
Network Update

Internet-Delivered Audio and Video—The Client Perspective

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Introduction

The Web, given its exponential growth, is rapidly becoming a premiere source for authentic, target-language materials, including audio and video content. Recent "Network Update" columns have covered Web page development, including CGI and scripting, multilingual browsing, and plug-ins. In this column I will take a closer look at the client side of Web-based audio and video, while in an upcoming column I will discuss the server details of audio and video content delivery via the intra- and Internet.

Downloadable Audio and Video

Currently, Web-based audio and video content can be delivered by either download or by streaming. Downloadable audio and video content differs among platforms (MacOS vs. Windows) and includes QuickTime movies, AVI, MPEG audio and video, MIDI audio files, and other platform-specific audio formats (au, aiff, wav, etc.). Downloadable audio and video content is saved directly to a user's hard drive, and most Web browsers process this downloaded content with plug-ins. Netscape's Navigator (versions 3 and 4) and Communicator (version 4), for example, ship with several default plug-ins—LiveAudio, NPAVI (Windows only), and QuickTime—which play back downloaded media files. Some files are prepared with "fast-start" or progressive download capabilities which allow a user to begin listening to or viewing the content before it has been completely downloaded and saved to a user's local hard drive. These audio and video files can be quite large, and often end up clogging a user's hard drive. Other plug-ins exist for additional audio and video file formats, but few of these proprietary formats are currently used extensively in

Web sites.

Information on plug-ins, including those that enable audio and video, can be found at C|Net's Browser.com (<http://www.browser.com>), from the Netscape Web pages (http://www.netscape.com/comprod/products/navigator/version_2.0/plugins/index.html?), and from Browser Watch's Plug-in Plaza (<http://browserwatch.internet.com/plugin.html>). To find out which plug-ins you have installed on a machine, type "about:plugins" into Netscape's "Open Location ..." dialog box or, for Microsoft's Internet Explorer, look in your plug-ins folder or directory. Additional installation, plug-in, and Web browser details can be found in Bob Godwin-Jones' "Real-time Audio and Video Playback on the Web" at <http://polyglot.cal.msu.edu/vol1num1/emerging.html>).

Streamed Audio and Video

Streaming audio and video content is a process different from downloading: a large content file is never actually passed to or saved to a user's hard drive, but rather a small temporary "pointer" file is saved on the drive, and this pointer file opens a connection to a remote server that streams the audio or video requested. The requested digital media material is sent immediately and in real time to the end user in small data packets which are reassembled by the streaming player or plug-in used for playback (see figure on page 53). By comparison, approximately 25% of downloadable content must normally be saved to the end user's hard drive before playback begins. Unlike downloadable audio and video files, this pointer file is automatically deleted when a user quits the browser and/or any associated helper application(s). If you wish to save this pointer file for later access, you can make a copy of the pointer before quitting your Web browser or associated helper application(s). A hyperlink to a saved pointer file can be included on a Web site and when a user clicks on the hyperlink the streaming audio or video will be delivered. These pointer files only contain information on how to open a connection to an audio/video server, and therefore have few, if any, copyright issues associated with them.

Until recently, numerous streaming audio and video technologies existed, but this array is being narrowed to two emerging standards: Real Networks' RealPlayer (<http://www.real.com>) which delivers RealMedia (RealAudio and RealVideo) content, and Microsoft's NetShow (<http://www.microsoft.com/netshow>) which delivers ASF, or Active Streaming Format files. Two other important contenders in the streaming audio and video arena are VDOnet's VDO

Player (<http://www.vdo.net>)—Microsoft has investments in VDOnet—and VivoActive's VivoActive Player (<http://www.vivo.com>). There is a special version of NetShow that is also capable of delivering RealAudio and RealVideo streams, and there are plans for ASF-savvy versions of the RealPlayer, the VDO Player, and the VivoActive Player. Motorola (<http://www.mot.com/truestream>) is developing TrueStream, a technology that is still in its infancy, and Vosaic's MediaServer streaming technology (<http://www.vosaic.com>) relies on Java, rather than plug-ins or players. Telos with AudioActive (<http://www.audioactive.com>) and Xing Technology Corporation (<http://www.streamworks.com>) are other developers in streaming media whose products cater to MPEG content developers including some Internet radio stations. InterVU (<http://www.intervu.net>) is a developer of MPEG video streaming technology that is delivered from the nearest geographical location by partner Internet Service Providers (ISP's). V Xtreme (<http://www.microsoft.com/vxtreme>), developer of WebTheater streaming technology, has been bought by Microsoft and its streaming technology has been rolled into NetShow's TheaterServer.

At this time (January 1998) there is no single plug-in/player combination for all streaming formats, and since content providers use varying formats, users need multiple plug-ins and players to be able to view audio and video content from the wide array of content providers. Apple's QuickTime 3.0, scheduled to ship by April 1998, will incorporate streaming technology. I'll cover this in more detail in the next column. For more information, see Apple's Quicktime site—<http://quicktime.apple.com>.

Issues in Web-Delivered Audio and Video

Web-delivered audio and video has improved dramatically, but, nonetheless, several problems still persist, including limited bandwidth and annoying artifacts associated with compression/decompression. Limited bandwidth refers to content that is served at a higher (or lower) data transfer rate than an end-user's network and/or computer hardware can handle, or vice versa. Bandwidth limitations are typically less of a problem for computers networked at colleges and universities than for dial-up and remote access users. Many schools already have adequate bandwidth for intracampus network-based delivery of audio and video content. Limited bandwidth results in lost data packets which cause the audio or video to stutter or disconnect completely.

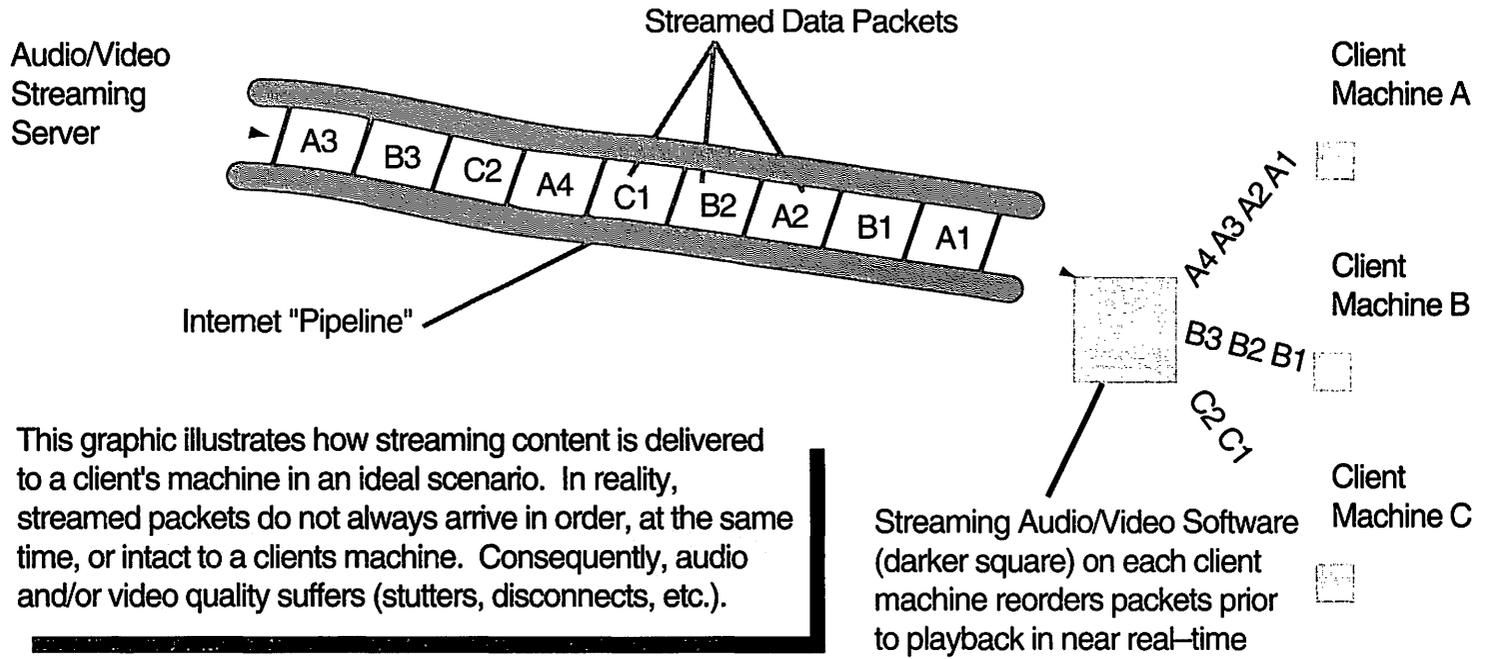
Web-delivered audio and video content is compressed prior to delivery and then decompressed for listening and

viewing using one of many codec algorithms (short for compression-decompression). Compression reduces the amount of data needed to transmit a content file, but increased compression results in decreased audio and video quality. Some codecs are proprietary, such those used in RealMedia and VDO content while other multimedia architectures, such as QuickTime, can use many different codecs. Not all codecs are created equal and some are more effective in preparing content for Web-delivery than others. Most industry standard codecs are included with Web browser software. A good primer on multimedia architectures—including software, file formats, and codecs—is provided by Terran Interactive, makers of Media Cleaner Pro, a multimedia processing and compression tool (<http://www.CodecCentral.com>). As we go to press, I've found a site at Dartmouth that provides a comprehensive, yet less technical overview of Web-based audio and video for instructional purposes (<http://www.dartmouth.edu/~cc/didactic>).

Software developers and content providers alike have made efforts to compensate for the bandwidth and codec limitations involved in streaming audio and video. Most streamed audio and video players have 10-30 second buffers that help diminish the effects of limited bandwidth and net congestion. Developers continue to refine codecs to improve their results with Web-based delivery. Content providers have also begun to optimize audio and video content for Web-delivery. Most importantly, end users can improve their results by following a few guidelines: a) use a powerful computer (Pentium 90MHz or PowerPC) which will have the necessary computing speed and networking hardware to process the content; b) allocate as much RAM as possible to the Web browser and/or player; and c) make requests for audio and video content during off-peak periods of network activity.

Streaming audio and video content holds promise as a source of authentic and current instructional materials that can be seamlessly incorporated into the foreign language curriculum. The future of Web-based audio and video is promising, especially as new streaming standards such as RealMedia and Active Streaming Format are adopted by more content providers. In my next column, I will discuss how you can deliver streamed audio and video, including digitized materials that accompany foreign language textbooks, to students at your institution.

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This graphic illustrates how streaming content is delivered to a client's machine in an ideal scenario. In reality, streamed packets do not always arrive in order, at the same time, or intact to a clients machine. Consequently, audio and/or video quality suffers (stutters, disconnects, etc.).

Just a few of the streaming audio and video content providers of interest to language learning professionals are found below.

Language	Media Type	Player/Plug—in Needed	URL	Special Notes:
Chinese	AUDIO	RealPlayer	http://www.voa.gov/programs/audio/realaudio	Also available in AU format. Downloadable audio files are in the public domain and can be redistributed freely. Text transcripts are also available (GB format).
English	AUDIO	RealPlayer, NetShow	http://www.npr.org	Audio archive is available.
French	AUDIO/ VIDEO	RealPlayer	http://www.france2.fr/indexfrm.htm http://www.lci.enfrance.com	
German	AUDIO/ VIDEO	RealPlayer (Audio) VDO Player (Video)	http://www.dwelle.de	
Hindi	AUDIO	RealPlayer	http://air.kode.net/index1.html	
Italian	AUDIO	RealPlayer	http://www.rai.it/grr	
Japanese	VIDEO AUDIO	RealPlayer RealPlayer	http://www.ginga.com/utb http://bekkoame.or.jp/~fl1604/poems/index.html	(poetry read off the web)
Russian	AUDIO	RealPlayer	http://www.voa.gov/programs/audio/realaudio	
Spanish	VIDEO AUDIO	RealPlayer RealPlayer	http://www.venevision.com.ve/rafiles/vresumen.ram http://www.rtve.es/rtve/_rnc/_audio/ind_r5.ra http://www.caracol.com.co/indexG.htm	
List of RealMedia Providers	VIDEO AUDIO		http://www.timecast.com/video/rvs_a-zlist.html http://www.timecast.com/complete.html	

Additional audio and video providers can be found in Bob Godwin-Jones' "Real-time Audio and Video Playback on the Web" at <http://polyglot.cal.msu.edu/llt/vol1num1/emerging.html>