

The "New" American DBS:

The Entry of Cable Television

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I. Introduction

The involvement of American firms in DBS started in earnest in 1979, when Comsat, the U.S. Signatory in INTELSAT, began to plan an ambitious system. In late 1982, the Federal Communications Commission (FCC) authorized eight companies -- all of the applicants at that stage -- to enter high-power DBS. They included such major communications firms as CBS, RCA, Comsat (through its subsidiary STC), and Western Union, as well as the smaller ventures DBSC, Graphic, VSS, and USSB. Today, only USSB and RCA are still mildly pursuing DBS, while all others have either dropped out, or, like CBS, are sitting on the side-lines to keep options open for a future high-definition broadcasting. A fair-sized number of other firms have been in and out of DBS planning. [One of them was Rupert Murdoch's Inter-American Satellite Television Network, later renamed Skyband, which was announced in early 1983. Unlike the other project (except for USCI), it sought to use an existing low power satellite. By November of 1983, however, a change of strategy was announced, with a later start-up and a more powerful satellite. However, the plan never became reality.]

In mid-1985, several projects are still alive, though not necessarily active; they are the "traditional" DBS projects by Hughes, USSB, SSS, RCA, NEX and SDT.

However, much more important in the long run, in my view, are the plans, preliminary in some instances, by the cable television firms HBO, TCI, ATC, and United.

II. Changes in Technology

It is necessary, at the outset, to lightly touch the debate on high power versus medium power DBS, an unavoidably technical subject. When DBS was originally conceived, the international WARC-77 conference agreed on a necessary signal power of 62-65 dbw, requiring travelling wave tubes of 230 watts, and a receiving antenna of .9 meters. (To reduce it to .6 meters would require a doubling of power.) In comparison, regular low-power communications satellites would reach 36 dbw, with 9 watts of power. This led to plans of very big, very expensive DBS satellites whose untested technology required also redundant satellites as a stand-by. A high-power beam also means a smaller "footprint," and thus requires more satellites, while providing fewer program channels (transponders) per satellite.

Comsat's 230-watts STC system started with a plan for four satellites for the United States, with a total projected hardware cost of \$400 million. This was eventually reduced, as the number of satellites was scaled down to two, and then to one. The attached table from the author's recent book demonstrates how

unfavorably the economics of such a high-power DBS compare to those of rival delivery systems, (Eli Noam. ed., Video Media Competition: Regulation, Economics, and Technology, Columbia University Press, 1985, based on figures provided by Jane Henry in that volume.) The table shows the STC high-power DBS system to require \$75 in capital investment per US household reached and program channel supplied, in comparison to its more down-to-earth rivals cable television (\$17), MDS (\$15), and SMATV (\$12).

Satellite broadcasting technology, however, changed the transmission power requirement. On the one hand, the high-power tubes proved technically more difficult than expected. All three Japanese 100-watts transmitters broke down within two years, and a successor satellite fared even worse. Technical problems have also plagued the French-German 230-watts DBS satellite co-production.

At the same time, it became clear that a medium powered satellite would be cheaper and more effective than previously expected. Transmission, amplification, antenna design, and noise reduction technology have been adding the equivalent of at least 5 dbw in effective signal strength, according to the BBS's technical director, Bryce McCrirrick, (Connections, 14 Jan. 1984, p. 5). Nor did rain attenuation prove to be as much of a problem as feared. Thus, it became possible to consider satellites which, -- in relation to earlier predictions,

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 ^e	\$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

^bAssumes broadcasting in a 700,000 metropolitan area

^cAssumes 500-unit building, addressable system, direct satellite feed. Building not required.

^dNot including feed to SMATV systems

-- could have more program channels, or require smaller antennas, or combine both. In the Western Hemisphere (Region 2), the required DBS signal strength was therefore reduced from 62-65 dbw to 55 dbw.

It should be noted that the U.S. has several advantages relevant to DBS power requirements over most other industrialized countries, in that its 525-line NTSC transmission format needs a bandwidth of only 4.2 MHz, in contrast to the 5.5 MHz of a 625 line PAL or SECAM transmission. This corresponds to a further gain of 2.5 dbw, though at the expense of lesser definition of pictures. Furthermore, Americans do not have the same political problems as Europeans in accepting a lower quality DBS signal at the edges of the foot-print, i.e., in providing inferior service to outlying areas. The quality of American TV picture varies widely, partly for economic reasons, and partly as the price for a policy of localism in broadcasting, which leads to hundreds of different stations with signal strength that is by necessity limited. Less powerful satellites are therefore more likely to be acceptable in the United States than in some other countries.

For these reasons, the trend in the US is, at least for the moment, towards medium power satellites, and it converges from both directions: "pure" DBS projects have scaled down their power demands and found medium-power technically adequate and economically superior. And,

equally importantly, cable television program networks, which have previously been users of low-power signals, are beginning to eye the stronger signals of medium power transmission which can be marketed to households as "satellite-direct" in those areas where cable television is unavailable.

In February 1985 the Federal Communications Commission has initiated rulemaking proceedings for DBS technical standards. It has done so reluctantly, due to its deregulatory philosophy, and because that the technology is still too much in flux. [Two trade associations (the DBS Association and the Electronic Industries Association) have also been working on establishing voluntary standards.] But through indirect action, the FCC has, in effect, already established 100 watts as the standard for medium power DBS. Hughes, RCA, Antares, NEX, S.S.S., SDT, all plan for 100 watts. NEX had initially filed for a lower power system, but the FCC returned the application for upgrading of power. (Most projects, by the way, aim for a quarter coverage of the U.S. at 54 dpw. Hughes aims at half coverage at 51 dbw with 16 channels.) Dominion has downgraded its planned satellite from 220 to 100 watts. The only high-power proposal still on the table in the spring of 1985 was that of USSB with 240 watts (two satellites covering the lower 48 states at a signal strength requiring .45 meter dishes, or, alternatively, a single satellite for the entire country for a .6 meter antenna.

At least two medium power systems are already available or will be soon. Hughes has been positioning itself for an important role in the Ku-band similar to the one of its low-power cable-oriented C-band satellite Galaxy I. Another Ku-band satellite, launched in April of 1985, is GTE's GSTAR I, with 5 channels to both coasts of the United States for 1-1.2 meter dishes. It has been the intended upgraded carrier for the late USCI venture.

III. The Emergence of Backyard DBS

For all the talk about DBS, only one "real" DBS system has actually ever operated in the US. USCI, a consortium of Prudential Insurance, General Instruments, and the Galesi investor group started service in late 1983. By March 31, 1985, the company had barely 10,000 subscribers, was deeply in debt, and ceased operations. It was not even able to attract enough interest in its considerable tax-loss carry-forward. From its dismal experience, it would be natural to conclude that DBS is dead in the United States, and many commentators have done so, taking further note of the rapid penetration of video cassette recorders in recent years. And yet, paradoxically, one could with equal justification observe DBS to be alive and well, and gaining the interest of a new and promising set of major media firms. How is this seeming contradiction possible?

The answer is that DBS had developed in ways not anticipated by the original planners, both governmental and corporate. Their concept had been state-of-the-art engineering. Such "supply-side" television (which has parallels in Western Europe, where DBS proved to have appeal to high-tech firms in search of government contracts) missed the market because it generally underestimated the subscriber and software parts of the business: customer service, program supply, and subscriber billing. Yet while major corporations floundered in "real" DBS, all across the United States a "demand-side" or quasi-DBS emerged virtually spontaneously from the consumer end. Spearheaded by do-it-yourselfers and promoted by small businesses that only yesterday may have sold water-beds, hundreds of thousands of people set up satellite antennas in their backyards and farms. The home "dish"-antennas (TVROs) number now more than a million and often are a status symbol: they very visibly proclaim technical and financial sophistication and financial shrewdness in getting a wide program option legally for "free," including channels such as Home Box Office (HBO) or, better yet, the Playboy Channel, satellite for which cable television subscribers must pay. Reception is not really free, of course, but the equipment price for a simple TVRO has come down to \$1000 and less, and the channels available number up to 150, if one is willing or able to train the antenna onto different satellites. (At Columbia University, a special 10-foot antenna tracks the

non-stationary Soviet Gorizon satellites, and receives the evening news from Moscow at a better picture quality than that of the CBS evening news originating a few dozen city blocks further south in Manhattan.)

The key element in this spreading phenomenon on the ground is the equal expansion in the sky. Fueled by the phenomenal expansion of cable television (36 million subscriber households in 1985, corresponding to 42% of all TV-households, up from the 11 million subscribers a decade earlier) and the drop in satellite transponder costs (cheaper electronics and launches), a large number of program suppliers have emerged to fill the multi-channel cable medium with a variety of program wares ranging from the Eternal World Television Network to the Pleasure Channel. All this can be received without payment whatsoever to the program providers. In fact, until very recently, no mechanism was in place that would have permitted an antenna owner willing to pay a fee to the program supplier to do so.

IV. The Response of the Cable Industry

As long as the numbers of these private backyard receivers was small, the cable operators and their program providers could shrug off the matter as a transitory demand caused by the often tortuous process of municipal cable franchise awards. They only drew the line where such programming was resold to third parties without permission and royalty payment. (In the case of several Caribbean countries, US program suppliers have been powerless to stem the unauthorized commercial distribution). However, with the growing numbers of TVRO owners, it became evident that direct satellite broadcast reception -- "quasi-DBS" -- was not transitory but here to stay in (a) low-density areas that are not likely to be reached by cable; (b) in cabled urban and suburban settings when viewers seek to avoid payment of the not insubstantial cable subscription fees. (This trend has accelerated since 1983 to the point that reportedly one third of TVRO sales are now in cabled areas); and (c) in apartment house settings, where landlords are setting up unregulated SMATV (Satellite Master Antenna TV) distribution. The potential and real revenue losses galvanized the cable industry into legislative, judicial, and organizational action. It also led the cable industry to begin recognizing the potential of the market, and to view it as a natural extension of its activities, and as an opportunity rather than a rival.

The trend towards backyard antennas has clearly been accelerating. According to a 1985 market survey, 60% of urban dwellers who own a TVRO antenna bought it during the past year. In rural homes, 59% bought it within the past year. Of new buyers, 33% had cable available to them, up from 15% in 1983. (Multichannel News, May 27, 1985, p. 7).

Thus, events in 1985 have demonstrated the viability of "unorganized" DBS, and mark the beginning of organized DBS under the leadership of the cable television industry.

There have been several approaches to stop backyard satellite receptions. One approach has been for municipalities to ban TVROs, partly for aesthetic reasons, and partly because local governments are typically 5% partners in the revenues of cable companies, and must protect the latter's ability to cross-subsidize service in poor neighborhoods. Almost 500 such ordinances have been passed across the country. The FCC is considering regulations that would preempt such local interference in interstate communications.

Cable companies have also challenged the antenna vendors in court, arguing that they knowingly sell equipment used to receive unauthorized signals. However, in a recent case, a federal judge in Kansas ruled

against a cable company that had tried to stop the sales by such a dealer.

Much more effective, however, is to go to the source of program supply. For DBS to have a commercial foundation outside of the pirate market, and for cable operators to be protected from "free" DBS, the key economic condition of excludability needs to be fulfilled. Scrambling of the signal is thus being introduced, at a substantial cost, by HBO, the market leader.

Interestingly, commercial television networks, whose programs are free, i.e. advertiser supported, are also considering some scrambling. For example, football games often are required to be "blacked out" in the areas in which the games are played, but some bars are showing the local teams' games received via the national network satellite feed, and are able to charge admission.

V. The Economics of Scrambling

The scrambling idea began as a defensive move to stop piracy. But it immediately pointed to a commercial potential, by making it possible, e.g., for HBO to sell its programs retail to satellite viewers, instead of wholesale through cable operators. Payment

for receiving broadcast signals has been fought by SPACE, the feisty TVRO industry and user association, which has argued on constitutional grounds for the right to freely broadcast signals put into the public airwaves. Senator Barry Goldwater, always the champion of high-tech individualism -- and owner of his own dish -- successfully sponsored in the landmark Cable Communications Policy Act of 1984 a provision that guaranteed the right to receive for private viewing any satellite channel without payment obligation, unless the supplier encrypted the signal and had a marketing mechanism in place to supply these programs. Thus, if the satellite programs are not actively retailed to satellite antenna users, they can be legally picked up for free in non-cabled areas. This legislation creates an incentive for the more popular of the satellite channels to set up a DBS retailing system, at least for non-cabled areas. This would involve the provision of retail descramblers and codes. (A different approach, taken by Turner Broadcasting, has been to declare that payment is owed for non-scrambled signals. One suspects, however, that not many TVRO owners will voluntarily send Ted Turner the \$25 per month he has demanded).

It is very important to distinguish between a cable program supplier's desire to set up such a direct marketing system, and his ability to maintain it in a competitive environment. HBO is asking, in effect, a

TVRO owner to pay \$395 for unscrambling equipment, (which would be incompatible with many of the TVROs, thus requiring further costly modifications), and a monthly fee of \$12.75 thereafter. Why would a backyard pirate be willing to be thus domesticated? True, HBO is the most popular pay channel, but there are other movie channels, too, which one can watch instead of HBO, and with little loss. For HBO to sign up satellite viewers would require other channel suppliers to migrate to scrambling, too, and often at a high cost. It is therefore not surprising that HBO was not initially joined by other program suppliers in a joint "scrambled package."

There is, of course, another possibility of creating an economic foundation for hybrid DBS, i.e., to follow the traditional pattern of American broadcasting and become advertiser-supported. More specifically, the satellite signal could have advertising messages inserted into programs, which the "satellite-direct" viewer would have to watch. The cable operator, who receives the same programs for re-transmission to households via cable could either leave the commercials in place and participate in their revenue, or excise them. Several minutes of lag would accumulate periodically, but there are few programs where real-time is important. A more serious issue is the ascertainment of audience size for purposes of

advertising rates. But that seems to be a manageable problem.

The economic viability of such a system would be for many program suppliers more realistic than the "technological fix" of scramblers, decoder boxes, national billings, and collections systems in a world of (a) competitive program supply and (b) a million backyard satellite antenna enthusiasts for whom "free" DBS seems almost a matter of principle, and who are supported by an entrepreneurial infrastructure. To succeed in scrambling, the major program suppliers would have to behave oligopolistically, i.e., to agree on joint action, and be able to enforce such action. In the past, they were not able to do so. Therefore, the recent interest of the cable operators, as distinguished from the program providers, is of significance. Any major cable operator, in effect, could be the organizer of a "scrambling cartel," by insisting on carrying only those programs which have been scrambled by their providers. The program suppliers, one must understand, face in each market a monopsonist (the cable operator) and are thus dependent on its goodwill. A TCI or ATC -- the two largest cable multiple system operators (MSOs) -- can for example shut out a non-agreeing program supplier from 3.6 and 2.5 million subscribers households. For the cable operator to insist on scrambling makes perfect business sense, since the free satellite reception of unscrambled signals diverts some of its customers.

Thus, the conclusion emerges that the major program suppliers will have to convert to scrambling to stay competitive as a supplier to cable operators. And, once the scrambling has pre-empted many of the "free" satellite program channels, many backyard dish receivers may have to grudgingly become paying subscribers.

Once most satellite programs are scrambled, not only are cable operators protected from an erosion of their subscriber base, but it is feasible for them to enter scrambled DBS distribution themselves, either on their own, or, more realistically, as local agents of program suppliers such as HBO. Hence, one would expect to see the MSOs with DBS interest at the forefront of the pressure towards scrambling.

VI. Cable Operator Involvement in DBS

To confirm this theoretical argument, a quote from the major cable TV trade publication Multichannel News is instructive:

ATC [the second largest Mso and a sister company to HBO] Chairman Trygve Myhren said he was prepared to drop from all ATC systems any service that declines to scramble its

signal... He said ATC's obligation to its stockholders and its paying subscribers would force it to refuse to carry any service that is "inviting piracy" by failure to scramble ... He said he has been holding discussions with programmers on the matter and that "there is a receptivity there."

United Cable president Fred Vierra also last week gave a ringing endorsement to the cooperative idea. "Our attitude about this is that the industry doesn't have a higher priority than to get these signals scrambled," he said. "We'll support anything that makes sense and are prepared to do battle with the programmers on this." With the backing of ATC ... and United ... the TCI proposal appeared last week to be gaining strong momentum." Multichannel News, (May 27, 1985, p. 1)

It is significant that the companies mentioned -- ATC, TCI, and United -- have an active interest in DBS. TCI had been seriously negotiating to pick up the

financially collapsing DBS operation USCI, which, it may be recalled, was the only operating "real" American DBS system. TCI, according to the trade press, is negotiating with RCA for all 16 transponders on Satcom K-1, a Ku-band satellite to be launched in December of 1985. It reportedly plans to use these transponders with cable program suppliers, and to offer them directly as DBS for 1-meter dish reception.

ATC is the sister company of HBO, which is scrambling its signal and does not wish to be left out on a limb by being the only scrambling program provider. HBO has announced its plan to offer a "satellite-direct" package of the HBO channel and of Cinemax. For areas with cable franchises in place, it will have cable operators act as its agents, in charge of setting the local rates, activate subscriber decoder boxes, and be responsible for billing and collection of payment. They, in turn, could sub-license others for these tasks, such as satellite antenna vendors.

Programs would be unscrambled through M/A-COM VideoCipher 2000 E which can handle up to 50 channels. In addition, that equipment could be used for future satellite pay-per-view, electronic mail, and teletext.

In areas outside of a cable franchise, HBO will distribute unscramblers through satellite equipment dealers and major retailers, with billing by HBO directly

by mail (\$12.75 for one channel and \$19.95 for two) or through its agents. These could, according to HBO's plans, include M/A-COM itself, or cable MSOs such as TCI and ATC.

Similar interest in DBS has been shown by United Cable Television and Cox Communications, (another major cable MSO) which have formed in March of 1985, through a complex transaction involving a subsidiary, the DBS venture Antares Satellite Corp.

(An interesting variant has been the offer by one company, SBC, to program suppliers: it would pay for the scrambling and unscrambling of their signals, in return for the exclusive rights for C-band low power "direct" DBS retailing. So far, the idea has not caught on.)

In sum, several major cable operators have become enthusiastic about scrambling, after being luke-warm about it for years due to its costliness and slightly degraded picture quality. They now support it both as a defensive move against loss of subscribers, as well as offensively in order to expand their operations into DBS retailing.

In effect, the million-plus backyard antenna owners would be a the foundation for market expansion; with

medium power and smaller, cheaper dishes, many other users, particularly in rural areas, could follow.

The larger firms are beginning to see themselves not as cable companies, but as retailers of programs, whether by conventional broadcast, or over cable, or directly by satellite. One problem is the fragmentation of the cable industry. Standards setting is particularly important in this environment. The National Cable Television Association is therefore planning a "non-profit cooperative" to facilitate the introduction of scrambling. Emerging as the industry standard is M/A-COM's VideoCipher II system adopted by HBO, with substantial encryption for audio and a "soft" one for video. (Broadcasting, July 8, 1985, p. 56). M/A-COM is setting up a computer for centralized scrambler authorization for the use of all program providers.

The term presently used for low-power encrypted quasi-DBS is "C-band direct." C-band is the primary band for low-power satellite feeds to cable operators. TCI has been actively considering medium-power service on the Ku-band, as mentioned. By having the cable operators active in such a system, it reduces the possibility that it would be used by outsiders to invade cable operators turf. However, the concept raises several touchy intra-industry issues. First, if a cable MSO would control such a "Ku-direct" satellite,

what would stop it from invading via DBS other cable operators' territory? Similarly, by creating a Ku- band service under cable operators' control, it would extend their network vertically -- in the literal sense of the word -- and encroach on program suppliers. Furthermore, such a cable/DBS distributor would also compete on the ground with the retail DBS marketing of those program suppliers who pursue DBS distribution on their own, and who at the same time depend on the cable MSO to reach their cable subscribers.

The move towards scrambling has not been without political opposition. U.S. Representative William Tauzin (D.-La.), an influential member of the telecommunications subcommittee, has introduced a bill for the "Satellite Television Viewing Rights Act of 1985" that would enable the FCC to regulate prices of scrambled signals, if access to these signals had been impeded or denied.

Discrimination between cable and satellite prices for the same programs, and requirements to obtain descrambles from "specified sources" would be illegal under the proposed legislation.

Another bill, by Rep. Judd Gregg, provides for a 2-year moratorium on scrambling. Neither bill is likely to be enacted.

VII. Conclusion

The entry of the cable industry's top MSOs into low and medium power DBS changes the nature of the industry. DBS had been advanced by satellite firms such as Comsat, or by undercapitalized entrepreneurs such as USCI, and was weak both in program provision and the customer/marketing links of the chain of distribution. "Pure" DBS also emerged when satellite costs were higher, and the size requirements of antennas greater. By 1985, however, large cable operators have been edging into DBS, preparing the market by getting program suppliers to scramble their signals. Now, some cable MSOs consider entering DBS distribution in uncabled areas. To do so, they are considering, at least in the case of TCI, the largest MSO, to move program satellite feeds from low-power into medium-power satellites, so as to be able to more easily serve both cable operators and direct satellite receivers.

These developments are important, because they constitute the first attempts at DBS that may well succeed. The pieces are falling into place. DBS will be mainly a supplement to cable rather than a competitor. Or, more accurately, it could be the supplement to several large MSOs, who then would have at their disposal the delivery system to invade other cable firms' territories. On the one hand, this may make the cable

market more competitive by reducing the insularity of franchisees. On the other hand, it should increase the concentration within the retail distribution of programming. And it reduces the ability of program suppliers to choose the format (scrambling, advertiser support, pay per view) under which they want to operate. It puts them in a position of being at once dependent suppliers to the MSOs as well as their potential competitors in DBS retailing. From the perspective of at least some program suppliers, the positive side to these developments is that they are being organized into collective scrambling, which is a precondition for pay-DBS.

The cable industry (operators and program suppliers) can succeed in a field as littered with shelved plans as DBS, because they already are experienced and successful in video program packaging and retailing. They already have local management, maintenance crews, and a payment collection mechanism in place.

All of this casts a pall over the "traditional" or "pure" DBS industry. Realistically, the cable industry is financially richer, politically stronger, and operationally more experienced. Hence, traditional DBS projects may be in trouble. DBS as such, however, may have finally an American future, as a medium-power hybrid to cable television distribution.