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ABSTRACT

Much of the debate over interactive television has focused on immediate push-button access to a wide range of high quality, full motion video programs. Public broadcasters need to position themselves for the coming age of digital transmission; they can do this by concentrating on transition services that offer increased interaction with less risk than do the most complex and high bandwidth on-demand services. While the total vision of interactive television is still some years away, the delivery of data services along with television programs is not a new idea. Audio-subcarrier and various vertical blanking interval (VBI) text services using closed captioning decoders have been tested. Although they were discarded for the most part, datacasting is beginning to make a comeback as decoding devices are becoming affordable. Two commercial projects, StarSight Telecast and the Interactive Network, illustrate services possible now with low-cost datacasters in the home. Spread-spectrum digital radio will soon offer an alternative upstream response channel for future interactive applications. Coupling this with a datacast channel and receiving devices of sufficient memory can mimic a direct online connection. Stations should be considering what they can deliver when datacasting really takes off. Two figures illustrate the discussion. (SLD)

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What is Interactive Television, Anyway?

And How Do We Prepare For It?

Part One: Datacasting Makes a Comeback

by Steven Vedro

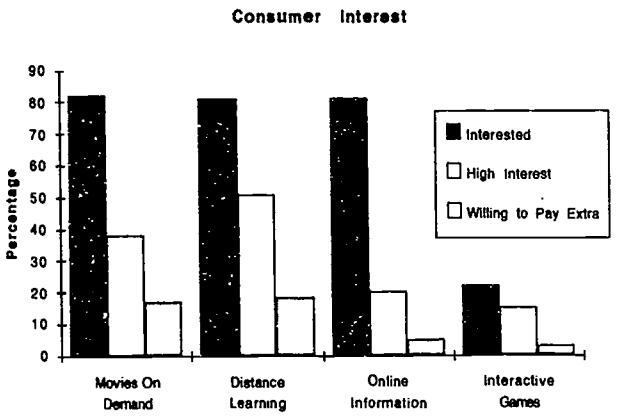
The High Stakes Gamble Over Video-on-Demand

In numerous test markets around the country the cable and telephone industries are gambling billions in speculative ventures that promise to bring "interactive television" directly to everyone's television set. These systems promise consumers: (1) increased choices of specific programs from a large menu of entertainment, sports, and educational offerings (via a set-top program navigator); (2) greater control of the program being delivered (like a virtual VCR); (3) easy access to associated text and graphics information (via online multi-media) and (4) the ability to engage in transactional services (ordering program-related products and services) at the touch of a keypad.

The underlying technologies to support these value-added features are under rapid development. Digital compression is expanding the number of programs that can be stored in regional video-servers or shipped on physical media such as CD-ROMs. Major computer and media alliances are busy designing the set-top navigators that will allow home viewers to select and control the video signals delivered to them, and new programming ventures (like the recent $300 million investment in program development by Bell Atlantic, NYNEX and Pacific Telesis Group) are announced regularly.

Broadcasters, in turn, are pinning their hopes on turning their future HDTV channel into a multi-channel pipeline — broadcasting simultaneous video streams at different compression levels depending upon the program content and audience needs. Viewers would not have true 2-way transactions or video-on-demand, but would have more program choices and access to enormous quantities of downloaded data and software.

But no one is really certain when (or if) these massive investments will pay off. Costs for HDTV transmission and digital switching alone will exceed a million dollars per station—not including production and editing facilities (see *Current,* March 20, 1995), and for many years there will be few sets available to receive these transmissions. Many of the highly touted interactive television trials are behind schedule, the equipment complexity and cost is still daunting. What consumers want, how they want it delivered, and what they are willing to pay for is also unclear.



Sources: "Interested" from Bell Atlantic Study 1993,"High Interest and Willing to Pay Extra" from Phillips Business Information Report (1994)

While many phone company-sponsored surveys show a high interest in new interactive service, surveys of existing cable households reveal a less sanguine view. Most w unwilling to pay a premium over their exis .g basic cable bill for these new features. According to *Interactive Video News* (November, 1994), "even traditionally" early adopters—current cable subscribers—appear willing to pay extra for interactive video services; however the expenditure margin above what they are paying in monthly cable fees is limited. Subscribers said they would pay $5.80 more per month for new interactive services...about 18% over monthly averages for cable."

According to Phillips Business Information Reports, consumer research "has not shown an abundance of excitement" for paying the costs of video on demand technology. Citing a number of focus groups and telephone surveys, they found that while half of those interviewed expressed an interest in adding interactive services, only 38% expressed a "high interest" in video on demand, and less than half of these "interested" consumers were willing to pay more than a few dollars a month extra for the service.

And no one is even certain whether the television set will be the preferred interaction device. Advocates of computer-based video argue that the multi-media PC will be the video terminal of choice in the coming decade when today's young people begin their families: that the future of interaction will be based upon high speed data delivery (via cable, telco, and broadcasting) to multiple home computers.

I can't imagine distributing information that has an interactive, branching architecture to anything but a personal computer. The information tool has to go directly to the user's brain to give him or her a personal experience. Television is another entertainment experience... a group experience where everybody can see a big screen. But when I want to get information, I don't want to have anyone looking over my shoulder. I always envision my information machine as being mine... Everyone hates the guy with the remote. John Warnock, the inventor of Postscript, interviewed by David Goodstein, in *Wired,* July 1994.

Those betting on HDTV and "near-video-on-demand" (where the viewer is given a choice of the top ten movies at multiple starting times) remind us that most TV viewers simply want to be entertained, and are not to be trusted when they tell interviewers about their interests in interactive programs, education and online services. They argue that pay-per-view movies (with little interaction required) will drive the

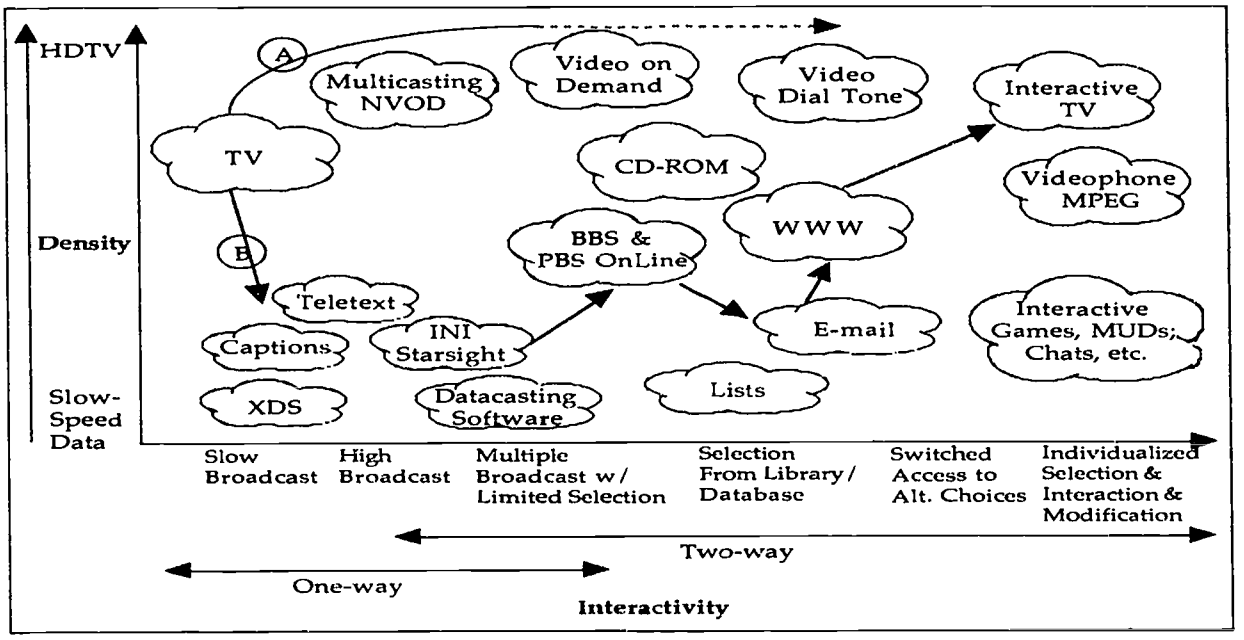
market, with most true interactivity limited to sports betting (for prizes where allowed), innovative commercials and home shopping. Given all of this uncertainty, it's tempting to take a wait-and-see attitude. But public broadcasters cannot afford to sit out the storm. In addition to planning for their digital production and editing facilities, they will need to position themselves for the coming age of digital transmission. The good news is that stations can begin to develop interactive applications using today's technologies, concentrating not at the most complex transaction levels and high bandwidth on-demand services, but on transition services that offer increased interaction with somewhat less risk.

The Spectrum of Interactivity

As discussed above, interactive television will offer the consumer increased choice, easier access, control and feedback. The more complex the service, the greater the underlying technical requirements and cost. At one extreme we can imagine easily selecting and controlling the immediate presentation of a desired video program, complete with on screen access to related program materials, products, and services. Some choices may result in receiving video, others text and graphics. Some may require a separate off-line transaction (*e.g.*, using the telephone to order a pay-per-view movie event, zirconium ring, or contribute to a fund drive), others may be available by just pointing to an icon. Choices may be unique to the individual or limited to a confined on-screen menu. Some of these complexity factors include:

1. How dense or information-rich is the programming selected? Is it in real-time or delayed? Is it a text display,a feature film, or an interactive lesson? Is it a faxed recipe or an actual hot pizza? What kind of bandwidth (or data rate) is needed to deliver the requested information/program?

Paths to Interactive Television



* While much attention has been focused on the costs and barriers to path "A", opportunities abound along path "B".

2. How unique is the programming received as a result of that transaction? How large a database or set of switched links is required? An on screen program guide or a choice of a pay movie from a list of ten is less individualized a transaction than ordering from a menu of hundreds of videos, calling up one's personal bank state mentor, better yet, one's personal banker. And, even with all the delivery in place, one must ask...

3. How easy is it for the viewer to engage in the offered transaction? Getting up and making a phone call and then entering a string of digits into a voice response system takes more effort than using a hand-held remote to click on an on-screen icon.

Too much of the ITV debate has unfortunately focused on the most complex corner of this matrix: (a) immediate (b) push-button access to (c) a wide range of (d) high quality full motion video programs. But there are other starting points to interactive services: datacasting to smart TVs and PCs, developing and managing local online computer services and Internet World Wide Web home pages, and producing materials for CD-ROM and other transportable video media. Multicasting video does not have to wait for ATV: many stations have access to ITFS and (wireless) cable channels, and video dial tone trials will offer new opportunities to become regional video server sites for an entire community's educational and cultural institutions. One challenge ahead will be in finding the (local) programming and negotiating access to these distribution channels. An even bigger challenge is the need to identify *where* to focus our limited marketing research resources!

The rest of this article will look at some developing non-video interactive television applications: delivering data to home PCs, "smart" televisions, and even VCRs. My next pieces will describe other steps towards multicasting.

Delivering Data to Smart TVs: Some Steps Along the Way

From Teletext to Datacasting

Tomorrow's ATV channels will transmit more than video. Smart televisions and video-ready computers will capture, store and sort massive amounts of broadcast data, creating individualized databases of text, graphics and animated video. Users will order specific information content via wireless data terminals and receive their customized responses within seconds. While this vision is still a few years off, the delivery of data services along with television programs is not a new idea: audio-subcarrier and various vertical blanking interval (VBI) text services using closed captioning decoders were tested, and for the most part were discarded, during the 1980s. Teletext, which allows the user to enter a specific page number on a keypad to display news, weather, sports scores and program listings on their television, was also piloted by a number of public stations, but then dropped for lack of inexpensive decoders or teletext-ready television sets. Today, as various decoding devices become truly affordable, broadcast datacasting is making a comeback:

- closed captioning decoders are now built-in to most televisions, making it possible to send text messages as well as captions to millions of homes;

- the Extended Data Set capabilities of the Line-21 captioning system are already resetting the clocks on many Sony VCRs, and will offer stations a new way to enhance their broadcasts with such things as call letters, program titles and running times, as well as emergency weather alerts;

- downloading weather information to home computers is on its way; and

- more and more commercial providers are using the PBS National Datacast Service to distribute business information.

Two of these commercial datacasting applications

offer some insight as to the future: one helps you pick a program for your VCR to record, the other allows you to play along with *Carmen Sandiego*!

StarSight Telecast transmits television program schedule data to home sets via the PBS VBI. The data signal updates a local database stored on the user's set-top. By using a hand-held keypad, the viewer can instruct the database to display program information by channel and day of week, or by theme or subject matter: movies, sports, closed captioned programs, and even Cable in the Classroom shows. The StarSight box has infrared emitters that connect to the user's VCR and cable converter. Selecting the "view now" or "record later" options control these devices directly via an on screen display.

Although today's service is limited to one-way transmission of program schedules and plot synopsis information, StarSight has built additional interactivity into its system design. Each box is addressable and can be sent customized data; the station data bridge, which takes the national signal and filters out all but local information, can be upgraded to add local data. According to StarSight representatives, while program listings are today's focus, future downloaded information services—such as localized ad-ons to national commercials or other program-related materials—are also being investigated, "so long as the new services are not too complex, confusing or expensive." Major VCR, television receiver and cable convertor manufacturers are adding StarSight decoders to their product lines. The company's owners include such deep-pocket entities as Cox Communications, Viacom (owner of Blockbuster Video), the Tribune Company and other major media firms.

Another user of PBS Datacast is the Interactive Network. Instead of downloading program descriptions, this system delivers program-related polls, quizzes, and other interactive opportunities to hand-held game devices. Viewers can predict sports moves, guess along with *Wheel of Fortune* and *Jeopardy!*, respond to polls on *60 Minutes* and *20/20*, and search for *Carmen Sandiego*. At the end of a particular "interactive" program, viewers can upload their responses via a built-in phone jack. Interactive Network claims that they can process responses from up to 50 million subscribers without telephone traffic delays, and transmit the results to all terminals within four minutes. Interactive advertising will play an important part in the company's future, According to *Multimedia DAILY*, over 89% of IN's Super Bowl participants "interacted" with a specially-designed Chrysler ad, and almost half requested brochures.

Interactive Network is testing its service in the San Francisco Bay Area, Sacramento, Chicago, South Bend, and Indianapolis. Today all interactive programming is entered from one national location, but the company plans to create regional licensees to handle local programs and regional sporting events. INI's principal investors include TCI, NBC, Sprint and Motorola.

These commercial projects may do for public television what failed to occur in the 1980's—getting low-cost datacast decoders into the home. Opportunities for new public broadcast services will increase in the coming years as companies like StarSight and INI (already riding on the public television signal) look for more content, and as multi-media PC sales continue to climb, making broadcast delivery (first of games and business news, later educational software) affordable to both "smart televisions" and "broadcast-ready computers." PBS's Mark Richer told me that he expects to see a cheap PC decoder card in mass production within the year. "There are too many companies looking for a cheap way to distribute software, information and games into the home. It's only a matter of time before someone breaks the 'chicken-and-egg' problem."

Spread-spectrum digital radio will soon offer an alternative upstream response channel for future interactive applications. These frequencies, in the

Interactive Video Data Service bands—153 licenses were just issued by the FCC in January—promise to add a low cost wireless channel that can be used by local stations for viewer participation and response, online shopping and product ordering, and hopefully—education and instruction. The IVDS return channel's data capacity is limited, but when coupled with a high speed downstream datacast channel and receiving devices of sufficient memory, the result can mimic a direct online connection.

Coming Up: A Homepage on the Web

Stations should be looking at their digital resources—text, graphics and audio files—and thinking about what they might deliver once datacasting really takes off. One way to begin this process is to let the telephone provide the connection—to Learning Link or PBS Online projects, or even internet World Wide Web home pages. In my next article I'll take a closer look at how some radio and television stations are doing more than putting their program listings online.

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