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October 9, 2008

Ex Parte via Electronic Filing

Marlene H. Dortch
Office of the Secretary
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

Re: Authorized Ex Parte Contact – Unlicensed Operation in the TV Broadcast Bands
(ET Docket No. 04-186)

Dear Ms. Dortch:

On October 8, 2008, Phil Gossett, Larry Alder, Minnie Ingersoll, and the undersigned, all from Google Inc. (“Google”), met by telephone with Julius Knapp, Chief of the Commission’s Office of Engineering and Technology (“OET”), and Alan Stillwell, OET engineer. During the course of the discussion, the Google representatives presented the attached slides, which demonstrate a unified proposal to establish the appropriate power levels for white space devices (WSDs) using channels adjacent to licensed digital television (DTV) signals. This letter summarizes the major points presented verbally by the Google representatives.

In its March 2, 2007 reply comments in this proceeding, the White Spaces Coalition discussed how best to combine transmit masks and transmit power control specifically designed to address the issue of interference in adjacent channels.¹ This ex parte submits a unified proposal, based on the existing record, that combines the Coalition’s proposed power limits for WSDs with Motorola’s proposed use of geolocation databases to identify whether and how specific DTV stations would be subject to adjacent channel protection.² This plan provides an optimal mix of protection for DTV signals and usable power limits for WSDs, and would require no real-time calculations at all.

The Unified Proposal

To this point in the proceeding, focus on adjacent channel interference has centered on using spectrum sensing only technology as a means of determining the appropriate power

¹ See Reply Comments of Dell Inc., Google Inc., The Hewlett-Packard Co., Intel Corp., Microsoft Corp., and Philips Electronics North America Corp., ET Docket Nos. 04-186, 02-380, submitted on March 2, 2007, at 5-8.

² See Ex Parte of Motorola, ET Docket No. 04-186, submitted on October 18, 2007.

levels for a WSD to use. However, as the Commission moves towards an approach for personal/portable WSD uses that utilizes geolocation databases as a signal protection mechanism, it is appropriate now to clarify accordingly the scope of the Coalition’s adjacent channel protection plan.

Google believes that the Commission should adopt a two-step process for determining the appropriate power limits for adjacent channels, where users are employing a “hybrid” model of fixed transmitters and portable clients.³ Importantly these elements all could be pre-calculated and loaded into the geolocation database, so no real-time processing would be necessary.

Step One would use a database and propagation model, such as Motorola proposal’s propagation model,⁴ to determine what adjacent channels need to be protected. For any open channel that might be considered for use by the WSD, where the geo-database shows an adjacent channel occupied in the region, the model would be used to predict the power of that adjacent channel at the geographic location of the WSD. Importantly, no sensing is required for this approach to succeed.⁵

Step Two would calculate the allowed WSD transmit power based on the predicted adjacent channel powers. This calculation would rely on the Coalition proposal’s transmission power control (TPC) model. Here the allowed Effective Isotropic Radiated Power (EIRP) – the maximum acceptable power limits -- could be ascertained for a WSD. Thus if there were “weak” adjacent channel TV signals in the area, the WSD would be forced to transmit at lower power levels.

Channel off-set “i”	Transmit Power Control (TPC) Factor 0dB<=TPC<=25dB	Allowed EIRP 20dBm>=EIRP>=-5dBm
± 1	20-(X _{k±1} +85) dB	X _{k±1} +85 dBm
± 2	20-(X _{k±2} +85) dB	X _{k±2} +85 dBm
± 3	20-(X _{k±3} +85) dB	X _{k±3} +85 dBm

Table 1: Allowable unlicensed device transmit power⁶

In Table 1 (from the Coalition’s original proposal), X_{k±1} is the predicted power in the adjacent channel from Step 1. While the Coalition proposal utilized channel off-sets of +/- three channels (or six channels in total), we do not believe such an approach is necessary here to provide optimal protection. Google proposes instead using a +/- one channel offset (or two channels in total).

³ See Ex Parte letter from Richard Whitt, Google, to Marlene Dortch, FCC, ET Docket 04-186, 02-380, submitted on December 17, 2007 (describing Google’s proposed “hybrid” approach).

⁴ See Ex Parte of Motorola, ET Docket No. 04-186, submitted on October 18, 2007. at 41

⁵ See Ex Parte of Motorola, ET Docket No. 04-186, submitted on October 18, 2007. at 3, Section 2.1

⁶ See Reply Comments of Dell Inc., Google Inc., The Hewlett-Packard Co., Intel Corp., Microsoft Corp., and Philips Electronics North America Corp., ET Docket Nos. 04-186, 02-380, submitted on March 2, 2007, at 7.

Moreover the Coalition’s table applies to a portable or mobile device that is using geolocation. For a fixed device which may be communicating with a mobile device, we would propose a similar power control approach; as a result, the maximum Tx power would be 36dBm, as compared to 20dBm for the mobile device.

Channel off-set “i”	Transmit Power Control (TPC) Factor 0dB<=TPC<=41dB	Allowed EIRP 36dBm>=EIRP>=-5dBm
±1	36-(X _{k±1} +85) dB	X _{k±1} +85dBm

Table2: Allowable unlicensed device transmit power for fixed station.

The attached presentation provides a concrete example of how the formula actually would work, based on different possible rules, and the resulting optimal utility and safety. No sensing will be required, as all the calculations would be contained already in the geolocation database. Moreover, the Commission could also provide a somewhat simpler, albeit less granular, approach by relying on certain quantized “bands” for the allowable power limits.

The Benefits

This proposed unified approach for geolocation databases actually provides the best of both worlds of protection and usability. The plan combines better adjacent channel protection for DTVs, and more useful uses for WSDs at higher allowable power levels, than would be the case from using, say, a single power limit number.

First, the unified proposal provides better protection than a fixed adjacent channel power limit.

Second, and at the same time, the unified proposal provides usable power levels for every circumstance. In the case of a large city, with strong DTV signals and many more channels in use, normally there would be far fewer (if any) unused non-adjacent channels.

As a result of our proposed rules, the utility due to usable power levels is much greater, while the risk of harmful interference is much smaller. In contrast, relatively weaker DTV signals still will be adequately protected because WSDs will be required to use lower power than otherwise they might when adjacent to such signals.

In summary, the unified proposal provides greater protection where it is needed, for DTV signals near the threshold of visibility, when a fixed power level scheme otherwise might cause more harmful interference. At the same time, the proposal provides more power where it is safe to do so, in cases where the DTV signals are quite strong and not as susceptible to harmful interference.

Should you have any questions, please do not hesitate to contact the undersigned.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'R. S. Whitt', written in a cursive style.

Richard S. Whitt, Esq.
Washington Telecom and
Media Counsel
Google Inc.

Attachment: "Google Presentation to FCC, Unified Proposal for Adjacent Channel Power Limits with Geo-Location," dated October 8, 2008

Unified Proposal for Adjacent Channel Power Limits with Geo-Location

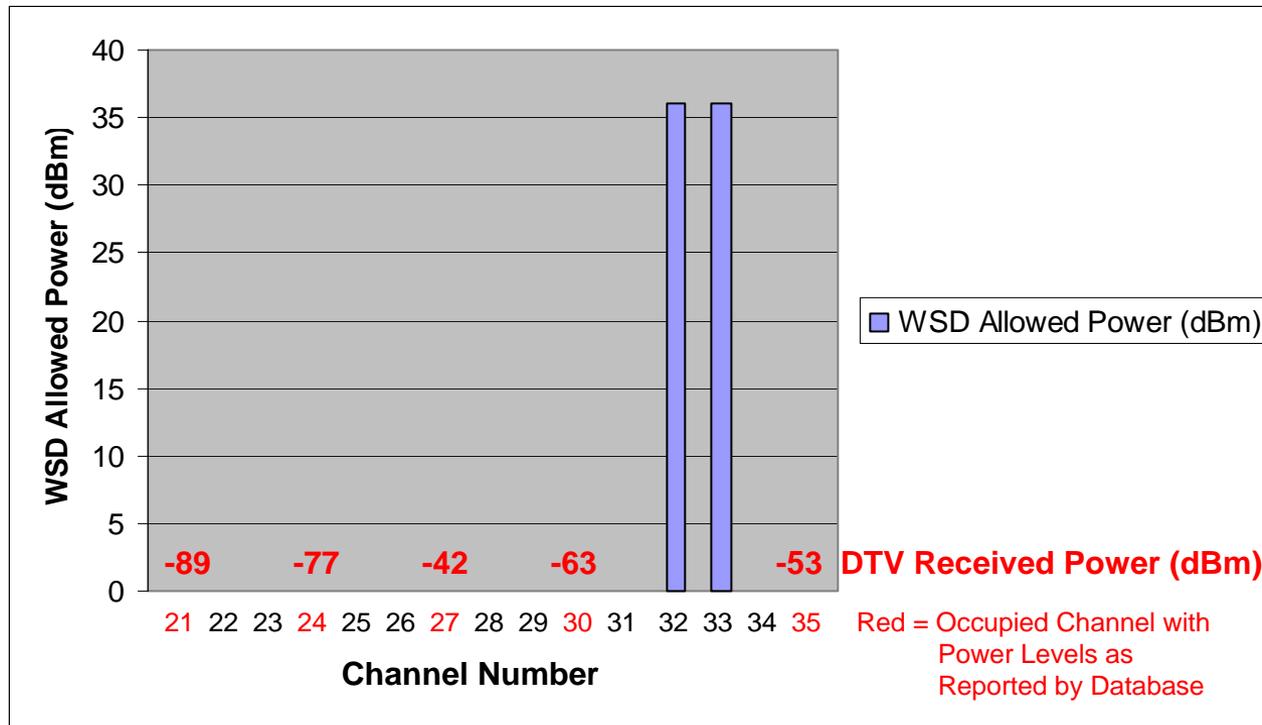
Google *Ex Parte* Presentation to the
Federal Communications Commission
(ET Docket No. 04-186)

October 8, 2008

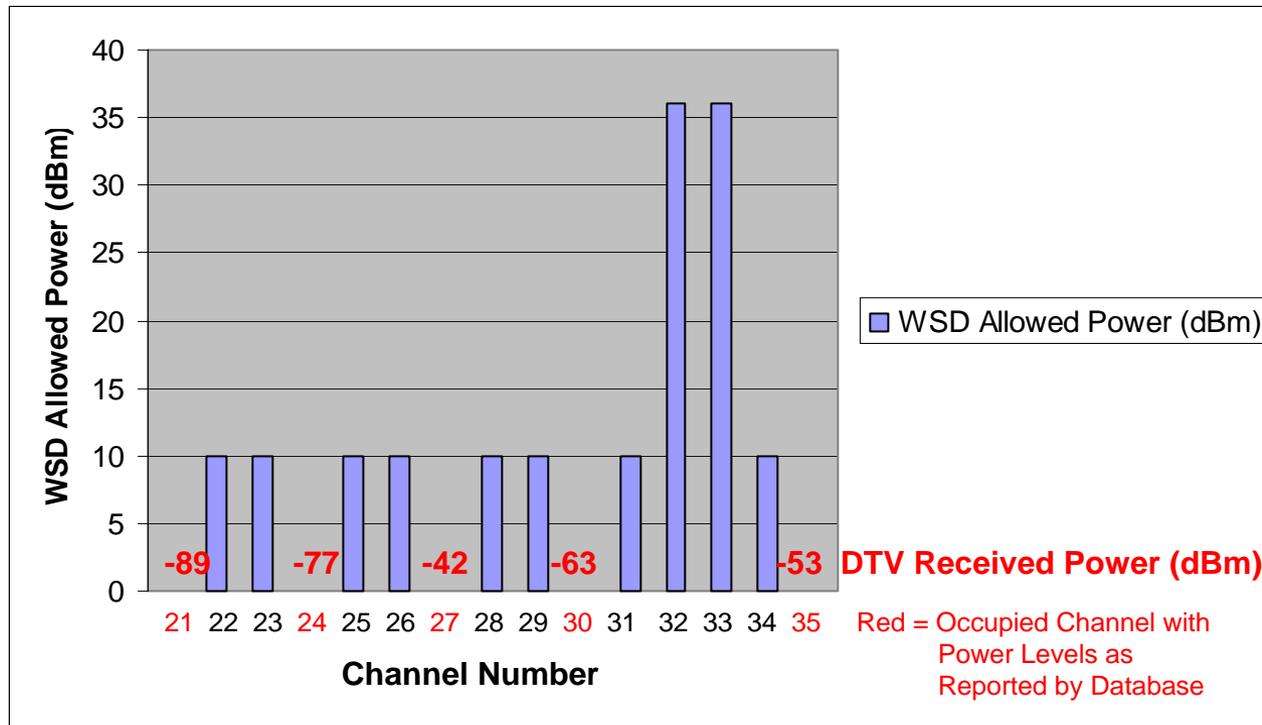
Proposed Rules (No Sensing)

- If can't geo-locate or can't reach database:
 - No transmission
- If co-channel with protected channel:
 - No transmission on that channel
- If adjacent to protected channel:
 - Allowed WSD power = Lesser of:
 - Received power of weakest protected channel + 85 dB
 - Received power pre-calculated based on propagation model
 - 36 dBm EIRP for fixed, 20 dBm for mobile
 - Allowed transmit power pre-calculated, retrieved from geo-database
- If not adjacent to protected channel :
 - Allowed WSD power = 36 dBm EIRP (fixed), 20 dBm (mobile)

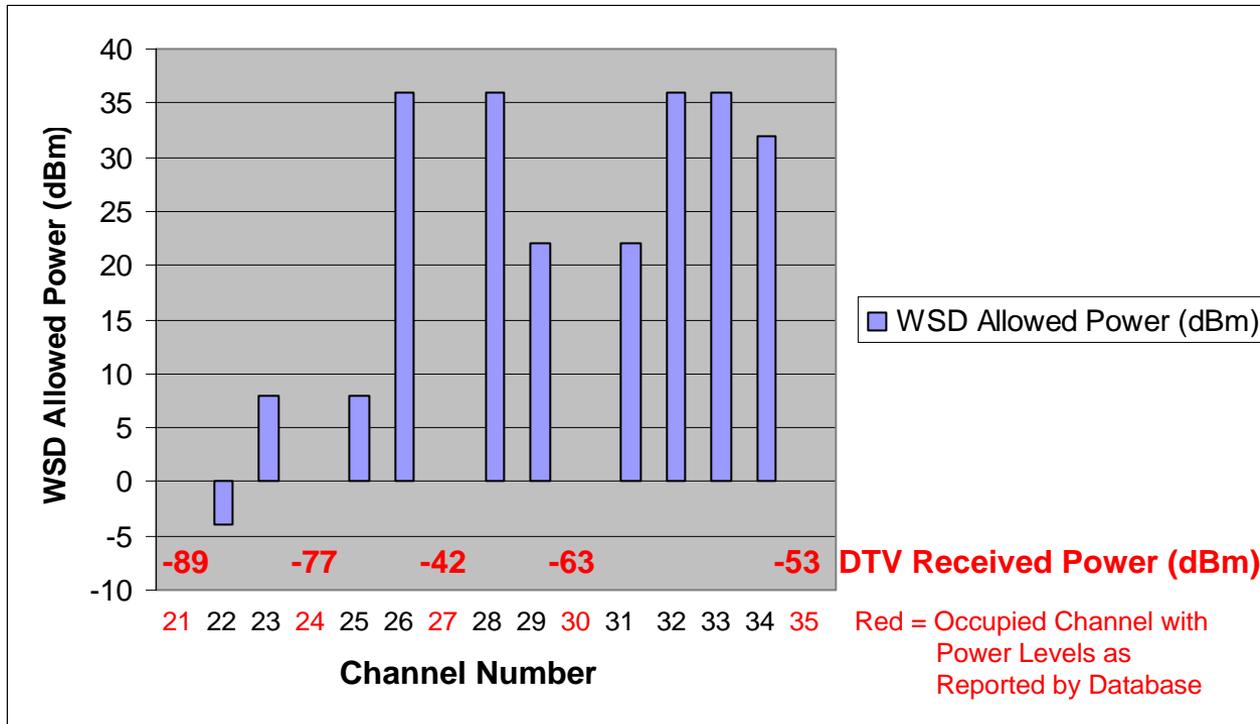
No Adjacent Channels Example



Adjacent Channel: Fixed Power



Adjacent Channel: Proposed Rules



Adjacent Channel: Proposed Rules

