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Before the
Federal Communications Commission
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of	)	
	)	
Implementation of Section 304 of the Telecommunications Act of 1996	)	CS Docket No. 97-80
	)	
	)	
Commercial Availability of Navigation Devices	)	
	)	

Comments of Scientific-Atlanta, Inc.

Summary

Scientific-Atlanta supports efforts to assure the commercial availability of navigation devices used for video programming. Commercial or retail availability provides an additional outlet for the manufacturers of these navigation devices. This provision is subject to the common sense caveats in the statute and legislative history that: the security of cable systems and other network providers not be jeopardized; the introduction of new technology not be interfered with; and any standards setting should rely on the voluntary industry process.

The ability of the Commission to ensure the commercial or retail availability of these devices is largely determined by the functionality of the equipment and network, as well as the history of use. For example, given that the recent cable industry standard for cable modems (Multimedia Cable Network System or MCNS) should enable a broad range of interoperability and portability and the fact that the nature of their use is for

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interactive purposes, modems are likely to have an early adaptation to the retail environment. The FCC should continue to rely on the market and voluntary industry standards process to define the standards, while being sure to leave room for feature differentiation among suppliers.

By contrast, the retail sale of analog set-top boxes is not feasible technically, logistically or economically. While the decoder interface has been touted as a solution, it faces insurmountable legal obstacles and technical limitations in its current form. The retail availability of equipment in the analog environment also poses serious security risks.

The digital set-top environment is different from both analog set-tops and modems. Security is much better in the digital domain, but it is different in the set-top environment than it is for modems. Digital set-tops are also not encumbered by a forty year legacy as are analog devices where security was a major concern and there was no requirement and little incentive for interoperability or portability.

The cable industry has made major strides toward interoperability and portability by its efforts to set standards and initiative to harmonize the digital domain. Today's environment permits multiple vendors and backward compatibility problems are minimized. Some functions are suitable for interoperability such as digital broadcast only set-top boxes, as are some of the video aspects, transmission standards and program core encryptors. Scientific-Atlanta is attempting to fulfill the spirit of the retail availability requirement by its third party licenses with manufacturers such as Pioneer and Toshiba, cross licensing agreements with General Instrument and through manufacturing its set-top

boxes in compliance with cable industry standards. The Commission should not require security functions, the network interface or access control and encryption to be retail available.

The Commission could have performance criteria for retail availability, but government standards and mandates will only stifle the market and end up being anti-consumer. If the Commission grants consumers and subscribers a right to attach, steps must be taken to ensure that signal ingress and leakage do not interfere with the operation of the cable network, particularly since such interference can disable other subscribers' access to the network.

Security must be of paramount concern. In the analog environment, there is currently no feasible and legal way of separating out security. For digital devices, separation should be an option, but not a requirement. Security requirements for digital may be subject to major changes. The decoder interface has been suggested as a means of ensuring separation for some analog applications. However, it is questionable whether this device will work or have a market in many networks and it is too restricting for many new technologies and advances. The decoder interface is also illegal under the Eshoo amendment and is neither voluntary nor a private industry standard.

Interoperability and portability have relatively simple everyday definitions - the ability to use equipment from multiple suppliers on a single network and the ability of the consumer to move equipment across systems. However, they are too difficult to define technically, particularly in the dynamically changing digital environment. There are at least

four levels of interoperability for digital devices and as digital technology evolves, so will the definition of interoperability.

The standards process needs to be voluntary and industry driven. Government standards will not only stifle the deployment of new technology, it may actually slow down the process of making navigation devices commercially available to the consumer.

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Introduction

Scientific-Atlanta provides its customers with the products, systems and services they need to develop the advanced terrestrial and satellite networks that deliver entertainment, information and communications to hundreds of millions of people around the globe. A variety of today's global information, entertainment and communications services are transmitted via satellite and terrestrial networks directly to users or to headends where they are distributed over one-way broadcast and two-way networks to subscribers. Scientific-Atlanta makes products for virtually every stage of these advanced networks.

Headquartered in metropolitan Atlanta, Georgia for 45 years, Scientific-Atlanta conducts business through more than 40 worldwide offices, engineering and manufacturing facilities.

The company is one of the leading manufacturers of analog and advanced analog set-tops. It has provided a number of digital set-tops to some of the initial pilot projects and experimental demonstrations of new digital, interactive services and technologies. The company will provide network operators with digital set-tops and cable modems.

Scientific-Atlanta supports the concept of retail or commercial availability, subject to the provisos and caveats contained in the statute. The sale of converters through retail or commercial outlets should benefit consumers, network operators and manufacturers.

The basis for action by the FCC in the regulation of set-top boxes or converters has changed. While historically the consumer often viewed the set-top as a hindrance and costly expense, subscriber satisfaction with cable operator provided set-tops or Home Communications Terminals is now very high, because they allow access to new features, functions and services without requiring a consumer investment in new equipment. Rate regulation provisions now require set-top or converter charges to be separately stated and limited to a set rate of return. In addition, subscribers are not required to have set-tops or Home Communications Terminals to get many of the services offered by cable operators.

The Telephone Model

The Notice discusses various current distribution methods and models, including cable, DBS and telephony. The Notice concludes that the evolution of equipment in the telephone model provides a good starting point. With respect to the *Carterfone* decision, there is some parallel. The Commission did progressively adopt regulations that enabled telephone customers to freely connect telephones and other CPE equipment to the telephone network so long as the connections did not cause harm. However, it does not follow that this resulted in the consumers buying much of their CPE in retail outlets. In actuality, much of this change in distribution occurred when the local telephone company was barred from providing this equipment to customers for a year under the MFJ.[1]

The Notice cites some of the differences between the telephone and cable model, including the fact that there are few security issues in the telephone network, less potential for interference and the fact that when customer ownership became an option the

telephone network was a national monopoly with a well developed set of standards. However, there are other differences that were not cited or elaborated on. The following chart compares these models, plus the computer and DBS models, which have increasing applicability to the telecommunications marketplace:

Differences in Delivery Systems

Characteristic	Cable	Telephone	Computer	DBS
Bandwidth	Broadband	Narrowband	Evolving to Broadband	Broadband
Traditional architecture	Tree and branch	Switched	-	Broadcast
Intelligence	Split between consumer and network	Network	Mainframe to PC	Split between consumer and network
Security	Important - easy to compromise	Point to point Hard to compromise	Becoming more important	Important -easy to compromise

In particular, the cable and telephone networks are significantly different. In the telephone network, the customer has a dedicated line back to the switch. In the cable network, most of the data is transmitted down steam and the customer's return path is not dedicated and can more easily be affected by signal leakage and ingress from other subscribers.

The interfaces are also quite different. The interfaces for telephone services are at baseband. These baseband interfaces are simple and much more direct. The broadcast and cable or set-top terminal interface, by contrast, extends back into the network and

[1] There was an approximately one year hiatus between the MFJ and the FCC's *Computer Inquiry II* when the RBOCs were not allowed to sell CPE, except for equipment in inventory. During this one year period,

includes many of the functions that are in telephone and utility networks. With radio frequency modulation, cable television has additional responsibility for cable signal leakage and its responsibility doesn't stop at the pole, the house or the converter, but extends all the way to the input of the television.

None of these models is monolithic; there are different features and functions within each of these networks. For example, even though the PC model is predominant in the computer industry, there are still many mainframe computers. Also, the cellular telephone network is a major subset of the traditional telephone network, with much more of the intelligence in the terminal in lieu of the network.

Cable, computer, telephone and other networks now have widely varying features and functions which are converging in cyberspace. These differences are based on how humans take in information and use it. Telephone networks are interconnected and interoperable to enable everyone to talk to each other over their telephones. Cable networks are broadband but not fully interactive to allow consumers to receive television signals which require much more bandwidth. As these networks converge and interconnect, their features and functions will undergo a transformation. Preemptive action by the FCC in this area could freeze technology and this convergence.

Entities Covered by Section 629

The Commission's Notice of Proposed Rulemaking raises the issue as to what entities are covered by the commercial availability requirements of section 629. While the scope of entities covered appears to be broad, there are many other provisions of the section which determine its specific applicability, such as the impact on security and new

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sales of CPE increased 60%, which jump started the retail market.

technology and the relationship to private, voluntary industry standards-setting processes. The statute specifically refers to cable operators, multichannel multipoint distribution services, direct broadcast satellite and TVRO satellite program distributors and does appear to contain a specific exemption for an open video system or OVS operator, but there are numerous other hypothetical questions about newly emerging technologies and services such as satellite, microwave, other wireless and Internet offerings which do not necessarily have to be responded to by this notice.

Scope of Equipment Covered

The Commission tentatively concludes that the coverage of Section 629 is broad with respect to the kinds of equipment which it covers. The definitions in section 629 are quite broad, but they need to be read in conjunction with the intent of the provision and the other restrictions and requirements. For example, some advanced models of laptops have the capability of receiving video programming over the Internet and other networks and some Internet service providers will undoubtedly package multiple channels of programming. Rechargeable batteries for many laptop and notebook computers are not standardized and widely available.[2] There are standards and protocols for batteries that, if used by notebook and laptop manufacturers, would provide large savings to the consumer. However, it would be a considerable stretch of this provision to argue that laptops and notebooks or their batteries are subject to the provisions of this section based on an overly literal reading of the definitions. The Commission should focus the scope of its proceeding on three key areas:

[2] See Suzanne Oliver, "Batteries Not Included", *Forbes*, March 11, 1996, p. 164.

Cable Modems. While cable modems are arguably an access device and not a navigation device, this newly emergent market could be considered subject to this provision. The Commission could address this market precisely because there is not a significant embedded base of equipment. The Commission will have considerable difficulty addressing equipment markets where there is a legacy or history of devices which, for functionality and commercial reasons, have not been available through retail outlets. Another reason that cable modems are likely to adopt to retail availability is that they serve an interactive function and hence innately have a higher level of interoperability and portability and less security requirements than set-tops and network interface and security modules. Thirdly, the cable industry, through an operator consortium and Cable Labs, have developed a voluntary private industry standard (Multimedia Cable Network System or MCNS) to facilitate greater interoperability and portability in the cable modem market. In order to participate in the interoperability testing, a manufacturer or vendor had to notify CableLabs by April 7 and submit a final proposal by May 9. Cable operators expect to see a range of MCNS-compliant, interoperable cable modems within the next year or two by a variety of manufacturers.[3] In encouraging the commercial or retail availability of modems, the Commission should recognize that the industry is headed in the right direction and be sure to leave room for product and feature differentiation in order the allow the industry to meet the needs of consumers.

[3] The following manufacturers are planning cable modem products: 3Com Corp., Bay Networks/LANCity Corp., Cisco Systems Inc., Com21 Corp., General Instrument Corp., Hayes Modem, Hybrid Networks Inc., Intel Corp., Motorola Inc., NEC, Panasonic Inc., Phasecom, Scientific-Atlanta Inc., Sharp Electronics Corp., Terayon Corp., Toshiba, US Robotics Inc. and Zenith Electronics Corp. Other manufacturers have announced their plans to produce chip sets: Broadcom Corp., ComStream Corp., Stanford Telecom, Ultracom Communications Inc., and VLSI Technology Inc.

Analog Devices and Set-top Boxes. The retail sale or commercial availability of navigation devices in the analog market is not feasible technically, logistically or economically. The cable industry has developed its analog infrastructure over forty years. The key functions of that infrastructure were to provide a broadband, television broadcast wire to the home and to provide security for that wire. There were very few interactive applications for that wire and most of them proved uneconomic or impractical. For most of this period, no one even suggested that the cable television equipment in the home be either interoperable or portable - its major purpose was the delivery of broadband multichannel video programming to the consumer.

During this period, a major thrust of the cable industry and its vendors was to provide security for this programming. Different approaches were adopted by each of the major suppliers as a means of product differentiation and improved security.[4] Since the cable industry began to use security, cable equipment manufacturers have developed at least seventeen basic scrambling methods.[5] There are numerous dynamic variants of these basic scrambling modes which each manufacturer has implemented for improved security. There are now 10,000 headends and approximately seventy million cable television subscribers, with some of these headends having multiple scrambling methods. Any solution in the analog environment would have to take into account these various different forms of security or separate out security (in which case the relief would only be

[4] There are at least five major or significant suppliers: General Instrument/Tocom, Scientific-Atlanta, Panasonic, Pioneer and Zenith.

[5] Jerrold 6dB Sync Suppression, Jerrold 10dB Sync Suppression, Jerrold Dynamic Sync Suppression, Jerrold Video Inversion, Jerrold Dynamic Video Inversion, Hamlin 6dB Sync Suppression, Eagle 6dB Sync Suppression, Scientific-Atlanta Sync Suppression, Scientific-Atlanta Video Inversion, Scientific-Atlanta Sync Inversion, Scientific-Atlanta All Inversion, Zenith Sync Suppression, Zenith Video Inversion, Zenith 6dB and 10dB Phase Modulation, Tocom Normal Mode M2, M2, M3, Pioneer 6dB Sync Suppression, Pioneer 10dB Sync Suppression.

prospective). The nature and complexity of this environment makes it extremely difficult to develop a one size fits all solution which would enable analog devices to be made available through retail outlets. Most solutions are either economically cost prohibitive and/or would pose logistical nightmares for cable operators who would have to make major overhauls of their existing plant.

One solution proposed to this dilemma is the decoder interface or set-back decoder. Since this involves separation of security, the relief would only be prospective. The current proposed solution, which includes CEBus, was made illegal by the Eshoo amendment to the Telecommunications Act of 1996. Nor is it possible that this could be prescribed as a private, voluntary industry standard, since it was developed under a government mandate in the 1992 Cable Act and it has not gone through the normal steps required of a private sector voluntary industry standard.

Digital Set-Tops. Deployment of digital technology is expected to advance rapidly as more realistic expectations for integrated data and video services gain acceptance. Interactive trials have proven that the technology works, end-to-end digital multimedia standards are emerging to replace fragmented proprietary efforts, and with the success of digital broadcast services the consumer is becoming more aware and acceptant of digital television.

Built on a foundation of open standards, Scientific-Atlanta is introducing a two-way communications system which will: start with less-complex digital broadcast services; immediately support high-speed data and Internet access via either television or PC; allow operators to upgrade the system as new digital services such as video-on-demand and

distance learning prove their revenue potential; leverage emerging industry standards in content authoring (i.e. HTML, Java, etc.); and capitalize on the inherent strengths of broadband hybrid fiber coax transmission networks. (A diagram of this system and its components is included as Attachment I).

Digital set-tops have several key differences from analog devices. Some security is designed to enable multiple security algorithms. Industry standards have been set to help achieve interoperability and portability. The digital environment is relatively new, unfettered by a forty year legacy where portability and interoperability were not relevant.

Major suppliers of digital set-tops are fulfilling the spirit of the commercial availability section of the Telecommunications Act of 1996 through licensing, cross-licensing and compliance with CableLabs standards. Both Scientific-Atlanta and General Instrument have agreed to comply with CableLabs standards. Scientific-Atlanta has licensed its technology to Toshiba and Pioneer. General Instrument has licensed its technology to Pace, Hewlett-Packard and Zenith.[6] Digital set-tops are being sold in an open, competitive market with different delivery methods (cable, DBS and MMDS) and many players (e.g. Thomson, Divicom, Zenith, Pace, Toshiba, Pioneer, General Instrument and Scientific-Atlanta).

Scientific-Atlanta believes that the market should determine what can be made available through retail channels. We believe there are certain aspects of the digital network that should not be subject to commercial availability requirements, including

[6] "Next Level Satellite and Cable Groups of General Instrument License Digital Television System Technology to Pace Micro Technology," February 4, 1997; "General Instrument Announces Royalty Free Licensing of 64/256 QAM/FEC Technology," November 6, 1996.

addressable control and encryption, network interface modules, residential gateways and in-home wiring used with an MVPD system.

Practical Availability - Portability and Interoperability.

Interoperability and portability have relatively simple everyday definitions - the ability to use equipment from multiple suppliers on a single network and the ability of the consumer to move equipment across systems and still be able to use the equipment as before in the new location. However, in a rapidly changing environment, these terms cannot be defined with a great deal of precision without setting a rigid national standard and stifling new technology, two outcomes the statute seeks to avoid. This is particularly true for a newly emerging market like digital where it is not certain what services and technologies will be a marketplace success.

Telephone vs. Cable Models. The Notice states that:

> one major difference between the telephone industry and the MVPD industry is that the telephone industry had a well-developed body of standards that facilitated the development of a competitive CPE market. In contrast to the telephone industry, MVPDs in general have little standardization either between different types of MVPDs or between MVPDs in the same market segment. This lack of standardization creates a potential obstacle to the ability of manufacturers to produce and retailers to sell CPE equipment that can be widely used.[7]

These statements do not recognize the differences in the traditional cable and telephone models. The telephone model required standardization, because the primary purpose of the network was for people to communicate with one another. Without this standardization, the network could not function, as some of the early telephone companies found out when they adopted different standards and architectures and their customers

were unable to call one another. Parenthetically, it should be noted that the purported need to standardize the telephone network was used as a justification for making it a government conferred monopoly.

The cable network confronted an entirely different set of problems. Originally started as a means of improving the quality and delivery of over-the-air broadcast signals, these networks did use the NTSC standard for delivering analog signals. However, when security became a major concern, standardization was counterproductive. A standardized security system would be much more vulnerable to theft and piracy.

While the lack of standards may have discouraged some manufacturers from entering the cable equipment market, this problem was not really an entry barrier - over 50 companies have at one time or another manufactured cable set-tops or converters.

Analog Devices. By some measures, some of today's analog set-tops are portable and interoperable. In some cases, more than one type of set-top box can be used in the same system and a set-top box can be taken out of one system and put into another. In most cases, operators must reduce the level of security deployed to enable multiple types of set-tops to co-exist. It is doubtful that anyone would argue that today's analog set-tops are interoperable or portable, because in the majority of cases they are not.

Digital Devices. The digital world is rapidly evolving. As the cable industry moves toward digital and interactive services, there will be a need to develop standards to improve interoperability and portability in order to enable cable subscribers to

[7] See *Notice* ¶ 64.

communicate with one another.[8] In fact, the cable industry has been in the process of doing just that. Last fall, the industry adopted a voluntary standard which should help ensure the interoperability and portability of digital systems. The Cable Labs press release described this effort:

> This specification establishes the basic building blocks of digital services, allowing set-top terminals and data modems built by different manufacturers to work together (interoperate) on the same cable system. CableLabs expects that many of its members will purchase equipment that complies with the specification.
>
> The specification covers how cable television systems will transport digital video and data in standard six MegaHertz (MHz) cable channels. In the specified digital transmission systems, the payload data rate will be between 27 and 40 Megabits per second (Mbps)...
>
> TCI Senior Vice President Thomas Elliot, a pioneer in cable's digital video efforts, said that manufacturers will be able to include these key elements of the specification and differentiate their terminal products based on features. "This interoperable digital cable specification will allow the simultaneous coexistence in the same cable system of set-top terminals and data modems from a variety of manufacturers," Elliot said.
>
> Among the basic areas covered in this agreed specification are that the system will conform to MPEG-2 (Moving Picture Expert Group) main profile at main level parameters; the specification transport multiplex will also be MPEG-2; and the audio element will be the Dolby Audio AC-3 system. The service information tables for this specification will incorporate the Advanced Television Systems Committee (ATSC) specification. Having uniformity in these tables is critical for interoperability.
>
> Downstream digital modulation will conform to the International Telecommunications Union (ITU) standard ITU-TJ.83 Annex B which calls for 64 and 256 quadrature amplitude modulation (QAM)with concatenated trellis coded modulation, plus enhancement such as variable interleaving depth for low latency in delay sensitive applications such as data and voice.
>
> Using 64 QAM, a cable channel that today carries one analog video channel could carry 27 Mbps of information or enough for multiple video programs. Using 256 QAM, the standard 6MHz cable channel would carry 40 Mbps...
>
> As for cable security, suppliers and cable operators have specified the [CableLabs] DigiCipher® implementation of the DES encryption standard as the core encryption system. Multiple conditional access and control data systems such

[8] The cable industry is also taking other steps to prepare for this eventuality, such as reducing the number of headends and selling or swapping systems to increase clustering of consumers or subscribers in many metropolitan areas.

> as DigiCipher® and PowerKEY™ will be supported, enabling multiple vendor use of core encryption...
>
> Cable Labs President and CEO Dr. Richard R. Green praised the key suppliers, GI and Scientific-Atlanta, for their willingness to work with CableLabs to establish this specification. "Scientific-Atlanta and GI are working toward an agreement that will include a royalty free cross licensing arrangement for core encryption, modulation and forward error correction technology and they are willing to license other manufacturers," Green said. "This is a tremendous precedent and we would like to see it expand into other areas," he added.[9]

The agreement was widely noted and praised in the press, including *The Wall Street Journal, Multichannel News,* and *Communications Daily* for opening up the cable architecture and facilitating interoperability.[10]

The voluntary industry standards process has in fact expanded into other areas, such as the MCNS or Multimedia Cable Network System data standard for cable modems.

Scientific-Atlanta has announced on several occasions that it would license its technology. We have licensed our technology to two other manufacturers - Pioneer and Toshiba. General Instrument has also announced licensing agreements. We are also working on a cross-licensing agreement with General Instrument.

Digital technology and services are extremely complex and have multiple levels of interoperability and portability. In fact, there are at least four levels or layers.

Digital Video Standard. This level includes packets, packet sizes, multiplexing and video and audio compression algorithms. For video, MPEG-2 is the standard generally

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[9] CableLabs press release of October 3, 1996 "Cable Industry Agrees on Key Elements of Digital Systems Specification."

[10] Mark Robichaux, "Cable Industry and Suppliers Set Standards for Set-Top Boxes, Modems", *The Wall Street Journal,* October 4, 1996, p. B2; Leslie Ellis, "Ops, Vendors Reach Accord on Digital", *Multichannel News,* October 7, 1996, p. 7; "Cable Moves to De Facto Standard for Digital Set-tops, Modems", *Communications Daily,* October 4, 1996, p. 3.

used. For data, it is HTML, while DAVIC fills in some of the blanks not covered by these first two standards.

Physical Layer. This level is also referred to as Open System Interface Standards and includes modulation, error correction and interleaving depth. DAVIC is becoming a world standard in this area.

Signaling protocols. These include the communications and client/server relationships. MPEC-2 is generally the standard.

Security and conditional access. This layer is gradually undergoing harmonization for certain core encryptors and key structures, although certain aspects, such as key distribution, can be proprietary.

Applications can be considered another layer which is sometimes referred to as an Application Program Interface or API. There are other configurations and ways of looking at these different levels and layers given their complexity and the evolving nature of digital technology.

Different Delivery Systems. The cable industry has moved away from the analog model and has set basic standards for digital cable and cable modems that will ensure a wide range of interoperability and portability. This does not mean that devices will work on all cable systems, satellite systems or MMDS networks. For example, while today's DBS systems generally have retail availability, they are not interoperable. One satellite device will not work for the different satellite systems and no one network will currently accommodate more than one type of equipment. A federal government imposed interoperability or portability requirement would not work for DBS, MMDS or today's cable systems.

The Notice seeks comment on how to prevent navigation equipment from being used as a bottleneck to access of competing MVPD providers. The problem is not generally that the equipment is a bottleneck, but rather that the competing providers have different modulation schemes, protocols and technology. The DAVIC specification does provide for a selector switch for competing MVPD providers, but the expense of including multiple modulation schemes, protocols and other features which differentiate these services currently makes such an effort cost-prohibitive. Over time, it is entirely possible that such differences could be accommodated in a single computer chip. This mechanism will probably be used to accommodate QAM and VSB modulation in television sets and TDMA or GSM and CDMA modulation for cellular phones offered after the turn of the decade. If the economics warrant and the range of options is relatively set, one or more chip manufacturers will try to achieve such an integration.

Requirements and Standards. The Commission raises the issue as to whether it should make requirements regarding portability and interoperability. This would be highly inadvisable at this time for several reasons. With respect to analog devices and technology, there is currently a very low level of interoperability and portability. Any general requirements for these devices and technology would be extremely expensive or ineffective. Such requirements would either force cable operators to make expensive investments in their systems for little or no value added to the subscriber or these requirements would be applied prospectively, at the twilight of analog services and would probably not have broad applicability or subscriber penetration. For most of the forty years that cable operators were deploying their plant, there was barely even a suggestion, much less a requirement, that cable equipment be portable or interoperable.

For new advanced analog and digital services, it is not yet clear what technologies and services will succeed. Absent knowledge about what services and technologies will work and be demanded by the consumer, how is the Commission going to define portability and interoperability? Any such definition would surely have a chilling effect on innovation and new digital services.

The Commission should not attempt to set standards, but rather rely on the private standards setting process. As previously noted, the cable industry has recently made major strides in this regard. Government intervention and standards setting would freeze the marketplace and stifle innovation. Bill Gates noted in *The Road Ahead:*

> Because the set-top box is in every sense a computer, it stands to reason it will follow the same pattern of rapid innovation that has driven the PC industry. In fact, the set-top box will be sold to a far more uncertain market than the PC was, so the case for letting it be market driven is even stronger. It would be foolish to impose the constraint of government-dictated design on an unfinished invention.
>
> The original set-top box compatibility legislation in the United States ultimately died in Congress in 1994, but related issues arose in 1995, and I expect similar efforts will be made in other countries. It seems easy to legislate reasonable-sounding constraints, but if we don't watch out, those constraints could strangle the market.[11]

The prospect of government standards has been widely denounced by a gamut of different people, including Peter Pitsch of the Hudson Institute:

> The imposition of mandatory government standards could stifle innovation, because technical changes would require regulatory approval. This process invites abuse by concentrated economic interests who wish to resist change for protectionist reasons.[12]

The famous quality guru W. Edwards Deming was another critic:

> I do not want my talented, capable and sincere friends in federal agencies in Washington to write the technical standards of this country. Too much is at stake.

[11] Bill Gates, *The Road Ahead*, pp. 234-235.
[12] Peter Pitsch and David C. Murray, *A New Vision for Digital Telecommunications*", Hudson Briefing Paper, December 1994.

> If you control an industry's standards, you control that industry lock, stock and ledger. On the day that standards become a governmental function and responsibility...the government will take a very long step toward the control of American industry.
>
> In such a setup, government personnel will decide when and what standards should be developed and what the provisions of the standards should be. That method is inflexible. It does not permit the single manufacturer to depart from a standard in order to develop a specialized and useful business.
>
> Standards made under such conditions tend to become limitations, controls and restrictive procedures. They reduce consumer choice.
>
> No government planner knows enough to write the standards for the rest of American industry and all other American people.[13]

The Telecommunications Industry Association (TIA) and Electronics Industry Association (EIA) issued a *White Paper on National Information Infrastructure* which concluded:

> The variety of information appliances interconnected by one-way and two-way communications networks that define the NII must be functionally compatible with the networks and information resources to which they connect. This compatibility is best achieved by industry (which has the expertise) voluntarily developing interface and interoperability standards. Such standards serve the public interest by stimulating competition and allowing manufacturers, network and information providers to compete on the basis of innovation, quality and price. Industry standards also increase consumer confidence and provide assurances that a device will interoperate with a network, and will properly access, display or act upon information resources carried on the network...
>
> We are leading proponents of voluntary technical standards...In areas of rapidly changing technology, premature adoption of a standard can impede innovation.

Definition of Affiliate.

The Notice raises the issue as to whether affiliation exists between Multichannel Video Programming Distributor (MVPD) and an equipment manufacturer who is single source supplier of a technology, even if such relationship is through a contractual process. It is unclear what exactly is meant by this inquiry. Most of the products manufactured by

[13] W. Edwards Deming, *Out of the Crisis*, p. 302.

Scientific-Atlanta have some unique feature or aspect that might be interpreted as a technology or product supplied by a single source. The fact that our products are differentiated from those of other cable suppliers does not necessarily make us a single source or sole source supplier, since many products from other vendors can be substituted for or compete with our offerings. Scientific-Atlanta, as one of the major suppliers of the cable industry, has entered into a large number of equipment contracts with cable operators. We do not regard any of these contracts or relationships as resulting in any form off "affiliation" as that term is used by the Commission.

Security and Theft of Service

The statute contains the common sense caveat that rules to ensure commercial or retail availability not jeopardize the security of services offered by cable operators and other multichannel video programming distributors. Piracy and theft of service is a major problem for the cable industry. The problem has become so serious that there have been armed robberies of cable warehouses and trucks. The cost of piracy is usually estimated at $4-5 billion domestically and $8 billion internationally.[14] The vast majority of this theft comes at the expense of American network operators, programmers and copyright holders.

The Notice asks for data and information concerning the operation of existing security methodologies. The basic methods for analog scrambling have been listed previously.[15] There are numerous variants of these basic scrambling methods, so it is

[14] William Mahoney, "To Catch A Thief", *Multichannel News*, April 1995 Supplement, pp. 18B-26B; Joe Estrella, "NCTA Estimates Loss to Piracy at $5.2B", *Multichannel News*, April 14, 1997, p. 10.
[15] These include: Jerrold 6dB Sync Suppression, Jerrold 10dB Sync Suppression, Jerrold Dynamic Sync Suppression, Jerrold Video Inversion, Jerrold Dynamic Video Inversion, Hamlin 6dB Sync Suppression,

difficult to determine the exact number of methods in use in the over 10,000 cable systems or headends that exist in the U.S. In the digital environment, security is more flexible and is designed for multiple vendors. The Notice notes that some of these analog techniques are quite unsophisticated and prone to attack. The Notice also accurately notes that operators improve security by leasing the box to subscribers and then recovering the box on termination of service and that if analog decoders are readily available for purchase, existing security methods would become completely ineffective. It should also be noted that cable operators use various techniques to keep track of where the boxes are and who owns them and can use this information to limit theft and expose pirates.

The Notice recognizes the principle that digital signals are less vulnerable to security breaches due to the encoding of all information into bits and the application of encryption techniques. However, it does not follow that digital signals will be immune from piracy. Security may take on much more important dimensions in a digital environment, particularly if financial transactions are part of the encoded stream of bits. Any breach of security involving money or finances could have a severe impact on digital networks.

The Notice concludes that "a system's digital technology can be configured so that should security be breached on a wide scale, changing the security involves he replacement of fewer hardware components than in the analog environment. That is, the security component can be contained in a 'smart card' or similar devices provided by the MVPD independent of the digital box and the smart card can be replaced if a problem with

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Eagle 6dB Sync Suppression, Scientific-Atlanta Sync Suppression, Scientific-Atlanta Video Inversion, Scientific-Atlanta Sync Inversion, Scientific-Atlanta All Inversion, Zenith Sync Suppression, Zenith

security develops."[15] However, this ignores an important principle in preventing piracy and theft: at higher levels of hardware integration, security becomes harder to compromise. To the extent that security functions are a mixture of hardware and software, the challenge to the pirate and thief is heightened. For example, the original configuration of Videocipher system for the backyard dish market, while tamper proof for military purposes, became relatively easy for pirates to compromise. At one point, approximately 75% of the backyard dish market consisted of pirates. Not surprisingly, the program offerings began to dry up. The eventual solution to this problem, Videocipher plus, involved a much more embedded type of security function and has been much more successful. Hence, any effort to separate out the security functions and mandating a system such as smart cards would conflict with the statutory requirement that the Commission not jeopardize security. In uses where is makes sense, such as our Pegasus terminal, smart card technology and separating out security can be helpful. Cable operators and multichannel video program distributors must be given maximum flexibility to develop their security technology. This is particularly true as hackers and pirates gain access to faster and more powerful computers and networks of computers with the capability of compromising most of the currently available security technology.

As stated in the Notice, the separation of security functions would probably require a standard interface or publication of interface specifications. However, any effort to standardize security or specify an interface will enlarge the target for piracy and therefore make attempted piracy more attractive.

Video Inversion, Zenith 6dB and 10dB Phase Modulation, Tocom Normal Mode M2, M2, M3, Pioneer 6dB Sync Suppression, Pioneer 10dB Sync Suppression.

[16] See *Notice* at ¶ 30.