the new television technologies

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To Kevin, Owen, and Brian to show
to their grandchildren

preface

This book represents a snapshot in time. It is an attempt to pause for a moment to consider where the new television technologies have been, and where they might or should proceed in the future. This will be of value both to those practicing within the television world and to those who are general members of society charged with controlling their own destiny and that of others.

The new television technologies are changing so rapidly that no book can capture them in a solidified state. By definition parts of this book will be out of date by the time it is printed. And yet, there has been no attempt to chronicle the many interesting processes and events that have occurred as the new technologies develop. Much of this will remain a stable part of history well worth recording now for future reference.

Material appears in scattered form in various trade journals, and much is known about particular aspects of the tehnologies by specific individuals, but someone wishing an overview of the past and present of this dynamic field has nowhere to turn. Enough has happened within the realm of new television technologies that it can be included in a meaningful whole. This book, then, is essentially the packaging of the most significant known information about the new television technologies.

Words in this field are in transition, both in terms of spelling and definition. Videodisc, video-disk, vid disk, and various other spellings are seen in different publications. In fact, different spellings often occur within a single page of one magazine article. The definition of videotext (video text, videotex) is changing to encompass different types of alphanumeric information and interaction as the technology presents new forms. Even the word technology does not have uniform meaning. To an engineer it is the inner workings of equipment, but to the social scientist it is a system or method of applied science. This book treats technology more in line with the social science definition.

History written at this date will undoubtedly be altered at later times when twenty-twenty hindsight has more time to settle in and when the secret negotiations undertaken in corporate board rooms can be discussed without fear of competitive idea pilfering or individual head rolling. But the facts known and assumed at this time can lead to insight concerning future directions the new technologies will take.

I developed an interest in undertaking the writing of this book because of academic pursuits and professional experience. Prior to beginning this book, I wrote an introductory telecommunications textbook, also for William C. Brown. Dur-

ing the course of this writing I gathered clippings about the telecommunications field in general and found that the majority of fast-paced changing issues dealt with the new technologies.

Before becoming Associate Professor at Cal State Fullerton, I was Director of Programming for a cable TV system at a time when cable was growing at an extremely fast pace. My present duties at Fullerton involve developing programming for cable channels on two different systems. In these ways I have participated in and learned first hand much of what is included in this book. I have also taught a graduate seminar in Contemporary Media at UCLA where my students and I delved into many of the sociological issues posed by the new technologies. All of these experiences led me to feel that the time was ripe for a book detailing the past, present, and future of this dynamic area.

The book is organized primarily by the various new distribution methods surfacing for video material such as cable TV, subscription TV, videocassettes, videotext, direct broadcast satellite, and low-power TV. Each chapter is divided into three sections: description, history, and issues. The description section explains what the technology is, and how it operates. The history section includes what has happened to date with the technology. While some of the delivery systems have a long, rich history, others only date back to 1981. The issues section primarily discusses the impact that the technology may have upon society and the obstacles and successes it may encounter as it develops.

The book also contains an introductory overview, a concluding chapter, and a glossary. The latter contains words pertinent to the new technologies, some of which did not exist in the English language a few short years ago.

I am indebted to the help given to me by many people in the media and to the thought provoking ideas posed by many of my students. I am also indebted to all the members of my family who acted as a clipping service for me, providing me with articles whenever they came upon them. I particularly appreciate the technical information and computer assistance provided to me by my eldest son.

I am also appreciative of the many helpful comments and suggestions provided by the reviewers: Joe Johnson of San Diego State University; Larry Namer of Cable America; and Nicholas Browne of the University of California at Los Angeles. I was happy to be able to work with the people at William C. Brown, particularly Louise Waller and Kevin Kane, who saw that the book was published as rapidly as possible.

The book was written with the aid of new technological developments. It was composed on a word processor, and the glossary was alphabetized by a computer. Attempts were made to establish a communication system whereby words typed in California could be sent over phone lines and printed in Iowa. However, this idea was a bit ahead of its time but no doubt will be available by the time this book is revised.

The new television technologies are exciting and intriguing. I hope this book will convey both a sense of enthusiasm and understanding to those who read it.

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overview 1

Scope of the New Television Technologies

Ever since the very early experiments with television in the late 1800s, there have been new television technologies. The early systems for placing pictures on a television screen were crude and bulky. Picture resolution was poor, and the lights needed to create an acceptable image were enough to wilt the heartiest of souls.

But gradually these problems were solved and by the late 1940's TV sets had sprung up in homes and taverns, and an embryo network and station system had developed.

Technology continued, and engineers developed new and exciting advances for this infant medium. Videotape recorders enabled programs to be taped and played back at a later time, greatly increasing the flexibility of the programming function. Color added a new dimension to the picture. Cameras that were light enough to be carried on the shoulder changed the whole news gathering function of television.

Structure of the Industry

But through all of this, the major structural elements of the television industry remained the same. Three networks, NBC, CBS, and ABC dominated the programming function. Their affiliated stations were the most watched stations, and their programming was what was talked about each day in lunchrooms, school cafeterias, barber shops, and other gathering places. Even the independent stations survived primarily on old network shows they reran.

The overall system was one way—from the networks and stations to the viewer. The time function was also in the hands of the program providers, and those wishing to see "Gunsmoke" or other favorite programs knew they must be poised in front of their TV set at a particular time. The type of programming could be fairly well predicted—soft informational programs in the morning, game shows and soap operas in the afternoon, news around dinner time, situation comedies and drama in the evening, talk shows in the late evening, cartoons on Saturday mornings, religious programs on Sunday mornings, and sports heavy on weekend afternoons.

Technological developments from the 1940s to the 1970s improved this structure but did not change it in any basic way.

Technology Affecting Structure

But in the 1970s technological advances in the field of television began to progress geometrically, and new breakthroughs led to new services and new ways of looking at that old television set. Cable television with its multitude of channel possibilities began breaking down the old programming formats. Instead of a potpourri of programming that changed throughout the day, cable was able to offer twenty-four hours of particular types of programs. Increased channel capacity led to the potential for increased choice on the part of the viewer.

Technology allowed the time function to be in the hands of the viewer through videocassette recorders, which could record programs off-air while the owner was out. Pre-recorded videocassettes and video discs allowed viewers to choose not only the time they wished to view but also, within limitations, the material they wanted to see. This began a trend through which people could view their TV sets differently than they had traditionally viewed them. TV viewing no longer needed to be a passive activity designed by programmers and absorbed by audience members. Individuals could now exercise some active control over the output of the glowing box situated in the living room.

The one-way nature of television began to dissolve also as interactive TV was introduced in cable systems, and as people began interfacing their TV sets with computers capable of retrieving information or simply playing games. This furthered the active rather than passive aspects of the TV set.

Companies by the score began devising programs and methods to divert the viewers from their traditioinal TV habits, and the three networks found their dominant positions threatened.

The technologies developed and envisioned during the late 1970s and early 1980 allowed people to pay only for programs viewed, provided a multitude of avenues and healthy competition in delivering entertainment programming, provided enormous storage and retrieval capabilities for information in both the written and video form, democraticized television letting the small entrepreneur and even the viewer share the programming responsibility with the large corporate entities, and provided the potential for clearer, larger, more comprehensive TV pictures.

These technologies, which have the potential for changing the overall structure of the television industry and the overall structure of much of our social fabric, will be the technologies discussed in this book. They include satellites, cable television, subscription television, multipoint distribution service, satellite master antenna TV, drop-ins, videocassettes, video discs, teletext, videotext, direct broadcast satellite, low-power TV, fiber optics, high density TV, digital television, flat screen TV, large screen TV, three-D TV, and video games.

Other Technological Developments

There are many other technological advances closely aligned to those mentioned above, which are of great interest but which will not be treated in any detail in the book, mainly because they do not deal directly with television or do not have the potential for changing the overall structure of the television industry or the social fabric.

Television Production Technologies

For example, new technological advances continue in the area of traditional television production. Cameras and videotape recorders are providing sharper pictures while at the same time becoming smaller and more lightweight. Units that contain both camera and videotape recorder are approaching the size and quality of film cameras. Microprocessors and other electronic components are increasing the efficiency of the production process. The special effects, which are possible through television switchers, continue to multiply with each new model.[1]

But these advances are ones that fit within the production rather than the distribution process and are not likely to revolutionize social communication.

AM Stereo

Television's sister, radio, is also undergoing some technological development, which may prove interesting.

A number of methods have been engineered for transmitting AM stereo, but unfortunately none of them are compatible with each other. Each system has a different method of treating the radio waves so that the stereo sound occurs. For all systems the listeners must buy a new radio in order to pick up the appropriate signals that translate into stereo sound. A new radio that can pick up one form of AM stereo cannot pick up any of the others.

Experimentation in AM stereo accelerated during the late 1960s and early 1970s when FM stereo proved to be very popular. In the mid-1970s five different plans for AM stereo were submitted to the Federal Communications Commission, which studied them for five years. Then, in April of 1980 the FCC selected one of these, a system designed by Magnavox, to be the industry standard.[2] However, the other four companies that had developed AM stereo at the time, Harris, Belar, Kahn, and Motorola objected, and several unbiased industry practitioners also questioned the Magnavox choice. As a result, the FCC failed to reconfirm its decision regarding Magnavox and instead decided to let the marketplace decide how the situation should be resolved.

This left individual stations in a quandry. If a station chose one method and bought all the equipment necessary to broadcast AM stereo in that method, it might be left out in the cold if another method became the favorite of most other radio stations and of the consumers who purchased the sets to receive the other brand of AM stereo. Because of the incompatibility of the systems, multiple AM

stereo systems will probably not be the answer, but which system will prevail has yet to be decided.[3]

AM stereo is not the type of technology that will have broad, significant impact on society. It may draw back some of the music fans who left AM for FM or perhaps attract some who have never paid much attention to AM. However, of late, AM has been skewing its programming toward an older audience—one that prefers talk radio, which monaural transmission handles quite well, and one that prefers the hits of yesteryear, which were recorded before the days of stereo.

The indecision on the part of the FCC may stifle AM stereo entirely. The FCC, like the rest of government, has been strongly favoring a policy of deregulation or nonregulation, which has something to be said for it in programming areas. But in technological areas, this can be a foolhardy approach. The marketplace does not have the sophistication to make such technical decisions. The original reason for establishing a government body in communications was to set technical standards for the airwaves. No one has questioned the value of the FCC's authority in this area. Broadcasters, consumers, and manufacturers, alike, realize the need for such a service. The FCC need not have shirked its duty in the decision regarding AM radio and may lose some of its status and respect for having done so, especially because it took five years to decide it could not decide on a standard.

Cellular Radio

Another audio oriented service is called cellular radio. This can greatly expand mobile telephone service making it possible for individuals to make telephone calls from their automobiles or from any other point they desire. The present mobile telephone service allows for only about 160,000 mobile telephones in the entire nation, but cellular radio could provide an almost unlimited number of mobile phones.

The system, which was invented by AT&T, operates by dividing a particular geographic area into rather small discrete parts called "cells." Low-powered transmitters and receivers serve each cell, so low-powered, in fact, that several phones can transmit on the same frequency in the same cell without causing interference to each other. A person making a phone call from an automobile does so with a low-power transmitter that is received at a central cell complex. This cell complex is tied by phone lines to the regular local and national phone system, so in this way the caller in the automobile can reach anywhere in the country. Similarly, the automobile caller can receive calls from anywhere in the country. The call goes by phone lines to the central cell location and then goes from a cell low-power transmitter to a receiver in an automobile.

The present mobile telephone service operates with relatively high-power transmitters that cover a large area. Because of the high power, only a limited number of phones can operate in that area, but those that operate do cover a large area. The limited area of a cell might appear to be a disadvantage for cellular radio, but the real beauty of it is that as traffic moves from one cell to

another, the cellular system has the ability to hand off signals from one cell to the next. This is accomplished by a switching system, which determines when an in-progress call is at too low a signal level and, therefore, switches it to a closer cell. This switching process takes only a few milliseconds, so the caller would not even be aware of changing from one cell to another.

A cellular radio system can also be expanded to meet increasing demand simply by breaking a cell into smaller areas and increasing the number of cell sites.

The technology for cellular radio was in development at AT&T's Bell Telephone Laboratories as early as the 1960s. In 1971 Bell presented the FCC with a detailed study of how the system would work. Three years later the FCC authorized the concept and several years after that it allowed several experimental systems to be developed. One was a ten-cell system in Chicago serving 2000 customers and operated by AT&T's Illinois Bell Telephone Company, and the other was a seven cell 200 customer system in the Baltimore-Washington area operated by American Radio-Telephone Service, Inc., a radio common carrier involved in mobile radio. Response to both systems from the customers was overwhelmingly positive. In April of 1981 the FCC authorized cellular radio and invited applicants to apply for franchises to operate in various areas.[4]

Although cellular radio is more closely akin to a telephone system than a traditional radio system, companies with radio interests such as Metromedia, LIN Broadcasting, and Cox Broadcasting have applied to the FCC for franchises to operate in particular markets. The two companies applying for the most cellular radio franchises, however, are the two giant phone companies, AT&T and General Telephone. Companies that have traditionally been involved in radio paging and mobile telephone services have also applied to develop this new medium.[5]

The whole cellular radio structure is designed to foster healthy competition. Up to two systems can operate in any area. One of these systems will automatically go to the local phone company if that entity desires it, but the other can be operated as competition to the phone company by some other corporation.

Any company that gains the right to build a cellular system must cover 75 percent of its proposed coverage area within three years and must demonstrate that it has the financial resources to operate the system for at least a year during which time it probably will not show a profit. It must also have the resources to build the system, which will cost between $500,000 and $1 million per cell.

Many companies are planning to manufacture the equipment needed to send and receive the phone messages. The competition generated by these companies should make the cost to the consumer reasonable. However, unlike the AM radio decision, the FCC has established one technology for cellular radio so all equipment manufactured by one company will be compatible with that manufactured by others.[6]

Cellular radio could greatly affect the personal and corporate communication structure. The population in general will be able to receive and place calls anywhere and at anytime. This will make the telephone an even more important communicating device than it is today. The speed of communication will be hastened and stacks of phone messages to be returned will be eliminated.