

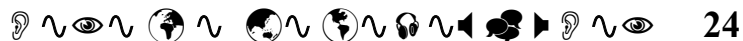
***Get Set to Stream!***  
**A Comprehensive Guide to Putting Audio on Your Web Site**  
**Or**  
**(Almost) Everything You Need to Know to Stream Audio from Your**  
**Web Site**

Written and researched by:

Karolyn van Putten, Ph.D.  
 Project Director  
 National Youth in Radio Training Project  
 National Federation of Community Broadcasters  
 Fort Mason Center, Bldg. D  
 San Francisco, CA 94123  
 ©NFCB (National Federation of Community Broadcasters) 2001

<b>I. Introduction</b>	<b>2</b>
A. PURPOSE.....	2
B. RATIONALE.....	3
C. WHAT THIS DOCUMENT WILL INCLUDE.....	3
<b>II. Things to Think About</b>	<b>4</b>
<b>III. Host-it-Yourself or Make a Deal?</b>	<b>6</b>
A. DELIVERY SYSTEMS AND PLATFORMS.....	8
1. About RealPlayer™.....	10
2. About Windows Media Player™.....	11
3. About Quicktime™.....	11
4. About Beatnik™.....	11
5. About Clipstream™.....	12
6. About Live365.com.....	13
B. AUDIO QUALITY ENHANCEMENT.....	14
<b>IV. Guidance on the Web: Tutorials, How-to</b>	<b>14</b>
A. TUTORIALS ON LINE.....	14
B. HOW-TO DOCUMENTS.....	17
<b>V. CD-ROMs</b>	<b>18</b>
<b>VI. Books and Tape Resources</b>	<b>19</b>
<b>VII. Digital Editing and Production Tools</b>	<b>20</b>
<b>VIII. Final Sidebar</b>	<b>21</b>
<b>IX. Streaming Public Media</b>	<b>22</b>

## X. Closing Words 23



### I. Introduction

This document is an outcome of a grant to the National Federation of Community Broadcasters (NFCB) from the Albert A. List Foundation in support of the NFCB National Youth in Radio Training Project (NYRTP). In addition to identifying and organizing youth training groups nationwide, NFCB received List Foundation support to help these groups gain access to new distribution methods for their work. *Get Set to Stream!* is a compilation of ideas and information to assist these groups in webcasting, or streaming audio programs produced by youth on the Internet. While it may provide assistance to other groups or organizations, this document is designed for and addressed to the scores of community radio youth, their trainers, and project directors with which NFCB has interacted during the past two years.

#### A. Purpose

Limitations in available airtime on local radio stations put severe constraints on whose work, and how much of it, gets heard. Having a web site that is accessible 24/7 makes virtually unlimited “airtime” possible. Since this information is being transmitted through wire and fiber lines, rather than through the atmosphere we inhabit, there is no “air” in cyberspace. All of the restraints inherent to broadcast spectrum and its use completely disappear in the web realm. There’s no limit to the number, or size, of the computer system we call the Internet. When we need more space (or storage capacity), we simply add another server, or expand into a network of servers.

The Internet has become the easiest and fastest way to share information, to **distribute** our productions, to anyone anywhere in the world who has the requisite tools. Notice the distinction between *distribute* and *broadcast*. While we as citizens are prohibited from *broadcasting* outside our national frequency boundaries, through the Internet we can and do share ideas and information with people thousands of miles away, who we will likely never meet in person. In terms of “broadcasting” your youth organization’s presence and the good work you’re all doing, audio streaming on the Net can effectively spread your message around the globe.

This comprehensive online resource guide is designed to provide you with access to all the information you need in order to start streaming audio on the Internet. There are several ways to accomplish this, some easier, faster, and cheaper than others. Which approach you choose will be determined by a combination of factors specific to your situation: economic and practical considerations, resources available, and staffing, for example.

The number and variety of resources available to assist you that we reference here may be somewhat dizzying. Be aware that you don't need to read/understand everything in or linked to this document before you get started. How much of it is relevant to your situation may be determined by your answers to the questions on pp. 4– 6 of this document. Based on that information you can pick, choose, and use hyperlinks to access directly the portions that are most pertinent, and “discover” the rest at your leisure, or as the demand presents itself.

## **B. Rationale**

Internet radio, often referred to as “webcasting” or “netcasting,” is thriving. At last count, there were more than 35,000 Internet radio stations and the number is growing daily, as is the number of listeners (see <http://www.live365.com/futureisnow/future1-1.pdf> for a recent report on the impact and future of Internet radio. *Note: This file is large and takes a while to download.* You may want to come back to this later.) Many of these stations are online versions of terrestrial broadcasters, but most were created for and are only available online.

Several Internet radio services (called content aggregators) provide web sites with descriptions of and links to webcasters some of which may use the company's proprietary software to create streaming audio (see, e.g., Live365.com @ <http://www.live365.com/home/index.live>, Shoutcast.com @ <http://shoutcast.com/>, Beatnik.com @ <http://www.beatnik.com/index.html>, and Sonicbox.com @ <http://sonicbox.com/company/index.shtml> or <http://www.imnetworks.com/>). While there are some drawbacks to collaborating with an aggregator, being listed on one of these sites provides an easy promotion and marketing opportunity for producers who could otherwise be difficult for most users to find.

Beyond the appeal of Internet webcasting as a media outlet for organizations, activists, and individuals who want to have a radio program, learning how to stream audio is a skill that has considerable utility in the web world. As bandwidth increases, more and more web sites are incorporating streaming media to promote organizations and business services and products, and to distribute e-learning courses. This will create a widespread market demand for people who can set up and manage streaming audio (and video) content. Training for youth in this skill set can help prepare them for career opportunities that are now emerging.

In addition, community radio youth who use this technology will be able to form allegiances with other youth groups outside the community radio environment in order to share ideas/information (and exchange services) that will enhance their personal and social development.

## **C. What This Document Will Include**

Before making any decisions about file formatting, which streaming media player to use, or similar technical considerations, it will be helpful to have answers for a number

of other questions. The first section of this guide is focused on those “things to think about,” and how your answers can help you make sound technical choices best suited to your circumstance. Next, we’ll examine the pertinent issues associated with streaming audio yourself, from servers at your site, or forming partnerships with other organizations who already maintain large server capacity. There are a number of online tutorials that take you step-by-step through the process of audio webcasting or web audio streaming (both live and on demand), and each of them provides plenty of links to additional web resources. We’ll reference those in section three of this guide.

Section four will point you toward the major media production applications available on CD ROM, and section five is an annotated list of books and tapes for on-hand reference that can provide background information, theory basics, principles, and project planning suggestions. That section is followed by an overview of digital editing tools/sites for both Macintosh and Windows PC platforms. The remaining sections of this guide will feature links to each National Youth in Radio Training Project (NYRTP) participant that has streaming audio on line, and relevant public radio streaming media sites. Seeing and hearing how other public radio entities present streaming audio content can help you get a feel for how you want your site to be. The online version of this guide will include “hot” links that will allow you to take an interactive approach to this learning process.

## II. Things to Think About

[Note: NFCB acquired some of the information in this section from presenters at the Community Radio Conference in April 2000, and expresses gratitude for its use here.]

1. What is the purpose of streaming audio on your web site? Is it intended to supplement other content, or be the main focus of the site? How will you evaluate the effectiveness of using streaming audio as it is related to your original purpose?
2. Do you want to use live or “on demand” audio streaming (or some combination of both)? Live streaming is best suited for stations that already broadcast using transmitters and antennae, or for groups who set up a studio as a virtual station online and operate it as if it were on air. If you have only a few audio segments to offer initially, rather than streaming them repeatedly for 12, 18, or 24 hours, it would be more practical to make them available for your web site visitor to choose when and what to listen to, i.e., “on demand.”
3. Would it be worthwhile to have audio embedded in your site using HTML code rather than having it streamed? This option is useful when bandwidth is at a premium, and/or the audio you intend to use is brief (some JavaScript applets can be coded for lengths of 5 minutes or more).
4. How long are the pieces or programs you want to stream, and a related question, how much time do you need/want to fill (e.g., 24 hours versus fewer hours, using intermittent and/or repeated segments)?

5. How many online listeners do you want to serve simultaneously? How many online listeners do you expect to be accessing your site at any given moment (5, 10, 25, 100)? The answer to this question will determine (or be determined by) which content producing platform you will use, and this will, in turn, set the cost of using a particular application. You may wish to investigate the possibility of IP multicast. Using this protocol, the number of listeners isn't limited by the bandwidth you have available (see, for example, Ken Nosé, "IP Multicast," in *BE Radio*, April 2001, p. 62, or online at <http://industryclick.com/magazinearticle.asp?magazineid=135&releaseid=6776&magazinearticleid=112240&siteid=15>, <http://www.beradio.com>).
6. What is the speed of your Internet connection? Are you using a 56K modem, cable modem, ISDN, DSL/ADSL, T-1, or satellite to access the Internet? *[If you need help decoding these letters, two excellent glossaries and a dictionary of terms are provided by Matisse Enzer (<http://www.matisse.net/files/glossary.html>), Stephen Perkins at Rutgers (<http://www.rci.rutgers.edu/~au/workshop/int-def.htm>), and Albion.com, an Internet publishing firm that provides a range of Internet services, at <http://www.netdictionary.com/html/index.html>].* If you choose to host the audio on a server that you do not own/control, you will likely have to send the audio to that server through one of these means. The slower the rate of transmission, the more cumbersome (and, potentially costly) it becomes to stream segments longer than 2 – 3 minutes.
7. If you intend to host the audio on your own servers, how much server capacity do you have (or can you afford to expand to), and what platform does the server use (Windows, Macintosh, or Unix)? Do you have adequate back up server capacity to cover down time (for maintenance or unanticipated interruptions) on your primary server? Additional information about arranging to stream sound from your own server is available at [www.current.org/stream/stream020npr.html](http://www.current.org/stream/stream020npr.html).
8. Are you using digital production software to create audio features? What computer platform are you using or committed to, and how current is the computer model? The answer to the latter question will determine which digital audio production applications you can use.
9. How much money or other resources (e.g., people power) is available to maintain your streaming capability once you've gotten started?
10. Are there organizations you can partner with: nearby universities/colleges, on air or online broadcasters (either commercial or non-commercial), local Internet service providers (ISPs), local businesses or nonprofit organizations with similar markets or related content needs? Quite often you can find enormous support for what you are doing with youth among those possibilities. Colleges/universities may have unused bandwidth they will donate to your project. ISPs may want to demonstrate their willingness to provide a community service (thereby increasing the number of customers who will do business with them). Youth oriented businesses could want to include content on their sites (or create sites) that

promotes young people, or they may be willing to co-create a site that serves both the business and your youth group. Arrangements like these can minimize the costs of setting up a streaming audio web site, or of getting the equipment you will need.

11. How frequently will you change or update the audio files and who will be responsible for doing so?
12. Is your web site audio content production need compatible with your training project cycles, schedules, structure, or requirements? Will you have trainees who are able to update and change the audio on your site at all points throughout your training cycle, or only at the end of a cycle?
13. Have you determined how knowledge management will be handled, that is, who will be primarily responsible for seeing to it that at least two persons will always have ALL of the information necessary to sustain streaming capability over the next year or longer?
14. Does your content rely on copyrighted sound recordings? If so, the cost and legality of using this material is still being determined by the copyright office and the courts. The effect of the outcome of these rulings may depend on whether you are streaming your station's signal or content from a "station" that is only online (see, for example, Harry Martin's "Streaming decision appealed," in BE Radio, April 2001, p. 28, or online at <http://industryclick.com/magazinearticle.asp?magazineid=135&releaseid=6776&magazinearticleid=112235&siteid=15>). If you are affected by this ruling, it's very important that you stay abreast of legal developments in this arena (for general copyright issues specific to web pages, <http://www.copyrightwebsite.com/digital/webIssues/webIssues.asp>; <http://www.wired.com/news/politics/0,1283,45813,00.html> discusses the latest copyright law legislation). A subscription to the About.com multimedia newsletter will provide you with updates on changes in copyright legislation (<http://mmsound.about.com/gi/pages/mmail.htm>, or for general and specific copyright information go directly to <http://home.about.com/compute/hubsearch.htm?terms=copyright&SUName=compute&TopNode=2710&type=0&x=8&y=8>). It's always a good idea to check the U.S. Copyright Office Law site for current rulings (<http://www.loc.gov/copyright/title17/92chap10.html>).

### **III. Host-it-Yourself or Make a Deal?**

If it is your desire or intention to provide the server(s) where your web site and its streaming audio will reside, you will need help from an IT specialist/technician, or someone who has experience setting up servers for this purpose. There's no need to reinvent the wheel, or make this task as hard as it would be trying to do it alone. Several

NFCB members have expressed a willingness to provide this kind of technical assistance to NYRTP participants.

Another excellent resource is <http://www.techsoup.org>, an online service of CompuMentor, a San Francisco nonprofit that provides “technology resources to nonprofits and schools serving low income communities.” The Techsoup site also includes listings for discounted software, hardware, web and consulting services.

In addition, a thorough examination of issues involved in “establishing a multimedia presence on the web” was published in the December 2000 issue of *BE Radio* (<http://industryclick.com/magazinearticle.asp?magazineid=135&releaseid=6780&magazinearticleid=112321&siteid=15>). Though addressed to commercial broadcasters, all of the technical background and explanatory information in this article is still useful to nonprofit youth groups.

It is also quite possible that you will be able to find computer technology firms to donate one or more servers to your project. They may even donate the services of a technician as well. According to Kevin McNamara, in the November 2000 issue of *BE Radio*, the cost of purchasing a server with a reasonable amount of storage space ranges from \$3,000 to more than \$15,000 (<http://industryclick.com/magazinearticle.asp?magazineid=135&releaseid=6779&magazinearticleid=112274&siteid=15>).

In this brief article, you will find a useful comparison between outsourcing to a streaming host provider (SHP) and in-house hosting. Don’t forget to make provisions for auxiliary backup computer equipment. While most server hardware and software is quite stable, it’s prudent to prepare for the possibility of down time that could interfere with your program streaming.

Looking for potential funding and grant support from computer hardware and software manufacturers? Techportal.org is a good point of departure for your search at <http://www.nccsf.org/techportal/techportal-results.asp?Category=2&Region=ALL>. Techsoup offers funding search resource support as well (go to <http://www.techsoup.org/articlepage.cfm?ArticleId=264&topicid=10>).

While the preceding scenario makes doing it yourself sound relatively do-able, writer William Harrison points out that “establishing and maintaining your station’s Internet presence is a full-time job.” Keep in mind that his audience is primarily terrestrial broadcasters who want to put their stations online as well, although the issues he raises are pertinent to those who will *only* be online.

“Some of the obstacles include buggy software, unstable hardware, and untested custom applications to be installed, configured, and secured. Building and maintaining a successful system is tough to do. It’s even tougher to do it right. Why go through it alone? There are plenty of Internet service providers (ISPs) that are more than willing to help you. All you have to do is decide if you want their help, and if so, whose services you should choose.”

“Anyone can set up a server today. Follow the manual, type this, install that, and it’s done. But the number of people who can set up a server that doesn’t need to be restarted every week, and doesn’t get into a locked process loop or misallocate system resources, is decreasing.” (Source: “Netcasting In-house or ISP?” BE Radio, April 2001, pp. 30 – 36, or online at <http://industryclick.com/magazinearticle.asp?magazineid=135&releaseid=6776&magazinearticleid=112236&siteid=15>.)

Harrison offers some ideas to help you make this decision. Some of his suggestions are included in the list of questions to think about on p. 4– 6 of this document. As manager of Web Technology for WETA-FM and WETA-TV in Washington, DC, Harrison’s perspective is decidedly non-commercial, as is ours.

If you decide to make a deal with a local company or another broadcasting entity, it’s best to avoid negotiating a contract that lasts longer than one year. Things change so quickly on Internet time that a sweet deal today could easily be sour a year from now. If the one-year contract experience is satisfactory and you haven’t located another deal that provides the same services or more for less, you can usually renew the agreement when the initial time period expires. You could even include a non-binding option to renew in your first one-year agreement.

One web radio site will register your organization as a .fm, store and host your audio for a monthly fee that ranges from \$19.95 (basic) to \$119.95 (business), and list you in their directory of 5,000+ online radio stations (<http://www.radioweb.fm/hosting.html>). Scores of these services are available, so do some homework before making a decision (see, for example, <http://www.streamingmedia.com/directory/category.asp?id=7>, <http://www.streamingmedia.com/directory/>, and a listing of the top 25 webcasting networks, [http://www.arbitron.com/webcast\\_ratings/home.htm](http://www.arbitron.com/webcast_ratings/home.htm) ).

Another deal-making option is getting the necessary server capacity from a local university. NFCB member Native American Public Telecommunications was able to get FREE access to unused server capacity from the University of Nebraska, Lincoln for its online program stream AIROS (American Indian Radio Online Service, <http://airos.org/nsnv/> ). If you’re in a town or city with a major higher education institution, there’s a good likelihood that the institution will want to assist you in fulfilling your youth access mission. There are significant benefits in this arrangement for both parties, so it’s definitely worth investigating.

## **A. Delivery Systems and Platforms**

Whatever route you choose, you’ll have to decide which audio media delivery system to use for your content (unless that decision is made for you by the ISP you contract with to provide this service). There are three main and four less often used and perhaps less well known options to choose among: RealPlayer™ (RP), Windows Media Player™ (WMP), Quicktime™ (QT), Beatnik™, WinAmp, Shockwave, and

Clipstream™ (a way of streaming audio using web site embedded Java applets instead of requiring the use of a specific media player).

Depending on how many users you want to be able to hear your audio stream simultaneously, the use of a proprietary player can be free of charge to individuals and groups. RealPlayer™, Windows Media Player™, Quicktime™, and Beatnik™ are all proprietary players. Beatnik™ is a WinAmp-based streaming audio system from Nullsoft that supports the use of simple MP3 files. Like Beatnik, Shockwave audio can be used to stream directly from your web site, with its own player and integrated production software for the Macintosh platform (Sound Edit 16).

While RealPlayer™ probably has the largest installed user base of these options; Windows Media Player™ is second largest and may have caught up with or surpassed the number of Real users at the time you read this. In order to maximize accessibility, it's worth considering making your content available in both Real and Windows format. In all likelihood, any user who has one of the other player options (QT, or Beatnik) will also have one or both of these. There is, of course, the requirement that you have double storage and production capacity if you decide to make content available in both Real and Windows formats. You'll have a better understanding of what all of this means when you review the "how-to" documents referenced later.

Shockwave audio streams from HTML code embedded in your site, making it functionally similar to Clipstream (see preceding discussion). Instead of creating .ra, .rm (RealMedia), .wm (Windows Media), and .qt (Quicktime) files from your produced content, this application converts audio to .swa files (Shockwave Audio) for playback through the associated proprietary player, which is available to users as a free download. One advantage to SWA is that it was created for use on the Macintosh platform, like Quicktime and unlike Real/Windows Media. The PC platform version of Shockwave is also available.

Shoutcast.com (<http://www.shoutcast.com/>) will provide the tools to get your audio distributed on the Net, but you'll need to run your own server, or find someone to run one for you. Basically, this service amounts to providing you with the ability to have a larger number of simultaneous listeners at no cost. Java-based RadioDestiny™ (<http://www.destiny-software.com/products/radiodestiny.html>) will connect with your server to "broadcast an audio signal to a web page or to the Destiny Media Player™. Users can broadcast from a CD, a list of MP3 or .WAV files or from a live signal plugged into the input of their sound card." This service is limited to live streaming, and the media player is only available for the PC platform.

. Live365 (<http://www.live365.com/>) will set up the visual presentation and infrastructure of a web radio/audio station and player for you, eliminating most of the hassles of doing it yourself. You simply upload MP3 files to their servers, along with a play list, and they stream it to 50 or more simultaneous users for a set monthly charge, depending on the package of service you sign up for. Your files can be either spoken word or music. This system works for both a live stream and "looped" audio segments.

The Live365 setup also makes it effortless to make an online purchase of whatever selection of music you're streaming by providing links to Amazon.com.

No specialized player is required to access Live365.com streams (as MP3 files, these streams will play on WinAmp and other media players, though perhaps not as hiccup-free). One drawback specific to Live365.com and RadioDestiny™ might be the service fee you'll have to pay. In addition, Live365.com is a commercial entity, so using their player automatically means dealing with a variety of flashing (and perhaps enticing) product and service ads.

While taking one of these routes could get you up and running quickly and economically, in the long run it will better serve your training purposes to have youth learn how to do everything themselves. If circumstances demand it, you could always start with one of the streaming service providers and change to a Real/Windows/Quicktime player after you have enough training capacity and trainees to take on more technical tasks. We'll take a quick survey of what each of these has to offer here. For more in-depth information, access the product web sites linked to this document.

### ***1. About RealPlayer™***

Real Networks™ (<http://www.realnetworks.com>, and [http://www.realnetworks.com/products/media\\_creation.html](http://www.realnetworks.com/products/media_creation.html)) produces software for creating and providing (i.e., *servicing*) audio streams that will be listened to on the industry's most widely used audio/video player. Everything you need to send up to 25 simultaneous streams from your server is free to producers. Beyond that limit, there are costs that vary depending on how many additional streams you want to provide. In general, 25 streams at a time are enough for most youth groups/organizations, and certainly more than adequate to get started. At this site you'll find production tools, tutorials on how to use them, clear guidance on putting streaming media on your web site, player downloads, and much more. "Outside" tutorials on using Real media tools are plentiful. You'll find more information about these later in this guide (see WebMonkey tutorial on p.14 of this document).

If you use this approach to audio streaming, it's a really good idea to have a link on your site to where the player can be retrieved. This makes it possible for a visitor to your site, who doesn't already have RealPlayer, to get it quickly and easily. What you need to do this and more is explained in several tutorials, among them, "How to Stream Media" (see <http://www.realnetworks.com/products/find/guides.html> for information on using Sound Forge XP Studio 5.0 to produce digital content for RealMedia).

The products section of the RealNetworks site will try to convince you to spend several hundred dollars on higher grade production/streaming tools, but at the bottom of or somewhere unobtrusive on these pages you'll see a section leading you to the free "trial" versions. Be persistent in going for the free stuff. At every opportunity to get to it, the site is focused on getting you to pay for the more advanced versions of these basic tools.

As noted later, however (see Clipstream™ on p. 11 of this document), only 28% of web users have installed RealPlayer on their computers. If you produce streaming audio using only the Real platform, the other 62% of web users won't be able to hear it. This is the main reason many audio streaming sites provide files in both Real and Windows Media formats. Combined, these two proprietary platforms will allow your message to be heard by 50% of web users (Window Media users represent 22%). The Clipstream™ solution below will make it possible for you to reach another 43%, or a total of 93% of all web users.

## ***2. About Windows Media Player™***

As you can probably tell by the numbers cited previously, WMP is coming close to having the same amount of user coverage, as does RP (it may have reached or surpassed RP by the time you read this). According to Microsoft™, two-thirds of the 700 large organizations surveyed say that Microsoft™ Windows Media™ technologies is their leading choice for streaming content (<http://www.microsoft.com/presspass/press/2001/Apr01/04-26OneInFourPr.asp>). The recent release of WMP format version 7.1 claims to be the “first all-in-one player” that provides ease-of-use integration.

In addition, since 1999 Microsoft's Youth & Learning Initiative is evidence of a commitment to support the use of this technology (<http://www.microsoft.com/presspass/youthandlearning/>). It is quite likely that Microsoft™ can provide abundant low or no cost resources to qualified youth programs. Go to <http://www.microsoft.com/windows/windowsmedia/en/compare/default.asp> for a list of resources that compare WMP to RealMedia. Access technical information about players, encoding, and streaming with WMP at <http://windowsmedia.com/mg/help.asp?>.

## ***3. About Quicktime™***

With a wide range of free authoring tools, the QuickTime™ platform provides a number of useful capabilities that can enhance your website with other interactivity options as well as stream audio content (<http://developer.apple.com/quicktime/quicktimeintro/tools/>). Particularly if you're already a Macintosh-based program, QT server support may be the best solution for your situation (<http://www.apple.com/quicktime/products/qtss/>). Of course, Apple Computer has always been committed to educational uses of its products and, like Microsoft; it is also quite likely to provide exceptional support to youth training programs (<http://www.apple.com/education/>).

## ***4. About Beatnik™***

“Using the range of Beatnik and third party authoring tools, you can weave interactive high fidelity, low bandwidth audio directly into your HTML web page or your Flash™ & Shockwave™ projects.” (Source: <http://www.beatnik.com/software/index.html>)

While primarily used for distributing music files, this audio streaming tool set allows sound to be embedded on your web site, permitting short, fast downloads of content up to more than five minutes in length. The Beatnik audio editor is JavaScript – based, like Clipstream, the streaming option referenced next. It can be useful for providing site visitors with a quick sample of some of the different pieces your trainees have produced, akin to an audio table of contents, for example, or a notice of things to come that are currently in development. To hear how this can sound, visit <http://www.bongdern.com/Btnk.html>, or the Beatnik showcase <http://www.beatnik.com/showcase/media.html>. Your site visitors can download a Beatnik player in about two minutes with a 56K modem (<http://www.beatnik.com/software/player.html>). Be sure to put a link on your site that makes it easy for visitors to access the player download.

### **5. *About Clipstream™***

Clipstream™ is a Java-based audio delivery system that doesn't require that the user have a media player of any kind. Instead, audio content is coded as Java HTML (your webmaster/mistress will know what this means), allowing the user to hear streamed audio with no delay, no buffering required. One advantage to using this system is you won't have to re-direct site visitors who need to download a particular player. Sound can begin streaming from your site as soon as your home page opens, or wherever you specify. Before spending the, admittedly, low cost dollars to purchase Clipstream™, users can try it FREE for 30 days. Using Clipstream™ to embed sound in your web site will require basic site-building skills and is touted as “easy to install.”

“Stream Audio From Your Site Without Plugins

“clipstream [sic] converts existing audio files from CD Audio, wav, or MP3 format into a version that can be delivered directly from a Web site to any Java-enabled browser. According to the vendor, using the program requires no programming knowledge and the clips created can be heard by 90% of Web surfers.

“The user creates the custom Java applet for delivery from their site by dragging and dropping the desired audio clip into the clipstream compressor. The program then automatically generates the necessary code for delivery of the audio via the Web. Surfers hear the audio by way of a small auto downloaded Java applet, which automatically senses the visitor's connection speed and delivers the audio clip at either 22kbs or 44kbs.

“The clipstream compressor is a small download (28k) and is available now for both PC and MacOS from the clipstream Web site at a retail price of \$99.”  
(Source: <http://ipw.internet.com/development/audio/944761771.html>)

Given the reality that 93% of web users have Java-enabled browsers (compared to 28% for Real, 22% for Windows Media, and 4% for Quicktime, as of November 2000<sup>1</sup>) this option is a quick, affordable way to get audio files on your site WITHOUT requiring users to have or get a proprietary player. It streams immediately (once the coding is inserted), is cheap, and sounds surprisingly good for compressed content. You can have multiple files available for user selection, there's no limit on how many users can access your stream simultaneously, and there's no apparent limit on the length of your streamed feature.

This seems like a good way to get started streaming, even if you ultimately decide to go with one of the major players. In fact, there's probably no reason you couldn't have both possibilities on your site, giving users the option of what quality sound they're willing to listen to. Before doing this, however, it's best to check with your Webmaster and Clipstream to find out about any potential incompatibilities or conflicts. This is definitely worth your consideration as an easy, simple quick-start possibility.

## 6. *About Live365.com*

While free to *individuals* who want to be web broadcasters, groups or organizations like yours would have to subscribe to one of their service packages. The basic package will permit up to 25 users to listen to your stream simultaneously. It costs \$150 per month, with a \$200 setup fee. Basically, they do practically all of the work associated with audio file conversion/compression, set up, getting your web station listed on their site, and providing you with the code that will link users to your content on their site. Your part would be converting your audio files to MP3 format, creating a play list, and uploading the converted files to their server.

This can be an expensive route to take for small groups, although the trade-off is your site gets up and streaming very quickly without your group having to do much in the way of content post-production conversion. Another value is the higher profile your site will have as a result of being included in the Live365.com directory, where people browsing who don't know anything about your project will be exposed to it. Live365.com is home to more than 35,000 audio streamers; individuals program many "stations" with unique content unavailable elsewhere on the Web or in the world. The Live365.com directory sorts stations by genre. Users are then directed to hundreds of stations within these subcategories (<http://www.live365.com/>).

If there's some urgency about getting your site streaming (e.g., you don't want to wait until you have all the skills to do it in-house), this could be a good temporary solution (with the understanding that your group will be learning whatever is necessary to convert your streaming content to one of the other delivery systems as soon as possible). If you use this option, be sure to read the contract (i.e., "fine print") carefully, and make certain that you can cancel it without penalty within the time frame it will take to get the alternative system in place. Go to <http://www.live365.com/plr/index.html> for more details.

---

<sup>1</sup> Source: According to Media Metrix, reported on **Business Wire** Jan 22, 2001. ([http://www.findarticles.com/cf\\_0/m0EIN/2001\\_Jan\\_22/69370706/print.jhtml](http://www.findarticles.com/cf_0/m0EIN/2001_Jan_22/69370706/print.jhtml))

## B. Audio Quality Enhancement

Octiv ([www.octiv.com](http://www.octiv.com)) “offers first line of software-only products that dramatically increase the quality and performance of audio on the Internet while simultaneously reducing bandwidth demands for streaming audio. . .” (See their FAQ for more details.). We experienced this product at the 2000 Streaming Media West Conference exhibition in San Jose, CA and heard a significant improvement in audio quality. You can assess how (or whether) that might change with real-world conditions by listening to their examples (<http://www.octiv.com/main.html>), and getting references to Octiv users.

Other specialized plug-ins and applications for streaming audio quality enhancement are available at <http://ipw.internet.com/development/audio/index.html>. In addition, About.com provides both an “auditorial” and scripted versions (based on an excerpt from the Beggs and Thede book discussed later in this document) of several easy ways to enhance the quality of your digital audio using effects (e.g., delay, reverb), normalization and equalization (<http://www.auditorial.com/digital/script.html>).

## IV. Guidance on the Web: Tutorials, How-to

### A. Tutorials on line

Quite likely the best part about learning how to stream audio on the web is the online presence of a large number of tutorials that will guide you through the required processes. Fortunately there’s no need to re-invent the wheel, and using a tutorial can eliminate a great deal of trial-and-error learning. Many others have already gone through the steps of whatever you may need to do and have posted a method and guidelines on the Net to make it easier for the next person

WebMonkey, an online tutorial resource focused on web site development, has sections devoted to audio streaming which include a page that provides links to all the major media players and a few of the less well known (<http://hotwired.lycos.com/webmonkey/00/42/index3a.html>). While there may be some content repetition between tutorials and how-to articles, this section of our document will focus on tutorials, and a separate section for “how-to” articles follows. Some of you may find it helpful to first read some of the How-To documents in the next section, before deciding which tutorial to hone in on.

Easily one of the best online resources overall for arts organizations that want to be or are using the Internet is the NEA and Benton Foundation’s Open Studio Project. While somewhat dated, the Open Studio Toolkit contains a wealth of invaluable information, with tutorials that can guide you through all aspects of Internet use. The links you’ll find here will be tremendously helpful as you continue to explore and use the Internet for audio distribution (<http://www.openstudio.org/homepage1594/index.htm>). This Toolkit will help you navigate content from policy issues to getting online, planning,

creating and publicizing your site. Much of it is still exceptionally useful – and definitely worth visiting.

An informative general web site building resource is LeRoy Miller's guide to Creating Usable Websites (<http://www.tekdok.com/usablewebsites/index.htm>). Posted in 1999, his site includes pages on the basics of good design, web tips, web page appearance and layout, writing for the web, a downloadable and printable web glossary, assorted web resources, and site examples. Miller's guide is simple and clear, and it provides a quick point of entry for users who want to get an overview of important design principles before constructing a site or to evaluate the usability of their existing sites. It will lead you to numerous valuable online resources and references. If you want an outside perspective on how well your site "works," Miller may still be conducting site evaluations.

The Web Developer's Virtual Library (WDVL) is another comprehensive online learning resource. It offers a variety of audio tutorials, including:

- Charlie Morris's "Building an Internet Radio Station" (<http://wdvl.internet.com/Multimedia/WebRadio/>)
- The Internet Radio List's "Streaming Guide," which is helpful for looking at the topic from the user's/listener's point of view (<http://internetradiolist.com/rg/sg/>)
- Morris's slightly outdated, yet still useful "Streaming Audio" (<http://wdvl.com/Multimedia/Sound/Audio/streaming.html>) where he makes a plug for NFCB member station WMNF in Florida as "the world's greatest radio station."
- His overview of basic concepts "Audio for the Worldwide Web" (<http://wdvl.com/Multimedia/Sound/Audio/>).

Webdeveloper.com has an extensive audio tutorial library, with links to comprehensive tutorials by Real Networks, and Streaming Media World (some of these links are duplicated in two or more sites). Most of the webdeveloper.com audio section is devoted to creating in and using RealAudio. David Fiedler's "The WebDeveloper.com Secret Guide to RealAudio" ([http://webdeveloper.internet.com/multimedia/multimedia\\_guide\\_realaudio.html](http://webdeveloper.internet.com/multimedia/multimedia_guide_realaudio.html)) delves into the differences between .ra and .rm files (and reasons for using one versus the other), codec variables, and how to stream Real Audio without using a Real Server (including the risks associated with doing that).

Steve McCannell, in "Creating Great Audio for the Web," starts with the basics of good recording, and works his way through to streaming those recordings using RealMedia ([http://www.webreview.com/2000/10\\_13/designers/10\\_13\\_00\\_1.shtml](http://www.webreview.com/2000/10_13/designers/10_13_00_1.shtml)). Similarly, Jay Lorenzo takes another approach to some of the same information in his tutorial "Produce Streaming Audio that Satisfies," again directed at RealMedia users ([http://www.webdeveloper.com/multimedia/multimedia\\_produce\\_streaming\\_audio.html](http://www.webdeveloper.com/multimedia/multimedia_produce_streaming_audio.html)). Adam Powell's multimedia tutorial covers audio, video and flash, all using RealMedia

©NFCB (National Federation of Community Broadcasters) 2001

Written by Carolyn van Putten, Ph.D., Project Director, National Youth In Radio Training Project

Last updated 10/26/01

(<http://hotwired.lycos.com/webmonkey/multimedia/tutorials/tutorial3.html>). Powell estimates that it will take eight days to complete his tutorial.

The Windows Media Content Development and Deployment site in the MSDN Library of articles offers all you need to create and deploy WM content (<http://msdn.microsoft.com/library/>). You'll have to use the site search engine in the left side frame to locate Windows Media Technologies, which will lead you to a long list of options. Be forewarned, it can take a few minutes to load into your browser window.

Sonify.org is yet another web site developer community resource that focuses on interactive web audio. It also has links to numerous tutorials, including "Audio Basics," Beatnik, Windows Media Player, Quicktime, and other audio applications (<http://sonify.org/tutorials/links/pages/index.html>). In terms of accessibility, Sonify's learning levels range from beginner to advanced. The advanced tutorials generally assume web developer knowledge. The information Sonify.org offers works best when used to supplement the tutorials created by Windows Media and Apple/Quicktime. Find another Beatnik tutorial demonstrating a different approach to "sonification" here: <http://www.angrycoffee.com/tutorials/beatnik/index.html>.

You'll find an excellent, detailed streaming audio tutorial that uses a MP3 WinAmp-based application, Shoutcast version 1.7, at <http://hotwired.lycos.com/webmonkey/00/45/index3a.html?tw=multimedia>. This one aims to be one of those "easy-to-use tools that can have you broadcasting your own live online radio show in just a few hours." This option prepares you to stream from your own computer, though the number of listeners you can have at one time is constrained by the speed of your Internet connection (a 256 kbps DSL will support 8 listeners). Jon Luini and Allen Whitman's tutorial will even show you a cost comparison among the leading audio players and the requirements for using them ([http://hotwired.lycos.com/webmonkey/00/45/index3a\\_page8.html?tw=multimedia](http://hotwired.lycos.com/webmonkey/00/45/index3a_page8.html?tw=multimedia)). In return for using its software, Shoutcast.com will list and promote your station on its portal site (see <http://www.shoutcast.com/support/docs/>).

Shareware.com's Music Machine site says it has the world's biggest software shareware site, where you can find more than a dozen tutorials for Cool Edit, MP3, WAV, and more (<http://www.hitsquad.com/smm/tutorials.html>).

Apple Computer's web site is the best single source for QuickTime tutorials (<http://www.apple.com/quicktime/products/tutorials/>). While it is possible to use QuickTime for audio content, most of the tutorials are video or image dominant. You might consider using a QT stream on your site to tell the story of your project or group with pictures and graphic images.

I.S.L.A.N.D., Internet Source for Learning and New Development is an outstanding find in tutorial sites, all developed by and for youth (and their teachers). It is the result of an annual contest offered by ThinkQuest, "a global network of students, teachers, parents and technologists dedicated to exploring youth-centered learning on the Net." A place where young people can "participate in programs, use the resources, belong

to communities, do research, or just hang out electronically.” Intentionally youth-centric, international and diverse, ThinkQuest is “where young people learn, teach, mentor, discover, research and grow through engaging in ThinkQuest programs with other young people.”

ThinkQuest and its forums could also be a rich source of program ideas, interview respondents, and contemporary youth education information. When your site is up and streaming, submitting details about it to ThinkQuest would be an excellent way to conduct an outreach/publicity campaign likely to reach the youth population online. With pictures of youth participants on every page, ThinkQuest also provides e-mail, chat, a messaging system, and web site hosting services to facilitate teamwork, all with NO advertising! (<http://www.thinkquest.org/>)

I.S.L.A.N.D. includes links to tutorials for Real Audio, Quicktime, and Shockwave in addition to those for basic web site building applications. It is touted as “a complete tutorial on multimedia webpage [sic] design” that contains “ideas for creating new sites as well as some basic guidelines and copyright facts that are important to know” (<http://library.thinkquest.org/10021/stud/>).

While there is unavoidable overlap and some repetition amongst the tutorials mentioned in this section, the range of material covered, in style and content, allows for the possibility that one of them may be more suited to you than another, depending on your technical skill comfort level and other factors. Whichever player you use, be sure to place a link on your site to a convenient audio player download site so that visitors who don’t have the format you’re using can get it without searching. All of the sites for players referenced in this document provide details on how to link to their sites for download.

## **B. How-To Documents**

In addition to the tutorials described in the preceding section, there are a large number of “how-to” documents for most, if not all, of the production areas involved in streaming audio. Some of the more obviously useful “how-to” references are cited here. While there is some redundancy (when compared to the tutorials already cited), these articles take somewhat different approaches to the content and the variations in style of delivery may appeal to certain users. At the very least, these how-to documents can provide a quick overview of the area you’re focusing on before delving into the step-by-step tutorials.

We’ll begin with a list of the how-to documents that are more general and proceed to those which are specific to a streaming platform or process.

1. *Designing Web Audio*, by Josh Beggs & Dylan Thede. Chapter 5: Introduction to Streaming Media: [www.oreilly.com/catalog/sound/chapter/ch05.html](http://www.oreilly.com/catalog/sound/chapter/ch05.html). This may well be the

most useful general introduction to the topic of streaming, and it is certainly the most current information available in book form (see complete reference below). It covers all the formats included in this article and a few more that weren't directly pertinent to our purposes. The free chapter online is clearly a hook to get you to purchase the book, which might not be a bad idea. Decide for yourself after reading the chapter.

2. "Audio Webcasting Demystified: Unlocking the Mysteries of Sound on the Web": [www.webtechniques.com/archives/1997/08/pizzi/](http://www.webtechniques.com/archives/1997/08/pizzi/). This article by Skip Pizzi and Steve Church is outdated, but still useful for background theory and an explanation of the basics. Warning: definitely written for techies!
3. You'll find numerous Real Networks links at Net Vista's site for "how to add streaming audio and video to your web pages" (using the Real Media format). Some of the information is available as a PDF file for offline reading ([www.netvista.net/real\\_server\\_howto.htm](http://www.netvista.net/real_server_howto.htm)).
4. Streaming Real Audio: These brief how-to "instructions will show you how to download a real audio encoder, produce real audio sound clips, and serve them up on your web pages" ([www.akc.com/howto/realaudio.htm](http://www.akc.com/howto/realaudio.htm)). This site also includes several generic web site building how-to resources.
5. Jay Lorenzo's detailed 4-part column, "Produce Streaming Audio that Satisfies" focuses "on the process of encoding audio and delivering it from your Web site, using the RealAudio 2.0. Real is up to version 8.5 now, so the details are very outdated. Still, his article includes links to many related resources (digital audio production software, sound utilities, audio share/freeware and their associated tutorials). Although some of the links have lost their utility in the months since this article was posted online, the utilities and share/freeware sites are still quite useful. ([http://www.webdeveloper.com/multimedia/multimedia\\_produce\\_streaming\\_audio.html](http://www.webdeveloper.com/multimedia/multimedia_produce_streaming_audio.html))

## V. CD-ROMs

Dropping in on the exhibits associated with streaming media conferences is an excellent way to get several of the streaming formats on CD-ROM. Having the CD can make it easier for you to review and experiment with various tools, without having to be online. Our last visit to one of these exhibits turned up CDs for "The DV Guys Present The Webcasters Guide to QuickTime™" (<http://www.dvguys.com/dvguys/> has a website version available to download), RealNetworks free products, and Microsoft™ Windows Media™ technologies, in addition to sample versions of digital audio production applications from Sonic Foundry (Sound Forge, Acid Pro), Syntrillium Software (CoolEdit Pro). As an option to downloading, sometimes these resources can be ordered from the company that makes them. Check their web sites for details.

## VI. Books and Tape Resources

Books with publication dates prior to 2000 are mostly outdated in terms of the state of current applications, but they remain useful for understanding basics, principles, and project planning. Here's a list of the helpful books we found.

- A. Alvear, José. *Guide to Streaming Multimedia*. New York, NY: John Wiley & Sons, 1998. [Includes CD-ROM "Guide to Streaming Multimedia" that features audio/video players/editors for StreamWorks®, Sound Forge®, and Macromedia products.]
- B. Beggs, Josh & Dylan Thede. *Designing Web Audio*. Sebastapol, CA: O'Reilly & Associates, Inc., 2001. [The most current book resource. Includes CD-ROM.]
  - 1. "...is the most complete Internet audio guide on the market. It's loaded with informative real-world case studies and interviews with some of the world's leading audio and web producers. It contains step-by-step instructions on how to build multimedia web pages using the most popular web audio formats. [Real Audio, Windows Media, Quicktime, MP3, Flash and Director Shockwave, Beatnik, Liquid Audio, MIDI] This book also includes a wealth of basic digital audio and sound wave theory, practical tips and techniques for recording and editing audio for the Web, and an invaluable buyer's guide to building an effective sound studio." (From online description at site above.)
  - 2. Guides user through process of selecting the right streaming format (see online chapter 5, at [www.oreilly.com/catalog/sound/chapter/ch05.html](http://www.oreilly.com/catalog/sound/chapter/ch05.html))
- C. Miles, Peggy. *Internet World Guide to Webcasting: The Complete Guide to Broadcasting on the Web*. New York, John Wiley & Sons, 1998.
- D. Rumsey, Francis. *The Audio Workstation Handbook*. Oxford: Focal Press, 1996.
- E. Seaman, Patrick & Jim Cline. *Website Sound*. Indianapolis, IN: New Riders Publishing, 1996. [Very dated]
- F. Simpson, Ron. *Cutting Edge Web Audio*. Upper Saddle River, NJ: Prentice-Hall PTR, 1998. [Includes 50 easy-to-follow software tutorials with accompanying sample files, demoware, shareware, and freeware on CD-ROM.]

Since the 2000 Community Radio Conference, NFCB has acquired an archive of cassette tape resources featuring presentations about creating and streaming digital audio content. Contact NFCB for a complete listing of audiotapes and information on ordering them. Here's a sample of available sessions:

1. Audio Streaming and Sharing Audio Files (2000)
2. The Art of Radio (WRTE/Radio Arte, 2000)
3. Legal Issues for Internet Users (2000, 2001)
4. Introduction and Overview to New Media (2001)
5. NYRTP Workshop – Webcasting (2001)
6. Streaming Audio (2001).

## VII. Digital Editing and Production Tools

Depending on your platform of choice (primarily Mac or PC), there are several digital audio production/editing applications to use for creating the audio files you will prepare for streaming. A great deal can be said about this area alone, so we won't further lengthen this document by going into detail (see Rumsey, Francis. *The Audio Workstation Handbook*. Oxford: Focal Press, 1996, and other similar resources). As a quick point of entry, you should know (if you don't already) that digital audio is exceptionally RAM and hard drive intensive. For example, digital audio consumes about 10M per minute of stereo content (that would be 600M for one hour of audio, a bit more than half a gigabyte). You can imagine how quickly your files will fill up even a 40-gigabyte hard drive, and continue growing every week!

As with any application, the more RAM you have to work with the easier and faster your work will progress. This is even *more* true (if that's possible) for working with audio files. For the sake of your sanity (and to minimize your trainees impatience with the process), it's best if you don't even *attempt* to edit/produce significant amounts of audio with less than 128 megabytes of RAM. 256 Megs is far better, and there's no upper limit on RAM to making it easier. A simple rule: get as much RAM as you can afford, and as your hardware can accommodate. You won't regret spending the money for this.

There is an abundance of editing tools to choose from, depending on your operating system and streaming platform and how complex your production needs are. All software is available in free trial versions, both downloadable from the company web site and by request on CD-ROM. The primary applications are:

### A. Digital editing/production for Macintosh

1. Pro Tools 5.0.1 ([www.digidesign.com](http://www.digidesign.com); as well as at <http://download.cnet.com/downloads/0-10216-100-3296394.html?tag=st.dl.10216-106-2.lst-0-24.3296394>.)
2. Shockwave ([www.macromedia.com/shockwave](http://www.macromedia.com/shockwave))
3. SoundEdit 16 (<http://www.macromedia.com/software/sound/>)
4. QuickTime ([www.apple.com/quicktime](http://www.apple.com/quicktime))

### B. Digital editing/production for PC

1. Cool Edit ([www.syntrillium.com](http://www.syntrillium.com), and a list of tutorials for using it at <http://school.syntrillium.com/tutor/>)
  2. SAW+ (<http://www.stgd.ch/IOS/demos.htm>)
  3. Sound Forge (<http://www.sonicfoundry.com/download/default.asp>)
  4. Samplitude ([http://www.ucik.com/sekd\\_bio/](http://www.ucik.com/sekd_bio/))
  5. Pro Tools ([www.digidesign.com](http://www.digidesign.com))
- C. Other useful sites (primarily with an assortment of links to a great deal of relevant information and shareware, though some of it is outdated)
1. [http://www.sharewaremusicmachine.com/smm/win95/STREAMING\\_AUDIO\\_MEDIA/](http://www.sharewaremusicmachine.com/smm/win95/STREAMING_AUDIO_MEDIA/)  
 “Here you will find a collection of streaming audio tools for both listening to, creating and streaming audio and/or video in a wide range of formats like MP3, RealMedia and Liquid Audio. Includes tools for pre-recorded and live streaming - editing, recording, converting.” This could be called the mother of all audio shareware/streaming sites. It is a treasure trove, complete with links to “leading audio software developers.” (Note also that it is directed primarily at musicians.)
  2. <http://www.mattnet.freemove.co.uk/minidisc/mdtomp3.html> (copying files from minidisc to MP3 on your computer)
  3. <http://home.sprintmail.com/%7Edalegreer/MacMD.html> (Mac to minidisc tutorial)
  4. <http://www.mattnet.freemove.co.uk/minidisc/index.html> (general to specific minidisc info)
  5. <http://www.mattnet.freemove.co.uk/minidisc/mp3tomd.html> (copy MP3 to minidisc tutorial)
  6. <http://smw.internet.com/audio/tutor/master/index.html> (“How to Master Audio Files for Internet Distribution,” by John Townley)
  7. <http://archive.museophile.sbu.ac.uk/audio/> (Jonathan Bowen’s extensive list of “pointers to information on computer-based audio sound and associated software available around the world on the World Wide Web.” A comprehensive WWW Virtual Library resource.)

## VIII. Final Sidebar

Many of your youth programs will focus on spoken word, public affairs, and talk radio content. More often than not, the music chosen for breaks or transitions in these formats is copyright protected, and your ability to use them may be subject to as-yet-unresolved-and-constantly-changing legal issues. One brilliant way to avoid that

concern, while also providing your trainees with an additional creative outlet, is to add producing original music to your training curriculum.

In addition to eliminating some grief and expanding your program offering, teaching trainees to make music for tags, breaks, and other transitions could help direct some youth to a viable career in music production and sound design. Further, since music making is inherently appealing to youth, this program enhancement could make a significant difference in attracting youth to your projects and keeping them involved.

Fortunately, learning to create short musical phrases with currently available software is easy and fun. Many applications are free to try and affordable to buy. Go to [http://www.hitsquad.com/smm/win95/RE-MIXING\\_DJ/](http://www.hitsquad.com/smm/win95/RE-MIXING_DJ/) for a long list of DJ mixing and song creation applications. Take it further out into the creative realm with sound synthesis and sound design software at [http://www.hitsquad.com/smm/win95/SOFTWARE\\_SYNTHESIZERS/](http://www.hitsquad.com/smm/win95/SOFTWARE_SYNTHESIZERS/).

## **IX. Streaming Public Media, Including NYRTP Participants: Examples, Resources**

The following list is **not** intended to be a comprehensive collection of public media organizations and projects that are currently streaming audio. We have focused primarily on the youth organizations that have participated in this project, and included a small sample of national public broadcasting entities. A few of the projects have more than one web address or are also represented on their sponsoring organizations web sites.

Among those listed, you will find varied demonstrations of different players, streaming technology, content, approaches, and purposes. Some projects produce news, features and commentary that are inserted in local broadcasts of nationally distributed programs on community and public radio stations (and streamed live). Still others produce regular weekly or monthly programs aired on, and streamed by, their sponsoring stations. Some maintain archives of past features that can be retrieved on demand. One project operates an entire low power radio station and streams the on-air signal. You might find it helpful to compare and contrast their audio streaming results, in the context of your desired outcomes, before making some decisions about a technology-of-choice. For more information about the NYRTP youth programs and their training curricula, go to the training manual section of this web site. [\[insert button link?\]](#)

Some of the hyperlinks on the following list go to pages on other sites that are themselves a collection of related sites. As you've learned from our earlier discussion, many factors influence your ability to hear the audio streaming from any of these sites. You may have to visit a site more than once to have the full audio experience. A few of these sites will require that you download specific uncommon players (e.g., Surfer Network Player, Chaincast Player). Using a modem speed of at least 56K will allow the listening/surfing process to be more enjoyable.

1. [www.appalshop.org](http://www.appalshop.org) (Appalachian Media Institute)

2. [www.knba.org](http://www.knba.org) (Alaska Native Youth Media Center)
3. [www.latinousa.org](http://www.latinousa.org) (Youth Spin)
4. <http://www.layc-dc.org/youthradiodc/default.html> (Youth Radio DC)
5. <http://www.natecory.org/blunt/> (Blunt Radio)
6. [www.radioarte.org](http://www.radioarte.org) (Radio Arte)
7. [www.radiobilingue.org](http://www.radiobilingue.org) (Rockin' Da House)
8. [www.radiorookies.org](http://www.radiorookies.org) (Radio Rookies)
9. [www.wabe.org](http://www.wabe.org) (Youth Radio Atlanta)
10. [www.wbai.org](http://www.wbai.org) (Youth Pulse/Global Kids)
11. [www.wdiyfm.org](http://www.wdiyfm.org) (Youth Media Program)
12. <http://www.wnyc.org/new/news/arts/mccuneharlem.html> (Harlem Radio and Photography Project)
13. <http://www.wnyc.org/new/RadioRookies/RRintro.html> (Radio Rookies, use the Quick Link drop down menu)
14. [www.wwoz.org](http://www.wwoz.org) (Original Minds, Institute of Women and Ethnic Studies)
15. [www.youthincontrol.org](http://www.youthincontrol.org) (Youth Radio, Youth Radio Atlanta, Youth Radio DC, Latin American Youth Center)
16. [www.youthradio.org](http://www.youthradio.org) (Youth Radio, Youth Radio Atlanta, Youth Radio DC, Latin American Youth Center)
17. <http://airos.org/nsnv/>
18. [www.current.org/stream](http://www.current.org/stream)
19. [www.nativetelecom.org](http://www.nativetelecom.org)
20. <http://www.publicradiofan.com/>
21. [www.soundpartners.org](http://www.soundpartners.org)
22. <http://world.std.com/~franl/media.html> (scores of links to streaming media sites that include stations and content aggregators using all of the different players: RealPlayer, Winamp, Windows Media Player, Quicktime, Shoutcast, Live365, and more)

## X. Closing Words

Even if you only sampled this document, it's pretty certain that you're a lot more knowledgeable than you were and much better prepared to take on the task of adding streaming audio to your youth project website. Remember, changes occur quickly in Internet time, so some of the links in this document may not be functioning in just a few months. During the few weeks between revisions of this guide several pages had moved or been removed. In addition, rapid advances in technology could make a good portion

of this information obsolete within a year. While this phase of the National Youth in Radio Training Project is concluded, we will do our best to keep the content updated for the next six months. Should you find a website discrepancy, please let us know so it can be corrected. Send your discoveries to Ryan Bruce, NFCB Director of Communications and Technology, [rjbnfcb@aol.com](mailto:rjbnfcb@aol.com).

Our sincere thanks goes to all of the group leaders and youths who participated in this initiative. Your eagerness, enthusiasm, and willingness to share experiences have helped NFCB take a giant leap forward in supporting and strengthening the next generation of community radio broadcasters. As your projects thrive, we can feel proud of your (and our) accomplishments. We hope you will keep us informed of your progress. Send mail to [nfcb@aol.com](mailto:nfcb@aol.com). Fare well, cyberspace travelers!



### Acknowledgements

This document, its web site, and the research it required were made possible by the generous support of the Alfred A. List Foundation. NFCB is pleased and proud to be the recipient of these resources and a conduit for extending the List Foundation's reach.