

Administering IP/TV Store and Replay Server

This chapter describes how to administer the Store and Replay feature of IP/TV Server. Topics covered include:

- Store and Replay concepts and application scenarios
- Store and Replay modes
- Using the Store and Replay feature
- About Store and Replay windows
- Viewing status and statistical information

Overview

IP/TV Server has an integrated Store and Replay Server that enables storing, replaying, and forwarding of Cisco audio/video .rtp streams in the IP/TV network.

If the source is from a local live-capture program, the IP/TV Store and Replay Server will write the file into an .mpg format instead of an .rtp format.

The Store and Replay function enables recording of live broadcasts at remote LANs for later viewing. One application of this function is allowing viewers from different time zones the flexibility to view programs or to repeat a live event when it is suitable.

The Forward function uses a multicast tunneling capability called SmallCast. Using the SmallCast feature, IP/TV software can operate across a WAN, where some portions of the network are not upgraded with IP multicast capability.

Generally, you will not use the Store and Replay Server directly. IP/TV Server invokes the Store and Replay Server automatically when scheduled to do so by the Content Manager. However, you will need to run the Store and Replay Server directly to preview .rtp files or to manually carry out the Replay and Forward functions.

After an .rtp file has been recorded, the file can be made available as an on-demand program or file session through the Content Manager.

Concepts

The Store and Replay Server receives or transmits multimedia streams on the network. It may store .rtp data in an .rtp file, replay the file locally, or serve it to the network. These streams are usually generated by one of the other components of the IP/TV Server. The streams may be MPEG audio and video, H.261, MPEG4, or any of the audio and video formats that Cisco Systems supports. In all of these cases audio and video streams are sent using an industry standard protocol called .rtp (RTTP). The Store and Replay Server stores or forwards these streams immediately by multicast, or it may be used to replay the stored streams later.

Network Source

A network video or audio source is an .rtp stream received over the network.

Store and Replay

Storing (recording) a program consists of saving incoming live or network multimedia streams to a local disk. You can schedule a recording by indicating specific times using the Content Manager or you can spontaneously record while the program is being received (just like one would with a VCR).

Replaying a program consists of sending a locally stored .rtp file to the network.

SmallCast

SmallCast is designed for intranet and Internet environments in which one or more of the routes is not multicast-enabled. SmallCasting allows a multimedia session to be forwarded across one or more nonmulticast-enabled routers (or across the Internet) as a unicast

transmission. Then it is multicast to viewers on the remote network segment or it can simply be viewed by a single IP/TV viewer. See the “SmallCasting Scheduled Programs” chapter for more information about SmallCast.

Application Scenarios

This section contains four example scenarios (cases) in which IP/TV Servers in remote offices or workgroups can use Store and Replay and/or SmallCast to distribute multimedia content. For all cases, see Figure 9-1.

Case 1: Multicast with Local Storage

This case provides viewing time flexibility for geographically remote office LANs. The remote IP/TV Server stores .rtp streams received via multicast while headquarters viewers are watching the program in real time. Source viewers at the remote site can watch the program in real time while others may view a scheduled rebroadcast or on-demand program later.

Case 2: SmallCast

This case shows how to reach remote office LANs connected through older network segments. The remote IP/TV Server receives unicast streams over the nonmulticast WAN and then remulticasts the streams to the local LAN for real-time viewing.

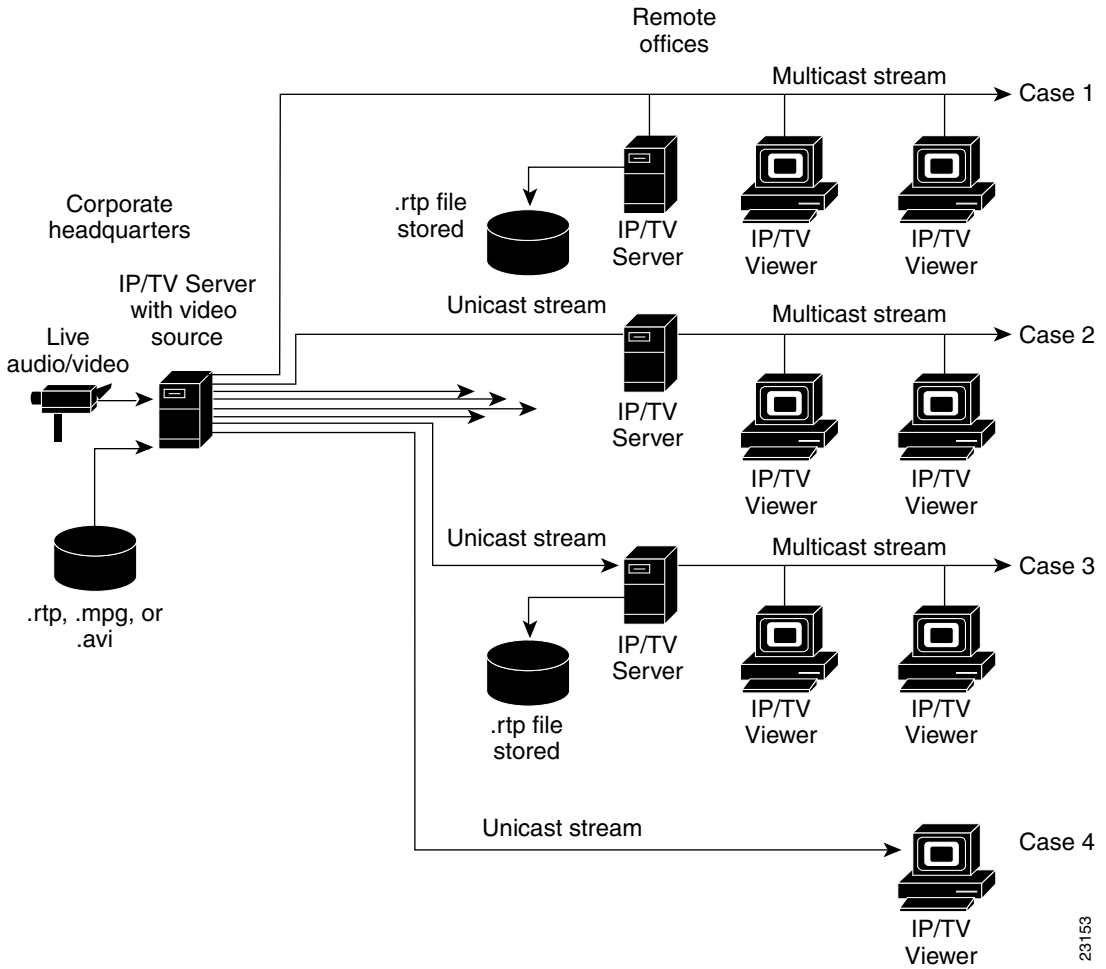
Case 3: SmallCast with Simultaneous Local Storage

This case shows how the remote IP/TV Server simultaneously stores an incoming SmallCast stream (sent via a unicast address) for later replay and remulticasts the content to the LAN for real-time viewing.

Case 4: Standalone Viewer

This case shows how a standalone remote user can receive a unicast stream from headquarters over the WAN and view the video in real time without having an IP/TV Server installed.

Figure 9-1 Example Application Scenerios



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About Store and Replay Modes

There are two modes of using the Store and Replay feature: Server mode and Manual mode.

The Server mode is the normal way to use the Store and Replay Server. You set up a Store and Replay Server program for storing (recording), replaying, and forwarding using the Content Manager. The Store and Replay Server is automatically started by the IP/TV Server when scheduled to do so by the Content Manager. Refer to the *IP/TV Content Manager User Guide* for additional information.

Use the Manual mode when the Content Manager may not be available, or when you want to replay or forward previously stored or incoming .rtp streams on an unscheduled basis.

Using the Store and Replay Server

This section discusses how to use the Server and Manual modes of the Store and Replay functions. It also describes how to manually preview a local .rtp file.

Storing (Recording)

The Store feature records incoming media streams to a .rtp file. It can record one video, one audio, and one SlideCast stream simultaneously, or any combination thereof.

Note Web Presenter programs are not recordable.

When the IP/TV Server requests the Store and Replay Server to record, the Store and Replay Server is automatically launched by the IP/TV Server.

To schedule the Content Manager to record a program and save it as an .rtp file, follow instructions in the “Recording Scheduled Programs,” section in the *IP/TV Content Manager User Guide*.

Reserving Disk Space

The Store and Replay Server allows a certain amount of reserve disk space that it will not touch while recording an .rtp or .mpg file. The default reserve space is 20 MB. You can increase or decrease this amount by entering the following into the IPTV.ini file:

```
[RTP Files]
reserve=n

[MPEG Files]
reserve=n
```

where *n* is the size in megabytes if followed by an M, gigabytes if followed by a G, and bytes if followed by a K. For example, 40M, 1G, and 200K are 40 megabytes, 1 gigabyte, and 200 kilobytes, respectively.

When you record an .rtp or .mpg file, the maximum size is 4 GB by default. You can reduce or increase the size by entering the following into the IPTV.ini file:

```
[RTP Files]
maxfilesize=n

[MPEG Files]
maxfilesize=n
```

where *n* is a size in megabytes if followed by an M, or gigabytes if followed by a G.

Note A typical MPEG1 video stream with MPEG audio will consume about 12 MB per minute.

Replaying

The Replay feature plays a recorded program from an .rtp file and sends the stored data to the network. The replay program will be identical to the original program as it was received by the recording server which means that if any data is lost by the network then the quality of the recording and the retransmission will reflect the loss.

The replay of an .rtp file normally is controlled by a program created in the Content Manager. The Store and Replay Server is automatically launched by the IP/TV Server and given a .svr file containing the program definition. However, you can copy the created .svr

file and later open it manually in IP/TV Server. Note that the .svr file is only available while the replay is active. See the “Replaying Using Server Mode” and “Replaying Using Manual Mode” sections later in this chapter.

Replaying Using Server Mode

To schedule the Content Manager to replay an .rtp file to the network, follow the instructions in the “Managing IP/TV Programs” section in Chapter 4 of the *IP/TV Content Manager User Guide*.

Replaying Using Manual Mode

Follow these steps to manually replay a recording to the network without a Content Manager:

Step 1 Open the .svr file you want to replay to the network in any text editor.

Note Refer to the sample .sdp file that follows. The corresponding .svr file that is used by the source server is identical to this sample .sdp file, except it does not have the backchannel attribute.

Step 2 Specify the name of the .rtp file you want to replay next to the file: and filespec: attributes.

Step 3 Start IP/TV Server and click **Open** on the File menu.

Step 4 Select the .svr file you want to replay to the network.

Previewing a Stored .rtp File

To preview a stored .rtp file, open the .rtp file directly, or start .rtp File Viewer by clicking **Start>Cisco IP/TV>RTP File Viewer**. Then, click **Open** on the File menu and select the .rtp file.

Replaying a Stored .rtp File From Offset

To replay a video clip from a stored .rtp file, note the start and end times in the File Time field of the video clip you are viewing in the RTP File Server window. The start and end times are displayed in hours, minutes, and seconds (in the format hh.mm.ss). You can reposition the video using the Slider bar to obtain your video clip.

Then in the Content Manager, create or edit the program and go to the Edit Program window. Enter the start and end times in the Play from Offset field.

SmallCasting

The Store and Replay Server SmallCast function sends a program in unicast mode from a source server to another Store and Replay Server on the network. The receiving Store and Replay Server forwards the program in multicast mode.

The SmallCast function is used when programs are transmitted to remote multicast enabled networks through links that do not support multicast. If the remote network is a single LAN segment it does not need to support multicast.

When invoked by the IP/TV Server, the Store and Replay Server creates a .sdp file which defines a forwarding program. Note that the .sdp file is the same file type used by the Viewer. However, in the case of the forwarding program, additional instructions in the file tell the forwarder to re-transmit the program to a set of multicast addresses (one for each media: video, audio, and SlideCast).

Note The **Show Preview** command is disabled on the forwarding server. Performance problems may occur on many systems if you are locally viewing and forwarding simultaneously.

SmallCasting Using Server Mode

You can schedule the Content Manager to SmallCast a program by following the instructions in the “Setting Content Manager Defaults and Preferences,” sections in the “Setting Up IP/TV Content Manager” chapter.

You can configure the Store and Replay component of IP/TV Server, using the Content Manager, to SmallCast programs with the following options:

- SmallCast with multicast
- SmallCast with no multicast

The Use SmallCast option instructs the source server to unicast the program to all of the servers specified in the server's SmallCast list (limit of seven), and if the SmallCast Only option is not checked, multicast the program using the IP address specified in the Multicast Address Information section of the New Program page.

The SmallCast Only option instructs the source server to only unicast the program to the servers specified in its SmallCast list. If this check box is turned on, the program will not be multicast. This option only applies if the Use SmallCast option is turned on.

SmallCasting Using Manual Mode

Follow these steps to manually view and forward an incoming media stream to another server:

- Step 1** Open the .sdp file and edit in any text editor. Refer to the sample .sdp file in the “Sample .sdp File” section later in this chapter.
- Step 2** Specify the server or servers you want to forward to in the `forward` attribute and the backchannel address in the `backchannel` attribute. Then save and close the file.

The lines that are specific to forwarding are:

```
a1=backchannel:204.162.119.80  
  
a3=forward:only 204.162.119.80 204.162.116.97 204.162.119.106
```

On the backchannel line the address is the same as the first address on the forward line. This is the source server that is sending the unicast stream to the forwarder.

The addresses of the forwarding servers are the second through the nth address on the forward line. The only keyword on the forward line tells the source server not to multicast at that end of the link (only unicast to 204.162.116.97 and 204.162.119.106 in this case). If you do want to multicast at the source server, then delete the only keyword.

The multicast addresses to use are in their usual place on the cvideo and caudio lines.

If you hand edit .sdp or .svr files, you must be aware that you can insert or remove attributes, but the attribute numbers must be contiguous starting from 1 so that there is not a gap in the numbering. For example, if you remove the backchannel attribute in order to convert this .sdp file into a .svr file, you should change it to something similar to `a1=removed` instead of deleting the line. It is acceptable to have an unrecognized attribute. If you insert an attribute, you can put it at the end of the file. Make sure that the new number is the previous last number plus 1.

Step 3 Start the IP/TV Server and click **Open** on the File menu.

Step 4 Select the .sdp file (see Example 9-1).

Example 9-1 Sample .sdp File

```
[programs]
LaunchPrograms=1
[Launch Program]
o=- LaunchProgram 4 IN IP4 204.162.119.80
i=Continuous file session for commercial test.
s=Lobby's cont. file
a1=backchannel : 204.162.119.80
a2=filespec: 1 name e:\video\sample.mpg
a3=forward: only 204.162.119.80.204.162.116.97.204.162.119.106
a4=video rtpmap: 96 WBIH/90000
mvideo=video 53006 RTP/AVP 31 32 96
cvideo=IN IP4 239.255.203.1/15
a5=video source:video 204.162.119.80 file loop 1
a6=audio rtpmap: 96 L8/22050/2
a7= audio rtpmap: 97 L8/22050
a8=audio rtpmap: 98 L8/22050/2
a9=audio rtpmap: 99 L8/11025
a10=audio rtpmap100 L16/22050/2
a11=audio rtpmap: 101 L16/22050
a12=audio rtpmap: 102 L16/11025/2
a13=audio rtpmap: 103 L1611025
maudio=audio 22058 RTP/AVP 0 14 3 5 96 97 98 99 100 101 102 103
caudio=IN IP4 239.255.195.237/15
a14=audio source: audio 204.162.119.80 file loop 1
a15=framerate: 24
a16=bandwidth: 1150
a17=quality: 7
a18=SuppressErrorMessages: 0
a19:DoSlideShow: 0
a20=copyright:
a21=file: e\video\sample.mpg
a22=channel: QA's Lobby
t=1 1
```

About Store and Replay Server Windows

This section describes the Store and Replay windows, window tools, and menu items. The Store and Replay Server windows display information about selected programs. There are two Store and Replay Server windows:

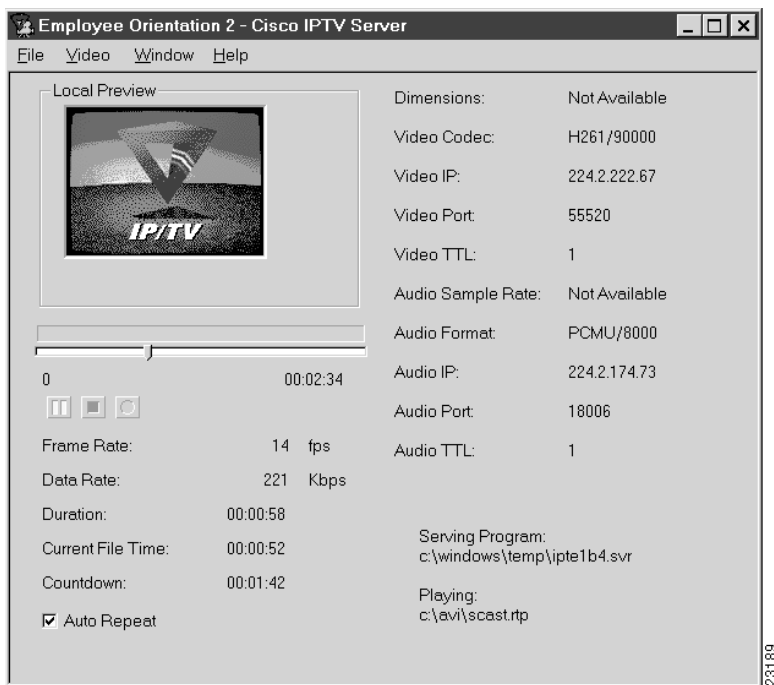
- A Server Program Details window. This window displays the status of scheduled and on-demand programs that are currently transmitting media streams from .rtp files to the network, or programs that are currently recording incoming media streams to a .rtp file, or manually launched programs serving .svr files that reference .rtp files.
- An RTP File Viewer window. This window allows you to locally preview .rtp files.

Server Program Details Window

To open the Server Program Details window, double-click a program in the IP/TV Server Program Listings window, or right click the program and click **Program Details**.

Figure 9-2 shows an example of the Server Program Details window while serving a .rtp file for a replay of a prerecorded program scheduled through the Content Manager.

Figure 9-2 Server Program Details Window



Server Program Details Window Menu Commands

describes the menu commands available on the Server Program Details window menu bar.

Table 9-1 Server Program Details Window Menu Commands

Menu	Command	Description
File	Switch to Program Listings	Switch to the Program Listings window.
	Close	Closes the currently open Server Program Details window.

About Store and Replay Server Windows

Table 9-1 Server Program Details Window Menu Commands (continued)

Menu	Command	Description
Video	Play	Performs the same as the play function of the Play/Pause button.
	Pause	Performs the same as the pause function of the Play/Pause button.
	Stop	Stops the currently open program or .rtp file.
	Record Program	Performs the same as the record start function of the Record Start/Pause button. (Record session only.)
	Pause Recording	Performs the same as the pause recording function of the Record Start/Pause button. (Record session only.)
	Show Preview	Toggles between displaying or hiding the preview window.
Window	Always On Top	Displays the Server Program Details window on top of any other open windows.
	Stats Window	Displays the Statistics window. See the “Statistics Windows” section later in this chapter.
Help	Contents	Displays online help table of contents.
	Using Help	Provides information about using Windows Help.

Server Program Details Window Tools

Table 9-2 describes control buttons and icons on the Server Program Details window.

Table 9-2 Server Program Details Window Tools







Icon	Tool	Description
	Play/ Pause button	Plays the current program. This button toggles to pause a program.
	Pause/ Play button	Pauses the current program. This button toggles to resume playing a program.

Table 9-2 Server Program Details Window Tools (continued)

Icon	Tool	Description
	Stop button	Stops the program that is currently playing.
	Record Start/ Pause button	Toggles between start recording and pause recording. When recording is active, the button is yellow. When recording has paused, the button is green.
	Slider bar	Allows you to adjust the position while serving a prerecorded .rtp file. The number at the right end is the Total File Time.
	Progress bar	Indicates the completion progress of a scheduled recording or while serving a prerecorded .rtp file. For continuous replay or forwarding, the bar just indicates activity. For continuous replay, the bar indicates progress through the recorded .rtp file. For a one time replay, the progress bar and slider bar track each other.

Server Program Details Statistical Information

This section describes the Server Program Details window status and statistical information. See Figure 9-2 for all items described in the following sections.

Program Status Items

When a program is playing, serving, or recording, a program status item is displayed. When recording, the program status item Recording Program is also displayed. A separate item indicates whether the recording is active, and the name of the .rtp file that is capturing the recorded data.

Program Statistics

Table 9-3 lists and describes the overall program statistics.

Table 9-3 Program Statistics

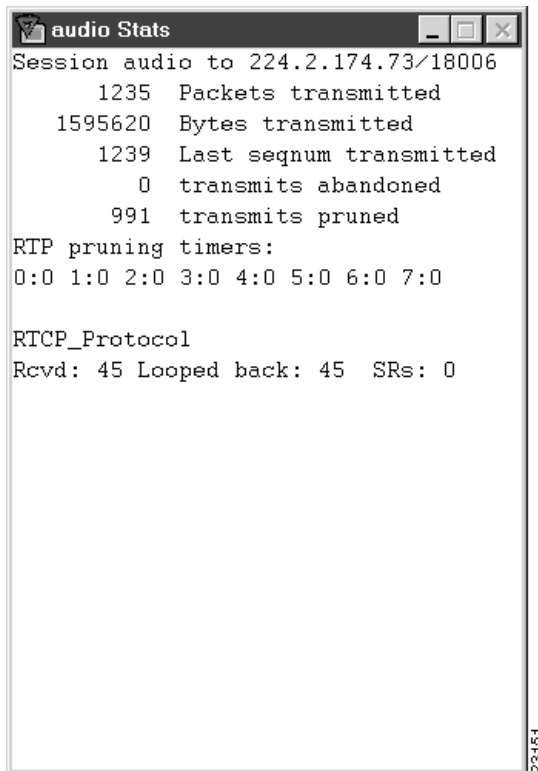
Statistic	Description
Frame Rate	This is the video frame rate as represented in the data stream that is either being served from a recorded file, or received for recording or forwarding. When recording, this rate is the same as the original capture frame rate unless the network is heavily loaded and many packets are being lost. This situation usually does not last long unless there is a serious network problem.
Data Rate	Indicates, in bits per second, the sum of both audio and video data (and also SlideCast if present).
Duration	Indicates the total elapsed time since the program was opened.
Current File Time	The File Time will advance, indicating the current offset in the file.
Countdown	Indicates the amount of time remaining in the file.
Total File Time	Indicates the size of the file in time. It increases while recording a file.

Statistics Windows

Click **Window>Stats Window** to open the audio and video Statistics windows. These lower-level protocol statistics windows contain information provided by Cisco System's MSocket layer. MSocket stands for Multimedia Sockets and is Cisco System's implementation of the RTP/RTCP protocol.

Figure 9-3 shows an example of the Server Program Details Audio Statistics window.

Figure 9-3 Server Program Details Audio Statistics Window



```
audio Stats
Session audio to 224.2.174.73/18006
    1235  Packets transmitted
    1595620  Bytes transmitted
    1239  Last seqnum transmitted
    0  transmits abandoned
    991  transmits pruned
RTP pruning timers:
0:0 1:0 2:0 3:0 4:0 5:0 6:0 7:0

RTCP_Protocol
Rcvd: 45 Looped back: 45  SRs: 0
```

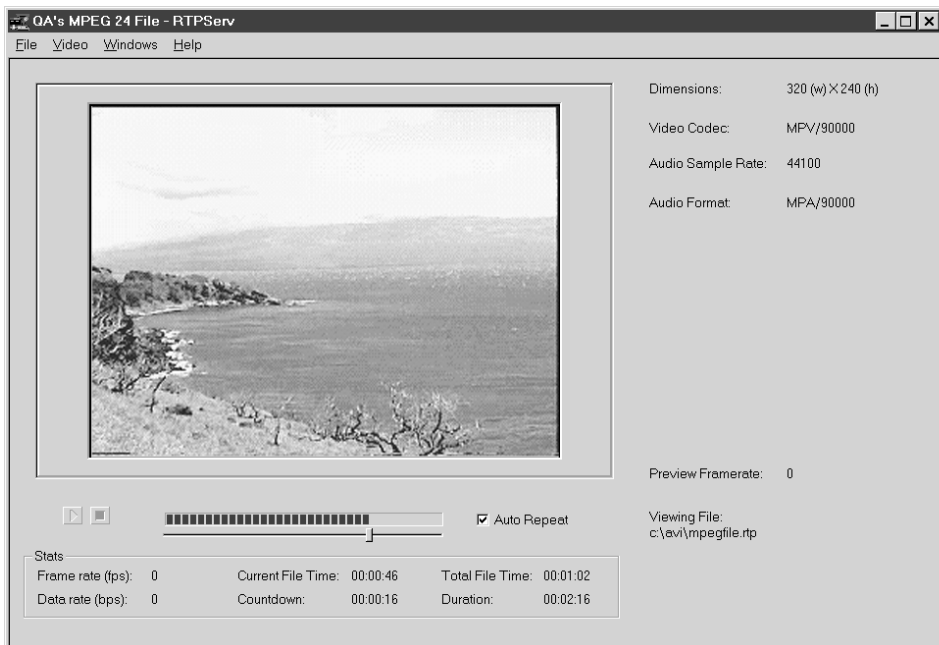
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RTP File Viewer Window

To open the RTP File Viewer window, click **Start>Program Files>Cisco IP/TV Server>RTP File Viewer**. Go to Open in the window menu and select a .rtp file. You can also double-click an .rtp file to open the window and file simultaneously.

Figure 9-4 shows an example of the RTP File Viewer preview window for a prerecorded .rtp file.

Figure 9-4 RTP File Viewer Window



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RTP File Viewer Window Menu Commands

Table 9-4 describes the menu commands available on the RTP File Viewer window menu bar.






Table 9-4 RTP File Viewer Window Menu Commands

Menu	Command	Description
File	Open	Opens a RTP file.
	Close	Closes the currently open program or .rtp file.
	Recent File	Reopens the most recently opened .rpt file.
	Exit	Exits the RTP File Viewer window.
Video	Play	Performs the same as the play function of the Play/Pause button.
	Pause	Performs the same as the pause function of the Play/Pause button.
Window	Always On Top	Displays the RTP File Viewer window on top of any other open windows.
	Stream Statistics	Displays the Stream Statistics window. See the “Stream Statistics Window” section later in this chapter.
Help	Contents	Displays online help table of contents.
	Using Help	Provides information about using Windows Help.
	About RTP Server	Displays version information.

RTP File Viewer Window Icons and Buttons

Table 9-5 describes icons and buttons on the RTP File Viewer window.

Table 9-5 RTP File Viewer Window Tools

Icons	Buttons	Description
	Play/ Pause button	Plays the current program. This button toggles to pause a program.
	Pause/ Play button	Pauses the current program. This button toggles to resume playing a program.
	Stop button	Stops the program that is currently playing.
	Slider bar	Allows you to adjust the position while serving a prerecorded .rtp file. The number at the right end is the Total File Time.
	Progress bar	Indicates the completion progress while previewing a prerecorded .rtp file. The progress bar and the slider bar track each other.

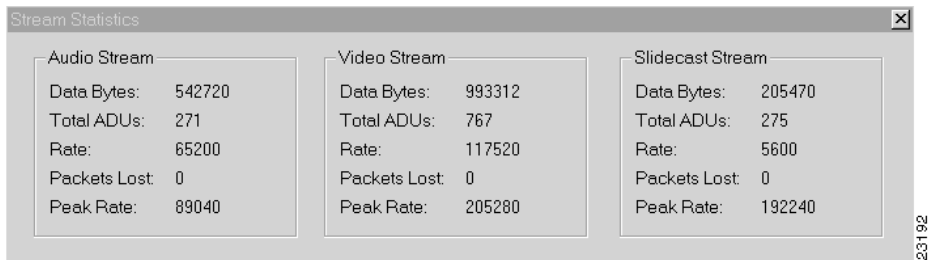
Stream Statistics Window

The Stream Statistics window shows the activity of up to three streams of audio, video, and SlideCast for the .rtp file you are previewing.

To open the Stream Statistics window, in the RTP File Viewer window click **Windows>Stream Statistics**.

Figure 9-5 shows an example of the Stream Statistics window.

Figure 9-5 Stream Statistics Window



Information displayed in the window is as follows:

- **Data Bytes:** The accumulated number of bytes sent up to the present time.
- **Total ADUs:** The total number of application data units.
- **Rate:** The data rate in bits per second.
- **Packets Lost:** The accumulated number of lost packets (based on observing the .rtp sequence numbers).
- **Peak Rate:** The maximum instantaneous rate in bits per second during the transmission (since the program was opened).

