandwidths in real-time using just a moderately powerful PC. Refer to your broadcast application's manual or online help for guidelines on machine requirements for broadcasting.

Decide Whether to Archive a Live Broadcast

RealNetworks encoding tools let you write a live broadcast to a file. RealServer can also archive the broadcast to a file. The latter option may be the better solution if your broadcast is long and your broadcast machine has limited disk space. The RealServer administrator can set up RealServer to archive the live broadcast.

Get the Broadcast URL and RealServer Parameters

The RealServer administrator can give you the parameters you need to connect a broadcast application to RealServer. The administrator will also provide the broadcast URL or URLs.

Perform a Trial Run of a Live Broadcast

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 the broadcast results are what you expect. Because you can't edit a live broadcast the way you can edit a prerecorded file, it's important to set your audio levels and plan your video shots carefully in advance.

> **Additional Information**
>
> For pointers on producing audio, see "Capturing Audio" on page 41. For video, see "Recording Video" on page 53.

During both the trial run and the live broadcast, view the broadcast output with RealPlayer. When RealPlayer connects, check that the buffering time for receiving a live stream does not exceed 5-10 seconds. Throughout the presentation, keep an eye on the broadcast quality.

If you experience problems with the broadcast output, use the broadcast application to lower the video frame size and frame rate (fps), or select lower-bandwidth codecs. If these adjustments do not help, you may need to run your broadcast application on a more powerful machine.

Advertise a Public Broadcast Event

If you are broadcasting content that has wide public appeal, advertise your event on RealGuide (**http://realguide.real.com/**), the online guide to RealAudio and RealVideo.

Additional Information

See "Advertising on RealGuide" on page 157.

Using SMIL with a Broadcast

You can use SMIL to coordinate live streams or create a presentation that adds prerecorded content to a live broadcast. The following sections gives you tips on using SMIL with broadcasts.

Additional Information

See Chapter 7 beginning on page 75 for more on SMIL. Chapter 9 beginning on page 137 tells how to include ads in broadcasts.

SMIL Limitations for Broadcasts

Within a SMIL file, you treat a broadcast like any other clip. You can assign broadcast streams to SMIL regions and group a broadcast with on-demand clips in a `<seq>` or `<par>` group, for example. However, you cannot use some SMIL features with broadcast streams:

- You cannot replay a broadcast with the SMIL `repeat` attribute.
- The `clip-begin` and `clip-end` attributes do not work with broadcasts. You can terminate a broadcast before the stream stops by using the SMIL `end` attribute, however.

Additional Information

See "Setting Begin and End Times" on page 85.

Including On-Demand Clips with Broadcasts

Using SMIL, you can easily embed a broadcast in a multiclip presentation. SMIL can deliver an on-demand RealPix slideshow along with live RealAudio, for example, when both are in a `<par>` group. It cannot synchronize the on-demand clip to the live stream, however. The on-demand clip's timeline starts

when the viewer requests the presentation. The broadcast stream's timeline starts when the broadcast begins.

To illustrate this, suppose viewer A requests the presentation two minutes after the broadcast begins, while viewer B requests it four minutes after the broadcast begins. At ten minutes into the broadcast, both A and B hear the same audio, but viewer A's RealPix clip is at its eight-minute mark, whereas viewer B's clip is at its six-minute mark. Hence the relationship of the two timelines varies for each viewer.

Synchronizing Multiple Broadcast Streams

If you have multiple broadcast streams for a single presentation, you can synchronize the streams through SMIL. This compensates for the fact that you typically cannot start two broadcast applications at exactly the same time. For example, you might start a live RealText encoding application a few seconds before a live RealVideo stream. When it receives the streams, RealPlayer delays playing the RealText stream until it can synchronize it with the RealVideo stream.

Tip

RealPlayer synchronizes broadcast streams to audio. For this reason, start your RealAudio/RealVideo broadcast application last. This way RealPlayer will have received and buffered the other streams by the time it receives the audio.

The broadcast streams are timestamped according to the broadcast machines' internal clocks. You should therefore run broadcast applications on the same machine, or on different machines that have synchronized clocks. To make RealPlayer synchronize streams, add a `?wallclock=`*name* option to the broadcast source tag URLs in the SMIL file as shown in this example:

```
<par>
  <video src="rtsp://realserver.company.com/encoder/video.rm?wallclock=sync"/>
  <textstream src="rtsp://realserver.company.com/live/text.rt?wallclock=sync"/>
</par>
```

All `wallclock` attributes should use the same name value (`sync` in the example above), which can be any name you choose. The `wallclock` attribute is not needed for an on-demand clip or a single broadcast stream.

Warning

The wallclock attribute works with all RealNetworks clip types, including RealAudio, RealVideo, RealPix, and RealText. It may not function with other clip types broadcast by RealServer, however.

Additional Information

Sample RealText and RealPix broadcast applications are available in the RealSystem G2 Authoring Kit at **http://www.real.com/products/tools/authkit/index.html**.

QUICK STEPS FOR STREAMING CLIPS



This appendix provides examples that show how to set up some simple streaming presentations quickly. This information will aid you if you are a beginning user. Once you are familiar with the basic steps for hosting RealSystem G2 presentations, you can easily create more complex presentations.

Note

You will need to get the correct URLs for media clips from the RealServer or Web server administrator. Substitute those values for the example URLs shown below.

Streaming a RealAudio or RealVideo Clip

It's simple to add a RealAudio or RealVideo clip to your Web page. Following the instructions below, you can stream the clip from RealServer G2 or download it from a Web server. The clip plays back in RealPlayer.

Note

Before using a Web server, read "Hosting a Presentation on a Server" on page 21 and "Limitations on Web Server Playback" on page 151.

➤ **To create the clip:**

1. Prepare your audio or video source file for encoding. This can include normalizing the audio source file or setting the video's window size.

Additional Information

"Optimizing Audio" on page 43. "Digitizing Video" on page 54.

2. Use a RealNetworks encoding tool to encode the RealAudio or RealVideo clip from your audio or video source file. RealVideo and RealAudio clips use the file extension .rm.

Note

Encoding tools are available for free download or purchase at **http://www.real.com/products/tools/**.

➤ **To stream the clip from RealServer G2 using Ramgen:**

1. Transfer the clip to the RealServer G2 directory prepared by the RealServer administrator.
2. Link your Web page to the clip with an HTML hyperlink that specifies the RealServer address, the ramgen parameter, and the HTTP protocol. You can get this information from the RealServer administrator. In your HTML source file, the link will look like this example:

```
<a href="http://realserver.company.com:8080/ramgen/content/myclip.rm">
Click here</a> to see my RealVideo presentation.
```

Additional Information

"Streaming Clips from RealServer G2" on page 146.

3. In your Web browser, click the link to verify that it works. RealPlayer will launch as a helper application and, after a few seconds of buffering, will play the streaming clip.

➤ **To play the clip back from a Web server:**

1. With any text editor, open a new file and enter the URL your clip will have on the Web server. For example:

```
http://www.company.com/media/myclip.rm
```

2. Save this file as plain text with the file extension .ram. This is your Ram file.

Additional Information

"Creating a Ram File Manually" on page 153.

3. Transfer the media clip and the Ram file to the appropriate directory on the Web server.
4. Link your Web page to the Ram file (not the media clip) with a standard HTML hyperlink like this:

```
<a href="http://www.company.com/media/myclip.ram">
Click here</a> to see my RealVideo presentation.
```

5. In your Web browser, click the link to verify that it works. RealPlayer will launch as a helper application and, after a few seconds of buffering, will play the clip.

Additional Information

"Playing Clips from a Web Server" on page 149.

Embedding a RealVideo Clip in a Web Page

Using RealPlayer's Netscape plug-in, you can embed a RealVideo clip directly in your Web page. The following example assumes that the video is 176 pixels wide by 132 pixels high. It places the video window and the full RealPlayer control panel in your Web page.

Additional Information

See "Chapter 8: Playing Clips in a Web Page" beginning on page 117.

➤ **To embed the clip in your Web page:**

1. In your Web page, add the `<EMBED>` tag with the RealVideo URL, window size, and `ImageWindow` control. The following example assumes RealServer G2 will stream the presentation:

```
<EMBED WIDTH=176 HEIGHT=132
SRC="http://realserver.company.com:8080/ramgen/content/myclip.rm?embed"
CONTROLS=ImageWindow CONSOLE=one NOJAVA=true>
```

   If you intend to play the clip back from a Web server, use an HTTP URL and link to a Ram file with the extension `.rpm` (see below) as in the following example:

```
<EMBED WIDTH=176 HEIGHT=132
SRC="http://www.company.com/media/myclip.rpm"
CONTROLS=ImageWindow CONSOLE=one NOJAVA=true>
```

2. You can then add RealPlayer controls through additional `<EMBED>` tags that all use the same URL for the `SRC` parameter. The following example embeds the full RealPlayer control panel in the Web page, linking it to the image window through the same console. It assumes RealServer will stream the presentation:

```
<EMBED WIDTH=375 HEIGHT=100
SRC="http://realserver.company.com:8080/ramgen/content/myclip.rm?embed"
CONTROLS=All CONSOLE=one NOJAVA=true>
```

Use an <EMBED> tag like the following when playing the clip back from a Web server:

```
<EMBED WIDTH=375 HEIGHT=100
SRC="http://www.company.com/media/myclip.rpm"
CONTROLS=All CONSOLE=one NOJAVA=true>
```

Tip

Because you can place each <EMBED> tag anywhere on your Web page, you can lay out the image window and controls in any manner using HTML.

Additional Information

Download the HTML version of this manual from **http://service.real.com/help/library/index.html** to see online examples of embedded RealPlayer controls.

3. Transfer the clip to the appropriate RealServer G2 or Web server directory. When streaming from G2, you are ready to test the clip because the Web page already contains the link to the RealVideo clip.

➤ **To create the Ram file when playing the clip back from a Web server:**

1. With any text editor, open a new file and enter the URL your clip will have on the Web server, as in the following example:

   ```
   http://www.company.com/media/myclip.rm
   ```

2. Save this file as plain text with the file extension .rpm. This is your Ram file.
3. Transfer the Ram file to the appropriate directory on the Web server.
4. In your Web browser, click the link to verify that it works.

URL Reference

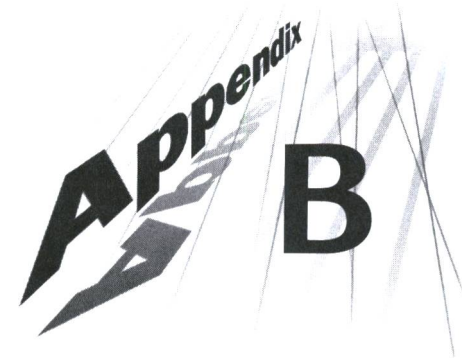
As explained throughout this manual, URLs to files and clips vary depending on what kind of file or clip you link to and what type of file contains the link. The table below provides a quick reference for the protocol used for various types of links. It also shows whether the link should invoke RealServer's

Ramgen utility. This table assumes that the presentation is for RealPlayer G2 and not earlier versions of RealPlayer.

Quick URL Reference

Link from	Link to	Located on	Protocol	Ramgen?	Reference
Web page	Media clip	RealServer	http://	**yes**	page 146
		Web server	http://	no	page 149
Web page	SMIL file	RealServer	http://	**yes**	page 146
		Web server	http://	no	page 149
Web page	Ram file (.ram or .rpm)	RealServer	http://	no	page 153
		Web server	http://	no	page 153
SMIL file	Media clip	RealServer	rtsp://	no	page 78
		Web server	http://	no	page 80
		Local host	file://	no	page 80
SMIL file	SMIL file	RealServer	rtsp://	no	page 78
		Web server	http://	no	page 80
		Local host	file://	no	page 80
Ram file (.ram or .rpm)	Media clip	RealServer	rtsp://	no	page 153
		Web server	http://	no	page 153
		Local host	file://	no	page 153
Ram file (.ram or .rpm)	SMIL file	RealServer	rtsp://	no	page 153
		Web server	http://	no	page 153
		Local host	file://	no	page 153

ADVANCED PRODUCTION TECHNIQUES



This appendix will help you utilize the many features of RealSystem G2 and SMIL. Before following the production tips given here, make sure you have a good understanding of SMIL as described in Chapter 7, beginning on page 75.

Smoothing Transitions between Clips

By grouping clips played in sequence within a SMIL <par> tag, you can create smooth transitions between the clips. When clips normally play in sequence, each clip buffers data (its *preroll*) when it starts to play. By grouping the sequence within a <par> tag, though, RealSystem takes advantage of unused bandwidth to send clips' preroll before they start to playback. You can use this feature to mask preroll for high-bandwidth clips, for example, by streaming the preroll while low-bandwidth, introductory clips play.

The following SMIL example, which omits the header that defines the region layout and base URL, shows how to mask preroll for high-bandwidth clips and create smooth transitions between the initial and subsequent clips:

```
<body>
 <par>
  <seq>
   <par>
    <!-- group 1: introductory group masking preroll -->
    <audio src="intro.rm"/>
    <textstream src="titles.rt" region="left"/>
    <textstream src="credits.rt" region="right"/>
   </par>
   <par>
    <!-- group 2: main group with masked preroll -->
    <ref src="graphics.rp" region="left"/>
    <video src="story.rm" region="right"/>
```

```
    </par>
  </seq>
 </par>
</body>
```

Group 1 consists of two RealText clips and a RealAudio clip played in parallel. Because of the <seq> tag, the group 1 clips precede the RealPix and RealVideo clips in group 2. If the <seq> tag were the highest level of organization, RealServer would stream the group 1 clips without regard to group 2, streaming data for group 2 clips only after group 1 finished. Viewers would experience a delay after group 1 clips finished as RealServer streamed preroll for group 2 clips.

The outer <par> tag just below the <body> tag, however, makes RealSystem treat groups 1 and 2 as one large parallel group with subgroups played in sequence. Although this doesn't affect the order in which the clips play, the parallel grouping makes RealSystem balance bandwidth between all clips. After it starts to stream the group 1 clips, RealServer makes use of unused bandwidth by streaming data for group 2 clips while the group 1 clips play. This masks the preroll for the group 2 clips.

Note

When you enclose clips in a <par> group, the individual clips do not appear in the RealPlayer playlist.

Additional Information

See "What is Preroll?" on page 28 and "Developing Multiclip Presentations" on page 33.

Hiding Regions with z-index

RealPlayer creates all regions defined in a SMIL file's header section when it first reads the file. So a single SMIL presentation cannot play clips in a certain set of regions, then destroy those regions and create different regions with a new layout. To accomplish dynamic layout changes, you can create separate SMIL files that define each region set, then play the SMIL files in sequence as described in "Creating a Ram File Manually" on page 153.

An alternative is to create a single SMIL file that uses the <region> tag's z-index parameter to create transparent, overlaying regions. The following SMIL header example creates a left region next to a right region. Both are in portrait orientation, their heights over twice the value of their widths. A second set of

regions, top and bottom, are stacked. These regions have higher z-index values, meaning that they display in front of the left and right regions:

```
<head>
 <layout>
  <root-layout width="360" height="360"/>
  <!-- first two side-by-side regions -->
  <region id="left" top="10" left="10" width="165" height="340" z-index="0"/>
  <region id="right" top="10" left="185" width="165" height="340" z-index="1"/>
  <!-- second two stacked regions -->
  <region id="top" top="10" left="70" width="220" height="165" z-index="2"/>
  <region id="bottom" top="185" left="70" width="220" height="165" z-index="3"/>
 </layout>
</head>
```

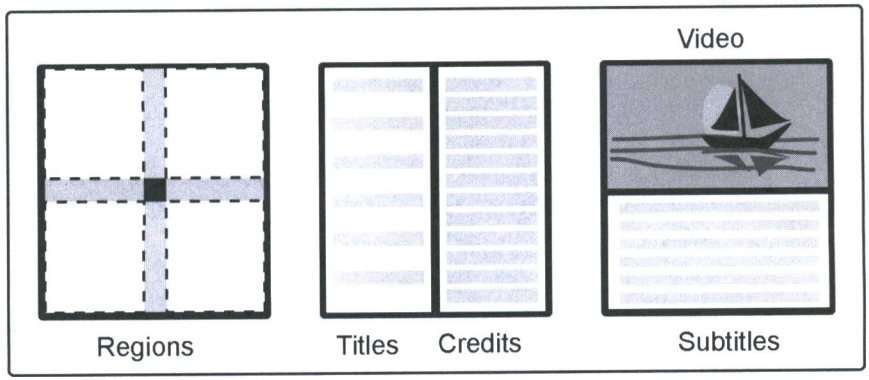
As defined in the following SMIL body, RealPix and RealText clips first play in the left and right regions, which appear beneath the top and bottom regions. Because the overlaying top and bottom regions do not use background colors, they remain transparent until clips play in them. The introductory RealPix and RealText clips disappear when they finish playback, restoring to view the root-layout default background color of black. The group 2 clips, a RealVideo clip and another RealText clip, then play in the top and bottom regions:

```
<body>
 <par>
  <seq>
   <par>
    <!-- group 1: side-by-side titles and credits -->
    <ref src="titles.rp" region="left" fill="remove"/>
    <textstream src="credits.rt" region="right" fill="remove"/>
   </par>
   <par>
    <!-- group 2: stacked video and subtitles -->
    <video src="story.rm" region="top"/>
    <textstream src="subtitles.rt" region="bottom"/>
   </par>
  </seq>
 </par>
</body>
```

Although the left, right, top, and bottom regions exist from the start of the SMIL file playback, the use of z-index, fill="remove", and default region transparency makes it appear as if the regions are created dynamically with each new set of clips. The following figure illustrates the initial region

creation, the first set of clips, then the second set of clips playing in the RealPlayer window.

Transparent Region Creation and Ordering



Additional Information

For more on z-index, see "Ordering Overlapping Regions with z-index" on page 101. "Laying Out Multiple Clips" on page 95 discusses SMIL layouts.

Writing Complex SMIL Switch Statements

The SMIL <switch> tag is a powerful feature that lets you specify options that each RealPlayer can choose between based on its preference settings and available bandwidth. "Switching Between Alternate Choices" on page 89 explains the basics of using the <switch> tag. The following sections give tips on writing complex <switch> statements.

Switching with SureStream Clips

With RealAudio or RealVideo clips encoded for multiple bit rates with SureStream technology, you may or may not need to use the <switch> tag:

- When the presentation consists solely of a SureStream clip, simply link to that clip within the SMIL file. The clip then streams at the rate appropriate for RealPlayer's connection speed. You do not need to specify bandwidth choices with a <switch> group.
- Use the <switch> tag when combining a SureStream clip with other clips encoded for single bandwidths. The SureStream clip is always used, but

the <switch> group gives RealPlayer options for other clips. The following example illustrates a RealAudio SureStream clip and a choice between two RealPix presentations built for different bandwidths:

```
<par>
  <audio src="audio/newsong2.rm"/>
  <switch>
    <ref src="image/slideshow1.rp" system-bitrate="47000"/>
    <ref src="image/slideshow2.rp" system-bitrate="20000"/>
  </switch>
</par>
```

Additional Information

For more on SureStream, see "Choosing RealAudio Codecs" on page 45 and "Choosing RealVideo Codecs" on page 57. Refer to "Supporting Multiple Bandwidth Connections" on page 34 for more on developing presentations for different connection speeds.

Switching with Multiple Test Attributes

You can use multiple <switch> test attributes to have RealPlayer choose clips based on both bandwidth and language. There are two ways to do this. In this first example, each audio clip choice has two test-attributes, one for language and one for bandwidth. Both attributes must be viable for RealPlayer to choose the clip:

```
<switch>
  <!-- French language choices -->
  <audio src="sound/audio_fr2.rm" system-language="fr" system-bitrate="47000"/>
  <audio src="sound/audio_fr1.rm" system-language="fr" system-bitrate="20000"/>
  <!-- English language choices (default) -->
  <audio src="sound/audio_en2.rm" system-bitrate="47000"/>
  <audio src="sound/audio_en1.rm" system-bitrate="20000"/>
</switch>
```

Because RealPlayer evaluates the <switch> choices from top to bottom, selecting the first viable option, the last two choices do not have system-language options. This lets all RealPlayers other than those with French as their language preference choose between the two English-language clips.

The next example adds RealText files in both French and English to the presentation possibilities. Here, <switch> statements are nested so that RealPlayers with French set as their language preference play the French

RealText file and choose from the set of French-language RealAudio files based on available bandwidth. All other RealPlayers play the English RealText file and choose from a set of English-language RealAudio files:

```
<switch>
  <!-- Choose French as the language -->
  <par system-language="fr">
    <textstream src="text/credits_fr.rt"/>
    <switch>
      <!-- Choose fast or slow bit rate for French audio -->
      <audio src="sound/audio_fr2.rm" system-bitrate="47000"/>
      <audio src="sound/audio_fr1.rm" system-bitrate="20000"/>
    </switch>
  </par>
  <!-- Choose English (default) as  the language -->
  <par>
    <textstream src="text/credits_en.rt"/>
    <switch>
      <!-- Choose fast or slow bit rate for English audio -->
      <audio src="sound/audio_en2.rm" system-bitrate="47000"/>
      <audio src="sound/audio_en1.rm" system-bitrate="20000"/>
    </switch>
  </par>
</switch>
```

Displaying Captions for the Hearing Impaired

The RealPlayer G2 preferences window has an option to enable captions for the hearing impaired. To author these captions, write a RealText clip that coordinates text with the audio timeline. Then create a SMIL file that plays the two in parallel. The SMIL attribute `system-captions="on"` makes the captions appear only if the viewer's preferences enable captions:

```
<smil>
  <head>
    <layout>
      <root-layout background-color="blue" width="310" height="200"/>
      <region id="video" width="176" height="132" left="67" top="5"/>
      <region id="captions" width="300" height="50" left="4" top="145"/>
    </layout>
  </head>
  <body>
    <par>
      <video src="news.rm" region="video"/>
```

```
    <textstream src="captions.rt" region="captions" system-captions="on"/>
   </par>
  </body>
</smil>
```

In this example, the RealText file (captions.rt) appears only for viewers who have enabled captions in RealPlayer. For all other viewers, the caption region shows the root-layout region's background color. RealPlayer's captions setting does not affect the video clip, which has no system-captions value. Following sections explain how to fill the caption region or make it disappear when captions are off.

Tip

The system-captions attribute also works for <seq> and <par> groups. You can use system-captions="off" to make a clip or group play only when system captions are turned off in RealPlayer.

Additional Information

"Laying Out Multiple Clips" on page 95 discusses SMIL layouts. *RealText Authoring Guide* is available at **http://service.real.com/help/library/encoders.html**. The RealPlayer G2 online help can assist you with turning captions on and off in the preferences.

Filling a Captions Region when Captions are Off

To avoid a blank region when captions are off, you can display another file, such as an image file, in the caption region. The following extract is from a SMIL file that uses the same layout as the previous example. Here, the parallel group includes an image clip with a system-captions="off" attribute. This makes the image display only when captions are turned off in RealPlayer:

```
<par>
 <video src="news.rm" region="video"/>
 <textstream src="captions.rt" region="captions" system-captions="on"/>
 <img src="filler.gif" region="captions" system-captions="off"/>
</par>
```

Any clip, not just a static image, can fill the captions region when captions are off. The filler clip should be the same size as the RealText captions clip, however, when the two display in the same region.

Resizing the Playback Area for Captions

As an extension to SMIL, RealPlayer G2 supports system-captions in layout tags. This lets you change layouts when captions are displayed. The following SMIL file centers a video region above a captions region only when RealPlayer enables captions. Although this example uses system-captions in the <layout> tag, you could use the attribute in <root-layout/> and <region/> tags as well to display or hide individual regions based on RealPlayer's captions setting:

```
<smil>
  <head>
    <meta name="title" content="Closed-Captioned News"/>
    <!-- Layout used when captions are on. -->
    <layout system-captions="on">
      <root-layout background-color="blue" width="310" height="200"/>
      <region id="video" width="176" height="132" left="67" top="5"/>
      <region id="captions" width="300" height="50" left="4" top="145"/>
    </layout>
  </head>
  <body>
    <par>
      <video src="news.rm" system-captions="off"/>
      <video src="news.rm" region="video" system-captions="on"/>
      <textstream src="captions.rt" region="captions" system-captions="on"/>
    </par>
  </body>
</smil>
```

With this SMIL file, RealPlayer creates the layout and plays the RealText clip in parallel with the video only when captions are on. When captions are off, RealPlayer defines no regions and plays only the news.rm clip that includes the system-captions="off" attribute. When captions are off, the SMIL file is equivalent to the following:

```
<smil>
  <head>
    <meta name="title" content="Closed-Captioned News"/>
  </head>
  <body>
    <video src="news.rm" system-captions="off"/>
  </body>
</smil>
```

SMIL QUICK REFERENCE



Once you understand SMIL, use this appendix as reference when writing SMIL files. For full information on SMIL and RealSystem G2, see Chapter 7 beginning on page 75. In the tables below, an asterisk (*) denotes a required attribute. Ellipses (...) designate nonessential information left out of the example.

Header Tags

<meta.../>

The header region's <meta.../> tags provide presentation information. A <meta.../> tag can also set a base URL for source clips in the SMIL file.

<meta.../> Tag Attributes

Attribute	Value	Function	Reference
content *	any value	Provides content for the name attribute.	page 91
name *	abstract	Gives presentation abstract.	page 91
	author	Lists name of presentation author.	page 91
	base	Sets base URL for source clips.	page 79
	copyright	Supplies presentation copyright.	page 91
	title	Gives presentation title, which displays in the RealPlayer run list.	page 91

Note

You can define other information attributes besides abstract, author, copyright, and title. See "Adding Presentation Information" on page 91.

Examples

```
<meta name="author" content="Jane Morales"/>
<meta name="title" content="Multimedia My Way"/>
<meta name="copyright" content="(c)1998 Jane Morales"/>
<meta name="base" content="rtsp://realserver.company.com/"/>
```

<layout>...</layout>

The <layout> and </layout> tags define the layout of visual clips such as video and animation. Within the tags, you define a root-layout region and separate regions for the clips. The layout must be defined with the SMIL header.

<root-layout.../>

Within <layout>...</layout>, <root-layout> sets the overall size of the playback area. Clips do not play in the root-layout area.

<root-layout.../> Tag Attributes

Attribute	Value	Function	Reference
background-color	color name or hex value	Sets root-layout color.	page 99
height *	pixels	Sets playback area height.	page 96
system-captions	on|off	Determines if root-layout is created based on system captions preference.	page 180
width *	pixels	Sets playback area width.	page 96

Example

```
<layout>
  <root-layout background-color="maroon" width="250" height="230"/>
  <region .../>
  <region .../>
</layout>
```

<region.../>

Within <layout>...</layout>, <region> tags define the size and placement (relative to root-layout) of each region used to play clips.

<region.../> Tag Attributes

Attribute	Value	Function	Reference
background-color	color name or hex value	Sets region background color.	page 99
fit	fill, hidden, meet, or slice	Determines how clip fits region when the two are different sizes.	page 100
height *	pixels or percentage	Sets region height.	page 96
id *	name	Provides target name for setting clips to play in the region.	page 97
left *	pixels or percentage	Sets region offset from the left side of the root-layout region.	page 96
system-captions	on|off	Determines if region is created based on system captions preference.	page 180
top *	pixels or percentage	Sets region offset from the top of the root-layout region.	page 96
width *	pixels or percentage	Sets region width.	page 96
z-index	number	Defines order of overlapping regions.	page 101

Example

```
<layout>
  <root-layout .../>
  <region id="video" top="5" left="5" width="240" height="180"
    background-color="blue" fit="fill" z-index="3"/>
  <region.../>
</layout>
```

Clip Source Tags

To define locations and timing attributes for clips within a presentation, use a source tag with one of the following clip type identifiers:

```
<animation.../>
<audio.../>
<image.../>
<ref.../>
<text.../>
<textstream.../>
<video.../>
<RealAdInsert.../>
```

Although a clip type identifier must start a source tag, the identifier does not affect playback. All clip source tags can use <ref.../>, for example. The <RealAdInsert.../> tag is not a SMIL tag, but a RealSystem tag that RealServer replaces with a SMIL tag for an advertising clip. It does not include a src attribute, but can include any other SMIL clip attribute. These attributes get passed to the replacement tag. See Chapter 9 beginning on page 137 for more on <RealAdInsert.../>.

Clip Source Tag Attributes

Attribute	Value	Function	Reference
abstract	abstract	Gives abstract for clip.	page 92
author	name	Lists author for clip.	page 92
begin	h, min, s, or ms	Delays normal playback time.	page 85
clip-begin	h, min, s, or ms	Specifies clip's internal timing mark where playback begins.	page 86
clip-end	h, min, s, or ms	Specifies clip's internal timing mark where playback ends.	page 86
copyright	copyright	Lists copyright information for clip.	page 92
dur	h, min, s, or ms	Sets total time clip plays. Do not use with end.	page 87
end	h, min, s, or ms	Sets end time for clip relative to begin time. Do not use with dur.	page 85
fill	freeze or remove	Freezes or removes (default) clip from screen when it stops playing.	page 88
id	name	Names clip for reference by other SMIL elements.	page 82
region	<region.../> tag id name	Assigns clip to a region.	page 103
repeat	number	Repeats clip the specified number of times.	page 82

(Table Page 1 of 2)

Clip Source Tag Attributes (continued)

Attribute	Value	Function	Reference
src *	URL	Provides full or relative URL for clip.	page 77
system-bitrate	bits per second	Sets bit rate attribute for <switch>...</switch>.	page 90
system-captions	on|off	Determines if clip plays based on system captions preference.	page 178
system-language	language code	Sets language attribute for <switch>...</switch>.	page 90
title	title	Lists title for clip.	page 92

(Table Page 2 of 2)

Examples

```
<video src="rtsp://realserver.company.com/media/video2.rm" region="video"
  begin="40s" clip-begin="5100ms" clip-end="4.5min" fill="freeze"/>

<audio src="rtsp://realserver.company.com/media/music.rm"
  dur="10.5s" repeat="5"/>
```

Image Source Tag Options

For a still image, you can include the following options in the image source tag.

Image Source Tag Options

Option	Value	Function	Reference
bgcolor	color name or hex value	Changes GIF transparency to color.	page 113
bitrate	bits per second (bps)	Sets streaming bit rate.	page 112
reliable	true	Guarantees reliable image transmission.	page 115
target	_browser	Makes Web browser the URL target.	page 113
	_player	Sets RealPlayer as command target.	page 114
url	URL	Sends URL to browser on mouse click.	page 113
	command:play()	Gives play command on mouse click.	page 114
	command:pause()	Gives pause command on mouse click.	
	command:seek(*time*)	Makes RealPlayer seek to specified time in timeline on mouse click. Time has dd:hh:mm:ss.xyz format.	
	command:stop()	Gives stop command on mouse click.	

A question mark operator ("?") separates image options from the image URL in the clip source tag. Additional options preceded by ampersands ("&") can follow in this format:

```
<image src= "URL?option=value&option=value"/>
```

Note

Image options and values are not in quotation marks because they are part of the quoted src value.

Examples

```
<image src="ad1.gif?bitrate=1000&bgcolor=blue"/>

<image src="ad.gif?url=http://www.company.com&target=_browser" .../>

<image src="stop.gif?url=command:stop()&target=_player" .../>

<image src="seek.gif?url=command:seek(1:35.4)&target=_player" .../>
```

Group Tags

<par>...</par>

The <par> and </par> tags make enclosed clips play in parallel. No attributes are required for a <par> tag.

<par> Tag Attributes

Attribute	Value	Function	Reference
abstract	abstract	Gives abstract for group.	page 92
author	name	Lists author for group.	page 92
begin	h, min, s, or ms	Delays normal group playback time.	page 86
copyright	copyright	Lists copyright for group.	page 92
dur	h, min, s, or ms	Sets total time group plays.	page 87
end	h, min, s, or ms	Sets end time for group relative to begin time. Do not use with endsync.	page 86
endsync	first	Ends group when first clip ends.	page 82
	last	Ends group when last clip ends.	
	id(*clip id*)	Ends group when specified clip ends.	
id	name	Names group for reference by other SMIL elements.	page 109

(Table Page 1 of 2)

<par> Tag Attributes (continued)

Attribute	Value	Function	Reference
repeat	number	Repeats group the specified number of times.	page 82
system-bitrate	bits per second	Sets bit rate attribute for <switch>...</switch>.	page 90
system-captions	on|off	Determines if group plays based on system captions preference.	page 178
system-language	language code	Sets language attribute for <switch>...</switch>.	page 90
title	title	Lists title for group.	page 92

(Table Page 2 of 2)

Examples

```
<par>
  <video src="videos/newsong.rm"/>
  <textstream src="lyrics/newsong.rt"/>
</par>

<par endsync="id(text)" repeat="2" begin="4s">
  <video src="videos/newsong.rm"/>
  <textstream id="text" src="lyrics/newsong.rt"/>
</par>
```

<seq>...</seq>

The <seq> and </seq> tags group clips that play in sequence. No attributes are required for a <seq> tag.

<seq> Tag Attributes

Attribute	Value	Function	Reference
begin	h, min, s, or ms	Delays normal group playback time.	page 86
dur	h, min, s, or ms	Sets total time group plays.	page 87
end	h, min, s, or ms	Sets end time for group relative to begin time.	page 86
id	name	Names group for reference by other SMIL elements.	page 109
repeat	number	Repeats group the specified number of times.	page 82

(Table Page 1 of 2)

<seq> Tag Attributes (continued)

Attribute	Value	Function	Reference
system-bitrate	bits per second	Sets bit rate attribute for <switch>...</switch>.	page 90
system-captions	on|off	Determines if group plays based on system captions preference.	page 178
system-language	language code	Sets language attribute for <switch>...</switch>.	page 90

(Table Page 2 of 2)

Example

```
<seq repeat="3">
  <audio src="rtsp://realserver.company.com/one.rm"/>
  <audio src="rtsp://realserver.company.com/two.rm"/>
</seq>
```

<switch>...</switch>

The <switch> and </switch> tags contain clips or groups of clips that RealPlayer chooses between based on its available bandwidth or language preference. Clips or groups that RealPlayer evaluates must include a system-bitrate or system-language attribute.

<switch> Tag Attributes

Attribute	Value	Function	Reference
id	name	Names group as a link target for other SMIL files.	page 109

Additional Information

See "Switching Between Alternate Choices" on page 89.

Example

```
<switch>
  <audio src="french/seattle.rm" system-language="fr"/>
  <audio src="german/seattle.rm" system-language="de"/>
  <audio src="english/seattle.rm"/>
</switch>
```

Hyperlink Tags

<a>...

The <a>... tags work like HTML hyperlink tags to connect a media source clip to another clip. But whereas you enclose text between <a> and in HTML, you enclose a media source tag between <a> and in SMIL.

<a.../> Tag Attributes

Attribute	Value	Function	Reference
href *	URL	Sets hyperlink URL.	page 105
show	new	Opens URL in browser while RealPlayer continues.	page 105
	pause	Opens URL in browser and pauses RealPlayer.	
	replace (default)	Opens URL in RealPlayer.	

Example

```
<a href="http://www.company.com/index.htm" show="new">
  <video src="video.rm" region="videoregion"/>
</a>
```

<anchor.../>

An <anchor> tag can define a hot spot hyperlink that can be temporal as well as spatial. It fits within a media source tag:

```
<video ...>
  <anchor .../>
</video>
```

Note that here the <video> source tag does not end with a forward slash as it normally does. Instead, a </video> tag follows it and the <anchor.../> tag.

<anchor.../> Tag Attributes

Attribute	Value	Function	Reference
begin	h, min, s, or ms	Defines when hot spot becomes active or when linked media clip begins in its timeline.	page 109 page 111
coords	pixels or percentages	Defines boundary for hot spot as left, top, right, and bottom offset from source clip.	page 107
end	h, min, s, or ms	Determines when hot spot deactivates.	page 109

(Table Page 1 of 2)

<anchor.../> Tag Attributes (continued)

Attribute	Value	Function	Reference
href *	URL	Sets hyperlink URL.	page 107
id	name	Defines target for use by other hypertext links.	page 111
show	new	Opens URL in browser while RealPlayer continues playback.	page 105
	pause	Opens URL in browser and pauses RealPlayer.	
	replace (default)	Opens URL in RealPlayer.	

(Table Page 2 of 2)

Examples

```
<video src="video.rm" region="videoregion">
  <anchor href="rtsp://realserver.company.com/vid2.rm" coords="20,40,80,120"/>
</video>
```

```
<video src="video.rm" region="videoregion">
  <anchor href="http://www.company.com" show="pause" coords="10,30,70,100"
    begin="5s" end="45s"/>
</video>
```



FILE TYPE REFERENCE

The following tables provide a quick reference to file types commonly used in RealSystem G2 media production. This is not a definitive list of all file types used in RealSystem G2, however. Plug-in technology allows RealSystem G2 to stream virtually any file type.

Additional Information

Refer to **http://www.real.com/devzone** for information on other types of media RealSystem G2 can stream.

RealSystem G2 Standard Streaming Clip Types

Extension	File Type	Reference
.rm or .ra	RealAudio	"Creating RealAudio Clips" on page 44
.rm	RealVideo	"Creating RealVideo Clips" on page 57
.rp	RealPix streaming image mark-up	"Images" on page 12
.rpa	RealPix ad rotation	"Displaying Banner Ads" on page 138
.rt	RealText streaming text	"Text" on page 13
.swf	Shockwave Flash file for RealFlash	"Producing Animation" on page 63

RealSystem G2 Information Files

Extension	File Type	Reference
.ram	Ram file to launch RealPlayer	"Creating a Ram File Manually" on page 153
.rpm	Ram file for embedded presentations	
.smil, .smi	SMIL file for layout and timing	"SMIL General Rules" on page 76

Video File Types Encodable as RealVideo

Extension	File Type	Reference
.avi	Windows standard video	"Creating RealVideo Clips" on page 57
.mov	QuickTime movie	

Common Video File Types Streamed by RealSystem G2

Extension	File Type	Reference
.asf	Advanced Streaming Format	"Streaming Other Video Formats" on page 61
.avi	Windows standard video	
.mov	QuickTime movie	
.viv	Vivo video	

Audio File Types Encodable as RealAudio

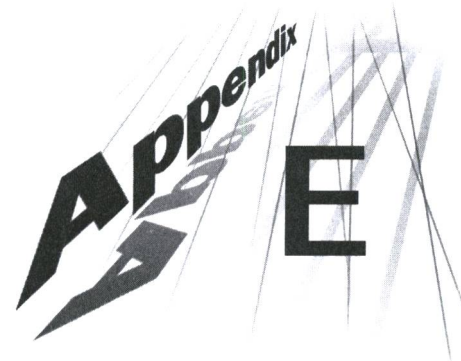
Extension	File Type	Reference
.aif	Audio Interchange Format	"Creating RealAudio Clips" on page 44
.au	Sun standard audio	
.mov	QuickTime movie	
.snd	Sound audio	
.wav	WAV audio	

Common Audio File Types Streamed by RealSystem G2

Extension	File Type	Reference
.aif	Audio Interchange Format	"Streaming Other Audio Formats" on page 49
.au	Sun-standard audio	
.wav	WAV audio	

Image Files Types Playable Directly in RealPlayer G2 and RealPix

Extension	File Type	Reference
.jpg	JPEG (nonprogressive)	"Images" on page 12
.gif	GIF87, GIF89, or animated GIF	



SMIL LANGUAGE CODES

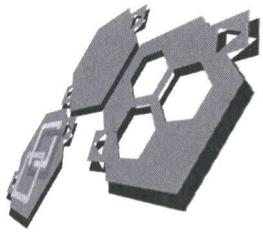
As "Setting Language Choices" on page 90 explains, SMIL can list different language choices that RealPlayer chooses from based on its language preference. The following table lists the codes you can use in a SMIL file to indicate clips created for specific languages.

Code	Language
af	Afrikaans
sq	Albanian
ar-iq	Arabic (Iraq)
ar-dz	Arabic (Algeria)
ar-bh	Arabic (Bahrain)
ar-eg	Arabic (Egypt)
ar-jo	Arabic (Jordan)
ar-kw	Arabic (Kuwait)
ar-lb	Arabic (Lebanon)
ar-ly	Arabic (Libya)
ar-ma	Arabic (Morocco)
ar-om	Arabic (Oman)
ar-qa	Arabic (Qatar)
ar-sa	Arabic (Saudi Arabia)
ar-sy	Arabic (Syria)
ar-tn	Arabic (Tunisia)
ar-ae	Arabic (U.A.E.)
ar-ye	Arabic (Yemen)
eu	Basque
bg	Bulgarian
ca	Catalan

Code	Language
zh-hk	Chinese (Hong Kong)
zh-cn	Chinese (People's Republic)
zh-sg	Chinese (Singapore)
zh-tw	Chinese (Taiwan)
hr	Croatian
cs	Czech
da	Danish
nl	Dutch (Standard)
nl-be	Dutch (Belgian)
en	English
en-au	English (Australian)
en-bz	English (Belize)
en-gb	English (British)
en-ca	English (Canadian)
en	English (Caribbean)
en-ie	English (Ireland)
en-jm	English (Jamaica)
en-nz	English (New Zealand)
en-za	English (South Africa)
en-tt	English (Trinidad)
en-us	English (United States)

Code	Language
et	Estonian
fo	Faeroese
fi	Finnish
fr-be	French (Belgian)
fr-ca	French (Canadian)
fr-lu	French (Luxembourg)
fr	French (Standard)
fr-ch	French (Swiss)
de-at	German (Austrian)
de-li	German (Liechtenstein)
de-lu	German (Luxembourg)
de	German (Standard)
de-ch	German (Swiss)
el	Greek
he	Hebrew
hu	Hungarian
is	Icelandic
in	Indonesian
it	Italian (Standard)
it-ch	Italian (Swiss)
ja	Japanese
ko	Korean
ko	Korean (Johab)
lv	Latvian
lt	Lithuanian
no	Norwegian
pl	Polish
pt-br	Portuguese (Brazilian)
pt	Portuguese (Standard)
ro	Romanian
sr	Serbian
sk	Slovak

Code	Language
sl	Slovenian
es-ar	Spanish (Argentina)
es-bo	Spanish (Bolivia)
es-cl	Spanish (Chile)
es-co	Spanish (Colombia)
es-cr	Spanish (Costa Rica)
es-do	Spanish (Dominican Republic)
es-ec	Spanish (Ecuador)
es-sv	Spanish (El Salvador)
es-gt	Spanish (Guatemala)
es-hn	Spanish (Honduras)
es-mx	Spanish (Mexican)
es-ni	Spanish (Nicaragua)
es-pa	Spanish (Panama)
es-py	Spanish (Paraguay)
es-pe	Spanish (Peru)
es-pr	Spanish (Puerto Rico)
es	Spanish (Spain)
es-uy	Spanish (Uruguay)
es-ve	Spanish (Venezuela)
sv	Swedish
sv-fi	Swedish (Finland)
th	Thai
tr	Turkish
uk	Ukrainian
vi	Vietnamese



GLOSSARY

A

Advertising Application
A RealSystem option that inserts ads into SMIL-based presentations. The SMIL files use `<RealAdInsert/>` tags to indicate ad placement.

B

bandwidth
The upper limit on the amount of data, typically expressed as Kilobits per second (Kbps), that can pass through a network connection.

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.

buffering
Receiving and storing data before playing it back. The initial buffering time is called *preroll*. After preroll, excessive buffering may stall the presentation.

byte
A common measurement of data. One byte comprises eight (8) bits.

C

client
A software application that receives data from a server. A Web browser is a client of a Web server. RealPlayer G2 is a client of RealServer G2.

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*.

E

encoding
Converting a file into a compressed, streaming format. For example, you can encode WAV files as RealAudio.

F

Flash
A Macromedia tool for creating animations that can be streamed as RealFlash. See also *Shockwave Flash*.

H

HTTP
The protocol used by Web servers to communicate with Web browsers. RealServer can use HTTP, but it streams clips to RealPlayer G2 with RTSP.

I

ISP
Internet Service Provider. A company that provides access to the Internet. Many ISPs have RealServer available to stream media clips.

K

Kilobit
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
A common unit of data measurement equal to 1024 bytes. Also equal to 8 Kilobits.

P

PNA
A proprietary protocol RealServer G2 supports for backwards compatibility with RealSystem 3.0 through 5.0. URLs using PNA start with `pnm://`.

port
A connection to a server designated by a number such as 8080. RealServer G2 uses different ports for the RTSP, HTTP, and PNA protocols.

preroll
Buffering that occurs at the start of a presentation. Preroll should be 15 seconds or less.

presentation
A group of clips coordinated through SMIL and streamed from RealServer to RealPlayer.

R

RDP
The proprietary data package protocol RealServer G2 uses (along with RTSP) when communicating with RealPlayer G2. Contrast to *RTP*.

RealAudio
A RealSystem clip type for streaming audio over a network. RealAudio clips use the `.rm` or `.ra` extension.

RealFlash
A RealSystem clip type for streaming Shockwave Flash animation along with a RealAudio soundtrack.

RealPix
A RealSystem clip type (file extension `.rp`) for streaming still images over a network. It uses a mark-up language for creating special effects such as fades and zooms.

RealPlayer
RealNetworks client designed to play multimedia presentations streamed by RealServer or a Web server.

RealServer
RealNetworks server software used to stream multimedia presentations to RealPlayer.

RealSystem
The system for streaming clips such as RealAudio and RealVideo over a network. It consists of RealServer, RealPlayer, and production tools.

RealText
A RealSystem clip type (file extension .rt) for streaming text over a network. It uses a mark-up language for formatting text.

real-time
Delivered as it occurs. For example, a live broadcast is streamed across a network in real-time.

RealVideo
A RealSystem clip type for streaming video over a network. RealVideo clips use the .rm extension.

rotating banner ads
Banner advertisments that change at a specified interval, such as a new ad banner every 30 seconds.

RTP
The open, standards-based data package protocol RealServer G2 uses (along with RTSP) to communicate with RTP-based clients. Contrast to *RDP*.

RTSP
The open, standards-based control protocol RealServer G2 uses to stream clips to RealPlayer G2 or any RTP-based client. Contrast to *HTTP*.

S

server
1. A software application, such as a Web server or RealServer G2, that sends clips over a network.

2. A computer that runs server software.

Shockwave Flash
A compressed Flash file format (file extension .swf) used as the animation component in RealFlash.

SMIL
Synchronized Multimedia Integration Language. A mark-up language for specifying how and when each clip plays. SMIL files use the extension .smil or .smi.

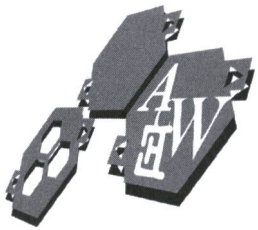
stream
v. To send a media clip over a network so that it begins playing back as quickly as possible.

n. 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 technology that allows switching to a lower-bandwidth encoding in a RealAudio or RealVideo clip to compensate for network congestion. Available only in RealSystem G2.

U

URL
Uniform Resource Locator. A location description that lets a Web browser or RealPlayer receive a clip stored on a Web server or RealServer.



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