



# QuickTime Streaming

End-to-end solutions for live broadcasting and on-demand streaming of digital media.

## Features

### Unlimited cross-platform streaming

- Streams to standards-based media players on any platform
- Relays streams to additional servers for broadcasting to a virtually unlimited number of viewers
- Does not require per-stream license fees

### Standards-based streaming

- Delivers streams over industry-standard RTP/RTSP via multicast or unicast transport
- Supports native MPEG-4 and 3GPP streaming
- Serves MP3 files via Icast-compatible protocols over HTTP to MP3 clients
- Supports streaming H.264 video
- Ensures a smooth streaming experience over mobile networks with 3GPP Release 6 bit-rate adaptation

### Flexible delivery methods

- Live broadcasting using QuickTime Broadcaster
- Simulated live broadcasts of prerecorded content
- On-demand streaming

### Comprehensive, easy-to-use tools

- Server Admin for local or remote administration
- Web-based administration
- Logs and performance statistics for real-time monitoring and planning

### Superior quality of service

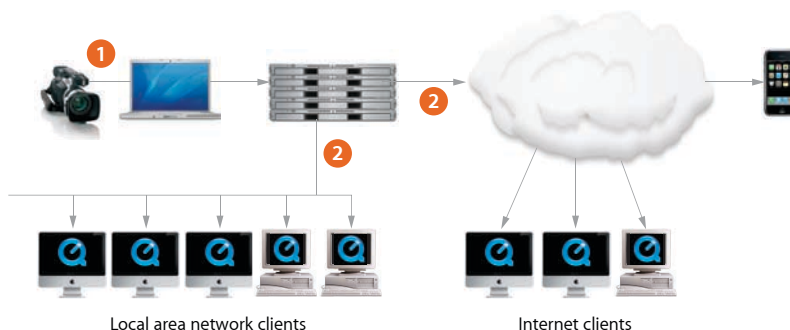
- Instant-on streaming to reduce waiting time for broadband users
- Skip Protection for high-quality media streams even during times of network congestion

Mac OS X Server v10.5 Leopard includes the latest version of the popular QuickTime Streaming Server, providing a complete solution for streaming live and on-demand media to audiences everywhere. Whether you're broadcasting employee communications, adding streaming content for your mobile subscribers, implementing a distance learning program, or simply creating more engaging content for your website, Mac OS X Server makes it easy and affordable to enhance and extend the reach of your communications with rich video and audio content.

QuickTime is one of the most versatile, cost-effective platforms for creating, playing, and streaming digital media over the Internet. It supports all the latest digital media standards, including H.264, AAC, MP3, MPEG-4, and 3GPP, so your content can be played anywhere using standards-compliant media players—even Apple's iPhone.

Reliability, scalability, and the latest in standards-based technology make QuickTime Streaming Server the most flexible media streaming solution available. It's also the easiest to deploy and manage, thanks to the innovative administration, broadcast, and publishing tools built into Mac OS X Server.

## Media Streaming at a Glance



- 1 QuickTime Broadcaster captures and encodes live events and delivers the content to the server for real-time broadcasting.
- 2 QuickTime Streaming Server streams media via RTP/RTSP to local area networks, the Internet, and wireless networks.

## Technology Brief

Mac OS X Server: QuickTime Streaming

## What Is Streaming?

Two methods are commonly used for delivering audio and video content over the Internet: progressive download and real-time streaming. Right out of the box, Mac OS X Server includes the tools you'll need for deploying either service. To choose the technology most appropriate for your needs, it's helpful to understand how each one works.

### **Instant-on streaming**

Instant-on streaming provides broadband users with immediate access to streaming content and accelerates startup of playback. With Instant-on streaming, you can do real-time scrubbing using the playhead, and playback is updated instantaneously, allowing you to locate precisely the desired content.

Progressive download allows users to watch or listen to media as it is downloaded from a standard web server (such as Apache, which is built into Mac OS X Server) to their hard drive. This method works best for short-form media where file size is limited. Progressive download ensures high-quality playback regardless of users' Internet connection speed, although users with slower connections will wait longer before media starts to play.

Real-time streaming using QuickTime Streaming Server delivers media in real time over the Internet or mobile devices, from modem to broadband rates to HD rates. Using the open standard Real-Time Transport Protocol/Real-Time Streaming Protocol (RTP/RTSP), no file is ever downloaded to a viewer's hard drive. Media is played, but not stored, by the client software as it is delivered. Real-time streaming is often preferable to progressive download for webcasts of live events, delivery of long-form video, and 24/7 Internet radio and TV channels.

## Flexible Media Streaming Options

QuickTime Streaming Server provides three mechanisms for real-time media streaming: live, simulated live, and on demand.

### **Live**

Live events, such as concerts, speeches, news, or sports coverage, can be streamed over the Internet with the help of broadcast software, such as QuickTime Broadcaster. QuickTime Broadcaster encodes the live source—from a microphone, video camera, or other recording device—in real time and delivers the resulting stream to the server. The server then serves, or "reflects," the stream so the audience experiences the event as it happens.

### **Simulated live**

Internet radio and TV producers, distance learning teachers, and corporate trainers can simulate live broadcasts by creating playlists of music, lectures, interviews, and other prerecorded media. As with live broadcasts, all users connecting to the stream see the same point in the simulated live broadcast at the same time. Since the event is not live, broadcasting software is not required.

### **On demand**

To provide "anytime" access to feature films, lectures, presentations, and other content, you can use on-demand streaming. In this scenario, each user initiates the stream independently, so everyone experiences the audio or video content from the beginning. Like live and simulated live broadcasts, on-demand streams are played, but not stored, by the client software. This means that no files are downloaded to the viewer's hard drive, allowing you to maintain control over the distribution of your media.



### Enjoying streamed media

Mac, Windows, and multimedia device users can experience streaming with:

- QuickTime Player to “tune in” to a live or prerecorded broadcast.
- A web browser with the QuickTime plug-in to play streamed media from a web page.
- Software such as iTunes, SoundJam, or Musicmatch to listen to Internet radio and MP3 or AAC playlists.
- MPEG-4-compliant players and devices to view MPEG-4 files anywhere.
- Mobile devices to view 3GPP content.

## Multicast and Unicast Streaming

QuickTime Streaming Server supports both multicast and unicast network transports to deliver streaming media, giving you the flexibility to choose what’s right for your audience and what works best on your network.

In a multicast, each client tunes in to the same stream, much as a radio tunes in to an FM broadcast. The single multicast stream is sent to a group address, which can be accessed by many client computers simultaneously. This minimizes network congestion because it uses a fixed amount of bandwidth, regardless of the number of client connections. However, multicast delivery requires special network capabilities: The network must be multicast enabled for content distributed within a contained private network; or it must have access to the multicast backbone, or Mbone, for content generally distributed over the Internet.

### Multicast



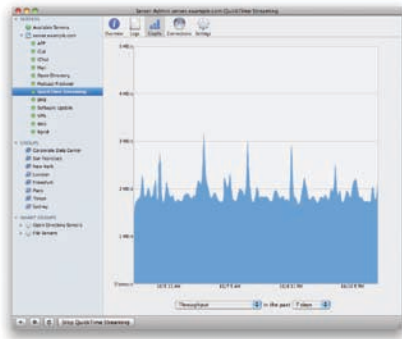
In a unicast, each client initiates its own stream, generating many one-to-one connections between client and server. Although this can result in heavy network traffic, unicast is the most reliable technique for delivery over the Internet, since no special network transport is required.

### Unicast



### Relaying streams for extended reach

Whether you use multicast or unicast, it’s easy to extend the reach of your media server by relaying streams. When relaying is turned on, the streaming server automatically forwards the stream to one or more additional servers, enabling the streaming load to be shared by those servers. Especially important for live and simulated live scenarios, relays can reduce network congestion and are useful for broadcasts with large numbers of viewers in different locations.



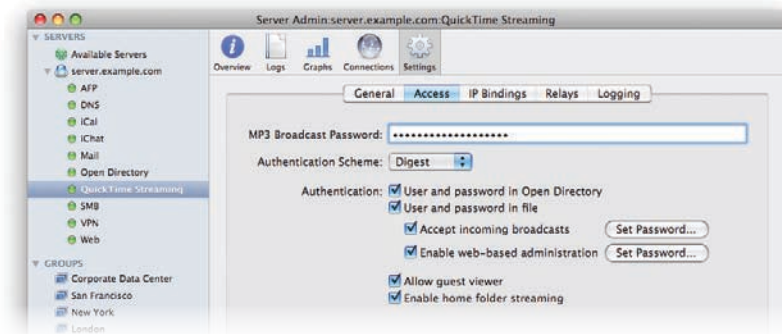
### Remote management

Use Server Admin to remotely configure and manage streaming services, view real-time activity logs, and monitor server throughput and traffic.

## Setting Up QuickTime Streaming Server

Setting up and administering QuickTime Streaming Server is a snap with the easy-to-use Server Admin application in Mac OS X Server. Server Admin can run on any Mac OS X system, providing secure remote management and monitoring of your server from anywhere on the Internet. The full suite of Server Admin capabilities can also be accessed from the terminal using SSH—ideal for UNIX-savvy administrators who prefer a scriptable, command-line environment.

After logging in to Server Admin, simply click the Start QuickTime Streaming button and the content in your Media folder is made available for streaming over the Internet. You can also use Server Admin to set access privileges and passwords, create relays, and customize log settings. You can even bind QuickTime Streaming Server to a specific IP address if you are hosting websites on the same server.



## Preparing Content for Streaming

For simulated live and on-demand streaming, your media must be compressed, hinted, and uploaded to the streaming server.

### QuickTime 7 Pro

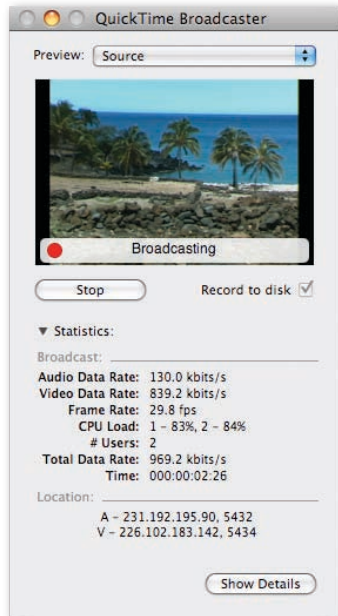
Apple's QuickTime 7 Pro application delivers powerful media authoring capabilities, including audio and video capture, complex video and audio encoding, hinting media files for streaming, Media Skin creation, automation of repetitive production tasks, and assembly of different media types into a single movie file.

### Compressing media files

Uncompressed video files require massive bandwidth, making it impossible to send them over the Internet. That's why it's necessary to compress, or encode, your movie before streaming. Start by choosing an audio or video compressor optimized for streaming and select a data rate appropriate for the connection speed of your target audience. Because QuickTime supports MPEG-4 and H.264—the industry standards for delivering digital media over the Internet—you can use QuickTime Pro or any application that uses QuickTime (such as Final Cut Pro, Final Cut Express, or iMovie) to create MPEG-4 files for streaming with QuickTime Streaming Server.

### Hinting media files

Movies intended for streaming must be "hinted"—that is, they need a hint track for every streamable media track. A hint track contains information that tells QuickTime Streaming Server how and when to deliver each frame of media when the media player requests the stream. Hint tracks can be applied in the same application you use to encode your video.



### QuickTime Broadcaster

A component of Mac OS X Server, QuickTime Broadcaster is also available as a free download from the Apple website.

## Broadcasting Live Events

Apple's QuickTime technologies combine to provide an end-to-end solution for producing professional-quality live events for online delivery—quickly, easily, and affordably. QuickTime Broadcaster live encoding software has broad, extensible codec support that includes H.264 video, and it works seamlessly with QuickTime Streaming Server. This makes it easy to reach large numbers of viewers for corporate meetings, online courses, keynote addresses, entertainment, and other special events.

Based on standards, live broadcasts can be viewed on a variety of compliant devices in addition to QuickTime Player on Mac and Windows PCs. Live streaming begins with a Mac desktop or notebook computer connected to a video camera, microphone, or other media-recording device. Using QuickTime Broadcaster, the system digitizes and compresses the media feed and sends the encoded signal to the server. The QuickTime Streaming Server software then reflects the signal, sending it out to audiences, who “tune in” with QuickTime Player or other compliant devices.

While it's possible to broadcast and stream from the same system, when streaming to larger audiences you'll want separate systems. This improves performance, enabling you to dedicate one computer to compressing the live source content and another to serving the broadcast over your network or the Internet. Having separate systems also gives you more flexibility: For example, you can broadcast from a notebook computer onsite to a server in a remote location.

### Using QuickTime Broadcaster

QuickTime Broadcaster has presets for popular broadcasting configurations, so you can produce a live event in just a few clicks. For media professionals who want more encoding control, a full array of advanced settings provides options for custom configurations. To help you manage your broadcast, QuickTime Broadcaster displays real-time statistics, including the data rate of the audio and video stream, the video frame rate, the processor load, the number of connected users, and the data rate of the broadcast.

### Instant video-on-demand

While you're recording and streaming your live broadcast, you can also save the content for viewing after the event is over. In addition to saving the encoded file to your hard drive, QuickTime Broadcaster automatically hints the file for posting to the streaming server—perfect for on-demand access or a simulated live broadcast immediately following the event.

## Apple Server Solutions

Media streaming services are among the powerful workgroup and Internet tools built into Mac OS X Server, Apple's UNIX server operating system. Combining the latest open source technologies with Mac ease of use, Mac OS X Server unleashes the power of Xserve, Apple's rack-optimized server hardware. With phenomenal performance, massive storage capacity, high-bandwidth I/O, and integrated remote management tools, Xserve running Mac OS X Server is the ideal solution for education, small businesses, and enterprises alike.

## For More Information

For more information about Mac OS X Server, Xserve, and other Apple server solutions, visit [www.apple.com/server](http://www.apple.com/server).

For more information about Apple's suite of QuickTime technologies, see [www.apple.com/quicktime](http://www.apple.com/quicktime).