ASSOCIATION FOR **MAXIMUM SERVICE TELEVISION, INC.**

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October 22, 2008

Via Electronic Filing

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12 Street, SW
Washington, DC 20554

Re: Notice of Ex Parte Communication,
ET Docket Nos. 04-186, 02-380

Dear Ms. Dortch:

On October 21, 2008, Victor Tawil and Bruce Franca of the Association for Maximum Service Television (MSTV) met with Mr. Julius Knapp, Mr. Alan Stillwell, Mr. Ira Keltz and Mr. Bruce Romano of the Office of Engineering and Technology (OET). Dr. Rashmi Doshi, Mr. William Hurst, Mr. Steven Jones and Mr. Thomas Phillips of OET's Laboratory Division attended via teleconference.

OET staff provided some clarification with regard to press descriptions of the FCC proposal. MSTV then discussed the results of recent field testing in this proceeding. MSTV pointed out that the results conclusively show that all of the tested devices failed to correctly identify whether TV channels were occupied or vacant. The test results also show that the devices could not correctly detect wireless microphone operation. MSTV also pointed out that the interference distance using another radial was significantly larger than the 1.2 km distance identified in the OET Report.

MSTV noted that the OET study shows that all devices completely failed to identify either occupied or vacant channels. MSTV also observed that there is no data to support the conclusion that the "proof of concept" burden that "spectrum sensing in combination with geolocation" was met. MSTV stated that there is absolutely no evidence or data in the OET report to support the idea that "spectrum sensing in combination with geolocation" offered any improvement compared to a geolocation and database approach.

The attached power point slides were provided to those in attendance.

Respectfully submitted,

Bruce Franca
VP, Policy and Technology

cc: Julius Knapp
Alan Stillwell
Ira Keltz
Bruce Romano
Rashmi Doshi
William Hurst
Steven Jones
Thomas Phillips

MSTV

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FCC Data Does Not Support "Proof of Concept" for Sensing

October 20, 2008

Sensing Concept

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- Can spectrum sensing be used to accurately determine whether a TV channel is occupied or vacant?
  - If device not sensitive enough, device operates on occupied channel causing interference (Failure A)
  - If device too sensitive, no channels are available (Failure B)
- Proof of concept must avoid both types of failures

See, for example, *Fundamental Design Tradeoffs in Cognitive Radio Systems* or *Fundamental Limits on Detection in Low SNR Under Noise Uncertainty by Department of Electrical Engineering and Computer Science, University of California at Berkley*

OET Report

Co-channel Interference from Tx3 to TV at Rx at less than ½ mW

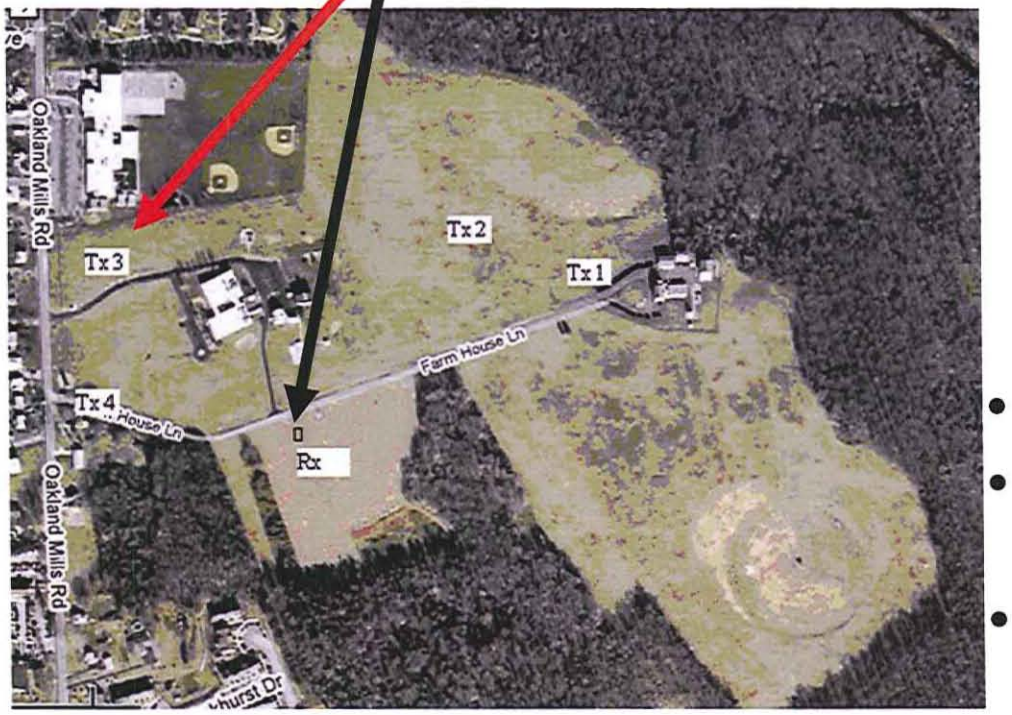

FIGURE 4-4. Site Orientation for Co-Channel Interference Tests in Rx Back- and Side-Lobes.

- For co-channel operation DTV "can experience interference at significant separation distances (data extrapolation indicates up to 1.2 km) from the WSD transmitter"
- OET Report at p. 37
- Extrapolation from Rx to Tx4
- Extrapolation from Rx to Tx3 yields significantly longer distance

Co-channel Interference

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- FCC WSD proposals premised on no co-channel operation within protected contour of DTV station

- Interference distance of 1 km means sensing must ensure no operation in DTV contour
  - Fact that DTV signal is not present at specific location does not matter
  - DTV signal must not be present over entire interference distance to avoid interference

OET Field Test Results

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- FCC Field Test Conditions
  - Condition I - Within the contour and DTV signal can be displayed using simple DTV receiver
  - Condition II – Within the contour but DTV signal not viewable using simple DTV receiver at specific location
- Interference Impact on DTV Service

	Unlicensed Device Fails to detect a DTV signal	Interference Radius to TV reception
Condition I	Yes	Up to 1.2 Km
Condition II	Yes	Up to 1.2 Km

Field Test Results

(Condition I)

- 3 out of 4 of the unlicensed devices (Adaptrum, I2R, and Motorola) FAILED to accurately detect DTV signals even when they were receivable by a simple $40 NTIA coupon eligible converter box
  - *Failure A*

- Remaining device (Philip) FAILED to detect 85% of all vacant channels
  - *Failure B*

Field Test Results
(Condition II)

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- Device performance was even worse:
  - Adaptrum and Motorola devices FAILED to identify almost 50% of DTV channels (Table 5-61)
  - I2R device FAILED to identify 70% of DTV channels
  - Philips device FAILED to identify almost 10% of DTV channels and almost 30% of DTV channels when an attenuator was used to decrease its sensitivity so that vacant channels could be better identified

Field Test Results

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- FCC's proposed protection is to TV Station's protected contour
- Absolutely no evidence or data in OET study to support that "spectrum sensing in combination with geolocation" offers any improvement compared to geolocation and database approach
- All data collected shows sensing only will introduce *errors* either by:
  - saying channel is available when it is not – potentially leading to interference to TV viewers, or
  - saying channel is occupied when it is available – leading to inefficient use of the spectrum

Field Test Results

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- No evidence or data to support selection of appropriate "detection threshold"
  - Detection threshold sensitivity of devices tested varied from -106 to -128 dBm but failed to accurately detect TV signals
  - Detection threshold for microphones ranged from -103 to -129 dBm but devices failed to detect microphone signals
- Limited or no correlation between "detection threshold" in laboratory tests and field results
  - For example, for capture WAS 6-34 results were: -119 for Adaptrum, -120 for I2R, -116 for Motorola and -125 for Philips; and , for capture WAS 49-34 results were: -120 for Adaptrum, -111 for I2R, -109 for Motorola and -117 for Philips
- Limited FCC measurements show difference in TV signal level received by roof-top TV antenna and WSD device can be 34 dB (or 38.3 assuming receiving system compliant with DTV planning factors (FN 33))
  - These limited and incomplete measurements yield minimum detection threshold of -122 dBm needed to protect TOV or edge of contour not -116 dBm level proposed by Coalition

Conclusion

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- Such results DO NOT SUPPORT A finding that these devices meet the "proof of concept" burden
- Nor do such results give any technical support to or shed any light on what is an appropriate "sensing threshold" to protect DTV viewers

Google Power Proposal

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- Google proposes Coalition formula of "received power of weakest protected channel + 85 dB"

- Google argues would allow higher power for unlicensed devices and provide more protection to broadcasting in weak signal conditions

Google Power Proposal

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- Google formula based on D/U ratio of -37 dB or 11 dB *less protection* that proposed by the FCC and used for licensed broadcast interference calculations
  - Unlicensed devices should not provide viewers less protection than licensed operations
  - Formula also ignores the additional 7 dB margin required to account for transmitter splatter (see Martin report at 4-2)
  - Formula also ignores that the fact that the D/U is further reduced as desired signal level is increased

Google Power Proposal

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- Google also fails to show how DTV signal variability is taken into account and viewers are protected
  - FCC Letter from Ed Thomas, Chief of OET suggests signal variability factor of 15.19 dB needed to protect 90% of viewers
  - NAF data shows even larger variability is possible
- Google also fails to show how viewers receiving weaker signals due to the use of indoor antennas are protected

Conclusion

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- Google power formula will allow higher power and cause interference where indoor antenna use and DTV signal variation is most likely

- Fixed power limit rather than Google formula will better protect DTV viewers
  - MSTV's proposed 5 mW power limit will better protect DTV viewers in both high and low DTV signal conditions