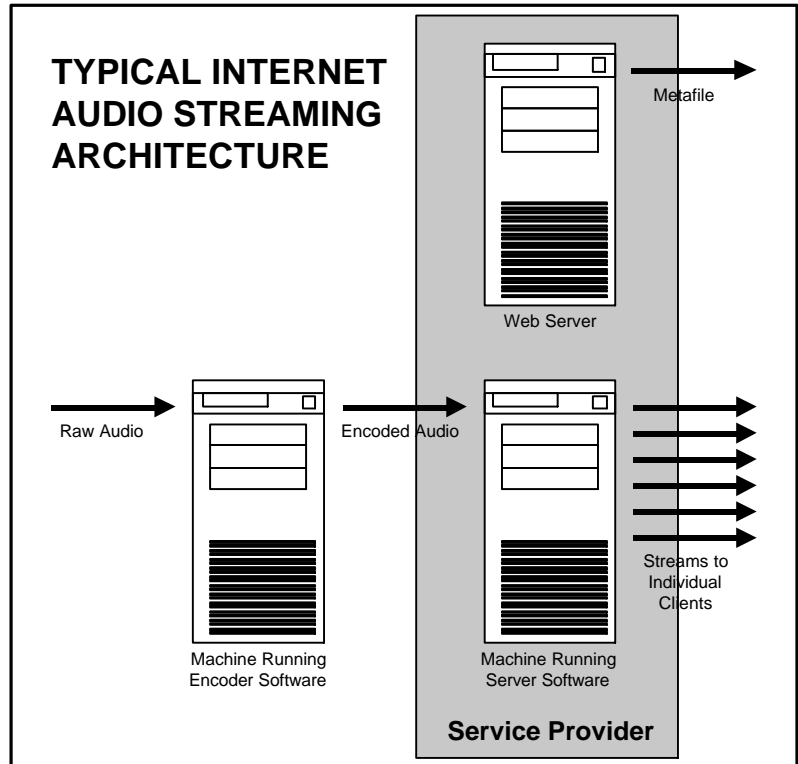


Radio Webcasting How-to National College Media Convention

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- The first step in the streaming process is to encode the raw audio into the specific format selected. The encoding software usually runs on a machine located at the station's studios, so that it can be directly connected to station audio. The encoding machine might also be housed outside of the studio, but at a location that can receive the station's over-the-air signal.
- A machine running audio server software provides the actual streams to the clients (players). A separate data connection to this server is established for each client request, known as "unicasting." The bandwidth demands for the traffic coming from the server can be quite high. For this reason, the streaming server is most often located off-premises.
- In low-budget and low-traffic situations, in some streaming formats, it is technically possible to run the encoding and serving software on the same machine. Web and streaming servers should not be run on a single machine, unless you're very brave.
- Metafiles (.ram, .smil, .asx, .pls, and .m3u) are text files that give instructions to the client about how to play the actual audio file. The chosen streaming format determines which metafile type is used. This file resides on the web server with the rest of the station's website files. Links written in the web page HTML code will reference this metafile.
- College radio stations were early adopters of audio streaming because many have been able to take advantage of wide-bandwidth network service available on their campuses. A college radio station with access to sufficient bandwidth can provide its own live audio streaming at a relatively low cost.
- Bandwidth use can become a sore point with campus IT administrators. There is a linear relationship between required bandwidth and the number of listeners. A station with 60 simultaneous connections at 20 kbps would require approximately 1.2 Mbps of bandwidth, nearly the entire capacity of a T1 connection (1.54 Mbps).
- Encoders and servers must have fixed, as opposed to dynamic, IP addresses. On some campuses this might require special configuration of network routers.
- Networks on some campuses use private "reserved" IP addresses in-house that are translated to another value for traffic leaving campus. This Network Address Translation ("NAT") is not compatible with the protocols used by some streaming formats. Reserved addresses are usually in the ranges 10.nnn.nnn.nnn, 172.16-31.nnn.nnn, or 192.168.nnn.nnn. Ask your IT department to provide you with non-translated IP addresses.
- Streaming to the outside world from behind a campus firewall can also be extremely difficult, if not impossible. The streaming equipment should preferably be located "outside" of the firewall. This is another case where politicking with the IT administrator is critical.



- RealNetwork's Helix Producer Basic (encoding software) is free, but is limited to three target bandwidths. Helix Producer Plus costs \$199.95, and will create content for unlimited target bandwidths. Helix Universal Basic Server (up to 1 Mbps capacity) is free, but unlike releases of earlier server versions now times out after 12 months. Helix Universal Standard Server (up to 4 Mbps capacity) costs \$1,999.95. Helix delivers of all major file formats, including Real Media, Windows Media, QuickTime, MPEG Layers 2, 3 & 4. (<http://www.realnetworks.com/products/index.html>).
- Windows Media Encoder is free (<http://www.microsoft.com/windows/windowsmedia/download/default.asp>). Windows Media Services provides the server software and is included in the Microsoft Windows 2000 Server operating system (academic pricing: \$29.00 media kit, plus \$127.60 academic license — part of the Microsoft Open License program). Windows .NET server 2003 (currently in beta) will provide the next generation of Windows Media services.
- The SHOUTcast (MPEG Layer 3) server and SHOUTcast Source Plug-in for Winamp 2.0 are free (<http://www.shoutcast.com/download>).
- If sufficient bandwidth is not available to allow the streaming server to be located on your campus, you will have to contract with an outside provider for this service. In this situation, only the encoding machine will be located in your facilities. You will still need a single network connection to link the encoder with the provider's server. Since only one data stream is necessary between these two machines, the bandwidth demands are much smaller.
- Three basic models typify business arrangements with streaming providers:
 - Barter.
 - Package pricing (based on peak number of streams at a specified bandwidth).
 - Bandwidth pricing.
- The primary advantage of the package-priced arrangement is that you have a predictable cost to plan for in the station's budget. One drawback is that you may end up paying for bandwidth that you do not use; your peak, not average, demand determines your cost. Another concern might be that once you reach the contracted peak additional listeners will not be allowed to connect to your stream.
- With bandwidth pricing you only pay for the service you use, which is both a plus and a minus. With this arrangement you cannot definitively predict your actual cost. What you pay is entirely determined by the demand for your site; this is a case where you could become a victim of your own success! This approach is best used by a station anticipating wide-ranging demand. If you expect that most of the time you will receive a relatively small amount of traffic, but at other times your demand will spike significantly (e.g., during sporting events), this could be the best deal for you.
- Beware of the service provider's surcharges, setup fees, and contract length. The provider's basic rate might be deceptively attractive when considered in the context of hidden charges. In this uncertain era of Internet streaming, you would be wise to be cautious about long-term commitments. You should also check with references to evaluate service reliability and the quality of technical support.
- Just a couple of commercial streaming providers:
 - Live365: <http://www.live365.com/pro/index.html> (Live365 offers a discount program for CBI members)
 - Loudeye: http://www.loudeye.com/radio/terrestrial_radio.asp
- Regardless of the streaming format you choose, and whether you decide to stream your audio yourself or outsource the server, you should consider audio processing specifically for your stream. Each streaming format uses its own data reduction scheme to lessen the amount of bandwidth required for transmission. By equalizing your programming specifically for your stream you can reduce some of the artifacts otherwise created by the encoding process. Maintaining proper volume level control is of crucial importance for this, and any, digital system.
- Several webcasting copyright issues have technical and programming implications:
 - Through the end of calendar year 2002, the webcaster must be able to determine the total combined listening time for all domestic listeners for each month, referred to as "Aggregate Tuning Hours" (ATH). Data requirements for future years have yet to be announced by the U.S. Copyright Office.
 - The law requires the webcaster to display the recording artist, song title and album title at the time of the transmission. See *17 USC § 114(d)(2)(C)(ix)*.
 - Prior announcement of specific song or album titles is prohibited. See *17 USC § 114(d)(2)(B)(iii)*.
 - Webcasters are limited in the number of songs played per three-hour period from each recording, artist, or box set. See *17 USC § 114(j)(13)*.
 - Limitations are placed on archived programs. See *17 USC § 114(d)(2)(C)(iii)*.
 - The applicable language of the law is available online at <http://www.copyright.gov/title17/92chap1.html#114> (17 USC § 114).
 - Webcast copyright royalties are the topic of the separate session "Copyright for Radio Webcasters" (Hand-out available online at <http://www.ulm.edu/~willer/presentations>).