

announce its intention to adopt, at the appropriate time, a single broadcast ATV transmission standard.

The basis for these conclusions is discussed in detail in the following report.

II. Legal Authority

Of necessity, the Communications Act provides the Commission with sweeping grants of authority.^{1/} These provisions clearly encompass the area of broadcast transmissions.^{2/} Moreover, an agency is generally accorded

^{1/} FCC v. WNCN Listeners Guild, 450 U.S. 582 (1981); NBC v. U.S., 319 U.S. 190 (1943); FCC v. Pottsville Broadcasting Co., 309 U.S. 134, 138 (1940). See also 47 U.S.C. 154(i) (1988).

^{2/} See e.g., Section 303:

Except as otherwise provided in this Act, the Commission shall from time to time, as public convenience, interest or necessity requires shall

. . .

(c) Assign bands of frequencies to the various classes of stations and assign frequencies for each individual station and determine the power which each station shall use and the time during which it may operate;

. . .

(e) Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;

(f) Make such regulations not inconsistent with law as it may deem

(footnote cont'd)

broad discretion in implementing its controlling statute, particularly when the matter involves the scientific and technical expertise of the agency, such as is the case with ATV.^{3/} The Commission is required only to act reasonably and in accordance with established procedures. The Commission would appear to have the authority to promulgate broadcast transmission standards for ATV by choosing a standard from among several technologically feasible possibilities.

Thus, in 1951, the FCC's choice of a standard for color TV transmission was upheld by the Supreme Court in Radio Corp. of America v. United States.^{4/} It was regarded as beyond dispute that the Commission had authority under Sections 303(c), (e), (f), and (g) of the Communications Act,

(footnote cont'd)

necessary to prevent interference between stations and to carry out the provisions of this Act: Provided, however, that changes in the frequencies, authorized power, or in the times of operation of any station, shall not be made without the consent of the station licensee unless, after a public hearing, the Commission shall determine that such changes will promote public convenience or interest or will serve public necessity, or the provisions of this Act will be more fully complied with;

(g) Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest.

^{3/} See FPC v. Florida Power & Light, 404 U.S. 453, 463 (1972).

^{4/} 341 U.S. 412 (1951).

to adopt such standards on the basis of substantial evidence. 341 U.S. at 416. The only issue was whether the Court should review the wisdom of the Commission's choice.

The Commission had held extensive hearings on the various transmission methods, including demonstrations, and ultimately concluded that the CBS system would best serve the public interest by producing immediate benefits. In the process it rejected two other color systems, one of which, the RCA system, was compatible with existing technology. The Supreme Court reviewed the contention that the FCC was arbitrary and capricious in rejecting RCA's system. The Court found substantial evidence to support the FCC's findings, relying on the Commission's "special familiarity" with these matters.^{5/} The Court emphasized that "courts should not overrule an administrative decision merely because they disagree with its wisdom."^{6/}

In only one instance has the Commission's authority to set technical standards been successfully challenged.^{7/} In EIA v. FCC, the Court held that since the standard for UHF noise reduction chosen by the Commission was not then technologically feasible (a critical fact not disputed by the Commission), the Commission exceeded its authority under the

^{5/} Id.

^{6/} Id. at 420.

^{7/} Electronic Industries Ass'n v. FCC, 636 F.2d 689 (D.C. Cir. 1980).

All Channel Receiver Act.^{8/} The Court found that the legislative history of Section 303(s) limited the FCC's standards-setting power in this specific respect to "the normal state of receiver development at the time."^{9/} Thus, the holding of the Court that the FCC had exceeded its authority was premised on a specific Congressional rejection of broad regulatory power in the area, unique to the UHF all-channel situation.

In the ATV context, there are no such regulatory constraints. The Commission's authority flows not from any specific provision like Section 303(s) but from the more general and broad authority of Sections 303(e), (f), (g), and (r).

The Commission thus clearly has the authority to adopt a single standard for ATV transmission by television broadcast licensees. In doing so, the Commission must follow prescribed procedures of the Administrative Procedure Act for informal rule making^{10/} and it must act reasonably. Whether an FCC order on ATV will be affirmed depends on the particular facts of the ruling -- namely, did the Commission act in accordance with proper procedure, and have substantial evidence to support its conclusion?

^{8/} 47 U.S.C. § 303(s) (1988).

^{9/} EIA v. FCC, 636 F.2d at 694.

^{10/} See 5 U.S.C. § 553 (requiring notice and opportunity to comment).

That the decision may be difficult to make militates for, not against, judicial affirmance. The courts are not expert, and do not substitute their judgment for that of the expert agency on difficult, complex technical issues committed by Congress to the agency's judgment.

. . . Although it was declared in National Broadcasting Co. v. United States, supra, that the goal of the Act is 'to secure the maximum benefits of radio to all people of the United States,' 319 U.S., at 217, it was also emphasized that Congress had granted the Commission broad discretion in determining how that goal could best be achieved. The Court accordingly declined to substitute its own views on the best method of encouraging effective use of the radio for the views of the Commission. 319 U.S., at 218 . . . ^{11/}

Indeed, in light of Congressional interest in ATV (shown by the numerous oversight hearings), courts may be especially reluctant to enter this legislative thicket. Thus, as long as there is "carefully articulated expert opinion,"^{12/} the Commission's findings as to the desirability and necessity of a standard will be upheld.

Finally, there is the issue raised in the AM Stereo decision that if the Commission selects a single standard, the losers will appeal and obtain a stay, thus leaving the area in a judicial "freeze" for years of litigation. We think this is a mistaken notion of judicial process. Stays can be obtained

^{11/} FCC v. WNCN Listeners Guild, supra, 450 U.S. at 593-946. See also id. at 596.

^{12/} FPC v. Florida Power Light, supra, 404 U.S. at 463.

only upon a showing of irreparable injury (i) not just to the petitioners but (ii) also to the public and (iii) must have a substantial likelihood of prevailing upon the merits.^{13/}

If the Commission does its job properly as indicated above, it should be most difficult for a petitioner to make the showings as to factors (ii) and (iii). On the contrary, the Commission should be able to argue persuasively that the public interest will be hurt by delay, and that the merits lie with the agency. Again it should be a powerful factor that Congress, with its strong oversight, is allowing the Commission to proceed (if Congress is urging delay, that is a different matter, because as experience has shown (e.g., subscriber line charges; price caps), a favorable political climate is a vital aspect of successful agency action on a matter like this).

In sum, the Commission has the necessary legal authority to adopt a single ATV standard, and if it acts reasonably and appropriately as to procedure and substance, it should have clear sailing.

^{13/} Washington Metropolitan Area Transit Commission v. Holiday Tours, Inc., 559 F.2d 841 (D.C. Cir. 1977); Virginia Petroleum Jobbers Association v. FPC, 259 F.2d 921 (D.C. Cir. 1958).

III. Policy Analysis

A. Background

There is an extensive academic literature on the subject of standard setting. This literature is summarized in the report of Working Party 5 of the Planning Subcommittee.^{14/} Rather than repeat that discussion at length, this report will build on the foundation of PS/WP5.

In general, the studies have found that the principal advantages of standardization include economies of scale leading to lower prices, increased incentive to invest because of lower risk, the ability of users to share, connect or interchange hardware and software, and protection against the imposition of a sub-optimal de facto standard by individual market participants. The general disadvantages include the possibility of choosing a sub-optimal standard, precluding further technological innovation, and discouraging alternate solutions for users with divergent preferences.

The relative importance of these advantages and disadvantages vary with the particular circumstances. Standards are especially important where parts of a system must be compatible, requiring a high degree of coordination among market participants. The higher the cost of converting a product or service from one standard to another at the

^{14/} "Economic Factors and Market Penetration" (May 9, 1988) at pages 90-99. The PS/WP5 report also contains an extensive bibliography of this literature.

interface, the more important it is that they be initially produced according to the same standard.^{15/}

De facto standards are more likely to emerge where control of an industry is concentrated and the action of relatively few firms will be decisive. For example, IBM effectively set the de facto standard for the personal computer industry. Other firms designed software, peripherals and clones to be compatible with IBM. Standards also may emerge without government intervention if one design is perceived as clearly superior to others, especially if consumer demand is high.

However, consensus may be slow to develop where firms are uncertain about the preferences of other participants in the market. This can occur where the differences between contending standards are small or difficult to evaluate, or where different groups of consumers have varying uses for a product. In addition, when one or more firms have a proprietary interest in a particular standard they may try to prevent the industry from coalescing around any other standard.^{16/} Consensus also may be delayed

^{15/} Conversely, where compatibility among standards can be achieved at relatively low cost, or where standards differ in their ability to serve the particular needs of diverse user groups, it may be desirable to maintain multiple standards.

^{16/} The Working Party does not mean to imply that it is any way inappropriate for system proponents to have proprietary interests in their systems. To the contrary, such interests and the prospect of substantial return on investment are

(footnote cont'd)

if technology is developing rapidly and some participants choose to wait for the situation to stabilize in order to avoid the risk of being stranded with an unsuccessful technology. More participants are likely to adopt such a "wait-and-see" attitude when a serviceable substitute technology is already in place, or when the cost of adopting a new technology is high, especially if the sunk costs associated with a new technology cannot be recovered.

Previous attempts to introduce major improvements into mass media standards have demonstrated the value of standard setting.^{17/} Such innovations as TV stereo, FM stereo and color TV were successfully introduced through the use of mandated or "protected" standards. Similarly, entirely new services such as television, FM radio and cellular telephone that employed a single standard achieved more rapid and efficient acceptance in the marketplace than AM stereo, teletext, or direct broadcast satellites, where no consensus standard emerged. Government intervention can act as a catalyst to facilitate the sharing of information and the

(footnote cont'd)

important stimulants for research and development. Nor does the Working Party take any position in this paper as to what, if any, consideration the Commission should give to the presence and nature of proprietary interests in selecting a transmission standard. The point here is simply that the existence of such proprietary interests may impede the development of a consensus.

^{17/} See S.M. Besen & L.L. Johnson, *Compatibility Standards, Competition, and Innovation in the Broadcasting Industry*, (Rand, November 1986) (collecting case studies).

emergence of a consensus in situations where most participants desire standardization, but transaction costs, antitrust barriers or strategic behavior may prevent a marketplace agreement.

The cautionary tale of AM stereo is perhaps the most prominent example of the importance of standardization and the useful role that government can play in the process.^{18/} Although the introduction of stereo would benefit both broadcasters and listeners, in the absence of an agreement on standards adoption of the new technology has been extremely slow.^{19/} All segments of the industry are reluctant to risk committing themselves to a standard that may not gain wide acceptance. The result is stalemate.

AM stereo is very similar to ATV in many significant respects. Broadcasters, consumers and equipment manufacturers all must coordinate their actions for the service to achieve the wide acceptance that is necessary for the success of the service. Several incompatible standards are contending for acceptance, and no single firm has the market power to establish a de facto standard. The potential for the necessary coordination is complicated by the fact that in both

^{18/} See Report and Order in Docket No. 21313, 47 Fed. Reg. 13152 (1982). The Commission continues to believe its approach was appropriate and that the market is converging on a single AM stereo standard, see AM Stereophonic Broadcasting, 3 FCC Rcd. 403 (1988).

^{19/} Seven years after Commission action, only about 10 percent of all AM stations broadcast in stereo. Id.

AM stereo and ATV, different firms have a proprietary interest in various contending systems. As with AM, there is a serviceable TV technology already available, reducing the pressure to adopt the new system. In addition, there was little perceived difference between the leading AM stereo systems, preventing the emergence of an obvious de facto standard; it remains to be seen whether a particular ATV system stands out in terms of cost quality or spectrum efficiency.

B. Advantages of Standardization

1. **Economies of Scale.** The principal advantages of establishing a single transmission standard for broadcast ATV arise from economies of scale. First, large scale production will reduce the price of ATV receivers. Lower price is obviously a direct benefit of consumers; it may also be necessary to promote public adoption of the new technology. Programming supply may be limited until receiver penetration is significant. Demand for ATV receivers is likely to be limited until prices fall. Both supply and demand must reach a critical mass in order for ATV service to succeed. If incompatible systems compete, none may reach the production levels necessary to take advantage of significant economies, and ATV may never attain its potential.

The same economies are applicable to studio and transmission equipment. Converting a television station to ATV initially could cost as much as five times as much as the

comparable NTSC equipment. Until these costs are reduced, many broadcasters will be discouraged from converting. Stations in smaller markets would be unable to make an investment of this magnitude and would be precluded from participating in ATV. Incomplete participation by local stations could delay adoption of ATV by the national broadcast networks.

Perhaps the most important economy relates to programming. With a single transmission standard, every programmer will be able to reach the widest possible audience, and every viewer will have the widest selection of programming. Distributing the cost over a large number of viewers allows production of high quality programming without imposing prohibitive advertising rates or subscriber fees. A single broadcast standard could also advance the conversion of programming from whatever production standard is employed, increasing the availability of conversion facilities, and lowering the cost.

Finally, although it is not a traditional economy of scale, a single transmission standard can lead to significant spectrum efficiencies. The use of a varying standards requiring different degrees of protection may make it difficult to allot channels and service areas on an efficient basis. Moreover, the transmission method, the system proposed by Zenith, depends upon special signal processing techniques, including synchronization of signals, to achieve interference-free operations among stations that are separated

by only a fraction of the distance now required.^{20/} Since electromagnetic spectrum may be the most valuable factor of production in broadcast television, these efficiencies are particularly important.⁶^{21/}

Although the Working Party does not address the issue of standardization for media other than terrestrial broadcast, it notes that these economies of scale would be magnified if other media were to adopt the broadcast transmission standard or a closely compatible standard.

2. Reducing Risk/Overcoming Inertia. The risks involved in the introduction of ATV in the absence of an established transmission standard suggest a significant possibility for stalemate of the kind that has plagued AM stereo. The need for significant coordination among firms, the magnitude of the investment involved and the limited consumer demand for immediate adoption of the new technology all contribute to the potential for inertia.

The television industry involves the interaction of numerous suppliers of complementary products. Broadcasters, program producers and manufacturers of receivers and other equipment are organized into separate firms. There is no

^{20/} Proposal for Zenith Spectrum Compatible ATV System at 9 (Sept. 1, 1988).

^{21/} By designating and assigning television channels, the FCC will necessarily establish important parameters on ATV transmission; therefore government cannot completely avoid participation in the standardization process.

significant vertical integration of these activities and at each horizontal level there is substantial competition. Despite this fragmentation of the industry, each firm's production must be compatible with the others in order to deliver programming to the viewer. Production and recording equipment, transmission media and receivers must all be compatible.

The success of broadcasting requires the ability to reach a large audience. The ability to finance high-quality programming and to appeal to advertisers depends upon the virtually universal penetration of broadcast television service. If the market is balkanized by incompatible technical standards, the economic foundation of the service is undermined. Therefore, a firm considering entry into ATV cannot merely select the "best" transmission system, it must attempt to select the system that others will adopt. The consequences of being stranded with an incompatible technology can be ruinous.

Viewers face a similar problem. They are more likely to prefer a particular ATV system because of the programming available with that system than because of its inherent technical advantages. Selection of an "incorrect" receiver would limit the programming available. Moreover, the absence of standards creates a constant risk of obsolescence for expensive TV receivers. Multipoint or open architecture receivers mitigate this risk to some extent, but create problems of their own, including additional expense and

complication, the potential creation of imperfections, and the sacrifice of many of the benefits of economies of scale.

The risk to a firm (and perhaps to a viewer) who selects the "wrong" system is magnified by the amount of expense involved in converting to ATV. Current estimates for the cost of converting a television station range from \$10-\$40 million.^{22/} The cost of retooling for an equipment manufacturer could be much greater. Even if these costs continue to be reduced by technological advancements and economies of scale, they will remain significant.

At the same time, the availability of a serviceable alternative system (NTSC) with an installed base of capital equipment and programming among both producers and consumers reduces the incentives to convert before the uncertainty concerning standards is resolved. There is little benefit, and significant risk, to being the first adopter of a new system.

Under these circumstances a de facto standard is unlikely to emerge in the absence of a government-supported

^{22/} A de facto ATV transmission standard may be more of a possibility in nonbroadcast media. Because spectrum availability is not a limiting factor, introduction of nonbroadcast ATV in this country (e.g., via VCRs) does not depend on Commission allocations and assignment actions. Nor need it await broadcast plant conversions, for example, and immediate access to a mass audience is not a critical consideration. If such a head start resulted in a de facto nonbroadcast transmission standard, terrestrial broadcasting could be at a disadvantage indefinitely. Thus, it is important that adoption of a terrestrial ATV broadcast standard not be unnecessarily delayed.

standard. No single firm has enough market power to be confident of its ability to create a "bandwagon" effect and impose a standard on the others (as IBM effectively imposed the MS-DOS standard on the personal computer industry). Antitrust laws restrict the ability of firms to agree among themselves on a single system. The fact that different firms have proprietary interests in the contending systems makes such an agreement even more difficult.

It is likely that most participants in the television industry would adopt "wait and see" attitudes about ATV, leading to inertia and a very slow adoption of the new technology. If testing of the proposed transmission systems reveals that one is substantially and obviously superior to the others, a de facto standard might yet emerge without government intervention. Even in that case, however, one or more firms with a proprietary interest in some competing technology might seek to block a pure market-based solution. Government intervention (through adoption of a consensus standard) will assure that no small minority will be able to exercise "veto" power when the industry as a whole has a strong interest in achieving standardization.

Alternatively, the proponent of a particular system might attempt to start a bandwagon effect by the use of promotional pricing or side payments to influential early adopters, leading to the adoption of an inefficient de facto system. An early declaration that the Commission's evaluation and selection process is intended to result in the designation

of a single transmission standard will go a long way toward discouraging this kind of strategic behavior.

C. Disadvantages of Standardization

1. **Selection of Sub-Optimal Standard.** The most serious problem that can arise from standardization is that the "wrong" standard will be chosen, a special danger if the standard is chosen prematurely. A television transmission standard could be considered sub-optimal if it provides insufficient quality of pictures and sound, or is subject to excessive interference, or is uneconomical to implement or to operate because of incompatibility, expense or inadequate service areas.

All human activity is subject to error. The special problem of standardization is that the error will become entrenched and difficult to correct. However, the risk of an incorrect standard must be weighed against the advantages of standardization. These advantages are particularly compelling when any standard, even a sub-optimal standard, is preferable to the stalemate that will result in the absence of standardization. This was the case in AM stereo, and as in AM stereo, the issue may have less to do with qualitative differences between standards than the difficulty of agreeing on a single standard.

It is important to remember that the problem is inherent in standardization. It exists whether the standard is chosen by the "marketplace" or with government

intervention. When participants in the market have incomplete information about each other's preferences, they may fail to move toward the optimal result. Intense consumer demand can lead to the adoption of an available standard, despite its inefficiency. Firms can artificially stimulate demand through promotional pricing or other strategic behavior intended to achieve a foothold and induce others to follow. Because the pioneers of a new technology can reap large rewards, the incentive to attempt a "bandwagon" is very strong. Leaving the selection of standards to the marketplace does not guarantee a solution that maximizes consumer welfare.^{23/}

Nor is a marketplace standard necessarily more flexible than standard set with government intervention. Standards become entrenched through widespread investment in skills, software or equipment. The classic case is the standard typewriter keyboard, which won acceptance in the free market and persists despite its inefficiency.^{24/} In contrast, government-mandated standards that did not achieve this entrenched status were successfully abandoned, despite the initial official endorsement (e.g., CBS color standard, Magnavox AM stereo standard).

^{23/} S.M. Besen and G. Saloner, Compatibility Standards and the Market for Telecommunications Services (Rand, Feb. 1988) (reviewing literature on market failures in standardization).

^{24/} See David, Clio and the Economics of QWERTY, 75 American Economic Review 332 (1985).

2. Inhibiting Technological Development. Perhaps the most common mistake in standardization is the premature selection of a standard. The proper time to select a standard depends upon specific information about the state of the art and the prospects for its development. If important problems remain unsolved, standardization may be premature unless there is an overwhelming consumer demand. On the other hand, if available standards perform adequately and future developments are largely in the nature of refinements, it would be advisable to specify a standard immediately, unless demand were especially low.^{25/} This is an issue that arose in setting the original black and white television standard, and again when color was introduced.

In 1939, the Television Committee of the Radio Manufacturers Association (RMA) asked the Commission to approve a technical transmission standard consisting of a 441-line picture and a field frequency of 60 Hz interlaced. The Commission was reluctant to do so, however, while television technology continued to develop rapidly.

It is inescapable that th[e] commercial activity inspired and then reinforced by the existence of Commission standards would cause an abatement of research. To a greater or less extent the art would be frozen at that point. Even more important, investment in receivers which, by reason of technical advances when ultimately introduced, may

^{25/} The selection process should afford some degree of preference for standards that can be most easily upgraded to incorporate new anticipated developments and improve performance.

become^{26/} obsolete in a relatively short time.

The Commission was even forced to rescind a policy allowing limited commercialization on television broadcasts out of concern that a de facto standard would prematurely emerge.^{27/}

The initial selection of the CBS "field-sequential" color television system by the FCC^{28/} is considered to be an example of a standardization decision that resulted in an incorrect choice, probably because the decision was premature. The only other color system available, designed by RCA, was not yet fully developed. Its quality was still poor and the equipment, including home receivers, was bulky and complex. The CBS system provided better performance, but was incompatible with existing black and white receivers. With the prospects uncertain for perfecting RCA or another compatible system, and the installed base of black and white sets growing, the Commission was under pressure to make an early decision. The longer it waited to endorse the CBS standard, the more sets would require retrofitting or abandonment. At some point, it might have become impossible to introduce color television at all.

^{26/} Report, Docket No. 5806 (released Feb. 29, 1940).

^{27/} FCC Order No. 65, FCC Mimeograph No. 39922 (March 25, 1940).

^{28/} Color Television Issues, 41 F.C.C. 1 (1950).

In any event, the incompatibility problem slowed popular acceptance of the new color technology. CBS stations could not be received by the bulk of their audience during the part of the day that they broadcast in color. The Korean War restricted the manufacture of color sets, and CBS suspended its color broadcasts. By the end of the war, RCA had made significant improvements in its compatible system, and the FCC, at the urging of the NTSC, replaced the CBS standard with the RCA standard.

Concerns about premature standardization remain valid today. However, in order to achieve the considerable benefits of standardization, a choice must be made at some point, inevitably limiting the options for future development. Selection of the CBS color standard may have been premature, but the RCA standard has served for more than 35 years and both were government-mandated standards.

The Working Party believes it would be premature for the Commission to endorse a particular ATV transmission standard at this time. Such a selection can be made only after evaluating the actual performance of proposed transmission standards, assessing the technological problems that remain unresolved and the progress being made toward a solution, and the potential for later improvements within the framework of particular standards. The procedures discussed in Part IV, below, are intended to accommodate these concerns.

3. Reducing Consumer Choice. Another effect of standardization is to reduce the availability of alternate or competing systems. This is especially significant when the market consists of heterogeneous consumers with different preferences for a product. For example, consumers interested in finely detailed imagery or precise color reproduction, as for medical, military or engineering and design applications might not be satisfied with a system designed for general entertainment programming. However, such specialized users make up distinct market segments and need not be precluded from using alternative ATV standards.^{29/} They are out of the network of users whose activities require standardization. Most television viewers have basically similar requirements and will benefit more from standardization than they will suffer from the limitation of choice.

A more significant consideration is the effect that the choice of a terrestrial broadcast standard would have on other distribution media. For example, cable system operators might have different signal propagation requirements than terrestrial broadcasters or a specialized concern for encoding. Cable may also seek to provide a superior signal quality to distinguish its product in the market.

^{29/} These markets are smaller and more integrated and can be more easily organized around discrete, alternative standards for their particular activities. The cost of their doing so is likely to be less than the cost of constraining the remainder of consumers by the requirements of a few.

A terrestrial broadcast standard would not necessarily preclude cable operators from employing a different ATV system. Nevertheless, any standards used by the two media should account for the large amount of broadcast programming that is retransmitted on cable, and the obvious advantages of compatibility or interoperability. But the problems that would occur in the absence of such a compromise are not an argument against standardization. The absence of standardization would be no better, either increasing the amount of incompatibility as multiple systems persisted, or enabling one of the media ultimately to impose its system on the other. Rather, these considerations suggest that cable and terrestrial broadcasters ought to select systems with an appropriate degree of compatibility.

IV. Standard-Setting Procedure

As discussed above, deciding whether an area should be standardized is separate from determining whether a particular standard is a good one. Having determined that ATV transmission would benefit from a single standard, we must establish a process that will choose the best standard.

The advantages of standardization can be obtained whether the standard is set by the marketplace or through cooperative action with or without government intervention.^{30/}

^{30/} The government has already decided to intervene to
(footnote cont'd)

Similarly, the risk of selecting an incorrect or premature standard is not inherently greater with a private or public process. The procedure must be fitted to the particular circumstances.

Two factors appear to be essential to avoid the selection of a premature or sub-optimal standard: first, sufficient technical data and other information to make an informed decision; and second, consensus among the participants in the market. The historical examples show that this is best accomplished when standards are initially developed by a panel representing all segments of the industry, and the panel's recommendations are adopted by the FCC.

A. Technical and Factual Basis

A proposed standard must be evaluated for both attributes and performance. Each proposed system may have a somewhat different collection of attributes, such as picture resolution, sound quality, spectrum requirements, resistance to interference, and compatibility with existing equipment. Users must weigh the importance of each of these attributes and choose the best combination for the intended use. Some

(footnote cont'd)

establish fundamental parameters for ATV standardization. The FCC necessarily must set channel size and distribution. It also has tentatively decided to require all ATV systems to protect service to NTSC receivers. Tentative Decision and Further Notice of Inquire, Docket No. 87-268, 3 F.C.C. Rcd. 6520, _____ (¶ 4)(1988).

attributes may be essential, such as compatibility proved to be for color television. The unavailability of an acceptable system with attributes that are regarded as essential indicates that standardization is premature.

Whatever the nominal attributes of a proposed standard, it must be thoroughly tested for actual performance. The CBS standard for color television was selected, in part, because at that time the RCA standard exhibited performance problems with color reproduction, susceptibility to interference, and other factors. Only after RCA demonstrated improved performance, did the FCC select its standard to replace CBS. Some of the proposed ATV "systems" now under consideration are still no more than designs on paper or computer simulations. Their ability to perform as projected is unproven. The Advanced Television Test Center is now preparing to conduct the tests necessary to resolve this issue. Although these tests will not be completed for at least two more years, the results will greatly facilitate standard selection. The committee that developed the original NTSC standard in 1941 completed its work in only a few months, but its deliberations were based on extensive research sponsored by the RMA during 1936-38. Fundamental data of this kind is absolutely essential to a rational choice of a transmission standard. The Test Center's research should also produce valuable information about the state of the ATV art and the pace of its development in order to determine if selection of a standard is premature.