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October 20, 2008

**VIA ELECTRONIC FILING**

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

RE: Authorized Ex Parte Communications: Unlicensed Operation in the TV Broadcast Bands (ET Dockets No. 04-186 and 02-380)

Dear Ms. Dortch:

On Friday, October 17, 2008, David L. Donovan, president of the Association for Maximum Service Television ("MSTV"), Victor Tawil, MSTV's senior vice president, and Bruce Franca, MSTV's vice president of technology and policy, met with Angela Giancarlo, chief of staff and senior legal advisor to Commissioner Robert McDowell. We discussed several issues in the above- captioned docket.

First, we presented MSTV's plan to resolve the TV White Spaces proceeding, relying on geolocation. We noted that devices must avoid operation on the first adjacent channel to avoid interfering with consumers' digital television sets. We also urged a spectrum set aside for wireless microphones.

Second, referencing the Chairman's most recent press statements, we voiced our strong objection to the proposal to rely on "sensing" to protect over-the-air television viewers. We noted the dramatic inconsistencies between purported conclusions in the OET Report and the actual data contained in the Report. Given the failure of these devices to operate, we questioned how one could conclude that the "concept" of sensing had been proved.

Third, consistent with MSTV's filing earlier in the day, we requested that the OET Report be put out for public comment. This is especially important given the inconsistencies between data in the Report and the Report's purported conclusions. Placing such Reports out for public comment is consistent with the FCC's treatment of previous reports in this proceeding and in other proceedings as well.

Fourth, we noted that the 40 milliwatt power level for operating on the first adjacent channel will cause interference to TV viewing. We asked if the FCC knew how many viewers would be harmed in order to reach a "compromise" position. We noted that you cannot compromise the laws of physics.

Finally, we discussed Google's proposal to allow high power operation of unlicensed devices especially on the first adjacent channel. We noted that Google's approach would result in significant interference to viewers living in urban and high-density areas.

Attached please find materials that were presented. These documents were submitted previously in the record.

Sincerely,

David Donovan

CC: The Honorable Kevin Martin
The Honorable Michael Copps
The Honorable Jonathan Adelstein
The Honorable Deborah Tate
The Honorable Robert McDowell
Mr. Julius Knapp
Mr. Alan Stillwell
Ms. Angela Giancarlo

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

October 16, 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**

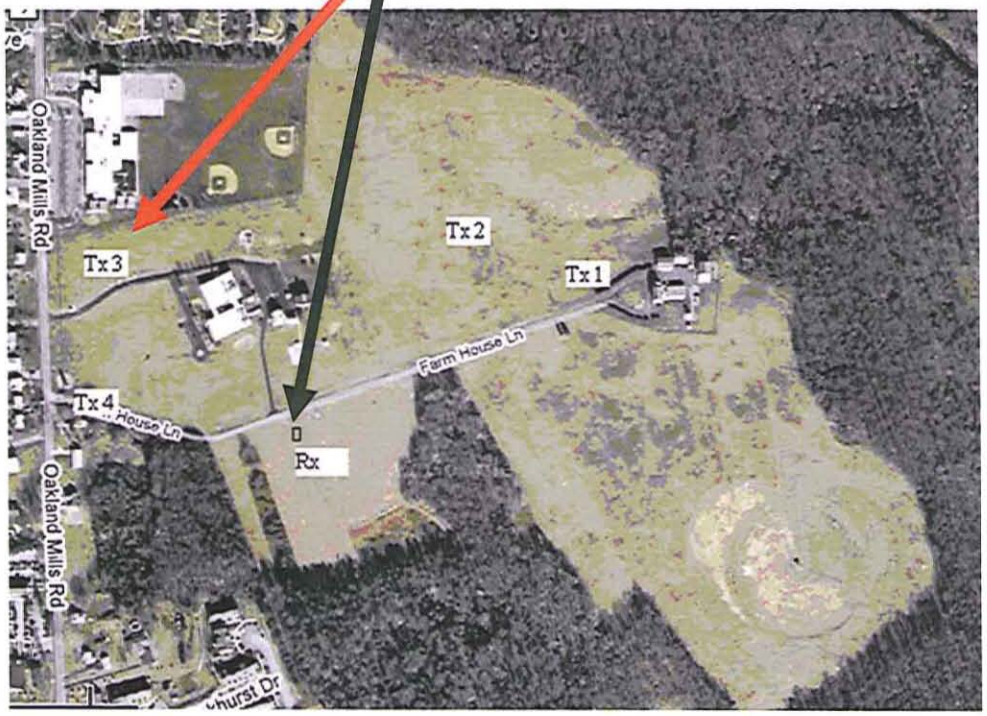


**FIGURE 4-4.** Site Orientation for Co-Channel Interference Tests in Rx Back- and Side-Lobes.

- 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.

# 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 DTV 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

# 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

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# White Space Proposal

*OET Presentation*

*September 30, 2008*

# Background

- Broadcasters have supported and continue to support rural broadband deployment
  - Rural broadband deployment is being delayed as FCC waits for White spaces proponents to develop workable technology
  - Personal/portable devices and "sensing" technology are not necessary for the deployment of rural broadband systems

# Test Results

- Laboratory and field tests demonstrate that "sensing" is not an effective means of avoiding interference to TV reception or wireless microphones
  - Even in limited laboratory and field tests, all devices failed to accurately detect whether channels are occupied or vacant

- Cable DPU interference was observed in the laboratory and the field

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# Solution Possible

- Solution needs to be based on the science and test results
  - A single "one size fits all" approach will not provide solution
- Geolocation (as opposed to sensing) can provide co-channel interference protection to TV viewers
- However, solutions needed for other interference mechanisms:
  - Adjacent channel interference to over-the-air viewers
  - Cable TV DPU interference
  - Continued operation of licensed wireless microphones
- Must have effective interference resolution and enforcement mechanisms

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# Solution Framework

- All white space operations based on geo-location and "trusted" database to protect all incumbent operations
  - Protection should include all TV, Class A, LPTV and translator operations, TV production and studios, cable head ends, satellite receive sites, sports and entertainment (such as Broadway) venues, etc.
  - Safe harbor/limited number of TV channels set aside for licensed wireless microphones
  - Beacons are not a viable option to protect wireless microphones used in news gathering

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# Solution Framework

- Broadband High Power Fixed Use
  - High power fixed permitted under Part 90 "light licensing" (ala 3650 MHz)
  - No transmission on co- or adjacent TV channels to protect TV viewers (and licensed wireless microphones on adjacent channels)
  - Professional installation/licensing to protect cable viewers
- Part 15 Unlicensed Use
  - No transmission on co-channel TV operation to protect TV viewers
  - Max. 10 mW to protect cable viewers
  - Max. 5 mW on first adjacent to *minimize* interference to TV viewers (Generally, permits device to operate with more power than Motorola proposed calculations)

# Summary

- White space solution should include:
  - Geo-location
  - Trusted data base
  - Safe harbor for wireless microphones
  - Interference resolution and enforcement mechanisms
- White space solutions should not include :
  - Sensing
  - Beacon