

However, the present era is witness to technologies far beyond the conception of those who forged the NTSC standard, to a rapid pace of technological development and competitive vigor in bringing innovative products to the global marketplace. Consequently, it is essential that the various industry groups play a primary role in standards-setting.

Specifically, we support a standards-setting process in which the industry groups forge a consensus regarding the most desirable ATV standards and systems based on the work of Working Parties 1, 2 and 3 and on extensive testing of hardware, particularly in the planned ATTC labs. When this consensus is reached, Working Party 4 of the FCC Advisory Committee should produce as its final output a recommendation for adoption by the industry and the Commission of either a single ATV standard or multiple standards based on the most promising of ATV systems.

The actual adoption of a standard or standards based on an industry consensus must afford all affected parties an opportunity to participate, because many conflicting interests will invariably be involved. It is imperative therefore that proper due process, with a fair and equitable voting mechanism, be put into place. For example, recommended standards could be forwarded to the ATSC, which already has in place a voting procedure for voluntary standards approval. The Commission could thereafter ratify the standards adopted through this voluntary process.

Our own experience with the process of bringing to fruition an HDTV production standard in a industry setting (under SMPTE and ATSC) convinces us that the process of consensus-building by the industry leading to adoption of a standard -- a unique U.S. methodology -- serves the public interest very well because it harmonizes the disparate voices of the industry. Moreover, manufacturers such as Sony will move forward much more expeditiously to bring ATV systems and receivers to fruition if we have well-planned and executed standards to guide our progress.

3. Inflexible Standards With The Force of Law

We support and applaud the Commission's conclusion that ATV transmission standards should be flexible in order to enable future developments to be taken into account. Further Notice, ¶¶ 115-16. ATV standards will inevitably be established in the dawn of a new age of television imaging. While all of HDTV's applications and resulting benefits for the U.S. public cannot now be anticipated, the Commission must realize (as we emphasized in our Reply Comments) that this new television age is not (like the original NTSC color system of the 1950s) born with the exclusive end result of enhancing home entertainment. Rather, this is an age where vastly improved television images will be carried by terrestrial transmission, satellite, cable and packaged distribution media and will reach into all walks of

life, including industrial, business, government, military, cultural and educational settings.

Yet we must not let the need for flexibility disintegrate into a multiplicity of diverse and incompatible transmission standards. ATV transmission standards must enable ATV to be transmitted to all U.S. households equipped with NTSC receivers. The Commission has mandated no less. Therefore, it is more desirable for the needed flexibility to be attained through development of a transmission standard that contains built-in guidelines for future refinements that will enhance the quality of ATV terrestrial transmission as time and new technologies permit. The SMPTE 240M standard for HDTV studio origination is a good example of an ingenious standard that contains its own blueprint for the future -- built-in steps -- that affords industry the time to implement sequential and evolutionary developments in colorimetry as technology and manufacturing processes allow, while also accommodating future developments in digital technology. The industry, and ultimately the U.S. public, will benefit from such flexible standards crafted by a broad range of interests and with the individual foresight of members of the industry.

4. Timing of Adoption of ATV Standards

The Commission has tentatively concluded that it is premature to adopt ATV transmission standards and seeks further comment on this conclusion. Further Notice, ¶¶ 113, 119. Sony

agrees that it is premature to consider setting ATV transmission standards. More than 20 ATV transmission systems have been proposed. Many are in embryonic form and are still being reduced to preliminary prototype hardware. Accordingly, a critical testing program has yet to take place. This testing program will represent a very significant milestone in the Commission's ATV program for two primary reasons: first, the testing program will quickly distinguish the legitimate contenders for a robust effective ATV system; and second, the results will galvanize industry efforts toward building a consensus. As described above, we hope this consensus process will set the stage for the forging of ATV standards for broadcasting that will enhance rather than impede the potential for worldwide program exchange and production compatibility.

Obviously, a well implemented test program must precede standards-making activity. However, standards-setting is a laborious, time-consuming endeavor, and Working Party 4 of the Systems Subcommittee of the FCC Advisory Committee would be well advised to begin preparing now for what may be a lengthy committee deliberation on the fine details of the particular standards to be recommended. For example, it is quite possible for the Working Party to determine now the scope of the planned standards and the structure of the standards document even in advance of its anticipated recommendations on specific ATV systems.

5. Limitations on the Duration of a Mandatory Standard

The Commission has noted the apparent benefit of a sunset provision for any mandatory ATV standards, which would ensure compatibility with the existing NTSC system in the early stages while paving the way for the introduction of new technologies at a later date. Further Notice, ¶ 118. We see no apparent advantage in limiting the duration of a mandatory standard, however. We know of no precedent in television history that would warrant consideration of a short-term standard. As a manufacturer planning to be active in future ATV receiver development, we would be most uncomfortable with the unpredictability associated with a standard having a limited life. We favor instead the careful structuring of a standard that encourages the timely commitment of substantial industry resources to launching a real ATV service, while at the same time forming a flexible blueprint that is consistent with industry's best assessment of evolutionary future possibilities.

6. The Possibility/Desirability of a De Facto ATV Standard

The Commission has sought comment on the likelihood that a de facto standard will be adopted by the industry and the desirability of such a development. Further Notice, ¶ 119. Our television industry has seen the establishment of de facto standards in the past that have served the public interest and industry very well. The marketplace can be a very shrewd judge

of the merits of a given technology and of public interest, and a de facto standard can replace a more formal standardization process. In view of past positive experience with de facto standards-setting, it could be argued that the establishment of a de facto standard for an ATV transmission service might repeat a procedure that has proven effective -- on occasion. But the circumstances of time and place play a major role in such a process.

The existence of alternative means for bringing HDTV to the U.S. home in the future by media other than terrestrial transmission is a pivotal reality that cannot be overlooked within the overall ATV scenario. Some of these alternative media enjoy a freedom -- both technical and regulatory -- not experienced by the broadcast industry and would find it all too easy to quickly establish their own de facto signal distribution format. This specter pressures all who are working on terrestrial ATV transmission emission systems. It would perhaps be very tempting for the more confident and technologically developed proponent to recognize this pressure and to make a run for a de facto placement of its unique system.

We believe, however, that the risks attendant to such a move -- particularly the narrowing of technical compatibility that could result -- are unacceptable in the current environment. A far more orderly process will result from a cooperative effort under the aegis of the FCC Advisory Committee to initiate

promptly a well-founded testing program. Such testing undoubtedly will raise new questions, but it will answer many more and will set the stage for logical ATV standards-setting activities.

7. The Open Architecture Receiver

The Commission expressed interest in an open architecture receiver ("OAR") as a means of allowing more flexibility in the development and provision of ATV service. Further Notice, ¶ 119. However, because the arguments on this issue are not well developed, the Commission asked for additional information, particularly with regard to the projected cost of an open architecture receiver. Id.

The subject of OAR has been widely debated in our industry and continues to be the subject of vigorous dialogue. Our internal examinations and our recent preliminary review of the many proposals for ATV systems convince us now more than ever that ATV receiver costs will pose immense challenges to all of us engaged in consumer receiver design.

While OAR is admittedly appealing in concept (particularly when reference is made to current computer practices, the move toward digital processing within present day receivers, the incorporation of microcomputers and a consequent swing to software rather than hardware implementation of certain functions, and the possible digital encoding techniques advanced by various ATV proponents), we still see the philosophy of open

architecture as an abrupt change in the philosophy of worldwide contemporary receiver design.

We all face a great battle in the near future to produce ATV receivers acceptable in cost to the U.S. consumer. These receivers will involve large screen displays, the cost of which can rise rapidly with increases in physical dimensions. They will certainly involve decoders of a complexity far beyond those in current NTSC receivers. Electronic technology's fast-paced evolution will no doubt work favorably, but only to a degree. OAR, if mandated by the Commission, would introduce even greater complexity (and consequent cost) by imposing on manufacturers detailed specifications for multiple transmission formats that would be accessed by consumers through numerous plug-in boards. This result would not be desirable because of the costs and complexity associated with such receivers. Industry must remain unfettered in its options to develop ATV receivers whose costs and level of technical complexity are in line with what consumers realistically can manage.

We prefer, therefore, to remain open-minded on the subject of OAR and urge the Commission to take no steps that in any way impose such an approach upon our industry. If OAR makes sense in some future scenario which regrettably involves a proliferation of multiple ATV standards, then the receiver industry will be very quick to seize upon such an approach. But this decision should be left to the industry and marketplace

forces. Above all, OAR explorations should in no manner dilute industry and Commission efforts to energetically pursue a single ATV standard.

8. Compatibility with Alternative Media

The Commission has tentatively concluded that while interoperability of a terrestrial ATV system with alternative media such as satellite, cable and VCR is desirable, it does not intend at this time to mandate such compatibility. Further Notice, ¶ 133. There can be little argument about the apparent desirability of compatibility of a terrestrial ATV transmission service with alternate media. For example, it is important to recognize that thousands of cable television systems in the U.S. transmit terrestrial broadcast television programming. We believe this level of compatibility to be most relevant to a future ATV scenario. We further believe that satellite distribution will serve as a major mechanism for ATV program contribution feeds from networks to their affiliates and also will be used to deliver ATV programming to cable headends. However, from a purely technical viewpoint, it must be recognized that the Commission's tentative ruling constraining the ATV system to 6 MHz channels (and, further, to compatibility with NTSC) places quite severe constraints on the possibilities otherwise open for some of the alternative media. This specifically applies to the packaged distribution media of VCR and video disc.

The situation is further clouded, at this time, by uncertainty over the ATV system that is likely to succeed in the U.S. There are almost two dozen proponents -- any one of which could emerge as the most promising following the Advisory Committee's analysis and testing. However, at this time the outcome of that process cannot be predicted. None of the proponent systems have demonstrated hardware systems that can give us any guidance as to criteria for picture performance; consequently, we do not yet know the actual ATV picture quality that will finally be realized in the U.S.

An insistence, therefore, on rigid compatibility of the terrestrial ATV transmission system with the other alternatives would, at this time, hamper current development efforts. The fundamental relationship between available bandwidth and final picture resolution applies to all media -- and bandwidth is the major variable between different media. The natural inclination of any competitive manufacturer is, of course, to proceed with the development of a particular media of interest, for example, a video disc system, and take an approach that would optimize the capabilities of that particular media in an attempt to realize true HDTV portrayal for the consumer.

Our opinion, at this time, is that it is simply too early to finalize any decision on whether a single ATV transmission standard is also applicable to all other non-broadcast media. However, we see considerable value in the

Commission urging industry to attempt to ensure a reasonable level of interoperability between ATV media. It may well be that a well-planned, hierarchical structure within a given ATV encoding/modulation system would allow simple conversion from one ATV format to another, with each format tailored optimally to the constraints of the different media. Such a hierarchy could be as simple as a scaling of bandwidth according to the capabilities of the individual media or it might of necessity embrace encoding techniques that permit relatively easy conversion from one level of the hierarchy to another. This would allow maximum exploitation of each media, while allowing a workable degree of interoperability between media. Such flexibility is clearly in the public interest. But further study and considerably more R&D effort is required on the part of industry to understand fully the degree of inter-operability that can indeed be achieved.

IV. SPECTRUM ISSUES

A. Spectrum Options

The Commission has tentatively concluded that it will allot additional spectrum only within the existing VHF and UHF television allocation for future ATV transmissions. Further Notice, ¶ 75. The Commission has further concluded that it will consider for possible authorization as a U.S. terrestrial ATV television system only those ATV systems with spectrum plans that employ no more than 6 MHz of additional bandwidth per station.

Id., ¶ 82. Thus, any new ATV system must either transmit a signal that is compatible with the existing NTSC system or simultaneously transmit an ATV signal and a NTSC signal on separate channels (the "simulcast" option). Within these constraints, there are a number of options available, summarized at paragraphs 82-93 of the Further Notice, for spectrum assignment. We offer below our perspective on the issues raised by these options.

1. Contiguous Versus Non-Contiguous Channels

Based upon extensive experience in television receiver design and worldwide evaluation in all conceivable transmission environments, we view with some apprehension the separation of any ATV signal which involves an augmentation channel into two components that are separately transmitted. Even with the highly sophisticated receiver designs of today, propagation of VHF and UHF signals poses many unpredictable obstacles to transmitting a clean signal for final display. At the very least, to minimize a new level of unpredictability stemming from new differential phenomena (i.e., the disparate characteristics of two RF channels), we favor channels that are as close as they possibly can be -- namely adjacent. In particular, we strongly recommend against any consideration of UHF/VHF or VHF/UHF.

2. Simulcast versus NTSC-Compatible Options

On the surface, there is much to be said in favor of the simulcast scenario, in which an NTSC-incompatible HDTV signal

is transmitted on a separate 6 MHz channel simultaneously with the NTSC signal. This is so for two reasons.

First, NTSC-compatible ATV systems are severely constrained by the inevitable tempering of today's powerful encoding methodologies caused by adherence to the "millstone" of an older (and very spectrum inefficient) NTSC encoding system. Indeed, the Commission has already recognized that the long-term survival of a 6 MHz NTSC-compatible ATV system is unclear. This recognition highlights, in our view, the dilemma posed to the industry by a Commission compelled to move in a most expeditious manner on spectrum decisions, while simultaneously preserving the massive existing broadcast infrastructure based on the NTSC format.

Second, the simulcast scenario frees up an entire 6 MHz channel devoted to the HDTV signal to exploit the best of contemporary ingenuity in signal compression and encoding techniques. This allows the packing of a great deal of HDTV signal information into that 6 MHz channel. Moreover, the simulcast approach could be very desirable as a long-term scenario, because it preserves intact the form of program distribution used today -- the 525 NTSC signal, thus allowing an opportunity for a clean cessation of this service at some appropriate time in the future. At that time, another 6 MHz channel will become available, either for additional ATV

transmissions or possibly for future development of a yet higher level of ATV capability using two channels.

Despite the apparent benefits of the simulcast option, we remain concerned that compressing so much information into a single 6 MHz channel will increase the potential for causing harmful interference beyond that of the relatively benign NTSC signal. Moreover, we have not yet formed an opinion on whether true HDTV quality can indeed be carried by an incompatible signal within a 6 MHz bandwidth. However, our examination of the few proposals that describe such encoding/compression techniques certainly leaves us with open minds. For the present, it is clear that the Commission must devote special care and attention to the planning and implementation of the test program for those non-compatible 6 MHz ATV systems that are based on a simulcast scenario. Much can be learned by comparing these results with the alternative two-channel compatible approaches.

B. Advisory Committee Spectrum Study

The work of the Planning Subcommittee Working Party 3 on ATS Spectrum Utilization and Alternatives, summarized at paragraphs 54-59 of the Further Notice, provides the first blueprint for possible availability of and options for sharing spectrum space in the UHF and VHF bands. This work must be kept in careful perspective, however, because while it provides a broad guideline, it lacks a total systems approach. This deficiency stems, as the Commission recognized, from insufficient

fundamental information on possible ATV systems and the severe time constraints imposed on completion of this first study.

Further Notice, ¶ 54. Nevertheless, the enormous scope of the fundamental engineering tasks which must precede any decision on spectrum allocation must not be underestimated.

The total systems approach must fully recognize that an intricate interdependence exists between spectrum allocation, the attributes of a particular ATV system, and the technology of new ATV receiver design. To date, very little information is available on the ATV systems and their related receiver design. The puzzle is therefore most incomplete, and the continuing work of Working Party 3 must be flanked by a well planned and promptly implemented propagation test program. The early work of the ATSC T3S4 Task Force on Terrestrial Broadcast Propagation became immobilized at a critical juncture due to structural changes in the ATSC and FCC Advisory Committee and a consequent shift in responsibilities. This is most regrettable. Valuable time was lost and critical data continues to elude the many experts who need it. Questions relating to the spectrum requirements of an augmentation channel, technical aspects of contiguous or non-contiguous dual channel operation, simulcast, and the like can only be answered by analysis of substantive data derived from extensive testing. There should be no short-circuiting of this fundamental research upon which the future viability of so many ATV proposals are dependent.

C. OET Studies of Spectrum and Receivers

The Commission's summary of the OET studies of spectrum availability and receiver performance highlights the complexity of these issues. Further Notice, ¶¶ 60-72. The HDTV era ushers in a whole new and uncharted set of parameters in multiplexed baseband video and audio signal formats and their encoding and subsequent modulation -- the radical departure from our well known NTSC signal structure proposed by many ATV proponents; the enormous increase in energy content within the baseband video signals indigenous to some of the proposals; the as-yet unknown nature of some of the compression/packing techniques proposed; the new synchronization schemes offered by some; and the addition of multi-channel digital audio within the same signal structure. The sheer number of variables, and the interdependence of many, is challenging to the best of engineering minds.

We appreciate the constraints under which the OET worked in their study on present receiver design capabilities. Further Notice, ¶ 69. But we do question the assumption that the NTSC format represents the "worst case" interference situation. While some ATV proponents have incorporated design precautions and criteria to ensure this, others have not. Some baseband structures are more complex (and on the surface, more fragile) than the NTSC signal format. The potential for interference posed by these signal formats is totally unknown. Again, only proper testing will reveal the realities.

We feel at the present juncture, however, that is essential to move away from the drawing board and into the laboratory. While ongoing theoretical studies will continue to expose optional scenarios (an admittedly important function), we feel the time has come to focus attention on the testing of hardware. No amount of theoretical study can predict the complex behaviors that will ensue. Computer simulation is only a tool to aid the process (albeit a powerful tool); it can provide no conclusive answers. Only a stringent professional test program and measurements on real operating systems will provide the critical answers required to support the nation's move to a future ATV service. These measurements must carefully anticipate the dual nature of the problem -- the interference impact of external signals on a new ATV transmission system and the impact of the particular characteristics of the ATV coding and modulation scheme on other external channels.

We stress the complexity and importance of the task at hand because we see the need for a level and intensity of test activity that currently will not fit the schedule of the present FCC Advisory Committee timetable, which calls for completion of testing by 1989. The planning for such testing itself is an enormous logistical task. The test program will be far more complicated than is anticipated by many. Numerous tests, conducted under a multiplicity of conditions, will be required to

extract the critical answers needed. It is mammoth task, and the schedule is already slipping.

The Commission must recognize that the very short time allotted to the entire ATV development cycle will afford very few ATV system proponents the opportunity to pre-test their systems. Therefore, they will learn much for the first time during the Systems Subcommittee Working Party 2 test program. The usual iterative process of testing, modifying, retesting, and remodifying will not be easy to adhere to within the high-pressure environment of a test program that seeks to give fair and equitable consideration to all proponents.

Yet the complexity of ATV encoders and receivers cannot be ignored or underestimated. Such technical developments are currently in their infancy. And we are talking about cramming more dense and complicated signals into a possibly new and uncharted scenario of channel allocation. The Commission must recognize the vital cooperative role it must play in aiding the process of problem solving. The interests of the U.S. broadcasters cannot be short-circuited to meet schedules that may have no basis in reality. We urge the Commission to give maximum support to the FCC Advisory Committee in implementing a vigorous, quantifiable, controlled test program that is not short-circuited because of time pressures. If this calls for an extension of time for completion of the Advisory Committee's tasks, then we urge the Commission to take such steps now as may be necessary to

assure that the Advisory Committee will have an uninterrupted authorization to complete this essential test program.

V. ALLOTMENT AND POST-ALLOTMENT ISSUES

Sony has considerable experience in servicing the U.S. commercial broadcast system with a wide range of broadcast studio equipment and also services the U.S. consumer with domestically-produced television receivers. The U.S. commercial broadcasting system is unique in the world and has no peer, given its enormous infrastructure of more than 1,300 local television stations, its competitive vigor, and its emphasis on regional diversity and localism not found anywhere else in the world. The dynamics that propelled the vigorously competitive nature of this service are also uniquely American; nothing should be permitted to imperil this superb service. Based on Sony's intimate familiarity with the special nature of the U.S. broadcast system, it is inconceivable that a substantial improvement in television imaging capability and the future of U.S. local broadcasting are mutually exclusive. HDTV is a logical development whose time has come, and U.S. television broadcasters should not be placed at a serious competitive disadvantage relative to other video delivery media -- an imbalance that would do a very major disservice to the public interest.

It is therefore incumbent upon the Commission to recognize the fact that while the U.S. deserves a continuing

broadcast terrestrial service, such service must compare favorably among the other ATV alternatives that can and will be brought to U.S. households. This places an immense responsibility upon the Commission as guarantor of that most sought after media -- the air wave spectrum. The Commission must therefore take a long term view and recognize that no matter what form in which ATV first appears in the U.S. households, it will continue to evolve. ATV's evolution will continue to be propelled by technology and by competition -- two forces with which the U.S. has ample experience, indeed more than any other nation. The two major technical restrictions tentatively proposed by the Commission -- restriction to 6 MHz channels and compatibility with NTSC -- pose a technological hardship on the terrestrial ATV system and the possibilities for its evolution and continuing competitiveness with alternative media. This hardship could be offset somewhat if the Commission ensures that additional spectrum will be made available to broadcasters in the future to enable terrestrial ATV systems to progress in pace with the inevitable evolution of the alternative media.

Sony is unable at this time to recommend a particular allotment methodology. There is simply too little information relative to the availability of appropriate spectrum. We do feel, however, that, once again, testing is all important. Even though the Commission is strongly urging that attention be exclusively focused on the spectrum below 1 GHz, Sony believes

that the long-term solution mandates lifting this constraint.

The broadcaster must have access to additional spectrum in the long term -- wherever it may come from. At the very least, the Commission should collect data on this issue and should retain an open mind regarding the need for and source of additional spectrum in the future. The industry is rallying to undertake a major effort, resources are being mobilized, test centers are being assembled. To let all of this pass by and not utilize the opportunity to test and gather valuable data for future examination would be a major failure.

We urge the Commission to give priority and positive encouragement to doing the necessary fundamental homework -- and later concern itself with determining whether post-allotment adjustments of spectrum allocations for ATV are necessary and proper. The very broad and complex implications of the latter have no part in the present environment -- where first and foremost technical answers are being sought to enable

broadcasters to introduce a terrestrial HDTV service to the
American audience at the earliest possible date.

Respectfully submitted,

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CERTIFICATE OF SERVICE

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