

Minnesota Public Radio

Streaming Audio Service

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I. Introduction

Minnesota Public Radio, like most public (and commercial) radio stations, has spent an enormous amount of time and energy grappling with the many editorial and technical challenges inherent in transferring our audio product to our audiences via the Web. Since 1996, we have offered audio on our Web sites, and over the past few years we have dramatically increased both the amount and variety of audio files we stream for our audiences.

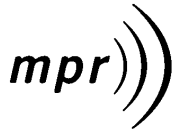
This paper describes what we stream and the editorial process for deciding what types of audio to stream. It also explores some of the technical challenges and how we are working to meet them. And finally, we describe how our audience uses our streamed audio service today. Throughout this paper we refer to our national shows: *A Prairie Home Companion*®, and *MarketPlace*®. And we also talk about our regional service, including *Midmorning* and *Midday*, our two local talk shows, and finally we refer to our regional news service and the individual feature stories that are produced by our newsroom for broadcast in the news magazines; *All Things Considered*® and *Morning Edition*®, as well as our regular newscasts.

II. What do we stream?

Minnesota Public Radio offers both live, real-time streaming and archived, on-demand audio streaming. Within these two broad categories are several program types:

Live audio stream types

- Regularly scheduled stream that repeats MPR live-broadcast programming. At present the live streaming provides service from 6 a.m. -1 p.m. CT weekdays and 5-7 p.m. on Saturdays. The weekday programming includes MPR's regional *Morning Show* and news-talk programs *Midmorning* and *Midday*. The Saturday streaming serves *A Prairie Home Companion*.
- Special live-stream events that parallel radio broadcasts, for example, *Talking Volumes* presentations and the "Mr. and Mrs. Olson" opera.
- Special live-stream events that are not broadcast, such as the state political conventions.



Archived audio stream types

- Automatically archived programs, including *MarketPlace*® (daily) and *Saint Paul Sunday* (weekly) from MPR's set of national programs, and *Midmorning* and *Midday* (both daily) from MPR's regional service. These programs can be processed automatically because they are consistently available at a set time.
- Special archived programs, including national music specials (e.g. "Giving Thanks"), regional broadcasts (e.g. political debates), and individual regional news stories. These are encoded and posted from non-broadcast sources including CDs and audio storage devices.
- Non-broadcast, event audio, such as recordings of MPR-sponsored events. These entail obtaining recordings through MPR Operations staff. Examples include a public presentation by *The Savvy Traveler's* Diana Nyad with Greg LeMonde.
- Extra or supplemental audio that is added to online stories and features, such as the audio files accompanying *American Radio Works'* "Kay Fulton's Diary."

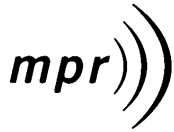
III. How do we decide what to stream?

Streaming audio is considered a primary component of our online service. Almost without exception, each national program Web site has an audio archive of the programs. Our *A Prairie Home Companion* site features archives as far back as 1996. With our regional service we are more selective because we would be faced with an enormous amount of work (and server space) if we choose to archive everything.

At a conceptual level, however, we consider just about all MPR-produced audio (both from our national programs and our regional news and music services) to be available for online archiving, and we continue to build our audio systems towards an ideal of accommodating all of MPR's audio output. In parallel to our public site we are building an internal archive system in which we intend to store *all* of our audio products, for use primarily as an internal resource.

The determination of whether to make a particular piece available on the Web - whether live or archived - is based on these criteria:

1. Audience value: Is there a large or in other ways important audience for the audio (understanding that a single piece may acquire a significant audience over time)?
2. Mission value: Does this piece strongly reflect our efforts as public media? Is it an important part of our service?
3. Production expense: What human and technical resources are required to make this available and are those resources reasonable relative to the previous criteria?



4. Is it good? Does it have merit for us or for our audience that goes beyond the usual criteria? Does it represent a technical challenge or provide a valuable internal educational value?

IV. How do we do it technically?

Streaming format

MPR chose the Real Server as our streaming technology back in 1996 and we continue to offer the RealMedia file type as our only streaming format. At the time, it was our only choice as Windows Media and MP3 formats were not available and Quicktime was not as widely adopted as it is now. We recently polled our users and we found the majority of our audience still prefers the RealMedia format and 70% of our users had it on their primary computer. We continue to keep a careful eye on the user adoption of the other file formats and are likely to begin offering the Windows Media format in the next year.

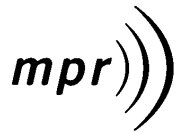
Audio group

Also, in 1996, we recognized the complexity of offering audio on a large scale. A comprehensive and robust system and process required staff participation from various departments, so we formed a cross-departmental Audio Group. This group includes people from Operations, Engineering, IT and New Media. The group meets once a week to proactively address audio issues, tasks and projects, as well as review any issues or service level problems that have occurred. Each Web audio project requires the participation of these four departments. The initial focus of this group was to establish manual encoding (i.e., processing our broadcast audio into a file suitable for streaming). Later, as our family of Web sites grew, we became increasingly aware of the need to automate our encoding process. The Audio Group then, developed the automated process that we use today. This process is described in detail in the next section.

Description of MPR's automated encoding process

Reellogger was the primary automation method for mpr.org audio encoding. As of the spring of 2001, only the *Hourly Local Newscast* is handled in this manner. The Reellogger application performs scheduled RealAudio encoding of on-air audio. The shuttlecock application automatically deploys the encoded audio files to the MPR Web site. This document addresses the specifics of the shuttlecock application.

When Reellogger performs a scheduled recording of an on-air audio event, it begins writing a file to one of the directories monitored by the shuttlecock instances running on the Reellogger machine in MPR's Network Control Center (NCC). When the file is done being created, shuttlecock FTPs the file from NCC to the corresponding directory on Dylan (Content Management UNIX machine). It then moves the file into the designated archive directory for the instance, usually /archive beneath the directory being monitored.



Once the file has been moved to Dylan, a similar process takes place. A shuttlecock instance notices the new file, waits for it to finish writing, and FTPs the file to Bach and Glass (Production Web Servers). At this point, and special renaming of files is performed. For example, the newscasts are always called newscast_28.ra when they are placed on Bach and Glass. Again, the file is archived, as well as copied to the audio staging area. At all stages of operation, shuttlecock logs its activities.

In the spring of 2001, MPR deployed an ENCO box for New Media's use. This enabled a higher quality audio encode. Reelogger is limited to RealAudio 3.0, which is fine for newscasts, but not for music shows or shows with higher audio quality requirements.

The ENCO box is directly connected to a Windows NT encode box that has two audio processing software products running, WAVConvert and RealProducer. ENCO dumps a WAV file onto a directory of the encode box and WAVConvert automatically starts encoding the file. When it has processed the file, it is automatically placed into a directory that RealProducer picks from to start processing the file to create a RealAudio file. MPR utilizes Perl scripts to move audio from a PC to a UNIX machine and from directory to directory on a PC – such as was described above between WAVConvert and RealProducer. Once the file has been encoded, it is automatically moved to Dylan and then the Teamsite component Open Deploy moves the audio file to the production Web servers.

A key element to making this work is the naming standard utilized by MPR. This makes the Shuttlecock scripts generic so that a one-line change in a configuration file is needed to add a new show to the audio flow.

`/net/kammen/rafiles/news/midday/[weekday]_midday[1|2].ra` This particular naming standard ensures that each day the previous week's audio file is replaced for that day.

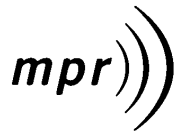
Having access to high-quality, automatically encoded audio enabled MPR to automate all of the national and local shows that were being manually encoded each week. The following shows are now automatically encoded:

Regional Programming:

Midday
Midmorning
Word of Mouth

National Programming:

MarketPlace® Morning Report
MarketPlace®
A Prairie Home Companion
Pipedreams
Savvy Traveler
Sound Money
The Splendid Table
Saint Paul Sunday
Writer's Almanac



How an audio request is generated and produced

An audio request is initiated by anyone in the organization. Typically, the request comes from New Media. The request goes directly to Operations. When an operator has completed the encode, an email or phone call is the usual method of informing the Contact Person that the audio is done.

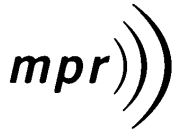
today_date: 06/05/02
date_available: 06/10/02
date_needed: 06/11/02
Contact_name: Eric Walter
Contact_Title: editor/producer, new media
Contact_WorkPhone: 1310
Contact_altPhone:
Contact_Email: ewalter@mpr.org
projectname: Diana Nyad visit
audiosource: DAT recorded June 10
filename: 020610_nyadlamond.rm
title_of_piece: Diana Nyad and Greg LeMond
artist: MPR's Broadcast Journalism Series
copyright: Minnesota Public Radio, 2002
format: Real Audio G2 (Mono)
destination: share drive, "Audio" folder
notify: Eric Walter, John Pearson
instructions: please direct questions on this to John Pearson
Remote User:
Date: Wednesday June 05, 2002

How we inventory available audio - File structures

As alluded to above in the audio flow description, naming standards were established to allow for archiving. For daily shows, two audio files are sent; one named for the day of the week, or "current," and one that is named within a directory structure of Year/Month/Day_Show. The file is duplicated by Shuttlecock. An example of this file is: http://news.mpr.org/programs/midday/rafiles/2002/05/13_midday1.ram

Local stream vs. Akamai: systems perspective

MPR sought help for streaming *A Prairie Home Companion* on Saturdays from 5 p.m. to 7 p.m. The streaming of the audio and pictures from the stage were maxing out MPR's Web servers, and specifically the network connections to the Internet. The infrastructure development cost to provide the level of service required for those two hours would be prohibitive.



MPR contracted with Akamai to provide the bandwidth required for the APHC netcasts. MPR sends an ISDN feed of the audio to Akamai and an HTTP Web feed for the pictures. MPR's Web site links to Akamai's audio and picture links to provide a seamless interface for MPR's users.

V. What does our audience think and how do they use it?

Live streaming service is our most popular audio offering. This shouldn't be surprising as the streams mimic the audience experience of turning on a device and having an ongoing experience. When we were offering our most complete streaming service (two full-time streams), our audience used it much more than the archived audio. We were thrilled when first the number of simultaneous listeners passed 100 during *A Prairie Home Companion* a few years ago. Today we average 600 simultaneous users for the same live Webcast.

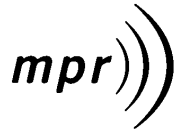
The most popular archived audio is the *newest* audio - that day's or week's broadcast. The number of requests for an audio file drops precipitously as the file becomes older. Again, not a surprise, especially as most of this audio relates to current events or time-dependent programming. Exceptions to this are often pleasantly surprising and are usually the result of an Internet-only function like "e-mail forwarding," Web log mentions and search engines.

It is for this exception that we do not discount the value of "on demand" audio service for individual news stories or related feature stories that do not constitute an entire program but rather a small chunk of a larger broadcast segment; usually our daily news magazines and regular newscasts. While the potential utilization for this shorter file (e.g. a 5 minute news story) could appear too low to bother with, the cumulative use of this type of on-demand archived audio file is considerable and continues to grow faster than our overall growth in page views would suggest. As of May 2002, this type of audio content has grown to 20% of our entire streaming service.

Audience interest in downloadable/MP3 files is increasing only at a snail's pace according to our most recent audience survey. However, we do accommodate this nascent interest through an arrangement with Audible.com, in which we make *MarketPlace*® programs and *A Prairie Home Companion* segments available for purchase on their site.

VI. Improving MPR's Web audio services

In conclusion, Minnesota Public Radio is deeply committed to continuing this very important service to our audience. It is a constant work in progress. In addition, audience demand, creative interests, and maturing technologies continue to drive our audio offerings - along with expectations for resolution of economic issues.



Here are some areas for improvements and expansion:

1. Greater integration of audio into the site. This includes:
 - More sophisticated combinations of audio with text and images, such as in SMIL and Flash files.
 - Audio accompaniments to Web documents to establish an aural environment.
2. Aggregating audio in Web spaces that are separate from story and feature documents, making it possible for an audience member to listen to a series of audio files without jumping from document to document.
3. Adoption of additional audio-delivery technologies. MPR continues to consider adding Windows Media, Quicktime, and Flash technologies to our audio toolkit, especially as these alternatives establish a stronger foothold among our audiences.
4. Provision for downloadable, portable audio
5. Rebuilding of 7x24 streams following economically prudent principles.