Chapter 5

Digital Data Broadcasting

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Abstract: This paper describes data broadcasting from the perspective of broadcasters who have experimented with it. Valuable suggestions for implementation including cost estimates and technical alternatives are covered. Several opportunities for broadcasters seeking to implement this capability are outlined.

1. INTRODUCTION

As participants in more and more industry events, we have been asked to talk about data broadcasting because of our company' interest in this area. We have found that our colleagues are skeptical, as they should be, of data broadcasting and unclear about the opportunities, costs, content and technology associated with it and that they have many questions.

While we have neither all the questions nor all the answers, we have attempted here to address those questions about data broadcasting which we believe are of interest to broadcasters and which highlight some of the potential opportunities.

Both the technology and business approaches of data broadcasting are evolving quickly. To stay informed in this rapidly changing area it is necessary to stay current in the field and to follow the trends.

In raising these questions about data broadcasting, we do not wish to give the impression that data broadcasting is more or less important than the other aspects of DTV, including HDTV and DTV multiplexing.

2.   THE BROAD PERSPECTIVE

From the broadcaster's perspective, data broadcasting is the broadcasting of the most popular digital content to the widest possible audience. Broadcasters have a very efficient one-to-many technology that, with digital data broadcasting, merely extends our reach and service. In digital broadcasting we can now broadcast popular digital content to a wide audience. Our definition of the most "popular digital content" is explained later but it can be produced with text, graphics, photographs, audio and/or video. In other words, in digital data broadcasting we have access to the full range of multimedia tools to enhance the content.

Data broadcasting is not much different than what broadcasters do today. TV broadcasters broadcast popular content to a wide audience. This content includes our news, weather, sports, local, syndicated and network programs. Some of the programs we produce and own and some of the programs we acquire from others and some of the programs are originated by our networks and distributed through our stations. We do not broadcast home videos of our son's birthday parties even though these videos might be interesting to a few people. They are not of interest to a wide enough audience to warrant using our transmission system for these programs. And unless something really unusual happens at the birthday party that would qualify as news, there is no reason to broadcast it because it will not achieve an audience to which we could sell advertising.

There is one other aspect of data broadcasting that is important to convey even though it is not a requirement of the definition. For the most part, data broadcasting means that the content (or data) is broadcast to devices that have memory and intelligence, such as today's personal computers. In doing so, broadcasters can now broadcast content in non-real time as well as in real time. If the user's computer is on and is equipped with a data receiver it can receive digital content from our broadcasts even when no one is present at that moment to consume or view the content. In this sense, the computer serves as an intelligent agent seeking out content of greatest interest to the user. The computer works almost as a VCR except that the content is much easier to access in the non-linear forms of the computer rather than the linear VCR recording.

3.   RECEIVERS

The receiver for data broadcasts is usually a computer but it does not need to be and the form of the receiver may be dependent upon the data broadcasting applications. The computer is the only device today that has a

significant amount of memory and intelligence to receive, store and manipulate the received data to make sense to the user. Furthermore, there are a large number of computers already in the marketplace that can be retrofitted to accept data receivers. The computer is the preferred device because the user can store, manipulate, print, and otherwise interact with the content once the computer has received the data.

For most data broadcasting services that exist today, there are receiver cards (ISA or PCI) that are added to computers to receive the data broadcasts. Many of these receiver cards contain tuners that tune to the television broadcast channels to receive the data broadcasts. These tuners are nearly identical to the inside of existing TV receivers and tune channels 2 through 69.

In the future, data broadcasts might be received by TV sets with memory modules added to them, as in set-top boxes, or in future DTV receivers that also have memory and intelligence. Still in the future, personal digital assistants, pagers, and other intelligent devices could receive data broadcasts.

Ultimately, broadcasters need not be too concerned about the receiver technology. Broadcasters will broadcast digital content to any device that can receive it.

Current computer penetration is about 45% of households. Of course very few of these computers are outfitted with data receivers. Household computer penetration is estimated to grow to 54% by the year 2002.[1] It is estimated that there will be several million computers sold this year that will contain TV tuners that could receive VBI{ XE "VBI" }, (vertical blanking interval) data broadcasts.

Current data receivers in the form of computer ISA or PCI cards cost about $100 at the retail level. As noted above, if the tuner is already on board the computer, then the cost of data reception is much, much lower. It is estimated that receivers to receive DTV data broadcasts into the computer can be manufactured for about $200 to $300 at the retail level, perhaps less. These receivers are designed to decode the data transmissions only, not to display real time DTV broadcasts into the computer. Receivers for data broadcasting are much lower in cost than will be receivers for DTV or, for that matter, for accessing data through telephone lines if one considers the costs of modems, telephone lines, ISP costs, etc.

There are not many data receivers out there now, and this market will likely grow because of the growth in home computer penetration and the availability of low cost of data receivers. Of course, this prediction is based upon the assumption that there will be content of interest to PC users.

4.   DIGITAL CONTENT

It is easier to give examples than to define the "content" of data broadcasting. The "data" in data broadcasting can be almost any form of human communication, text, graphics, photographs, audio and video. In fact, the multimedia aspects of data broadcasting are what make it compelling and interesting to the user. The content can be news, sports, weather, financial information, entertainment programming; the possibilities are far too numerous to mention all of them here, but they are limited only by our imagination. Let me give you some examples from experiments we have conducted.

A Granite station in San Jose, the heart of Silicon Valley competes with a very strong local newspaper, the San Jose Mercury News. As you can imagine, one of the largest categories of ad revenue for the newspaper is classified advertising. One category of classified advertising in the newspaper is jobs, especially jobs in the high tech computer industries that are located in Silicon Valley. Our station has tried to compete with the newspaper in this area but without much success for obvious reasons. The television medium is not very effective for advertising the fact that Intel has openings for four computer engineers with the following technical qualifications, etc. Part of the reason for TV's ineffectiveness for these positions is that the content here is too dense requiring many words to describe it and there are only a relatively small number of viewers, even in San Jose, who are in the target of the ad. This is the nearly perfect data broadcasting application, a job channel for computer jobs broadcast to computers by local broadcasters. In the data broadcast version of the ad we can have a full text description of the job similar to the newspaper, we can have a full description of the job benefits, we can have a photograph and/or video of the Intel campus and the employee cafeteria, a video or audio message from the manager of this area of Intel, and we can even data broadcast an application form to be completed and e-mailed back to Intel for consideration. In other words, the message can be made to be quite appealing, using all of the multimedia techniques available today and the ad can be produced at much, much lower cost than can a TV ad. And our broadcasting distribution system is much more efficient than that of the newspaper.

Of course not everyone in San Jose is looking for this kind of job, but undoubtedly there are a large number of qualified potential applicants in the coverage area of our station. An end user with a data receiver can filter out those data broadcasts which do not interest them. In our example, if a user has no interest in the "jobs" channel, the user merely ignores it and the data receiver does not capture this channel. If the user is interested, they set their

computer to capture the "jobs" channel data and with appropriate filters sort through the data to only capture "engineering opportunities at Intel." The point of this example is that the data broadcaster has a much more powerful advertising medium than does the local newspaper. And the data broadcasts can be much easier to access than can web sites and can be much more multimedia intensive to increase the sales effectiveness.

One of the other broadcast investors in Datacast has a station that has a very popular high school football program that is broadcast on Saturday and is a summary of all of the high school football games that were played on Friday evening. This station has a large coverage area so there are many, many high school games and a great deal to summarize. On the other hand, most viewers are only interested in the one or two high schools which their son or daughter attends, not the full group of high school coverage. With data broadcasting, the station could broadcast this football content in such a way that users can capture only the game summaries of interest. Furthermore, the game summaries can contain video clips of the scoring plays, game and individual player statistics, interviews with players, coaches, conference standings, etc. All of this "data" can be tailored and produced at extremely low cost and can be advertiser supported.

This same concept can be extended to professional football, as another example. If you are a Buffalo Bills fan, late on Sunday afternoon, you could capture only the scoring plays from the Bills' game along with a variety of other "data" about the performance of the Bills, the AFC, player statistics, etc. This "data" could be cached to your hard drive without ever lifting a finger because you instructed your computer to capture the Bills "data" from the data broadcast of your local broadcast station(s).

5.   MORE EXAMPLES

The following are additional examples of data broadcast. During the O.J. Simpson trial, for example, there was great interest in the relatively boring transcript of the trial. These transcripts could have been easily broadcast, with advertising, to computers throughout the broadcast coverage area. As the station discussed the trial on the newscast for that evening, the transcript could have been data broadcast to computers. The O.J. Simpson trial transcript is one example of content that would have been totally inappropriate for the television broadcast but is perfect for popular digital content to be data broadcast.

During tax preparation time, most broadcasters are running advertisements for tax preparation firms. This is the perfect opportunity for data broadcasts. The digital broadcaster data broadcasts the IRS forms to

computer users, nearly all of whom must complete these forms, along with advertisements from tax preparation firms. The user captures the forms, completes the relevant forms on their computer and files those completed forms electronically via their modem in compliance with IRS regulations.

Most TV broadcasters today run 30-second ads advertising new movie releases. Viewers see the movie ads but have no idea where the movie is showing in their hometown, their neighborhood or their favorite theater. The answer for the viewer is to go to the newspaper to obtain the listing of theaters and show times. With data broadcasting, the entire movie trailer, the theater, the show times, the telephone number of the theater, etc., can all be data broadcast to the computer for retrieval by the user at their convenience.

Other content may include web sites of advertisers, additional information about products or services advertised on the broadcast station, news scripts, station and program promotions, etc.

6.   DATA BROADCASTS AND BASIC TELEVISION VIDEO SERVICE

There are two approaches to data broadcasts as it relates to basic television video service. One is referred to as "enhanced TV," or the concept that existing TV programs are enhanced with additional data. The idea is that while you are watching TV on your PC there can be additional data that is associated with the TV program or picture. Another example would be showing data on the TV screen by using a set-top box that receives the data and displays it along with the TV picture or program. The second approach is to transmit data to the PC that is unrelated to the television picture or program being broadcast. Both of these approaches have merit and it is my opinion that both will become successful, though one might favor the second approach over the first for the following reasons. Television is a great advertising medium and today advertisers spend money to have their products and services showcased in a fixed and real time ad on the TV screen. It is not clear that watching real time TV on the PC is desirable when the real time TV set works quite well and is much easier to use. Additionally, the idea of associating distracting digital content with the content that was originally produced for the TV medium mixes the media to the point where the TV ad may suffer from the distracting data. The goal should be to preserve the franchise that we have in the most powerful advertising medium with the broadest reach, television, and grow a new business that makes us equally powerful in the multimedia world of computers. As digital television develops I have no doubt that data and advertising can be easily merged onto one display, but we are not there yet.

Data broadcasting is not mutually exclusive with the other DTV capabilities. Digital broadcasting and DTV give broadcasters tremendous flexibility and there are opportunities on many fronts. It is not a case of HDTV *or* multiple DTV channels *or* data broadcasting. All three are possible and should be exploited by broadcasters. We don't know today what will prove to be the most successful with consumers. Consumers may select all of these choices in equal measure. Data broadcasting merely creates new opportunities for broadcasters that should be seriously studied and exploited if appropriate.

7. OPPORTUNITIES

The business opportunities in data broadcasting are extensive. There are several different business models that can be applied through data broadcasting. There can be advertising support, subscriptions, combinations of advertising and subscriptions, pay-per-performance and pay-for-carriage. These last two perhaps require some explanation. In pay-per-performance, broadcasters could data broadcast computer games to the PC but the user cannot play the game until they place a toll-free call to obtain the code to unlock the game (or the user could go to the web to obtain a code). When the user calls or accesses a web site they are asked for a credit card to make the payment to fulfill the purchase of the game.

In pay-for-carriage, data broadcasters would charge companies for distributing data to desired customers. For example, today consumer catalog companies spend large sums of money to simply distribute their catalogs to customers and potential customers. Multimedia merchandise catalogs can be data broadcast to home PCs thus saving the huge cost and unreliable delivery using the mail system. At the same time, the catalog can be more compelling, including not just text and photographs, but audio and video to market products. Carrying this catalog example further, the data broadcaster could also charge the catalog supplier for each order actually placed through the data broadcast version of the catalog.

From my earlier examples of content and from this example of a few sources of revenue broadcasters should get the picture that there are enormous opportunities to generate new revenue without cannibalizing our existing advertiser base. Much of data broadcasting is potentially more competitive with print than it is with existing broadcast advertising.

If we look at these other industries, we see that there are significant revenue sources to go after. For example, daily newspapers generate about $40 billion in annual revenues, with nearly $17 billion of this in classified advertising. Of the $17 billion, nearly $6 billion is for job-related classifieds

alone. Magazines generate about $10 billion in ad revenues. Direct Mail is about a $36 billion industry and Yellow Pages is about a $12 billion industry.

Finally, let's examine the current online advertising and e-commerce opportunities. Online and Internet advertising is growing at more than 100% per year and totaled less than $200 million in 1996 and is estimated to be nearly $3.0 billion in 2000. E-commerce is growing at even a more alarming rate totaling just over $300 million in 1995 but is estimated to grow to a whopping $95 billion in 2000.[2] If these estimates prove correct, the combined e-commerce and Internet/online advertising revenue will be more than twice as large as all of television advertising from all sources.

For those in software development, content production and new media, data broadcasting provides huge opportunities to package software for distribution through data broadcasting channels.

Data broadcasting can capture much of these existing print advertising markets and the production quality of data broadcasting can be much higher than it is in web-based and online advertising. Most online advertising is very limited in production quality, consisting of text, photographs, limited graphics and animation. High-speed data broadcasting can make these same online ad messages come alive with audio and video as well as text, photographs and animation.

8.   IMPLEMENTATION COSTS

It will cost a lot less in capital equipment to implement data broadcasting than it will cost to build a new DTV station.

To implement data broadcasting for a station with NTSC service it will cost anywhere from $20,000 to a maximum of $70,000 in hardware and software depending upon whether you activate VBI lines or use the VSB, (vestigial side band) .For example, a station which uses the VSB can estimate the costs to range from $20,000 to $70,000 per station depending upon the age of the transmitter, whether it is a VHF or UHF, whether the STL, (Studio-Transmitter Link), needs to be modified, whether there is satellite receive capability, etc. Also servers, workstations, authoring tools and software will be needed which are included in these estimates.

In DTV the cost of adding data broadcasts to the DTV station and operation are really minimal. It would help if we had a standard, but assuming that we do have a data broadcasting DTV standard, then the cost to implement data broadcasting in DTV could be as little as the cost of the software, servers, authoring tools and workstations. Of course, the cost of building the DTV station is much more than implementing data broadcasts

in an existing NTSC TV station. Again the cost of ADDING data broadcasts to an existing DTV station should not cost more than $20,000 to $40,000, depending upon the sophistication of the software, workstations and servers.

9. HUMAN AND OTHER RESOURCE REQUIREMENTS

How many people required to staff a data broadcasting and determining the resources needed to initiate a data broadcasting at a station will depend on the business model and the applications that are developed. For example, if a station becomes a Datacast affiliate for the first Datacast network, then we estimate that you will need at least one full-time person to program your local data broadcasting service. This person might be someone who is already on staff and is responsible for maintaining your station's web site. As the number of applications grow and as more advertising is generated you will need to add staff. To support a data broadcasting service in the DTV channel will require a few to several people, again depending upon the applications and data services that you develop.

Broadcasters that have active web sites and have been instrumental in developing web activities including servicing your advertising clients with web activities will have the jump on other broadcasters. Also broadcasters that have a great deal of local material and an active news department will find it easier to program a data service.

10. TECHNICAL ISSUES

Despite the fact hat in some sense data is data is data, there are some differences between the technical forms of data broadcasting, VBI versus VSB versus DTV. And "the devil is in the details."

VBI uses lines of the picture to carry data. The throughput of each line is about 9.6 Kbps per line. So, if you have three lines of VBI carrying data, the total throughput is about 30 Kbps.

For example, using the VSB achieves a throughput data rate of 561 Kbps which is nearly 20 times faster than three lines of VBI. Furthermore, tests have shown that the VSB data broadcasts are significantly more rugged than other forms of data broadcasting in the NTSC channel.

In DTV, the data broadcasting throughput rates can be almost anything up to 19.3 Mbps, or a whopping 600 times faster than three lines of VBI. The ATSC data broadcasting standards setting body for DTV is planning

three different levels of data broadcasting throughput rates, one at a lower 384 Kbps rate, one at about 1.5 Mbps and one at the full 19.3 Mbps or the maximum throughput rate of the digital channel.

Some might argue that the data rate does not matter. To some extent this is true, but if you are planning to move a large amount of data through the channel which increases the functionality and usefulness of the service to the PC user, then the higher the data rate the better. And, for those of us in broadcasting, who are used to high impact video and audio, the data rate is important because you need bandwidth to get this content through the channel to the computer.

11.   COMPETITION

There will undoubtedly be a large number of competitors in data delivery to the home, but, in my opinion, none will have the unique capabilities of local broadcasters.

We should think of competition in two ways, one is from the perspective of technology and one is from the perspective of competing services. From a technology perspective, certainly cable modems, satellite, MMDS, telephone companies with XDSL and ISDN lines will be competing technologies. From the service side, competitors will include computer online services, especially online services that provide localized content, newspapers that partner with online services or local ISP's and the Internet itself.

But broadcasters have something unique. They have local content, much of it already produced into multimedia formats, they have the local business relationships, they are a recognized brand in the community and they can provide a free digital service to PC users in their markets. Broadcasters have a very, very efficient technology to broadcast to a large number of PCs in their service area.

12.   DIFFERENT FROM THE INTERNET AND THE
WORLD WIDE WEB

Clearly much of the content provided by data broadcasting can be the same as that available from the Internet. For example, Datacast presently broadcasts many, many web sites in their demonstrations on our station in San Jose and in Los Angeles on KCOP. Data broadcasters should use the web to identify popular content that can be data broadcast to PC users. The biggest difference is that there is no delay with data broadcasting since the

content is cached to the hard drive and is instantly available. Another difference is that there is no need for the user to dial into the web and tie up a telephone line as well as pay for the line and the Internet Service Provider. The concept is to provide free digital content to the end user, free digital service to PC users with data receivers, 24 hour per day, seven days a week, and to deliver free content to those who have data reception capabilities.

13. ABOUT STANDARDS AND OBSTACLES

While standards for data broadcast do not currently exist they are being developed. In particular, the Advanced Television Systems Committee (ATSC) is working on a data broadcasting standard through the "Technology Group on Distribution." This group has a Specialist Group on Data Broadcasting, headed by Serge Rutman of Intel and is an open standards setting body.[3] ATSC at 1750 K Street, NW, Washington, DC 20006 or go to the ATSC web site at http://www.atsc.org.

To conclude, I believe that the single obstacle data broadcasting faces is the receiver technology inside computers that is needed to decode the data broadcasts. Despite the computer industry's stated interest in data broadcasting, they have done little to get data decoding technology inside their computers. With millions of computers equipped with data reception capability, data broadcasting will become a very, very large business.

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[1] Jupiter Communications, Internet Appliance Report, February 1997

[2] International Data Corporation

[3] ATSC at 1750 K Street, NW, Washington, DC 20006 , http://www.atsc.org