
EMERGING TECHNOLOGIES

Real-time Audio and Video Playback on the Web

Bob Godwin-Jones
Virginia Commonwealth University

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From Downloading to Streaming

For many of us interested in language teaching and technology, our first visit to the Web back in the pioneer days of 1993-94 was a revelation, even with the painfully slow rendering of pages supplied by early *Mosaic*. Here was a networked medium which displayed not only text with accented characters (unlike e-mail) but also graphics, and--so crucial to our needs--even allowed incorporation of audio and video files. And it did so in a non-proprietary, cross-platform format! This seems so commonplace to us today that it's hard to realize how tremendous a benefit the standards-based, multi-platform compatibility of the Web has been to us in language and technology. It has largely made our platform wars and battles over authoring tools irrelevant, while providing a means to reach out to everyone, not just the chosen few who share our cyber-religious platform convictions.

At that time and until recently, the only way to access audio and video files on the Web was to download them temporarily to the local computer, a process which could take some time depending on the size of the file. Of course, this process is handled transparently by the browser: a helper application or the browser itself plays back the file once it has been received in its entirety. Web delivery of multimedia files solved a problem for our language lab at VCU and undoubtedly for others as well, namely that of how to store digital audio and video clips temporarily on users' machines, without having to manually delete or replace them before each new group of students comes in for Spanish, French, or German class.

"What once were virtues now are vices." Today this feature of the Web--the ability to access downloadable multimedia files--is seen as problematic. Our give-it-to-me-now mentality needs the audio and video to play immediately, not to download first and then play. In fact, Web technology has evolved to the point that this kind of real-time delivery (called "streaming") of audio is a reality, even over a modem connection. Initial audio quality was that of a cheap AM radio, but the latest players feature near CD-quality [stereo](#) (over a fast connection). A number of [radio](#) stations, both in the U.S. and abroad are now "web-casting" their programs. Many special events and conference presentations are being delivered [live](#) over the Web in streaming format.

Video streaming has not yet reached the same level of maturity and performance. Real-time video provides a small playback window and delivery tends to be choppy and erratic and especially painful over a modem connection. Given the enormous volume of visual and graphic information needed to

transmit and synchronize video, it's not surprising that reliable streaming video over the congested Internet is a tremendous technical challenge. Progressive Networks recently introduced their [RealVideo](#) streaming technology, which offers a significant improvement in quality. As compression technologies evolve and network bandwidth increases (for example through the new 56k modems), video broadcasting over the Web should steadily improve in quality and performance.

Standards and Players

There is not yet a single standard for delivery of streaming audio and video over the Web. Currently the major formats are [StreamWorks](#), [Vivo](#), [VDO](#), and [RealAudio/RealVideo](#), the latter being the most widely used standard. With all available standards, the quality of the delivered files varies considerably and is dependent on such factors as the speed of your Internet connection, the capability of your computer and the location of and traffic to the site where the file is located. Even under optimal conditions, playback is not instantaneous. Typically there is a short "buffering" process before playback during which enough of the file is downloaded for it to begin playing. While that section is playing, the rest of the file is downloaded in the background in order to allow for continuous play. Techniques have been developed to allow a kind of pseudo-streaming of formats that normally require initial downloading before playback; this is now possible with [QuickTime](#) audio and video.

How the audio or video file is delivered to you on the Web varies with each product, but the basic approach is the same. You download the player software to your computer from the company making the player (it's best to go direct to the source and get the latest version), run the installation program (or follow the instructions to install the player manually), and then re-start your Web browser. The streaming formats listed here all come with free players for both Windows and Macintosh computers. Some Mac players are for PowerPC Macs only; some Windows players are for Windows95 only. They typically require [Netscape](#) Navigator 2.0 or higher or [Microsoft](#) Internet Explorer 3.0 or higher. Most players work as external "helper applications" to your Web browser, but some also can function as "plug-in" applications, in which the controls (and in the case of video, the picture) are seamlessly integrated into your browser window, rather than being displayed in an external window.

The player (or plug-in controls) allow the user to play, stop and pause the file, and in most cases also jump ahead or back. With streaming formats it is possible to have usable audio files which are quite long in length--some on the Web are an hour or longer--and still have it possible for the user to navigate through the file as desired. With downloaded audio files (in au, aiff, or wav formats), that kind of length would not be practical since it would take too long to download over the Internet and would also require too much temporary storage space on the local PC. Streaming formats are compressed much more than other sound or video formats and thus are easier to receive and to store.

Language Sites

There is a wealth of streaming audio materials available on the Web in a great variety of languages. Unfortunately, not all sites use the same streaming technology; this makes it necessary to make sure you have the appropriate player for the site you are visiting. Most will let you know what technology they are using and will offer some assistance, but this varies greatly from site to site. The links to sites in the [Resource List](#) below are intended as examples, they do not represent by any means the full extent of offerings in any language. Only technologies for which they are a good number of sites offering audio or video in languages other than English are listed. Some sites now offer files in more than one streaming standard.

The major European languages offer the richest variety of streaming audio and video. For French there is access to radio stations such as Europe 1 or RTL ([FranceLink](#)) as well as to news from [Canada](#) or [Tunisia](#); [Regional French](#) news broadcasts are also available, offering a different perspective from the national services. Germany's [ARD](#) re-broadcasts on the Web its most popular TV news shows and the [Deutsche Welle](#) service offers a variety of radio transmissions; [Swiss](#) and [Austrian](#) programs are also available. Spanish speakers can tune in to radio broadcasts and news from a great diversity of countries including [Spain](#), [Mexico](#), and a number of South American countries (including [Colombia](#), [Guatemala](#), [Peru](#), [Chile](#), [Ecuador](#), [Uruguay](#), and [Venezuela](#)). News is available in streaming format for [Italian](#) and Portuguese (from [Portugal](#) and [Brazil](#)).

[Swedish](#) news is available, as is [Norwegian](#), [Icelandic](#), and [Finnish](#). Live radio is being Web-cast from [Romania](#), the [Czech Republic](#), and [Hungary](#). You can tune in to [Polish](#) broadcasts from Chicago (also Bulgarian, Serbian and Russian). Non-European languages are represented as well, with news broadcasts from countries such as [Israel](#), [Taiwan](#), [India](#), [Korea](#), [Indonesia](#), and [Japan](#). The Web offers a compelling showcase for regional languages to reach a wider audience--streaming audio is available, for example, for [Catalan](#) and [Cornish](#). For ESL students, the [Timecast](#) server features a wide range of sites of potential interest and also allows subscription to a "daily briefing" in user-selected areas.

Instructional Uses

What does this technology offer us as language teachers? The most obvious and direct benefit is the availability of authentic language materials in a multimedia format. For language teachers, audio and video are not fancy add-ons but provide direct access to the discipline's "content"--human communication in all its linguistic and cultural diversity. Streaming technologies provide up-to-date, even live, information in an on-demand, easy-to-use format. It's not difficult to imagine building lesson plans on the basis of student visits to some of the sites listed above. An interesting benefit is that while many sites have alternative English versions of their Web pages, most have only target language audio and video (an exception is the current Web hit [Calling Bill Gates](#) from Germany). One practical concern about basing assignments on such sites is whether the targeted links will still be active when students visit the sites. Most of the streaming files can not be cached locally, as is the case with HTML files or graphics (or traditional audio). In the case of RealAudio, there is a commercial version of the player ([RealPlayer Plus](#)) which allows saving and local playback of "real" audio and video files.

Besides having students use language material from target cultures, it is also possible for instructors to put their own audio or video materials in streaming format on the Web. How this is done depends on the particular product used. For most, it is necessary to save the audio or video file in a proprietary format and then upload it to a Web server or to a proprietary media server. For RealAudio, for example, an already digitized sound file in au, aiff or wav format is "encoded" into Progressive Networks' "ra" (RealAudio) format using either a (free) stand-alone encoder or a plug-in to programs such as [SoundEdit 16](#) (Mac) or [SoundForge](#) (Windows). In the case of some streaming formats, users then link directly to that new sound file. In the case of RealAudio, the user links instead to a "meta" file which contains a pointer to the sound file, which is typically delivered from a proprietary RealAudio server. Alternatively, RealAudio files can also be streamed from a standard Web server.

An interesting instructional possibility with RealAudio or RealVideo is "[synchronized multimedia](#)." While a sound or video file is played, a kind of slide show is shown in the browser window, displaying a series of Web pages containing text and/or graphics which complement or illustrate the

audio content. In fact, entire lectures, complete with lecture notes or slides, can be delivered in this way. This kind of presentation is also possible through Macromedia's Shockwave plug-in technology. For content developers, there are in fact a variety of interesting approaches to incorporating real-time audio or video with interactive Web functionality through [JavaScript](#) or [Java](#).

Resource List

Streaming Formats and Sample Sites

StreamWorks

Player and info: [Xing Technology](#)

Directory of sites: [StreamWorks Sites](#)

Sample sites:

[FranceLink](#) - Links to a number of French radio programs

[La Megaestacion](#) - A San Juan, Puerto Rico radio station (Spanish)

[Yonhap Television News](#) - Korean news

Vivo

Player and info: [Vivo Software](#)

Directory of sites: [VivoActive Video Gallery](#)

Sample sites:

[Italia on-line](#) (Italian)

[Tokyo Broadcasting system](#) (Japanese)

[ONTV-sverige](#) (Swedish)

VDO

Player and info: [VDOnet Corporation](#)

Directory of sites: [VDOGuide](#)

Sample sites:

[ARD](#) - Erstes Deutsche Fernsehen (German)

[Polish news from Chicago](#) - Also links to Bulgarian, Serbian and Russian broadcasts

[FR3](#) - Regional TV newscasts (French)

RealAudio and RealVideo

Player and info: [Progressive Networks](#)

Directory of sites: [Site Guide](#)

Sample sites:

[Radio-Canada Nouvelles](#) - All-news Web site in French from the CBC

[Tunisia National Radio \(ERTT\)](#) - News, music and sports in French and Arabic

[Der Spiegel](#) - Links to German multimedia resources

[Deutsche Welle](#) - Rich source of news in German

[Swiss info](#) - In German

[Portugal](#) - Live radio programming in Portuguese from Lisbon

[Brazil](#) - News in Portuguese from Rio de Janeiro

[Radio COPE](#) From Madrid (Spanish)
[Colombia](#) - From Bogota (Spanish)
[Uruguay](#) - News and information from Montevideo (Spanish)
[Radiodifusion Argentina al Exterior](#) - From Buenos Aires (Spanish)
[Segundo Informe de Gobierno](#) - From Mexico City (Spanish)
[Venezuela](#) - News and music from Caracas (Spanish)
[Latin News](#) - From Chile, Ecuador and Peru (Spanish)
[Emisoras Unidas](#) - News, sports and entertainment radio station in Spanish from Guatemala
[Hungary](#) - Live news, talk and music programming from Budapest (Hungarian)
[Czech Republic](#) - Multilingual daily news and information about the Czech people
[Croatia](#) - News in Croatian
[Romania](#) - Live radio broadcasts from Bucharest (Romanian)
[RADIO X97.7](#) - In Icelandic from Reykjavik
[Swedish Radio](#) - From Stockholm
[Norway](#) - News and information in Norwegian from Oslo
[YLE Radionews](#) - Hourly news broadcasts in Finnish (Helsinki, Finland)
[Taiwan](#) - Music and news in Chinese
[Syahreza's Radio Station](#) - Pop music and news from Jakarta, Indonesia (Indonesian)
[All India Internet radio](#) - Music and news
[Israel](#) - News broadcasts in Hebrew and English
[Ad Newodhow: The Cornish News Service](#) - News from Cornwall (Cornish)
[Catalan](#) - News and talk show programming from Barcelona (Catalan)

Developer's Corner

[RealAudio Content Creation Guide](#) - Getting started with RealAudio file creation
[Synchronized multimedia](#) - Sending audio or video with timed slide show
[RealAudio and JavaScript](#) - Controlling playback of audio (or video) with JavaScript
[Educational Resources](#) - Some sites using RealAudio and RealVideo in instruction
[VivoActive Producer 2.0](#) - Information on creating Vivo audio or video streaming
[StreamWorks Server FAQ](#) - Frequently asked questions about using the StreamWorks server
[VDOLive Tools](#) - How to create VDO files from QuickTime

[Shockwave Director](#) - Pointers to information on streaming with Shockwave
[QuickTime](#) - Information on pseudo-streaming QuickTime movies

[SoundForge](#) - Commercial sound editor for Windows
[SoundEdit 16](#) - Commercial sound editor for Mac