ORIGINAL FILE

RECEIVED
DEC 24 1992
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20510

In the Matter of	)	
	)	PP Docket No. 92-234
Inquiry into Encryption Technology	)	
for Satellite Cable Programming	)	

COMMENTS OF GENERAL INSTRUMENT CORPORATION

General Instrument Corporation ("GI") submits these Comments in response to the above captioned Notice of Inquiry into Encryption Technology for Satellite Cable Programming ("Notice" or "NOI").

TABLE OF CONTENTS

No. of Copies rec'd 0+4
List A B C D E

I. SUMMARY OF POSITION

The NOI seeks a broad range of information on competitive and technological issues in the satellite programming encryption industry. As one of the leading firms in this industry, General Instrument responds to those topics for which it has information that may be helpful to the Commission.

At the outset, it should be noted that, because of GI's policy of "second sourcing" modules and integrated receiver descramblers, substantial competition already exists in descrambler modules. That policy, which was established to fulfill the desires of GI's satellite programmer customers for multiple sources, stimulated additional sales of descramblers. In addition to this "intra-VC II competition," additional competition from competitive encryption systems also exists. The desirability of artificially creating even more "competition" within the specific VC II technology is open to question, since the hoped-for result of a lower priced descrambler may be purchased at the expense of reduced security. When the costs of security upgrades in recent years are considered, current prices for descramblers are clearly reasonable.

Similarly, the necessity to maintain security should be paramount in considering the desirability of requiring access to GI's DBS authorization center for potential competitors of GI, an issue on which the Commission also seeks comment. GI submits that proliferation of access would likely result in diminished

security. In any event, the economic literature and the holding of numerous cases teach that it is economically undesirable to require facility sharing where duplicate facilities can be created and efficiently operated. The fact that competitive facilities are contemplated by other firms strongly suggests that duplicate facilities are feasible. Moreover, requiring access to GI's Center would create insurmountable practical problems in establishing and monitoring the terms and conditions of access.

The Commission also seeks comment on the probable consequences of digital transmission. GI believes that digital compression is the wave of the future and has taken significant steps to hasten the advent of this advanced technology, including innovative licensing agreements with several telecommunications companies. Recognizing its responsibilities to the consumer, however, GI fully intends to introduce its specific digital technology in such as way as to minimize incompatibility with the existing installed base.

II. GI's INTEREST IN THIS PROCEEDING

GI is a world leader in broadband transmission, distribution and access control technologies for cable, satellite, and terrestrial broadcasting applications, as well as in discrete power rectifying components. GI is also a world leader in the application of digital technology for the transmission of video to cable, satellite, and broadcasting. It was the first to propose all-digital HDTV and developed the

first all-digital HDTV System, which was successfully tested under the procedures established by the Commission. GI and its predecessors developed the VideoCipher® II[1] ("VCII"), VideoCipher II Plus ("VCII Plus") and VideoCipher RS ("VCRS") encryption technologies used in the home satellite dish market. GI also owns and operates the DBS Authorization Center (herein also "DBS Center") which is used to authorize consumers using VCII Plus and VCRS descrambling units to receive satellite television programming.

GI shares the Commission's optimism about the ability of the private sector to "navigate" the transitions that can be anticipated in the entertainment market.[2] Increased competition and rapid technological development are powerful forces changing all sectors of the communications industry. As a leading developer of two key technologies central to such change, digital compression/transmission and access control,[3] GI offers these Comments on the two matters addressed in the NOI, the current status of the home satellite dish ("HSD") market and other issues raised by the advent of new technologies, products, services and businesses.

---

[1] VideoCipher® is a registered trademark of GI.

[2] NOI, ¶.2, p.2.

[3] NOI, ¶ 2, p. 2.

III. THE CURRENT HSD MARKET

A. Background - Historical Description

We believe that the NOI's description of the historical development of the scrambling of satellite television programming services[4] is reasonably accurate. We would place more emphasis on the increased competition in programming and equipment supply and increased standardization that have become part of the HSD market since the onset of scrambling. Some information about these developments was provided in our previous filings to the Commission in related proceedings,[5] and additional information is provided herein.[6] We believe that this information is important to issues raised by the NOI.

B. GI Lacks Certain Information Sought by the NOI

The NOI asks a number of questions and raises a number of issues that are not directly within the knowledge or experience of GI. Indeed, fundamental to the inquiry are a number of facts about Titan Corporation's ("Titan") technology and business proposals to which GI has not been made privy. In connection with this notice, GI is filing with the Commission a copy of the correspondence GI has

---

[4] NOI, Sec. II; ¶ 4-11, pp. 3-6.

[5] In the Matter of Inquiry into the Scrambling of Satellite Television Signals and Access to those Signals by Owners of Home Satellite Dish Antennas, Gen. Docket No. 86-336, FCC 86-355, released August 19, 1986 ("Scrambling Inquiry"), GI Comments, pp. 26-29; In the Matter of Inquiry into the Need for A Universal Encryption Standard for Satellite Cable Programming, Gen. Docket 89-78, FCC 89-104, released April 14, 1989, GI Comments, pp. 5-11.

[6] Infra, pp. 8-10.

exchanged with Titan. (Exhibit A) As this correspondence shows, a number of crucial questions about the Titan system remain unanswered. These include questions relevant to Titan's ability to supply descrambling technology to the HSD market and the technical capabilities of the Titan system which affect the feasibility of Titan's proposed use of the DBS Center.[7]

In any case, we await Titan's Comments in this proceeding in anticipation that these may shed some light on those aspects of Titan's proposal which we still do not understand. With that *caveat*, we will attempt here to address as much of the NOI as we can, relying upon our Reply Comments to complete our contribution to this Inquiry.

C. Competition in the Provision of VCII Decoder Modules[8]

The Commission seeks to assess the potential benefits of competition in the sale of descrambler modules, including intra-VCII competition.[9] The Notice

---

[7] We have been concerned throughout our correspondence with Titan that it was primarily interested in building a "record." Titan's partner and investor, Houston Satellite Systems, Inc., recently offered to purchase 250,000 VCII Plus modules from GI at a cost of $249/module, the announced Titan "list" price. The offer was declined. Titan has recently added threats of litigation to the matters raised in its correspondence with GI.

[8] Title of Sec. III of the NOI, p. 6. We address competition within a broader framework, as well.

[9] It is important to note that, at this time, there is no production of VCII modules, anywhere in the world. GI and Channel Master, a GI licensee, ceased manufacturing VCII modules in early 1990.

speculates that Titan may be relying on different methods of access control than those utilized by the VCII system, noting that access control and not encryption techniques was the source of security compromises in the original VCII system.[10] This speculation recognizes that it is possible that what Titan will produce for the encryption market is a product different from a VCII in important respects, just as the descrambler now being used in the HSD market is no longer a VCII, but a VCRS.[11]

The distinction between these various encryption systems is more than merely "hair splitting" over the intricacies of module design. Based on its claim to the original VCII patents, Titan has used the common ancestry between the proposed TitanCipher and GI's VCII Plus system to minimize issues of compatibility

---

[10] NOI, ¶ 13, p. 6.

[11] Titan has sometimes referred to its product as the TitanCipher, which name we will use herein for convenience. The Notice also refers to three generations of VideoCipher technology, adding the VideoCipher Renewable Security system ("VCRS") to the VCII and VCII Plus. The VideoCipher RS technology is an enhanced version of VideoCipher II Plus, adding, among other features, a slot in the back of the descrambler module to accommodate a TvPass™ Card, a high security version of a "smart card". The smart card will replace and upgrade the module's security should such an upgrade be necessary in the future. Until such time as it becomes necessary to implement the security upgrade, VCRS modules function identically to VideoCipher II Plus units. The VCRS modules provide a more convenient and less expensive method for upgrading security. This flexibility is a deterrent to satellite theft because it makes a response to security breaches easier and more rapid to implement, minimizing potential profits to satellite pirates. The security smart card is not included with the VCRS module because (1) it is not prudent to put a security fix in the hands of pirates prior to the need for it and (2) as the nature of a potential security breach is unknown until it occurs, it cannot be fixed with confidence until the breach can be analyzed.

between the systems. This ignores the rapid evolution of encryption technology since 1985, and particularly the changes involved in the migration from the VCII to the VCRS system. It also assumes that Titan's own development has not materially changed the VCII in its evolution into TitanCipher.[12] Titan's emphasis on the source of the technology implies that it acquired the inventive talent which created the VideoCipher technology when it acquired a M/A-COM subsidiary with legal rights to some of the VideoCipher technology. In fact, most of those people joined GI in 1986 when the VideoCipher business was sold to GI.[13]

The concern expressed in the NOI about competition in the supply of descrambling modules has in fact been addressed through a combination of the incentives of GI to license additional sources of supply and the insistence by programmers that such "second sourcing" occur. It is now well known that, under certain circumstances, producers can increase the demand for their products by licensing competing sources of supply.[14] Indeed, the existence of these

---

[12] The TitanCipher may in fact be the original VCII, with the same access control technology and implementation. If so, GI submits that fielding such a product would be inconsistent with the objective of limiting satellite signal theft. GI, which has worked diligently to render the VCII inoperative and improve system security, wants no part of any program which would recreate the problems which have so troubled programmers and others in the satellite industry.

[13] We have no knowledge of the documentation relating to this technology being used from the time of the transfer in 1986 to the expiration of the covenant not to compete in 1991.

[14] See A. Shepard, "Licensing to Enhance Demand for New Technologies," RAND Journal of Economics, 18, 1987, 360-368, and J. Farrell and N.T. Gallini, "Second-Sourcing as a Commitment: Monopoly Incentives to Attract Competition," Quarterly Journal of Economics, 108, 1988, 673-694.

competing sources makes the producers' products attractive to users who might otherwise fear an excessive dependency on a single source and they can increase their profits by promoting competition. This tendency is reinforced when a small number of large buyers can insist that additional sources of supply be licensed.

Indeed, GI has, consistent with this view, licensed an additional source of supply, ChannelMaster, to produce VideoCipher decoders in competition with GI. For the reasons already expressed, GI had an incentive to do so and this incentive was strengthened when cable programmers imposed a "second sourcing" requirement as a condition of adopting the VideoCipher standard.

At the same time, there must be limits on the number and identity of firms that GI will license. Although promoting compatibility is desirable because it increases competition among suppliers,[15] there may be offsetting effects, such as reduced product variety and stifled innovation. Perhaps more important in the present context, making information about product design widely available so that rivals can produce competing products is inconsistent with the requirements of a system that is intended to promote security.

---

[15] See, e.g., J. Farrel and G. Saloner, "Standardization, Compatibility, and Innovation," Rand Journal of Economics, 16, 1985, 70-83.

Over the lives of the VCII, VCII Plus and VCRS systems, there have been significant fluctuations in relative sales of Channel Master and GI, with Channel Master having as much as approximately 60% of sales during some periods. We believe that GI's sales are currently somewhat in excess of 50%.

The NOI's historical summary states that GI "effectively controls the supply of VCII decoder modules."[16] There is no empirical evidence that any meaningful control over the supply of those modules has ever existed. During the one period since the inception of scrambling when there was a shortage of descramblers (from late 1986 to late 1987), there was no increase in their price.[17] Such a price increase is a common indicia of control of supply.

In addition to licensing Channel Master for the production and sale of VCII, VCII Plus and VCRS modules, GI has licensed numerous integrated receiver/descrambler ("IRD") manufacturers to include VCII Plus and VCRS descrambling modules in their products. There are currently approximately 16 such original equipment manufacturers (OEMs) who, along with General Instrument Corporation, provide competitive IRD products to the marketplace. Consumers

---

[16] NOI, ¶ 6, p. 4. Again, ¶ 12, p. 6. It should be noted that GI no longer produces VCII modules. We take the NOI's reference to apply to all of the generations of VideoCipher technology that have served the HSD market.

[17] See GI Testimony, House of Representatives, Hearings before the Subcommittee on Telecom-munications & Finance, Committee on Energy & Commerce, July 1, 1987, Serial No. 100-64, pp. 297-99.

have received the substantial benefits of "intra-VCII competition" because GI elected to license such products. Attached hereto as Exhibit B is a Price List and Terms and Conditions of Sale for VideoCipher RS Modules for GI's OEMs.

In this vein, we note that many of the concerns raised at the onset of scrambling have been successfully addressed as the market has developed. The HSD market now has much higher levels of standardization and competition in programming and equipment supply than was the case in the early days of scrambling. Packages of satellite programming are now available from a variety of providers, with vastly increased potential for such packaging available since the introduction of the VCII Plus system.[18] Consumer prices for such programming have decreased dramatically since the onset of scrambling. Satellite receivers have to some extent been standardized to accommodate encryption technology, and a competitive market in such receivers exists. Standardization resulting from encryption technology has not constrained the variety of receiver products and features available. It has, however, led to improved performance in receivers yielding improved picture and sound quality for consumers. IRDs have completely replaced the standalone descramblers designed to retrofit the then installed base of satellite receivers. Overall, the total price to an HSD consumer for the purchase of equipment and programming has decreased, despite the increased cost of providing security in a market plagued by theft.

---

[18] See infra, fn. 28 p. 18.

For example, a basic satellite television system, including all components, had a retail price of approximately $2,700 in 1986. Currently, retail pricing for a mid-range complete satellite system is approximately $2,100 and includes additional features such as pay-per-view functionality and improved product quality. A satellite system using a fixed satellite position such as Galaxy 5 can be purchased today for approximately $1,400. Programming costs have also shown a marked decrease. For example, an annual package of premium movie programming which cost $180 in 1986 costs only $99.96 today. We estimate that the cost of a typical package of basic services has declined approximately 25% since 1986 and choices have increased.

Finally, satellite piracy appears to be waning as the highly successful upgrade program designed to increase encryption security while protecting legitimate subscribing consumers undertaken by GI and programmers nears completion. Authorizations of satellite subscribers are running at a record monthly pace.

1. The Economics of Security

Titan's announced pricing policy for descrambling modules has been the focus of its marketing efforts and of public discussion. Titan has announced a price of $249 per descrambling module, which it compares to the current GI list

price of the VCRS at $336. In addition, we understand that Titan has proposed a deep discount for early purchases.

In addition to the production costs of the equipment itself (the scrambling and descrambling units), security entails a number of additional costs. These costs have now exceeded $100 million since 1987 at GI. In addition, there have been costs for the maintenance of an ongoing technical capability to meet challenges to the system which exceeds $12 million annually.

From the inception of scrambling, it has been clear that there are trade-offs between cost and security. In selecting the VCII, programmers rejected the more secure VideoCipher I, despite its higher level of security, because its cost, at $1500 per descrambler, was viewed as too high for the consumer market.

The characteristics of the information or product for which protection is sought also have a major bearing on cost. Encrypted information may be sought by unintended recipients for many purposes and, hence, provide greater or lesser incentives to attack the system and gain access.[19] It has become painfully and expensively apparent that satellite cable programming is highly attractive and

---

[19] An encryption system may appear more secure and more difficult to break than it actually is, simply because the information it is protecting has a low level of desirability and, therefore, is not sought. Additionally, a system used periodically may appear more secure than it actually is either because attackers have not had a sufficient opportunity to observe the system's operation or because the volume of information protected does not warrant the cost or effort.

provides substantial economic incentives for those seeking to steal it. As the Commission has noted, signal theft or signal piracy is the single biggest problem facing the industry.[20] As discussed above, we have serious questions about Titan's redeployment of early VCII technology with its history of compromise in this environment.

Substantial efforts to defeat satellite piracy have been made by GI, programmers, industry organizations and federal, state and local law enforcement agencies. GI's activities have focused on commercial, legal and technical efforts to defeat piracy. GI's strenuous efforts are exemplified by the company's ongoing financial commitment. Since 1987, GI has spent in excess of $100 million on extensive research and development, the VideoCipher II Upgrade Program, legal expenses incurred in piracy related litigation, consumer and industry communications, training and support for law enforcement agencies, and retention of engineering and other employees whose job responsibilities are devoted to security related issues. In addition, GI has been a significant contributor to the anti-piracy task force of the Satellite Broadcasting & Communications Association, an industry trade group. GI also supports the anti-piracy efforts of the Motion Picture Association of America.

---

[20] Scrambling Inquiry; Second Report, FCC 88-67, released March 11, 1988, ¶¶ 16-17.

Finally, an encryption system may provide users with a wide variety of other services. Services provided by GI through the DBS Center include program ratings, geographic blackouts, program service reconciliation, text services, as well as consumer oriented features, such as impulse pay-per-view and, potentially, auditing of second set discounts.

These factors render any simple comparison of prices meaningless as a tool for assessing competition or potential competition in descrambling modules.[21]

2. Other Issues Raised by Section III of the NOI

We cannot comment on the theoretical possibility, raised by the NOI, that a secure version of the VCII descrambler module could be developed.[22] We remind the Commission that our own experience, which included development and shipment of several generations of the VCII module, suggests otherwise. In the final analysis, GI determined that it was necessary to break cleanly with the VCII system and move to the VCII Plus and VCRS. This view was also shared by key programmers, who have participated in the program to upgrade subscribing VCII customers.

---

[21] It appears that Titan has been candid in responding to requests for specific comparisons of the VideoCipher and TitanCipher system. We know of at least one occasion when Titan was asked about services which its proposed authorization center would provide. We are advised that Titan responded by saying that it would offer all the services offered by GI's DBS Center, "...but not at the $249 module price." This declaration supports our conclusion.

[22] NOI, ¶ 13, & fn. 15.

The NOI inquires about upgrading commercial VCII units.[23] A successful completion of the consumer VC II upgrade program represents only phase one of a program structured to maintain ongoing security in the marketplace. GI will be working diligently with programmers in the cable television industry to implement the next phase, commercial descrambler upgrades. The upgrade is required because pirates are stealing commercial keys and using them to illegally authorize modified descramblers. In 1993, it is anticipated that many U.S. commercial VCII descrambler units used for premium movie services will be upgraded to commercial VCRS technology. Like the consumer VCRS product, the commercial VCRS descrambler module will be able to accommodate a "smart card" which will provide a convenient and expeditious method for upgrading security in the future if required. The commercial upgrade program will be conducted by GI with certain of its programmer customers and their affiliates. A commercial upgrade has been completed for the Encore movie service whereby all Encore commercial VCII descrambler units have been upgraded to VCRS. All Encore services currently utilize VCRS signals exclusively and all future Encore affiliates will require VCRS commercial descramblers to obtain access to Encore programming.

In addition, substantial security upgrades will be implemented to programmers' VideoCipher II Plus and RS scrambling systems to further protect critical information resident in such systems.

---

[23] NOI, ¶ 14, p. 7.

D. Access to the DBS Center

The Commission seeks information concerning potential negative ramifications of permitting DBS Center access to competing vendors of conditional access service. After describing its operation, we will address the reasons for limiting access to the DBS Center.

1. Description of the Center

As the Notice recognizes, GI operates the DBS Center for the purpose of authorizing the VCII Plus and VCRS descrambler modules of legitimate program subscribers and to enable those subscribers to receive programming. The Center maintains hardware and software in order to communicate with the business systems of programmers and program packagers from which it receives messages directing authorization of consumers' VideoCipher descramblers. The DBS Center then packages those authorizations into a data stream that is inserted into the uplink data streams of all DBS Center users.

When the DBS Center was established, some programmers expressed a desire to own and/or operate it. These proposals met with objection from other programmers, who feared that some advantage might accrue to a competitor. For this reason, M/A-COM, which originally developed the Center, retained ownership and control.[24]

---

[24] GI's DBS Center does not receive or maintain the names and addresses of subscribers. This information is proprietary to the programmers and program packagers and is maintained by them.

The Center was purchased by GI with other assets of M/A-COM in 1986.[25] GI retains control of the DBS Center, subject only to contractual obligations which GI has entered into with programmer/users.[26]

GI's DBS Center is operated on a not-for-profit basis. Programmers and program packagers are granted equal access to the use of the Center. Costs, including depreciation, are apportioned among programmers and program packagers in accordance with the number of authorization tier bits, ports and scrambler data feeds which they utilize.[27] General Instrument submits as Exhibit C to this filing a copy of the standard agreement under which programmers and packagers have access to the DBS Center and costs are apportioned.

---

[25] DBS Authorization Center, Inc., which actually owns the Center is a wholly owned subsidiary of Cable/Home Communication Corp. Cable/Home is a wholly owned subsidiary of GI Corporation, which is a wholly owned subsidiary of General Instrument Corporation. All of these corporations are incorporated in Delaware.

[26] NOI, ¶ 17; p. 8. The DBS Center is the exclusive property of GI, no less than are the patents and other assets of the VideoCipher II Plus technology and other kinds of property held by the corporation. It is true that GI operates the DBS Center "...for the benefit of its customers," a term used in the NOI and, if used in a business sense of providing customer service, one with which we agree. However, we dispute any suggestion that GI is trustee for those customers or that such a relationship has been created or exists.

[27] Under the VideoCipher II Plus system, there are 256 tier bits available for the separate authorization of programs or program packages. This represents a dramatic increase over the 56 tier bits available under the old VCII system. This increase was a response to demand from the HSD marketplace.

2. Security Implications of Increased Access to the DBS Center

Of paramount concern to GI and its customers is the need to maintain the highest possible level of system security. It is a basic tenet of sound security practice to limit the number of persons with access to the system. Serving multiple systems will lead to degraded security. This is especially true in a price sensitive environment where vendors, seeking to reduce costs, may sacrifice physical security for cost containment reasons. For example, vendors of alternative systems, pursuing cost reduction objectives are particularly susceptible to implementing an inexpensive, physically insecure design.

However, it is one thing to promote compatibility between nuts and bolts and quite another to promote compatibility between locks and keys. The value of nuts may be increased if they can be combined with the bolts of many different manufacturers. The value of locks are certainly decreased if they can be operated with keys made by any manufacturer. Indeed, in the case of encryption systems for cable satellite programming, if the specifications of the encryption module were made widely available so that anyone could manufacture a decoder, pirate decoders would undoubtedly dominate the market. Restricting the number of suppliers to limit those with access to information is the sine qua of a security system like VideoCipher. A perfectly competitive supply of VideoCipher is inconsistent with it remaining a security system.[28]

---

[28] However, as noted above, some competition, with controls over which and how many entities have access to information, is in the interest of both GI and its customers.

Furthermore, permitting multiple system access through the DBS Center with different systems having different levels of security operating on the same data channel is a fundamentally flawed concept since each system ultimately has access to the same encrypted programming material. If the security of one system is breached, the breach unavoidably impacts the other system since the pirate community can circumvent the more secure system by exploiting the deficiencies of the insecure system. Programming material cannot be completely protected until the deficiencies in the insecure system are remedied. This inherent weakness is present regardless of actions taken to separate the two independent systems. System compatibility requires that certain common keys be used. The consequence of utilizing these common keys is that complete system security is only as effective as the security of the weakest system.

Security problems are also present if two independent authorization centers are used to transmit information to one common data channel. In addition to the considerations described above, the requirement of maintaining system operating information in two locations increases the risk of information disclosure. The absence of uniform system design between the two systems will also inevitably lead to compatibility issues and satellite equipment performance degradation.

Network systems can be viewed as a triangle comprised of the programmer uplink scrambling system, the DBS Center and consumer descramblers. If any element of the security triangle is compromised, the security of the entire network is jeopardized.

Serving multiple systems will also make it more difficult and expensive to respond to security breaches. GI's program to combat piracy has historically included making periodic changes to the VideoCipher system design. GI has incorporated certain modifications into the messages of the authorization data stream including contents, timing and delivery method. GI has been able to implement these changes in the messages with the knowledge that such changes would not be disruptive to legal, unmodified descramblers. Other anti-piracy efforts have involved design changes to the descrambler module hardware itself.

Significant changes and upgrades will occur on a regular basis as part of GI's ongoing security program. Compatibility between Titan's products and GI and Channel Master products has not been contemplated in conjunction with GI's continuing efforts to provide a secure environment and to protect its customers' copyrighted programming material.

It is conceivable that GI-initiated changes which are implemented to address security weaknesses may maintain operation of GI and Channel Master descramblers but have an adverse impact upon another system's descramblers.

Absent complete knowledge and information of another manufacturer's technology, any future changes contemplated by GI to enhance convenience, security, feature optimization or otherwise through the DBS Center software may jeopardize another manufacturer's descrambler performance.

Additionally, proposed system design changes will be delayed as compatibility problems are reconciled by two competing organizations. DBS Center service to multiple systems would inhibit GI's ability to implement the electronic countermeasures undertaken to prevent piracy.

The concept of renewable security is an acknowledgement by the cable and satellite television industry that piracy is likely to persist, and that it will require increasingly sophisticated responses over time, demanding continuing efforts of GI and other industry participants.[29] Renewable security recognizes that the security of any product which is widely and openly distributed will degrade over time. The success of renewable security techniques is dependent upon the flexibility to make fundamental changes to the system which invalidate all known techniques of breaching the security of the existing system. Limiting the flexibility of the industry to make fundamental alterations to respond to breaches or potential breaches decreases its probability of success. The task of upgrading to a more

---

[29] A conclusion which the Commission has also reached. See infra, fn. 16, p.__, citing Second Report.

secure system requires careful coordination between the equipment vendor and participating programmers to minimize disruption to subscribing consumers. It is likely that the communication and coordination of a security upgrade between two manufacturers increases the risk of the pirate community prematurely learning of future plans since the plans would need to be discussed by a larger group of people and organizations. A joint security upgrade would also entail additional time delay and continuing loss of programmer revenues from piracy.

Alternatively, a new system design could be provided by one of the two conditional access service vendors. In addition to compatibility issues, an undesirable consequence may be that the organization not responsible for system design will profit from the technical efforts of the other organization and will gain unfair competitive advantage by not having the obligation or responsibility to support the significant engineering and other resources required for a successful security upgrade. The Department of Justice has cautioned that permitting a commercial enterprise to "coat tail" upon the efforts and investment of another company might seriously hamper innovation and provide significant disincentives for companies to make the research and development expenditures necessary to incorporate new and improved security technologies and other feature enhancements.[30]

---

[30] See Antitrust Division, U.S. Department of Justice, Policy Statement on Sharing for the Nat'l Comm'n on Electronic Fund Transfers 4 (Jan. 13, 1977).

Of equal, if not greater concern, is a problem which would arise from a breach resulting from the products or conduct of one of two conditional access vendors. In connection with the upgrade of VCII to VCRs GI entered into upgrade agreements with several programmers requiring at GI to respond to any breach by developing means to contain it. The fact that the breach may result from acts or omissions of another vendor would not necessarily relieve GI from its contractual obligations. The problem for GI in such circumstances would be exacerbated by the Consumer Security Protection Plan ("Plan") coverage which, in the event of a security upgrade, requires GI to upgrade covered VCRs to the level of security necessary to receive the services they received before the upgrade. Thus, one scenario which could result from the introduction of additional conditional access vendors would be GI bearing the financial burden of necessary upgrades to the hardware and software of the DBS Center, uplink scramblers and decoders following a breach of an alternate product which would not have occurred in a GI only environment. This outcome seems totally unreasonable. We have no knowledge of what commitments Titan, for example, is prepared to make to its commercial and consumer customers with respect to containing any future breaches. We can assure the Commission from past experience, as discussed elsewhere herein, that the commitment required is substantial.

In addition to the likely degradation of system security, serving multiple systems through the DBS Center would require additional software support. The degree of incremental support and additional cost is difficult to quantify without

having a better understanding of Titan's plans. However, at a minimum, it is clear that additional support would be required for separating business system port access between Titan and GI or Channel Master descrambler module authorization. Additionally, separation of specific costs for processing utilization, equipment maintenance and monitoring would be necessary. As previously indicated, the DBS Center is operated on a not-for-profit basis. It would be outside the scope of the existing DBS Center agreements as well as inequitable for a programmer not interested in another manufacturer's product to have financial responsibility on a *pro rata* basis for the incremental costs to the DBS Center of supporting another manufacturer.

DBS Center users purchasing uplink scrambling equipment from GI are licensed to use GI proprietary software in conjunction with the hardware equipment. Strict measures are established and maintained at all uplink facilities in order to avoid a compromise of the VideoCipher scrambling system security. In that regard, GI's customers agree at the time of equipment purchase to institute a system security plan outlining security procedures to be established and maintained. These procedures include both physical and data security. In order to maintain the integrity of system security. In order to maintain the integrity of system security, the software license agreements provide that the software programs are to be used on equipment provided and only for a customer's internal operations. As we noted in our comments in the Commission's Inquiry into the Need for a Universal Encryption Standard, the pirate cartel is constantly seeking