Chapter 7

RealAudio and Other Streaming Audio Applications

If you've ever waited for a huge WAV or SND file to download, you probably thought to yourself, "There's got to be a better way." Well, you were right — there is a better way to handle sampled files on the Internet. It's called *streaming audio,* and it lets you listen to huge files or even live broadcasts without long download times. This chapter features the primary streaming application, RealAudio, and introduces some of its up-and-coming competitors.

What you'll learn:

- What streaming is and how it works
- What RealAudio is and how to use it
- Who the major competitors are: Xing StreamWorks, Macromedia Shockwave, and Microsoft NetShow

What Is Streaming?

Streaming plays multimedia information — audio and/or video — while it is still being downloaded. You don't have to wait for an entire file to download before it starts to play, as you do with traditional audio files. Suppose you want to listen to a 400K file.

WAVS, MIDIs, & RealAudio • 7507-4/1 • ch07.2 • Chapter 07 • Proof 02 • MS • 10/2/98 • p.145

Without streaming, you could sit around twiddling your thumbs for what seems like forever while the file downloads. With streaming, you need wait only around a few seconds, barely time for a twiddle.

Note

In case you're not familiar with the server-client model a *server* is a program that runs on a remote computer and makes various services available to a network. The Internet consists of Web servers, FTP servers, mail servers, gopher servers, newsgroup servers, and so on. A *client* is a program the runs on your PC and requests information from the server. In order to access a Web server, you must have a Web client. To access a newsgroup server, you must have a newsgroup client, and so on.

Why wait even a few seconds? Data does not flow smoothly across the Internet. It travels in *packets*—small chunks, each with an address and a sequence number. Your packets are mixed in with other people's packets, which often get into traffic jams. Each packet is routed dynamically, so one may travel by way of Chicago and New York, another by way of Timbuktu. Your Internet software then reassembles the packets into a file.

Imagine that you place a huge order with a company across the country. Your order is packed in hundreds of cartons, which are shipped via the Post Office and several other ground carriers. If you can imagine the various routes the packages take, the other packages that come and go, and the frequency and order in which yours arrive, you'll have a pretty good idea of how packets travel on the Internet. Of course, Internet packets travel much faster, even if it's still frustratingly slow.

How streaming works

If . . . you heard the sound data . . . as it . . . . . arrived . . . it would sound . . . . . like . . . this . . . . . where the . . . dots . . . represent . . . . static. To smooth out the data flow and eliminate the static, streaming builds up several seconds' worth of sound in a buffer

before beginning to play. (A *buffer* is simply a storage area in memory.) It then continues to drop arriving data into one end of the buffer while it pulls a smooth stream from the other end.

It's important to get the sound data through the Internet as efficiently as possible so your buffer doesn't run dry. Therefore, streamed data is compressed as much as possible, using a lossy compression scheme. Your streaming player's biggest task is to decompress it. Compression and decompression cause their own set of problems, as you'll see in the next section, but there's no better way to get a lot of data through the Internet as quickly as possible.

The pros and cons

Streaming offers two tremendous advantages. First, because you don't have to download an entire file before it starts to play, there's really no limit on file size. The 180K limit I suggested in earlier chapters does not apply to streamed files. A streamed file may contain a complete symphony, a ten-minute interview with your favorite star, a major news event, or an entire Shakespearean play.

Second, streaming enables live Internet broadcasting, much like radio and television except for the slight buffering delay. Hundreds of Internet "radio" stations are now transmitting, plus live audio and video broadcasts of events such as concerts, weddings, sports, and Mars landings. In Netspeak, a *live stream* is streamed data being broadcast as it happens. An *on-demand file* is a streamed recorded file, such as the symphony or Shakespearean play mentioned earlier.

As always, advantages are accompanied by disadvantages. When traffic is heavy on the Internet or the server is overloaded, you most likely will experience some *brownouts*—short periods where the buffer runs dry and you hear nothing but static. This can ruin the mood of a piece, to put it mildly. Brownouts can also happen when your processor can't decompress data quickly enough. Decompression requires intense computation, which eats up processing time. If you're doing any other computing while listening, you'll notice the difference. I currently have a Pentium 266, not as

fast as they come these days, but pretty darn fast. I love to listen to Internet radio while I work. But when I do something that requires a lot of computation, such as scrolling or printing a large document, my radio broadcast turns to fuzz.

Another disadvantage is poor sound quality. Sometimes packets get lost entirely or arrive too late, making the audio sound choppy. Information lost during compression also contributes to poor sound quality. Speech comes through pretty well, but music sometimes sounds as if it's being played underwater.

These are early days for streaming technology, somewhat like radio in the 1920s. You'd better believe the major streaming companies are all scrambling to overcome the problems. I believe they'll succeed within the next few years, and someday we'll be able to say to our grandkids, "I remember when . . . ."

RealAudio

The biggest player in the streaming technology ballpark is RealNetworks, Inc., creator of RealAudio. They pioneered the technology and seized the lion's share of the market before anyone else really got into the game. Since they give away both their basic player and their encoder, they are likely to remain the king of the hill for quite some time. They make their money selling their enhanced player, their server, and a few other related products.

Early versions of RealAudio handled audio only, but video was added with version 4.0, and the player's name changed from RealAudio to RealPlayer. RealFlash, an animation viewer, was added with RealPlayer 5.0. Now RealPlayer G2 includes RealPix, a picture viewer, and RealText, a text viewer. Technically speaking, the name RealAudio is out-of-date, but it's still commonly used for the entire collection of streaming products and technologies from RealNetworks.

Another factor that keeps RealAudio on top is its flexibility. RealPlayer comes as a standalone player, a plug-in, and an ActiveX control, and it works not only with Windows and Macintosh, but also with several other platforms as well. Web designers who want to reach the widest audience for their streaming multimedia products usually choose RealAudio. This book's CD-ROM includes RealPlayer G2 for Windows 95, 98, and NT. If you have already installed RealPlayer 5.0 or earlier for Windows, you should definitely install the newer G2 version. It not only offers a lot more features, it also incorporates greatly improved technology.

Note

I'm sorry not to include a G2 RealAudio player on the CD-ROM, but RealNetworks has not yet the G2 player. The CD-ROM includes the earlier RealPlayer 5.0. Check RealNetworks' Web site at the following address to see if the retail version of the G2 player is ready:

`http://www.real.com/products/player/index.html`

The fine print

The basic version of RealPlayer is free. (There's also a version with more features that you must pay for to use.) Its system requirements depend on your modem speed and the RealPlayer components you want to use. In general, you'll be fine in Windows if you have a Pentium 166, 16MB of RAM, a 28.8 Kbps modem, and 4MB of hard drive space. If your system falls short of these requirements, you might still be able to use parts of RealPlayer. You can check detailed requirements at this site:

`http://www.real.com/products/player/50player/sysreq.html`

You might even be able to use RealPlayer behind your company's firewall. The following Web site offers some suggestions for dealing with firewalls:

`http://www.real.com/help/firewall`

RealAudio compression

Are you wondering why different modem speeds have different system requirements? Because RealAudio uses different *codecs* (defined in Chapter 1) for different modems speeds. The slower the speed, the more compression is needed to keep the data flowing fast enough. At 14.4 Kbps, data must be so highly compressed that the quality suffers — it's about equivalent to telephone quality. At 56 Kbps, much less compression is needed, and you'll find that the quality approaches that of a CD. With speeds of 64 Kbps or higher, stereo streams are possible.

The RealAudio file formats

A RealAudio sound clip was originally stored in an RA file. When video was added, the file extension was changed to RM for RealMedia. Basically, RA and RM files are sampled audio and video files that have been encoded for RealAudio streaming. An RM file may, however, contain several streams of audio, video, animation, and other data.

Two more RealAudio formats are RAM and RMM, for RealAudio Metafile and RealMedia Metafile. A *metafile* contains nothing but a link to an RA or RM file. The link could refer to a file on your hard drive or one on the Internet. When you open a metafile, RealPlayer knows to follow the link. This prevents you from saving a copy of the referenced file itself. If you save a copy, all you get is the link. Web designers use metafiles to protect their copyrights.

Here's another reason Web designers use metafiles. A Web site does not have to use the RealAudio server to make RealAudio files available. It can use HTML to link to RA or RM files just like WAV, MIDI, or any other type of file. But RA or RM files provided this way aren't streamed. RealPlayer downloads them entirely before starting them. When RealPlayer follows a link from a RAM file, however, it does stream the referenced RA or RM file. So Webmasters who don't want to pay the price for the RealAudio

server can still provide streaming files by placing RAM files on the page and letting them link to RA or RM files.

RealPlayer G2 recognizes another type of multimedia file. SMI files, which stand for the Synchronized Multimedia Integration Language, are files where two or more streams are synchronized to provide a complete multimedia presentation.

Streams, clips, and presentations

When talking about RealAudio, you'll often encounter these three terms:

- Presentation — A complete multimedia package, which may be made up of one or more clips; each RM or RA file contains a presentation.
- Clip — An integrated multimedia sequence, such as a song, a film preview, or a cartoon; a clip contains one or more streams.
- Stream — A single streaming component, such as an audio stream, video stream, or animation stream.

The RealPlayer window

You can download the free beta (test) version of RealPlayer G2 from `http://www.real.com/products/player/index.html`. Figure 7-2 shows what RealPlayer G2 looks like when playing a live audio stream. The window is divided into several sections. At the top are the title bar and menu bar. Below them appear the playback controls and position slider, which use the common icons for play, pause, stop, rewind, and fast forward. Rewind, fast forward, and the position slider work only with on-demand files, which is why they are dimmed in the figure. There's no way to change positions in a live stream.

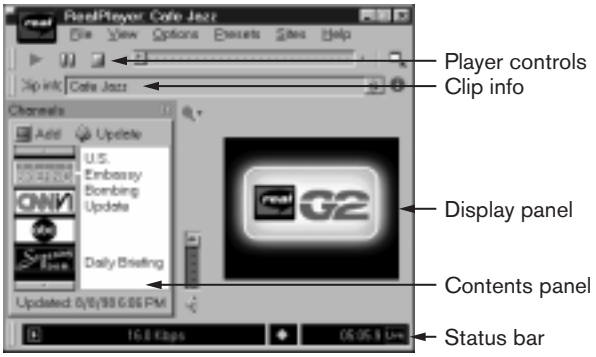

Figure 7-1 *RealPlayer G2's normal window looks like this.*

Clip Info bar

The bar below the playback controls is called the Clip Info bar. It typically shows the title of the clip. There may be more info lines that you can't see. You scroll through all the lines by choosing the Scroll Clip Info button, shown in the margin. The button on the far right, called About This Clip, pops up a separate window containing whatever information the clip's creators choose to share with you.

Contents Panel

In the free version of RealPlayer G2, the Contents Panel shows your channels. A *channel* is an Internet information service that is updated frequently. News channels could be updated several times a day, whereas other channels might be updated daily. The channels you can access with RealPlayer G2 tend to provide full multimedia content — video synchronized with audio, perhaps with animation, still pictures, and text as well. When you click a channel in the Contents Panel, its current show plays in the Display Panel.

Display Panel

The Display Panel shows the visual elements of a clip—video streams, animation streams, text, and still pictures. It displays the Real G2 logo in Figure 7-1 because the clip contains only an audio stream.

Status bar

The status bar displays status information as the clip plays. You may see these symbols at various times:

The timer appears while you're waiting for a connection or while-buffering.

The word connecting appears while RealPlayer attempts to connect to a requested site.

When connected, the play, stop, or pause icon indicates the status of the clip.

During buffering, this gauge shows the buffer filling up.

This bandwidth indicator shows the bandwidth of the broadcast, in kilobytes per second. Typical bandwidths are 16.0 Kbps for mono and 20.0 Kbps for stereo. Some stations are now broadcasting at 80 or higher Kbps, for listeners with dual-channel ISDN, cable, and other high-speed connections.

This tells you that you're listening to a stereo clip.

This tells you that you're listening to a live stream.

The first number shows how much time has elapsed; the second number shows the total time of the clip and is omitted for live streams. Times are shown in minutes, seconds, and tenths of a sec-

ond until you pass one hour. Then they are shown in hours, minutes, and seconds.

The G2 logo appears when a clip uses features that are available only with version G2.

The green "traffic" light indicates a good connection, yellow a fair connection, and red a bad connection. A flashing light indicates that RealPlayer is currently optimizing the stream, which could interrupt playback briefly but results in improved sound.

Configuring the window

You have quite a bit of control over what appears in the RealPlayer G2 window. You can hide or show various elements and move them around in the window. The Clip Info bar, Contents Panel, and Status Bar are all optional. You hide and display them via the View menu. For example, to hide the Clip Info bar, choose View➪Clip Info. Choose the same option again to redisplay the bar. The Clip Info bar, Player Controls bar, and Status Bar can all be moved to other positions by dragging them. A pair of vertical lines appears at the left end of each bar. Grab the bar by those lines and drag it up or down in the window to relocate it.

If you like to listen to RealAudio as you work at your computer, you can keep the window on top of your other applications. Just choose View➪On Top While Playing. Choose the same option again to toggle this feature off. You might also want to reduce the window to its smallest size. Clicking the Compact Mode button, shown in the margin, reduces the window to the top view in Figure 7-2. All you see are the most essential controls and information, and the window fits nicely in a corner of your screen However, if you move your mouse pointer over the compact window, it automatically jumps to the slightly larger view at the bottom in Figure 7-2. This view gives you a title bar to drag around and a few essential menus. As soon as you move your mouse away, the window

jumps back to the smaller view again. All this switching between two compact views happens automatically, but if you don't like it you can turn it off. Choose Options ➪ Preferences and click the Display tab. Then disable the option that says "`Auto-hide in compact mode`."

When in compact mode, the Compact Mode button becomes a Normal Mode button, which you click to return to the full window.

Figure 7-2 *RealPlayer G2's compact window has two views, depending on the position of your mouse pointer.*

Playing audio clips

When you're browsing the Web and encounter a RealAudio clip, you can start RealPlayer simply by opening the clip. The player starts in its own window and plays the selected clip. You don't even have to stay on the original site. You can continue to surf while you listen. The window stays open so you can replay the same clip or play other clips that you find.

But you don't have to run your browser to access online clips. RealPlayer has some browser capabilities. As long as you are online somehow — an ISP or online service, for example — it can access RealAudio clips from sites. It can't display the Web pages, but it can play the clips. (Don't forget that the word *clip* can refer to an on-demand file or a live stream.) First, start up the standalone version of RealPlayer by choosing Start ➪ RealAudio ➪ RealPlayer G2.

Now you're ready to open a clip. RealAudio gives you several ways to do that:

- If you know the address of the clip, such as `http://www.netradio.com/country.ram`, choose File ➪ Open Location, enter the address, and choose OK.

- If you played the clip recently, you might be able to recall it. RealPlayer G2 lists your recent clips at the bottom of the File menu. Simply choose one to reopen it. With RealPlayer 5.0, choose File ➪ Open Recent, then choose the clip you want to reopen.
- Both versions of RealPlayer let you keep a list of your favorite clips. The next section explains how you save and access them.

If you're not online when you try to open a clip from an Internet site, RealPlayer will attempt to sign you on using your default service. You might have to enter your user name and password, of course.

If you want to play a clip from your own drive instead of the Internet, you don't have to be online. Just choose File ➪ Open File and select the clip.

Can you save an online clip to your hard drive? Maybe or maybe not. You can't do it from the RealPlayer window, but you might be able to do it from the Web page where the clip is located. You can save the file just like you save any file from a Web page. (Chapter 9 shows you how to download and save files from a Web site.) If it's an RA or RM file, you save the actual clip. But if it's an RAM or RMM file, all you save is a link to the clip.

RealPlayer G2 presets

You use RealPlayer's Presets menu to store and access your favorite clips, including live broadcasts. Figure 7-3 shows an example of the Presets menu. To start a favorite clip, pull down the menu, point to one of the folders from the bottom of the list, then choose the desired clip.

Figure 7-3 *You can add your favorite clips and Internet radio stations to RealPlayer G2's Presets menu.*

It's easy to add a new clip to the menu. While you're listening to it, choose Presets ➪ Add to Presets to open the dialog box shown in Figure 7-4. Change the default title, if you wish, and select one of the folders from the drop-down list.

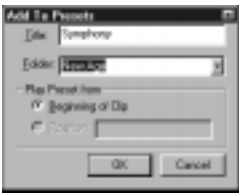

Figure 7-4 *You use this dialog box to add another clip to the Presets menu.*

RealPlayer G2 starts you off with a good-sized collection of folders and clips. You don't have to keep the ones you don't want. Choose Presets ➪ Organize to open the Organize Presets dialog box. This dialog box is quite simple to use:

- To add a new folder, choose the New Folder button and enter a name for a folder.

- To delete a folder or a clip, select it and choose Delete.
- To change the name of a folder, select it and choose Edit.
- To change the name, the address, or the folder for a clip, select it and choose Edit.

Note

The RealPlayer G2 Sites menu contains links to Web sites, not clips. The sites are preprogrammed and you can't change them. Selecting a site points your browser to that address. (RealPlayer starts up your browser and signs you on, if necessary.)

Dealing with problems

If you're having trouble getting good sound from RealPlayer, there are several things you can try. Start by experimenting with your Connection preferences. Choose Options ➪ Preferences and click the Connection tab to open the dialog box shown in Figure 7-5. In the Bandwidth box, make sure you have set the correct speeds for your modem. For example, if you're using a 56K modem and never connect at any other speed, you would choose 56K modem for both the Normal and Maximum bandwidths. (Don't choose the other 56K option, 56K ISDN, unless you have an ISDN terminal that also acts as a 56K modem when necessary.)

If you're experiencing a lot of brownouts, try increasing your buffer size in the middle portion of the dialog box. If all else fails, try choosing "Buffer entire clip up to available memory." This could impede the performance of your other applications, however.

Figure 7-5 *You can often solve poor sound quality by adjusting your connection preferences.*

Also check out the options on the Performance tab, shown in Figure 7-6. As I said earlier, decompressing audio streams consumes huge amounts of processor time. If you find that the rest of your system is having problems because you're listening to RealAudio, you might want to give less processor time to the RealAudio stream. Adjust the slider in the Playback Performance box toward the left to give your other applications more time. But be aware when you do this that your playback quality will suffer. Keep adjusting the slider until you find the best trade-off between RealAudio quality and system performance.

As you can see in the Sound Card Compatibility box in the Performance preferences, sometimes poor quality can result from an incompatible sound card. If you can't find any other reason for poor performance, try pressing the Settings button to open the dialog box shown in Figure 7-7. You might need to limit clips to 8 bits if you have an older sound card. As it says in the dialog box, if audio sounds distorted or scratchy, try checking the box labeled "Disable 16-bit sound (use 8-bit only)." Check the box labeled "Disable custom sampling rates" if your audio often seems to play at the wrong speed or is distorted.

Figure 7-6 *The performance preferences can also help solve poor sound quality.*

Figure 7-7 *The Sound Card Compatibility settings might also improve sound quality.*

Sometimes you just can't get good performance because the Internet is too busy. You can check your network statistics by choosing View ➪ Statistics to open the dialog box shown in Figure 7-8. You can get a lot of information about your connection from the Connection tab, which is shown in the figure. You can see how many packets have actually been lost or received late, how many had to be recovered, and so on. The statistics in the example are excellent. I was having no trouble listening to RealAudio that day. But sometimes, you just have to give it up and come back later.

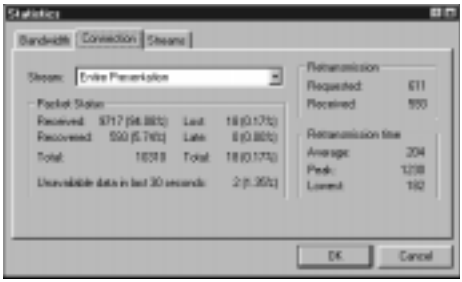

Figure 7-8 *RealPlayer's statistics can tell you that sound quality is poor because of Internet problems.*

Streaming other file types

You can set up RealPlayer G2 to stream non-RealAudio files. To do this, you have to download and install a plug-in for each file type you want to stream. A *plug-in* is a program component that extends RealPlayer's capabilities. As I write this, plug-ins are available for WAV, MIDI, AVI, and Vivo files. (Vivo Software is a company that creates video-related software.) RealNetworks continues to develop plug-ins, so by the time you read this, some more might be available. The easiest way to install a plug-in is to open a file that needs it. Suppose, for example, that you want to stream MIDI files. Use File ➪ Open File to open any MIDI file on your hard drive. You'll see the dialog box shown in Figure 7-9, which offers to download the plug-in for you. Choose Yes to download and install it.

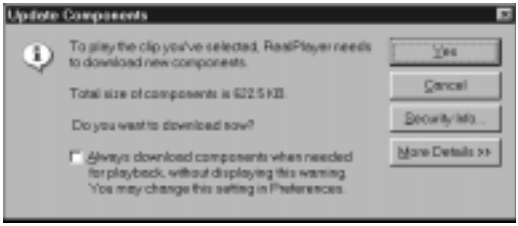

Figure 7-9 *RealPlayer displays this dialog box when you try to open a file type that requires a plug-in that you have not yet installed.*

Once the plug-in has been installed, it appears in the RealPlayer window whenever you play that type of file. Figure 7-10 shows an example of the MIDI plug-in — Crescendo Forte by LiveUpdate. You learn more about the regular Crescendo MIDI plug-in in Chapter 8.

Figure 7-10 *This shows the Crescendo Forte MIDI plug-in in the RealPlayer G2 window.*

To find out what plug-ins are already installed, choose Options ➪ Preferences to open the Preferences window. Then choose the Upgrade tab to open the page shown in Figure 7-11. All your components are listed at the bottom of the page. The list includes the basic components for playing RealAudio, RealVideo, and so on, plus any plug-ins you have installed.

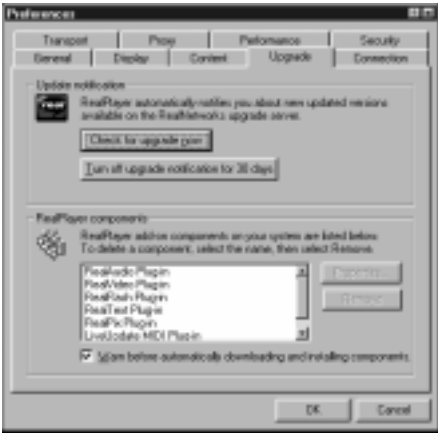

Figure 7-11 *You can see your list of components in RealPlayer's Content Preferences page.*

Playlists

Some files provide a playlist of several clips. For example, some sites let you "try before you buy" entire CDs online. There are sites where you can listen to complete audio books online, with a chapter per clip. The Playlist bar, shown in Figure 7-12, comes in handy when you're listening to a playlist. You display it by choosing View➪ Playlist. The title and number of the current clip appear in the bar. (The clips are often cleverly titled clip 1, clip 2, and so on.) You can change clips by clicking the previous and next icons or select a clip from the drop-down list.

Figure 7-12 *RealPlayer G2's Playlist bar gives you control over playlists.*

Tip

Clip 1 is often an advertisement. Just click the next clip icon to skip it.

Other ways to play RealAudio

You don't have to use RealPlayer to listen to RealAudio. Several third-party players can handle RealAudio files. Among the players described in this book, Media Player 5.2 and Jet-Audio can play RealAudio. Neither of them can handle the new G2 features, however.

Other Streaming Applications

RealAudio isn't the only kid on the streaming block. Several other major players have come along in recent years, along with a host of minor players. Of these, the most important are StreamWorks, Shockwave, and NetShow. None of them approach the prominence

of RealAudio on the Internet, although they all would like to. The following sections briefly describe these three streaming products and where you might run into them.

Xing StreamWorks

As specialists in data compression, it was only natural for Xing Technology Corporation to turn their attention to multimedia streaming, where compression is the name of the game. Their collection of streaming products and formats, called StreamWorks, uses MPEG compression with excellent results. They have extended the MPEG standard to handle exceptionally low bit-rates, down to 8 Kbps. Many music sites provide samples in StreamWorks XSM format, so I suggest that you install the StreamWorks player if you like to browse music sites. StreamWorks for Windows and Macintosh is included on this book's CD-ROM.

Macromedia Shockwave

Another extremely popular set of multimedia streaming products is Macromedias Shockwave. Like RealAudio, it handles audio, video, and animation. Some Web sites provide interactive experiences such as games via Shockwave. Shockwave players are built into Internet Explorer and Netscape Navigator, so I have not included any on this book's CD-ROM.

Microsoft NetShow

The new kid on the block comes from the Seattle area. Microsoft's NetShow provides streaming multimedia presentations, or shows, in ASF and ASX format. You have already met NetShow's player, Media Player 5.2, which was designed specifically to play NetShow shows along with other popular file formats. Sites that are closely aligned with Microsoft tend to use NetShow rather than one of the other products for multimedia presentations. Figure 7-13 shows an example of a NetShow audio presentation playing in Media Player.

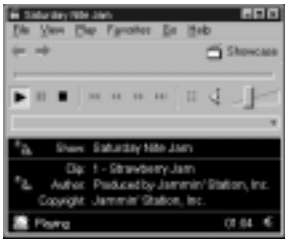

Figure 7-13 *Media Player 5.2 plays Microsoft NetShow presentation such as this audio presentation.*

As with RealPlayer, once you have started a presentation, NetShow continues to download and play the stream from that site, even if you browse to other sites or close your browser. You must stay online, however.

What's on the CD-ROM

Digiband Radio for Windows provides a push-button interface to your favorite RealAudio Internet radio stations. Figure 7-14 shows an example of the Digiband window, which you can program with all your favorite stations.

Figure 7-14 *Digiband Radio's window gives you push button access to RealAudio radio stations.*

IQ from QSound enhances all sampled sounds on your Windows system, including RealAudio. Try it; it's wild. (It runs in the background, so there's no window to show you.)

What's Next?

This chapter briefly introduced the concept of browser plug-ins. Chapter 9 explains a great deal more about how your browser plays audio.