The Evolution of the Cable-Satellite Distribution System

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The television industry began a dramatic transformation in the mid 1970s following the creation of the cable-satellite programming distribution system. This paper details the evolution of the cable-satellite link, from its conceptual roots in the 1960s, through pioneering efforts by Teleprompter Corp., to the eventual involvement of Home Box Office. It offers a narrative and analysis that fills a gap in the existing historical record and provides an illustration of several themes involving the social evolution of technology.

The introduction in 1975 of the cable-satellite programming distribution system led to a dramatic restructuring of the television industry in the United States. From an industry dominated by three national networks, television evolved into a multichannel environment in which viewers had access to dozens of highly specialized program choices. While NBC, CBS, and ABC remain the most heavily viewed television networks, their market share has steadily eroded since the introduction of the cable-satellite link and the cable programming industry that it spawned.

While this critical inflection point in television history is ritually noted in most textbooks, its evolution has never been substantively detailed. The typical treatment in the literature involves a note to the effect that in 1975 Home Box Office (HBO) inaugurated satellite-delivered programming, helping spark a revolution in television (See e.g., Dominick, Sherman, & Copeland, 1996, p. 70; Head, Sterling, & Schofield, 1994, p. 78; Gross, 1997, pp. 75-77; Parsons and Frieden, 1998, 52-54). Some broadcast and cable history texts offer a bit more detail (Fang, 1997, p. 201; Hilliard & Keith, 1997, p. 213, 216; Southwick, 1998; Sterling & Kittross, 2002, p. 412). Two pieces from the 1970s discuss then-future prospects for cable-satellite interconnection (Shapiro, 1972; Shapiro, Epstein, & Cass, 1975), and Winston (1986, p. 289) mentions early proposals for satellite-cable systems, but only in passing. None have provided the richer description that this key turning point in communications history arguably deserves. This paper is an effort to begin to fill that gap in the historical narrative. Its intent is to explore the development of the cable-satellite union.

The paper is also an effort to illustrate several broader theoretical points about the

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nature of technological development. It proceeds from the factual observation that the cable-satellite system had a substantial prehistory and the analytical position that technological change is, to a point, evolutionary. This review builds upon models of technological change that posit incremental and gradual, rather than radical and discontinuous, technical innovation (Basalla, 1988; Ziman, 2000). Analysis therefore focuses on the stages in the development of a given device or system. At the same time, this analysis breaks from much of the recent evolutionary literature to suggest that at some point a given idea, design, or device reaches a new phase in its technical development. Coming together, the constituent components offer a new functionality that opens the door to subsequent rapid social deployment. At the same time, appropriate social conditions must be in place to accommodate that deployment. This is a kind of quantum leap in the longer evolutionary path of the technology. Television itself is a classic example. Conceptually, the roots of television are almost timeless and technically they trace back to the discovery of selenium and the work of people such as Nipkow, Jenkins, Farnsworth, and Zworykin (Fisher & Fisher, 1996). The technical, political, economic, and social conditions were not in place for a viable system, however, until after World War II, when, with sufficient convergence of these elements, television took off with dramatic consequences. Therefore, analysis must be sensitive to both the slow accretion of ideas and activities that lead up to a socially operational system and to the subsequent rapid unfolding of that system.

The case of the cable-satellite distribution system also underscores the rather well established touchstone that analysis be sensitive to socio-economic context. Technology cannot be treated apart from its social conditions. Beginning with Marx and across the literature, from Hughes (1983) to Rogers and Shoemaker (1971) to Winston (1998), scholars repeatedly stress that technological change is shaped and constrained by the existing social, economic, and political fabric. A host of technical solutions may, therefore, be proposed for any particular communications problem but only those that comport, at least initially, with existing social structures will find fertile soil.

Early Discourse in Satellite Television

The cable-satellite distribution system built, of course, on existing technologies of cable and satellite communications, each with its own substantial history. It is not the intent of this paper to explore in any detail the full history of satellite or cable television, but rather to look at the particular events and forces surrounding their merger. At the same time, some background in satellite and cable development is useful.

The concept of satellite communications is classically traced to a seminal 1945 article by science fiction author and engineer Arthur C. Clarke (1945), in which he offered for the first time a published description of three strategically placed, manned

space stations in geosynchronous earth orbit. Television and radio signals beamed from these platforms could, he noted, cover the globe. Twelve years later the Soviet Union launched the world's first artificial satellite, Sputnik I, setting off the Cold War's "space race," and leading eventually to passage of the Satellite Communications Act of 1962 and creation of the Communications Satellite Corporation (Comsat) in 1963. Comsat's mission was, in part, to be the exclusive state-sanctioned service provider for satellite communications facilities in the United States. It also helped form and manage a similar international body, INTELSAT, the International Telecommunications Satellite Organization.

Satellite technology itself was progressing with the launch of two passive communications satellites, SCORE in 1958 and Echo in 1960. SCORE simply transmitted a pre-recorded holiday message from President Eisenhower, while Echo was, in fact, a large metallic balloon that reflected radio signals back to earth. Courier, launched by the Defense Department in 1960, could actively relay limited voice and teletype communications but lasted only 17 days in space. The first communications satellite actually capable of electronically receiving and retransmitting voice and television signals was AT&T's Telstar, launched in July 1962. By 1963, Hughes Aircraft Corp., which would become a significant force in television-satellite development, provided the first geosynchronous communications satellite, Syncom-II (Syncom-I failed shortly after its launch earlier that year). Orbiting at 22,300 miles above the equator and traveling at 6,870 miles an hour, a geosynchronous satellite is stationary with respect to a spot on earth, giving it a stable coverage area and largely eliminating the need for expensive ground tracking. In 1965, Hughes launched the first true commercial communications satellite, Early Bird (Intelsat I).

The earliest satellites were designed and used in large part for the relay of telephone communications. Technically, however, satellite transponders can process either telephone or television signals, allowing for early experimentation with the latter. The first live television signal relayed by satellite was an image of the American flag waving in front of AT&T's ground station in Andover, Maine, on July 23, 1962. Telstar beamed that and other pictures to receiving sites in France and Great Britain, and brought signals from Europe back to the United States, opening the way for eventual commercial exploitation of the service. Within a few years, Early Bird and its successors were providing live feeds of important European news and cultural and sporting events, and offering Europeans similar coverage from the United States. The focus of this examination, then, is the harnessing of that emerging technology to the needs of a growing domestic cable television industry.

Futurists and policy makers in the 1960s discussed at length the possibilities, and potential dangers, of using satellites for purposes beyond the trans-Atlantic relay of specialty news and cultural events. These conversations, however, most typically revolved around the possibilities of direct-to-home (DTH) broadcasting. Studies on DTH were sponsored or conducted through the early 1960s by RCA (Bond, 1962), NASA, Hughes Research Laboratories, the Rand Corporation, General Electric, and TRW (Prochaska, 1974, pp. 17-24; Taylor, 1977, pp. 48-53). The seductive image of

instant, global television captured the popular imagination as well, leading to frequent commentary in the popular and trade press ("GE Engineer," 1962; Craven, 1962), and to serious policy debates, as early as 1958, over the control and social impact of such technology (U.S. Congress, 1958; Clarke, 1959; Smythe, 1960).

Contrasting sharply with the often enthusiastic rhetoric was the absence of any actual development of a DTH system. Beyond a set of direct-broadcast experiments by NASA in the early 1970s (the Applied Technology Satellite or ATS project), the economics and technology of the day militated strongly against adoption of the technology for this purpose. Satellite transponders were far too weak for true DTH service (President's Task Force, 1968) and there was little vested commercial interest in developing a DBS system that would directly threaten the powerful existing broadcasting networks, or AT&T, which profited handsomely from the common carriage of broadcast programming via terrestrial cable and microwave facilities.

Hughes, however, was seeking to expand its market for satellites and approached ABC with a proposal for a system that would use satellite technology to distribute network programming to ABC affiliates around the country. On September 21, 1965, ABC filed a proposal with the FCC. It was the first such request to come to the Commission and was novel in a number of aspects, including its plan to operate a satellite outside of the Comsat monopoly. The Commission returned the application, stating that it wanted to look more closely at the issues raised in the proposal (FCC, 1965a). The Commission then opened an inquiry into the question of private ownership of domestic communications satellites and their appropriate uses (FCC, 1965b). Sensing a general need for long-term planning in communications policy, President Lyndon Johnson commissioned in August 1967 a task force headed by Under Secretary of State Eugene Rostow to investigate the numerous intertwined issues, and the FCC indicated it would await the findings of the report before drawing its own conclusions on the matter.

Cable Networking: The Seeds of an Idea

DTH and broadcast television networking, in short, tended to dominate the television satellite agenda in the early and mid 1960s. The possibility that satellites could be used in connection with cable television was, at best, a marginal thought, but this was not surprising given the broader social context of that period. Started in the late 1940s and early 1950s as a simple television retransmission service, cable had expanded by the early 1960s, but was still a relatively small piece of the nation's television landscape. There were fewer than 1,600 systems in 1966, most of which served only a few hundred subscribers. Cable's national reach was only about 1.6 million of the nation's 53.8 million television homes, or about 3 percent. After a decade of benign neglect, the FCC was beginning to exert control over cable and place restrictions on its growth such that the prospects for its expansion beyond a

well constrained supplementary television service were coming into doubt (LeDuc, 1973).

At the same time, the concept of cable networking, part of the seed that would grow into the cable-satellite system, had been a topic of industry conversation since at least 1959 (Merrill, 1991). Small-scale regional cable system interconnection via land-based microwave was common by the late 1950s. The possibility of extending such links and interconnecting cable systems, especially in order to create a larger audience for possible pay-television programming, was a recurrent theme among cablecasters and broadcasters in the early 1960s, albeit one which the broadcasters naturally viewed with fear and loathing. The terrestrial technology that allowed for interconnection and the clear view that such regional systems might be expanded to a nationwide distribution platform were, therefore, steps along the incremental, evolutionary path toward today's industrial structure.

The idea that satellites might be a part of this interconnection concept was introduced and grew in the mid and late 1960s. Satellite technology itself was evolving during this period and, importantly, a new public rhetoric was springing up around the potential of cable television. The period saw a wave of utopian thinking sweep into the telecommunications field. Dubbed the "Blue Sky" era, it positioned cable television not as a simple broadcast retransmission service but as a broadband communications technology that could be used to bind local communities, deliver health and educational services, and foster democracy (Streeter, 1987). "Blue Sky" discourse also incorporated the idea of cable networking at about the same time that business and policy discussion about the potential for satellite television was heating up. The result was a confluence of concepts. A short time after ABC filed its satellite petition with the FCC in 1965, a long-time cable executive, Leon Papernow, wrote in *Television Magazine* that the near future would see satellites used to beam cable programming from New York and Los Angeles to cable systems across the country (Papernow, 1965).

From simple technical interconnection, the next conceptual step was the idea of exploiting a nationwide broadband system to provide multiple, specialty-programming networks. The Carnegie Commission Report on Educational Television published in January 1967 proposed interconnecting PBS stations via satellite, and a supplementary paper by MIT professor and Internet visionary J.C.R. Licklider outlined several future scenarios for television including one that foresaw a multiplicity of television networks aimed at serving the needs of smaller, specialized audiences. "Here," stated Licklider, "I should like to coin the term 'narrowcasting,' using it to emphasize the rejection or dissolution of the constraints imposed by commitment to a monolithic mass-appeal, broadcast approach" (Licklider, 1967, p. 212). The means for delivering these networks, explained Licklider, would be interconnected CATV systems linked by terrestrial and satellite technologies.

In May 1967, Rand Corporation researcher Leland Johnson delivered an address to the annual meeting of the American Astronautical Society in which he detailed a similar proposal:

> The combination of CATVs with nationwide satellite hookups could provide the means whereby sufficiently large audiences could be accumulated to make more attractive than is now the case commercial sponsorship of programming that caters to 'minority' tastes. To be sure, such an arrangement would also make profitable additional mass-appeal, light entertainment as well. Moreover, the expansion of programming would tend to erode and fragment existing large audiences enjoyed by particular programs today (Johnson, 1967, p. 8).

In August of the same year, a pair of Johnson's Rand Corporation colleagues published a proposal for what they termed "wired city television" (Barnett & Greenberg, 1967). It called for a 20-channel coaxial system to carry all domestic television, replacing the existing broadcast system. The report noted almost offhandedly, citing Johnson, that national interconnection, by ground and satellite relay, would be a part of the scheme.

In the summers of 1967 and 1968, a project jointly sponsored by NASA and the National Academy of Sciences (The Summer Study on Space Applications) looked at the "Useful Applications of Earth-Oriented Satellites" (National Academy of Sciences, 1969). Panel number 10 reviewed the use of satellites in broadcasting and, among other recommendations, outlined a system of satellite networking for CATV. The panel visualized eight national cable-satellite networks, including the three existing broadcast networks, a public broadcasting channel, a world-wide United Nations channel, two additional educational channels and an eighth channel held in reserve for an unspecified "new service."

Capping the public policy examination was the widely publicized Rostow report, completed by December of 1968. The President's Task Force concluded that cable television, in contrast to direct broadcast satellites and even established television networks, offered the greatest promise for increasing diversity in the nation's television diet.

The Cable Industry Stirs

On the heels of the rising policy discussions about potential cable-satellite networks, the National Cable Television Association (NCTA), at its June 1969 convention, sponsored a General Management and Engineering session on "CATV Via Satellite" (NCTA, 1969). Among the presenters were representatives from Rand Corporation, Comsat, and perhaps most importantly, Irving Kahn, President of Teleprompter Corp., the cable industry's largest MSO. The panel was chaired by Frederick Ford, NCTA President and former Chairman of the FCC. Ford (NCTA, 1969, p. 668) indicated that he, along with others, had been considering the possibility of a national cable network for several years and that in early 1969 he had directed the NCTA staff to begin working on a plan for a multi-channel satellite system. Released at the 1969 convention, the scheme called for a six-channel service that included channels for PBS-type cultural fare, instructional television, medical

and health programming, reruns of broadcast network (ABC, NBC, CBS) documentaries, 24-hour weather programming, and full-time coverage of Congress. (Entertainment programming was specifically excluded from the proposal as a result of an ongoing set of political negotiations with the NAB and FCC over developing cable regulations.)

The lure of new programming, even non-fiction programming, was especially important to cable operators at this time. Restrictive FCC regulations, the political and regulatory context in which cable had to operate at the time, had foreclosed to cable most of the nation's top 100 markets (LeDuc, 1973). Even without such regulatory shackles, however, cable had little product to offer in the nation's urban areas. In most large markets, consumers could receive adequate reception of all three networks, plus an independent or two, and were unwilling, in sufficient numbers, to subscribe to a cable service that offered only marginally better reception and perhaps an imported signal. Despite a 1969 FCC order requiring local origination for larger systems (FCC, 1969), individual cable operators were not in a financial position to create their own programming, at least not at a production level commensurate with existing broadcast fare. Pay television presented long-term potential, but again was expensive to produce and raised regulatory problems (Gershon, 1990).

The answer lay in national interconnection. Only by aggregating a national audience and spreading production costs across that audience could sufficient revenue be generated to make alternative programming possible. Cable operators needed to assemble a critical mass of subscribers and subscriber dollars sufficient to make national networking economically viable (see also, Markus, 1987). Construction of a dedicated terrestrial microwave system, despite the rhetoric of earlier years, was determined to be too expensive, as was use of the existing national television distribution system run by AT&T (See, e.g., Noll, Peck, & McGowan, 1973, pp. 246-250; Seiden, 1972, p. 134). Those few cable operators who were discussing interconnection in the late 1960s, therefore, cast their eyes upward toward a satellite option.

Despite the high cost of building, launching, and operating a satellite, the economics of satellite communication were very attractive when contrasted with land-based networks (Parsons & Frieden, 1998, pp. 141-46). Satellite communication, for example, is economically distance-insensitive; once the capital investment is in place, the cost of transmission within the footprint of satellite is equal to all points. And the cost of adding additional receivers within the footprint is only the cost of the receiving equipment itself. Satellites, therefore, enjoy overpowering economies of scale in comparison to terrestrial networks. Additional benefits for cable included network externalities, the economic snowballing effect of system participation. Lower distribution costs would mean more and smaller systems could participate, increasing total and shared revenues, while keeping costs low and encouraging yet more participation. Satellite distribution also offered superior picture quality. Technically, therefore, there were several solutions to the distribution

dilemma. The economic context of the time, however, favored and fostered only one—the satellite system.

Teleprompter

The concept of a cable-satellite distribution system providing multiple specialty programming services was well in place by the end of the 1960s. But while a satellite solution looked good on paper, the questions remained of how to bring it about and who to lead the way. The NCTA could encourage creation of satellite cable networks, but it required a company with substantial resources to make it real. The company that took the lead was Irving Kahn's Teleprompter. Kahn was one of the earliest and most vocal proponents of a satellite network and as head of the nation's largest cable company had the resources to initiate action (Kahn, 1987). Kahn assigned much of the job to his long-time partner Hubert Schlafly, an engineer and a cofounder of Teleprompter. In the late 1960s, Schlafly was working with Hughes Corp. on the development of a 12-channel, short-haul microwave distribution system (Amplitude Modulation Link or AML) to substitute for very expensive cable runs in Teleprompter's Manhattan, New York, franchise. The work brought Schlafly into regular contact with Hughes' satellite chief, Harold Rosen, and out of their conversations came the possibility of a Hughes-built satellite system for Teleprompter (Schlalfy, 1998). (The AML project also led to a Hughes investment in Teleprompter and by 1970 Hughes owned 17 percent of the company). Following his appearance at the 1969 NCTA session, Kahn formally announced in October of that year Teleprompter's intention to create, with Hughes, a satellite distribution system.

Teleprompter was supported, at least in spirit, by other large cable operators. At a the NCTA convention in May 1970, "operators all but cheered at the suggestion that the only answer for the sale of national advertising . . . must be a national interconnected CATV network" ("CATV headed for ad-supported network?" 1970). The NCTA issued a report that year analyzing the potential for growth in the industry, which was stagnating under the burden of FCC control, and pegged business revitalization in part to the promise of satellite interconnection. The report noted that if industry leader Teleprompter could interconnect all its systems, it would have a national subscriber base of 450,000 homes, sufficient to begin thinking about new program networks and accompanying advertising revenue (Lady, 1970, p. 4).

In December 1970, Hughes filed its proposal with the FCC. It called for two satellites, each capable of delivering 10 channels of video. Programming for the CATV service would consist of specialty channels for news, sports, music, public affairs, and minority interests. The material would be provided by Teleprompter and The Hughes Sports Network. The service would cost customers an extra 25 cents to $1 a month ("Hughes files for CATV satellite system," 1970).

It was not the only such plan presented to the Commission. Under the strong

urging of the Nixon administration, the FCC in 1970 had finally proposed an "Open Skies" policy for communications satellites, one that would permit private companies to own and operate the system (FCC, 1970). In addition to Teleprompter, seven other companies filed applications to operate systems and most of the proposals included provisions for the distribution of programming specifically for cable. A Comsat proposal promised two channels for CATV use (and two for PBS) ("Comsat poised to file," 1970). MCI-Lockheed filed a plan said to be sufficiently flexible to meet the needs of the CATV industry, as did RCA Global Communications and Fairchild Industries.[1] One of the most interesting filings, from an historical perspective, came from Western Tele-Communications, Inc., the microwave distribution arm of cable MSO, Telecommunications, Inc. (TCI). TCI had an early vision of a national microwave network for cable programming, and saw the advantage in developing its own material for delivery over that network. Its filing with the FCC in 1971 called for a $66 million, two-satellite, communication system designed in large part to interconnect cable operators (Shapiro, 1972).

An economic analysis of all the proposals concluded, in part, that TCI was unlikely to succeed in an open skies environment (Allen, Bossert, & Krause, 1971) and an FCC staff report (FCC, 1972a) recommended substantial revisions to the plan. By early 1973 the company had run into financial difficulties and was no longer actively seeking authorization, but the filing demonstrated the wider interest of the industry. Similarly, as part of the FCC review, three cable companies, including Teleprompter, sought permission to operate earth stations in conjunction with any potential cable-satellite network (FCC, 1972a).[2] The NCTA and cable operators such as Time, Inc. also weighed in on the debate, urging the FCC, no matter which applicants it approved, to make sure that facilities were provided for the interconnection of the nation's cable operators and to allow cable systems to own earth stations. ("Up in the air over satellites," 1971; Shapiro, 1972, p. 149).

By June 1972, the FCC had completed its inquiry and issued its "Open Skies" order (FCC, 1972b). Western Union was the first company to earn FCC approval in January 1973, launching the nation's first commercial domestic communications satellite, Westar, in 1974 (FCC, 1973a). Satellite applications of five more companies, including Hughes and RCA, were approved in September 1973 (FCC, 1973b).

Cable, however, needed more than just FCC approval and transponder capacity. These were necessary but not sufficient conditions to bring about the technical quantum leap; additional key industrial components were still missing. Deployment of a satellite system required acceptance by the thousands of small systems that made up the bulk of the cable industry, and few of them were enthusiastic. The stumbling block was characterized at the time as "the chicken or the egg problem." Simply put, most cable operators were exceptionally hesitant to invest in satellite dishes without assurances of a steady stream of quality programming. Receiver prices were estimated at $75,000 to $250,000, and ownership, while now permitted, still required FCC approval which meant a lengthy and cumbersome application process. Alternatively, with exceptions such as Hughes and TCI, program producers were hesitant

to spend the capital necessary to develop programming without some assurance there would be a sufficient number of receiving cable systems to recover their cost. It was an economic "vicious cycle."

It was Teleprompter's intent to break that cycle, in part by a physical demonstration of the satellite promise and in part through a plan to organize the industry. While the FCC pondered satellite applications, Teleprompter went to work in early 1973 to show the industry that satellite networking was more than just a pipe dream. Schlafly put out a request for proposals for an earth station capable of picking up a satellite television transmission but small enough to be transportable and priced under $100,000. As he recalled later, he received no response from the industry's major players, such as General Electric and Raytheon, but two men from a previously little known company approached him saying they could do the job (Schlafly, 1998). The company was Scientific Atlanta, headed by Sidney Topol, who soon became a major proponent of the cable-satellite concept (Topol, 1991). Schlafly had the Scientific Atlanta earth station hauled from Atlanta, Georgia, to Anaheim, California, for the National Cable Television Association's 1973 convention. There, on June 18, television history marked the first coast-to-coast satellite transmission of programming designed specifically for cable television. The United States had not yet launched a domestic satellite capable of transmitting the material and Teleprompter used the Canadian bird, ANIK II. The programming consisted of a morning feed featuring greetings from Speaker of the House, Democrat Carl Albert in Washington, D.C. That evening the satellite link beamed in a highly touted championship boxing match between Jimmy Ellis and Ernie Shavers from Madison Square Garden. The feature material was supplied by a pay television company called Home Box Office (HBO), through an arrangement initiated by Teleprompter.

The satellite demonstration was publicized in the trade press and featured in subsequent articles about HBO. Less heralded at the convention was a gathering of larger cable operators designed to initiate serious industry-wide discussion about satellites. More than a dozen companies attending the meeting indicated a willingness to contribute $5,000 each to fund a study ("Domsat show is high note," 1973), and at a subsequent meeting in July, the Cable Satellite Access Entity (CSAE) was formed. CSAE hired the consulting firm of Booze, Allen, and Hamilton to conduct a year-long study. In the meantime, Schlafly took his case for satellites, and his earth station, on the road.

The 1973 demonstration was a technical success, another incremental step in the evolution of the system, and was appropriately lauded in the trade press as a significant accomplishment for the industry. Despite the formation of the CSAE group, however, its reception on the floor of the convention center by rank-and-file operators was, at best, mild. Until operators could be convinced of the business case for the technology, promoters faced an uphill struggle. After the convention Schlafly took the earth station on a cross-country excursion, offering demonstrations to individual operators around the United States (Schlafly, 1998). But as a Teleprompter official explained in 1973, "The reactions [from cable operators] run the gamut from

'we're too busy getting new subscribers' to 'show us the numbers and when they figure up, we'll go'" ("How Teleprompter figures to weave a cable network," 1973).

Meanwhile, Teleprompter was running into serious business problems. In October 1971, Kahn was sentenced to 5 years in prison (eventually serving about 18 months) for bribing Johnstown, Pennsylvania, city council members to win the local franchise. A stockholder fight for control of the company followed, and in September 1973 the Securities and Exchange Commission suspended trading in Teleprompter stock amid rumors of accounting improprieties. The resulting tumult led to changes in management and corporate philosophy. Teleprompter's research and development activities were drastically reduced and the initiative for the satellite system evaporated. Schlafly soon left the company.

The period from late 1973 to mid 1975 was, in fact, a difficult one for the entire industry. Interest rates had risen and capital was hard to come by. Construction in the major cities had stagnated and companies such as Teleprompter and TCI were facing tough financial times. Grand schemes to build satellite systems were set aside. Beneath the troubled surface there was some movement. The CSAE/Booze, Allen and Hamilton report was finished in August 1974 ("Nothing to say," 1974). It concluded that a satellite system was technically feasible and a market existed for specialty programming. The real problem, according to the consulting firm, lay in the development and financing of the programming. It proposed a plan that included specialty channels aimed at children and women, along with various arts and entertainment material (Booze, Allen & Hamilton, 1974). The industry view, however, seemed to be that satellite distribution was a good idea, but one that was not yet ripe. Something was needed to move the project ahead. That something was to emerge from Time, Inc.'s Home Box Office.

Home Box Office

Chuck Dolan founded Sterling Communications in 1965 and obtained a franchise from New York City to wire lower Manhattan. Time Life, Inc., in the same year, purchased 20 percent of Dolan's company. The New York system was riddled with difficulties, however, and was losing money. In 1971, looking for new revenue sources, Dolan came up with the idea of creating a pay television service featuring movies and sports, initially dubbed the Green Channel and later renamed Home Box Office (Mair, 1988).

Time, Inc., as noted, had supported cable satellite use before the FCC and Dolan included it as a possibility when he presented his Green Channel idea to Time management (Winston, 1986, p. 289). Satellite distribution was only a distant possibility at the time, however, so HBO began service in November 1972 using microwave to feed its programming to a CATV system in Wilkes Barre, Pennsylvania

(Gershon & Wirth, 1993). To help run the HBO project Dolan hired a young attorney named Gerald Levin, who had experience in contracting for televised films and sporting events (Whiteside, 1985, p. 61).

Levin had been at the 1973 Anaheim demonstration, having helped arrange the Madison Square Garden feed, and he was impressed with what he saw. But at the time, according to Levin, the plans for distributing HBO did not extend far beyond the use of regional microwave. Satellite distribution was a part of the long-term thinking, but not a part of the short-term reality. If the area network proved successful, explained Levin, the system would be extended one region at a time and "maybe, ultimately use satellite transmission to reach those parts of the country that wouldn't lend themselves to regional networking. There was no domestic satellite activity we could even plan for. It seemed very much a distant thing for us" ("HBO: Point man," 1977). Dolan left the company in March 1973; Levin took over as President, and in September, Time, Inc. completed its acquisition of the pay service. HBO was soon on 14 systems in New York and Pennsylvania, but the churn rate was exceptionally high. Subscribers would sample the service for a few weeks, get weary of seeing the same films, and then cancel. HBO was struggling and something had to be done.

By the end of 1974, Westar was in orbit and additional domestic satellites were in preparation. Scientific Atlanta's Sid Topol (1991), with dishes to sell, accelerated his lobbying for a cable-satellite network, as did Schlafly, now working as a private consultant. Levin, in fact, credits Topol with helping convince him of the feasibility of satellite distribution. RCA, readying its new Satcom I, was also looking for customers, and the head of its satellite division was Andrew Inglis, an old college classmate of Levin. This mix of business, technical, and interpersonal influences resolved in late 1974 and early 1975 in a new plan by Levine. Working with Inglis, he signed a contract for transponder time from RCA, $7.5 million for a five-year term. Levin also hired Schlafly as a consultant and cut a deal with Topol for a reduced price on bulk-order Scientific Atlanta dishes.

Levin next needed a cable operator to help him solve the "chicken or egg" dilemma. That operator turned out to be Robert Rosencrans, head of UA-Columbia Cablevision, Inc. Levin called him in early 1975 and the two met in New York (Rosencrans, 1998). Rosencrans said he was attracted to the concept for a number of reasons. UA-Columbia was already an HBO customer, taking the microwave feed at systems in Wayne, N.J., and Brookhaven, N.Y., and found the service so promising that he was looking for a means to expand. However, a plan to build a centralized microwave system in Florida, serving both UA-Columbia and unaffiliated systems, was plagued with potential problems. Rosencrans reported it would have been labor intensive, costly, time consuming, and would have relied on videotape shipped to the regional center. Satellite distribution solved those problems and offered a better quality picture than the tape-fed microwave. It also held the potential for live programming (Rosencrans, 1998).

Levin and Rosencrans announced their agreement to the press on April 10, 1975

("Time, Inc. Unit to Use Satellites," 1975). A few days later, another large multiple system operator, ATC, joined the service. The cable satellite distribution system was inaugurated on September 30, 1975, with feeds to the UA-Columbia system in Ft. Pierce-Vero Beach, Florida, and an ATC system in Jackson, Mississippi. (The RCA satellite was not yet in service so the first programming was beamed via Westar). The programming consisted of speeches by FCC chairman Richard Wiley and Andrew Heiskell, of Time Inc.; two films, "Brother of the Wind" and "Alice Doesn't Live Here Anymore"; and the featured event, the championship boxing match between Muhammad Ali and Joe Frazier, beamed via satellite from the Philippines and known as the "Thrilla from Manila." The fight was a particularly shrewd marketing move because it demonstrated the power of the satellite system and it was a highly publicized sports event that was otherwise unavailable to television viewers in the United States.

In June 1975, Teleprompter, still the nation's largest cable operator, had re-emerged from its financial problems to sign up for the HBO service. While historically this helped to realize Kahn's initial dream, more practically it added some 800,000 new subscribers to the HBO service, helping create the critical economic mass necessary for success. Additional cable companies were encouraged to sign on as Scientific Atlanta continued to offer deep discounts on its dishes and in some cases HBO helped cable operators buy the technology. Further, the FCC in late 1976 relaxed technical rules on earth stations, allowing operators to use smaller and cheaper dishes (FCC, 1977). The cost reduction, from about $100,000 for the larger dishes to less than $25,000 for the smaller ones, meant still more operators could afford the service. Finally, FCC regulations restricting pay television and limiting HBO's business opportunities were challenged by HBO and struck down by the courts in 1977 (*Home Box Office v. FCC*, 1977).

Expansion of the cable-satellite distribution platform was subsequently promoted by the addition of Ted Turner's "Superstation," WTCG, an Atlanta-based UHF independent (later renamed WTBS). Turner, like a few other independent television operators around the country, had been distributing his broadcast signal via microwave to regional cable systems. When he heard about HBO's initiative, he saw the possibilities for WTCG. In December 1976, Turner became the second satellite-delivered cable programmer. His channel was particularly appealing to operators and customers because, unlike HBO, it was an advertising-based service that could be offered to subscribers without additional charge (although operators paid 10-cents a subscriber for the feed).

Other programmers soon began flocking to the satellite. By 1980, some 2,500 systems were carrying such services as the Madison Square Garden channel, the Christian Broadcasting Network, C-SPAN, and Viacom's Showtime. By 1987 there were more than 70 cable networks. The industry was franchising the major cities and national penetration was on the rise. A new telecommunications infrastructure was evolving.

Conclusion

Development of the cable-satellite distribution system was, in summary, an evolutionary phenomenon, rather than a system that sprang forth from the ether, fully formed and implemented in 1975. Cable operators in the early 1960s and before were actively discussing cable system interconnection, and the rise of communication satellite technology in the mid and late 1960s offered a likely "next step" in realizing such interconnection. Pioneers such as Kahn helped promote the plan while engineers at Hughes, Scientific Atlanta, and similar firms worked on advancing the technology.

The idea of, and concrete proposals for, a satellite-cable system, in short, arose logically from prior technical, economic, and regulatory developments. Social structures in place at the time helped constrain and guide development. Costly terrestrial distribution options motivated cable operators and broadcasters to look to satellites, while changing FCC policy with regard to satellite ownership and smaller critical issues, such as allowable dish size, served to channel and regulate the pace of development. Within the given set of social and economic parameters, a multitude of players, such as Topol, Levine, and Schlafly, each with their own resources and agendas, engaged in a process of contestation and negotiation. Building from existing technologies and working within this context, the cable-satellite connection was finally established and the inauguration of the new system marked an inflection point, a quantum leap, in the longer-term trajectory of cable television development. The new system served as the foundation upon which were built scores of specialized cable programming services.

Understanding the evolution of the system requires a close examination of the small steps taken by the various actors in their social context as well as the examination of the often-substantial social impact of the technology at key developmental stages in the process. History shows us that technology does change, growing ever more powerful and complex. But the nature of that evolution is typically local and contingent; it is bound by existing social conditions. It is a fluid and dynamic social dance. The development of the cable-satellite link is important both in its real-world contribution to the development of our modern communications infrastructure and as a fascinating example of history, technology, and social change at work.

Notes

[1] Proposals limited CATV-dedicated transponders to a small number for several reasons. Transponder capacity in most of the plans was limited to 12 or 24, and demand from other potential users, especially telephone traffic, was high. Moreover, it was unclear whether the cable industry could or would use more than a few transponders at this point in its history, insofar as only Hughes, Teleprompter, and TCI had expressed serious interest in developing a cable network.

[2] Teleprompter asked for five ground station permits, as did LVO, a top-15 MSO, and Twin County Cable, a small but far-seeing company based in Northampton, Pennsylvania.

References

Allen, D.S., Bossert, J.L., & Krause, L.I. (1971). *Economic viability of the proposed United States communications satellite systems, Final Report.* Menlo Park, CA: Stanford Research Institute.

Barnett, H., & Greenberg, E. (1967). *A proposal for wired city television.* Santa Monica, CA: Rand Corp., Rand Doc. P-3668.

Basalla, B. (1988). *The evolution of technology.* New York: Cambridge University Press.

Bond, D. (1962, November 13-18). *A system for direct television broadcasting using earth satellite repeaters: Five papers by members of the technical staff of the Radio Corporation of America.* Paper presented at the 17th Annual Meeting and Space Flight Exposition of the American Rocket Society, Los Angeles, California.

Booze, Allen, & Hamilton. (1974, August 1). *Final Report: Satellite Interconnection Feasibility Study, Cable Satellite Access Entity.* Norfolk, VA: NCTA.

Carnegie Commission on Educational Television. (1967). *Public television: A program for action.* New York: Bantam Books.

CATV headed for ad-supported network? (1970, May 4). *Broadcasting,* p. 23.

Clarke, A. (1945, October). Extra-terrestrial relays: Can rocket stations give world-wide radio coverage? *Wireless World,* pp. 305-308.

Clarke, A. (1959, September). Faces From the Sky. *Holiday,* pp. 48-49.

Comsat poised to file. (1970, March 1). *Broadcasting,* p. 9.

Craven, T.A.M. (1962, June 25). Global TV unreal: Pursue practical uses. *Advertising Age,* p. 72.

Dominick, J., Sherman, B., & Copeland, G. (1996). *Broadcasting/Cable and Beyond.* 3rd ed. New York: McGraw-Hill, Inc. Domsat show is high note of NCTA's all-stops-out convention. (1973, June 25). *Broadcasting.* p. 25.

Fang, I. (1997). *A history of mass communication: Six information revolutions.* Boston: Focal Press.

Federal Communications Commission. (1965a). *Non-acceptance of application by american broadcasting Cos.,* 2 FCC 2d 671.

Federal Communications Commission. (1965b). *Notice of inquiry, establishment of domestic noncommon carrier communications satellites by non-governmental entities,* 31 Fed. Reg. 3507. Docket no. 16495.

Federal Communications Commission. (1969). *First report and order,* 20 FCC 2d 201.

Federal Communications Commission. (1970). *First report and order, in the matter of establishment of domestic communications satellite facilities by non-governmental entities,* 22 FCC 2d 86. Docket no. 16495.

Federal Communications Commission. (1972a). *Proposed second report and order on domestic communications satellite facilities,* 34 FCC 2d 9. Docket no. 16495.

Federal Communications Commission. (1972b). *Second report and order on domestic communications satellite facilities,* 35 FCC 2d 844. Docket no. 16495.

Federal Communications Commission. (1973a, Jan. 4). *FCC common carrier action, public notice No. 1000.*

Federal Communications Commission. (1973b, Sept. 13). *FCC common carrier action, public notice No. 1270.*

Federal Communications Commission. (1977). *In re: American Broadcasting Co.,* 62 FCC 2d 901.

Fisher, D., & Fisher, M. (1996). *Tube: The invention of television.* Washington, DC: Counterpoint.

GE Engineer Envisions Space-to-Home TV. (1962, November 12). *Broadcasting*, p. 66.
Gershon, R. (1990). Pay cable television: A regulatory history. *Communications and the Law, 12*(2), 3-26.
Gershon, R., & Wirth, M. (1993). "Home Box Office," in Robert Picard (Ed.), *The cable networks handbook* (pp. 114-122). Riverside, CA: Carpelan Publishing.
Gross, L. (1997). *Telecommunications: An introduction to electronic media.* 6th ed. Madison, WI: Brown and Benchmark.
HBO: Point man for an industry makes it into the clear. (1977, October 17). *Broadcasting*, p. 51.
Head, S., Sterling, C., & Schofield, L. (1994). *Broadcasting in America.* 7th ed. Boston: Houghton Mifflin, Co.
Hilliard, R., & Keith, M. (1997). *The broadcast century: A biography of American broadcasting.* 2nd ed. Boston: Focal Press.
Home Box Office v. FCC. (1977). 567 F.2d 9.
How Teleprompter figures to weave a cable network. (1973, March 19). *Broadcasting*, p. 114.
Hughes files for CATV satellite system. (1970, December 28). *Broadcasting*, p. 9.
Hughes, T. (1983). *Networks of power: Electrification in Western society.* Baltimore: John Hopkins University Press.
Johnson, L. (1967, April). *The impact of communications satellites on the television industry* (Rand paper P-3572). Santa Monica, CA: The Rand Corp.
Kahn, I. (1987). *Oral History.* National Cable Television Center and Museum. Denver, CO: University of Denver.
Lady, J. (1970). *Analysis of the potential growth of the CATV industry.* NCTA Report.
Le Duc, D. (1973). *Cable television and the FCC: A crisis in media control.* Philadelphia: Temple University Press.
Licklider, L. (1967). Televistas: Looking ahead through side windows. In *Public Television, A Program for Action* (pp. 201-225). New York: Bantam Books.
Mair, G. (1988). *Inside HBO.* New York: Dodd, Mead & Co.
Markus, M.L. (1987). Toward a 'critical mass' theory of interactive media. *Communication Research, 14*(5), 491-511.
Merrill, B. (1991). *Oral History.* National Cable Television Center and Museum. Denver, CO: University of Denver.
Mr. Levin's giant step for pay TV. (1975, April 21). *Broadcasting*, p. 16.
National Academy of Sciences. (1969). *Useful applications of earth-oriented satellites: Broadcasting*, Report of Panel 10, Summer Study on Space Applications.
National Cable Television Association. (1969, June 22-25). *18th Annual NCTA convention, official transcript. Rx: Cable, prescription for the future.* San Francisco Hilton, pp. 668-745.
Noll, R., Peck, M., & McGowen, J. (1973). *Economic aspects of television regulation.* Washington, DC: The Brookings Institution.
Nothing to say. (1974, August 5). *Broadcasting*, p. 5.
Papernow, L. (1965, December). One man's opinion. *Television Magazine*, pp. 30-31.
Parsons, P., & Frieden, R. (1998). *The cable and satellite television industries.* Boston: Allyn & Bacon.
President's Task Force on Communications Policy. (1968). *Final report.* (The Rostow Report). Washington, DC: Government Printing Office.
Prochaska, J. (1974). *Key factors for domestic policy in the establishment of broadcast satellites for United States Television.* D.B.A. thesis, George Washington University.
Rogers, E., & Shoemaker, F. (1971). *Communication of Innovations,* 2nd ed. New York: The Free Press.
Rosencrans, R. (1998, October 20). Telephone interview with author.
Schlafly, H. (1998, October 20). Telephone interview with author.
Seiden, M. (1972). *Cable television U.S.A.: An analysis of government policy.* New York: Praeger.

Shapiro, G., Epstein, G., & Cass, R. (1975). Cable-satellite networks: Structures and problems. *Catholic University Law Review,* 24, 692-718.

Shapiro, P. D. (1972, August). *Networking in cable television: Analysis of present practices and future alternatives.* Ph.D. Dissertation. Institute for Communication research, Stanford University.

Smythe, D. (1960, Summer). Space broadcasting: Threat or promise? *Journal of Broadcasting,* 4, 191-198.

Southwick, T. (1998). *Distant signals.* Overland Park, Ks: Primedia Intertec.

Sterling, C., & Kittross, J.M. (2002). *Stay tuned: A history of American broadcasting.* Mahwah, NJ: Erlbaum.

Streeter, T. (1987). The cable fable revisited: Discourse, policy, and the making of cable television. *Critical Studies in Mass Communication, 4,* 174-200.

Taylor, R. (1977). *Satellite direct Broadcasting: The prospect for development.* Ed.D.thesis. Columbia University.

Time Inc. unit to use satellites to deliver programs to UA-Columbia cable systems. (1975, April 11). *Wall Street Journal,* p. 21.

Topol, S. (1991, June 20). *Oral History.* National Cable Television Center and Museum, Denver, CO.

Up in the air over satellites. (1971, April 5). *Broadcasting,* p. 71.

U.S. Congress. (1958). House Select Committee on Astronautics and Space Exploration. Summary of Hearings. April 15-May12, 1958.

Whiteside, T. (1985, May 20). Onward and upward in the arts. *New Yorker,* p. 61.

Winston, B. (1986). *Misunderstanding media.* Cambridge, MA: Harvard University Press.

Ziman, J., ed. (2000). *Technological innovation as an evolutionary process.* New York: Cambridge University Press.