INTERNET RADIO: THE NEW PORTAL

by

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Abstract

Streaming media is an emerging Internet technology with the potential to change the way colleges and universities conduct business. The media’s appeal for communications, personal and professional development, education, training, news, and entertainment drives application development. In this paper, I discuss the viability of streaming media, particularly audio, for the university today and explore new metaphors, such as Internet radio, for organizational communications and community participation. I also speculate on characteristics of a streaming media portal that is personalized, pervasive (always there, always on, and always current), and ubiquitous (available on desktops, handheld wireless devices, in automobiles and other devices and locations not yet identified).

Emerging technologies for applications in the future are a challenge to all our senses and states of being today.

On February 16, 2001 the proposal for this paper and presentation was submitted to Educause. On October 20, 2001, a short week and a half away from the deadline for this paper’s submission, I sat in my lab with a total sense of irrelevance and without the ability to begin this paper or its associated PowerPoint presentation. Since September 11, 2001, this feeling and attendant emotions paralyzed me every time I sat down to write about our research and development. How could I enthusiastically talk about a topic such as Internet radio and the work we are doing in our lab to make funky skins that sit on top of Internet jukeboxes so that corporate communications are fun when thousands of
people on our home land have died and unknown numbers of others in the world continue to die in a new form of war?

I knew I had to crack the stalemate because I would be standing in front of peers in a week and a half to talk about our work and really needed some PowerPoint slides. I did it. I did it by reflecting on what had happened over the past nine months. I did it by seeking out and finding the relevance of my work.

On February 16, 2001, when I submitted the proposal for this paper, the country was trying to get used to the new President, George W. Bush, better know as “dubya.” All sorts of odd things had accompanied his election with the oddest being Florida’s voting procedures. At the time, we were feeling especially affected by the collapse of the dot com economy and the decimation of the Internet entertainment market. Entertainment is one of the two primary markets for streaming media; the other is the enterprise. All the neat and fun sites where we saw technologies we wanted to use and emulate were disappearing. Napster’s young Shawn Fanning, a bad boy if there ever was one, was slapped down by mother RIAA (Recording Industry Association of America). If it weren’t bad enough that all the fun streaming media web sites and radio stations were going away, California found out that it couldn’t even keep the lights on 24 hours a day 7 days a week.

And then a spurt of happiness and glee as I watched in awe a demonstration in New York City by a representative of Microsoft of a movie streaming from a Windows Media Technology server in California through a Windows CE player on a wireless Compaq iPAQ using Metrocom’s Richochet network. Wow! What we were doing and where we wanted to go would be possible and it was going to be great!

We watched the economy continue to turn down in the days and weeks that followed the Microsoft demonstration. We wondered about the reasons for the US being in last place with wireless deployments and speculated that our advanced technological infrastructure, which grew so rapidly, was part of the cause. Were desktops just too pervasive and convenient? Was there little reason for us to demand a small wireless device that could go everywhere with us and provide email and web services? We were very disappointed at the news of Metricom’s Richochet network going under (128Kbps wireless connection with Novatel’s Merlin modem on a pocket PC).

We continued to read the dire predictions of an era of Internet mass victimization crimes. Then some excitement. The Court halted the Microsoft break up. A strategic alliance with Bertelsmann buoyed up by a significant loan to the Napster music site is followed by a new CEO, Konrad Hilber, an ex-Bertelsmann manager, taking over Napster in a bid to legitimatize the operation.
And how about that DoCoMo! Thousands of people in Japan using a new kind of wireless device in the subways, on the way to and from work, everywhere and all the time. Pricing is different too – it is by the amount of data transferred over the network. Oops, what does this say for the future of streaming? The DoCoMo model supports a download model, not a streaming model. We need to think more about this and the cultural aspects of the Japanese phenomenon. We need to factor this into our research.

Marist College has a partnership with the IBM Corporation and, in our current joint study with Big Blue, we have been exploring new technologies on an IBM mainframe with Linux on board. Any number of virtual servers can be set up on this one big box (refer to Educause Effective Practices article entitled “Leveraging Linux Research: Virtual Server Hosting” by Kamran Khan, VP IT and CIO, Marist College, Poughkeepsie, NY, at http://www.educause.edu/ep/ep_item_detail.asp?ITEM_ID=54 for additional information on this environment and how other universities can participate). We talk daily in our lab about a future streaming environment on Linux/390 for serving media to all kinds of devices. We are encouraged by IBM’s success in the market place with Linux/390 sales as we read about the latest major contract with the New York Stock Exchange (NYSE) and the Securities Industry Automation Corporation (SIAC). We are further excited by the National Science Foundation’s (NSF) funding of grid computing. In thinking about the success of the SETI model and the funding for grid, our thinking turns to how these ideas work for streaming media. Interesting, isn’t it to think about?

Goodness, gracious, what next? Just as we are getting comfortable with our Compaq iPAQ and our Linux implementation, we find out that it is now a Hewlett Packard iPAQ. The purchase is announced as we complete installing Linux over the native Windows CE and start trying to write and port a new Linux streaming player for video and audio. Our wireless card works right out of the box!

And then the attack on our country and its technology takes place. On September 11, 2001 we watch the death of thousands of people and the near total destruction of America’s financial center.

The disaster brings other downturns. Exodus declares Chapter 11. CEO Ellen Hancock, a good friend of Marist College, and a person whose career is one that has been a model of strength and resilience, particularly for professional women, has left the company. If Exodus can’t make it why are we even bothering with something like streaming media at this time? Perhaps Linux/390 virtual servers suggest a more economic and scalable environment and perhaps it is an environment in which streaming media will thrive?

The United States teeters on recession – so says the news. Then as we focus more and more on Afghanistan we see all kinds of interesting examples of streaming media in action in the midst of crisis. We see Tom Aspell on the
MSNBC video phone from Afghanistan, the news on demand from the CNN web site, all kinds or new security systems with cameras and stream servers and software that looks for trespassers. MPEG-4 becomes a hot word. Yes it has been around for a while but now it is touted as the future for streaming video. We are really on track. MPEG-4 is the format we are working toward for our HP iPAQ. We are learning so much about MPEG-4 that we hope to offer an MPEG-4 technical course online in the spring. We are excited about the tools that are being developed for creating and encoding MPEG-4 streams. We have seen MPEG-4 stream from an Apache HTTP server over an iPAQ with Linux. It works and it is great. And more than that, these technologies will have a positive impact on the quality of our lives in time. New demands for pervasive computing and broadband services are heard. Can our economy move forward and satisfy our cravings for rich media on our desktops and handheld devices?

On October 7, 2001 war begins but streaming media is no longer irrelevant. We need to stay tuned into the world all the time from every place. Anthrax warns of the continuing attack on America and technology in Florida, New York, and Reno, Nevada. By the way, what is doing on in Florida?

Recession concerns abate somewhat as the market returns to pre-September 11 levels. The “New Economy” is declared dead.

From the ashes of the World Trade Center and the death of the “New Economy” comes what has to be a braver new world with a new community of convenience that is determined to eradicate the terrorist threat. The old world is gone for our lifetime. Streaming media is part and parcel of the new global community. Relevance can be found in the new ways that critical content can be deployed for communications, to maintain some quality of life, to make the work we do easier, and enable us to be more efficient?

A strategy of discovery

The Center for E-Business at Marist College embarked on a three-stage strategy to learn about streaming media as an emerging technology, build a new way, and consolidate what we learn and build by taking a product to the market place. We chose the enterprise market as opposed to entertainment because:

- Entry is easier than the entertainment space
- We wished to gain an understanding of how new media can support business processes
- We hoped to explore new ways of communicating within the enterprise
- We wanted to explore new ways of doing e-learning
- We hoped to acquire funds to continue development by selling streaming products and services to industry.
During the “learn” stage we developed a streaming media application:

- That is small and simple
- Can be used in both the entertainment and enterprise marketplaces
- Uses audio as the driving media
- Is capable of video and other media
- Could be taken to the marketplace rapidly
- Could prove a concept
- Could evolve to new emerging technologies such as wireless applications

We deployed it to the enterprise.

**ASmallFootprint.com** is the vehicle for transitioning from the “learn” stage to the “build” stage.

**ASmallFootprint** is a suite of products and services, owned by Marist College, which supports streaming media in the enterprise. It is designed to serve the communications needs of a busy and mobile society. A high capacity server-based product, **ASmallFootprint** is a custom and personalized environment for concurrent telework and telelearning. (Refer to “Concurrent Telework and Telelearning” by L.S. Harms, University of Hawaii, Honolulu, Hawaii, 1991).

**ASmallFootprint** uses streaming media, audio primarily, and video where appropriate. **ASmallFootprint** is positioned for migration to wireless hand-held devices and automobiles when streaming becomes available in these environments. Current products include:

- **Corporate Radio** – a product deployed for internal communications and e-learning -- has been deployed to industry
- **SupplierNet Radio** – currently seeking a test site
- **MaristCollegeChat** – the new portal in development
- **HighSchoolRap** -- a variation of the new portal, also in development

The current state of development includes tools for content creation, uploading, and scheduling. The content is viewed with a branded and personalized jukebox. The key features that form the framework for future development are:

1. All products are server-based. This is key to being able to manage digital rights, to enable new content revenue models, to be able to meter and bill content usage.

2. The applications in the base product include organizational communications, e-learning, and marketing. The application mix is of
interest to all organizations and provides a rich area for experimentation and exploration

3. All products deliver a managed list of streaming multimedia content. This provides a new way of looking at multimedia on demand. For example, the radio metaphor is one where you click the play button on your desktop and the current news is heard. It is delivered to you with all your other content.

4. Content is delivered through a personalized and branded player that is always present, always on, and always current. When you click play in the morning when you get out of bed or get to the office, you are greeted with a great voice saying “Good morning, Mary.”

A jukebox metaphor was chosen to stream audio, video and other multimedia because it enables a clear focus on our ultimate environment, which is mobile. A jukebox is thinner than a full player. It can be spawned from a full player. It can work well on portable devices and supports entertainment content as well.

Content today can be stored and managed through a browser on the Marist Center for E-Business’ RealServer, on a cache or edge server or appliance inside a firewall, on a corporate RealServer, or elsewhere. Content types today include audio (the primary media), video (used in a support role, for flash, and for entertainment), music, text, pictures, URLs, PowerPoint slides, visualizations, and animations, among others.

We believe that the model should support demand for voice copies of e-mail, phone-mail, announcements, news, and other important communications that will save people time in their busy day. We also believe that we have taken the first step toward a new portal that is pervasive, portable, and mobile.

**Leveraging our experience with ASmallFootprint to build a new pervasive embedded Linux player as part of a Marist College/IBM Joint Study**

Joint development with IBM Germany of a pervasive Linux player (deployed for the desktop and ported to an embedded Linux handheld device that streams media) is the most important step in our research and development today. We are fortunate to have the assistance of a great company and creative and knowledgeable people. Students working on this portion of the project in our lab at Marist are IBM paid interns and have a better opportunity at IBM jobs on graduation than others. We have the opportunity to be on the edge of new infrastructure development and hope to be the first to deploy streaming media with IBM’s VideoCharger server on Linux/390 with support for the MPEG-4 video
format. We hope to then be the first to employ a new embedded Linux portable device with streaming media from VideoCharger.

This is an exciting adventure to be on and we look forward to a day in which we can move to the **consolidation** stage with all this knowledge and development and establish new revenue streams for the college.

**The idea of a new portal is explored.**

Although bandwidth constraints are often cited as the primary reason for not exploring technologies such as streaming media more vigorously, it seems that there are opportunities for compromise. Streaming audio is viable today, particularly in intranet applications, where control of bandwidth is possible and quality is predictable. The question then becomes how to best exploit audio technologies and metaphors in search of new and better approaches to information delivery.

We can move ahead incrementally with streaming media, starting with audio, adding video where appropriate, and enhancing the experience with other media to support needed applications. As we see more and more relevance of these technologies to the work at hand, we are very rapidly faced with a conflict in user interfaces or, in a broader sense, metaphors. The existing desktop metaphor upon which we are currently building portals that are personalized to the individual and the work they do, is inadequate to the concepts discussed in this paper. What then does the new portal look like? Is there a metaphor that helps us to understand what we need to to?

We have taken the first step in positing the problem by designing a streaming media portal for a college environment and another for a high school environment. These can be viewed at [www.asmallfootprint.com](http://www.asmallfootprint.com) (click on Educause).

**The Characteristics of a Portal for Higher Education**

The Eastern Michigan University Information and Communications Technology Initiative’s Portal Group research project, “Portals from the Higher Education Perspective” ([http://ict.emich.edu/portal.html](http://ict.emich.edu/portal.html)) defines the ideal portal for higher education as “a hub from which users can locate all the Web content and services they commonly need.”

The ideal portal for higher education will overcome the confusion created for users by:
– the myriad of information providers who exist on any campus – from student groups, to individual faculty members and researchers, to schools within the university, to administrative back-end system information providers, and many other sources
– the myriad of formats, taxonomies, and user interfaces employed by information providers
– the myriad of access and security mechanisms employed.

The first step in the analysis is to consider what indispensability means for:

– Students
– Faculty
– Staff
– Alumni
– Parents and family
– Donors
– Corporate learning clients
– Legislators and policy makers

We then see a huge list of requirements emerge for a streaming media portal. Some of the most obvious are listed below. We welcome contributions to this list and ask you to send them directly to Barbara McMullen (Barbara.mcmullen@marist.edu).

Requirements for a streaming media university portal include:

– Intelligent, integrated, and personalized access to university services from anywhere, anytime (all portals)
– Elegantly integrated content that supports the mission and is seamlessly presented to only those to whom the content is pertinent and who are authorized to get it
– Integrated and powerful personalization tools and methods
– Tools for creation, uploading, managing content from a browser
– Tools to compose, manage and deliver complex content of mixed media
– New processes that are rich media oriented
– Intranet, Internet, and extranet strategies
– A wireless strategy for handheld and other pervasive devices including automobiles to enable user mobility
– Secure stream and web servers
– Secure delivery of personal information from back-end systems such as student records, human resources, or financial aid – we think this implies a hybrid interface.
– An appropriate player that supports all forms of content that users may need and the means to distribute the player to users
− A convergence of audio technologies (e.g., voice mail) and conversion of text technologies (e.g., email)
− Supports community (workgroup communications)
− Audio/video content search tools

Is it worth it? Do we need to throw out all our current thinking on how to construct portals? If we do, are the benefits worth the effort and expense? We think so if the correct metaphor is found. We know that:

− Audio/video are often a more powerful means to communicate than other media
− It is media that delivers emotional impact very directly and effectively
− It is entertaining while informing and educating
− The audience gets more in the content. If they are willing to pay extra for rich media content, then give them what they want
− Compelling content encoded and streamed properly is a good thing
− Live streaming is too risky and expensive; short, sweet on-demand clips available for a longer time are very valuable
− Streaming enables consistent and pervasive communications with employees, customers and partners.
− Streaming is a better technology than downloading, if properly implemented, because it requires less resources on the –client end and facilitates rights management and usage fees of media stored, managed and delivered from a server

The inhibitors today are significant, most especially to the university. These include, among others:

− Bandwidth and network load
− Cost (technology and labor)
− Infrastructure
− Business process
− End user access
− Quality of streams
− Limitations of desktops (high bandwidth connections, sound cards, microphones, etc.)
− Culture

In demonstrating an early draft of what a streaming media portal might look like for the college we created personalized portals for students and alumni, which are compelling, modern and supportive of fun. The portals for faculty and staff are more traditional to support the more traditional activities that faculty and staff need to do such as accessing information from back-office systems. These portals can best be characterized as serviceable.
Where we are now and where we are going

We are under no illusion that we have found the appropriate metaphor for the new streaming media portal that will serve us in the years to come. We do believe that we have demonstrated something new and stimulating and have brought to the surface the questions and problems that should be addressed. Development at Marist will continue. We need help in exploring new metaphors that support both desktop and wireless handheld environments and encourage you to join with us in our exploration. We also seek clients, funding, collaborators, partners, and test sites.

An area of interest to all educators is how the new streaming media portal metaphor will support e-learning on handheld devices. We ask you to work with us on this problem and perhaps its solution will pave the way to the definition of the broader portal. The problems include:

- Limited screen size.
- Streaming is just one aspect – learning requires more than a talking head.
- How do you take notes, collaborate, have interaction using a very small screen and keyboard?
- How do you keep content short enough to be viewed on the subway ride to work? Listened to during the car ride to work?
- What do we need to do to be ready with a product when the DoCoMo culture comes to the U.S.?
- “Always connected” wireless business models encourage download vs. streaming. A hybrid needed.

Join us. Contact Barbara McMullen if you are interested in participating (Barbara.mcmullen@marist.edu).

Conclusion

As Internet radio expands from a vehicle for music enjoyment into a new, robust form of communications, Marist College is at the forefront by expanding the radio metaphor to include streaming voice, video, slides, text, pictures, visualizations, and community building tools. The emerging new portal is both mobile and personalized. For more information about ASmallFootprint products and services refer to the paper in these proceedings entitled “ASmallFootprint: A Product Of New Partnerships And Collaborations” by Barbara E. McMullen Director of the Center for E-Business, Marist College, Poughkeepsie, New York

About Marist College
Marist College is a nationally recognized regional college listed as a top tier college by U.S. News & World Report, rated “highly selective” by TIME/The Princeton Review and listed in Yahoo’s 100 most wired colleges and universities (2001. A liberal arts college situated on the Hudson River in Poughkeepsie, NY, it has 3600 full-time undergraduates in 27 degree programs and 600 graduate students in MBA, MPA, Psychology, Computer Science, and Information Services programs.

Marist has a commitment to technology. Information Technology is emphasized in the Marist College Mission Statement and Strategic Plan. A unique partnership with IBM has resulted in its current joint study focusing on zSeries (S/390) mainframe computing with Linux and streaming media research and development. With its ATM backbone network, Marist has 215 faculty, 1632 student, and 320 networked pc. There are an additional 415 networked PCs in labs and 20 multimedia classrooms. The library has 205 workstations, four multimedia classrooms, and over 400 network ports for student laptops.

A digital library and archival collection of digital information in multiple formats (video, audio, animation, images and text), which runs on the IBM S/390 is the foundation for Marist’s multimedia technology initiative. A collaboration with the FDR presidential library has resulted in a digital library and database for scholars and researchers that is unique to presidential libraries.