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

COMMISSION AUTHORIZED

In the Matter of	)	
	)	
Advanced Television Systems	)	
and Their Impact on the	)	
Existing Television Broadcast	)	
Service	)	
	)	
Review of Technical and	)	
Operational Requirements:	)	MM Docket No. 87-268
Part 73-E, Television Broadcast	)	
Stations	)	
	)	
Reevaluation of the UHF Television	)	
Channel and Distance Separation	)	
Requirements of Part 73 of the	)	
Commission's Rules	)	

November 30, 1988

COMMENTS OF THE STAFF OF THE BUREAU OF ECONOMICS OF THE FEDERAL TRADE COMMISSION

I. Introduction and Summary

In its Tentative Decision and Further Notice of Inquiry (NOI),[1] the Federal Communications Commission (FCC) requests comments on several proposed regulatory policies for Advanced Television (ATV).[2] These proposals include the FCC's tentative decision to allocate spectrum administratively to terrestrial ATV broadcasting. The FCC is also considering setting a technological standard for ATV. In addition, the FCC has tentatively decided to require ATV systems to be compatible with existing National Television System Committee (NTSC) television receivers for a transitional period. This decision would require that ATV signals be receivable on NTSC receivers, or that they be simulcast with a signal that is receivable on NTSC receivers.

In these comments, the Bureau of Economics' staff makes three main points: 1) the FCC should consider allowing the market to determine the total quantity of spectrum allocated to ATV; 2) administratively setting an optimal ATV standard requires considerable information on the benefits and

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[1] In the Matter of Advanced Television Systems and Their Impact of the Existing Television Broadcast Service, Review of Technical and Operational Requirements: Part 73-E, Television Broadcast Stations, Reevaluation of the UHF Television Channel and Distance Separation Requirements of Part 73 of the Commission's Rules, MM Docket No. 87-268, September 1, 1988. Also see Broadcast Television Service; Policies and Requirements for Advanced Television Systems, Federal Register, Vol. 53, October 3, 1988, p. 38747.

[2] These comments are the views of the staff of the Bureau of Economics of the Federal Trade Commission. They are not necessarily the views of the Federal Trade Commission or of any individual Commissioner. Please contact staff economist Paul Pautler at (202) 326-3357 if you have any questions regarding these comments.

costs to society;[3] and 3) the proposed requirement that ATV be compatible with existing television receivers could impose future costs on society that exceed any benefits.

II. Interest and Experience of the Federal Trade Commission Staff

The staff of the Federal Trade Commission -- upon request by federal, state, and local governmental bodies -- comments on regulatory proposals that may affect competition, consumers, or the efficiency of the economy. The FTC staff has on several occasions examined the competitive and other effects of FCC proposals to regulate the broadcast and cable industry.[4]

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[3] In these comments, we evaluate proposed policies in terms of their impact on the net benefits (benefits minus costs) to society, including both producers and consumers. The policy that is optimal (best for society) is the one that maximizes the sum of producers' and consumers' net benefits.

[4] See the comments of the staff of the Bureau of Economics of the Federal Trade Commission before the Federal Communications Commission In the Matter of Amendment of Part 74 of the Commission's Rules Concerning FM Translator Stations, Docket No. 88-140, August 15, 1988. See also the comments of the Federal Trade Commission's Bureaus of Competition, Consumer Protection, and Economics before the Federal Communications Commission In the Matter of Selection of Initial Licenses Using Random Selection or Lotteries Instead of Comparative Hearings, Docket No. 81-768, December 30, 1981; In the Matter of Amendment of Section 73.3597 of the Commission's Rules on Applications for Voluntary Assignments or Transfers of Control, BC Docket No. 81-897, March 1, 1982; In the Matter of Amendment of Part 76, Subpart J, Section 76.501 of the Commission's Rules and Regulations Relative to Elimination of the Prohibition on Common Ownership of Cable Television Systems and National Television Networks, CT Docket No. 82-434, December 8, 1982; In the Matter of Domestic Fixed Satellite Transponder Sales, CC Docket No. 82-45, April 16, 1982; In the Matter of Amendment of 47 C.F.R. Section 73.658(i) on the Syndication and Financial Interest Rule, BC Docket No. 82-345, January 31, 1983; Reply Comments In the Matter of Amendment of 47 C.F.R. Section 73.658(i) on the Syndication and Financial Interest Rule, BC Docket No. 82-345, April 26, 1983; In the Matter of the Processing of New Domestic Satellite Applications, Report No. DS-265, May 7, 1984; In the Matter of Amendment of Part 76 of the Commission's Rules Concerning Carriage of Television Broadcast Signals by Cable Television Systems, MM Docket No. 85-349, February 25, 1986; In the Matter of Amendment of Section 73.3555 of the Commission's Rules on

Well-formulated public policy for broadcasting in general and for ATV in particular can increase consumer satisfaction with television programming by not artificially restricting the range of options available to consumers.

III. The FCC Should Consider Allowing the Market to Determine the Total Quantity of Spectrum Allocated to ATV

The FCC has tentatively decided to limit the spectrum available for ATV service to the spectrum currently allocated to broadcast television, excluding that part of the UHF and VHF frequencies already assigned to nonbroadcast users.[5] This tentative decision appears to be based on the assumption that current nonbroadcast use of the broadcast spectrum precludes use for ATV service. The resulting limit on the spectrum available for ATV leads the FCC to consider also limiting the spectrum available to an individual ATV station. Neither limit is necessarily in society's best interest.[6]

If spectrum could be freely transferred among broadcast and nonbroadcast users of the television broadcast spectrum, then users with high-valued services would bid spectrum away from users with low-valued

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Broadcast Multiple Ownership, MM Docket No. 87-7, July 15, 1987. We also note that in December 1923, the Report of the FTC on the Radio Industry contributed to the passage of the Radio Act of 1927 and the succeeding Communications Act of 1934.

[5] In this regard it is important to note that the FCC will grant no new broadcast licenses in the UHF region pending its decision in the current proceeding.

[6] Commissioner Quello, in a separate statement, dissents from the FCC in part by opposing a limit on the amount of spectrum available for ATV. He argues that it is too early in the technological development process to make a tentative decision on spectrum availability.

services.[7] From the spectrum users' point of view, voluntary transfers would take place only if both buyer and seller were made no worse off and at least one was made better off.[8] The buyer would increase its revenues by using more spectrum, while the seller would receive more than it could have earned from continuing deployment of the spectrum in its present use. While we cannot be sure that the market will ultimately allocate more spectrum to ATV than is currently allocated to broadcast uses by the FCC, we can conclude that the market will tend to allocate spectrum to its highest valued uses.[9]

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[7] The maximum price that a user would be willing to pay for a license is the amount that, when added to the other costs of the service provided with the license, equals the revenues expected from the purchasers of the service. Some nonbroadcast spectrum users that society wishes to subsidize -- for example, some fire and ambulance services -- may be willing to pay less for spectrum than some broadcast users. Free market spectrum transfers are nevertheless in society's best interest. It is more efficient to subsidize fire and ambulance services by grants of money that can be spent for spectrum, labor, or equipment, than to allocate spectrum administratively to these services. Administrative allocation may increase the costs to society of fire and ambulance services above the most efficient level by granting more spectrum to them and less to other uses. If grants of money are deemed unrealistic, the FCC could prevent the transfer of spectrum licenses used for public safety purposes, while permitting the transfer of licenses used for other purposes. To the extent that such transfers provide a windfall to current licensees, the FCC could either design a system to capture the windfall or decide to write it off as a one-time subsidy to the entities involved. In this regard, the FCC should note that, even without license transfers, the current licensees are already receiving a substantial part of the windfall in the prices that they charge for their services.

[8] Frequently both would be made better off. For this reason a transfer that would impose substantial costs on either buyer or seller (see NOI, para. 76) would not be made voluntarily unless the price compensated each party for these costs.

[9] The strength of actual and potential competition in many television markets makes it unlikely that broadcast stations can collude on advertising rates. In many markets at least three over-the-air stations compete for viewers, and cable and DBS systems offer alternative sources of programming. Collusion appears even less likely if the FCC decides not to restrict the total quantity of spectrum available for ATV service. Additional

If ATV programming were permitted to encompass the spectrum now used by the nonbroadcast licensees of the broadcast television spectrum via market-based transfers of spectrum, the potential for an increase in the number of viewers could make more ATV stations profitable than otherwise. More viewers could receive the quantity and variety of ATV programming that they prefer. By contrast, administratively restricting the spectrum allocated to ATV service could deny viewers the benefits of this additional ATV programming.[10]

Because broadcast television is supported by advertising revenues, it does not necessarily provide the programming that best satisfies viewers. For example, a relatively small group of viewers with intense preferences for particular programming may remain unsatisfied because advertisers tend to support programming that draws the largest possible audience size. Permitting ATV programming to expand beyond the spectrum limits contemplated by the FCC in this proceeding would increase the probability that such viewers' preferences would be satisfied.[11]

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spectrum would facilitate entry by new broadcast television stations. The increased potential for entry would further discourage any attempts to collude by incumbent stations. In some markets, however, incumbent NTSC stations may now wield market power, or after purchasing a rival's license, an incumbent ATV station may be able to obtain market power. This possibility calls for careful antitrust scrutiny of license purchases in such markets.

[10] As noted above, market transfers of spectrum will result in additional spectrum going to ATV use only if that is the highest valued use of the spectrum. This additional spectrum could be used to provide additional programming at the same level of signal quality or the same amount of programming at a higher level of signal quality. We discuss below the higher signal-quality alternative.

[11] This would, of course, increase the probability that those benefiting from existing, lower-valued uses of the spectrum would become dissatisfied as spectrum was shifted to higher-valued ATV uses. For a more extensive

Even if the FCC restricts the total spectrum available for ATV service, we suggest that the FCC permit current licensees in the television region of the spectrum -- both broadcast and nonbroadcast licensees -- to use their licenses for both broadcast and nonbroadcast purposes.[12] If existing restrictions on license use were removed, for example, a would-be broadcaster seeking spectrum for ATV service could obtain the needed license from an incumbent NTSC broadcast licensee, or from a nonbroadcast licensee.[13] Also, a licensee that incurs unanticipated delays in inaugurating ATV service could transfer otherwise idle spectrum temporarily to a nonbroadcast licensee.[14] Such free-market license transfers would tend to allocate spectrum to the most highly valued uses. Transfers would also ensure that valuable spectrum did not remain idle.

One important consideration in the FCC's current deliberations regarding ATV standards is the amount of spectrum per broadcast station required by ATV technology.[15] Because the FCC is considering limiting the total spectrum available to ATV to the broadcast spectrum (excluding

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discussion of these issues see Comments of the Staff of the Bureau of Economics of the Federal Trade Commission before the Federal Communications Commission, In the Matter of Amendment of Part 74 of the Commission's Rules Concerning FM Translator Stations, Docket No. 88-140, August 15, 1988.

[12] As we noted above in footnote 7, the FCC may choose to make an exception for spectrum licenses used for public safety purposes.

[13] Such a would-be licensee would have to comply with all FCC requirements to use the spectrum.

[14] This proposal would require that the licensee observe the applicable interference standards.

[15] Whether or not the FCC should set an ATV standard is discussed below.

nonbroadcast users' holdings), and because of the agency's ideal that as many broadcasters as possible be able to provide ATV service, the FCC has expressed a preference for the ATV system that requires the least amount of spectrum per ATV station. As we observed above, modifying the licenses of nonbroadcast users of the broadcast spectrum, and permitting transfers of those licenses to ATV stations, can increase the quantity of spectrum available for ATV service. More available spectrum could enable more stations to transmit ATV at any given level of quality.[16] Alternatively, more available spectrum could enable the same number of stations to transmit ATV of higher signal quality, which would require more spectrum per station.

Even if the FCC chooses to limit the total spectrum available for ATV to the broadcast spectrum (excluding nonbroadcast users' holdings), the interests of consumers may not be served by selecting the ATV system that uses the least amount of additional spectrum per station. In particular, viewers may prefer relatively fewer ATV stations, each with more spectrum to provide higher signal quality. In that case, choosing the ATV technology that minimizes spectrum use could prevent the development and implementation of a more spectrum-intensive technology that would provide viewers a higher quality service that they might prefer.

The FCC's ideal that all existing television broadcasters provide ATV service may not reflect consumer preferences. The ideal assumes in effect that, regardless of receiver costs, consumers would prefer an all-ATV

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[16] It is generally believed that higher quality requires more spectrum. In this regard, the spectrum above 1 GHz may be suitable for ATV service.

broadcast industry to the current NTSC industry.[17] Depending on the relative prices of NTSC and ATV television receivers, however, some viewers may prefer ATV service, while others prefer NTSC service.

Similar variation in consumer preferences for picture and sound qualities are illustrated by photographers and music listeners. Some photographers choose to buy high-priced 35 mm. cameras, while other photographers choose cheaper, lower quality equipment. Similarly, some music listeners choose to buy CD players, while other music listeners choose lower quality equipment.

Together with the FCC's contemplated restriction on the total quantity of spectrum available for ATV and the agency's preference for the ATV system that uses the least amount of spectrum, the ideal could result in an ATV system that is of lower overall quality than consumers might prefer. Lower quality and the high cost of ATV receivers would decrease the demand for ATV programming, and some stations would find it profitable to continue to offer NTSC programming. As a result, any additional spectrum that the FCC had assigned to these stations for ATV broadcasting would lie fallow or, if permitted, would be transferred to lower-valued nonbroadcast users.

IV. Administratively Setting an Optimal ATV Standard Requires Considerable Information on the Benefits and Costs to Society

Although the FCC notes that it is premature to adopt an ATV standard at present, the FCC also proposes to work with industry to develop such a

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[17] We present below some different views on the expected cost of an ATV receiver.

standard. In general there is no single answer to the question: Does a standard necessarily make society better off? In some instances government can impose a standard that maximizes the value of output to consumers. In other instances, the value of output is higher if standard setting is left to cooperative deliberations by private industry.[18] In still other cases, the value of output might be maximized if no standard is adopted, and the choice of technology or technologies is left to the competitive activities of participants in the market.

The NOI indicates that the FCC is contemplating setting an ATV standard in the near future, with assistance from cooperative industry groups. Accordingly, we suggest that the FCC consider its options in terms of three general categories: 1) setting a standard early in the technological development process, 2) reserving judgment on a standard until later in the technological development process, and 3) leaving the choice among ATV technologies to the market. We do not possess sufficient information at this time to be able to recommend one of these options to the FCC. Instead in the discussion that follows we present the advantages and disadvantages of each option.

1) Setting a standard early in the technological development process

Under the first option, the FCC would encourage cooperative private industry groups rapidly to gather the available information on potential ATV technologies. Based on this information, the FCC would choose a standard

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[18] In this discussion we are, of course, not advocating that industry groups collude to adopt standards that unreasonably restrict competition and thereby reduce consumer welfare. Instead we are considering the cooperative setting of standards, such as those to promote fire safety, that increase economic welfare.

while these technologies were still in the early stages of their development.[19] This option may provide large gains if, based on the relatively limited information that the industry can gather rapidly, the FCC chooses the right ATV technology, and if (absent that choice) gathering additional information would lead to long delays in the choice of a standard, and the market would fail to elicit investment in the development of ATV. However, this option also presents a high risk that the FCC will choose the wrong ATV technology, thereby failing to encourage ATV programming, or misdirecting private investment and delaying introduction of the right technology.[20]

This risk is increased because technological development of ATV is at an early stage. A large number of ATV technologies are under development, and their characteristics are subject to substantial and rapid change. As a result, industry will likely be able rapidly to obtain only highly speculative information on the costs and benefits of different ATV systems. This information includes the equipment costs that each ATV technology would impose on broadcasters and viewers, and consumer preferences for the different levels of quality that different technologies would offer. Such

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[19] Perhaps less restrictively, the FCC could protect a chosen technology from interference by other technologies. This option -- which the FCC chose in TV stereo -- could encourage adoption of a technology without precluding later use of any superior technologies that might be developed. Protecting a particular ATV signal technology means that rival technologies for sending ATV signals would not be allowed to interfere with the performance of receivers that decode signals from the protected technology. This does not imply that rival ATV technologies must send signals that can be decoded by ATV receivers that can decode signals from the protected technology. That is, compatibility is not required.

[20] Even if the FCC chooses the best ATV technology at a particular point in time, the choice may delay improvements to other technologies that prove ultimately to be superior to the chosen one.

information would be needed to assist the FCC in selecting the ATV standard that would be best for society, assuming that it would be in society's interest for any standard to be selected.[21]

The case of color television illustrates the risk that, at an early stage of technological development, the FCC will choose the wrong ATV technology as a standard. In 1950, when the technological development of color television was proceeding at a rapid pace, and after approximately nine months of hearings to gather information from industry and other sources, the FCC chose the CBS technology as the standard. However, the choice failed to encourage color programming because the CBS technology was incompatible with existing monochromatic television receivers. Additional information demonstrated the superiority of an improved compatible RCA system. In response to an industry committee recommendation, the FCC substituted the RCA system for the CBS system as the standard in 1953.[22]

The case of AM stereo provides further illustration of the same risk. In 1980, from the five AM stereo technologies then under development, the FCC

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[21] Conflicting information now exists regarding the price and quality-size relationship for HDTV receivers. With regard to price, an industry executive has estimated that consumers will have to pay a $100 premium over a NTSC receiver, more if the FCC chooses an HDTV standard that requires a wider picture tube. Another executive has suggested, however, that after an initially high price, HDTV receivers will cost no more than NTSC receivers (Broadcasting, 9/12/88, p. 30). Another estimate is that an HDTV receiver will initially cost at least $1,500 (New York Times, 9/21/88, p. D7). With regard to the relationship between the quality of HDTV service and the size of the receiver, one industry executive has suggested that consumers will perceive no difference between an HDTV signal and an NTSC signal on a receiver with a picture smaller than 26 inches. By contrast, another executive has suggested that a significant difference exists even on a 14-inch receiver (Broadcasting, 9/12/88, p. 30).

[22] S.M. Besen and L.L. Johnson, Compatibility Standards, Competition, and Innovation in the Broadcasting Industry, Rand, November 1986, pp. 91-92.

chose the Magnavox system as the standard. This choice was criticized by broadcasters and engineers who cited problems with the quality of the sound transmitted by the Magnavox system and with the high cost of the transmission equipment that the system required. In 1982, in response to these criticisms, the FCC rescinded its choice and, after setting minimum standards for AM stereo systems, left the choice among technologies to the market.[23]

2) Reserving judgment on a standard until later in the technological development process

Under the second option, the FCC would encourage extended cooperative industry deliberations to gather additional information and to promote the further development of ATV systems. Until these deliberations were concluded, the agency would reserve judgment on the need for a standard and on the particular technology that would be selected. The FCC would also consider alternatives to setting a mandatory standard, including letting private groups cooperatively select a voluntary standard, or protecting a chosen system from interference by other systems.[24]

Extended industry deliberations, and the further technological development that would likely accompany them, would provide additional information on the costs and benefits of different ATV technologies. For example, private participants would have more time to collect information on

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[23] See Besen and Johnson, pp. 34-38. This case is considered further below in our discussion of option 3.

[24] The private groups would likely include representatives from several industries -- for example, ATV system developers, equipment manufacturers, broadcasters, and cablecasters -- with diverse interests. This diversity reduces the risk of anticompetitive collusion on prices or quantities of services.

the equipment costs that each technology would impose on broadcasters and viewers, and on the preferences that viewers might have for ATV services of different qualities and characteristics. With this additional information, the FCC would face a reduced probability of picking the wrong ATV technology as the standard, should it prove in society's best interest for the agency to set a mandatory standard. Such information would also assist private industry in selecting the right voluntary standard, absent an FCC choice.[25]

Alternatively, the FCC could protect from interference the technology chosen in industry deliberations. This alternative could encourage the adoption of the technology without delaying the use of any superior technologies that might be developed later.[26]

The increased probability of choosing the right technology would come at the cost of delay in implementing ATV service. In general, the extended deliberations contemplated in this option would require additional time to gather information, to develop competing technologies further, and, possibly,

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[25] Limited cooperative activity in response to a governmental request for information in advance of a regulatory decision -- such as that already encouraged by the FCC in this proceeding, and that contemplated in options 1 and 2 -- would not normally be subject to antitrust attack. The FCC should, however, be aware of the potential antitrust implications of standards. In this regard, see Department of Justice policy statements on research joint ventures (for example, Antitrust Guide Concerning Research Joint Ventures, November 1980; and J. Paul McGrath, Assistant Attorney General, Antitrust Division, "Remarks at the 18th Annual New England Antitrust Conference," November 2, 1984).

[26] In the case of TV stereo, the FCC protected one system from interference by other signals. It appears that the protected system will become the de facto industry standard. It is, of course, possible that no de facto standard would emerge in the case of ATV, even if the FCC gave interference protection to one of the ATV technologies.

to choose a standard.[27] In the case of ATV, several factors would increase the amount of time that these deliberations would require.

First, a dominant participant in the development of ATV technology might be able to act as a "market leader" in adopting a particular technology. However, deliberations to choose a standard are more difficult when there are many nondominant participants with divergent views about the "right" technology. In the case of ATV, the participants include broadcast stations, program suppliers, equipment manufacturers, cable systems, direct broadcast satellite (DBS) services, and Multichannel Multipoint Distribution Services (MMDS), none of which is dominant. Each group contains many members; for example, the NOI cites more than 10 companies that are currently developing ATV technologies. In addition, preferences regarding ATV systems may vary both within and among the groups.

Second, deliberations are more difficult because there are many potentially competitive ATV technologies. To illustrate, the NOI discusses more than 20 ATV technologies currently under development. Of these, more than 10 are compatible with NTSC receivers, five are incompatible with NTSC receivers, and seven other systems have technical parameters that are unknown to the FCC.

Finally, deliberations are more difficult because the development of many ATV technologies is at an early stage. As a result, participants would have much information to collect on those technologies. To illustrate, the NOI notes that there is little information on such technical characteristics

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[27] Until a standard is chosen by the industry or by the FCC, broadcasters and consumers will be reticent to invest their time and money for sending or receiving equipment.

as spectrum requirements, interference characteristics, and interference performance of receivers. Moreover, the NOI is silent on the information on costs and benefits of different ATV technologies to broadcasters, viewers, and the rest of society. Such information would be needed in order to make the tradeoffs necessary to arrive at an optimal standard.[28]

3) Leaving the choice among ATV technologies to the market

Under the third option, the FCC would leave the choice among ATV technologies to the competitive activities of participants in the market. The agency would neither set a mandatory standard nor encourage cooperative deliberations by private industry groups. On the one hand, this option would eliminate the high risk associated with an FCC choice of an ATV standard based on inadequate information. On the other hand, this option would increase the risk that society will be worse off because the market will be slow or unable to coalesce around the best ATV technology.

Absent an ATV standard, the market may fail to develop ATV because investments are delayed or halted. The developer of one ATV technology must incur costs that are not recoverable in the event that another ATV technology wins out in the market. Similarly, ATV broadcasters and viewers must invest in equipment whose costs are not recoverable. The potential loss of these investments may deter developers, broadcasters, and viewers

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[28] Note that the second and last factors increase both the difficulty of the extended deliberations contemplated under option 2, and the risk that the FCC will choose the wrong ATV technology as the standard based on the rapid deliberations contemplated under option 1.

from making them in the first place, even though all would benefit if the investments were made.[29]

Such market failure may be illustrated by the case of AM stereo. The development of this service may have been delayed because, absent a standard, both industry and consumers have hesitated to invest in equipment that could become obsolete.[30] One contributing factor to the problem may be that none of the four AM stereo technologies is strongly preferred. As a result, anyone who purchased equipment would have less assurance that others would follow than if the purchased equipment were clearly superior.[31] Also, industry members are less willing to incur the costs of deliberations because the gains from selecting a particular technology as the standard may be small.

An alternative explanation for the slow growth of AM stereo, however, is that consumer demand is weak because of AM stereo's cost and its qualitative inferiority to FM stereo. It was estimated in 1984 that adding

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[29] The absence of an industry consensus will deter investment under either option 2 or option 3. Option 3, however, will likely entail even greater disincentives to investment, since consumers and broadcasters may not anticipate that a standard will soon emerge from the competition among the many nondominant rival technologies. Conversely, option 2, involving industry cooperation, should more quickly lead to a standard or industry consensus.

[30] In his separate statement Commissioner Quello expresses concern that, absent a standard, the experience of AM stereo will be repeated in ATV. As we noted above, however, the FCC initially set an AM stereo standard, but then rescinded it.

[31] In an attempt to overcome this inertia, suppliers have offered to lease systems, to supply on a free-trial basis the equipment whose costs would be sunk, and to license patents on a royalty-free basis (Besen and Johnson, p. 48).

AM stereo increased retail receiver prices by $20-40.[32] A survey of AM radio stations found none that thought its audience had increased as a result of stereo broadcasts.[33]

In this regard it is instructive to note that, even after the FCC adopted a compatible color television standard developed by the industry, the growth of receiver ownership and programming was relatively slow for several years. Ultimately, of course, color television became highly successful.[34] Hence, it is possible that -- even with an AM stereo standard, and even if AM stereo were ultimately to prove successful -- receiver ownership and programming would grow slowly for some time.

We cannot predict how the ATV market would behave absent a standard. We can, however, identify some possible outcomes. To the extent that a single receiver reduces costs to viewers, the market will tend toward outcomes with all television signals shown on one type of receiver. One such outcome would have a single ATV technology that would be compatible with NTSC television. Another outcome would have one ATV technology, incompatible with NTSC, whose signal would be receivable on an NTSC receiver connected to a translator.[35] Still another outcome would have multiple ATV technologies, some incompatible with NTSC, but all receivable

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[32] See Besen and Johnson, p. 40.

[33] See Besen and Johnson, p. 56.

[34] See Besen and Johnson, pp. 94-95.

[35] A translator permits otherwise incompatible technologies to interact. Whether a translator would be superior to a standard depends on the costs of each (Besen and Johnson, p. 7).

on a single "open architecture" receiver.[36] With available information, however, we cannot determine which, if any, of these outcomes would be best for society.

The absence of a standard may sometimes be in society's best interest, for example, in the case of information search-and-retrieval systems (teletext and videotex). Here two incompatible technologies have different features. Because teletext transmits information in part of the television signal, there is no limit to the number of simultaneous users. Teletext is, however, one-way noninteractive. By contrast, videotex, which transmits information on telephone or cable television circuits, can serve a limited number of users at the same time, but can provide interactive service.[37] It is arguable that a single standard would not have provided this diversity of features, leaving some users' needs unserved.

4) Questions to answer to determine the correct option

In the preceding sections we outlined three general options available to the FCC in considering ATV standards. The FCC can choose any of the

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[36] The economic basis for an open architecture receiver appears to be the decreasing marginal cost of including the capability to receive signals from additional systems. Decreasing marginal cost exists when the additional (marginal) cost of adding one more system to a receiver decreases as the number of systems increases. In the case of receiving television signals, once a receiver can decode an NTSC signal and one ATV signal, the cost of receiving additional signals appears to be low (see NOI, p. 52).

Decreasing marginal cost in a multisystem receiver is illustrated by the case of AM stereo. Matsushita estimated in 1982 that one stereo system would add between $10 and $20 to the cost of a receiver, and that the remaining systems -- four at that time -- would cost an added $10-20 (Besen and Johnson, pp. 34-40). Hence the added cost falls from $10-20 for the first system to $2.50-5.00 per system for the next four systems.

[37] Besen and Johnson, pp. 72-73.

following: 1) set a standard early in the technological development process, 2) reserve judgment while encouraging industry negotiations to achieve a consensus on a standard, or 3) leave the choice among ATV technologies to the market. Given the information that now exists, the choice among these alternatives is difficult. Our analysis, however, points to a few questions that may be important in deciding which option the FCC might want to pursue. The reliability and completeness of the responses to these questions will vary with the option selected. Regardless of that choice, however, we believe that the kinds of information contained in the responses can help the FCC choose the policy that will best serve society's interests.

a) Is there likely to be a "breakthrough" technology in the future that will cause society to miss the "best" available option if a standard is chosen now?

b) What are consumer preferences regarding the likely quality levels of the ATV technologies currently under development? Information might be gathered from consumers regarding their preferences for various known ATV technologies and the intensity of those preferences. Survey techniques may help determine the strength of those preferences for experimental systems.

c) How many local stations would have to broadcast an ATV signal to make the system of value to consumers? How would that value change as more stations were able to broadcast ATV signals?

d) What time delay would consumers be willing to incur to reduce the ultimate cost or improve the ultimate quality of ATV systems?[38]

e) What will be the costs of receivers and transmitters under each of the various systems and what would be the cost of an open architecture receiver if multiple transmitting systems existed?

f) Would translators reduce the cost of ATV systems and what would be the cost of those translators to consumers? Would such translators reduce picture or sound quality?

g) What can we learn from the European and Japanese experience with ATV? Does this experience indicate the magnitude of the costs and benefits associated with early choice of a standard and with the choice of a standard that is not NTSC-compatible?

h) Should the FCC wait to see whether cable TV chooses a standard for HDTV? Due to the nature of consumer payment for cable TV service, the cable experience may provide a means of market-testing a standard.

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[38] Picking a standard early will not necessarily result in earlier, more widespread use of the chosen ATV technology, particularly if it becomes apparent that the "wrong" standard was chosen.

V. The Proposed Requirement that ATV be Compatible with Existing Television Receivers Could Impose Future Costs on Society that Exceed Any Benefits

The FCC's proposed requirement that, during a transitional period, ATV broadcasts be receivable on existing NTSC receivers appears unlikely to have an impact for the immediate future. Even without this requirement, broadcasters would probably not choose an ATV technology that would cut advertisers off from a large fraction of their viewers.[39] Hence, the near-

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[39] The experience of the CBS color television technology, which the FCC originally chose as the standard, may be instructive in this regard. The CBS technology was incompatible with existing monochromatic television sets. As a result, viewers with such sets turned to other networks during the hours when CBS broadcast in color, and many did not return to CBS during the hours when it broadcast in black and white. A final blow to the CBS system came when the government prohibited the manufacture of color receivers due to Korean War demands. The CBS system was abandoned, and a private industry group developed a compatible standard based on an improved RCA system (Besen and Johnson, pp. 91-93).

In this regard, it is interesting to note the degree of compatibility between ATV and conventional television in other parts of the world. In Japan, the Ministry of Post and Telecommunications will provide two ATV services: an ATV service -- at less than the HDTV level -- that is NTSC-compatible, and an HDTV service by satellite that is incompatible with the existing NTSC system. The compatible system has been proposed for a gradual transition from NTSC to HDTV. In Europe, by contrast, HDTV broadcasters plan to provide an HDTV service by satellite, that is compatible with a DBS system, but not with the existing terrestrial broadcast television systems. European viewers will have to buy a dedicated receiver and satellite receiving antenna to receive the HDTV DBS signal. This outcome appears consistent with the lesser importance of advertising revenues in Europe compared to the United States.

term benefits of requiring that ATV broadcasts be compatible with NTSC receivers are likely to be minimal or nonexistent, as are the costs.

As ownership of ATV receivers grows, however, the size of the ATV audience could make profitable an ATV technology that is superior, but incompatible with NTSC receivers. At that point the compatibility requirement could delay such a technology, if the FCC did not relax the requirement soon enough. The costs of the requirement would be the lost benefits of the delayed ATV programming to the potential viewers.

The requirement could provide benefits in the future if it prevents the premature ending of NTSC service, that is, the ending of service when the net benefits to society from continuing NTSC television are greater than the net benefits from initiating the incompatible ATV service. Although inefficient replacement of a technology can occur in some instances,[40] we are unable to determine whether such an outcome is likely in ATV. The discussion in the NOI of the different ATV technologies suggests that the FCC also lacks the information needed to make this determination.

Because a compatibility requirement would likely have little or no impact in the immediate future, it appears that the FCC might reserve judgment on the requirement until additional information becomes available. With additional information on costs and consumer benefits, the FCC could make an assessment of the probability of inefficient replacement of NTSC television and of the costs and benefits of delaying the use of an incompatible ATV technology.

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[40] See Besen and Johnson (p. 25) for a discussion of this "inefficient bandwagon" effect.

VI. Conclusions

Instead of restricting the quantity of spectrum that ATV service may use, we suggest that the FCC permit licensees in the broadcast region, and possibly other regions, of the spectrum to transfer their licenses. Such license transfers could increase the quantity, quality, and variety of ATV programming available to viewers. Transfers would also ensure that spectrum did not remain idle.

With the information currently available to us, we cannot conclude with certainty that the FCC or cooperative private industry deliberations should set an ATV standard, or that the choice among ATV technologies should be left solely to the noncooperative activities of participants in the market. We have, however, identified several issues that the FCC might usefully investigate in its deliberations concerning ATV standards.

Finally, we suggest that the FCC consider relying on the market to determine how long NTSC programming continues. The alternative under consideration, a compatibility requirement, may impose future costs on society that are greater than any benefits.