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

In the Matter of Amendment of Part 15 of the Commission's Rules to Permit Operation of Biomedical Telemetry Devices on VHF TV Channels 7-13 and on UHF TV Channels	)))))	**ET Docket No. 95-177**

COMMENTS OF THE ASSOCIATION
FOR MAXIMUM SERVICE TELEVISION, INC.

The Association for Maximum Service Television, Inc. ("MSTV") hereby files comments in response to the Notice of Proposed Rulemaking released in the above-captioned docket on January 25, 1996 (the "Notice").[1/]

INTRODUCTION

In response to a petition for rule making filed by the Critical Care Telemetry Group ("CCTG") on December 23, 1995, the Commission proposes to expand the available frequencies and permitted power of unlicensed biomedical telemetry devices operating on VHF TV Channels 7-13 and on all UHF TV Channels. The Commission has generally not permitted operation of unlicensed devices in the television bands. Therefore, it seeks comment on whether such sharing by biomedical telemetry devices is feasible or desirable.

CCTG argues that a serious shortage of usable spectrum for biomedical telemetry devices poses a safety risk to patients who rely on interference-free service. MSTV

[1/] MSTV is a non-profit trade association of local broadcast television stations committed to achieving and maintaining the highest technical quality for the public's local broadcast service.

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agrees that additional spectrum should be set aside for the operation of biomedical telemetry devices. However, as detailed in the attached Engineering Statement, sharing in the proposed television broadcast bands is not likely to be feasible or desirable.

Television broadcast spectrum is not a suitable candidate for sharing with biomedical telemetry devices because such devices are likely to cause harmful interference to the public's television reception, and equally importantly, because sharing is likely to prevent reliable operation of these critical devices. In addition, sharing with broadcast spectrum would unnecessarily limit the geographic operation of biomedical telemetry devices, thereby restricting the full value of this critical technology. Finally, these concerns are exacerbated by the transition to ATV broadcasting, which will result in more intensive use of existing television bands and the likelihood of greater interference.

I. THERE IS NO ENGINEERING BASIS FROM WHICH TO CONCLUDE THAT BIOMEDICAL TELEMETRY DEVICES COULD OPERATE IN THE PROPOSED TELEVISION BANDS WITHOUT CAUSING HARMFUL INTERFERENCE TO THE PUBLIC'S TELEVISION RECEPTION.

As set forth in the attached Engineering Statement, CCTG's Petition fails to demonstrate that biomedical telemetry devices could operate at increased power levels without causing harmful interference to the public's television reception.

CCTG's engineering analysis is premised on the transmission of standard NTSC signals, in which desired-to-

undesired cochannel and adjacent channel ratios are used to determine how far the devices must be from cochannel television stations to avoid interference to those stations. Transmissions from telemetry devices, however, do not resemble standard NTSC transmissions. Rather, the type of modulation varies depending on both the manufacturer and the type of device, as petitioner concedes. See CCTG's Petition, Exhibit A at 2 (Biomedical telemetry devices use "various types of digital modulation such as PM/BPSK, Binary NRZ FSK, or GMSK.") Because the propagation characteristics vary for each of these devices, each modulation scheme must be evaluated separately.

As just one example, the Grand Alliance has tested interference to and from NTSC signals from the 8VSB digital modulation scheme proposed by the Grand Alliance for HDTV broadcasting. While the Advanced Television Test Center (ATTC) found a desired-to-undesired interference ratio of approximately 48 dB for median channels, it also found ratios of -2 dB to -6 dB for the upper and lower adjacent channels, respectively. Moreover, these interference ratios changed when the digital modulation scheme was altered from one modulation type to another (from 8VSB to 16QAM). Because each modulation scheme has its own characteristics that affect performance and resulting interference levels, each digital system must be evaluated separately. See attached Engineering Statement at 2.

In contrast, CCTG's petition fails to cite any tests demonstrating the interference ratios that would result from

use of such medical telemetry devices. See attached Engineering Statement at 1-2 ("No tests are cited that would provide interference ratios appropriate to these modulation forms or whatever other modulation schemes may be possible for the devices.")

Absent such an engineering evaluation, there is no basis from which to conclude that such devices could operate without causing harmful interference.

II. THERE IS NO ENGINEERING BASIS FROM WHICH TO CONCLUDE THAT BIOMEDICAL TELEMETRY DEVICES COULD OPERATE RELIABLY ON A SECONDARY, NON-INTERFERENCE BASIS.

There is also no evidence to demonstrate that television broadcast signals would not unacceptably interfere with biomedical telemetry devices, even at the increased power levels and the kilometer spacings proposed in CCTG's petition, given the magnitude of competing television broadcast signals.

As set forth in the attached Engineering Statement, even if medical telemetry devices operated with a power output of five milliwatts, the magnitude of competing NTSC television signals would range from 59 to 72 dBu. Reliable operation is unlikely given the magnitude of these competing signals. See attached Engineering Statement at 3. Petitioner fails to cite any tests to suggest otherwise.

Furthermore, reliance on attenuation factors resulting from the presence of hospital walls is not conclusive. Petitioner's own studies reveal that there was either no attenuation factor at all, or at most 10 dB. Id. Moreover, because indoor interference measurements are subject

to wide variation, clusters of measurements or continuous recording of signal strength is needed to properly evaluate attenuation factors. See attached Engineering Statement at 4. Finally, as stated above, these measurements vary greatly depending on the type of telemetry device and related antenna gain associated with the device. As Petitioner concedes, antenna gains range from as little as -20 dBi to as much as +3 dBi. See CCTG Petition, Exhibit A, at 2. Discrete studies are necessary to accurately evaluate attenuation levels across this wide spectrum.

Moreover, the benefit of this technology should not be artificially confined to use in hospitals simply based upon an initial spectrum allocation that is incompatible with the full range of desired operations for such devices. Clearly there are many sites, including numerous health care facilities, that could benefit from the use of this technology. This further supports the conclusion that dedicated spectrum should be set aside for the operation of biomedical telemetry devices outside of the television broadcast bands.

CONCLUSION

There is no engineering basis from which to conclude that biomedical telemetry devices could function within the proposed television broadcast bands without causing harmful interference to the public's television reception, or without receiving interference that would prevent reliable operation of such devices. Moreover, the transition to ATV broadcasting

will require full access to spectrum within broadcasting's existing allocation, further exacerbating the likelihood of interference.

The critical nature of biomedical telemetry devices demands interference-free performance. Accordingly, dedicated spectrum should be set aside for the operation of such devices. Some existing allocations in the private or government-shared 220 MHz band, either above or below television broadcast spectrum, may be suitable. Absent such an allocation, a reliable test program should be undertaken to determine the most appropriate spectrum for these important devices, as well as the rules needed to ensure their operational reliability.

Respectfully submitted,

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April 16, 1996

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ENGINEERING STATEMENT ON BEHALF OF
THE ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC.
RELATIVE TO THE OPERATION OF BIOMEDICAL TELEMETRY DEVICES
ET Docket No. 95-177

This engineering statement, prepared on behalf of the Association for Maximum Service Telecasters, Inc. (MSTV), relates to the matter of Amendment of Part 15 of the Commission's Rules to Permit Operation of Biomedical Telemetry Devices on VHF TV Channels 7-13 and on UHF TV Channels. The thrust of this engineering statement is that the petitioner has neither provided the engineering basis for rules which would assure the avoidance of interference to broadcast television station reception, nor has a determination been made that these important devices could operate reliably in the television environment.

The petitioner has relied upon traditional NTSC-to-NTSC, desired-to-undesired (D/U) cochannel and adjacent channel ratios to determine how far the devices must be from cochannel television broadcast stations to avoid interference to those stations, and to conclude that no regard need be given to adjacent channel television stations. But transmissions from the telemetry devices do not resemble transmission from a NTSC source. The modulation scheme is certainly not vestigial side band amplitude modulation with a second carrier frequency modulated. As set forth on page 2 of the petitioner's engineering statement, manufacturers of biomedical telemetry devices "employ various types of digital modulation such as PM/BPSK, Binary NRZ FSK, or GMSK." No tests

are cited that would provide interference ratios appropriate to these modulation forms or whatever other modulation schemes may be possible for the devices.

An example of a digital modulation scheme that has been tested for interference to and from NTSC is the 8VSB modulation adopted by the Grand Alliance for HDTV broadcasting. For a weak NTSC signal, comparable to what may be expected at the Grade B contour, the Advanced Television Test Center (ATTC) found a D/U ratio of approximately 48 dB at the threshold of interference visibility for the median receiver.[1] The referenced report shows also approximate D/U ratios of -2 dB for interference from the upper adjacent channel HDTV signal to NTSC, -6 dB for the lower adjacent channel, and various interference ratios for undesired station operation on channels further removed from the desired station's operating channel.

The foregoing is not intended to suggest that the measurements made on interference to and from the digital 8VSB HDTV signal are applicable to the digital biomedical telemetry devices. In the comparisons of interference considerations applicable to 16QAM, also tested for the Grand Alliance, the results were different from the 8VSB results. Each modulation scheme has its own characteristics that affect its performance in the presence of other signals, so each must be evaluated separately.

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[1] Digital HDTV Grand Alliance System Record of Test Results, submitted to Advisory Committee on Advanced Television Service and Federal Communications Commission by ATTC *et al.*;October, 1995; page I-3-16.

As emphasized on page 3 of the petitioner's engineering statement, "the radio link [for the biomedical telemetry devices] ... must be highly reliable." However, no evidence has been provided that the devices, even with power output of five milliwatts, could operate reliably in the television broadcast environment. At the 107.1 kilometer spacing suggested as appropriate for operation in the high VHF band in Zone I, a maximum television facility would provide a 59 dBμ f(50,10) signal. For a high VHF band maximum facility in Zone II or III, the signal at 131.8 kilometers would be 61 dBμ. The UHF maximum facility station signal at 113.2 kilometers would be 72 dBμ. Unless tests, not revealed in the petition, have been made to establish that the devices would perform satisfactorily with NTSC signals of these magnitudes, reliable operation cannot be anticipated.

Furthermore, based on the petitioner's own measurements, reliance cannot be placed on the likelihood that hospital walls will provide isolation of 20 dB at UHF frequencies. Although the measurements made at four hospital locations have serious limitations that will be discussed below, if taken at their face values, measurements made on UHF television stations inside and outside the hospitals do not support a 20 dB attenuation factor, or any at all. At both Howard University Hospital and the Mercy Medical Center, indoor and outdoor measurements yielded similar signal levels, indicating no attenuation through building walls. At Suburban Hospital, an attenuation factor more in the order of 10 dB would appear to apply. At Calvert Memorial Hospital, indoor

measurements of received television signal strength were made on only two stations, the results were indeterminate.

Measurements made on both biomedical telemetry transmissions and UHF television stations were insufficient to be definitive. Indoor measurements, in particular, are subject to wide variation because of the ever present multipath phenomenon. Even outdoor measurements are never sufficiently removed from reflecting surfaces to avoid multipath. If nothing else, the ground is always nearby. Because of the prevalence of multipath, single measurements cannot be relied upon to be representative of signal strength in the vicinity. Clusters of measurements, or continuous recording of signal strength over runs of several wavelengths, are necessary.

Another weakness of the measurement program is the failure to describe completely the telemetry devices in use. As the petitioner's engineering statement points out, "antenna gains typically range from -20 dBi to +3 dBi." (page 2) On the following page of the petitioner's engineering statement, the information provided is that, in a typical configuration of the units, manufacturers find that a gain of approximately -20 dB is found across the VHF and UHF spectrum. Did the units tested conform to this "typical configuration?" Under what circumstances and how often are the +3 dBi antennas used?

Conclusions

The Critical Care Telemetry Group has provided the basis for concluding that the important function of the biomedical telemetry devices is jeopardized by inadequate spectrum availability. What has not been provided is the engineering basis for concluding that the devices could function within the suggested television bands without causing interference to television reception, or receiving interference that would prevent reliable operation. To guarantee interference-free performance of these important devices, dedicated spectrum would appear to be most desirable. In the absence of the availability of such spectrum, a proper test program should be undertaken to determine where in the spectrum the devices could operate interference-free, and what rules for their operation are necessary to assure the needed reliability.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 5, 1996.

Jules Cohen

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