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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF SECRETARY

July 11, 1996

Mr. William F. Caton  
Acting Secretary  
Federal Communications Commission  
1919 M Street, NW.  
Washington, D.C. 20554

DOCKET FILE COPY ORIGINAL

Re: *In the Matter of Advanced Television Systems and Their Impact  
Upon the Existing Television Broadcast Service,  
MM Docket No. 87-268*

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Dear Mr. Caton:

Pursuant to the Fifth Further Notice of Proposed Rulemaking in the above captioned matter, enclosed please find an original and six (6) copies of the Comments of the Computer Industry Coalition on Advanced Television Service ("CICATS") and accompanying Exhibits. Please be advised that the Comments and its Exhibits are bound in separate volumes.

Please date stamp the additional copy and return it with our messenger. If you have any questions regarding this filing, please do not hesitate to call.

Sincerely,

  
Kevin S. DiLallo

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Before the  
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In the Matter of )

Advanced Television Systems )  
and Their Impact Upon the )  
Existing Television Broadcast )  
Service )

MM Docket No. 87-268

**COMMENTS OF THE  
COMPUTER INDUSTRY COALITION  
ON ADVANCED TELEVISION SERVICE**

VOLUME 1 OF 2: COMMENTS

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July 11, 1996

## Summary

The Computer Industry Coalition on Advanced Television Service (“CICATS”), an *ad hoc* group of major U.S. computer and software companies, urges the Commission to reject the digital television (“DTV”) broadcasting standard recommended by the Advisory Committee on Advanced Television Service (“ACATS”).

The members of CICATS believe that voluntary, industry-set DTV broadcasting standards better serve the public interest than the adoption of government-mandated standards. CICATS would urge the Commission to adopt no more than a minimally necessary DTV standard designed to protect spectrum users from interference. If the Commission finds, however, based on substantial record evidence, that it should adopt a more encompassing DTV standard, it should adopt only those components necessary to address legitimate concerns without imposing unreasonable costs. Given these criteria, it should certainly not adopt the ACATS standard.

In the Fifth Further Notice of Proposed Rule Making in this proceeding (“Fifth NPRM”), the Commission seemed to assume that the ACATS standard served the public interest unless opponents of the standard could satisfy a heavy burden in challenging the standard. Such an approach unevenly allocates burdens of proof, and injects presuppositions into the deliberative process that are difficult to overcome.

Specifically, the Commission has virtually ignored the costs of adopting any DTV standard, much less the ACATS standard, apparently assuming that those costs would be justified by the benefits of its action. They won't.

A government-mandated standard carries with it a host of significant public detriments that the Commission should seriously weigh in determining whether it should adopt *any* but the most minimal DTV standard. Government-mandated standards freeze technology and thwart innovation, interposing lengthy regulatory processes between new technology and its approval for incorporation in the mandated standard. In addition, they can perpetuate obsolete technology and hamper the introduction of more advanced products (particularly those that are better and thus do not meet the mandated standard).

Moreover, as this proceeding attests, government-mandated standards are often the product of political compromise and interest group politics, rather than thorough, unbiased analysis of technical, economic, and other considerations. More substantive issues tend to surrender to political expediencies, and the resulting standard does not serve the public interest as well as it serves its proponents' interests. Finally, the free market (consumers), not government, is best positioned to define what product standards best satisfy their demands, and allowing the free market to work without government interference will produce lower costs and greater product variation than a government-mandated standard would.

Most important, a market-driven standard gives *consumers* the choice of which product they prefer; it does not impose one on them.

Nevertheless, if the Commission should decide that the costs of a more expansive mandated DTV standard are justified by its benefits, and that such a standard would best serve the public interest and the Commission's stated objectives -- CICATS believes it would not -- the standard should again be as minimal as possible to address parties' legitimate concerns without creating greater offsetting costs. The ACATS standard is not such a standard, and it should not be adopted.

The ACATS standard suffers from many flaws. It incorporates certain *obsolete technology*, such as *interlaced scanning*, that is inferior to existing alternatives. Interlaced scanning, and other elements of the standard (such as non-square picture elements and awkward, slow picture rates) erect barriers against computer compatibility that can only be remedied through expensive computer-based conversions, which unnecessarily inflates their costs.

The ACATS standard also unnecessarily boosts consumers' and broadcasters' costs of transitioning to DTV by essentially forcing them to leap beyond digital Standard Definition TV ("SDTV") -- a marked improvement over NTSC TV -- and equip themselves to receive and transmit, respectively, extremely sophisticated, data-rich, HDTV formats. The complexity of the HDTV formats requires additional -- and expensive -- memory and processing power in receiving equipment that is not needed to receive SDTV digital broadcasts.

But without expensive HDTV decoding capability, under the ACATS standard, consumers' receiving equipment will go black when programming in such formats is broadcast; they will not merely receive the program in a lower resolution. This blackout, coupled with the expectations of the standard's proponents, that all TV manufacturers will produce sets capable of receiving the sophisticated HDTV formats, denies consumers any role in deciding whether they are willing to pay the substantial premium for HDTV. The manufacturing industry, with the government's help, makes that decision for consumers. The cost to consumers of transitioning to DTV in an ACATS world: \$91 billion in seven years!

If the Commission determines that it should adopt a more expansive DTV standard that includes a video format component, CICATS proposes that the standard be a streamlined refinement of the ACATS standard that takes the best elements of that standard and eliminates its many disadvantages.

Such a standard would be CICATS's proposal for a minimum base-line format standard, which would allow all broadcasters to transmit an SDTV digital signal, and allow all consumers to receive, at a minimum, an SDTV picture on their digital equipment -- at equal or better quality and significantly lower costs -- estimated at \$44 billion -- than under the ACATS standard

Moreover, the use of MPEG-2 to layer data would permit broadcasters, at their discretion, and if demand existed, to transmit enhanced programming, including HDTV formats. Consumers would have the option of deciding whether

HDTV is worth the price. And no digital set would go black during any digital programming, since even the highest resolution transmissions would contain the "base-line" SDTV format, that even the least sophisticated digital receive could decode.

CICATS has analyzed the costs to consumers and broadcasters of adoption of the ACATS standard, as compared to adoption of a base-line format standard. Under the base-line format standard, consumers and broadcasters would save *billions* of dollars that they would likely have had to spend to accommodate the ACATS standard. Consumers should not be forced to incur these inflated costs, which will disproportionately disadvantage low-income households, schools, libraries, and hospitals

Nor does adoption of a base-line format standard undermine the legitimacy of industrial policy in this area. No domestic jobs in TV manufacturing would have to be lost -- digital sets would still be produced, though all would not include HDTV capability. Indeed, if consumers' costs are lower, demand for digital sets may be greater, thereby creating additional TV manufacturing jobs.

And if the Commission adopts a standard that imposes costs on vital industries that might otherwise benefit from convergence with DTV, such as the computer, software, and entertainment industries, the result to the U.S. economy and to the balance of trade -- in terms of lost opportunities -- could be palpable.

CICATS has shouldered the burden the Commission has placed on those who challenge the ACATS standard. For all the reasons stated above, the Commission should reject that standard.

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Exhibit B	"Technical Details of the Proposed Base-Line Format of the Computer Industry Coalition on Advanced Television Service (CICATS)"
Exhibit C	"Cost Comparison of ACATS and CICATS Set-top Converters, Receivers and PC Decoders"
Exhibit D	"Economic Considerations in the Evaluation of Alternative Advanced Television Proposals"
Exhibit E	Written Testimony of Robert Stearns

Exhibit F	"Informal Reply Comments of William F. Schreiber"
Exhibit G	"Comparison Between Interlaced and Progressive Scanning Formats"
Exhibit H	"Advanced Television Systems for Terrestrial Broadcasting: Some Problems and Some Proposed Solutions"
Exhibit I	"Temporal and Resolution Layering in Advanced Television"
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Exhibit L	"Progressive versus Interlaced Coding"
Exhibit M	Letter from William F. Schreiber to Chairman Reed Hundt
Exhibit N	Testimony of Rob Hummell
Exhibit O	Testimony of Representative Vernon J. Ehlers
Exhibit P	Oral Testimony of Robert Stearns
Exhibit Q	Oral Testimony of Craig Mundie

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**COMMENTS OF THE  
COMPUTER INDUSTRY COALITION  
ON ADVANCED TELEVISION SERVICE**

The Computer Industry Coalition on Advanced Television Service ("CICATS") submits these Comments in response to the Fifth Further Notice of Proposed Rule Making ("Fifth NPRM") in this proceeding.<sup>1</sup> For the reasons set forth below, CICATS urges the Commission not to adopt any digital television ("DTV") broadcast standard, and particularly not the DTV standard recommended by the Advisory Committee on Advanced Television Service ("ACATS").<sup>2</sup> If the Commission nevertheless concludes that the public interest would be better served by adoption of a standard, CICATS urges it to adopt the

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<sup>1</sup> *Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, MM Docket No. 87-268, Fifth Further Notice of Proposed Rule Making, FCC 96-207 (released May 20, 1996) ("Fifth NPRM").

<sup>2</sup> That standard is formally referred to as the "Advanced Television Systems Committee Standard A/53 (1995)," and is referred to in these Comments as the "ACATS standard(s)." In its Reply Comments to the Fourth Further Notice of Proposed Rule Making in this docket (filed January 22, 1996) ("Grand Alliance Reply"), the HDTV Grand Alliance, which developed the ACATS standard, erroneously claimed that ACATS "recommended unanimously" that the Commission adopt the standard. Grand Alliance Reply at 38. In fact, the two members of ACATS who represented the computer industry abstained, and the vote was therefore not unanimous.

minimal standard necessary to serve the public interest. *At most*, the Commission should adopt only the minimal base-line format standard CICATS describes herein, which represents a substantial refinement of the ACATS standard. Adoption of the ACATS standard in its present form would impose costs on consumers and technological innovation that completely outweigh its benefits, to the serious detriment of the public interest.

### **INTRODUCTION**

CICATS is an *ad hoc* coalition of American software publishers and hardware manufacturers that was formed specifically to address issues surrounding the introduction of Advanced Television.<sup>3</sup> CICATS's members include Apple Computer, Inc., Compaq Computer Corporation, Dell Computer Corporation, Intel Corporation, and Microsoft Corporation. They are among the most innovative companies in the United States, and have made substantial contributions to this country's global preeminence in computers and software.

The enormous benefits that CICATS's members' products and services have brought to all sectors of American society are largely the result of rapid advances in technology harnessed by visionary product developers. The government has assisted by adopting policies that foster, rather than hamper, innovation and market development. The Commission's decision in this proceeding could ensure that these forces allow DTV broadcasting to become

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<sup>3</sup> As used here, "Advanced Television" refers to all forms of digital broadcasting, including the transmission of standard definition television ("SDTV") and high definition television ("HDTV") programming and other services made possible by the digital transmission of video signals.

the centerpiece of a new generation of innovative products and services. Or it could erect a regulatory hurdle -- in the form of the ACATS standard -- that will hobble the ability of the computer, software, broadcast, entertainment, and consumer electronics industries to use available and emerging technology to the greatest benefit of the American public

Digital technology has now advanced to the point where computer technology and broadcasting can be combined to form products and services that multiply the capabilities of both. The promise of this convergence lies at the heart of what has come to be called the National Information Infrastructure ("NII"). The NII will create high-value jobs, benefit consumers, health care providers and educators, and offer broadcasters the ability to develop new services to compete with other information providers.

Computer software and hardware companies have spent billions of research and development dollars developing products that integrate computing, information services, and television. Several manufacturers, including Compaq and Gateway 2000, have publicly exhibited such products and are expected to market them this year<sup>4</sup>. They will expand the capabilities of individual components in ways that we are just beginning to understand.

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<sup>4</sup> Written Testimony of Robert Stearns (Compaq Computer Corporation) before the Senate Committee on Commerce, Science, and Transportation (June 20, 1996) ("Stearns Written Testimony"), Exhibit E hereto; "Putting TVs and PCs Together: Convergence Will Mean Larger Screens, Expanded Use of Both," *USA Today* (May 23, 1996) at 4D.

They will also save consumers money, and thus satisfy a primary objective of Congress in passing the Telecommunications Act of 1996 (and echoed by the Commission<sup>5</sup>): “to provide for a pro-competitive, de-regulatory national policy framework designed to accelerate rapid private sector deployment of advanced telecommunications and information technologies *for all Americans*.”<sup>6</sup> Convergence can further those objectives through multiple uses of components such as display devices that will lower costs and greatly facilitate access to diverse information sources for lower income households and cash-strapped public institutions, such as schools, libraries, and hospitals.

In sharp contravention of these objectives, adoption of the ACATS standard would impose significant direct and indirect economic costs on consumers -- *aggregating tens of billions of dollars* -- which could be avoided if the Commission rejects the ACATS standard or adopts only such a standard as is minimally required to serve the public interest and further the transition to digital broadcast television. Proponents of the ACATS standard should bear a significant burden in justifying such enormous costs (described in detail in Section IV, below). Yet the Commission has shifted the burden in this

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<sup>5</sup> *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Notice of Proposed Rulemaking and Order Establishing Joint Board FCC 96-93 (released March 8, 1996) at ¶¶ 5-6, 71-72.

<sup>6</sup> H.R. Conf. Rep. No. 458, Conference Report on S. 652, Telecommunications Act of 1996 (the “Act”), 104th Cong., 2d Sess. (Jan. 31, 1996) at 113 (emphasis added). This goal is reflected in Section 254 of the Act, which requires the Commission to promote universal service, including access to advanced services.

proceeding to those opposing the ACATS standard, thus reflecting an unwarranted bias in favor of the standard.

In addition to imposing significant economic costs on consumers, the ACATS standard would also take a heavy toll on technological innovation (as explained in Section I, below), particularly within major U.S. industries -- computers, software, and entertainment -- that could offer the most expanded uses of DTV. This stifling of innovation will affect not only individual consumers, but the national economy and the competitiveness of U.S. industries worldwide (as explained in Section V, below).

For all these reasons, the members of CICATS believe that the best policy, given the speed with which technology is advancing and products are appearing, would be to forebear from mandating any standard at this time. The digital world is changing too fast to set today's technology in stone.

If the Commission concludes that the public interest would best be served by adopting an Advanced Television standard it can (and should) still reject the ACATS standard. That standard perpetuates obsolete technologies that are flatly inconsistent with the convergence of computers and television. More importantly, the entire architecture of the standard is designed to force consumers to purchase unnecessarily expensive, sophisticated high-definition receiving equipment, whether they want it or not. The result: Consumers will spend almost \$50 billion more than they need to take the quantum quality leap to DTV.

In Section I below, CICATS demonstrates why a voluntary industry standard would be better than a government-mandated standard. In Section II, CICATS enumerates the technical flaws of the ACATS standard, including its obsolete technology and poor compatibility with computers.

In the event that the Commission determines that it should adopt a DTV standard including a video format to allow consumers to transition to digital broadcast television, CICATS (in Section III) offers a refined version of the ACATS proposal which will provide minimal standards, greater certainty, comparable quality, and significantly lower costs than the ACATS proposal.

Section IV of these Comments examines the tremendous economic consequences to consumers, broadcasters, and the general public of adoption of the ACATS standard; and Section V discusses the ACATS standard's effect on the U.S. economy and our global competitiveness.

Finally, in Section VI, CICATS submits that it has satisfied the burden the Commission has placed on opponents of the ACATS standard -- a burden which, as noted above, seems skewed in favor of the standard.

**I. Adoption of a Voluntary Industry Standard Would Better Serve the Public Interest than Adoption of a Government-Mandated Standard.**

In the Fifth NPRM, the Commission proposed to adopt the ACATS standard because it apparently believes that the benefits of a government-mandated standard outweigh its costs.<sup>7</sup> But the Commission has all but ignored

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<sup>7</sup> Fifth NPRM at ¶¶ 31-37.

the substantial risks of government-mandated standards.<sup>8</sup> First, in fast-moving industries, a government-mandated standard stifles innovation. Second, a mandated standard perpetuates obsolete technologies beyond their normal market life. Third, a government-mandated standard is inevitably the product of interest group politics, rather than technological and economic considerations that would otherwise drive sound business decisions in a free market. Fourth, the private sector (and market forces) are better than the government at establishing standards that meet consumer needs. Digital television is a textbook example of all these risks.

Moreover, a voluntary industry-set standard would serve the Commission's objectives in this proceeding better than a government-mandated standard. Those objectives include "increas[ing] the availability of new products and services," "encourag[ing] technological innovation and competition," and "minimiz[ing] regulation."<sup>9</sup>

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<sup>8</sup> Adoption of minimal standards, needed to prevent interference among users, would not pose unreasonable risks, and CICATS would not oppose adoption of such minimal standards, as the Commission did in the *Broadband PCS Proceeding, Amendment to the Commission's Rules to Establish New Personal Communications Services*, Gen. Docket No. 90-314, Second Report and Order, 8 FCC Rcd 7700 (1993) ("Broadband PCS"), and in the *Advanced Cellular Proceeding, Amendment of Parts 2 and 22 of the Commission's Rules to Permit Liberalization of Technology and Auxiliary Service Offerings in the Domestic Public Cellular Radio Telecommunications Service*, Gen. Docket No. 87-390, Report and Order, 3 FCC Rcd 7033 (1988) ("Advanced Cellular").

<sup>9</sup> Fifth NPRM at ¶ 1

**A. A Government-Mandated DTV Standard -- Particularly the ACATS Standard -- Will Freeze Rapidly Evolving Technology.**

It is widely recognized that government-mandated standards deter technological innovation.<sup>10</sup> This deterrence is exacerbated if the product involved is in an early stage of development,<sup>11</sup> and if technological developments affecting the product are occurring rapidly. Both of these factors are present here.

The Commission has acknowledged that DTV is "in its infancy and further advances are likely to occur."<sup>12</sup> And digital technology is advancing at lightning speed.<sup>13</sup> Under these conditions, a government-mandated standard will have the most profound chilling effect on technological innovation -- a public detriment that the Commission cannot ignore.

When this proceeding began in 1987, digital broadcasting was beyond the participants' wildest expectations -- they sought only a higher-quality analog

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<sup>10</sup> Bruce M. Owen & Steven S. Wildman, *Video Economics*, (Harvard University Press: 1992) ("Owen & Wildman") at 261; Stanley M. Besen & Leland L. Johnson, *Compatibility Standards, Competition and Innovation in the Broadcasting Industry*, (Santa Monica, CA: The Rand Corporation, 1986) ("Besen & Johnson") at 131; Dr. Jeffrey Krauss, "Implications of FCC Regulation of Telecommunications Technical Standards," *IEEE Communications Magazine* (Sept 1982) ("Krauss") at 28, 31; Fifth NPRM at ¶¶ 33-34

<sup>11</sup> The time at which standards are adopted is also critical, as "premature technical standards tend to freeze the state of the art and inhibit further innovation." Krauss at 31

<sup>12</sup> Fifth NPRM at ¶ 33

<sup>13</sup> See Owen & Wildman at 260; Besen & Johnson at 135. Edward Volkwein, Senior Sales and Marketing Vice President of Philips U.S., a member of the Grand Alliance, has acknowledged the speed at which technology in this market is changing, observing: "There will be a [DTV] standard [that is more compatible with computers], but the world is moving too fast to wait for it. Let's get stuff in the marketplace and evolve it very, very quickly." "Digital Future Imminent for Philips U.S.," *TV Digest*, April 29, 1996 at 13

signal. By the end of 1990, however, General Instrument Corporation and MIT had jointly developed a digital broadcasting system,<sup>14</sup> which inspired others to develop their own digital systems.<sup>15</sup> This “unexpected turning point in the approach to advanced television” not only dramatically improved DTV, but opened the door to new players and new products derived from such technology.<sup>16</sup>

The advent of digital broadcast technology has fueled dramatic product innovation, including the development of a production-quality, progressive-scan camera by Polaroid and MIT, and introduction of hybrid PC/TVs that merge the capabilities of televisions and personal computers.

Even ACATS has admitted, “Although the introduction of digital eventually resulted in at least two years delay in the Advisory Committee schedule, the [technological] advance was well worth the wait.”<sup>17</sup> Given the rapid pace at

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<sup>14</sup> ACATS Final Report and Recommendation (November 28, 1995) (“ACATS Final Report”) at 8.

<sup>15</sup> *Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, MM No. Docket 87-268, Second Report & Order/Further Notice of Proposed Rulemaking, 7 FCC Rcd 3340, 3341, n.3 (1992) (“Second Report and Order”); Richard E. Wiley, “High Tech and the Law,” *The Recorder*, at 6 (July 26, 1994)

<sup>16</sup> Fifth NPRM at ¶ 33; ACATS Final Report at 8; Tom Haradon, “The HDTV Alliance: One Process Stops, Another Starts; High Definition Television,” *Digital Media*, (June 23, 1993) (“Haradon”) at 32. As ACATS states in its Final Report, “Due largely to the state of technology in 1987, the FCC did not then perceive the computer industry as being significantly affected by ATV broadcasting. However, subsequent technological advances, particularly the introduction of digital transmission technology . . . generated significant interest within that industry.” ACATS Final Report at 4. Nevertheless “the computer and photography industries were not taken seriously.” Haradon at 32.

<sup>17</sup> ACATS Final Report at 8.

which digital technology is advancing, the Commission should not be rushed into adopting a DTV standard. Indeed,

[t]he United States may . . . realize long-term benefits from delays in selecting its HDTV standards. . . . [T]he government may beneficially slow down the standards selection process in the early stages of the development of a new technology when the range of its applications and alternative approaches to developing the technology are not well understood.<sup>18</sup>

The threat of technological stagnation has previously caused the Commission to reject government-mandated standards. In the *Broadband PCS Proceeding*, the *Advanced Cellular Proceeding*, and the *DBS Proceeding*, where a key Commission goal was the rapid deployment of new technology, the Commission opted for market-driven solutions of technical issues in lieu of government-mandated standards.<sup>19</sup> In the *Broadband PCS Proceeding*, the Commission

indicated that . . . PCS is in a nascent stage in its development and that imposition of a rigid technical framework could stifle the introduction of important new technology.<sup>20</sup>

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<sup>18</sup> Owen & Wildman at 283.

<sup>19</sup> *Advanced Cellular*, 3 FCC Rcd 7033; *Amendment of Subpart C of Part 100 of the Commission's Rules and Regulations with Respect to Technical Standards for Direct Broadcast Satellite Service*, 60 RR. 2d 1539 (1986), 1986 FCC LEXIS 2818, ¶¶ 4, 12; *Broadband PCS*, 8 FCC Rcd 7700 (1993).

<sup>20</sup> *Broadband PCS* at 7755.

Similarly, DTV is in its infancy, where the "benefits of allowing experimentation and innovation may be particularly great,"<sup>21</sup> because "technical change occurs most rapidly."<sup>22</sup>

Consider the evolution of analog television, compared to that of personal computers. The former is subject to mandated standards; the latter is not. The NTSC standards were originally adopted decades ago and have undergone few changes since;<sup>23</sup> and those few changes were introduced only after lengthy proceedings before the Commission.

In contrast, the personal computer was introduced 20 years ago, and has improved exponentially -- through many generations -- in response to rapidly advancing technology.<sup>24</sup> Had the personal computer been subject to government-mandated standards imposed only recently, consumers would likely be stuck using 286 chips rather than the family of Pentium processors now available.

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<sup>21</sup> Fifth NPRM at ¶ 33

<sup>22</sup> *Inquiry into the development of regulatory policy in regard to Direct Broadcast Satellites for the period following the 1983 Regional Administrative Radio Conference*, Gen. Docket No. 80-603, Notice of Proposed Policy Statement and Rulemaking, 86 FCC 2d 719, 748 (1981).

<sup>23</sup> L. Selwyn, "Economic Considerations in the Evaluation of Alternative Advanced Television Proposals," ("Economic Considerations"). Exhibit D hereto, at 1-2.

<sup>24</sup> Testimony of Joseph Tasker, Jr.(Compaq Computer Corporation), *En Banc* Hearing before the FCC in MM Docket No. 87-268 (Washington D.C , December 12, 1995) ("Tasker Testimony") Tr. 265; "Economic Considerations" Exhibit D hereto, at 2

Similarly, if the government had adopted a DTV standard in 1991, it would have been an analog standard that would have precluded or discouraged the introduction of digital broadcasting and the resulting product innovation.

In their Comments on the Fifth NPRM, several academicians from the Massachusetts Institute of Technology<sup>25</sup> have warned against adoption of any mandatory ATV standard (other than for modulation) because

evolution of the standard to accommodate advances in picture and sound quality, to add features desired by consumers or program providers, or to allow applications not anticipated by the system design would require an FCC rulemaking rather than merely agreement among industry groups. *The likely result will be stagnation, not the rapid innovation and improvement that has characterized other digital media such as the Internet.*

In short, the Commission should not ignore the heavy toll on technological innovation that a government-mandated DTV standard would impose.

**B. Adoption of the ACATS Standard Will Perpetuate Obsolete Technology and Hamper Convergence of Digital Technologies.**

As discussed in Section II below, the ACATS standard incorporates elements that originated in the decades-old analog NTSC standard, that have been surpassed by newer technology, and that obstruct the convergence of television and computers. For example, experts have cautioned that the inclusion in the standard of interlaced scanning -- an obsolete technology -- will

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<sup>25</sup> Comments of V. Michael Bove, Jr., Lee W. McKnight, Nicholas Negroponete, Andrew Lippman, and Suzanne Chambliss Neil in MM Docket No. 87-268 (filed June 21, 1996) ("MIT Joint Comments") at 3 (emphasis added).

only perpetuate that technology and deter if not prevent entirely the implementation of the superior progressive scanning technology.<sup>26</sup> There is no sound basis for perpetuating such a technological relic.<sup>27</sup> Outdated technology could therefore become the *de facto* standard because of the regulatory hurdles that any improvement to the standard must clear

The Commission cannot dismiss the high public cost of handicapping digital broadcasting by perpetuating obsolete technologies.

**C. A Government-Mandated DTV Standard Is Often the Result of Interest Group Politics, Not Sound Technology.**

As this proceeding amply demonstrates a government-mandated standard is the product of an adversarial process in which parties with differing interests exert their political views and influence to the detriment of unbiased technological and economic decisionmaking<sup>28</sup> Interest group politics and technology optimization are strange and exceedingly poor bedfellows.<sup>29</sup>

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<sup>26</sup> William F. Schreiber (Professor of Electrical Engineering, Emeritus, MIT), Informal Reply Comments to the Fourth Further Notice of Proposed Rule Making, MM Docket 87-268 (filed March 11, 1996) ("Schreiber Reply"), Exhibit F hereto at 2,5-7; P. Delogne, "Comparison Between Interlaced and Progressive Scanning Formats," (Laboratoire de Telecommunications et Teledetection, Universite Catholique de Louvain, Louvain-la-Neuve, Belgium) ("Delogne Study"), Exhibit G hereto, at § 6

<sup>27</sup> See Section II.A.1, below for possible explanations for the inclusion of interlaced scanning in the ACATS standard. As shown in that section, none of these explanations withstands scrutiny.

<sup>28</sup> E.g. "U.S. Jobs and Better TVs?: HDTV Universal Standards: Political and Economic Decisions May Color Decision," *Los Angeles Times* (May 8, 1993) at D1.

<sup>29</sup> One writer characterized the process through which the Commission would choose a winner among the four groups then proposing competing advanced TV standards as "a political brawl." Edmund L. Andrews, "Choice of TV System Shifting Into a Political Brawl on Jobs," *The New York Times* (May 14, 1993) at A1.

The ACATS standard is not, as claimed “the best of the best” in digital television technology; it is the result of arm-twisting by ACATS to force a compromise by the four proponents of different systems to eliminate evaluation of the individual systems.<sup>30</sup> In 1993, when participants were pressured to reach a compromise, one participant in the process stated that “[i]ntervention by the government could change the nature of the 5-year-old HDTV standard-setting process from a technology competition to a political process.”<sup>31</sup>

To achieve a political compromise among competing interests, the proponents of the ACATS standard sacrificed quality. For example, while most systems designers preferred progressive scanning over interlaced scanning, interlaced scanning was included in the standard because broadcasters sought to cling to remnants of NTSC technology.<sup>32</sup> Similarly, the decision to include 18

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<sup>30</sup> Richard E. Wiley, “High Tech and the Law,” *The Reporter* at 6 (“After many months of arduous business and technical negotiations” a compromise was reached to form the “merged system.”); e.g. Lawrence Malkin, “Talks in U.S. Seek Common Standard for HDTV,” *International Herald Tribune* (May 22, 1993) (“if the rivals fail to agree by this weekend, the FCC has demanded separate tests of their systems at a cost of \$850,000 each”)

<sup>31</sup> Jube Shriver, Jr., “U.S. Jobs and Better TV’s? HDTV Universal Standards: Political and Economic Pressures May Color Decision,” *Los Angeles Times* (May 8, 1993) at D1 (quoting General Instruments Chairman Donald H. Rumsfeld)

<sup>32</sup> *Id.* (“Principally, a determination was required on whether the new proposal would encompass ‘interlaced scanning,’ as used in current television, or ‘progressive scanning,’ as employed in most computer displays. . . . Accordingly, they decided on a system that encompasses both interlaced and progressive scanning . . .”). MIT participants gave a more ominous explanation for the inclusion of both interlaced and progressive scanning. According to Jae Lim of MIT Media Lab, the “alliance accepted interlace only because broadcasters ‘are just afraid of change’ and because European manufacturers had large investments in interlace.” “MIT Opposes Compromise; HDTV Transition from Interlaced to Progressive to Raise Costs,” *Communications Daily* (May 26, 1993) at 2