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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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

REPLY COMMENTS OF SONY CORPORATION

Tom W. Davidson
Margaret L. Tobey

SIDLEY & AUSTIN
1722 Eye Street, N.W.
Washington, D.C. 20006

Its Attorneys

January 23, 1989

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Sony Corporation ("Sony") hereby submits its reply to the comments filed in response to the Tentative Decision and Further Notice of Inquiry on Advanced Television Systems released by the Federal Communications Commission ("FCC" or "Commission") on September 1, 1988 (FCC 88-288) ("Further Notice").[1]

I. INTRODUCTION AND SUMMARY

The comments filed in response to the Further Notice evidence an encouraging level of agreement among diverse parties on major issues facing the Commission and the communications

[1] The Commission extended the filing deadline for reply comments to January 23, 1989.

industry on the threshold of the high definition television era. In particular, the comments reflect widespread support for a terrestrial HDTV broadcast service in the United States that appreciably enhances the quality of visual images in the home without abruptly displacing existing NTSC service, wasting scarce spectrum, or alienating consumers with a profusion of complicated, incompatible, and expensive video devices. The majority of commenters also recognize that such goals can be timely achieved only if the Commission indicates its support for and takes an active role in the establishment of uniform HDTV standards after a period of thorough testing and evaluation of proponent systems. The value of such standards in encouraging the necessary investment in this new technology by creating certainty in the marketplace is a theme repeated frequently in the comments of manufacturers, broadcasters and other entities representing cable, satellite and telephone company interests, trade associations, and others.

Most of the comments that address the issue of standards-setting focus on transmission standards, in part because the transmission of HDTV signals is viewed as a particularly national issue that is most appropriately addressed in this federal forum. A number of parties recognize, however, that the many diverse HDTV transmission systems now being developed and adopted by the nations of the world will be served best by a production community that is united behind a single

production standard that offers "the best picture resolution that consumers can reasonably expect to receive over any media."[2]

The Commission itself has acknowledged the relevance of production standards to "the overall quality and likely success of specific [HDTV transmission] systems" and has therefore requested the parties to comment on this issue. Further Notice, ¶ 21. The comments filed in response to this directive reflect a widely held view that a uniform production standard will advance many important public and private objectives, including enhanced international program exchange; international co-production of television programs; maximum utility of HDTV imaging for such diverse applications as electronic cinematography, flight simulation, printing and publishing, medicine, education, and others; certainty in the marketplace, leading to investment in new technology; and consequent economies of scale in equipment manufacture.

Since 1983, the nine broadcasting unions of the world, including the North American Broadcasting Union, have endorsed the goal of a uniform worldwide production standard, and most of these organizations have embraced the 1125/60 production standard

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[2] Comments of Southwestern Bell Telephone Company at 4; see also Comments of Public Broadcasting Service and National Association of Public Television Stations (PBS) at 31-32; Comments of ATSC; Comments of the HDTV 1125/60 Group.

as the only HDTV production standard that realistically can be expected to fulfill these objectives by gaining worldwide acceptance. As recently as January 1988, the Advanced Television Systems Committee (ATSC) and the Society of Motion Picture Television Engineers (SMPTE) adopted the 1125/60 production format as a voluntary national standard for HDTV studio origination in the United States, and the American National Standards Institute is currently considering adoption of the standard. In addition, the 1125/60 production standard is the only standard that is officially before the CCIR at this time.

At this critical juncture in the CCIR four-year study cycle on HDTV, it is important to maintain an international perspective. However, a few of the commenters (including those who have supported the 1125/60 production standard in the past) have developed a more parochial view that imperils this fundamental goal of HDTV, i.e., the global benefits of a uniform world standard for studio origination and international program exchange. Regrettably, in disparaging the 1125/60 standard as a viable world-wide production standard -- as well as the standard for North America -- the result is the introduction of misconception into the record. Since this record will provide the basis for policy decisions that will profoundly affect the future of HDTV in the United States and elsewhere, it is imperative that the Commission have before it a complete and accurate record on the subject of production standards.

Therefore, Sony submits these reply comments in the hope that it can dispel some of the misconceptions in the record before decisions are reached that will irretrievably jeopardize the ultimate goal -- shared by all parties -- of enhanced international communications. The parties must not lose sight, at this critical juncture, of the larger perspective -- the communications industry in all its many facets is moving irrevocably toward a new global information age.

Sony is also dismayed by the self-interested advocacy contained in the comments of some ATV transmission system proponents, who urge the Commission to prejudge important issues long before the record is fully developed.[3] While the opening comments in this proceeding provide useful information about various proposed ATV systems, there simply is no basis in the present record for action by the Commission that would substantially narrow the choices available to American broadcasters and the American television audience. Therefore, Sony urges the Commission to avoid making premature substantive decisions on the basis of an incomplete record and to take steps now to ensure that the Advisory Committee has adequate time to complete the testing process before its charter expires.

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[3] See, e.g., Comments of North American Philips Corporation (NA Philips) at 7, 9.

II. THE 1125/60 PRODUCTION STANDARD SHOULD BE SUPPORTED BY THE U.S. BROADCASTING AND MANUFACTURING INDUSTRIES

Several parties, including Capital Cities/ABC, Inc. (ABC), National Broadcasting Company, Inc. (NBC), Zenith Electronics Corporation (Zenith), and North American Philips Corporation (NA Philips) have argued in their opening comments that while a uniform worldwide production standard is desirable for many reasons,[4] the chosen standard should not be based on the 1125/60 scanning format because the 1125/60 format is not "NTSC-friendly" or because the 1125/60 standard appears to have been rejected by the European broadcasting community. This view is somewhat understandable, particularly among U.S. broadcasters, given the history of broadcasting in the United States: For more than 40 years, there has been complete parity among the scanning formats used in television studios, transmission systems (terrestrial, cable, satellite), and receivers in the United States, based on the 525/59.94 encoded NTSC signal. Thus, the perpetuation of this standard (or a standard that is integrally and harmonically related to it) in HDTV production offers a certain superficial appeal when viewed solely in the context of terrestrial broadcasting within the United States.

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[4] See Comments of NBC at 23-24; Comments of Zenith at 17; Comments of NA Philips at 34.

The U.S. television and electronics manufacturing industries do not operate in isolation, however. To the contrary, U.S.-based manufacturers must recognize that the professional HDTV studio equipment market will be a highly competitive international activity. Therefore, any effort to tailor HDTV production standards -- exclusively to American transmission requirements (based on an older television transmission standard) will result in an insular industry that is unlikely to develop in the future as a serious international competitor.

The U.S. broadcast industry likewise must not view itself in isolation. U.S. broadcasters obtain their programming from a large and successful program production community for whom foreign syndication is critical to financial success. This production community presently uses 35mm film -- not television -- to originate more than 80% of prime-time television programming, because 35mm film represents the worldwide standard of excellence. In addition, because of the worldwide consensus on this standard, program producers -- domestic and foreign -- are able to film virtually anywhere in the world using fully compatible equipment. More importantly, their edited programs subsequently can be syndicated in any region of the world because 35mm film is a unique and universally accepted world production standard.

HDTV is the first television system that offers program producers an electronic medium that can compare qualitatively to 35mm film, and the 1125/60 HDTV production standard offers the best of the HDTV alternatives for the electronic emulation of 35mm film. Thus, the Public Broadcasting Service, which uses foreign-produced films, sells its programs abroad, and has co-production arrangements with foreign producers, has, in its comments, strongly endorsed the 1125/60 production standard as the only proposed standard "that would permit international ATV production standardization and thus the international exchange of ATV programs."[5] For these reasons, and because of the technological superiority of the 1125/60 standard as an origination standard, many international broadcasting unions and other professional organizations have also endorsed the 1125/60 production standard. In view of this continuing widespread support for the 1125/60 HDTV production standard, we urge the network organizations seriously to reconsider their positions on the standard.

Nor will U.S. broadcasters stand alone in the delivery of HDTV signals within the United States. Cable, direct broadcast satellite, and videocassette all will deliver HDTV signals -- unrestrained by many of the limitations imposed on terrestrial broadcasters. At the same time, the television

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[5] Comments of PBS at 31-33.

studio of the future could be expected to feed many different signal formats to a variety of different media. The engineering and other experts who support the highest quality studio production standard recognize a fundamental principal that must guide HDTV decision-making if these demands are to be met -- a high-quality HDTV studio signal can be downconverted to serve diverse transmission systems while remaining acceptable to viewers, but an inferior studio signal rarely can be improved.

As the Commission observed in its original Notice of Inquiry in this proceeding, the NTSC standard "reflects the technological limits of the early days of television development, and is perceived today as limited in video quality and audio fidelity. More importantly, it no longer represents the limits of the present and anticipated future technological possibilities in the home video delivery service."[6] Therefore, if U.S. broadcasters and manufacturers are to play a leading role in HDTV development, as they should, they must not treat the Commission's tentative decision to require compatibility with NTSC receivers as establishing the necessary parameters of the HDTV production standard. In the interest of the ultimate goal of enhanced international communication, now is the time to turn outward and put to rest parochial concerns. Above all, U.S. broadcasters and electronics manufacturers should not take actions or advocate

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[6] Notice of Inquiry, 2 FCC Rcd 5125, ¶ 6 (1987).

positions at this early stage of HDTV development that will jeopardize worldwide support for a forward-looking HDTV production standard based on the 1125/60 scanning format. Solidarity on this issue is particularly important on the eve of the 1990 plenary session of CCIR, when other nations are looking to the U.S. broadcasting and manufacturing industries -- and even the Commission -- for guidance on HDTV's future evolution. Many of these nations have viewed with admiration the significant accomplishments of the SMPTE, the ATSC, and the FCC, yet lack the resources to replicate these efforts on their own. Therefore, as the HDTV technology rapidly develops, the leadership role of the United States will assume even greater importance.

Two of the national networks and two electronics manufacturers offer two basic reasons for their current lack of support for the 1125/60 production standard -- the apparent rejection of the standard by European broadcasters and the claimed "unfriendliness" of the 1125/60 standard to the NTSC format. As we show below, neither of these reasons can justify withdrawing support from the only high quality production standard that has any chance of gaining worldwide acceptance.

A. U.S. Choices Should Not Be Limited by European Broadcasters Who Propose No Terrestrial HDTV Service

NBC states that "now that it appears that European broadcasters will not accept an 1125/60 standard," NBC and other broadcasters and manufacturers[7] have submitted to SMPTE documentation in support of an origination standard based on the 1050/59.94/2:1 and 1:1 and 525/59.94/1:1 studio production formats.[8] This statement is an erroneous oversimplification of the actual situation in Europe. The fact is that European views on HDTV today are split. One European contingent is led by two large manufacturers of consumer television products who have rallied a following in support of a 50Hz HDTV standard based on Europe's proposed satellite-based 625-MAC system -- a system which is wholly incompatible with the existing European terrestrial broadcasting systems.

But this manufacturing contingent does not speak for all European broadcasters. For example, the Public Broadcasting Corporation of the Federal Republic of Germany has spoken with clarity in support of the 1125/60 standard as the only standard that offers a realistic possibility to achieve high quality

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[7] ABC, Faroudja Laboratories, NA Philips, Sarnoff, TCI, The Center for Advanced Television Studies, Thompson Consumer Electronics, Tribune Broadcasting, and Zenith.

[8] Comments of NBC at 24.

international program production and exchange.[9] Nor should this contingent of European manufacturers speak for American broadcasters, particularly since HDTV will not even be offered as a terrestrial broadcast service in Europe. U.S. broadcasters, and the networks to whom they look for guidance, should not abandon prematurely a sophisticated production standard that their own experts have developed during the last five years and thereby fulfill their own prophesy that the goal of a uniform worldwide production standard is doomed. Finally, even if the 1125/60 standard is rejected by European broadcasters, this does not at all mean that the standard is diminished. It is far too early in the development process to reject this well-established production standard, particularly if the United States acts now to rally around it.

It is particularly puzzling that NBC, in view of its active support for a uniform worldwide production standard in the past, has in its opening comments stated that it is now developing yet another production standard -- 1250/59.94/1:1 -- "that could add to HDTV's compatibility throughout the world." We are surprised at this change in position. NBC has publicly discontinued its support of the 1125/60 production standard because of its view that Europe would not accept this standard.

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[9] See High-Definition Television -- Memorandum of the Public Broadcasting Corporation of the Federal Republic of Germany (ARD/ZDF).

NBC's new proposed standard is at variance with the hierarchy of standards (1050/59.94/2:1, 1050/59.94/1:1, 525/59.94/1:1) also advocated by NBC in its opening comments. Yet NBC offers no explanation of how its latest postulated and untested standard could garner the necessary international support, while the 1125/60 standard could not. The latter standard has enjoyed worldwide support for years, and more than 35 international manufacturers are presently fabricating and marketing hardware in the 1125/60 format.

B. Technical Objections To The 1125/60 Standard Are Premature And Not Well-Founded

ABC, Zenith, and North American Philips Corporation (NA Philips) object to the 1125/60 standard not because the Europeans have rejected it, but because of alleged technical shortcomings. Thus, ABC, in an exhibit to its comments, concludes that "conversion artifacts in the temporal domain are a key stumbling block to the practical problem of using a world production standard to feed existing transmission standards and all proposed ATV systems."[10] Zenith and NA Philips similarly claim that deleterious artifacts will necessarily result from "complicated"

[10] Comments of ABC, Exhibit A at 2.

and "expensive" downconversions from the 1125/60 origination signal.[11]

These arguments disregard two important facts. First, no such stumbling block has manifested itself in the worldwide programming/transmission infrastructure that exists today. Yet in the conversion of 24-frame 35mm film (the primary program source worldwide) to the 525/59.94 NTSC format, there is created a distinct temporal artifact known as the 3:2 conversion.[12] This conversion artifact has not impaired U.S. program producers or broadcasters in the least. Similarly, in the conversion of this same film master to 626/50 PAL or SECAM formats, European broadcasters have adopted the expedient of running the film faster, thereby introducing a temporal artifact, as well as clearly audible audio distortion, to synthesize an easy frame transfer to 25-frame television. While this expedient may be offensive to technical purists, the resulting artifacts do not impair international program producers or broadcasters. Thus, it

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[11] Comment of Zenith, Appendix B at 1; Comments of NA Phillips at 34-35.

[12] In this connection, we note that NA Philips has offered the curious suggestion that "to ensure fairness" in competitive evaluation of proponent ATV systems, all program test material should be in the form of 35mm film operating at 60 frames per second. Since 24-frame 35mm film is the dominant medium in the world today for prime-time program production and is likely to continue as such for decades to come, it is difficult to perceive any justification for rejection of this widely-accepted medium in favor of a system that barely exists in prototype stage, and NA Philips has offered no such justification.

is misleading to emphasize the presence of conversion artifacts in rejecting or supporting a proposed production standard.

Second, the 1125/60 production standard ultimately will employ digital electronic converters to transfer program material to 525/59.94, 625/50, and future ATV transmission formats (including, possibly, 1050 interlace, 787.5 progressive, 525 progressive, and other signal formats). Manufacturers such as Sony who are actively engaged in the development of digital electronic converters know full well that such high quality conversions are well within the capability of today's technology. We know the quality of the conversions certainly will be substantially better than that achieved by existing telecine machines. Likewise, we believe that such conversion temporal artifacts as might exist will be totally insignificant when compared to those produced by telecine machines. This belief is supported by actual experiences with downconversion to 525/59.94 of HDTV programming originated in the 1125/60 format,[13] which conversions were deemed most successful by the program producers involved.[14]

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[13] "Chasing Rainbows" (CBC, Canada, 1987); "Littlest Victims" (CBS, U.S.A., 1988).

[14] These experiences thus belie the speculative conclusion in ABC's Exhibit A that "it may not be possible with known technology to make NTSC and ATV downconversions that are aesthetically acceptable to trained viewers, program producers and directors in particular."

(continued...)

As noted above, some of the comments on the 1125/60 production standard also claim that the conversion process will add unnecessary costs to the program delivery process.[15] This objection is not well-founded. Unlike telecine machines, the HDTV signal converters rely totally on digital electronics -- the one area in communications technology where prices are plummeting as the technological capabilities are racing ahead.[16] U.S. program distributors, broadcasters, and American consumers will benefit directly from this trend, both as to cost and sophistication of technology.

Unfortunately, premature judgments concerning these converters are being made today -- in the earliest stages of their development and without consideration of the successful

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[14](...continued)
NA Philips also implies that the 1125/60 standard should be rejected because it is not a "home-grown" standard. See Comments of NA Philips at 4 n.5, 34-36. This is incorrect. While NHK initiated the fundamental psychophysical research underlying the 1125/60 standard, SMPTE, ATSC, and other North American-based committees and working groups have defined the basic parameters of the standard over the course of the last six years. Indeed, the SMPTE working group held more than 30 meetings (all of them in Los Angeles, reflecting the dominant role of the North American production community in the adoption of this standard) involving nearly 250 experts in the field. Indeed, it was the American experts who originally recommended the change in the frame rate from 59.94 Hz 60 Hz and the change in the aspect ratio to 16:9.

[15] See Comments of NBC at 24-25; Comments of ABC, Exhibit A at 2; Comments of Zenith, Appendix B at 1.

[16] For example, in just a few short years, we have moved from 16kb RAM to 1mb RAM technology -- and already 16mb RAM is being realized in R&D labs.

tests conducted to date in the downconversion of 1125/60 signals to both 525/59.94 and 625/50 formats[17] or the certainty of rapid refinements in converter technology. Because we are just now entering the phase of serious testing and evaluation of prototype ATV systems in the United States, however, it is particularly inappropriate at this time to reject a production standard that has received widespread international support from producers, engineers, manufacturers, and others and for whom equipment is presently being manufactured and marketed.

III. THE COMMISSION AND THE PARTIES SHOULD AVOID PRE-JUDGING PROPONENT TRANSMISSION SYSTEMS

A number of the opening comments evidence a dismaying tendency on the part of various ATV system proponents to advocate premature judgments on the basic transmission issues as well. While this advocacy may be the understandable product of self-interest, it disserves the American public by limiting choices on the basis of a woefully inadequate record.

For example, NA Philips asks the Commission to reject "in this phase of the proceeding" the 12 MHz simulcast approach in favor of its own 9 MHz augmentation approach, on the ground

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[17] See "Document IWP 11/6-96" (CCIR Study Cycle 1982-86, Sept. 20, 1986) (documenting 625/50 conversion).

that the simulcast approach is "spectrally inefficient."[18] Yet, the comprehensive testing program on these proponent systems has barely begun. As Sony noted in its opening comments, the simulcast approach has much to commend it, but it remains to be seen whether so much information can be compressed into a single 6 MHz channel without increasing the potential for harmful interference or whether true HDTV quality can be carried within a 6 MHz bandwidth by a signal incompatible with NTSC receivers. Likewise, the jury is still very much out on the augmentation approach (whether 3 MHz or 6 MHz). In particular, in the latter case, there are numerous unanswered questions regarding differential transmission impairments caused by non-contiguous augmentation channels.

We submit that there simply is no basis in the present record for any action by the Commission that would substantially narrow the choices available to American broadcasters and the American television audience. That record can only be developed through stringent prototype testing, a process that has been set in motion but is far from complete. Therefore, Sony urges the Commission to avoid making premature substantive decisions on the basis of an inadequate record and to take steps now to ensure that the Advisory Committee has adequate time to complete the testing process before its charter expires.

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[18] See Comments of NA Philips at 9, 12-17.

Similarly, we believe it is premature for the Commission to adopt, as Zenith urges, an HDTV display standard based on the current 4x3 aspect ratio.[19] Zenith claims that the added side panels of a wide screen picture display use a portion of the video information spectrum space that would otherwise be available for transmitting more picture detail in a conventional 4x3 format. While perhaps correct as a technical engineering matter, Zenith's argument fails to challenge the results of psychophysical research measuring the degree of picture resolution that can be appreciated by the average home viewer.[20] Their argument instead perpetuates a current widespread confusion on HDTV image presentation which could seriously impede the future rational evaluation of the contending ATV transmission proposals.

Thus, for consumers, HDTV is not merely a question of technical specifications, but rather the manner in which we portray a totally new viewing experience that is a composite (perceived subjectively by the viewer), of both increased

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[19] See Comments of Zenith at 36-41.

[20] When MIT engineers, for example, recently tested audience reactions to side-by-side presentations of HDTV and NTSC images with precisely equal picture heights, the viewers saw no dramatic differences between these two displays. The real difference between HDTV and NTSC -- namely, a radical change in image size, image width, and camera angle of view -- was simply not presented to the viewers. The technical differences which were presented were simply not meaningful to non-technical audiences.

resolution and greater aspect ratio.[21] The ATV image that most closely approximates the large wider image of the cinema experience -- is the ATV system most likely to prevail in the marketplace, not the system that brings increased resolution to a small NTSC-like screen.[22] Therefore, the Commission should not make any premature decisions regarding screen size and width until the planned test program, including the testing of viewer perceptions, is complete.

IV. CONCLUSION

Although the opening comments filed in this proceeding reflect a heartening degree of consensus on certain major issues facing the Commission and the communications industry, Sony is is disappointed that the feasibility of a single worldwide HDTV production standard based on the 1125/60 scanning format is being questioned. The 1125/60 production standard has received widespread international (and domestic) support for years and is the standard most likely to gain worldwide acceptance, thereby substantially increasing the opportunities for international program exchange and co-production. Now is the time for American

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[21] The Commission, by establishing a Working Party to conduct audience research and tests of viewer perceptions, has acknowledged the important subjective element in HDTV imaging technology.

[22] See Glenn, Karen and William, "High Definition Television Compatible Transmission System," IEEE Transactions on Broadcasting, Vol. BC-33, No. 4 (Dec. 1987).

broadcasters and manufacturers to adopt an international perspective. The nations of the world look to the United States to take a leadership role in bringing HDTV technology to all parts of the world.

The opening comments also demonstrate that it is premature and counter-productive to disparage particular proponent HDTV and ATV systems at this very early stage in the development of HDTV service. The proponent ATV systems are embryonic prototypes in research labs. Until the experts have thoroughly tested and evaluated over-the-air transmissions by these prototype systems, self-serving attacks on rival systems serve no purpose but to politicize the Commission's deliberative process at the expense of greater knowledge. Therefore, we urge the American broadcasting and manufacturing industries to reserve judgment on proponent systems and to take no actions that would

jeopardize the widely-shared goal of a uniform worldwide production standard until the testing process has been completed.

Respectfully submitted,

SONY CORPORATION

By: Tom W. Davidson

Tom W. Davidson

Margaret L. Tobey

Margaret L. Tobey

SIDLEY & AUSTIN
1722 Eye Street, N.W.
Washington, D.C. 20006

Its Attorneys

January 23, 1989

CERTIFICATE OF SERVICE

I, Margaret Winebrenner, a secretary with the law firm of Sidley & Austin, do hereby certify that on this 23rd day of January, 1989, copies of the foregoing "Reply Comments Of Sony Corporation" were sent by first class United States mail, postage prepaid to the following:

Gregory M. Schmidt
Covington & Burling
1201 Pennsylvania Avenue, N.W.
P.O. Box 7566
Washington, DC 20044

James L. Casserly
Squire, Sanders & Dempsey
1201 Pennsylvania Avenue, N.W.
Washington, DC 20044

Michael H. Bader
Haley, Bader & Potts
2000 M Street, N.W.
Washington, DC 20036

Molly Pauker
National Broadcasting Company, Inc.
1825 K Street, N.W., Suite 807
Washington, DC 20006

Peter Tannenwald, Esq.
Arent, Fox, Kintner, Plotkin & Kahn
1050 Connecticut Avenue, N.W.
Washington, DC 20036-5339

Arthur Pankopf
Corporation for Public Broadcasting
1111 16th Street, N.W.
Washington, DC 20036

John B. Richards
Land Mobile Communications Council
1150 17th Street, N.W.
Suite 1000
Washington, DC 20034

William E. Glenn
New York Institute of Technology
Service and Technology Research Center
8000 N. Ocean Drive
Dania, FL 33004