

(1) Sarnoff cannot speak for the broadcast industry but hopes that it would not lightly abandon its present audience.

(2) A direct specification of quality level of a received signal is problematical, as it will vary with signal strength, interference (sometimes temporary), receiving antenna installation, etc. However, the goal of requiring that a "compatible" ATV signal deliver good quality to an NTSC receiver can be accomplished through the Commission's present course of testing of submitted proposals followed by setting an appropriate standard. This standard should be maintained at least for the life of NTSC receivers; it should be noted that cost-conscious consumers will continue to purchase NTSC receivers even after a new standard is adopted (monochrome receiver sales continue more than three decades after the advent of compatible color).

(3) Sarnoff does not believe that the public is well served by requiring ATV-to-NTSC converters. Given the feasibility of compatible alternatives, such a required purchase would be confusing and inconvenient, and an unwarranted economic burden to the American public.

Compatibility with Alternate Media (§134):

Sarnoff believes that the public is best served by an ATV signal that is compatible with all home delivery media. Such a signal and the transmission and receiving systems to support it are technically and economically feasible. This full compatibility concept is one of the motivations behind Advanced Compatible Television.

Specifically addressing the issues in §134:

(1) Compatibility among all media is in the public interest. It simplifies interconnections, allows lowest home system cost because of highest manufacturing volume to a uniform standard, minimizes program generation costs, and avoids confusing the buying public. Sharing the developing equipment and supporting a common system with comparable

performance among all delivery media will permit the fastest growth of ATV.

Sarnoff urges that a broadcast system that is compatible with all home delivery media be selected as quickly as possible, consistent with the requirements of a sound testing program. This will most likely become a standard for all media. If some media want a unique system, they must then bear the cost penalty of reduced manufacturing volume, and the marketplace will decide their fate.

(2) The Commission has established Subcommittees to investigate the performance of proposed systems in broadcast as well as alternate delivery scenarios. Industry participation in these Subcommittees could form the basis of advice to the Commission on a preferred system that best serves the issues of compatibility with NTSC, compatibility among alternate media, performance, and cost. The Commission, after considering the advice from its Subcommittees and the industry, should mandate a standard for ATV signals that will be delivered to receivers in consumers' homes.

(3) Voluntary standards are not as effective as mandated ones in protecting the public from possible changes in transmission format that could affect the performance of their home receiving equipment.

The open architecture concept has been discussed as part of the ATV Standards (§122) section of these Comments, and it has been found wanting.

(4) Sarnoff will not comment on the extent of the Commission's legal authority over non-spectrum-using media.

Compatibility with Production Standards (§21):

The signal format of Advanced Compatible Television (ACTV) has been described in detail in Sarnoff's submission to Systems

Subcommittee/Working Party 1 on September 1, 1988. As stated in that document, the ideal signal source for Advanced Compatible Television would be 1050-lines, 59.94 fields/second, progressively scanned, and wide screen. Practical limitations of camera and video tape recorder technology suggest that either 525-lines progressively scanned or 1050-lines interlaced would be a more realizable choice for the immediate future. Conversion to 1050/59.94 from a 35 mm film source can be handled with the same kind of scanners and frame-rate-conversion schemes as presently used with NTSC.

Sarnoff supports the HDTV production standard recently submitted by the National Broadcasting Company, Inc. (NBC) to the Society of Motion Picture and Television Engineers (SMPTE). This proposed standard describes origination equipment operating at 59.94 fields/second in 1050-line interlaced and progressive formats as well as a 525/59.94 progressive format.

The NBC-proposed standard is well-suited for Advanced Compatible Television and is naturally related to NTSC in the United States. 525/59.94/progressive scan is appropriate for ACTV-I and is also suitable for derivation of NTSC. It is essential that one of these signal formats be available to derive an interlaced NTSC-compatible signal for transmission in the United States. Transcoding between formats has been demonstrated, and so additional standards are possible for production. Proposals include 1125/60 and 1250/50. NTSC and Advanced Compatible Television can be derived from either of these formats using a transcoder, although a significant amount of hardware is required for the frame rate conversion from 60 fields/second to the 59.94 fields/second required for NTSC compatibility. If transcoding between formats is to be practical, however, it is necessary that the total number of production standards be small. Marketplace forces will determine the best practical way to serve the terrestrial broadcasting worlds with both 59.94 Hz and 50 Hz.

ALLOTMENT AND POST-ALLOTMENT ISSUES

Sarnoff has no comment on the matters of local arrangements among broadcasters regarding coverage (§148).

Sarnoff urges extreme caution in permitting non-ATV uses of additional spectrum on a "transitional" basis (§150-153). If the Commission eventually concludes that two broadcast channels are needed for ATV, then such "transitional" arrangements will be an impediment to rapid adoption of ATV. Only if a single-channel compatible system, such as ACTV-I, is selected and expected to serve without augmentation for the foreseeable future could non-ATV uses be considered for broadcast frequencies.

An additional question is raised by non-television uses of the broadcast spectrum. The interference caused by new services is unknown. Coverage and interference data exist only for NTSC-type modulation. Non-standard uses of broadcast spectrum should be permitted only after extensive testing to assure protection of existing television signals. Sarnoff recommends that non-standard uses of broadcast spectrum be prohibited, at least until the ATV transition is resolved.

CONCLUSIONS

Sarnoff believes, with the Commission, that maintenance of NTSC service by provision of a compatible ATV signal is essential. ATV services that require more than 6 MHz additional to a present TV channel are impractical for terrestrial broadcasting. Sarnoff believes further that an NTSC-compatible ATV service can begin by effective use of the existing 6 MHz TV channels and has proposed ACTV-I to meet that challenge. ACTV-I offers an excellent mix of performance improvement over NTSC, bandwidth efficiency, trade-offs that match the human vision system, NTSC compatibility, and cost. ACTV-I can be augmented, compatibly, with an additional 3 or 6 MHz when the Commission has satisfied itself that such spectrum can be provided without harm to the existing broadcast service.

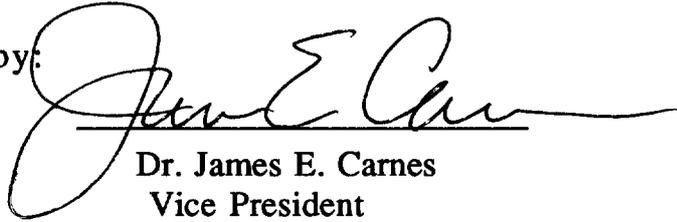
Sarnoff believes that, upon completion of testing, the Commission should establish a single standard for delivery of ATV to consumers' homes. The standard should allow both broadcast and alternate media to deliver an NTSC-compatible signal. Sarnoff recommends the NBC-proposed standard based on 1050 lines with a field rate of 59.94 fields/second as best matched to the needs of the United States. A single standard for home equipment eliminates the need for an expensive, complicated, and confusing open architecture receiver.

Sarnoff believes that the Commission cannot make an informed decision about new spectrum assignments at this time. Proposed systems and their performance claims have not been tested. Modulation schemes are not tested. The effects of the interference caused by additional channels cannot be determined until the new signals are specified. The effects of spectrum sharing with services other than broadcast TV are even less well understood. The Commission has established the Subcommittees and mechanisms to gather the necessary data. Sarnoff

urges the Commission to resist pressure for a hasty decision until the Commission's own processes, already under way, are complete.

Respectfully submitted,
David Sarnoff Research Center, Inc.

by:

A handwritten signature in black ink, appearing to read "James E. Carnes", written over a horizontal line.

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REFERENCES

1. FCC Tentative Decision and Further Notice of Inquiry in the Matter of Advanced Television Systems and Their Impact on Existing Television Broadcast Service, MM Docket No. 87-268.
2. Report of the Spectrum Utilization and Alternatives Working Party (WP-3) of the Planning Subcommittee of the Advisory Committee on Advanced Television Service, 1/17/88.
3. R. Eckert, J. Knapp, R. LaForge "Estimate of Availability of Spectrum for Advanced Television (ATV) in the Existing Terrestrial Broadcast Bands," FCC Technical Memorandum FCC/OET, TM88-1, August 1988.
4. FCC Technical Staff, "Analysis of UHF TV Receiver Interference Immunities Considering Advanced Television," FCC/OET, TM88-2, August 1988.
5. D. M. Jansky and R. A. O'Connor, "Impact of UHF-TV Taboos on Availability of Spectrum for Advanced Television Systems," Jansky/Barmat Report to Working Party 3 (See Ref. 2), March 1988.
6. V. Tawil, "Preliminary Analysis of VHF and UHF Spectrum Scenarios," Maximum Service Telecasters, Inc., Memorandum Submitted to Working Party 3 (See Ref.2), July 1988.
7. J. N. Rypkema, "UHF Taboos, Protection Ratios, and Current NTSC Television Receiver Performance," Memorandum WP3/21 submitted to Working Party 3 (See Ref. 2), 2/22/88.
8. J. N. Rypkema, "Further Discussion of Taboos and TV Receiver Performance," Memorandum WP3/0059 Submitted to Working Party 3 (See Ref. 2), 7/14/88.
9. J. N. Rypkema, "Interference Penetration by Transmitters Operating at Minimum Taboo Spacings," Memorandum WP3/0063 submitted to Working Party 3 (See Ref. 2), 9/1/88.
10. J. N. Rypkema, "Interference Problems in Proposed Spectrum Sharing Between FM Land Mobile and UHF Television," IEEE Transactions on Consumer Electronics, Vol. CE-32 No. 3, August 1986.

11. Comments of the David Sarnoff Research Center, Inc. to the FCC, MM Docket No. 87-268, In the Matter of Advanced Television Systems and Their Impact on Existing Broadcast Service, pp. 12-26.
12. CCIR Report No. 306-4, 1982, "Ratio of Wanted to Unwanted Signal for AM Vestigial Sideband Colour Television Systems."
13. FCC Rules Part 3, §73.610, "Minimum Distance Separation Between Stations."
14. "FCC Sixth Report and Order," April 14, 1952 on "Utilization of Frequencies in the Band 470 to 890 MHz for Television Broadcasting" including table of Taboos (Table IV). See also FCC Rules §73.698, Table IV.
15. "System Description, Advanced Compatible Television," submitted September 1, 1988 by the David Sarnoff Research Center, Inc. to the Advisory Committee on Advanced Television Service.
16. Y. Ninomiya, et al, "An HDTV Broadcasting System Utilizing a Bandwidth Compression Technique - MUSE," IEEE Trans. on Broadcasting, Dec. 1987.
17. NYIT comments, Appendix A
18. Schreiber comments, Appendix A.
19. A. G. Toth, et al "NTSC Compatible HDTV System," IEEE Trans. on Consumer Electronics, Feb. 1988.
20. Zenith comments, Appendix A.