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The Economics of Pay-TV Media

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I. INTRODUCTION

Pay-television programming has grown vigorously in recent years, both in the number of pay-television subscribers and in the quantity of competing subscription services. Over the five years from 1978 to 1983, the

number of pay cable subscriptions has increased at an annual rate of roughly 60 percent to over 30 million. In 1983, 29 basic and 10 pay program services were available on cable TV. The number of U.S. homes wired for cable totaled 36,870,000 in 1983, compared to less than half that number—17,135,000 homes—in 1978. Over the five-year period, the number of separate pay cable subscriptions grew at a rate fully four times faster than the increase in basic subscriptions.

While the public's willingness to pay for two- and three-premium channels had not been widely predicted, new suppliers of both programming content and programming distribution have moved quickly to capitalize on the opportunity. A dozen subscription programming services exist today, each trying to duplicate Time Inc.'s highly profitable movie and entertainment network, Home Box Office, which reported 13.7 million subscribers in early 1984.

This paper, will present a competitive cost analysis of cable television and the major noncable pay services: direct broadcast satellite (DBS), multichannel multipoint distribution service (MMDS), satellite master antenna television (SMATV), low-power television (LPTV), and subscription television (STV). Based on an analysis of the economics of each service, I will give an estimate of the cost of each to the consumer, and predict the number of subscribers each will attract by 1992.

II. CABLE TELEVISION

Basic subscription fees and pay tier fees are the major sources of cable revenue. Pay revenues represent about 40 percent of total revenues. The most important factor behind a system's profitability is a high penetration rate, that is, a high ratio of homes that subscribe to homes passed by cable. An average system breaks even when it achieves about a 30 percent penetration, although in some urban systems, breakeven will require a penetration of 45 percent and more to cover the high fixed capital cost.

Because capital costs are so high, ratios of debt to equity range between 1.75 and 3.0. Interest expense has averaged 9.4 percent of sales and will increase. Fixed assets account for 75 percent of the industry's total assets. The average investment per new subscriber runs at about $650 today.

The top ten multiple system operators (MSOs), which serve about three-quarters of all subscribers, invested heavily in the 1979–1983

period to gain market share, backed by well-funded parent companies. The factors that encouraged this surge in construction activity were spectacular growth in cable profits in the late seventies due to a dramatic deceleration of cable construction, the introduction of pay services, and lower interest rates. Today, with cable construction at a high level, the substantial cost of urban construction together with higher interest rates and a more modest view of future revenues from interactive services have caused a retrenchment that is likely to continue. MSOs are also raising rates, and looking for partners who will provide equity relief. Most future growth in cable will occur in urban areas, and roughly 90 percent of new subscribers in the 1980s will be located there. While the *average* cable system cost just over a million dollars in 1981, the average *urban* system requires an estimated $75 to $100 million investment today.

Urban cable systems have the capital characteristics of a modern battleship—a colossal sunk cost—although they also have a higher-than-average potential for return on investment. Thus while the average cable system has less than 5,000 subscribers, profits increase substantially above 10,000 subscribers. Rural systems are generally too small to support enhanced services such as security. The expected higher returns on investment from the large population bases of urban areas, as well as exaggerated hopes for services like videotex, home shopping, and security, created the keen franchising competition of the early 1980s.

Operating expenses increased as a percentage of sales in the 1980s, owing to several factors: costlier franchise negotiations, the increasing share of revenues from pay services (which have a lower profit margin, since cable operators must compensate program suppliers), and the increase in marketing costs. A cable operator passes along about 40 percent of pay subscription fees to the pay service. While substantial discounts exist for the MSO with over 70,000 subscribers, there is no question that basic subscriptions are on the average a more profitable product than are pay subscriptions. Furthermore, in the effort to increase subscriber penetration, and to raise the ratio of pay to basic units, marketing costs rose significantly in the early 1980s.

In the sections that follow, I analyze the economics of competing pay TV delivery services. Several are more expensive than cable—DBS is a good example. Others, like SMATV and in certain areas, multichannel MDS, can skim the cream from a cable system's revenues.

III. SATELLITE MASTER ANTENNA TELEVISION (SMATV)

A. Background

Satellite master antenna television (SMATV) is a simple concept which has become an important and highly profitable business as a result of technological and regulatory trends. In order to bring the wide range of television programming now available by satellite to individual apartments, condominiums, or mobile home units not passed by cable, the SMATV operator installs a television receive-only (TVRO) earth station and connects it by means of suitable wiring to individual television receivers (in effect, a private mini cable system). In early 1984, the National Satellite Cable Association, SMATV's trade organization, estimated total subscribers at 600,000, and SMATV systems at roughly 2,000. As in cable television, a converter may be used to make specific channels on the cable appear at particular locations on the television tuner, and a variety of devices may be used to restrict access to pay television channels to those who have paid for them. SMATV has received increasing attention as major cable MSOs have won franchises in major U.S. cities where a good portion of the choicest apartment units are already served by SMATV.

Most, though by no means all, SMATV systems are installed in apartment buildings. SMATV has been operating for several years in hotels and mobile home parks as well as condominiums, cooperatives, and resort communities. By definition, a localized television distribution system (master antenna television MATV) is a SMATV system if it gets its program feed from one or more satellites and if its distribution cables do not cross a property line. (Once the system crosses a property line, it becomes subject to municipal regulation and may require a franchise—it has turned, from a legal point of view, into a conventional cable television system.) SMATV can serve contiguous apartments, single-family homes, condominiums, or mobile homes which can be reached without crossing a property line. According to a recent FCC ruling, municipalities cannot regulate SMATV (FCC 1983i). If this ruling is upheld, an important advantage of SMATV will be its freedom from potentially burdensome franchise fees (such as the 5 percent fee often charged to cable operators). Still, SMATV operators usually pay between 3 and 10 percent of their revenues to the owner of the multiunit dwelling they serve.

Moreover, the definitions themselves, though useful, are inevitably blurred. Cable Dallas, a major SMATV operator in Dallas, has received a license from the FCC to feed its signals from one location to another by microwave. This means that the SMATV locations supplied in this way do not need to have their own TVRO earth station, so that the cost per location is decreased and smaller groups of housing units—smaller apartment buildings, for example—can be served profitably. SMATV is traditionally seen as a business for small entrepreneurs, but both Warner Amex, and more recently, Cox Cable, have constructed SMATV operations in multiunit dwellings as an interim measure as they are about to wire a city, in an effort to secure their potential subscribers from encroachment by other pay-TV media.

SMATV has been technically possible ever since domestic satellite distribution of signals for cable television began with HBO's first transmissions via RCA's Satcom I satellite in 1975, but it has only become important since 1981. In 1981, there were roughly 150,000 SMATV subscribers in the United States, and by late 1982 the number had exceeded 500,000. The reason for this explosive growth is partly the "discovery" of the SMATV concept by entrepreneurs, but mainly the rapid reduction in the price of TVRO earth stations, reflecting both technical progress and the rapidly accumulated production experience of manufacturers such as California Microwave, M/A-COM, and Scientific-Atlanta.

Two additional forces will promote the continuing growth of SMATV. These are:

1. The launch of new, more powerful U.S. domestic satellite systems, such as Hughes' Galaxy system, allowing smaller and less expensive earth stations to be used by the SMATV operator to provide the same picture quality that larger, more costly earth stations provide today.

2. The availability of advanced satellites operating in the newly exploited Ku-band frequencies, which are more suitable for use with small antennae than the lower-frequency C-band satellites that provide virtually all the television distribution in the United States today. One of the most powerful Canadian Anik C satellites, which operate in the Ku band, is to be tilted so as to provide television distribution service within the United States. Both these developments will accelerate the downward trend in SMATV operators' fixed earth-station costs, thus increasing the profitability of the SMATV business and making it possible to serve smaller groups of households profitably.

At the same time, some obstacles to the development of the SMATV business are also appearing. The most important of these will be the scrambling of pay television channels such as Home Box Office Inc. (HBO), which can presently be received by TVRO earth station owners without charge, though the legal status of such reception is very much in question. In fact, the SMATV industry can be divided into the "legitimate" sector—which receives pay television channels only where the vendor has consented to SMATV relay and receives a percentage of gross tier revenues—and the "pirates." In mid-1982 the former group, organized into the National Satellite Cable Association, counted 250,000 subscribers (and an estimated 325,000 to 350,000 by late 1982), which, compared with an estimated total of 500,000 SMATV subscribers in late 1982, suggests there were perhaps 150,000 "pirate" subscribers at that time.

B. SMATV Economics

1. Trends in SMATV Economics

The SMATV business has very low start-up costs and therefore can generate a quick cash flow for the entrepreneur. Alternatively, the SMATV operator can invest in the longer term by setting up solid customer service and billing operations capable of handling a large subscriber base; investing in addressability for better subscriber control; and investing in new cable wiring within a building, rather than relying on the existing master antenna system wiring. When an SMATV operator makes this level of financial commitment to the pay TV business, his position begins to resemble that of a franchised cable operator. He is investing in the longer term. SMATV is developing in three stages: in the early stage of the business, SMATV was characterized by low capital investment for quick returns, and low percentage-of-revenue compensation paid to landlords. More recently there has been a willingness to invest in sophisticated addressable systems, rewiring, and computerized subscriber management. Landlords now expect a higher percentage of revenue, 7 to 10 percent rather than the 3 to 5 percent fees of early days. In the future multichannel MDS and direct broadcast satellite (DBS) services will allow SMATV operators to receive the signals with only a small investment in capital equipment. For example,

DBS feeds could be set up to provide four to five channels of supplemental programming at a cost of $600 to $800 for the TVRO and related electronics, compared to $20,000 to $25,000 for the same equipment today. It is likely, however, that both DBS and MDS suppliers will give preference to large, well-managed SMATV operators who have invested in sound computerized subscriber management systems.

In the sections that follow, I consider the current economics of SMATV. Although costs and scale vary widely in this industry, I will provide typical values for revenues and costs as supplied by SMATV operators.

2. Capital Costs

a. The Satellite Antenna and Related Electronics. ranges in cost from $6,000 to $35,000, with installation. A 1984 estimate is $17,000 for a four-meter dish aimed at Satcom III-R, the satellite which carries most pay TV programming, and $4,000 for installation.

b. Subscriber Equipment.

i. Nonaddressable. Subscriber equipment costs approximately $80 per subscriber: $50 for a nonaddressable decoder and $30 for installation.

ii. An Addressable System. Table 1.1 supplies estimates for the capital investment in addressable equipment at the head-end office, including microcomputer and software, autodialer and auto-answer equipment, for a total of $14,500. The investment per subscriber for addressable equipment is $143 rather than $80, also detailed in the table.

c. The Wiring from the Earth Station to the Individual Subscriber's Apartment. costs $150 to $200 per unit in a low-rise environment, and $300 to $400 per unit in an urban, high-rise environment. In addition, the SMATV operator may need to invest in repeaters where the building complex is extensive enough to require them. In the calculations that follow, these costs are excluded, since most SMATV operators select buildings that do not require rewiring.

d. Establishment of Administrative Systems, such as customer service operations and billing systems is required for a well-managed

Table 1.1. SMATV Capital Costs: Addressable System with Computerized Subscriber Management, 1983

Investment per subscriber	
Addressable wall unit[a]	$ 73
Decoder	25
Installation	45
	$ 143
Head-End addressable subscriber management equipment	
Subscriber management software and microcomputer	$10,000
Autodialer	2,000
Data power supply	500
Auto-Answer	2,000
	$14,500
Central programming receive equipment	
Satellite receive antenna and electronics	$17,000
Installation	4,000
	$21,000

[a]For example, Delta Benco Cascade's IT-1-3SM, which allows for three-tier service.

Table 1.2. Comparison of Typical Prices Charged by Three SMATV Operators and a Cable Operator

Cable Operator	*SMATV Operator A*	*SMATV Operator B*	*SMATV Operator C*
Tier 1: $6.00. 38 channels.	Tier 1: $8.95. 9 channels: 5 local channels, CNN, ESPN, Munic. TV.	Tier 1: $8.50. 5 local channels, CNN, ESPN.	Tier 1: $13.50. 12 channels or $7.00 bulk rate.
Tier 2: $16.50. Tier 1 and HBO.	Tier 2: $17.90. Tier 1 and Showtime *or* The Movie Channel.	Tier 2: $18.50. Tier 1, The Movie Channel, and Nickelodeon.	Tier 2: $22.50. Tier 1 and Showtime, $15 bulk rate
Tier 3: $24.50. Tier 1, HBO, and Showtime.	Tier 3: $26.85. Tier 1, The Movie Channel, and Showtime.		Tier 3: None.

SMATV system which operates many buildings in a single urban area. An operator needs 3,500 subscribers to break even, which implies that the SMATV system must pass about 6,000 units. This breakeven estimate assumes that the system is not addressable.

3. Revenues, Operating Costs, and Profitability

SMATV revenues per subscriber are usually slightly higher than the prices charged by cable franchise operators, particularly for basic service. Table 1.2 illustrates the $6 basic price offered by a cable operator for 38 channels compared to the $9 to $13 prices charged by SMATV operators for 12 channels. Prices for a tier adding one subscription movie channel like Showtime or The Movie Channel are slightly higher for SMATV operators: $18 to $22 compared to $16 charged by the cable operator.

SMATV operators achieve a penetration rate of households passed ranging roughly from 40 to 60 percent. A spokesman at a major program supplier to SMATV operators estimates that its affiliates achieve an average penetration of 58 percent.

A pro forma income statement for an SMATV system in a 1,000-unit apartment dwelling is provided in table 1.3. I have assumed that penetration rises from 45 percent in year one to 60 percent in year four, since the demographics of the building in this example favor pay-television penetration. Operating cash flow from this unit reaches $73,000 in the second year and $107,000 in the fourth.

Important cost elements to point out are: fees to program suppliers, the fee to the owner of the building at 7 percent of adjusted revenues per year (gross revenues minus programming fee), and a sales commission of $10 per apartment. Billing, collection, and customer service cost close to $10,000 for management of 500 subscribers in year two.

Investors in SMATV sometimes look for a high level of capital investment to provide a tax shelter through a limited partnership arrangement. This was the case for the building in table 1.3, and the model allows for capital investment in addressability and in an additional earth station to increase the amount of programming available. It does not include rewiring of the apartment building. The higher capital costs are reflected in both depreciation and interest expenses.

Table 1.3. Pro Forma Income Statement for 1,000-Unit SMATV Building

	Year 1	*Year 2*	*Year 3*	*Year 4*
Beginning units	0	450	550	580
Ending units	450	550	580	600
Ending penetration	45%	55%	58%	60%
Average units	360	500	565	590
Average rate, annual	$ 264	$ 290	$ 319	$ 351
Revenue				
Subscriber service revenues	95,040	145,000	180,235	207,090
Installation revenue	9,000	2,000	600	400
Total Revenues	104,040	147,000	180,835	207,490
Expenses				
Programming fee	29,664	45,320	56,333	64,708
Owner's fee	5,206	7,118	8,715	10,247
Sales commission	4,500	1,000	300	200
Guide	1,512	2,100	2,373	2,478
Billing and collection	3,240	4,500	5,085	5,310
Customer service	3,780	5,250	5,933	6,195
Maintenance	4,320	6,000	6,780	7,080
Bad debt	1,901	2,900	3,605	4,142
Total Expenses	54,123	74,188	89,124	100,360
Operating cash flow	49,917	72,812	91,711	107,130
Depreciation expense	16,983	19,443	20,585	21,024
Income before interest, fees/and taxes	32,934	53,369	71,126	86,106
Interest expense	13,694	16,004	17,184	17,758
Management fees[a]	14,904	15,700	18,384	20,949
Net income before taxes	4,336	21,665	35,558	47,399
Income taxes	2,168	10,833	17,779	23,700
Net profit	2,168	10,832	17,779	23,699

[a]Administrative fee: 10% gross revenues; construction management fee: $10 per unit installed.

C. Pay-TV Economics in Multiunit Dwellings Compared to Single-Family Houses

Cable operators in many cities have created an opportunity for SMATV by being slow to wire apartment buildings. Their reluctance to wire apartments and other multiunit dwellings and to concentrate on construction that passes single-family houses is due to several factors. Apartment buildings have higher churn (turnover) rates than single-family houses, since the apartment population is more mobile; there are higher incidences of decoder boxes being stolen, and more incidents of bad debt and bounced checks with apartment residents. These and other variables are compared in table 1.4, which is based on a 1982 survey of pay-TV operators serving both apartments and single-family houses. Decoder boxes were stolen nearly twice as often by apartment dwellers, and disconnects for a variety of reasons were higher in a multiunit environment. On the basis of these observations, table 1.5 calculates the additional expense incurred by an operator serving 100 apartment-dwelling subscribers rather than 100 single-family houses.

The highest costs are $140 extra to serve 100 apartment dwellers for disconnecting subscribers who do not pay their bills, and $89 for disconnecting subscribers who voluntarily discontinue service. The fig-

Table 1.4 Pay-TV Economic Characteristics of Households Multiunit Dwellings vs. Single-Family Households

	Single-Family Houses (Cable TV's natural market)	*Multiunit Dwellings (SMATV's natural market)*
Stolen box	100 Index	183
Bad debt loss	100	166
Bounced check	100	160
Nonpay disconnects ("hard discos")	100	119
Sales orders cancelled before installation ("erosion")	100	126
Service call required	100	119
Voluntary disconnects	100	112

SOURCES: CableVision; Communications Studies and Planning International.

ures are based on two elements: the cost of each item and the average frequency with which it occurs in each environment. Therefore, while disconnects are only 12 to 19 percent higher in an apartment setting, their frequent occurence in any pay-TV system generates the highest marginal cost.

It is important to note that addressability allows the SMATV to significantly reduce many of the costs shown in table 1.5. A large component of any disconnect is the cost of sending a service technician to the dwelling to pick up the decoder box and adjust the wiring. With addressability, the disconnect can be accomplished in 8 to 10 seconds by a central computer, which may even be located in a distant city. Subscribers who are late with payments can also be controlled closely by temporarily switching off their service.

Finally, the addressable system illustrated in table 1.1 allows the operator to put a low-priced decoder box (cost $25) in the subscriber's apartment and to control tier levels with a "wall tap," placed permanently in the wall of the apartment unit and having the dimensions of an electrical outlet. In a nonaddressable SMATV system, decoder boxes cost $50 to $75. Stolen boxes are, therefore, clearly less of a problem in

Table 1.5. Higher Cost of Pay-Television Business in Multiunit Dwelling Setting (not an addressable environment)

	Marginal Cost for 100 Multiunit Households vs. 100 Single-Family Houses per Year	*Higher Incidence Multiunit Household vs. Single-Family House*
Nonpay disconnect	$140	19%
Voluntary disconnects	89	12
Service call required	36	19
Sales orders cancelled	33	26
Bad debt loss	26	66
Bounced check	21	60
Stolen box	4	83

SOURCE: Dallas-based cable operations in single-family households compared to Dallas-based multiunit pay TV operation.

NOTE: Average frequency for multiunit dwellings (SMATV) compared to average frequency for single-family households, times cost per incident per year, times 100 households.

an addressable system using wall taps. Service calls can also be reduced if the operator uses the $25 boxes, since these can be inventoried with the apartment manager for quick replacements. This often makes it unnecessary to send a service technician to the apartment.

IV. MULTICHANNEL MICROWAVE DISTRIBUTION SERVICE (MMDS)

A. Background

With several major 12- to 20-channel multichannel microwave distribution services (MMDS) in the start-up stage, MMDS is likely to become the most profitable of the "cable substitutes," and also the largest in terms of the number of subscribers. MMDS is likely to attract over 8 million subscribers by 1992, compared to only 5 to 6 million subscribers for the next largest of the new pay TV media, DBS. In urban areas where cable construction promises to be very expensive, MMDS could move in early and establish a consumer penetration which the cable system, launched later and priced higher, would not be able to challenge very easily.

MMDS has several important economic advantages: the headend capital investment to launch an MMDS system is under one million dollars, and its operating costs are lower than those of DBS. Subscriber equipment costs about $150 to $175, compared to an estimated $380 to $480 for DBS subscriber equipment and installation. As a result, MMDS can underprice its competitors in cable and DBS, while offering more channels than DBS.

In theory, a total of 29 channels are available for MMDS entertainment services, a significant increase over the *two channels* which the FCC authorized for multipoint microwave distribution service (MDS) in 1962. Microband, owned by Tymshare, operates MDS pay-TV systems in 75 cities, transmitting Home Box Office, for example, as a single-channel service to roughly 60,000 subscribers in the New York area. Another eight channels are awarded by the FCC through a lottery. The FCC awards two four-channel grants per market (*four channels* to one operator). Applicants include all three networks, large group broadcasters, cable MSOs, newspapers, SMATV operators, and existing MDS operators like Microband. An additional *three channels* become avail-

able in mid-1985 on Operational Fixed Service (OFS) channels. Finally, and most importantly, an additional twenty channels are available on the Instructional Television Fixed Service portion of the spectrum (ITFS channels). A major MMDS activity is therefore to sign deals with universities and other nonprofit institutions likely to have ITFS licenses. Instructional channels were poorly utilized. For example, only 5 percent were in use in 1980. All major MMDS applicants are seeking to negotiate deals with educational institutions, who are allowed (as of April 1984) to sell the bulk of time on their channel or channels to an entertainment service like an MMDS operator.

Like subscription television, MMDS broadcasts a scrambled signal to a special antenna and decoder at a private home or multiunit dwelling. MMDS, however, has much lower capital and operating costs than STV. The signal range of MMDS is about 25 to 30 miles; an important limitation of MMDS is that it requires line-of-sight transmission.

Multipoint distribution service (MDS) is a microwave-fed communications service used primarily for the distribution of pay television as well as business and government data in metropolitan areas. It was created in 1962 when the Federal Communications Commission set aside a high-frequency portion of the electromagnetic spectrum, 2.15 to 2.16 GHz, for the distribution of local communications services to the public. Regulated as a common carrier service by the FCC, an MDS operator (also known as the MDS licensee) constructs a low-power transmitting facility, generally with a reach of 15 to 30 miles, and leases time to outside parties for communication services of their selection. The MDS signal is picked up by a microwave receiving dish on an apartment roof or subscriber home. For multiunit subscribers, coaxial cable distributes the MDS signal from the dish to the building units. A down-converter changes the microwave signal into the frequency of a conventional television channel.

When MDS was created, it was expected that private business and Instructional Television Fixed Service (ITFS) communications would be its primary use. No one envisioned that it would take more than ten years for commercial MDS services to develop, and that afterwards MDS would become one of the major methods of delivering pay television in urban areas. CableVision estimates that in 1983/84 MDS systems in the United States broadcast single-channel pay television

programming to 600,000 subscribers in apartments, hotels, motels, and single-family homes.The local nature of the MDS signal can be turned into a programming advantage. Unlike DBS, which transmits a single program format to the entire country, MDS has considerable flexibility in the selection of local programming and in the ways that programming can be delivered to the station transmitter.

While these advantages cannot materially challenge the superior value delivered by cable television, they do make multichannel MDS the strongest overall competitor for pay TV services to homes not passed by cable.

Originally conceived as a means of transmitting business data, MDS has attracted pay-TV entrepreneurs because technology advances have dropped the price of an MDS antenna to $100 to $150. Prior to this change in subscriber economics, the natural market for MDS was limited to reception clusters like apartments and hotels, where the cost of the receiving equipment could be spread over many subscribers.

B. MDS Economics

According to industry sources, single-channel MDS services for subscriber entertainment cost an average of $16 in 1982. This monthly price compares favorably with the average monthly fee for cable and for subscription television, which averaged about $21 per month in 1982. However, the monthly service charges are likely to increase for multichannel MDS. The discussion of MDS economics that follows focuses on the economics of multichannel MDS service.

1. Headend and Subscriber Equipment Costs

The costs of an MDS system are subject to several variables: the physical configuration of the market served; whether a 10-watt or a 100-watt transmitter is used; whether or not a satellite receiving dish is installed; whether down-converters and antennas are bought separately or as combination units; whether the signal is scrambled; and whether the system is addressable or not.

Headend costs for multichannel MDS stations range from $700,000 to $900,000. A system equipped for satellite signal reception could cost

an additional $100,000 to $120,000. Both a CCC/CBS multichannel MDS proposal and a Microband multichannel MDS proposal target station capital costs at well under $1 million, and include the cost of satellite-fed programming.

Subscriber equipment costs, in 1984, were between $150 and $200; if the MDS system is addressable, 1984 costs per subscriber are estimated as $220 to $300. Addressability adds a revenue stream from pay-per-view events, allows closer control of subscribers who pay late, and reduces service calls.

2. Subscriber Pricing

The low equipment costs for multichannel MDS, both at the station transmitter site and for the SMATV operator or the individual subscriber home, make multichannel MDS one of the strongest noncable pay-TV competitors in markets where topography favors MDS transmission.

According to estimates based on the FCC filings of CCC/CBS and Microband, an installation fee of $50 and a monthly fee of $20 to $23 for a five- to six-channel MDS service will provide a good income return to MDS suppliers as well as a healthy subscriber growth. This assumes that the MDS supplier is willing to amortize the cost of MDS subscriber equipment and installation over a 24-month period in order to gain faster market penetration. Accordingly, $5 a month is budgeted to amortize the subscriber equipment, and $15 to $18 a month is allocated for profit, programming, customer service, and billing. Alternatively, the MDS supplier could charge the subscriber the full price of subscriber equipment and installation, $150 to $200, and reduce the monthly fee to $15 to $18.

3. Breakeven and Market Size

Cash flow breakeven in a typical MDS city is only 4,000 to 5,000 subscribers, compared to 45,000 to 50,000 subscribers for subscription television (STV). This lower breakeven will allow MDS to serve many markets that STV cannot enter. I expect MDS stations to bring multichannel pay TV programming to uncabled parts of large urban areas by

establishing more than one MDS transmitter in a city. Los Angeles would be a good example.

Very small population centers, on the other hand, will often be served better by low-power television (LPTV). Although LPTV offers only one channel, its start-up cost (well under $50,000 for the headend) allows LPTV to reach small population clusters that would not be economical for MDS.

V. DIRECT BROADCAST SATELLITE (DBS)

A. Background

On June 23, 1982, the FCC cleared the way for direct-to-home transmission of premium entertainment services via very high-powered satellites. When this kind of service is available, satellite receiver dishes placed on top of a home or apartment building will be able to pick up five or six full television channels for home viewing. At least three of these channels will be delivered without advertising. The DBS concept essentially streamlines the delivery of pay television programming. High-powered satellites in a fixed position 22,300 miles above the earth transmit programming (beamed from a program supplier) directly to subscribers' homes equipped with dish-shaped receiving antennas two to two-and-a-half feet in diameter.

While DBS will not be a major competitor for cable, it does have a market in areas which cannot be served profitably by cable, and to SMATV operators both inside and outside cable franchise areas. The point/multipoint distribution architecture of DBS gives it advantages in serving sparsely populated areas and in delivering pay-per-view more economically than cable. Despite these advantages, it is doubtful that the DBS market will be able to support more than two fully integrated competitors, since it is likely to have only five to six million subscribers by 1990 (a 15 to 20 percent share of U.S. households not passed by cable). The high capital requirements of DBS have already narrowed the field.

The technological concept that makes direct-to-home satellite broadcasting possible is the use of high-powered satellite signals which can be received by small TVRO (television receive-only) antennas, afford-

able to a mass consumer market. Business planning for DBS services has assumed considerable pricing flexibility, based on the assumption that DBS will serve areas without competition from cable TV. Early prices are $30 to $40 for five channels of programming, and a $300 to $400 installation charge. Competitors will differentiate themselves on price; Comsat has signaled its intention to do so.

The basic concept of "interim DBS" is the use of medium-powered satellites, which are available at a lower cost than the high-powered satellites necessary for "true DBS" but require larger and more expensive subscriber dish antenna and electronics to receive and amplify the weaker signal.

The success of interim DBS services depends on the resolution of two key questions: (1) *How expensive* the subscriber equipment will be; 1985 forecasts range from $550 to $750, depending on the DBS company consulted. (2) *How effective* the entire system (particularly the subscriber receiving antenna and electronics) will be in creating a high-quality picture.

The key issue behind an economic assessment of DBS is the advantage of high-powered DBS relative to medium-powered DBS. Stated differently, at what price does the far higher cost of high-powered satellite transmission justify the reduced cost of the dish antenna to the consumer? The market price for a medium-powered transponder, for example, was about $10.5 million. Each pay-TV channel requires one transponder, and most services back up their transponders with a standby. A high-powered transponder costs an estimated $14.5 to $15 million. Comsat's Satellite Business Systems (SBS) asked $17 million but found no buyers.

Advances in the technology of consumer dishes and backup electronics, especially low noise amplifiers, have dramatically altered the outlook for DBS by making it possible to capture signals from medium-powered satellites on small dishes. In the trade-off between investment in the sky and investment on the ground, Comsat/STC chose to invest in the sky, and will transmit a very high-powered Ku-band signal capable of being picked up by a two-foot dish (three in some areas). United Satellite's strategy, on the other hand, is to broadcast on a medium-powered C-band satellite, requiring three- to four-foot dishes at a reported cost of $650 to $750 including installation.

It is important to note that dish technology has improved so rapidly that today, a one-meter dish is sufficient to pick up the HBO signal from Galaxy, which is a stronger-than-average medium-powered (C-band) satellite. Galaxy's effective radiated power (EIRP) is 39, compared to about 30 for conventional C-band satellites. For comparison, the EIRP of the high-powered SBS transponders offered at $17 million is 48.

The C-band, medium-powered DBS service has two important advantages:

1. Price

High-powered transponders are at least five times as expensive as medium-powered transponders. To illustrate, a high-powered satellite carrying six to eight transponders costs about $500 million. Assuming eight transponders, the cost of each was about $60 million, compared to a market price of $10.5 million for a medium-powered transponder. C-band transponder prices reflected a glut, and have continued to soften in 1984, as almost as many transponders are scheduled to be launched as are already in orbit.

2. Performance

High-powered satellites transmit a signal that can be received by a dish 50 to 65 percent of the diameter of a medium-powered satellite. However, rain attentuates the Ku-band signal, but does not attenuate the C-band signal.

B. DBS Economics and Competition

DBS's pricing flexibility will be a key factor in its successful market penetration. In this section I will first compare DBS to cable on the basis of its marginal capital cost and provide an estimate of fixed construction costs for DBS. Second, I compare DBS to multichannel MDS, emphasizing subscriber equipment costs. Third, I compare DBS to low-power television services.

It is increasingly clear that DBS will have to price at a relatively high level to cover fixed costs and return a profit. It is also likely that DBS

will encounter significant price competition in parts of both rural and urban markets from LPTV and multichannel MDS. In urban areas, multichannel MDS will offer significant price competition to DBS and provide the same product. DBS should do better in those urban areas that have many apartments and condominiums—these offer DBS a natural partner in the SMATV operators who wire multiunit dwellings, and they will also be the areas that cable operators wire last (see the above section on SMATV economics.) In rural areas, DBS will meet competition from low-power television services.

1. Competition with Cable

Given spectrum allocations, cable can offer more channels than DBS. While a Browne Bortz study (1981) established that pay-television subscribers tend to concentrate their viewing on four or five channels, it is also clear that when offered identical prices, consumers will favor the choice of 36 or 54 channels rather than 5 or 6. DBS can deliver up to half a dozen entertainment channels, as well as many one-way text channels. DBS will not, however, offer two-way text and information channels for such services as home shopping and home banking. The capability for interactive services on DBS is technologically possible but prohibitively expensive. Cable clearly dominates in its ability to offer a broad range of entertainment and information services.

Second, comparing the two services on price, it is less well known that DBS is at a price disadvantage relative to cable. The average installed capital cost per subscriber is roughly the same for cable and DBS, but the *marginal* capital cost, that is, the equipment investment for one more subscriber added to an existing system, clearly favors cable. This is owing to appreciably lower cable converter costs compared to DBS home receiver costs, as shown in table 1.6.

Table 1.6. Cable and DBS Capital Investment Per Subscriber

	Average Cost	*Marginal Cost*
Cable	$500–$600	$120–$160
DBS	$500–$650	$230–$240

SOURCE: CSP International.

NOTE: Assumption: Pay TV services delivered to individual homes, not units of multiunit dwellings.

Table 1.7 Estimated Cost of System Construction, Comsat ($ million)

Construction/Preoperational Costs	*First Year*
Satellite development and launch	$252.0
Ground System	13.0
Capital investment in rented indoor electronics and outdoor microwave units	31.8
Program production equipment	3.5
Administrative/start-up costs and working capital	93.0
Subtotal	$393.3

SOURCE: Satellite Television Corporation FCC Application.

a. Capital Costs. Comsat's Satellite Television Corporation filed its view of the capital investment necessary to launch DBS (table 1.7). The development and launch of Comsat's satellites were estimated at $252 million. Industry observers believe this cost, which accounts for 64 percent of early capital investment, will be considerably higher. STC has announced, in addition, a $25 million marketing budget to launch DBS. More important, Comsat has been criticized for taking a system-design approach that dramatically increased the cost "in the sky"—the $252 million figure—to achieve a small reduction in the diameter of the dish on the subscriber's roof.

b. Subscriber Equipment Costs. The cost of a receiver dish, low noise amplifier (LNA), decoder, and installation for DBS could very well be the key to its success or failure. There is a large area of uncertainty surrounding these costs in 1986 and 1987, but one can make some useful observations. In late 1984, the subscriber equipment needed for DBS could be bought for about $600. In the two years that follow, Comsat expects subscriber equipment to drop to $350 to $400. Oak Industries, which decided not to pursue its initial interest in DBS, projects substantially higher figures. The unknown variables here are how fast suppliers will move down the cost curve of accumulated production experience. The problem is that the experience curve for DBS equipment is going to be fragmented among several suppliers. Economies of scale will also reduce costs, but again, they will be distributed

over competing equipment suppliers. These factors make it difficult for suppliers to agree on the probable cost of subscriber equipment in 1986 and 1987.

Oak projects subscriber equipment prices at least 15 to 20 percent higher than Comsat's $300 to $400 estimate. The company is essentially skeptical about the ability of advances in chip technology to drive down the price of the LNA while maintaining its efficiency. Oak's stategic moves are undoubtedly due in part to its judgement that subscriber equipment costs will be higher than originally expected. Thus it withdrew from its "interim DBS" business, which was to have been launched in 1983, and decided to make SMATV operators an integral part of its business planning for DBS in 1986.

2. Competition with Multichannel MDS

Several factors could make multichannel MDS a formidable competitor to DBS for households not passed by cable.

a. Quicker Entry. Multichannel MDS can be launched at a capital cost of under $1 million per station, according to CBS and Microband, and CBS estimates that stations can be built in only six months. Multichannel MDS should have a good one- to two-year lead on DBS and enjoy the favored position of an entrenched pay-TV supplier. While both services will offer roughly the same four- to six-channel capacity in their early stages, MDS can capitalize on its programming flexibility.

b. Greater Programming Diversity and Flexibility. DBS must send national, homogeneous programming across the entire continent. MDS, on the other hand, tailors programming to appeal to the audience in its 20 to 25 mile range. It can offer local sports or movies selected for a regional appeal, and has many ways to get the programming to the MDS transmitter, such as satellite feeds or physical distribution of video tapes or films.

c. Lower Subscriber Equipment Costs. Table 1.8 compares subscriber equipment costs for DBS and MDS services, accepting Comsat's low ($300–$400) estimate. Comparative equipment costs for multichannel MDS are roughly only $175 to $250. Given these equipment costs,

Table 1.8. Multichannel MDS Subscriber Equipment Costs Compared to DBS

	Multichannel MDS[a]	*True DBS*
Total subscriber equipment costs[a]	$175–$250	$300–$400
Hypothetical subscriber pricing		
Installation fee	$50	$100
Total monthly fee	$20–$23	$30–$33
Amortization of equipment	$5	$15
Programming, billing, etc.	$15–$18	$15–$18
Total	$20–$23	$30–$33

SOURCES: Comsat, Microband, CSP International.
[a]Includes receive antenna, LNA, decoder, and installation.

multichannel MDS can price lower than DBS. As shown in the table, MDS could charge $50 for installation and $20 to $23 a month. Furthermore, MDS could offer self-installation of equipment purchased at a retail store, while for DBS, a trained installer must spend roughly four hours.

3. DBS Competition with Low-Power Television (LPTV)

DBS stands a good chance of competing in low-density rural markets, where the number of homes per square mile is too low to attract an MDS operator. These rural markets, however, will also be attractive to low-power television (LPTV) operators. Total transmitter and studio costs of a normal ten-mile-range LPTV station are only about $40,000, with transmitter cost at about $8,000 to $10,000 and falling, in real terms, at about 5 percent per year.

4. DBS Feeds to SMATV Operators

Because they can deliver DBS service to many apartments via the apartment MATV system, SMATV operators are a good initial market for DBS. The DBS receiving equipment and programming package will allow SMATV operators to make a profit serving far smaller multiunit dwelling complexes than they can now. Today, SMATV needs a complex of over 500 units to be profitable. Since an SMATV system needs roughly 3,500 subscribers in a city to reach breakeven, the ability to

increase penetration of smaller buildings with a DBS partnership, improves the outlook dramatically for SMATV.

VI. SUBSCRIPTION TELEVISION (STV)

A. Background

Subscription television (STV) is a single-channel pay-TV service which is broadcast in scrambled form for part or all of a day over conventional UHF and VHF television channels. Scrambling is meant to insure that only those television sets equipped with a decoder box can receive the movies and sports programming. STV transmits a standard broadcast signal via a UHF channel to a subscriber's special antenna, decoder, and standard television receiver. STV headends, located in or near major cities at a VHF station, receive programming both by physical distribution (i.e., reels of movies are flown to the STV station) and by satellite (e.g., a live pay-per-view boxing match). The signal is scrambled at the local transmitter site and unscrambled by a decoder attached to the subscriber's television receiver. The decoder costs about $120 to $150. In 1984, *CableFile '84* reported a total of 1,324,000 STV basic subscribers, using mid-1983 counts, compared to 1,349,150 counted by CableVision in 1982. While STV apparently managed to maintain its nationwide level of subscribers, the number of systems dropped from 29 in 1982 to 25 in 1983. More important, where cable and SMATV are actively being developed, STV subscriber counts drop quickly—for example, in early 1982 Dallas had over 100,000 STV subscribers, and by mid-1983, only 54,000.

STV operators typically enter the business by purchasing UHF channels or, if cross-ownership regulations prohibit that approach, by leasing channels during either evening or weekend hours or on a 24-hour basis from a UHF station owner. An easing of FCC rules has made entry into the STV market simpler.

STV operators purchase their films and sports rights directly from producers, or buy the programming packages of other STV operators. Their main program offerings include 40 to 45 movies per month, sports, occasional pay-per-view events, and an adult tier of late night programming.

The fact that subscription television (STV) has attracted so much attention as a challenger to cable television's dominance has little to do with the underlying business strength of STV. With its single-channel programming, unenhanced broadcast signal, and relatively high price, STV is not a real competitor to cable, and has trouble attracting and retaining subscribers even in areas which are not passed by cable.

Industry observers have given STV services consideration because they have a large subscriber base and because they provide clear competition to cable television in Los Angeles. In 1983, with just over 1.3 million subscribers, STV had more than twice as many customers as the second most popular noncable pay-TV service, MDS. STV began in 1976 and experienced fast growth because its large, well-funded entrants saw it as a short-lived opportunity to make money on pay television before cable arrived in the major cities; it was expected to mature very rapidly. Subscriber bases were built up fast through heavy mass media advertising, particularly television ads. Since the STV signal could be instantly broadcast to all homes within the UHF signal range from the first day of operation, subscribers could easily get service after the quick installation of a roof antenna and receipt of a decoder box to unscramble the movie and sports programming. The early demise of STV has been postponed as the politics of cable franchising has lengthened the pre-cable period.

Nevertheless, the 1.3 million subscriber base of STV severely tested the abilities of system operators to manage the installation and the back paperwork in the peak years of 1980 and 1981. Most operators alienated subscribers during this period, as they could not handle their unexpected growth and still provide good customer service.

An influential study of cable and its competitors published in 1982 by Browne, Bortz, and Coddington (Pottle and Bortz 1982) showed STV as a substantial competitor to cable. The study was commissioned by the National Cable Television Association (NCTA) to impress on Washington that cable faced substantial competition from other media. In its effort to avoid regulation, the cable industry argued that it did not have a "monopoly" position in franchised areas—the view held by some legislators and FCC staff in Washington—because there was competition from other pay-TV services. Using subscriber data gathered in Los Angeles (the most favored of STV markets for several unusual reasons), the Bortz study clearly implied that STV could hold its own against

cable competition. In fact, Los Angeles STV subscribers declined from over 500,000 in 1982 to 271,000 in June 1983.

In commissioning the Bortz study and directing its slant, the NCTA did not imagine the news would reach beyond Washington to Wall Street. Yet ironically, the net result of cable's desire to appear part of a healthy competitive battle in Washington was to damage its ability to raise capital on Wall Street, as well as some short-lived attention to STV as a serious long-term business.

In fact, STV has fundamental problems as a business. Before STV, pay-television executives marveled at the astounding appetite of the American people for pay-TV services. STV definitely tests the limits of that appetite. With one channel of indifferent signal quality priced at approximately $21 a month, STV operators have attempted to establish a business at the outer frontier of what people will pay for uninterrupted movie programming. Systems which are striving to reach breakeven find it difficult to attract new subscribers, even with free installation offers.

Even though subscribers for adult-only programs seem to be on the rise, STV churn rates (i.e., the percentage of all subscribers who disconnect in any month) are running at 5 to 6 percent per month, as compared to between 3 and 4 percent per month for pay cable. Churn is costly for a business where a serviceman must visit a subscriber's house to install equipment and again to pick up the expensive decoder box whenever a subscriber disconnects. An STV subscriber must maintain a subscription for about 18 to 22 months for an operator to break even. Today, many STV subscribers drop service well before 18 months.

B. Economics of STV

STV systems with less than 40,000 subscribers are suffering substantial cash losses. The causes of their disappointing performances are:

(a) Subscriber disconnection (churn) is much higher than expected, running at 5 to 6 percent per month rather than the 2 to 3 percent projected.

(b) Piracy of the STV signal has deprived operators of significant revenues.

(c) The $20 to $22 monthly subscription price has caused bad debts to rise.

(d) Difficulties have arisen with STV technology. In particular, the decoder boxes placed in subscriber homes to unscramble programming have not proven as reliable as expected.

1. The Basics

Revenues and expenses per subscriber are provided in table 1.9. Revenue projections are based on a price of $21 per month for standard service, and the assumption that 40 percent of the subscriber base also takes a $5 adult tier.

General operating and administrative expenses, totaling about $33 per subscriber per year, include: customer service telephone inquiries, billing, and service technician visits to fix subscriber equipment—e.g., to change defective decoder boxes or to reorient antenna.

Origination expenses are a fixed cost that can be roughly allocated to subscribers. For a system with 50,000 subscribers, the cost of leasing time from the UHF station and operating the STV studio runs at about $5 per year per subscriber.

Marketing to established subscribers involves actions aimed at preventing voluntary subscriber disconnect. Programs to discourage churn

Table 1.9. Summary of STV Economics, Revenues, and Expenses per Subscriber, 1982 Estimates

Annual revenue per average subscriber for programming service[a]		$265
Annual continuing expenses per average subscriber		
Programming	$75	
Semivariable general and administrative	18	
Operating	15	
Origination	5	
Remarketing	4	
		$117
Cost of acquiring one new STV subscriber		$180
Cost of one subscriber disconnect		$ 40

SOURCE: Communications Studies and Planning International.

[a]Less bad debt and late pay allocation. Assumes basic service price is $21 per month, 40% of subscriber base take adult tier at $5 per month. Also assumes an average STV system of 50,000 subscribers.

have recently been given more attention, and usually range from $2 to $10 per subscriber per year; for purposes of the calculation, $4 is assumed.

2. Breakeven Calculations

In the early days of STV, operators planned to reach breakeven at 20,000 to 25,000 subscribers. As marketing costs skyrocketed in the effort to acquire subscribers as quickly as possible, hefty advertising budgets and sales costs made breakeven an elusive goal for nearly all STV systems. Breakeven in 1980–1982 was often at over 100,000 subscribers per station.

Recently, STV systems have shifted their focus to cost-cutting rather than spending to acquire that new subscriber. The breakeven calculation shown in table 1.10 illustrates an STV station which has reduced expenses to achieve breakeven. Annual fixed costs are roughly $5.2 million a year. The annual gross margin is calculated at $147 a year. Therefore, the station's breakeven is 35,000 subscribers. For STV stations which have not reduced costs, breakeven ranges from 60,000 to 80,000 subscribers.

3. Implications for the Future Development of STV

This overview of STV economics raises two important concerns about the business. First is the high cost of churn. The cost of replacing subscribers who disconnect is roughly $160 to $180 and the cost of the disconnect is about $40, including office paperwork as well as the service technician visit. As the competing pay TV services, such as multichannel MDS and DBS, enter STV's urban markets, STV systems

Table 1.10. STV Operating Breakeven

Fixed Costs	$5.2 million	
Monthly revenue per subscriber		$ 22.00
Variable costs per subscriber		9.75
	Monthly gross margin	$ 12.25
	Annual gross margin	$147.00

SOURCE: Communications Studies and Planning International.
NOTE: Breakeven equals $5.2 million ÷ $147 = 35,000 subscribers.

will find their churn rates rising, and the cost of acquiring new subscribers even higher.

Second, since STV systems have high breakeven subscriber levels, there will be a point when many STV systems, faced with competition from four- and five-channel systems as well as the growth of cable television, realize that they cannot hope to reach breakeven. In the mid-1980s, many STV stations will, in all likelihood, sell their subscribers to competing pay-TV stations at prices ranging from $135 to $175 per subscriber (1983 dollars). In some cities, multichannel MDS operators may offer to acquire the office operations of STV stations—customer service, billing, those service technicians directly employed by STV, and general management. The STV "window" has existed largely because cable franchising battles and the slow machinery of urban politics have decelerated cable penetration of important urban areas.

VII. LOW-POWER TELEVISION (LPTV)

A. Background

Low-power television is the first new conventional TV service to be approved by the FCC in over twenty years. The possibility of owning a relatively low-cost broadcast station with a broadcast radius of up to 40 miles has created great excitement from a wide range of entrepreneurs, including newspaper publishers, nonprofit organizations, minority businesses, and well-known national corporations. The licensing of these new stations, according to the FCC, will promote more diversity in media ownership, since start-up costs of less than $50,000 should not prohibit any organization or business from embarking upon this kind of television venture.

The first low-power TV stations came about when some television translator operators succeeded in obtaining FCC waivers of rules to broadcast locally made programming and to record and reschedule playback of programs being received from high-power broadcast stations whose signals were being boosted. In 1983, the FCC approved the service as a broadcast service in its own right. Although it is limited to substantially less power than full power UHF and VHF broadcasters, as

Table 1.11. Comparison of Effective Radiated Power of Low-Power Television and Full-Service Broadcast Television

	UHF	*VHF*
LPTV stations	2,500–20,000 watts	100 watts
Full-power broadcast stations		
Channels 2–6		100,000 watts
Channels 7–13		316,000 watts
Channels 14–69	5,000,000 watts	

SOURCE: FCC Broadcast Bureau.

illustrated in table 1.11, its stations can still cover a radius of 5 to 40 miles, depending on topography and climate.

LPTV is currently defined by the FCC as a "secondary service," which in practical terms means that low-power stations may receive signal interference from but not cause signal interference to such "full service" licensed communications facilities as full-power broadcast stations. Though this "secondary" status is likely to have little technical impact on LPTV stations in rural and semirural areas, avoiding interference with other broadcasters may become a problem for LPTV operators in the urban TV markets.

Because the maximum transmission power of LPTV stations is low, LPTV transmission sites must be in or quite close to the target broadcast area. The choice of UHF or VHF signals for a specific LPTV station varies, depending upon the kind of obstruction or interference the signal may encounter. For instance, choosing a low-band VHF signal is preferable if homes in the target broadcast area are surrounded by hills, buildings, or trees. However, if the signal encounters man-made interference, a UHF channel is a superior choice. UHF is therefore usually better for a station which attempts to reach homes in urban areas.

A survey of ideas for LPTV which have appeared in several FCC applications gives a further view of how companies and individuals are thinking about the proposed service. An early application was submitted, for instance, by the Community TV Network (CTN), a group of black attorneys who formerly worked for the FCC. They proposed to broadcast satellite-delivered programming geared for black audiences during the day and to carry subscription TV service from Wometco during prime-time hours. Programming would be carried in a number of

cities, including Denver, Indianapolis, Louisville, Tampa, Houston, New Orleans, Memphis, Kansis City, Missouri, St. Louis, and Dallas. CTN estimated that its program facilities, transmission equipment, and satellite equipment would cost approximately $130,000.

It is important to note that, contrary to its image, LPTV is not simply a broadcasting service for rural audiences, since it also has a significant potential to reach major-market audiences. In rural markets, LPTV could function as a pay service to individual subscribers, but in major markets LPTV revenues are much more likely to come from advertising. While the focus of this article is the new pay media, it is worth understanding advertising-supported LPTV.

An LPTV operator could acquire LPTV stations in major markets, each one with a signal radius of 7 miles, for example, and cover a good portion of an ADI. A boosted signal, provided it is noninterfering, can boost LPTV output further. In nearly all major markets, LPTV and translator applications have been filed, and awards will be made in the LPTV in late 1985 and 1986. The lottery has begun with applications from the most rural taken first. There are noninterfering frequencies still available in nearly every major market. Recently, however, the FCC made it more difficult for LPTV to find noninterfering frequencies in major cities, because it ruled that it would not consider an LPTV application that was *potentially* interfering, that is, one that conflicted with a full-power TV station that was only at the application stage. Sears' Allstate Venture Capital, for example, has funded Neighborhood TV, a new venture located in Phoenix, Arizona, which has translator applications in virtually every major market. Neighborhood TV has filed a translator application in Boston for channel 61. Recently, a full-power UHF application for channel 62 has been filed, so the Sears-backed application will be declined.

B. Economics of LPTV

With all the discussion of low-power television's extremely low cost, some observers are worried that many applicants have not correctly appraised the true investment that may be required. Though considerably less expensive then full-power transmission facilities, a 1,000-watt transmitter for a 20 to 30 mile broadcast radius may cost between $60,000 and $100,000. The cost of originating programming and/or

purchasing programming for the station will boost costs higher by about one half.

Even these figures, however, are low compared to the investment that the Bemidji, Minnesota, LPTV station has made. Though many LPTV observers may feel that high investment will be uncharacteristic of future low-power operations, it is useful to examine the Bemidji station to see how choices about quality of service and the size and topography of the service area may affect an entrepreneur's decisions about justifiable costs. Bemidji's channel 26 is the only commercial station serving a town of 11,500 people. The 1,000-watt transmitter for the station was erected on a 457-foot tower at a site seven miles north of town. Under normal circumstances, a low-power signal such as this might have a radius of approximately 20 miles, but because of the relatively flat terrain, the reach of the station is boosted to a 50-mile radius. The result is that channel 26 reaches a service area containing approximately 40,000 people who are not reached by more than one full-power TV station or by a cable service.

Channel 26 is run as a commercial station supplemented by STV, and its owner, who has built five full-power broadcast stations in his career, decided that an investment of approximately $800,000 was warranted. The company has spent $463,000 for construction and $600,000 per year for its total operation. About $100,000 has been spent on a mobile production unit and $102,000 for a building. Programming begins at 8:00 A.M. with syndicated shows from a satellite, an hour of local news, a local TV magazine program on local people and events, and satellite-delivered weather forecasting.

Channel 26 contracted with SelecTV in Los Angeles to provide subscription programming via satellite from 7:00 P.M. until sign-off to supplement revenues from local advertising. The STV service was initially offered for $18.50 a month, and the goal of the station was to sign on 1,500 subscribers in the first year.

In the pay-TV market, economic forecasts show that LPTV delivery may be competitive with MDS. In fact, LPTV is projected to have lower direct and retransmission costs than the other two pay-TV delivery systems. Table 1.12 offers some comparison.

Although small entrepreneurs might be inclined to approach venture capital firms for LPTV financing, many financial experts would be hesitant to advise this approach. Because such firms take between 40

Table 1.12. Comparison of Projected Costs of LPTV and MDS

	LPTV	*MDS*
Cost per channel	$50–$70,000	$75–$100,000
Operations and maintenance per channel	$6,000/year	$9,000/year
Subscriber equipment, 1984/85	$150 decoder	$200

and 80 percent of the company, many feel that the small businessman could do better by soliciting commitments from groups of local investors or from a single wealthy member of the community. While venture capital firms are accustomed to financing enterprises with more national and regional visibility, local investors would be more likely to appreciate the services that an LPTV operation will bring to the community that they know.

VIII. CONCLUSION

Today, noncable pay-TV services have attracted a total of roughly 2.75 million subscribers. In 1992, they are likely to account for about 14 million subscribers, a cumulative increase of over 500 percent. The probable distribution of these subscribers among the noncable pay-TV services is given in table 1.14.

By 1990 pay-cable penetration of households passed by cable will be about 60 percent. This figure is based on the assumption that the market for noncable services lies outside the areas passed by cable—cable dominates wherever it is provided. Given this 60 percent penetration rate, by 1992 there will be an estimated 32 million U.S. households not passed by cable. Of these, 40 to 45 percent are likely to subscribe to one or more of the pay-TV services in table 1.13, for a total of about 14 million subscribers. The current penetration of existing noncable services into households not passed by cable is only 8 percent.

Multichannel MDS, DBS, and SMATV will dominate this growth of new pay-TV services.

Based on an analysis of the economics of the new pay-TV media, as well as an understanding of the marketing advantages each service possesses, the outlook for each service in the early 1990s can be estimated. Assessing the attractiveness of each of these "cable substitutes" as a business opportunity raises three key questions:

— Which of the cable substitutes is likely to attract the most subscribers in 1992?
— What level of investment does it take to secure a competitive position in one of the new pay-TV media today?
— Which services are likely to be the most profitable ones in the 1990s?

Among the new pay-TV media, multichannel MDS is likely to attract the greatest number of subscribers in the early 1990s (see table 1.13). Of a total of 14 million subscribers to noncable pay TV services, I estimate that MMDS will attract roughly 8.5 million, compared to the 4.0 million that DBS is likely to attract, and the 2.5 million subscribers SMATV could serve in the early 1990s.

Multichannel MDS could successfully challenge cable in urban areas that are expensive to wire, since major 12- to 20-channel MMDS systems could price the monthly subscription at $20 to $25 and offer two to three premium service channels in the package. MMDS has greater pricing flexibility than DBS, its major competitor along with cable, because the cost to build a transmission station for MMDS with a signal range of 25 to 30 miles is under $1 million. DBS capital costs range from $70 to $500 million, and it should be noted that the competitor who tried to launch a medium-powered DBS service at an estimated $70 million in capital costs, United Satellite, failed in 1984 and was absorbed by STC.

Table 1.13. Projected Subscriber Counts for Several Noncable Pay-TV Services in 1992 (United States only)[a]

	Millions
Multichannel MDS	8.5
Direct broadcast satellite	4.0
Satellite master antenna television	2.5
Low-power television	0.75
Subscription television	0.0

[a]The estimated number of subscribers in 1992 for each pay service was derived by weighing many factors, together with the competitive cost analysis which is the subject of this essay. Taken into account, for example, were signal strength, channel capacity, the projected distribution of households among multiunit dwellings (by size of the MDU), households in rural areas not served by cable, households in areas with a housing density attractive to MMDS, and the households in urban areas that may not receive cable by 1992.

[b]I assume that the majority of SMATV subscribers receive either MMDS or DBS feeds, or both; thus SMATV subscribers may be counted twice or even three times, causing an apparent total of 15.75 million subscribers when the total should be only 14 million.

Furthermore, MMDS subscriber installation fees could be priced much lower than DBS installation fees. The cost of subscriber installation and equipment for DBS is estimated at $380 to $480, compared to about $150 to $175 for MMDS. The practical result of MMDS's lower headend and subscriber equipment costs is that MMDS will be able to price subscriber installation fees at promotional levels (amortizing some of the equipment cost over monthly fees), while DBS subscriber installation fees are likely to remain above $300. For cost comparisons, see table 1.14.

With the availability of Instructional Television Fixed Service (ITFS) channels to MMDS entertainment services, the total number of channels theoretically available to an MMDS operator is 29. In practice, most MMDS systems will probably offer 12 to 20 channels. Most of these systems will be launched very soon, since MMDS does not require a long lead time, and since MMDS is eager to establish consumer franchises in markets that will be served in the future by cable or by DBS. In addition to the 6 to 7 million subscribers MMDS is likely to serve in single-family dwellings in 1992, it should also serve between 1 and 2 million subscribers through SMATV operators, where MMDS becomes a low-cost program feed to SMATV.

Direct Broadcast Satellite (DBS) cannot compete head to head with multichannel MDS in markets where the MMDS signal is a good one. It offers fewer channels at a higher price: 4 to 5 channels for a $300 installation fee and a monthly fee in the $30 range, compared to MMDS's 12 to 20 channels priced at about $25 a month with a $100 to $180 installation fee. Driven to very rural markets by MMDS, DBS is unlikely to attract more than 4 million subscribers by 1992, enough to support only two competitors at most.

While DBS has the clear advantage of serving virtually any household within the continental United States, its high cost puts it at a disadvantage to multichannel MDS. More important, the cost to the subscriber for multichannel MDS receiver equipment could easily be priced under $100, while the DBS subscriber equipment will cost $200 to $300. A key assumption is that MMDS operators subsidize part of the subscriber equipment cost, just as DBS does now. As shown in table 1.14, DBS's capital costs are of a completely different order of magnitude.

Table 1.14. Comparison of Pay-TV Services

	Transmission Capital Investment	*Cost of Equipment and Installation per subscriber*	*Likely Number of Channels Offered*	*Estimated Reach of Potential Subscriber Households*	*Average Transmission Investment per Potential Subscriber Reached*	*Average Transmission and Subscriber Investment per Potential Subscriber*	*Average Capital Investment per Potential Subscriber and Video Channel Offered*
DBS (high power)	$400 million[a]	$380–480	5–7	50 million[d]	$8	$440	$75
Cable Television (700,000 city)	$75–100 million	$150–175	35–54	150,000	$600	$765	$17.20
STV[b]	$1–2 million	$175–250	1	120,000[b]	$12.50	$200	$200
MDS[b]	$1 million	$175–250	10–20	100,000[b,d]	$10.00	$220	$14.60
SMATV[c]	$30–40 thousand	$150–170	10–30	500[c]	$70	$230	$11.50
LPTV[b] (pay)	$200 thousand	$175–200	1	60,000[b]	$3.50	$190	$190

NOTE: This table was compiled and estimated by Eli Noam from various economic and technical information in Jane Henry's paper, in order to compare the order of magnitudes in question.

[a]$400 million assumes building a high-powered system.

[b]Assumes broadcasting in a 700,000 metropolitan area.

[c]Assumes 500-unit building, addressable system, direct satellite feed. Building not rewired.

[d]Not including feed to SMATV systems.

Satellite Master Antenna Television (SMATV) should attract between 2 and 3 million subscribers by 1992. Since it is essentially a small cable system within the confines of a privately owned multiunit dwelling, and protected by a contract between the owner of the property and the SMATV system, SMATV has sound business characteristics. Due to its low barriers to entry and high cash returns on investment, however, SMATV has attracted many small competitors who are poorly financed. The crowded field will undergo consolidation, and by the early 1990s addressable SMATV systems will serve apartments and condominiums with as few as 25 units each, using cheap MMDS and DBS feeds. As the table readily demonstrates, the lowest subscriber equipment costs are held by cable, STV, and SMATV. STV can be ruled out as a competitor, since it offers only one channel. SMATV's investment per subscriber, even assuming an addressable SMATV system, is a low $150 to $170. This fact, together with the barrier to entry posed by SMATV whenever an SMATV operator signs an exclusive contract with a building owner, makes it a powerful competitor against any pay-TV service. By 1990, the majority of SMATV systems will be served by low-cost DBS and MMDS feeds, expanding their channel capacity beyond the offering of current programming received from SatCom III-R.

Low Power Television (LPTV), with a signal range of only 6 to 10 miles, faces difficulties in selling and creating advertising because of its small scale. LPTV will largely be an advertising-supported service, with LPTV stations linked in networks to sell advertising more efficiently. Pay-television subscribers to LPTV could reach between 500,000 and 750,000 by 1992. Pay LPTV will compete with DBS, MMDS, and VCRs. The initial capital cost to build an LPTV headend is about $200,000.