



Technical Overview



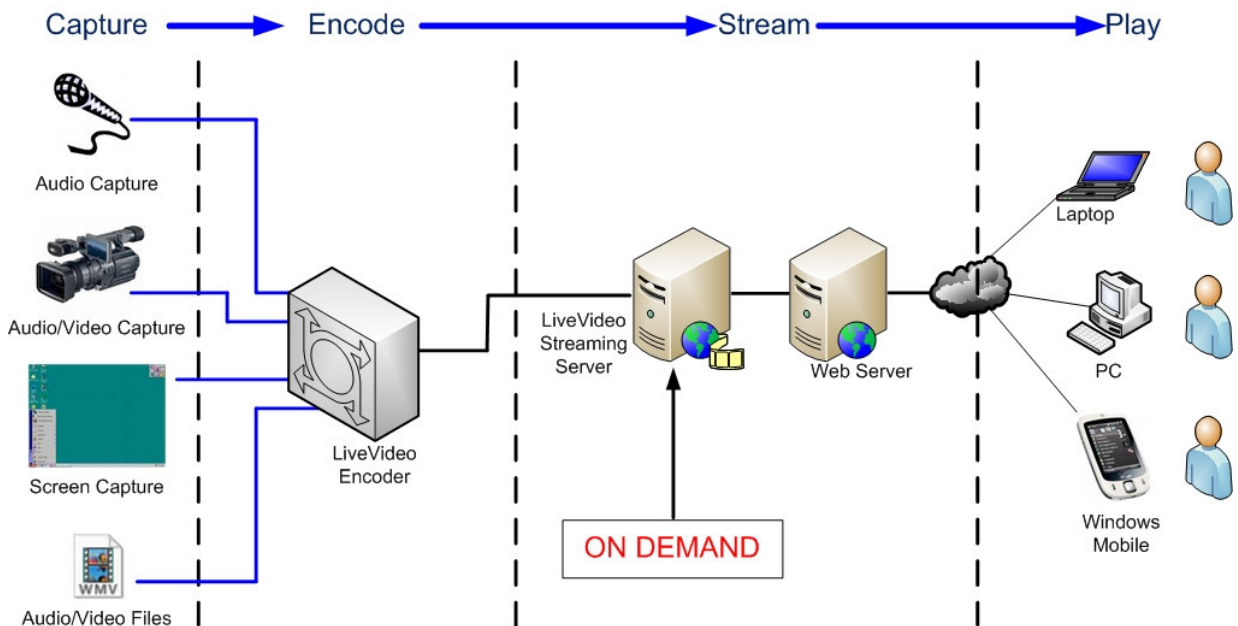
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Streaming

Streaming video is a sequence of "moving images" that are sent in compressed form over the Internet and displayed by the viewer as they arrive. Streaming media is streaming video with sound. With streaming video or streaming media, a Web user does not have to wait to download a large file before seeing the video or hearing the sound. Instead, the media is sent in a continuous stream and is played as it arrives. The user needs a *player*, which is a special program that uncompresses and sends video data to the display and audio data to speakers. A player can be either an integral part of a browser or downloaded from the software maker's Web site.

"According to Nielsen/NetRatings, more than 72 percent of Internet users do more than just surf the Web, and popular Internet activities include watching video clips."



Challenges

The most difficult task of broadcasting audio and video over a internet is maintaining a continuous presentation to the user in a highly changeable environment.

Buffering is the biggest problem of streaming digital media. It is caused when the client runs out of data in memory, called the buffer, and must wait for more to arrive.

The client will always run out of data if the bit rate of the incoming stream exceeds the current available bandwidth. All audio or video clips that are played over the Internet must be converted and compressed using a special digital format. The conversion and compression process is called **digital encoding**.

Bit rates determine the quality of audio and video playback over the Internet. Material encoded at higher bit rates will have higher resolution, smoother playback, higher fidelity, and will provide the viewer with a better experience. Media can be encoded at single or multiple bit rates starting from 5 Kbps to over 1 Mbps. We can help you determine which bit rates to encode at, depending upon the audience you are targeting.

LiveVideo Introduction

LiveVideo Streaming Server v1.0 is the server component of the LiveVideo Streaming solution which comprises of the LiveVideo Encoder v1.0 and uses Windows Media Player to deliver audio and video content to clients over the Internet or an intranet. These clients might be other computers or devices that play back the content using a player, such as Windows Media Player, or they might be other computers running LiveVideo Encoder that are proxying, caching, or redistributing content.

Deliver Streaming or Preexisting Content

Livevideo Streaming Solution can deliver a live stream or preexisting content, such as a digital media file. If you are planning to stream live content, you would configure a broadcast publishing point in the LiveVideo Streaming Server and then connect to LiveVideo Encoding software, that is capable of compressing a live stream into a format supported by the LiveVideo server. You can also stream preexisting content that has been encoded by LiveVideo Encoder. You would be able to stream preexisting content from an on-demand publishing point

Fast Streaming

Fast Streaming refers to a set of features in LiveVideo Services that significantly improves the quality of the streaming experience. Fast Streaming is based on the latest technologies and delivers compelling audio and video content over a variety of networks—even when network connections are unreliable. Fast Streaming is possible because of these four components:

- Fast Start
- Fast Cache
- Fast Recovery
- Fast Reconnect

Fast Start

Fast Start provides an instant-on playback experience with no buffering delay—whether playing a single piece of content, or switching between on-demand clips or broadcast channels.

Buffering Data

Before it can start playing content, Windows Media Player must buffer a certain amount of data. When streaming to clients who use Windows Media Player for Windows XP or a later version of the player, you can use Fast Start to provide data directly to the buffer at speeds higher than the bit rate of the content requested. This enables users to start receiving content more quickly. After the initial buffer requirement is fulfilled, on-demand and broadcast content streams at the bit rate defined by the content stream.

The Fast Start Experience

Using Fast Start provides a better experience for users when playing back your content. Users can fast-forward and rewind content without additional delay and rebuffering. A player that connects through broadband networks starts playing the content more quickly, making the experience much more like viewing a television program or listening to a radio broadcast. Content delivered from your server by using server-side playlists switches smoothly and seamlessly between content items. Additionally, the pre-buffering of data makes the player resistant to playback errors due to lost packets or other network issues.

Fast Cache

Fast Cache provides an always-on playback experience by streaming content to the Windows Media Player cache as fast as the network will allow, reducing the likelihood of an interruption in play due to network issues.

For example, using Fast Cache, the server can transmit a 128-kilobits-per-second (Kbps) stream at 700 Kbps. The stream is still rendered in Windows Media Player at the specified data rate, but the client is able to buffer a much larger portion of the content before rendering it. This allows the client to handle variable network conditions without a perceptible impact on the playback quality of either on-demand or broadcast content.

This ability is useful in the following situations:

- When the available network bandwidth of the client exceeds the required bandwidth of the content—for example, clients that use a cable modem, DSL connection, or corporate intranets.
- When the network connectivity is intermittent or has high latency—for example, wireless networks.
- When the quality of the content received is of paramount importance—for example, businesses that provide pay-per-view movies.

Fast Recovery

Fast Recovery works in conjunction with Forward Error Correction (FEC) to provide redundant packets of information to clients that are using wireless connections. Providing redundant packets ensures that no data is lost as a result of connectivity disruptions. Because of FEC, Windows Media Player can usually recover lost or damaged data packets without having to request that the data be resent by the LiveVideo Streaming server.

In environments that are subject to latency problems, such as satellite networks and other wireless networks, this process of receiving data is much more efficient. And it's easy to specify the amount of error correction data transmitted per span of data sent using the LiveVideo streaming Services user interface.

Fast Reconnect

Fast Reconnect automatically restores live or on-demand player-to-server and server-to-server connections if disconnected during a broadcast. This ensures an uninterrupted viewing experience.

If the client was connected to an on-demand publishing point, the client restarts playback at the point at which the connection was lost by synchronizing itself with the content timeline. If the content includes video, the client estimates the approximate video frame at which the connection was lost. If the content is indexed, this estimate is more accurate. If the client is connected to a broadcast publishing point, the client reconnects to the broadcast in progress. Depending on the content, the user may experience a gap in the broadcast.

Fast Reconnect can be used with clients that connect through any of the default connection protocols (MMS, HTTP, and RTSP). Fast Reconnect is available for both broadcast and on-demand streaming.

Dynamic Content Delivery

With LiveVideo Streaming solution, you can customize the distribution of your content using server-side playlists and advertisements. Once you've customized your content, it's easy to distribute it to the edge of the Internet by stringing servers together using the latest protocols and cache/proxy solutions.

Server-Side Playlists

The LiveVideo Server-side playlist is based on the Synchronized Multimedia Integration Language (SMIL) 2.0 standard. It is a robust mechanism for assembling content for playback on personal computers and portable devices. Both broadcast and on-demand publishing points, can stream content from a playlist that executes on the server. A server-side playlist can contain live or preexisting content and be delivered using unicast or multicast transmission.

Using Server-side Playlists

Here are a few examples of what you can do with server-side playlists:

- Stream an infinite sequence of content, repeat content, or set durations for content.
- Stream content to devices such as handheld personal computers, or set-top boxes that don't support client-side playlists.
- Insert advertisements, or wrap site branding or sponsor information around your content.
- Interrupt content for ads or emergency announcements.
- Use ASP or CGI scripts to dynamically display ads with each pass through the playlist.
- Switch between live and stored streams with no noticeable delay on the client side.
- Dynamically change and save playlists, or build playlists on the fly based on user profiles or preferences.
- Stream content from LiveVideo Encoder.
- Nest playlists within one another.

Advertisements

Streaming advertisements is a great way to generate revenue for your Web site. LiveVideo Streaming solution integrates with third-party ad servers to enable you to use advertising in the following ways:

- Place ads at the beginning and end of your playlist, or at any point within the playlist.
- Dynamically change the ads that you show based on national, regional, local, or other demographic information.
- Personalize ads based on information you gather from cookies or other data gathering tools.
- Log ad data, such as number of ads played in a particular broadcast or number of users who watched the entire ad.

Edge Delivery

To ensure that your content gets where it needs to go when it needs to be there, LiveVideo Streaming solution provides the following features:

- New cache/proxy support enables developers to easily build streaming cache/proxy solutions and control the customization and extension of native cache and proxy policies. Cache/proxy solutions conserve network bandwidth, decrease network-imposed latency, and decrease the load on LiveVideo origin servers.
- Improved protocol support between servers, including: Real Time Streaming Protocol (RTSP) and Hypertext Transfer Protocol (HTTP). Support for new client protocols and standards includes: RTSP, HTTP version 1.1, Internet Group Management Protocol (IGMP) version 6, and Internet Protocol (IP) version 6.
- Flexible distribution between servers using User Datagram Protocol/Transmission Control Protocol (UDP/TCP).

Industrial Strength

LiveVideo v1.0 Streaming Solution is more scalable, reliable, and secure, enabling streaming for the largest enterprises and content delivery networks.

Built-in Security

Industrial strength security is part of LiveVideo Streaming Solution. Authentication and authorization mechanisms ensure secure transfer of data from encoder to server, server to server, and client to server. You'll also find support for HTTP Digest and for digital rights management that ensures on-the-wire and persistent client-side security.

Administration

Administering LiveVideo Streaming has never been easier. With 2 different administration tools, you can administer your LiveVideo Streaming Server in virtually any environment:

- LiveVideo Administrator for the Web, an HTML 3.2-based interface, is a brand new way to administer your server when you're not in the office, or when you want to administer LiveVideo Services through a firewall or low-bandwidth network.
- The command-line enables you to use scripts to administer your LiveVideo Streaming server.