Law Offices
HOLLAND & KNIGHT

A Partnership Including Professional Corporations

2100 Pennsylvania Avenue, N.W.
Suite 400
Washington, D.C. 20037-3202
202-955-3000
FAX 202-955-5564

Atlanta
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August 12, 1996

PATRICIA Y. LEE
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VIA HAND DELIVERY

William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

Re: In the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service - MM Docket No. 87-268

Dear Mr. Secretary:

Transmitted herewith, on behalf of Harris Corporation, are an original and eleven (11) copies of its Reply Comments in the above-referenced docket.

If you have any questions, please do not hesitate to contact me.

Very truly yours,

Patricia Y. Lee
Counsel for Harris Corporation

Enclosures

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

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In the Matter of	)	
Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service	)	MM Docket No. 87-268

REPLY COMMENTS OF HARRIS CORPORATION

Edward W. Hummers, Jr.
Patricia Y. Lee
Holland & Knight
2100 Pennsylvania Avenue, N.W.
Suite 400
Washington, D.C. 20037
(202) 955-3000

Counsel for Harris Corporation

August 12, 1996

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

In the Matter of	)	
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Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service	)	MM Docket No. 87-268

REPLY COMMENTS OF HARRIS CORPORATION

Harris Corporation ("Harris") hereby replies to the comments filed on July 11, 1996, in response to the Commission's Fifth Further Notice of Proposed Rule Making, FCC 96-207, released on May 20, 1996 (hereinafter "Fifth Further Notice"), in the above-captioned proceeding.

I. INTRODUCTION.

1. In the Fifth Further Notice, the Commission seeks comments and reply comments on its proposed adoption of the digital television ("DTV") broadcast standard endorsed by the Advanced Television Systems Committee ("ATSC"), and recommended to the Commission by the Advisory Committee on Advanced Television Services ("ACATS" or "Advisory Committee"). Harris supports the Commission's recognition of the need for a single broadcast transmission standard for digital television and urges the Commission to adopt the ATSC DTV Standard (hereinafter the "Standard"). Adoption of the Standard is an important step forward for digital television and a giant leap forward for advanced television technology. Moreover, this action will bring the

Commission one step closer to reaching its goals of ensuring the smooth introduction of free and universally available digital broadcast television service, increasing the availability of new products and services to consumers, and encouraging innovation and competition. Fifth Further Notice at ¶ 1.

2. Harris has been a leading provider of broadcast transmission equipment for more than 70 years. Today, Harris Broadcast Division supplies television and radio transmission products and systems, studio and mobile production systems and services to broadcasters in more than 150 countries. Harris is a leader in the development of DTV. The Broadcast Division has been heavily involved in digital television since 1990 when it developed the RF Test Bed for the Advanced Television Test Center in Alexandria, Virginia. Harris employees have participated actively in the ACATS Working Groups. Its involvement has, in part, been predicated upon the belief that the Commission would adopt a DTV standard for the efficient and practical development of digital television.

3. On July 15, 1996, Harris announced plans to establish a new research and development facility to speed the introduction of equipment for the emerging digital television market. The Broadcast Division will establish the Harris Digital Television Center of Excellence in the greater Cincinnati/northern Kentucky area to serve as the hub for the company's development of digital television transmission equipment and systems. Last year, the Broadcast Division demonstrated the first commercially-viable DTV transmission equipment and launched the first all-components serial digital television network in the United States.

4. On July 25, 1996, CBS affiliate WRAL-TV in Raleigh, North Carolina, used a digital transmitter developed by Harris to broadcast the first commercial digital television images in the United States. Harris developed, manufactured and installed the high-power Sigma CD transmitter that was used by WRAL-TV. WRAL-TV broadcasted a special collection of short subjects with movie-quality images and compact disc-type sound. The station had begun transmitting digital television signals without images on July 23, 1996. WRAL-TV, which recently became the first in the nation to receive an experimental digital license, transmitted the new signal under the call letters WRAL-HD. In the near future, the station plans to broadcast its own programs, along with programming from the CBS television network and the Public Broadcasting Service's soon-to-be developed national HDTV satellite digital feed. Harris will continue to work with WRAL-HD in the experimental digital broadcast.

II. THE COMMISSION SHOULD ADOPT THE ATSC DTV STANDARD AND MANDATE ITS USE BY DIGITAL TELEVISION LICENSEES.

5. Harris supports the Commission's proposal to adopt and mandate the use of the Standard by digital television licensees. In the Fifth Further Notice, the Commission correctly recognized that adoption of the Standard will "provide a measure of certainty and confidence to manufacturers, broadcasters and consumers thus helping to assure a smooth implementation of digital broadcast television and the preservation of a free and universally available broadcast television service." Fifth Further Notice at ¶ 37. The Commission further recognized that because of the inherent flexibility of the Standard it will provide certainty in the marketplace while simultaneously accommodating innovative new developments. Id.

6. Harris agrees. To date, it has been Harris' experience that the Standard is sufficiently flexible to accommodate advances in the state-of-the-art of broadcast technology and to promote technological innovation. In designing and constructing a digital television transmitter to meet the Standard, Harris has had sufficient flexibility to accommodate the constant stream of technical improvements flowing from its experimentation and tests. The proposed mandatory Standard will not limit competition in the TV equipment manufacturing business. Rather, the mandatory Standard provides sufficient certainty to permit new entrants into the market with minimal technical risk. Indeed, the lack of a transmission standard might prevent many companies from making the investments necessary to design and manufacture new equipment in a digital television environment and result in unnecessarily high costs for the products required for the production, transmission and reception of DTV.[1]

7. Harris further supports the concept of a "permanent" standard. There is no compelling reason at this time to set a date for review of the Standard (either as a specific date or linked to a specific event), nor to adopt a sunset provision. Commitment now to a future review date would be based on sheer speculation and would be a poor substitute for a reasoned approach based upon petitions by interested parties or upon the Commission's own motion. Harris notes that it took eight years of concerted effort by a group of skilled and interested participants to design and

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[1] Harris was a proponent of one of the alternative AM stereo exciters at the time the Commission declined to adopt a single standard for AM stereo. Harris expended several million dollars to develop AM stereo exciters that are not in use today; money which would have been better spent in refining an exciter built to an adopted standard. That in turn would have enabled Harris to pass savings onto broadcasters in the form of lower prices.

develop the proposed Standard. The industry should expect the Standard to be in place for the foreseeable future to assure adequate return on investment. Moreover, a permanent standard would facilitate the cost effective design of receivers resulting in savings and benefits to consumers.

8. As noted above, the Standard is inherently flexible. However, if new technologies develop which are incompatible with the Standard, it may be reviewed and appropriate changes made. The fifty-year history of the NTSC standard amply supports this position. As developments in advanced television technology came to fruition, the Commission timely commenced review of the NTSC standard and development of a new standard for the emerging technology.

III. THE COMMISSION SHOULD ADOPT AND MANDATE THE RF/TRANSMISSION STANDARD.

9. In order to ensure harmony along the broadcast spectrum, it is necessary to adopt the RF/transmission layer of the Standard for allocation and assignment purposes and to mandate its use by digital television licensees. Without such a standard, the air waves would be in disarray, much like in certain foreign countries where a uniform standard has not been adopted for all broadcast services. Thus, adoption of an optional RF/transmission standard would be insufficient to prevent objectionable interference within the allocated spectrum band. Only a mandatory, uniform RF/transmission standard will provide the desired protection from objectionable interference in this service as it matures and improves over the years.

10. With regard to the proposed Standard for video coding and audio coding, Harris would have no objection to the adoption of optional standards for those layers,

so long as the transport-to-transmission layer interface standard is uniform and mandatory.

IV. PROTECTION FROM INTERFERENCE.

A. Emission Mask

11. At paragraph 56, the Fifth Further Notice seeks comment on a specified rigid emission mask designed to limit the out-of-channel emissions from a DTV station transmitter. Harris supports the general intent of a rigid emission mask and, with some modification, the attenuation curve specified by the formula in paragraph 56 as the basis for the RF emission mask. If the Commission adopts a rigid emission mask, Harris, based upon its extensive experimentation with and testing of digital television transmitters, recommends the following minor modifications to the RF mask specification.

12. First, the Commission seeks comment, inter alia, on the following emission mask: "(A) at the channel edge, emissions attenuated no less than 35 dB below the average transmitter power." Fifth Further Notice at ¶ 56. Harris recommends a somewhat different specification for that emission mask. Harris proposes the following specification:

> " (A) at the channel edge, plus 100 kHz, emissions attenuated no less than 35 dB below the average transmitted power where the channel edges are defined as the lower edge channel frequency extending 6 MHz to the upper edge at the 20 dB point below the average transmitted power;"

Harris notes that its proposed specification slightly moves out the spectral bandwidth at the -35 dB point by 100 kHz at each channel edge. The standard 6 MHz channel

bandwidth is retained at -20 dB and above. The purpose of this is to allow practical nyquist shaping filters for the DTV signal that would otherwise call for nearly perfect filter side slopes from the nyquist -3 dB position to the -35 dB point.

13. Second, paragraph 56 suggests that the Commission is planning to adopt a measurement method for system performance based on a bandwidth of 500 kHz. Harris submits that this is neither necessary nor practical. The 500 kHz bandwidth is not provided on most spectrum analyzers that could be used for the measurement and such a bandwidth would also obscure the occupied bandwidth observation of the DTV signal. Instead, Harris recommends, based on its experience with measurements of DTV signals, that to show compliance with the RF mask specifications in paragraph 56, a spectrum analyzer be set up with the resolution bandwidth set to 30 kHz, the video bandwidth set to 3 kHz and the average function turned on to cleanly display the occupied bandwidth over a 20 MHz span. The display can then be measured accurately to within +/- 1 dB for RF mask compliance.

14. Third, Harris submits that the attenuation level between NTSC and DTV of 12 dB need not be part of the consideration for the RF mask specification. The RF mask specification should only apply to the DTV transmitter under test in the antenna or a test load of equivalent impedance with output filters in place, where required, to certify RF mask compliance of the DTV transmitter operating at its licensed power level.

15. Harris further submits that the issue of potential interference between NTSC and DTV stations in a common coverage area where the 12 dB planning ratio

can have various +/- variations should be solved on a case-by-case basis using DTV transmitter bandpass filters, antenna directional patterns, transmitter location or DTV transmitter power adjustments.

B. Frequency Offsets

16. Harris supports the Commission's proposal to require maintenance of the frequency difference between closely spaced lower adjacent NTSC stations and DTV stations within a tolerance of +/- 3 Hz.

C. Power Measurements

17. In paragraph 58 of the Fifth Further Notice, the Commission proposes to specify the maximum power for each DTV station as an average power across the occupied bandwidth. The Commission further proposes that stations using the Standard would be allowed to determine their average power using conventional RMS averaging power meters. Id. In its comments, ATSC proposed using a "conventional full-wave rectifier" to measure the DTV transmitter output power. ATSC Comments at B-8.

18. Harris agrees that maximum power should be measured as average power across the occupied bandwidth, but submits, to measure the DTV transmitter output power, the Commission should require stations to use a true RMS wattmeter that is based on the heating effect of applied RF power, so as to be independent of the signal peak to average characteristics. A wattmeter of this type should have, at a minimum, 5% full scale accuracy, or preferably, 3% accuracy over the useful range of the meter.

Modern calorimeters can meet the 3% requirement and are preferred for high power applications above 1 kW.

19. Alternatively, an RF coupling device can be used to sample the forward power flow on a transmission line connected to a test load and the sampled power read on a heating effect type power meter. This method requires accurate calibration of the RF coupling factor to the transmission line within +/- .1 dB. The coupling factor then can be used to compute the actual power flow from the sampled power reading.

20. The above methods can also be used to calibrate other power indicating devices that may use rectifying type circuits for daily observation of the DTV transmitter output power. These devices should be calibrated as frequently as required using the above heating type meters to insure that the overall output of the DTV transmitter is held within a +/- 5% tolerance window.

V. OTHER ISSUES.

A. Licensing of Technology

21. Harris submits that patent licensing issues, including patents pending, are best negotiated between interested commercial parties and that no further government regulation is required.

B. International Trade

22. While a common world-wide DTV standard would be desirable, Harris is prepared to compete in the international marketplace in the absence of such a standard. The present analog television environment involves multiple standards for both vision and sound. While this situation presents challenges to equipment manufacturers,

Harris has successfully met those challenges. At the present time, the transport-to-transmission layer interface for DTV is not defined. This offers an opportunity to develop an interface compatible with the European DVB standard. Harris submits that the industry should take additional measures to facilitate such compatibility.

VI. CONCLUSION.

For all these reasons, the Commission should adopt immediately the ATSC DTV Standard and mandate its use by digital television licensees.

Respectfully submitted,

Edward W. Hummers, Jr.
Patricia Y. Lee
Holland & Knight
2100 Pennsylvania Avenue, N.W.
Suite 400
Washington, D.C. 20037
(202) 955-3000

Counsel for Harris Corporation

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