

Multimedia Standards for iTV Technology

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INTRODUCTION

Forms of broadcast media, such as TV and radio, are considered passive because the consumer simply receives the message and does not choose whether or not view or to listen (other than by changing the channel). Interactive television (iTV) is changing this. It gives users control over the programs they receive, as well as a range of online services such as electronic programming guides, e-mail, e-commerce, games, interactive advertising, video on demand (VOD), and Web browsing. This is taking place by creating enhanced programming and offering compelling interactive services. The iTV market is growing at a remarkable rate. Its services have been launched across many countries, including in much of Europe and the U.S. According to the state of interactive TV 2005 report from Kagan Research at present (<http://www.kagan.com/>), 34.1 million households subscribe to iTV services, and the number of subscribers is expected to reach 69 million by 2009. Revenues from electronic transactions for games, television, or t-commerce (television commerce), and interactive advertising are estimated to reach \$2.4 million by 2009. During the same period, we estimate that the interactive services segment will generate \$780 million in operator revenue or cable, digital broadcast satellites (DBS), and telecoms.

The switch from analog TV to digital television is referred to as the digital TV (DTV) transition. We expect that in the coming decade most broadcast signals will become digital. In 1996, the U.S. Congress authorized the distribution of an additional broadcast channel to each TV broadcaster so that they could introduce DTV

service while simultaneously continuing their analog TV broadcasts (<http://www.dtv.gov/consumercorner.html>). In Europe several countries have already started making digital transmissions, and government has developed a roadmap that indicates when all transmissions will be digital. For the industry point of view, over the past few years it has been developing and selling devices for digital transmission and reception. The growing integration trend between personal computers and digital TV will affect the birth of new emerging markets for interactive TV broadcasting and Web TV. They can offer several different simultaneous TV programs, with visual and sound quality that is equal to or better than what is generally available nowadays. In addition, broadcasters can simultaneously transmit a variety of other information through a data bit stream to both enhance TV programming and to provide entirely new services (<http://www.dtv.gov/consumercorner.html>). Both set-top boxes (STB) and DTV are able to handle digital content. The advantages of DTV consist of audio and video quality improvement, providing more channels, more languages per channel, and additional data, for instance applications delivering.

The purpose of this article is to present the content development techniques for iTV. It evaluates some existing technologies related to the multimedia interactive content component of DVB-MHP (Multimedia Home Platform) and MPEG-4. These two technologies make interactivity possible, but both have different origins and mature actions. This article traces the development of a real-time immersive and interactive TV show based on DVB-MHP technology. This article is structured as follows. We first present the interactive TV technolo-

gies and the standards associated with them. We then present a demonstration that illustrates this technology based on an immersive TV show case study.

INTERACTIVE TV TECHNOLOGIES

Definitions

Interactive television refers to a number of ways that allow viewers to interact with TV content as they view it. Television programming that allows viewers to participate in some way consists in providing two-way communication between the consumer and the service provider using a television set-top box that sends and receives signals via satellite, cable, or aerial. This may involve the following opportunities:

- The program credits could be available anytime during the show instead of only at the beginning and/or the end;
- At anytime one could find out who an actor/actress is and more information about him/her;
- At anytime one could find out the location of a particular scene and information on how it was filmed;
- Get scores, highlights, and game summaries whenever;
- Customized and localized information (such as news, weather, and sports);
- While viewing one program, one can keep abreast of other TV program(s), including sports;
- Home banking and home shopping;
- Electronic program guides/Interactive program guides;
- Polls/Surveys—Make your vote count during a program (or after) without having to pay for a toll call or log onto a special computer;
- Interactive game shows—Play along (compete) with others;
- Interactive sports;
- Local/regional/national weather and traffic;
- Interactive advertising;
- Videoconferencing;
- Distance learning;
- Interactive betting;
- Answer trivia questions in real time during a TV show—Prove your knowledge and win prizes by answering questions correctly;

- Ability to switch camera angles, most popular for sports;
- Interactive video magazines and music selection;
- Instant messaging;
- E-mail;
- Other trivia games; and
- Instant shopping; when you see a product or service you want, buy it or order it immediately.

iTV Committee Standards

Following is an overview of existing standards initiatives (Hartman, 2001).

- **Advanced Television Systems Committee:** The ATSC, established by the FCC in 1987, is an advisory forum for the technical and public policy issues regarding advanced television. In 1995, the ATSC developed the ATSC DTV standard, a springboard for policy and technological specifications for broadcasting merging into digital technology.
- **Digital Video Broadcasting:** Located in Geneva, Switzerland, DVB is a consortium of around 300 companies in the fields of Broadcasting, Manufacturing, Network Operation and Regulatory matters that have come together to establish common international standards for the move from analog to digital broadcasting. DVB has adopted the COFDM (Coded Orthogonal Frequency Division Multiplexing) modulation scheme for digital transmission, the current standard for European countries. DVB has also developed a common API called DVB-MHP.
- **NHK Laboratories:** The laboratories have been engaged in comprehensive research relating to broadcast technologies and standards. The ISDB (Integrated Services Digital Broadcasting) system, cantering on NHK's Hi-Vision technology, promote techniques for multiplexing and transmitting multiple types of information, new types of services and receivers, total digital broadcasting system covering satellite, terrestrial broadcasting and cable. Japan and other countries have adopted the ISDB standard as they switch to digital transmission.

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