To the Graduate Council

I am submitting herewith a thesis written by Jeffrey K. Oberg entitled "TV Station Managers' Attitudes towards the Implementation of Digital Television." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Communications.

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TV Station Managers' Attitudes towards the Implementation of Digital Television

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

Jeffrey K. Oberg

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Dedication

This thesis is dedicated to my parents

Kenneth W. Oberg

And

Starr V. Oberg

and

to my sister

Karen S. Oberg

for their tremendous love and support.

Abstract

The purpose of this study was to understand how local broadcasters are approaching the era of digital broadcasting. The researcher surveyed a census of ABC, CBS, ABC, and Fox affiliates. Out of a population of 715 broadcast television stations, 188 surveys were returned for a response rate of 26.33 percent.

All indications are the move to digital broadcasting is popular among broadcasters. Broadcasters express dissatisfaction towards Congress and the FCC for their handling of digital broadcasting, and they express high levels of concerns over such matters as financing new digital equipment, willingness of advertisers to fund digital programming, and the costs to consumers that digital television poses.

Among the important finds from this study is the discovery of a possible shift in the business definition for local broadcasters. Initially, 163 respondents indicated that their current business definition is as broadcasters, compared with only 13 who said they are information providers. However, when respondents were asked what they envision their future definition to be, the number of respondents who identified themselves as future information providers had grown to 63 while the number of future broadcasters was down to 107.

The researcher uncovered several key differences among future information providers and future broadcasters in how they view the future of their industry. Among the differences are how great of an impact digital television will have on their business definition and the levels of interests the two groups have in providing additional digital

services. Overall, future information providers felt that digital broadcasting will have a greater impact on their business definition than did future broadcasters. Also, future information providers expressed greater levels of interest than future broadcasters in providing additional digital services.

This study also explored progress in planning for digital broadcasting. All indications are that broadcasters are only doing what is necessary to comply with Congress and the FCC by planning to purchase digital transmitters in order to broadcast a digital signal. All other areas of planning, including purchasing digital studio equipment and planning for digital programming, lags far behind planning for purchasing digital transmitters.

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Chapter I

Introduction

The broadcast television industry is in the midst of a revolution in the way it does business. The Federal Communications Commission (FCC) has mandated that by May 1, 2006, television, at least as most consumers in the United States know it, will cease to exist. In the place of the three-generation old analog system will be a new digital system capable of broadcasting high-quality video signals, CD-quality sound, and other digital signals.

The near overabundance of possibilities facing the broadcasting industry in the digital age is potentially very rewarding, and at the same time cause for great concern for broadcasters. As of May 1, 1999, all top-10 market affiliates of the four major networks are scheduled to be broadcasting in a digital signal. Several have delayed launching DTV due to technical difficulties, but even the ones that have made it on the air with digital broadcasting are facing a multitude of uncertainties as to how this new medium will evolve. In this respect, there is little difference between a top-10 market like Boston and a 101+-size market like Boise, Idaho. Both markets are dealing with few certainties and thousands of guesses as to exactly what will happen with television in the seven-plus years between now and the demise of the current NTSC system.

Most experts predict the industry will eventually migrate towards the highest-definition of the new digital signal -- the 1080-line progressive (1080p)[1] format -- but just if and how it will get there is in question. By choosing any format from 480i[2] to 720p[3], and even, to a point, 1080i[4] and 1080p[5], broadcasters have a world of opportunities to provide consumers with services that they never were able to provide before. Potential services including multi-channeling up to four channels at once, data services, paging and wireless communications. The potential is made possible by the advent of digital broadcasting.

Before the first wave of digital broadcasts went on the air on November 1, 1998, all but a few experimental United States television broadcasts were analog under the antiquated NTSC, 525-line format that was adopted in 1941 and modified for color in 1953. However, almost 30 years after the first discussions into high definition television (HDTV) (Flaherty, 1998, p.xv), the system by which Americans receive their television signals has finally begun to change. Every television station in America has, or will have to, fulfill its FCC and Congressional mandate to begin supplying the American public with digital television. The switch to digital broadcasting is forcing television broadcasters to answer a fundamental question pertaining to their business identification: Are they traditional broadcasters or are they information providers? The definition of a traditional broadcaster, for the purpose of this study, is a broadcaster who provides

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[1] 1080 lines per screen, progressive scan
[2] 480 lines per screen, interlace scan
[3] 720 lines per screen, progressive scan
[4] 1080 lines per screen, interlace scan
[5] For a complete explanation of resolutions for digital television, please see Technical Aspects of DTV, p. 28.

consumers with the best possible, free, over-the-air television signal as its primary business. An information provider provides a multitude of digital signals, either free or fee-based, as a means for generating additional revenue streams. The additional digital signals can either be an additional television signal (multicasting) or can diverge from the standard television signal offered by traditional broadcasters to include such services as high-speed data streams, cellular phone and pager services.

Fox Television Network President Larry Jacobson has joined the ranks of those who see providing information as the future for broadcasters. Jacobson said, "We're not in the broadcast business anymore. We're in the business of delivering entertainment and information" (qtd. in Consolli and Freeman, 1998, 12).

Increasingly broadcasters are looking to digital broadcasting as a way to break into other, non-traditional methods of providing information, thus redefining their main business to be information providers. Traditionally, it has been the business of broadcast television stations to provide viewers with news, entertainment and sports through a single information stream. With digital broadcasting, the traditional mode of business may no longer be applicable. Digital broadcasting allows broadcasters to provide a single information stream, much like traditional broadcasters, or several information streams simultaneously. It is this ability to split the digital signal into several information streams, that has the potential to redefine broadcasters as information providers.

The question of identity faced by broadcasters has the potential to redefine the broadcast industry and ultimately will decide the product the broadcast industry delivers to the consumers. The choice, either to provide the highest-quality picture and sound

possible or to split their frequency and provide a plethora of entertainment and information choices, will dictate the direction the industry will take for the foreseeable future. For most, like Jacobson, the choice is to expand into areas not previously possible under the old system of delivery. Others are more hesitant to move away from the role of traditional television broadcaster.

In establishing the objectives for adopting digital television standards in the Fourth Report and Order, the FCC purposely promoted the flexibility provided by not adopting a single transmission standard with the idea that broadcasters would be able to provide a multitude of services they were never able to provide before. The four objectives as outlined by the FCC were: "(1) to ensure that all affected parties have sufficient confidence and certainty in order to promote the smooth introduction of a free and universally available digital broadcast television service; (2) to increase the availability of new products and services to consumers through the introduction of digital broadcasting; (3) to ensure that our rules encourage technological innovation and competition; and (4) to minimize regulation and assure that any regulations we do adopt remain in effect no longer than necessary" (Federal Communications Commission, 1996a, 32).

The objectives outlined in the Fourth Report and Order were further refined by the FCC in the Fifth Report and Order (1997a), which left the course digital television (DTV) takes up to broadcasters, who will base their decisions on consumer demand. The report not only opened a whole new avenue of business possibilities for broadcasters, but also gave DTV the potential economic windfalls necessary to make the technology a commercial success. For the first time, broadcasters were not going to adhere to a single

standard for broadcasting. The report gave them the freedom to choose the product they wished to deliver to consumers, anything from a HDTV signal, to four standard definition television (SDTV, comparable to the quality of current analog television signals) signals to non-television digital signals. It is that potential to provide the marketplace with the most profitable digital signals that broadcasters must now carefully evaluate in order to take advantage of this unique opportunity.

According to the FCC, broadcasters should embrace digital broadcasting because it affords broadcasters the ability to compete in a multitude of businesses. Nonetheless, many broadcasters are questioning the wisdom of the digital evolution in their industry. The broadcast television industry is a very profitable industry, with average profit margins for local television stations exceeding average Fortune 500 companies. So why are Congress and the FCC meddling with a profitable industry whose content reaches over 99 percent of American homes?

Broadcasters are not sure of the answer as to why Congress and the FCC are meddling with their industry. They cite a number of concerns covering areas of costs to both consumers and broadcasters, and concerns towards Congress and the FCC, to which they had little input to the laws and regulations which brought about these changes.

However, one of the most repeated criticisms broadcasters express towards DTV is the fundamental fact that unlike every other diffusion of technology that effected the broadcast television industry, this one is not market driven. In a market-driven revolution, diffusion should happen naturally, if at all. According to Schumann, Prestwood, Tong and Vanston (1994) the way Congress, the FCC are forcing digital

broadcasting is the wrong way to introduce an innovation. They say an innovation needs to be market driven and to do that, an organization must "understand the markets, commit to leadership in the markets they chose to serve, execute with excellence across the organization, and keep customers foremost" (p. 3).

Television has been through revolutions before, most notably the color revolution. The digital revolution, though, is like no other in the history of television. Previous revolutions were market driven, allowing the market enough time to mature naturally, for broadcasters to understand the needs and wants of the market, and for diffusion to run its course for both broadcasters and consumers. In addition, the end product in all previous revolutions was still a broadcast television product that supplied consumers with better picture quality. The digital revolution is not necessarily market driven and, while it has the potential to provide consumers with better picture quality, the end product is not guaranteed to be a broadcast television product, much less a substantially better picture than what existed in the analog age. All this presents a host of potential rewards and pitfall for the managers chosen to guide their respective broadcast stations into the digital age.

Managers must decide what resolution to broadcast in, what equipment to purchase, whether to go full-bore into digital or develop a hybrid system, and how much local content should be produced in HDTV or DTV. Of course, these are just a few of the questions broadcasters are facing. Fact is, no one really knows the answers to these question. However, regardless of whether or not broadcasters know the answers, or even

the questions, they must develop a plan to implement this new thing called digital broadcasting. Digital broadcasting is here for some, and coming for the rest.

Statement of Problem

The implementation of digital broadcasting has the broadcast television industry facing an uncertain future. The lack of earlier precedents and the compressed timetable to begin digital broadcasting has forced broadcasters to adopt unproven and unresearched DTV business plans. Managers must decide what picture resolution to adopt, what, if any, additional digital services to offer, and how they will approach the issues surrounding carriage on their local cable television (CTV) provider. For general managers, presidents, vice presidents, operation managers and owners, how the tactics they take in approaching this new business could make the difference between a successful and unsuccessful foray into the digital era.

This study will explore the planning and decisions concerning digital broadcasting being made at the local level and how they relate to the diffusion of technology theory. For digital television to be successful, consumers have to adopt the technology and bring it into their homes. Before that happens, broadcasters have to adopt the digital broadcasting technology in order to get the DTV signal on the air and available to consumers. Diffusion of innovations theory looks at the process by which technology and innovations are adopted.

The network trend seems to be initially to provide viewers with less-than-full HDTV and to supplement revenue streams with additional digital services. However, some broadcasters appear ready to diverge from the plans of the networks and make their own decisions on what to broadcast; though few have actually made much headway in planning for such decisions. One such company that has made specific programming and technology plans is A.H. Belo Corporation. It has decided to broadcast 1080i from all of its stations regardless of network affiliation (Consoli, 1998a). If A.H. Belo Corporation is any indication of a trend in digital television, then it is possible that local broadcasters have a greater level of control over the nature of their business than at any other time in their history.

This study will focus on the attitudes of local broadcasters towards DTV and the decision making process they are using to approach this fundamental change in their business. The study will be approached from the perspective of the diffusion of technology innovation theory. Is this theory applicable to how digital television is evolving and if so how is it shaping the broadcast television industry in the digital age? Early indications are that it is applicable in some areas of the switch to digital broadcasting and not applicable in other areas. This study will show how diffusion is and is not applicable in the digital era of broadcast television.

The primary focus of the study will center on the question: In the digital era, will the business of broadcasting continue to be traditional broadcasting or will it migrate towards the business of providing information in many digital forms? The concentration of the study will center on the decisions concerning several key facets of digital

television, including; broadcasters' attitudes towards digital television, regulation issues, programming, equipment upgrades, resolution quality, carriage issues presented by local cable companies, and the potential for providing additional digital services.

Other questions this study hopes to answer include:

1. What are broadcaster's prevailing attitudes towards the digital transition?
2. Are television stations, in fact, attempting to make the transition from traditional broadcasters to information providers as mentioned earlier in this paper?
3. Are digital television decisions being made at the corporate or local level?
4. How much freedom do local broadcasters have in making decisions regarding digital television?
5. How far along are local broadcasters in the digital planning process?

Significance of the Study

The purpose of this study is to understand the situation facing local broadcasters and how they are handling it. This study hopes to identify and understand early digital television trends among both small and large market television broadcasters by surveying affiliates of the four major networks in every television market in the United States of America. By identifying and understanding broadcasters' early attitudes and decision-making processes as they begin to make and implement plans for digital broadcasting, this study will bring light the differences between large and small markets, the four major

networks, and potential early adopters. This study will also identify several previously unrecognized trends.

The research should be beneficial to both the broadcaster currently broadcasting a digital signal as well as the broadcaster preparing to begin digital broadcasting as many as three-to-five years from now. The broadcaster currently broadcasting a digital signal could benefit from his or her fellow DTV broadcasters' trials and tribulations and, naturally, the broadcaster still awaiting commencement of DTV broadcasting could benefit from those who have gone before him or her.

This study could also serve as a foundation for later research. This study was conducted in the early stages of the transition to digital broadcasting. Many respondents were unclear as to how they will approach digital broadcasting when the time comes for them to commence broadcasting a digital signal. This study will serve as a reflection of broadcasters early thoughts, opinions, and plans for digital broadcasting. Future researchers will be able to use this study as a starting point by which to measure progress in the areas this study analyzed.

Organization of Chapters

Presented in five chapters, this research examined the planning processes, attitudes and concerns faced by broadcasters making the switch to digital broadcasting, reviewed current literature on DTV and chronicled recent developments in digital television.

Chapter I introduces the current status facing the broadcast television industry. The chapter begins to outline the mandated switch from analog to digital broadcasting faced by the television industry. The discussion introduces the perils and opportunities the digital evolution presents. The purpose and significance of the study are also included.

Chapter II presents a review of related literature on broadcasters' plans for switching to digital, their choices of equipment, resolutions qualities and how and why they made the decisions they made. Issues concerning Congress and the FCC, as well as cable television, are also discussed. The literature also offers insight to where the industry may evolve in the future.

Chapter III details the method used to survey the opinions, attitudes and progress towards digital television of all affiliates of the four major networks in the United States.

Chapter IV presents the research findings. Results are organized by research questions.

Chapter V examines and discusses the study's findings in contrast to published market trends. A call for future research is also presented.

Chapter II

Literature Review

Overview of the Diffusion of Innovation Theory

This study looks to analyze the evolution to digital broadcasting, for both the broadcasters and the consumers, from the perspective of the theory of diffusion of innovation and technology. Therefore, the analysis of digital television will begin will begin with a discussion into the theory of diffusion of innovation.

The two basic elements of the theory of diffusion of innovations are diffusion and innovation. According to Everett M. Rogers' Diffusion of Innovations (1995), diffusion is "the process by which an innovation is communicated through certain channels over time among the members of a social system" (p.5). Rogers defines innovation as "an idea, practice or object that is perceived as new by an individual or other unit of adoption" (11).

In Sieling, Malecki, and Brown's Infrastructure Growth and Adoption: The Diffusion of Cable Television Within a Community (1976), the sequence of diffusion is stated to be: development of the innovation; diffusion agency establishment; innovation establishment efforts by agencies, and finally adoption by households (p.1).

The four main elements in the diffusion of innovations, as outlined by Rogers, are the innovation, communication channels, time, and the social system (1995, p.10).

The specific type of innovation this study analyzes is a technological innovation. Therefore, the element of the innovation must be viewed from a technology viewpoint. Rogers (1995) defines technology as a "design for instrumental action that reduces the uncertainty in the cause-effect relationship involved in achieving a desired outcome" (p. 12). In the case of digital television, the uncertainty about its expected consequences on the broadcast industry is evident, and probably great. At the same it represents an opportunity to reduce uncertainty, at least according to Rogers, because it "represents the possible efficacy of the innovation in solving an individual's perceived problem" (1995, p.14).

The theory states that the uncertainty reduction in one category caused by an innovation should lead potential adopters to seek out information on the innovation, thus reducing the uncertainty of expected consequences the innovation created. Ideally, therefore, an innovation should alleviate all uncertainties concerning itself. Digital broadcasting, however, has probably not been in existence long enough to have begun to alleviate the uncertainties surrounding itself.

The second element in the diffusion of innovation process is the communication channels. For the purposes of this theory, communication is defined as "the process by which participants create and share information with one another in order to reach a mutual understanding." The four elements of communication of an innovation are: (1) an innovation; (2) an individual or adoption unit that has knowledge of the innovation; (3)

an individual or unit that does not have knowledge of the innovation; and (4) a communication channel by which the two units are connected (Rogers, 1995, 17-18).

In order to have the communication necessary to disseminate information concerning an innovation, like digital broadcasting, a communication channel must exist. The most common types of communication channels are mass media and interpersonal, both of which are being widely utilized by the broadcast industry as it moves towards digital broadcasting.

The third element in the diffusion of innovations is time. According to Rogers (1995), the three ways time is involved in the diffusion process are: (1) The "innovation-decision" process in which the potential adopter first learns of the innovation through the time the individual or unit rejects or accepts the innovation; (2) How early or late, compared to other members of the population, in the innovation's cycle the innovation is adopted; and (3) The rate of adoption for an innovation, which is usually measured as the number of members in a system that adopt the innovation in a given time period (p. 20).

An essential component in the element of time is the innovation-decision process. Rogers outlines the five main steps in the process to be knowledge, persuasion, decision, implementation and confirmation. The first four steps are self-explanatory. The final step, confirmation, is when the decision-making unit seeks reinforcement of the innovation decision. However, the innovation decision may be reversed if the decision-making unit is exposed to conflicting messages concerning the innovation (Rogers, 1995, p. 20).

Time is applied to when adopters accept the new innovation (innovativeness) and to the rate of adoption of the innovation. Innovativeness is defined as the "degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system." Rogers defines the five classifications of adopters as (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards (20). Rate of adoption is the relative speed with which an innovation is adopted by members or a social system. The rate of adoption is usually measured by the length of time required for a certain percentage of the member of a system to adopt an innovation (Rogers, 1995, p. 22-23).

The final element of diffusion is the social system, which Rogers (1995) defines as "a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal" (p. 23). Furthermore, the social system sets the boundaries within which an innovation defuses. The units can consist of individuals, groups or organizations. In the case of digital television, the units in this study are local broadcasters, which can be analyzed separately or as an informal group, and consumers, which are looked at individually.

There are three types of innovative-decisions, all of which apply to broadcasters' transition to digital broadcasting and consumers' adoption of digital televisions and converter boxes. The first type of innovative-decisions is optional innovative-decisions, by which an individual accepts or rejects an innovation independently of what others may chose (Rogers, 1995, p. 28). Locally owned and operated broadcast outlets, or

broadcasters with complete autonomy from their corporation, would fall under this category.

The second type of innovative-decision-making is collective innovative-decisions. In this case, a consensus on whether to adopt or reject an innovation is made by the members of a system (Rogers, 1995, p. 28-29). If members of a corporate-owned broadcast group are viewed as a system, and there is a level of equity between the corporate decision makers and the local broadcaster, then decisions concerning such matters as what digital studio equipment to adopt for the corporation would qualify as a collective innovative-decision.

The final type of innovative-decision-making is authority innovation-decisions. Authority innovative-decisions are defined as innovations that are adopted by relatively few individuals in a system "possess power, status or technical expertise" (Rogers 29). While strictly corporate decisions regarding digital broadcasting decisions for the local level may qualify under this category, the Congress and FCC's decision to change broadcasting in the United States best fits this category. The fact that Congress and the FCC have decided to adopt the digital innovation to replace the analog NTSC system is clearly an example of an authority innovation-decision.

The adoption step is categorized by Lawrence A. Brown in The Market and Infrastructure Context of Adoption: A Perspective on the Spatial Diffusion of Innovation (1976) as the demand side of the diffusion equation. The development of the innovation and the establishment of diffusion agencies can be seen as the supply side of the equation (p. 2).

Brown asserts in his discussion of the supply side of diffusion that "characteristics of the diffusion agency system and the gross pattern of diffusion came about through the aggregation of individual actions and the decentralized decision-making. Factors such as profitability or market potential appear to operate here only as threshold conditions for agency establishment. Given these conditions, agency establishment is primarily related to the exposure of the founder to the innovation" (1976, p.6). Therefore, if broadcasters have been exposed to certain possibilities concerning digital television, and the conditions of their specific markets are receptive to these possibilities, then innovation in digital broadcasting is likely to occur.

Brown's discussion of the supply side of diffusion is carried further by Gross, Shreestha, Malecki, Semple and Brown (1974). In The Diffusion of Cable Television in Ohio: A Case Study of Diffusion Agency Location Patterns and Processes of the Polynuclear Type, Gross et al. write that overall, diffusion of technology can be broken down into two main types of diffusion agency location processes; mononuclear and polynuclear. In a mononuclear model, a single proprietor or economic entity establishes a number of diffusion agencies. In this model, decisions are made by ranking and evaluating alternatives and "primarily employing economic criteria such as profitability" (1976, p.1-2).

Polynuclear is defined as a case where each diffusion agency is established by a different entrepreneurial or economic entity. Two factors that mark a case of polynuclear diffusion are: (1) economic factors appear to operate only in terms of threshold conditions that make agency establishment feasible; and (2) "exposure of the

entrepreneur to the innovation whereby he learns of the method by which a diffusion agency may be established and of the possibilities and profitability of doing so." Thus, the basic difference between mononuclear and polynuclear diffusion is polynuclear involves the spread of diffusion agencies with the adoption of an entrepreneurial innovation whereas a mononuclear diffusion involves the spread of diffusion agencies without entrepreneurial innovation (Gross et al., 1976, p.2).

The case of digital television can be viewed as both mononuclear and polynuclear, though agencies (broadcasters) have already been established. As will soon be discussed, broadcasters engaging in bare-bones digital broadcasting, which requires nothing more than a digital transmitter, are engaged in mononuclear diffusion. Though already established, they have yet to establish develop the innovations possible with digital broadcasting. If digital innovations are to be established by broadcasters operating in a mononuclear environment, the more profitable markets will be exploited first with less profitable markets exploited later, if at all (Gross et al., 1976, p. 8).

Broadcasters seeking to employ all the benefits of digital broadcasting and provide additional digital services, are entrepreneurial, and thus are engaged in polynuclear diffusion. Based on the polynuclear model, broadcasters who fit this model will have to meet threshold conditions concerning exposure and market size (or profitability) before adoption occurs. Once those thresholds are taken into account, then broadcasters will look at the number of entrepreneurs already in the market and determine from there if they will offer certain digital services.

Throughout the remainder of this study, specific examples of how digital broadcasting is being implemented by Congress and the FCC, corporations, and local broadcasters will be analyzed against the principles of diffusion.

Early Advanced Television

The current concept of digital television had not even begun to take shape when, in the early 1970s, the industry began discussion into improving the current broadcast system. The goal or the early research was to offer the consumer better picture and sound quality than what was currently available under the NTSC system. The Japanese broadcasting company NHK was the first to launch research into a "high-definition" system with the initial effort being an exploratory discussion to come up with a definition for high definition television. The research begun by NHK spawned a series of papers studying how people perceived picture quality, how they responded to interlaced scanning, and other areas concerning what the optimum television resolution a human could perceive. The end result of the first phase of research led NHK to describe the original, 16 x 9-1125-line format for High Definition Television (Flaherty, 1998, p. xv).

The International Telecommunications Union was the next to promote research into high definition television in 1974. In posing the question of what standards should be recommended for a HDTV system, it stated that the resolution quality should be at least that of 35 mm film, or twice the resolution of the present television system (Flaherty, 1998, p. xv).

The motion picture industry added its input into an appropriate standard for ATV (advanced television, the term used to describe the next level of television beyond NTSC) with the Society of Motion Picture and Television Engineer's (SMPTE) Study Group on High Definition Television. The Group's report, stated: "The appropriate standard of comparison (for HDTV) is the current and prospective optimum of the 35 mm release print as projected on a wide screen ... The appropriate line rate for HDTV is approximately 1100 lines-per-frame and the frame rate should be 30 frames-per second interlaced 2-to-1" (qtd. in Flaherty, 1998, p. xvi).

In 1987, the FCC began the regulatory aspect of the United States broadcast industry's shift into the modern high-definition television era with the formation of the Advisory Committee on Advanced Television Services (ACATS). The committee was charged to study the problems of the terrestrial broadcasting of advanced television, to test proposed systems and to make a recommendation to the FCC by the second quarter of 1993 for selection a single terrestrial HDTV transmission standard for the United States. ACATS was given further direction in 1990 with FCC Chairman Sikes' announcement that: "The Commission's intent is to select a simulcast high-definition television standard that is compatible with the current 6 MHz channelization plan but employing new design principles independent of NTSC technology" (qtd. in Flaherty, 1998, p. 16). Sikes had energized the FCC towards a goal he envisioned as full quality HDTV broadcast terrestrially separate for the current system.

The ACATS had in front of it, at the time of Sikes' remarks, nine proposals for a new ATV system. However, all were similar to the old NTSC system in that they were

all analog and relied, at least in part, on NTSC technology. The Commission and the industry had yet to explore the potential of digital for the broadcast television industry. That began to change a mere two months later.

The Dawn of Digital

General Instruments ushered in the DTV era on June 1, 1990 with its proposal for an all-digital, terrestrial HDTV system. According to Flaherty (1998), "Television was to make its most fundamental technological change since its invention and its subsequent colorization" (p.xvii). With GI's digital introduction, analog basically was doomed, and the nine analog proposals facing the ACATS in 1990 became four digital systems and one hybrid analog/digital system in 1991.

The FCC indirectly made another major prompt for digital television in September 1990, in its First Report and Order on ATV, in which it decided not to pursue any system that augmented a current 6 MHz signal in order to be compatible with the current NTSC service. The Report went on to explain that the FCC was looking for a completely new system, incompatible with the current system, that would be simulcast along with the NTSC signal. Finally, the new system would use 6 MHz space to broadcast a HDTV signal, the same amount of space as an NTSC signal. This Report and Order is significant in that it paved the way for the FCC to abandon NTSC in favor of an entirely new, incompatible system for television. The sequence of events by which analog broadcast television was to reinvent itself as digital broadcast advanced television was finally beginning to take shape.

In the Further Notice of Proposed Rule Making (1991), the FCC, in effect, finalized the demise of NTSC, and ATV became DTV. In it, the FCC said it envisioned that HDTV will eventually replace NTSC and that once HDTV "becomes the prevalent medium," broadcasters would have to give back the analog 6 MHz frequency and broadcast only in HDTV. While the Further Notice of Proposed Rule Making did not set the timetable for return of the analog spectrum, it did establish the principle that the new system will be separate and apart from the current system and that at some point the frequency used by the current system will be returned to the government and only the new HDTV system will be used.

In the Second Report and Order for implementing HDTV, issued by the FCC in May of 1992, the Commission put aside a block of frequencies for HDTV and gave current broadcasters first rights to them. The distribution system, which went a long way towards not only mandating DTV but promoting it as well, will be discussed later in this study.

With its Third Notice of Proposed Rule Making (1993), the FCC set the calendar for the transition to HDTV and, at the same time, eliminated natural diffusion from the innovation of digital broadcasting. The Commission set May 1, 1999 as the date affiliates of the four major networks (ABC, CBS, Fox, and NBC) in markets 1-10, which reach 30 percent of all U.S. households, must begin broadcasting in DTV -- although 24 stations reached an agreement with the FCC to begin broadcasting in DTV by November 1, 1998. Affiliates of the four major networks in top 30 markets, which reach 53 percent of all U.S. households, must be broadcasting in DTV by November 1, 1999. All other

commercial stations must be broadcasting in DTV by May 1, 2002 and all non-commercial stations must be broadcasting in DTV by May 1, 2003. Therefore, by May 1, 2002, every American who presently has access to a free, over-the-air, commercially broadcasted television signal should have access to a DTV signal. By May 1, 2006, all television broadcasters will cease broadcasting in the NTSC bandwidth and it revert back to government control (FCC, 1997).

The FCC reviewed this timetable in its Fifth Report and Order (1997) and found it to be reasonable. The report explains further why the FCC chose network affiliates in the larger markets to be the first stations required to broadcast a digital signal:

> We note that the most aggressive requirements apply to stations that we believe are most able to absorb the costs of conversion and are otherwise situated to make the transition quickly: stations affiliated with the four major networks in the largest markets. We base our decision in this regard on several grounds. First, network affiliates consistently garner the highest percentage of audience share,[6] and thus are likely to have substantial revenues that may be used to fund the conversion. Second, network affiliates are in a stronger position than independent stations because they obtain programming from their network and may also receive economic, technical, and other support that would help with respect to the conversion. Affiliates are consistently the most highly watched and generally the most financially successful, with better ratings and consequent higher advertising

[6] *See, e.g.*, Television Audience 1995, at 21; Cable Television Developments, Spring 1997, at 5.

revenues.[7] Their greater strength should give them a strong position from which to launch their digital service... Finally, our construction schedule also focuses on network affiliates because we believe that the sale of receivers and thus the conversion to DTV will be accelerated by the early availability of network programming in DTV[8] (FCC, 1997, p. 37-38).

The timetable established by the FCC is an example of the using an authority innovative-decision making process. While opinions and feedback were sought from members of organizations representing individuals in all industries affected by the rules and regulations, the final decisions were made by a select few.

The FCC's timetable for converting to digital broadcasting can also be explained as mononuclear diffusion. Edward J. Malecki (1975), in Innovation Diffusion Among Firms, outlines the setting as of mononuclear diffusion as: "A single propagator entity determines the location of each agency and the time at which it is established. This is done by evaluating and ranking alternative locations, employing such criteria as market potential for the innovation, and then, subject to budget constraints, choosing the most favorable as diffusion agency sights" (p. 5). By selecting top-10 markets, which are often the most wealthy of markets, to begin broadcasting digital first, followed by markets in increasingly smaller size, the FCC employed mononuclear diffusion to at least get digital broadcasting on the air.

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[7] *See, e.g.,* Palmer, *The Eye Has It*, Barron's, March 3, 1997.

[8] We have recognized the value and appeal of network programming in a number of previous decisions. *See Channel 41, Inc.*, 6 FCC Rcd 4109, 4111 (1991) (rule waiver granted in order to preserve ABC programming); Herald Publishing Co., 6 FCC 2d 631 (1967) (waiver granted in part because station proposed to bring NBC network programming to a large number of viewers for the first time).

It is possible, however, that the return date of NTSC will be extended. Congress has allowed for the possibility of extending the timetable for return of the analog spectrum. The 1996 Telecommunications Act extends the timeline for returning the analog spectrum if 80 percent of households do not have "access" to a digital signal by the analog return date. Even with this loophole in place, it seems the broadcast industry thinks the timetable is too short.

Many in the industry site the conversion to color as an indicator of a more realistic timetable. Penetration of color television sets took (BLANK) years from their introduction to reach 80 percent. They question how digital television can be expected to reach 80 percent penetration in a shorter time period.

Formation of the Grand Alliance

The process that would eventually lead to the formation of the Grand Alliance, a partnership between several companies and an institute of higher education with the intention of developing the set of standards that would become ATV, began in November, 1992. Shortly before the ACATS recommendations on HDTV system were to be made in early 1993, each group with an ATV proposal in front of the ACATS pinpointed a series of improvements and requested an opportunity to implement those improvements. On February 8, 1993, the Special Panel of the Advisory Committee met to consider the test results and system improvements in an effort to decide a specific standard. While all four digital systems performed better than the hybrid analog/digital

system from Narrow Muse, none performed well enough to win outright over the other competitors. Narrow Muse was dropped from consideration and the remaining parties – AT&T/Zenith, General Instrument, DSRC (Sarnoff)/Thomson/Phillips, and MIT – formed the Grand Alliance on May 24, 1993. The Alliance was formed in an effort to develop a final system using the best-of-the-best technology developed individually by each company (Flaherty, 1998).

The Grand Alliance met with the Technical Subgroup of the Advisory Committee and recommended the basic system parameters:

- The system would support two, and only two, scanning rates of 1080 active lines with 1920 square pixel-per-line interlace scanned at 59.94 and 60 fields/second and 720 active lines with 1280 pixels-per-line progressively scanned at 59.94 and 60 frame/second. Both formats would also operate in the progressive scanning mode at 30 and 24 frames/second.
- The system would employ MPEG-2 compatible video compression and transport systems.
- The system would use the Dolby Digital, 384 Kbit/s audio system (Flaherty, 1998).

Shift from HDTV to DTV

The *Fifth Report and Order* moves away from the *Third Report and Order's* language concerning HDTV, choosing instead to substitute it with DTV. With the *Fifth*

Report and Order, the Commission took the economics of the transition from analog broadcasting to digital broadcasting into account. The Commission saw the need to work in an element of flexibility in order to make DTV economically viable, by introducing SDTV, thereby giving broadcasters the option of providing additional digital services by which to develop additional revenue streams.

At the same time, the FCC was able to work into the digital evolution a market-driven element. Up until this point, the FCC regulations had dictated how and when DTV would be introduced. The element of flexibility introduced in the *Fifth Report and Order* gave broadcasters an avenue by which to respond to the needs of the local markets through multiple digital signals (i.e. multiple television signals, cellular phone service, high speed internet access, etc.). By introducing a market-driven element, the theory of diffusion of technology innovations, necessary for successful innovations (Schumann, Prestwood, Tong, and Vanston), came into play in the evolution of digital television.

The shift in focus away from HDTV towards DTV came in the spring of 1995. Up until that date, the focus since 1970 had been on developing a high-definition television system, with high-definition defined as something better than the standard that currently existed. Two formats -- 1080i (1080 lines per screen, interlaced scanned) and 720p (720 lines per screen, progressive scanned) -- as recommended by the Grand Alliance, were closely related to the original 1100 line system recommended by NHK in 1973 because they closely resembled the quality of 35 mm film (Flaherty). When it came to HDTV, this is what the FCC and Congress had in mind. (1080p is not currently possible because it takes up more than 6 MHz of bandwidth.)

The Federal Communications Commission gave DTV its best chance at being commercially viable came in the Spring 1995, when FCC Chairman Reed Hundt required the Advisory Committee to include several standard definition television (SDTV) formats (480i and 480p) in its final recommendations. These formats more closely resemble the picture quality found in upper-level television sets operating under the NTSC format.

The SDTV formats were included thereby altering the transition of television in the United States from an analog-to-HDTV conversion to an analog-to-DTV conversion. As will further be discussed, this one move by Hundt has created opportunities for the broadcast industry that were unimaginable 10 years ago, thereby possibly changing the definition of the business of broadcast television.

The Advisory Committee recommended the ACATS DTV and HDTV standards to the FCC on November 28, 1995. After the scanning formats were privatized as Advanced Television Systems Committee (ATSC) standards, they were approved by the FCC on December 24, 1996 and were mandated for terrestrial DTV/HDTV broadcasting. Finally, on April 3, 1997, the digital-channel assignment plan and DTV service rules were adopted (Flaherty, 1998, p. xix).

An Introduction to the Technical Aspects of DTV

What is digital television? The intent of this study was not to discuss technical specifics concerning how stations should handle the switch to DTV. The choice of specific equipment is much too involved, changes too rapidly for discussion here, and

does little to address the overall definition of television in the digital age. Nonetheless, it is necessary to discuss the technical standards adopted by the FCC as they have a direct and significant impact on what, if any, digital services broadcasters can offer in addition to their free, over-the-air television broadcasts and therefore what the future business of broadcasting will be.

The FCC's technical standards encompass a range of resolutions from standard definition television to high definition television. The varying degrees of resolution offers broadcasters the flexibility to make decisions on product delivery based on consumer demand. The higher the resolution quality, the more bandwidth the signal takes up. The lower the resolution quality, the more bandwidth is available to provide additional digital services. This section will take a look at each level of resolution and the benefits and drawbacks each offers to broadcasters.

Before getting into the different formats, some discussion on interlaced versus progressive scanning is necessary. Even though the resolution formats broadcasters pick will play a major role in what services they will be able to provide, it is the scanning format that will play a major role in the convergence aspect with existing technologies like the personal computer.

Technical Aspects of DTV

The NTSC system uses interlaced scanning to display a picture on the television screen. Microsoft Corporation's Bookshelf 98 defines interlaced as "To connect by or as

if by lacing together; interweave" (Microsoft Corporation, 1997) which is exactly what the television does with the signal. Interlaced scanning of a television picture takes two halves of a picture and combines them to make one whole picture. The pictures are scanned at such a rate as to fool the human eye into thinking there is only one picture on the screen.

Progressive scan is the delivery mechanism that will allow the greatest flexibility and best picture quality for television. In this format, the entire picture is scanned on to the screen at the same time instead of being broken down into two pictures like interlacing. This is the format used by computers, which is why it offers the most promise for broadcasters exploring convergence possibilities.

While progressive scanning allows for the greatest level of picture quality at a given resolution, as well as the greatest level of flexibility, it requires more bandwidth than interlaced scanning. For example, with a 1080i picture, there is, in effect, two 540-line pictures. The first picture is scanned on to the screen and the second 540-line picture is scanned in between the lines of the first picture. However, with a 720p picture the entire 720 lines are scanned on the screen at the same time. Clearly 720 lines requires more bandwidth than 540 lines (SCRI International, 1999, p. 14).

The Executive Committee of the ATSC approved a number of different formats from which broadcasters could chose to use. The standards adopted were broken down into two categories: HDTV and SDTV (Advanced Television System Committee Online, accessed July 20, 1999).

Six video formats comprise the ATSC High Definition Television standard. Three formats use 1080 line by 1920 pixels, at 24, 30, and 60 pictures per second. This group of standards totals roughly 2 million pixels per picture. The highest possible resolution, 1080p at 60 frames per second, often called the "Holy Grail," is not currently feasible within frequency constraints. The technology does not exist to compress its massive bandwidth requirements into the allotted 6 MHz at 19.4 Gbts that the FCC has mandated (SCRI International, 1999, p. 17).

The second group of HDTV formats uses 720-line by 1280 pixels at 24, 30 and 60 pictures per second. The 720-line standard totals roughly 1 million pixels. All six HDTV standards employ a 16:9 aspect ratio (Advanced Television Systems Committee Online, accessed July 20, 1999).

The remaining twelve digital video formats, while representing some significant improvements over analog NTSC, are not considered high definition television. They are referred to as "standard definition television." These are the 480-line by 704-pixel formats in 16:9 widescreen and 4:3 aspect ratios, at the picture rates listed above, and the 480-line by 640-pixel format at a 4:3 aspect ratio, at the same picture rates (Advanced Television Systems Committee Online, accessed July 20, 1999).

A comparison between NTSC and SDTV progressive scan shows why even a SDTV progressive picture, is a vast improvement over NTSC. While NTSC delivers 525 lines of information, only 480 lines are active video. The remaining lines are used for vertical synchronizing information. Hence, the 480-SDTV formats were adopted based on NTSC's 480 active lines of active video. But because NTSC is interlaced, it is

actually delivering two 240-line pictures, which is inferior to the 48 active video lines in 480p format. (SCRI International, 1999, p. 18).

Implementation of DTV

Both Congress and the FCC have clearly expressed that the switch from analog to digital is going to happen, and, in fact, is happening. However, both regulatory bodies have been purposely vague in directing the switch by avoiding clear mandates and technical specifications. The FCC has specifically spelled out its desire to implement as few technical mandates as possible in order to let the market decide the end products of digital broadcasting.

This has led to a feeling of uncertainty among broadcasters, many of whom express excitement and optimism over the potential of digital broadcasting, although the uncertainty aspects of the high-stakes gamble temper the optimism somewhat or, perhaps, significantly. An engineer from WJLA, Mike Olingy, summed up that attitude of a large segment of the broadcasting industry when he said, "It's (digital broadcasting) like the brave new world. Actually, it's more like what Yogi Berra once said, 'It's an insurmountable opportunity" (qtd. in Mundy, 1998a, p. 27).

Digital broadcasting may not exactly be insurmountable, at least in the short term, as 69 stations -- as of July 2, 1999 -- are proving or in the process of proving with their current digital transmissions (National Association of Broadcasters Online, accessed July 17, 1999). Nearly half (30) of the stations currently broadcasting a digital signal are in

markets other than top-10 markets, meaning they are not currently required to be broadcasting a digital signal according to the FCC. Of those 30 stations, 19 are in top-30 markets, thereby required to commence broadcasting a digital signal by November 1, 1999. While these stations could be regarded as early adopters based on their willingness to beat the FCC deadline to begin broadcasting a digital signal, the 11 other stations broadcasting a digital signal in markets smaller than top-30 are definitely early adopters. Their deadline to begin broadcasting a digital signal is not until May 1, 2002, yet they are doing so nearly three years early. For these stations, and the 19 stations in markets 11-30, the choice to begin digital broadcasting prior to the deadline date introduced an element of natural diffusion to the FCC's and Congress' forced diffusion via laws and regulations.

Instead of an insurmountable opportunity, as Olingy called digital broadcasting, it is more like an uncertain opportunity that is cause for broadcasters to reinvent themselves. As discussed earlier, the issue facing broadcasters is what will consumers demand from broadcast stations in the digital age: high definition pictures and sound or standard definition pictures coupled with other digital services. It is an issue broadcasters do not necessarily want to face. For most of them, the current system is working just fine, at least, according to the bottom line on their balance sheets.

A majority of broadcasters are doing rather well financially. The current status of traditional broadcasters under the NTSC system is producing, on average, rather healthy profits for broadcasters. Geismar (1993) said that operating margins for broadcasters are significantly higher than can be obtained through most other investments

(p. 50). In that case, what incentives do broadcasters have to risk the expensive switch from analog to digital broadcasting? Actually, for most broadcasters there are few incentives other than the fact their competitors are already making, or planning to make the switch to digital. However, is that really enough to justify such an expensive risk?

It very well might be. Whether concerned over losing viewers to a better picture or losing customers to digital services offered by competitors, if there is the possibility of making additional profits through digital transmissions, broadcasters are not going to sit on the sidelines while their competition gets into the marketplace.

However, if broadcasters jump full-bore into digital television, they will have to face more important factors than just what their competition is doing. Factors facing broadcast station owners in this convergence are current profitability, regulatory factors and costs. This section of this study will delve into those aspects and in what direction they are pushing broadcasters as they make, or prepare to make, the move to digital broadcasting.

If digital television went away tomorrow, never to be heard of again, broadcasters would not be overly upset, at least if the current economic conditions continued. In the first quarter of 1994, publicly reporting television station group owners showed profits up at least 30 percent on revenue gains of high single to low double-digits (Foisie, 1994, p. 18). That trend continued in 1998. For the quarter ending March 31, 1998, Tribune, Pulitzer Broadcasting, Meredith, Univision, and Granite Broadcasting reported record, or at least healthy, profits (McClellan, 1998c, p. 18). For the 1998 fiscal year, CBS owned stations achieved a group-wide cash-flow margin of 50 percent while posting a 45

percent gain in operating profit. NBC stations posted healthy profits of $560 million while ABC owned stations saw profits climb 11 percent over a year earlier to $510 million (McClellan, 1999, p. 10).

With the current television system providing such broadcasters with such a good economic state, the FCC and Congress would need to do more than mandate a switch to DTV if the venture was going to go over well with the powerful broadcast industry. Indeed, if Congress felt that DTV was best for the American public, it would have to coax the broadcast industry out of its current comfortable position and into taking a substantial risk by reinventing itself in digital form. In reinventing itself in digital form, broadcaster television stations will be forced to spend several million dollars to upgrade their equipment with no guarantee that the investment will pay off in the form of increased profits from additional revenue streams. In the end, broadcasters could lose their investments in digital equipment only to end up with a product very similar to what they produce today. That, they feel, would not justify the expense of converting to digital broadcasting.

The Great Frequency Giveaway

The FCC can be promotional as well as compulsory in managing and directing the switch to digital, which is exactly what it did when it came time to parcel out frequencies. The debate over whether or not to make broadcasters pay for the digital bandwidth was polarized between two groups. The first group saw the free distribution of the digital

frequencies as corporate welfare for rich broadcasters. The second group was made up of those who saw the free distribution as a means to promoting DTV and consistency amid an uncertain future. In a panel discussion before the FCC on December 12, 1995, former FCC Chairman Richard Wiley addressed the position of auctioning off the digital spectrum. He warned that such an action could "disrupt the Commission's orderly transition plan and likely deprive broadcast viewers of the full advantage of ATV" (FCC, 1995, p. 11). The feeling was if the spectrum was auctioned off, large corporations like AT&T and General Motors would force out most established broadcasters because of their easier access to large amounts of capital. In theory, they would be able to outbid broadcasters potentially causing confusion amongst an American public that is looking for a seamless shift to DTV. Ultimately, Congress decided to allocate to broadcasters, at no charge, 6 MHz on the digital spectrum for the purpose of broadcasting digital pictures.

At the heart of the decision to give away the digital spectrum to broadcasters was the Commission's desire not just to mandate DTV but to promote it as well. In Commission Adopts Rules for Digital Television Service, the press release accompanying the Fifth Report and Order, the FCC said, "The overarching goal ... is to provide for the success of free, local digital television" (FCC, 1997b, p. 1). In order to do that, the Commission had to make DTV attractive to broadcasters by making DTV economically feasible.

Flexibility in the Digital Age

The issue of flexibility gets to the root of defining the local broadcaster in the digital age. When the FCC took up the issue of digital broadcasting, it was not trying to define the broadcaster, but instead it was trying to decide to what extent it should mandate particular uses of the digital spectrum. Its solution was to promote flexibility within the rigid timetable it mandated for the introduction of digital broadcasting. In doing so, the FCC introduced the option of addressing the needs and concerns of broadcasters' markets into what was previously a non-market-driven, mononuclear transition to digital broadcasting.

This study already discussed the issue of flexibility, in regards to available resolution formats, in its discussion of the Grand Alliance. In establishing the various formats proposed by the Grand Alliance, the FCC gave its first hints that much of the decision-making process in selecting a DTV format was going to be left up to individual broadcasters.

Voices opposed to flexibility in DTV formats argued the original intent of DTV was HDTV and that to promote anything less would be a disservice to the American public. In a transcript of the FCC's Advisory Committee in December, 1995, Ed Grebow said, "The Commission should encourage broadcasters to offer a minimum amount of HD content. There are several sound public interest reasons for such an approach: the public interest in assuming technical excellence in the broadcasting service, the public interest in stimulating the marketplace for new and innovative HDTV digital TV sets and

the public interest in avoiding confusion between standard definition and HD standards" (14).

Grebow's call for HDTV was in line with several important members of Congress whose original intent in providing 6 MHz of free spectrum space for DTV was for broadcasters to operate at a HDTV standard. Congressman Billy Tauzin said, "That (HDTV) is why we gave them 6 MHz." (Mundy, 1998b, p. 16).

Nevertheless, the overriding voice in the FCC's initial standards discussion was one of flexibility. As Lawrence Grossman said, "...commercial broadcasting is a business first and foremost, and a very good one. And not basically either a public service, and certainly not a public trusteeship..." (FCC, 1995, p. 19). In that vein, the FCC adopted the Fifth Report and Order, which laid the groundwork for the introduction of a digital broadcasting system that would allow for broadcasters to take into account their local markets and develop a business strategy to explore the potential of their markets. In the press release accompanying the Fifth Report and Order (1997a), the FCC said, "To bolster DTV's chance for success, the Commission's decisions today allow broadcasters to use their channels according to their best business judgement, as long as they continue to provide free programming on which the public has come to rely. Broadcasters will be able to put together whatever package of digital product they believe will best attract customers and to develop partnerships with others to help make the most productive and efficient use of their channels" (FCC, 1997b, p. 1).

In adopting a wide range of standards, including SDTV, the FCC agreed with the statement made by Grossman and dismissed, for the most part, broadcasters' societal

duties in favor of standards that will give broadcasters the right to decide how best to pay for the transformation to digital. Before the order, this was a major concern for broadcasters and investors, who saw the mandated switch to DTV as having little financial reward. With little promise for reward, investors would find it difficult to raise the necessary capital to finance the transformation.

Cost of Converting to Digital

Converting from analog to digital technology is not cheap for broadcasters, especially broadcasters in small markets who's resources are often more limited compared to broadcasters in larger markets. Nick Trigony, president of Cox Broadcasting, estimates the initial investment for tower construction and installation of new transmitters to be between $2 -5 million per station. To complete the move to digital with new cameras, remote news-gathering equipment, switchers, routers, computer servers and digital downlink equipment is an additional $6 million to $10 million (Freeman, 1998, p. 46).

Market size will have little to no bearing on the cost to covert a station to DTV. Moreover, with smaller market stations not generating the same revenue streams of large market stations, some owners, according to Freeman, may opt to get out of the business. "With the sort of investment that it is going to be required for each station ... it could be conceivable that some of the small market operators will sell instead of converting," said Trigony (qtd. in Freeman, 1998, p. 46).

The difficulties faced by smaller markets are made even greater by the model of technological change proposed by David Clark (1975). Clark proposed that it is conventional that within the second phase of technological change, which covers the period between the manufacture of a technology and its complete market penetration, there are early and late adopters. Early adopters are often characterized as providing agencies, in this case broadcasters, in those markets locational and growth advantages. Despite the spatially related differences that will be removed as diffusion becomes total, early adopters -- in this case most of whom will reside in the large markets as digital broadcasting will first be introduced in large markets -- should retain the advantage gained as early adopters (Clark, 1975, p.2). So, even though diffusion should become total and reach smaller markets, the advantage gained by the early adopters in the large markets will be difficult, if not impossible, for smaller markets to overcome.

For the owners who elect to stay the business, though, the flexibility provided by the FCC is designed to help broadcasters finance the $8-15 million price tag of converting to digital. Steven Rattner, speaking before the FCC in December 1995, said:

> Since we all have difficulty predicting new technological developments and consumer preferences, investors generally hope that the government will let companies make their own strategic choices. This can also be viewed as in the public interest as it is likely to maximize the chance that whatever services are provided are those of greatest interest to consumers. This is certainly true in the case of digital television, which has the potential to provide new services for consumers and help insure that

> broadcasters become active participants in the next phase of information delivery. Specifically, I think investors are most interested in the opportunities for multiplexing and new communication services since it is hard to see how HDTV alone will generate sufficient additional revenue to fund major capital expenditures. The fact that a broadcaster would not be restricted to providing one form of service or another, whatever that might be, would enhance the broadcaster's ability to finance because, left to his own devices, the broadcaster is going to develop more or more projects that represent in his mind the most profitable use of the spectrum (FCC, En Banc Hearing on Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, 28-29).

According to Rattner, in order for broadcasters to lure in investors who, in turn, can finance the capital expenditures (i.e. transmitters, towers, digital equipment) necessary to begin broadcasting digital signals, broadcasters need to show a way that digital television will increase revenue. He argued that HDTV alone will not do that. Instead, broadcasters need the flexibility to provide other services that will provide additional streams of revenue in order to raise the capital necessary to finance the expenditure of new digital equipment. To do that, broadcasters will have little choice but to move away from their roles as traditional broadcasters and become information providers.

The FCC and Congress agreed, to a point, with this argument, and left it up to individual broadcasters to decide which format, from 480i to 1080p, to use. However, for

many in Congress, that was not the end of it. The feeling was the free allocation of 6 MHz frequencies to broadcasters was for HDTV, not for broadcasters to find other avenues by which to make a profit (Mundy, 1998a). Thus, Congress and the FCC generated conflict between the original intent of the digital frequency allocation and the practical application of the FCC's final standards in the current business climate. That said, the prevailing attitude is that if the broadcast industry elects to deliver something less than HDTV and, at the same time, delivers services other than free, over-the-air broadcasts, then the government is going to take its share of the profits from those additional services.

"We are not going to tell broadcasters how to do DTV or order them to do real HDTV," said Representative Bill Tauzin (R-La.). "If they want to go with the lower resolution, like 480, that's their decision. We will not dictate their business strategy. But if they use the leftover spectrum to produce income on something that isn't free, over-the-air TV, they will be assessed a fee based on its market value. Period" (qtd. in Mundy, 1998a, 24).

With the regulations in place, now it is up to the individual broadcaster and his or her network to decide what the future of their business will be. By this decision, the networks and television stations will decide what level of resolution to go with, be it 480i, 480p, 720i, 720p, 1080i or 1080p. Each network has publicly committed to a resolution for some of its primetime broadcasting. However, in reality, those commitments are short-term as the broadcast industry begins to discover the products and service the public wants and demands.

"It doesn't matter what anyone says they're going to do," said an official with News Corp, parent company of Fox. "I promise you, no one has a business plan. And no one really has any idea which technology is going to be used – 480, 720, 1080" (qtd. in Mundy, 1998a, p. 24).

The decisions of broadcasters and networks in regards to resolution for digital television are occasionally at odds. CBS and NBC have already committed to 1080 for their prime-time broadcasting. Some station owners at networks committed to 720i and SDTV are fretting their network's decision to broadcast in a lower resolution. They fear a mass exodus to the better picture provided by CBS and NBC affiliates. For them, it is clear-cut: people want better picture and sound quality, not additional digital services.

"What do we do when the competition delivers a better picture?" said a lobbyist for a group of stations with affiliations at three networks. "We don't know what the public wants yet, what the market demand will be. But I suspect – and I'm not alone here – that people will chose the better picture, the wider screen, clearer sound" (Mundy, 1998a, p. 26).

The lobbyist may not be alone in his theory, but he may be in the minority, at least considering the decisions made by half the major broadcast networks. CBS and NBC are committed to delivering true HDTV at 1080i, ABC is set to go with 720p and Fox and Sinclair are lined up with 480 for their prime-time broadcasting schedule. Fox has expressed the possibility of going with some 720 broadcasts during primetime and major sporting events, but not for another year at least. The WB Network and UPN are currently taking a wait-and-see approach (McClellan and Dickson, 1998a, 1998b, 6, 8).

The reason for going with 1080 resolution broadcasts is quite clear – better picture and sound is the selling point used by both NBC and CBS. Moreover, even at 1080, the networks still have about 1.5 megabits of bandwidth available by which to broadcast large quantities of data to PCs (Consolli and Freeman 12). Basically, there is no reason, therefore, for broadcasters not to get into providing additional digital services if there is the potential for making a profit by providing digital services. The only factor in selecting a resolution quality is how many additional services a broadcaster would like to offer. Lower resolutions still allow for more services in addition to the free, over-the-air signal, than do higher resolution formats.

ABC is attempting to have the best of both worlds by delivering HDTV while leaving additional bandwidth available to deliver other digital services. According to Preston Padden, ABC TV Network president, ABC's plan to broadcast in 720p gives it the best possible picture quality of any currently available format, especially if the network chooses to broadcast at 60 frames per second (Consolli, 1998b, p. 6-7). A primary reason ABC and Fox chose not to go with full HDTV at 1080I is that it is ABC's belief that 720p offers easier convergence between television and computers.

Regardless of what resolutions the networks plan on broadcasting, local broadcasters have the ability to up-convert or down-convert the network signal into whatever resolution they chose, and initially, it looks as though local broadcasters are opting for SDTV. SCRI International found that initially, 49.3 percent of stations surveyed plan on broadcasting in 480, a figure that will grow to 56.2 percent a year after commencing digital broadcasting (1999, p.15).

One reason for going with SDTV, at least for locally produced programming, is the lack of availability of HDTV equipment. "Lots of stations are undergoing their digital rebuild right now, but very few people have much interest in high-definition. You couldn't do it (HDTV) if you wanted to because the equipment doesn't exist," said Tom Mann, chief technology officer of Digital Systems Technology (Anderson, 1999, p. 72).

Networks' Convergence with the Personal Computer

The selling point for lower resolutions chosen by ABC and Fox – 720 and 480 – is a bit more complex than NBC's and CBS' 1080 pitch. For Fox and ABC, it is a matter of convergence, or the ability to provide other digital services in addition to free, over-the-air television broadcasts. Television will have the ability to broadcast as many as four different SDTV signals simultaneously as well as cell phone and pager services, but it is the convergence with the personal computer industry that has generated the most excitement within the broadcast industry. "As a company, we intend to take full advantage of the opportunities, not just as a stand-alone business, but as a converged medium in a potent combination with television," said Robert Iger, ABC president (qtd. in Consolli et al., 1998, p.12).

Fox may have the easiest path towards convergence with the computer industry with its selection of the 480p broadcast format, which, according to Consolli, is the easiest to integrate with the computer industry (1998b). Both Fox and ABC have chosen 720p for their HDTV broadcasts. Fox acknowledged the convergence issue as playing an

essential part in electing to go with 720p (Consolli et al., 1998, p. 9). The advantage for progressive scanning in television is that it is the same format used in computers.

It would seem, then, that NBC and CBS will have a difficult time converging with the personal computer industry because of their decisions to broadcast an interlaced format. However, like everything in the information fields, technology will overcome just about any problem. "Intel will obviate the problems between progressive and interlaced," said former FCC Chairman Richard Wiley (qtd. in Consolli et al., 1998, p. 12).

With all four networks on the verge of having the ability to converge with the computer industry, what does this mean for the future of television and computers? It may mean a more compelling product on television, the convergence down to one appliance, or the availability of vast amounts of information currently unavailable to consumers. NBC already has a deal with Intercast to provide "enhanced data" to go along with shows like *Dateline*. ABC and Disney are exploring the possibilities of creating datacasting channels for uses ranging from online games, in-home schooling featuring Disney characters and transactional sales of Disney merchandise (Consolli et al, 1998, p. 12).

A Time of Decision for Local Broadcasters

Broadcasters now are in position to approach digital broadcasting, and more specifically, providing additional digital services, in a polynuclear diffusion model.

While the initial push to get digital broadcasting on the air was a mononuclear effort by Congress and the FCC, every other decision concerning digital broadcasting, will be made under a polynuclear framework. From purchasing digital studio equipment to providing additional digital services, broadcaster will make digital decisions in an entrepreneurial environment where competition from other broadcast entities is the overriding concern.

Unlike the mononuclear model for diffusion used by Congress and the FCC to get digital broadcasting on the air initially, the option to explore the potential of digital broadcasting presents a polynuclear setting for broadcasters. If the word "agency" is substituted for broadcasters in the creation of non-television digital, then Malecki's (1975) criteria for establishing agencies can be applied to the innovation of digital services by broadcasters.

Digital services can be innovated with or without a centralized propagator, which is an important aspect in establishing an agency. In this case, the central propagator is the corporation or television network to which a local broadcaster belongs. In the case of a centralized propagator, the propagator would provide information about the innovation, support in establishing the agency, and assistance in the promotion of the innovation by providing integrated promotional packages (Malecki, 1975, p. 8-9).

In the case where the local broadcast outlet is locally owned, or where the local broadcaster is independent of a corporation in its digital broadcasting decisions, a central propagator is not a factor. In this case, it is imperative that broadcasters seek out support

from prior adopters and make significant use of personal communication channels (Malecki, 1975, p. 8-9).

Cable Television's Role in HDTV

The debate over what and how broadcast television is going to deliver digital signals to the American consumer becomes a moot point for Americans receiving their signal through a coaxial cable or by satellite dish. Nearly 64 million, or 66 percent of American households that own televisions, receive their television signals via cable (Parsons and Frieden, 1998). Furthermore, early signal checks of DTV broadcasts have revealed potential problems receiving signals indoors. With no guarantee in place that cable will deliver DTV and HDTV signals, the early adopters of DTV may not have access to a signal unless they purchase an outdoor antenna tower. That is not very likely according to Gunther Meisse, president and owner of WMFD-TV in Mansfield Ohio. "People who got cable over the last couple of decades and dutifully tore down their old rusty towers were glad to get rid of the darned things. And now to suggest that these people run out and buy a nice silver tower and bolt it to the side of their house, I think is foolhardy" (qtd. in Anderson, 1999, p. 73).

Tom Allan, General Manager of WRAL-TV, which has been broadcasting a digital signal in Raleigh since June 1996, said it is important to broadcasters that cable companies provide the digital signals to its customers. "When more than two-thirds of

your viewers are receiving your signal via cable, it's very important that accessibility be there as we move into digital" (qtd. in Petrozzello and Dickson, 1998, p. 6).

The possible penetration problems of digital television signals coupled with the high percentage of Americans who receive their signals via cable television have forced broadcasters to deal with questions concerning cable's ability and willingness to carry their digital signals.

Aside from the technical issue of standards, which will eventually be resolved by cable and television manufacturers, the larger issues which concern broadcasters is how to get their new digital signals carried on the local cable operator's system. Cable operators say they are already pushing the limits of what their systems can handle, and they do not have the bandwidth to be burdened with additional signals. Broadcasters say cable needs to carry their signals in order for the transition to DTV to be successful. The government does not want to get involved, instead preferring to let the industries work out their differences between themselves.

"We don't want a bottleneck provider like cable to be able to block...the full recognition of the digital signal (qtd. in Mundy, 1998b, p. 16)," FCC chairman Susan Ness said, as a warning to the cable industry. Nevertheless, Ness stopped short of saying government would intervene. "The need for government regulation is inversely related to the level of industry cooperation," she said. Tom Rodgers, president of NBC Cable, added, "We have always been able to figure out our carriage issues with the cable industry on the basis of private negotiations" (qtd. in Cooper, 1998, p. 10).

The two industries may be able to agree to cooperate without government intervention, but both sides are far apart on important issues. For example, as discussed earlier, CBS and NBC are planning to broadcast some events in 1080i, to which TCI chairman John Malone says, "No way...(they) are not getting (1080i) on my system." Malone was later a bit more forgiving, if still harshly critical, in a statement read by TCI representative LaRae Marsik: "With respect to broadcasters which are desirous of adopting more demanding and inefficient formats, such as 1080i, TCI will continue to work with vendors to accommodate their needs" (qtd. in Cooper, 1998, p. 10).

Some cable companies are already working towards HDTV carriage. Time Warner is about to begin delivering HDTV full time in Tampa, Florida. The company is the first to deliver HBO HDTV over a cable system using 256 QAM modulation which has the ability to compress two HDTV channels in one 6 MHz cable channel. The earlier system of using unencrypted 8-VSB kills two cable channels per HDTV signal (Dickson, 1999, p. 29). The 256 QAM modulation technology should alleviate some of the bandwidth fears cable operators had when dealing with HDTV.

While some in the television industry, like Rodgers, express a desire for government to stay out of the broadcast versus cable battle, still others would like to see it intervene in the form of must-carry. The FCC and Congress could mandate that digital broadcast signals be carried by cable operators. In turn, cable operators say that is fine, but cable television operators say the government's meddling would need go so far as to include making decisions on what cable stations they would drop in order to make bandwidth room for digital channels (Cooper, 1998).

What Congress will do with cable television and must carry is uncertain. However, to date, Congress has been a very large proponent of DTV, and there is no reason for that not to continue. Congress wants DTV to be successful, and if it sees must-carry as a necessary method to achieving that goal, then cable operators are sure to be making the decision of what programming will no longer be carried so that local DTV signals can have space on their systems.

Consumer Costs

What does all this mean for consumers? Well, there are two choices. The first is to stay with an analog television and pick up a set-top box capable of converting the digital signal to analog. The second option is to purchase a new digital television. Either way, consumers are faced with costs that worry some in the broadcast industry.

Consumer adoption of digital televisions will likely follow the two stages for technological changes as outlined by David Clark (1975) in Technology, Diffusion, and Time-Space Convergence: The Example of S.T.D Telephone. In it, Clark states that technological change occurs in two stages. The first stage is aspatial and spans the time between invention and commercial manufacture. The second stage is spatial and covers the time between manufacture and complete market penetration (p. 2).

Early digital televisions cost up to $8,000, were unable to handle 720p, and lacked many necessary video inputs. Even though these sets were commercially manufactured, they still represented examples of the first stage of technological change. New digital

televisions are now able to handle 720p and include such video inputs as Y-Pb-Pr, but still cost close to the price of the early models.

The other option for consumers is to get a digital set-top receiver. Some of these boxes are able receive DirecTV's standard and high definition satellite services in addition to over-the-air DTV broadcasts come in the $650-1,600 price range (Tarr, 1999, p. 42).

Clearly, the market for digital televisions and set-top receivers is in the first stages of Clark's technological change. This infancy of this technological change has broadcasters concerned as they spend millions to broadcast a digital signal few, if any, are capable of receiving.

As mentioned earlier, the digital revolution in broadcast television is not purely market driven, making this revolution unlike its predecessors. Both the electronic and color revolutions grew out of the desire of consumers for a better picture, thus make more money for equipment makers like RCA. The public had a choice whether or not to purchase the equipment to receive the better picture. Over time, most consumers bought color televisions and all television stations bought equipment enabling them to broadcast a color picture. Thus, diffusion occurred naturally without government intervention.

However, in the case of digital, and especially high definition, the public appears to be apathetic. They are questioning the need to spend considerable money to improve a picture they already feel is adequate. The affects of consumer apathy towards digital television on broadcasters are twofold: First, a slow rate of diffusion could delay the date broadcasters are required to return the analog spectrum. The FCC, in the Fifth Report

and Order, suggested a threshold that might be used to determine when broadcasters must return the analog spectrum to the government. The report suggested a penetration rate of 70 percent for digital receivers, and/or such a time as 80 percent of households no longer "rely solely on analog broadcasting (FCC, 1997, p. 42).

While the slow pace of diffusion may be a positive aspect of the DTV convergence, at least according to broadcasters, the second aspect should be a cause for concern. According to the Organization for Economic Co-operation and Development, consumers spread their attention on many different commodities, have short attention spans and their choices may often result in the adoption of "intrinsically inferior technologies" (1992, p.58). What this means for broadcasters is companies like A.H. Belo, which is planning on broadcasting 1080i from all its stations, might not be making the best choices when it comes to digital broadcasting. Some companies may have the tendency to adopt all the digital gadgets they can, but that may not be in line with digital diffusion into the marketplace, which is likely to progress towards the lowest-common denominator. In this case, the lowest-common denominator is not 1080i, but 480p.

Digital television presents an opportunity for local broadcasters to expand their horizons concerning exactly what their business is. The FCC has established a framework for the adoption of digital broadcasting, including when and where digital broadcasting will begin. However, by adopting a series of technological standards, has created an environment through which the local broadcaster can develop and deliver the product most demanded by his or her market. In this sense, the FCC and Congress have mandated diffusion by dictating when digital broadcasting must begin, but have allowed

normal diffusion to occur by allowing broadcasters to chose which products to deliver and then to offer them to the public in whatever manner they see fits.

Chapter III

Research Method

By conducting this study, the researcher hoped to gain an understanding of how the broadcast television industry was approaching a fundamental change in the way it does business. The basic question the research attempts to answer is: In the digital era, will the business of broadcasting continue to be traditional broadcasting or will it migrate towards the business of providing information in many digital forms?

The research was conducted through a mail survey of a target population of General Managers at affiliates of the four major networks. The population was surveyed on all matters concerning digital television, including: present and future business definitions, impact of digital television on business definition, factors concerning the potential success and failure of digital broadcasting, matters concerning Congress and the Federal Communications Commission and digital broadcasting, cable television issues, and digital purchasing, programming and services decisions.

Before assembling the survey, the researcher conducted exploratory interviews with Gary DeHaven, General Manager of WTNZ-TV, the Fox affiliate in Knoxville, Tennessee, and Jeffrey Lee, General Manager of WBIR-TV, the NBC affiliate in Knoxville, Tennessee. The interviews were designed to gain insight into the thoughts

and opinions of local broadcasters concerning digital broadcasting. The researcher found through these interviews that broadcasters may hold grave concerns towards digital broadcasting. Those concerns were not adequately relayed in the literature reviewed for this study and where not a part of the original outline for the survey. The answers and opinions offered by Mr. DeHaven and Mr. Lee altered somewhat the course of study initially proposed by the researcher's research proposal. Concerns raised by Mr. Lee, were of particular influence in that those concerns were the basis for the researcher surveying respondents on how problematic they anticipate certain factors to be for local broadcasters making the switch from analog broadcasting to digital broadcasting.

After assembly of the initial survey, it was delivered to WTNZ, WBIR, WATE (ABC affiliate in Knoxville, Tennessee) and WVLT (CBS affiliate in Knoxville, Tennessee) for pre-testing by those stations' General Managers. All four General Managers completed the instrument and forwarded their opinions and recommendations concerning the survey to the researcher.

On April 2, 1999, the survey was mailed to every broadcast station fitting the research criteria. The population for the survey was a census of every ABC, CBS, NBC, and Fox affiliate in the United States. A mailing list provided by the National Association of Broadcasters provided the names and addresses of 714 stations fitting the research criteria..

On May 6, 1999, a second mailing was sent to the survey population, thanking survey respondents for their cooperation, and requesting responses from stations who had yet to respond.

The survey was closed on June 1, 1999. A total of 188 responses were received. One mailing came back undeliverable, leaving a population size of 714, for a response rate of 26.33 percent.

Data was coded by the researcher and entered into Microsoft Excel. The data was then analyzed on the bases of the following 13 research questions. SPSS Version 9.0 software was used for the analysis.

Research Questions

Attitudes and Opinions

Research Question 1. Is there an initial inclination for broadcasters to move from the business of broadcasting to providing information and are there different trends between different size markets? Data for this research question were obtained by asking respondents to identify what one word best describes their current business definition and what phrase best describes what they envision their future definition to be. Respondents were given the choices for each question of "Broadcaster," "Information Provider," "Entertainer," and "Other" followed by a blank in which to clarify their response. The researcher was looking for a trend where those who answered their current definition to be "Broadcaster" would chose "Information Provider" for the answer to what their future business will be.

Research Question 2. How do perceptions of the impact DTV will have on the business of broadcasting differ between those who identify their future business to be broadcasting versus those who identify their future business to be providing information? For this question, researchers were asked to rank on a 5-point Likert scale from (1) None to (5) Very Much the extent to which DTV will have an impact on the current business definition. Means for those answering their future business will be broadcasting (future broadcasters, FBs) were compared to the means of those answering their future business will be providing information (future information providers, FIPs) using an Independent Sample t-test. For all questions concerning future business definitions, respondents answering either "Entertainer" or "Other" as their future business definitions were disregarded, as the number of respondents for each was to small to generalize.

Research Question 3. Which of four listed factors do broadcasters feel will contribute to the success of digital television and do those factors differ between future broadcasters and future information providers? For this research question, the researcher listed four often-cited characteristics of digital television: (1) Ability to provide multiple television signals; (2) Ability to provide non-television digital signals; (3) Ability to provide high-definition television signals; and (4) Ability to provide CD-quality sound. Respondents were asked to indicate on separate 5-point Likert scales how important they felt each factor would be in determining the success of digital television. Means for future broadcasters were compared with means for future information providers using an Independent Sample t-test.

Research Question 4. What factors do broadcasters feel will be problematic in their transition to digital television and do those factors differ among stations in different market sizes? For this research question, respondents were provided a list of 10 commonly voiced concerns by broadcasters concerning digital broadcasting. For each concern, broadcasters were asked to indicate on a 5-point Likert scale how problematic a potential hurdle each concern poses. The Likert scales ranged from (1) "Not at all" to (5) "Extremely." To analyze how great of a factor market size plays in determining levels of concern with each potential hurdles, One-Way ANOVAs were conducted for each concern to measure for statistically significant differences among stations in different market sizes. For all analysis involving market size, market sizes were consolidated into markets 1-30, 31-50, 51-100, and 101+ to provide more equal representation per group. For a complete list of potential hurdles respondents were questioned about, please see the survey in the Appendix.

Congress and the FCC

Research Question 5. How valid are certain criticisms directed towards the FCC for its handling of the DTV transition? The criticisms developed by the researcher were derived from the review of literature and from the interviews conducted with Mr. Lee, general manager of WVLT-TV, and Mr. DeHaven, general manager of WBIR-TV. For each criticism, broadcasters were asked to indicate on a 5-point Likert scale the validity of the criticism. The Likert scales ranged from (1) "Not at all valid" to (5) "Very Valid."

Criticisms posed to respondents were: (1) Transition to digital television is not market-driven; (2) Regulations lack input from broadcasters; (3) Timetable for switching to digital is unrealistic; (4) Timetable for returning analog spectrum is unrealistic; and (4) FCC relying too much on unproven digital technology.

Research Question 6. What are broadcasters' attitudes towards Congress' understanding and acting upon their needs as it relates to digital television and do those attitudes differ among stations in different market sizes? Respondents were questioned as to: (1) How problematic a hurdle Congressional legislation poses in making the switch to digital television; (2) How well they thought Congress understood the needs of broadcasters; (3) How well were those needs taken into account by Congress; and (4) How they would assess the timeline established by Congress for broadcasters to return the analog spectrum. A 5-point Likert scale was used for each question. For the question concerning how problematic the hurdle posed by Congressional legislation is, the scale ranged from (1) "Not at all" to (5) "Extremely." For the next three questions, the Likert scale ranged from (1) "Very Poor" to (5) "Very Good." To analyze how great of a factor market size plays in determining overall attitudes towards Congress, a One-Way ANOVA was conducted to measure for statistically significant differences between different market sizes.

Research Question 7. Are broadcasters supportive of must-carry legislation and are there different opinions between future broadcasters and future information providers? To answer this question, the research posed a number of CTV-related questions to respondents. The first question was among the list of questions concerning

potential hurdles faced by broadcasters as they make the transition from analog broadcasting to digital broadcasting. The question asked broadcasters how problematic they felt access to cable television systems for digital programming would be. The Likert scale following the question ranged from (1) "Not at all" to (5) "Extremely." The researcher posed four more questions concerning broadcasters and cable television. The first question asked respondents how supportive they were of must-carry legislation requiring cable television operators to carry all local, free, over-the-air, digital broadcast television signals. The second question asked broadcasters how supportive they are of legislation requiring cable television operators to carry all local, fee-based, over-the-air, digital broadcast television signals. For each question, respondents were asked to rank their support on a 5-point Likert scale ranging from (1) "Very Opposed" to (5) "Very Supportive." The remaining two questions asked respondents how concerned they were with their local cable television operator's ability to carry their digital television signal when they begin digital broadcasting, and how concerned are they that their local cable television operator's ability to carry their digital television signal will have an adverse impact on their television station's transition to digital television. Each question asked respondents to rank their concern on a 5-point Likert scale ranging from (1) "Very Unconcerned" to (5) "Very Concerned." Means for future broadcasters were compared to means for future information providers using an Independent Sample t-test.

Planning for DTV

Research Question 8. Where are digital programming and digital equipment purchasing decisions being made, how far along are broadcasters in planning for DTV and are there differences between how far along broadcasters are in planning for digital television and stations of various market sizes and based on who answered the survey? Nine questions encompassed the section of the survey dealing with planning for digital broadcasting. However, before the researcher probed individual elements of planning, the survey posed a question asking respondents to indicate how far along they were in overall planning for digital television and where digital planning decisions were being made. For the question regarding overall planning for digital television, respondents were asked to indicate on a 5-point Likert scale ranging from (1) "No Planning" to (5) "Implementing Planning" how far along they are in the overall planning for digital television. Means for future broadcasters were compared with means for future information providers using an Independent Sample t-test. For where digital decisions are being made, the researcher broke the issue of planning into two categories -- programming and purchasing digital equipment. The first question asked respondents to indicate where digital programming decisions are made, and the second question asked respondents to indicate where digital equipment purchasing decisions are made. Both questions used a 5-point Likert scale ((1) "Totally local," (2) "Mostly local/Some Corporate," (3) "Local and Corporate," (4) "Mostly corporate/Some local," and (5) "Totally corporate").

Research Question 9. How far along are broadcasters in the planning process to purchase DTV equipment and is there a relationship between planning status and market size, number of hours of locally produced programming, and those who answered the survey? In order to understand all the elements of purchasing decisions, the researcher broke down digital purchasing decisions into four separate questions. The four questions covered: (1) Overall planning for purchasing digital production equipment; (2) Overall planning for upgrading studio facilities to digital; (3) Overall planning for purchasing digital transmitting equipment; and (4) How integrated with digital technology the station hopes to be within two years of commencing digital broadcasting. For the three questions regarding planning for digital television, respondents were asked to indicate on separate 5-point Likert scales ranging from (1) "No Planning" to (5) "Implementing Planning" how far along in the planning process they are for each individual planning aspect. A One-Way ANOVA was conducted for each concern to measure for statistical significant differences between different market sizes. Additionally, another One-Way ANOVA was conducted to measure for statistically significant differences between stations based on number of hours of local programming they produced. For all analysis involving hours of locally produced programming, stations were consolidated into three categories based on hours of locally produced programming -- 0-10 hours, 10.5-20 hours, 20.5+ hours -- to provide more equal representation per group. A t-test used was to measure for statistically significant differences between stations based on the title of the person answering the survey. Because the researcher was most concerned about the two major groups of respondents -- General Mangers/Vice

Presidents/Presidents/Operations Mangers, and those who had "Engineer" in their title -- and because the three other groups represented were so small, the research was confined to studying the differences between General Managers and Engineers. All questions analyzing differences between respondents based on the job titles will involve analysis of General Managers and Engineers only.

Research Question 10. How far into the planning process for planning digital programming are broadcasters and are there differences in planning stages between various stations based on where they identified programming decisions are being made and based on the title of the person answering the survey? For this research question, the researcher posed one questions to respondents: How far along in the planning process for digital television are they. Respondents were asked to indicate on a 5-point Likert scales ranging from (1) "No Planning" to (5) "Implementing Planning" how far into the planning process they were. A One-Way ANOVA was conducted to determine if a statistically significant difference existed between stations based on where digital programming decisions are made and how far along in the planning process for digital television stations are. In addition, an Independent Sample t-test was used to measure for statistical significance between stations based on the title of the person answering the survey. Another One-Way ANOVA was conducted to see if there was a correlation between planning for digital programming and network affiliation.

Research Question 11. Is there a relationship between how much HDTV programming a station plans to broadcast and its network affiliation? For this question, the researcher asked respondents how much local digital programming do they anticipate

being high-definition television within one year of launching digital television. Respondents were again asked to indicate on a 5-point Likert scales ranging from (1) "No HDTV" to (5) "All HDTV" how much HDTV they plan on broadcasting. A One-Way ANOVA was conducted to see if there was a correlation between amount of HDTV programming and network affiliation.

Additional Digital Services

Research Question 12. How far along are broadcasters in planning to provide additional digital services and are there differences between stations in various sized markets and network affiliations? For this research question, the researcher asked respondents to indicate on a 5-point Likert scale how far along in the planning process for additional digital services they were. The scale ranged from (1) "No Planning" to (5) "Implementing Planning." A One-Way ANOVA was conducted to measure for statistical significance between different market sizes and planning for digital broadcasting. Also, a One-Way ANOVA was conducted to see if there was a correlation between amount of HDTV programming and network affiliation.

Research Question 13. What are some of the services broadcasters may be interested in offering and are there differences between future information providers and future broadcasters in what digital services stations would be interested in providing? For this research question, the researcher presented respondents with a list of eight potential services broadcasters may have the option of offering their respective markets at

some point in the future. The list of potential digital services (see the intrument in the Appendix for complete list) was compiled from the review of literature. For each potential digital service, the respondents were asked to indicate on a 5-point Likert scale how interested their station might be in offering the service. The Likert scales accompanying each digital service ranged from (1) "Not at all" to (5) "Extremely." The researcher wanted to see if differences exist between what future broadcasters might be interested in providing and what future information providers might be interested in providing. An Independent Sample t-test was conducted for each potential digital service to see if significant differences existed between future information providers and future broadcasters.

Chapter IV

Results

Characteristics of Respondents

The target population for this survey was general managers at the affiliates of the four major television networks. While it is truly impossible to know who really did complete the survey, the survey did ask each respondent to indicate his or her title. A majority (67.4 %) of the respondents fit the target population, describing their title as General Manager, President, Vice President, Operations Manager or some variation of those titles. The next largest group of respondents was those with Engineering (28.3 %) in their titles followed by Owners (1.6 %) and Program Directors (1.1%). Two respondents left the question blank. (See Table 1)

The response rate of respondents based on network affiliation was consistent with the overall breakdown of stations by network. Of the total population of 715 stations, 26.3 percent are affiliated with ABC, 24.9 percent CBS, 22.5 percent FOX and 26.3 percent NBC. Of respondents to the survey, 51 (27.1%) indicated they were affiliated with ABC, 50 (26.6%) with CBS, 35 (18.6%) FOX, and 52 (27.7%) indicated they were

Table 1: Title of Person Answering Survey.

		Frequency	Percent	Cumulative Percent
Valid	.00	2	1.1	1.1
	GM/V.P/Pres./OM	126	67.0	68.4
	Engineer	53	28.2	96.8
	Program Director	2	1.1	97.9
	Owner	3	1.6	99.5
	CEO	1	.5	100.0
	Total	187	99.5	
Missing	System	1	.5	
Total		188	100.0	

with NBC. One survey was returned with the affiliation question left blank. (See Table 2)

This study did not attempt to dissect how each, individual market is approaching DTV. Instead, the researcher chose to break down stations by large (1-30-sized markets), medium (31-100) and small (101+). Large markets were further broken down into two categories -- 1-10 and 11-30 -- in recognition of the FCC's timeline for implementation of DTV. Medium-sized markets were broken down into 31-50 and 51-100 categories in an effort to distinguish trends among top-50 markets and top-100 markets.

Because more markets in the United States fall in the 101+ range, it was expected a majority of the respondents would indicate that they fall under this category. Such was the case with 86, or 45.7 percent, marking themselves as being such. The next largest percentage of respondents was among markets size 51-100 (60, 31.9%), followed by markets 31-50 (22, 11.7 %), 11-30 (14, 7.4%) and 1-10 (6, 3.2%). (See Table 3)

Table 2: Network Affiliation of Stations Answering Survey.

		Frequency	Percent	Cumulative Percent
Valid	ABC	51	27.1	27.1
	CBS	50	26.6	53.7
	NBC	52	27.7	81.4
	Fox	35	18.6	100.0
	Total	188	100.0	

Table 3: Market Size of Stations Answering Survey.

		Frequency	Percent	Cumulative Percent
Valid	1-10	6	3.2	3.2
	11-30	14	7.4	10.6
	31-50	22	11.7	22.3
	51-100	60	31.9	54.3
	101+	86	45.7	100.0
	Total	188	100.0	

The study looked for initial tendencies based on the amount of local programming produced. The largest group of respondents (22.9%) indicated they produce more than 25 hours or more of local programming per week followed by stations that produce 15.5-20 hours and 20.5-25 hours of local programming, each with 18.1 percent of respondents. That was followed by 10.5-15 (15.4%), 5.5-10 (10.1%), 0.5-5 (13.3%) and 0 hours of local programming (2.1%). (See Table 4)

Finally, the researcher asked respondents to identify whether or not they were currently broadcasting a digital signal. If they were, they were asked when did they go on the air with the digital signal. If they were not, they were asked when they expected to go on the air with the digital signal. Only nine respondents (4.2%) indicated they were broadcasting a digital signal at the time of the survey. Of those stations, one began

Table 4: Number of Hours Per Week of Locally Produced Programming Produced by Stations Answering Survey.

		Frequency	Percent	Cumulative Percent
Valid	None	4	2.1	2.1
	0.5-5	25	13.3	15.4
	5.5-10	19	10.1	25.5
	10.5-15	29	15.4	41.0
	15.5-20	34	18.1	59.0
	20.5-25	34	18.1	77.1
	25.5+	43	22.9	100.0
	Total	188	100.0	

broadcasting in digital in January 1998, with the last station coming online in February 1999. An additional 14 respondents (7.4%) indicated they were due to begin DTV broadcasting later in 1999. Of the 179 respondents who indicated they were not broadcasting in DTV, 44.7 percent indicated they were waiting until 2002 to begin DTV broadcasting. This desire to wait until the last-possible minute was echoed in many of the 49 (27.3%) blank responses to the question. Many of those responses simply said, "As late as possible." Fourteen respondents indicated they were to begin DTV broadcasting in 2001, followed by 11 in 2000, three 2003 and two in both 2004 and 2005.

Attitudes and Opinions of Broadcasters

Research Question 1. Is there an initial inclination for broadcasters to move from the business of broadcasting to providing information and are there different trends between different size markets?

Data for this research question were obtained by asking respondents to identify what one word best describes their current business definition and what phrase best describes what they envision their future definition to be. Respondents were given the choices for each question of "Broadcaster," "Information Provider," "Entertainer," and "Other" followed by a blank in which to clarify their response. The researcher was looking for a trend where those who answered their current definition to be "Broadcaster" would chose "Information Provider" for the answer to what their future business will be.

This research question was the fundamental question posed by this study. The literature review pointed to a definite change in the way broadcasters were beginning to approach their business in the digital era. However, was this perception valid or was it just a creation of a vocal few and not, in fact, part of a widespread trend towards providing information?

There is an initial inclination of broadcasters towards changing the definition of their business from broadcasting to providing information. Currently, with just over 50 stations broadcasting a digital television signal, it should come as little surprise that broadcasters still see their primary business as broadcasting. More than four in five (85.6%) respondents defined their primary business as "Broadcasters" followed by

"Information Provider" (6.9%) and "Entertainer" (5.3%). Four respondents (2.1%) marked other and indicated that no one word effectively encompassed the definition of their business. (See Table 5)

Most respondents who identified themselves as broadcasters (56.9%) continued to say broadcasting would be their primary business in the future. However, the fall off from those answering "Broadcaster" as the current definition to those answering "Broadcaster" in the second question (n=54), can be seen in a dramatic rise of those seeing the future of their business as that of "Information Provider" (33.5%). The percentage of respondents answering "Entertainer" remained steady at 5.3 percent. (See Table 6) Therefore, while the shift may appear to be modest based on the statistics generated by this study, they are substantial enough not to be easily dismissed as inconsequential.

Among those who answered "broadcaster" as the current definition of their business, there is no significant relationship between market size and the perception of what the business of broadcasting will be in the future (Pearson Chi-Square=.767, df=3, p=.857). Likewise, there is no relationship between those whom answered "broadcaster" as their future definition and network affiliation (Pearson Chi-Square=5.782, df=3, p=.123). So regardless the networks' plans for DTV and how soon a broadcaster is required to begin broadcasting in digital, it is just as likely for an ABC affiliate in Helena, Montana, to perceive the definition of his or her business will switch from broadcasting to providing information as a Fox affiliate in Miami, Florida.

Table 5: Current Definition of Stations Answering Survey.

		Frequency	Percent	Cumulative Percent
Valid	Broadcaster	161	85.6	85.6
	Information Provider	13	6.9	92.6
	Entertainer	10	5.3	97.9
	Other	4	2.1	100.0
	Total	188	100.0	

Table 6: Future Definition of Stations Answering Survey

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Broadcaster	107	56.9	57.2	57.2
	Information Provider	63	33.5	33.7	90.9
	Entertainer	10	5.3	5.3	96.3
	Other	7	3.7	3.7	100.0
	Total	187	99.5	100.0	
Missing	No answer	1	.5		
Total		188	100.0		

Research Question 2. How do perceptions of the impact DTV will have on the business of broadcasting differ between those who identify their future business to be broadcasting versus those who identify their future business to be providing information?

For this question, researchers were asked to rank on a 5-point Likert scale from (1) None to (5) Very Much the extent to which DTV will have an impact on the current business definition. Means for those answering their that future business will be broadcasting (future broadcasters, FBs) were compared to the means of those answering their future business will be providing information (future information providers, FIPs) using an Independent Sample t-test. For all questions concerning future business definitions, respondents answering either "Entertainer" or "Other" as their future business definitions were disregarded, as the number of respondents for each was insignificant.

This study found that broadcasters' current definition of their primary business might be changing. Most respondents indicated digital television will, in fact, change their current definition significantly (M=3.34, Mdn.=4, Mo.=4). (See Table 7) Respondents who answered that their primary future business will be broadcasting were found to have greater variance of opinion on the impact of DTV (Std. Dev.=1.47) than those who answered that their future will be as information providers (Std. Dev.=.82). When equal variances were not assumed, the researcher found that future information providers also felt significantly stronger that DTV will have an impact on their business (M=3.9) than did future broadcasters (M=3.06) ($t=-4.423$, $df=162.486$, $p<.001$).

Table 7: Broadcasters' Perception of How Great an Impact DTV Will Have on Their Business Definition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	30	16.0	16.0	16.0
	2.00	21	11.2	11.2	27.3
	3.00	37	19.7	19.8	47.1
	4.00	54	28.7	28.9	75.9
	5.00	45	23.9	24.1	100.0
	Total	187	99.5	100.0	
Missing	.00	1	.5		
Total		188	100.0		

Research Question 3. Which of four listed factors do broadcasters feel will contribute to the success of digital television and do those factors differ between future broadcasters and future information providers?

For this research question, the researcher listed four often-cited characteristics of digital television: (1) Ability to provide multiple television signals; (2) Ability to provide non-television digital signals; (3) Ability to provide high-definition television signals; and (4) Ability to provide CD-quality sound. Respondents were asked to indicate on separate 5-point Likert scales how important they felt each factor would be in determining the success of digital television. Means for future broadcasters were compared with means for future information providers using an Independent Sample t-test.

Broadcasters felt that the ability to provide a High-Definition Television Signal was the most important (M=3.83, Std. Dev.=1.15) factor for the potential success of digital television. The ability to deliver Multiple Television Signals (M=3.74, Std. Dev.

1.24), CD-Quality Sound (M=3.60, Std. Dev.=1.14), and Non-Television Signals (3.24, Std. Dev. 1.21) are all so close to the mean for providing HDTV signals that the researcher was lead to believe that all four factors are vital to the success of DTV. (See Table 8)

A very strong relationship was found between the way broadcasters answered what their future business will be and two factors in the potential success of digital television. The strongest relationship, as could be expected, concerned the ability to provide non-television signals. On the 5-point Likert scale, the mean for future broadcasters was 2.94 while future information providers scored a mean of 3.74 (Table 9). This difference was statistically significant, using an Independent Sample t-test where equal variance was not assumed ($t=-4.409$, $df=132.082$, $p<.001$). (See Table 10) The other area of significance concerned the ability to provide multiple television signals. The mean for future broadcasters was 3.58 while the mean for future information providers was 4.0 ($t=-2.91$, $df=147.771$, $p=.03$). The differences in the responses to the ability to provide HDTV signals ($t=-.440$, $df=139.596$, $p=.654$) and the ability to provide CD-quality sound ($t=-.713$, $df=126.506$, $p=.477$) were not found to be statistically significant between future information providers and future broadcasters.

Table 8: Factors Broadcasters Believe Will Lead to Success of Digital Broadcasting

	Mean	Median	Mode	Std. Deviation
multiple television signals	3.7380	4.0000	5.00	1.2447
non-television signals	3.2378	3.0000	3.00	1.2058
High Definition Television Signals	3.8333	4.0000	5.00	1.1480
CD-quality sound	3.5968	4.0000	4.00	1.1360

Table 9: How Future Broadcasters and Future Information Providers Responded to the Question of Success Factors of Digital Broadcasting

	future definition	N	Mean	Std. Deviation	Std. Error Mean
multiple television signals	Broadcaster	106	3.5755	1.3448	.1306
	Information Provider	63	4.0000	1.1359	.1431
non-television signals	Broadcaster	105	2.9429	1.1588	.1131
	Information Provider	62	3.7419	1.1153	.1416
High Definition Television Signals	Broadcaster	105	3.7905	1.2145	.1185
	Information Provider	63	3.8730	1.1143	.1404
CD-quality sound	Broadcaster	105	3.5333	1.1441	.1117
	Information Provider	63	3.6667	1.1914	.1501

Table 10: Significance of Different DTV Success Factors Between Future Information Providers and Future Broadcasters.

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
multiple television sign	Equal variances assumed	4.708	.031	-2.099	167	.037
	Equal variances not assun			-2.191	147.771	.030
non-television signals	Equal variances assumed	.029	.866	-4.365	165	.000
	Equal variances not assun			-4.409	132.082	.000
High Definition Television Signals	Equal variances assumed	.790	.375	-.440	166	.661
	Equal variances not assun			-.449	139.596	.654
CD-quality sound	Equal variances assumed	.146	.703	-.720	166	.473
	Equal variances not assun			-.713	126.506	.477

Research Question 4. What factors do broadcasters feel will be problematic in their transition to digital television and do those factors differ among stations in different market sizes?

For this research question, respondents were provided a list of 10 commonly voiced concerns by broadcasters concerning digital broadcasting. For each concern, broadcasters were asked to indicate on a 5-point Likert scale how problematic a potential hurdle each concern poses. The Likert scales ranged from (1) "Not at all" to (5) "Extremely." To analyze how great of a factor market size plays in determining levels of concern with each potential hurdles, One-Way ANOVAs were conducted for each concern to measure for statistically significant differences among stations in different market sizes. For all analysis involving market size, market sizes were consolidated into markets 1-30, 31-50, 51-100, and 101+ to provide more equal representation per group. For a complete list of potential hurdles respondents were questioned about, please see the survey in the Appendix.

Overall, every factor listed solicited some level of concern for broadcasters. However, the data indicate the areas broadcasters are most concerned about lie outside their control. The number of receivers in the market (M=4.52, Mdn.=5., Mo.=5., Std. Dev. .862) and costs to consumers (M=4.44, Mdn.=5, Mo.=5, Std. Dev. .902) were the greatest concerns out of the 10 potential concerns listed. These findings were consistent with a later question in the survey that asked broadcasters to rate their level of concern on a 5-point Likert scale that the number of receivers in the market would have an adverse impact on their ability to make DTV commercially viable (1=Very Unconcerned to

5=Very Concerned). Nearly three-quarters, or 72.9 percent (n=137), said they were "Very concerned" compared to just 3.7 percent (n=7) who expressed no concern (n=137, M=4.47, Mdn.=5.0, Mo.=5.0 Std. Dev.=1.03).

Other factors of concern for broadcasters include: Access to cable television for digital programming (M=4.12); Advertisers funding digital television (M=4.11); Financing new equipment (M=4.04); Challenges of new technology (M=3.87); Creating local digital programming (M=3.76); and FCC regulations (M=3.53). For complete results, please see Table 11.

While it is not feasible to analyze every concern broadcasters have concerning DTV in an effort to find all significant trends, a few are worth noting. The researcher found no significant differences in concerns that different broadcasters in market sizes have towards new technology ($F(3, 184)=.428$, $p=.733$). Smaller markets, thus still several years away from commencing digital broadcasting, are just as likely to be concerned about whether or not the technology will work as larger markets already faced with having to utilize the still somewhat-experimental technology of today. As can be expected, smaller markets (where station revenues are less) are more concerned with financing new digital equipment ($F(3, 184)=2.663$, $p=0.049$). A Tukey test did find a significant difference between markets sizes 101+ and top-30 markets (Table 12). The smallest sized markets (101+) expressed a greater level of concern over how to pay for new digital equipment than did top-30 markets. There was, however, no relationship between market size and concern over costs to consumers ($F(3, 184)=.473$, $p=.702$) and the number of digital receivers in the market consumers ($F(3, 184)=.087$, $p=.967$).

Table 11: Potential Problematic Hurdles for Digital Broadcasting.

	Mean	Median	Mode	Std. Deviation
Congressional Legislation	3.4734	4.0000	4.00	1.1811
FCC regulations	3.5266	4.0000	4.00	1.1901
Financing New Equipment	4.0372	4.0000	5.00	1.1440
Challenges of New Technology	3.8723	4.0000	4.00	.9727
Number of recivers in market	4.5160	5.0000	5.00	.8620
Costs to Consumers	4.4362	5.0000	5.00	.9023
Creating local DTV programing	3.7606	4.0000	5.00	1.1568
Access to CTV for DTV	4.1170	4.0000	5.00	1.0327
Advertisers funding DTV	4.1117	4.0000	5.00	1.0813
Availability of DTV advertisements	3.4362	3.5000	4.00	1.1192

Table 12: Market Size and the Ability to Finance Digital Equipment.

Tukey HSD[a,b]

		Subset for alpha = .05	
Market Size	N	1	2
1-30	20	3.4500	
31-50	22	3.9091	3.9091
51-100	60	4.0167	4.0167
101+	86		4.2209
Sig.		.181	.683

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 32.323.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Congress and the FCC

Research Question 5. How valid are certain criticisms directed towards the FCC for its handling of the DTV transition?

The criticisms developed by the researcher were derived from the review of literature and from the interviews conducted with Mr. Lee, general manager of WVLT-TV, and Mr. DeHaven, general manager of WBIR-TV. For each criticism, broadcasters were asked to indicate on a 5-point Likert scale the validity of the criticism. The Likert scales ranged from (1) "Not at all valid" to (5) "Very Valid." Criticisms posed to respondents were: (1) Transition to digital television is not market-driven; (2) Regulations lack input from broadcasters; (3) Timetable for switching to digital is unrealistic; (4) Timetable for returning analog spectrum is unrealistic; and (4) FCC relying too much on unproven digital technology.

The most valid criticism according the survey was the criticism that the timetable established by the FCC for broadcasters to return the analog spectrum is unrealistic (M=4.46, Mdn.=5, Mo.=5, Std. Dev.=0.74). Other highly-valid criticisms include: Timetable for switching to digital is unrealistic (M=4.48, Mdn.=5, Mo.=5, Std. Dev.=0.77); Digital television is not market-driven (M=4.34, Mdn.=5, Mo.=5, Std. Dev.=1.07); FCC relying on unproven technology too much (M=4.12, Mdn.=4, Mo.=5, Std. Dev.=0.94); and Regulations lack input from broadcasters (M=3.63, Mdn.=4, Mo.=4, Std. Dev.=1.04). (See Table 13)

Table 13: Validity of Criticisms Levied at FCC

	Mean	Median	Mode	Std. Deviation
DTV not market-driven	4.3351	5.0000	5.00	1.0745
Regulations lack broad. input	3.6330	4.0000	4.00	1.0436
DTV timetable unrealistic	4.4787	5.0000	5.00	.7701
Timetable for analog unrealistic	4.6223	5.0000	5.00	.7392
FCC relying on unproven technology	4.1223	4.0000	5.00	.9370

While the survey could not seek responses to every criticism levied at the FCC for its handling of the move to digital broadcasting, it did survey most of the categories criticism directed at the FCC falls under. Furthermore, the numbers listed above clearly indicate an industry frustrated at its governmental regulatory body's handling of a crucial issue. Broadcasters were moderately concerned (M=3.53) with the FCC's regulations, but given the opportunity to comment on individual criticisms, it may be safe to assume that the frustration with the FCC may be even greater than the earlier number indicates.

Research Question 6. What are broadcasters' attitudes towards Congress' understanding and acting upon their needs as it relates to digital television and do those attitudes differ among stations in different market sizes?

Respondents were questioned as to: (1) How problematic a hurdle Congressional legislation poses in making the switch to digital television; (2) How well they thought

Congress understood the needs of broadcasters; (3) How well were those needs taken into account by Congress; and (4) How they would assess the timeline established by Congress for broadcasters to return the analog spectrum. A 5-point Likert scale was used for each question. For the question concerning how problematic the hurdle posed by Congressional legislation is, the scale ranged from (1) "Not at all" to (5) "Extremely." For the next three questions, the Likert scale ranged from (1) "Very Poor" to (5) "Very Good." To analyze how great of a factor market size plays in determining overall attitudes towards Congress, a One-Way ANOVA was conducted to measure for statistically significant differences between different market sizes.

Already it has been shown that Congressional legislation is perceived as a moderate concern to broadcasters going digital, a slightly smaller hurdle than that posed by the FCC. However, like the responses to questions concerning the FCC, broadcasters may well not be expressing their true levels of frustration when expressing their overall criticisms of Congress when it comes to digital television.

The conclusion that broadcasters are not fully expressing the level of frustration they possess towards Congress when making their overall assessment of Congress is due to two questions posed on the survey. The first question asked respondents to rank on a 5-point Likert scale their assessment of Congress' understand of their needs when it comes to DTV. The second question surveyed respondents on how well they thought their needs were taken into account by Congress when it established the laws governing DTV. The question concerning understanding broadcasters' needs scored a mean of 1.93 (Mdn.=2, Mo.=2, Std. Dev.=0.88) (Table 14) and the question concerning whether or not

Table 14: Broadcasters' Perceptions of How Well Congress Understands Their Needs In Regards to Digital Television.

		Frequency	Percent	Cumulative Percent
Valid	1.00	68	36.2	36.2
	2.00	75	39.9	76.1
	3.00	36	19.1	95.2
	4.00	8	4.3	99.5
	5.00	1	.5	100.0
	Total	188	100.0	

those needs were taken into account scored an even lower mean of 1.89 (Mdn.=2, Mo.=2, Std. Dev.=.84) (Table 15). There was a significant correlation between how broadcasters perceive that Congress understood their needs and how they perceive that Congress took their needs into account (Pearson Correlation=.580, p<.001) (Table 16). That data clearly shows that broadcasters feel their input was left out of the legislative process for drafting and implementing DTV guidelines.

Research Question 7. Are broadcasters supportive of must-carry legislation and are there different opinions between future broadcasters and future information providers?

To answer this question, the research posed a number of CTV-related questions to respondents. The first question was among the list of questions concerning potential hurdles faced by broadcasters as they make the transition from analog broadcasting to digital broadcasting. The question asked broadcasters how problematic they felt access to cable television systems for digital programming would be. The Likert scale following

Table 15: Broadcasters' Perception of How Well Congress Took Their Needs Into Account In Regards To Digital Television.

		Frequency	Percent	Cumulative Percent
Valid	1.00	70	37.2	37.2
	2.00	78	41.5	78.7
	3.00	33	17.6	96.3
	4.00	6	3.2	99.5
	5.00	1	.5	100.0
	Total	188	100.0	

Table 16: Correlation Between How Well Needs Were Understood By Congress and How Well They Were Taken Into Account.

		Congress Understands the Needs	Needs Taken Into Account
Congress Understands the Needs	Pearson Correlation	1.000	.580**
	Sig. (2-tailed)	.	.000
	N	188	188
Needs Taken Into Account	Pearson Correlation	.580**	1.000
	Sig. (2-tailed)	.000	.
	N	188	188

**. Correlation is significant at the 0.01 level (2-tailed).

the question ranged from (1) "Not at all" to (5) "Extremely." The researcher posed four more questions concerning broadcasters and cable television. The first question asked respondents how supportive they were of must-carry legislation requiring cable television operators to carry all local, free, over-the-air, digital broadcast television signals. The second question asked broadcasters how supportive they are of legislation requiring cable television operators to carry all local, fee-based, over-the-air, digital broadcast television signals. For each question, respondents were asked to rank their support on a 5-point

Likert scale ranging from (1) "Very Opposed" to (5) "Very Supportive." The remaining two questions asked respondents how concerned they were with their local cable television operator's ability to carry their digital television signal when they begin digital broadcasting, and how concerned are they that their local cable television operator's ability to carry their digital television signal will have an adverse impact on their television station's transition to digital television. Each question asked respondents to rank their concern on a 5-point Likert scale ranging from (1) "Very Unconcerned" to (5) "Very Concerned." Means for future broadcasters were compared to means for future information providers using an Independent Variable t-test.

Anything that would require one business to aid another business is sure to be supported by the business being aided. This general rule has held true thus far for broadcasters, who have traditionally been in favor of must-carry legislation, requiring cable operators to carry their signals.

Digital broadcasting does little to sway broadcasters' support for must-carry. When asked on a 5-point Likert scale, which ranged from (1) "Very opposed" to (5) "Very supportive," respondents said they were overwhelmingly supportive of must-carry legislation for free, over-the-air, digital television signals (M=4.85, Mdn. = 5, Mo.=5, Std. Dev.=.44) (Table 17). Support for must-carry requiring the carriage of fee-based, over-the-air, digital television signals, was evident, but not nearly as strong as that for free programming (M=3.53, Mdn.=4, Mo.=5, Std. Dev.=1.36) (Table 18). With equal variance not assumed, the researcher found that there was no statistically significant difference between future information providers and future broadcasters when it came to

Table 17: Broadcasters' Support For Must-Carry Legislation Requiring CTV Companies to Carry Free, Over-the-Air, Digital Television Signals.

		Frequency	Percent	Cumulative Percent
Valid	2.00	1	.5	.5
	3.00	3	1.6	2.1
	4.00	20	10.6	12.8
	5.00	164	87.2	100.0
	Total	188	100.0	

Table 18: Broadcasters' Support For Must-Carry Legislation Requiring CTV Companies to Carry Fee-Based, Over-the-Air, Digital Television Signals.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	17	9.0	9.1	9.1
	2.00	21	11.2	11.3	20.4
	3.00	52	27.7	28.0	48.4
	4.00	31	16.5	16.7	65.1
	5.00	65	34.6	34.9	100.0
	Total	186	98.9	100.0	
Missing	.00	2	1.1		
Total		188	100.0		

support must-carry for fee-based digital programming. (t=.336, df=122.772, p=.737) (Table 19).

Earlier, broadcasters said access to CTV systems was a major hurdle in the way of DTV's success. The mean for that concern was 4.11 on a 5-point Likert scale (range of concern was from (1) "Not at all" to (5) "Extremely"). That concern was consistent with more detailed questions found later in the survey. Using a 5-point Likert scale which ranged from (1) "Very unconcerned," to (5) "Very concerned", respondents were asked to rank both how concerned they were with their local CTV company's ability to carry their digital signal and how concerned they were that the CTV company's ability to carry the digital signal would have an adverse impact on DTV's success. Concern for CTV's ability to carry broadcasters' digital signal is great, with 78.7 percent of the respondents answering either a 4 or 5 on the Likert scale (M=4.27, MDN.=5, Mo.=5, Std. Dev.=1.14) (Table 20). The concern for carriage was directly related to a concern that problems associated with CTV carriage will have an adverse impact on the commercial success of digital television (Pearson Correlation=.637, p<.001) (Table 21). Respondents who indicated a high level of concern for their local cable company's ability to carry their digital television signal where likely to say that the ability of their local cable company to carry their digital signal would have an *adverse* impact on their television station's transition to digital television. While not as high of a concern as CTV's ability to carry the signal, a significant concern that carriage will adversely impact DTV was recorded. Nearly three-quarters (74.5%) rated their concern as either a 4 or 5 on the same 5-point Likert scale as the previous question (M=4.07, Mdn.=4, Mo.=5, Std. Dev.=1.14) (Table

Table 19: Relationship Between Broadcaster's Support For Must-Carry Legislation Requiring CTV Companies to Carry Fee-Based, Over-the-Air, Digital Television Signals and Future Business Definition.

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Must-Carry for Fee-Based Programmi	Equal variances assumed	.342	.560	.341	166	.734
	Equal variances not assur			.336	122.772	.737

Table 20: Broadcasters' Concern Over Local CTV Company's Ability to Carry Digital Television Signals.

		Frequency	Percent	Cumulative Percent
Valid	1.00	6	3.2	3.2
	2.00	16	8.5	11.7
	3.00	18	9.6	21.3
	4.00	29	15.4	36.7
	5.00	119	63.3	100.0
	Total	188	100.0	

Table 21: Relationship Between Broadcaster's Concern Over CTV Carriage and That Carriage Issue Will Have an Adverse Impact on the Transition to DTV.

		Concern with CTV Carriage	Carriage will have Adverse Impact
Concern with CTV Carriage	Pearson Correlation	1.000	.637**
	Sig. (2-tailed)	.	.000
	N	188	188
Carriage will have Adverse Impact	Pearson Correlation	.637**	1.000
	Sig. (2-tailed)	.000	.
	N	188	188

**. Correlation is significant at the 0.01 level (2-tailed).

22). Evidently, several broadcasters who express the same level of concern over CTV's carriage of DTV disagree somewhat, though not significantly, on the extent to which the issue will be detrimental to digital broadcasting's commercial success.

Planning for Digital Broadcasting

Research Question 8. Where are digital programming and digital equipment purchasing decisions being made, how far along are broadcasters in planning for DTV and are there differences between how far along broadcasters are in planning for digital television and stations of various market sizes and based on who answered the survey?

Nine questions encompassed the section of the survey dealing with planning for digital broadcasting. However, before the researcher probed individual elements of planning, the survey posed a question asking respondents to indicate how far along they were in overall planning for digital television and where digital planning decisions were

Table 22: Broadcasters' Concern that Local CTV Carriage Will Have an Adverse Impact on the Transition to DTV.

		Frequency	Percent	Cumulative Percent
Valid	1.00	8	4.3	4.3
	2.00	14	7.4	11.7
	3.00	26	13.8	25.5
	4.00	49	26.1	51.6
	5.00	91	48.4	100.0
	Total	188	100.0	

being made. For the question regarding overall planning for digital television, respondents were asked to indicate on a 5-point Likert scale ranging from (1) "No Planning" to (5) "Implementing Planning" how far along they are in the overall planning for digital television. Means for future broadcasters were compared with means for future information providers using an Independent Variable t-test. For where digital decisions are being made, the researcher broke the issue of planning into two categories -- programming and purchasing digital equipment. The first question asked respondents to indicate where digital programming decisions are made, and the second question asked respondents to indicate where digital equipment purchasing decisions are made. Both questions used a 5-point Likert scale ((1) "Totally local," (2) "Mostly local/Some Corporate," (3) "Local and Corporate," (4) "Mostly corporate/Some local," and (5) "Totally corporate").

Despite broadcasters' reluctance to embrace digital television, most believe they are well along in the overall planning process for its implementation. Using a 5-point Likert scale, respondents were asked to rank their current digital planning status (1 equaled No planning and 5 equaled Implementing planning). Just over 45 percent of respondents (n=85) indicated that when it came to overall planning for digital television, they were either very far along in their planning or actually implementing their planning (M=3.38, Mdn.=3, Mo.=3, Std. Dev.=1.2). (See Table 23) The relationship between market size and overall planning for digital television is statistically significant ($F(3, 184)=10.593$, $p<.001$). Tukey did find that top-30 markets perceived themselves to be significantly ahead of all other markets in planning for digital television (Table 24). In

Table 23: Overall Planning for Digital Television.

		Frequency	Percent	Cumulative Percent
Valid	1.00	11	5.9	5.9
	2.00	36	19.1	25.0
	3.00	56	29.8	54.8
	4.00	41	21.8	76.6
	5.00	44	23.4	100.0
	Total	188	100.0	

Table 24: Means of DTV Planning by Market Size.

Tukey HSD[a,b]

		Subset for alpha = .05	
Market Size	N	1	2
101+	86	3.0233	
51-100	60	3.4000	
31-50	22	3.6364	
1-30	20		4.5500
Sig.		.122	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 32.323.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

addition, a significant difference was found between those who identified themselves as a General Manager, President, Vice President, Operations Manager or some variation of like and those who had "Engineer" in their title. Engineers (M=3.81) were found to be significantly further along (t=-3.11, df=101, p=.002) in the planning process for DTV than were General Managers (M=3.22) (Table 25, 26).

For the most part, broadcasters have a tremendous amount of say at the local level when it comes to planning for the two key components of digital broadcasting --

Table 25: Means of DTV Planning by Title of Person Answering Survey.

	Title of Person Answering Survery	N	Mean	Std. Deviation	Std. Error Mean
Overall Planning for DTV	GM/V.P/Pres./OM	126	3.2222	1.1858	.1056
	Engineer	53	3.8113	1.1445	.1572

Table 26: Statistical Difference in Perceptions of DTV Planning by Title of Person Answering Survey.

		evene's Test for Equalit of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Overall Planning for I	Equal variances assume	.000	.999	-3.065	177	.003
	Equal variances not assu			-3.110	101.000	.002

equipment purchases and programming. Nearly 70 percent (n=131) said they have at least an equal say with the corporate level when it comes to making digital purchasing decisions (Table 27). An even greater 76.9 percent (n=143) indicated the same level of input for digital programming (Table 28). A direct relationship exists between where decisions are being made for both technology purchasing and digital programming. Broadcasters have the same level of autonomy for purchasing digital equipment as they do for planning digital programming (Chi-Square=10.272, df=4, p=.036) (Table 29). So despite the minor differences in mean between programming and digital equipment purchasing, for the most part broadcasters have the same level of autonomy when deciding how best to handle each decision.

Table 27: Where Digital Equipment Purchase Decisions are Made.

		Frequency	Percent	Cumulative Percent
Valid	Totally local	26	13.8	13.8
	Mostly local/Some corporate	37	19.7	33.5
	Local and Corporate	68	36.2	69.7
	Mostly corporate/Some local	41	21.8	91.5
	Totally corporate	16	8.5	100.0
	Total	188	100.0	

Table 28: Where Digital Programming Decisions are Made.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Totally local	36	19.1	19.4	19.4
	Mostly local/Some corporate	28	14.9	15.1	34.4
	Local and Corporate	79	42.0	42.5	76.9
	Mostly corporate/Some local	33	17.6	17.7	94.6
	Totally corporate	10	5.3	5.4	100.0
	Total	186	98.9	100.0	
Missing	No answer	2	1.1		
Total		188	100.0		

Table 29: Relationship Between Where Digital Programming and Digital Equipment Purchasing Decisions are being Made

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.272[a]	4	.036
Likelihood Ratio	10.372	4	.035
Linear-by-Linear Association	.607	1	.436
N of Valid Cases	186		

[a] 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.94.

Research Question 9. How far along are broadcasters in the planning process to purchase DTV equipment and is there a relationship between planning status and market size, number of hours of locally produced programming, and those who answered the survey?

In order to understand all the elements of purchasing decisions, the researcher broke down digital purchasing decisions into four separate questions. The four questions covered: (1) Overall planning for purchasing digital production equipment; (2) Overall planning for upgrading studio facilities to digital; (3) Overall planning for purchasing digital transmitting equipment; and (4) How integrated with digital technology the station hopes to be within two years of commencing digital broadcasting. For the three questions regarding planning for digital television, respondents were asked to indicate on separate 5-point Likert scales ranging from (1) "No Planning" to (5) "Implementing Planning" how far along in the planning process they are for each individual planning aspect. A One-Way ANOVA was conducted for each concern to measure for statistical significant differences between different market sizes. Additionally, another One-Way ANOVA was conducted to measure for statistically significant differences between stations based on number of hours of local programming they produced. For all analysis involving hours of locally produced programming, stations were consolidated into three categories based on hours of locally produced programming -- 0-10 hours, 10.5-20 hours, 20.5+ hours -- to provide more equal representation per group. A t-test used was to measure for statistically significant differences between stations based on the title of the person answering the survey. Because the researcher was most concerned about the

two major groups of respondents -- General Mangers/Vice Presidents/Presidents/Operations Mangers, and those who had "Engineer" in their title -- and because the three other groups represented were so small, the research was confined to studying the differences between General Managers and Engineers. All questions analyzing differences between respondents based on the job titles will involve analysis of General Managers and Engineers only.

Despite how far along broadcasters think they are towards planning for making digital purchases, a more detailed look at individual digital planning factors indicates that broadcasters may not be as far along in planning for digital television as they initially indicated. No other question concerning DTV planning approached the mean for overall planning, with the exception of planning for purchasing a digital transmitter. The remaining digital equipment purchasing questions showed just how far broadcasters still have to go to get a product, produced from start to finish in digital, on the air.

When it comes to overall planning for purchasing digital equipment, broadcasters have made very little headway. Eighty-five (48.9%) respondents indicated little or no planning in purchasing digital equipment (M=2.7, Mdn.=3, Mo.=2, Std. Dev.=1.27). (See Table 30)

When digital equipment purchasing decisions are broken down into two categories -- studio and transmitter -- it is clear what direction broadcasters are pursuing for the near future. Purchasing a digital transmitter is perhaps the easiest and quickest way in which a television station can comply with Congress and the FCC. That fact may be why 44.1 percent (n=75) indicated they were either far along with their planning or

Table 30: Broadcasters' Perceptions of Progress Made Towards Purchasing Digital Equipment.

		Frequency	Percent	Cumulative Percent
Valid	1.00	38	20.2	20.2
	2.00	54	28.7	48.9
	3.00	43	22.9	71.8
	4.00	33	17.6	89.4
	5.00	20	10.6	100.0
	Total	188	100.0	

implementing planning for purchasing a digital transmitter (M=3.23, Mdn.=3, Mo.=2, Std. Dev.=1.32). (See Table 31) Broadcasters are apparently looking just to comply with Congress and the FCC, and see purchasing a digital transmitter as the way to do just that. Purchasing digital equipment for the studio lags far behind. Just 52 respondents (27.6%) indicated they were either far along or finalizing planning for purchasing digital studio equipment (M=2.63, Mdn.=2, Mo.=2, Std. Dev.=1.33). (See Table 32)

Despite not being far along in planning to purchase digital equipment, broadcasters are nonetheless convinced they will be integrated with digital technology within two years. One hundred four respondents (55.3%) claimed that within two years they will be highly or completely integrated with digital technology (M=3.63, Mdn.=4, Mo.=4, Std. Dev. = 1.04). (See Table 33)

As should be expected, market size plays a significant role in how far along stations are in planning for purchasing digital equipment ($F(3, 184)=2.793$, $p=.042$). The larger markets -- 1-30 (M=3.3) and 31-50 (M=3.05) -- were on average further along in

Table 31: Broadcasters' Perceptions of Progress Made Towards Purchasing Digital Transmitters.

		Frequency	Percent	Cumulative Percent
Valid	1.00	18	9.6	9.6
	2.00	48	25.5	35.1
	3.00	39	20.7	55.9
	4.00	39	20.7	76.6
	5.00	44	23.4	100.0
	Total	188	100.0	

Table 32: Broadcasters' Perceptions of Progress Made Towards Purchasing Digital Studio Equipment.

		Frequency	Percent	Cumulative Percent
Valid	1.00	45	23.9	23.9
	2.00	54	28.7	52.7
	3.00	37	19.7	72.3
	4.00	29	15.4	87.8
	5.00	23	12.2	100.0
	Total	188	100.0	

Table 33: Broadcasters' Perceptions of How Integrated With Digital Technology They Will be Two Years After Commencing DTV Broadcasting.

		Frequency	Percent	Cumulative Percent
Valid	1.00	3	1.6	1.6
	2.00	25	13.3	14.9
	3.00	56	29.8	44.7
	4.00	59	31.4	76.1
	5.00	45	23.9	100.0
	Total	188	100.0	

planning for purchasing digital equipment than the smaller markets -- 51-100 (M=2.63) and 101+ (M=2.51). (See Table 34) Likewise, market size plays a significant role in how far along stations are in planning to purchase both studio equipment ($F(3, 184)=7.026$, $p<.001$) (Table 35) and transmitters ($F(3, 184)=16.045$, $p<.001$). (See Table 36) Markets 1-30 are ahead of markets 101+ in the planning process to purchase digital transmitters by a statistically significant margin. Market size also plays a significant role in how integrated with digital technology stations hope to be ($F(3, 184)=3.901$, $p=.01$). Only with integration of digital technology do the numbers not conform exactly to market size. Stations in market sizes 31-50 are looking to be more integrated (M=4.14) than markets 1-30 (M=3.8) for no obvious reason. (See Table 37) There is no significant difference in opinion concerning planning for DTV purchasing between General Managers and Engineers. While the two groups differed on overall planning progress, the two group were in agreement concerning how far along they were in planning for purchasing digital equipment ($t=-.326$, $df=100.18$, $p=.748$)

The number of hours of locally produced programming is somewhat a factor in how far along television stations are in planning on purchasing digital studio equipment ($F(2, 185)=3.201$, $p=.043$) (Table 38) and purchasing a digital transmitter ($F(2,185)=9.12$, $p<.001$) (Table 39). In all cases, stations that produce more than 20 hours of local programming per week (group 3 on Tables 38, 39) are significantly more likely to be further along than stations that produce 0-10 hours per week (group 1 on Tables 38, 39) and stations the produce 10.5-20 hours per week (group 2 on Tables 38, 39) in planning for every category involving purchasing digital equipment. The only exception is that

Table 34: Overall Planning for Purchasing Digital Equipment in Relationship to Market Size.

DTV Equipement Purchasing

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.142	3	4.381	2.793	.042
Within Groups	288.576	184	1.568		
Total	301.718	187			

Tukey HSD[a,b]

		Subset for alpha = .05
Market Size	N	1
101+	86	2.5116
51-100	60	2.6333
31-50	22	3.0455
1-30	20	3.3000
Sig.		.055

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 32.323.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 35: Planning for Purchasing Digital Studio Equipment by Market Size.

Tukey HSD[a,b]

		Subset for alpha = .05	
Market Size	N	1	2
101+	86	2.2791	
51-100	60	2.6833	
31-50	22	2.9545	2.9545
1-30	20		3.6500
Sig.		.140	.122

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 32.323.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 36: Planning for Purchasing Digital Transmitters by Market Size.

Tukey HSD[a,b]

		Subset for alpha = .05		
Market Size	N	1	2	3
101+	86	2.7907		
51-100	60	3.1833	3.1833	
31-50	22		3.6818	
1-30	20			4.7500
Sig.		.541	.327	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 32.323.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 37: Integration Plans by Market Size.

Tukey HSD[a,b]

		Subset for alpha = .05	
Market Size	N	1	2
101+	86	3.3837	
51-100	60	3.7333	3.7333
1-30	20	3.8000	3.8000
31-50	22		4.1364
Sig.		.352	.381

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 32.323.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 38: Planning for Purchasing Digital Studio Equipment by Hours of Locally Produced Programming

Tukey HSD[a,b]

		Subset for alpha = .05	
HRLOCAL2	N	1	2
2.00	63	2.3333	
1.00	48	2.6042	2.6042
3.00	77		2.8961
Sig.		.493	.440

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 60.370.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 39: Planning for Purchasing Digital Transmitters by Hours of Locally Produced Programming.

Tukey HSD[a,b]

		Subset for alpha = .05	
HRLOCAL2	N	1	2
1.00	48	2.8750	
2.00	63	2.9206	
3.00	77		3.7013
Sig.		.979	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 60.370.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

stations that produce 0-10 hours per week are more likely to be further along in the planning process for purchasing digital studio equipment, and more likely to be further integrated with digital technology in the future than are stations that produce 10.5-20 hours per week.

The title of the person answering the survey was not related to the progress made in overall planning for purchasing digital equipment. The researcher found no statistically significant difference between General Managers (M=2.71) and Engineers (M=2.77) (Table 40) when it comes to the overall planning for digital equipment purchases (t=-.326, df=100.184, p=.745). (Table 41)

Table 40: Perception of Progress Made Towards Planning for Purchasing Digital Equipment by Title of Person Answering Survey.

	Title of Person Answering Survery	N	Mean	Std. Deviation	Std. Error Mean
DTV Equipement Purchasing	GM/V.P/Pres./OM	126	2.7063	1.2842	.1144
	Engineer	53	2.7736	1.2503	.1717

Table 41: Relationship Between Title of Person Answering Survey and Overall Planning for Purchasing Digital Equipment.

		evene's Test for Equalit of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
DTV Equipement Purcha	Equal variances assumec	.044	.834	-.322	177	.748
	Equal variances not assu			-.326	100.184	.745

Research Question 10. How far into the planning process for planning digital programming are broadcasters and are there differences in planning stages between various stations based on where they identified programming decisions are being made and based on the title of the person answering the survey?

For this research question, the researcher posed one questions to respondents: How far along in the planning process for digital television are they. Respondents were asked to indicate on a 5-point Likert scales ranging from (1) "No Planning" to (5) "Implementing Planning" how far into the planning process they were. A One-Way ANOVA was conducted to determine if a statistically significant difference existed between stations based on where digital programming decisions are made and how far along in the planning process for digital television stations are. In addition, an Independent Variable t-test was used to measure for statistical significance between stations based on the title of the person answering the survey. Another One-Way ANOVA was conducted to see if there was a correlation between planning for digital programming and network affiliation.

Further evidence that currently broadcasters are only trying to meet the FCC's minimum DTV requirements is found in how broadcasters are approaching digital programming. To put it simply, for the most part they are choosing not to approach digital programming at all. Broadcasters are ignoring digital programming by simply not planning for it. Broadcasters were asked to indicate on a 5-point Likert scale similar to the one used to gauge digital purchasing planning. Table 42 demonstrates that broadcasters have made few digital programming plans (M=1.99, Mdn.=2, Mo.=1, Std.

Table 42: Broadcasters' Perceptions of Progress Made Towards Digital Programming.

		Frequency	Percent	Cumulative Percent
Valid	1.00	80	42.6	42.6
	2.00	54	28.7	71.3
	3.00	37	19.7	91.0
	4.00	10	5.3	96.3
	5.00	7	3.7	100.0
	Total	188	100.0	

Dev.=1.08). Seventy-one percent (n=134) said they had done little or no planning for digital programming while only 3.7 percent (n=7) said they were implementing their DTV programming planning.

Network affiliation is a significant factor in television stations' planning for digital programming (F(3, 184)=3.693, p=.013). Stations affiliated with CBS perceive that they are further along in planning for digital programming (M=2.4), than ABC (M=1.74), Fox (M=1.83) and NBC (M=1.94). (See Table 43) The difference in planning between CBS and ABC and Fox was statistically significant.

Whether digital programming decisions are made locally or not is not a statistically significant factor in how far along a station is in planning for digital programming (F(2, 183)=1.044, p=.354) (Table 44). Likewise, market size plays no statistically significant role in planning for digital programming (F(3,184)=.931, p=.427) (Table 45). However, there was a surprising difference of opinion found between engineers and general managers. Though no statistically significant relationship was found to exist between the title of the person answering the survey and the perception of

Table 43: Broadcasters' Perception of Progress Towards Planning DTV Programming by Network Affiliation.

Tukey HSD[a,b]

		Subset for alpha = .05	
Network Affiliation	N	1	2
ABC	51	1.7451	
Fox	35	1.8286	
NBC	52	1.9423	1.9423
CBS	50		2.4000
Sig.		.811	.166

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 45.761.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 44: Broadcasters' Perception of Progress Towards Planning DTV Programming by Where Digital Programming Decisions are Made.

DTV Programming Planning

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.470	2	1.235	1.044	.354
Within Groups	216.525	183	1.183		
Total	218.995	185			

Table 45: Broadcasters' Perception of Progress Towards Planning DTV Programming by Market Size.

DTV Programming Planning

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.288	3	1.096	.931	.427
Within Groups	216.691	184	1.178		
Total	219.979	187			

progress made towards planning to purchase digital equipment (t=-.326, df=100.184, p=.745), a relationship was found to exist between the title of the person answering the survey and the perception of progress made towards digital programming (t=-2.2, df=93.22, p=.03) (Table 46). It is not surprising that a difference in perception exists, but rather the manner in which it exists. Engineers perceive that they are further along in planning for digital programming (M=2.3) than general managers (M=1.9) (Table 47).

Table 46: Perception of Progress Made Towards Planning Digital Programming by Title of Person Answering Survey.

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
DTV Programming Plan	Equal variances assumed	.296	.587	-2.248	177	.026
	Equal variances not assu			-2.200	93.224	.030

Table 47: Means of General Managers and Engineers Answering How Far Along in Their Station is in Planning for Digital Programming.

	Title of Person Answering Survey	N	Mean	Std. Deviation	Std. Error Mean
DTV Programming Planning	GM/V.P/Pres./OM	126	1.9048	1.0615	9.457E-02
	Engineer	53	2.3019	1.1195	.1538

Research Question 11. Is there a relationship between how much HDTV programming a television station plans and its network affiliation?

For this question, the researcher asked respondents how much local digital programming do they anticipate being high-definition television within one year of

launching digital television. Respondents were again asked to indicate on a 5-point Likert scales ranging from (1) "No HDTV" to (5) "All HDTV" how much HDTV they plan on broadcasting. One-Way ANOVA was conducted to see if there was a correlation between amount of HDTV programming and network affiliation.

Continuing the theme of doing just enough to comply with the FCC in the short-term, broadcasters have few plans to broadcast much in the way of HDTV programming in the near future. Respondents were asked to rank on a 5-point Likert scale how much high-definition television they plan on broadcasting within one year of launching digital broadcasting. A full 83.5 percent (n=157) said they plan to broadcast little or no HDTV within a year while only 5.3 percent (n=10) said they plan to broadcast a lot or all HDTV (M=1.73, Mdn.=1, Mo.=1, Std. Dev.=.92) (Table 48). Unlike planning for digital programming, where network affiliation was a factor in how far along in the planning process stations were, network affiliation is not a factor in planning for broadcasting HDTV. No statistical significance was found between how much HDTV a station plans on broadcasting and it's network affiliation (F(3, 184)=.996, p=.396) (Table 49). The number of hours of programming produced locally has no statistically significant relationship with network affiliation (F(2,185)=.1.628, p=.199) (Table 50).

Table 48: Anticipated Level of HDTV Programming One Year After Commencement of Digital Broadcasting.

		Frequency	Percent	Cumulative Percent
Valid	1.00	95	50.5	50.5
	2.00	62	33.0	83.5
	3.00	21	11.2	94.7
	4.00	7	3.7	98.4
	5.00	3	1.6	100.0
	Total	188	100.0	

Table 49: Anticipated Level of HDTV Programming One Year After Commencement of Digital Broadcasting In Relationship to Network Affiliation

Amount of HDTV Programming

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.511	3	.837	.996	.396
Within Groups	154.654	184	.841		
Total	157.165	187			

Table 50: Anticipated Level of HDTV Programming One Year After Commencement of Digital Broadcasting In Relationship to Number of Hours of Locally Produced Programming.

Amount of HDTV Programming

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.718	2	1.359	1.628	.199
Within Groups	154.447	185	.835		
Total	157.165	187			

Additional Digital Services

Research Question 12. How far along are broadcasters in planning to provide additional digital services and are there differences between stations in various sized markets and network affiliations?

For this research question, the researcher asked respondents to indicate on a 5-point Likert scale how far along in the planning process for additional digital services they were. The scale ranged from (1) "No Planning" to (5) "Implementing Planning." A One-Way ANOVA was conducted to measure for statistical significance between different market sizes and planning for digital broadcasting. Market sizes were consolidated into markets 1-30, 31-50, 51-100, and 101+ to provide more equal representation per group. In addition, a One-Way ANOVA was conducted to see if there was a correlation between amount of HDTV programming and network affiliation.

With broadcasters still in the very early stages of planning DTV programming, it should come as no surprise that few have even begun to think about taking advantage of being able to split a digital signal and provide additional services. On a 5-point Likert scale ranging from (1) No planning to (5) Implementing planning, respondents were asked how far along they were in planning for additional digital services. Overall, broadcasters have barely begun to think about providing additional digital services (M=1.8, Mdn.=2, Mo.=1, Std. Dev.=.982). Just 5.3 percent (n=10) answered a 4 or 5, indicating that they were either far along in the planning process to provide additional digital services or were actually implementing their planning (Table 51). Just over 48

Table 51: Broadcasters' Perceptions of Planning for Digital Services.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	88	46.8	47.6	47.6
	2.00	54	28.7	29.2	76.8
	3.00	33	17.6	17.8	94.6
	4.00	7	3.7	3.8	98.4
	5.00	3	1.6	1.6	100.0
	Total	185	98.4	100.0	
Missing	.00	3	1.6		
Total		188	100.0		

percent (48.4%, n=88) said they had not begun planning for additional digital services. Neither market size (F(3, 184)=1.673, p=.174) (Table 52) nor network affiliation (F(3, 184)=.215, p= .886) (Table 53) plays a statistically significant role in a station's planning for digital services.

Research Question 13. What are some of the services broadcasters may be interested in offering and are there differences between future information providers and future broadcasters in what digital services stations would be interested in providing?

For this research question, the researcher presented respondents with a list of eight potential services broadcasters may have the option of offering their respective markets at some point in the future. The list of potential digital services (see the instrument in the Appendix for complete list) was compiled from the review of literature.

Table 52: Broadcasters Planning for Additional Digital Services by Market Size.

Planning for Digital Services

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.788	3	1.596	1.673	.174
Within Groups	175.531	184	.954		
Total	180.319	187			

Table 53: Broadcasters Planning for Additional Digital Services by Network Affiliation.

Planning for Digital Services

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.629	3	.210	.215	.886
Within Groups	179.690	184	.977		
Total	180.319	187			

For each potential digital service, the respondents were asked to indicate on a 5-point Likert scale how interested their station might be in offering the service. The Likert scales accompanying each digital service ranged from (1) "Not at all" to (5) "Extremely." The researcher wanted to see if differences exist between what future broadcasters might be interested in providing and what future information providers might be interested in providing. An Independent Variable t-test was conducted for each potential digital service to see if significant differences existed between future information providers and future broadcasters.

While no one service hit a major cord with broadcasters, several digital services found potential interest among broadcasters. Interactive television (M=3.63), data enhancement (M=3.62), high-speed Internet access (M=3.6) and at-home shopping

(M=3.16) all drew high levels interest among broadcasters. Broadcasters evidently have little or no interest in providing some services such as; on-line gaming (M=1.94), cellular phone service (M=2.6), and in-home schooling (M=2.73). For complete results, please see Table 54.

Several potential digital services proved to have statistically significant differences between future broadcasters and future information providers as defined earlier in this study. For a complete list of means for potential interest in providing additional digital services, broken down between future information providers and future broadcasters, see Table 55. For the following potential services future information providers were significantly more interested in providing the service than were future broadcasters (equal variances is not assumed): Pager service (t=-1.981, df=126.331, p=.05); Data enhancement service (t=-2.348, df=137.555, p=.02); Interactive television (t=-2.0, df=138.48, p=.047). (Table 56).

Table 54: Broadcasters' Interests In Potential Digital Services.

	Mean	Median	Mode	Std. Deviation
Cellular Phone Service	2.5904	3.0000	1.00	1.4652
Pager Service	2.9149	3.0000	1.00	1.4564
High-Speed Internet Access	3.5957	4.0000	5.00	1.3628
Data Enhancemen t Service	3.6170	4.0000	5.00	1.2548
Interactive Television	3.6330	4.0000	5.00	1.3318
In-Home Schooling	2.7340	3.0000	3.00	1.3498
On-Line Gaming	1.9415	1.5000	1.00	1.2331
At-Home Shopping	3.1649	3.0000	3.00	1.3402

Table 55: Potential Interest in Digital Services Based on Future Definitions.

	future definition	N	Mean	Std. Deviation	Std. Error Mean
Cellular Phone Service	Broadcaster	107	2.4299	1.3948	.1348
	Information Provider	63	2.7302	1.5049	.1896
Pager Service	Broadcaster	107	2.7196	1.4128	.1366
	Information Provider	63	3.1746	1.4651	.1846
High-Speed Internet Access	Broadcaster	107	3.4673	1.3481	.1303
	Information Provider	63	3.6984	1.3635	.1718
Data Enhancement Service	Broadcaster	107	3.4860	1.2617	.1220
	Information Provider	63	3.9365	1.1760	.1482
Interactive Television	Broadcaster	107	3.4766	1.3622	.1317
	Information Provider	63	3.8889	1.2587	.1586
In-Home Schooling	Broadcaster	107	2.6822	1.3289	.1285
	Information Provider	63	2.8413	1.4166	.1785
On-Line Gaming	Broadcaster	107	1.8879	1.2157	.1175
	Information Provider	63	2.0000	1.2048	.1518
At-Home Shopping	Broadcaster	107	3.0000	1.3318	.1287
	Information Provider	63	3.3810	1.3251	.1669

Table 56: Significance of Interest In Additional Services Based on Future Definitions.

		Levene's Test for	t-test for Equality of Means		
		F	t	df	Sig. (2-tailed)
Cellular Phone Service	Equal variances assumed	1.271	-1.316	168	.190
	Equal variances not assume		-1.291	122.282	.199
Pager Service	Equal variances assumed	.175	-2.000	168	.047
	Equal variances not assume		-1.981	126.331	.050
High-Speed Internet Acces:	Equal variances assumed	.020	-1.075	168	.284
	Equal variances not assume		-1.072	128.924	.286
Data Enhancement Service	Equal variances assumed	1.184	-2.305	168	.022
	Equal variances not assume		-2.348	137.555	.020
Interactive Television	Equal variances assumed	2.936	-1.959	168	.052
	Equal variances not assume		-2.000	138.480	.047
In-Home Schooling	Equal variances assumed	1.516	-.735	168	.463
	Equal variances not assume		-.723	123.504	.471
On-Line Gaming	Equal variances assumed	.000	-.583	168	.561
	Equal variances not assume		-.584	131.063	.560
At-Home Shopping	Equal variances assumed	.221	-1.805	168	.073
	Equal variances not assume		-1.807	130.650	.073

Chapter V

Summary, Conclusions, and Recommendations

Summary

This study set out to determine local broadcasters' early attitudes and trends towards digital television in the early stages of its implementation. Through the study, the researcher attempted to gauge the direction by which the industry is heading by determining how broadcasters defined themselves in the present and how they envisioned defining themselves in the future. It also tried to determine what factors most concern broadcasters, what factors they feel will contribute to the success of digital broadcasting and how far into the planning process for digital broadcasting are broadcasters.

Data were collected through a survey sent out to 714 affiliates of ABC, CBS, NBC and Fox. One hundred eighty-eight useable surveys were returned by June 1, 1999 for a response rate of 26.33 percent.

Differences Between Future Broadcasters and Future Information Providers

The most important finding from this study is that a shift is underway in how broadcasters may define themselves in the future. Sixty-three respondents (33.5%) say their future is as information providers. That is up from 13 (6.9%) who now define themselves as information providers. Not only is the trend of moving from broadcasting to providing information likely to continue, it is also likely to define the industry. As information providers become a larger segment of the broadcast television industry, their new business strategies, especially towards multicasting and additional digital services, will be an influential force on the entire industry. If future information providers' business strategies prove successful, the entire industry may be forced to adopt their strategies or risk being overtaken by information providers.

This study found that future broadcasters and future information providers see the digital future much differently. For instance, the perception that broadcasters have of the impact digital broadcasting will have on the industry is related to how broadcasters envision the future definition of their business to be. The mean for all respondents was 3.32. However, when respondents were broken down into two groups -- future broadcasters and future information providers -- statistically significant differences appeared. Future broadcasters were less consistent (Std. Dev. 1.47) than future information providers (Std. Dev.=.82) on the impact DTV will have on their business definition. Overall, future information providers were felt DTV will have a greater impact on their business definition than future broadcasters ($M=3.9$ vs. $M=3.06$, $p<.001$).

Future information providers feel more strongly than future broadcasters that the ability to provide digital non-television signals and the ability to provide multiple television signals were important factors for the potential commercial success of digital broadcasting. In addition, future information providers have a greater interest in providing every potential digital service included in the researcher's survey, with significant differences found for providing pager service, data enhancement and interactive television.

The Upsides and Downsides of Digital Broadcasting

For broadcasters, the advent of digital broadcasting is both a blessing and a curse. The blessing is it opens many new avenues by which to expand the business of broadcasters. The curse is that it forces broadcasters into an expensive world of uncertainty. Uncertainty is unsettling for such a industry for which the basic product it produces, a single 6 MHz broadcast television signal, has gone fundamentally unchanged since the invention of television broadcasting. The historic lack of change in the basic fundamentals of broadcast television probably explains why the overall consensus from this study is that, based on responses to questions concerning potential hurdles, FCC criticisms, and cable carriage, if it can't be said that broadcasters do not want digital broadcasting, then they are at least very worried about its possible outcomes.

As a whole, broadcasters say the ability to provide high-definition television signals (M=3.83) and the ability to provide multiple television signals (M=3.74) are the

most important factors in the commercial success of digital broadcasting. The ability to provide CD-quality sound (M=3.6) and non-television signals (M=3.23) also will play important roles. Since all four factors for the success of digital broadcasting scored high, it is safe to say that broadcasters are in agreement that not only is digital broadcasting a superior product over analog broadcasting, but it is a multi-faceted technology for which all four factors will play important roles if digital broadcasting is to be successful.

Despite the evident superiority of digital broadcasting, broadcasters have a number of causes for concern over its implementation. The minimum mean for all 10 potential hurdles to the success of digital broadcasting, as posed to respondents, was a high 3.44 (availability of DTV advertisement) on a 5-point Likert scale, indicating that broadcasters are concerned about all issues surveyed. The biggest concerns for broadcasters is the two factors most out of their hands -- number of receivers in their market (M=4.52) and the costs to consumers (M=4.44).

For the most part, broadcasters are in agreement concerning most of these concerns. Even concerns over new technology, something top-30 markets are having to deal with now and markets 31-plus do not have to deal until some time in the future, are relatively consistent regardless of market size. However, the estimated $8-15 million price tag for a station to fully convert to digital did bring about an expected difference in concern between stations of various market sizes. Stations in top-30 markets were significantly less concerned about financing new equipment than were stations in markets 101 and smaller.

Congress and the FCC

By mandating a complete change in the way broadcasters do business, Congress and the FCC were unavoidably facing criticism. However, based on the results from this study, both the Congress and the FCC could have done a better job in handling the transition. While broadcasters rated concern for the potential hurdles posed by both governmental bodies lower than other potential hurdles to digital television, concern for the potential hurdles both the FCC and Congress pose is still great (Congress M=3.48, FCC M=3.52).

Compared to other potentially problematic hurdles faced by broadcasters making the switch to digital broadcasting, Congress is not a great concern. However, in the eyes of broadcasters, there was certainly room for improvement in the way Congress handled the switch to digital. Broadcasters say Congress simply did not understand the industry's needs (M=1.93), and even worse, did a poor job of acting on those needs (M=1.89).

The researcher listed five criticisms levied at the FCC and asked respondents to indicate how valid those criticisms are. In light of the low score given to Congress in its understanding the needs of broadcasters, it was surprising that the lowest score given to any criticism of the FCC was that the agency's regulations lack input from broadcasters (M=3.63), though that mean score substantially indicates a feeling by broadcasters that the regulations lacked their input. According to broadcasters, the FCC's timetable for returning the analog spectrum is unrealistic, the DTV timetable is unrealistic, DTV is not market driven and the agency is relying to too heavily on unproven technology.

Cable Television

Broadcasters appear to understand that in order for digital broadcasting to be successful, cable television has to play a significant role. This is cause for concern for broadcasters who expressed both a concern with their local cable company's ability to carry their digital signals (M=4.27) as well as a concern that the carriage issue will have an adverse impact the commercial success of DTV (M=4.07).

One remedy for this concern is to look to the same government that broadcasters seem to feel did them an injustice and ask for must-carry legislation. While it is not clear how must carry will work in a digital environment where broadcasters are capable of broadcasting many digital signals, strong broadcaster support for legislation exists anyway. Support for must carry of free digital broadcast signals was overwhelming (M=4.85) while support for fee-based digital broadcasting was strong (M=3.53), but not nearly as strong as that for free signals.

Planning for Digital Broadcasting

When it comes to overall planning for digital broadcasting, television stations in top-30 markets are generally ahead of those in other sized markets ($p<.001$). However, this may be, at least in part, a misperception. How far along broadcasters think they are in planning for digital broadcasting and how far along they actually are may be two different things. The mean score for broadcasters' overall planning for digital

broadcasting (M=3.38) was significantly higher than the two main planning areas for digital broadcasting -- digital programming (M=1.99) and digital equipment purchasing (M=2.7). Only planning for purchasing a digital transmitter (M=3.23) comes close to the mean for overall digital planning. This discrepancy was not expected. A possible explanation is that broadcasters looking at the overall picture of what needs to be done to broadcast digitally are thinking about how far along they are in planning to purchase a digital transmitter, which is the least they need to do to begin broadcasting digitally. The mean for that planning was 3.23. At this point, broadcasters are not thinking much about upgrading digital studio equipment or planning for digital programming. So when asked about overall planning for digital broadcasting, they think only of purchasing a digital transmitter, not of other factors of digital broadcasting.

The planning for digital broadcasting predominately is done at the local level. For both digital equipment purchasing and digital programming, most respondents said the decision making was split evenly between corporate and local. However, for both programming and equipment purchasing, more respondents (33.5% equipment, 34.5% programming) indicated decisions were either "totally local" (13.8% equipment, 19.4% programming) or "mostly local/some corporate" (19.7% equipment, 15.1% programming) than respondents (30.3% equipment, 23.1% programming) who indicated they were "totally corporate" (8.5% purchasing, 5.4% programming) or "mostly corporate/some local" (21.8% equipment, 17.7% programming). In addition, a Chi-Square indicated that the level of local involvement in decisions for both digital

programming and digital equipment purchases was found to be consistent both areas for the individual broadcaster (Chi-Square=91.363, df=4, p<.001).

As should be expected, larger markets were found to be further along in planning to purchase digital equipment and more likely to plan to be more integrated with digital technology within two years of commencing digital broadcasting. Also, hours of local programming played a significant role in planning to purchase digital equipment with stations that produce 20.5 or more hours per week of digital programming more likely to be further along in the planning process.

At this point, broadcasters are simply not planning for digital programming. Only seven respondents (3.7%) indicated they were implementing digital programming planning. Surprisingly, network affiliation plays a role in how far along broadcasters perceive themselves to be when it comes to planning for digital programming. CBS affiliates perceive themselves to be further along (M=2.4) in planning for digital programming than were ABC, NBC and Fox, though the mean for CBS indicates they too are not very far along in this category.

A noteworthy finding concerned differences in perceptions of planning between General Managers and Engineers. Overall, Engineers (M=3.81) felt that they were further along in planning for digital television than did General Managers (3.22). This difference was found to be statistically significant (t=-3.11, df=101, p=.002). There were no statistically significant differences in how they perceived how far along they were in overall planning for digital purchasing (t=-3.26, df=100.184, p=.745). However, Engineers (M=2.3) perceived their respective stations to be further ahead in planning for

digital programming than General Managers (M=1.9). This difference was found to be statistically significant (t=-2.2, df=93.224, p=.03).

Digital Services

The opportunities to expand the business of broadcasters as presented by digital broadcasting has barely been tapped as of yet. Whereas planning for digital purchasing is beginning to take shape and planning for digital programming is entering its initial stages, planning to provide additional digital services has basically not even been conceived as of yet (M=1.8). Nonetheless, a profile of what services the public might see their local broadcasters provide in the future can be made. For the most part, broadcasters are most interested in providing services supplied by few, if any other businesses today. Interactive television and data enhancement services topped the list of potential future services they may be interested in offering. High speed Internet access and at-home shopping, two services offered by others in many markets but not saturating most markets, rounded out the list of services broadcasters are most interested in possibly providing consumers.

When broadcasters are broken down into two groups on the basis of how they are likely to define themselves in the future, an interesting split is seen between future information providers and future broadcasters. No differences exist between the two groups in regards to how far along in planning for digital services either group is. However, future information providers are overall more interested in exploring digital

services than are the future broadcasters. The differences in means are significant for pager service, data enhancement service, and interactive television, though future information providers scored higher means for every digital service than did future broadcasters.

Conclusions

Several important conclusions can be deduced from the study's data. The most obvious conclusion is that broadcasters have severe reservations towards digital broadcasting. The means for each of the potential problematic areas concerning digital broadcasting indicates a population concerned about the future of its industry in the digital age. Broadcasters are highly critical of the way Congress and the FCC have handled the transition to digital. Most fear how they will pay for the new digital equipment, whether or not the technology will work, where digital programming will come from, how cable companies will handle their digital signals, whether or not advertisers will fund the foray into digital, and, most of all, how consumers will pay for digital technology.

The questions surrounding the cable television industry's carriage of DTV further paints a picture of a broadcast industry concerned over implementation of digital broadcasting. Broadcasters as a group are also understandably supportive of must-carry legislation for free digital broadcast signals. Support for carriage of fee-based digital signals is evident, though not as strong, probably due in part to the lack of planning for

such signals by broadcasters. Though cable companies are working on ways to increase their bandwidth and developing plans to handle digital broadcast signals, broadcasters are very concerned with their local CTV company's ability to carry their signal. They are equally as worried that the carriage issue will have a detrimental impact on the commercial success of DTV.

With all the uncertainty concerning what shape digital broadcasting will take, and even if it will be commercially successful, broadcasters are evidently taking a wait-and-see approach, considering far along they are in planning for certain digital elements. Curiously, broadcasters seem to think they are further along in the overall planning process than they may actually be. The mean for overall planning was greater than the mean for any other question concerning planning for digital broadcasting.

What broadcasters are planning for is just to comply with Congress and the FCC in the immediate future by purchasing a digital transmitter to broadcast the digital signal. Other planning areas such as purchasing digital studio equipment, planning digital programming, and planning for additional digital services lag far behind planning for a digital transmitter.

Larger markets are well ahead of smaller markets in planning to purchase digital equipment, though when it comes to all other facets of digital planning, market size appears to make no difference. And considering how much more concerned smaller markets are towards financing new digital equipment, smaller markets would just assume put off any planning for digital broadcasting for as long as they possibly can.

Besides the expected differences in market size, two other interesting divisions appeared in this study. Differences emerged based on who answered the survey and what broadcasters envisioned their future business to be.

One possible explanation as for the differences in opinion between engineers and management when it comes to DTV planning is a difference in opinion as to what constitutes planning. The transition to digital broadcasting is confusing to even the most technologically knowledgeable people, of which most engineers probably belong. Their technological expertise could explain why they feel their stations are further along in the overall planning for digital broadcasting. The presumption that engineers are not passing that expertise along to management, which is why management is not of the opinion that they are as far along in the planning process as they are, could be made if not for two other general planning questions. Engineers and management are of like mind when it comes to planning for digital purchasing -- an area requiring a certain level of technical knowledge. However, the two groups differ when it comes to planning for digital programming, an area engineers typically are not involved in. The only possible explanation the researcher could deduce was that planning for digital programming means something different to engineers than to management. Management may view programming in terms of content while engineers may view programming as possessing the necessary tools through which to get digital programming on the air. Barring that explanation, the researcher could develop no explanation as to why management and engineers are in agreement in one area and not the other.

From a theoretical standpoint, digital broadcasting offers a interesting look at an unusual case study in diffusion. With the exception of broadcast television stations that chose to begin broadcasting a digital signal before their FCC set deadline, natural diffusion has been eliminated from one facet of DTV. By establishing a firm timetable for the implementation of DTV, the FCC and Congress have eliminated natural diffusion from the products initial introduction.

It has already been discussed, however, that broadcasters are only doing what is necessary to comply with the FCC by planning to purchase digital transmitters. All other elements of digital broadcasting -- digital studio purchasing, digital programming, additional digital services -- will be introduced and accepted by the industry and by consumers, through natural, polynuclear diffusion model.

This study also exposed strong, and possibly growing, difference of opinion concerning the future of the broadcasting industry. Two trains of thought are emerging. One is that the industry will not change significantly and that the business of broadcasting will remain broadcasting. The second train of thought is that the industry will experience great changes that will take advantage of the diverse applications offered by digital and that the industry will migrate away from broadcasting in favor of providing information. The future information providers and future broadcasters differed on how much digital would change their business, what factors would lead to the success of digital broadcasting, and what digital services they might be interested in providing. As few broadcasters have given much thought to this level of planning for digital broadcasting, it is understandable that the group that identified itself as future information providers is

considerably smaller than future broadcasters. However, as more than 30 percent of the respondents indicated themselves to be future information providers despite the low levels of planning devoted towards digital programming and digital services, it is a safe assumption that the number of future information providers is sure to grow.

The confusion associated with the early stages of a major change in the way an industry does its business is sure to bring about anger and frustration within the group as a whole and is likely to divide the group into several smaller camps. That is exactly what has happened so far with digital broadcasting. Nearly all broadcasters harbor a number of concerns over the unknowns connected to digital broadcasting. They express overwhelming disapproval of Congress and the FCC. They are divided based on market size and by the visionaries (future information providers) and those who prefer to stick to the status quo (future broadcasters). In ten or more years, however, the industry will settle down into a standard, bitterness towards Congress and the FCC will cease, the information providers will absorb the broadcasters, and television as we know it will cease to exist. In its place a new medium, offering potential unimagined today, will emerge.

Proposal for Future Study

The primary concern for the researcher heading into this study was that it might very well be premature. The first deadline for stations to begin broadcasting a digital signal came during the study. Obviously, most stations surveyed for this study were still

years away from broadcasting a digital signal. Even stations already on the air or set to go on the air before the end of 1999 were hurrying just to comply with Congress and the FCC and had given little or no thought to many of the subjects broached by this study.

This study set out to answer what the early attitudes and trends toward digital broadcasting are, and it did just that. Nevertheless, another study in one or two years should be made. That study should survey the same population as this study and should probe the same subjects in order to gauge progress and changes in attitudes and perceptions towards digital television.

Another interesting and worthwhile study would explore further the differences between future broadcasters and future information providers. Diffusion of digital broadcasting will go far beyond consumers to include the broadcast television industry itself. Future information providers gave indications through their greater interest in providing additional digital services and their beliefs on the impact DTV will have on their future business definition, that they are forefront of a potential revolution in the way their industry operates. Future research could profile this segment of the broadcast television industry and determine their adoption patterns when it comes to digital broadcasting. If their they can be classified as early adopters, and if their attitudes, opinions, and business practices concerning digital broadcasting, are adopted by a majority of the industry, then future research on this group could yield potentially valuable information concerning the direction of the broadcast television industry.

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Appendix

March 25, 1999

Dear Sir or Madam:

About a month ago, I sent you survey to collect data on digital television at your station for my thesis at the University of Tennessee. While I am nearing completion of the data collection phase of my research, your completion of the survey would be greatly appreciated.

If you need an additional copy of the survey, or have any questions or concerns, please feel free to contact me at:

- Home phone: 423-602-2238
- Work phone 423-974-3864 or 423-974-2228
- email: joberg@utk.edu
- Regular mail: 333 Communications Building, University of Tennessee, Knoxville, TN 37996

Thank you for your time and effort in aiding me with this study.

Sincerely,
Jeffrey K. Oberg
Graduate Student

March 25, 1999

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About a month ago, I sent you survey to collect data on digital television at your station for my thesis at the University of Tennessee. While I am nearing completion of the data collection phase of my research, your completion of the survey would be greatly appreciated.

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Sincerely,
Jeffrey K. Oberg
Graduate Student

Digital Television Survey

Digital opens a myriad of opportunities and pitfalls for the free, over-the-air, broadcast television industry. This survey is designed to assess opinions and attitudes towards DTV and your station's progress in planning for its impact. Please answer the questions to the best of your ability and return the survey in the enclosed envelope at your earliest convenience. Thank you for your time and cooperation.

What ONE word, in your opinion, BEST defines the business of your television station prior to switching to digital broadcasting?
____ Broadcaster ____ Information Provider ____Entertainer
____Other:_____

On a scale of 1 to 5, how much do you envision digital television will alter your current definition of your television station as you answered in the previous question?

None 1 2 3 4 5 Very Much

After your launch of digital broadcasting, what ONE word BEST describes your vision of what will be the business of your television station?
____ Broadcaster ____ Information Provider ____ Entertainer
____Other:_____

The following questions will gauge the importance of several factors concerning your perceptions of factors influencing the transition to digital television. Please rate, on a scale of 1 to 5, the importance of each factor as it relates to each question.

Digital television offers the ability to provide consumers with improvements over the current NTSC signal. For each factor listed below, in your opinion how important will each factor be in determining the success of digital television?

Ability to provide multiple television signals:	Not at all	1	2	3	4	5	Extremely
Ability to provide non-television digital signals:	Not at all	1	2	3	4	5	Extremely
Ability to provide high-definition television signals:	Not at all	1	2	3	4	5	Extremely
Ability to provide CD-quality sound:	Not at all	1	2	3	4	5	Extremely

Local broadcasters face many hurdles in making the switch to digital television. How problematic do you anticipate the following potential hurdles to be?

Congressional legislation:	Not at all	1	2	3	4	5	Extremely
FCC regulations:	Not at all	1	2	3	4	5	Extremely
Financing new equipment:	Not at all	1	2	3	4	5	Extremely
Challenges of new technology:	Not at all	1	2	3	4	5	Extremely
Number of digital receivers in your market:	Not at all	1	2	3	4	5	Extremely
Costs to consumers:	Not at all	1	2	3	4	5	Extremely
Creating local digital programming:	Not at all	1	2	3	4	5	Extremely
Access to cable TV systems for digital programming:	Not at all	1	2	3	4	5	Extremely
Willingness of advertisers to fund digital programming:	Not at all	1	2	3	4	5	Extremely
Availability of advertising produced in digital format:	Not at all	1	2	3	4	5	Extremely

The FCC has been criticized for their handling of the transition to digital television. How valid do you feel are the following criticisms of the FCC's handling of the transition to digital television?

Transition to digital television is not market driven:	Not at all valid	1	2	3	4	5	Very valid
Regulations lack input from broadcasters:	Not at all valid	1	2	3	4	5	Very valid
Timetable for switching to digital is unrealistic:	Not at all valid	1	2	3	4	5	Very valid
Timetable for returning analog spectrum is unrealistic:	Not at all valid	1	2	3	4	5	Very
FCC relying too much on unproven digital technology:	Not at all valid	1	2	3	4	5	Very

Now, I would like to ask you a series of questions concerning the way Congress and the FCC are handling the transition to digital television. For each question, please give your opinion on the 1-to-5 scale following the question.

In your opinion, how would you assess Congress' understanding of the needs of local broadcasters concerning the transition to digital television?

Very Poor 1 2 3 4 5 Very Good

In your opinion, how well were the needs of local broadcasters taken into account by Congress when it established rules and standards for digital broadcasting?

Very Poor 1 2 3 4 5 Very Good

In your opinion, how would you assess the timeline established by Congress for broadcasters to return the analog spectrum?

Very Poor 1 2 3 4 5 Very Good

Congress is currently considering placing additional taxes on fee-based, over-the-air uses of the digital broadcast spectrum by local broadcasters. How great of an impact do you feel this will have on your television station's ability to successfully make the transition to digital broadcasting?

None 1 2 3 4 5 Great

Congress is currently debating must-carry legislation for broadcasters' digital signals on cable television systems. How supportive are you of legislation that would require cable companies to carry ALL local, FREE, over-the-air, digital television signals?

Very Opposed 1 2 3 4 5 Very Supportive

How supportive are you of legislation that would require cable companies to carry ALL local, FEE-BASED, over-the-air, digital broadcast television signals?

Very Opposed 1 2 3 4 5 Very Supportive

How concerned are you with your local cable television company's ability to carry your digital television signal when you begin digital broadcasting?

Very Unconcerned 1 2 3 4 5 Very Concerned

How concerned are you that the ability of your local cable television company to carry your digital signal will have an adverse impact on your television station's transition to digital television?

Very Unconcerned 1 2 3 4 5 Very Concerned

In your opinion, how would you assess Congress' understanding of the needs of local broadcasters concerning the transition to digital television?

Very Poor 1 2 3 4 5 Very Good

In your opinion, how well were the needs of local broadcasters taken into account by Congress when it established rules and standards for digital broadcasting?

Very Poor 1 2 3 4 5 Very Good

How would you assess the FCC's timeline for implementation of digital television?

Very Poor 1 2 3 4 5 Very Good

Now I would like to ask your opinion on how your station is handling the planning phase of your transition to digital television. For each question, please give your opinion on the 1-to-5 scale following the question.

How concerned are you that the number of digital television receivers in your market at the onset of your digital broadcasting will have an adverse impact on your ability to make digital television commercially viable?

Very Unconcerned 1 2 3 4 5 Very Concerned

How far along is your television station in your overall planning for digital television?

No Planning 1 2 3 4 5 Implementing Planning

In regards to programming for digital television, where are non-network digital programming decisions being made for your local digital television station?

1	2	3	4	5
Totally local	Mostly local/Some corporate		Local and Corporate	Mostly corporate/Some local	Totally Corporate

How far along is your television station in planning local programming for digital television?

No Planning 1 2 3 4 5 Implementing Planning

How much local digital programming do you anticipate being high definition television within one year of launching digital television?

No HDTV 1 2 3 4 5 All HDTV

In regards to purchasing digital production equipment for digital television, where are digital production equipment purchase decisions being made for your local television station?

1	2	3	4	5
Totally local	Mostly local/Some corporate		Local and Corporate	Mostly corporate/Some local	Totally Corporate

In regards to purchasing digital production equipment for your local television, how far along is your television station in the planning process for purchasing digital production equipment?

No Planning 1 2 3 4 5 Finalizing Planning

In regards to upgrading your studio to a digital studio, how far along is your television station in the planning process for upgrading your studio facility to a digital studio

No Planning 1 2 3 4 5 Finalizing Planning

In regards to purchasing digital transmitting equipment for your local television, how far along is your television station in the planning process for purchasing digital transmitting equipment?

No Planning 1 2 3 4 5 Finalizing Planning

How integrated with digital technology do you hope to be within two years of commencing digital broadcasting at your television station?

No Integration 1 2 3 4 5 Total Integration

Below is a list of potential digital services that the broadcast television industry has mentioned as possibly providing over the digital television spectrum. How interested in providing each service might your television station be?

Cellular phone service:	Not at all	1	2	3	4	5	Extremely
Pager service:	Not at all	1	2	3	4	5	Extremely
High-speed internet access:	Not at all	1	2	3	4	5	Extremely
Data enhancement service:	Not at all	1	2	3	4	5	Extremely
Interactive television:	Not at all	1	2	3	4	5	Extremely
In-home schooling:	Not at all	1	2	3	4	5	Extremely
On-line gaming service:	Not at all	1	2	3	4	5	Extremely
At-home shopping service:	Not at all	1	2	3	4	5	Extremely

In regards to the possibility of providing additional digital services, how far along is your television station in the planning process for providing additional digital services?

No Planning 1 2 3 4 5 Finalizing Planning

With which network is your television station affiliated?
____ ABC ____ CBS ____ NBC ____ Fox

Within which market range does your local market fall?
____ 1-10 ____ 11-30 ____ 31-50 ____ 51-100 ____ 101+

Which definition best describes your television station's ownership?
____ Single entity ____ Group owned ____ Network owned

On average, about how many hours of local programming per week do you produce? Ranges given are in hours.
____ None____ 0.5-5____ 5.5-10 ____ 10.5-15 ____ 15.5-20 ____ 20.5-25 ____ 25+

Are you currently broadcasting a digital signal?
____ Yes ____ No

If you are currently broadcasting a digital signal, on what date did you begin broadcasting in digital? _____

If you are not currently broadcasting a digital signal, on what date do you expect to begin broadcasting a digital signal?
_____

What is your title at your television station? _____

Thank you for your time and effort in filling out this survey. If you would like a copy of the results, please include a business card in the enclosed envelope when you mail in your survey. If you have any questions, comments or concerns about this survey, please feel free to contact me at:

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Vita

Jeffrey K. Oberg was born in Worcester, Massachusetts on January 3, 1973. In April, 1984 his family moved to Pembroke Pines, Florida before settling in Boca Raton, Florida. There he attended Spanish River High School. Oberg graduated with an A.B. in communication from Lenoir-Rhyne College in Hickory, North Carolina, in 1995.

After graduation, Oberg worked as Sports Editor for the Herald-Leader in Siloam Springs, Arkansas before moving to Downingtown, Pennsylvania to become Sports Editor at the Suburban Advertiser in Exton, Pennsylvania. Oberg last worked as Assistant Sports Editor at the Suburban and Wayne Times in Wayne, Pennsylvania, before enrolling in the master's program at the University of Tennessee, Knoxville in August, 1997.